

RMOL

0.25.3

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- [Users Guide](#)
- [Tutorials](#)
- [Copyright and License](#)
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- [Make a new release](#)
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### 1.2 RMOL at SourceForge

- [Project page](#)
- [Download RMOL](#)
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- [Mailing lists](#)
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### 1.3 RMOL Development

- [Git Repository](#) (Subversion is deprecated)
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- [Documentation Rules](#)
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### 1.4 External Libraries

- [Boost](#) (C++ STL extensions)
- [Python](#)
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- [SOI](#) (C++ DB API)

### 1.5 Support RMOL

### 1.6 About RMOL

[RMOL](#) is a C++ library of revenue management and optimisation classes and functions. [RMOL](#) mainly targets simulation purposes. [N](#)

[RMOL](#) makes an extensive use of existing open-source libraries for increased functionality, speed and accuracy. In particular [GSL](#) (*GNU Scientific Library*) and [Boost](#) (*C++ Standard Extensions*) libraries are used.

The [RMOL](#) library originates from the department of Operational Research and - Innovation at [Amadeus](#), Sophia Antipolis, France. [RMOL](#) is released under the terms of the [GNU Lesser General Public License](#) (LGPLv2.1) for you to enjoy.

[RMOL](#) should work on [GNU/Linux](#), [Sun Solaris](#), Microsoft Windows (with - [Cygwin](#), [MinGW/MSYS](#), or [Microsoft Visual C++ .NET](#)) and [Mac OS X](#) operating systems.

#### Note

(N) - The [RMOL](#) library is **NOT** intended, in any way, to be used by airlines for production systems. If you want to report issue, bug or feature request, or if you just want to give feedback, have a look on the right-hand side of this page for the preferred reporting methods. In any case, please do not contact Amadeus directly for any matter related to [RMOL](#).

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### Note

(N) - **Amadeus** employees.

## 3 Coding Rules

In the following sections we describe the naming conventions which are used for files, classes, structures, local variables, and global variables.

### 3.1 Default Naming Rules for Variables

Variables names follow Java naming conventions. Examples:

- `lNumberOfPassengers`
- `lSeatAvailability`

### 3.2 Default Naming Rules for Functions

Function names follow Java naming conventions. Example:

- `int myFunctionName (const int& a, int b)`

### 3.3 Default Naming Rules for Classes and Structures

Each new word in a class or structure name should always start with a capital letter and the words should be separated with an under-score. Abbreviations are written with capital letters. Examples:

- `MyClassName`
- `MyStructName`

### 3.4 Default Naming Rules for Files

Files are named after the C++ class names.

Source files are named using `.cpp` suffix, whereas header files end with `.hpp` extension. Examples:

- `FlightDate.hpp`
- `SegmentDate.cpp`

### 3.5 Default Functionality of Classes

All classes that are configured by input parameters should include:

- default empty constructor
- one or more additional constructor(s) that takes input parameters and initializes the class instance
- setup function, preferably named `'setup'` or `'set_parameters'`

Explicit destructor functions are not required, unless they are needed. It shall not be possible to use any of the other member functions unless the class has been properly initiated with the input parameters.

## 4 Copyright and License

### 4.1 GNU LESSER GENERAL PUBLIC LICENSE

#### 4.1.1 Version 2.1, February 1999

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#### 4.3.2 END OF TERMS AND CONDITIONS

### 4.4 How to Apply These Terms to Your New Programs

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

```
<one line to give the library's name and a brief idea of what it does.>
Copyright (C) <year> <name of author>
```

```
This library is free software; you can redistribute it and/or
modify it under the terms of the GNU Lesser General Public
License as published by the Free Software Foundation; either
version 2.1 of the License, or (at your option) any later version.
```

```
This library is distributed in the hope that it will be useful,
but WITHOUT ANY WARRANTY; without even the implied warranty of
MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU
Lesser General Public License for more details.
```

```
You should have received a copy of the GNU Lesser General Public
License along with this library; if not, write to the Free Software
Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA
```

Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if necessary. Here is a sample; alter the names:

```
Yoyodyne, Inc., hereby disclaims all copyright interest in the
library 'Frob' (a library for tweaking knobs) written by James Random Hacker.
```

```
<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice
```

That's all there is to it!

[Source](#)

## 5 Documentation Rules

### 5.1 General Rules

All classes in [RMOL](#) should be properly documented with Doxygen comments in include (.hpp) files. Source (.cpp) files should be documented according to a normal standard for well documented C++ code.

An example of how the interface of a class shall be documented in [RMOL](#) is shown here:

```

/*!
 * \brief Brief description of MyClass here
 *
 * Detailed description of MyClass here. With example code if needed.
 */
class MyClass {
public:
    //! Default constructor
    MyClass(void) { setup_done = false; }

    /*!
     * \brief Constructor that initializes the class with parameters
     *
     * Detailed description of the constructor here if needed
     *
     * \param[in] param1 Description of \a param1 here
     * \param[in] param2 Description of \a param2 here
     */
    MyClass(TYPE1 param1, TYPE2 param2) { setup(param1, param2); }

    /*!
     * \brief Setup function for MyClass
     *
     * Detailed description of the setup function here if needed
     *
     * \param[in] param1 Description of \a param1 here
     * \param[in] param2 Description of \a param2 here
     */
    void setup(TYPE1 param1, TYPE2 param2);

    /*!
     * \brief Brief description of memberFunction1
     *
     * Detailed description of memberFunction1 here if needed
     *
     * \param[in] param1 Description of \a param1 here
     * \param[in] param2 Description of \a param2 here
     * \param[in,out] param3 Description of \a param3 here
     * \return Description of the return value here
     */
    TYPE4 memberFunction1(TYPE1 param1, TYPE2 param2, TYPE3 &param3);

private:

```

```

bool _setupDone;          /*!< Variable that checks if the class is properly
                           initialized with parameters */
TYPE1 _privateVariable1; /*!< Short description of _privateVariable1 here
TYPE2 _privateVariable2; /*!< Short description of _privateVariable2 here
};

```

## 5.2 File Header

All files should start with the following header, which include Doxygen's `\file`, `\brief` and `\author` tags, `$Date$` and `$Revisions$` CVS tags, and a common copyright note:

```

/*!
 * \file
 * \brief Brief description of the file here
 * \author Names of the authors who contributed to this code
 * \date Date
 *
 * Detailed description of the file here if needed.
 *
 * -----
 *
 * RMOL - C++ Revenue Management Object Library
 *
 * Copyright (C) 2007-2010 (\see authors file for a list of contributors)
 *
 * \see copyright file for license information
 *
 * -----
 */

```

## 5.3 Grouping Various Parts

All functions must be added to a Doxygen group in order to appear in the documentation. The following code example defines the group `'my_group'`:

```

/*!
 * \defgroup my_group Brief description of the group here
 *
 * Detailed description of the group here
 */

```

The following example shows how to document the function `myFunction` and how to add it to the group `my_group`:

```

/*!
 * \brief Brief description of myFunction here
 * \ingroup my_group
 *
 * Detailed description of myFunction here
 *
 * \param[in] param1 Description of \a param1 here
 * \param[in] param2 Description of \a param2 here

```



```
* \return Description of the return value here
*/
TYPE3 myFunction(TYPE1 param1, TYPE2 &param2);
```

## 6 Main features

A short list of the main features of [RMOL](#) is given below sorted in different categories. Many more features and functions exist and for these we refer to the reference documentation.

### 6.1 Optimisation features

- [Dynamic Programming \(DP\)](#)
- [EMSRa](#) and [EMSRb](#)
- Network optimisation with [Linear Programming \(LP\)](#)

### 6.2 Unconstraining

- Inventory censorflag and guillotine
- E-M (Expectation Maximisation)

### 6.3 Forecasting features

- [Exponential Smoothing](#)
- [Moving Average](#)

### 6.4 Overbooking features

- Cancellations and No-Shows
- Cost-based optimisation
- Service-based optimisation

### 6.5 Other features

- CSV input file parsing

## 7 Make a Difference

**Do not ask what [RMOL](#) can do for you. Ask what you can do for [RMOL](#).**

You can help us to develop the [RMOL](#) library. There are always a lot of things you can do:

- Start using [RMOL](#)
- Tell your friends about [RMOL](#) and help them to get started using it
- If you find a bug, report it to us. Without your help we can never hope to produce a bug free code.
- Help us to improve the documentation by providing information about documentation bugs
- Answer support requests in the [RMOL](#) discussion forums on SourceForge. If you know the answer to a question, help others to overcome their [RMOL](#) problems.
- Help us to improve our algorithms. If you know of a better way (e.g. that is faster or requires less memory) to implement some of our algorithms, then let us know.
- Help us to port [RMOL](#) to new platforms. If you manage to compile [RMOL](#) on a new platform, then tell us how you did it.
- Send us your code. If you have a good [RMOL](#) compatible code, which you can release under the LGPL, and you think it should be included in [RMOL](#), then send it to us.
- Become an [RMOL](#) developer. Send us an e-mail and tell what you can do for [RMOL](#).

## 8 Make a new release

### 8.1 Introduction

This document describes briefly the recommended procedure of releasing a new version of [RMOL](#) using a Linux development machine and the SourceForge project site.

The following steps are required to make a release of the distribution package.

- [Initialisation](#)
- [Release branch maintenance](#)
- [Commit and publish the release branch](#)
- [Create source packages \(tar-balls\)](#)
- [Upload the HTML documentation to SourceForge](#)
- [Generate the RPM packages](#)

- [Update distributed change log](#)
- [Create the binary package, including the documentation](#)
- [Upload the files to SourceForge](#)
- [Make a new post](#)
- [Send an email on the announcement mailing-list](#)

## 8.2 Initialisation

Clone locally the full [Git project](#):

```
cd ~
mkdir -p dev/sim
cd ~/dev/sim
git clone git://rmol.git.sourceforge.net/gitroot/rmol/rmol rmolgit
cd rmolgit
git checkout trunk
```

## 8.3 Release branch maintenance

Switch to the release branch, on your local clone, and merge the latest updates from the trunk. Decide about the new version to be released.

```
cd ~/dev/sim/rmolgit
git checkout releases
git merge trunk
```

Update the version in the various build system files, replacing the old version numbers by the correct ones:

```
vi CMakeLists.txt
vi autogen.sh
vi README
```

Update the version, add some news in the NEWS file, add a change-log in the Change-Log file and in the RPM specification files:

```
vi NEWS
vi ChangeLog
vi rmol.spec
```

## 8.4 Commit and publish the release branch

Commit the new release:

```
cd ~/dev/sim/rmolgit
git add -A
git commit -m "[Release 0.5.0] Release of the 0.5.0 version of RMOL."
git push
```

## 8.5 Create source packages (tar-balls)

Create the distribution packages using the following command:

```
cd ~/dev/sim/rmolgit
git checkout releases
rm -rf build && mkdir -p build
cd build
export INSTALL_BASEDIR=/home/user/dev/deliveries
export LIBSUFFIX_4_CMAKE="-DLIB_SUFFIX=64"
cmake -DCMAKE_INSTALL_PREFIX=${INSTALL_BASEDIR}/rmol-0.5.0 \
-DWITH_STDAIR_PREFIX=${INSTALL_BASEDIR}/stdair-stable \
-DWITH_AIRAC_PREFIX=${INSTALL_BASEDIR}/airrac-stable \
-DWITH_AIRAC_PREFIX=${INSTALL_BASEDIR}/airrac-stable \
-DWITH_RMOL_PREFIX=${INSTALL_BASEDIR}/rmol-stable \
-DWITH_RMOL_PREFIX=${INSTALL_BASEDIR}/airinv-stable \
-DWITH_RMOL_PREFIX=${INSTALL_BASEDIR}/simfqt-stable \
-DCMAKE_BUILD_TYPE:STRING=Debug -DINSTALL_DOC:BOOL=ON \
${LIBSUFFIX_4_CMAKE} ..
make check && make dist
make install
```

This will configure, compile and check the package. The output packages will be named, for instance, `rmol-0.5.0.tar.gz` and `rmol-0.5.0.tar.bz2`.

## 8.6 Upload the HTML documentation to SourceForge

In order to update the Web site files, either:

- **synchronise them with rsync and SSH:** Upload the just generated HTML (and PDF) documentation onto the **SourceForge Web site**.

```
cd ~/dev/sim/rmolgit/build
git checkout releases
rsync -aiv ${INSTALL_BASEDIR}/rmol-0.5.0/share/doc/rmol-0.5.0/html/ \
your_sf_user,rmol@web.sourceforge.net:htdocs/
```

where `-aiv` options mean:

- `-a`: archive/mirror mode; equals `-rlptgoD` (no `-H`, `-A`, `-X`)
- `-v`: increase verbosity
- `-i`: output a change-summary for all updates
- Note the trailing slashes (`/`) at the end of both the source and target directories. It means that the content of the source directory (`doc/html`), rather than the directory itself, has to be copied into the content of the target directory.

- or use the **SourceForge Shell service**.

## 8.7 Generate the RPM packages

Optionally, generate the RPM package (for instance, for **Fedora/RedHat**):

```
cd ~/dev/sim/rmolgit/build
git checkout releases
make dist
```

To perform this step, rpm-build, rpmlint and rpmdevtools have to be available on the system.

```
cp ../rmol.spec ~/dev/packages/SPECS \
  && cp rmol-0.5.0.tar.bz2 ~/dev/packages/SOURCES
cd ~/dev/packages/SPECS
rpmbuild -ba rmol.spec
cd ~/dev/packages
rpmlint -i SPECS/rmol.spec SRPMS/rmol-0.5.0-1.fc16.src.rpm \
  RPMS/noarch/rmol-* RPMS/i686/rmol-*
```

## 8.8 Update distributed change log

Update the NEWS and ChangeLog files with appropriate information, including what has changed since the previous release. Then commit and push the changes into the [RMOL's Git repository](#).

## 8.9 Create the binary package, including the documentation

Create the binary package, which includes HTML and PDF documentation, using the following command:

```
cd ~/dev/sim/rmolgit/build
git checkout releases
make package
```

The output binary package will be named, for instance, `rmol-0.5.0-Linux.-tar.bz2`. That package contains both the HTML and PDF documentation. The binary package contains also the executables and shared libraries, as well as C++ header files, but all of those do not interest us for now.

## 8.10 Upload the files to SourceForge

Upload the distribution and documentation packages to the SourceForge server. Check [SourceForge help page on uploading software](#).

## 8.11 Make a new post

- submit a new entry in the [SourceForge project-related news feed](#)
- make a new post on the [SourceForge hosted WordPress blog](#)
- and update, if necessary, [Trac tickets](#).

## 8.12 Send an email on the announcement mailing-list

Finally, you should send an announcement to [rmol-announce@lists.sourceforge.net](mailto:rmol-announce@lists.sourceforge.net) (see <https://lists.sourceforge.net/lists/listinfo/rmol-announce> for the archives)

## 9 Installation

### 9.1 Table of Contents

- [Fedora/RedHat Linux distributions](#)
- [RMOL Requirements](#)
- [Basic Installation](#)
- [Compilers and Options](#)
- [Compiling For Multiple Architectures](#)
- [Installation Names](#)
- [Optional Features](#)
- [Particular systems](#)
- [Specifying the System Type](#)
- [Sharing Defaults](#)
- [Defining Variables](#)
- ['cmake' Invocation](#)

### 9.2 Fedora/RedHat Linux distributions

Note that on [Fedora/RedHat](#) Linux distributions, RPM packages are available and can be installed with your usual package manager. For instance:

```
yum -y install rmol-devel rmol-doc
```

RPM packages can also be available on the [SourceForge download site](#).

### 9.3 RMOL Requirements

[RMOL](#) should compile without errors or warnings on most GNU/Linux systems, on - UNIX systems like Solaris SunOS, and on POSIX based environments for Microsoft Windows like Cygwin or MinGW with MSYS. It can be also built on Microsoft Windows NT/2000/XP/Vista/7 using Microsoft's Visual C++ .NET, but our support for this compiler is limited. For GNU/Linux, SunOS, Cygwin and MinGW we assume that you have at least the following GNU software installed on your computer:

- GNU Autotools:
  - `autoconf`,
  - `automake`,
  - `libtool`,
  - `make`, version 3.72.1 or later (check version with ``make --version``)
- `GCC` - GNU C++ Compiler (g++), version 4.3.x or later (check version with ``gcc --version``)
- `Boost` - C++ STL extensions, version 1.35 or later (check version with ``grep "define BOOST_LIB_VERSION" /usr/include/boost/version.hpp``)
- `MySQL` - Database client libraries, version 5.0 or later (check version with ``mysql --version``)
- `SOCI` - C++ database client library wrapper, version 3.0.0 or later (check version with ``soci-config --version``)

Optionally, you might need a few additional programs: `Doxygen`, `LaTeX`, `Dvips` and `Ghostscript`, to generate the HTML and PDF documentation.

We strongly recommend that you use recent stable releases of the GCC, if possible. We do not actively work on supporting older versions of the GCC, and they may therefore (without prior notice) become unsupported in future releases of `RMOL`.

## 9.4 Basic Installation

Briefly, the shell commands ``../cmake .. && make install`` should configure, build and install this package. The following more-detailed instructions are generic; see the ``README`` file for instructions specific to this package. Some packages provide this ``INSTALL`` file but do not implement all of the features documented below. The lack of an optional feature in a given package is not necessarily a bug. More recommendations for GNU packages can be found in the info page corresponding to "Makefile Conventions: (standards)Makefile Conventions".

The ``cmake`` shell script attempts to guess correct values for various system-dependent variables used during compilation. It uses those values to create a ``-Makefile`` in each directory of the package. It may also create one or more ``.h`` files containing system-dependent definitions. Finally, it creates a ``CMakeCache.txt`` cache file that you can refer to in the future to recreate the current configuration, and files ``CMakeFiles`` containing compiler output (useful mainly for debugging ``cmake``).

It can also use an optional file (typically called ``config.cache`` and enabled with ``--cache-file=config.cache`` or simply ``-C``) that saves the results of its tests to speed up reconfiguring. Caching is disabled by default to prevent problems with accidental use of stale cache files.

If you need to do unusual things to compile the package, please try to figure out how ``configure`` could check whether to do them, and mail diffs or instructions to the address given in the ``README`` so they can be considered for the next release. If you are using

the cache, and at some point `config.cache` contains results you don't want to keep, you may remove or edit it.

The file `CMakeLists.txt` is used to create the `Makefile` files.

The simplest way to compile this package is:

1. `cd` to the directory containing the package's source code and type `./cmake .` to configure the package for your system. Running `cmake` is generally fast. While running, it prints some messages telling which features it is checking for.
2. Type `make` to compile the package.
3. Optionally, type `make check` to run any self-tests that come with the package, generally using the just-built uninstalled binaries.
4. Type `make install` to install the programs and any data files and documentation. When installing into a prefix owned by root, it is recommended that the package be configured and built as a regular user, and only the `make install` phase executed with root privileges.
5. You can remove the program binaries and object files from the source code directory by typing `make clean`. To also remove the files that `configure` created (so you can compile the package for a different kind of computer), type `make distclean`. There is also a `make maintainer-clean` target, but that is intended mainly for the package's developers. If you use it, you may have to get all sorts of other programs in order to regenerate files that came with the distribution.
6. Often, you can also type `make uninstall` to remove the installed files again. In practice, not all packages have tested that uninstallation works correctly, even though it is required by the GNU Coding Standards.

## 9.5 Compilers and Options

Some systems require unusual options for compilation or linking that the `cmake` script does not know about. - Run `./cmake --help` for details on some of the pertinent environment variables.

You can give `cmake` initial values for configuration parameters by setting variables in the command line or in the environment. Here is an example:

```
./cmake CC=c99 CFLAGS=-g LIBS=-lposix
```



See also

[Defining Variables](#) for more details.

## 9.6 Compiling For Multiple Architectures

You can compile the package for more than one kind of computer at the same time, by placing the object files for each architecture in their own directory. To do this, you can use GNU 'make'. 'cd' to the directory where you want the object files and executables to go and run the 'configure' script. 'configure' automatically checks for the source code in the directory that 'configure' is in and in '..'. This is known as a "VPATH" build.

With a non-GNU 'make', it is safer to compile the package for one architecture at a time in the source code directory. After you have installed the package for one architecture, use 'make distclean' before reconfiguring for another architecture.

On MacOS X 10.5 and later systems, you can create libraries and executables that work on multiple system types--known as "fat" or "universal" binaries--by specifying multiple '-arch' options to the compiler but only a single '-arch' option to the preprocessor. Like this:

```
./configure CC="gcc -arch i386 -arch x86_64 -arch ppc -arch ppc64" \  
CXX="g++ -arch i386 -arch x86_64 -arch ppc -arch ppc64" \  
CPP="gcc -E" CXXCPP="g++ -E"
```

This is not guaranteed to produce working output in all cases, you may have to build one architecture at a time and combine the results using the 'lipo' tool if you have problems.

## 9.7 Installation Names

By default, 'make install' installs the package's commands under '/usr/local/bin', include files under '/usr/local/include', etc. You can specify an installation prefix other than '/usr/local' by giving 'configure' the option '--prefix=PREFIX', where PREFIX must be an absolute file name.

You can specify separate installation prefixes for architecture-specific files and architecture-independent files. If you pass the option '--exec-prefix=PREFIX' to 'configure', the package uses PREFIX as the prefix for installing programs and libraries. Documentation and other data files still use the regular prefix.

In addition, if you use an unusual directory layout you can give options like `--bindir=DIR` to specify different values for particular kinds of files. Run `configure --help` for a list of the directories you can set and what kinds of files go in them. In general, the default for these options is expressed in terms of `${prefix}`, so that specifying just `--prefix` will affect all of the other directory specifications that were not explicitly provided.

The most portable way to affect installation locations is to pass the correct locations to `configure`; however, many packages provide one or both of the following shortcuts of passing variable assignments to the `make install` command line to change installation locations without having to reconfigure or recompile.

The first method involves providing an override variable for each affected directory. For example, `make install prefix=/alternate/directory` will choose an alternate location for all directory configuration variables that were expressed in terms of `${prefix}`. Any directories that were specified during `configure`, but not in terms of `${prefix}`, must each be overridden at install time for the entire installation to be relocated. The approach of makefile variable overrides for each directory variable is required by the GNU Coding Standards, and ideally causes no recompilation. However, some platforms have known limitations with the semantics of shared libraries that end up requiring recompilation when using this method, particularly noticeable in packages that use GNU Libtool.

The second method involves providing the `DESTDIR` variable. For example, `make install DESTDIR=/alternate/directory` will prepend `/alternate/directory` before all installation names. The approach of `DESTDIR` overrides is not required by the GNU Coding Standards, and does not work on platforms that have drive letters. On the other hand, it does better at avoiding recompilation issues, and works well even when some directory options were not specified in terms of `${prefix}` at `configure` time.

## 9.8 Optional Features

If the package supports it, you can cause programs to be installed with an extra prefix or suffix on their names by giving `cmake` the option `--program-prefix=PREFIX` or `--program-suffix=SUFFIX`.

Some packages pay attention to `--enable-FEATURE` options to `configure`, where `FEATURE` indicates an optional part

of the package. They may also pay attention to `--with--PACKAGE` options, where PACKAGE is something like `gnu-as` or `x` (for the X Window System). The `README` should mention any `--enable-` and `--with-` options that the package recognizes.

For packages that use the X Window System, `configure` can usually find the X include and library files automatically, but if it doesn't, you can use the `configure` options `--x-includes=DIR` and `--x-libraries=DIR` to specify their locations.

Some packages offer the ability to configure how verbose the execution of `make` will be. For these packages, running `./configure --enable-silent-rules` sets the default to minimal output, which can be overridden with `make -V=1`; while running `./configure --disable-silent-rules` sets the default to verbose, which can be overridden with `make V=0`.

## 9.9 Particular systems

On HP-UX, the default C compiler is not ANSI C compatible. If GNU CC is not installed, it is recommended to use the following options in order to use an ANSI C compiler:

```
./configure CC="cc -Ae -D_XOPEN_SOURCE=500"
```

and if that doesn't work, install pre-built binaries of - GCC for HP-UX.

On OSF/1 a.k.a. Tru64, some versions of the default - C compiler cannot parse its `<wchar.h>` header file. - The option `-nodtk` can be used as a workaround. If GNU CC is not installed, it is therefore recommended to try

```
./configure CC="cc"
```

and if that doesn't work, try

```
./configure CC="cc -nodtk"
```

On Solaris, don't put `/usr/ucb` early in your `PATH`. - This directory contains several dysfunctional programs; working variants of these programs are available in `/usr/bin`. So, if you need `/usr/ucb` in your `PATH`, put it after - `/usr/bin`.

On Haiku, software installed for all users goes in `/boot/common`, not `/usr/local`. It is recommended to use the following options:

```
./cmake -DCMAKE_INSTALL_PREFIX=/boot/common
```

## 9.10 Specifying the System Type

There may be some features 'configure' cannot figure out automatically, but needs to determine by the type of machine the package will run on. Usually, assuming the package is built to be run on the `_same_` architectures, 'configure' can figure that out, but if it prints a message saying it cannot guess the machine type, give it the `'--build=TYPE'` option. TYPE can either be a short name for the system type, such as `'sun4'`, or a canonical name which has the form CPU-COMPANY-SYSTEM

where SYSTEM can have one of these forms:

- OS
- KERNEL-OS

See the file `'config.sub'` for the possible values of each field. If `'config.sub'` isn't included in this package, then this package doesn't need to know the machine type.

If you are `_building_` compiler tools for cross-compiling, you should use the option `'--target=TYPE'` to select the type of system they will produce code for.

If you want to `_use_` a cross compiler, that generates code for a platform different from the build platform, you should specify the "host" platform (i.e., that on which the generated programs will eventually be run) with `'--host=TYPE'`.

## 9.11 Sharing Defaults

If you want to set default values for 'configure' scripts to share, you can create a site shell script called `'config.site'` that gives default values for variables like `'CC'`, `'cache-file'`, and `'prefix'`. 'configure' looks for `'PREFIX/share/config.site'` if it exists, then `'PREFIX/etc/config.site'` if it exists. Or, you can set the `'CONFIG_SITE'` environment variable to the location of the site script. A warning: not all 'configure' scripts look for a site script.

## 9.12 Defining Variables

Variables not defined in a site shell script can be set in the environment passed to 'configure'. However, some

packages may run configure again during the build, and the customized values of these variables may be lost. - In order to avoid this problem, you should set them in the 'configure' command line, using 'VAR=value'. For example:

```
./configure CC=/usr/local2/bin/gcc
```

causes the specified 'gcc' to be used as the C compiler (unless it is overridden in the site shell script).

Unfortunately, this technique does not work for 'CONFIG\_SHELL' due to an Autoconf bug. Until the bug is fixed you can use this workaround:

```
CONFIG_SHELL=/bin/bash /bin/bash ./configure CONFIG_SHELL=/bin/bash
```

### 9.13 'cmake' Invocation

'cmake' recognizes the following options to control how it operates.

- '--help', '-h' print a summary of all of the options to 'configure', and exit.
- '--help=short', '--help=recursive' print a summary of the options unique to this package's 'configure', and exit. The 'short' variant lists options used only in the top level, while the 'recursive' variant lists options also present in any nested packages.
- '--version', '-V' print the version of Autoconf used to generate the 'configure' script, and exit.
- '--cache-file=FILE' enable the cache: use and save the results of the tests in FILE, traditionally 'config.cache'. FILE defaults to '/dev/null' to disable caching.
- '--config-cache', '-C' alias for '--cache-file=config.cache'.
- '--quiet', '--silent', '-q' do not print messages saying which checks are being made. To suppress all normal output, redirect it to '/dev/null' (any error messages will still be shown).
- '--srcdir=DIR' look for the package's source code in directory DIR. Usually 'configure' can determine that directory automatically.
- '--prefix=DIR' use DIR as the installation prefix.

**See also**

[Installation Names](#) for more details, including other options available for fine-tuning the installation locations.

- '--no-create', '-n' run the configure checks, but stop before creating any output files.

'cmake' also accepts some other, not widely useful, options. Run 'cmake --help' for more details.

The 'cmake' script produces an output like this:

```
cmake -DCMAKE_INSTALL_PREFIX=/home/user/dev/deliveries/rmol-99.99.99 -DLIB_SUFFIX=64 -DCMAKE_BUILD
-- The C compiler identification is GNU
-- The CXX compiler identification is GNU
-- Check for working C compiler: /usr/lib64/ccache/gcc
-- Check for working C compiler: /usr/lib64/ccache/gcc -- works
-- Detecting C compiler ABI info
-- Detecting C compiler ABI info - done
-- Check for working CXX compiler: /usr/lib64/ccache/c++
-- Check for working CXX compiler: /usr/lib64/ccache/c++ -- works
-- Detecting CXX compiler ABI info
-- Detecting CXX compiler ABI info - done
-- Requires Git without specifying any version
-- Current Git revision name: 56c6c98cf2cfb4008a0acd35d08075cf5f79e693 trunk
-- Requires Boost-1.41
-- Boost version: 1.46.0
-- Found the following Boost libraries:
--   program_options
--   date_time
--   iostreams
--   serialization
--   filesystem
--   unit_test_framework
--   python
-- Found Boost version: 1.46.0
-- Found BoostWrapper: /usr/include (Required is at least version "1.41")
-- Requires MySQL without specifying any version
-- Using mysql-config: /usr/bin/mysql_config
-- Found MySQL: /usr/lib64/mysql/libmysqlclient.so
-- Found MySQL version: 5.5.14
-- Requires SOCI-3.0
-- Using soci-config: /usr/bin/soci-config
-- SOCI headers are buried
-- Found SOCI: /usr/lib64/libsoci_core.so (Required is at least version "3.0")
-- Found SOCIMySQL: /usr/lib64/libsoci_mysql.so (Required is at least version "3.0")
-- Found SOCI with MySQL back-end support version: 3.0.0
-- Requires StdAir-0.35
-- Found StdAir version: 0.37.1
-- Requires Doxygen without specifying any version
-- Found Doxygen: /usr/bin/doxygen
-- Found DoxygenWrapper: /usr/bin/doxygen
-- Found Doxygen version: 1.7.4
-- Had to set the linker language for 'airraclib' to CXX
-- Had to set the linker language for 'rmollib' to CXX
-- Test 'UnconstrainerTest' to be built with 'UnconstrainerTestSuite.cpp'
-- Test 'ForecasterTest' to be built with 'ForecasterTestSuite.cpp'
-- Test 'OptimiseTest' to be built with 'OptimiseTestSuite.cpp'
-- Test 'BOMsForForecasterTest' to be built with 'bomsforforecaster.cpp'
```

```

--
-- =====
-- -----
-- ---      Project Information      ---
-- -----
-- PROJECT_NAME ..... : rmol
-- PACKAGE_PRETTY_NAME ..... : RMOL
-- PACKAGE ..... : rmol
-- PACKAGE_NAME ..... : RMOL
-- PACKAGE_BRIEF ..... : C++ library of Revenue Management and Optimisation classes and
-- PACKAGE_VERSION ..... : 99.99.99
-- GENERIC_LIB_VERSION ..... : 99.99.99
-- GENERIC_LIB_SOVERSION ..... : 99.99
--
-- -----
-- ---      Build Configuration      ---
-- -----
-- Modules to build ..... : airrac;rmol
-- Libraries to build/install ..... : airraclib;rmollib
-- Binaries to build/install ..... : airrac;rmol
-- Modules to test ..... : rmol
-- Binaries to test ..... : UnconstrainerTesttst;UnconstrainerTesttst;ForecasterTesttst;
--
-- * Module ..... : airrac
--   + Layers to build ..... : .;basic;bom;factory;command;service
--   + Dependencies on other layers :
--   + Libraries to build/install . : airraclib
--   + Executables to build/install : airrac
--   + Tests to perform ..... :
-- * Module ..... : rmol
--   + Layers to build ..... : .;basic;bom;factory;command;service
--   + Dependencies on other layers : airraclib
--   + Libraries to build/install . : rmollib
--   + Executables to build/install : rmol
--   + Tests to perform ..... : UnconstrainerTesttst;UnconstrainerTesttst;ForecasterTesttst;
--
-- BUILD_SHARED_LIBS ..... : ON
-- CMAKE_BUILD_TYPE ..... : Debug
-- * CMAKE_C_FLAGS ..... :
-- * CMAKE_CXX_FLAGS ..... : -Wall -Werror
-- * BUILD_FLAGS ..... :
-- * COMPILE_FLAGS ..... :
-- CMAKE_MODULE_PATH ..... : /home/user/dev/sim/rmol/rmolgithub/config/
-- CMAKE_INSTALL_PREFIX ..... : /home/user/dev/deliveries/rmol-99.99.99
--
-- * Doxygen:
--   - DOXYGEN_VERSION ..... : 1.7.4
--   - DOXYGEN_EXECUTABLE ..... : /usr/bin/doxygen
--   - DOXYGEN_DOT_EXECUTABLE ..... : /usr/bin/dot
--   - DOXYGEN_DOT_PATH ..... : /usr/bin
--
-- -----
-- ---      Installation Configuration      ---
-- -----
-- INSTALL_LIB_DIR ..... : /home/user/dev/deliveries/rmol-99.99.99/lib64
-- INSTALL_BIN_DIR ..... : /home/user/dev/deliveries/rmol-99.99.99/bin
-- INSTALL_INCLUDE_DIR ..... : /home/user/dev/deliveries/rmol-99.99.99/include
-- INSTALL_DATA_DIR ..... : /home/user/dev/deliveries/rmol-99.99.99/share
-- INSTALL_SAMPLE_DIR ..... : /home/user/dev/deliveries/rmol-99.99.99/share/rmol/samples
-- INSTALL_DOC ..... : ON
--
-- -----

```

```

-- --- Packaging Configuration ---
-- -----
-- CPACK_PACKAGE_CONTACT ..... : Denis Arnaud <denis_arnaud - at - users dot sourceforge dot net>
-- CPACK_PACKAGE_VENDOR ..... : Denis Arnaud
-- CPACK_PACKAGE_VERSION ..... : 99.99.99
-- CPACK_PACKAGE_DESCRIPTION_FILE . : /home/user/dev/sim/rmol/rmolgithub/README
-- CPACK_RESOURCE_FILE_LICENSE .... : /home/user/dev/sim/rmol/rmolgithub/COPYING
-- CPACK_GENERATOR ..... : TBZ2
-- CPACK_DEBIAN_PACKAGE_DEPENDS ... :
-- CPACK_SOURCE_GENERATOR ..... : TBZ2;TGZ
-- CPACK_SOURCE_PACKAGE_FILE_NAME . : rmol-99.99.99
--
-- -----
-- --- External libraries ---
-- -----
--
-- * Boost:
--   - Boost_VERSION ..... : 104600
--   - Boost_LIB_VERSION ..... : 1_46
--   - Boost_HUMAN_VERSION ..... : 1.46.0
--   - Boost_INCLUDE_DIRS ..... : /usr/include
--   - Boost required components .. : program_options;date_time;iostreams;serialization;filesystem;atomic
--   - Boost required libraries ... : optimized;/usr/lib64/libboost_iostreams-mt.so;debug;/usr/lib64/libboost_iostreams-mt-gd.so
--
-- * MySQL:
--   - MYSQL_VERSION ..... : 5.5.14
--   - MYSQL_INCLUDE_DIR ..... : /usr/include/mysql
--   - MYSQL_LIBRARIES ..... : /usr/lib64/mysql/libmysqlclient.so
--
-- * SOCI:
--   - SOCI_VERSION ..... : 3.0.0
--   - SOCI_INCLUDE_DIR ..... : /usr/include/soci
--   - SOCI_INCLUDE_DIRS ..... : /usr/include/soci
--   - SOCI_LIBRARIES ..... : /usr/lib64/libsoci_core.so
--   - SOCI_INCLUDE_LIBRARIES ..... : /usr/lib64/libsoci_mysql.so
--
-- * StdAir:
--   - STDAIR_VERSION ..... : 0.37.1
--   - STDAIR_BINARY_DIRS ..... : /home/user/dev/deliveries/stdair-0.37.1/bin
--   - STDAIR_EXECUTABLES ..... : stdair
--   - STDAIR_LIBRARY_DIRS ..... : /home/user/dev/deliveries/stdair-0.37.1/lib64
--   - STDAIR_LIBRARIES ..... : stdairlib;stdairuiclib
--   - STDAIR_INCLUDE_DIRS ..... : /home/user/dev/deliveries/stdair-0.37.1/include
--   - STDAIR_SAMPLE_DIR ..... : /home/user/dev/deliveries/stdair-0.37.1/share/stdair/samples
--
-- Change a value with: cmake -D<Variable>=<Value>
-- =====
--
-- Configuring done
-- Generating done
-- Build files have been written to: /home/user/dev/sim/rmol/rmolgithub/build

```

It is recommended that you check if your library has been compiled and linked properly and works as expected. - To do so, you should execute the testing process 'make check'. As a result, you should obtain a similar report:

```

[ 0%] Built target hdr_cfg_rmol
[ 0%] Built target hdr_cfg_airrac
[ 30%] Built target airraclib
[ 86%] Built target rmollib

```



```
[ 90%] Built target BOMsForForecasterTesttst
[ 93%] Built target UnconstrainerTesttst
[ 96%] Built target ForecasterTesttst
[100%] Built target OptimiseTesttst
Scanning dependencies of target check_rmoltst
Test project /home/user/dev/sim/rmol/rmolgithub/build/test/rmol
  Start 1: UnconstrainerTesttst
1/4 Test #1: UnconstrainerTesttst ..... Passed    0.04 sec
  Start 2: ForecasterTesttst
2/4 Test #2: ForecasterTesttst ..... Passed    0.04 sec
  Start 3: OptimiseTesttst
3/4 Test #3: OptimiseTesttst ..... Passed    0.44 sec
  Start 4: BOMsForForecasterTesttst
4/4 Test #4: BOMsForForecasterTesttst ..... Passed    0.02 sec

100% tests passed, 0 tests failed out of 4

Total Test time (real) = 0.78 sec
[100%] Built target check_rmoltst
Scanning dependencies of target check
[100%] Built target check
```

Check if all the executed tests PASSED. If not, please contact us by filling a [bug-report](#).

Finally, you should install the compiled and linked library, include files and (optionally) HTML and PDF documentation by typing:

```
make install
```

Depending on the PREFIX settings during configuration, you might need the root (administrator) access to perform this step.

Eventually, you might invoke the following command

```
make clean
```

to remove all files created during compilation process, or even

```
cd ~/dev/sim/rmolgit
rm -rf build && mkdir build
cd build
```

to remove everything.

## 10 Linking with RMOL

### 10.1 Table of Contents

- [Introduction](#)

- [Using the pkg-config command](#)
- [Using the rmol-config script](#)
- [M4 macro for the GNU Autotools](#)
- [Using RMOL with dynamic linking](#)

## 10.2 Introduction

There are two convenient methods of linking your programs with the [RMOL](#) library. - The first one employs the `'pkg-config'` command (see <http://pkgconfig.freedesktop.org/>), whereas the second one uses `'rmol-config'` script. - These methods are shortly described below.

### 10.3 Using the pkg-config command

`'pkg-config'` is a helper tool used when compiling applications and libraries. It helps you insert the correct compiler and linker options. The syntax of the `'pkg-config'` is as follows:

```
pkg-config <options> <library_name>
```

For instance, assuming that you need to compile an [RMOL](#) based program `'my_prog.cpp'`, you should use the following command:

```
g++ `pkg-config --cflags rmol` -o my_prog my_prog.cpp `pkg-config --libs rmol`
```

For more information see the `'pkg-config'` man pages.

### 10.4 Using the rmol-config script

[RMOL](#) provides a shell script called `'rmol-config'`, which is installed by default in `'$prefix/bin'` (`'/usr/local/bin'`) directory. It can be used to simplify compilation and linking of [RMOL](#) based programs. The usage of this script is quite similar to the usage of the `'pkg-config'` command.

Assuming that you need to compile the program `'my_prog.cpp'` you can now do that with the following command:

```
g++ `rmol-config --cflags` -o my_prog_opt my_prog.cpp `rmol-config --libs`
```

A list of `'rmol-config'` options can be obtained by typing:

```
rmol-config --help
```

If the `'rmol-config'` command is not found by your shell, you should add its location `'$prefix/bin'` to the `PATH` environment variable, e.g.:

```
export PATH=/usr/local/bin:$PATH
```

## 10.5 M4 macro for the GNU Autotools

A M4 macro file is delivered with [RMOL](#), namely 'rmol.m4', which can be found in, e.g., '/usr/share/aclocal'. When used by a 'configure' script, thanks to the 'AM\_PATH\_RMOL' macro (specified in the M4 macro file), the following Makefile variables are then defined:

- 'RMOL\_VERSION' (e.g., defined to 0.23.0)
- 'RMOL\_CFLAGS' (e.g., defined to '-I\${prefix}/include')
- 'RMOL\_LIBS' (e.g., defined to '-L\${prefix}/lib -lrmol')

## 10.6 Using RMOL with dynamic linking

When using static linking some of the library routines in [RMOL](#) are copied into your executable program. This can lead to unnecessary large executables. To avoid having too large executable files you may use dynamic linking instead. Dynamic linking means that the actual linking is performed when the program is executed. This requires that the system is able to locate the shared [RMOL](#) library file during your program execution. If you install the [RMOL](#) library using a non-standard prefix, the 'LD\_LIBRARY\_PATH' environment variable might be used to inform the linker of the dynamic library location, e.g.:

```
export LD_LIBRARY_PATH=<RMOL installation prefix>/lib:$LD_LIBRARY_PATH
```

## 11 Test Rules

This section describes rules how the functionality of the IT++ library should be verified. In the 'tests' subdirectory test files are provided. All functionality should be tested using these test files.

### 11.1 The Test File

Each new IT++ module/class should be accompanied with a test file. The test file is an implementation in C++ that tests the functionality of a function/class or a group of functions/classes called modules. The test file should test relevant parameter settings and input/output relations to guarantee correct functionality of the corresponding classes/functions. The test files should be maintained using version control and updated whenever new functionality is added to the IT++ library.

The test file should print relevant data to a standard output that can be used to verify the functionality. All relevant parameter settings should be tested.

The test file should be placed in the 'tests' subdirectory and should have a name ending with '\_test.cpp'.

## 11.2 The Reference File

Consider a test file named `'module_test.cpp'`. A reference file named `'module_test.ref'` should accompany the test file. The reference file contains a reference printout of the standard output generated when running the test program. The reference file should be maintained using version control and updated according to the test file.

## 11.3 Testing IT++ Library

One can compile and execute all test programs from `'tests'` subdirectory by typing

```
% make check
```

after successful compilation of the IT++ library.

# 12 Users Guide

## 12.1 Table of Contents

- [Introduction](#)
- [Get Started](#)
  - [Get the RMOL library](#)
  - [Build the RMOL project](#)
  - [Build and Run the Tests](#)
  - [Install the RMOL Project \(Binaries, Documentation\)](#)
- [Exploring the Predefined BOM Tree](#)
  - [Forecaster BOM Tree](#)
  - [Optimiser BOM Tree](#)
- [Extending the BOM Tree](#)

## 12.2 Introduction

The [RMOL](#) library contains classes for revenue management. This document does not cover all the aspects of the [RMOL](#) library. It does however explain the most important things you need to know in order to start using [RMOL](#).

## 12.3 Get Started

### 12.3.1 Get the RMOL library

### 12.3.2 Build the RMOL project

To run the configuration script the first time, go to the top directory (where the [RMOL](#) package has been un-packed), and issue the following command:

- `mkdir -p build && cd build && cmake ..`
- `make`

#### Note

The [RMOL](#) project can either be cloned from the [Git Repository](#) or downloaded as a tar-ball package from the [Sourceforge Web site](#).

### 12.3.3 Build and Run the Tests

### 12.3.4 Install the RMOL Project (Binaries, Documentation)

## 12.4 Exploring the Predefined BOM Tree

[RMOL](#) predefines a BOM (Business Object Model) tree specific to the airline IT arena.

### 12.4.1 Forecaster BOM Tree

- `RMOL::EMDetruncator`
- `RMOL::Detruncator`
- `RMOL::Forecaster`

### 12.4.2 Optimiser BOM Tree

- `RMOL::DPOptimiser`
- `RMOL::MCOptimiser`
- `RMOL::Optimiser`

## 12.5 Extending the BOM Tree

# 13 Supported Systems

## 13.1 Table of Contents

- [Introduction](#)
- [RMOL 0.23.x](#)
  - [Linux Systems](#)
    - \* [Fedora Core 4 with ATLAS](#)
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    - \* [Gentoo Linux with ATLAS](#)
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    - \* [Gentoo Linux with NetLib's BLAS and LAPACK](#)
    - \* [Red Hat Enterprise Linux with RMOL External](#)
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  - [Windows Systems](#)
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  - [Unix Systems](#)
    - \* [SunOS 5.9 with RMOL External](#)
- [RMOL 3.9.1](#)
- [RMOL 3.9.0](#)
- [RMOL 3.8.1](#)

## 13.2 Introduction

This page is intended to provide a list of [RMOL](#) supported systems, i.e. the systems on which configuration, installation and testing process of the [RMOL](#) library has been successful. Results are grouped based on minor release number. Therefore, only the latest tests for bug-fix releases are included. Besides, the information on this page is divided into sections dependent on the operating system.

Where necessary, some extra information is given for each tested configuration, e.g. external libraries installed, configuration commands used, etc.

If you manage to compile, install and test the [RMOL](#) library on a system not mentioned below, please let us know, so we could update this database.

## 13.3 RMOL 0.23.x

### 13.3.1 Linux Systems

#### 13.3.1.1 Fedora Core 4 with ATLAS

- **Platform:** Intel Pentium 4
- **Operating System:** Fedora Core 4 (x86)
- **Compiler:** g++ (GCC) 4.0.2 20051125
- **RMOL release:** 0.23.0
- **External Libraries:** From FC4 distribution:
  - `fftw3.i386-3.0.1-3`
  - `fftw3-devel.i386-3.0.1-3`
  - `atlas-sse2.i386-3.6.0-8.fc4`
  - `atlas-sse2-devel.i386-3.6.0-8.fc4`
  - `blas.i386-3.0-35.fc4`
  - `lapack.i386-3.0-35.fc4`
- **Tests Status:** All tests PASSED
- **Comments:** RMOL configured with:

```
% CXXFLAGS="-O3 -pipe -march=pentium4" ./configure
```
- **Date:** March 7, 2006
- **Tester:** Tony Ottosson

#### 13.3.1.2 Gentoo Linux with ACML

- **Platform:** AMD Sempron 3000+
- **Operating System:** Gentoo Linux 2006.0 (x86 arch)
- **Compiler(s):** g++ (GCC) 3.4.5
- **RMOL release:** 0.23.1
- **External Libraries:** Compiled and installed from portage tree:
  - `sci-libs/acml-3.0.0`
- **Tests Status:** All tests PASSED
- **Comments:** BLAS and LAPACK libs set by using the following system commands:

```
% eselect blas set ACML
% eselect lapack set ACML
```

RMOL configured with:

```
% export CPPFLAGS="-I/usr/include/acml"  
% ./configure --with-blas="-lblas"
```

- **Date:** March 31, 2006
- **Tester:** Adam Piatyszek (ediap)

#### 13.3.1.3 Gentoo Linux with ATLAS

- **Platform:** Intel Pentium M Centrino
- **Operating System:** Gentoo Linux 2006.0 (x86)
- **Compiler:** g++ (GCC) 3.4.5
- **RMOL release:** 0.23.1
- **External Libraries:** Compiled and installed from portage tree:
  - sci-libs/fftw-3.1
  - sci-libs/blas-atlas-3.6.0-r1
  - sci-libs/lapack-atlas-3.6.0
- **Tests Status:** All tests PASSED
- **Comments:** BLAS and LAPACK libs set by using the following system commands:

```
% eselect blas set ATLAS  
% eselect lapack set ATLAS
```

RMOL configured with:

```
% ./configure --with-blas="-lblas"
```

- **Date:** March 31, 2006
- **Tester:** Adam Piatyszek (ediap)

#### 13.3.1.4 Gentoo Linux with MKL

- **Platform:** Intel Pentium M Centrino
- **Operating System:** Gentoo Linux 2006.0 (x86 arch)
- **Compiler:** g++ (GCC) 3.4.5
- **RMOL release:** 0.23.0
- **External Libraries:** Intel Math Kernel Library (MKL) 8.0.1 installed manually in the following directory: /opt/intel/mkl/8.0.1
- **Tests Status:** All tests PASSED



- **Comments:** [RMOL](#) configured using the following commands:

```
% export LDFLAGS="-L/opt/intel/mkl/8.0.1/lib/32"
% export CPPFLAGS="-I/opt/intel/mkl/8.0.1/include"
% ./configure
```

- **Date:** February 28, 2006
- **Tester:** Adam Piatyszek (ediap)

#### 13.3.1.5 Gentoo Linux with NetLib's BLAS and LAPACK

- **Platform:** Intel Pentium M Centrino
- **Operating System:** Gentoo Linux 2006.0 (x86)
- **Compiler:** g++ (GCC) 3.4.5
- **[RMOL](#) release:** 0.23.1
- **External Libraries:** Compiled and installed from portage tree:
  - sci-libs/fftw-3.1
  - sci-libs/blas-reference-19940131-r2
  - sci-libs/cblas-reference-20030223
  - sci-libs/lapack-reference-3.0-r2
- **Tests Status:** All tests PASSED
- **Comments:** BLAS and LAPACK libs set by using the following system commands:

```
% blas-config reference
% lapack-config reference
```

[RMOL](#) configured with:

```
% ./configure --with-blas="-lblas"
```

- **Date:** March 31, 2006
- **Tester:** Adam Piatyszek (ediap)

#### 13.3.1.6 Red Hat Enterprise Linux with RMOL External

- **Platform:** Intel Pentium 4
- **Operating System:** Red Hat Enterprise Linux AS release 4 (Nahant Update 2)
- **Compiler:** g++ (GCC) 3.4.4 20050721 (Red Hat 3.4.4-2)
- **[RMOL](#) release:** 0.23.0
- **External Libraries:** BLAS, CBLAS, LAPACK and FFTW libraries from [RMOL](#) External 2.1.1 package
- **Tests Status:** All tests PASSED
- **Date:** March 7, 2006
- **Tester:** Erik G. Larsson

## 13.3.1.7 SUSE Linux 10.0 with NetLib's BLAS and LAPACK

- **Platform:** Intel Pentium 4 CPU 3.20GHz (64-bit)
- **Operating System:** SUSE Linux 10.0 (x86\_64)
- **Compiler(s):** g++ (GCC) 4.0.2
- **RMOL release:** 0.23.0
- **External Libraries:** BLAS, LAPACK and FFTW libraries installed from Open-Suse 10.0 RPM repository:
  - blas-3.0-926
  - lapack-3.0-926
  - fftw3-3.0.1-114
  - fftw3-threads-3.0.1-114
  - fftw3-devel-3.0.1-114
- **Tests Status:** All tests PASSED
- **Comments:** RMOL configured with:

```
% export CXXFLAGS="-m64 -march=nocona -O3 -pipe"
% ./configure --with-lapack="/usr/lib64/liblapack.so.3"
```
- **Date:** March 1, 2006
- **Tester:** Adam Piatyszek (ediap)

## 13.3.1.8 SUSE Linux 10.0 with MKL

- **Platform:** Intel Pentium 4 CPU 3.20GHz (64-bit)
- **Operating System:** SUSE Linux 10.0 (x86\_64)
- **Compiler(s):** g++ (GCC) 4.0.2
- **RMOL release:** 0.23.0
- **External Libraries:** Intel Math Kernel Library (MKL) 8.0.1 installed manually in the following directory: /opt/intel/mkl/8.0.1
- **Tests Status:** All tests PASSED
- **Comments:** RMOL configured with:

```
% export CXXFLAGS="-m64 -march=nocona -O3 -pipe"
% export LDFLAGS="-L/opt/intel/mkl/8.0.1/lib/em64t"
% export CPPFLAGS="-I/opt/intel/mkl/8.0.1/include"
% ./configure
```
- **Date:** March 1, 2006
- **Tester:** Adam Piatyszek (ediap)

### 13.3.2 Windows Systems

#### 13.3.2.1 Microsoft Windows XP with Cygwin

- **Platform:** AMD Sempron 3000+
- **Operating System:** Microsoft Windows XP SP2, Cygwin 1.5.19-4
- **Compiler(s):** g++ (GCC) 3.4.4 (cygming special)
- **RMOL release:** 0.23.1
- **External Libraries:** Installed from Cygwin's repository:
  - `fftw-3.0.1-2`
  - `fftw-dev-3.0.1-1`
  - `lapack-3.0-4`
- **Tests Status:** All tests PASSED
- **Comments:** Only static library can be built. [RMOL](#) configured with:

```
% ./configure
```
- **Date:** March 31, 2006
- **Tester:** Adam Piatyszek (ediap)

#### 13.3.2.2 Microsoft Windows XP with Cygwin and ATLAS

- **Platform:** AMD Sempron 3000+
- **Operating System:** Microsoft Windows XP SP2, Cygwin 1.5.19-4
- **Compiler(s):** g++ (GCC) 3.4.4 (cygming special)
- **RMOL release:** 0.23.1
- **External Libraries:** Installed from Cygwin's repository:
  - `fftw-3.0.1-2`
  - `fftw-dev-3.0.1-1`

ATLAS BLAS and LAPACK libraries from [RMOL](#) External 2.1.1 package configured using:

```
% ./configure --enable-atlas --disable-fftw
```
- **Tests Status:** All tests PASSED
- **Comments:** Only static library can be built. [RMOL](#) configured with:

```
% export LDFLAGS="-L/usr/local/lib"
% ./configure
```
- **Date:** March 31, 2006
- **Tester:** Adam Piatyszek (ediap)

## 13.3.2.3 Microsoft Windows XP with Cygwin and ACML

- **Platform:** AMD Sempron 3000+
- **Operating System:** Microsoft Windows XP SP2, Cygwin 1.5.19-4
- **Compiler(s):** g++ (GCC) 3.4.4 (cygming special)
- **RMOL release:** 0.23.2
- **External Libraries:** ACML version 3.1.0 (acml3.1.0-32-win32-g77.-exe) installed into a default directory, i.e. "c:\Program Files\AMD\acml3.1.0"
- **Tests Status:** All tests PASSED
- **Comments:** Only static library can be built. [RMOL](#) configured with:

```
% export LDFLAGS="-L/cygdrive/c/Progra~1/AMD/acml3.1.0/gnu32/lib"
% export CPPFLAGS="-I/cygdrive/c/Progra~1/AMD/acml3.1.0/gnu32/include"
% ./configure --enable-debug
```
- **Date:** May 15, 2006
- **Tester:** Adam Piatyszek (ediap)

## 13.3.2.4 Microsoft Windows XP with MinGW, MSYS and ACML

- **Platform:** AMD Sempron 3000+
- **Operating System:** Microsoft Windows XP SP2, MinGW 5.0.2, MSYS 1.0.10
- **Compiler(s):** g++ (GCC) 3.4.4 (mingw special)
- **RMOL release:** 0.23.2
- **External Libraries:** ACML version 3.1.0 (acml3.1.0-32-win32-g77.-exe) installed into a default directory, i.e. "c:\Program Files\AMD\acml3.1.0"
- **Tests Status:** All tests PASSED
- **Comments:** Only static library can be built. [RMOL](#) configured with:

```
% export LDFLAGS="-L/c/Progra~1/AMD/acml3.1.0/gnu32/lib"
% export CPPFLAGS="-I/c/Progra~1/AMD/acml3.1.0/gnu32/include"
% ./configure --enable-debug
```
- **Date:** May 15, 2006
- **Tester:** Adam Piatyszek (ediap)

## 13.3.2.5 Microsoft Windows XP with MinGW, MSYS and RMOL External

- **Platform:** AMD Sempron 3000+
- **Operating System:** Microsoft Windows XP SP2, MinGW 5.0.2, MSYS 1.0.10
- **Compiler(s):** g++ (GCC) 3.4.4 (mingw special)
- **RMOL release:** 0.23.5
- **External Libraries:** BLAS, CBLAS, LAPACK and FFTW libraries from [RMOL External 2.2.0](#) package
- **Tests Status:** All tests PASSED
- **Comments:** Only static library can be built. [RMOL](#) configured with:

```
% export LDFLAGS="-L/usr/local/lib"
% export CPPFLAGS="-I/usr/local/include"
% export CXXFLAGS="-Wall -O3 -march=athlon-tbird -pipe"
% ./configure --disable-html-doc
```

- **Date:** August 11, 2006
- **Tester:** Adam Piatyszek (ediap)

## 13.3.2.6 Microsoft Windows XP with MS Visual C++ and Intel MKL

- **Platform:** AMD Sempron 3000+
- **Operating System:** Microsoft Windows XP SP2
- **Compiler(s):** Microsoft Visual C++ 2005 .NET
- **RMOL release:** 0.23.5
- **External Libraries:** Intel Math Kernel Library (MKL) 8.1 installed manually in the following directory: "C:\Program Files\Intel\MKL\8.1"
- **Tests Status:** Not fully tested. Some [RMOL](#) based programs compiled and run with success.
- **Comments:** Only static library can be built. [RMOL](#) built by opening the "win32\rmol.vcproj" project file in MSVC++ and executing "Build -> Build Solution" command from menu.
- **Date:** August 11, 2006
- **Tester:** Adam Piatyszek (ediap)

### 13.3.3 Unix Systems

#### 13.3.3.1 SunOS 5.9 with RMOL External

- **Platform:** SUNW, Sun-Blade-100 (SPARC)
- **Operating System:** SunOS 5.9 Generic\_112233-10
- **Compiler(s):** g++ (GCC) 3.4.5
- **RMOL release:** 0.23.2
- **External Libraries:** BLAS, CBLAS, LAPACK and FFTW libraries from [RMOL External 2.1.1](#) package. The following configuration command has been used:

```
% export CFLAGS="-mcpu=ultrasparc -O2 -pipe -funroll-all-loops"  
% ./configure
```

- **Tests Status:** All tests PASSED
- **Comments:** [RMOL](#) configured with:

```
% export LDFLAGS="-L/usr/local/lib"  
% export CPPFLAGS="-I/usr/local/include"  
% export CXXFLAGS="-mcpu=ultrasparc -O2 -pipe"  
% ./configure --enable-debug
```

- **Date:** May 15, 2006
- **Tester:** Adam Piatyszek (ediap)

## 14 RMOL Supported Systems (Previous Releases)

### 14.1 RMOL 3.9.1

### 14.2 RMOL 3.9.0

### 14.3 RMOL 3.8.1

## 15 Tutorials

### 15.1 Table of Contents

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## 15.2 Introduction

This page contains some tutorial examples that will help you getting started using Std-Air. Most examples show how to construct some simple business objects, i.e., instances of the so-named Business Object Model (BOM).

### 15.2.1 Preparing the StdAir Project for Development

The source code for these examples can be found in the `batches` and `test/stdair` directories. They are compiled along with the rest of the `Std-Air` project. See the User Guide ([Users Guide](#)) for more details on how to build the `StdAir` project.

## 15.3 Build a Predefined BOM Tree

A few steps:

- [Instantiate the BOM Root Object](#)
- [Instantiate the \(Airline\) Inventory Object](#)
- [Link the Inventory Object with the BOM Root](#)

### 15.3.1 Instantiate the BOM Root Object

First, a BOM root object (i.e., a root for all the classes in the project) is instantiated by the `stdair::STDAIR_ServiceContext` context object, when the `stdair::STDAIR_Service` is itself instantiated. The corresponding `StdAir` type (class) is `stdair::BomRoot`.

In the following sample, that object is named `ioBomRoot`, and is given as input/output parameter of the `stdair::CmdBomManager::buildSampleBom()` method:

### 15.3.2 Instantiate the (Airline) Inventory Object

An airline inventory object can then be instantiated. Let us give it the "BA" airline code (corresponding to **British Airways**) as the object key. That is, an object (let us name it `lBAKey`) of type (class) `stdair::InventoryKey` has first to be instantiated.

Thanks to that key, an airline inventory object, i.e. of type (class) `stdair::Inventory`, can be instantiated. Let us name that airline inventory object `lBAInv`.

### 15.3.3 Link the Inventory Object with the BOM Root

Then, both objects have to be linked: the airline inventory object (`stdair::Inventory`) has to be linked with the root of the BOM tree (`stdair::BomRoot`). That operation is as simple as using the `stdair::FacBomManager::addToListAndMap()` method:

### 15.3.4 Build Another Airline Inventory

Another airline inventory object, corresponding to the Air France (**Air France**) company, is instantiated the same way:

See the corresponding full program (`cmd_bom_manager_cpp`) for more details.

### 15.3.5 Dump The BOM Tree Content

From the `BomRoot` (of type `stdair::BomRoot`) object instance, the list of airline inventories (of type `stdair::Inventory`) can then be retrieved...

... and browsed:

See the corresponding full program (`bom_display_cpp`) for more details.



## 15.3.6 Result of the Tutorial Program

When the `stdair.cpp` program is run (with the `-b` option), the output should look like:

```
[D]../batches/stdair.cpp:243: Welcome to stdair
[D]../batches/stdair/command/CmdBomManager.cpp:41: StdAir will build the BOM tree
    from built-in specifications.
[D]../batches/stdair.cpp:286:
=====
BomRoot:  -- ROOT --
=====
+++++
Inventory: BA
+++++
*****
FlightDate: BA9, 2011-Jun-10
*****
*****
Leg-Dates:
-----
Flight, Leg, BoardDate, BoardTime, OffDate, OffTime, Date Offset, Time Offset,
    Elapsed, Distance, Capacity,
BA9 2011-Jun-10, LHR-BKK, 2011-Jun-10, 21:45:00, 2011-Jun-11, 15:40:00, 11:05:
    00, 1, 06:50:00, 9900, 0,
BA9 2011-Jun-10, BKK-SYD, 2011-Jun-11, 17:05:00, 2011-Jun-12, 15:40:00, 09:05:
    00, 1, 13:30:00, 8100, 0,
*****
*****
LegCabins:
-----
Flight, Leg, Cabin, OffedCAP, PhyCAP, RgdADJ, AU, UPR, SS, Staff, WL, Group,
    CommSpace, AvPool, Avl, NAV, GAV, ACP, ETB, BidPrice,
BA9 2011-Jun-10, LHR-BKK 2011-Jun-10, Y, 0, 0, 0, 0, 0, 0, 0, 0, 9, 9, 0,
    0, 3.52965e-319, 0, 0,
BA9 2011-Jun-10, BKK-SYD 2011-Jun-11, Y, 0, 0, 0, 0, 0, 0, 0, 0, 0, 9, 9, 0,
    0, 0, 0, 0,
*****
*****
Buckets:
-----
Flight, Leg, Cabin, Yield, AU/SI, SS, AV,
*****
*****
SegmentCabins:
-----
Flight, Segment, Cabin, FF, Bkgs, MIN, UPR, CommSpace, AvPool, BP,
BA9 2011-Jun-10, LHR-SYD 2011-Jun-10, Y, EcoSaver, 0, 0, 0, 0, 9, 0,
BA9 2011-Jun-10, LHR-BKK 2011-Jun-10, Y, EcoSaver, 0, 0, 0, 0, 9, 0,
BA9 2011-Jun-10, BKK-SYD 2011-Jun-11, Y, EcoSaver, 0, 0, 0, 0, 9, 0,
*****
*****
Subclasses:
-----
Flight, Segment, Cabin, FF, Subclass, MIN/AU (Prot), Nego, NS%, OB%, Bkgs,
    GrpBks (pdg), StfBkgs, WLBkgs, ETB, ClassAvl, RevAvl, SegAvl,
BA9 2011-Jun-10, LHR-SYD 2011-Jun-10, Y, EcoSaver, Q, 0 (0), 0, 0, 0, 0 (0),
    0, 0, 0, 0, 0, 0,
+++++
Inventory: AF
+++++
*****
FlightDate: AF84, 2011-Mar-20
*****
*****
Leg-Dates:
-----
Flight, Leg, BoardDate, BoardTime, OffDate, OffTime, Date Offset, Time Offset,
    Elapsed, Distance, Capacity,
AF84 2011-Mar-20, CDG-SFO, 2011-Mar-20, 10:40:00, 2011-Mar-20, 12:50:00, 11:10:
    00, 0, -09:00:00, 9900, 0,
*****
```

```

*****
LegCabins:
-----
Flight, Leg, Cabin, OffedCAP, PhycAP, RgdADJ, AU, UPR, SS, Staff, WL, Group,
    CommSpace, AvPool, Avl, NAV, GAV, ACP, ETB, BidPrice,
AF84 2011-Mar-20, CDG-SFO 2011-Mar-20, Y, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 9, 9, 0
    , 0, 0, 0, 0,
*****
*****
Buckets:
-----
Flight, Leg, Cabin, Yield, AU/SI, SS, AV,
*****
*****
SegmentCabins:
-----
Flight, Segment, Cabin, FF, Bkgs, MIN, UPR, CommSpace, AvPool, BP,
AF84 2011-Mar-20, CDG-SFO 2011-Mar-20, Y, EcoSaver, 0, 0, 0, 0, 9, 0,
*****
*****
Subclasses:
-----
Flight, Segment, Cabin, FF, Subclass, MIN/AU (Prot), Nego, NS%, OB%, Bkgs,
    GrpBks (pdg), StfBkgs, WLBkgs, ETB, ClassAvl, RevAvl, SegAvl,
AF84 2011-Mar-20, CDG-SFO 2011-Mar-20, Y, EcoSaver, Q, 0 (0), 0, 0, 0, 0, 0 (0)
    , 0, 0, 0, 0, 0, 0,

```

See the corresponding full program (batch\_stdair\_cpp) for more details.

## 15.4 Extend the Pre-Defined BOM Tree

Now that we master how to instantiate the pre-defined StdAir classes, let us see how to extend that BOM.

### 15.4.1 Extend an Airline Inventory Object

For instance, let us assume that some (IT) provider (e.g., you) would like to have a specific implementation of the `Inventory` object. The corresponding class has just to extend the `stdair::Inventory` class:

The STL containers have to be defined accordingly too:

See the full class definition (test\_archi\_inv\_hpp) and implementation (test\_archi\_inv\_cpp) for more details.

### 15.4.2 Build the Specific BOM Objects

The BOM root object (`stdair::BomRoot`) is instantiated the classical way:

Then, the specific implementation of the airline inventory object (`myprovider::Inventory`) can be instantiated the same way as a standard `Inventory` (`stdair::Inventory`) would be:

Then, the specific implementation of the airline inventory object (`myprovider::Inventory`) is linked to the root of the BOM tree (`stdair::BomRoot`) the same way as the standard `Inventory` (`stdair::Inventory`) would be:

Another specific airline inventory object is instantiated the same way:

From the `BomRoot` (of type `stdair::BomRoot`) object instance, the list of specific airline inventories (of type `stdair::Inventory`) can then be retrieved...

... and browsed:

#### 15.4.3 Result of the Tutorial Program

When this program is run, the output should look like:

```
Inventory: BA
Inventory: AF
```

See the corresponding full program (`StandardAirlineITTestSuite.cpp`) for more details.

## 16 Command-Line Test to Demonstrate How To Test the RMOL - Project

```
*/
// //////////////////////////////////////
// Import section
// //////////////////////////////////////
// STL
#include <cassert>
#include <limits>
#include <sstream>
#include <fstream>
#include <string>
// Boost Unit Test Framework (UTF)
#define BOOST_TEST_DYN_LINK
#define BOOST_TEST_MAIN
#define BOOST_TEST_MODULE OptimiseTestSuite
```

```

#include <boost/test/unit_test.hpp>
// StdAir
#include <stdair/basic/BasLogParams.hpp>
#include <stdair/basic/BasDBParams.hpp>
#include <stdair/service/Logger.hpp>
// RMOL
#include <rmol/RMOL_Service.hpp>
#include <rmol/config/rmol-paths.hpp>

namespace boost_utf = boost::unit_test;

// (Boost) Unit Test XML Report
std::ofstream utfReportStream ("bomsforforecaster_utfresults.xml");

struct UnitTestConfig {
    UnitTestConfig() {
        boost_utf::unit_test_log.set_stream (utfReportStream);
        boost_utf::unit_test_log.set_format (boost_utf::XML);
        boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
        //boost_utf::unit_test_log.set_threshold_level
        (boost_utf::log_successful_tests);
    }

    ~UnitTestConfig() {
    }
};

namespace RMOL {

    struct BookingClassData {

        // Attributes
        double _bookingCount;
        double _fare;
        double _sellupFactor;
        bool _censorshipFlag;

        // Constructor
        BookingClassData (const double iBookingCount, const double iFare,
                         const double iSellupFactor, const bool iCensorshipFlag)
            : _bookingCount(iBookingCount), _fare(iFare),
              _sellupFactor(iSellupFactor), _censorshipFlag(iCensorshipFlag) {
        }

        // Getters
        double getFare () const {
            return _fare;
        }

        bool getCensorshipFlag () const {
            return _censorshipFlag;
        }

        // Display
        std::string toString() const {
            std::ostringstream oStr;
            oStr << std::endl
                << "[Booking class data information]" << std::endl
                << "Booking counter: " << _bookingCount << std::endl
                << "Fare: " << _fare << std::endl
                << "Sell-up Factor: " << _sellupFactor << std::endl
                << "censorshipFlag: " << _censorshipFlag << std::endl;
            return oStr.str();
        }
    };

    struct BookingClassDataSet {

        typedef std::vector<BookingClassData*> BookingClassDataList_T;

        // Attributes
        int _numberOfClass;
        double _minimumFare;
    };
}

```

```

bool _censorshipFlag; // true if any of the classes is censored
BookingClassDataList_T _bookingClassDataList;

// Constructor
BookingClassDataSet ()
: _numberOfClass(0), _minimumFare(0),
  _censorshipFlag(false) {
}

// Add BookingClassData
void addBookingClassData (BookingClassData& ioBookingClassData) {
    _bookingClassDataList.push_back (&ioBookingClassData);
}

// Getters
unsigned int getNumberOfClass () const {
    return _bookingClassDataList.size();
}

double getMinimumFare () const {
    return _minimumFare;
}

bool getCensorshipFlag () const {
    return _censorshipFlag;
}

// Setters
void setMinimumFare (const double iMinFare) {
    _minimumFare = iMinFare;
}

void setCensorshipFlag (const bool iCensorshipFlag) {
    _censorshipFlag = iCensorshipFlag;
}

// compute minimum fare
void updateMinimumFare() {
    double minFare = std::numeric_limits<double>::max();
    BookingClassDataList_T::iterator itBookingClassDataList;
    for (itBookingClassDataList = _bookingClassDataList.begin();
        itBookingClassDataList != _bookingClassDataList.end();
        ++itBookingClassDataList) {
        BookingClassData* lBookingClassData = *itBookingClassDataList;
        assert (lBookingClassData != NULL);

        const double lFare = lBookingClassData->getFare();
        if (lFare < minFare) {
            minFare = lFare;
        }
    }
    //
    setMinimumFare(minFare);
}

// compute censorship flag for the data set
void updateCensorshipFlag () {
    bool censorshipFlag = false;
    BookingClassDataList_T::iterator itBookingClassDataList;
    for (itBookingClassDataList = _bookingClassDataList.begin();
        itBookingClassDataList != _bookingClassDataList.end();
        ++itBookingClassDataList) {
        BookingClassData* lBookingClassData = *itBookingClassDataList;
        assert (lBookingClassData != NULL);

        const bool lCensorshipFlagOfAClass =
            lBookingClassData->getCensorshipFlag();
        if (lCensorshipFlagOfAClass) {
            censorshipFlag = true;
            break;
        }
    }
    //
    setCensorshipFlag(censorshipFlag);
}

```

```

    }

    // Display
    std::string toString() const {
        std::ostringstream ostr;
        ostr << std::endl
            << "[Booking class data set information]" << std::endl
            << "Number of classes: " << _numberOfClass << std::endl
            << "Minimum fare: " << _minimumFare << std::endl
            << "The data of the class set are sensed: " << _censorshipFlag
            << std::endl;
        return ostr.str();
    }
};

// /**----- BOM : Q-Forecaster ----- */
// struct QForecaster {

//     // Function focused BOM

//     // 1. calculate sell up probability for Q-eq

//     // 2. calculate Q-Equivalent Booking
//     double calculateQEqBooking (BookingClassDataSet& iBookingClassDataSet) {
//         double lQEqBooking = 0.0;
//         double lMinFare = iBookingClassDataSet.getMinimumFare();

//         return lQEqBooking;
//     }

//     // Calculate Q-equivalent demand
//     // [<- performed by unconstrainer if necessary (Using ExpMax BOM)]
//     // */

//     // 3. Partition to each class

//     //

// };

}

// ////////////////////////////////// Main: Unit Test Suite //////////////////////////////////

// Set the UTF configuration (re-direct the output to a specific file)
BOOST_GLOBAL_FIXTURE (UnitTestFixture);

BOOST_AUTO_TEST_SUITE (master_test_suite)

BOOST_AUTO_TEST_CASE (rmol_forecaster) {

    // Output log File
    std::string lLogFilename ("bomsforforecaster.log");
    std::ofstream logOutputFile;

    // Open and clean the log outputfile
    logOutputFile.open (lLogFilename.c_str());
    logOutputFile.clear();

    // Initialise the RMOL service
    const stdair::BasLogParams lLogParams (stdair::LOG::DEBUG, logOutputFile);

    // Initialise the RMOL service
    RMOL::RMOL_Service rmolService (lLogParams);

    // Build a sample BOM tree
    rmolService.buildSampleBom();

    // Register BCDataSet
    RMOL::BookingClassDataSet lBookingClassDataSet;

```

```

// Register BookingClassData
RMOL::BookingClassData QClassData (10, 100, 1, false);
RMOL::BookingClassData MClassData (5, 150, 0.8, true);
RMOL::BookingClassData BClassData (0, 200, 0.6, false);
RMOL::BookingClassData YClassData (0, 300, 0.3, false);

// Display
STDAIR_LOG_DEBUG (QClassData.toString());
STDAIR_LOG_DEBUG (MClassData.toString());
STDAIR_LOG_DEBUG (BClassData.toString());
STDAIR_LOG_DEBUG (YClassData.toString());

// Add BookingClassData into the BCDataSet
lBookingClassDataSet.addBookingClassData (QClassData);
lBookingClassDataSet.addBookingClassData (MClassData);
lBookingClassDataSet.addBookingClassData (BClassData);
lBookingClassDataSet.addBookingClassData (YClassData);

// DEBUG
STDAIR_LOG_DEBUG (lBookingClassDataSet.toString());

// Number of classes
const unsigned int lNoOfClass = lBookingClassDataSet.getNumberOfClass();

// DEBUG
STDAIR_LOG_DEBUG ("Number of Classes: " << lNoOfClass);

// Minimum fare
BOOST_CHECK_NO_THROW (lBookingClassDataSet.updateMinimumFare());
const double lMinFare = lBookingClassDataSet.getMinimumFare();

// DEBUG
STDAIR_LOG_DEBUG ("Minimum fare: " << lMinFare);

// Censorship flag
BOOST_CHECK_NO_THROW (lBookingClassDataSet.updateCensorshipFlag());
const bool lCensorshipFlag = lBookingClassDataSet.getCensorshipFlag();

// DEBUG
STDAIR_LOG_DEBUG ("Censorship Flag: " << lCensorshipFlag);

// Close the log output file
logOutputFile.close();
}

// End the test suite
BOOST_AUTO_TEST_SUITE_END()

/*!

```

## 17 Command-Line Test to Demonstrate How To Test the RMOL - Project

```

*/
// ////////////////////////////////////////
// Import section
// ////////////////////////////////////////
// STL
#include <sstream>
#include <fstream>
#include <string>
#include <vector>
#include <cmath>
// Boost Unit Test Framework (UTF)
#define BOOST_TEST_DYN_LINK
#define BOOST_TEST_MAIN
#define BOOST_TEST_MODULE ForecasterTestSuite
#include <boost/test/unit_test.hpp>

```

```

// StdAir
#include <stdair/basic/BasLogParams.hpp>
#include <stdair/basic/BasDBParams.hpp>
#include <stdair/basic/BasFileMgr.hpp>
#include <stdair/service/Logger.hpp>
// RMOL
#include <rmol/RMOL_Service.hpp>

namespace boost_utf = boost::unit_test;

// (Boost) Unit Test XML Report
std::ofstream utfReportStream ("ForecasterTestSuite_utfresults.xml");

struct UnitTestConfig {
    UnitTestConfig() {
        boost_utf::unit_test_log.set_stream (utfReportStream);
        boost_utf::unit_test_log.set_format (boost_utf::XML);
        boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
        //boost_utf::unit_test_log.set_threshold_level
        (boost_utf::log_successful_tests);
    }

    ~UnitTestConfig() {
    }
};

// //////////// Main: Unit Test Suite ////////////

// Set the UTF configuration (re-direct the output to a specific file)
BOOST_GLOBAL_FIXTURE (UnitTestConfig);

BOOST_AUTO_TEST_SUITE (master_test_suite)

BOOST_AUTO_TEST_CASE (rmol_forecaster_q_forecasting) {
    const bool lTestFlag = true; //testForecasterHelper(0);
    BOOST_CHECK_EQUAL (lTestFlag, true);
    BOOST_CHECK_MESSAGE (lTestFlag == true,
        "The test has failed. Please see the log file for "
        "<< \"more details\"");
}

// End the test suite
BOOST_AUTO_TEST_SUITE_END()

/*!

```

## 18 Command-Line Test to Demonstrate How To Test the RMOL - Project

```

*/
// ////////////////////////////////////////
// Import section
// ////////////////////////////////////////
// STL
#include <sstream>
#include <fstream>
#include <string>
// Boost Unit Test Framework (UTF)
#define BOOST_TEST_DYN_LINK
#define BOOST_TEST_MAIN
#define BOOST_TEST_MODULE OptimiseTestSuite
#include <boost/test/unit_test.hpp>
// StdAir
#include <stdair/basic/BasLogParams.hpp>
#include <stdair/basic/BasDBParams.hpp>
#include <stdair/basic/BasFileMgr.hpp>
#include <stdair/service/Logger.hpp>

```



```

// RMOL
#include <rmol/RMOL_Service.hpp>
#include <rmol/config/rmol-paths.hpp>

namespace boost_utf = boost::unit_test;

// (Boost) Unit Test XML Report
std::ofstream utfReportStream ("OptimiseTestSuite_utfresults.xml");

struct UnitTestConfig {
    UnitTestConfig() {
        boost_utf::unit_test_log.set_stream (utfReportStream);
        boost_utf::unit_test_log.set_format (boost_utf::XML);
        boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
        //boost_utf::unit_test_log.set_threshold_level
        (boost_utf::log_successful_tests);
    }

    ~UnitTestConfig() {
    }
};

// ////////////////////////////////////////
int testOptimiseHelper (const unsigned short optimisationMethodFlag,
                       const bool isBuiltin) {

    // Return value
    int oExpectedBookingLimit = 0;

    // Output log File
    std::ostream oStr;
    oStr << "OptimiseTestSuite_" << optimisationMethodFlag << ".log";
    const stdair::Filename_T lLogFilename (oStr.str());

    // Number of random draws to be generated (best if greater than 100)
    const int K = 100000;

    // Methods of optimisation (0 = Monte-Carlo, 1 = Dynamic Programming,
    // 2 = EMSR, 3 = EMSR-a, 4 = EMSR-b, 5 = EMSR-a with sellup prob.)
    const unsigned short METHOD_FLAG = optimisationMethodFlag;

    // Cabin Capacity (it must be greater then 100 here)
    const double cabinCapacity = 100.0;

    // Set the log parameters
    std::ofstream logOutputFile;
    // Open and clean the log outputfile
    logOutputFile.open (lLogFilename.c_str());
    logOutputFile.clear();

    // Initialise the RMOL service
    const stdair::BasLogParams lLogParams (stdair::LOG::DEBUG, logOutputFile);
    RMOL::RMOL_Service rmolService (lLogParams);

    // Check wether or not a (CSV) input file should be read
    if (isBuiltin == true) {

        // Build the default sample BOM tree and build a dummy BOM tree.
        rmolService.buildSampleBom();

    } else {

        // Parse the optimisation data and build a dummy BOM tree
        const stdair::Filename_T lRMInputFileName (STDAIR_SAMPLE_DIR "/rm02.csv");
        rmolService.parseAndLoad (cabinCapacity, lRMInputFileName);

    }

    switch (METHOD_FLAG) {
    case 0: {
        // DEBUG
        STDAIR_LOG_DEBUG ("Optimisation by Monte-Carlo (MC)");

        // Calculate the optimal protections by the Monte Carlo
    }
    }
}

```

```

    // Integration approach
    rmolService.optimalOptimisationByMCIntegration (K);
    break;
}

case 1: {
    // DEBUG
    STDAIR_LOG_DEBUG ("Optimisation by Dynamic Programming (DP)");

    // Calculate the optimal protections by DP.
    rmolService.optimalOptimisationByDP ();
    break;
}

case 2: {
    // DEBUG
    STDAIR_LOG_DEBUG ("Calculate the Bid-Price Vectors (BPV) by EMSR");

    // Calculate the Bid-Price Vector by EMSR
    rmolService.heuristicOptimisationByEmsr ();
    break;
}

case 3: {
    // DEBUG
    STDAIR_LOG_DEBUG ("Calculate the Authorisation Levels (AUs) by EMSRa");

    // Calculate the protections by EMSR-a
    // Test the EMSR-a algorithm implementation
    rmolService.heuristicOptimisationByEmsrA ();

    // Return a cumulated booking limit value to test
    // oExpectedBookingLimit = static_cast<int> (lBookingLimitVector.at(2));
    break;
}

case 4: {
    // DEBUG
    STDAIR_LOG_DEBUG ("Calculate the Authorisation Levels (AUs) by EMSRb");

    // Calculate the protections by EMSR-b
    rmolService.heuristicOptimisationByEmsrB ();
    break;
}

default: rmolService.optimalOptimisationByMCIntegration (K);
}

// Close the log file
logOutputFile.close();

return oExpectedBookingLimit;
}

// ////////////////////////////////// Main: Unit Test Suite //////////////////////////////////

// Set the UTF configuration (re-direct the output to a specific file)
BOOST_GLOBAL_FIXTURE (UnitTestFixture);

// ////////////////////////////////////////
// Tests are based on the following input values
// price; mean; standard deviation;
// 1050; 17.3; 5.8;
// 567; 45.1; 15.0;
// 534; 39.6; 13.2;
// 520; 34.0; 11.3;
// ////////////////////////////////////////

BOOST_AUTO_TEST_SUITE (master_test_suite)

BOOST_AUTO_TEST_CASE (rmol_optimisation_monte_carlo) {

```

```
// State whether the BOM tree should be built-in or parsed from an input file
const bool isBuiltin = false;

BOOST_CHECK_NO_THROW (testOptimiseHelper(0, isBuiltin));
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_dynamic_programming) {

    // State whether the BOM tree should be built-in or parsed from an input file
    const bool isBuiltin = false;

    BOOST_CHECK_NO_THROW (testOptimiseHelper(1, isBuiltin));
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_bpv) {

    // State whether the BOM tree should be built-in or parsed from an input file
    const bool isBuiltin = false;

    BOOST_CHECK_NO_THROW (testOptimiseHelper(2, isBuiltin));
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_a) {

    // State whether the BOM tree should be built-in or parsed from an input file
    const bool isBuiltin = false;

    BOOST_CHECK_NO_THROW (testOptimiseHelper(3, isBuiltin));
    // const int lBookingLimit = testOptimiseHelper(3);
    // const int lExpectedBookingLimit = 61;
    // BOOST_CHECK_EQUAL (lBookingLimit, lExpectedBookingLimit);
    // BOOST_CHECK_MESSAGE (lBookingLimit == lExpectedBookingLimit,
    //     "The booking limit is " << lBookingLimit
    //     << ", but it is expected to be "
    //     << lExpectedBookingLimit);
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_b) {

    // State whether the BOM tree should be built-in or parsed from an input file
    const bool isBuiltin = false;

    BOOST_CHECK_NO_THROW (testOptimiseHelper(4, isBuiltin));
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_monte_carlo_built_in) {

    // State whether the BOM tree should be built-in or parsed from an input file
    const bool isBuiltin = true;

    BOOST_CHECK_NO_THROW (testOptimiseHelper(5, isBuiltin));
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_dynamic_programming_built_in) {

    // State whether the BOM tree should be built-in or parsed from an input file
    const bool isBuiltin = true;

    BOOST_CHECK_NO_THROW (testOptimiseHelper(6, isBuiltin));
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_bpv_built_in) {

    // State whether the BOM tree should be built-in or parsed from an input file
    const bool isBuiltin = true;

    BOOST_CHECK_NO_THROW (testOptimiseHelper(7, isBuiltin));
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_a_built_in) {

    // State whether the BOM tree should be built-in or parsed from an input file
    const bool isBuiltin = true;
```

```

    BOOST_CHECK_NO_THROW (testOptimiseHelper(8, isBuiltin));
}

BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_b_built_in) {

    // State whether the BOM tree should be built-in or parsed from an input file
    const bool isBuiltin = true;

    BOOST_CHECK_NO_THROW (testOptimiseHelper(9, isBuiltin));
}

// End the test suite
BOOST_AUTO_TEST_SUITE_END()

/*!

```

## 19 Command-Line Test to Demonstrate How To Test the RMOL - Project

```

    */
    // //////////////////////////////////////
    // Import section
    // //////////////////////////////////////
    // STL
    #include <sstream>
    #include <fstream>
    #include <string>
    // Boost Unit Test Framework (UTF)
    #define BOOST_TEST_DYN_LINK
    #define BOOST_TEST_MAIN
    #define BOOST_TEST_MODULE UnconstrainerTestSuite
    #include <boost/test/unit_test.hpp>
    // StdAir
    #include <stdair/basic/BasLogParams.hpp>
    #include <stdair/basic/BasDBParams.hpp>
    #include <stdair/basic/BasFileMgr.hpp>
    #include <stdair/service/Logger.hpp>
    // RMOL
    #include <rmol/RMOL_Service.hpp>

    namespace boost_utf = boost::unit_test;

    // (Boost) Unit Test XML Report
    std::ofstream utfReportStream ("UnconstrainerTestSuite_utfresults.xml");

    struct UnitTestConfig {
        UnitTestConfig() {
            boost_utf::unit_test_log.set_stream (utfReportStream);
            boost_utf::unit_test_log.set_format (boost_utf::XML);
            boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
            //boost_utf::unit_test_log.set_threshold_level
            (boost_utf::log_successful_tests);
        }

        ~UnitTestConfig() {
        }
    };

    // ////////////////////////////////////// Main: Unit Test Suite //////////////////////////////////////

    // Set the UTF configuration (re-direct the output to a specific file)
    BOOST_GLOBAL_FIXTURE (UnitTestConfig);

    BOOST_AUTO_TEST_SUITE (master_test_suite)

    BOOST_AUTO_TEST_CASE (rmol_unconstraining_em) {
        const bool lTestFlag = true; // testUnconstrainerHelper(0);
    }

```

```
BOOST_CHECK_EQUAL (lTestFlag, true);
BOOST_CHECK_MESSAGE (lTestFlag == true,
    "The test has failed. Please see the log file for "
    "<< \"more details\"");
}

// End the test suite
BOOST_AUTO_TEST_SUITE_END()

/*!
```

## 20 Directory Hierarchy

### 20.1 Directories

This directory hierarchy is sorted roughly, but not completely, alphabetically:

<b>rmol</b>	<b>77</b>
<b>basic</b>	<b>75</b>
<b>batches</b>	<b>75</b>
<b>bom</b>	<b>75</b>
<b>old</b>	<b>77</b>
<b>command</b>	<b>76</b>
<b>config</b>	<b>76</b>
<b>factory</b>	<b>77</b>
<b>service</b>	<b>78</b>
<b>test</b>	<b>78</b>
<b>rmol</b>	<b>77</b>

## 21 Namespace Index

### 21.1 Namespace List

Here is a list of all namespaces with brief descriptions:

<b>RMOL</b>	<b>78</b>
<b>stdair</b>	<b>82</b>

## 22 Class Index

### 22.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

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<b>std::fstream</b>	<b>108</b>
<b>std::basic_fstream&lt; wchar_t &gt;</b>	<b>84</b>
<b>std::wfstream</b>	<b>153</b>
<b>std::basic_ifstream&lt; char &gt;</b>	<b>85</b>
<b>std::ifstream</b>	<b>117</b>
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## 23 Class Index

### 23.1 Class List

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## 25 Directory Documentation

### 25.1 rmol/basic/ Directory Reference

#### Files

- file [BasConst.cpp](#)
- file [BasConst\\_Curves.hpp](#)
- file [BasConst\\_General.hpp](#)
- file [BasConst\\_RMOL\\_Service.hpp](#)

### 25.2 rmol/batches/ Directory Reference

#### Files

- file [rmol.cpp](#)

### 25.3 rmol/bom/ Directory Reference

#### Directories

- directory [old](#)

## Files

- file [BucketHolderTypes.hpp](#)
- file [DistributionParameterList.hpp](#)
- file [DPOptimiser.cpp](#)
- file [DPOptimiser.hpp](#)
- file [EMDetruncator.cpp](#)
- file [EMDetruncator.hpp](#)
- file [Emsr.cpp](#)
- file [Emsr.hpp](#)
- file [EmsrUtils.cpp](#)
- file [EmsrUtils.hpp](#)
- file [GuillotineBlockHelper.cpp](#)
- file [GuillotineBlockHelper.hpp](#)
- file [HistoricalBooking.cpp](#)
- file [HistoricalBooking.hpp](#)
- file [HistoricalBookingHolder.cpp](#)
- file [HistoricalBookingHolder.hpp](#)
- file [MCOptimiser.cpp](#)
- file [MCOptimiser.hpp](#)
- file [Utilities.cpp](#)
- file [Utilities.hpp](#)

25.4 `rmol/command/` Directory Reference

## Files

- file [Detruncator.cpp](#)
- file [Detruncator.hpp](#)
- file [Forecaster.cpp](#)
- file [Forecaster.hpp](#)
- file [InventoryParser.cpp](#)
- file [InventoryParser.hpp](#)
- file [Optimiser.cpp](#)
- file [Optimiser.hpp](#)

25.5 `rmol/config/` Directory Reference

## Files

- file [rmol-paths.hpp](#)

## 25.6 rmol/factory/ Directory Reference

### Files

- file [FacRmolServiceContext.cpp](#)
- file [FacRmolServiceContext.hpp](#)

## 25.7 rmol/bom/old/ Directory Reference

### Files

- file [DemandGeneratorList.cpp](#)
- file [DemandGeneratorList.hpp](#)

## 25.8 test/rmol/ Directory Reference

### Files

- file [bomsforforecaster.cpp](#)
- file [ForecasterTestSuite.cpp](#)
- file [ForecasterTestSuite.hpp](#)
- file [OptimiseTestSuite.cpp](#)
- file [OptimiseTestSuite.hpp](#)
- file [UnconstrainerTestSuite.cpp](#)
- file [UnconstrainerTestSuite.hpp](#)

## 25.9 rmol/ Directory Reference

### Directories

- directory [basic](#)
- directory [batches](#)
- directory [bom](#)
- directory [command](#)
- directory [config](#)
- directory [factory](#)
- directory [service](#)

### Files

- file [RMOL\\_Service.hpp](#)
- file [RMOL\\_Types.hpp](#)

## 25.10 rmol/service/ Directory Reference

### Files

- file [RMOL\\_Service.cpp](#)
- file [RMOL\\_ServiceContext.cpp](#)
- file [RMOL\\_ServiceContext.hpp](#)

## 25.11 test/ Directory Reference

### Directories

- directory [rmol](#)

# 26 Namespace Documentation

## 26.1 RMOL Namespace Reference

### Classes

- struct [DefaultMap](#)
- struct [DefaultDCPList](#)
- class [DPOptimiser](#)
- class [EMDetruncator](#)
- class [Emsr](#)
- class [EmsrUtils](#)
- class [GuillotineBlockHelper](#)
- struct [HistoricalBooking](#)
  - *Structure keeping track, for a given class, of the number of historical bookings and of the censorship flag.*
- struct [HistoricalBookingHolder](#)
- class [MCOptimiser](#)
- class [DemandGeneratorList](#)
- class [Utilities](#)
- class [Detruncator](#)
- class [Forecaster](#)
- class [InventoryParser](#)
  - *Class filling the virtual class list (representing a list of classes/buckets) from a given input inventory.*
- class [Optimiser](#)
- class [FacRmolServiceContext](#)
  - *Factory for the service context.*
- class [RMOL\\_Service](#)
  - *Interface for the [RMOL](#) Services.*
- class [OverbookingException](#)



*Overbooking-related exception.*

- class [UnconstrainingException](#)

*Unconstraining-related exception.*

- class [ForecastException](#)

*Forecast-related exception.*

- class [OptimisationException](#)

*Optimisation-related exception.*

- class [RMOL\\_ServiceContext](#)

*Inner class holding the context for the [RMOL](#) Service object.*

## Typedefs

- typedef [std::list](#)< BucketHolder \* > [BucketHolderList\\_T](#)
- typedef [std::list](#) < FldDistributionParameters > [DistributionParameterList\\_T](#)
- typedef [std::vector](#) < [HistoricalBooking](#) > [HistoricalBookingVector\\_T](#)
- typedef [boost::shared\\_ptr](#) < [RMOL\\_Service](#) > [RMOL\\_ServicePtr\\_T](#)
- typedef [std::vector](#) < [stdair::NbOfRequests\\_T](#) > [UnconstrainedDemandVector\\_T](#)
- typedef [std::vector](#) < [stdair::NbOfBookings\\_T](#) > [BookingVector\\_T](#)
- typedef [std::vector](#) < [stdair::Flag\\_T](#) > [FlagVector\\_T](#)
- typedef [std::map](#) < [stdair::BookingClass](#) \*, [UnconstrainedDemandVector\\_T](#) > [BookingClassUnconstrainedDemandVectorMap\\_T](#)
- typedef [std::map](#) < [stdair::BookingClass](#) \*, [stdair::NbOfRequests\\_T](#) > [BookingClassUnconstrainedDemandMap\\_T](#)
- typedef [std::map](#)< const [stdair::DTD\\_T](#), double > [FRAT5Curve\\_T](#)

## Variables

- const [stdair::AirlineCode\\_T](#) [DEFAULT\\_RMOL\\_SERVICE\\_AIRLINE\\_CODE](#) = "B-A"
- const double [DEFAULT\\_RMOL\\_SERVICE\\_CAPACITY](#) = 1.0
- const int [DEFAULT\\_NUMBER\\_OF\\_DRAWS\\_FOR\\_MC\\_SIMULATION](#) = 100000
- const int [DEFAULT\\_PRECISION](#) = 10
- const double [DEFAULT\\_EPSILON](#) = 0.0001
- const double [DEFAULT\\_STOPPING\\_CRITERION](#) = 0.01
- const double [DEFAULT\\_INITIALIZER\\_DOUBLE\\_NEGATIVE](#) = -10.0
- const [FRAT5Curve\\_T](#) [DEFAULT\\_CUMULATIVE\\_FRAT5\\_CURVE](#)
- const [stdair::DCPList\\_T](#) [DEFAULT\\_DCP\\_LIST](#) = [DefaultDCPList::init\(\)](#)

### 26.1.1 Typedef Documentation

#### 26.1.1.1 typedef [std::list](#)<[BucketHolder](#)\*> [RMOL::BucketHolderList\\_T](#)

Define a vector (ordered list) of N bucket/classe holders.

Definition at line 16 of file [BucketHolderTypes.hpp](#).

26.1.1.2 **typedef std::list<FldDistributionParameters> RMOL::DistributionParameterList\_T**

Define the set of parameters, each of one wrapping a pair of distribution parameters (i.e., mean and standard deviation).

Definition at line 16 of file [DistributionParameterList.hpp](#).

26.1.1.3 **typedef std::vector<HistoricalBooking> RMOL::HistoricalBookingVector\_T**

Define a vector (ordered list) of N HistoricalBookings.

Definition at line 16 of file [HistoricalBookingHolder.hpp](#).

26.1.1.4 **typedef boost::shared\_ptr<RMOL\_Service> RMOL::RMOL\_ServicePtr\_T**

Pointer on the [RMOL](#) Service handler.

Definition at line 73 of file [RMOL\\_Types.hpp](#).

26.1.1.5 **typedef std::vector<stdair::NbOfRequests\_T> RMOL::UnconstrainedDemandVector\_T**

Define the vector of historical unconstrained demand.

Definition at line 76 of file [RMOL\\_Types.hpp](#).

26.1.1.6 **typedef std::vector<stdair::NbOfBookings\_T> RMOL::BookingVector\_T**

Define the vector of historical bookings.

Definition at line 79 of file [RMOL\\_Types.hpp](#).

26.1.1.7 **typedef std::vector<stdair::Flag\_T> RMOL::FlagVector\_T**

Define the vector of censorship flags.

Definition at line 82 of file [RMOL\\_Types.hpp](#).

26.1.1.8 **typedef std::map<stdair::BookingClass\*, UnconstrainedDemandVector\_T> RMOL::BookingClassUnconstrainedDemandVectorMap\_T**

Define the map between the booking class and it's corresponding unconstrained demand vector.

Definition at line 86 of file [RMOL\\_Types.hpp](#).

26.1.1.9 **typedef std::map<stdair::BookingClass\*, stdair::NbOfRequests\_T> RMOL::BookingClassUnconstrainedDemandMap\_T**

Define the map between the booking class and it's corresponding unconstrained demand.

Definition at line 90 of file [RMOL\\_Types.hpp](#).

26.1.1.10 `typedef std::map<const stdair::DTD_T, double> RMOL::FRAT5Curve_T`

Define the FRAT5 curve.

Definition at line 93 of file [RMOL\\_Types.hpp](#).

## 26.1.2 Variable Documentation

26.1.2.1 `const stdair::AirlineCode_T RMOL::DEFAULT_RMOL_SERVICE_AIRLINE_CODE = "BA"`

Default airline code for the [RMOL\\_Service](#).

Definition at line 11 of file [BasConst.cpp](#).

26.1.2.2 `const double RMOL::DEFAULT_RMOL_SERVICE_CAPACITY = 1.0`

Default capacity for the [RMOL\\_Service](#).

Definition at line 14 of file [BasConst.cpp](#).

26.1.2.3 `const int RMOL::DEFAULT_NUMBER_OF_DRAWS_FOR_MC_SIMULATION = 100000`

Default value for the number of draws within the Monte-Carlo Integration algorithm.

Definition at line 18 of file [BasConst.cpp](#).

26.1.2.4 `const int RMOL::DEFAULT_PRECISION = 10`

Default value for the precision of the integral computation in the Dynamic Programming algorithm (100 means that the precision will be 0.01).

Default value for the precision of the integral computation in the Dynamic Programming algorithm.

Definition at line 23 of file [BasConst.cpp](#).

26.1.2.5 `const double RMOL::DEFAULT_EPSILON = 0.0001`

Default epsilon value to qualify a denominator

Definition at line 26 of file [BasConst.cpp](#).

26.1.2.6 `const double RMOL::DEFAULT_STOPPING_CRITERION = 0.01`

Default stopping value for an iterative algorithm.

Definition at line 29 of file [BasConst.cpp](#).

26.1.2.7 `const double RMOL::DEFAULT_INITIALIZER_DOUBLE_NEGATIVE = -10.0`

Default negative value used to initialize a double variable.

Definition at line 32 of file [BasConst.cpp](#).

## 26.1.2.8 const FRAT5Curve\_T RMOL::DEFAULT\_CUMULATIVE\_FRAT5\_CURVE

**Initial value:**

```
DefaultMap::createCumulativeFRAT5Curve()
```

Default cumulative[for the remaining period] FRAT5 curve for forecasting and optimisation.

Default cumulative (for the remaining period) FRAT5 curve for forecasting and optimisation.

Definition at line 36 of file [BasConst.cpp](#).

## 26.1.2.9 const stdair::DCPList\_T RMOL::DEFAULT\_DCP\_LIST = DefaultDCPList::init()

Default data collection point list.

Definition at line 69 of file [BasConst.cpp](#).

Referenced by [RMOL::Utilities::buildRemainingDCPList\(\)](#), [RMOL::Utilities::buildRemainingDCPList2\(\)](#), [RMOL::RMOL\\_Service::forecastOnD\(\)](#), [RMOL::RMOL\\_Service::resetDemandInformation\(\)](#), [RMOL::RMOL\\_Service::projectAggregatedDemandOnLegCabins\(\)](#), [RMOL::RMOL\\_Service::projectOnDDemandOnLegCabinsUsingYP\(\)](#), [RMOL::RMOL\\_Service::optimiseOnD\(\)](#), [RMOL::RMOL\\_Service::updateBidPrice\(\)](#), [RMOL::RMOL\\_Service::projectOnDDemandOnLegCabinsUsingDA\(\)](#), [RMOL::RMOL\\_Service::projectOnDDemandOnLegCabinsUsingDYP\(\)](#), [RMOL::RMOL\\_Service::optimiseOnDUsingRMCooperation\(\)](#), and [RMOL::RMOL\\_Service::optimiseOnDUsingAdvancedRMCooperation\(\)](#).

## 26.2 stdair Namespace Reference

## 26.2.1 Detailed Description

Forward declarations.

## 27 Class Documentation

## 27.1 std::allocator Class Reference

STL class.

## 27.1.1 Detailed Description

STL class.

The documentation for this class was generated from the following files:

## 27.2 `std::auto_ptr` Class Reference

STL class.

### 27.2.1 Detailed Description

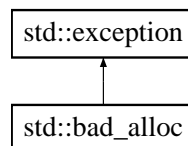
STL class.

The documentation for this class was generated from the following files:

## 27.3 `std::bad_alloc` Class Reference

STL class.

Inheritance diagram for `std::bad_alloc`:



### 27.3.1 Detailed Description

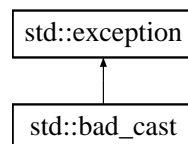
STL class.

The documentation for this class was generated from the following file:

## 27.4 `std::bad_cast` Class Reference

STL class.

Inheritance diagram for `std::bad_cast`:



### 27.4.1 Detailed Description

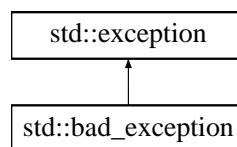
STL class.

The documentation for this class was generated from the following file:

## 27.5 `std::bad_exception` Class Reference

STL class.

Inheritance diagram for `std::bad_exception`:



### 27.5.1 Detailed Description

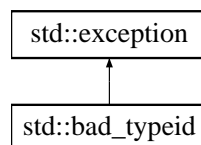
STL class.

The documentation for this class was generated from the following file:

## 27.6 `std::bad_typeid` Class Reference

STL class.

Inheritance diagram for `std::bad_typeid`:



### 27.6.1 Detailed Description

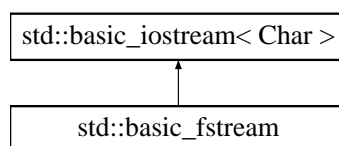
STL class.

The documentation for this class was generated from the following file:

## 27.7 `std::basic_fstream` Class Reference

STL class.

Inheritance diagram for `std::basic_fstream`:



## 27.7.1 Detailed Description

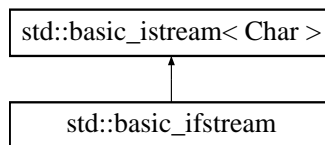
STL class.

The documentation for this class was generated from the following file:

27.8 `std::basic_ifstream` Class Reference

STL class.

Inheritance diagram for `std::basic_ifstream`:



## 27.8.1 Detailed Description

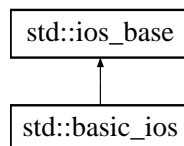
STL class.

The documentation for this class was generated from the following file:

27.9 `std::basic_ios` Class Reference

STL class.

Inheritance diagram for `std::basic_ios`:



## 27.9.1 Detailed Description

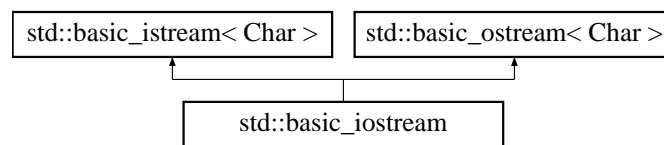
STL class.

The documentation for this class was generated from the following file:

27.10 `std::basic_iostream` Class Reference

STL class.

Inheritance diagram for `std::basic_iostream`:



#### 27.10.1 Detailed Description

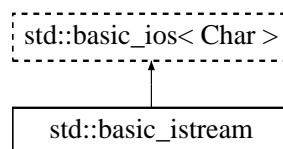
STL class.

The documentation for this class was generated from the following file:

### 27.11 std::basic\_istream Class Reference

STL class.

Inheritance diagram for `std::basic_istream`:



#### 27.11.1 Detailed Description

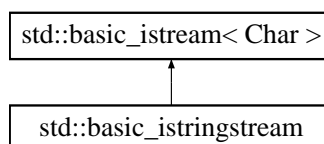
STL class.

The documentation for this class was generated from the following file:

### 27.12 std::basic\_istringstream Class Reference

STL class.

Inheritance diagram for `std::basic_istringstream`:



#### 27.12.1 Detailed Description

STL class.

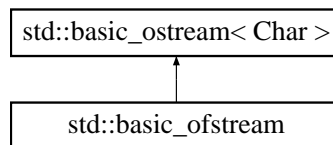


The documentation for this class was generated from the following file:

### 27.13 std::basic\_ofstream Class Reference

STL class.

Inheritance diagram for std::basic\_ofstream:



#### 27.13.1 Detailed Description

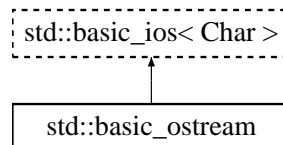
STL class.

The documentation for this class was generated from the following file:

### 27.14 std::basic\_ostream Class Reference

STL class.

Inheritance diagram for std::basic\_ostream:



#### 27.14.1 Detailed Description

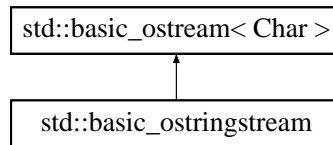
STL class.

The documentation for this class was generated from the following file:

### 27.15 std::basic\_ostringstream Class Reference

STL class.

Inheritance diagram for std::basic\_ostringstream:



### 27.15.1 Detailed Description

STL class.

The documentation for this class was generated from the following file:

## 27.16 std::basic\_string Class Reference

STL class.

### Classes

- class [const\\_iterator](#)  
*STL iterator class.*
- class [const\\_reverse\\_iterator](#)  
*STL iterator class.*
- class [iterator](#)  
*STL iterator class.*
- class [reverse\\_iterator](#)  
*STL iterator class.*

### 27.16.1 Detailed Description

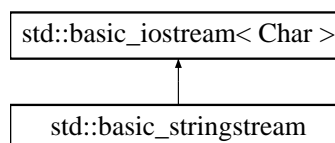
STL class.

The documentation for this class was generated from the following file:

## 27.17 std::basic\_stringstream Class Reference

STL class.

Inheritance diagram for std::basic\_stringstream:



### 27.17.1 Detailed Description

STL class.

The documentation for this class was generated from the following file:

## 27.18 **std::bitset Class Reference**

STL class.

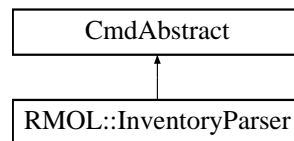
### 27.18.1 Detailed Description

STL class.

The documentation for this class was generated from the following file:

## 27.19 **CmdAbstract Class Reference**

Inheritance diagram for CmdAbstract:



The documentation for this class was generated from the following file:

- [rmol/command/InventoryParser.hpp](#)

## 27.20 **std::complex Class Reference**

STL class.

### 27.20.1 Detailed Description

STL class.

The documentation for this class was generated from the following file:

## 27.21 **std::string::const\_iterator Class Reference**

STL iterator class.

**27.21.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.22 std::wstring::const\_iterator Class Reference**

STL iterator class.

**27.22.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.23 std::deque::const\_iterator Class Reference**

STL iterator class.

**27.23.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.24 std::list::const\_iterator Class Reference**

STL iterator class.

**27.24.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.25 std::map::const\_iterator Class Reference**

STL iterator class.

**27.25.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.26 std::multimap::const\_iterator Class Reference**

STL iterator class.

**27.26.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.27 std::set::const\_iterator Class Reference**

STL iterator class.

**27.27.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.28 std::multiset::const\_iterator Class Reference**

STL iterator class.

**27.28.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.29 std::vector::const\_iterator Class Reference**

STL iterator class.

**27.29.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.30 std::basic\_string::const\_iterator Class Reference**

STL iterator class.

**27.30.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.31 std::string::const\_reverse\_iterator Class Reference**

STL iterator class.

**27.31.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.32 std::wstring::const\_reverse\_iterator Class Reference**

STL iterator class.

**27.32.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.33 std::deque::const\_reverse\_iterator Class Reference**

STL iterator class.

**27.33.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.34 std::list::const\_reverse\_iterator Class Reference**

STL iterator class.

**27.34.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.35 std::map::const\_reverse\_iterator Class Reference**

STL iterator class.

**27.35.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.36 std::multimap::const\_reverse\_iterator Class Reference**

STL iterator class.

**27.36.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.37 std::set::const\_reverse\_iterator Class Reference**

STL iterator class.

**27.37.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.38 std::multiset::const\_reverse\_iterator Class Reference**

STL iterator class.

**27.38.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.39 std::vector::const\_reverse\_iterator Class Reference**

STL iterator class.

#### 27.39.1 Detailed Description

STL iterator class.

The documentation for this class was generated from the following file:

### 27.40 `std::basic_string::const_reverse_iterator` Class Reference

STL iterator class.

#### 27.40.1 Detailed Description

STL iterator class.

The documentation for this class was generated from the following file:

### 27.41 `RMOL::DefaultDCPList` Struct Reference

```
#include <rmol/basic/BasConst_General.hpp>
```

#### Static Public Member Functions

- static `stdair::DCPList_T` [init](#) ()

#### 27.41.1 Member Function Documentation

27.41.1.1 `stdair::DCPList_T RMOL::DefaultDCPList::init ( )` [static]

Definition at line 70 of file [BasConst.cpp](#).

The documentation for this struct was generated from the following files:

- [rmol/basic/BasConst\\_General.hpp](#)
- [rmol/basic/BasConst.cpp](#)

### 27.42 `RMOL::DefaultMap` Struct Reference

```
#include <rmol/basic/BasConst_Curves.hpp>
```

#### Static Public Member Functions

- static `FRAT5Curve_T` [createCumulativeFRAT5Curve](#) ()



## 27.42.1 Detailed Description

Default PoS probability mass.

## 27.42.2 Member Function Documentation

27.42.2.1 FRAT5Curve\_T RMOL::DefaultMap::createCumulativeFRAT5Curve ( )  
[static]

Definition at line 38 of file [BasConst.cpp](#).

The documentation for this struct was generated from the following files:

- [rmol/basic/BasConst\\_Curves.hpp](#)
- [rmol/basic/BasConst.cpp](#)

## 27.43 RMOL::DemandGeneratorList Class Reference

```
#include <rmol/bom/old/DemandGeneratorList.hpp>
```

## Public Member Functions

- [DemandGeneratorList](#) ()
- [DemandGeneratorList](#) (const [DemandGeneratorList](#) &)
- [DemandGeneratorList](#) (const [DistributionParameterList\\_T](#) &)
- virtual [~DemandGeneratorList](#) ()
- void [generateVariateList](#) ([VariateList\\_T](#) &) const

## Protected Types

- typedef [std::list](#)< [Gaussian](#) > [DemandGeneratorList\\_T](#)

## 27.43.1 Detailed Description

Wrapper around a set of Gaussian Random Generators.

## 27.43.2 Member Typedef Documentation

27.43.2.1 typedef [std::list](#)<[Gaussian](#)> [RMOL::DemandGeneratorList::DemandGeneratorList\\_T](#) [protected]

Define a (ordered) set of Gaussian Random Generators.

Definition at line 20 of file [DemandGeneratorList.hpp](#).

## 27.43.3 Constructor &amp; Destructor Documentation

27.43.3.1 `RMOL::DemandGeneratorList::DemandGeneratorList ( )`

Constructors.

Definition at line 10 of file [DemandGeneratorList.cpp](#).

27.43.3.2 `RMOL::DemandGeneratorList::DemandGeneratorList ( const DemandGeneratorList & iDemandGeneratorList )`

Definition at line 17 of file [DemandGeneratorList.cpp](#).

27.43.3.3 `RMOL::DemandGeneratorList::DemandGeneratorList ( const DistributionParameterList_T & iDistributionParameterList )`

List of distribution parameters (mean, standard deviation).

Definition at line 25 of file [DemandGeneratorList.cpp](#).

27.43.3.4 `RMOL::DemandGeneratorList::~~DemandGeneratorList ( )` `[virtual]`

Destructors.

Definition at line 30 of file [DemandGeneratorList.cpp](#).

## 27.43.4 Member Function Documentation

27.43.4.1 `void RMOL::DemandGeneratorList::generateVariateList ( VariateList.T & ioVariateList ) const`

Definition at line 50 of file [DemandGeneratorList.cpp](#).

The documentation for this class was generated from the following files:

- [rmol/bom/old/DemandGeneratorList.hpp](#)
- [rmol/bom/old/DemandGeneratorList.cpp](#)

27.44 `std::deque` Class Reference

STL class.

## Classes

- class [const\\_iterator](#)  
*STL iterator class.*
- class [const\\_reverse\\_iterator](#)  
*STL iterator class.*
- class [iterator](#)

*STL iterator class.*

- class [reverse\\_iterator](#)

*STL iterator class.*

#### 27.44.1 Detailed Description

STL class.

The documentation for this class was generated from the following files:

### 27.45 RMOL::Detruncator Class Reference

```
#include <rmol/command/Detruncator.hpp>
```

#### Static Public Member Functions

- static void [unconstrainUsingAdditivePickUp](#) (const stdair::SegmentCabin &, [BookingClassUnconstrainedDemandVectorMap\\_T](#) &, [UnconstrainedDemandVector\\_T](#) &, const stdair::DCP\_T &, const stdair::DCP\_T &, const stdair::Date\_T &)
- static void [unconstrainUsingMultiplicativePickUp](#) (const stdair::SegmentCabin &, [BookingClassUnconstrainedDemandVectorMap\\_T](#) &, [UnconstrainedDemandVector\\_T](#) &, const stdair::DCP\_T &, const stdair::DCP\_T &, const stdair::Date\_T &, const stdair::NbOfSegments\_T &)
- static void [retrieveUnconstrainedDemandForFirstDCP](#) (const stdair::SegmentCabin &, [BookingClassUnconstrainedDemandVectorMap\\_T](#) &, [UnconstrainedDemandVector\\_T](#) &, const stdair::DCP\_T &, const stdair::NbOfSegments\_T &, const stdair::NbOfSegments\_T &)
- static void [unconstrainUsingMultiplicativePickUp](#) ([HistoricalBookingHolder](#) &)

#### 27.45.1 Detailed Description

Class wrapping the principal unconstraining algorithms and some accessory algorithms.

#### 27.45.2 Member Function Documentation

27.45.2.1 void RMOL::Detruncator::unconstrainUsingAdditivePickUp ( const stdair::SegmentCabin & *iSegmentCabin*, [BookingClassUnconstrainedDemandVectorMap\\_T](#) & *ioBkgClassUncDemMap*, [UnconstrainedDemandVector\\_T](#) & *ioQEquivalentDemandVector*, const stdair::DCP\_T & *iDCPBegin*, const stdair::DCP\_T & *iDCPEnd*, const stdair::Date\_T & *iCurrentDate* ) [static]

Unconstrain booking figures between two DCP's.

Definition at line 25 of file [Detruncator.cpp](#).

References [RMOL::GuillotineBlockHelper::getNbOfSegmentAlreadyPassedThisDTD\(\)](#).

```
27.45.2.2 void RMOL::Detruncator::unconstrainUsingMultiplicativePickUp (
    const stdair::SegmentCabin & iSegmentCabin, BookingClass-
    UnconstrainedDemandVectorMap_T & ioBkgClassUncDemMap,
    UnconstrainedDemandVector_T & ioQEquivalentDemandVector, const
    stdair::DCP_T & iDCPBegin, const stdair::DCP_T & iDCPEnd, const stdair::Date_T
    & iCurrentDate, const stdair::NbOfSegments_T & iNbOfDepartedSegments )
    [static]
```

Unconstrain booking figures between two DCP's.

Definition at line 317 of file [Detruncator.cpp](#).

References [RMOL::GuillotineBlockHelper::getNbOfSegmentAlreadyPassedThisDTD\(\)](#).

```
27.45.2.3 void RMOL::Detruncator::retrieveUnconstrainedDemandForFirstDCP
    ( const stdair::SegmentCabin & iSegmentCabin, BookingClass-
    UnconstrainedDemandVectorMap_T & ioBkgClassUncDemVectorMap,
    UnconstrainedDemandVector_T & ioQEquivalentDemandVector, const
    stdair::DCP_T & iFirstDCP, const stdair::NbOfSegments_T & iNbOfSegments, const
    stdair::NbOfSegments_T & iNbOfUsedSegments ) [static]
```

Retrieve unconstrained demand figures for the first DCP.

Definition at line 239 of file [Detruncator.cpp](#).

```
27.45.2.4 void RMOL::Detruncator::unconstrainUsingMultiplicativePickUp (
    HistoricalBookingHolder & ioHBHolder ) [static]
```

Unconstrain the product-oriented booking figures for a given class ou Q-equivalent class.

Definition at line 558 of file [Detruncator.cpp](#).

References [RMOL::HistoricalBookingHolder::getNbOfUncensoredData\(\)](#), [RMOL::HistoricalBookingHolder::getNbOfFlights\(\)](#), [RMOL::HistoricalBookingHolder::getCensorshipFlag\(\)](#), [RMOL::HistoricalBookingHolder::getHistoricalBooking\(\)](#), and [RMOL::HistoricalBookingHolder::setUnconstrainedDemand\(\)](#).

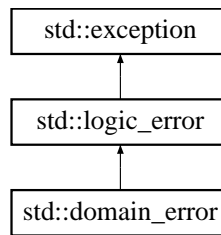
The documentation for this class was generated from the following files:

- [rmol/command/Detruncator.hpp](#)
- [rmol/command/Detruncator.cpp](#)

## 27.46 std::domain\_error Class Reference

STL class.

Inheritance diagram for std::domain\_error:



### 27.46.1 Detailed Description

STL class.

The documentation for this class was generated from the following file:

## 27.47 RMOL::DPOptimiser Class Reference

```
#include <rmol/bom/DPOptimiser.hpp>
```

### Static Public Member Functions

- static void [optimalOptimisationByDP](#) (stdair::LegCabin &)
- static double [cdfGaussianQ](#) (const double, const double)

### 27.47.1 Detailed Description

Utility methods for the Dynamic Programming algorithms.

### 27.47.2 Member Function Documentation

**27.47.2.1** void RMOL::DPOptimiser::optimalOptimisationByDP ( stdair::LegCabin & *ioLegCabin* ) [static]

Dynamic Programming to compute the cumulative protection levels and booking limits (described in the book Revenue Management - Talluri & Van Ryzin, p.41-42).

Definition at line 22 of file [DPOptimiser.cpp](#).

**27.47.2.2** static double RMOL::DPOptimiser::cdfGaussianQ ( const double , const double ) [static]

Compute the cdf\_Q of a gaussian.

The documentation for this class was generated from the following files:

- rmol/bom/[DPOptimiser.hpp](#)
- rmol/bom/[DPOptimiser.cpp](#)

## 27.48 RMOL::EMDetruncator Class Reference

```
#include <rmol/bom/EMDetruncator.hpp>
```

### Static Public Member Functions

- static void [unconstrainUsingEMMethod](#) ([HistoricalBookingHolder](#) &)

#### 27.48.1 Detailed Description

Utility for the Expectation-Maximisation algorithm.

#### 27.48.2 Member Function Documentation

27.48.2.1 void RMOL::EMDetruncator::unconstrainUsingEMMethod (  
HistoricalBookingHolder & *ioHistoricalBookingHolder* ) [static]

Unconstrain the censored booking data using the Expectation-Maximisation algorithm.

Definition at line 20 of file [EMDetruncator.cpp](#).

References [RMOL::HistoricalBookingHolder::getNbOfFlights\(\)](#), [RMOL::HistoricalBookingHolder::getNbOfUncensoredData\(\)](#), [RMOL::HistoricalBookingHolder::getNbOfUncensoredBookings\(\)](#), [RMOL::HistoricalBookingHolder::getUncensoredStandardDeviation\(\)](#), [RMOL::HistoricalBookingHolder::getListOfToBeUnconstrainedFlags\(\)](#), [RMOL::HistoricalBookingHolder::getUnconstrainedDemand\(\)](#), [RMOL::HistoricalBookingHolder::setUnconstrainedDemand\(\)](#), [RMOL::HistoricalBookingHolder::getDemandMean\(\)](#), and [RMOL::HistoricalBookingHolder::getStandardDeviation\(\)](#).

The documentation for this class was generated from the following files:

- [rmol/bom/EMDetruncator.hpp](#)
- [rmol/bom/EMDetruncator.cpp](#)

## 27.49 RMOL::Emsr Class Reference

```
#include <rmol/bom/Emsr.hpp>
```

### Static Public Member Functions

- static void [heuristicOptimisationByEmsr](#) (stdair::LegCabin &)
- static void [heuristicOptimisationByEmsrA](#) (stdair::LegCabin &)
- static void [heuristicOptimisationByEmsrB](#) (stdair::LegCabin &)

#### 27.49.1 Detailed Description

Class Implementing the EMSR algorithm for Bid-Price Vector computing.

## 27.49.2 Member Function Documentation

27.49.2.1 void RMOL::Emsr::heuristicOptimisationByEmsr ( stdair::LegCabin & *ioLegCabin* )  
[static]

Compute the Bid-Price Vector using the EMSR algorithm. Then compute the protection levels and booking limits by using the BPV.

For each class/bucket  $j$  with yield  $p_j$  and demand  $D_j$ , compute  $p_j \cdot \Pr(D_j \geq x)$  with  $x$  the capacity index. This value is called the EMSR (Expected Marginal Seat Revenue) of the class/bucket  $j$  with the remaining capacity of  $x$ . Thus, we have for each class/bucket a list of EMSR values. We merge all these lists and sort the values from high to low in order to obtain the BPV.

Definition at line 108 of file [Emsr.cpp](#).

References [RMOL::EmsrUtils::computeEmsrValue\(\)](#).

27.49.2.2 void RMOL::Emsr::heuristicOptimisationByEmsrA ( stdair::LegCabin & *ioLegCabin* )  
[static]

Calculate the optimal protections for the set of buckets/classes given in input, and update those buckets accordingly.

Definition at line 21 of file [Emsr.cpp](#).

References [RMOL::EmsrUtils::computeProtectionLevel\(\)](#).

27.49.2.3 void RMOL::Emsr::heuristicOptimisationByEmsrB ( stdair::LegCabin & *ioLegCabin* )  
[static]

Compute the protection levels and booking limits by using the EMSR-b algorithm.

Definition at line 64 of file [Emsr.cpp](#).

References [RMOL::EmsrUtils::computeProtectionLevel\(\)](#), and [RMOL::EmsrUtils::computeAggregatedVirtualClass\(\)](#).

The documentation for this class was generated from the following files:

- [rmol/bom/Emsr.hpp](#)
- [rmol/bom/Emsr.cpp](#)

## 27.50 RMOL::EmsrUtils Class Reference

```
#include <rmol/bom/EmsrUtils.hpp>
```

## Static Public Member Functions

- static void [computeAggregatedVirtualClass](#) (stdair::VirtualClassStruct &, stdair::VirtualClassStruct &)
- static const stdair::ProtectionLevel\_T [computeProtectionLevel](#) (stdair::VirtualClassStruct &, stdair::VirtualClassStruct &)

- static const double [computeEmsrValue](#) (double, `stdair::VirtualClassStruct &`)

### 27.50.1 Detailed Description

Forward declarations.

### 27.50.2 Member Function Documentation

**27.50.2.1** `void RMOL::EmsrUtils::computeAggregatedVirtualClass ( stdair::VirtualClassStruct & ioAggregatedVirtualClass, stdair::VirtualClassStruct & ioCurrentVirtualClass )`  
[static]

Compute the aggregated class/bucket of classes/buckets 1,...,j for EMSR-b algorithm.

Definition at line 19 of file [EmsrUtils.cpp](#).

Referenced by [RMOL::Emsr::heuristicOptimisationByEmsrB\(\)](#).

**27.50.2.2** `const stdair::ProtectionLevel_T RMOL::EmsrUtils::computeProtectionLevel ( stdair::VirtualClassStruct & ioAggregatedVirtualClass, stdair::VirtualClassStruct & ioNextVirtualClass )` [static]

Compute the protection level using the Little-Wood formular.

Definition at line 53 of file [EmsrUtils.cpp](#).

Referenced by [RMOL::Emsr::heuristicOptimisationByEmsrA\(\)](#), and [RMOL::Emsr::heuristicOptimisationByEmsrB\(\)](#).

**27.50.2.3** `const double RMOL::EmsrUtils::computeEmsrValue ( double iCapacity, stdair::VirtualClassStruct & ioVirtualClass )` [static]

Compute the EMSR value of a class/bucket.

Definition at line 80 of file [EmsrUtils.cpp](#).

Referenced by [RMOL::Emsr::heuristicOptimisationByEmsr\(\)](#).

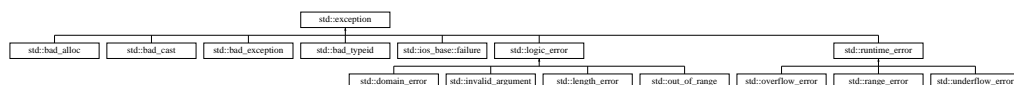
The documentation for this class was generated from the following files:

- `rmol/bom/EmsrUtils.hpp`
- `rmol/bom/EmsrUtils.cpp`

## 27.51 `std::exception` Class Reference

STL class.

Inheritance diagram for `std::exception`:





### 27.51.1 Detailed Description

STL class.

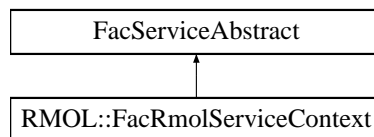
The documentation for this class was generated from the following file:

## 27.52 RMOL::FacRmolServiceContext Class Reference

Factory for the service context.

```
#include <rmol/factory/FacRmolServiceContext.hpp>
```

Inheritance diagram for RMOL::FacRmolServiceContext:



### Public Member Functions

- [~FacRmolServiceContext\(\)](#)
- [RMOL\\_ServiceContext & create\(\)](#)

### Static Public Member Functions

- static [FacRmolServiceContext & instance\(\)](#)

### Protected Member Functions

- [FacRmolServiceContext\(\)](#)

### 27.52.1 Detailed Description

Factory for the service context.

### 27.52.2 Constructor & Destructor Documentation

#### 27.52.2.1 RMOL::FacRmolServiceContext::~~FacRmolServiceContext()

Destructor.

The Destruction put the `_instance` to NULL in order to be clean for the next `FacSimfqt-ServiceContext::instance()`.

Definition at line 17 of file [FacRmolServiceContext.cpp](#).

**27.52.2.2** `RMOL::FacRmolServiceContext::FacRmolServiceContext ( ) [inline, protected]`

Default Constructor.

This constructor is protected in order to ensure the singleton pattern.

Definition at line 57 of file [FacRmolServiceContext.hpp](#).

Referenced by [instance\(\)](#).

### 27.52.3 Member Function Documentation

**27.52.3.1** `FacRmolServiceContext & RMOL::FacRmolServiceContext::instance ( ) [static]`

Provide the unique instance.

The singleton is instantiated when first used.

#### Returns

FacServiceContext&

Definition at line 22 of file [FacRmolServiceContext.cpp](#).

References [FacRmolServiceContext\(\)](#).

**27.52.3.2** `RMOL_ServiceContext & RMOL::FacRmolServiceContext::create ( )`

Create a new ServiceContext object.

This new object is added to the list of instantiated objects.

#### Returns

ServiceContext& The newly created object.

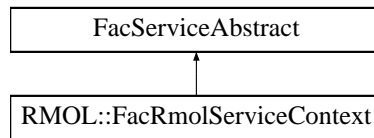
Definition at line 34 of file [FacRmolServiceContext.cpp](#).

The documentation for this class was generated from the following files:

- [rmol/factory/FacRmolServiceContext.hpp](#)
- [rmol/factory/FacRmolServiceContext.cpp](#)

## 27.53 FacServiceAbstract Class Reference

Inheritance diagram for FacServiceAbstract:



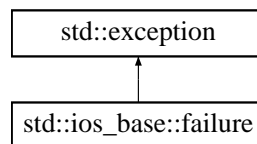
The documentation for this class was generated from the following file:

- [rmol/factory/FacRmolServiceContext.hpp](#)

## 27.54 std::ios\_base::failure Class Reference

STL class.

Inheritance diagram for std::ios\_base::failure:



### 27.54.1 Detailed Description

STL class.

The documentation for this class was generated from the following file:

## 27.55 RMOL::Forecaster Class Reference

```
#include <rmol/command/Forecaster.hpp>
```

### Static Public Member Functions

- static bool [forecastUsingAdditivePickUp](#) (stdair::FlightDate &, const stdair::DateTime\_T &)
- static bool [forecastUsingMultiplicativePickUp](#) (stdair::FlightDate &, const stdair::DateTime\_T &)

### 27.55.1 Detailed Description

Class wrapping the optimisation algorithms.

## 27.55.2 Member Function Documentation

27.55.2.1 `bool RMOL::Forecaster::forecastUsingAdditivePickUp ( stdair::FlightDate & ioFlightDate, const stdair::DateTime_T & iEventTime ) [static]`

Forecast demand for a flight-date using additive pick-up method.

Definition at line 35 of file [Forecaster.cpp](#).

References [RMOL::Utilities::buildRemainingDCPList\(\)](#), and [RMOL::Utilities::build-RemainingDCPList2\(\)](#).

Referenced by [RMOL::RMOL\\_Service::optimise\(\)](#).

27.55.2.2 `bool RMOL::Forecaster::forecastUsingMultiplicativePickUp ( stdair::FlightDate & ioFlightDate, const stdair::DateTime_T & iEventTime ) [static]`

Forecast demand for a flight-date using multiplicative pick-up method.

Definition at line 276 of file [Forecaster.cpp](#).

Referenced by [RMOL::RMOL\\_Service::optimise\(\)](#).

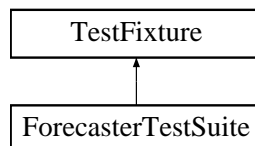
The documentation for this class was generated from the following files:

- [rmol/command/Forecaster.hpp](#)
- [rmol/command/Forecaster.cpp](#)

## 27.56 ForecasterTestSuite Class Reference

```
#include <test/rmol/ForecasterTestSuite.hpp>
```

Inheritance diagram for ForecasterTestSuite:



## Public Member Functions

- `void testQForecaster ()`
- `ForecasterTestSuite ()`

## Protected Attributes

- `std::stringstream _describeKey`

### 27.56.1 Constructor & Destructor Documentation

#### 27.56.1.1 ForecasterTestSuite::ForecasterTestSuite ( )

Constructor.

### 27.56.2 Member Function Documentation

#### 27.56.2.1 void ForecasterTestSuite::testQForecaster ( )

Test Q-forecaster.

### 27.56.3 Member Data Documentation

#### 27.56.3.1 std::stringstream ForecasterTestSuite::\_describeKey [protected]

Definition at line 19 of file [ForecasterTestSuite.hpp](#).

The documentation for this class was generated from the following file:

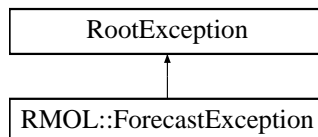
- test/rmol/[ForecasterTestSuite.hpp](#)

## 27.57 RMOL::ForecastException Class Reference

Forecast-related exception.

```
#include <rmol/RMOL_Types.hpp>
```

Inheritance diagram for RMOL::ForecastException:



### Public Member Functions

- [ForecastException](#) (const [std::string](#) &iWhat)

### 27.57.1 Detailed Description

Forecast-related exception.

## 27.57.2 Constructor &amp; Destructor Documentation

27.57.2.1 `RMOL::ForecastException::ForecastException ( const std::string & iWhat )`  
[inline]

Constructor.

Definition at line 54 of file [RMOL\\_Types.hpp](#).

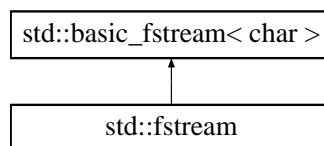
The documentation for this class was generated from the following file:

- [rmol/RMOL\\_Types.hpp](#)

27.58 `std::fstream` Class Reference

STL class.

Inheritance diagram for `std::fstream`:



## 27.58.1 Detailed Description

STL class.

The documentation for this class was generated from the following file:

27.59 `RMOL::GuillotineBlockHelper` Class Reference

```
#include <rmol/bom/GuillotineBlockHelper.hpp>
```

## Static Public Member Functions

- static `stdair::NbOfSegments_T` [getNbOfSegmentAlreadyPassedThisDTD](#) (const `stdair::GuillotineBlock &`, const `stdair::DTD_T &`, const `stdair::Date_T &`)
- static bool [hasPassedThisDTD](#) (const `stdair::SegmentCabin &`, const `stdair::DTD_T &`, const `stdair::Date_T &`)

## 27.59.1 Detailed Description

Class representing the actual business functions for an airline guillotine block.

## 27.59.2 Member Function Documentation

27.59.2.1 `stdair::NbOfSegments_T RMOL::GuillotineBlockHelper::getNbOfSegmentAlreadyPassedThisDTD ( const stdair::GuillotineBlock & iGB, const stdair::DTD_T & iDTD, const stdair::Date_T & iCurrentDate ) [static]`

Retrieve the number of similar segments which already passed the given DTD.

Definition at line 20 of file [GuillotineBlockHelper.cpp](#).

References [hasPassedThisDTD\(\)](#).

Referenced by [RMOL::Utilities::getNbOfDepartedSimilarSegments\(\)](#), [RMOL::Detruncator::unconstrainUsingAdditivePickUp\(\)](#), and [RMOL::Detruncator::unconstrainUsingMultiplicativePickUp\(\)](#).

27.59.2.2 `bool RMOL::GuillotineBlockHelper::hasPassedThisDTD ( const stdair::SegmentCabin & iSegmentCabin, const stdair::DTD_T & iDTD, const stdair::Date_T & iCurrentDate ) [static]`

Check if the given segment has passed the given DTD.

Definition at line 42 of file [GuillotineBlockHelper.cpp](#).

Referenced by [getNbOfSegmentAlreadyPassedThisDTD\(\)](#).

The documentation for this class was generated from the following files:

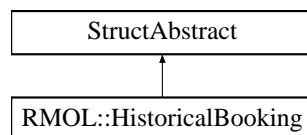
- [rmol/bom/GuillotineBlockHelper.hpp](#)
- [rmol/bom/GuillotineBlockHelper.cpp](#)

## 27.60 RMOL::HistoricalBooking Struct Reference

Structure keeping track, for a given class, of the number of historical bookings and of the censorship flag.

```
#include <rmol/bom/HistoricalBooking.hpp>
```

Inheritance diagram for RMOL::HistoricalBooking:



## Public Member Functions

- `const stdair::NbOfBookings_T & getNbOfBookings () const`
- `const stdair::NbOfBookings_T & getUnconstrainedDemand () const`
- `const stdair::Flag_T & getFlag () const`

- void [setUnconstrainedDemand](#) (const stdair::NbOfBookings\_T &iDemand)
- void [setParameters](#) (const stdair::NbOfBookings\_T, const stdair::Flag\_T)
- void [toStream](#) (std::ostream &ioOut) const
- const [std::string describe](#) () const
- void [display](#) () const
- [HistoricalBooking](#) (const stdair::NbOfBookings\_T, const stdair::Flag\_T)
- [HistoricalBooking](#) ()
- [HistoricalBooking](#) (const [HistoricalBooking](#) &)
- virtual [~HistoricalBooking](#) ()

### 27.60.1 Detailed Description

Structure keeping track, for a given class, of the number of historical bookings and of the censorship flag.

### 27.60.2 Constructor & Destructor Documentation

#### 27.60.2.1 RMOL::HistoricalBooking::HistoricalBooking ( const stdair::NbOfBookings\_T *NbOfBookings*, const stdair::Flag\_T *iFlag* )

Main constructor.

Definition at line 21 of file [HistoricalBooking.cpp](#).

#### 27.60.2.2 RMOL::HistoricalBooking::HistoricalBooking ( )

Default constructor.

Definition at line 15 of file [HistoricalBooking.cpp](#).

#### 27.60.2.3 RMOL::HistoricalBooking::HistoricalBooking ( const HistoricalBooking & *iHistoricalBooking* )

Copy constructor.

Definition at line 29 of file [HistoricalBooking.cpp](#).

#### 27.60.2.4 RMOL::HistoricalBooking::~~HistoricalBooking ( ) [virtual]

Destructor.

Definition at line 36 of file [HistoricalBooking.cpp](#).

### 27.60.3 Member Function Documentation

#### 27.60.3.1 const stdair::NbOfBookings\_T& RMOL::HistoricalBooking::getNbOfBookings ( ) const [inline]

Getter for the booking.



Definition at line 22 of file [HistoricalBooking.hpp](#).

Referenced by [toStream\(\)](#), [RMOL::HistoricalBookingHolder::getNbOfUncensoredBookings\(\)](#), [RMOL::HistoricalBookingHolder::getUncensoredStandardDeviation\(\)](#), [RMOL::HistoricalBookingHolder::getHistoricalBooking\(\)](#), [RMOL::HistoricalBookingHolder::calculateExpectedDemand\(\)](#), and [RMOL::HistoricalBookingHolder::toStream\(\)](#).

```
27.60.3.2  const stdair::NbOfBookings_T& RMOL::HistoricalBooking::getUnconstrainedDemand (
           ) const [inline]
```

Getter for the unconstrained bookings.

Definition at line 26 of file [HistoricalBooking.hpp](#).

Referenced by [toStream\(\)](#), [RMOL::HistoricalBookingHolder::getDemandMean\(\)](#), [RMOL::HistoricalBookingHolder::getStandardDeviation\(\)](#), [RMOL::HistoricalBookingHolder::getUnconstrainedDemand\(\)](#), and [RMOL::HistoricalBookingHolder::toStream\(\)](#).

```
27.60.3.3  const stdair::Flag_T& RMOL::HistoricalBooking::getFlag ( ) const [inline]
```

Getter for the flag of censorship: "false" means that the bookings are not censored.

Definition at line 31 of file [HistoricalBooking.hpp](#).

Referenced by [toStream\(\)](#), [RMOL::HistoricalBookingHolder::getNbOfUncensoredBookings\(\)](#), [RMOL::HistoricalBookingHolder::getListOfToBeUnconstrainedFlags\(\)](#), [RMOL::HistoricalBookingHolder::getCensorshipFlag\(\)](#), and [RMOL::HistoricalBookingHolder::toStream\(\)](#).

```
27.60.3.4  void RMOL::HistoricalBooking::setUnconstrainedDemand ( const
           stdair::NbOfBookings_T & iDemand ) [inline]
```

Setter for the unconstraining demand.

Definition at line 38 of file [HistoricalBooking.hpp](#).

```
27.60.3.5  void RMOL::HistoricalBooking::setParameters ( const stdair::NbOfBookings_T
           iNbOfBookings, const stdair::Flag_T iFlag )
```

Setter for all parameters.

Definition at line 41 of file [HistoricalBooking.cpp](#).

```
27.60.3.6  void RMOL::HistoricalBooking::toStream ( std::ostream & ioOut ) const
```

Dump a Business Object into an output stream.

#### Parameters

<i>ostream&amp;</i>	the output stream
---------------------	-------------------

## Returns

ostream& the output stream.

Definition at line 57 of file [HistoricalBooking.cpp](#).

References [getNbOfBookings\(\)](#), [getUnconstrainedDemand\(\)](#), and [getFlag\(\)](#).

Referenced by [display\(\)](#).

## 27.60.3.7 const std::string RMOL::HistoricalBooking::describe ( ) const

Give a description of the structure (for display purposes).

Definition at line 48 of file [HistoricalBooking.cpp](#).

## 27.60.3.8 void RMOL::HistoricalBooking::display ( ) const

Display on standard output.

Definition at line 66 of file [HistoricalBooking.cpp](#).

References [toStream\(\)](#).

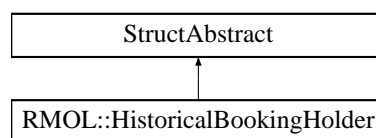
The documentation for this struct was generated from the following files:

- [rmol/bom/HistoricalBooking.hpp](#)
- [rmol/bom/HistoricalBooking.cpp](#)

## 27.61 RMOL::HistoricalBookingHolder Struct Reference

```
#include <rmol/bom/HistoricalBookingHolder.hpp>
```

Inheritance diagram for RMOL::HistoricalBookingHolder:



## Public Member Functions

- const short [getNbOfFlights](#) ( ) const
- const short [getNbOfUncensoredData](#) ( ) const
- const stdair::NbOfBookings\_T [getNbOfUncensoredBookings](#) ( ) const
- const double [getUncensoredStandardDeviation](#) (const double &iMeanOfUncensoredBookings, const short iNbOfUncensoredData) const
- const double [getDemandMean](#) ( ) const
- const double [getStandardDeviation](#) (const double) const
- const std::vector< bool > [getListOfToBeUnconstrainedFlags](#) ( ) const

- const stdair::NbOfBookings\_T & [getHistoricalBooking](#) (const short i) const
- const stdair::NbOfBookings\_T & [getUnconstrainedDemand](#) (const short i) const
- const stdair::Flag\_T & [getCensorshipFlag](#) (const short i) const
- const stdair::NbOfBookings\_T & [getUnconstrainedDemandOnFirstElement](#) () const
- const stdair::NbOfBookings\_T [calculateExpectedDemand](#) (const double, const double, const short, const stdair::NbOfBookings\_T) const
- void [setUnconstrainedDemand](#) (const stdair::NbOfBookings\_T &iExpectedDemand, const short i)
- void [addHistoricalBooking](#) (const [HistoricalBooking](#) &iHistoricalBooking)
- void [toStream](#) (std::ostream &ioOut) const
- const [std::string describe](#) () const
- void [display](#) () const
- virtual [~HistoricalBookingHolder](#) ()
- [HistoricalBookingHolder](#) ()

#### 27.61.1 Detailed Description

Holder of a [HistoricalBookingList](#) object (for memory allocation and recollection purposes).

#### 27.61.2 Constructor & Destructor Documentation

##### 27.61.2.1 RMOL::HistoricalBookingHolder::~~HistoricalBookingHolder ( ) [virtual]

Destructor.

Definition at line 23 of file [HistoricalBookingHolder.cpp](#).

##### 27.61.2.2 RMOL::HistoricalBookingHolder::HistoricalBookingHolder ( )

Constructor.

Protected to force the use of the Factory.

Definition at line 19 of file [HistoricalBookingHolder.cpp](#).

#### 27.61.3 Member Function Documentation

##### 27.61.3.1 const short RMOL::HistoricalBookingHolder::getNbOfFlights ( ) const

Get number of flights.

Definition at line 28 of file [HistoricalBookingHolder.cpp](#).

Referenced by [RMOL::EMDetruncator::unconstrainUsingEMMethod\(\)](#), and [RMOL::Detruncator::unconstrainUsingMultiplicativePickUp\(\)](#).

27.61.3.2 `const short RMOL::HistoricalBookingHolder::getNbOfUncensoredData ( ) const`

Get number of uncensored booking data.

Definition at line 33 of file [HistoricalBookingHolder.cpp](#).

Referenced by [RMOL::EMDetruncator::unconstrainUsingEMMethod\(\)](#), and [RMOL::Detruncator::unconstrainUsingMultiplicativePickUp\(\)](#).

27.61.3.3 `const std::pair<NbOfBookings_T, RMOL::HistoricalBookingHolder::getNbOfUncensoredBookings ( ) const`

Get number of uncensored bookings.

Definition at line 49 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getFlag\(\)](#), and [RMOL::HistoricalBooking::getNbOfBookings\(\)](#).

Referenced by [RMOL::EMDetruncator::unconstrainUsingEMMethod\(\)](#).

27.61.3.4 `const double RMOL::HistoricalBookingHolder::getUncensoredStandardDeviation ( const double & iMeanOfUncensoredBookings, const short iNbOfUncensoredData ) const`

Get standard deviation of uncensored bookings.

Definition at line 69 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getNbOfBookings\(\)](#).

Referenced by [RMOL::EMDetruncator::unconstrainUsingEMMethod\(\)](#).

27.61.3.5 `const double RMOL::HistoricalBookingHolder::getDemandMean ( ) const`

Get mean of historical demand.

Definition at line 95 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getUnconstrainedDemand\(\)](#).

Referenced by [RMOL::EMDetruncator::unconstrainUsingEMMethod\(\)](#).

27.61.3.6 `const double RMOL::HistoricalBookingHolder::getStandardDeviation ( const double iDemandMean ) const`

Get standard deviation of demand.

Definition at line 116 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getUnconstrainedDemand\(\)](#).

Referenced by [RMOL::EMDetruncator::unconstrainUsingEMMethod\(\)](#).

27.61.3.7 `const std::vector< bool > RMOL::HistoricalBookingHolder::getListOfToBeUnconstrainedFlags ( ) const`

Get the list of flags of need to be unconstrained.

Definition at line 140 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getFlag\(\)](#).

Referenced by [RMOL::EMDetruncator::unconstrainUsingEMMethod\(\)](#).

27.61.3.8 `const stdair::NbOfBookings_T & RMOL::HistoricalBookingHolder::getHistorical-Booking ( const short i ) const`

Get the historical booking of the (i+1)-th flight.

Definition at line 161 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getNbOfBookings\(\)](#).

Referenced by [RMOL::Detruncator::unconstrainUsingMultiplicativePickUp\(\)](#).

27.61.3.9 `const stdair::NbOfBookings_T & RMOL::HistoricalBookingHolder::getUnconstrained-Demand ( const short i ) const`

Get the unconstraining demand of the (i+1)-th flight.

Definition at line 169 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getUnconstrainedDemand\(\)](#).

Referenced by [RMOL::EMDetruncator::unconstrainUsingEMMethod\(\)](#), and [get-UnconstrainedDemandOnFirstElement\(\)](#).

27.61.3.10 `const stdair::Flag_T & RMOL::HistoricalBookingHolder::getCensorshipFlag ( const short i ) const`

Get the flag of the (i+1)-th flight.

Definition at line 177 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getFlag\(\)](#).

Referenced by [RMOL::Detruncator::unconstrainUsingMultiplicativePickUp\(\)](#).

27.61.3.11 `const stdair::NbOfBookings_T& RMOL::HistoricalBooking-Holder::getUnconstrainedDemandOnFirstElement ( ) const  
[inline]`

Get the unconstraining demand of the first flight.

Definition at line 60 of file [HistoricalBookingHolder.hpp](#).

References [getUnconstrainedDemand\(\)](#).

27.61.3.12 `const stdair::NbOfBookings_T RMOL::HistoricalBookingHolder::calculate-ExpectedDemand ( const double iMean, const double iSD, const short i, const stdair::NbOfBookings_T iDemand ) const`

Calculate the expected demand.

Definition at line 191 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getNbOfBookings\(\)](#).

27.61.3.13 void RMOL::HistoricalBookingHolder::setUnconstrainedDemand ( const stdair::NbOfBookings\_T & *iExpectedDemand*, const short *i* )

Set the expected historical demand of the (i+1)-th flight.

Definition at line 185 of file [HistoricalBookingHolder.cpp](#).

Referenced by [RMOL::EMDetruncator::unconstrainUsingEMMethod\(\)](#), and [RMOL::Detruncator::unconstrainUsingMultiplicativePickUp\(\)](#).

27.61.3.14 void RMOL::HistoricalBookingHolder::addHistoricalBooking ( const HistoricalBooking & *iHistoricalBooking* )

Add a [HistoricalBooking](#) object to the holder.

Definition at line 236 of file [HistoricalBookingHolder.cpp](#).

27.61.3.15 void RMOL::HistoricalBookingHolder::toStream ( std::ostream & *ioOut* ) const

Dump a Business Object into an output stream.

#### Parameters

<i>ostream&amp;</i>	the output stream
---------------------	-------------------

#### Returns

*ostream&* the output stream.

Definition at line 241 of file [HistoricalBookingHolder.cpp](#).

References [RMOL::HistoricalBooking::getNbOfBookings\(\)](#), [RMOL::HistoricalBooking::getUnconstrainedDemand\(\)](#), and [RMOL::HistoricalBooking::getFlag\(\)](#).

Referenced by [display\(\)](#).

27.61.3.16 const std::string RMOL::HistoricalBookingHolder::describe ( ) const

Give a description of the structure (for display purposes).

Definition at line 265 of file [HistoricalBookingHolder.cpp](#).

27.61.3.17 void RMOL::HistoricalBookingHolder::display ( ) const

Display on standard output.

Definition at line 273 of file [HistoricalBookingHolder.cpp](#).

References [toStream\(\)](#).

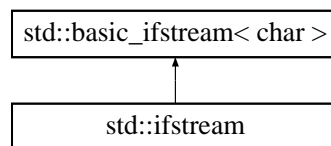
The documentation for this struct was generated from the following files:

- [rmol/bom/HistoricalBookingHolder.hpp](#)
- [rmol/bom/HistoricalBookingHolder.cpp](#)

## 27.62 std::ifstream Class Reference

STL class.

Inheritance diagram for std::ifstream:



### 27.62.1 Detailed Description

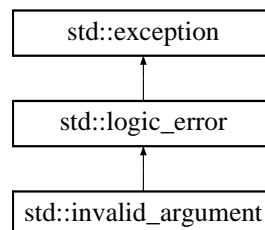
STL class.

The documentation for this class was generated from the following file:

## 27.63 std::invalid\_argument Class Reference

STL class.

Inheritance diagram for std::invalid\_argument:



### 27.63.1 Detailed Description

STL class.

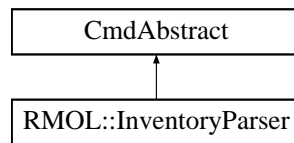
The documentation for this class was generated from the following file:

## 27.64 RMOL::InventoryParser Class Reference

Class filling the virtual class list (representing a list of classes/buckets) from a given input inventory.

```
#include <rmol/command/InventoryParser.hpp>
```

Inheritance diagram for RMOL::InventoryParser:



### Static Public Member Functions

- static bool [parseInputFileAndBuildBom](#) (const [std::string](#) &iInputFileName, [stdair::BomRoot](#) &)

#### 27.64.1 Detailed Description

Class filling the virtual class list (representing a list of classes/buckets) from a given input inventory.

#### 27.64.2 Member Function Documentation

**27.64.2.1** bool [RMOL::InventoryParser::parseInputFileAndBuildBom](#) ( const [std::string](#) &*iInputFileName*, [stdair::BomRoot](#) & *ioBomRoot* ) [static]

Parse the input values from a CSV-formatted inventory file.

#### Parameters

<i>const</i>	<a href="#">std::string</a> &iInputFileName Inventory file to be parsed.
<i>stdair::BomRoot</i> &	The BOM tree.

#### Returns

bool Whether or not the parsing was successful.

Definition at line 36 of file [InventoryParser.cpp](#).

Referenced by [RMOL::RMOL\\_Service::parseAndLoad\(\)](#).

The documentation for this class was generated from the following files:

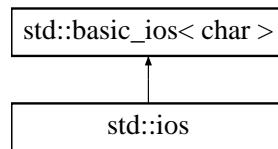
- [rmol/command/InventoryParser.hpp](#)
- [rmol/command/InventoryParser.cpp](#)

## 27.65 std::ios Class Reference

STL class.

Inheritance diagram for [std::ios](#):





#### 27.65.1 Detailed Description

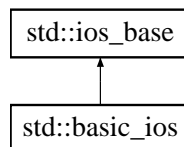
STL class.

The documentation for this class was generated from the following file:

### 27.66 std::ios\_base Class Reference

STL class.

Inheritance diagram for `std::ios_base`:



#### Classes

- class [failure](#)  
*STL class.*

#### 27.66.1 Detailed Description

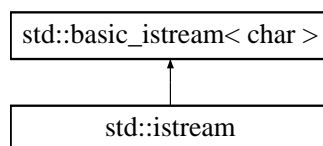
STL class.

The documentation for this class was generated from the following file:

### 27.67 std::istream Class Reference

STL class.

Inheritance diagram for `std::istream`:



**27.67.1 Detailed Description**

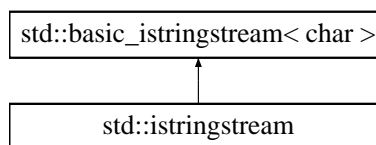
STL class.

The documentation for this class was generated from the following file:

**27.68 std::istream Class Reference**

STL class.

Inheritance diagram for std::istream:

**27.68.1 Detailed Description**

STL class.

The documentation for this class was generated from the following file:

**27.69 std::string::iterator Class Reference**

STL iterator class.

**27.69.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.70 std::wstring::iterator Class Reference**

STL iterator class.

**27.70.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.71 std::deque::iterator Class Reference**

STL iterator class.

**27.71.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.72 std::list::iterator Class Reference**

STL iterator class.

**27.72.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.73 std::map::iterator Class Reference**

STL iterator class.

**27.73.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.74 std::multimap::iterator Class Reference**

STL iterator class.

**27.74.1 Detailed Description**

STL iterator class.

The documentation for this class was generated from the following file:

**27.75 std::set::iterator Class Reference**

STL iterator class.

#### 27.75.1 Detailed Description

STL iterator class.

The documentation for this class was generated from the following file:

### 27.76 **std::multiset::iterator Class Reference**

STL iterator class.

#### 27.76.1 Detailed Description

STL iterator class.

The documentation for this class was generated from the following file:

### 27.77 **std::vector::iterator Class Reference**

STL iterator class.

#### 27.77.1 Detailed Description

STL iterator class.

The documentation for this class was generated from the following file:

### 27.78 **std::basic\_string::iterator Class Reference**

STL iterator class.

#### 27.78.1 Detailed Description

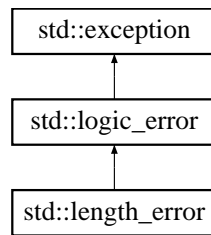
STL iterator class.

The documentation for this class was generated from the following file:

### 27.79 **std::length\_error Class Reference**

STL class.

Inheritance diagram for std::length\_error:



#### 27.79.1 Detailed Description

STL class.

The documentation for this class was generated from the following file:

### 27.80 `std::list` Class Reference

STL class.

#### Classes

- class [const\\_iterator](#)  
*STL iterator class.*
- class [const\\_reverse\\_iterator](#)  
*STL iterator class.*
- class [iterator](#)  
*STL iterator class.*
- class [reverse\\_iterator](#)  
*STL iterator class.*

#### 27.80.1 Detailed Description

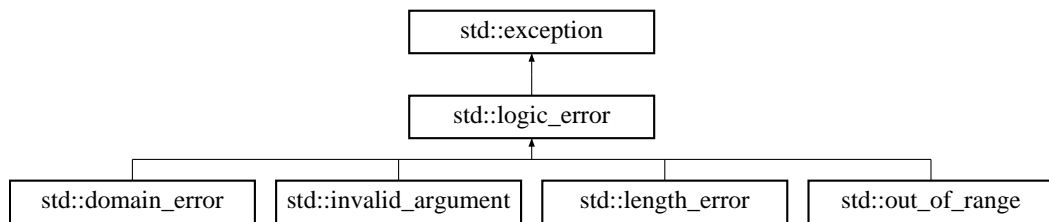
STL class.

The documentation for this class was generated from the following files:

### 27.81 `std::logic_error` Class Reference

STL class.

Inheritance diagram for `std::logic_error`:



### 27.81.1 Detailed Description

STL class.

The documentation for this class was generated from the following file:

## 27.82 std::map Class Reference

STL class.

### Classes

- class [const\\_iterator](#)  
*STL iterator class.*
- class [const\\_reverse\\_iterator](#)  
*STL iterator class.*
- class [iterator](#)  
*STL iterator class.*
- class [reverse\\_iterator](#)  
*STL iterator class.*

### 27.82.1 Detailed Description

STL class.

The documentation for this class was generated from the following files:

## 27.83 RMOL::MCOptimiser Class Reference

```
#include <rmol/bom/MCOptimiser.hpp>
```

### Static Public Member Functions

- static void [optimalOptimisationByMCIntegration](#) (stdair::LegCabin &)
- static stdair::GeneratedDemandVector\_T [generateDemandVector](#) (const stdair::MeanValue\_T &, const stdair::StdDevValue\_T &, const unsigned int &)

- static void [optimisationByMCIntegration](#) (stdair::LegCabin &)

### 27.83.1 Detailed Description

Utility methods for the Monte-Carlo algorithms.

### 27.83.2 Member Function Documentation

**27.83.2.1** void `RMOL::MCOptimiser::optimalOptimisationByMCIntegration` ( stdair::LegCabin & *ioLegCabin* ) [static]

Calculate the optimal protections for the set of buckets/classes given in input, and update those buckets accordingly.

The Monte Carlo Integration algorithm (see The Theory and Practice of Revenue - Management, by Kalyan T. Talluri and Garret J. van Ryzin, Kluwer Academic Publishers, for the details) is used.

Definition at line 28 of file [MCOptimiser.cpp](#).

**27.83.2.2** stdair::GeneratedDemandVector.T `RMOL::MCOptimiser::generateDemandVector` ( const stdair::MeanValue.T & *iMean*, const stdair::StdDevValue.T & *iStdDev*, const unsigned int & *K* ) [static]

Monte-Carlo

Definition at line 154 of file [MCOptimiser.cpp](#).

Referenced by [optimisationByMCIntegration\(\)](#).

**27.83.2.3** void `RMOL::MCOptimiser::optimisationByMCIntegration` ( stdair::LegCabin & *ioLegCabin* ) [static]

Definition at line 175 of file [MCOptimiser.cpp](#).

References [generateDemandVector\(\)](#).

Referenced by [RMOL::Optimiser::optimiseUsingOnDForecast\(\)](#).

The documentation for this class was generated from the following files:

- `rmol/bom/MCOptimiser.hpp`
- `rmol/bom/MCOptimiser.cpp`

## 27.84 `std::multimap` Class Reference

STL class.

### Classes

- class [const\\_iterator](#)

*STL iterator class.*

- class [const\\_reverse\\_iterator](#)

*STL iterator class.*

- class [iterator](#)

*STL iterator class.*

- class [reverse\\_iterator](#)

*STL iterator class.*

#### 27.84.1 Detailed Description

STL class.

The documentation for this class was generated from the following files:

## 27.85 **std::multiset Class Reference**

STL class.

### Classes

- class [const\\_iterator](#)

*STL iterator class.*

- class [const\\_reverse\\_iterator](#)

*STL iterator class.*

- class [iterator](#)

*STL iterator class.*

- class [reverse\\_iterator](#)

*STL iterator class.*

#### 27.85.1 Detailed Description

STL class.

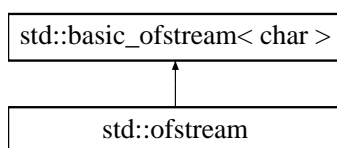
The documentation for this class was generated from the following files:

## 27.86 **std::ofstream Class Reference**

STL class.

Inheritance diagram for std::ofstream:





### 27.86.1 Detailed Description

STL class.

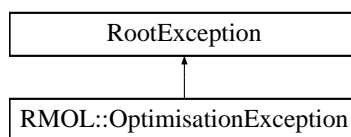
The documentation for this class was generated from the following file:

## 27.87 RMOL::OptimisationException Class Reference

Optimisation-related exception.

```
#include <rmol/RMOL_Types.hpp>
```

Inheritance diagram for RMOL::OptimisationException:



### Public Member Functions

- [OptimisationException](#) (const [std::string](#) &iWhat)

### 27.87.1 Detailed Description

Optimisation-related exception.

### 27.87.2 Constructor & Destructor Documentation

#### 27.87.2.1 RMOL::OptimisationException::OptimisationException ( const [std::string](#) & iWhat ) [inline]

Constructor.

Definition at line 64 of file [RMOL\\_Types.hpp](#).

The documentation for this class was generated from the following file:

- [rmol/RMOL\\_Types.hpp](#)

## 27.88 RMOL::Optimiser Class Reference

```
#include <rmol/command/Optimiser.hpp>
```

### Static Public Member Functions

- static void [optimalOptimisationByMCIntegration](#) (const int K, stdair::LegCabin &)
- static void [optimalOptimisationByDP](#) (stdair::LegCabin &)
- static void [heuristicOptimisationByEmsr](#) (stdair::LegCabin &)
- static void [heuristicOptimisationByEmsrA](#) (stdair::LegCabin &)
- static void [heuristicOptimisationByEmsrB](#) (stdair::LegCabin &)
- static void [optimise](#) (stdair::FlightDate &)
- static void [buildVirtualClassListForLegBasedOptimisation](#) (stdair::LegCabin &)
- static double [optimiseUsingOnDForecast](#) (stdair::FlightDate &, const bool &i-ReduceFluctuations=false)

### 27.88.1 Detailed Description

Class wrapping the optimisation algorithms.

### 27.88.2 Member Function Documentation

**27.88.2.1** void RMOL::Optimiser::optimalOptimisationByMCIntegration ( const int K, stdair::LegCabin & *ioLegCabin* ) [static]

Monte Carlo Integration algorithm.

Calculate the optimal protections for the set of buckets/classes given in input, and update those buckets accordingly.

The Monte Carlo Integration algorithm (see The Theory and Practice of Revenue - Management, by Kalyan T. Talluri and Garret J. van Ryzin, Kluwer Academic Publishers, for the details) is used. Hence, K is the number of random draws to perform. 100 is a minimum for K, as statistics must be drawn from those random generations.

Definition at line 29 of file [Optimiser.cpp](#).

Referenced by [optimise\(\)](#).

**27.88.2.2** void RMOL::Optimiser::optimalOptimisationByDP ( stdair::LegCabin & *ioLegCabin* ) [static]

Dynamic Programming.

Definition at line 63 of file [Optimiser.cpp](#).

**27.88.2.3** void RMOL::Optimiser::heuristicOptimisationByEmsr ( stdair::LegCabin & *ioLegCabin* ) [static]

EMRS algorithm.

Definition at line 68 of file [Optimiser.cpp](#).

27.88.2.4 `void RMOL::Optimiser::heuristicOptimisationByEmsrA ( stdair::LegCabin & ioLegCabin ) [static]`

EMRS-a algorithm.

Definition at line 73 of file [Optimiser.cpp](#).

27.88.2.5 `void RMOL::Optimiser::heuristicOptimisationByEmsrB ( stdair::LegCabin & ioLegCabin ) [static]`

EMRS-b algorithm.

Definition at line 78 of file [Optimiser.cpp](#).

27.88.2.6 `void RMOL::Optimiser::optimise ( stdair::FlightDate & ioFlightDate ) [static]`

Optimise a flight-date using leg-based Monte Carlo Integration.

Definition at line 83 of file [Optimiser.cpp](#).

References [buildVirtualClassListForLegBasedOptimisation\(\)](#), and [optimalOptimisation-ByMCIntegration\(\)](#).

27.88.2.7 `void RMOL::Optimiser::buildVirtualClassListForLegBasedOptimisation ( stdair::LegCabin & ioLegCabin ) [static]`

Build the virtual class list for the given leg-cabin.

Definition at line 112 of file [Optimiser.cpp](#).

Referenced by [optimise\(\)](#).

27.88.2.8 `double RMOL::Optimiser::optimiseUsingOnDForecast ( stdair::FlightDate & ioFlightDate, const bool & iReduceFluctuations = false ) [static]`

### [Optimiser](#)

Definition at line 156 of file [Optimiser.cpp](#).

References [RMOL::MCOptimiser::optimisationByMCIntegration\(\)](#).

Referenced by [RMOL::RMOL\\_Service::optimiseOnD\(\)](#), [RMOL::RMOL\\_Service::optimiseOnDUsingRMCooperation\(\)](#), and [RMOL::RMOL\\_Service::optimiseOnD-UsingAdvancedRMCooperation\(\)](#).

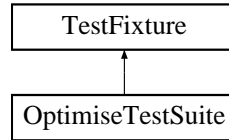
The documentation for this class was generated from the following files:

- [rmol/command/Optimiser.hpp](#)
- [rmol/command/Optimiser.cpp](#)

## 27.89 OptimiseTestSuite Class Reference

```
#include <test/rmol/OptimiseTestSuite.hpp>
```

Inheritance diagram for OptimiseTestSuite:



#### Public Member Functions

- void [testOptimiseMC](#) ()
- void [testOptimiseDP](#) ()
- void [testOptimiseEMSR](#) ()
- void [testOptimiseEMSRa](#) ()
- void [testOptimiseEMSRb](#) ()
- [OptimiseTestSuite](#) ()

#### Protected Attributes

- [std::stringstream \\_describeKey](#)

#### 27.89.1 Constructor & Destructor Documentation

##### 27.89.1.1 OptimiseTestSuite::OptimiseTestSuite ( )

Test some error detection functionalities. Constructor.

#### 27.89.2 Member Function Documentation

##### 27.89.2.1 void OptimiseTestSuite::testOptimiseMC ( )

Test the Monte-Carlo (MC) Optimisation functionality.

##### 27.89.2.2 void OptimiseTestSuite::testOptimiseDP ( )

Test the Dynamic Programming (DP) Optimisation functionality.

##### 27.89.2.3 void OptimiseTestSuite::testOptimiseEMSR ( )

Test the Expected Marginal Seat Revenue (EMSR) Optimisation functionality.

##### 27.89.2.4 void OptimiseTestSuite::testOptimiseEMSRa ( )

Test the Expected Marginal Seat Revenue, variant a (EMSR-a), Optimisation functionality.

### 27.89.2.5 void OptimiseTestSuite::testOptimiseEMSRb ( )

Test the Expected Marginal Seat Revenue, variant b (EMSR-b), Optimisation functionality.

### 27.89.3 Member Data Documentation

#### 27.89.3.1 std::stringstream OptimiseTestSuite::\_describeKey [protected]

Definition at line 43 of file [OptimiseTestSuite.hpp](#).

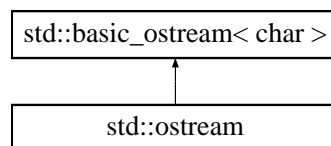
The documentation for this class was generated from the following file:

- test/rmol/[OptimiseTestSuite.hpp](#)

## 27.90 std::ostream Class Reference

STL class.

Inheritance diagram for std::ostream:



### 27.90.1 Detailed Description

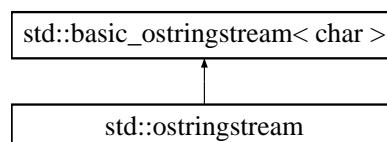
STL class.

The documentation for this class was generated from the following file:

## 27.91 std::ostringstream Class Reference

STL class.

Inheritance diagram for std::ostringstream:



## 27.91.1 Detailed Description

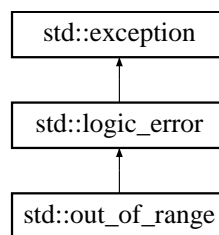
STL class.

The documentation for this class was generated from the following file:

## 27.92 std::out\_of\_range Class Reference

STL class.

Inheritance diagram for std::out\_of\_range:



## 27.92.1 Detailed Description

STL class.

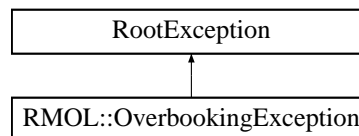
The documentation for this class was generated from the following file:

## 27.93 RMOL::OverbookingException Class Reference

Overbooking-related exception.

```
#include <rmol/RMOL_Types.hpp>
```

Inheritance diagram for RMOL::OverbookingException:



## Public Member Functions

- [OverbookingException](#) (const [std::string](#) &iWhat)

## 27.93.1 Detailed Description

Overbooking-related exception.

### 27.93.2 Constructor & Destructor Documentation

#### 27.93.2.1 `RMOL::OverbookingException::OverbookingException ( const std::string & iWhat )` `[inline]`

Constructor.

Definition at line 34 of file [RMOL\\_Types.hpp](#).

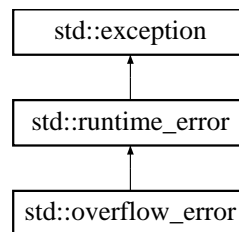
The documentation for this class was generated from the following file:

- [rmol/RMOL\\_Types.hpp](#)

## 27.94 `std::overflow_error` Class Reference

STL class.

Inheritance diagram for `std::overflow_error`:



### 27.94.1 Detailed Description

STL class.

The documentation for this class was generated from the following file:

## 27.95 `std::priority_queue` Class Reference

STL class.

### 27.95.1 Detailed Description

STL class.

The documentation for this class was generated from the following files:

## 27.96 `std::queue` Class Reference

STL class.

### 27.96.1 Detailed Description

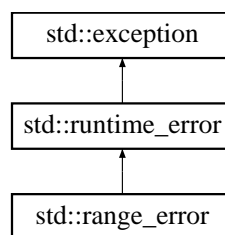
STL class.

The documentation for this class was generated from the following files:

## 27.97 `std::range_error` Class Reference

STL class.

Inheritance diagram for `std::range_error`:



### 27.97.1 Detailed Description

STL class.

The documentation for this class was generated from the following file:

## 27.98 `std::string::reverse_iterator` Class Reference

STL iterator class.

### 27.98.1 Detailed Description

STL iterator class.

The documentation for this class was generated from the following file:

## 27.99 `std::wstring::reverse_iterator` Class Reference

STL iterator class.

### 27.99.1 Detailed Description

STL iterator class.

The documentation for this class was generated from the following file:



## 27.100 **std::list::reverse\_iterator Class Reference**

STL iterator class.

### 27.100.1 Detailed Description

STL iterator class.

The documentation for this class was generated from the following file:

## 27.101 **std::basic\_string::reverse\_iterator Class Reference**

STL iterator class.

### 27.101.1 Detailed Description

STL iterator class.

The documentation for this class was generated from the following file:

## 27.102 **std::multimap::reverse\_iterator Class Reference**

STL iterator class.

### 27.102.1 Detailed Description

STL iterator class.

The documentation for this class was generated from the following file:

## 27.103 **std::vector::reverse\_iterator Class Reference**

STL iterator class.

### 27.103.1 Detailed Description

STL iterator class.

The documentation for this class was generated from the following file:

## 27.104 **std::set::reverse\_iterator Class Reference**

STL iterator class.

## 27.104.1 Detailed Description

STL iterator class.

The documentation for this class was generated from the following file:

27.105 `std::multiset::reverse_iterator` Class Reference

STL iterator class.

## 27.105.1 Detailed Description

STL iterator class.

The documentation for this class was generated from the following file:

27.106 `std::deque::reverse_iterator` Class Reference

STL iterator class.

## 27.106.1 Detailed Description

STL iterator class.

The documentation for this class was generated from the following file:

27.107 `std::map::reverse_iterator` Class Reference

STL iterator class.

## 27.107.1 Detailed Description

STL iterator class.

The documentation for this class was generated from the following file:

27.108 `RMOL::RMOL_Service` Class Reference

Interface for the [RMOL](#) Services.

```
#include <rmol/RMOL_Service.hpp>
```

## Public Member Functions

- [RMOL\\_Service](#) (const stdair::BasLogParams &, const stdair::BasDBParams &)

- [RMOL\\_Service](#) (const stdair::BasLogParams &)
- [RMOL\\_Service](#) (stdair::STDAIR\_ServicePtr\_T)
- void [parseAndLoad](#) (const stdair::CabinCapacity\_T &iCabinCapacity, const stdair::Filename\_T &iDemandAndClassDataFile)
- void [setUpStudyStatManager](#) ()
- [~RMOL\\_Service](#) ()
- void [buildSampleBom](#) ()
- void [optimalOptimisationByMCIntegration](#) (const int K)
- void [optimalOptimisationByDP](#) ()
- void [heuristicOptimisationByEmsr](#) ()
- void [heuristicOptimisationByEmsrA](#) ()
- void [heuristicOptimisationByEmsrB](#) ()
- bool [optimise](#) (stdair::FlightDate &, const stdair::DateTime\_T &, const stdair::ForecastingMethod &, const stdair::PartnershipTechnique &)
- void [forecastOnD](#) (const stdair::DateTime\_T &)
- stdair::YieldFeatures \* [getYieldFeatures](#) (const stdair::OnDDate &, const stdair::CabinCode\_T &, stdair::BomRoot &)
- void [forecastOnD](#) (const stdair::YieldFeatures &, stdair::OnDDate &, const stdair::CabinCode\_T &, const stdair::DTD\_T &, stdair::BomRoot &)
- void [setOnDForecast](#) (const stdair::AirlineClassList &, const stdair::MeanValue\_T &, const stdair::StdDevValue\_T &, stdair::OnDDate &, const stdair::CabinCode\_T &, stdair::BomRoot &)
- void [setOnDForecast](#) (const stdair::AirlineCode\_T &, const stdair::Date\_T &, const stdair::AirportCode\_T &, const stdair::AirportCode\_T &, const stdair::CabinCode\_T &, const stdair::ClassCode\_T &, const stdair::MeanValue\_T &, const stdair::StdDevValue\_T &, const stdair::Yield\_T &, stdair::BomRoot &)
- void [setOnDForecast](#) (const stdair::AirlineCodeList\_T &, const stdair::AirlineCode\_T &, const stdair::Date\_T &, const stdair::AirportCode\_T &, const stdair::AirportCode\_T &, const stdair::CabinCode\_T &, const stdair::ClassCodeList\_T &, const stdair::MeanValue\_T &, const stdair::StdDevValue\_T &, const stdair::Yield\_T &, stdair::BomRoot &)
- void [resetDemandInformation](#) (const stdair::DateTime\_T &)
- void [resetDemandInformation](#) (const stdair::DateTime\_T &, const stdair::Inventory &)
- void [projectAggregatedDemandOnLegCabins](#) (const stdair::DateTime\_T &)
- void [projectOnDDemandOnLegCabinsUsingYP](#) (const stdair::DateTime\_T &)
- void [projectOnDDemandOnLegCabinsUsingDA](#) (const stdair::DateTime\_T &)
- void [projectOnDDemandOnLegCabinsUsingDYP](#) (const stdair::DateTime\_T &)
- void [projectOnDDemandOnLegCabinsUsingDYP](#) (const stdair::DateTime\_T &, const stdair::Inventory &)
- void [optimiseOnD](#) (const stdair::DateTime\_T &)
- void [optimiseOnDUsingRMCooperation](#) (const stdair::DateTime\_T &)
- void [optimiseOnDUsingAdvancedRMCooperation](#) (const stdair::DateTime\_T &)
- void [updateBidPrice](#) (const stdair::DateTime\_T &)
- void [updateBidPrice](#) (const stdair::FlightDate &, stdair::BomRoot &)
- [std::string jsonExport](#) (const stdair::AirlineCode\_T &, const stdair::FlightNumber\_T &, const stdair::Date\_T &iDepartureDate) const
- [std::string csvDisplay](#) () const

### 27.108.1 Detailed Description

Interface for the [RMOL](#) Services.

### 27.108.2 Constructor & Destructor Documentation

#### 27.108.2.1 RMOL::RMOL\_Service::RMOL\_Service ( const stdair::BasLogParams & *iLogParams*, const stdair::BasDBParams & *iDBParams* )

Constructor.

The `initRmolService()` method is called; see the corresponding documentation for more details.

A reference on an output stream is given, so that log outputs can be directed onto that stream.

Moreover, database connection parameters are given, so that a session can be created on the corresponding database.

##### Parameters

<i>const</i>	stdair::BasLogParams& Parameters for the output log stream.
<i>const</i>	stdair::BasDBParams& Parameters for the database access.

Definition at line 84 of file [RMOL\\_Service.cpp](#).

#### 27.108.2.2 RMOL::RMOL\_Service::RMOL\_Service ( const stdair::BasLogParams & *iLogParams* )

Constructor.

The `initRmolService()` method is called; see the corresponding documentation for more details.

Moreover, a reference on an output stream is given, so that log outputs can be directed onto that stream.

##### Parameters

<i>const</i>	stdair::BasLogParams& Parameters for the output log stream.
--------------	---

Definition at line 63 of file [RMOL\\_Service.cpp](#).

#### 27.108.2.3 RMOL::RMOL\_Service::RMOL\_Service ( stdair::STDAIR\_ServicePtr\_T *ioSTDAIRServicePtr* )

Constructor.

The `initRmolService()` method is called; see the corresponding documentation for more details.

Moreover, as no reference on any output stream is given, it is assumed that the Std-Air log service has already been initialised with the proper log output stream by some other methods in the calling chain (for instance, when the [RMOL\\_Service](#) is itself being

initialised by another library service such as AIRINV\_Service).

#### Parameters

<i>STDAIR_ServicePtr_T</i>	the shared pointer of stdair service.
----------------------------	---------------------------------------

Definition at line 106 of file [RMOL\\_Service.cpp](#).

#### 27.108.2.4 RMOL::RMOL\_Service::~~RMOL\_Service ( )

Destructor.

Definition at line 123 of file [RMOL\\_Service.cpp](#).

### 27.108.3 Member Function Documentation

#### 27.108.3.1 void RMOL::RMOL\_Service::parseAndLoad ( const stdair::CabinCapacity\_T & iCabinCapacity, const stdair::Filename\_T & iDemandAndClassDataFile )

Parse the optimisation-related data and load them into memory.

First, the `STDAIR_Service::buildDummyInventory()` method is called, for [RMOL](#) and with the given cabin capacity, in order to build the minimum required flight-date structure in order to perform an optimisation on a leg-cabin.

The CSV input file describes the problem to be optimised, i.e.:

- the demand specifications for all the booking classes (mean and standard deviations for the demand distribution); the yields corresponding to those booking classes.

That CSV file is parsed and instantiated in memory accordingly. The leg-cabin capacity has been set at the initialisation of the ([RMOL](#)) service.

#### Parameters

<i>const</i>	stdair::CabinCapacity& Capacity of the leg-cabin to be optimised.
<i>const</i>	stdair::Filename_T& (CSV) input file.

Definition at line 200 of file [RMOL\\_Service.cpp](#).

References [RMOL::InventoryParser::parseInputFileAndBuildBom\(\)](#).

Referenced by [main\(\)](#).

#### 27.108.3.2 void RMOL::RMOL\_Service::setUpStudyStatManager ( )

Set up the StudyStatManager.

### 27.108.3.3 void RMOL::RMOL\_Service::buildSampleBom ( )

Build a sample BOM tree, and attach it to the BomRoot instance.

See also

stdair::CmdBomManager::buildSampleBom() for more details.

Definition at line 224 of file [RMOL\\_Service.cpp](#).

Referenced by [main\(\)](#).

### 27.108.3.4 void RMOL::RMOL\_Service::optimalOptimisationByMCIntegration ( const int K )

Single resource optimization using the Monte Carlo algorithm.

Definition at line 272 of file [RMOL\\_Service.cpp](#).

Referenced by [optimise\(\)](#).

### 27.108.3.5 void RMOL::RMOL\_Service::optimalOptimisationByDP ( )

Single resource optimization using dynamic programming.

Definition at line 312 of file [RMOL\\_Service.cpp](#).

Referenced by [optimise\(\)](#).

### 27.108.3.6 void RMOL::RMOL\_Service::heuristicOptimisationByEmsr ( )

Single resource optimization using EMSR heuristic.

Definition at line 316 of file [RMOL\\_Service.cpp](#).

Referenced by [optimise\(\)](#).

### 27.108.3.7 void RMOL::RMOL\_Service::heuristicOptimisationByEmsrA ( )

Single resource optimization using EMSR-a heuristic.

Definition at line 357 of file [RMOL\\_Service.cpp](#).

Referenced by [optimise\(\)](#).

### 27.108.3.8 void RMOL::RMOL\_Service::heuristicOptimisationByEmsrB ( )

Single resource optimization using EMSR-b heuristic.

Definition at line 378 of file [RMOL\\_Service.cpp](#).

Referenced by [optimise\(\)](#).

### 27.108.3.9 bool RMOL::RMOL\_Service::optimise ( stdair::FlightDate & ioFlightDate, const stdair::DateTime\_T & iRMEventTime, const stdair::ForecastingMethod & iForecastingMethod, const stdair::PartnershipTechnique & iPartnershipTechnique )

Optimise (revenue management) an flight-date/network-date

Definition at line 399 of file [RMOL\\_Service.cpp](#).

References [forecastOnD\(\)](#), [resetDemandInformation\(\)](#), [projectAggregatedDemandOnLegCabins\(\)](#), [optimiseOnD\(\)](#), [projectOnDDemandOnLegCabinsUsingYP\(\)](#), [updateBidPrice\(\)](#), [projectOnDDemandOnLegCabinsUsingDYP\(\)](#), [optimiseOnDUsingRMCooperation\(\)](#), [optimiseOnDUsingAdvancedRMCooperation\(\)](#), [RMOL::Forecaster::forecastUsingAdditivePickUp\(\)](#), and [RMOL::Forecaster::forecastUsingMultiplicativePickUp\(\)](#).

27.108.3.10 `void RMOL::RMOL_Service::forecastOnD ( const stdair::DateTime_T & iRMEventTime )`

#### Forecaster

Definition at line 500 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#), and [getYieldFeatures\(\)](#).

Referenced by [optimise\(\)](#).

27.108.3.11 `stdair::YieldFeatures * RMOL::RMOL_Service::getYieldFeatures ( const stdair::OnDDate & iOnDDate, const stdair::CabinCode_T & iCabinCode, stdair::BomRoot & iBomRoot )`

Definition at line 573 of file [RMOL\\_Service.cpp](#).

Referenced by [forecastOnD\(\)](#).

27.108.3.12 `void RMOL::RMOL_Service::forecastOnD ( const stdair::YieldFeatures & iYieldFeatures, stdair::OnDDate & iOnDDate, const stdair::CabinCode_T & iCabinCode, const stdair::DTD_T & iDTD, stdair::BomRoot & iBomRoot )`

Definition at line 646 of file [RMOL\\_Service.cpp](#).

References [setOnDForecast\(\)](#).

27.108.3.13 `void RMOL::RMOL_Service::setOnDForecast ( const stdair::AirlineClassList & iAirlineClassList, const stdair::MeanValue_T & iMeanValue, const stdair::StdDevValue_T & iStdDevValue, stdair::OnDDate & iOnDDate, const stdair::CabinCode_T & iCabinCode, stdair::BomRoot & iBomRoot )`

Definition at line 761 of file [RMOL\\_Service.cpp](#).

Referenced by [forecastOnD\(\)](#).

27.108.3.14 `void RMOL::RMOL_Service::setOnDForecast ( const stdair::AirlineCode_T & iAirlineCode, const stdair::Date_T & iDepartureDate, const stdair::AirportCode_T & iOrigin, const stdair::AirportCode_T & iDestination, const stdair::CabinCode_T & iCabinCode, const stdair::ClassCode_T & iClassCode, const stdair::MeanValue_T & iMeanValue, const stdair::StdDevValue_T & iStdDevValue, const stdair::Yield_T & iYield, stdair::BomRoot & iBomRoot )`

Definition at line 820 of file [RMOL\\_Service.cpp](#).

27.108.3.15 void RMOL::RMOL\_Service::setOnDForecast ( const stdair::AirlineCodeList\_T & *iAirlineCodeList*, const stdair::AirlineCode\_T & *iAirlineCode*, const stdair::Date\_T & *iDepartureDate*, const stdair::AirportCode\_T & *iOrigin*, const stdair::AirportCode\_T & *iDestination*, const stdair::CabinCode\_T & *iCabinCode*, const stdair::ClassCodeList\_T & *iClassCodeList*, const stdair::MeanValue\_T & *iMeanValue*, const stdair::StdDevValue\_T & *iStdDevValue*, const stdair::Yield\_T & *iYield*, stdair::BomRoot & *iBomRoot* )

Definition at line 882 of file [RMOL\\_Service.cpp](#).

27.108.3.16 void RMOL::RMOL\_Service::resetDemandInformation ( const stdair::DateTime\_T & *iRMEventTime* )

Definition at line 997 of file [RMOL\\_Service.cpp](#).

Referenced by [optimise\(\)](#), [optimiseOnDUsingRMCooperation\(\)](#), and [optimiseOnD-UsingAdvancedRMCooperation\(\)](#).

27.108.3.17 void RMOL::RMOL\_Service::resetDemandInformation ( const stdair::DateTime\_T & *iRMEventTime*, const stdair::Inventory & *iInventory* )

Definition at line 1023 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#).

27.108.3.18 void RMOL::RMOL\_Service::projectAggregatedDemandOnLegCabins ( const stdair::DateTime\_T & *iRMEventTime* )

Definition at line 1071 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#).

Referenced by [optimise\(\)](#).

27.108.3.19 void RMOL::RMOL\_Service::projectOnDDemandOnLegCabinsUsingYP ( const stdair::DateTime\_T & *iRMEventTime* )

Definition at line 1176 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#).

Referenced by [optimise\(\)](#).

27.108.3.20 void RMOL::RMOL\_Service::projectOnDDemandOnLegCabinsUsingDA ( const stdair::DateTime\_T & *iRMEventTime* )

Definition at line 1451 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#).

27.108.3.21 void RMOL::RMOL\_Service::projectOnDDemandOnLegCabinsUsingDYP ( const stdair::DateTime\_T & *iRMEventTime* )

Definition at line 1607 of file [RMOL\\_Service.cpp](#).



Referenced by [optimise\(\)](#), [optimiseOnDUsingRMCooperation\(\)](#), and [optimiseOnD-UsingAdvancedRMCooperation\(\)](#).

27.108.3.22 `void RMOL::RMOL_Service::projectOnDDemandOnLegCabinsUsingDYP ( const stdair::DateTime_T & iRMEventTime, const stdair::Inventory & ilInventory )`

Definition at line 1633 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#).

27.108.3.23 `void RMOL::RMOL_Service::optimiseOnD ( const stdair::DateTime_T & iRMEventTime )`

[Optimiser](#)

Definition at line 1275 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#), and [RMOL::Optimiser::optimiseUsingOnD-Forecast\(\)](#).

Referenced by [optimise\(\)](#).

27.108.3.24 `void RMOL::RMOL_Service::optimiseOnDUsingRMCooperation ( const stdair::DateTime_T & iRMEventTime )`

Definition at line 1749 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#), [RMOL::Optimiser::optimiseUsingOnD-Forecast\(\)](#), [resetDemandInformation\(\)](#), and [projectOnDDemandOnLegCabinsUsingDYP\(\)](#).

Referenced by [optimise\(\)](#).

27.108.3.25 `void RMOL::RMOL_Service::optimiseOnDUsingAdvancedRMCooperation ( const stdair::DateTime_T & iRMEventTime )`

Definition at line 1809 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#), [RMOL::Optimiser::optimiseUsingOnD-Forecast\(\)](#), [updateBidPrice\(\)](#), [resetDemandInformation\(\)](#), and [projectOnDDemandOnLegCabinsUsingDYP\(\)](#).

Referenced by [optimise\(\)](#).

27.108.3.26 `void RMOL::RMOL_Service::updateBidPrice ( const stdair::DateTime_T & iRMEventTime )`

Definition at line 1324 of file [RMOL\\_Service.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#).

Referenced by [optimise\(\)](#), and [optimiseOnDUsingAdvancedRMCooperation\(\)](#).

27.108.3.27 `void RMOL::RMOL_Service::updateBidPrice ( const stdair::FlightDate & iFlightDate,  
stdair::BomRoot & iBomRoot )`

Definition at line 1372 of file [RMOL\\_Service.cpp](#).

27.108.3.28 `std::string RMOL::RMOL_Service::jsonExport ( const stdair::AirlineCode_T & ,  
const stdair::FlightNumber_T & , const stdair::Date_T & iDepartureDate ) const`

Recursively dump, in the returned string and in JSON format, the flight-date corresponding to the parameters given as input.

#### Parameters

<i>const</i>	stdair::AirlineCode_T& Airline code of the flight to dump.
<i>const</i>	stdair::FlightNumber_T& Flight number of the flight to dump.
<i>const</i>	stdair::Date_T& Departure date of a flight to dump.

#### Returns

[std::string](#) Output string in which the BOM tree is JSON-ified.

27.108.3.29 `std::string RMOL::RMOL_Service::csvDisplay ( ) const`

Recursively display (dump in the returned string) the objects of the BOM tree.

#### Returns

[std::string](#) Output string in which the BOM tree is logged/dumped.

The documentation for this class was generated from the following files:

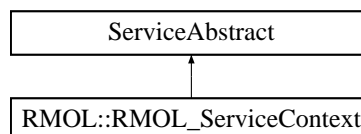
- [rmol/RMOL\\_Service.hpp](#)
- [rmol/service/RMOL\\_Service.cpp](#)

## 27.109 RMOL::RMOL\_ServiceContext Class Reference

Inner class holding the context for the [RMOL](#) Service object.

```
#include <rmol/service/RMOL_ServiceContext.hpp>
```

Inheritance diagram for RMOL::RMOL\_ServiceContext:



## Friends

- class [RMOL\\_Service](#)
- class [FacRmolServiceContext](#)

## 27.109.1 Detailed Description

Inner class holding the context for the [RMOL](#) Service object.

## 27.109.2 Friends And Related Function Documentation

27.109.2.1 friend class [RMOL\\_Service](#) `[friend]`

The [RMOL\\_Service](#) class should be the sole class to get access to ServiceContext content: general users do not want to bother with a context interface.

Definition at line 35 of file [RMOL\\_ServiceContext.hpp](#).

27.109.2.2 friend class [FacRmolServiceContext](#) `[friend]`

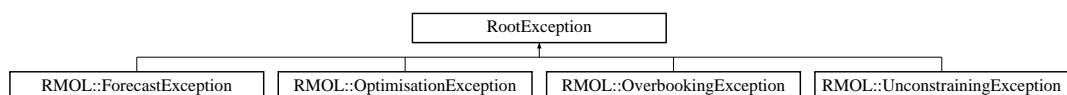
Definition at line 36 of file [RMOL\\_ServiceContext.hpp](#).

The documentation for this class was generated from the following files:

- [rmol/service/RMOL\\_ServiceContext.hpp](#)
- [rmol/service/RMOL\\_ServiceContext.cpp](#)

## 27.110 RootException Class Reference

Inheritance diagram for RootException:



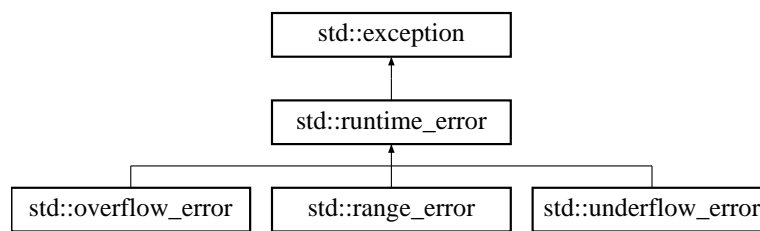
The documentation for this class was generated from the following file:

- [rmol/RMOL\\_Types.hpp](#)

## 27.111 std::runtime\_error Class Reference

STL class.

Inheritance diagram for std::runtime\_error:



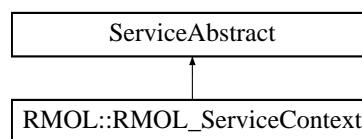
### 27.111.1 Detailed Description

STL class.

The documentation for this class was generated from the following file:

## 27.112 ServiceAbstract Class Reference

Inheritance diagram for ServiceAbstract:



The documentation for this class was generated from the following file:

- [rmol/service/RMOL\\_ServiceContext.hpp](#)

## 27.113 std::set Class Reference

STL class.

### Classes

- class [const\\_iterator](#)  
*STL iterator class.*
- class [const\\_reverse\\_iterator](#)  
*STL iterator class.*
- class [iterator](#)  
*STL iterator class.*
- class [reverse\\_iterator](#)  
*STL iterator class.*

## 27.113.1 Detailed Description

STL class.

The documentation for this class was generated from the following files:

27.114 `std::stack` Class Reference

STL class.

## 27.114.1 Detailed Description

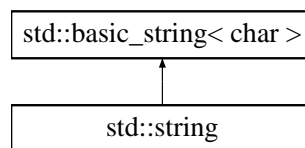
STL class.

The documentation for this class was generated from the following files:

27.115 `std::string` Class Reference

STL class.

Inheritance diagram for `std::string`:



## Classes

- class [const\\_iterator](#)  
*STL iterator class.*
- class [const\\_reverse\\_iterator](#)  
*STL iterator class.*
- class [iterator](#)  
*STL iterator class.*
- class [reverse\\_iterator](#)  
*STL iterator class.*

## 27.115.1 Detailed Description

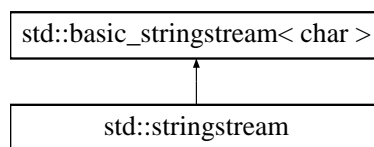
STL class.

The documentation for this class was generated from the following file:

## 27.116 std::stringstream Class Reference

STL class.

Inheritance diagram for std::stringstream:



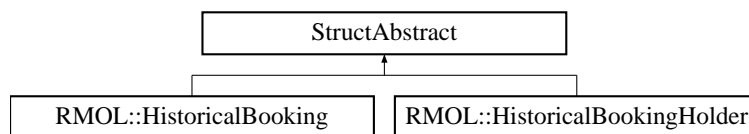
### 27.116.1 Detailed Description

STL class.

The documentation for this class was generated from the following file:

## 27.117 StructAbstract Class Reference

Inheritance diagram for StructAbstract:

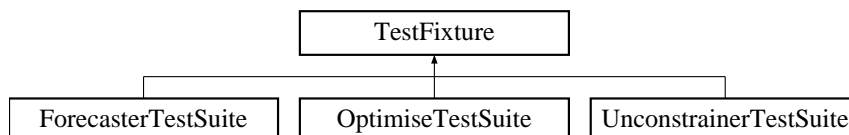


The documentation for this class was generated from the following file:

- [rmol/bom/HistoricalBooking.hpp](#)

## 27.118 TestFixture Class Reference

Inheritance diagram for TestFixture:



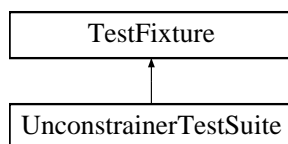
The documentation for this class was generated from the following file:

- [test/rmol/OptimiseTestSuite.hpp](#)

## 27.119 UnconstrainerTestSuite Class Reference

```
#include <test/rmol/UnconstrainerTestSuite.hpp>
```

Inheritance diagram for UnconstrainerTestSuite:



### Public Member Functions

- void [testUnconstrainingByEM](#) ()
- [UnconstrainerTestSuite](#) ()

### Protected Attributes

- [std::stringstream \\_describeKey](#)

### 27.119.1 Constructor & Destructor Documentation

#### 27.119.1.1 UnconstrainerTestSuite::UnconstrainerTestSuite ( )

Constructor.

### 27.119.2 Member Function Documentation

#### 27.119.2.1 void UnconstrainerTestSuite::testUnconstrainingByEM ( )

Test data unconstraining by Expectation Maximization.

### 27.119.3 Member Data Documentation

#### 27.119.3.1 [std::stringstream UnconstrainerTestSuite::\\_describeKey](#) [protected]

Definition at line 19 of file [UnconstrainerTestSuite.hpp](#).

The documentation for this class was generated from the following file:

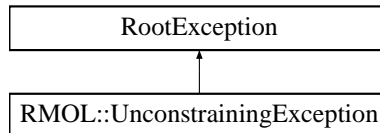
- [test/rmol/UnconstrainerTestSuite.hpp](#)

## 27.120 RMOL::UnconstrainingException Class Reference

Unconstraining-related exception.

```
#include <rmol/RMOL_Types.hpp>
```

Inheritance diagram for RMOL::UnconstrainingException:



### Public Member Functions

- [UnconstrainingException](#) (const `std::string` &iWhat)

#### 27.120.1 Detailed Description

Unconstraining-related exception.

#### 27.120.2 Constructor & Destructor Documentation

27.120.2.1 `RMOL::UnconstrainingException::UnconstrainingException ( const std::string &iWhat ) [inline]`

Constructor.

Definition at line 44 of file [RMOL\\_Types.hpp](#).

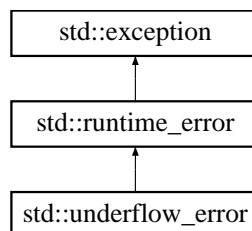
The documentation for this class was generated from the following file:

- [rmol/RMOL\\_Types.hpp](#)

## 27.121 std::underflow\_error Class Reference

STL class.

Inheritance diagram for `std::underflow_error`:





## 27.121.1 Detailed Description

STL class.

The documentation for this class was generated from the following file:

## 27.122 RMOL::Utilities Class Reference

```
#include <rmol/bom/Utilities.hpp>
```

## Static Public Member Functions

- static void [computeDistributionParameters](#) (const [UnconstrainedDemandVector\\_T](#) &, double &, double &)
- static stdair::DCPList\_T [buildRemainingDCPList](#) (const stdair::DTD\_T &)
- static stdair::DCPList\_T [buildRemainingDCPList2](#) (const stdair::DTD\_T &)
- static stdair::NbOfSegments\_T [getNbOfDepartedSimilarSegments](#) (const stdair::SegmentCabin &, const stdair::Date\_T &)

## 27.122.1 Detailed Description

Class holding helper methods.

## 27.122.2 Member Function Documentation

27.122.2.1 void RMOL::Utilities::computeDistributionParameters ( const [UnconstrainedDemandVector\\_T](#) & *iVector*, double & *ioMean*, double & *ioStdDev* ) [static]

Compute the mean and the standard deviation from a set of samples.

Definition at line 24 of file [Utilities.cpp](#).

27.122.2.2 stdair::DCPList\_T RMOL::Utilities::buildRemainingDCPList ( const stdair::DTD\_T & *iDTD* ) [static]

Build the list of remaining DCP's for the segment-date.

Definition at line 55 of file [Utilities.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#).

Referenced by [RMOL::Forecaster::forecastUsingAdditivePickUp\(\)](#).

27.122.2.3 stdair::DCPList\_T RMOL::Utilities::buildRemainingDCPList2 ( const stdair::DTD\_T & *iDTD* ) [static]

Definition at line 80 of file [Utilities.cpp](#).

References [RMOL::DEFAULT\\_DCP\\_LIST](#).

Referenced by [RMOL::Forecaster::forecastUsingAdditivePickUp\(\)](#).

27.122.2.4 `stdair::NbOfSegments_T` [RMOL::Utilities::getNbOfDepartedSimilarSegments](#) ( `const stdair::SegmentCabin & iSegmentCabin`, `const stdair::Date_T & iEventDate` )  
[static]

Retrieve the number of departed similar segments.

Definition at line 105 of file [Utilities.cpp](#).

References [RMOL::GuillotineBlockHelper::getNbOfSegmentAlreadyPassedThisDTD\(\)](#).

The documentation for this class was generated from the following files:

- [rmol/bom/Utilities.hpp](#)
- [rmol/bom/Utilities.cpp](#)

## 27.123 `std::valarray` Class Reference

STL class.

### 27.123.1 Detailed Description

STL class.

The documentation for this class was generated from the following files:

## 27.124 `std::vector` Class Reference

STL class.

### Classes

- class [const\\_iterator](#)  
*STL iterator class.*
- class [const\\_reverse\\_iterator](#)  
*STL iterator class.*
- class [iterator](#)  
*STL iterator class.*
- class [reverse\\_iterator](#)  
*STL iterator class.*

### 27.124.1 Detailed Description

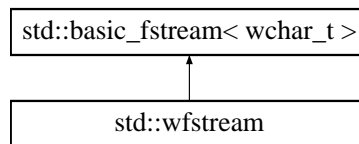
STL class.

The documentation for this class was generated from the following files:

## 27.125 **std::wfstream Class Reference**

STL class.

Inheritance diagram for std::wfstream:



### 27.125.1 Detailed Description

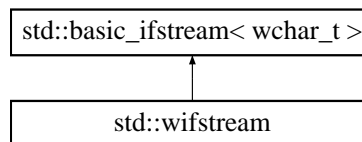
STL class.

The documentation for this class was generated from the following file:

## 27.126 **std::wifstream Class Reference**

STL class.

Inheritance diagram for std::wifstream:



### 27.126.1 Detailed Description

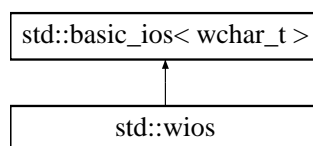
STL class.

The documentation for this class was generated from the following file:

## 27.127 **std::wios Class Reference**

STL class.

Inheritance diagram for std::wios:



**27.127.1 Detailed Description**

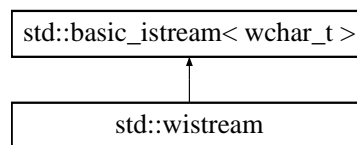
STL class.

The documentation for this class was generated from the following file:

**27.128 std::wistream Class Reference**

STL class.

Inheritance diagram for std::wistream:

**27.128.1 Detailed Description**

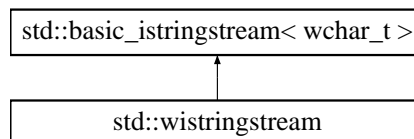
STL class.

The documentation for this class was generated from the following file:

**27.129 std::wstringstream Class Reference**

STL class.

Inheritance diagram for std::wstringstream:

**27.129.1 Detailed Description**

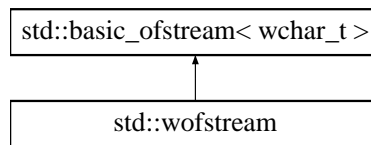
STL class.

The documentation for this class was generated from the following file:

**27.130 std::wofstream Class Reference**

STL class.

Inheritance diagram for std::wofstream:



#### 27.130.1 Detailed Description

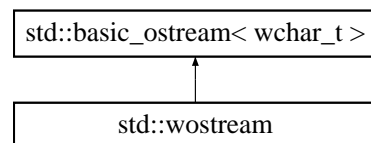
STL class.

The documentation for this class was generated from the following file:

### 27.131 std::wostream Class Reference

STL class.

Inheritance diagram for `std::wostream`:



#### 27.131.1 Detailed Description

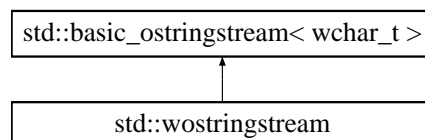
STL class.

The documentation for this class was generated from the following file:

### 27.132 std::wostringstream Class Reference

STL class.

Inheritance diagram for `std::wostringstream`:



#### 27.132.1 Detailed Description

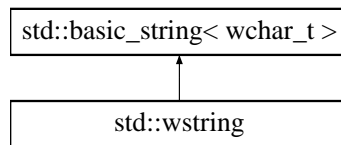
STL class.

The documentation for this class was generated from the following file:

## 27.133 `std::wstring` Class Reference

STL class.

Inheritance diagram for `std::wstring`:



### Classes

- class [const\\_iterator](#)  
*STL iterator class.*
- class [const\\_reverse\\_iterator](#)  
*STL iterator class.*
- class [iterator](#)  
*STL iterator class.*
- class [reverse\\_iterator](#)  
*STL iterator class.*

### 27.133.1 Detailed Description

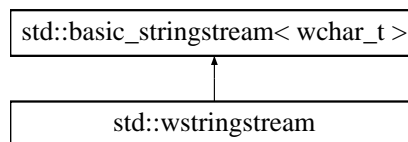
STL class.

The documentation for this class was generated from the following file:

## 27.134 `std::wstringstream` Class Reference

STL class.

Inheritance diagram for `std::wstringstream`:



### 27.134.1 Detailed Description

STL class.

The documentation for this class was generated from the following file:

## 28 File Documentation

28.1 doc/local/authors.doc File Reference

28.2 doc/local/codingrules.doc File Reference

28.3 doc/local/copyright.doc File Reference

28.4 doc/local/documentation.doc File Reference

28.5 doc/local/features.doc File Reference

28.6 doc/local/help\_wanted.doc File Reference

28.7 doc/local/howto\_release.doc File Reference

28.8 doc/local/index.doc File Reference

28.9 doc/local/installation.doc File Reference

28.10 doc/local/linking.doc File Reference

28.11 doc/local/test.doc File Reference

28.12 doc/local/users\_guide.doc File Reference

28.13 doc/local/verification.doc File Reference

28.14 doc/tutorial/tutorial.doc File Reference

28.15 rmol/basic/BasConst.cpp File Reference

```
#include <rmol/basic/BasConst_General.hpp> #include <rmol/basic/-  
BasConst_Curves.hpp> #include <rmol/basic/BasConst_RMOL_-  
Service.hpp>
```

## Namespaces

- namespace `RMOL`

## Variables

- `const stdair::AirlineCode_T RMOL::DEFAULT_RMOL_SERVICE_AIRLINE_CODE = "BA"`
- `const double RMOL::DEFAULT_RMOL_SERVICE_CAPACITY = 1.0`
- `const int RMOL::DEFAULT_NUMBER_OF_DRAWS_FOR_MC_SIMULATION = 100000`
- `const int RMOL::DEFAULT_PRECISION = 10`
- `const double RMOL::DEFAULT_EPSILON = 0.0001`
- `const double RMOL::DEFAULT_STOPPING_CRITERION = 0.01`
- `const double RMOL::DEFAULT_INITIALIZER_DOUBLE_NEGATIVE = -10.0`
- `const FRAT5Curve_T RMOL::DEFAULT_CUMULATIVE_FRAT5_CURVE`
- `const stdair::DCPList_T RMOL::DEFAULT_DCP_LIST = DefaultDCPList::init()`

## 28.16 BasConst.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 #include <rmol/basic/BasConst_General.hpp>
00005 #include <rmol/basic/BasConst_Curves.hpp>
00006 #include <rmol/basic/BasConst_RMOL_Service.hpp>
00007
00008 namespace RMOL {
00009
00011     const stdair::AirlineCode_T DEFAULT_RMOL_SERVICE_AIRLINE_CODE = "BA";
00012
00014     const double DEFAULT_RMOL_SERVICE_CAPACITY = 1.0;
00015
00018     const int DEFAULT_NUMBER_OF_DRAWS_FOR_MC_SIMULATION = 100000;
00019
00023     const int DEFAULT_PRECISION = 10;
00024
00026     const double DEFAULT_EPSILON = 0.0001;
00027
00029     const double DEFAULT_STOPPING_CRITERION = 0.01;
00030
00032     const double DEFAULT_INITIALIZER_DOUBLE_NEGATIVE = -10.0;
00033
00036     const FRAT5Curve_T DEFAULT_CUMULATIVE_FRAT5_CURVE =
00037         DefaultMap::createCumulativeFRAT5Curve();
00038     FRAT5Curve_T DefaultMap::createCumulativeFRAT5Curve() {
00039         FRAT5Curve_T oCurve;
00040         // oCurve[63] = 1.4; oCurve[56] = 1.45;
00041         // oCurve[49] = 1.5; oCurve[42] = 1.55; oCurve[35] = 1.6;
00042         // oCurve[31] = 1.7; oCurve[27] = 1.8; oCurve[23] = 2.0;
00043         // oCurve[19] = 2.3; oCurve[16] = 2.6; oCurve[13] = 3.0;
00044         // oCurve[10] = 3.3; oCurve[7] = 3.4; oCurve[5] = 3.44;
00045         // oCurve[3] = 3.47; oCurve[1] = 3.5;
00046         oCurve[63] = 1.1; oCurve[56] = 1.11;
00047         oCurve[49] = 1.17; oCurve[42] = 1.27;
00048         oCurve[35] = 1.28; oCurve[31] = 1.28; oCurve[27] = 1.28;
00049         oCurve[23] = 1.37; oCurve[19] = 1.37;
00050         oCurve[16] = 1.6; oCurve[13] = 1.6;
00051         oCurve[10] = 1.8; oCurve[7] = 1.8;
00052         oCurve[5] = 2.23; oCurve[3] = 2.23;
00053         oCurve[1] = 2.5;

```



```

00054     // oCurve[63] = 1.05; oCurve[56] = 1.07;
00055     // oCurve[49] = 1.09; oCurve[42] = 1.11; oCurve[35] = 1.14;
00056     // oCurve[31] = 1.16; oCurve[27] = 1.18; oCurve[23] = 1.21;
00057     // oCurve[19] = 1.24; oCurve[16] = 1.27; oCurve[13] = 1.3;
00058     // oCurve[10] = 1.33; oCurve[7] = 1.37; oCurve[5] = 1.4;
00059     // oCurve[3] = 1.45; oCurve[1] = 1.5;
00060     // oCurve[63] = 1.4;
00061     // oCurve[49] = 1.5; oCurve[35] = 1.6;
00062     // oCurve[23] = 2.0; oCurve[16] = 2.6;
00063     // oCurve[10] = 3.3; oCurve[5] = 3.44;
00064     // oCurve[1] = 3.5;
00065     return oCurve;
00066 };
00067
00069 const stdair::DCPList_T DEFAULT_DCP_LIST = DefaultDCPList::init();
00070 stdair::DCPList_T DefaultDCPList::init() {
00071     stdair::DCPList_T oDCPList;
00072     oDCPList.push_back (63); oDCPList.push_back (49);
00073     oDCPList.push_back (35); oDCPList.push_back (23);
00074     oDCPList.push_back (16); oDCPList.push_back (10);
00075     oDCPList.push_back (5); oDCPList.push_back (1);
00076     oDCPList.push_back (0);
00077     return oDCPList;
00078 }
00079
00080 }

```

## 28.17 rmol/basic/BasConst\_Curves.hpp File Reference

```
#include <rmol/RMOL_Types.hpp>
```

### Classes

- struct [RMOL::DefaultMap](#)

### Namespaces

- namespace [RMOL](#)

## 28.18 BasConst\_Curves.hpp

```

00001 #ifndef __RMOL_BAS_BASCONST_CURVES_HPP
00002 #define __RMOL_BAS_BASCONST_CURVES_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // RMOL
00008 #include <rmol/RMOL_Types.hpp>
00009
00010 namespace RMOL {
00011
00014     extern const FRAT5Curve_T DEFAULT_CUMULATIVE_FRAT5_CURVE;
00015
00017     struct DefaultMap {
00018         static FRAT5Curve_T createCumulativeFRAT5Curve();
00019     };
00020 }
00021 #endif // __RMOL_BAS_BASCONST_CURVES_HPP

```

## 28.19 rmol/basic/BasConst\_General.hpp File Reference

```
#include <stdair/stdair_types.hpp>
```

### Classes

- struct [RMOL::DefaultDCPList](#)

### Namespaces

- namespace [RMOL](#)

## 28.20 BasConst\_General.hpp

```
00001 #ifndef __RMOL_BAS_BASCONST_GENERAL_HPP
00002 #define __RMOL_BAS_BASCONST_GENERAL_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // StdAir
00008 #include <stdair/stdair_types.hpp>
00009
00010 namespace RMOL {
00011
00012     extern const int DEFAULT_NUMBER_OF_DRAWS_FOR_MC_SIMULATION;
00013
00014     extern const int DEFAULT_PRECISION;
00015
00016     extern const double DEFAULT_EPSILON;
00017
00018     extern const double DEFAULT_STOPPING_CRITERION;
00019
00020     extern const double DEFAULT_INITIALIZER_DOUBLE_NEGATIVE;
00021
00022     extern const stdair::DCPList_T DEFAULT_DCP_LIST;
00023
00024     struct DefaultDCPList { static stdair::DCPList_T init(); };
00025 }
00026
00027 #endif // __RMOL_BAS_BASCONST_GENERAL_HPP
```

## 28.21 rmol/basic/BasConst\_RMOL\_Service.hpp File Reference

```
#include <vector> #include <stdair/stdair_basic_types.-
hpp> #include <rmol/RMOL_Types.hpp>
```

### Namespaces

- namespace [RMOL](#)

## 28.22 BasConst\_RMOL\_Service.hpp

```
00001 #ifndef __RMOL_BAS_BASCONST_RMOL_SERVICE_HPP
00002 #define __RMOL_BAS_BASCONST_RMOL_SERVICE_HPP
00003
```

```

00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <vector>
00009 // StdAir
00010 #include <stdair/stdair_basic_types.hpp>
00011 // RMOL
00012 #include <rmol/RMOL_Types.hpp>
00013
00014 namespace RMOL {
00015
00017     extern const stdair::AirlineCode_T DEFAULT_RMOL_SERVICE_AIRLINE_CODE;
00018
00020     extern const double DEFAULT_RMOL_SERVICE_CAPACITY;
00021
00022 }
00023 #endif // __RMOL_BAS_BASCONST_RMOL_SERVICE_HPP

```

## 28.23 rmol/batches/rmol.cpp File Reference

```

#include <cassert> #include <iostream> #include <sstream> ×
#include <fstream> #include <string> #include <boost/date_
_time/posix_time/posix_time.hpp> #include <boost/date_
time/gregorian/gregorian.hpp> #include <boost/program_
options.hpp> #include <stdair/service/Logger.hpp> #include
<rmol/RMOL_Service.hpp> #include <rmol/config/rmol-paths.-
hpp>

```

### Functions

- template<class T >  
std::ostream & operator<< (std::ostream &os, const std::vector< T > &v)
- int readConfiguration (int argc, char \*argv[], int &ioRandomDraws, double &ioCapacity, short &ioMethod, bool &iolsBuiltin, std::string &ioInputFilename, std::string &ioLogFilename)
- void optimise (RMOL::RMOL\_Service &rmolService, const short &iMethod, const int &iRandomDraws)
- int main (int argc, char \*argv[])

### Variables

- const std::string K\_RMOL\_DEFAULT\_LOG\_FILENAME ("rmol.log")
- const bool K\_RMOL\_DEFAULT\_BUILT\_IN\_INPUT = false
- const std::string K\_RMOL\_DEFAULT\_INPUT\_FILENAME (STDAIR\_SAMPLE\_DIR"/rm01.csv")
- const int K\_RMOL\_DEFAULT\_RANDOM\_DRAWS = 100000
- const double K\_RMOL\_DEFAULT\_CAPACITY = 500.0
- const short K\_RMOL\_DEFAULT\_METHOD = 0
- const int K\_RMOL\_EARLY\_RETURN\_STATUS = 99

### 28.23.1 Function Documentation

28.23.1.1 `template<class T> std::ostream& operator<< ( std::ostream & os, const std::vector< T> & v )`

Definition at line 47 of file [rmol.cpp](#).

28.23.1.2 `int readConfiguration ( int argc, char * argv[], int & ioRandomDraws, double & ioCapacity, short & ioMethod, bool & iolsBuiltin, std::string & ioInputFilename, std::string & ioLogFilename )`

Read and parse the command line options.

Definition at line 57 of file [rmol.cpp](#).

References [K\\_RMOL\\_DEFAULT\\_BUILT\\_IN\\_INPUT](#), [K\\_RMOL\\_DEFAULT\\_RANDOM\\_DRAWS](#), [K\\_RMOL\\_DEFAULT\\_CAPACITY](#), [K\\_RMOL\\_DEFAULT\\_METHOD](#), [K\\_RMOL\\_DEFAULT\\_INPUT\\_FILENAME](#), [K\\_RMOL\\_DEFAULT\\_LOG\\_FILENAME](#), [K\\_RMOL\\_EARLY\\_RETURN\\_STATUS](#), [PACKAGE\\_NAME](#), [PACKAGE\\_VERSION](#), and [PREFIXDIR](#).

Referenced by [main\(\)](#).

28.23.1.3 `void optimise ( RMOL::RMOL_Service & rmolService, const short & iMethod, const int & iRandomDraws )`

Definition at line 167 of file [rmol.cpp](#).

References [RMOL::RMOL\\_Service::optimalOptimisationByMCIntegration\(\)](#), [RMOL::RMOL\\_Service::optimalOptimisationByDP\(\)](#), [RMOL::RMOL\\_Service::heuristicOptimisationByEmsr\(\)](#), [RMOL::RMOL\\_Service::heuristicOptimisationByEmsrA\(\)](#), and [RMOL::RMOL\\_Service::heuristicOptimisationByEmsrB\(\)](#).

Referenced by [main\(\)](#).

28.23.1.4 `int main ( int argc, char * argv[] )`

Definition at line 204 of file [rmol.cpp](#).

References [readConfiguration\(\)](#), [K\\_RMOL\\_EARLY\\_RETURN\\_STATUS](#), [RMOL::RMOL\\_Service::buildSampleBom\(\)](#), [RMOL::RMOL\\_Service::parseAndLoad\(\)](#), and [optimise\(\)](#).

### 28.23.2 Variable Documentation

28.23.2.1 `const std::string K_RMOL_DEFAULT_LOG_FILENAME("rmol.log")`

Default name and location for the log file.

Referenced by [readConfiguration\(\)](#).

**28.23.2.2** `const bool K_RMOL_DEFAULT_BUILT_IN_INPUT = false`

Default for the input type. It can be either built-in or provided by an input file. That latter must then be given with the `-i/--input` option.

Definition at line 23 of file `rmol.cpp`.

Referenced by `readConfiguration()`.

**28.23.2.3** `const std::string K_RMOL_DEFAULT_INPUT_FILENAME(STDAIR_SAMPLE_DIR"/rm01.csv")`

Default name and location for the (CSV) input file.

Referenced by `readConfiguration()`.

**28.23.2.4** `const int K_RMOL_DEFAULT_RANDOM_DRAWS = 100000`

Default number of random draws to be generated (best if over 100).

Definition at line 29 of file `rmol.cpp`.

Referenced by `readConfiguration()`.

**28.23.2.5** `const double K_RMOL_DEFAULT_CAPACITY = 500.0`

Default value for the capacity of the resource (e.g., a flight cabin).

Definition at line 32 of file `rmol.cpp`.

Referenced by `readConfiguration()`.

**28.23.2.6** `const short K_RMOL_DEFAULT_METHOD = 0`

Default name and location for the Revenue Management method to be used.

- 0 = Monte-Carlo
- 1 = Dynamic Programming
- 2 = EMSR
- 3 = EMSR-a
- 4 = EMSR-b

Definition at line 43 of file `rmol.cpp`.

Referenced by `readConfiguration()`.

**28.23.2.7** `const int K_RMOL_EARLY_RETURN_STATUS = 99`

Early return status (so that it can be differentiated from an error).

Definition at line 54 of file `rmol.cpp`.

Referenced by `readConfiguration()`, and `main()`.

## 28.24 rmol.cpp

```

00001 // STL
00002 #include <cassert>
00003 #include <iostream>
00004 #include <sstream>
00005 #include <fstream>
00006 #include <string>
00007 // Boost (Extended STL)
00008 #include <boost/date_time/posix_time/posix_time.hpp>
00009 #include <boost/date_time/gregorian/gregorian.hpp>
00010 #include <boost/program_options.hpp>
00011 // StdAir
00012 #include <stdair/service/Logger.hpp>
00013 // RMOL
00014 #include <rmol/RMOL_Service.hpp>
00015 #include <rmol/config/rmol-paths.hpp>
00016
00017 // ////////// Constants //////////
00019 const std::string K_RMOL_DEFAULT_LOG_FILENAME ("rmol.log");
00020
00023 const bool K_RMOL_DEFAULT_BUILT_IN_INPUT = false;
00024
00026 const std::string K_RMOL_DEFAULT_INPUT_FILENAME (STDAIR_SAMPLE_DIR "/rm01.csv")
00027 ;
00029 const int K_RMOL_DEFAULT_RANDOM_DRAWS = 100000;
00030
00032 const double K_RMOL_DEFAULT_CAPACITY = 500.0;
00033
00043 const short K_RMOL_DEFAULT_METHOD = 0;
00044
00045 // ////////// Parsing of Options & Configuration //////////
00046 // A helper function to simplify the main part.
00047 template<class T> std::ostream& operator<< (std::ostream& os,
00048                                           const std::vector<T>& v) {
00049     std::copy (v.begin(), v.end(), std::ostream_iterator<T> (std::cout, " "));
00050     return os;
00051 }
00052
00054 const int K_RMOL_EARLY_RETURN_STATUS = 99;
00055
00057 int readConfiguration(int argc, char* argv[],
00058                      int& ioRandomDraws, double& ioCapacity,
00059                      short& ioMethod, bool& ioIsBuiltin,
00060                      std::string& ioInputFilename, std::string& ioLogFilename)
00061 {
00062     // Default for the built-in input
00063     ioIsBuiltin = K_RMOL_DEFAULT_BUILT_IN_INPUT;
00064
00065     // Declare a group of options that will be allowed only on command line
00066     boost::program_options::options_description generic ("Generic options");
00067     generic.add_options()
00068         ("prefix", "print installation prefix")
00069         ("version,v", "print version string")
00070         ("help,h", "produce help message");
00071
00072     // Declare a group of options that will be allowed both on command
00073     // line and in config file
00074     boost::program_options::options_description config ("Configuration");
00075     config.add_options()
00076         ("draws,d",
00077          boost::program_options::value<int>(&ioRandomDraws)->default_value(
00078              K_RMOL_DEFAULT_RANDOM_DRAWS),
00079          "Number of to-be-generated random draws")
00079         ("capacity,c",
00080          boost::program_options::value<double>(&ioCapacity)->default_value(
00081              K_RMOL_DEFAULT_CAPACITY),
00082          "Resource capacity (e.g., for a flight leg)")
00082         ("method,m",
00083          boost::program_options::value<short>(&ioMethod)->default_value(
00084              K_RMOL_DEFAULT_METHOD),

```

```

00084     "Revenue Management method to be used (0 = Monte-Carlo, 1 = Dynamic
Programming, 2 = EMSR, 3 = EMSR-a, 4 = EMSR-b)")
00085     ("builtin,b",
00086     "The cabin set up can be either built-in or parsed from an input file.
That latter must then be given with the -i/--input option")
00087     ("input,i",
00088     boost::program_options::value< std::string >(&ioInputFilename)->
default_value(K_RMOL_DEFAULT_INPUT_FILENAME),
00089     "(CSV) input file for the demand distribution parameters and resource
(leg-cabin) capacities")
00090     ("log,l",
00091     boost::program_options::value< std::string >(&ioLogFilename)->
default_value(K_RMOL_DEFAULT_LOG_FILENAME),
00092     "Filename for the logs")
00093     ;
00094
00095     // Hidden options, will be allowed both on command line and
00096     // in config file, but will not be shown to the user.
00097     boost::program_options::options_description hidden ("Hidden options");
00098     hidden.add_options()
00099     ("copyright",
00100     boost::program_options::value< std::vector<std::string> >(),
00101     "Show the copyright (license)");
00102
00103     boost::program_options::options_description cmdline_options;
00104     cmdline_options.add(generic).add(config).add(hidden);
00105
00106     boost::program_options::options_description config_file_options;
00107     config_file_options.add(config).add(hidden);
00108
00109     boost::program_options::options_description visible ("Allowed options");
00110     visible.add(generic).add(config);
00111
00112     boost::program_options::positional_options_description p;
00113     p.add ("copyright", -1);
00114
00115     boost::program_options::variables_map vm;
00116     boost::program_options::
00117     store (boost::program_options::command_line_parser (argc, argv).
options (cmdline_options).positional(p).run(), vm);
00119
00120     std::ifstream ifs ("rmol.cfg");
00121     boost::program_options::store (parse_config_file (ifs, config_file_options),
00122     vm);
00123     boost::program_options::notify (vm);
00124
00125     if (vm.count ("help")) {
00126         std::cout << visible << std::endl;
00127         return K_RMOL_EARLY_RETURN_STATUS;
00128     }
00129
00130     if (vm.count ("version")) {
00131         std::cout << PACKAGE_NAME << ", version " << PACKAGE_VERSION << std::endl;
00132         return K_RMOL_EARLY_RETURN_STATUS;
00133     }
00134
00135     if (vm.count ("prefix")) {
00136         std::cout << "Installation prefix: " << PREFIXDIR << std::endl;
00137         return K_RMOL_EARLY_RETURN_STATUS;
00138     }
00139
00140     if (vm.count ("builtin")) {
00141         ioIsBuiltin = true;
00142     }
00143     const std::string isBuiltinStr = (ioIsBuiltin == true)?"yes":"no";
00144     std::cout << "The BOM should be built-in? " << isBuiltinStr << std::endl;
00145
00146     if (ioIsBuiltin == false) {
00147         if (vm.count ("input")) {
00148             ioInputFilename = vm["input"].as< std::string >();
00149             std::cout << "Input filename is: " << ioInputFilename << std::endl;
00150         }
00151     }
00152

```

```

00153     if (vm.count ("log")) {
00154         ioLogFilename = vm["log"].as< std::string >();
00155         std::cout << "Log filename is: " << ioLogFilename << std::endl;
00156     }
00157
00158     std::cout << "The number of random draws is: " << ioRandomDraws << std::endl;
00159     std::cout << "The resource capacity is: " << ioCapacity << std::endl;
00160     std::cout << "The optimisation method is: " << ioMethod << std::endl;
00161     std::cout << std::endl;
00162
00163     return 0;
00164 }
00165
00166 // //////////////////////////////////////
00167 void optimise (RMOL::RMOL_Service& rmolService,
00168               const short& iMethod, const int& iRandomDraws) {
00169
00170     switch (iMethod) {
00171     case 0: {
00172         // Calculate the optimal protections by the Monte Carlo
00173         // Integration approach
00174         rmolService.optimalOptimisationByMCIntegration (iRandomDraws);
00175         break;
00176     }
00177     case 1: {
00178         // Calculate the optimal protections by DP.
00179         rmolService.optimalOptimisationByDP ();
00180         break;
00181     }
00182     case 2: {
00183         // Calculate the Bid-Price Vector by EMSR
00184         rmolService.heuristicOptimisationByEmsr ();
00185         break;
00186     }
00187     case 3: {
00188         // Calculate the protections by EMSR-a
00189         rmolService.heuristicOptimisationByEmsrA ();
00190         break;
00191     }
00192     case 4: {
00193         // Calculate the protections by EMSR-b
00194         rmolService.heuristicOptimisationByEmsrB ();
00195         break;
00196     }
00197     default: {
00198         rmolService.optimalOptimisationByMCIntegration (iRandomDraws);
00199     }
00200     }
00201 }
00202
00203 // ////////////////////////////////// M A I N //////////////////////////////////
00204 int main (int argc, char* argv[]) {
00205
00206     // Number of random draws to be generated (best if greater than 100)
00207     int lRandomDraws = 0;
00208
00209     // Cabin Capacity (it must be greater then 100 here)
00210     double lCapacity = 0.0;
00211
00212     // Methods of optimisation (0 = Monte-Carlo, 1 = Dynamic Programming,
00213     // 2 = EMSR, 3 = EMSR-a, 4 = EMSR-b)
00214     short lMethod = 0;
00215
00216     // Built-in
00217     bool isBuiltin;
00218
00219     // Input file name
00220     std::string lInputFilename;
00221
00222     // Output log File
00223     std::string lLogFilename;
00224
00225     // Call the command-line option parser
00226     const int lOptionParserStatus =

```



```

00227     readConfiguration (argc, argv, lRandomDraws, lCapacity, lMethod,
00228                       isBuiltin, lInputFilename, lLogFilename);
00229
00230     if (lOptionParserStatus == K_RMOL_EARLY_RETURN_STATUS) {
00231         return 0;
00232     }
00233
00234     // Set the log parameters
00235     std::ofstream logOutputFile;
00236     // Open and clean the log outputfile
00237     logOutputFile.open (lLogFilename.c_str());
00238     logOutputFile.clear();
00239
00240     // Initialise the log stream
00241     const stdair::BasLogParams lLogParams (stdair::LOG::DEBUG, logOutputFile);
00242
00243     // Initialise the RMOL service
00244     RMOL::RMOL_Service rmolService (lLogParams);
00245
00246     if (isBuiltin == true) {
00247         // DEBUG
00248         STDAIR_LOG_DEBUG ("No input file has been given."
00249                          "A sample BOM tree will therefore be built.");
00250
00251         // Build a sample BOM tree
00252         rmolService.buildSampleBom();
00253     } else {
00254         // DEBUG
00255         STDAIR_LOG_DEBUG ("RMOL will parse " << lInputFilename
00256                          << " and build the corresponding BOM tree.");
00257
00258         //
00259         rmolService.parseAndLoad (lCapacity, lInputFilename);
00260     }
00261
00262     // Launch the optimisation
00263     optimise (rmolService, lMethod, lRandomDraws);
00264
00265     //
00266     logOutputFile.close();
00267
00268     return 0;
00269 }
00270

```

## 28.25 rmol/bom/BucketHolderTypes.hpp File Reference

```

#include <list> #include <map> #include <stdair/stdair_
basic_types.hpp>

```

### Namespaces

- namespace [RMOL](#)

### Typedefs

- typedef [std::list< BucketHolder \\* >](#) [RMOL::BucketHolderList\\_T](#)

## 28.26 BucketHolderTypes.hpp

```

00001 #ifndef __RMOL_BUCKETHOLDERTYPES_HPP

```

```

00002 #define __RMOL_BUCKETHOLDERTYPES_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <list>
00009 #include <map>
00010 // STDAIR
00011 #include <stdair/stdair_basic_types.hpp>
00012
00013 namespace RMOL {
00014
00016     class BucketHolder;
00017
00019     typedef std::list<BucketHolder*> BucketHolderList_T;
00020
00023     typedef std::map<const stdair::MapKey_T, BucketHolder*>;
00024 }
00025 #endif // __RMOL_BUCKETHOLDERTYPES_HPP

```

## 28.27 rmol/bom/DistributionParameterList.hpp File Reference

```
#include <list>      #include <rmol/field/FldDistribution-
Parameters.hpp>
```

### Namespaces

- namespace [RMOL](#)

### Typedefs

- typedef [std::list](#) < [FldDistributionParameters](#) > [RMOL::DistributionParameterList\\_T](#)

## 28.28 DistributionParameterList.hpp

```

00001 #ifndef __RMOL_DISTRIBUTIONPARAMETERLIST_HPP
00002 #define __RMOL_DISTRIBUTIONPARAMETERLIST_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <list>
00009 // RMOL
00010 #include <rmol/field/FldDistributionParameters.hpp>
00011
00012 namespace RMOL {
00013
00016     typedef std::list<FldDistributionParameters> DistributionParameterList_T;
00017
00018 }
00019 #endif // __RMOL_DISTRIBUTIONPARAMETERLIST_HPP

```

## 28.29 rmol/bom/DPOptimiser.cpp File Reference

```
#include <cassert> #include <sstream> #include <vector>
```

```
#include <cmath> #include <boost/math/distributions/normal.-
hpp> #include <stdair/bom/LegCabin.hpp> #include <stdair/bom/-
VirtualClassStruct.hpp> #include <stdair/service/Logger.-
hpp> #include <rmol/basic/BasConst_General.hpp> #include
<rmol/bom/DPOptimiser.hpp>
```

### Namespaces

- namespace [RMOL](#)

### 28.30 DPOptimiser.cpp

```
00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 #include <sstream>
00007 #include <vector>
00008 #include <cmath>
00009 // Boost Math
00010 #include <boost/math/distributions/normal.hpp>
00011 // StdAir
00012 #include <stdair/bom/LegCabin.hpp>
00013 #include <stdair/bom/VirtualClassStruct.hpp>
00014 #include <stdair/service/Logger.hpp>
00015 // RMOL
00016 #include <rmol/basic/BasConst_General.hpp>
00017 #include <rmol/bom/DPOptimiser.hpp>
00018
00019 namespace RMOL {
00020
00021 // //////////////////////////////////////
00022 void DPOptimiser::optimalOptimisationByDP (stdair::LegCabin& ioLegCabin) {
00023     // // Number of classes/buckets: n
00024     // const short nbOfClasses = ioBucketHolder.getSize();
00025
00026     // // Number of values of x to compute for each Vj(x).
00027     // const int maxValue = static_cast<int> (iCabinCapacity *
DEFAULT_PRECISION);
00028
00029     // // Vector of the Expected Maximal Revenue (Vj).
00030     // std::vector< std::vector<double> > MERVectorHolder;
00031
00032     // // Vector of V_0(x).
00033     // std::vector<double> initialMERVector (maxValue+1, 0.0);
00034     // MERVectorHolder.push_back (initialMERVector);
00035
00036     // // Current cumulative protection level (y_j * DEFAULT_PRECISION).
00037     // // Initialise with y_0 = 0.
00038     // int currentProtection = 0;
00039
00040     // int currentBucketIndex = 1;
00041     // ioBucketHolder.begin();
00042
00043     // while (currentProtection < maxValue && currentBucketIndex < nbOfClasses)
00044     {
00045         // //while (currentBucketIndex == 1) {
00046         // bool protectionChanged = false;
00047         // double nextProtection = 0.0;
00048         // std::vector<double> currentMERVector;
00049         // // double testGradient = 10000;
00050
00051         // Bucket& currentBucket = ioBucketHolder.getCurrentBucket();
00052         // const double meanDemand = currentBucket.getMean();
00053         // const double SDDemand = currentBucket.getStandardDeviation();
```

```

00053 // const double currentYield = currentBucket.getAverageYield();
00054 // const double errorFactor = 1.0;
00055
00056 // Bucket& nextBucket = ioBucketHolder.getNextBucket();
00057 // const double nextYield = nextBucket.getAverageYield();
00058
00059 // // For x <= currentProtection (y_(j-1)), V_j(x) = V_(j-1)(x).
00060 // for (int x = 0; x <= currentProtection; ++x) {
00061 //     const double MERValue =
MERVectorHolder.at(currentBucketIndex-1).at(x);
00062 //     currentMERVector.push_back (MERValue);
00063 // }
00064
00065 // //
00066 // boost::math::normal lNormalDistribution (meanDemand, SDDemand);
00067
00068 // // Vector of gaussian pdf values.
00069 // std::vector<double> pdfVector;
00070 // for (int s = 0; s <= maxValue - currentProtection; ++s) {
00071 //     const double pdfValue =
00072 //         boost::math::pdf (lNormalDistribution, s/DEFAULT_PRECISION);
00073 //     pdfVector.push_back (pdfValue);
00074 // }
00075
00076 // // Vector of gaussian cdf values.
00077 // std::vector<double> cdfVector;
00078 // for (int s = 0; s <= maxValue - currentProtection; ++s) {
00079 //     const double cdfValue =
00080 //         boost::math::cdf (boost::math::complement (lNormalDistribution,
00081 //             s/DEFAULT_PRECISION));
00082 //     cdfVector.push_back (cdfValue);
00083 // }
00084
00085 // // Compute V_j(x) for x > currentProtection (y_(j-1)).
00086 // for (int x = currentProtection + 1; x <= maxValue; ++x) {
00087 //     const double lowerBound = static_cast<double> (x -
currentProtection);
00088
00089 //     // Compute the first integral in the V_j(x) formulation (see
00090 //     // the memo of Jerome Contant).
00091 //     const double power1 =
00092 //         - 0.5 * meanDemand * meanDemand / (SDDemand * SDDemand);
00093 //     const double e1 = std::exp (power1);
00094 //     const double power2 =
00095 //         - 0.5 * (lowerBound / DEFAULT_PRECISION - meanDemand)
00096 //         * (lowerBound / DEFAULT_PRECISION - meanDemand)
00097 //         / (SDDemand * SDDemand);
00098 //     const double e2 = std::exp (power2);
00099
00100 //     const double cdfValue0 =
00101 //         boost::math::cdf (boost::math::complement (lNormalDistribution,
00102 //             0.0));
00103 //     const double cdfValue1 =
00104 //         boost::math::cdf(boost::math::complement(lNormalDistribution,
00105 //             lowerBound/DEFAULT_PRECISION));
00106 //     const double integralResult1 = currentYield
00107 //         * ((e1 - e2) * SDDemand / sqrt (2 * 3.14159265)
00108 //         + meanDemand * (cdfValue0 - cdfValue1));
00109
00110 //     double integralResult2 = 0.0;
00111
00112 //     for (int s = 0; s < lowerBound; ++s) {
00113 //         const double partialResult =
00114 //             2 * MERVectorHolder.at(currentBucketIndex-1).at(x-s)
00115 //             * pdfVector.at(s);
00116
00117 //         integralResult2 += partialResult;
00118 //     }
00119 //     integralResult2 -= MERVectorHolder.at(currentBucketIndex-1).at(x) *
00120 //         pdfVector.at(0);
00121
00122 //     const int intLowerBound = static_cast<int>(lowerBound);
00123 //     integralResult2 +=

```

```

00124 //      MERVectorHolder.at(currentBucketIndex-1).at(x - intLowerBound) *
00125 //      pdfVector.at(intLowerBound);
00126
00127 //      integralResult2 /= 2 * DEFAULT_PRECISION;
00128 //      /*
00129 //      for (int s = 0; s < lowerBound; ++s) {
00130 //          const double partialResult =
00131 //              (MERVectorHolder.at(currentBucketIndex-1).at(x-s) +
00132 //              MERVectorHolder.at(currentBucketIndex-1).at(x-s-1)) *
00133 //              (cdfVector.at(s+1) - cdfVector.at(s)) / 2;
00134 //          integralResult2 += partialResult;
00135 //      }
00136 //      */
00137 //      const double firstElement = integralResult1 + integralResult2;
00138
00139 //      // Compute the second integral in the V_j(x) formulation (see
00140 //      // the memo of Jerome Contant).
00141 //      const double constCoefOfSecondElement =
00142 //          currentYield * lowerBound / DEFAULT_PRECISION
00143 //          + MERVectorHolder.at(currentBucketIndex-1).at(currentProtection);
00144
00145 //      const double secondElement = constCoefOfSecondElement
00146 //          * boost::math::cdf(boost::math::complement(lNormalDistribution,
00147 //          lowerBound/DEFAULT_PRECISION));
00148
00149 //      const double MERValue = (firstElement + secondElement) /
00150 //          errorFactor;
00151
00152 //      assert (currentMERVector.size() > 0);
00153 //      const double lastMERValue = currentMERVector.back();
00154
00155 //      const double currentGradient =
00156 //          (MERValue - lastMERValue) * DEFAULT_PRECISION;
00157
00158 //      //assert (currentGradient >= 0);
00159 //      if (currentGradient < -0) {
00160 //          std::ostringstream ostr;
00161 //          ostr << currentGradient << std::endl
00162 //              << "x = " << x << std::endl
00163 //              << "class: " << currentBucketIndex << std::endl;
00164 //          STDAIR_LOG_DEBUG (ostr.str());
00165 //      }
00166
00167 //      /*
00168 //      assert (currentGradient <= testGradient);
00169 //      testGradient = currentGradient;
00170 //      */
00171 //      if (protectionChanged == false && currentGradient <= nextYield) {
00172 //          nextProtection = x - 1;
00173 //          protectionChanged = true;
00174 //      }
00175
00176 //      if (protectionChanged == true && currentGradient > nextYield) {
00177 //          protectionChanged = false;
00178 //      }
00179
00180 //      if (protectionChanged == false && x == maxValue) {
00181 //          nextProtection = maxValue;
00182 //      }
00183
00184 //      currentMERVector.push_back (MERValue);
00185 //      }
00186
00187 //      // DEBUG
00188 //      STDAIR_LOG_DEBUG ("Vmaxindex = " << currentMERVector.back());
00189
00190 //      MERVectorHolder.push_back (currentMERVector);
00191
00192 //      const double realProtection = nextProtection / DEFAULT_PRECISION;
00193 //      const double bookingLimit = iCabinCapacity - realProtection;
00194
00195 //      currentBucket.setCumulatedProtection (realProtection);

```

```

00196     // nextBucket.setCumulatedBookingLimit (bookingLimit);
00197
00198     // currentProtection = static_cast<int> (std::floor (nextProtection));
00199
00200     // ioBucketHolder.iterate();
00201     // ++currentBucketIndex;
00202     // }
00203 }
00204
00205 }
```

## 28.31 rmol/bom/DPOptimiser.hpp File Reference

```
#include <rmol/RMOL_Types.hpp>
```

### Classes

- class [RMOL::DPOptimiser](#)

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.32 DPOptimiser.hpp

```

00001 #ifndef __RMOL_BOM_DPOPTIMISER_HPP
00002 #define __RMOL_BOM_DPOPTIMISER_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // RMOL
00008 #include <rmol/RMOL_Types.hpp>
00009
00011 namespace stdair {
00012     class LegCabin;
00013 }
00014
00015 namespace RMOL {
00017     class DPOptimiser {
00018     public:
00019
00025         static void optimalOptimisationByDP (stdair::LegCabin&);
00026
00030         static double cdfGaussianQ (const double, const double);
00031     };
00032 }
00033 #endif // __RMOL_BOM_DPOPTIMISER_HPP
```

## 28.33 rmol/bom/EMDetruncator.cpp File Reference

```

#include <iostream> #include <cmath> #include <vector>
#include <cassert> #include <stdair/stdair_basic_types.-
hpp> #include <stdair/service/Logger.hpp> #include <rmol/bom/-
```

```
HistoricalBookingHolder.hpp> #include <rmol/bom/EMDetruncator.-
hpp>
```

#### Namespaces

- namespace [RMOL](#)

#### 28.34 EMDetruncator.cpp

```
00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <iostream>
00006 #include <cmath>
00007 #include <vector>
00008 #include <cassert>
00009 // StdAir
00010 #include <stdair/stdair_basic_types.hpp>
00011 #include <stdair/service/Logger.hpp>
00012 // RMOL
00013 #include <rmol/bom/HistoricalBookingHolder.hpp>
00014 #include <rmol/bom/EMDetruncator.hpp>
00015
00016 namespace RMOL {
00017
00018 // //////////////////////////////////////
00019 void EMDetruncator::unconstrainUsingEMMethod
00020 (HistoricalBookingHolder& ioHistoricalBookingHolder) {
00021
00022     // Number of flights.
00023     const short lNbOfFlights =
00024         ioHistoricalBookingHolder.getNbOfFlights();
00025
00026     // Number of uncensored booking data.
00027     const short lNbOfUncensoredData =
00028         ioHistoricalBookingHolder.getNbOfUncensoredData();
00029
00030     if (lNbOfUncensoredData > 1) {
00031         // Number of uncensored bookings.
00032         const stdair::NbOfBookings_T lNbOfUncensoredBookings =
00033             ioHistoricalBookingHolder.getNbOfUncensoredBookings();
00034
00035         const double lMeanOfUncensoredBookings =
00036             static_cast<double>(lNbOfUncensoredBookings/lNbOfUncensoredData);
00037
00038         const double lStdDevOfUncensoredBookings =
00039             ioHistoricalBookingHolder.getUncensoredStandardDeviation
00040                 (lMeanOfUncensoredBookings, lNbOfUncensoredData);
00041
00042         std::vector<bool> toBeUnconstrained =
00043             ioHistoricalBookingHolder.getListOfToBeUnconstrainedFlags();
00044
00045         double lDemandMean = lMeanOfUncensoredBookings;
00046         double lStdDev = lStdDevOfUncensoredBookings;
00047
00048         // DEBUG
00049         STDAIR_LOG_DEBUG ("mean: " << lDemandMean << ", std: " << lStdDev);
00050
00051         if (lStdDev != 0) {
00052             bool stopUnconstraining = false;
00053             while (stopUnconstraining == false) {
00054                 stopUnconstraining = true;
00055
00056                 for (short i = 0; i < lNbOfFlights; ++i) {
00057                     if (toBeUnconstrained.at(i) == true) {
00058                         // Get the unconstrained demand of the (i+1)-th flight.
00059                         const stdair::NbOfBookings_T demand =
```

```

00060         ioHistoricalBookingHolder.getUnconstrainedDemand (i);
00061         //STDAIR_LOG_DEBUG ("demand: " << demand);
00062
00063         // Execute the Expectation step.
00064         const stdair::NbOfBookings_T expectedDemand =
00065             ioHistoricalBookingHolder.
00066                 calculateExpectedDemand (lDemandMean, lStdDev, i, demand);
00067         //STDAIR_LOG_DEBUG ("expected: " << expectedDemand);
00068         assert (expectedDemand >= 0 || expectedDemand < 0);
00069
00070         double absDiff =
00071             static_cast<double>(expectedDemand - demand);
00072
00073         if (absDiff < 0) {
00074             absDiff = - absDiff;
00075         }
00076         if (absDiff < 0.001) {
00077             toBeUnconstrained.at (i) = false;
00078         }
00079         else {
00080             stopUnconstraining = false;
00081         }
00082
00083         ioHistoricalBookingHolder.setUnconstrainedDemand (expectedDemand,
00084                                                             i);
00085     }
00086 }
00087
00088 if (stopUnconstraining == false) {
00089     lDemandMean = ioHistoricalBookingHolder.getDemandMean();
00090     lStdDev =
00091         ioHistoricalBookingHolder.getStandardDeviation (lDemandMean);
00092 }
00093 }
00094 }
00095 }
00096
00097 }
00098 }

```

## 28.35 rmol/bom/EMDetruncator.hpp File Reference

### Classes

- class [RMOL::EMDetruncator](#)

### Namespaces

- namespace [RMOL](#)

## 28.36 EMDetruncator.hpp

```

00001 #ifndef __RMOL_BOM_EMDETRUNCATOR_HPP
00002 #define __RMOL_BOM_EMDETRUNCATOR_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 namespace RMOL {
00008     // Forward declarations.
00009     struct HistoricalBookingHolder;
00010
00012     class EMDetruncator {
00013     public:

```



```

00016     static void unconstrainUsingEMMethod (HistoricalBookingHolder&);
00017 };
00018 }
00019 #endif // __RMOL_BOM_EMDETRUNCATOR_HPP

```

## 28.37 rmol/bom/Emsr.cpp File Reference

```

#include <assert.h> #include <iostream> #include <cmath> ×
#include <list> #include <algorithm> #include <stdair/stdair-
_rm_types.hpp> #include <stdair/bom/LegCabin.hpp> #include
<stdair/bom/VirtualClassStruct.hpp> #include <rmol/bom/-
Emsr.hpp> #include <rmol/bom/EmsrUtils.hpp>

```

### Namespaces

- namespace [RMOL](#)

## 28.38 Emsr.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // C
00005 #include <assert.h>
00006 // STL
00007 #include <iostream>
00008 #include <cmath>
00009 #include <list>
00010 #include <algorithm>
00011 // StdAir
00012 #include <stdair/stdair_rm_types.hpp>
00013 #include <stdair/bom/LegCabin.hpp>
00014 #include <stdair/bom/VirtualClassStruct.hpp>
00015 // RMOL
00016 #include <rmol/bom/Emsr.hpp>
00017 #include <rmol/bom/EmsrUtils.hpp>
00018
00019 namespace RMOL {
00020 // //////////////////////////////////////
00021 void Emsr::heuristicOptimisationByEmsrA (stdair::LegCabin& ioLegCabin) {
00022     stdair::VirtualClassList_T& lVirtualClassList =
00023         ioLegCabin.getVirtualClassList ();
00024     const stdair::CabinCapacity_T& lCabinCapacity =
00025         ioLegCabin.getOfferedCapacity ();
00026
00032     stdair::VirtualClassList_T::iterator itVC = lVirtualClassList.begin();
00033     assert (itVC != lVirtualClassList.end());
00034
00035     stdair::VirtualClassStruct& lFirstVC = *itVC;
00036     lFirstVC.setCumulatedBookingLimit (lCabinCapacity);
00037     ++itVC;
00038     for (; itVC != lVirtualClassList.end(); ++itVC) {
00039         stdair::VirtualClassStruct& lNextVC = *itVC;
00040
00041         // Initialise the protection for class/bucket j.
00042         stdair::ProtectionLevel_T lProtectionLevel = 0.0;
00043
00044         for(stdair::VirtualClassList_T::iterator itHigherVC =
00045             lVirtualClassList.begin(); itHigherVC != itVC; ++itHigherVC) {
00046             stdair::VirtualClassStruct& lHigherVC = *itHigherVC;
00047             const double lPartialProtectionLevel =
00048                 EmsrUtils::computeProtectionLevel (lHigherVC, lNextVC);
00049             lProtectionLevel += lPartialProtectionLevel;

```

```

00050     }
00051     stdair::VirtualClassList_T::iterator itCurrentVC = itVC; --itCurrentVC;
00052     stdair::VirtualClassStruct& lCurrentVC = *itCurrentVC;
00053     lCurrentVC.setCumulatedProtection (lProtectionLevel);
00054
00055     // Compute the booking limit for the class/bucket j+1 (can be negative).
00056     const double lBookingLimit = lCabinCapacity - lProtectionLevel;
00057
00058     // Set the booking limit for class/bucket j+1.
00059     lNextVC.setCumulatedBookingLimit (lBookingLimit);
00060 }
00061 }
00062
00063 // //////////////////////////////////////
00064 void Emsr::heuristicOptimisationByEmsrB (stdair::LegCabin& ioLegCabin) {
00065     stdair::VirtualClassList_T& lVirtualClassList =
00066         ioLegCabin.getVirtualClassList ();
00067     const stdair::CabinCapacity_T& lCabinCapacity =
00068         ioLegCabin.getOfferedCapacity();
00069
00070     stdair::VirtualClassList_T::iterator itVC = lVirtualClassList.begin();
00071     assert (itVC != lVirtualClassList.end());
00072
00073     stdair::VirtualClassStruct& lFirstVC = *itVC;
00074     lFirstVC.setCumulatedBookingLimit (lCabinCapacity);
00075     ++itVC;
00076     stdair::VirtualClassStruct lAggregatedVC = lFirstVC;
00077     for (; itVC != lVirtualClassList.end(); ++itVC) {
00078         stdair::VirtualClassStruct& lNextVC = *itVC;
00079
00080         // Compute the protection level for the aggregated class/bucket
00081         // using the Little-Wood formular.
00082         const stdair::ProtectionLevel_T lProtectionLevel =
00083             EmsrUtils::computeProtectionLevel (lAggregatedVC, lNextVC);
00084
00085         // Set the protection level for class/bucket j.
00086         stdair::VirtualClassList_T::iterator itCurrentVC = itVC; --itCurrentVC;
00087         stdair::VirtualClassStruct& lCurrentVC = *itCurrentVC;
00088         lCurrentVC.setCumulatedProtection (lProtectionLevel);
00089
00090         // Compute the booking limit for class/bucket j+1 (can be negative).
00091         const double lBookingLimit = lCabinCapacity - lProtectionLevel;
00092
00093         // Set the booking limit for class/bucket j+1.
00094         lNextVC.setCumulatedBookingLimit (lBookingLimit);
00095
00096         // Compute the aggregated class/bucket of classes/buckets 1,...,j.
00097         EmsrUtils::computeAggregatedVirtualClass (lAggregatedVC, lNextVC);
00098     }
00099 }
00100
00101 // //////////////////////////////////////
00102 void Emsr::heuristicOptimisationByEmsr (stdair::LegCabin& ioLegCabin) {
00103     stdair::VirtualClassList_T& lVirtualClassList =
00104         ioLegCabin.getVirtualClassList ();
00105     const stdair::CabinCapacity_T& lCapacity = ioLegCabin.getOfferedCapacity();
00106     ioLegCabin.emptyBidPriceVector();
00107     stdair::BidPriceVector_T& lBidPriceVector =
00108         ioLegCabin.getBidPriceVector();
00109
00110     // Cabin capacity in integer.
00111     const int lCabinCapacity = static_cast<const int> (lCapacity);
00112
00113     // List of all EMSR values.
00114     stdair::EmsrValueList_T lEmsrValueList;
00115
00116     for (stdair::VirtualClassList_T::iterator itVC = lVirtualClassList.begin();
00117          itVC != lVirtualClassList.end(); ++itVC) {
00118         stdair::VirtualClassStruct& lCurrentVC = *itVC;
00119         for (int k = 1; k <= lCabinCapacity; ++k) {
00120             const double emsrValue = EmsrUtils::computeEmsrValue (k, lCurrentVC);
00121             lEmsrValueList.push_back(emsrValue);
00122         }
00123     }
00124 }

```

```

00134     }
00135
00136     // Sort the EMSR values from high to low.
00137     std::sort(lEmsrValueList.rbegin(), lEmsrValueList.rend());
00138
00139     // Sanity check
00140     const int lEmsrValueListSize = lEmsrValueList.size();
00141     assert (lEmsrValueListSize >= lCabinCapacity);
00142
00143     // Copy the EMSR sorted values to the BPV.
00144     stdair::EmsrValueList_T::const_iterator itCurrentValue =
00145         lEmsrValueList.begin();
00146     for (int j = 0; j < lCabinCapacity; ++j, ++itCurrentValue) {
00147         const double lBidPrice = *itCurrentValue;
00148         lBidPriceVector.push_back (lBidPrice);
00149     }
00150     lEmsrValueList.clear();
00151
00152     // Build the protection levels and booking limits.
00153     if (lVirtualClassList.size() > 1) {
00154         int lCapacityIndex = 0;
00155         for (stdair::VirtualClassList_T::iterator itVC = lVirtualClassList.begin();
00156             itVC != lVirtualClassList.end(); ) {
00157             stdair::VirtualClassStruct& lCurrentVC = *itVC;
00158             if (itVC != lVirtualClassList.end()) {
00159                 ++itVC;
00160             }
00161             stdair::VirtualClassStruct& lNextVC = *itVC;
00162             const stdair::Yield_T lNextYield = lNextVC.getYield();
00163             while ((lCapacityIndex < lCabinCapacity)
00164                 && (lBidPriceVector.at(lCapacityIndex) > lNextYield)) {
00165                 ++lCapacityIndex;
00166             }
00167             lCurrentVC.setCumulatedProtection (lCapacityIndex);
00168             lNextVC.setCumulatedBookingLimit (lCapacity - lCapacityIndex);
00169         }
00170     }
00171 }
00172
00173 }

```

## 28.39 rmol/bom/Emsr.hpp File Reference

```
#include <rmol/RMOL_Types.hpp>
```

### Classes

- class [RMOL::Emsr](#)

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.40 Emsr.hpp

```

00001 #ifndef __RMOL_EMSR_HPP
00002 #define __RMOL_EMSR_HPP
00003
00004 // //////////////////////////////////////

```

```

00005 // Import section
00006 // ///////////////////////////////////////////////////////////////////
00007 // RMOL
00008 #include <rmol/RMOL_Types.hpp>
00009
00011 namespace stdair {
00012     class LegCabin;
00013 }
00014
00015 namespace RMOL {
00016
00018     class Emsr {
00019     public:
00031         static void heuristicOptimisationByEmsr (stdair::LegCabin&);
00032
00037         static void heuristicOptimisationByEmsrA (stdair::LegCabin&);
00038
00043         static void heuristicOptimisationByEmsrB (stdair::LegCabin&);
00044
00045     };
00046 }
00047 #endif // __RMOL_EMSR_HPP

```

## 28.41 rmol/bom/EmsrUtils.cpp File Reference

```

#include <cassert> #include <cmath> #include <boost/math/distributions/normal.-
hpp> #include <stdair/stdair_maths_types.hpp> #include
<stdair/bom/VirtualClassStruct.hpp> #include <rmol/bom/-
EmsrUtils.hpp> #include <rmol/basic/BasConst_General.-
hpp>

```

### Namespaces

- namespace [RMOL](#)

## 28.42 EmsrUtils.cpp

```

00001 // ///////////////////////////////////////////////////////////////////
00002 // Import section
00003 // ///////////////////////////////////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 #include <cmath>
00007 // Boost Math
00008 #include <boost/math/distributions/normal.hpp>
00009 // StdAir
00010 #include <stdair/stdair_maths_types.hpp>
00011 #include <stdair/bom/VirtualClassStruct.hpp>
00012 // RMOL
00013 #include <rmol/bom/EmsrUtils.hpp>
00014 #include <rmol/basic/BasConst_General.hpp>
00015
00016 namespace RMOL {
00017 // ///////////////////////////////////////////////////////////////////
00018 void EmsrUtils::computeAggregatedVirtualClass
00019 (stdair::VirtualClassStruct& ioAggregatedVirtualClass,
00020 stdair::VirtualClassStruct& ioCurrentVirtualClass) {
00021     // Retrieve the demand mean, demand standard deviation and average
00022     // yield of the classes/buckets.
00023     const stdair::MeanValue_T lAggregatedMean =
00024         ioAggregatedVirtualClass.getMean();
00025     const stdair::MeanValue_T lCurrentMean = ioCurrentVirtualClass.getMean();
00026     const stdair::StdDevValue_T lAggregatedSD =

```

```

00027         ioAggregatedVirtualClass.getStdDev();
00028     const stdair::StdDevValue_T lCurrentSD = ioCurrentVirtualClass.getStdDev();
00029     const stdair::Yield_T lAggregatedYield =
00030         ioAggregatedVirtualClass.getYield();
00031     const stdair::Yield_T lCurrentYield = ioCurrentVirtualClass.getYield();
00032
00033     // Compute the new demand mean, new demand standard deviation and
00034     // new average yield for the new aggregated class/bucket.
00035     const stdair::MeanValue_T lNewMean = lAggregatedMean + lCurrentMean;
00036     const stdair::StdDevValue_T lNewSD =
00037         sqrt (lAggregatedSD*lAggregatedSD + lCurrentSD*lCurrentSD);
00038     stdair::Yield_T lNewYield = lCurrentYield;
00039     if (lNewMean > 0) {
00040         lNewYield = (lAggregatedYield*lAggregatedMean +
00041             lCurrentYield*lCurrentMean) / lNewMean;
00042     }
00043     // Set the new yield range for the new aggregated class/bucket.
00044     ioAggregatedVirtualClass.setYield(lNewYield);
00045
00046     // Set the new demand for the new aggregated class/bucket.
00047     ioAggregatedVirtualClass.setMean (lNewMean);
00048     ioAggregatedVirtualClass.setStdDev (lNewSD);
00049 }
00050
00051 // //////////////////////////////////////
00052 const stdair::ProtectionLevel_T EmsrUtils::
00053 computeProtectionLevel (stdair::VirtualClassStruct& ioAggregatedVirtualClass,
00054                         stdair::VirtualClassStruct& ioNextVirtualClass) {
00055     // Retrieve the mean & standard deviation of the aggregated
00056     // class/bucket and the average yield of all the two
00057     // classes/buckets.
00058     const stdair::MeanValue_T lMean = ioAggregatedVirtualClass.getMean();
00059     const stdair::StdDevValue_T lSD = ioAggregatedVirtualClass.getStdDev();
00060     const stdair::Yield_T lAggregatedYield = ioAggregatedVirtualClass.getYield()
00061 ;
00062     const stdair::Yield_T lNextYield = ioNextVirtualClass.getYield();
00063     assert (lAggregatedYield != 0);
00064
00065     // Compute the yield ratio between the higher bucket and the current one
00066     const double lYieldRatio = lNextYield / lAggregatedYield;
00067
00068     boost::math::normal lNormalDistribution (lMean, lSD);
00069     const stdair::ProtectionLevel_T lProtection =
00070         boost::math::quantile (boost::math::complement (lNormalDistribution,
00071             lYieldRatio));
00072
00073     return lProtection;
00074 }
00075
00076 // //////////////////////////////////////
00077 const double EmsrUtils::
00078 computeEmsrValue (double iCapacity,
00079                  stdair::VirtualClassStruct& ioVirtualClass){
00080     // Retrieve the average yield, mean and standard deviation of the
00081     // demand of the class/bucket.
00082     const stdair::MeanValue_T lMean = ioVirtualClass.getMean();
00083     const stdair::StdDevValue_T lSD = ioVirtualClass.getStdDev();
00084     const stdair::Yield_T lYield = ioVirtualClass.getYield();
00085
00086     // Compute the EMSR value = lYield * Pr (demand >= iCapacity).
00087     boost::math::normal lNormalDistribution (lMean, lSD);
00088     const double emsrValue =
00089         lYield * boost::math::cdf (boost::math::complement (lNormalDistribution,
00090             iCapacity));
00091
00092     return emsrValue;
00093 }
00094
00095 }
00096

```

## 28.43 rmol/bom/EmsrUtils.hpp File Reference

```
#include <stdair/stdair_inventory_types.hpp>
```

### Classes

- class [RMOL::EmsrUtils](#)

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.44 EmsrUtils.hpp

```
00001 #ifndef __RMOL_EMSRUTILS_HPP
00002 #define __RMOL_EMSRUTILS_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // StdAir
00008 #include <stdair/stdair_inventory_types.hpp>
00009
00010 // Forward declarations.
00011 namespace stdair {
00012     struct VirtualClassStruct;
00013 }
00014
00015 namespace RMOL {
00016
00017     class EmsrUtils {
00018     public:
00019         static void computeAggregatedVirtualClass (stdair::VirtualClassStruct&,
00020                                                    stdair::VirtualClassStruct&);
00021
00022         static const stdair::ProtectionLevel_T computeProtectionLevel (
00023             stdair::VirtualClassStruct&, stdair::VirtualClassStruct&);
00024
00025         static const double computeEmsrValue (double, stdair::VirtualClassStruct&);
00026     };
00027 }
00028
00029 #endif // __RMOL_EMSRUTILS_HPP
```

## 28.45 rmol/bom/GuillotineBlockHelper.cpp File Reference

```
#include <cassert>          #include <stdair/basic/BasConst_-
Inventory.hpp>          #include <stdair/bom/BomManager.hpp> ×
#include <stdair/bom/SegmentDate.hpp> #include <stdair/bom/-
SegmentCabin.hpp>          #include <stdair/bom/BookingClass.-
hpp> #include <stdair/bom/GuillotineBlock.hpp> #include
<stdair/service/Logger.hpp> #include <rmol/bom/Guillotine-
BlockHelper.hpp>
```

## Namespaces

- namespace **RMOL**

## 28.46 GuillotineBlockHelper.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 // StdAir
00007 #include <stdair/basic/BasConst_Inventory.hpp>
00008 #include <stdair/bom/BomManager.hpp>
00009 #include <stdair/bom/SegmentDate.hpp>
00010 #include <stdair/bom/SegmentCabin.hpp>
00011 #include <stdair/bom/BookingClass.hpp>
00012 #include <stdair/bom/GuillotineBlock.hpp>
00013 #include <stdair/service/Logger.hpp>
00014 // RMOL
00015 #include <rmol/bom/GuillotineBlockHelper.hpp>
00016
00017 namespace RMOL {
00018 // //////////////////////////////////////
00019 stdair::NbOfSegments_T GuillotineBlockHelper::
00020 getNbOfSegmentAlreadyPassedThisDTD (const stdair::GuillotineBlock& iGB,
00021                                     const stdair::DTD_T& iDTD,
00022                                     const stdair::Date_T& iCurrentDate) {
00023     stdair::NbOfSegments_T oNbOfSegments = 0;
00024
00025     // Browse the list of segments and check if it has passed the given DTD.
00026     const stdair::SegmentCabinIndexMap_T& lSCMap=iGB.getSegmentCabinIndexMap();
00027     for (stdair::SegmentCabinIndexMap_T::const_iterator itSC = lSCMap.begin();
00028          itSC != lSCMap.end(); ++itSC) {
00029         const stdair::SegmentCabin* lSC_ptr = itSC->first;
00030         assert (lSC_ptr != NULL);
00031
00032         if (hasPassedThisDTD (*lSC_ptr, iDTD, iCurrentDate) == true) {
00033             ++oNbOfSegments;
00034         }
00035     }
00036
00037     return oNbOfSegments;
00038 }
00039
00040 // //////////////////////////////////////
00041 bool GuillotineBlockHelper::
00042 hasPassedThisDTD (const stdair::SegmentCabin& iSegmentCabin,
00043                  const stdair::DTD_T& iDTD,
00044                  const stdair::Date_T& iCurrentDate) {
00045     // Retrieve the boarding date.
00046     const stdair::SegmentDate& lSegmentDate =
00047         stdair::BomManager::getParent<stdair::SegmentDate> (iSegmentCabin);
00048     const stdair::Date_T& lBoardingDate = lSegmentDate.getBoardingDate();
00049
00050     // Compare the date offset between the boarding date and the current date
00051     // to the DTD.
00052     stdair::DateOffset_T lDateOffset = lBoardingDate - iCurrentDate;
00053     stdair::DTD_T lDateOffsetInDays = lDateOffset.days();
00054     if (iDTD < lDateOffsetInDays) {
00055         return false;
00056     } else {
00057         return true;
00058     }
00059 }
00060 }

```

## 28.47 rmol/bom/GuillotineBlockHelper.hpp File Reference

```
#include <string>      #include <stdair/stdair_inventory_-
types.hpp> #include <stdair/stdair_date_time_types.hpp>
```

### Classes

- class [RMOL::GuillotineBlockHelper](#)

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.48 GuillotineBlockHelper.hpp

```
00001 #ifndef __RMOL_BOM_GUILLOTINEBLOCKHELPER_HPP
00002 #define __RMOL_BOM_GUILLOTINEBLOCKHELPER_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <string>
00009 // StdAir
00010 #include <stdair/stdair_inventory_types.hpp>
00011 #include <stdair/stdair_date_time_types.hpp>
00012
00013 // Forward declarations
00014 namespace stdair {
00015     class GuillotineBlock;
00016     class SegmentCabin;
00017 }
00018
00019 namespace RMOL {
00020
00021     class GuillotineBlockHelper {
00022     public:
00023         // ////////////////////////////////// Business Methods //////////////////////////////////
00024         static stdair::NbOfSegments_T getNbOfSegmentAlreadyPassedThisDTD (const
00025             stdair::GuillotineBlock&, const stdair::DTD_T&, const stdair::Date_T&);
00026
00027         static bool hasPassedThisDTD (const stdair::SegmentCabin&,
00028             const stdair::DTD_T&, const stdair::Date_T&);
00029     };
00030
00031 }
00032
00033 #endif // __RMOL_BOM_GUILLOTINEBLOCKHELPER_HPP
```

## 28.49 rmol/bom/HistoricalBooking.cpp File Reference

```
#include <sstream> #include <cassert> #include <iomanip> ×
#include <iostream> #include <rmol/bom/HistoricalBooking.-
hpp>
```



## Namespaces

- namespace [RMOL](#)

## 28.50 HistoricalBooking.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <sstream>
00006 #include <cassert>
00007 #include <iomanip>
00008 #include <iostream>
00009 // RMOL
00010 #include <rmol/bom/HistoricalBooking.hpp>
00011
00012 namespace RMOL {
00013
00014 // //////////////////////////////////////
00015 HistoricalBooking::HistoricalBooking () :
00016     _numberOfBookings (0.0), _unconstrainedDemand (0.0), _flag (false) {
00017 }
00018
00019 // //////////////////////////////////////
00020 HistoricalBooking::
00021 HistoricalBooking (const stdair::NbOfBookings_T iNbOfBookings,
00022                  const stdair::Flag_T iFlag)
00023     : _numberOfBookings (iNbOfBookings),
00024       _unconstrainedDemand (iNbOfBookings), _flag (iFlag) {
00025 }
00026
00027 // //////////////////////////////////////
00028 HistoricalBooking::HistoricalBooking
00029 (const HistoricalBooking& iHistoricalBooking) :
00030     _numberOfBookings (iHistoricalBooking.getNbOfBookings()),
00031     _unconstrainedDemand (iHistoricalBooking.getUnconstrainedDemand()),
00032     _flag (iHistoricalBooking.getFlag()) {
00033 }
00034
00035 // //////////////////////////////////////
00036 HistoricalBooking::~HistoricalBooking() {
00037 }
00038
00039 // //////////////////////////////////////
00040 void HistoricalBooking::setParameters
00041 (const stdair::NbOfBookings_T iNbOfBookings, const stdair::Flag_T iFlag) {
00042     _numberOfBookings = iNbOfBookings;
00043     _unconstrainedDemand = iNbOfBookings;
00044     _flag = iFlag;
00045 }
00046
00047 // //////////////////////////////////////
00048 const std::string HistoricalBooking::describe() const {
00049     std::ostringstream ostr;
00050     ostr << "Struct of hitorical booking, unconstrained demand and flag of "
00051           << "censorship for a FlightDate/Class.";
00052
00053     return ostr.str();
00054 }
00055
00056 // //////////////////////////////////////
00057 void HistoricalBooking::toStream (std::ostream& ioOut) const {
00058     const stdair::NbOfBookings_T bj = getNbOfBookings();
00059     const stdair::NbOfBookings_T uj = getUnconstrainedDemand();
00060     const stdair::Flag_T fj = getFlag();
00061     ioOut << std::fixed << std::setprecision (2)
00062           << bj << " "; << uj << " "; << fj << std::endl;
00063 }
00064

```

```

00065 // //////////////////////////////////////
00066 void HistoricalBooking::display () const {
00067     toStream (std::cout);
00068 }
00069 }

```

## 28.51 rmol/bom/HistoricalBooking.hpp File Reference

```

#include <stdair/stdair_basic_types.hpp> #include <stdair/basic/-
StructAbstract.hpp>

```

### Classes

- struct [RMOL::HistoricalBooking](#)  
*Structure keeping track, for a given class, of the number of historical bookings and of the censorship flag.*

### Namespaces

- namespace [RMOL](#)

## 28.52 HistoricalBooking.hpp

```

00001 #ifndef __RMOL_BOM_HISTORICALBOOKING_HPP
00002 #define __RMOL_BOM_HISTORICALBOOKING_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // StdAir
00008 #include <stdair/stdair_basic_types.hpp>
00009 #include <stdair/basic/StructAbstract.hpp>
00010
00011 namespace RMOL {
00012
00017     struct HistoricalBooking : public stdair::StructAbstract {
00018
00019     public:
00020         // ////////////////////////////////////// Getters //////////////////////////////////////
00022         const stdair::NbOfBookings_T& getNbOfBookings() const {
00023             return _numberOfBookings;
00024         }
00026         const stdair::NbOfBookings_T& getUnconstrainedDemand() const {
00027             return _unconstrainedDemand;
00028         }
00031         const stdair::Flag_T& getFlag() const {
00032             return _flag;
00033         }
00034
00035     public:
00036         // ////////////////////////////////////// Setters //////////////////////////////////////
00038         void setUnconstrainedDemand (const stdair::NbOfBookings_T& iDemand) {
00039             _unconstrainedDemand = iDemand;
00040         }
00041
00043         void setParameters (const stdair::NbOfBookings_T, const stdair::Flag_T);
00044
00045     public:
00046         // ////////////////////////////////////// Display Methods //////////////////////////////////////
00052         void toStream (std::ostream& ioOut) const;

```

```

00053
00057     const std::string describe() const;
00058
00062     void display () const;
00063
00064 public:
00065     // ////////// Constructors and destructor. //////////
00069     HistoricalBooking (const stdair::NbOfBookings_T, const stdair::Flag_T);
00073     HistoricalBooking();
00077     HistoricalBooking (const HistoricalBooking&);
00078
00082     virtual ~HistoricalBooking();
00083
00084 private:
00085     // ////////// Attributes //////////
00089     stdair::NbOfBookings_T _numberOfBookings;
00090
00094     stdair::NbOfBookings_T _unconstrainedDemand;
00095
00099     stdair::Flag_T _flag;
00100 };
00101 }
00102 #endif // __RMOL_BOM_HISTORICALBOOKING_HPP

```

## 28.53 rmol/bom/HistoricalBookingHolder.cpp File Reference

```

#include <sstream> #include <iostream> #include <iomanip> ×
#include <cmath> #include <cassert> #include <stdair/service/-
Logger.hpp> #include <rmol/bom/HistoricalBooking.hpp> ×
#include <rmol/bom/HistoricalBookingHolder.hpp>

```

### Namespaces

- namespace [RMOL](#)

## 28.54 HistoricalBookingHolder.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <sstream>
00006 #include <iostream>
00007 #include <iomanip>
00008 #include <cmath>
00009 #include <cassert>
00010 // StdAir
00011 #include <stdair/service/Logger.hpp>
00012 // RMOL
00013 #include <rmol/bom/HistoricalBooking.hpp>
00014 #include <rmol/bom/HistoricalBookingHolder.hpp>
00015
00016 namespace RMOL {
00017
00018     // //////////////////////////////////////
00019     HistoricalBookingHolder::HistoricalBookingHolder () {
00020     }
00021
00022     // //////////////////////////////////////
00023     HistoricalBookingHolder::~HistoricalBookingHolder () {
00024         _historicalBookingVector.clear();
00025     }
00026

```

```

00027 // //////////////////////////////////////
00028 const short HistoricalBookingHolder::getNbOfFlights () const {
00029     return _historicalBookingVector.size();
00030 }
00031
00032 // //////////////////////////////////////
00033 const short HistoricalBookingHolder::getNbOfUncensoredData () const {
00034     short lResult = 0;
00035     const short lSize = _historicalBookingVector.size();
00036
00037     for (short ite = 0; ite < lSize; ++ite) {
00038         const stdair::Flag_T lFlag = _historicalBookingVector.at(ite).getFlag ();
00039         if (lFlag == false) {
00040             ++ lResult;
00041         }
00042     }
00043
00044     return lResult;
00045 }
00046
00047 // //////////////////////////////////////
00048 const stdair::NbOfBookings_T HistoricalBookingHolder::
00049 getNbOfUncensoredBookings () const {
00050     stdair::NbOfBookings_T lResult = 0;
00051     const short lSize = _historicalBookingVector.size();
00052
00053     for (short ite = 0; ite < lSize; ++ite) {
00054         const HistoricalBooking& lHistorialBooking =
00055             _historicalBookingVector.at (ite);
00056         const stdair::Flag_T lFlag = lHistorialBooking.getFlag ();
00057         if (lFlag == false) {
00058             const stdair::NbOfBookings_T& lBooking =
00059                 lHistorialBooking.getNbOfBookings ();
00060             lResult += lBooking;
00061         }
00062     }
00063
00064     return lResult;
00065 }
00066
00067 // //////////////////////////////////////
00068 const double HistoricalBookingHolder::
00069 getUncensoredStandardDeviation (const double& iMeanOfUncensoredBookings,
00070                                 const short iNbOfUncensoredData) const {
00071
00072     double lResult = 0;
00073     const short lSize = _historicalBookingVector.size();
00074
00075     for (short ite = 0; ite < lSize; ++ite) {
00076         const stdair::Flag_T lFlag = _historicalBookingVector.at(ite).getFlag ();
00077         if (lFlag == false) {
00078             const HistoricalBooking& lHistorialBooking =
00079                 _historicalBookingVector.at (ite);
00080
00081             const stdair::NbOfBookings_T& lBooking =
00082                 lHistorialBooking.getNbOfBookings ();
00083
00084             lResult += (lBooking - iMeanOfUncensoredBookings)
00085                 * (lBooking - iMeanOfUncensoredBookings);
00086         }
00087     }
00088     lResult /= (iNbOfUncensoredData - 1);
00089     lResult = sqrt (lResult);
00090
00091     return lResult;
00092 }
00093
00094 // //////////////////////////////////////
00095 const double HistoricalBookingHolder::getDemandMean () const {
00096     double lResult = 0;
00097     const short lSize = _historicalBookingVector.size();
00098
00099     for (short ite = 0; ite < lSize; ++ite) {
00100         const HistoricalBooking& lHistorialBooking =

```

```

00101         _historicalBookingVector.at(ite);
00102
00103         const stdair::NbOfBookings_T& lDemand =
00104             lHistorialBooking.getUnconstrainedDemand ();
00105
00106         lResult += static_cast<double>(lDemand);
00107     }
00108
00109     lResult /= lSize;
00110
00111     return lResult;
00112 }
00113
00114 // //////////////////////////////////////
00115 const double HistoricalBookingHolder::getStandardDeviation
00116 (const double iDemandMean) const {
00117     double lResult = 0;
00118     const short lSize = _historicalBookingVector.size();
00119
00120     for (short ite = 0; ite < lSize; ++ite) {
00121         const HistoricalBooking& lHistorialBooking =
00122             _historicalBookingVector.at(ite);
00123
00124         const stdair::NbOfBookings_T& lDemand =
00125             lHistorialBooking.getUnconstrainedDemand ();
00126
00127         const double lDoubleDemand = static_cast<double>(lDemand);
00128         lResult += (lDoubleDemand - iDemandMean) * (lDoubleDemand - iDemandMean);
00129     }
00130
00131     lResult /= (lSize - 1);
00132
00133     lResult = sqrt (lResult);
00134
00135     return lResult;
00136 }
00137
00138 // //////////////////////////////////////
00139 const std::vector<bool> HistoricalBookingHolder::
00140 getListOfToBeUnconstrainedFlags () const {
00141     std::vector<bool> lResult;
00142     const short lSize = _historicalBookingVector.size();
00143
00144     for (short ite = 0; ite < lSize; ++ite) {
00145         const HistoricalBooking& lHistorialBooking =
00146             _historicalBookingVector.at(ite);
00147         const stdair::Flag_T lFlag = lHistorialBooking.getFlag ();
00148         if (lFlag == true) {
00149             lResult.push_back(true);
00150         }
00151         else {
00152             lResult.push_back(false);
00153         }
00154     }
00155
00156     return lResult;
00157 }
00158
00159 // //////////////////////////////////////
00160 const stdair::NbOfBookings_T& HistoricalBookingHolder::
00161 getHistoricalBooking (const short i) const {
00162     const HistoricalBooking& lHistorialBooking =
00163         _historicalBookingVector.at(i);
00164     return lHistorialBooking.getNbOfBookings ();
00165 }
00166
00167 // //////////////////////////////////////
00168 const stdair::NbOfBookings_T& HistoricalBookingHolder::
00169 getUnconstrainedDemand (const short i) const {
00170     const HistoricalBooking& lHistorialBooking =
00171         _historicalBookingVector.at(i);
00172     return lHistorialBooking.getUnconstrainedDemand();
00173 }
00174

```

```

00175 ///////////////////////////////////////////////////////////////////
00176 const stdair::Flag_T& HistoricalBookingHolder::
00177 getCensorshipFlag (const short i) const {
00178     const HistoricalBooking& lHistorialBooking =
00179         _historicalBookingVector.at(i);
00180     return lHistorialBooking.getFlag();
00181 }
00182
00183 ///////////////////////////////////////////////////////////////////
00184 void HistoricalBookingHolder::setUnconstrainedDemand
00185 (const stdair::NbOfBookings_T& iExpectedDemand, const short i) {
00186     _historicalBookingVector.at(i).setUnconstrainedDemand(iExpectedDemand);
00187 }
00188
00189 ///////////////////////////////////////////////////////////////////
00190 const stdair::NbOfBookings_T HistoricalBookingHolder::calculateExpectedDemand
00191 (const double iMean, const double iSD,
00192  const short i, const stdair::NbOfBookings_T iDemand) const {
00193
00194     const HistoricalBooking lHistorialBooking =
00195         _historicalBookingVector.at(i);
00196     const double lBooking =
00197         static_cast<double> (lHistorialBooking.getNbOfBookings());
00198     double e, d1, d2;
00199
00200     e = - (lBooking - iMean) * (lBooking - iMean) * 0.625 / (iSD * iSD);
00201     //STDAIR_LOG_DEBUG ("e: " << e);
00202     e = exp (e);
00203     //STDAIR_LOG_DEBUG ("e: " << e);
00204
00205     double s = sqrt (1 - e);
00206     //STDAIR_LOG_DEBUG ("s: " << s);
00207
00208     if (lBooking >= iMean) {
00209         if (e < 0.01) {
00210             return iDemand;
00211         }
00212         d1 = 0.5 * (1 - s);
00213     }
00214     else {
00215         d1 = 0.5 * (1 + s);
00216     }
00217     //STDAIR_LOG_DEBUG ("d1: " << d1);
00218
00219     e = - (lBooking - iMean) * (lBooking - iMean) * 0.5 / (iSD * iSD);
00220     e = exp (e);
00221     d2 = e * iSD / sqrt (2 * 3.14159265);
00222     //STDAIR_LOG_DEBUG ("d2: " << d2);
00223
00224     if (d1 == 0) {
00225         return iDemand;
00226     }
00227
00228     const stdair::NbOfBookings_T lDemand =
00229         static_cast<stdair::NbOfBookings_T> (iMean + d2/d1);
00230
00231     return lDemand;
00232 }
00233
00234 ///////////////////////////////////////////////////////////////////
00235 void HistoricalBookingHolder::addHistoricalBooking
00236 (const HistoricalBooking& iHistorialBooking) {
00237     _historicalBookingVector.push_back(iHistorialBooking);
00238 }
00239
00240 ///////////////////////////////////////////////////////////////////
00241 void HistoricalBookingHolder::toStream (std::ostream& ioOut) const {
00242     const short lSize = _historicalBookingVector.size();
00243
00244     ioOut << "Historical Booking; Unconstrained Demand; Flag" << std::endl;
00245
00246     for (short ite = 0; ite < lSize; ++ite) {
00247         const HistoricalBooking& lHistorialBooking =
00248             _historicalBookingVector.at(ite);

```

```

00249
00250     const stdair::NbOfBookings_T& lBooking =
00251         lHistorialBooking.getNbOfBookings();
00252
00253     const stdair::NbOfBookings_T& lDemand =
00254         lHistorialBooking.getUnconstrainedDemand();
00255
00256     const stdair::Flag_T lFlag = lHistorialBooking.getFlag();
00257
00258     ioOut << lBooking << "      "
00259         << lDemand << "      "
00260         << lFlag << std::endl;
00261 }
00262 }
00263
00264 // //////////////////////////////////////
00265 const std::string HistoricalBookingHolder::describe() const {
00266     std::ostringstream ostr;
00267     ostr << "Holder of HistoricalBooking structs.";
00268
00269     return ostr.str();
00270 }
00271
00272 // //////////////////////////////////////
00273 void HistoricalBookingHolder::display() const {
00274     toStream (std::cout);
00275 }
00276 }

```

## 28.55 rmol/bom/HistoricalBookingHolder.hpp File Reference

```

#include <iostream> #include <vector> #include <stdair/stdair-
_basic_types.hpp> #include <stdair/basic/StructAbstract.-
hpp>

```

### Classes

- struct [RMOL::HistoricalBookingHolder](#)

### Namespaces

- namespace [RMOL](#)

### Typedefs

- typedef [std::vector](#) < HistoricalBooking > [RMOL::HistoricalBookingVector\\_T](#)

## 28.56 HistoricalBookingHolder.hpp

```

00001 #ifndef __RMOL_BOM_HISTORICALBOOKINGHOLDER_HPP
00002 #define __RMOL_BOM_HISTORICALBOOKINGHOLDER_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <iostream>
00009 #include <vector>

```

```

00010 // StdAir
00011 #include <stdair/stdair_basic_types.hpp>
00012 #include <stdair/basic/StructAbstract.hpp>
00013
00014 namespace RMOL {
00016     struct HistoricalBooking;
00017
00019     typedef std::vector<HistoricalBooking> HistoricalBookingVector_T;
00020
00023     struct HistoricalBookingHolder : public stdair::StructAbstract {
00024
00025     public:
00026         // ///// Getters /////
00028         const short getNbOfFlights () const;
00029
00031         const short getNbOfUncensoredData () const;
00032
00034         const stdair::NbOfBookings_T getNbOfUncensoredBookings () const;
00035
00037         const double getUncensoredStandardDeviation
00038         (const double& iMeanOfUncensoredBookings,
00039          const short iNbOfUncensoredData) const;
00040
00042         const double getDemandMean () const;
00043
00045         const double getStandardDeviation (const double) const;
00046
00048         const std::vector<bool> getListOfToBeUnconstrainedFlags() const;
00049
00051         const stdair::NbOfBookings_T& getHistoricalBooking (const short i) const;
00052
00054         const stdair::NbOfBookings_T& getUnconstrainedDemand (const short i) const;
00055
00057         const stdair::Flag_T& getCensorshipFlag (const short i) const;
00058
00060         const stdair::NbOfBookings_T& getUnconstrainedDemandOnFirstElement() const
00061     {
00062         return getUnconstrainedDemand (0);
00063     }
00065
00066         const stdair::NbOfBookings_T calculateExpectedDemand (const double,
00067                                                                const double,
00068                                                                const short,
00069                                                                const stdair::NbOfBookings_T) const
00070     ;
00071
00073         void setUnconstrainedDemand (const stdair::NbOfBookings_T& iExpectedDemand,
00074                                     const short i);
00075
00077         void addHistoricalBooking (const HistoricalBooking& iHistoricalBooking);
00078
00080         void toStream (std::ostream& ioOut) const;
00081
00082         // ////////// Display Methods //////////
00084         const std::string describe() const;
00085
00087         void display () const;
00088
00090         virtual ~HistoricalBookingHolder();
00091
00092     public:
00095         HistoricalBookingHolder ();
00096
00097     private:
00099         HistoricalBookingVector_T _historicalBookingVector;
00100
00101     protected:
00102     };
00103 }
00104 #endif // __RMOL_BOM_HISTORICALBOOKINGHOLDER_HPP
00105

```



## 28.57 rmol/bom/MCOptimiser.cpp File Reference

```
#include <cassert> #include <string> #include <sstream>
#include <algorithm> #include <cmath> #include <stdair/stdair-
_basic_types.hpp> #include <stdair/bom/BomManager.hpp> ×
#include <stdair/bom/LegCabin.hpp> #include <stdair/bom/-
SegmentCabin.hpp> #include <stdair/bom/BookingClass.-
hpp> #include <stdair/bom/VirtualClassStruct.hpp> #include
<stdair/service/Logger.hpp> #include <stdair/basic/-
RandomGeneration.hpp> #include <stdair/basic/BasConst_-
General.hpp> #include <rmol/bom/MCOptimiser.hpp>
```

## Namespaces

- namespace [RMOL](#)

## 28.58 MCOptimiser.cpp

```
00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 #include <string>
00007 #include <sstream>
00008 #include <algorithm>
00009 #include <cmath>
00010 // StdAir
00011 #include <stdair/stdair_basic_types.hpp>
00012 #include <stdair/bom/BomManager.hpp>
00013 #include <stdair/bom/LegCabin.hpp>
00014 #include <stdair/bom/SegmentCabin.hpp>
00015 #include <stdair/bom/BookingClass.hpp>
00016 #include <stdair/bom/VirtualClassStruct.hpp>
00017 #include <stdair/service/Logger.hpp>
00018
00019 #include <stdair/basic/RandomGeneration.hpp>
00020 #include <stdair/basic/BasConst_General.hpp>
00021 // RMOL
00022 #include <rmol/bom/MCOptimiser.hpp>
00023
00024 namespace RMOL {
00025
00026 // // //////////////////////////////////////
00027 void MCOptimiser::
00028 optimalOptimisationByMCIntegration (stdair::LegCabin& ioLegCabin) {
00029     // Retrieve the segment-cabin
00030     const stdair::SegmentCabinList_T lSegmentCabinList =
00031         stdair::BomManager::getList<stdair::SegmentCabin> (ioLegCabin);
00032     stdair::SegmentCabinList_T::const_iterator itSC = lSegmentCabinList.begin()
00033 ;
00034     assert (itSC != lSegmentCabinList.end());
00035     const stdair::SegmentCabin* lSegmentCabin_ptr = *itSC;
00036     assert (lSegmentCabin_ptr != NULL);
00037
00038     // Retrieve the class list.
00039     const stdair::BookingClassList_T lBookingClassList =
00040         stdair::BomManager::getList<stdair::BookingClass> (*lSegmentCabin_ptr);
00041
00042     // Retrieve the remaining cabin capacity.
00043     const stdair::Availability_T& lCap = ioLegCabin.getAvailabilityPool();
00044     const int lCapacity = static_cast<const int> (lCap);
00045     const stdair::UnsignedIndex_T lCapacityIndex =
```

```

00045         static_cast<const stdair::UnsignedIndex_T> ((lCapacity+abs(lCapacity))/2)
00046     ;
00047     // Retrieve the virtual class list.
00048     stdair::VirtualClassList_T& lVCList = ioLegCabin.getVirtualClassList();
00049
00050     // Parse the virtual class list and compute the protection levels.
00051     stdair::VirtualClassList_T::iterator itCurrentVC = lVCList.begin();
00052     assert (itCurrentVC != lVCList.end());
00053     stdair::VirtualClassList_T::iterator itNextVC = itCurrentVC; ++itNextVC;
00054
00055     // Initialise the partial sum holder with the demand sample of the first
00056     // virtual class.
00057     stdair::VirtualClassStruct& lFirstVC = *itCurrentVC;
00058     stdair::GeneratedDemandVector_T lPartialSumHolder =
00059         lFirstVC.getGeneratedDemandVector();
00060
00061     // Initialise the booking limit for the first class, which is equal to
00062     // the remaining capacity.
00063     lFirstVC.setCumulatedBookingLimit (lCap);
00064
00065     // Initialise bid price vector with the first element (index 0) equal to
00066     // the highest yield.
00067     ioLegCabin.emptyBidPriceVector();
00068     stdair::BidPriceVector_T& lBPV = ioLegCabin.getBidPriceVector();
00069     //const stdair::Yield_T& y1 = lFirstVC.getYield ();
00070     //lBPV.push_back (y1);
00071     stdair::UnsignedIndex_T idx = 1;
00072
00073     for (; itNextVC != lVCList.end(); ++itCurrentVC, ++itNextVC) {
00074         // Get the yields of the two classes.
00075         stdair::VirtualClassStruct& lCurrentVC = *itCurrentVC;
00076         stdair::VirtualClassStruct& lNextVC = *itNextVC;
00077         const stdair::Yield_T& yj = lCurrentVC.getYield ();
00078         const stdair::Yield_T& yj1 = lNextVC.getYield ();
00079
00080         // Consistency check: the yield/price of a higher class/bucket
00081         // (with the j index lower) must be higher.
00082         assert (yj > yj1);
00083
00084         // Sort the partial sum holder.
00085         std::sort (lPartialSumHolder.begin(), lPartialSumHolder.end());
00086         const stdair::UnsignedIndex_T K = lPartialSumHolder.size ();
00087
00088         // Compute the optimal index lj = floor {[y(j)-y(j+1)]/y(j) . K}
00089         const double ljdoube = std::floor (K * (yj - yj1) / yj);
00090         stdair::UnsignedIndex_T lj =
00091             static_cast<stdair::UnsignedIndex_T> (ljdoube);
00092
00093         // Consistency check.
00094         assert (lj >= 1 && lj < K);
00095
00096         // The optimal protection: p(j) = 1/2 [S(j,lj) + S(j, lj+1)]
00097         const double sj1 = lPartialSumHolder.at (lj - 1);
00098         const double sj1p1 = lPartialSumHolder.at (lj + 1 - 1);
00099         const double pj = (sj1 + sj1p1) / 2;
00100
00101         // Set the cumulated protection level for the current class.
00102         lCurrentVC.setCumulatedProtection (pj);
00103         // Set the cumulated booking limit for the next class.
00104         lNextVC.setCumulatedBookingLimit (lCap - pj);
00105
00110         const stdair::UnsignedIndex_T pjint = static_cast<const int> (pj);
00111         stdair::GeneratedDemandVector_T::iterator itLowerBound =
00112             lPartialSumHolder.begin();
00113         for (; idx <= pjint && idx <= lCapacityIndex; ++idx) {
00114             itLowerBound =
00115                 std::lower_bound (itLowerBound, lPartialSumHolder.end(), idx);
00116             const stdair::UnsignedIndex_T pos =
00117                 itLowerBound - lPartialSumHolder.begin();
00118
00119             const stdair::BidPrice_T lBP = yj * (K - pos) / K;
00120             lBPV.push_back (lBP);
00121         }

```

```

00122
00123     // Update the partial sum holder.
00124     const stdair::GeneratedDemandVector_T& lNextPSH =
00125         lNextVC.getGeneratedDemandVector();
00126     assert (K <= lNextPSH.size());
00127     for (stdair::UnsignedIndex_T i = 0; i < K - 1j; ++i) {
00128         lPartialSumHolder.at(i) = lPartialSumHolder.at(i + 1j) + lNextPSH.at(i)
00129     };
00130     lPartialSumHolder.resize (K - 1j);
00131 }
00132
00133 stdair::VirtualClassStruct& lLastVC = *itCurrentVC;
00134 const stdair::Yield_T& yn = lLastVC.getYield();
00135 stdair::GeneratedDemandVector_T::iterator itLowerBound =
00136     lPartialSumHolder.begin();
00137 for (; idx <= lCapacityIndex; ++idx) {
00138     itLowerBound =
00139         std::lower_bound (itLowerBound, lPartialSumHolder.end(), idx);
00140     const stdair::UnsignedIndex_T pos =
00141         itLowerBound - lPartialSumHolder.begin();
00142     const stdair::UnsignedIndex_T K = lPartialSumHolder.size();
00143     const stdair::BidPrice_T lBP = yn * (K - pos) / K;
00144     lBPV.push_back (lBP);
00145 }
00146 }
00147 }
00148
00149 // //////////////////////////////////////
00150 stdair::GeneratedDemandVector_T MCOptimiser::
00151 generateDemandVector (const stdair::MeanValue_T& iMean,
00152                     const stdair::StdDevValue_T& iStdDev,
00153                     const unsigned int& K) {
00154     stdair::GeneratedDemandVector_T oDemandVector;
00155     if (iStdDev > 0) {
00156         stdair::RandomGeneration lGenerator (stdair::DEFAULT_RANDOM_SEED);
00157         for (unsigned int i = 0; i < K; ++i) {
00158             stdair::RealNumber_T lDemandSample =
00159                 lGenerator.generateNormal (iMean, iStdDev);
00160             oDemandVector.push_back (lDemandSample);
00161         }
00162     } else {
00163         for (unsigned int i = 0; i < K; ++i) {
00164             oDemandVector.push_back (iMean);
00165         }
00166     }
00167     return oDemandVector;
00168 }
00169
00170 // //////////////////////////////////////
00171 void MCOptimiser::
00172 optimisationByMCIntegration (stdair::LegCabin& ioLegCabin) {
00173     // Number of MC samples
00174     unsigned int K = 100000;
00175
00176     const stdair::YieldLevelDemandMap_T& lYieldDemandMap =
00177         ioLegCabin.getYieldLevelDemandMap();
00178     assert (!lYieldDemandMap.empty());
00179
00180     std::ostringstream oStr;
00181     oStr << "Yield list ";
00182     for (stdair::YieldLevelDemandMap_T::const_iterator itYD =
00183         lYieldDemandMap.begin();
00184         itYD != lYieldDemandMap.end(); ++itYD) {
00185         const stdair::Yield_T& y = itYD->first;
00186         oStr << y << " ";
00187     }
00188
00189     STDAIR_LOG_DEBUG (oStr.str());
00190     ioLegCabin.emptyBidPriceVector();
00191     stdair::BidPriceVector_T& lBidPriceVector =
00192         ioLegCabin.getBidPriceVector();
00193     const stdair::Availability_T& lAvailabilityPool =
00194         ioLegCabin.getAvailabilityPool();
00195     // Initialise the minimal bid price to 1.0 (just to avoid problems

```

```

00199     // of division by zero).
00200     const stdair::BidPrice_T& lMinBP = 1.0;
00201
00202     stdair::YieldLevelDemandMap_T::const_reverse_iterator itCurrentYD =
00203         lYieldDemandMap.rbegin();
00204     stdair::YieldLevelDemandMap_T::const_reverse_iterator itNextYD =
00205         itCurrentYD;
00206         ++itNextYD;
00207
00207     // Initialise the partial sum holder
00208     stdair::MeanStdDevPair_T lMeanStdDevPair = itCurrentYD->second;
00209     stdair::GeneratedDemandVector_T lPartialSumHolder =
00210         generateDemandVector(lMeanStdDevPair.first, lMeanStdDevPair.second, K);
00211
00212     stdair::UnsignedIndex_T idx = 1;
00213     for (; itNextYD!=lYieldDemandMap.rend(); ++itCurrentYD, ++itNextYD) {
00214         const stdair::Yield_T& yj = itCurrentYD->first;
00215         const stdair::Yield_T& yj1 = itNextYD->first;
00216         // Consistency check: the yield/price of a higher class/bucket
00217         // (with the j index lower) must be higher.
00218         assert (yj > yj1);
00219         // Sort the partial sum holder.
00220         std::sort (lPartialSumHolder.begin(), lPartialSumHolder.end());
00221         // STDAIR_LOG_DEBUG ("Partial sums : max = " << lPartialSumHolder.back()
00222         // << " min = " << lPartialSumHolder.front());
00223         K = lPartialSumHolder.size ();
00224         // Compute the optimal index lj = floor {[y(j)-y(j+1)]/y(j) . K}
00225         const double ljdoube = std::floor (K * (yj - yj1) / yj);
00226         stdair::UnsignedIndex_T lj =
00227             static_cast<stdair::UnsignedIndex_T> (ljdoube);
00228         // Consistency check.
00229         assert (lj >= 1 && lj < K);
00230         // The optimal protection: p(j) = 1/2 [S(j,lj) + S(j, lj+1)]
00231         const double sjl = lPartialSumHolder.at (lj - 1);
00232         const double sjlp1 = lPartialSumHolder.at (lj + 1 - 1);
00233         const double pj = (sjl + sjlp1) / 2;
00234         const stdair::UnsignedIndex_T pjint = static_cast<const int> (pj);
00235         stdair::GeneratedDemandVector_T::iterator itLowerBound =
00236             lPartialSumHolder.begin();
00237         for (; idx <= pjint && idx <= lAvailabilityPool; ++idx) {
00238             itLowerBound =
00239                 std::lower_bound (itLowerBound, lPartialSumHolder.end(), idx);
00240             const stdair::UnsignedIndex_T pos =
00241                 itLowerBound - lPartialSumHolder.begin();
00242
00243             const stdair::BidPrice_T lBP = yj * (K - pos) / K;
00244             lBidPriceVector.push_back (lBP);
00245         }
00246         // Update the partial sum holder.
00247         lMeanStdDevPair = itNextYD->second;
00248         const stdair::GeneratedDemandVector_T& lNextDV =
00249             generateDemandVector (lMeanStdDevPair.first,
00250                 lMeanStdDevPair.second, K - lj);
00251         for (stdair::UnsignedIndex_T i = 0; i < K - lj; ++i) {
00252             lPartialSumHolder.at(i) = lPartialSumHolder.at(i + lj) + lNextDV.at(i);
00253         }
00254         lPartialSumHolder.resize (K - lj);
00255     }
00256     // STDAIR_LOG_DEBUG ("Partial sums : max = " << lPartialSumHolder.back()
00257     // << " min = " << lPartialSumHolder.front());
00258
00259     std::sort (lPartialSumHolder.begin(), lPartialSumHolder.end());
00260     const stdair::Yield_T& yn = itCurrentYD->first;
00261     stdair::GeneratedDemandVector_T::iterator itLowerBound =
00262         lPartialSumHolder.begin();
00263     K = lPartialSumHolder.size();
00264
00265     bool lMinBPReached = false;
00266     for (; idx <= lAvailabilityPool; ++idx) {
00267         itLowerBound =
00268             std::lower_bound (itLowerBound, lPartialSumHolder.end(), idx);
00269
00270         if (!lMinBPReached) {
00271             const stdair::UnsignedIndex_T pos =

```

```

00284         itLowerBound - lPartialSumHolder.begin();
00285         stdair::BidPrice_T lBP = yn * (K - pos) / K;
00286
00287         if (lBP < lMinBP) {
00288             lBP = lMinBP; lMinBPReached = true;
00289         }
00290
00291         lBidPriceVector.push_back (lBP);
00292
00293     } else {
00294         lBidPriceVector.push_back (lMinBP);
00295     }
00296 }
00297
00298 // Updating the bid price values
00299 ioLegCabin.updatePreviousBidPrice();
00300 ioLegCabin.setCurrentBidPrice (lBidPriceVector.back());
00301
00302 // Compute and display the bid price variation after optimisation
00303 const stdair::BidPrice_T lPreviousBP = ioLegCabin.getPreviousBidPrice();
00304 stdair::BidPrice_T lNewBP = ioLegCabin.getCurrentBidPrice();
00305 // Check
00306 assert (lPreviousBP != 0);
00307 stdair::BidPrice_T lBidPriceDelta = lNewBP - lPreviousBP;
00308
00309 double lBidPriceVariation = 100*lBidPriceDelta/lPreviousBP;
00310
00311 STDAIR_LOG_DEBUG ("Bid price: previous value " << lPreviousBP
00312                  << ", new value " << lNewBP
00313                  << ", variation " << lBidPriceVariation << " %"
00314                  << ", BPV size " << lBidPriceVector.size());
00315 }
00316 }
00317
00318 }

```

## 28.59 rmol/bom/MCOptimiser.hpp File Reference

```

#include <rmol/RMOL_Types.hpp> #include <stdair/stdair_
maths_types.hpp> #include <stdair/stdair_rm_types.hpp>

```

### Classes

- class [RMOL::MCOptimiser](#)

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.60 MCOptimiser.hpp

```

00001 #ifndef __RMOL_BOM_MCUTILS_HPP
00002 #define __RMOL_BOM_MCUTILS_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // RMOL
00008 #include <rmol/RMOL_Types.hpp>
00009 #include <stdair/stdair_maths_types.hpp>

```

```

00010 #include <stdair/stdair_rm_types.hpp>
00011
00012 // Forward declarations.
00013 namespace stdair {
00014     class LegCabin;
00015 }
00016
00017 namespace RMOL {
00019     class MCOptimiser {
00020     public:
00021
00030         static void optimalOptimisationByMCIntegration (stdair::LegCabin&);
00031
00035         static stdair::GeneratedDemandVector_T
00036         generateDemandVector (const stdair::MeanValue_T&,
00037                               const stdair::StdDevValue_T&, const unsigned int&);
00038
00039         static void optimisationByMCIntegration (stdair::LegCabin&);
00040
00041     };
00042 }
00043 #endif // __RMOL_BOM_MCUUTILS_HPP

```

## 28.61 rmol/bom/old/DemandGeneratorList.cpp File Reference

```
#include <rmol/bom/DemandGeneratorList.hpp>
```

### Namespaces

- namespace [RMOL](#)

## 28.62 DemandGeneratorList.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // RMOL
00005 #include <rmol/bom/DemandGeneratorList.hpp>
00006
00007 namespace RMOL {
00008
00009 // //////////////////////////////////////
00010 DemandGeneratorList::DemandGeneratorList () {
00011     const DistributionParameterList_T aDistributionParameterList;
00012     init (aDistributionParameterList);
00013 }
00014
00015 // //////////////////////////////////////
00016 DemandGeneratorList::
00017 DemandGeneratorList (const DemandGeneratorList& iDemandGeneratorList) {
00018     // TODO: copy the distribution parameters of the input generator list
00019     const DistributionParameterList_T aDistributionParameterList;
00020     init (aDistributionParameterList);
00021 }
00022
00023 // //////////////////////////////////////
00024 DemandGeneratorList::
00025 DemandGeneratorList (const DistributionParameterList_T&
00026 iDistributionParameterList) {
00027     init (iDistributionParameterList);
00028 }
00029 // //////////////////////////////////////
00030 DemandGeneratorList::~DemandGeneratorList () {
00031 }

```

```

00032
00033 // //////////////////////////////////////
00034 void DemandGeneratorList::
00035 init (const DistributionParameterList_T& iDistributionParameterList) {
00036
00037     DistributionParameterList_T::const_iterator itParams =
00038         iDistributionParameterList.begin();
00039     for ( ; itParams != iDistributionParameterList.end(); itParams++) {
00040         const FldDistributionParameters& aParams = *itParams;
00041
00042         const Gaussian gaussianGenerator (aParams);
00043
00044         _demandGeneratorList.push_back (gaussianGenerator);
00045     }
00046 }
00047
00048 // //////////////////////////////////////
00049 void DemandGeneratorList::
00050 generateVariateList (VariateList_T& ioVariateList) const {
00051
00052     // Iterate on the (number of) classes/buckets, n
00053     DemandGeneratorList_T::const_iterator itGenerator =
00054         _demandGeneratorList.begin();
00055     for ( ; itGenerator != _demandGeneratorList.end(); itGenerator++) {
00056         const Gaussian& gaussianGenerator = *itGenerator;
00057
00058         // Generate a random variate following the Gaussian distribution
00059         const double generatedVariate = gaussianGenerator.generateVariate ();
00060         ioVariateList.push_back (generatedVariate);
00061     }
00062 }
00063
00064 }

```

## 28.63 rmol/bom/old/DemandGeneratorList.hpp File Reference

```

#include <list>          #include <rmol/bom/VariateList.hpp> ×
#include <rmol/bom/DistributionParameterList.hpp> #include
<rmol/bom/Gaussian.hpp>

```

### Classes

- class [RMOL::DemandGeneratorList](#)

### Namespaces

- namespace [RMOL](#)

## 28.64 DemandGeneratorList.hpp

```

00001 #ifndef __RMOL_DEMANDGENERATORLIST_HPP
00002 #define __RMOL_DEMANDGENERATORLIST_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <list>
00009 // RMOL
00010 #include <rmol/bom/VariateList.hpp>
00011 #include <rmol/bom/DistributionParameterList.hpp>

```

```

00012 #include <rmol/bom/Gaussian.hpp>
00013
00014 namespace RMOL {
00015
00017     class DemandGeneratorList {
00018     protected:
00020         typedef std::list<Gaussian> DemandGeneratorList_T;
00021
00022     public:
00024         DemandGeneratorList ();
00025         DemandGeneratorList (const DemandGeneratorList&);
00027         DemandGeneratorList (const DistributionParameterList_T&);
00028
00030         virtual ~DemandGeneratorList ();
00031
00033         void generateVariateList (VariateList_T&) const;
00034
00035     private:
00036         DemandGeneratorList_T _demandGeneratorList;
00037
00039         void init (const DistributionParameterList_T&);
00040
00041     };
00042 }
00043 #endif // __RMOL_DEMANDGENERATORLIST_HPP

```

## 28.65 rmol/bom/Utilities.cpp File Reference

```

#include <cassert> #include <string> #include <numeric>
#include <algorithm> #include <cmath> #include <stdair/basic/-
BasConst_Inventory.hpp> #include <stdair/bom/BomManager.-
hpp> #include <stdair/bom/SegmentCabin.hpp> #include
<stdair/service/Logger.hpp> #include <rmol/basic/Bas-
Const_General.hpp> #include <rmol/bom/Utilities.hpp> ×
#include <rmol/bom/GuillotineBlockHelper.hpp>

```

### Namespaces

- namespace [RMOL](#)

## 28.66 Utilities.cpp

```

00001
00002 // //////////////////////////////////////
00003 // Import section
00004 // //////////////////////////////////////
00005 // STL
00006 #include <cassert>
00007 #include <string>
00008 #include <numeric>
00009 #include <algorithm>
00010 #include <cmath>
00011 // StdAir
00012 #include <stdair/basic/BasConst_Inventory.hpp>
00013 #include <stdair/bom/BomManager.hpp>
00014 #include <stdair/bom/SegmentCabin.hpp>
00015 #include <stdair/service/Logger.hpp>
00016 // RMOL
00017 #include <rmol/basic/BasConst_General.hpp>
00018 #include <rmol/bom/Utilities.hpp>
00019 #include <rmol/bom/GuillotineBlockHelper.hpp>
00020

```



```

00021 namespace RMOL {
00022 ///////////////////////////////////////////////////////////////////
00023 void Utilities::
00024 computeDistributionParameters (const UnconstrainedDemandVector_T& iVector,
00025                               double& ioMean, double& ioStdDev) {
00026     ioMean = 0.0; ioStdDev = 0.0;
00027     unsigned int lNbOfSamples = iVector.size();
00028     assert (lNbOfSamples > 1);
00029
00030     // Compute the mean
00031     for (UnconstrainedDemandVector_T::const_iterator itSample = iVector.begin()
;
00032         itSample != iVector.end(); ++itSample) {
00033         //STDAIR_LOG_NOTIFICATION (*itSample);
00034         ioMean += *itSample;
00035     }
00036     ioMean /= lNbOfSamples;
00037
00038     // Compute the standard deviation
00039     for (UnconstrainedDemandVector_T::const_iterator itSample = iVector.begin()
;
00040         itSample != iVector.end(); ++itSample) {
00041         const double& lSample = *itSample;
00042         ioStdDev += ((lSample - ioMean) * (lSample - ioMean));
00043     }
00044     ioStdDev /= (lNbOfSamples - 1);
00045     ioStdDev = sqrt (ioStdDev);
00046
00047     // Sanity check
00048     if (ioStdDev == 0) {
00049         ioStdDev = 0.1;
00050     }
00051 }
00052
00053 ///////////////////////////////////////////////////////////////////
00054 stdair::DCPList_T Utilities::
00055 buildRemainingDCPList (const stdair::DTD_T& iDTD) {
00056     stdair::DCPList_T oDCPList;
00057
00058     const stdair::DCPList_T lWholeDCPList = stdair::DEFAULT_DCP_LIST;
00059     stdair::DCPList_T::const_iterator itDCP = lWholeDCPList.begin();
00060     while (itDCP != lWholeDCPList.end()) {
00061         const stdair::DCP_T& lDCP = *itDCP;
00062         if (iDTD >= lDCP) {
00063             break;
00064         }
00065         ++itDCP;
00066     }
00067     assert (itDCP != lWholeDCPList.end());
00068
00069     oDCPList.push_back (iDTD);
00070     ++itDCP;
00071     for (; itDCP != lWholeDCPList.end(); ++itDCP) {
00072         oDCPList.push_back (*itDCP);
00073     }
00074
00075     return oDCPList;
00076 }
00077
00078 ///////////////////////////////////////////////////////////////////
00079 stdair::DCPList_T Utilities::
00080 buildRemainingDCPList2 (const stdair::DTD_T& iDTD) {
00081     stdair::DCPList_T oDCPList;
00082
00083     const stdair::DCPList_T lWholeDCPList = RMOL::DEFAULT_DCP_LIST;
00084     stdair::DCPList_T::const_iterator itDCP = lWholeDCPList.begin();
00085     while (itDCP != lWholeDCPList.end()) {
00086         const stdair::DCP_T& lDCP = *itDCP;
00087         if (iDTD >= lDCP) {
00088             break;
00089         }
00090         ++itDCP;
00091     }
00092     assert (itDCP != lWholeDCPList.end());

```

```

00093
00094     oDCPList.push_back (iDTD);
00095     ++itDCP;
00096     for (; itDCP != lWholeDCPList.end(); ++itDCP) {
00097         oDCPList.push_back (*itDCP);
00098     }
00099
00100     return oDCPList;
00101 }
00102
00103 // //////////////////////////////////////
00104 stdair::NbOfSegments_T Utilities::
00105 getNbOfDepartedSimilarSegments (const stdair::SegmentCabin& iSegmentCabin,
00106                                 const stdair::Date_T& iEventDate) {
00107     stdair::DTD_T lDTD = 0;
00108     // Retrieve the guillotine block.
00109     const stdair::GuillotineBlock& lGuillotineBlock =
00110         iSegmentCabin.getGuillotineBlock();
00111     return GuillotineBlockHelper::
00112         getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, lDTD, iEventDate);
00113 }
00114
00115 }

```

## 28.67 rmol/bom/Utilities.hpp File Reference

```

#include <stdair/stdair_inventory_types.hpp>      #include
<rmol/RMOL_Types.hpp>

```

### Classes

- class [RMOL::Utilities](#)

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.68 Utilities.hpp

```

00001 #ifndef __RMOL_BOM_UTILITIES_HPP
00002 #define __RMOL_BOM_UTILITIES_HPP
00003 // //////////////////////////////////////
00004 // Import section
00005 // //////////////////////////////////////
00006 // StdAir
00007 #include <stdair/stdair_inventory_types.hpp>
00008 // RMOL
00009 #include <rmol/RMOL_Types.hpp>
00010
00011 // Forward declarations
00012 namespace stdair {
00013     class SegmentCabin;
00014 }
00015
00016 namespace RMOL {
00017
00018     class Utilities {
00019     public:
00020         static void computeDistributionParameters (const UnconstrainedDemandVector_T
00021             &, double&, double&);

```

```

00023
00027     static stdair::DCPList_T buildRemainingDCPList (const stdair::DTD_T&);
00028     static stdair::DCPList_T buildRemainingDCPList2 (const stdair::DTD_T&);
00029
00033     static stdair::NbOfSegments_T getNbOfDepartedSimilarSegments (const
stdair::SegmentCabin&, const stdair::Date_T&);
00034
00035 };
00036
00037 }
00038
00039 #endif // __RMOL_BOM_UTILITIES_HPP

```

## 28.69 rmol/command/Detruncator.cpp File Reference

```

#include <cassert>          #include <stdair/basic/BasConst_-
Inventory.hpp>          #include <stdair/bom/GuillotineBlock.-
hpp> #include <stdair/bom/BomManager.hpp> #include <stdair/bom/-
FlightDate.hpp>          #include <stdair/bom/SegmentDate.hpp>
#include <stdair/bom/SegmentCabin.hpp> #include <stdair/bom/-
BookingClass.hpp> #include <stdair/service/Logger.hpp> x
#include <rmol/bom/GuillotineBlockHelper.hpp> #include
<rmol/bom/HistoricalBookingHolder.hpp> #include <rmol/bom/-
HistoricalBooking.hpp> #include <rmol/bom/EMDetruncator.-
hpp> #include <rmol/command/Detruncator.hpp>

```

### Namespaces

- namespace [RMOL](#)

## 28.70 Detruncator.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 // StdAir
00007 #include <stdair/basic/BasConst_Inventory.hpp>
00008 #include <stdair/bom/GuillotineBlock.hpp>
00009 #include <stdair/bom/BomManager.hpp>
00010 #include <stdair/bom/FlightDate.hpp>
00011 #include <stdair/bom/SegmentDate.hpp>
00012 #include <stdair/bom/SegmentCabin.hpp>
00013 #include <stdair/bom/BookingClass.hpp>
00014 #include <stdair/service/Logger.hpp>
00015 // RMOL
00016 #include <rmol/bom/GuillotineBlockHelper.hpp>
00017 #include <rmol/bom/HistoricalBookingHolder.hpp>
00018 #include <rmol/bom/HistoricalBooking.hpp>
00019 #include <rmol/bom/EMDetruncator.hpp>
00020 #include <rmol/command/Detruncator.hpp>
00021
00022 namespace RMOL {
00023 // //////////////////////////////////////
00024 void Detruncator::
00025 unconstrainUsingAdditivePickUp (const stdair::SegmentCabin& iSegmentCabin,
00026 BookingClassUnconstrainedDemandVectorMap_T& ioBkgClassUncDemMap,
00027 UnconstrainedDemandVector_T& ioQEquivalentDemandVector,
00028 const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,

```

```

00029         const stdair::Date_T& iCurrentDate) {
00030
00031     // Retrieve the guillotine block.
00032     const stdair::GuillotineBlock& lGuillotineBlock =
00033         iSegmentCabin.getGuillotineBlock();
00034
00035     // Build the historical booking holders for the product-oriented bookings
00036     // of the casses and the Q-equivalent (price-oriented) bookings of the
cabin
00037     const stdair::NbOfSegments_T lNbOfUsableSegments = GuillotineBlockHelper::
00038         getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, iDCPEnd,
00039             iCurrentDate);
00040
00041     // Parse the booking class list and unconstrain historical bookings.
00042     for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00043         ioBkgClassUncDemMap.begin(); itBCUDV != ioBkgClassUncDemMap.end();
00044         ++itBCUDV) {
00045         stdair::BookingClass* lBC_ptr = itBCUDV->first;
00046         assert (lBC_ptr != NULL);
00047         const stdair::MapKey_T& lBCKey = lBC_ptr->describeKey();
00048         const stdair::BlockIndex_T& lBlockIdx =
00049             lGuillotineBlock.getBlockIndex (lBCKey);
00050         UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00051
00052         STDAIR_LOG_DEBUG ("Unconstrain product-oriented bookings for " << lBCKey)
;
00053         // STDAIR_LOG_NOTIFICATION (lBCKey << ";" << iDCPBegin
00054         // << ";" << iDCPEnd);
00055         unconstrainUsingAdditivePickUp (lGuillotineBlock, lUncDemVector,
00056             iDCPBegin, iDCPEnd,
00057             lNbOfUsableSegments, lBlockIdx);
00058     }
00059
00060     // Unconstrain the Q-equivalent bookings.
00061     // Retrieve the block index of the segment-cabin.
00062     std::ostream lSCMapKey;
00063     lSCMapKey << stdair::DEFAULT_SEGMENT_CABIN_VALUE_TYPE
00064         << iSegmentCabin.describeKey();
00065     const stdair::BlockIndex_T& lCabinIdx =
00066         lGuillotineBlock.getBlockIndex (lSCMapKey.str());
00067
00068     STDAIR_LOG_DEBUG ("Unconstrain price-oriented bookings");
00069     //STDAIR_LOG_NOTIFICATION (iDCPBegin << ";" << iDCPEnd);
00070     unconstrainUsingAdditivePickUp (lGuillotineBlock, ioQEquivalentDemandVector
00071
00072         iDCPBegin, iDCPEnd, lNbOfUsableSegments,
00073         lCabinIdx, iSegmentCabin, iCurrentDate);
00074 }
00075
00076 // //////////////////////////////////////
00077 void Detruncator::unconstrainUsingAdditivePickUp
00078 (const stdair::GuillotineBlock& iGuillotineBlock,
00079     UnconstrainedDemandVector_T& ioUncDemVector,
00080     const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00081     const stdair::NbOfSegments_T& iNbOfUsableSegments,
00082     const stdair::BlockIndex_T& iBlockIdx) {
00083     // TODO:
00084     stdair::NbOfSegments_T lSegBegin = 0;
00085     if (iNbOfUsableSegments > 52) lSegBegin = iNbOfUsableSegments - 52;
00086     // Retrieve the gross daily booking and availability snapshots.
00087     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lBookingView =
00088         iGuillotineBlock.
00089         getConstSegmentCabinDTDRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfUsableSegments - 1,
00090             stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00091             iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (
00092                 lSegBegin, iNbOfUsableSegments - 1, iDCPEnd, iDCPBegin);
00093
00094     // Browse the list of segments and build the historical booking holder.
00095     const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00096         iGuillotineBlock.getValueTypeIndexMap();
00097     const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00098     HistoricalBookingHolder lHBHolder;
00099     for (short i = 0; i < iNbOfUsableSegments - lSegBegin; ++i) {
00100         stdair::Flag_T lCensorshipFlag = false;

```

```

00098         stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00099         const short lNbOfDTDs = iDCPBegin - iDCPEnd + 1;
00100
00101         // Parse the DTDs during the period
00102         for (short j = 0; j < lNbOfDTDs; ++j) {
00103             // Check if the data has been censored during this day.
00104             // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00105             // << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00106             if (lCensorshipFlag == false) {
00107                 if (lAvlView[i*lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00108                     lCensorshipFlag = true;
00109                 }
00110             }
00111
00112             // Get the bookings of the day.
00113             //STDAIR_LOG_DEBUG ("Bookings of the day: " <<
lBookingView[i+lNbOfValueTypes + iBlockIdx][j]);
00114             lNbOfHistoricalBkgs += lBookingView[i+lNbOfValueTypes + iBlockIdx][j];
00115         }
00116
00117         HistoricalBooking lHistoricalBkg (lNbOfHistoricalBkgs, lCensorshipFlag);
00118         lHBHolder.addHistoricalBooking (lHistoricalBkg);
00119
00120         // DEBUG
00121         STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00122             << ", censored: " << lCensorshipFlag);
00123         // STDAIR_LOG_NOTIFICATION (lNbOfHistoricalBkgs
00124         // << ", " << lCensorshipFlag);
00125     }
00126
00127     // DEBUG
00128     STDAIR_LOG_DEBUG ("Unconstrain by EM");
00129
00130     // Unconstrain the booking figures
00131     EMDetruncator::unconstrainUsingEMMethod (lHBHolder);
00132
00133     // Add the unconstrained demand of the period to the unconstrained demand
00134     // vector.
00135     short idx = 0;
00136     for (UnconstrainedDemandVector_T::iterator itUD = ioUncDemVector.begin();
00137         itUD != ioUncDemVector.end(); ++itUD, ++idx) {
00138         *itUD += lHBHolder.getUnconstrainedDemand (idx);
00139         //STDAIR_LOG_NOTIFICATION (lHBHolder.getUnconstrainedDemand (idx));
00140     }
00141 }
00142
00143 // //////////////////////////////////////
00144 void Detruncator::unconstrainUsingAdditivePickUp
00145 (const stdair::GuillotineBlock& iGuillotineBlock,
00146  UnconstrainedDemandVector_T& ioUncDemVector,
00147  const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00148  const stdair::NbOfSegments_T& iNbOfUsableSegments,
00149  const stdair::BlockIndex_T& iBlockIdx,
00150  const stdair::SegmentCabin& iSegmentCabin,
00151  const stdair::Date_T& iCurrentDate) {
00152     // TODO
00153     stdair::NbOfSegments_T lSegBegin = 0;
00154     if (iNbOfUsableSegments > 52) lSegBegin = iNbOfUsableSegments - 52;
00155     // Retrieve the gross daily booking and availability snapshots.
00156     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lBookingView =
00157         iGuillotineBlock.
getConstSegmentCabinDTDRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfUsableSegments -1,
00158     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00159         iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (
lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCPBegin);
00160
00161     // Browse the list of segments and build the historical booking holder.
00162     const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00163         iGuillotineBlock.getValueTypeIndexMap();
00164     const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00165     HistoricalBookingHolder lHBHolder;
00166     for (short i = 0; i < iNbOfUsableSegments-lSegBegin; ++i) {
00167         stdair::Flag_T lCensorshipFlag = false;
00168         stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;

```

```

00169         const short lNbOfDTDs = iDCPBegin - iDCPEnd + 1;
00170
00171         // Parse the DTDs during the period
00172         for (short j = 0; j < lNbOfDTDs; ++j) {
00173             // Check if the data has been censored during this day.
00174             // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00175             //                  << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00176             if (lCensorshipFlag == false) {
00177                 if (lAvlView[i*lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00178                     lCensorshipFlag = true;
00179                 }
00180             }
00181
00182             // Get the bookings of the day.
00183             //STDAIR_LOG_DEBUG ("Bookings of the day: " <<
00184             lBookingView[i*lNbOfValueTypes + iBlockIdx][j]);
00185             lNbOfHistoricalBkgs += lBookingView[i*lNbOfValueTypes + iBlockIdx][j];
00186         }
00187
00188         HistoricalBooking lHistoricalBkg (lNbOfHistoricalBkgs, lCensorshipFlag);
00189         lHBHolder.addHistoricalBooking (lHistoricalBkg);
00190
00191         // DEBUG
00192         STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00193         << ", censored: " << lCensorshipFlag);
00194         // STDAIR_LOG_NOTIFICATION (lNbOfHistoricalBkgs
00195         //                  << ", " << lCensorshipFlag);
00196     }
00197
00198     // DEBUG
00199     STDAIR_LOG_DEBUG ("Unconstrain by EM");
00200
00201     // Unconstrain the booking figures
00202     EMDetruncator::unconstrainUsingEMMethod (lHBHolder);
00203
00204     // Add the unconstrained demand of the period to the unconstrained demand
00205     // vector.
00206     // LOG
00207     const stdair::SegmentDate& lSegmentDate = stdair::BomManager::
00208     getParent<stdair::SegmentDate, stdair::SegmentCabin> (iSegmentCabin);
00209     const stdair::FlightDate& lFlightDate = stdair::BomManager::
00210     getParent<stdair::FlightDate, stdair::SegmentDate> (lSegmentDate);
00211     const stdair::Date_T& lDepDate = lFlightDate.getDepartureDate();
00212     const boost::gregorian::date_duration lDD = lDepDate - iCurrentDate;
00213     const long lDTD = lDD.days();
00214     stdair::Date_T lRefDate (2012, boost::gregorian::Jan, 01);
00215
00216     short idx = 0;
00217     for (UnconstrainedDemandVector_T::iterator itUD = ioUncDemVector.begin();
00218         itUD != ioUncDemVector.end(); ++itUD, ++idx) {
00219         *itUD += lHBHolder.getUnconstrainedDemand (idx);
00220         if (lDepDate > lRefDate) {
00221             const stdair::DateOffset_T lDateOffset (7 *(52 - idx) + 420);
00222             const stdair::Date_T lHDate = lDepDate - lDateOffset;
00223             STDAIR_LOG_NOTIFICATION (boost::gregorian::to_iso_string(lDepDate)
00224             << ";" << lDTD << ";" << iDCPBegin << ";"
00225             << iDCPEnd << ";"
00226             << boost::gregorian::to_iso_string (lHDate)
00227             << ";" << lHBHolder.getUnconstrainedDemand (idx))
00228         };
00229
00230         STDAIR_LOG_NOTIFICATION (boost::gregorian::to_iso_string(lDepDate)
00231         << ";" << lDTD << ";" << iDCPBegin << ";"
00232         << iDCPEnd << ";"
00233         << boost::gregorian::to_iso_string (lHDate)
00234         << ";" << lHBHolder.getHistoricalBooking (idx));
00235     }
00236 }
00237
00238 // //////////////////////////////////////
00239 void Detruncator::retrieveUnconstrainedDemandForFirstDCP
00240 (const stdair::SegmentCabin& iSegmentCabin,
00241  BookingClassUnconstrainedDemandVectorMap_T& ioBkgClassUncDemVectorMap,

```

```

00241 UnconstrainedDemandVector_T& ioQEquivalentDemandVector,
00242 const stdair::DCP_T& iFirstDCP, const stdair::NbOfSegments_T& iNbOfSegments,
00243 const stdair::NbOfSegments_T& iNbOfUsedSegments){
00244
00245     // Retrieve the guillotine block.
00246     const stdair::GuillotineBlock& lGuillotineBlock =
00247         iSegmentCabin.getGuillotineBlock();
00248
00249     // Parse the booking class list and unconstrain historical bookings.
00250     for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00251          ioBkgClassUncDemVectorMap.begin();
00252          itBCUDV != ioBkgClassUncDemVectorMap.end(); ++itBCUDV) {
00253         stdair::BookingClass* lBC_ptr = itBCUDV->first;
00254         assert (lBC_ptr != NULL);
00255         const stdair::MapKey_T& lBCKey = lBC_ptr->describeKey();
00256         const stdair::BlockIndex_T& lBlockIdx =
00257             lGuillotineBlock.getBlockIndex (lBCKey);
00258         UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00259
00260         STDAIR_LOG_DEBUG("Retrieve the unconstrained product-oriented demand for
00261
00262             << lBCKey);
00263         retrieveUnconstrainedDemandForFirstDCP (lGuillotineBlock, lUncDemVector,
00264             iFirstDCP, lBlockIdx,
00265             iNbOfSegments, iNbOfUsedSegments)
00266     }
00267
00268     // Unconstrain the Q-equivalent bookings.
00269     // Retrieve the block index of the segment-cabin.
00270     std::ostringstream lSCMapKey;
00271     lSCMapKey << stdair::DEFAULT_SEGMENT_CABIN_VALUE_TYPE
00272         << iSegmentCabin.describeKey();
00273     const stdair::BlockIndex_T& lCabinValueIdx =
00274         lGuillotineBlock.getBlockIndex (lSCMapKey.str());
00275
00276     STDAIR_LOG_DEBUG ("Retrieve the unconstrained price-oriented demand");
00277     retrieveUnconstrainedDemandForFirstDCP (lGuillotineBlock,
00278         ioQEquivalentDemandVector,iFirstDCP
00279
00280         lCabinValueIdx, iNbOfSegments,
00281         iNbOfUsedSegments);
00282
00283 //////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00284 void Detruncator::retrieveUnconstrainedDemandForFirstDCP
00285 (const stdair::GuillotineBlock& iGuillotineBlock,
00286 UnconstrainedDemandVector_T& ioUnconstrainedDemandVector,
00287 const stdair::DCP_T& iFirstDCP, const stdair::BlockIndex_T& iValueIdx,
00288 const stdair::NbOfSegments_T& iNbOfSegments,
00289 const stdair::NbOfSegments_T& iNbOfUsedSegments) {
00290
00291     //TODO
00292     stdair::NbOfSegments_T lSegBegin = iNbOfSegments - iNbOfUsedSegments;
00293
00294     // Retrieve the snapshots of the corresponding booking value from the
00295     // first DTD (usually 365) till the given iFirstDCP.
00296     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lRangeBookingView =
00297         iGuillotineBlock.
00298         getConstSegmentCabinDTDRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfSegments -1, iFirst
00299
00300
00301     // Sum the bookings from the first day till the given iFirstDCP in order to
00302     // get the supposing unconstrained demand for this period.
00303     const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00304         iGuillotineBlock.getValueTypeIndexMap();
00305     const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00306     for (int itSegment = 0; itSegment < iNbOfSegments-lSegBegin; ++itSegment) {
00307         for (int i = iFirstDCP; i <= stdair::DEFAULT_MAX_DTD; ++i) {
00308             stdair::NbOfRequests_T& lUncDemand =
00309                 ioUnconstrainedDemandVector.at(itSegment);
00310             lUncDemand +=
00311                 lRangeBookingView[iValueIdx + itSegment*lNbOfValueTypes][i-iFirstDCP]
00312         }
00313     }

```

```

00309     }
00310     // STDAIR_LOG_NOTIFICATION (ioUnconstrainedDemandVector.at(itSegment)
00311     //                          << ";" << itSegment);
00312 }
00313 }
00314
00315 ///////////////////////////////////////////////////////////////////
00316 void Detruncator::unconstrainUsingMultiplicativePickUp
00317 (const stdair::SegmentCabin& iSegmentCabin,
00318  BookingClassUnconstrainedDemandVectorMap_T& ioBkgClassUncDemMap,
00319  UnconstrainedDemandVector_T& ioQEquivalentDemandVector,
00320  const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00321  const stdair::Date_T& iCurrentDate,
00322  const stdair::NbOfSegments_T& iNbOfDepartedSegments) {
00323
00324     // Retrieve the guillotine block.
00325     const stdair::GuillotineBlock& lGuillotineBlock =
00326         iSegmentCabin.getGuillotineBlock();
00327
00328     // Build the historical booking holders for the product-oriented bookings
00329     // of the casses and the Q-equivalent (price-oriented) bookings of the
00330     cabin
00331     const stdair::NbOfSegments_T lNbOfUsableSegments = GuillotineBlockHelper::
00332         getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, iDCPEnd,
00333         iCurrentDate);
00334
00335     // Parse the booking class list and unconstrain historical bookings.
00336     for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00337         ioBkgClassUncDemMap.begin(); itBCUDV != ioBkgClassUncDemMap.end();
00338         ++itBCUDV) {
00339         stdair::BookingClass* lBC_ptr = itBCUDV->first;
00340         assert (lBC_ptr != NULL);
00341         const stdair::MapKey_T& lBCKey = lBC_ptr->describeKey();
00342         const stdair::BlockIndex_T& lBlockIdx =
00343             lGuillotineBlock.getBlockIndex (lBCKey);
00344         UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00345
00346         STDAIR_LOG_DEBUG ("Unconstrain product-oriented bookings for " << lBCKey)
00347     ;
00348     unconstrainUsingMultiplicativePickUp (lGuillotineBlock, lUncDemVector,
00349     iDCPBegin, iDCPEnd,
00350     lNbOfUsableSegments, lBlockIdx,
00351     iNbOfDepartedSegments);
00352
00353     // Unconstrain the Q-equivalent bookings.
00354     // Retrieve the block index of the segment-cabin.
00355     std::ostream lSCMapKey;
00356     lSCMapKey << stdair::DEFAULT_SEGMENT_CABIN_VALUE_TYPE
00357         << iSegmentCabin.describeKey();
00358     const stdair::BlockIndex_T& lCabinIdx =
00359         lGuillotineBlock.getBlockIndex (lSCMapKey.str());
00360
00361     STDAIR_LOG_DEBUG ("Unconstrain price-oriented bookings");
00362     unconstrainUsingMultiplicativePickUp (lGuillotineBlock,
00363     ioQEquivalentDemandVector,
00364     iDCPBegin, iDCPEnd,
00365     lNbOfUsableSegments, lCabinIdx,
00366     iNbOfDepartedSegments,
00367     iSegmentCabin, iCurrentDate);
00368 }
00369
00370 ///////////////////////////////////////////////////////////////////
00371 void Detruncator::unconstrainUsingMultiplicativePickUp
00372 (const stdair::GuillotineBlock& iGuillotineBlock,
00373  UnconstrainedDemandVector_T& ioUncDemVector,
00374  const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00375  const stdair::NbOfSegments_T& iNbOfUsableSegments,
00376  const stdair::BlockIndex_T& iBlockIdx,
00377  const stdair::NbOfSegments_T& iNbOfDepartedSegments) {
00378     // TODO:
00379     stdair::NbOfSegments_T lSegBegin = 0;
00380     if (iNbOfDepartedSegments > 52) {
00381         lSegBegin = iNbOfDepartedSegments - 52;

```



```

00381     }
00382
00383     // Retrieve the gross daily booking and availability snapshots.
00384     stdair::ConstSegmentCabinDTRangeSnapshotView_T lBookingView =
00385         iGuillotineBlock.
getConstSegmentCabinDTRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfUsableSegments -1,
00386     stdair::ConstSegmentCabinDTRangeSnapshotView_T lAvlView =
00387         iGuillotineBlock.getConstSegmentCabinDTRangeAvailabilitySnapshotView (
lSegBegin, iNbOfUsableSegments -1, iDCPBegin, iDCPBegin);
00388
00389     // Browse the list of segments and build the historical booking holder.
00390     const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00391         iGuillotineBlock.getValueTypeIndexMap();
00392     const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00393     HistoricalBookingHolder lHBHolder;
00394     std::vector<short> lDataIndexList;
00395     for (short i = 0; i < iNbOfUsableSegments-lSegBegin; ++i) {
00396         stdair::Flag_T lCensorshipFlag = false;
00397         stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00398         const short lNbOfDTDs = iDCPBegin - iDCPBegin + 1;
00399
00400         // Parse the DTDs during the period
00401         for (short j = 0; j < lNbOfDTDs; ++j) {
00402             // Check if the data has been censored during this day.
00403             // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00404             // << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00405             if (lCensorshipFlag == false) {
00406                 if (lAvlView[i*lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00407                     lCensorshipFlag = true;
00408                 }
00409             }
00410
00411             // Get the bookings of the day.
00412             //STDAIR_LOG_DEBUG ("Bookings of the day: " <<
lBookingView[i*lNbOfValueTypes + iBlockIdx][j]);
00413             lNbOfHistoricalBkgs += lBookingView[i*lNbOfValueTypes + iBlockIdx][j];
00414         }
00415
00416         // If there is no booking till now for this class and for this segment,
00417         // there will be no unconstraining process.
00418         stdair::NbOfRequests_T lUncDemand = ioUncDemVector.at (i);
00419         if (lUncDemand < 1.0) {
00420             lUncDemand += lNbOfHistoricalBkgs;
00421         } else {
00422             double lBkgDemandFactor = lNbOfHistoricalBkgs / lUncDemand;
00423             HistoricalBooking lHistoricalBkg (lBkgDemandFactor, lCensorshipFlag);
00424             lHBHolder.addHistoricalBooking (lHistoricalBkg);
00425             lDataIndexList.push_back (i);
00426         }
00427
00428         // DEBUG
00429         STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00430             << ", censored: " << lCensorshipFlag);
00431     }
00432
00433     // DEBUG
00434     STDAIR_LOG_DEBUG ("Unconstrain by multiplicative pick-up using EM");
00435
00436     // Unconstrain the booking figures
00437     unconstrainUsingMultiplicativePickUp (lHBHolder);
00438
00439     // Update the unconstrained demand vector.
00440     short i = 0;
00441     for (std::vector<short>::iterator itIdx = lDataIndexList.begin();
00442         itIdx != lDataIndexList.end(); ++itIdx, ++i) {
00443         short lIdx = *itIdx;
00444         stdair::NbOfRequests_T lPastDemand = ioUncDemVector.at (lIdx);
00445         const stdair::NbOfRequests_T& lUncDemandFactorOfThisPeriod =
00446             lHBHolder.getUnconstrainedDemand (i);
00447         lPastDemand *= (1+lUncDemandFactorOfThisPeriod);
00448     }
00449 }
00450
00451 // //////////////////////////////////////

```

```

00452 void Detruncator::unconstrainUsingMultiplicativePickUp
00453 (const stdair::GuillotineBlock& iGuillotineBlock,
00454  UnconstrainedDemandVector_T& ioUncDemVector,
00455  const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00456  const stdair::NbOfSegments_T& iNbOfUsableSegments,
00457  const stdair::BlockIndex_T& iBlockIdx,
00458  const stdair::NbOfSegments_T& iNbOfDepartedSegments,
00459  const stdair::SegmentCabin& iSegmentCabin,
00460  const stdair::Date_T& iCurrentDate) {
00461     // TODO:
00462     stdair::NbOfSegments_T lSegBegin = 0;
00463     if (iNbOfDepartedSegments > 52) {
00464         lSegBegin = iNbOfDepartedSegments - 52;
00465     }
00466
00467     // Retrieve the gross daily booking and availability snapshots.
00468     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lBookingView =
00469         iGuillotineBlock.
00470         getConstSegmentCabinDTDRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfUsableSegments -1,
00471         stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00472         iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (
00473         lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCPBegin);
00474
00475     // Browse the list of segments and build the historical booking holder.
00476     const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00477         iGuillotineBlock.getValueTypeIndexMap();
00478     const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00479     HistoricalBookingHolder lHBHolder;
00480     std::vector<short> lDataIndexList;
00481     for (short i = 0; i < iNbOfUsableSegments-lSegBegin; ++i) {
00482         stdair::Flag_T lCensorshipFlag = false;
00483         stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00484         const short lNbOfDTDs = iDCPBegin - iDCPEnd + 1;
00485
00486         // Parse the DTDs during the period
00487         for (short j = 0; j < lNbOfDTDs; ++j) {
00488             // Check if the data has been censored during this day.
00489             // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00490             // << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00491             if (lCensorshipFlag == false) {
00492                 if (lAvlView[i*lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00493                     lCensorshipFlag = true;
00494                 }
00495             }
00496
00497             // Get the bookings of the day.
00498             //STDAIR_LOG_DEBUG ("Bookings of the day: " <<
00499             lBookingView[i*lNbOfValueTypes + iBlockIdx][j]);
00500             lNbOfHistoricalBkgs += lBookingView[i*lNbOfValueTypes + iBlockIdx][j];
00501         }
00502
00503         // If there is no booking till now for this class and for this segment,
00504         // there will be no unconstraining process.
00505         stdair::NbOfRequests_T& lUncDemand = ioUncDemVector.at (i);
00506         if (lUncDemand < 1.0) {
00507             lUncDemand += lNbOfHistoricalBkgs;
00508         } else {
00509             double lBkgDemandFactor = lNbOfHistoricalBkgs / lUncDemand;
00510             HistoricalBooking lHistoricalBkg (lBkgDemandFactor, lCensorshipFlag);
00511             lHBHolder.addHistoricalBooking (lHistoricalBkg);
00512             lDataIndexList.push_back (i);
00513         }
00514
00515         // DEBUG
00516         STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00517         << ", censored: " << lCensorshipFlag);
00518     }
00519
00520     // DEBUG
00521     STDAIR_LOG_DEBUG ("Unconstrain by multiplicative pick-up");
00522
00523     // Unconstrain the booking figures
00524     unconstrainUsingMultiplicativePickUp (lHBHolder);
00525
00526

```

```

00523 // Update the unconstrained demand vector.
00524 // LOG
00525 const stdair::SegmentDate& lSegmentDate = stdair::BomManager::
00526     getParent<stdair::SegmentDate, stdair::SegmentCabin> (iSegmentCabin);
00527 const stdair::FlightDate& lFlightDate = stdair::BomManager::
00528     getParent<stdair::FlightDate, stdair::SegmentDate> (lSegmentDate);
00529 const stdair::Date_T& lDepDate = lFlightDate.getDepartureDate();
00530 const boost::gregorian::date_duration lDD = lDepDate - iCurrentDate;
00531 const long lDTD = lDD.days();
00532 stdair::Date_T lRefDate (2012, boost::gregorian::Jan, 01);
00533
00534 short i = 0;
00535 for (std::vector<short>::iterator itIdx = lDataIndexList.begin();
00536      itIdx != lDataIndexList.end(); ++itIdx, ++i) {
00537     short lIdx = *itIdx;
00538     stdair::NbOfRequests_T& lPastDemand = ioUncDemVector.at (lIdx);
00539     const stdair::NbOfRequests_T& lUncDemandFactorOfThisPeriod =
00540         lHBHolder.getUnconstrainedDemand (i);
00541     const double lUncDemThisPeriod =
00542         lPastDemand * lUncDemandFactorOfThisPeriod;
00543     lPastDemand *= (1+lUncDemandFactorOfThisPeriod);
00544     if (lDepDate > lRefDate) {
00545         const stdair::DateOffset_T lDateOffset (7 *(53 - lIdx) + 420);
00546         const stdair::Date_T lHDate = lDepDate - lDateOffset;
00547         STDAIR_LOG_NOTIFICATION (boost::gregorian::to_iso_string(lDepDate)
00548             << " " << lDTD << " " << iDCPBegin << " "
00549             << iDCPEnd << " " << boost::gregorian::to_iso_string (lHDate)
00550             << " " << lUncDemThisPeriod);
00551     }
00552 }
00553 }
00554 }
00555
00556 // //////////////////////////////////////
00557 void Detruncator::
00558 unconstrainUsingMultiplicativePickUp (HistoricalBookingHolder& ioHBHolder) {
00559     // We use two loops in this algorithm. The first one is for calculating the
00560     // average of unconstrained data. The second one is for calculating the
00561     // average of unconstrained data and the constrained data which are higher
00562     // than the first average.
00563     short lNbOfUsedData = ioHBHolder.getNbOfUncensoredData();
00564     if (lNbOfUsedData > 0) {
00565         double lSumOfValues = 0.0;
00566         const short lNbOfData = ioHBHolder.getNbOfFlights();
00567
00568         // First loop
00569         for (short i = 0; i < lNbOfData; ++i) {
00570             if (ioHBHolder.getCensorshipFlag (i) == false) {
00571                 lSumOfValues += ioHBHolder.getHistoricalBooking (i);
00572             }
00573         }
00574         double lFirstAverage = lSumOfValues / lNbOfUsedData;
00575
00576         // Second loop
00577         for (short i = 0; i < lNbOfData; ++i) {
00578             if (ioHBHolder.getCensorshipFlag (i) == true) {
00579                 const stdair::NbOfBookings_T& lBkgs =
00580                     ioHBHolder.getHistoricalBooking (i);
00581                 if (lBkgs >= lFirstAverage) {
00582                     lSumOfValues += lBkgs;
00583                     ++lNbOfUsedData;
00584                 }
00585             }
00586         }
00587         double lSecondAverage = lSumOfValues / lNbOfUsedData;
00588
00589         // Last loop for updating the demand.
00590         for (short i = 0; i < lNbOfData; ++i) {
00591             if (ioHBHolder.getCensorshipFlag (i) == true) {
00592                 const stdair::NbOfBookings_T& lBkgs =
00593                     ioHBHolder.getHistoricalBooking (i);
00594                 if (lBkgs < lSecondAverage) {
00595                     ioHBHolder.setUnconstrainedDemand (lSecondAverage, i);
00596                 }
00597             }
00598         }
00599     }
00600 }

```

```

00597     }
00598     }
00599     }
00600     }
00601 }
00602

```

## 28.71 rmol/command/Detruncator.hpp File Reference

```

#include <stdair/stdair_inventory_types.hpp>      #include
<rmol/RMOL_Types.hpp>

```

### Classes

- class [RMOL::Detruncator](#)

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.72 Detruncator.hpp

```

00001 #ifndef __RMOL_COMMAND_DETRUNCATOR_HPP
00002 #define __RMOL_COMMAND_DETRUNCATOR_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // StdAir
00008 #include <stdair/stdair_inventory_types.hpp>
00009 // RMOL
00010 #include <rmol/RMOL_Types.hpp>
00011
00012 // Forward declarations.
00013 namespace stdair {
00014     class GuillotineBlock;
00015     class SegmentCabin;
00016 }
00017
00018 namespace RMOL {
00019     // Forward declarations.
00020     struct HistoricalBookingHolder;
00021
00022     class Detruncator {
00023     public:
00024         static void unconstrainUsingAdditivePickUp (const stdair::SegmentCabin&,
00025             BookingClassUnconstrainedDemandVectorMap_T&,
00026             UnconstrainedDemandVector_T&,
00027             const stdair::DCP_T&, const stdair::DCP_T&,
00028             const stdair::Date_T&);
00029
00030         static void unconstrainUsingMultiplicativePickUp
00031             (const stdair::SegmentCabin&, BookingClassUnconstrainedDemandVectorMap_T&,
00032             UnconstrainedDemandVector_T&, const stdair::DCP_T&, const stdair::DCP_T&,
00033             const stdair::Date_T&, const stdair::NbOfSegments_T&);
00034
00035         static void retrieveUnconstrainedDemandForFirstDCP
00036             (const stdair::SegmentCabin&,
00037             BookingClassUnconstrainedDemandVectorMap_T&,
00038             UnconstrainedDemandVector_T&, const stdair::DCP_T&,

```

```

00050         const stdair::NbOfSegments_T&, const stdair::NbOfSegments_T&);
00051
00055     static void unconstrainUsingMultiplicativePickUp (HistoricalBookingHolder&)
00056 ;
00057 private:
00061     static void unconstrainUsingAdditivePickUp (const stdair::GuillotineBlock&,
00062         UnconstrainedDemandVector_T&,
00063         const stdair::DCP_T&,
00064         const stdair::DCP_T&,
00065         const stdair::NbOfSegments_T&,
00066         const stdair::BlockIndex_T&);
00070     static void unconstrainUsingAdditivePickUp (const stdair::GuillotineBlock&,
00071         UnconstrainedDemandVector_T&,
00072         const stdair::DCP_T&,
00073         const stdair::DCP_T&,
00074         const stdair::NbOfSegments_T&,
00075         const stdair::BlockIndex_T&,
00076         const stdair::SegmentCabin&,
00077         const stdair::Date_T&);
00078
00082     static void unconstrainUsingMultiplicativePickUp
00083 (const stdair::GuillotineBlock&, UnconstrainedDemandVector_T&,
00084     const stdair::DCP_T&, const stdair::DCP_T&,
00085     const stdair::NbOfSegments_T&, const stdair::BlockIndex_T&,
00086     const stdair::NbOfSegments_T&);
00087
00091     static void unconstrainUsingMultiplicativePickUp
00092 (const stdair::GuillotineBlock&, UnconstrainedDemandVector_T&,
00093     const stdair::DCP_T&, const stdair::DCP_T&,
00094     const stdair::NbOfSegments_T&, const stdair::BlockIndex_T&,
00095     const stdair::NbOfSegments_T&,
00096     const stdair::SegmentCabin&, const stdair::Date_T&);
00097
00101     static void retrieveUnconstrainedDemandForFirstDCP
00102 (const stdair::GuillotineBlock&, UnconstrainedDemandVector_T&,
00103     const stdair::DCP_T&, const stdair::BlockIndex_T&,
00104     const stdair::NbOfSegments_T&, const stdair::NbOfSegments_T&);
00105 };
00106 }
00107 #endif // __RMOL_COMMAND_DETRUNCATOR_HPP
00108
00109

```

## 28.73 rmol/command/Forecaster.cpp File Reference

```

#include <cassert> #include <sstream> #include <cmath>
#include <stdair/basic/BasConst_General.hpp> #include
<stdair/basic/BasConst_Inventory.hpp> #include <stdair/basic/-
RandomGeneration.hpp> #include <stdair/bom/BomManager.-
hpp> #include <stdair/bom/FlightDate.hpp> #include <stdair/bom/-
LegDate.hpp> #include <stdair/bom/SegmentDate.hpp> #include
<stdair/bom/LegCabin.hpp> #include <stdair/bom/Segment-
Cabin.hpp> #include <stdair/bom/GuillotineBlock.hpp>
#include <stdair/bom/BookingClass.hpp> #include <stdair/service/-
Logger.hpp> #include <rmol/basic/BasConst_Curves.hpp> x
#include <rmol/bom/Utilities.hpp> #include <rmol/bom/-
GuillotineBlockHelper.hpp> #include <rmol/bom/Historical-
BookingHolder.hpp> #include <rmol/bom/HistoricalBooking.-
hpp> #include <rmol/bom/EMDetruncator.hpp> #include <rmol/command/-
Forecaster.hpp> #include <rmol/command/Detruncator.hpp>

```

## Namespaces

- namespace [RMOL](#)

## 28.74 Forecaster.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 #include <sstream>
00007 #include <cmath>
00008 // StdAir
00009 #include <stdair/basic/BasConst_General.hpp>
00010 #include <stdair/basic/BasConst_Inventory.hpp>
00011 #include <stdair/basic/RandomGeneration.hpp>
00012 #include <stdair/bom/BomManager.hpp>
00013 #include <stdair/bom/FlightDate.hpp>
00014 #include <stdair/bom/LegDate.hpp>
00015 #include <stdair/bom/SegmentDate.hpp>
00016 #include <stdair/bom/LegCabin.hpp>
00017 #include <stdair/bom/SegmentCabin.hpp>
00018 #include <stdair/bom/GuillotineBlock.hpp>
00019 #include <stdair/bom/BookingClass.hpp>
00020 #include <stdair/service/Logger.hpp>
00021 // RMOL
00022 #include <rmol/basic/BasConst_Curves.hpp>
00023 #include <rmol/bom/Utilities.hpp>
00024 #include <rmol/bom/GuillotineBlockHelper.hpp>
00025 #include <rmol/bom/HistoricalBookingHolder.hpp>
00026 #include <rmol/bom/HistoricalBooking.hpp>
00027 #include <rmol/bom/EMDetruncator.hpp>
00028 #include <rmol/command/Forecaster.hpp>
00029 #include <rmol/command/Detruncator.hpp>
00030
00031 namespace RMOL {
00032
00033 // //////////////////////////////////////
00034 bool Forecaster::
00035 forecastUsingAdditivePickUp (stdair::FlightDate& ioFlightDate,
00036                             const stdair::DateTime_T& iEventTime) {
00037     // Build the offset dates.
00038     const stdair::Date_T& lEventDate = iEventTime.date();
00039     stdair::Date_T lRefDate (2012, boost::gregorian::Jan, 01);
00040
00041     //
00042     bool isSucceeded = true;
00043     const stdair::SegmentDateList_T& lSDList =
00044         stdair::BomManager::getList<stdair::SegmentDate> (ioFlightDate);
00045     for (stdair::SegmentDateList_T::const_iterator itSD = lSDList.begin();
00046          itSD != lSDList.end(); ++itSD) {
00047         stdair::SegmentDate* lSD_ptr = *itSD;
00048         assert (lSD_ptr != NULL);
00049
00050         const stdair::Date_T& lBoardingDate = lSD_ptr->getBoardingDate();
00051         const stdair::DateOffset_T lSegmentDateOffset =
00052             lBoardingDate - lEventDate;
00053         const stdair::DTD_T lSegmentDTD = lSegmentDateOffset.days();
00054
00055         // Build remaining DCP's for the segment-date.
00056         // TODO: treat the case where the segment departure is not the
00057         // same as the flight-date departure.
00058         stdair::DCPList_T lDCPList;
00059
00060         if (lEventDate < lRefDate) {
00061             lDCPList = Utilities::buildRemainingDCPList (lSegmentDTD);
00062         } else {
00063             lDCPList = Utilities::buildRemainingDCPList2 (lSegmentDTD);
00064         }
00065     }
00066 }

```

```

00065
00066 //
00067 const stdair::SegmentCabinList_T& lSCList =
00068     stdair::BomManager::getList<stdair::SegmentCabin> (*lSD_ptr);
00069 for (stdair::SegmentCabinList_T::const_iterator itSC = lSCList.begin();
00070      itSC != lSCList.end(); ++itSC) {
00071     stdair::SegmentCabin* lSC_ptr = *itSC;
00072     assert (lSC_ptr != NULL);
00073
00074 //
00075 // STDAIR_LOG_NOTIFICATION (ioFlightDate.getDepartureDate()
00076 //                          << " " << lSegmentDTD);
00077 bool isForecasted = forecastUsingAdditivePickUp (*lSC_ptr, lDCPList,
00078                                                  lEventDate);
00079 if (isForecasted == false) {
00080     isSucceeded = false;
00081 }
00082 }
00083 }
00084
00085 return isSucceeded;
00086 }
00087
00088 // //////////////////////////////////////
00089 bool Forecaster::
00090 forecastUsingAdditivePickUp (stdair::SegmentCabin& ioSegmentCabin,
00091                             const stdair::DCPList_T& iDCPList,
00092                             const stdair::Date_T& iEventDate) {
00093     // Retrieve the number of departed similar segments.
00094     stdair::NbOfSegments_T lNbOfDepartedSegments =
00095         Utilities::getNbOfDepartedSimilarSegments (ioSegmentCabin, iEventDate);
00096     // TODO
00097     if (lNbOfDepartedSegments > 52) lNbOfDepartedSegments = 52;
00098
00099     // DEBUG
00100     STDAIR_LOG_DEBUG ("Nb of similar departed segments: "
00101                      << lNbOfDepartedSegments);
00102
00103     // If the DCP list includes only DTD0 or the number of departed
00104     // segments are less than two, remaining demand for all classes
00105     // will be set to zero.
00106     stdair::DCPList_T::const_iterator itDCP = iDCPList.begin();
00107     assert (itDCP != iDCPList.end());
00108     const stdair::DCP_T& lCurrentDTD = *itDCP;
00109     if (iDCPList.size() == 1 || lNbOfDepartedSegments < 2) {
00110         setRemainingDemandForecastToZero (ioSegmentCabin);
00111         return false;
00112     } else {
00113         // Initialise a holder for the unconstrained demand.
00114         UnconstrainedDemandVector_T lQEquivalentDemandVector (
00115             lNbOfDepartedSegments, 0.0);
00116         BookingClassUnconstrainedDemandVectorMap_T lBkgClassUncDemMap;
00117         const stdair::BookingClassList_T& lBCList =
00118             stdair::BomManager::getList<stdair::BookingClass> (ioSegmentCabin);
00119         for (stdair::BookingClassList_T::const_iterator itBC = lBCList.begin();
00120              itBC != lBCList.end(); ++itBC) {
00121             stdair::BookingClass* lBC_ptr = *itBC;
00122             assert (lBC_ptr != NULL);
00123             std::vector<stdair::NbOfRequests_T> lUncDemandVector (
00124                 lNbOfDepartedSegments, 0.0);
00125             bool insertionSucceeded = lBkgClassUncDemMap.insert
00126                 (BookingClassUnconstrainedDemandVectorMap_T::
00127                  value_type (lBC_ptr, lUncDemandVector)).second;
00128             assert (insertionSucceeded == true);
00129         }
00130
00131         // Build the DCP intervals and unconstrain censored booking figures for
00132         // each interval.
00133         stdair::DCPList_T::const_iterator itNextDCP = itDCP; ++itNextDCP;
00134         for (; itNextDCP != iDCPList.end(); ++itDCP, ++itNextDCP) {
00135             const stdair::DCP_T& lCurrentDCP = *itDCP;
00136             const stdair::DCP_T& lNextDCP = *itNextDCP;
00137
00138             // DEBUG

```

```

00137         STDAIR_LOG_DEBUG ("Unconstrain demand for "
00138             << ioSegmentCabin.describeKey()
00139             << " and the DCP's " << lCurrentDCP << ", "
00140             << lNextDCP);
00141         Detruncator::unconstrainUsingAdditivePickUp (ioSegmentCabin,
00142             lBkgClassUncDemMap,
00143             lQEquivalentDemandVector,
00144             lCurrentDCP-1, lNextDCP,
00145             iEventDate);
00146         STDAIR_LOG_DEBUG ("Detruncation successful");
00147     }
00148
00149     // Retrieve the FRAT5 coefficient and compute the sell-up coef.
00150     FRAT5Curve_T::const_iterator itFRAT5 =
00151         DEFAULT_CUMULATIVE_FRAT5_CURVE.lower_bound (lCurrentDTD);
00152     assert (itFRAT5 != DEFAULT_CUMULATIVE_FRAT5_CURVE.end());
00153     const double lFRAT5Coef = itFRAT5->second;
00154     const double lSellUpCoef = -log(0.5) / (lFRAT5Coef - 1);
00155
00156     forecastUsingAdditivePickUp (ioSegmentCabin, lBkgClassUncDemMap,
00157         lQEquivalentDemandVector, lSellUpCoef);
00158     return true;
00159 }
00160 }
00161
00162 // //////////////////////////////////////
00163 void Forecaster::
00164 forecastUsingAdditivePickUp (stdair::SegmentCabin& ioSegmentCabin,
00165     const BookingClassUnconstrainedDemandVectorMap_T
00166     & iClassUncDemMap,
00167     const UnconstrainedDemandVector_T& iUncDemVector
00168     ,
00169     const double& iSellUpFactor) {
00170     double lPriceOriMean; double lPriceOriStdDev;
00171     Utilities::computeDistributionParameters (iUncDemVector, lPriceOriMean,
00172         lPriceOriStdDev);
00173
00174     // DEBUG
00175     //STDAIR_LOG_NOTIFICATION (lPriceOriMean << ", " << lPriceOriStdDev);
00176
00177     // Retrieve the classes from low to high and compute the distributions of
00178     // product-oriented and price-oriented demand.
00179     // Retrieve the lowest class.
00180     const stdair::BookingClassList_T& lBCList =
00181         stdair::BomManager::getList<stdair::BookingClass> (ioSegmentCabin);
00182     stdair::BookingClassList_T::const_reverse_iterator itCurrentClass =
00183         lBCList.rbegin();
00184     assert (itCurrentClass != lBCList.rend());
00185     stdair::BookingClassList_T::const_reverse_iterator itNextClass =
00186         itCurrentClass;
00187     ++itNextClass;
00188     // If there is only one class in the cabin, the demand distribution of this
00189     // class is equal to the price-oriented demand distribution of the cabin.
00190     if (itNextClass == lBCList.rend()) {
00191         stdair::BookingClass* lLowestBC_ptr = *itCurrentClass;
00192         lLowestBC_ptr->setMean (lPriceOriMean);
00193         lLowestBC_ptr->setStdDev (lPriceOriStdDev);
00194     } else {
00195         // Compute the demand for higher class using the formula
00196         // Pro_sell_up_from_Q_to_F = e ^ ((y_F/y_Q - 1) * ln (0.5) / (FRAT5 - 1))
00197         for (; itNextClass != lBCList.rend(); ++itCurrentClass, ++itNextClass) {
00198             stdair::BookingClass* lCurrentBC_ptr = *itCurrentClass;
00199             assert (lCurrentBC_ptr != NULL);
00200             const stdair::Yield_T& lCurrentYield = lCurrentBC_ptr->getYield();
00201             stdair::BookingClass* lNextBC_ptr = *itNextClass;
00202             assert (lNextBC_ptr != NULL);
00203             const stdair::Yield_T& lNextYield = lNextBC_ptr->getYield();
00204
00205             // Compute the part of price-oriented demand distributed to the
00206             // current class.
00207             const double lSellUp =
00208                 exp ((1.0 - lNextYield/lCurrentYield) * iSellUpFactor);
00209             const double lPriceOriDemMeanFrac = lPriceOriMean * (1.0 - lSellUp);
00210             const double lPriceOriDemStdDevFrac = lPriceOriStdDev * (1.0 - lSellUp)

```



```

00209 ;
00210 // Compute the product-oriented demand distribution for the
00211 // current class.
00212 BookingClassUnconstrainedDemandVectorMap_T::const_iterator itBCUD =
00213     iClassUncDemMap.find (lCurrentBC_ptr);
00214 assert (itBCUD != iClassUncDemMap.end());
00215 const UnconstrainedDemandVector_T& lDemandVector = itBCUD->second;
00216 double lMean; double lStdDev;
00217 Utilities::computeDistributionParameters(lDemandVector, lMean, lStdDev)
00218 ;
00219 // Compute the demand distribution for the current class;
00220 lMean += lPriceOriDemMeanFrac;
00221 lStdDev = sqrt (lStdDev * lStdDev +
00222                 lPriceOriDemStdDevFrac * lPriceOriDemStdDevFrac);
00223 lCurrentBC_ptr->setMean (lMean);
00224 lCurrentBC_ptr->setStdDev (lStdDev);
00225
00226 // DEBUG
00227 // STDAIR_LOG_NOTIFICATION ("Class " << lCurrentBC_ptr->describeKey()
00228 //                             << ", mean = " << lMean
00229 //                             << ", stddev = " << lStdDev);
00230
00231 // Update the price-oriented demand
00232 lPriceOriMean *= lSellUp;
00233 lPriceOriStdDev *= lSellUp;
00234 }
00235
00236 // Compute the demand distribution for the highest class (which is the
00237 // "current class")
00238 stdair::BookingClass* lCurrentBC_ptr = *itCurrentClass;
00239 assert (lCurrentBC_ptr != NULL);
00240 BookingClassUnconstrainedDemandVectorMap_T::const_iterator itBCUD =
00241     iClassUncDemMap.find (lCurrentBC_ptr);
00242 assert (itBCUD != iClassUncDemMap.end());
00243 const UnconstrainedDemandVector_T& lDemandVector = itBCUD->second;
00244 double lMean; double lStdDev;
00245 Utilities::computeDistributionParameters(lDemandVector, lMean, lStdDev);
00246
00247 // Compute the demand distribution for the current class;
00248 lMean += lPriceOriMean;
00249 lStdDev = sqrt (lStdDev * lStdDev + lPriceOriStdDev * lPriceOriStdDev);
00250 lCurrentBC_ptr->setMean (lMean);
00251 lCurrentBC_ptr->setStdDev (lStdDev);
00252
00253 // DEBUG
00254 // STDAIR_LOG_NOTIFICATION ("Class " << lCurrentBC_ptr->describeKey()
00255 //                             << ", mean = " << lMean
00256 //                             << ", stddev = " << lStdDev);
00257 }
00258 }
00259
00260 //////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00261 void Forecaster::
00262 setRemainingDemandForecastToZero (const stdair::SegmentCabin& iSegmentCabin)
00263 {
00264     // Set the demand forecast for all classes to zero.
00265     const stdair::BookingClassList_T& lBCList =
00266         stdair::BomManager::getList<stdair::BookingClass> (iSegmentCabin);
00267     for (stdair::BookingClassList_T::const_iterator itBC = lBCList.begin();
00268          itBC != lBCList.end(); ++itBC) {
00269         stdair::BookingClass* lBC_ptr = *itBC;
00270         assert (lBC_ptr != NULL);
00271         lBC_ptr->setMean (0.0);
00272     }
00273 }
00274
00275 //////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00276 bool Forecaster::
00277 forecastUsingMultiplicativePickUp (stdair::FlightDate& ioFlightDate,
00278                                   const stdair::DateTime_T& iEventTime) {
00279     // Build the offset dates.
00280     const stdair::Date_T& lEventDate = iEventTime.date();

```

```

00280
00281 //
00282 bool isSucceeded = true;
00283 const stdair::SegmentDateList_T& lSDList =
00284     stdair::BomManager::getList<stdair::SegmentDate> (ioFlightDate);
00285 for (stdair::SegmentDateList_T::const_iterator itSD = lSDList.begin();
00286      itSD != lSDList.end(); ++itSD) {
00287     stdair::SegmentDate* lSD_ptr = *itSD;
00288     assert (lSD_ptr != NULL);
00289
00290     const stdair::Date_T& lBoardingDate = lSD_ptr->getBoardingDate();
00291     const stdair::DateOffset_T lSegmentDateOffset =
00292         lBoardingDate - lEventDate;
00293     const stdair::DTD_T lSegmentDTD = lSegmentDateOffset.days();
00294
00295 //
00296 const stdair::SegmentCabinList_T& lSCList =
00297     stdair::BomManager::getList<stdair::SegmentCabin> (*lSD_ptr);
00298 for (stdair::SegmentCabinList_T::const_iterator itSC = lSCList.begin();
00299      itSC != lSCList.end(); ++itSC) {
00300     stdair::SegmentCabin* lSC_ptr = *itSC;
00301     assert (lSC_ptr != NULL);
00302
00303     bool isForecasted = forecastUsingMultiplicativePickUp (*lSC_ptr,
00304                                                            lEventDate,
00305                                                            lSegmentDTD);
00306     if (isForecasted == false) {
00307         isSucceeded = false;
00308     }
00309 }
00310 }
00311 return isSucceeded;
00312 }
00313
00314 // //////////////////////////////////////
00315 bool Forecaster::
00316 forecastUsingMultiplicativePickUp (stdair::SegmentCabin& ioSegmentCabin,
00317                                   const stdair::Date_T& iEventDate,
00318                                   const stdair::DTD_T& iSegmentDTD) {
00319     // Retrieving the number of anterior similar segments.
00320     const stdair::GuillotineBlock& lGuillotineBlock =
00321         ioSegmentCabin.getGuillotineBlock();
00322     stdair::NbOfSegments_T lNbOfAnteriorSimilarSegments =
00323         GuillotineBlockHelper::
00324             getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, iSegmentDTD,
00325                                                  iEventDate) - 1;
00326     // Retrieve the number of departed similar segments.
00327     stdair::NbOfSegments_T lNbOfDepartedSegments =
00328         Utilities::getNbOfDepartedSimilarSegments (ioSegmentCabin, iEventDate);
00329     // TODO:
00330     if (lNbOfDepartedSegments > 52) {
00331         lNbOfAnteriorSimilarSegments =
00332             lNbOfAnteriorSimilarSegments - lNbOfDepartedSegments + 52;
00333     }
00334
00335     // DEBUG
00336     STDAIR_LOG_DEBUG ("Nb of anterior similar segments: "
00337                      << lNbOfAnteriorSimilarSegments);
00338
00339     // If the iSegmentDTD is the last DCP or there is no anterior similar
00340     // segment, remaining demand for all classes will be set to zero
00341     stdair::DCPList_T::const_reverse_iterator itLastDCP =
00342         stdair::DEFAULT_DCP_LIST.rbegin();
00343     assert (itLastDCP != stdair::DEFAULT_DCP_LIST.rend());
00344     const stdair::DCP_T& lLastDCP = *itLastDCP;
00345     if (lNbOfAnteriorSimilarSegments < 1.0 || iSegmentDTD <= lLastDCP) {
00346         setRemainingDemandForecastToZero (ioSegmentCabin);
00347         return false;
00348     } else {
00349         // Retrieve the booking figures of the first DCP and consider them
00350         // as unconstrained demand figures.
00351         stdair::DCPList_T::const_iterator itDCP = stdair::DEFAULT_DCP_LIST.begin();
00352
00353         assert (itDCP != stdair::DEFAULT_DCP_LIST.end());

```

```

00353     const stdair::DCP_T& lFirstDCP = *itDCP;
00354
00355     // Initialise the unconstrained demand for classes.
00356     stdair::NbOfSegments_T lNbOfUsableSegments =
00357         GuillotineBlockHelper::
00358             getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, lFirstDCP,
00359                                                 iEventDate);
00360
00361     // TODO
00362     unsigned short lSize = lNbOfUsableSegments;
00363     if (lNbOfDepartedSegments > 52) {
00364         lSize = lNbOfUsableSegments - lNbOfDepartedSegments + 52;
00365     }
00366
00367     STDAIR_LOG_DEBUG ("Nb of usable similar segments: "
00368                     << lNbOfUsableSegments);
00369
00370     UnconstrainedDemandVector_T lQEquivalentDemandVector (lSize, 0.0);
00371     stdair::NbOfBookings_T lCurrentSegmentQEquivalentDemand = 0.0;
00372     BookingClassUnconstrainedDemandVectorMap_T lBkgClassUncDemVectorMap;
00373     BookingClassUnconstrainedDemandMap_T lCurrentSegmentBkgClassDemMap;
00374     const stdair::BookingClassList_T& lBCList =
00375         stdair::BomManager::getList<stdair::BookingClass> (ioSegmentCabin);
00376     for (stdair::BookingClassList_T::const_iterator itBC = lBCList.begin();
00377          itBC != lBCList.end(); ++itBC) {
00378         stdair::BookingClass* lBC_ptr = *itBC;
00379         assert (lBC_ptr != NULL);
00380
00381         UnconstrainedDemandVector_T lUncDemandVector (lSize, 0.0);
00382         bool insertionSucceeded = lBkgClassUncDemVectorMap.
00383             insert (BookingClassUnconstrainedDemandVectorMap_T::
00384                 value_type (lBC_ptr, lUncDemandVector)).second;
00385         assert (insertionSucceeded == true);
00386         insertionSucceeded =
00387             lCurrentSegmentBkgClassDemMap.
00388             insert (BookingClassUnconstrainedDemandMap_T::
00389                 value_type (lBC_ptr, 0.0)).second;
00390         assert (insertionSucceeded == true);
00391     }
00392     Detruncator::
00393         retrieveUnconstrainedDemandForFirstDCP (ioSegmentCabin,
00394                                                 lBkgClassUncDemVectorMap,
00395                                                 lQEquivalentDemandVector,
00396                                                 lFirstDCP, lNbOfUsableSegments,
00397                                                 lSize);
00398
00399     // Unconstrain the booking figures.
00400     stdair::DCPList_T::const_iterator itNextDCP = itDCP; ++itNextDCP;
00401     while (itNextDCP != stdair::DEFAULT_DCP_LIST.end()) {
00402         const stdair::DCP_T& lCurrentDCP = *itDCP;
00403         const stdair::DCP_T& lNextDCP = *itNextDCP;
00404         if (lCurrentDCP <= iSegmentDTD) {
00405             break;
00406         }
00407         Detruncator::
00408             unconstrainUsingMultiplicativePickUp (ioSegmentCabin,
00409                                                   lBkgClassUncDemVectorMap,
00410                                                   lQEquivalentDemandVector,
00411                                                   lCurrentDCP-1, lNextDCP,
00412                                                   iEventDate,
00413                                                   lNbOfDepartedSegments);
00414         ++itNextDCP; ++itDCP;
00415     }
00416
00417     // Update the unconstrained demand for all the classes of the current
00418     // segment.
00419     lCurrentSegmentQEquivalentDemand =
00420         lQEquivalentDemandVector.at (lNbOfAnteriorSimilarSegments);
00421     BookingClassUnconstrainedDemandMap_T::iterator itBCUD =
00422         lCurrentSegmentBkgClassDemMap.begin();
00423     for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00424          lBkgClassUncDemVectorMap.begin();
00425          itBCUDV != lBkgClassUncDemVectorMap.end(); ++itBCUDV, ++itBCUD) {
00426         assert (itBCUD != lCurrentSegmentBkgClassDemMap.end());
00427         assert (itBCUD->first == itBCUDV->first);

```

```

00427         stdair::NbOfRequests_T& lUncDem = itBCUD->second;
00428         UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00429         lUncDem = lUncDemVector.at (lNbOfAnteriorSimilarSegments);
00430     }
00431
00432     // Forecast the remaining demand for all classes
00433     const stdair::DCP_T& lCurrentDTD = *itDCP;
00434     for (; itNextDCP != stdair::DEFAULT_DCP_LIST.end(); ++itNextDCP, ++itDCP)
    {
00435         const stdair::DCP_T& lCurrentDCP = *itDCP;
00436         const stdair::DCP_T& lNextDCP = *itNextDCP;
00437         forecastUsingMultiplicativePickUp (ioSegmentCabin,
00438                                           lBkgClassUncDemVectorMap,
00439                                           lQEquivalentDemandVector,
00440                                           lCurrentDCP-1, lNextDCP, iEventDate,
00441                                           lNbOfAnteriorSimilarSegments,
00442                                           lNbOfDepartedSegments);
00443     }
00444
00445     // Update the remaining demand for all classes
00446     lCurrentSegmentQEquivalentDemand =
00447         lQEquivalentDemandVector.at (lNbOfAnteriorSimilarSegments)
00448         - lCurrentSegmentQEquivalentDemand;
00449     itBCUD = lCurrentSegmentBkgClassDemMap.begin();
00450     for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00451          lBkgClassUncDemVectorMap.begin();
00452          itBCUDV != lBkgClassUncDemVectorMap.end(); ++itBCUDV, ++itBCUD) {
00453         assert (itBCUD != lCurrentSegmentBkgClassDemMap.end());
00454         assert (itBCUD->first == itBCUDV->first);
00455         stdair::NbOfRequests_T& lUncDem = itBCUD->second;
00456         UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00457         lUncDem = lUncDemVector.at (lNbOfAnteriorSimilarSegments) - lUncDem;
00458     }
00459
00460     // Retrieve the FRAT5 coefficient and compute the sell-up coef.
00461     FRAT5Curve_T::const_iterator itFRAT5 =
00462         DEFAULT_CUMULATIVE_FRAT5_CURVE.lower_bound (lCurrentDTD);
00463     assert (itFRAT5 != DEFAULT_CUMULATIVE_FRAT5_CURVE.end());
00464     const double lFRAT5Coef = itFRAT5->second;
00465     const double lSellUpCoef = -log(0.5) / (lFRAT5Coef - 1);
00466
00467     return forecastUsingMultiplicativePickUp (ioSegmentCabin,
00468                                              lCurrentSegmentBkgClassDemMap,
00469                                              lCurrentSegmentQEquivalentDemand,
00470                                              lSellUpCoef);
00471 }
00472 }
00473
00474 ///////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00475 void Forecaster::forecastUsingMultiplicativePickUp
00476 (const stdair::SegmentCabin& iSegmentCabin,
00477  BookingClassUnconstrainedDemandVectorMap_T& ioBkgClassUncDemMap,
00478  UnconstrainedDemandVector_T& ioQEquivalentDemandVector,
00479  const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00480  const stdair::Date_T& iCurrentDate,
00481  const stdair::NbOfSegments_T& iNbOfAnteriorSimilarSegments,
00482  const stdair::NbOfSegments_T& iNbOfDepartedSegments) {
00483
00484
00485     // Retrieve the guillotine block.
00486     const stdair::GuillotineBlock& lGuillotineBlock =
00487         iSegmentCabin.getGuillotineBlock();
00488
00489     // Build the historical booking holders for the product-oriented bookings
00490     // of the casses and the Q-equivalent (price-oriented) bookings of the
00491     cabin
00492     const stdair::NbOfSegments_T lNbOfUsableSegments = GuillotineBlockHelper::
00493         getNbOfSegmentAlreadyPassedThisDTD (lGuillotineBlock, iDCPEnd,
00494                                             iCurrentDate);
00495
00496     STDAIR_LOG_DEBUG ("Nb of usable similar segments: "
00497                      << lNbOfUsableSegments);

```

```

00498     if (lNbOfUsableSegments > 0) {
00499
00500         // Parse the booking class list and unconstrain historical bookings.
00501         for (BookingClassUnconstrainedDemandVectorMap_T::iterator itBCUDV =
00502             ioBkgClassUncDemMap.begin(); itBCUDV != ioBkgClassUncDemMap.end();
00503             ++itBCUDV) {
00504             stdair::BookingClass* lBC_ptr = itBCUDV->first;
00505             assert (lBC_ptr != NULL);
00506             const stdair::MapKey_T& lBCKey = lBC_ptr->describeKey();
00507             const stdair::BlockIndex_T& lBlockIdx =
00508                 lGuillotineBlock.getBlockIndex (lBCKey);
00509             UnconstrainedDemandVector_T& lUncDemVector = itBCUDV->second;
00510
00511             STDAIR_LOG_DEBUG ("Unconstrain product-oriented bookings for "<<lBCKey)
00512 ;
00513             forecastUsingMultiplicativePickUp (lGuillotineBlock, lUncDemVector,
00514                 iDCPBegin, iDCPEnd,
00515                 lNbOfUsableSegments, lBlockIdx,
00516                 iNbOfAnteriorSimilarSegments,
00517                 iNbOfDepartedSegments);
00518         }
00519
00520         // Unconstrain the Q-equivalent bookings.
00521         // Retrieve the block index of the segment-cabin.
00522         std::ostringstream lSCMapKey;
00523         lSCMapKey << stdair::DEFAULT_SEGMENT_CABIN_VALUE_TYPE
00524             << iSegmentCabin.describeKey();
00525         const stdair::BlockIndex_T& lCabinIdx =
00526             lGuillotineBlock.getBlockIndex (lSCMapKey.str());
00527
00528         STDAIR_LOG_DEBUG ("Unconstrain price-oriented bookings");
00529         forecastUsingMultiplicativePickUp (lGuillotineBlock,
00530             iQEquivalentDemandVector,
00531             iDCPBegin, iDCPEnd,
00532             lNbOfUsableSegments, lCabinIdx,
00533             iNbOfAnteriorSimilarSegments,
00534             iNbOfDepartedSegments,
00535             iSegmentCabin, iCurrentDate);
00536     }
00537 }
00538
00539 ///////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00540 void Forecaster::forecastUsingMultiplicativePickUp
00541 (const stdair::GuillotineBlock& iGuillotineBlock,
00542  UnconstrainedDemandVector_T& ioUncDemVector,
00543  const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00544  const stdair::NbOfSegments_T& iNbOfUsableSegments,
00545  const stdair::BlockIndex_T& iBlockIdx,
00546  const stdair::NbOfSegments_T& iNbOfAnteriorSimilarSegments,
00547  const stdair::NbOfSegments_T& iNbOfDepartedSegments) {
00548     // TODO
00549     stdair::NbOfSegments_T lSegBegin = 0;
00550     if (iNbOfDepartedSegments > 52) {
00551         lSegBegin = iNbOfDepartedSegments - 52;
00552     }
00553     // Retrieve the gross daily booking and availability snapshots.
00554     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lBookingView =
00555         iGuillotineBlock.
00556         getConstSegmentCabinDTDRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfUsableSegments -1,
00557     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00558         iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (
00559     lSegBegin, iNbOfUsableSegments -1, iDCPEnd, iDCPBegin);
00560
00561     // Browse the list of segments and build the historical booking holder.
00562     const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00563         iGuillotineBlock.getValueTypeIndexMap();
00564     const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00565     HistoricalBookingHolder lHBHolder;
00566     std::vector<short> lDataIndexList;
00567     for (short i = 0; i < iNbOfUsableSegments-lSegBegin; ++i) {
00568         stdair::Flag_T lCensorshipFlag = false;
00569         stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00570         const short lNbOfDTDs = iDCPBegin - iDCPEnd + 1;
00571     }
00572 }

```

```

00569         // Parse the DTDs during the period
00570         for (short j = 0; j < lNbOfDTDs; ++j) {
00571             // Check if the data has been censored during this day.
00572             // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00573             // << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00574             if (lCensorshipFlag == false) {
00575                 if (lAvlView[i*lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00576                     lCensorshipFlag = true;
00577                 }
00578             }
00579
00580             // Get the bookings of the day.
00581             // STDAIR_LOG_DEBUG ("Bookings of the day: " <<
lBookingView[i*lNbOfValueTypes + iBlockIdx][j]);
00582             lNbOfHistoricalBkgs += lBookingView[i*lNbOfValueTypes + iBlockIdx][j];
00583         }
00584
00585         // If there is no booking till now for this class and for this segment,
00586         // there will be no unconstraining process.
00587         stdair::NbOfRequests_T& lUncDemand = ioUncDemVector.at (i);
00588         if (lUncDemand < 1.0) {
00589             lUncDemand += lNbOfHistoricalBkgs;
00590         } else {
00591             double lBkgDemandFactor = lNbOfHistoricalBkgs / lUncDemand;
00592             HistoricalBooking lHistoricalBkg (lBkgDemandFactor, lCensorshipFlag);
00593             lHBHolder.addHistoricalBooking (lHistoricalBkg);
00594             lDataIndexList.push_back (i);
00595         }
00596
00597         // DEBUG
00598         STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00599         << ", censored: " << lCensorshipFlag);
00600     }
00601
00602     // DEBUG
00603     STDAIR_LOG_DEBUG ("Unconstrain by multiplicative pick-up using EM");
00604
00605     // Unconstrain the booking figures
00606     Detruncator::unconstrainUsingMultiplicativePickUp (lHBHolder);
00607
00608     // Update the unconstrained demand vector.
00609     short i = 0;
00610     for (std::vector<short>::iterator itIdx = lDataIndexList.begin();
00611          itIdx != lDataIndexList.end(); ++itIdx, ++i) {
00612         short lIdx = *itIdx;
00613         stdair::NbOfRequests_T& lPastDemand = ioUncDemVector.at (lIdx);
00614         const stdair::NbOfRequests_T& lUncDemandFactorOfThisPeriod =
00615             lHBHolder.getUnconstrainedDemand (i);
00616         lPastDemand *= (1+lUncDemandFactorOfThisPeriod);
00617     }
00618
00619     // Update the unconstrained demand for the current segment.
00620     if (lHBHolder.getNbOfFlights() > 0) {
00621         const stdair::NbOfRequests_T& lUncDemandFactorMean =
00622             lHBHolder.getDemandMean();
00623         stdair::NbOfRequests_T& lPastDemand =
00624             ioUncDemVector.at (iNbOfAnteriorSimilarSegments);
00625         lPastDemand *= (1+lUncDemandFactorMean);
00626     }
00627 }
00628
00629 // //////////////////////////////////////
00630 void Forecaster::forecastUsingMultiplicativePickUp
00631 (const stdair::GuillotineBlock& iGuillotineBlock,
00632  UnconstrainedDemandVector_T& ioUncDemVector,
00633  const stdair::DCP_T& iDCPBegin, const stdair::DCP_T& iDCPEnd,
00634  const stdair::NbOfSegments_T& iNbOfUsableSegments,
00635  const stdair::BlockIndex_T& iBlockIdx,
00636  const stdair::NbOfSegments_T& iNbOfAnteriorSimilarSegments,
00637  const stdair::NbOfSegments_T& iNbOfDepartedSegments,
00638  const stdair::SegmentCabin& iSegmentCabin,
00639  const stdair::Date_T& iCurrentDate) {
00640     // TODO
00641     stdair::NbOfSegments_T lSegBegin = 0;

```

```

00642     if (iNbOfDepartedSegments > 52) {
00643         lSegBegin = iNbOfDepartedSegments - 52;
00644     }
00645     // Retrieve the gross daily booking and availability snapshots.
00646     stdair::ConstSegmentCabinDTDRangeSnapshotView_T lBookingView =
00647         iGuillotineBlock.
00648         getConstSegmentCabinDTDRangeProductAndPriceOrientedBookingSnapshotView (lSegBegin, iNbOfUsableSegments -1,
00649         stdair::ConstSegmentCabinDTDRangeSnapshotView_T lAvlView =
00649         iGuillotineBlock.getConstSegmentCabinDTDRangeAvailabilitySnapshotView (
00650         lSegBegin, iNbOfUsableSegments -1, iDCPBegin, iDCPEnd);
00651
00652     // Browse the list of segments and build the historical booking holder.
00653     const stdair::ValueTypeIndexMap_T& lVTIdxMap =
00654         iGuillotineBlock.getValueTypeIndexMap();
00655     const unsigned int lNbOfValueTypes = lVTIdxMap.size();
00656     HistoricalBookingHolder lHBHolder;
00657     std::vector<short> lDataIndexList;
00658     for (short i = 0; i < iNbOfUsableSegments-lSegBegin; ++i) {
00659         stdair::Flag_T lCensorshipFlag = false;
00660         stdair::NbOfBookings_T lNbOfHistoricalBkgs = 0.0;
00661         const short lNbOfDTDs = iDCPEnd - iDCPBegin + 1;
00662
00663         // Parse the DTDs during the period
00664         for (short j = 0; j < lNbOfDTDs; ++j) {
00665             // Check if the data has been censored during this day.
00666             // STDAIR_LOG_DEBUG ("i: " << i << ", NbOfValues: " << lNbOfValueTypes
00667             // << ", BlockIdx: " << iBlockIdx << ", j: " << j);
00668             if (lCensorshipFlag == false) {
00669                 if (lAvlView[i*lNbOfValueTypes + iBlockIdx][j] < 1.0) {
00670                     lCensorshipFlag = true;
00671                 }
00672             }
00673
00674             // Get the bookings of the day.
00675             // STDAIR_LOG_DEBUG ("Bookings of the day: " <<
00676             lBookingView[i*lNbOfValueTypes + iBlockIdx][j]);
00677             lNbOfHistoricalBkgs += lBookingView[i*lNbOfValueTypes + iBlockIdx][j];
00678
00679             // If there is no booking till now for this class and for this segment,
00680             // there will be no unconstraining process.
00681             stdair::NbOfRequests_T lUncDemand = ioUncDemVector.at (i);
00682             if (lUncDemand < 1.0) {
00683                 lUncDemand += lNbOfHistoricalBkgs;
00684             } else {
00685                 double lBkgDemandFactor = lNbOfHistoricalBkgs / lUncDemand;
00686                 HistoricalBooking lHistoricalBkg (lBkgDemandFactor, lCensorshipFlag);
00687                 lHBHolder.addHistoricalBooking (lHistoricalBkg);
00688                 lDataIndexList.push_back (i);
00689             }
00690
00691             // DEBUG
00692             STDAIR_LOG_DEBUG ("Historical bkgs: " << lNbOfHistoricalBkgs
00693             << ", censored: " << lCensorshipFlag);
00694         }
00695
00696         // DEBUG
00697         STDAIR_LOG_DEBUG ("Unconstrain by multiplicative pick-up using EM");
00698
00699         // Unconstrain the booking figures
00700         Detruncator::unconstrainUsingMultiplicativePickUp (lHBHolder);
00701
00702         // Update the unconstrained demand vector.
00703         // LOG
00704         const stdair::SegmentDate& lSegmentDate = stdair::BomManager::
00705         getParent<stdair::SegmentDate, stdair::SegmentCabin> (iSegmentCabin);
00706         const stdair::FlightDate& lFlightDate = stdair::BomManager::
00707         getParent<stdair::FlightDate, stdair::SegmentDate> (lSegmentDate);
00708         const stdair::Date_T& lDepDate = lFlightDate.getDepartureDate();
00709         const boost::gregorian::date_duration lDD = lDepDate - iCurrentDate;
00710         const long lDTD = lDD.days();
00711         stdair::Date_T lRefDate (2012, boost::gregorian::Jan, 01);
00712         short i = 0;
00713         for (std::vector<short>::iterator itIdx = lDataIndexList.begin();

```

```

00713         itIdx != lDataIndexList.end(); ++itIdx, ++i) {
00714     short lIdx = *itIdx;
00715     stdair::NbOfRequests_T& lPastDemand = ioUncDemVector.at (lIdx);
00716     const stdair::NbOfRequests_T& lUncDemandFactorOfThisPeriod =
00717         lHBHolder.getUnconstrainedDemand (i);
00718     const double lUncDemThisPeriod =
00719         lPastDemand * lUncDemandFactorOfThisPeriod;
00720     const double lQEBkgThisPeriod =
00721         lPastDemand * lHBHolder.getHistoricalBooking (i);
00722     lPastDemand *= (1+lUncDemandFactorOfThisPeriod);
00723     if (lDepDate > lRefDate) {
00724         const stdair::DateOffset_T lDateOffset (7 *(52 - i) + 420);
00725         const stdair::Date_T lHDate = lDepDate - lDateOffset;
00726         STDAIR_LOG_NOTIFICATION (boost::gregorian::to_iso_string(lDepDate)
00727             << "," << lDTD << "," << iDCPBegin << ","
00728             << iDCPEnd << ","
00729             << boost::gregorian::to_iso_string (lHDate)
00730             << "," << lUncDemThisPeriod);
00731         STDAIR_LOG_NOTIFICATION (boost::gregorian::to_iso_string(lDepDate)
00732             << "," << lDTD << "," << iDCPBegin << ","
00733             << iDCPEnd << ","
00734             << boost::gregorian::to_iso_string (lHDate)
00735             << "," << lQEBkgThisPeriod);
00736     }
00737 }
00738
00739 // Update the unconstrained demand for the current segment.
00740 if (lHBHolder.getNbOfFlights() > 0) {
00741     const stdair::NbOfRequests_T& lUncDemandFactorMean =
00742         lHBHolder.getDemandMean();
00743     stdair::NbOfRequests_T& lPastDemand =
00744         ioUncDemVector.at (iNbOfAnteriorSimilarSegments);
00745     lPastDemand *= (1+lUncDemandFactorMean);
00746 }
00747 }
00748
00749 // //////////////////////////////////////
00750 bool Forecaster::
00751 forecastUsingMultiplicativePickUp (stdair::SegmentCabin& ioSegmentCabin,
00752     const BookingClassUnconstrainedDemandMap_T
00753 & iClassUncDemMap,
00754     const stdair::NbOfRequests_T& iUncDem,
00755     const double& iSellUpFactor) {
00756     double lPriceOriMean = iUncDem;
00757     double lPriceOriStdDev = sqrt (iUncDem);
00758
00759     // DEBUG
00760     STDAIR_LOG_DEBUG ("Price-oriented demand: mean = " << lPriceOriMean
00761         << ", stddev = " << lPriceOriStdDev);
00762
00763     // Retrieve the classes from low to high and compute the distributions of
00764     // product-oriented and price-oriented demand.
00765     // Retrieve the lowest class.
00766     const stdair::BookingClassList_T& lBCList =
00767         stdair::BomManager::getList<stdair::BookingClass> (ioSegmentCabin);
00768     stdair::BookingClassList_T::const_reverse_iterator itCurrentClass =
00769         lBCList.rbegin();
00770     assert (itCurrentClass != lBCList.rend());
00771     stdair::BookingClassList_T::const_reverse_iterator itNextClass =
00772         itCurrentClass;
00773     ++itNextClass;
00774     // If there is only one class in the cabin, the demand distribution of this
00775     // class is equal to the price-oriented demand distribution of the cabin.
00776     if (itNextClass == lBCList.rend()) {
00777         stdair::BookingClass* lLowestBC_ptr = *itCurrentClass;
00778         lLowestBC_ptr->setMean (lPriceOriMean);
00779         lLowestBC_ptr->setStdDev (lPriceOriStdDev);
00780         if (lPriceOriMean > 0) {
00781             return true;
00782         } else {
00783             return false;
00784         }
00785     } else {
00786         bool isSucceeded = false;

```



```

00786 // Compute the demand for higher class using the formula
00787 // Pro_sell_up_from_Q_to_F = e ^ ((y_F/y_Q - 1) * ln (0.5) / (FRAT5 - 1))
00788 for (; itNextClass != lBCList.rend(); ++itCurrentClass, ++itNextClass) {
00789     stdair::BookingClass* lCurrentBC_ptr = *itCurrentClass;
00790     assert (lCurrentBC_ptr != NULL);
00791     const stdair::Yield_T& lCurrentYield = lCurrentBC_ptr->getYield();
00792     stdair::BookingClass* lNextBC_ptr = *itNextClass;
00793     assert (lNextBC_ptr != NULL);
00794     const stdair::Yield_T& lNextYield = lNextBC_ptr->getYield();
00795
00796     // Compute the part of price-oriented demand distributed to the
00797     // current class.
00798     const double lSellUp =
00799         exp ((1.0 - lNextYield/lCurrentYield) * iSellUpFactor);
00800     const double lPriceOriDemMeanFrac = lPriceOriMean * (1.0 - lSellUp);
00801     const double lPriceOriDemStdDevFrac = lPriceOriStdDev * (1.0 - lSellUp)
00802 ;
00803 // Compute the product-oriented demand distribution for the
00804 // current class.
00805 BookingClassUnconstrainedDemandMap_T::const_iterator itBCUD =
00806     iClassUncDemMap.find (lCurrentBC_ptr);
00807     assert (itBCUD != iClassUncDemMap.end());
00808     double lMean = itBCUD->second;
00809     double lStdDev = sqrt (lMean);
00810
00811     // Compute the demand distribution for the current class;
00812     lMean += lPriceOriDemMeanFrac;
00813     lStdDev = sqrt (lStdDev * lStdDev +
00814         lPriceOriDemStdDevFrac * lPriceOriDemStdDevFrac);
00815     lCurrentBC_ptr->setMean (lMean);
00816     lCurrentBC_ptr->setStdDev (lStdDev);
00817
00818     if (lMean > 0) {
00819         isSucceeded = true;
00820     }
00821
00822     // DEBUG
00823     STDAIR_LOG_DEBUG ("Class " << lCurrentBC_ptr->describeKey()
00824         << ", mean = " << lMean
00825         << ", stddev = " << lStdDev);
00826
00827     // Update the price-oriented demand
00828     lPriceOriMean *= lSellUp;
00829     lPriceOriStdDev *= lSellUp;
00830 }
00831
00832 // Compute the demand distribution for the highest class (which is the
00833 // "current class")
00834 stdair::BookingClass* lCurrentBC_ptr = *itCurrentClass;
00835 assert (lCurrentBC_ptr != NULL);
00836 BookingClassUnconstrainedDemandMap_T::const_iterator itBCUD =
00837     iClassUncDemMap.find (lCurrentBC_ptr);
00838     assert (itBCUD != iClassUncDemMap.end());
00839     double lMean = itBCUD->second;
00840     double lStdDev = sqrt (lMean);
00841
00842     // Compute the demand distribution for the current class;
00843     lMean += lPriceOriMean;
00844     lStdDev = sqrt (lStdDev * lStdDev + lPriceOriStdDev * lPriceOriStdDev);
00845     lCurrentBC_ptr->setMean (lMean);
00846     lCurrentBC_ptr->setStdDev (lStdDev);
00847
00848     if (lMean > 0) {
00849         isSucceeded = true;
00850     }
00851
00852     // DEBUG
00853     STDAIR_LOG_DEBUG ("Class " << lCurrentBC_ptr->describeKey()
00854         << ", mean = " << lMean
00855         << ", stddev = " << lStdDev);
00856     return isSucceeded;
00857 }
00858 }

```

```
00859
00860 }
```

## 28.75 rmol/command/Forecaster.hpp File Reference

```
#include <map> #include <stdair/stdair_inventory_types.-
hpp> #include <rmol/RMOL_Types.hpp>
```

### Classes

- class [RMOL::Forecaster](#)

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.76 Forecaster.hpp

```
00001 #ifndef __RMOL_COMMAND_FORECASTER_HPP
00002 #define __RMOL_COMMAND_FORECASTER_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <map>
00009 // StdAir
00010 #include <stdair/stdair_inventory_types.hpp>
00011 // RMOL
00012 #include <rmol/RMOL_Types.hpp>
00013
00014 // Forward declarations
00015 namespace stdair {
00016     class FlightDate;
00017     class SegmentCabin;
00018     class GuillotineBlock;
00019 }
00020
00021 namespace RMOL {
00022     class Forecaster {
00023     public:
00024         static bool forecastUsingAdditivePickUp (stdair::FlightDate&,
00025                                                 const stdair::DateTime_T&);
00026
00027         static bool forecastUsingMultiplicativePickUp (stdair::FlightDate&,
00028                                                       const stdair::DateTime_T&);
00029
00030     private:
00031         static bool forecastUsingAdditivePickUp (stdair::SegmentCabin&,
00032                                                 const stdair::DCPList_T&,
00033                                                 const stdair::Date_T&);
00034
00035         static void forecastUsingAdditivePickUp (stdair::SegmentCabin&,
00036                                                 const
00037         BookingClassUnconstrainedDemandVectorMap_T&, const UnconstrainedDemandVector_T&
00038         , const double&);
00039
00040         static bool forecastUsingMultiplicativePickUp (stdair::SegmentCabin&,
00041                                                       const stdair::Date_T&);
00042     }
00043 }
```

```

00058                                     const stdair::DTD_T&);
00062     static void forecastUsingMultiplicativePickUp(const stdair::SegmentCabin&,
00063     BookingClassUnconstrainedDemandVectorMap_T&,
00064                                     UnconstrainedDemandVector_T&,
00065                                     const stdair::DCP_T&,
00066                                     const stdair::DCP_T&,
00067                                     const stdair::Date_T&,
00068                                     const stdair::NbOfSegments_T&
00069     ,
00070                                     const stdair::NbOfSegments_T&
00071     );
00072     static void forecastUsingMultiplicativePickUp(const stdair::GuillotineBlock
00073     &,
00074     UnconstrainedDemandVector_T&,
00075     const stdair::DCP_T&,
00076     const stdair::DCP_T&,
00077     const stdair::NbOfSegments_T&
00078     ,
00079     const stdair::BlockIndex_T&,
00080     const stdair::NbOfSegments_T&
00081     ,
00082     const stdair::NbOfSegments_T&
00083     );
00084     static void forecastUsingMultiplicativePickUp(const stdair::GuillotineBlock
00085     &,
00086     UnconstrainedDemandVector_T&,
00087     const stdair::DCP_T&,
00088     const stdair::DCP_T&,
00089     const stdair::NbOfSegments_T&
00090     ,
00091     const stdair::BlockIndex_T&,
00092     const stdair::NbOfSegments_T&
00093     ,
00094     const stdair::NbOfSegments_T&
00095     ,
00096     const stdair::SegmentCabin&,
00097     const stdair::Date_T&);
00101     static bool forecastUsingMultiplicativePickUp(stdair::SegmentCabin&,
00102     BookingClassUnconstrainedDemandMap_T&,
00103     const stdair::NbOfRequests_T&
00104     ,
00105     const double&);
00109     static void setRemainingDemandForecastToZero (const stdair::SegmentCabin&);
00110 };
00111 }
00112 #endif // __RMOL_COMMAND_FORECASTER_HPP

```

## 28.77 rmol/command/InventoryParser.cpp File Reference

```

#include <sstream> #include <fstream> #include <cassert> ×
#include <stdair/stdair_inventory_types.hpp> #include
<stdair/stdair_maths_types.hpp> #include <stdair/stdair-
_exceptions.hpp> #include <stdair/basic/BasConst_Default-
Object.hpp> #include <stdair/basic/BasConst_Inventory.-
hpp> #include <stdair/basic/BasFileMgr.hpp> #include
<stdair/bom/BomRetriever.hpp> #include <stdair/bom/Bom-
Manager.hpp> #include <stdair/bom/BomRoot.hpp> #include
<stdair/bom/Inventory.hpp> #include <stdair/bom/Flight-
Date.hpp> #include <stdair/bom/SegmentDate.hpp> #include
<stdair/bom/SegmentCabin.hpp> #include <stdair/bom/Leg-

```

```
Date.hpp> #include <stdair/bom/LegCabin.hpp> #include
<stdair/bom/BookingClass.hpp> #include <stdair/bom/-
VirtualClassStruct.hpp> #include <stdair/factory/FacBom.-
hpp> #include <stdair/factory/FacBomManager.hpp> #include
<stdair/service/Logger.hpp> #include <rmol/command/-
InventoryParser.hpp>
```

### Namespaces

- namespace [RMOL](#)

### 28.78 InventoryParser.cpp

```
00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <sstream>
00006 #include <fstream>
00007 #include <cassert>
00008 // StdAir
00009 #include <stdair/stdair_inventory_types.hpp>
00010 #include <stdair/stdair_maths_types.hpp>
00011 #include <stdair/stdair_exceptions.hpp>
00012 #include <stdair/basic/BasConst_DefaultObject.hpp>
00013 #include <stdair/basic/BasConst_Inventory.hpp>
00014 #include <stdair/basic/BasFileMgr.hpp>
00015 #include <stdair/bom/BomRetriever.hpp>
00016 #include <stdair/bom/BomManager.hpp>
00017 #include <stdair/bom/BomRoot.hpp>
00018 #include <stdair/bom/Inventory.hpp>
00019 #include <stdair/bom/FlightDate.hpp>
00020 #include <stdair/bom/SegmentDate.hpp>
00021 #include <stdair/bom/SegmentCabin.hpp>
00022 #include <stdair/bom/LegDate.hpp>
00023 #include <stdair/bom/LegCabin.hpp>
00024 #include <stdair/bom/BookingClass.hpp>
00025 #include <stdair/bom/VirtualClassStruct.hpp>
00026 #include <stdair/factory/FacBom.hpp>
00027 #include <stdair/factory/FacBomManager.hpp>
00028 #include <stdair/service/Logger.hpp>
00029 // RMOL
00030 #include <rmol/command/InventoryParser.hpp>
00031
00032 namespace RMOL {
00033
00034 // //////////////////////////////////////
00035 bool InventoryParser::
00036 parseInputFileAndBuildBom (const std::string& iInputFileName,
00037                             stdair::BomRoot& ioBomRoot) {
00038     bool hasReadBeenSuccessful = false;
00039
00040     // Check that the file path given as input corresponds to an actual file
00041     const bool doesExistAndIsReadable =
00042         stdair::BasFileMgr::doesExistAndIsReadable (iInputFileName);
00043     if (doesExistAndIsReadable == false) {
00044         std::ostringstream oMessage;
00045         oMessage << "The input file, '" << iInputFileName
00046             << "', can not be retrieved on the file-system";
00047         throw stdair::FileNotFoundException (oMessage.str());
00048     }
00049
00050     // Retrieve the (sample) leg-cabin
00051     stdair::LegCabin& lLegCabin =
00052         stdair::BomRetriever::retrieveDummyLegCabin (ioBomRoot);
00053 }
```

```

00054 // Retrieve the (sample) segment-cabin
00055 stdair::SegmentCabin& lSegmentCabin =
00056     stdair::BomRetriever::retrieveDummySegmentCabin (ioBomRoot);
00057
00058 // Open the input file
00059 std::ifstream inputFile (iInputFileName.c_str());
00060 if (! inputFile) {
00061     STDAIR_LOG_ERROR ("Can not open input file '" << iInputFileName << "'");
00062     throw new stdair::FileNotFoundException ("Can not open input file '"
00063                                             + iInputFileName + "'");
00064 }
00065
00066 char buffer[80];
00067 double dval;
00068 short i = 1;
00069 bool hasAllParams = true;
00070 stdair::Yield_T lYield;
00071 stdair::MeanValue_T lMean;
00072 stdair::StdDevValue_T lStdDev;
00073 stdair::BookingClassKey lBCKey (stdair::DEFAULT_CLASS_CODE);
00074
00075 while (inputFile.getline (buffer, sizeof (buffer), ';')) {
00076     std::istringstream iStringStr (buffer);
00077
00078     if (i == 1) {
00079         hasAllParams = true;
00080     }
00081
00082     if (iStringStr >> dval) {
00083         if (i == 1) {
00084             lYield = dval;
00085             // std::cout << "Yield[" << i << "] = '" << dval << "'" << std::endl;
00086
00087         } else if (i == 2) {
00088             lMean = dval;
00089             // std::cout << "Mean[" << i << "] = '" << dval << "'" << std::endl;
00090
00091         } else if (i == 3) {
00092             lStdDev = dval;
00093             //std::cout << "stdDev[" << i << "] = '" << dval << "'" << std::endl;
00094             i = 0;
00095         }
00096         i++;
00097     } else {
00098         hasAllParams = false;
00099     }
00100 }
00101
00102 if (hasAllParams && i == 1) {
00103     stdair::BookingClass& lBookingClass =
00104         stdair::FacBom<stdair::BookingClass>::instance().create (lBCKey);
00105     stdair::FacBomManager::addToList (lSegmentCabin, lBookingClass);
00106     lBookingClass.setYield (lYield);
00107     lBookingClass.setMean (lMean);
00108     lBookingClass.setStdDev (lStdDev);
00109
00110     stdair::VirtualClassStruct lVirtualClass (lBookingClass);
00111     lVirtualClass.setYield (lYield);
00112     lVirtualClass.setMean (lMean);
00113     lVirtualClass.setStdDev (lStdDev);
00114     lLegCabin.addVirtualClass (lVirtualClass);
00115 }
00116 }
00117
00118 //
00119 if (!inputFile.eof()) {
00120     STDAIR_LOG_ERROR ("Problem when reading input file '" << iInputFileName
00121                     << "'");
00122     return hasReadBeenSuccessful;
00123 }
00124
00125 //
00126 hasReadBeenSuccessful = true;
00127 return hasReadBeenSuccessful;

```

```

00128     }
00129
00130 }
```

## 28.79 rmol/command/InventoryParser.hpp File Reference

```
#include <string> #include <stdair/command/CmdAbstract.-
hpp>
```

### Classes

- class [RMOL::InventoryParser](#)

*Class filling the virtual class list (representing a list of classes/buckets) from a given input inventory.*

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.80 InventoryParser.hpp

```

00001 #ifndef __RMOL_CMD_INVENTORYPARSER_HPP
00002 #define __RMOL_CMD_INVENTORYPARSER_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <string>
00009 // StdAir
00010 #include <stdair/command/CmdAbstract.hpp>
00011
00013 namespace stdair {
00014     class BomRoot;
00015     class LegCabin;
00016     class SegmentCabin;
00017 }
00018
00019 namespace RMOL {
00020
00025     class InventoryParser : public stdair::CmdAbstract {
00026     public:
00027
00035         static bool parseInputFileAndBuildBom (const std::string& iInputFileName,
00036                                                 stdair::BomRoot&);
00037     };
00038 }
00039 #endif // __RMOL_CMD_INVENTORYPARSER_HPP
```

## 28.81 rmol/command/Optimiser.cpp File Reference

```
#include <cassert> #include <sstream> #include <stdair/basic/-
BasConst_General.hpp> #include <stdair/basic/RandomGeneration.-
hpp> #include <stdair/bom/BomManager.hpp> #include <stdair/bom/-
```

```
FlightDate.hpp> #include <stdair/bom/LegDate.hpp> #include
<stdair/bom/SegmentDate.hpp> #include <stdair/bom/Leg-
Cabin.hpp> #include <stdair/bom/SegmentCabin.hpp> #include
<stdair/bom/FareFamily.hpp> #include <stdair/bom/Booking-
Class.hpp> #include <stdair/service/Logger.hpp> #include
<rmol/bom/MCOptimiser.hpp> #include <rmol/bom/Emsr.hpp>
#include <rmol/bom/DPOptimiser.hpp> #include <rmol/command/-
Optimiser.hpp>
```

### Namespaces

- namespace [RMOL](#)

## 28.82 Optimiser.cpp

```
00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 #include <sstream>
00007 // StdAir
00008 #include <stdair/basic/BasConst_General.hpp>
00009 #include <stdair/basic/RandomGeneration.hpp>
00010 #include <stdair/bom/BomManager.hpp>
00011 #include <stdair/bom/FlightDate.hpp>
00012 #include <stdair/bom/LegDate.hpp>
00013 #include <stdair/bom/SegmentDate.hpp>
00014 #include <stdair/bom/LegCabin.hpp>
00015 #include <stdair/bom/SegmentCabin.hpp>
00016 #include <stdair/bom/FareFamily.hpp>
00017 #include <stdair/bom/BookingClass.hpp>
00018 #include <stdair/service/Logger.hpp>
00019 // RMOL
00020 #include <rmol/bom/MCOptimiser.hpp>
00021 #include <rmol/bom/Emsr.hpp>
00022 #include <rmol/bom/DPOptimiser.hpp>
00023 #include <rmol/command/Optimiser.hpp>
00024
00025 namespace RMOL {
00026
00027 // //////////////////////////////////////
00028 void Optimiser::
00029 optimalOptimisationByMCIntegration (const int K,
00030                                     stdair::LegCabin& ioLegCabin) {
00031     // Retrieve the segment-cabin
00032     const stdair::SegmentCabinList_T lSegmentCabinList =
00033         stdair::BomManager::getList<stdair::SegmentCabin> (ioLegCabin);
00034     stdair::SegmentCabinList_T::const_iterator itSC = lSegmentCabinList.begin();
00035
00036     assert (itSC != lSegmentCabinList.end());
00037     const stdair::SegmentCabin* lSegmentCabin_ptr = *itSC;
00038     assert (lSegmentCabin_ptr != NULL);
00039
00040     // Retrieve the class list.
00041     const stdair::BookingClassList_T lBookingClassList =
00042         stdair::BomManager::getList<stdair::BookingClass> (*lSegmentCabin_ptr);
00043     stdair::RandomGeneration lSeedGenerator (stdair::DEFAULT_RANDOM_SEED);
00044
00045     // Generate the demand samples for the booking classes.
00046     for (stdair::BookingClassList_T::const_iterator itBC =
00047         lBookingClassList.begin(); itBC != lBookingClassList.end(); ++itBC)
00048     {
00049         stdair::RandomSeed_T lRandomSeed =
00050             lSeedGenerator.generateUniform01 () * 1e9;
```

```

00049         stdair::BookingClass* lBookingClass_ptr = *itBC;
00050         assert (lBookingClass_ptr != NULL);
00051         lBookingClass_ptr->generateDemandSamples (K, lRandomSeed);
00052
00053         // DEBUG
00054         //STDAIR_LOG_DEBUG ("Generating " << K << " demand samples for the class
"
00055         //
00056     }
00057
00058     // Call the class performing the actual algorithm
00059     MCOptimiser::optimalOptimisationByMCIntegration (ioLegCabin);
00060 }
00061
00062 ///////////////////////////////////////////////////////////////////
00063 void Optimiser::optimalOptimisationByDP (stdair::LegCabin& ioLegCabin) {
00064     DPOptimiser::optimalOptimisationByDP (ioLegCabin);
00065 }
00066
00067 ///////////////////////////////////////////////////////////////////
00068 void Optimiser::heuristicOptimisationByEmsr (stdair::LegCabin& ioLegCabin) {
00069     Emsr::heuristicOptimisationByEmsr (ioLegCabin);
00070 }
00071
00072 ///////////////////////////////////////////////////////////////////
00073 void Optimiser::heuristicOptimisationByEmsrA (stdair::LegCabin& ioLegCabin) {
00074     Emsr::heuristicOptimisationByEmsrA (ioLegCabin);
00075 }
00076
00077 ///////////////////////////////////////////////////////////////////
00078 void Optimiser::heuristicOptimisationByEmsrB (stdair::LegCabin& ioLegCabin) {
00079     Emsr::heuristicOptimisationByEmsrB (ioLegCabin);
00080 }
00081
00082 ///////////////////////////////////////////////////////////////////
00083 void Optimiser::optimise (stdair::FlightDate& ioFlightDate) {
00084     // Browse the leg-cabin list and build the virtual class list for
00085     // each cabin.
00086     const stdair::LegDateList_T& lLDList =
00087         stdair::BomManager::getList<stdair::LegDate> (ioFlightDate);
00088     for (stdair::LegDateList_T::const_iterator itLD = lLDList.begin();
00089          itLD != lLDList.end(); ++itLD) {
00090         stdair::LegDate* lLD_ptr = *itLD;
00091         assert (lLD_ptr != NULL);
00092
00093         //
00094         const stdair::LegCabinList_T& lLCList =
00095             stdair::BomManager::getList<stdair::LegCabin> (*lLD_ptr);
00096         for (stdair::LegCabinList_T::const_iterator itLC = lLCList.begin();
00097              itLC != lLCList.end(); ++itLC) {
00098             stdair::LegCabin* lLC_ptr = *itLC;
00099             assert (lLC_ptr != NULL);
00100
00101             // Build the virtual class list.
00102             buildVirtualClassListForLegBasedOptimisation (*lLC_ptr);
00103
00104             // Optimise using Monte-Carlo Integration method.
00105             optimalOptimisationByMCIntegration (10000, *lLC_ptr);
00106         }
00107     }
00108 }
00109
00110 ///////////////////////////////////////////////////////////////////
00111 void Optimiser::
00112 buildVirtualClassListForLegBasedOptimisation (stdair::LegCabin& ioLegCabin) {
00113     // The map holding all virtual classes to be created.
00114     stdair::VirtualClassMap_T lVirtualClassMap;
00115
00116     // Retrieve the segment-cabin
00117     const stdair::SegmentCabinList_T lSegmentCabinList =
00118         stdair::BomManager::getList<stdair::SegmentCabin> (ioLegCabin);
00119     stdair::SegmentCabinList_T::const_iterator itSC = lSegmentCabinList.begin();
00120
00121     assert (itSC != lSegmentCabinList.end());

```



```

00121     const stdair::SegmentCabin* lSegmentCabin_ptr = *itSC;
00122     assert (lSegmentCabin_ptr != NULL);
00123
00124     // Retrieve the class list.
00125     const stdair::BookingClassList_T lBookingClassList =
00126         stdair::BomManager::getList<stdair::BookingClass> (*lSegmentCabin_ptr);
00127
00128     // Generate the demand samples for the booking classes.
00129     for (stdair::BookingClassList_T::const_iterator itBC =
00130         lBookingClassList.begin(); itBC != lBookingClassList.end(); ++itBC)
00131     {
00132         stdair::BookingClass* lBookingClass_ptr = *itBC;
00133         assert (lBookingClass_ptr != NULL);
00134
00135         const stdair::Yield_T& lYield = lBookingClass_ptr->getYield();
00136         stdair::VirtualClassStruct lVirtualClass (*lBookingClass_ptr);
00137         lVirtualClass.setYield (lYield);
00138         lVirtualClass.setMean (lBookingClass_ptr->getMean());
00139         lVirtualClass.setStdDev (lBookingClass_ptr->getStdDev());
00140
00141         lVirtualClassMap.insert (stdair::VirtualClassMap_T::
00142             value_type (lYield, lVirtualClass));
00143     }
00144
00145     // Browse the virtual class map from high to low yield.
00146     ioLegCabin.emptyVirtualClassList();
00147     for (stdair::VirtualClassMap_T::reverse_iterator itVC =
00148         lVirtualClassMap.rbegin(); itVC != lVirtualClassMap.rend(); ++itVC)
00149     {
00150         stdair::VirtualClassStruct& lVC = itVC->second;
00151
00152         ioLegCabin.addVirtualClass (lVC);
00153     }
00154
00155     // //////////////////////////////////////
00156     double Optimiser::
00157     optimiseUsingOnDForecast (stdair::FlightDate& ioFlightDate,
00158                             const bool& iReduceFluctuations) {
00159         double lMaxBPVariation = 0.0;
00160         // Check if the flight date holds a list of leg dates.
00161         // If so, retrieve it and optimise the cabins.
00162         if (stdair::BomManager::hasList<stdair::LegDate> (ioFlightDate)) {
00163             STDAIR_LOG_DEBUG ("Optimisation for the flight date: "
00164                 << ioFlightDate.toString());
00165             const stdair::LegDateList_T& lLDList =
00166                 stdair::BomManager::getList<stdair::LegDate> (ioFlightDate);
00167             for (stdair::LegDateList_T::const_iterator itLD = lLDList.begin();
00168                 itLD != lLDList.end(); ++itLD) {
00169                 stdair::LegDate* lLD_ptr = *itLD;
00170                 assert (lLD_ptr != NULL);
00171
00172                 //
00173                 const stdair::LegCabinList_T& lLCLList =
00174                     stdair::BomManager::getList<stdair::LegCabin> (*lLD_ptr);
00175                 for (stdair::LegCabinList_T::const_iterator itLC = lLCLList.begin();
00176                     itLC != lLCLList.end(); ++itLC) {
00177                     stdair::LegCabin* lLC_ptr = *itLC;
00178                     assert (lLC_ptr != NULL);
00179                     MCOptimiser::optimisationByMCIntegration (*lLC_ptr);
00180                     const stdair::BidPrice_T& lCurrentBidPrice =
00181                         lLC_ptr->getCurrentBidPrice();
00182                     const stdair::BidPrice_T& lPreviousBidPrice =
00183                         lLC_ptr->getPreviousBidPrice();
00184                     assert (lPreviousBidPrice != 0);
00185                     const double lBPVariation =
00186                         std::abs((lCurrentBidPrice - lPreviousBidPrice)/lPreviousBidPrice);
00187                     lMaxBPVariation = std::max(lMaxBPVariation, lBPVariation);
00188                 }
00189             }
00190             return lMaxBPVariation;
00191         }
00192     }

```

```
00193 }
```

## 28.83 rmol/command/Optimiser.hpp File Reference

```
#include <rmol/RMOL.Types.hpp>
```

### Classes

- class [RMOL::Optimiser](#)

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.84 Optimiser.hpp

```
00001 #ifndef __RMOL_COMMAND_OPTIMISER_HPP
00002 #define __RMOL_COMMAND_OPTIMISER_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // RMOL
00008 #include <rmol/RMOL.Types.hpp>
00009
00010 // Forward declarations
00011 namespace stdair {
00012     class FlightDate;
00013     class LegCabin;
00014 }
00015
00016 namespace RMOL {
00017     class Optimiser {
00018     public:
00019
00020         static void optimalOptimisationByMCIntegration (const int K,
00032                                                         stdair::LegCabin&);
00033
00034         static void optimalOptimisationByDP (stdair::LegCabin&);
00038
00039         static void heuristicOptimisationByEmsr (stdair::LegCabin&);
00043
00044         static void heuristicOptimisationByEmsrA (stdair::LegCabin&);
00048
00049         static void heuristicOptimisationByEmsrB (stdair::LegCabin&);
00053
00054         static void optimise (stdair::FlightDate&);
00058
00059         static void buildVirtualClassListForLegBasedOptimisation (stdair::LegCabin&)
00063 ;
00064
00066         static double optimiseUsingOnDForecast (stdair::FlightDate&,
00067                                                 const bool& iReduceFluctuations =
00068             false);
00069     };
00070 }
00071 #endif // __RMOL_COMMAND_OPTIMISER_HPP
```

## 28.85 rmol/config/rmol-paths.hpp File Reference

### Defines

- `#define PACKAGE "rmol"`
- `#define PACKAGE_NAME "RMOL"`
- `#define PACKAGE_VERSION "0.25.3"`
- `#define PREFIXDIR "/usr"`
- `#define EXEC_PREFIX "/usr"`
- `#define BINDIR "/usr/bin"`
- `#define LIBDIR "/usr/lib"`
- `#define LIBEXECDIR "/usr/libexec"`
- `#define SBINDIR "/usr/sbin"`
- `#define SYSCONFDIR "/usr/etc"`
- `#define INCLUDEDIR "/usr/include"`
- `#define DATAROOTDIR "/usr/share"`
- `#define DATADIR "/usr/share"`
- `#define DOCDIR "/usr/share/doc/rmol-0.25.3"`
- `#define MANDIR "/usr/share/man"`
- `#define INFODIR "/usr/share/info"`
- `#define HTMLDIR "/usr/share/doc/rmol-0.25.3/html"`
- `#define PDFDIR "/usr/share/doc/rmol-0.25.3/html"`
- `#define STDAIR_SAMPLE_DIR "/usr/share/stdair/samples"`

### 28.85.1 Define Documentation

#### 28.85.1.1 `#define PACKAGE "rmol"`

Definition at line 4 of file [rmol-paths.hpp](#).

#### 28.85.1.2 `#define PACKAGE_NAME "RMOL"`

Definition at line 5 of file [rmol-paths.hpp](#).

Referenced by [readConfiguration\(\)](#).

#### 28.85.1.3 `#define PACKAGE_VERSION "0.25.3"`

Definition at line 6 of file [rmol-paths.hpp](#).

Referenced by [readConfiguration\(\)](#).

#### 28.85.1.4 `#define PREFIXDIR "/usr"`

Definition at line 7 of file [rmol-paths.hpp](#).

Referenced by [readConfiguration\(\)](#).

#### 28.85.1.5 `#define EXEC_PREFIX "/usr"`

Definition at line 8 of file [rmol-paths.hpp](#).

28.85.1.6 `#define BINDIR "/usr/bin"`

Definition at line 9 of file [rmol-paths.hpp](#).

28.85.1.7 `#define LIBDIR "/usr/lib"`

Definition at line 10 of file [rmol-paths.hpp](#).

28.85.1.8 `#define LIBEXECDIR "/usr/libexec"`

Definition at line 11 of file [rmol-paths.hpp](#).

28.85.1.9 `#define SBINDIR "/usr/sbin"`

Definition at line 12 of file [rmol-paths.hpp](#).

28.85.1.10 `#define SYSCONFDIR "/usr/etc"`

Definition at line 13 of file [rmol-paths.hpp](#).

28.85.1.11 `#define INCLUDEDIR "/usr/include"`

Definition at line 14 of file [rmol-paths.hpp](#).

28.85.1.12 `#define DATAROOTDIR "/usr/share"`

Definition at line 15 of file [rmol-paths.hpp](#).

28.85.1.13 `#define DATADIR "/usr/share"`

Definition at line 16 of file [rmol-paths.hpp](#).

28.85.1.14 `#define DOCDIR "/usr/share/doc/rmol-0.25.3"`

Definition at line 17 of file [rmol-paths.hpp](#).

28.85.1.15 `#define MANDIR "/usr/share/man"`

Definition at line 18 of file [rmol-paths.hpp](#).

28.85.1.16 `#define INFODIR "/usr/share/info"`

Definition at line 19 of file [rmol-paths.hpp](#).

28.85.1.17 `#define HTMLDIR "/usr/share/doc/rmol-0.25.3/html"`

Definition at line 20 of file [rmol-paths.hpp](#).

28.85.1.18 `#define PDFDIR "/usr/share/doc/rmol-0.25.3/html"`

Definition at line 21 of file [rmol-paths.hpp](#).

28.85.1.19 `#define STDAIR_SAMPLE_DIR "/usr/share/stdair/samples"`

Definition at line 22 of file [rmol-paths.hpp](#).

## 28.86 rmol-paths.hpp

```
00001 #ifndef __RMOL_PATHS_HPP__
00002 #define __RMOL_PATHS_HPP__
00003
00004 #define PACKAGE "rmol"
00005 #define PACKAGE_NAME "RMOL"
00006 #define PACKAGE_VERSION "0.25.3"
00007 #define PREFIXDIR "/usr"
00008 #define EXEC_PREFIX "/usr"
00009 #define BINDIR "/usr/bin"
00010 #define LIBDIR "/usr/lib"
00011 #define LIBEXECDIR "/usr/libexec"
00012 #define SBINDIR "/usr/sbin"
00013 #define SYSCONFDIR "/usr/etc"
00014 #define INCLUDEDIR "/usr/include"
00015 #define DATAROOTDIR "/usr/share"
00016 #define DATADIR "/usr/share"
00017 #define DOCDIR "/usr/share/doc/rmol-0.25.3"
00018 #define MANDIR "/usr/share/man"
00019 #define INFODIR "/usr/share/info"
00020 #define HTMLDIR "/usr/share/doc/rmol-0.25.3/html"
00021 #define PDFDIR "/usr/share/doc/rmol-0.25.3/html"
00022 #define STDAIR_SAMPLE_DIR "/usr/share/stdair/samples"
00023
00024 #endif // __RMOL_PATHS_HPP__
```

## 28.87 rmol/factory/FacRmolServiceContext.cpp File Reference

```
#include <cassert> #include <stdair/service/FacSupervisor.-
hpp> #include <rmol/factory/FacRmolServiceContext.hpp> ×
#include <rmol/service/RMOL_ServiceContext.hpp>
```

### Namespaces

- namespace [RMOL](#)

## 28.88 FacRmolServiceContext.cpp

```
00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 // StdAir
00007 #include <stdair/service/FacSupervisor.hpp>
00008 // RMOL
00009 #include <rmol/factory/FacRmolServiceContext.hpp>
00010 #include <rmol/service/RMOL_ServiceContext.hpp>
00011
00012 namespace RMOL {
00013
00014     FacRmolServiceContext* FacRmolServiceContext::_instance = NULL;
00015
00016 // //////////////////////////////////////
00017 FacRmolServiceContext::~FacRmolServiceContext() {
```

```

00018     _instance = NULL;
00019 }
00020
00021 // //////////////////////////////////////
00022 FacRmolServiceContext& FacRmolServiceContext::instance() {
00023
00024     if (_instance == NULL) {
00025         _instance = new FacRmolServiceContext();
00026         assert (_instance != NULL);
00027
00028         stdair::FacSupervisor::instance().registerServiceFactory (_instance);
00029     }
00030     return *_instance;
00031 }
00032
00033 // //////////////////////////////////////
00034 RMOL_ServiceContext& FacRmolServiceContext::create() {
00035     RMOL_ServiceContext* aServiceContext_ptr = NULL;
00036
00037     aServiceContext_ptr = new RMOL_ServiceContext();
00038     assert (aServiceContext_ptr != NULL);
00039
00040     // The new object is added to the Bom pool
00041     _pool.push_back (aServiceContext_ptr);
00042
00043     return *aServiceContext_ptr;
00044 }
00045
00046 }

```

## 28.89 rmol/factory/FacRmolServiceContext.hpp File Reference

```

#include <string>    #include <stdair/stdair_basic_types.-
hpp> #include <stdair/service/FacServiceAbstract.hpp>

```

### Classes

- class [RMOL::FacRmolServiceContext](#)  
*Factory for the service context.*

### Namespaces

- namespace [RMOL](#)

## 28.90 FacRmolServiceContext.hpp

```

00001 #ifndef __RMOL_FAC_FACRMOLSERVICECONTEXT_HPP
00002 #define __RMOL_FAC_FACRMOLSERVICECONTEXT_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <string>
00009 // StdAir
00010 #include <stdair/stdair_basic_types.hpp>
00011 #include <stdair/service/FacServiceAbstract.hpp>
00012
00013 namespace RMOL {
00014

```

```

00016  class RMOL_ServiceContext;
00017
00018
00022  class FacRmolServiceContext : public stdair::FacServiceAbstract {
00023  public:
00024
00031      static FacRmolServiceContext& instance();
00032
00039      ~FacRmolServiceContext();
00040
00048      RMOL_ServiceContext& create();
00049
00050
00051  protected:
00057      FacRmolServiceContext() {}
00058
00059
00060  private:
00064      static FacRmolServiceContext* _instance;
00065  };
00066
00067 }
00068 #endif // __RMOL_FAC_FACRMOLSERVICECONTEXT_HPP

```

## 28.91 rmol/RMOL\_Service.hpp File Reference

```

#include <string>    #include <stdair/stdair_basic_types.-
hpp> #include <stdair/stdair_inventory_types.hpp> #include
<stdair/stdair_service_types.hpp> #include <stdair/stdair-
_maths_types.hpp>    #include <stdair/basic/Forecasting-
Method.hpp> #include <stdair/basic/PartnershipTechnique.-
hpp> #include <rmol/RMOL_Types.hpp>

```

### Classes

- class [RMOL::RMOL\\_Service](#)  
Interface for the [RMOL](#) Services.

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.92 RMOL\_Service.hpp

```

00001 #ifndef __RMOL_SVC_RMOL_SERVICE_HPP
00002 #define __RMOL_SVC_RMOL_SERVICE_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <string>
00009 // StdAir
00010 #include <stdair/stdair_basic_types.hpp>
00011 #include <stdair/stdair_inventory_types.hpp>
00012 #include <stdair/stdair_service_types.hpp>
00013 #include <stdair/stdair_maths_types.hpp>

```

```

00014 #include <stdair/basic/ForecastingMethod.hpp>
00015 #include <stdair/basic/PartnershipTechnique.hpp>
00016 // RMOL
00017 #include <rmol/RMOL_Types.hpp>
00018
00020 namespace stdair {
00021     class FlightDate;
00022     struct BasLogParams;
00023     struct BasDBParams;
00024     class BomRoot;
00025     class AirlineClassList;
00026     class YieldFeatures;
00027     class Inventory;
00028     class OnDDate;
00029 }
00030
00031 namespace RMOL {
00032
00034     class RMOL_ServiceContext;
00035
00039     class RMOL_Service {
00040     public:
00041         // ////////// Constructors and destructors //////////
00057         RMOL_Service (const stdair::BasLogParams&, const stdair::BasDBParams&);
00058
00070         RMOL_Service (const stdair::BasLogParams&);
00071
00087         RMOL_Service (stdair::STDAIR_ServicePtr_T);
00088
00112         void parseAndLoad (const stdair::CabinCapacity_T& iCabinCapacity,
00113                             const stdair::Filename_T& iDemandAndClassDataFile);
00114
00118         void setUpStudyStatManager();
00119
00123         ~RMOL_Service();
00124
00125     public:
00126         // ////////// Business Methods //////////
00127         void buildSampleBom();
00133
00138         void optimalOptimisationByMCIntegration (const int K);
00139
00143         void optimalOptimisationByDP();
00144
00148         void heuristicOptimisationByEmsr();
00149
00153         void heuristicOptimisationByEmsrA();
00154
00158         void heuristicOptimisationByEmsrB();
00159
00163         bool optimise (stdair::FlightDate&, const stdair::DateTime_T&,
00164                       const stdair::ForecastingMethod&, const
stdair::PartnershipTechnique&);
00165
00170         // O&D based forecast
00171         void forecastOnD (const stdair::DateTime_T&);
00172
00173         stdair::YieldFeatures* getYieldFeatures(const stdair::OnDDate&, const
stdair::CabinCode_T&,
00174                                                stdair::BomRoot&);
00175
00176         void forecastOnD (const stdair::YieldFeatures&, stdair::OnDDate&,
00177                           const stdair::CabinCode_T&, const stdair::DTD_T&,
00178                           stdair::BomRoot&);
00179
00180         void setOnDForecast (const stdair::AirlineClassList&, const
stdair::MeanValue_T&,
00181                             const stdair::StdDevValue_T&, stdair::OnDDate&, const
stdair::CabinCode_T&,
00182                             stdair::BomRoot&);
00183
00184         // Single segment O&D
00185         void setOnDForecast (const stdair::AirlineCode_T&, const stdair::Date_T&,

```



```

const stdair::AirportCode_T&,
00186         const stdair::AirportCode_T&, const
stdair::CabinCode_T&, const stdair::ClassCode_T&,
00187         const stdair::MeanValue_T&, const
stdair::StdDevValue_T&, const stdair::Yield_T&, stdair::BomRoot&);
00188
00189     // Multiple segment O&D
00190     void setOnDForecast (const stdair::AirlineCodeList_T&, const
stdair::AirlineCode_T&,const stdair::Date_T&,
00191         const stdair::AirportCode_T&, const
stdair::AirportCode_T&, const stdair::CabinCode_T&,
00192         const stdair::ClassCodeList_T&, const
stdair::MeanValue_T&, const stdair::StdDevValue_T&,
00193         const stdair::Yield_T&, stdair::BomRoot&);
00194
00195     // Initialise (or re-initialise) the demand projections in all leg cabins
00196     void resetDemandInformation (const stdair::DateTime_T&);
00197
00198     void resetDemandInformation (const stdair::DateTime_T&, const
stdair::Inventory&);
00199
00200     /* Projection of demand */
00201
00202     // Aggregated demand at booking class level.
00203     void projectAggregatedDemandOnLegCabins(const stdair::DateTime_T&);
00204
00205     // Static rule prorated yield
00206     void projectOnDDemandOnLegCabinsUsingYP(const stdair::DateTime_T&);
00207
00208     // Displacement-adjusted yield
00209     void projectOnDDemandOnLegCabinsUsingDA(const stdair::DateTime_T&);
00210
00211     // Dynamic yield proration (PF = BP_i/BP_{total}, where BP_{total} =
sum(BP_i))
00212     void projectOnDDemandOnLegCabinsUsingDYP (const stdair::DateTime_T&);
00213
00214     void projectOnDDemandOnLegCabinsUsingDYP (const stdair::DateTime_T&, const
stdair::Inventory&);
00215
00217     // O&D-based optimisation (using demand aggregation or demand aggregation).
00218     void optimiseOnD (const stdair::DateTime_T&);
00219
00220     // O&D-based optimisation using displacement-adjusted yield.
00221     void optimiseOnDUsingRMCooperation (const stdair::DateTime_T&);
00222
00223     // Advanced version of O&D-based optimisation using displacement-adjusted
yield.
00224     // Network optimisation instead of separate inventory optimisation.
00225     void optimiseOnDUsingAdvancedRMCooperation (const stdair::DateTime_T&);
00226
00227     // Update bid price and send to partners
00228     void updateBidPrice (const stdair::DateTime_T&);
00229     void updateBidPrice (const stdair::FlightDate&, stdair::BomRoot&);
00230
00231 public:
00232     // //////////// Export support methods ////////////
00243     std::string jsonExport (const stdair::AirlineCode_T&,
const stdair::FlightNumber_T&,
00244         const stdair::Date_T& iDepartureDate) const;
00245
00246
00247
00248 public:
00249     // //////////// Display support methods ////////////
00257     std::string csvDisplay() const;
00258
00259
00260 private:
00261     // ////////// Construction and Destruction helper methods //////////
00265     RMOL_Service();
00266
00270     RMOL_Service (const RMOL_Service&);
00271
00281     stdair::STDAIR_ServicePtr_T initStdAirService (const stdair::BasLogParams&,
const stdair::BasDBParams&);
00282

```

```

00283
00292     stdair::STDAIR_ServicePtr_T initStdAirService (const stdair::BasLogParams&)
;
00293
00302     void addStdAirService (stdair::STDAIR_ServicePtr_T,
00303                           const bool iOwnStdairService);
00304
00309     void initServiceContext();
00310
00317     void initRmolService();
00318
00322     void finalise();
00323
00324
00325 private:
00326     // ////////// Service Context //////////
00330     RMOL_ServiceContext* _rmolServiceContext;
00331
00333     stdair::Date_T _previousForecastDate;
00334 };
00335 }
00336 #endif // __RMOL_SVC_RMOL_SERVICE_HPP

```

## 28.93 rmol/RMOL\_Types.hpp File Reference

```

#include <map> #include <vector> #include <boost/shared-
_ptr.hpp> #include <stdair/stdair_inventory_types.hpp> ×
#include <stdair/stdair_exceptions.hpp>

```

### Classes

- class [RMOL::OverbookingException](#)  
*Overbooking-related exception.*
- class [RMOL::UnconstrainingException](#)  
*Unconstraining-related exception.*
- class [RMOL::ForecastException](#)  
*Forecast-related exception.*
- class [RMOL::OptimisationException](#)  
*Optimisation-related exception.*

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

### Typedefs

- typedef boost::shared\_ptr < RMOL\_Service > [RMOL::RMOL\\_ServicePtr\\_T](#)
- typedef [std::vector](#) < stdair::NbOfRequests\_T > [RMOL::UnconstrainedDemand-Vector\\_T](#)
- typedef [std::vector](#) < stdair::NbOfBookings\_T > [RMOL::BookingVector\\_T](#)
- typedef [std::vector](#) < stdair::Flag\_T > [RMOL::FlagVector\\_T](#)

- typedef `std::map` < `stdair::BookingClass *`, `UnconstrainedDemandVector_T` > `RMOL::BookingClassUnconstrainedDemandVectorMap_T`
- typedef `std::map` < `stdair::BookingClass *`, `stdair::NbOfRequests_T` > `RMOL::BookingClassUnconstrainedDemandMap_T`
- typedef `std::map`< `const stdair::DTD_T`, `double` > `RMOL::FRAT5Curve_T`

## 28.94 RMOL\_Types.hpp

```

00001 #ifndef __RMOL_RMOL_TYPES_HPP
00002 #define __RMOL_RMOL_TYPES_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <map>
00009 #include <vector>
00010 // Boost
00011 #include <boost/shared_ptr.hpp>
00012 // StdAir
00013 #include <stdair/stdair_inventory_types.hpp>
00014 #include <stdair/stdair_exceptions.hpp>
00015
00016 // Forward declarations.
00017 namespace stdair {
00018     class BookingClass;
00019 }
00020
00021 namespace RMOL {
00022
00023     // Forward declarations
00024     class RMOL_Service;
00025
00026     // ////////// Exceptions //////////
00027     class OverbookingException : public stdair::RootException {
00028     public:
00029         OverbookingException (const std::string& iWhat)
00030             : stdair::RootException (iWhat) {}
00031     };
00032
00033     class UnconstrainingException : public stdair::RootException {
00034     public:
00035         UnconstrainingException (const std::string& iWhat)
00036             : stdair::RootException (iWhat) {}
00037     };
00038
00039     class ForecastException : public stdair::RootException {
00040     public:
00041         ForecastException (const std::string& iWhat)
00042             : stdair::RootException (iWhat) {}
00043     };
00044
00045     class OptimisationException : public stdair::RootException {
00046     public:
00047         OptimisationException (const std::string& iWhat)
00048             : stdair::RootException (iWhat) {}
00049     };
00050
00051     // ////////// Type definitions //////////
00052     typedef boost::shared_ptr<RMOL_Service> RMOL_ServicePtr_T;
00053
00054     typedef std::vector<stdair::NbOfRequests_T> UnconstrainedDemandVector_T;
00055
00056     typedef std::vector<stdair::NbOfBookings_T> BookingVector_T;
00057
00058     typedef std::vector<stdair::Flag_T> FlagVector_T;
00059
00060
00061
00062
00063
00064
00065
00066
00067
00068
00069
00070
00071
00072
00073
00074
00075
00076
00077
00078
00079
00080
00081
00082
00083

```

```

00086  typedef std::map<stdair::BookingClass*, UnconstrainedDemandVector_T>
      BookingClassUnconstrainedDemandVectorMap_T;
00087
00090  typedef std::map<stdair::BookingClass*, stdair::NbOfRequests_T>
      BookingClassUnconstrainedDemandMap_T;
00091
00093  typedef std::map<const stdair::DTD_T, double> FRAT5Curve_T;
00094
00095  }
00096  #endif // __RMOL_RMOL_TYPES_HPP

```

## 28.95 rmol/service/RMOL\_Service.cpp File Reference

```

#include <cassert>          #include <boost/make_shared.hpp> ×
#include <stdair/stdair_inventory_types.hpp>          #include
<stdair/basic/BasChronometer.hpp> #include <stdair/basic/-
ContinuousAttributeLite.hpp>          #include <stdair/bom/Bom-
Manager.hpp>          #include <stdair/bom/BomRetriever.hpp> ×
#include <stdair/bom/BomRoot.hpp>          #include <stdair/bom/-
Inventory.hpp>          #include <stdair/bom/FlightDate.hpp> ×
#include <stdair/bom/LegCabin.hpp> #include <stdair/bom/-
LegDate.hpp>          #include <stdair/bom/YieldFeatures.hpp>
#include <stdair/bom/AirportPair.hpp> #include <stdair/bom/-
PosChannel.hpp>          #include <stdair/bom/DatePeriod.hpp>
#include <stdair/bom/TimePeriod.hpp> #include <stdair/bom/-
AirlineClassList.hpp>          #include <stdair/basic/BasConst_-
Request.hpp>          #include <stdair/basic/BasConst_Inventory_-
hpp> #include <stdair/bom/SegmentDate.hpp> #include <stdair/bom/-
SegmentCabin.hpp>          #include <stdair/bom/BookingClass_-
hpp> #include <stdair/bom/OnDDate.hpp> #include <stdair/bom/-
OnDDateTypes.hpp> #include <stdair/command/CmdBomManager_-
hpp> #include <stdair/service/Logger.hpp> #include <stdair/-
STDAIR_Service.hpp>          #include <rmol/basic/BasConst_RMO-
L_Service.hpp>          #include <rmol/factory/FacRmolService-
Context.hpp>          #include <rmol/command/InventoryParser_-
hpp> #include <rmol/command/Optimiser.hpp> #include <rmol/command/-
Forecaster.hpp> #include <rmol/service/RMOL_ServiceContext_-
hpp> #include <rmol/RMOL_Service.hpp>

```

### Namespaces

- namespace [RMOL](#)

## 28.96 RMOL\_Service.cpp

```

00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 // Boost
00007 #include <boost/make_shared.hpp>
00008 // StdAir

```

```

00009 #include <stdair/stdair_inventory_types.hpp>
00010 #include <stdair/basic/BasChronometer.hpp>
00011 #include <stdair/basic/ContinuousAttributeLite.hpp>
00012 #include <stdair/bom/BomManager.hpp>
00013 #include <stdair/bom/BomRetriever.hpp>
00014 #include <stdair/bom/BomRoot.hpp>
00015 #include <stdair/bom/Inventory.hpp>
00016 #include <stdair/bom/FlightDate.hpp>
00017 #include <stdair/bom/LegCabin.hpp>
00018 #include <stdair/bom/LegDate.hpp>
00019 #include <stdair/bom/YieldFeatures.hpp>
00020 #include <stdair/bom/AirportPair.hpp>
00021 #include <stdair/bom/PosChannel.hpp>
00022 #include <stdair/bom/DatePeriod.hpp>
00023 #include <stdair/bom/TimePeriod.hpp>
00024 #include <stdair/bom/AirlineClassList.hpp>
00025 #include <stdair/basic/BasConst_Request.hpp>
00026 #include <stdair/basic/BasConst_Inventory.hpp>
00027 #include <stdair/bom/Inventory.hpp>
00028 #include <stdair/bom/FlightDate.hpp>
00029 #include <stdair/bom/SegmentDate.hpp>
00030 #include <stdair/bom/SegmentCabin.hpp>
00031 #include <stdair/bom/BookingClass.hpp>
00032 #include <stdair/bom/OnDDate.hpp>
00033 #include <stdair/bom/OnDDateTypes.hpp>
00034 #include <stdair/command/CmdBomManager.hpp>
00035 #include <stdair/service/Logger.hpp>
00036 #include <stdair/STDAIR_Service.hpp>
00037 // RMOL
00038 #include <rmol/basic/BasConst_RMOL_Service.hpp>
00039 #include <rmol/factory/FacRmolServiceContext.hpp>
00040 #include <rmol/command/InventoryParser.hpp>
00041 #include <rmol/command/Optimiser.hpp>
00042 #include <rmol/command/Forecaster.hpp>
00043 #include <rmol/service/RMOL_ServiceContext.hpp>
00044 #include <rmol/RMOL_Service.hpp>
00045
00046 namespace RMOL {
00047
00048 // //////////////////////////////////////
00049 RMOL_Service::RMOL_Service()
00050 : _rmolServiceContext (NULL),
00051   _previousForecastDate (stdair::Date_T (2000, 1, 1)) {
00052     assert (false);
00053 }
00054
00055 // //////////////////////////////////////
00056 RMOL_Service::RMOL_Service (const RMOL_Service& iService) :
00057   _rmolServiceContext (NULL),
00058   _previousForecastDate (stdair::Date_T (2000, 1, 1)) {
00059     assert (false);
00060 }
00061
00062 // //////////////////////////////////////
00063 RMOL_Service::RMOL_Service (const stdair::BasLogParams& iLogParams) :
00064   _rmolServiceContext (NULL),
00065   _previousForecastDate (stdair::Date_T (2000, 1, 1)) {
00066
00067     // Initialise the STDAIR service handler
00068     stdair::STDAIR_ServicePtr_T lSTDAIR_Service_ptr =
00069       initStdAirService (iLogParams);
00070
00071     // Initialise the service context
00072     initServiceContext();
00073
00074     // Add the StdAir service context to the RMOL service context
00075     // \note RMOL owns the STDAIR service resources here.
00076     const bool ownStdairService = true;
00077     addStdAirService (lSTDAIR_Service_ptr, ownStdairService);
00078
00079     // Initialise the (remaining of the) context
00080     initRmolService();
00081   }
00082

```

```

00083 ///////////////////////////////////////////////////////////////////
00084 RMOL_Service::RMOL_Service (const stdair::BasLogParams& iLogParams,
00085                             const stdair::BasDBParams& iDBParams) :
00086     _rmolServiceContext (NULL),
00087     _previousForecastDate (stdair::Date_T (2000, 1, 1)) {
00088
00089     // Initialise the STDAIR service handler
00090     stdair::STDAIR_ServicePtr_T lSTDAIR_Service_ptr =
00091         initStdAirService (iLogParams, iDBParams);
00092
00093     // Initialise the service context
00094     initServiceContext();
00095
00096     // Add the StdAir service context to the RMOL service context
00097     // \note RMOL owns the STDAIR service resources here.
00098     const bool ownStdairService = true;
00099     addStdAirService (lSTDAIR_Service_ptr, ownStdairService);
00100
00101     // Initialise the (remaining of the) context
00102     initRmolService();
00103 }
00104
00105 ///////////////////////////////////////////////////////////////////
00106 RMOL_Service::RMOL_Service (stdair::STDAIR_ServicePtr_T ioSTDAIRServicePtr)
00107     : _rmolServiceContext (NULL),
00108     _previousForecastDate (stdair::Date_T (2000, 1, 1)) {
00109
00110     // Initialise the context
00111     initServiceContext();
00112
00113     // Add the StdAir service context to the RMOL service context.
00114     // \note RMOL does not own the STDAIR service resources here.
00115     const bool doesNotOwnStdairService = false;
00116     addStdAirService (ioSTDAIRServicePtr, doesNotOwnStdairService);
00117
00118     // Initialise the (remaining of the) context
00119     initRmolService();
00120 }
00121
00122 ///////////////////////////////////////////////////////////////////
00123 RMOL_Service::~RMOL_Service() {
00124     // Delete/Clean all the objects from memory
00125     finalise();
00126 }
00127
00128 ///////////////////////////////////////////////////////////////////
00129 void RMOL_Service::finalise() {
00130     assert (_rmolServiceContext != NULL);
00131     // Reset the (Boost.)Smart pointer pointing on the STDAIR_Service object.
00132     _rmolServiceContext->reset();
00133 }
00134
00135 ///////////////////////////////////////////////////////////////////
00136 void RMOL_Service::initServiceContext() {
00137     // Initialise the service context
00138     RMOL_ServiceContext& lRMOL_ServiceContext =
00139         FacRmolServiceContext::instance().create();
00140     _rmolServiceContext = &lRMOL_ServiceContext;
00141 }
00142
00143 ///////////////////////////////////////////////////////////////////
00144 void RMOL_Service::
00145     addStdAirService (stdair::STDAIR_ServicePtr_T ioSTDAIR_Service_ptr,
00146                     const bool iOwnStdairService) {
00147
00148     // Retrieve the RMOL service context
00149     assert (_rmolServiceContext != NULL);
00150     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00151
00152     // Store the STDAIR service object within the (AIRINV) service context
00153     lRMOL_ServiceContext.setSTDAIR_Service (ioSTDAIR_Service_ptr,
00154                                           iOwnStdairService);
00155 }
00156

```

```

00157 ///////////////////////////////////////////////////////////////////
00158 stdair::STDAIR_ServicePtr_T RMOL_Service::
00159 initStdAirService (const stdair::BasLogParams& iLogParams) {
00160
00161     stdair::STDAIR_ServicePtr_T lSTDAIR_Service_ptr =
00162         boost::make_shared<stdair::STDAIR_Service> (iLogParams);
00170
00171     return lSTDAIR_Service_ptr;
00172 }
00173
00174 ///////////////////////////////////////////////////////////////////
00175 stdair::STDAIR_ServicePtr_T RMOL_Service::
00176 initStdAirService (const stdair::BasLogParams& iLogParams,
00177     const stdair::BasDBParams& iDBParams) {
00178
00179     stdair::STDAIR_ServicePtr_T lSTDAIR_Service_ptr =
00180         boost::make_shared<stdair::STDAIR_Service> (iLogParams, iDBParams);
00188
00189     return lSTDAIR_Service_ptr;
00190 }
00191
00192 ///////////////////////////////////////////////////////////////////
00193 void RMOL_Service::initRmolService() {
00194     // Do nothing at this stage. A sample BOM tree may be built by
00195     // calling the buildSampleBom() method
00196 }
00197
00198 ///////////////////////////////////////////////////////////////////
00199 void RMOL_Service::
00200 parseAndLoad (const stdair::CabinCapacity_T& iCabinCapacity,
00201     const stdair::Filename_T& iInputFileName) {
00202
00203     // Retrieve the RMOL service context
00204     if (_rmolServiceContext == NULL) {
00205         throw stdair::NonInitialisedServiceException ("The RMOL service has not"
00206             " been initialised");
00207     }
00208     assert (_rmolServiceContext != NULL);
00209     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00210
00211     // Retrieve the StdAir service object from the (RMOL) service context
00212     stdair::STDAIR_Service& lSTDAIR_Service =
00213         lRMOL_ServiceContext.getSTDAIR_Service();
00214     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00215
00216     // Build a dummy inventory with a leg-cabin which has the given capacity.
00217     lSTDAIR_Service.buildDummyInventory (iCabinCapacity);
00218
00219     // Complete the BOM tree with the optimisation problem specification
00220     InventoryParser::parseInputFileAndBuildBom (iInputFileName, lBomRoot);
00221 }
00222
00223 ///////////////////////////////////////////////////////////////////
00224 void RMOL_Service::buildSampleBom() {
00225
00226     // Retrieve the RMOL service context
00227     if (_rmolServiceContext == NULL) {
00228         throw stdair::NonInitialisedServiceException ("The RMOL service has not"
00229             " been initialised");
00230     }
00231     assert (_rmolServiceContext != NULL);
00232
00233     // Retrieve the RMOL service context and whether it owns the Stdair
00234     // service
00235     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00236     const bool doesOwnStdairService =
00237         lRMOL_ServiceContext.getOwnStdairServiceFlag();
00238
00239     // Retrieve the StdAir service object from the (RMOL) service context
00240     stdair::STDAIR_Service& lSTDAIR_Service =
00241         lRMOL_ServiceContext.getSTDAIR_Service();
00242
00243     if (doesOwnStdairService == true) {
00244         //

```

```

00249         lSTDAIR_Service.buildSampleBom();
00250     }
00251 }
00269 }
00270
00271 // //////////////////////////////////////
00272 void RMOL_Service::optimalOptimisationByMCIntegration (const int K) {
00273     assert (_rmolServiceContext != NULL);
00274     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00275
00276     // Retrieve the StdAir service
00277     stdair::STDAIR_Service& lSTDAIR_Service =
00278         lRMOL_ServiceContext.getSTDAIR_Service();
00279     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00280
00281     //
00282     stdair::LegCabin& lLegCabin =
00283         stdair::BomRetriever::retrieveDummyLegCabin (lBomRoot);
00284
00285     stdair::BasChronometer lOptimisationChronometer;
00286     lOptimisationChronometer.start();
00287
00288     Optimiser::optimalOptimisationByMCIntegration (K, lLegCabin);
00289
00290     const double lOptimisationMeasure = lOptimisationChronometer.elapsed();
00291
00292     // DEBUG
00293     STDAIR_LOG_DEBUG ("Optimisation by Monte-Carlo performed in "
00294         << lOptimisationMeasure);
00295     STDAIR_LOG_DEBUG ("Result: " << lLegCabin.displayVirtualClassList());
00296
00297     std::ostream logStream;
00298     stdair::BidPriceVector_T lBidPriceVector = lLegCabin.getBidPriceVector();
00299     logStream << "Bid-Price Vector (BPV): ";
00300     unsigned int size = lBidPriceVector.size();
00301
00302     for (unsigned int i = 0; i < size - 1; ++i) {
00303         const double bidPrice = lBidPriceVector.at(i);
00304         logStream << std::fixed << std::setprecision (2) << bidPrice << ", ";
00305     }
00306     const double bidPrice = lBidPriceVector.at(size - 1);
00307     logStream << std::fixed << std::setprecision (2) << bidPrice;
00308     STDAIR_LOG_DEBUG (logStream.str());
00309 }
00310
00311 // //////////////////////////////////////
00312 void RMOL_Service::optimalOptimisationByDP () {
00313 }
00314
00315 // //////////////////////////////////////
00316 void RMOL_Service::heuristicOptimisationByEmsr () {
00317     assert (_rmolServiceContext != NULL);
00318     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00319
00320     // Retrieve the StdAir service
00321     stdair::STDAIR_Service& lSTDAIR_Service =
00322         lRMOL_ServiceContext.getSTDAIR_Service();
00323     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00324
00325     //
00326     stdair::LegCabin& lLegCabin =
00327         stdair::BomRetriever::retrieveDummyLegCabin (lBomRoot);
00328
00329     stdair::BasChronometer lOptimisationChronometer;
00330     lOptimisationChronometer.start();
00331
00332     Optimiser::heuristicOptimisationByEmsr (lLegCabin);
00333
00334     const double lOptimisationMeasure = lOptimisationChronometer.elapsed();
00335     // DEBUG
00336     STDAIR_LOG_DEBUG ("Optimisation EMSR performed in "
00337         << lOptimisationMeasure);
00338     STDAIR_LOG_DEBUG ("Result: " << lLegCabin.displayVirtualClassList());
00339 }

```



```

00340     stdair::BidPriceVector_T lBidPriceVector = lLegCabin.getBidPriceVector();
00341     std::ostream logStream;
00342     logStream << "Bid-Price Vector (BPV): ";
00343     unsigned int idx = 0;
00344     for (stdair::BidPriceVector_T::const_iterator itBP = lBidPriceVector.begin(
);
00345         itBP != lBidPriceVector.end(); ++itBP) {
00346         if (idx != 0) {
00347             logStream << ", ";
00348         }
00349         const stdair::BidPrice_T& lBidPrice = *itBP;
00350         logStream << std::fixed << std::setprecision (2) << lBidPrice;
00351     }
00352     // DEBUG
00353     STDAIR_LOG_DEBUG (logStream.str());
00354 }
00355
00356 // ////////////////////////////////////////
00357 void RMOL_Service::heuristicOptimisationByEmsrA() {
00358     assert (_rmolServiceContext != NULL);
00359     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00360
00361     // Retrieve the StdAir service
00362     stdair::STDAIR_Service& lSTDAIR_Service =
00363         lRMOL_ServiceContext.getSTDAIR_Service();
00364     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00365
00366     //
00367     stdair::LegCabin& lLegCabin =
00368         stdair::BomRetriever::retrieveDummyLegCabin (lBomRoot);
00369
00370     Optimiser::heuristicOptimisationByEmsrA (lLegCabin);
00371
00372     // DEBUG
00373     STDAIR_LOG_DEBUG ("Result: " << lLegCabin.displayVirtualClassList());
00374 }
00375
00376 // ////////////////////////////////////////
00377 void RMOL_Service::heuristicOptimisationByEmsrB() {
00378     assert (_rmolServiceContext != NULL);
00379     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00380
00381     // Retrieve the StdAir service
00382     stdair::STDAIR_Service& lSTDAIR_Service =
00383         lRMOL_ServiceContext.getSTDAIR_Service();
00384     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00385
00386     //
00387     stdair::LegCabin& lLegCabin =
00388         stdair::BomRetriever::retrieveDummyLegCabin (lBomRoot);
00389
00390     Optimiser::heuristicOptimisationByEmsrB (lLegCabin);
00391
00392     // DEBUG
00393     STDAIR_LOG_DEBUG ("Result: " << lLegCabin.displayVirtualClassList());
00394 }
00395
00396 // ////////////////////////////////////////
00397 bool RMOL_Service::
00398 optimise (stdair::FlightDate& ioFlightDate,
00399          const stdair::DateTime_T& iRMEEventTime,
00400          const stdair::ForecastingMethod& iForecastingMethod,
00401          const stdair::PartnershipTechnique& iPartnershipTechnique) {
00402
00403
00404     STDAIR_LOG_DEBUG ("Forecast & Optimisation");
00405
00406     const stdair::PartnershipTechnique::EN_PartnershipTechnique&
00407     lPartnershipTechnique =
00408         iPartnershipTechnique.getTechnique();
00409
00410     switch (lPartnershipTechnique) {
00411     case stdair::PartnershipTechnique::RAE_DA:

```

```

00412     case stdair::PartnershipTechnique::IBP_DA:{
00413         if (_previousForecastDate < iRMEventTime.date()) {
00414             forecastOnD (iRMEventTime);
00415             resetDemandInformation (iRMEventTime);
00416             projectAggregatedDemandOnLegCabins (iRMEventTime);
00417             optimiseOnD (iRMEventTime);
00418         }
00419         break;
00420     }
00421     case stdair::PartnershipTechnique::RAE_YP:
00422     case stdair::PartnershipTechnique::IBP_YP:
00423     case stdair::PartnershipTechnique::IBP_YP_U:{
00424         if (_previousForecastDate < iRMEventTime.date()) {
00425             forecastOnD (iRMEventTime);
00426             resetDemandInformation (iRMEventTime);
00427             projectOnDDemandOnLegCabinsUsingYP (iRMEventTime);
00428             optimiseOnD (iRMEventTime);
00429         }
00430         break;
00431     }
00432     case stdair::PartnershipTechnique::RMC:{
00433         if (_previousForecastDate < iRMEventTime.date()) {
00434             forecastOnD (iRMEventTime);
00435             resetDemandInformation (iRMEventTime);
00436             updateBidPrice (iRMEventTime);
00437             projectOnDDemandOnLegCabinsUsingDYP (iRMEventTime);
00438             optimiseOnDUsingRMCooperation (iRMEventTime);
00439         }
00440         break;
00441     }
00442     case stdair::PartnershipTechnique::A_RMC:{
00443         if (_previousForecastDate < iRMEventTime.date()) {
00444             forecastOnD (iRMEventTime);
00445             resetDemandInformation (iRMEventTime);
00446             updateBidPrice (iRMEventTime);
00447             projectOnDDemandOnLegCabinsUsingDYP (iRMEventTime);
00448             optimiseOnDUsingAdvancedRMCooperation (iRMEventTime);
00449         }
00450         break;
00451     }
00452     case stdair::PartnershipTechnique::NONE:{
00453         // DEBUG
00454         STDAIR_LOG_DEBUG ("Forecast");
00455
00456         // 1. Forecast
00457         bool isForecasted = false;
00458         const stdair::ForecastingMethod:EN_ForecastingMethod& lForecastingMethod
=
00459             iForecastingMethod.getMethod();
00460         switch (lForecastingMethod) {
00461             case stdair::ForecastingMethod::ADD_PK: {
00462                 isForecasted = Forecaster::forecastUsingAdditivePickUp (ioFlightDate,
00463                                     iRMEventTime);
00464             }
00465             break;
00466             case stdair::ForecastingMethod::MUL_PK: {
00467                 isForecasted =
00468                     Forecaster::forecastUsingMultiplicativePickUp (ioFlightDate,
00469                                     iRMEventTime);
00470             }
00471             break;
00472             default: {
00473                 assert (false);
00474                 break;
00475             }
00476         }
00477
00478         // DEBUG
00479         STDAIR_LOG_DEBUG ("Forecast successful: " << isForecasted);
00480
00481         // 2. Optimisation
00482         if (isForecasted == true) {
00483             // DEBUG
00484             STDAIR_LOG_DEBUG ("Optimise");

```

```

00485
00486         Optimiser::optimise (ioFlightDate);
00487         return true;
00488     }
00489     break;
00490 }
00491 default:{
00492     assert (false);
00493     break;
00494 }
00495 }
00496 return false;
00497 }
00498
00499 ///////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
00500 void RMOL_Service::forecastOnD (const stdair::DateTime_T& iRMEventTime) {
00501
00502     if (_rmolServiceContext == NULL) {
00503         throw stdair::NonInitialisedServiceException ("The Rmol service "
00504             "has not been initialised")
00505     };
00506     assert (_rmolServiceContext != NULL);
00507     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
00508
00509     // Retrieve the bom root
00510     stdair::STDAIR_Service& lSTDAIR_Service =
00511         lRMOL_ServiceContext.getSTDAIR_Service();
00512     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
00513
00514     // Retrieve the date from the RM event
00515     const stdair::Date_T lDate = iRMEventTime.date();
00516
00517     _previousForecastDate = lDate;
00518
00519     const stdair::InventoryList_T& lInventoryList =
00520         stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
00521     assert (!lInventoryList.empty());
00522     for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin()
00523
00524         itInv != lInventoryList.end(); ++itInv) {
00525         const stdair::Inventory* lInventory_ptr = *itInv;
00526         assert (lInventory_ptr != NULL);
00527         if (stdair::BomManager::hasList<stdair::OnDDate> (*lInventory_ptr)) {
00528             const stdair::OnDDateList_T lOnDDateList =
00529                 stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
00530
00531             for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
00532                 itOD != lOnDDateList.end(); ++itOD) {
00533                 stdair::OnDDate* lOnDDate_ptr = *itOD;
00534                 assert (lOnDDate_ptr != NULL);
00535
00536                 const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
00537                 stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
00538                 stdair::DTD_T lDTD = short (lDateOffset.days());
00539
00540                 stdair::DCPLIST_T::const_iterator itDCP =
00541                     std::find (stdair::DEFAULT_DCP_LIST.begin(),
00542                         stdair::DEFAULT_DCP_LIST.end(), lDTD);
00543                 // Check if the forecast for this O&D date needs to be forecasted.
00544                 if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
00545                     // Retrieve the total forecast map.
00546                     const stdair::CabinForecastMap_T& lTotalForecastMap =
00547                         lOnDDate_ptr->getTotalForecastMap();
00548
00549                     // Browse the map and make a forecast for every cabin.
00550                     for (stdair::CabinForecastMap_T::const_iterator itCF =
00551                         lTotalForecastMap.begin();
00552                         itCF != lTotalForecastMap.end(); ++itCF) {
00553                         const stdair::CabinCode_T lCabinCode = itCF->first;
00554                         stdair::YieldFeatures* lYieldFeatures_ptr =
00555                             getYieldFeatures(*lOnDDate_ptr, lCabinCode, lBomRoot);
00556                         if (lYieldFeatures_ptr == NULL) {
00557                             STDAIR_LOG_ERROR ("Cannot find yield corresponding to "

```

```

00557         << "the O&D date"
00558         << lOnDDate_ptr->toString()
00559         << " Cabin " << lCabinCode);
00560         assert (false);
00561     }
00562     forecastOnD (*lYieldFeatures_ptr, *lOnDDate_ptr, lCabinCode, lDTD
00563         lBomRoot);
00564     }
00565     }
00566     }
00567     }
00568     }
00569     }
00570
00571     // ////////////////////////////////////////
00572     stdair::YieldFeatures* RMOL_Service::
00573     getYieldFeatures(const stdair::OnDDate& iOnDDate,
00574         const stdair::CabinCode_T& iCabinCode,
00575         stdair::BomRoot& iBomRoot) {
00576
00577         const stdair::AirportCode_T& lOrigin = iOnDDate.getOrigin();
00578         const stdair::AirportCode_T& lDestination = iOnDDate.getDestination();
00579
00580         const stdair::Date_T& lDepartureDate = iOnDDate.getDate();
00581
00582         // Build the airport pair key out of O&D and get the airport pair object
00583         const stdair::AirportPairKey lAirportPairKey(lOrigin, lDestination);
00584         stdair::AirportPair* lAirportPair_ptr = stdair::BomManager::
00585             getObjectPtr<stdair::AirportPair> (iBomRoot,
00586                 lAirportPairKey.toString());
00587         if (lAirportPair_ptr == NULL) {
00588             STDAIR_LOG_ERROR ("Cannot find yield corresponding to the airport "
00589                 << "pair: " << lAirportPairKey.toString());
00590             assert (false);
00591         }
00592
00593         // Retrieve the corresponding date period to lDepartureDate.
00594         const stdair::DatePeriodList_T lDatePeriodList =
00595             stdair::BomManager::getList<stdair::DatePeriod> (*lAirportPair_ptr);
00596         for (stdair::DatePeriodList_T::const_iterator itDatePeriod =
00597             lDatePeriodList.begin();
00598             itDatePeriod != lDatePeriodList.end(); ++itDatePeriod) {
00599             const stdair::DatePeriod* lDatePeriod_ptr = *itDatePeriod;
00600             assert (lDatePeriod_ptr != NULL);
00601
00602             const bool isDepartureDateValid =
00603                 lDatePeriod_ptr->isDepartureDateValid (lDepartureDate);
00604
00605             if (isDepartureDateValid == true) {
00606                 // Retrieve the PoS-Channel.
00607                 // TODO: Use POS and Channel from demand instead of default
00608                 const stdair::PosChannelKey lPosChannelKey (stdair::DEFAULT_POS,
00609                     stdair::DEFAULT_CHANNEL);
00610                 stdair::PosChannel* lPosChannel_ptr = stdair::BomManager::
00611                     getObjectPtr<stdair::PosChannel> (*lDatePeriod_ptr,
00612                         lPosChannelKey.toString());
00613                 if (lPosChannel_ptr == NULL) {
00614                     STDAIR_LOG_ERROR ("Cannot find yield corresponding to the PoS-"
00615                         << "Channel: " << lPosChannelKey.toString());
00616                     assert (false);
00617                 }
00618                 // Retrieve the yield features.
00619                 const stdair::TimePeriodList_T lTimePeriodList = stdair::
00620                     BomManager::getList<stdair::TimePeriod> (*lPosChannel_ptr);
00621                 for (stdair::TimePeriodList_T::const_iterator itTimePeriod =
00622                     lTimePeriodList.begin();
00623                     itTimePeriod != lTimePeriodList.end(); ++itTimePeriod) {
00624                     const stdair::TimePeriod* lTimePeriod_ptr = *itTimePeriod;
00625                     assert (lTimePeriod_ptr != NULL);
00626
00627                     // TODO: Use trip type from demand instead of default value.
00628                     const stdair::YieldFeaturesKey lYieldFeaturesKey (
00629                         stdair::TRIP_TYPE_ONE_WAY,

```

```

00629                                     iCabinCode);
00630         stdair::YieldFeatures* oYieldFeatures_ptr = stdair::BomManager::
00631             getObjectPtr<stdair::YieldFeatures>(*lTimePeriod_ptr,
00632                                                 lYieldFeaturesKey.toString());
00633         if (oYieldFeatures_ptr != NULL) {
00634             return oYieldFeatures_ptr;
00635         }
00636     }
00637 }
00638 }
00639 return NULL;
00640 }
00641 }
00642
00643
00644 // //////////////////////////////////////
00645 void RMOL_Service::
00646 forecastOnD (const stdair::YieldFeatures& iYieldFeatures,
00647             stdair::OnDDate& iOnDDate,
00648             const stdair::CabinCode_T& iCabinCode,
00649             const stdair::DTD_T& iDTD,
00650             stdair::BomRoot& iBomRoot) {
00651
00652     const stdair::AirlineClassListList_T lAirlineClassListList =
00653         stdair::BomManager::getList<stdair::AirlineClassList> (iYieldFeatures);
00654     assert (lAirlineClassListList.begin() != lAirlineClassListList.end());
00655
00656     // Yield order check
00657     stdair::AirlineClassListList_T::const_iterator itACL =
00658         lAirlineClassListList.begin();
00659     stdair::Yield_T lPreviousYield ((*itACL)->getYield());
00660     ++itACL;
00661     for (; itACL != lAirlineClassListList.end(); ++itACL) {
00662         const stdair::AirlineClassList* lAirlineClassList = *itACL;
00663         const stdair::Yield_T& lYield = lAirlineClassList->getYield();
00664         if (lYield <= lPreviousYield) {
00665             lPreviousYield = lYield;
00666         }
00667         else{
00668             STDAIR_LOG_ERROR ("Yields should be given in a descendant order"
00669                             << " in the yield input file") ;
00670             assert (false);
00671         }
00672     }
00673     // Proportion factor list initialisation
00674     // Each element corresponds to a yield rule
00675     stdair::ProportionFactorList_T lProportionFactorList;
00676     stdair::ProportionFactor_T lPreviousProportionFactor = 0;
00677
00678     // Retrieve the minimal willingness to pay associated to the demand
00679     const stdair::WTPDemandPair_T& lTotalForecast =
00680         iOnDDate.getTotalForecast (iCabinCode);
00681     const stdair::WTP_T& lMinWTP = lTotalForecast.first;
00682
00683     // Retrieve the remaining percentage of booking requests
00684     const stdair::ContinuousAttributeLite<stdair::FloatDuration_T>
00685         lArrivalPattern (stdair::DEFAULT_DTD_PROB_MAP);
00686
00687     STDAIR_LOG_DEBUG (lArrivalPattern.displayCumulativeDistribution());
00688     const stdair::Probability_T lRemainingProportion =
00689         lArrivalPattern.getRemainingProportion(-float(iDTD));
00690
00691     // Compute the characteristics (mean and std dev) of the total
00692     // forecast demand to come
00693     const stdair::MeanStdDevPair_T lForecatsMeanStdDevPair =
00694         lTotalForecast.second;
00695     const stdair::MeanValue_T& lMeanValue =
00696         lForecatsMeanStdDevPair.first;
00697     const stdair::MeanValue_T& lRemainingMeanValue =
00698         lRemainingProportion*lMeanValue;
00699     const stdair::StdDevValue_T& lStdDevValue =
00700         lForecatsMeanStdDevPair.second;
00701     const stdair::StdDevValue_T& lRemainingStdDevValue =
00702         lRemainingProportion*lStdDevValue;

```

```

00703
00704 // Retrieve the frat5 coef corresponding to the input dtd
00705 stdair::DTDFratMap_T::const_iterator itDFC =
00706     stdair::DEFAULT_DTD_FRAT5COEF_MAP.find(iDTD);
00707 if (itDFC == stdair::DEFAULT_DTD_FRAT5COEF_MAP.end()) {
00708     STDAIR_LOG_ERROR ("Cannot find frat5 coef for DTD = " << iDTD );
00709     assert (false);
00710 }
00711 stdair::RealNumber_T lFrat5Coef =
00712     stdair::DEFAULT_DTD_FRAT5COEF_MAP.at(iDTD);
00713
00714 STDAIR_LOG_DEBUG ("Remaining proportion " << lRemainingProportion
00715     << " Total " << lMeanValue
00716     << " StdDev " << lStdDevValue
00717     << "Frat5 Coef " << lFrat5Coef);
00718
00719 std::ostringstream oStr;
00720 // Compute the "forecast demand to come" proportion by class
00721 itACL = lAirlineClassListList.begin();
00722 for (; itACL != lAirlineClassListList.end(); ++itACL) {
00723     const stdair::AirlineClassList* lAirlineClassList_ptr = *itACL;
00724     const stdair::Yield_T& lYield = lAirlineClassList_ptr->getYield();
00725     stdair::ProportionFactor_T lProportionFactor =
00726         exp ((lYield - lMinWTP)*log(0.5)/(lMinWTP*(lFrat5Coef-1.0)));
00727     // If the yield is smaller than minimal WTP, the factor is greater than
00728     1.
00729     // In that case it should be modified and put to 1.
00730     lProportionFactor = std::min (lProportionFactor, 1.0);
00731     lProportionFactorList.push_back(lProportionFactor -
00732         lPreviousProportionFactor);
00733     lPreviousProportionFactor = lProportionFactor;
00734     oStr << lAirlineClassList_ptr->toString() << lProportionFactor << " ";
00735 }
00736 STDAIR_LOG_DEBUG (oStr.str());
00737
00738 // Sanity check
00739 assert (lAirlineClassListList.size() == lProportionFactorList.size());
00740
00741 STDAIR_LOG_DEBUG ("Forecast for " << iOnDDate.describeKey()
00742     << " " << iDTD << " days to departure");
00743
00744 // store the forecast demand to come characteristics in the booking classes
00745 stdair::ProportionFactorList_T::const_iterator itPF =
00746     lProportionFactorList.begin();
00747 itACL = lAirlineClassListList.begin();
00748 for (; itACL != lAirlineClassListList.end(); ++itACL, ++itPF) {
00749     const stdair::AirlineClassList* lAirlineClassList_ptr = *itACL;
00750     const stdair::ProportionFactor_T& lProportionFactor = *itPF;
00751     stdair::MeanValue_T lMeanValue = lProportionFactor*lRemainingMeanValue;
00752     stdair::StdDevValue_T lStdDevValue =
00753         lProportionFactor*lRemainingStdDevValue;
00754     setOnDForecast (*lAirlineClassList_ptr, lMeanValue, lStdDevValue,
00755         iOnDDate, iCabinCode, iBomRoot);
00756 }
00757
00758 // //////////////////////////////////////
00759 void RMOL_Service::
00760 setOnDForecast (const stdair::AirlineClassList& iAirlineClassList,
00761     const stdair::MeanValue_T& iMeanValue,
00762     const stdair::StdDevValue_T& iStdDevValue,
00763     stdair::OnDDate& iOnDDate,
00764     const stdair::CabinCode_T& iCabinCode,
00765     stdair::BomRoot& iBomRoot) {
00766
00767     const stdair::AirportCode_T& lOrigin = iOnDDate.getOrigin();
00768     const stdair::AirportCode_T& lDestination = iOnDDate.getDestination();
00769
00770     const stdair::Date_T& lDepartureDate = iOnDDate.getDate();
00771
00772     const stdair::AirlineCodeList_T& lAirlineCodeList =
00773         iAirlineClassList.getAirlineCodeList();

```

```

00775
00776 // Retrieve the class list (one class per airline)
00777 const stdair::ClassList_StringList_T& lClassList_StringList =
00778     iAirlineClassList.getClassCodeList();
00779 assert (!lClassList_StringList.empty());
00780 stdair::ClassCodeList_T lClassCodeList;
00781 for (stdair::ClassList_StringList_T::const_iterator itCL =
00782     lClassList_StringList.begin();
00783     itCL != lClassList_StringList.end(); ++itCL){
00784     const stdair::ClassList_String_T& lClassList_String = *itCL;
00785     assert (lClassList_String.size() > 0);
00786     stdair::ClassCode_T lFirstClass;
00787     lFirstClass.append (lClassList_String, 0, 1);
00788     lClassCodeList.push_back(lFirstClass);
00789 }
00790
00791 // Sanity check
00792 assert (lAirlineCodeList.size() == lClassCodeList.size());
00793 assert (!lAirlineCodeList.empty());
00794
00795 if (lAirlineCodeList.size() == 1) {
00796     // Store the forecast information in the case of a single segment
00797     stdair::AirlineCode_T lAirlineCode = lAirlineCodeList.front();
00798     stdair::ClassCode_T lClassCode = lClassCodeList.front();
00799     stdair::Yield_T lYield = iAirlineClassList.getYield();
00800     setOnDForecast(lAirlineCode, lDepartureDate, lOrigin,
00801         lDestination, iCabinCode, lClassCode,
00802         iMeanValue, iStdDevValue, lYield, iBomRoot);
00803 } else {
00804     // Store the forecast information in the case of a multiple segment
00805
00806     stdair::Yield_T lYield = iAirlineClassList.getYield();
00807     for (stdair::AirlineCodeList_T::const_iterator itAC =
00808         lAirlineCodeList.begin();
00809         itAC != lAirlineCodeList.end(); ++itAC) {
00810         const stdair::AirlineCode_T& lAirlineCode = *itAC;
00811         setOnDForecast(lAirlineCodeList, lAirlineCode, lDepartureDate, lOrigin,
00812             lDestination, iCabinCode, lClassCodeList,
00813             iMeanValue, iStdDevValue, lYield, iBomRoot);
00814     }
00815 }
00816 }
00817
00818 // ////////////////////////////////////////
00819 void RMOL_Service::
00820 setOnDForecast (const stdair::AirlineCode_T& iAirlineCode,
00821     const stdair::Date_T& iDepartureDate,
00822     const stdair::AirportCode_T& iOrigin,
00823     const stdair::AirportCode_T& iDestination,
00824     const stdair::CabinCode_T& iCabinCode,
00825     const stdair::ClassCode_T& iClassCode,
00826     const stdair::MeanValue_T& iMeanValue,
00827     const stdair::StdDevValue_T& iStdDevValue,
00828     const stdair::Yield_T& iYield,
00829     stdair::BomRoot& iBomRoot) {
00830     stdair::Inventory* lInventory_ptr = iBomRoot.getInventory(iAirlineCode);
00831     if (lInventory_ptr == NULL) {
00832         STDAIR_LOG_ERROR ("Cannot find the inventory corresponding"
00833             "<< " to the airline" << iAirlineCode) ;
00834         assert(false);
00835     }
00836     const stdair::OnDDateList_T lOnDDateList =
00837         stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
00838     assert (!lOnDDateList.empty());
00839     bool lFoundOnDDate = false;
00840     for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
00841         itOD != lOnDDateList.end(); ++itOD) {
00842         stdair::OnDDate* lOnDDate_ptr = *itOD;
00843         assert (lOnDDate_ptr != NULL);
00844         const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
00845         const stdair::AirportCode_T& lOrigin = lOnDDate_ptr->getOrigin();
00846         const stdair::AirportCode_T& lDestination = lOnDDate_ptr->getDestination(
00847 );
00847         if (!stdair::BomManager::hasList<stdair::SegmentDate> (*lOnDDate_ptr)) {

```

```

00848         STDAIR_LOG_ERROR ("The O&D date " << lOnDDate_ptr->describeKey()
00849         << "has not been correctly initialized : SegmentDate
list is missing");
00850         assert (false);
00851     }
00852     const stdair::SegmentDateList_T& lSegmentDateList =
00853     stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
00854     // Check if the the O&D date is the one we are looking for
00855     if (lDepartureDate == iDepartureDate && lOrigin == iOrigin &&
00856         lDestination == iDestination && lSegmentDateList.size() == 1) {
00857         stdair::CabinClassPair_T lCabinClassPair (iCabinCode, iClassCode);
00858         stdair::CabinClassPairList_T lCabinClassPairList;
00859         lCabinClassPairList.push_back(lCabinClassPair);
00860         const stdair::MeanStdDevPair_T lMeanStdDevPair (iMeanValue,
iStdDevValue);
00861         const stdair::WTPDemandPair_T lWTPDemandPair (iYield, lMeanStdDevPair);
00862         lOnDDate_ptr->setDemandInformation(lCabinClassPairList, lWTPDemandPair)
;
00863         lFoundOnDDate = true;
00864         STDAIR_LOG_DEBUG (iAirlineCode << " Class " << iClassCode
00865         << " Mean " << iMeanValue
00866         << " Std Dev " << iStdDevValue);
00867         break;
00868     }
00869 }
00870
00871 if (!lFoundOnDDate) {
00872     STDAIR_LOG_ERROR ("Cannot find class " << iClassCode << " in cabin "
00873     << iCabinCode << " for the segment "
00874     << iOrigin << "-" << iDestination << " with"
00875     << " the airline " << iAirlineCode);
00876     assert(false);
00877 }
00878 }
00879
00880 // ////////////////////////////////////////
00881 void RMOL_Service::
00882 setOnDForecast (const stdair::AirlineCodeList_T& iAirlineCodeList,
00883                 const stdair::AirlineCode_T& iAirlineCode,
00884                 const stdair::Date_T& iDepartureDate,
00885                 const stdair::AirportCode_T& iOrigin,
00886                 const stdair::AirportCode_T& iDestination,
00887                 const stdair::CabinCode_T& iCabinCode,
00888                 const stdair::ClassCodeList_T& iClassCodeList,
00889                 const stdair::MeanValue_T& iMeanValue,
00890                 const stdair::StdDevValue_T& iStdDevValue,
00891                 const stdair::Yield_T& iYield,
00892                 stdair::BomRoot& iBomRoot) {
00893     stdair::Inventory* lInventory_ptr = iBomRoot.getInventory(iAirlineCode);
00894     if (lInventory_ptr == NULL) {
00895         STDAIR_LOG_ERROR ("Cannot find the inventory corresponding"
00896         << " to the airline" << iAirlineCode) ;
00897         assert(false);
00898     }
00899     const stdair::OnDDateList_T lOnDDateList =
00900     stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
00901     assert (!lOnDDateList.empty());
00902     bool lFoundOnDDate = false;
00903     for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
00904         itOD != lOnDDateList.end(); ++itOD) {
00905         stdair::OnDDate* lOnDDate_ptr = *itOD;
00906         assert (lOnDDate_ptr != NULL);
00907         const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
00908         const stdair::AirportCode_T& lOrigin = lOnDDate_ptr->getOrigin();
00909         const stdair::AirportCode_T& lDestination = lOnDDate_ptr->getDestination(
);
00910         if (!stdair::BomManager::hasList<stdair::SegmentDate> (*lOnDDate_ptr)) {
00911             STDAIR_LOG_ERROR ("The O&D date " << lOnDDate_ptr->describeKey()
00912             << "has not been correctly initialized : SegmentDate
list is missing");
00913             assert (false);
00914         }
00915         const stdair::SegmentDateList_T& lSegmentDateList =

```



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00916         stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
00917         // Check if the O&D date might be the one we are looking for.
00918         // There still is a test to go through to see if the combination of
00919         // airlines is right.
00919         if (lDepartureDate == iDepartureDate && lOrigin == iOrigin &&
00920             lDestination == iDestination && lSegmentDateList.size() ==
00921             iAirlineCodeList.size()) {
00921             const stdair::SegmentDateList_T& lSegmentDateList =
00922                 stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
00923
00923             stdair::AirlineCodeList_T::const_iterator itAC = iAirlineCodeList.begin
00924             ();
00924             stdair::SegmentDateList_T::const_iterator itSD = lSegmentDateList.begin
00925             ();
00925             for (;itAC != iAirlineCodeList.end(); ++itAC, ++itSD) {
00926                 const stdair::AirlineCode_T lForecastAirlineCode = *itAC;
00927                 const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
00928                 // Check if the operating airline is a different one and check if it
00929                 // is the airline that we are looking for.
00929                 const stdair::SegmentDate* lOperatingSegmentDate_ptr =
00930                     lSegmentDate_ptr->getOperatingSegmentDate ();
00931                 if (lOperatingSegmentDate_ptr != NULL) {
00932                     const stdair::FlightDate* lOperatingFD_ptr =
00933                         stdair::BomManager::getParentPtr<stdair::FlightDate>
00934                         (*lOperatingSegmentDate_ptr);
00935                     const stdair::AirlineCode_T lOperatingAirlineCode =
00936                         lOperatingFD_ptr->getAirlineCode();
00937                     if (lOperatingAirlineCode != lForecastAirlineCode) {
00938                         break;
00939                     }
00940                 } else {
00941                     const stdair::AirlineCode_T lOperatingAirlineCode =
00942                         lOnDDate_ptr->getAirlineCode();
00943                     if (lOperatingAirlineCode != lForecastAirlineCode) {
00944                         break;
00945                     }
00946                 }
00947             }
00948             if (itAC == iAirlineCodeList.end()) {lFoundOnDDate = true;}
00949         }
00950         if (lFoundOnDDate) {
00951             stdair::CabinClassPairList_T lCabinClassPairList;
00952             for (stdair::ClassCodeList_T::const_iterator itCC = iClassCodeList.
00953                 begin();
00953                 itCC != iClassCodeList.end(); ++itCC) {
00954                 const stdair::ClassCode_T lClassCode = *itCC;
00955                 stdair::CabinClassPair_T lCabinClassPair (iCabinCode, lClassCode);
00956                 lCabinClassPairList.push_back(lCabinClassPair);
00957             }
00958             const stdair::MeanStdDevPair_T lMeanStdDevPair (iMeanValue,
00959                 iStdDevValue);
00959             const stdair::YieldDemandPair_T lYieldDemandPair (iYield,
00960                 lMeanStdDevPair);
00960             lOnDDate_ptr->setDemandInformation(lCabinClassPairList,
00961                 lYieldDemandPair);
00961             lFoundOnDDate = true;
00962             std::ostringstream oACStr;
00963             for (stdair::AirlineCodeList_T::const_iterator itAC = iAirlineCodeList.
00964                 begin();
00964                 itAC != iAirlineCodeList.end(); ++itAC) {
00965                 if (itAC == iAirlineCodeList.begin()) {
00966                     oACStr << *itAC;
00967                 }
00968                 else {
00969                     oACStr << "-" << *itAC;
00970                 }
00971             }
00972             std::ostringstream oCCStr;
00973             for (stdair::ClassCodeList_T::const_iterator itCC = iClassCodeList.
00974                 begin();
00974                 itCC != iClassCodeList.end(); ++itCC) {
00975                 if (itCC == iClassCodeList.begin()) {
00976                     oCCStr << *itCC;
00977                 }

```

```

00978         else {
00979             oCCStr << "-" << *itCC;
00980         }
00981     }
00982
00983     STDAIR_LOG_DEBUG (oACStr.str() << " Classes " << oCCStr.str()
00984                     << " Mean " << iMeanValue << " Std Dev " <<
iStdDevValue);
00985     break;
00986 }
00987 }
00988 if (!lFoundOnDDate) {
00989     STDAIR_LOG_ERROR ("Cannot find the required multi-segment O&D date: "
00990                     << iOrigin << "-" << iDestination << " " <<
iDepartureDate);
00991     assert(false);
00992 }
00993 }
00994
00995 // //////////////////////////////////////
00996 void RMOL_Service::
00997 resetDemandInformation (const stdair::DateTime_T& iRMEventTime) {
00998     if (_rmolServiceContext == NULL) {
00999         throw stdair::NonInitialisedServiceException ("The Rmol service "
01000             "has not been initialised")
;
01001     }
01002     assert (_rmolServiceContext != NULL);
01003     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01004
01005     // Retrieve the bom root
01006     stdair::STDAIR_Service& lSTDAIR_Service =
01007         lRMOL_ServiceContext.getSTDAIR_Service();
01008     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01009
01010     const stdair::InventoryList_T lInventoryList =
01011         stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01012     assert (!lInventoryList.empty());
01013     for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin()
;
01014         itInv != lInventoryList.end(); ++itInv) {
01015         const stdair::Inventory* lInventory_ptr = *itInv;
01016         assert (lInventory_ptr != NULL);
01017         resetDemandInformation (iRMEventTime, *lInventory_ptr);
01018     }
01019 }
01020
01021 // //////////////////////////////////////
01022 void RMOL_Service::
01023 resetDemandInformation (const stdair::DateTime_T& iRMEventTime,
01024                         const stdair::Inventory& iInventory) {
01025
01026     const stdair::FlightDateList_T lFlightDateList =
01027         stdair::BomManager::getList<stdair::FlightDate> (iInventory);
01028     assert (!lFlightDateList.empty());
01029     for (stdair::FlightDateList_T::const_iterator itFD = lFlightDateList.begin(
);
01030         itFD != lFlightDateList.end(); ++itFD) {
01031         const stdair::FlightDate* lFlightDate_ptr = *itFD;
01032         assert (lFlightDate_ptr != NULL);
01033
01034         // Retrieve the date from the RM event
01035         const stdair::Date_T lDate = iRMEventTime.date();
01036
01037         const stdair::Date_T& lDepartureDate = lFlightDate_ptr->getDepartureDate(
);
01038         stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
01039         stdair::DTD_T lDTD = short (lDateOffset.days());
01040
01041         stdair::DCPLList_T::const_iterator itDCP =
01042             std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST.
end(), lDTD);
01043         // Check if the demand forecast info corresponding to this flight date
needs to be reset.

```

```

01044         if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01045             // Check if the flight date holds a list of leg dates.
01046             // If so, find all leg cabin and reset the forecast they are holding.
01047             if (stdair::BomManager::hasList<stdair::LegDate> (*lFlightDate_ptr)) {
01048                 const stdair::LegDateList_T lLegDateList =
01049                     stdair::BomManager::getList<stdair::LegDate> (*lFlightDate_ptr);
01050                 assert (!lLegDateList.empty());
01051                 for (stdair::LegDateList_T::const_iterator itLD = lLegDateList.begin(
01052 );
01053                     itLD != lLegDateList.end(); ++itLD) {
01054                         const stdair::LegDate* lLegDate_ptr = *itLD;
01055                         assert (lLegDate_ptr != NULL);
01056                         const stdair::LegCabinList_T lLegCabinList =
01057                             stdair::BomManager::getList<stdair::LegCabin> (*lLegDate_ptr);
01058                         assert (!lLegCabinList.empty());
01059                         for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList.
01060 begin();
01061                     itLC != lLegCabinList.end(); ++itLC) {
01062                         stdair::LegCabin* lLegCabin_ptr = *itLC;
01063                         assert (lLegCabin_ptr != NULL);
01064                         lLegCabin_ptr->emptyYieldLevelDemandMap();
01065                     }
01066                 }
01067             }
01068         }
01069     }
01070     // ////////////////////////////////////////
01071     void RMOL_Service::projectAggregatedDemandOnLegCabins(const
stdair::DateTime_T& irMEventTime) {
01072
01073         if (_rmolServiceContext == NULL) {
01074             throw stdair::NonInitialisedServiceException ("The Rmol service "
01075                 "has not been initialised");
01076         }
01077         assert (_rmolServiceContext != NULL);
01078         RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01079
01080         // Retrieve the bom root
01081         stdair::STDAIR_Service& lSTDAIR_Service =
01082             lRMOL_ServiceContext.getSTDAIR_Service();
01083         stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01084
01085         // Retrieve the date from the RM event
01086         const stdair::Date_T lDate = irMEventTime.date();
01087
01088         const stdair::InventoryList_T lInventoryList =
01089             stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01090         assert (!lInventoryList.empty());
01091         for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin()
01092 );
01093             itInv != lInventoryList.end(); ++itInv) {
01094                 const stdair::Inventory* lInventory_ptr = *itInv;
01095                 assert (lInventory_ptr != NULL);
01096                 const stdair::OnDDateList_T lOnDDateList =
01097                     stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
01098                 assert (!lOnDDateList.empty());
01099                 for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
01100                     itOD != lOnDDateList.end(); ++itOD) {
01101                     stdair::OnDDate* lOnDDate_ptr = *itOD;
01102                     assert (lOnDDate_ptr != NULL);
01103
01104                     const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
01105                     stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
01106                     stdair::DTD_T lDTD = short (lDateOffset.days());
01107
01108                     stdair::DCPList_T::const_iterator itDCP =
01109                         std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST
01110 .end(), lDTD);
01111                     // Check if the forecast for this O&D date needs to be projected.
01112                     if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {

```

```

01112         // Browse the demand info map.
01113         const stdair::StringDemandStructMap_T& lStringDemandStructMap =
01114             lOnDDate_ptr->getDemandInfoMap ();
01115         for (stdair::StringDemandStructMap_T::const_iterator itStrDS =
lStringDemandStructMap.begin();
01116             itStrDS != lStringDemandStructMap.end(); ++itStrDS) {
01117             std::string lCabinClassPath = itStrDS->first;
01118             const stdair::YieldDemandPair_T& lYieldDemandPair =
01119                 itStrDS->second;
01120             const stdair::CabinClassPairList_T& lCabinClassPairList =
01121                 lOnDDate_ptr->getCabinClassPairList(lCabinClassPath);
01122             const unsigned int lNbOfSegments = lOnDDate_ptr->getNbOfSegments();
01123             // Sanity check
01124             assert (lCabinClassPairList.size() == lNbOfSegments);
01125
01126             const stdair::SegmentDateList_T lOnDSegmentDateList =
01127                 stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
01128             // Sanity check
01129             assert (lOnDSegmentDateList.size() == lNbOfSegments);
01130             stdair::CabinClassPairList_T::const_iterator itCCP =
lCabinClassPairList.begin();
01131             stdair::SegmentDateList_T::const_iterator itSD =
lOnDSegmentDateList.begin();
01132             for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD) {
01133                 const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01134                 const stdair::SegmentDate* lOperatingSegmentDate_ptr =
01135                     lSegmentDate_ptr->getOperatingSegmentDate ();
01136                 assert (lSegmentDate_ptr != NULL);
01137                 // Only operated legs receive the demand information.
01138                 if (lOperatingSegmentDate_ptr == NULL) {
01139                     const stdair::CabinCode_T lCabinCode = itCCP->first;
01140                     const stdair::ClassCode_T lClassCode = itCCP->second;
01141                     const stdair::SegmentCabin* lSegmentCabin_ptr =
01142                         stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*
lSegmentDate_ptr,
01143 lCabinCode);
01144                     assert (lSegmentCabin_ptr != NULL);
01145                     // Retrieve the booking class (level of aggregation of demand).
01146                     // The yield of the class is assigned to all types of demand
01147                     for it.
01148                         const stdair::BookingClass* lBookingClass_ptr =
01149                             stdair::BomManager::getObjectPtr<stdair::BookingClass> (*
lSegmentCabin_ptr,
01150 lClassCode);
01151                     assert (lBookingClass_ptr != NULL);
01152                     const stdair::LegCabinList_T lLegCabinList =
01153                         stdair::BomManager::getList<stdair::LegCabin>
(*lSegmentCabin_ptr);
01154                     assert (!lLegCabinList.empty());
01155                     const int lNbOfLegs = lLegCabinList.size();
01156                     // Determine the yield (equally distributed over legs).
01157                     const stdair::Yield_T& lYield = lBookingClass_ptr->getYield()/
lNbOfLegs;
01158                     const stdair::MeanStdDevPair_T& lMeanStdDevPair =
01159                         lYieldDemandPair.second;
01160                     const stdair::MeanValue_T& lMeanValue = lMeanStdDevPair.first;
01161                     const stdair::StdDevValue_T& lStdDevValue = lMeanStdDevPair.
second;
01162                     for (stdair::LegCabinList_T::const_iterator itLC =
lLegCabinList.begin();
01163                         itLC != lLegCabinList.end(); ++itLC) {
01164                         stdair::LegCabin* lLegCabin_ptr = *itLC;
01165                         assert (lLegCabin_ptr != NULL);
01166                         lLegCabin_ptr->addDemandInformation (lYield, lMeanValue,
lStdDevValue);
01167                     }
01168                 }
01169             }
01170         }
01171     }
01172 }

```

```

01173     }
01174
01175     // //////////////////////////////////////
01176     void RMOL_Service::projectOnDDemandOnLegCabinsUsingYP(const
stdair::Date_T& iRMEventTime) {
01177
01178         if (_rmolServiceContext == NULL) {
01179             throw stdair::NonInitialisedServiceException ("The Rmol service "
01180                 "has not been initialised")
01181         };
01182         assert (_rmolServiceContext != NULL);
01183         RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01184
01185         // Retrieve the bom root
01186         stdair::STDAIR_Service& lSTDAIR_Service =
01187             lRMOL_ServiceContext.getSTDAIR_Service();
01188         stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01189
01190         // Retrieve the date from the RM event
01191         const stdair::Date_T lDate = iRMEventTime.date();
01192
01193         const stdair::InventoryList_T lInventoryList =
01194             stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01195         assert (!lInventoryList.empty());
01196         for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin()
01197
01198             itInv != lInventoryList.end(); ++itInv) {
01199             const stdair::Inventory* lInventory_ptr = *itInv;
01200             assert (lInventory_ptr != NULL);
01201             const stdair::OnDDateList_T lOnDDateList =
01202                 stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
01203             assert (!lOnDDateList.empty());
01204             for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
01205                 itOD != lOnDDateList.end(); ++itOD) {
01206                 stdair::OnDDate* lOnDDate_ptr = *itOD;
01207                 assert (lOnDDate_ptr != NULL);
01208
01209                 const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
01210                 stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
01211                 stdair::DTD_T lDTD = short (lDateOffset.days());
01212
01213                 stdair::DCPLIST_T::const_iterator itDCP =
01214                     std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST
01215                         .end(), lDTD);
01216                 // Check if the forecast for this O&D date needs to be projected.
01217                 if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01218                     // Browse the demand info map.
01219                     const stdair::StringDemandStructMap_T& lStringDemandStructMap =
01220                         lOnDDate_ptr->getDemandInfoMap ();
01221                     for (stdair::StringDemandStructMap_T::const_iterator itStrDS =
01222                         lStringDemandStructMap.begin();
01223                         itStrDS != lStringDemandStructMap.end(); ++itStrDS) {
01224                         std::string lCabinClassPath = itStrDS->first;
01225                         const stdair::YieldDemandPair_T& lYieldDemandPair =
01226                             itStrDS->second;
01227                         const stdair::CabinClassPairList_T& lCabinClassPairList =
01228                             lOnDDate_ptr->getCabinClassPairList(lCabinClassPath);
01229                         const unsigned int lNbOfSegments = lOnDDate_ptr->getNbOfSegments();
01230                         // Sanity check
01231                         assert (lCabinClassPairList.size() == lNbOfSegments);
01232
01233                         const stdair::SegmentDateList_T lOnDSegmentDateList =
01234                             stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
01235                         // Sanity check
01236                         assert (lOnDSegmentDateList.size() == lNbOfSegments);
01237                         stdair::CabinClassPairList_T::const_iterator itCCP =
01238                             lCabinClassPairList.begin();
01239                         stdair::SegmentDateList_T::const_iterator itSD =
01240                             lOnDSegmentDateList.begin();
01241                         for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD) {
01242                             const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01243                             assert (lSegmentDate_ptr != NULL);

```

```

01240         const stdair::SegmentDate* lOperatingSegmentDate_ptr =
01241             lSegmentDate_ptr->getOperatingSegmentDate ();
01242         // Only operated legs receive the demand information.
01243         if (lOperatingSegmentDate_ptr == NULL) {
01244             const stdair::CabinCode_T lCabinCode = itCCP->first;
01245             const stdair::ClassCode_T lClassCode = itCCP->second;
01246             const stdair::SegmentCabin* lSegmentCabin_ptr =
01247                 stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*
01248                     lSegmentDate_ptr,
01249                     lCabinCode);
01250             assert (lSegmentCabin_ptr != NULL);
01251             const stdair::LegCabinList_T lLegCabinList =
01252                 stdair::BomManager::getList<stdair::LegCabin>
01253                 (*lSegmentCabin_ptr);
01254             assert (!lLegCabinList.empty());
01255             const int lNbOfLegs = lLegCabinList.size();
01256             // Determine the yield (equally distributed over segments and
01257             then legs).
01258             const stdair::MeanStdDevPair_T& lMeanStdDevPair =
01259                 lYieldDemandPair.second;
01260             const stdair::Yield_T& lYield = lYieldDemandPair.first/(
01261                 lNbOfLegs*lNbOfSegments);
01262             const stdair::MeanValue_T& lMeanValue = lMeanStdDevPair.first;
01263             const stdair::StdDevValue_T& lStdDevValue = lMeanStdDevPair.
01264                 second;
01265             for (stdair::LegCabinList_T::const_iterator itLC =
01266                 lLegCabinList.begin();
01267                 itLC != lLegCabinList.end(); ++itLC) {
01268                 stdair::LegCabin* lLegCabin_ptr = *itLC;
01269                 assert (lLegCabin_ptr != NULL);
01270                 lLegCabin_ptr->addDemandInformation (lYield, lMeanValue,
01271                 lStdDevValue);
01272             }
01273         }
01274     }
01275 }
01276
01277 // //////////////////////////////////////
01278 void RMOL_Service::optimiseOnd (const stdair::DateTime_T& iRMEventTime) {
01279     if (_rmolServiceContext == NULL) {
01280         throw stdair::NonInitialisedServiceException ("The Rmol service "
01281             "has not been initialised");
01282     }
01283     assert (_rmolServiceContext != NULL);
01284     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01285     // Retrieve the bom root
01286     stdair::STDAIR_Service& lSTDAIR_Service =
01287         lRMOL_ServiceContext.getSTDAIR_Service();
01288     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01289     // Retrieve the date from the RM event
01290     const stdair::Date_T lDate = iRMEventTime.date();
01291     const stdair::InventoryList_T& lInvList =
01292         stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01293     for (stdair::InventoryList_T::const_iterator itInv = lInvList.begin();
01294         itInv != lInvList.end(); ++itInv) {
01295         stdair::Inventory* lCurrentInv_ptr = *itInv;
01296         assert (lCurrentInv_ptr != NULL);
01297         const stdair::FlightDateList_T& lFlightDateList =
01298             stdair::BomManager::getList<stdair::FlightDate> (*lCurrentInv_ptr);
01299         for (stdair::FlightDateList_T::const_iterator itFlightDate =
01300             lFlightDateList.begin();
01301             itFlightDate != lFlightDateList.end(); ++itFlightDate) {
01302             stdair::FlightDate* lCurrentFlightDate_ptr = *itFlightDate;

```

```

01305         assert (lCurrentFlightDate_ptr != NULL);
01306
01307         const stdair::Date_T& lCurrentDepartureDate = lCurrentFlightDate_ptr->
getDepartureDate();
01308         stdair::DateOffset_T lDateOffset = lCurrentDepartureDate - lDate;
01309         stdair::DTD_T lDTD = short (lDateOffset.days());
01310
01311         stdair::DCPList_T::const_iterator itDCP =
01312             std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST
.end(), lDTD);
01313         // Check if the optimisation is needed.
01314         if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01315             STDAIR_LOG_DEBUG ("Optimisation using O&D forecast: " <<
lCurrentInv_ptr->getAirlineCode()
01316                             << " Departure " << lCurrentDepartureDate << " DTD
" << lDTD);
01317             Optimiser::optimiseUsingOnDForecast (*lCurrentFlightDate_ptr);
01318         }
01319     }
01320 }
01321 }
01322
01323 // ////////////////////////////////////////
01324 void RMOL_Service::updateBidPrice (const stdair::DateTime_T& iRMEventTime) {
01325
01326     if (_rmolServiceContext == NULL) {
01327         throw stdair::NonInitialisedServiceException ("The Rmol service "
01328                                                         "has not been initialised")
;
01329     }
01330     assert (_rmolServiceContext != NULL);
01331     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01332
01333     // Retrieve the bom root
01334     stdair::STDAIR_Service& lSTDAIR_Service =
01335         lRMOL_ServiceContext.getSTDAIR_Service();
01336     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01337
01338     // Retrieve the date from the RM event
01339     const stdair::Date_T lDate = iRMEventTime.date();
01340
01341     const stdair::InventoryList_T& lInvList =
01342         stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01343
01344     for (stdair::InventoryList_T::const_iterator itInv = lInvList.begin();
01345          itInv != lInvList.end(); ++itInv) {
01346         stdair::Inventory* lCurrentInv_ptr = *itInv;
01347         assert (lCurrentInv_ptr != NULL);
01348
01349         const stdair::FlightDateList_T& lFlightDateList =
01350             stdair::BomManager::getList<stdair::FlightDate> (*lCurrentInv_ptr);
01351         for (stdair::FlightDateList_T::const_iterator itFlightDate =
01352              lFlightDateList.begin();
01353              itFlightDate != lFlightDateList.end(); ++itFlightDate) {
01354             stdair::FlightDate* lCurrentFlightDate_ptr = *itFlightDate;
01355             assert (lCurrentFlightDate_ptr != NULL);
01356
01357             const stdair::Date_T& lCurrentDepartureDate = lCurrentFlightDate_ptr->
getDepartureDate();
01358             stdair::DateOffset_T lDateOffset = lCurrentDepartureDate - lDate;
01359             stdair::DTD_T lDTD = short (lDateOffset.days());
01360
01361             stdair::DCPList_T::const_iterator itDCP =
01362                 std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST
.end(), lDTD);
01363             // Check if the operation is needed.
01364             if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01365                 updateBidPrice (*lCurrentFlightDate_ptr, lBomRoot);
01366             }
01367         }
01368     }
01369 }
01370
01371 // ////////////////////////////////////////

```

```

01372 void RMOL_Service::updateBidPrice (const stdair::FlightDate& iFlightDate,
01373                                     stdair::BomRoot& iBomRoot) {
01374     const stdair::SegmentDateList_T& lSegmentDateList =
01375         stdair::BomManager::getList<stdair::SegmentDate> (iFlightDate);
01376     const stdair::AirlineCode_T& lOptAC = iFlightDate.getAirlineCode();
01377     const std::string lFDKeyStr = iFlightDate.describeKey();
01378
01379     for (stdair::SegmentDateList_T::const_iterator itSegmentDate =
lSegmentDateList.begin();
01380          itSegmentDate != lSegmentDateList.end(); ++itSegmentDate) {
01381         stdair::SegmentDate* lSegmentDate_ptr = *itSegmentDate;
01382         assert (lSegmentDate_ptr != NULL);
01383         if (stdair::BomManager::hasList<stdair::SegmentDate>(*lSegmentDate_ptr))
01384         {
01385             const stdair::LegDateList_T& lLegDateList =
01386                 stdair::BomManager::getList<stdair::LegDate>(*lSegmentDate_ptr);
01387             // Get the list of marketing carriers segments.
01388             // These are part of maketing partners inventories images held by the
operating airline.
01389             const stdair::SegmentDateList_T& lMktSegmentDateList =
01390                 stdair::BomManager::getList<stdair::SegmentDate>(*lSegmentDate_ptr);
01391             for (stdair::SegmentDateList_T::const_iterator itMktSD =
lMktSegmentDateList.begin();
01392                  itMktSD != lMktSegmentDateList.end(); ++itMktSD) {
01393                 // Get the marketing airline code.
01394                 stdair::SegmentDate* lMktSD_ptr = *itMktSD;
01395                 assert (lMktSD_ptr != NULL);
01396                 stdair::FlightDate* lMktFD_ptr =
01397                     stdair::BomManager::getParentPtr<stdair::FlightDate>(*lMktSD_ptr);
01398                 assert (lMktFD_ptr != NULL);
01399                 const stdair::AirlineCode_T& lMktAC = lMktFD_ptr->getAirlineCode();
01400                 // Get the (real) marketer inventory.
01401                 const stdair::Inventory* lMktInv_ptr =
01402                     stdair::BomManager::getObjectPtr<stdair::Inventory>(iBomRoot, lMktAC
);
01403                 assert (lMktInv_ptr != NULL);
01404                 // Get the image of the operating airline inventory held by the
marketer.
01405                 const stdair::Inventory* lOptInv_ptr =
01406                     stdair::BomManager::getObjectPtr<stdair::Inventory>(*lMktInv_ptr,
lOptAC);
01407                 assert (lOptInv_ptr != NULL);
01408                 // Find the image of the concerned flight date.
01409                 const stdair::FlightDate* lOptFD_ptr =
01410                     stdair::BomManager::getObjectPtr<stdair::FlightDate>(*lOptInv_ptr,
lFDKeyStr);
01411                 assert (lOptFD_ptr != NULL);
01412                 // Browse the list of leg dates in the real operating inventory.
01413                 // Retrieve the image of each leg date.
01414                 for (stdair::LegDateList_T::const_iterator itLD = lLegDateList.begin(
);
01415                      itLD != lLegDateList.end(); ++itLD) {
01416                     const stdair::LegDate* lLD_ptr = *itLD;
01417                     assert (lLD_ptr != NULL);
01418                     const std::string lLDKeyStr = lLD_ptr->describeKey();
01419                     stdair::LegDate* lOptLD_ptr =
01420                         stdair::BomManager::getObjectPtr<stdair::LegDate>(*lOptFD_ptr,
lLDKeyStr);
01421                     assert (lOptLD_ptr != NULL);
01422                     const stdair::LegCabinList_T& lLegCabinList_T =
01423                         stdair::BomManager::getList<stdair::LegCabin>(*lLD_ptr);
01424                     // Browse the list of leg cabins in the real operating inventory.
01425                     // Retrieve the image of each leg cabin and update the bid price of
the real and send it to the image.
01426                     for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList_T.
begin();
01427                          itLC != lLegCabinList_T.end(); ++itLC) {
01428                         stdair::LegCabin* lLC_ptr = *itLC;
01429                         assert (lLC_ptr != NULL);
01430                         const std::string lLCKeyStr = lLC_ptr->describeKey();
01431                         stdair::LegCabin* lOptLC_ptr =
01432                             stdair::BomManager::getObjectPtr<stdair::LegCabin>(*lOptLD_ptr,
lLCKeyStr);
01433                         assert (lOptLC_ptr != NULL);

```



```

01433         // Update the current bid price of the real leg.
01434         lLC_ptr->updateCurrentBidPrice();
01435         // Update the previous bid price (store the current).
01436         lOptLC_ptr->updatePreviousBidPrice();
01437         // Update the current bid price.
01438         lOptLC_ptr->setCurrentBidPrice (lLC_ptr->getCurrentBidPrice());
01439
01440         STDAIR_LOG_DEBUG ("Update bid price of " << lLC_ptr->getFullerKey
01441         ()
01442         << " : " << lOptLC_ptr->getCurrentBidPrice()
01443         << " Availability pool " << lLC_ptr->
01444         getAvailabilityPool());
01445     }
01446 }
01447 }
01448 }
01449
01450 // ////////////////////////////////////////
01451 void RMOL_Service::projectOnDDemandOnLegCabinsUsingDA(const
stdair::DateTime_T& irMEventTime) {
01452
01453     if (_rmolServiceContext == NULL) {
01454         throw stdair::NonInitialisedServiceException ("The Rmol service "
01455         "has not been initialised")
01456     };
01457     assert (_rmolServiceContext != NULL);
01458     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01459
01460     // Retrieve the bom root
01461     stdair::STDAIR_Service& lSTDAIR_Service =
01462     lRMOL_ServiceContext.getSTDAIR_Service();
01463     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01464
01465     // Retrieve the date from the RM event
01466     const stdair::Date_T lDate = irMEventTime.date();
01467
01468     const stdair::InventoryList_T lInventoryList =
01469     stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01470     assert (!lInventoryList.empty());
01471     for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin()
01472     ;
01473     itInv != lInventoryList.end(); ++itInv) {
01474         const stdair::Inventory* lInventory_ptr = *itInv;
01475         assert (lInventory_ptr != NULL);
01476         const stdair::OnDDateList_T lOnDDateList =
01477         stdair::BomManager::getList<stdair::OnDDate> (*lInventory_ptr);
01478         assert (!lOnDDateList.empty());
01479         for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
01480         itOD != lOnDDateList.end(); ++itOD) {
01481             stdair::OnDDate* lOnDDate_ptr = *itOD;
01482             assert (lOnDDate_ptr != NULL);
01483
01484             const stdair::Date_T lDepartureDate = lOnDDate_ptr->getDate();
01485             stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
01486             stdair::DTD_T lDTD = short (lDateOffset.days());
01487
01488             stdair::DCPLIST_T::const_iterator itDCP =
01489             std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST
01490             .end(), lDTD);
01491             // Check if the forecast for this O&D date needs to be projected.
01492             if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01493                 // Browse the demand info map.
01494                 const stdair::StringDemandStructMap_T& lStringDemandStructMap =
01495                 lOnDDate_ptr->getDemandInfoMap ();
01496                 for (stdair::StringDemandStructMap_T::const_iterator itStrDS =
01497                 lStringDemandStructMap.begin();
01498                 itStrDS != lStringDemandStructMap.end(); ++itStrDS) {
01499                     std::string lCabinClassPath = itStrDS->first;
01500                     const stdair::YieldDemandPair_T& lYieldDemandPair = itStrDS->second
01501                 };
01502             }
01503         }
01504     }

```

```

01499         const stdair::CabinClassPairList_T& lCabinClassPairList =
01500             lOnDDate_ptr->getCabinClassPairList(lCabinClassPath);
01501         const unsigned int lNbOfSegments = lOnDDate_ptr->getNbOfSegments();
01502         // Sanity check
01503         assert (lCabinClassPairList.size() == lNbOfSegments);
01504
01505         //
01506         const stdair::SegmentDateList_T lOnDSegmentDateList =
01507             stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
01508         // Sanity check
01509         assert (lOnDSegmentDateList.size() == lNbOfSegments);
01510         stdair::CabinClassPairList_T::const_iterator itCCP =
01511             lCabinClassPairList.begin();
01512         stdair::SegmentDateList_T::const_iterator itSD =
01513             lOnDSegmentDateList.begin();
01514         // List of bid prices that will be used to easily compute
01515         // displacement-adjusted yields.
01516         std::list<stdair::BidPrice_T> lBidPriceList;
01517         // The sum of bid prices that will be stored in the list above.
01518         stdair::BidPrice_T lTotalBidPrice = 0;
01519         // Retrieve the bid prices
01520         for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD) {
01521             // Get the operating segment cabin (it holds the bid price
01522             // information).
01523             const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01524             assert (lSegmentDate_ptr != NULL);
01525             // Get the operating airline code and check if it is the airline
01526             // we are looking for.
01527             const stdair::SegmentDate* lOperatingSegmentDate_ptr =
01528                 lSegmentDate_ptr->getOperatingSegmentDate ();
01529             if (lOperatingSegmentDate_ptr != NULL) {
01530                 lSegmentDate_ptr = lOperatingSegmentDate_ptr;
01531             }
01532             const stdair::CabinCode_T lCabinCode = itCCP->first;
01533             const stdair::SegmentCabin* lSegmentCabin_ptr =
01534                 stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*
01535                     lSegmentDate_ptr,
01536                     lCabinCode);
01537             assert (lSegmentCabin_ptr != NULL);
01538             stdair::BidPrice_T lBidPrice = 0;
01539             const stdair::LegCabinList_T lLegCabinList =
01540                 stdair::BomManager::getList<stdair::LegCabin>
01541                     (*lSegmentCabin_ptr);
01542             for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList.
01543                 begin();
01544                 itLC != lLegCabinList.end(); ++itLC) {
01545                 const stdair::LegCabin* lLegCabin_ptr = *itLC;
01546                 assert (lLegCabin_ptr != NULL);
01547                 lBidPrice += lLegCabin_ptr->getCurrentBidPrice();
01548             }
01549             lBidPriceList.push_back (lBidPrice);
01550             lTotalBidPrice += lBidPrice;
01551         }
01552         itCCP = lCabinClassPairList.begin();
01553         itSD = lOnDSegmentDateList.begin();
01554         std::list<stdair::BidPrice_T>::const_iterator itBP = lBidPriceList.
01555             begin();
01556         for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD, ++itBP)
01557         {
01558             stdair::BidPrice_T lBidPrice = *itBP;
01559             stdair::BidPrice_T lComplementaryBidPrice = lTotalBidPrice -
01560                 lBidPrice;
01561             const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01562             assert (lSegmentDate_ptr != NULL);
01563             const stdair::SegmentDate* lOperatingSegmentDate_ptr =
01564                 lSegmentDate_ptr->getOperatingSegmentDate ();
01565             // Only operated legs receive the demand information.
01566             if (lOperatingSegmentDate_ptr == NULL) {
01567                 const stdair::CabinCode_T lCabinCode = itCCP->first;
01568                 const stdair::ClassCode_T lClassCode = itCCP->second;
01569                 const stdair::SegmentCabin* lSegmentCabin_ptr =

```

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01561         stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*
01562     lSegmentDate_ptr,
01563     lCabinCode);
01563         assert (lSegmentCabin_ptr != NULL);
01564         const stdair::LegCabinList_T lLegCabinList =
01565             stdair::BomManager::getList<stdair::LegCabin>
01566             (*lSegmentCabin_ptr);
01566         assert (!lLegCabinList.empty());
01567         // Determine the displacement-adjusted yield.
01568         // It is set to 100 (positive small value), if the computed
01569         value is negative.
01569         const stdair::Yield_T& lDAYield =
01570             std::max(100., lYieldDemandPair.first -
01571 lComplementaryBidPrice);
01571
01572
01573         stdair::Yield_T lYield = lDAYield;
01574         // In order to be protected against important variations of
01575         partners' bid price,
01576         // the displacement adjusted yield is not allowed to get out of
01577         a certain range.
01578         // This range is here chosen to be from 80% to 100% of the
01579         (static rule) prorated yield.
01580         /*
01581         const int lNbOfLegs = lLegCabinList.size();
01582         const stdair::Yield_T& lStaticProrationYield =
01583             lDemandStruct.getYield()/(lNbOfLegs*lNbOfSegments);
01584         if (lDAYield < 0.8*lStaticProrationYield){
01585             lYield = 0.8*lStaticProrationYield;
01586         }
01587         if (lDAYield > lStaticProrationYield) {
01588             lYield = lStaticProrationYield;
01589         }
01590         */
01591         const stdair::MeanStdDevPair_T& lMeanStdDevPair =
01592             lYieldDemandPair.second;
01593         const stdair::MeanValue_T& lMeanValue = lMeanStdDevPair.first;
01594         const stdair::StdDevValue_T& lStdDevValue = lMeanStdDevPair.
01595         second;
01596         for (stdair::LegCabinList_T::const_iterator itLC =
01597     lLegCabinList.begin();
01598         itLC != lLegCabinList.end(); ++itLC) {
01599             stdair::LegCabin* lLegCabin_ptr = *itLC;
01600             assert (lLegCabin_ptr != NULL);
01601             lLegCabin_ptr->addDemandInformation (lYield, lMeanValue,
01602 lStdDevValue);
01603         }
01604     }
01605 }
01606 }
01607 ///////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
01608 void RMOL_Service::projectOnDDemandOnLegCabinsUsingDYP(const
01609 stdair::DateTime_T& irMEventTime) {
01610
01611     if (_rmolServiceContext == NULL) {
01612         throw stdair::NonInitialisedServiceException ("The Rmol service "
01613             "has not been initialised")
01614     };
01615 }
01616 assert (_rmolServiceContext != NULL);
01617 RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01618 // Retrieve the bom root
01619 stdair::STDAIR_Service& lSTDAIR_Service =
01620     lRMOL_ServiceContext.getSTDAIR_Service();
01621 stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01622 const stdair::InventoryList_T lInventoryList =

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01622     stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01623     assert (!lInventoryList.empty());
01624     for (stdair::InventoryList_T::const_iterator itInv = lInventoryList.begin()
;
01625         itInv != lInventoryList.end(); ++itInv) {
01626         const stdair::Inventory* lInventory_ptr = *itInv;
01627         assert (lInventory_ptr != NULL);
01628         projectOnDDemandOnLegCabinsUsingDYP (iRMEventTime, *lInventory_ptr);
01629     }
01630 }
01631
01632 // //////////////////////////////////////
01633 void RMOL_Service::projectOnDDemandOnLegCabinsUsingDYP(const
stdair::DateTime_T& iRMEventTime,
01634                                                         const
stdair::Inventory& iInventory) {
01635     const stdair::OnDDateList_T lOnDDateList =
01636         stdair::BomManager::getList<stdair::OnDDate> (iInventory);
01637     assert (!lOnDDateList.empty());
01638     for (stdair::OnDDateList_T::const_iterator itOD = lOnDDateList.begin();
01639         itOD != lOnDDateList.end(); ++itOD) {
01640         stdair::OnDDate* lOnDDate_ptr = *itOD;
01641         assert (lOnDDate_ptr != NULL);
01642
01643         // Retrieve the date from the RM event
01644         const stdair::Date_T lDate = iRMEventTime.date();
01645
01646         const stdair::Date_T& lDepartureDate = lOnDDate_ptr->getDate();
01647         stdair::DateOffset_T lDateOffset = lDepartureDate - lDate;
01648         stdair::DTD_T lDTD = short (lDateOffset.days());
01649
01650         stdair::DCPList_T::const_iterator itDCP =
01651             std::find (stdair::DEFAULT_DCP_LIST.begin(), stdair::DEFAULT_DCP_LIST.
end(), lDTD);
01652         // Check if the forecast for this O&D date needs to be projected.
01653         if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01654             // Browse the demand info map.
01655             const stdair::StringDemandStructMap_T& lStringDemandStructMap =
01656                 lOnDDate_ptr->getDemandInfoMap ();
01657             for (stdair::StringDemandStructMap_T::const_iterator itStrDS =
lStringDemandStructMap.begin();
01658                 itStrDS != lStringDemandStructMap.end(); ++itStrDS) {
01659                 std::string lCabinClassPath = itStrDS->first;
01660                 const stdair::YieldDemandPair_T& lYieldDemandPair = itStrDS->second;
01661                 const stdair::CabinClassPairList_T& lCabinClassPairList =
01662                     lOnDDate_ptr->getCabinClassPairList (lCabinClassPath);
01663                 const unsigned int lNbOfSegments = lOnDDate_ptr->getNbOfSegments();
01664                 // Sanity check
01665                 assert (lCabinClassPairList.size() == lNbOfSegments);
01666
01667                 //
01668                 const stdair::SegmentDateList_T lOnDSegmentDateList =
01669                     stdair::BomManager::getList<stdair::SegmentDate> (*lOnDDate_ptr);
01670                 // Sanity check
01671                 assert (lOnDSegmentDateList.size() == lNbOfSegments);
01672                 stdair::CabinClassPairList_T::const_iterator itCCP =
lCabinClassPairList.begin();
01673                 stdair::SegmentDateList_T::const_iterator itSD = lOnDSegmentDateList.
begin();
01674                 // The sum of bid prices of all cabins.
01675                 stdair::BidPrice_T lTotalBidPrice = 0;
01676                 for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD) {
01677                     // Get the operating segment cabin (it holds the bid price
01678                     information).
01679                     const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01680                     assert (lSegmentDate_ptr != NULL);
01681                     // Get the operating airline code and check if it is the airline we
01682                     are looking for.
01683                     const stdair::SegmentDate* lOperatingSegmentDate_ptr =
01684                         lSegmentDate_ptr->getOperatingSegmentDate ();
01685                     if (lOperatingSegmentDate_ptr != NULL) {
01686                         lSegmentDate_ptr = lOperatingSegmentDate_ptr;

```

```

01687     }
01688     const stdair::CabinCode_T lCabinCode = itCCP->first;
01689     const stdair::SegmentCabin* lSegmentCabin_ptr =
01690         stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*
01691             lSegmentDate_ptr,
01692             lCabinCode);
01693     assert (lSegmentCabin_ptr != NULL);
01694     const stdair::LegCabinList_T lLegCabinList =
01695         stdair::BomManager::getList<stdair::LegCabin>(*lSegmentCabin_ptr)
01696     ;
01697     for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList.
01698         begin();
01699         itLC != lLegCabinList.end(); ++itLC) {
01700         const stdair::LegCabin* lLegCabin_ptr = *itLC;
01701         assert (lLegCabin_ptr != NULL);
01702         lTotalBidPrice += lLegCabin_ptr->getCurrentBidPrice();
01703     }
01704     itCCP = lCabinClassPairList.begin();
01705     itSD = lOnDSegmentDateList.begin();
01706     for (; itSD != lOnDSegmentDateList.end(); ++itCCP, ++itSD) {
01707         const stdair::SegmentDate* lSegmentDate_ptr = *itSD;
01708         assert (lSegmentDate_ptr != NULL);
01709         const stdair::SegmentDate* lOperatingSegmentDate_ptr =
01710             lSegmentDate_ptr->getOperatingSegmentDate();
01711         // Only operated legs receive the demand information.
01712         if (lOperatingSegmentDate_ptr == NULL) {
01713             const stdair::CabinCode_T lCabinCode = itCCP->first;
01714             const stdair::ClassCode_T lClassCode = itCCP->second;
01715             const stdair::SegmentCabin* lSegmentCabin_ptr =
01716                 stdair::BomManager::getObjectPtr<stdair::SegmentCabin> (*
01717                     lSegmentDate_ptr,
01718                     lCabinCode);
01719             assert (lSegmentCabin_ptr != NULL);
01720             const stdair::LegCabinList_T lLegCabinList =
01721                 stdair::BomManager::getList<stdair::LegCabin>
01722                 (*lSegmentCabin_ptr);
01723             assert (!lLegCabinList.empty());
01724             const stdair::Yield_T& lYield = lYieldDemandPair.first;
01725             const stdair::MeanStdDevPair_T& lMeanStdDevPair =
01726                 lYieldDemandPair.second;
01727             const stdair::MeanValue_T& lMeanValue = lMeanStdDevPair.first;
01728             const stdair::StdDevValue_T& lStdDevValue = lMeanStdDevPair.
01729                 second;
01730             for (stdair::LegCabinList_T::const_iterator itLC = lLegCabinList.
01731                 begin();
01732                 itLC != lLegCabinList.end(); ++itLC) {
01733                 stdair::LegCabin* lLegCabin_ptr = *itLC;
01734                 assert (lLegCabin_ptr != NULL);
01735                 const stdair::BidPrice_T& lBidPrice = lLegCabin_ptr->
01736                     getCurrentBidPrice();
01737                 const stdair::RealNumber_T lDynamicYieldProrationFactor =
01738                     lBidPrice / lTotalBidPrice;
01739                 const stdair::Yield_T lProratedYield =
01740                     lDynamicYieldProrationFactor*lYield;
01741                 lLegCabin_ptr->addDemandInformation (lProratedYield, lMeanValue
01742                     , lStdDevValue);
01743                 // STDAIR_LOG_DEBUG ("Adding demand information to leg-cabin "
01744                 << lLegCabin_ptr->getFullerKey()
01745                 // << " Total yield " << lYield << "
01746                 Proration factor "
01747                 // << lDynamicYieldProrationFactor << "
01748                 Prorated yield " << lProratedYield
01749                 // << " Mean demand " << lMeanValue << "
01750                 StdDev " << lStdDevValue);
01751             }
01752         }
01753     }

```

```

01743     }
01744     }
01745     }
01746 }
01747
01748 // //////////////////////////////////////
01749 void RMOL_Service::optimiseOnDUsingRMCooperation (const stdair::DateTime_T&
iRMEventTime) {
01750
01751     if (_rmolServiceContext == NULL) {
01752         throw stdair::NonInitialisedServiceException ("The Rmol service "
01753             "has not been initialised")
;
01754     }
01755     assert (_rmolServiceContext != NULL);
01756     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01757
01758     // Retrieve the bom root
01759     stdair::STDAIR_Service& lSTDAIR_Service =
01760         lRMOL_ServiceContext.getSTDAIR_Service();
01761     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01762
01763     // Retrieve the date from the RM event
01764     const stdair::Date_T lDate = iRMEventTime.date();
01765
01766     // Browse the list of inventories and optimise within each one
independently.
01767     const stdair::InventoryList_T& lInvList =
01768         stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01769     for (stdair::InventoryList_T::const_iterator itInv = lInvList.begin();
01770         itInv != lInvList.end(); ++itInv) {
01771         stdair::Inventory* lCurrentInv_ptr = *itInv;
01772         assert (lCurrentInv_ptr != NULL);
01773
01774         double lMaxBPVariation = 1.0;
01775         short lIterationCounter = 0;
01776         // Iterate until the variation is under the wanted level or the maximal
number of iterations is reached.
01777         while (lMaxBPVariation > 0.01 && lIterationCounter < 10) {
01778             lMaxBPVariation = 0.0;
01779             lIterationCounter++;
01780             const stdair::FlightDateList_T& lFlightDateList =
01781                 stdair::BomManager::getList<stdair::FlightDate> (*lCurrentInv_ptr);
01782             for (stdair::FlightDateList_T::const_iterator itFlightDate =
01783                 lFlightDateList.begin();
01784                 itFlightDate != lFlightDateList.end(); ++itFlightDate) {
01785                 stdair::FlightDate* lCurrentFlightDate_ptr = *itFlightDate;
01786                 assert (lCurrentFlightDate_ptr != NULL);
01787
01788                 const stdair::Date_T& lCurrentDepartureDate = lCurrentFlightDate_ptr
->getDepartureDate();
01789                 stdair::DateOffset_T lDateOffset = lCurrentDepartureDate - lDate;
01790                 stdair::DTD_T lDTD = short (lDateOffset.days());
01791
01792                 stdair::DCPLList_T::const_iterator itDCP =
01793                     std::find (stdair::DEFAULT_DCP_LIST.begin(),
stdair::DEFAULT_DCP_LIST.end(), lDTD);
01794                 // Check if the optimisation is needed.
01795                 if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01796                     const double lBPVariation = Optimiser::optimiseUsingOnDForecast (*
lCurrentFlightDate_ptr);
01797                     lMaxBPVariation = std::max(lMaxBPVariation, lBPVariation);
01798                 }
01799             }
01800             // Update the prorated yields for the current inventory.
01801             resetDemandInformation (iRMEventTime, *lCurrentInv_ptr);
01802             projectOnDDemandOnLegCabinsUsingDYP (iRMEventTime, *lCurrentInv_ptr);
01803         }
01804     }
01805 }
01806
01807 // //////////////////////////////////////
01808 void RMOL_Service::optimiseOnDUsingAdvancedRMCooperation (const

```

```

stdair::DateTime_T& iRMEventTime) {
01810
01811     if (_rmolServiceContext == NULL) {
01812         throw stdair::NonInitialisedServiceException ("The Rmol service "
01813             "has not been initialised")
01814     };
01815     assert (_rmolServiceContext != NULL);
01816     RMOL_ServiceContext& lRMOL_ServiceContext = *_rmolServiceContext;
01817
01818     // Retrieve the bom root
01819     stdair::STDAIR_Service& lSTDAIR_Service =
01820         lRMOL_ServiceContext.getSTDAIR_Service();
01821     stdair::BomRoot& lBomRoot = lSTDAIR_Service.getBomRoot();
01822
01823     // Retrieve the date from the RM event
01824     const stdair::Date_T lDate = iRMEventTime.date();
01825
01826     double lMaxBPVariation = 1.0;
01827     short lIterationCounter = 0;
01828     // Iterate until the variation is under the wanted level or the maximal
    number of iterations is reached.
01829     // Every iteration corresponds to the optimisation of the whole network.
    Bid prices are communicated
    // between partners at the end of each iteration.
01831     while (lMaxBPVariation > 0.01 && lIterationCounter < 50) {
01832         lMaxBPVariation = 0.0;
01833         lIterationCounter++;
01834
01835         const stdair::InventoryList_T& lInvList =
01836             stdair::BomManager::getList<stdair::Inventory> (lBomRoot);
01837         for (stdair::InventoryList_T::const_iterator itInv = lInvList.begin();
01838             itInv != lInvList.end(); ++itInv) {
01839             stdair::Inventory* lCurrentInv_ptr = *itInv;
01840             assert (lCurrentInv_ptr != NULL);
01841             const stdair::FlightDateList_T& lFlightDateList =
01842                 stdair::BomManager::getList<stdair::FlightDate> (*lCurrentInv_ptr);
01843             for (stdair::FlightDateList_T::const_iterator itFlightDate =
01844                 lFlightDateList.begin();
01845                 itFlightDate != lFlightDateList.end(); ++itFlightDate) {
01846                 stdair::FlightDate* lCurrentFlightDate_ptr = *itFlightDate;
01847                 assert (lCurrentFlightDate_ptr != NULL);
01848
01849                 const stdair::Date_T& lCurrentDepartureDate = lCurrentFlightDate_ptr
->getDepartureDate();
01850                 stdair::DateOffset_T lDateOffset = lCurrentDepartureDate - lDate;
01851                 stdair::DTD_T lDTD = short (lDateOffset.days());
01852
01853                 stdair::DCPLList_T::const_iterator itDCP =
01854                     std::find (stdair::DEFAULT_DCP_LIST.begin(),
stdair::DEFAULT_DCP_LIST.end(), lDTD);
01855                 if (itDCP != stdair::DEFAULT_DCP_LIST.end()) {
01856                     const double lBPVariation = Optimiser::optimiseUsingOnDForecast (*
lCurrentFlightDate_ptr);
01857                     lMaxBPVariation = std::max(lMaxBPVariation, lBPVariation);
01858                 }
01859             }
01860         }
01861         // At the end of each iteration, communicate bid prices and compute
    displacement adjusted yields.
01862         updateBidPrice (iRMEventTime);
01863         resetDemandInformation (iRMEventTime);
01864         projectOnDDemandOnLegCabinsUsingDYP (iRMEventTime);
01865     }
01866 }
01867
01868 }

```

## 28.97 rmol/service/RMOL\_ServiceContext.cpp File Reference

```
#include <cassert> #include <sstream> #include <stdair/-
STDAIR_Service.hpp> #include <rmol/basic/BasConst_RMOL_-
Service.hpp> #include <rmol/service/RMOL_ServiceContext.-
hpp>
```

### Namespaces

- namespace [RMOL](#)

## 28.98 RMOL\_ServiceContext.cpp

```
00001 // //////////////////////////////////////
00002 // Import section
00003 // //////////////////////////////////////
00004 // STL
00005 #include <cassert>
00006 #include <sstream>
00007 // StdAir
00008 #include <stdair/STDAIR_Service.hpp>
00009 // RMOL
00010 #include <rmol/basic/BasConst_RMOL_Service.hpp>
00011 #include <rmol/service/RMOL_ServiceContext.hpp>
00012
00013 namespace RMOL {
00014
00015 // //////////////////////////////////////
00016 RMOL_ServiceContext::RMOL_ServiceContext() : _ownStdairService (false) {
00017 }
00018
00019 // //////////////////////////////////////
00020 RMOL_ServiceContext::RMOL_ServiceContext (const RMOL_ServiceContext&) {
00021     assert (false);
00022 }
00023
00024 // //////////////////////////////////////
00025 RMOL_ServiceContext::~RMOL_ServiceContext() {
00026 }
00027
00028 // //////////////////////////////////////
00029 stdair::STDAIR_Service& RMOL_ServiceContext::getSTDAIR_Service() const {
00030     assert (_stdairService != NULL);
00031     return *_stdairService;
00032 }
00033
00034 // //////////////////////////////////////
00035 const std::string RMOL_ServiceContext::shortDisplay() const {
00036     std::ostringstream oStr;
00037     oStr << "RMOL_ServiceContext -- Owns StdAir service: " << _ownStdairService
00038 ;
00039     return oStr.str();
00040 }
00041
00042 // //////////////////////////////////////
00043 const std::string RMOL_ServiceContext::display() const {
00044     std::ostringstream oStr;
00045     oStr << shortDisplay();
00046     return oStr.str();
00047 }
00048
00049 // //////////////////////////////////////
00050 const std::string RMOL_ServiceContext::describe() const {
00051     return shortDisplay();
00052 }
```



```

00053 // //////////////////////////////////////
00054 void RMOL_ServiceContext::reset() {
00055     if (_ownStdairService == true) {
00056         _stdairService.reset();
00057     }
00058 }
00059
00060 }

```

## 28.99 rmol/service/RMOL\_ServiceContext.hpp File Reference

```

#include <string>    #include <stdair/stdair_basic_types.-
hpp> #include <stdair/stdair_inventory_types.hpp> #include
<stdair/stdair_maths_types.hpp> #include <stdair/stdair-
_service_types.hpp>    #include <stdair/service/Service-
Abstract.hpp> #include <rmol/RMOL_Types.hpp>

```

### Classes

- class [RMOL::RMOL\\_ServiceContext](#)  
Inner class holding the context for the [RMOL](#) Service object.

### Namespaces

- namespace [stdair](#)
- namespace [RMOL](#)

## 28.100 RMOL\_ServiceContext.hpp

```

00001 #ifndef __RMOL_SVC_RMOL_SERVICE_CONTEXT_HPP
00002 #define __RMOL_SVC_RMOL_SERVICE_CONTEXT_HPP
00003
00004 // //////////////////////////////////////
00005 // Import section
00006 // //////////////////////////////////////
00007 // STL
00008 #include <string>
00009 // StdAir
00010 #include <stdair/stdair_basic_types.hpp>
00011 #include <stdair/stdair_inventory_types.hpp>
00012 #include <stdair/stdair_maths_types.hpp>
00013 #include <stdair/stdair_service_types.hpp>
00014 #include <stdair/service/ServiceAbstract.hpp>
00015 // RMOL
00016 #include <rmol/RMOL_Types.hpp>
00017
00018 namespace stdair {
00019     class STDAIR_Service;
00020     class LegCabin;
00021 }
00022
00023 namespace RMOL {
00024     class RMOL_ServiceContext : public stdair::ServiceAbstract {
00025     public:
00026         friend class RMOL_Service;
00027         friend class FacRmolServiceContext;
00028     private:

```

```

00039 // ////////// Getters //////////
00043 stdair::STDAIR_ServicePtr_T getSTDAIR_ServicePtr() const {
00044     return _stdairService;
00045 }
00046
00050 stdair::STDAIR_Service& getSTDAIR_Service() const;
00051
00055 const bool getOwnStdairServiceFlag() const {
00056     return _ownStdairService;
00057 }
00058
00059
00060 private:
00061 // ////////// Setters //////////
00065 void setSTDAIR_Service (stdair::STDAIR_ServicePtr_T ioSTDAIR_ServicePtr,
00066                         const bool iOwnStdairService) {
00067     _stdairService = ioSTDAIR_ServicePtr;
00068     _ownStdairService = iOwnStdairService;
00069 }
00070
00074 void reset();
00075
00076
00077 private:
00078 // ////////// Display Methods //////////
00082 const std::string shortDisplay() const;
00083
00087 const std::string display() const;
00088
00092 const std::string describe() const;
00093
00094
00095 private:
00096 // ////////// Construction / initialisation //////////
00100 RMOL_ServiceContext();
00104 RMOL_ServiceContext (const RMOL_ServiceContext&);
00105
00109 ~RMOL_ServiceContext();
00110
00111
00112 private:
00113 // ////////// Children //////////
00117 stdair::STDAIR_ServicePtr_T _stdairService;
00118
00122 bool _ownStdairService;
00123 };
00124
00125 }
00126 #endif // __RMOL_SVC_RMOL_SERVICE_CONTEXT_HPP

```

## 28.101 test/rmol/bomsforforecaster.cpp File Reference

### 28.102 bomsforforecaster.cpp

```

00001
00005 // //////////////////////////////////////
00006 // Import section
00007 // //////////////////////////////////////
00008 // STL
00009 #include <cassert>
00010 #include <limits>
00011 #include <sstream>
00012 #include <fstream>
00013 #include <string>
00014 // Boost Unit Test Framework (UTF)
00015 #define BOOST_TEST_DYN_LINK
00016 #define BOOST_TEST_MAIN
00017 #define BOOST_TEST_MODULE OptimiseTestSuite
00018 #include <boost/test/unit_test.hpp>
00019 // StdAir

```

```

00020 #include <stdair/basic/BasLogParams.hpp>
00021 #include <stdair/basic/BasDBParams.hpp>
00022 #include <stdair/service/Logger.hpp>
00023 // RMOL
00024 #include <rmol/RMOL_Service.hpp>
00025 #include <rmol/config/rmol-paths.hpp>
00026
00027 namespace boost_utf = boost::unit_test;
00028
00029 // (Boost) Unit Test XML Report
00030 std::ofstream utfReportStream ("bomsforforecaster_utfresults.xml");
00031
00032 struct UnitTestConfig {
00033     UnitTestConfig() {
00034         boost_utf::unit_test_log.set_stream (utfReportStream);
00035         boost_utf::unit_test_log.set_format (boost_utf::XML);
00036         boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
00037         //boost_utf::unit_test_log.set_threshold_level
00038         (boost_utf::log_successful_tests);
00039     }
00040
00041     ~UnitTestConfig() {
00042     }
00043 };
00044
00045 namespace RMOL {
00046
00047     struct BookingClassData {
00048
00049         // Attributes
00050         double _bookingCount;
00051         double _fare;
00052         double _sellupFactor;
00053         bool _censorshipFlag;
00054
00055         // Constructor
00056         BookingClassData (const double iBookingCount, const double iFare,
00057                         const double iSellupFactor, const bool iCensorshipFlag)
00058             : _bookingCount(iBookingCount), _fare(iFare),
00059             _sellupFactor(iSellupFactor), _censorshipFlag(iCensorshipFlag) {
00060         }
00061
00062         // Getters
00063         double getFare () const {
00064             return _fare;
00065         }
00066
00067         bool getCensorshipFlag () const {
00068             return _censorshipFlag;
00069         }
00070
00071         // Display
00072         std::string toString() const {
00073             std::ostringstream oStr;
00074             oStr << std::endl
00075                 << "[Booking class data information]" << std::endl
00076                 << "Booking counter: " << _bookingCount << std::endl
00077                 << "Fare: " << _fare << std::endl
00078                 << "Sell-up Factor: " << _sellupFactor << std::endl
00079                 << "CensorshipFlag: " << _censorshipFlag << std::endl;
00080             return oStr.str();
00081         }
00082     };
00083
00084     struct BookingClassDataSet {
00085
00086         typedef std::vector<BookingClassData*> BookingClassDataList_T;
00087
00088         // Attributes
00089         int _numberOfClass;
00090         double _minimumFare;
00091         bool _censorshipFlag; // true if any of the classes is censored
00092         BookingClassDataList_T _bookingClassDataList;
00093     };

```

```

00100
00101 // Constructor
00102 BookingClassDataSet ()
00103 : _numberOfClass(0), _minimumFare(0),
00104   _censorshipFlag(false) {
00105 }
00106
00107 // Add BookingClassData
00108 void addBookingClassData (BookingClassData& ioBookingClassData) {
00109     _bookingClassDataList.push_back (&ioBookingClassData);
00110 }
00111
00112 // Getters
00113 unsigned int getNumberOfClass () const {
00114     return _bookingClassDataList.size();
00115 }
00116
00117 double getMinimumFare () const {
00118     return _minimumFare;
00119 }
00120
00121 bool getCensorshipFlag () const {
00122     return _censorshipFlag;
00123 }
00124
00125 // Setters
00126 void setMinimumFare (const double iMinFare) {
00127     _minimumFare = iMinFare;
00128 }
00129
00130 void setCensorshipFlag (const bool iCensorshipFlag) {
00131     _censorshipFlag = iCensorshipFlag;
00132 }
00133
00134 // compute minimum fare
00135 void updateMinimumFare() {
00136     double minFare = std::numeric_limits<double>::max();
00137     BookingClassDataList_T::iterator itBookingClassDataList;
00138     for (itBookingClassDataList = _bookingClassDataList.begin();
00139         itBookingClassDataList != _bookingClassDataList.end();
00140         ++itBookingClassDataList) {
00141         BookingClassData* lBookingClassData = *itBookingClassDataList;
00142         assert (lBookingClassData != NULL);
00143
00144         const double lFare = lBookingClassData->getFare();
00145         if (lFare < minFare) {
00146             minFare = lFare;
00147         }
00148     }
00149     //
00150     setMinimumFare (minFare);
00151 }
00152
00153 // compute censorship flag for the data set
00154 void updateCensorshipFlag () {
00155     bool censorshipFlag = false;
00156     BookingClassDataList_T::iterator itBookingClassDataList;
00157     for (itBookingClassDataList = _bookingClassDataList.begin();
00158         itBookingClassDataList != _bookingClassDataList.end();
00159         ++itBookingClassDataList) {
00160         BookingClassData* lBookingClassData = *itBookingClassDataList;
00161         assert (lBookingClassData != NULL);
00162
00163         const bool lCensorshipFlagOfAClass =
00164             lBookingClassData->getCensorshipFlag();
00165         if (lCensorshipFlagOfAClass) {
00166             censorshipFlag = true;
00167             break;
00168         }
00169     }
00170     //
00171     setCensorshipFlag (censorshipFlag);
00172 }
00173

```

```

00174     // Display
00175     std::string toString() const {
00176         std::ostringstream ostr;
00177         ostr << std::endl
00178             << "[Booking class data set information]" << std::endl
00179             << "Number of classes: " << _numberOfClass << std::endl
00180             << "Minimum fare: " << _minimumFare << std::endl
00181             << "The data of the class set are sensed: " << _censorshipFlag
00182             << std::endl;
00183         return ostr.str();
00184     }
00185
00186 };
00187
00188 // /**----- BOM : Q-Forecaster ----- */
00189 // struct QForecaster {
00190
00191 //     // Function focused BOM
00192
00193 //     // 1. calculate sell up probability for Q-eq
00194
00195 //     // 2. calculate Q-Equivalent Booking
00196 //     double calculateQEqBooking (BookingClassDataSet& iBookingClassDataSet) {
00197 //         double lQEqBooking = 0.0;
00198 //         double lMinFare = iBookingClassDataSet.getMinimumFare();
00199
00200
00201 //         return lQEqBooking;
00202 //     }
00203
00204 //     /* Calculate Q-equivalent demand
00205 //     [<- performed by unconstrainer if necessary (Using ExpMax BOM)]
00206 //     */
00207
00208
00209 //     // 3. Partition to each class
00210
00211 //     //
00212
00213 // };
00214
00215 }
00216
00217 // ////////////////////////////////// Main: Unit Test Suite //////////////////////////////////
00218
00219 // Set the UTF configuration (re-direct the output to a specific file)
00220 BOOST_GLOBAL_FIXTURE (UnitTestFixture);
00221
00222 BOOST_AUTO_TEST_SUITE (master_test_suite)
00223
00224 BOOST_AUTO_TEST_CASE (rmol_forecaster) {
00225
00226     // Output log File
00227     std::string lLogFilename ("bomsforforecaster.log");
00228     std::ofstream logOutputFile;
00229
00230     // Open and clean the log outputfile
00231     logOutputFile.open (lLogFilename.c_str());
00232     logOutputFile.clear();
00233
00234     // Initialise the RMOL service
00235     const stdair::BasLogParams lLogParams (stdair::LOG::DEBUG, logOutputFile);
00236
00237     // Initialise the RMOL service
00238     RMOL::RMOL_Service rmolService (lLogParams);
00239
00240     // Build a sample BOM tree
00241     rmolService.buildSampleBom();
00242
00243     // Register BCDataSet
00244     RMOL::BookingClassDataSet lBookingClassDataSet;
00245
00246     // Register BookingClassData

```

```

00253 RMOL::BookingClassData QClassData (10, 100, 1, false);
00254 RMOL::BookingClassData MClassData (5, 150, 0.8, true);
00255 RMOL::BookingClassData BClassData (0, 200, 0.6, false);
00256 RMOL::BookingClassData YClassData (0, 300, 0.3, false);
00257
00258 // Display
00259 STDAIR_LOG_DEBUG (QClassData.toString());
00260 STDAIR_LOG_DEBUG (MClassData.toString());
00261 STDAIR_LOG_DEBUG (BClassData.toString());
00262 STDAIR_LOG_DEBUG (YClassData.toString());
00263
00264 // Add BookingClassData into the BCDataSet
00265 lBookingClassDataSet.addBookingClassData (QClassData);
00266 lBookingClassDataSet.addBookingClassData (MClassData);
00267 lBookingClassDataSet.addBookingClassData (BClassData);
00268 lBookingClassDataSet.addBookingClassData (YClassData);
00269
00270 // DEBUG
00271 STDAIR_LOG_DEBUG (lBookingClassDataSet.toString());
00272
00273 // Number of classes
00274 const unsigned int lNoOfClass = lBookingClassDataSet.getNumberOfClass();
00275
00276 // DEBUG
00277 STDAIR_LOG_DEBUG ("Number of Classes: " << lNoOfClass);
00278
00279 // Minimum fare
00280 BOOST_CHECK_NO_THROW (lBookingClassDataSet.updateMinimumFare());
00281 const double lMinFare = lBookingClassDataSet.getMinimumFare();
00282
00283 // DEBUG
00284 STDAIR_LOG_DEBUG ("Minimum fare: " << lMinFare);
00285
00286 // Censorship flag
00287 BOOST_CHECK_NO_THROW (lBookingClassDataSet.updateCensorshipFlag());
00288 const bool lCensorshipFlag = lBookingClassDataSet.getCensorshipFlag();
00289
00290 // DEBUG
00291 STDAIR_LOG_DEBUG ("Censorship Flag: " << lCensorshipFlag);
00292
00293 // Close the log output file
00294 logOutputFile.close();
00295 }
00296
00297 // End the test suite
00298 BOOST_AUTO_TEST_SUITE_END()
00299
00300

```

## 28.103 test/rmol/ForecasterTestSuite.cpp File Reference

### 28.104 ForecasterTestSuite.cpp

```

00001
00005 // //////////////////////////////////////
00006 // Import section
00007 // //////////////////////////////////////
00008 // STL
00009 #include <sstream>
00010 #include <fstream>
00011 #include <string>
00012 #include <vector>
00013 #include <cmath>
00014 // Boost Unit Test Framework (UTF)
00015 #define BOOST_TEST_DYN_LINK
00016 #define BOOST_TEST_MAIN
00017 #define BOOST_TEST_MODULE ForecasterTestSuite
00018 #include <boost/test/unit_test.hpp>
00019 // StdAir
00020 #include <stdair/basic/BasLogParams.hpp>

```

```

00021 #include <stdair/basic/BasDBParams.hpp>
00022 #include <stdair/basic/BasFileMgr.hpp>
00023 #include <stdair/service/Logger.hpp>
00024 // RMOL
00025 #include <rmol/RMOL_Service.hpp>
00026
00027 namespace boost_utf = boost::unit_test;
00028
00029 // (Boost) Unit Test XML Report
00030 std::ofstream utfReportStream ("ForecasterTestSuite_utfresults.xml");
00031
00032 struct UnitTestConfig {
00033     UnitTestConfig() {
00034         boost_utf::unit_test_log.set_stream (utfReportStream);
00035         boost_utf::unit_test_log.set_format (boost_utf::XML);
00036         boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
00037         //boost_utf::unit_test_log.set_threshold_level
00038         (boost_utf::log_successful_tests);
00039     }
00040
00041     ~UnitTestConfig() {
00042     }
00043 };
00044
00045 // Main: Unit Test Suite
00046 // Set the UTF configuration (re-direct the output to a specific file)
00047 BOOST_GLOBAL_FIXTURE (UnitTestConfig);
00048 BOOST_AUTO_TEST_SUITE (master_test_suite)
00049
00050 BOOST_AUTO_TEST_CASE (rmol_forecaster_q_forecasting) {
00051     const bool lTestFlag = true; //testForecasterHelper(0);
00052     BOOST_CHECK_EQUAL (lTestFlag, true);
00053     BOOST_CHECK_MESSAGE (lTestFlag == true,
00054         "The test has failed. Please see the log file for "
00055         "<< \"more details\");
00056 }
00057
00058 // End the test suite
00059 BOOST_AUTO_TEST_SUITE_END()
00060
00061
00062

```

## 28.105 test/rmol/ForecasterTestSuite.hpp File Reference

```
#include <sstream>    #include <cppunit/extensions/Helper-
Macros.h>
```

### Classes

- class [ForecasterTestSuite](#)

### Functions

- [CPPUNIT\\_TEST\\_SUITE\\_REGISTRATION](#) ([ForecasterTestSuite](#))

#### 28.105.1 Function Documentation

## 28.105.1.1 CPPUNIT\_TEST\_SUITE\_REGISTRATION( ForecasterTestSuite )

## 28.106 ForecasterTestSuite.hpp

```

00001 // STL
00002 #include <sstream>
00003 // CPPUNIT
00004 #include <cppunit/extensions/HelperMacros.h>
00005
00006 class ForecasterTestSuite : public CppUnit::TestFixture {
00007     CPPUNIT_TEST_SUITE (ForecasterTestSuite);
00008     CPPUNIT_TEST (testQForecaster);
00009     CPPUNIT_TEST_SUITE_END ();
00010 public:
00011
00012     void testQForecaster();
00013
00014     ForecasterTestSuite ();
00015
00016 protected:
00017     std::stringstream _describeKey;
00018 };
00019
00020 CPPUNIT_TEST_SUITE_REGISTRATION (ForecasterTestSuite);

```

## 28.107 test/rmol/OptimiseTestSuite.cpp File Reference

## 28.108 OptimiseTestSuite.cpp

```

00001
00005 // //////////////////////////////////////
00006 // Import section
00007 // //////////////////////////////////////
00008 // STL
00009 #include <sstream>
00010 #include <fstream>
00011 #include <string>
00012 // Boost Unit Test Framework (UTF)
00013 #define BOOST_TEST_DYN_LINK
00014 #define BOOST_TEST_MAIN
00015 #define BOOST_TEST_MODULE OptimiseTestSuite
00016 #include <boost/test/unit_test.hpp>
00017 // StdAir
00018 #include <stdair/basic/BasLogParams.hpp>
00019 #include <stdair/basic/BasDBParams.hpp>
00020 #include <stdair/basic/BasFileMgr.hpp>
00021 #include <stdair/service/Logger.hpp>
00022 // RMOL
00023 #include <rmol/RMOL_Service.hpp>
00024 #include <rmol/config/rmol-paths.hpp>
00025
00026 namespace boost_utf = boost::unit_test;
00027
00028 // (Boost) Unit Test XML Report
00029 std::ofstream utfReportStream ("OptimiseTestSuite_utfresults.xml");
00030
00031 struct UnitTestConfig {
00032     UnitTestConfig() {
00033         boost_utf::unit_test_log.set_stream (utfReportStream);
00034         boost_utf::unit_test_log.set_format (boost_utf::XML);
00035         boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
00036         //boost_utf::unit_test_log.set_threshold_level
00037         (boost_utf::log_successful_tests);
00038     }
00039
00040     ~UnitTestConfig() {
00041     }
00042 };
00043
00044 };

```



```

00047
00048
00049 // //////////////////////////////////////
00050 int testOptimiseHelper (const unsigned short optimisationMethodFlag,
00051                        const bool isBuiltin) {
00052
00053     // Return value
00054     int oExpectedBookingLimit = 0;
00055
00056     // Output log File
00057     std::ostream oStr;
00058     oStr << "OptimiseTestSuite_" << optimisationMethodFlag << ".log";
00059     const stdair::Filename_T lLogFilename (oStr.str());
00060
00061     // Number of random draws to be generated (best if greater than 100)
00062     const int K = 100000;
00063
00064     // Methods of optimisation (0 = Monte-Carlo, 1 = Dynamic Programming,
00065     // 2 = EMSR, 3 = EMSR-a, 4 = EMSR-b, 5 = EMSR-a with sellup prob.)
00066     const unsigned short METHOD_FLAG = optimisationMethodFlag;
00067
00068     // Cabin Capacity (it must be greater then 100 here)
00069     const double cabinCapacity = 100.0;
00070
00071     // Set the log parameters
00072     std::ofstream logOutputFile;
00073     // Open and clean the log outputfile
00074     logOutputFile.open (lLogFilename.c_str());
00075     logOutputFile.clear();
00076
00077     // Initialise the RMOL service
00078     const stdair::BasLogParams lLogParams (stdair::LOG::DEBUG, logOutputFile);
00079     RMOL::RMOL_Service rmolService (lLogParams);
00080
00081     // Check wether or not a (CSV) input file should be read
00082     if (isBuiltin == true) {
00083
00084         // Build the default sample BOM tree and build a dummy BOM tree.
00085         rmolService.buildSampleBom();
00086
00087     } else {
00088
00089         // Parse the optimisation data and build a dummy BOM tree
00090         const stdair::Filename_T lRMInputFileName (STDAIR_SAMPLE_DIR "/rm02.csv");
00091         rmolService.parseAndLoad (cabinCapacity, lRMInputFileName);
00092     }
00093
00094     switch (METHOD_FLAG) {
00095     case 0: {
00096         // DEBUG
00097         STDAIR_LOG_DEBUG ("Optimisation by Monte-Carlo (MC)");
00098
00099         // Calculate the optimal protections by the Monte Carlo
00100         // Integration approach
00101         rmolService.optimalOptimisationByMCIntegration (K);
00102         break;
00103     }
00104
00105     case 1: {
00106         // DEBUG
00107         STDAIR_LOG_DEBUG ("Optimisation by Dynamic Programming (DP)");
00108
00109         // Calculate the optimal protections by DP.
00110         rmolService.optimalOptimisationByDP ();
00111         break;
00112     }
00113
00114     case 2: {
00115         // DEBUG
00116         STDAIR_LOG_DEBUG ("Calculate the Bid-Price Vectors (BPV) by EMSR");
00117
00118         // Calculate the Bid-Price Vector by EMSR
00119         rmolService.heuristicOptimisationByEmsr ();
00120         break;

```

```

00121     }
00122
00123     case 3: {
00124         // DEBUG
00125         STDAIR_LOG_DEBUG ("Calculate the Authorisation Levels (AUs) by EMSRa");
00126
00127         // Calculate the protections by EMSR-a
00128         // Test the EMSR-a algorithm implementation
00129         rmolService.heuristicOptimisationByEmsrA ();
00130
00131         // Return a cumulated booking limit value to test
00132         // oExpectedBookingLimit = static_cast<int> (lBookingLimitVector.at(2));
00133         break;
00134     }
00135
00136     case 4: {
00137         // DEBUG
00138         STDAIR_LOG_DEBUG ("Calculate the Authorisation Levels (AUs) by EMSRb");
00139
00140         // Calculate the protections by EMSR-b
00141         rmolService.heuristicOptimisationByEmsrB ();
00142         break;
00143     }
00144
00145     default: rmolService.optimalOptimisationByMCIntegration (K);
00146 }
00147
00148 // Close the log file
00149 logOutputFile.close();
00150
00151 return oExpectedBookingLimit;
00152 }
00153
00154
00155 // ////////////////////////////////// Main: Unit Test Suite //////////////////////////////////
00156
00157 // Set the UTF configuration (re-direct the output to a specific file)
00158 BOOST_GLOBAL_FIXTURE (UnitTestFixture);
00159
00160 // ////////////////////////////////////////
00161 // Tests are based on the following input values
00162 // price; mean; standard deviation;
00163 // 1050; 17.3; 5.8;
00164 // 567; 45.1; 15.0;
00165 // 534; 39.6; 13.2;
00166 // 520; 34.0; 11.3;
00167 // ////////////////////////////////////////
00168
00173 BOOST_AUTO_TEST_SUITE (master_test_suite)
00174
00175
00178 BOOST_AUTO_TEST_CASE (rmol_optimisation_monte_carlo) {
00179     // State whether the BOM tree should be built-in or parsed from an input file
00180     const bool isBuiltin = false;
00181
00182     BOOST_CHECK_NO_THROW (testOptimiseHelper(0, isBuiltin));
00183 }
00184
00185
00189 BOOST_AUTO_TEST_CASE (rmol_optimisation_dynamic_programming) {
00190     // State whether the BOM tree should be built-in or parsed from an input file
00191     const bool isBuiltin = false;
00192
00193     BOOST_CHECK_NO_THROW (testOptimiseHelper(1, isBuiltin));
00194 }
00195
00196
00201 BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_bpv) {
00202     // State whether the BOM tree should be built-in or parsed from an input file
00203     const bool isBuiltin = false;
00204
00205     BOOST_CHECK_NO_THROW (testOptimiseHelper(2, isBuiltin));
00206 }
00207 }

```

```
00208
00213 BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_a) {
00214
00215     // State whether the BOM tree should be built-in or parsed from an input file
00216     const bool isBuiltin = false;
00217
00218     BOOST_CHECK_NO_THROW (testOptimiseHelper(3, isBuiltin));
00219     // const int lBookingLimit = testOptimiseHelper(3);
00220     // const int lExpectedBookingLimit = 61;
00221     // BOOST_CHECK_EQUAL (lBookingLimit, lExpectedBookingLimit);
00222     // BOOST_CHECK_MESSAGE (lBookingLimit == lExpectedBookingLimit,
00223     //                       "The booking limit is " << lBookingLimit
00224     //                       << ", but it is expected to be "
00225     //                       << lExpectedBookingLimit);
00226 }
00227
00232 BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_b) {
00233
00234     // State whether the BOM tree should be built-in or parsed from an input file
00235     const bool isBuiltin = false;
00236
00237     BOOST_CHECK_NO_THROW (testOptimiseHelper(4, isBuiltin));
00238 }
00239
00243 BOOST_AUTO_TEST_CASE (rmol_optimisation_monte_carlo_built_in) {
00244
00245     // State whether the BOM tree should be built-in or parsed from an input file
00246     const bool isBuiltin = true;
00247
00248     BOOST_CHECK_NO_THROW (testOptimiseHelper(5, isBuiltin));
00249 }
00250
00254 BOOST_AUTO_TEST_CASE (rmol_optimisation_dynamic_programming_built_in) {
00255
00256     // State whether the BOM tree should be built-in or parsed from an input file
00257     const bool isBuiltin = true;
00258
00259     BOOST_CHECK_NO_THROW (testOptimiseHelper(6, isBuiltin));
00260 }
00261
00266 BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_bpv_built_in) {
00267
00268     // State whether the BOM tree should be built-in or parsed from an input file
00269     const bool isBuiltin = true;
00270
00271     BOOST_CHECK_NO_THROW (testOptimiseHelper(7, isBuiltin));
00272 }
00273
00278 BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_a_built_in) {
00279
00280     // State whether the BOM tree should be built-in or parsed from an input file
00281     const bool isBuiltin = true;
00282
00283     BOOST_CHECK_NO_THROW (testOptimiseHelper(8, isBuiltin));
00284 }
00285
00290 BOOST_AUTO_TEST_CASE (rmol_optimisation_emsr_b_built_in) {
00291
00292     // State whether the BOM tree should be built-in or parsed from an input file
00293     const bool isBuiltin = true;
00294
00295     BOOST_CHECK_NO_THROW (testOptimiseHelper(9, isBuiltin));
00296 }
00297
00298 // End the test suite
00299 BOOST_AUTO_TEST_SUITE_END()
00300
00301
```

## 28.109 test/rmol/OptimiseTestSuite.hpp File Reference

```
#include <sstream>    #include <cppunit/extensions/Helper-
Macros.h>
```

### Classes

- class [OptimiseTestSuite](#)

### Functions

- [CPPUNIT\\_TEST\\_SUITE\\_REGISTRATION](#) ([OptimiseTestSuite](#))

#### 28.109.1 Function Documentation

##### 28.109.1.1 CPPUNIT\_TEST\_SUITE\_REGISTRATION ( [OptimiseTestSuite](#) )

## 28.110 OptimiseTestSuite.hpp

```
00001 // STL
00002 #include <sstream>
00003 // CPPUNIT
00004 #include <cppunit/extensions/HelperMacros.h>
00005
00006 class OptimiseTestSuite : public CppUnit::TestFixture {
00007     CPPUNIT_TEST_SUITE (OptimiseTestSuite);
00008     CPPUNIT_TEST (testOptimiseMC);
00009     CPPUNIT_TEST (testOptimiseDP);
00010     CPPUNIT_TEST (testOptimiseEMSR);
00011     CPPUNIT_TEST (testOptimiseEMSRa);
00012     CPPUNIT_TEST (testOptimiseEMSRb);
00013     CPPUNIT_TEST (testOptimiseEMSRaWithSU);
00014     // CPPUNIT_TEST (errorCase);
00015     CPPUNIT_TEST_SUITE_END ();
00016 public:
00017
00019     void testOptimiseMC();
00020
00022     void testOptimiseDP();
00023
00026     void testOptimiseEMSR();
00027
00030     void testOptimiseEMSRa();
00031
00034     void testOptimiseEMSRb();
00035
00037     // void errorCase ();
00038
00040     OptimiseTestSuite ();
00041
00042 protected:
00043     std::stringstream _describeKey;
00044 };
00045
00046 CPPUNIT_TEST_SUITE_REGISTRATION (OptimiseTestSuite);
```

## 28.111 test/rmol/UnconstrainerTestSuite.cpp File Reference

## 28.112 UnconstrainerTestSuite.cpp

```

00001
00005 // //////////////////////////////////////
00006 // Import section
00007 // //////////////////////////////////////
00008 // STL
00009 #include <sstream>
00010 #include <fstream>
00011 #include <string>
00012 // Boost Unit Test Framework (UTF)
00013 #define BOOST_TEST_DYN_LINK
00014 #define BOOST_TEST_MAIN
00015 #define BOOST_TEST_MODULE UnconstrainerTestSuite
00016 #include <boost/test/unit_test.hpp>
00017 // StdAir
00018 #include <stdair/basic/BasLogParams.hpp>
00019 #include <stdair/basic/BasDBParams.hpp>
00020 #include <stdair/basic/BasFileMgr.hpp>
00021 #include <stdair/service/Logger.hpp>
00022 // RMOL
00023 #include <rmol/RMOL_Service.hpp>
00024
00025 namespace boost_utf = boost::unit_test;
00026
00027 // (Boost) Unit Test XML Report
00028 std::ofstream utfReportStream ("UnconstrainerTestSuite_utfresults.xml");
00029
00033 struct UnitTestConfig {
00035     UnitTestConfig() {
00036         boost_utf::unit_test_log.set_stream (utfReportStream);
00037         boost_utf::unit_test_log.set_format (boost_utf::XML);
00038         boost_utf::unit_test_log.set_threshold_level (boost_utf::log_test_units);
00039         //boost_utf::unit_test_log.set_threshold_level
00040         (boost_utf::log_successful_tests);
00041     }
00042
00043     ~UnitTestConfig() {
00044     }
00045 };
00046
00047
00048 // ////////////////////////////////// Main: Unit Test Suite //////////////////////////////////
00049
00050 // Set the UTF configuration (re-direct the output to a specific file)
00051 BOOST_GLOBAL_FIXTURE (UnitTestConfig);
00052
00053 BOOST_AUTO_TEST_SUITE (master_test_suite)
00054
00055 BOOST_AUTO_TEST_CASE (rmol_unconstraining_em) {
00056     const bool lTestFlag = true; // testUnconstrainerHelper(0);
00057     BOOST_CHECK_EQUAL (lTestFlag, true);
00058     BOOST_CHECK_MESSAGE (lTestFlag == true,
00059         "The test has failed. Please see the log file for "
00060         "<< \"more details\"");
00061 }
00062
00063 // End the test suite
00064 BOOST_AUTO_TEST_SUITE_END()
00065
00066
00067

```

## 28.113 test/rmol/UnconstrainerTestSuite.hpp File Reference

```

#include <sstream>    #include <cppunit/extensions/Helper-
Macros.h>

```

## Classes

- class [UnconstrainerTestSuite](#)

## Functions

- [CPPUNIT\\_TEST\\_SUITE\\_REGISTRATION](#) ([UnconstrainerTestSuite](#))

### 28.113.1 Function Documentation

#### 28.113.1.1 CPPUNIT\_TEST\_SUITE\_REGISTRATION ( UnconstrainerTestSuite )

## 28.114 UnconstrainerTestSuite.hpp

```
00001 // STL
00002 #include <sstream>
00003 // CPPUNIT
00004 #include <cppunit/extensions/HelperMacros.h>
00005
00006 class UnconstrainerTestSuite : public CppUnit::TestFixture {
00007     CPPUNIT_TEST_SUITE (UnconstrainerTestSuite);
00008     CPPUNIT_TEST (testUnconstrainingByEM);
00009     CPPUNIT_TEST_SUITE_END ();
00010 public:
00011
00012     void testUnconstrainingByEM();
00013
00014     UnconstrainerTestSuite ();
00015
00016 protected:
00017     std::stringstream _describeKey;
00018 };
00019
00020 CPPUNIT_TEST_SUITE_REGISTRATION (UnconstrainerTestSuite);
```

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