Installing and Configuring the Vacation Booking Environment for Rational Integration Tester

Note

Before using this information and the product it supports, read the information in "Legal Notices" on page 43.

1   Scenario overview

1.1   Purpose

This document describes how to install and configure the Vacation Booking training environment for IBM® Rational® Integration Tester.   This environment may also be used for delivering demonstrations of Rational Integration Tester.

1.2   Audience

As the process of setting up the Vacation Booking environment requires the installation of a number of different software packages, it is expected that anyone who wishes to go through this procedure will be familiar with the underlying environment – in this case, Red Hat Enterprise Linux (RHEL).

Although the documentation provides walkthroughs for the installation of any IBM software, the user is expected to be able to perform simple installations of other software as directed in this document.

If the reader is unfamiliar with RHEL or Linux in general, some extra research may be required in order to understand some of the modifications to the system that are required during this set up of the training environment.

In particular, it is assumed that the user is capable of understanding how to secure their environment correctly. Setting up the environment may require changing settings in the local firewall; doing this without understanding the implications of those changes may create security risks within that environment.

1.3   Software requirements

During the installation of the training environment, the user will need administrator-level access to a RHEL server – it is suggested that the creation of this environment should be within a virtual machine. The table below lists the software requirements for this environment.   With the exception of the operating system, none of this software is expected to be pre-installed; however, the user will need to make sure that they have access to all of the software listed in TABLE 1.

Note that all instructions in this guide assume that the user has root access, unless otherwise stated. If the user has switched to the root account with su, then all commands in this guide may be executed as presented; otherwise, commands may need to be preceded with the sudo command.

Software	Version	Comments
RHEL 64 bit Client O/S	6.x	Installation has been tested on RHEL 6.5; RHEL 7 has not yet been tested.

IBM Installation Manager	1.8.1 or later	Required to install other IBM software, including Rational Integration Tester. Earlier versions will not work.
IBM WebSphere® MQ	7.0, 7.1 or 7.5	Version 8 will be supported in a future release.
IBM WebSphere Application Server	8.0 or 8.5	The Express edition may be used, but is more complex to set up on a 64 bit system – the full version of the application server is therefore preferred.
IBM DB2® Express-C	10.1, 10.5	The Express-C edition has been used in this document; other editions should also work.
Apache Tomcat	6 or 7	Download only; installed with the main Vacation Booking packages.
Web Browser (Firefox, Chrome, etc)	Any recent version	The demonstration environment has only been tested on Firefox; in theory other browsers should work, though this has not been tested.

Table 1 - Software Requirements

1.4 Hardware requirements

As there is a lot of software involved in this setup, it is recommended that any machine used for this environment have at least 4GB RAM. More RAM is suggested; less may lead to some components malfunctioning due to the need to swap between RAM and the hard drive, and the timeouts that will occur as a result. For a VM, it is recommended that 80GB be used for the hard drive. It may be possible to use less, but this should be enough to prevent issues during the installation process, when archived versions of files may need to be extracted, copied, etc.

2   RHEL configuration

Before the software required for the Vacation Booking scenario is installed, the RHEL image should be configured appropriately. This requires three main steps:

1. Installation of software dependencies

2. Installation of an appropriate Java runtime environment

3. Configuration of firewall ports

4. Configuration of the hosts file

2.1   Software dependencies

In order to install the IBM software, some extra packages may need to be installed first. Each of these may be installed as the root user with the yum software, in the form: `yum install xxxx`, where xxxx is replaced by each of the following:

```
glibc.i686
pam.i686
compat-libstdc++-33
compat-libstdc++-33.i686
sg3_utils
```

If the software is already installed, running the `yum` command will simply state that the software is present. You may also want to make sure your system is up to date if you have created a fresh VM, by using the command: `yum update`

2.2   Installing the Java Runtime Environment

RHEL is supplied with OpenJDK, which is an open source implementation of the Java Platform, Standard Edition (Java SE).

However, as there are some compatibility issues between OpenJDK and the Vacation Booking environment, it is suggested that OpenJDK is uninstalled and replaced with the most recent version of the IBM or Oracle Java Runtime Environment (JRE) for Linux.

If desired, it is also possible to leave OpenJDK on the machine, and set up multiple JREs. This is an exercise left to the reader.

To uninstall OpenJDK:

1. Open **System**

2. Select **Administration > Add/Remove Software**

3. Enter OpenJDK in the search box, and click **Find**. A list of OpenJDK components will be displayed.

4. Find the `java-1.x.x-openjdk` package in the list, and clear the check box for that package.

5. Press **Apply**

Following this, the IBM or Oracle JRE may be installed. The IBM JRE may be downloaded from IBM DeveloperWorks at http://www.ibm.com/developerworks/java/jdk/. Whichever JRE is installed, it should be a Java 6 or Java 7 JRE – older versions may cause issues later on.

Once a JRE is installed, it is advisable to test the installation. From a terminal window, enter the command `java –version`

Sample output for an Oracle JRE:

```
java version "1.7.0_17"

Java(TM) SE Runtime Environment (build 1.7.0_17-b02)

Java HotSpot(TM) 64-Bit Server VM (build 23.7-b01, mixed mode)
```

Sample output for an IBM JRE:

```
Java(TM) SE Runtime Environment (build pxa6470sr4fp1-20130325_01(SR4 FP1))

IBM J9 VM (build 2.6, JRE 1.7.0 Linux amd64-64 Compressed References
20130306_140761 (JIT enabled, AOT enabled)

J9VM - R26_Java726_SR4_FP1_20130306_1011_B140761

JIT  - r11.b03_20130131_32403ifx1

GC   - R26_Java726_SR4_FP1_20130306_1011_B140761_CMPRSS

J9CL - 20130306_140761)

JCL - 20130315_01 based on Oracle 7u13-b08
```

Finally, check that the JAVA_HOME or the JRE_HOME environment variable has been set up, pointing to the root folder of your new Java installation. The Java home folder should also be on your path. To handle this for an IBM JDK, using Java 7 on a 64 bit machine, create the file `/etc/profile.d/ibmjdk.sh`, with the following content (note that you may need to change the path specified, depending on where you installed the JDK):

```
if [[ ! ":$PATH:" == *":/opt/ibm/java-x86_64-70/bin:"* ]]; then
      export PATH=/opt/ibm/java-x86_64-70/bin:$PATH
fi

if [[ -z "$JAVA_HOME" ]]; then
      export JAVA_HOME=/opt/ibm/java-x86_64-70
fi
```

Note that the paths will be different if you are using a Java 6 JVM, or a JRE. Make sure that the file is owned by root. Once it is in place, the PATH and JAVA_HOME variables will be updated on the next login.

2.3 Configuring the firewall

As everything can be run on the local machine, extensive port configurations are not necessarily required. However, as a large number of ports are required for communications, the simplest way to handle this is to allow all traffic over the localhost interface. This should be sufficient on a virtual machine, but if the Vacation Booking environment is being set up outside a virtual environment, then it may not be possible to do this; in that case, refer to the table below, which supplies a list of ports required by each application.

To add simple firewall rules that allow communications on all ports over the localhost interface, run the following commands in a terminal window:

```
iptables –A INPUT –i lo –p tcp –m tcp –j ACCEPT

iptables –A INPUT –i lo –p udp –m udp –j ACCEPT

service iptables save
```

For environments that need to be more secure, you may wish to consider enabling only certain ports. To do this, you can use the commands, replacing 1234 with the appropriate port number:

```
iptables -A INPUT -i lo -p tcp -m tcp --dport 1234 -j ACCEPT  (for tcp)

iptables -A INPUT -i lo -p udp -m udp --dport 1234 -j ACCEPT (for udp)
```

You will need to save the iptables configuration after making all of your changes. The ports for each application are described below, in TABLE 2. Note that if you follow this method, you will need to configure ports for each virtual service when you create it. This is because, when the desired port is already in use (as it will be in this instance), Rational Integration Tester picks a random port to use – specifying the port numbers below and using them when creating stubs will prevent this behaviour.

Software	Port Numbers (TCP unless otherwise specified)

HTTP/HTTPS Traffic	80, 443
WebSphere Application Server	2809, 5060, 5061, 5557, 5558, 5578, 7276, 7286, 8008, 8876, 8877, 8880, 8881, 9043, 9060, 9080, 9098, 9099, 9100, 9353, 9401, 9402, 9403, 9443, 9630, 9631, 9633, 9634, 9807, 9808, 9810, 9811, 9943, 9960
IBM DB2	523 (TCP), 523 (UDP), 50000
WebSphere MQ	1414
Tomcat	8005, 8089
Rational Test Control Panel	7819
Rational Integration Tester HTTP Proxy	3128-3131
Rational Integration Tester Agent	4476, 7842, 8765
Sample Web Services	8086,8088
Virtual Services	8085,8095,9085

Table 2 - Ports required by Vacation Booking software

In addition to the ports listed above, the entire set of ports from 32768 to 61000 should be allowed for communications within the localhost. These are used by some of the applications on the server as ephemeral ports (otherwise known as dynamic ports), allowing the use of temporary ports. This can be done with the commands:

```
iptables –A INPUT –i lo –p tcp –m tcp --dport 32768:61000 –j ACCEPT

iptables –A INPUT –i lo –p udp –m udp --dport 32768:61000 –j ACCEPT

service iptables save
```

You may notice that all firewall rules have been specified using the localhost interface, rather than the localhost address as the source and destination. This is because some services will use the IP address of the local machine, rather than 127.0.0.1. If you would like to make your test environment available from other machines, then you will need to edit these rules further. Under normal circumstances, this will not be necessary, as the environment should contain everything that you will require.

2.4 Hosts configuration

As everything is running within a single machine, it may be preferable to set up multiple hostnames for that machine, to allow the appearance of running the environment across multiple machines. This will also help avoid problems with changing hostnames is operating within a larger cloud environment. As an example, a training environment may

be set up with modifications to the file `/etc/hosts` to allow you to use the domains `www.vbooking.com`, `was.vbooking.com`, `mq.vbooking.com`, `db2.vbooking.com`, and `rit.vbooking.com`, all pointing at `127.0.0.1`. Note that this step is entirely optional. All steps in this guide may be completed by using `localhost` or the hostname of the machine.

Whatever you choose to do, make sure that the hostname of your machine can be resolved, either through an nslookup, or through the hosts file. If you do not do this, you will encounter problems with the DB2 installation.

3 Vacation Booking software installation

3.1 Introduction

Before you can install the Vacation Booking scenario, you must first install the software prerequisites outlined in TABLE 1.

This chapter describes how to install the required software. Particular focus is given to IBM software, to make sure that everything is configured correctly before attempting to install the Vacation Booking applications. The following chapter will cover the installation of those applications on top of this environment.

As mentioned previously, most steps are performed as a root user. Some software may need to be configured with a different user; in that case, you will be told to switch to that user at the appropriate time.

All instructions assume that the user has access to a current X Windows session. Most of the software used within this document is GUI driven, and so will not work without a graphical environment. Some software may be configured without the GUI; however, this document favors graphical environments where possible. Command line equivalents to most GUI-driven software have been left to the reader.

All software installed in this chapter should be installed to the default path for that software. This will make configuration of Rational Integration Tester's Library Manager very easy. If you need to install WebSphere MQ or the WebSphere Application Server into a different location, you will need to set up the Library Manager to point to those locations during the configuration of Rational Integration Tester and the Rational Test Virtualization Server.

Any password suggested is for demonstration purposes only, and should be changed. However, most passwords will need to be shared with end users. If installing the environment onto a virtual machine that will be distributed to different users, make sure that any passwords used can also be shared.

Finally, these instructions assume that all installation is taking place on a fresh virtual machine image; if this is not the case, some modifications may be required. Those modifications are beyond the scope of this document, as they will change depending on what is already present and configured.

3.2 IBM Installation Manager

In order to install some IBM products, the IBM Installation Manager is required. Version 1.8.1 or newer should be downloaded from the IBM website. Older versions will not be able to support or install recent versions of Rational Integration Tester.

1. From the IBM website, download the `agent.installer.linux.gtk.x86_64` for 64-bit machines or `agent.installer.linux.gtk.x86` for 32-bit machines.

2. Extract the archive to a convenient location.

3. Find the install script within the extracted files, and execute it from the command line:
   `./install`
   This will launch an Installation Manager window – you can then follow the prompts to install this tool.

4. Alternatively, a silent installation can be carried out with the command:
   `./install --launcher.ini silent-install.ini -log <log file path and name>`

5. Following this installation, the Installation Manager should be run as the root user.

3.3   WebSphere Application Server

The installation for WebSphere Application Server can be done through IBM Installation Manager. Installation Manager will handle most of the details – simply follow the prompts and instructions on screen. All options may be left at their default settings.

At the end of the installation process, you can choose to use the option **Profile Management Tool to create an application server profile**. If you use this method, do not enable administrative security.

Alternatively, from the console, you can switch to the folder `/opt/IBM/WebSphere/AppServer/bin` and execute the command: `./manageprofiles.sh –create`

Either method will create a new profile for you; no further setup needs to be carried out at this stage.

3.4   IBM WebSphere MQ

Installation of IBM WebSphere MQ is not handled through the IBM Installation Manager; rather, it is installed as a set of rpm packages through the RHEL package management tools.

1. First, download the appropriate WebSphere MQ package for your environment – eg,
   `WSMQ_LNX_ON_X86_64_7.1.0.2_EIM.tar.gz`

2. Move the downloaded file to a convenient location, and extract it to that folder:
   `tar -zxvf WSMQ_LNX_ON_X86_64_7.1.0.2_EIM.tar.gz`

3. Run the `mqlicense.sh` script to license your WebSphere MQ installation.

4. Install all .rpm packages with the command:
   `rpm –ivh *.rpm`

In order to get WebSphere MQ working, you may need to check several of the system settings for your operating system. This information is detailed at http://www-01.ibm.com/support/knowledgecenter/SSFKSJ_7.1.0/com.ibm.mq.doc/zi00760_.htm

3.5 IBM DB2

Similarly, the DB2 installation is done outside of IBM Installation Manager. DB2 can be downloaded as an installation archive, which you will need to extract and run, choosing a typical installation as you go through the wizard. During the installation, you will need to set up a user as an administrator for DB – leave the name of the user and the group at the default values (`dasusr1` and `dasadm1` respectively).

You will be offered the opportunity to create an instance towards the end of the installation process. There is no need to do this. An instance will be created when the Vacation Booking packages are installed.

When the process completes, it will suggest a few further actions, such as running the DB2 first steps wizard. Note that, in some versions of DB2, the first steps wizard depends on web browser features that have been removed from current releases of those browsers, and so it may not function correctly. For the purposes of this document, the first steps wizard is not necessary.

Note: SE Linux security policies can cause problems with some versions of DB2. The simplest solution to this is to disable SE Linux, although this will not be acceptable from a security point of view in all environments. Within a virtual machine that is sufficiently cut off from the rest of the world, it may be a reasonable option. If it is not acceptable to disable SE Linux, it is left to the reader to configure the SE Linux policies appropriately to work with DB2; this information is outside the scope of this document.

3.6 Apache Tomcat

Apache Tomcat is also used by the Vacation Booking system. The install scripts will handle the installation and configuration of this software for you, but make sure you have downloaded a copy of Tomcat 6 or Tomcat 7 from the tomcat home page at `http://tomcat.apache.org/`. At this stage, nothing more than the .zip file is required.

3.7 Other software

To go through the training course, students will require a web browser and an office package. The course materials have been tested with Firefox as the web browser, and both LibreOffice and OpenOffice for the office package.

Additionally, a text editor will be required. While some users may be familiar with standard Linux text editors such as emacs, vi or nano, an X Windows-based editor will work better during the training course.

Gedit is available within the RHEL repositories, has syntax highlighting for XML and other message types, and provides a simple interface. It has also been tested with the training materials. If you are using KDE or another desktop environment, you may wish to choose an editor supplied within that environment.

For demonstrations, the web browser is the only piece of software that is definitely required, but the other tools will most likely be quite useful.

3.8   Post-installation

Most installation tasks should have completed without problems. However, before you install the Vacation Booking applications, you should check a few things:

- A group should have been created for accessing the WebSphere MQ server. By default this group should be called mqm. The user that you will be using to log in should be added to this group with the command:
`usermod –a –G mqm <username>`

- WebSphere MQ and WebSphere Application Server should be running.

- If you will be shutting down and starting up your machine fairly often, you may wish to make sure that each of the applications that you have installed in this module will start automatically when rebooting the machine.

- As a precaution, you may want to remove the DB2 Administration Server. This can cause system stability issues on 64 bit systems, and is not necessary for the Vacation Booking system. To do this, enter the command `/opt/ibm/db2/<Vx.x>/instance/dasdrop`

4   Installing and configuring Vacation Booking

4.1   System overview

The Vacation Booking system has 3 main flows through it, which involve several different pieces. Before you set up the system, let's look at what's included.
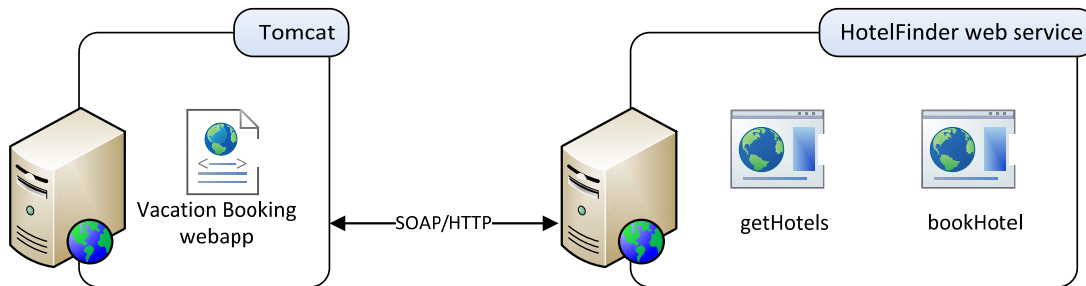
Flight search and booking:
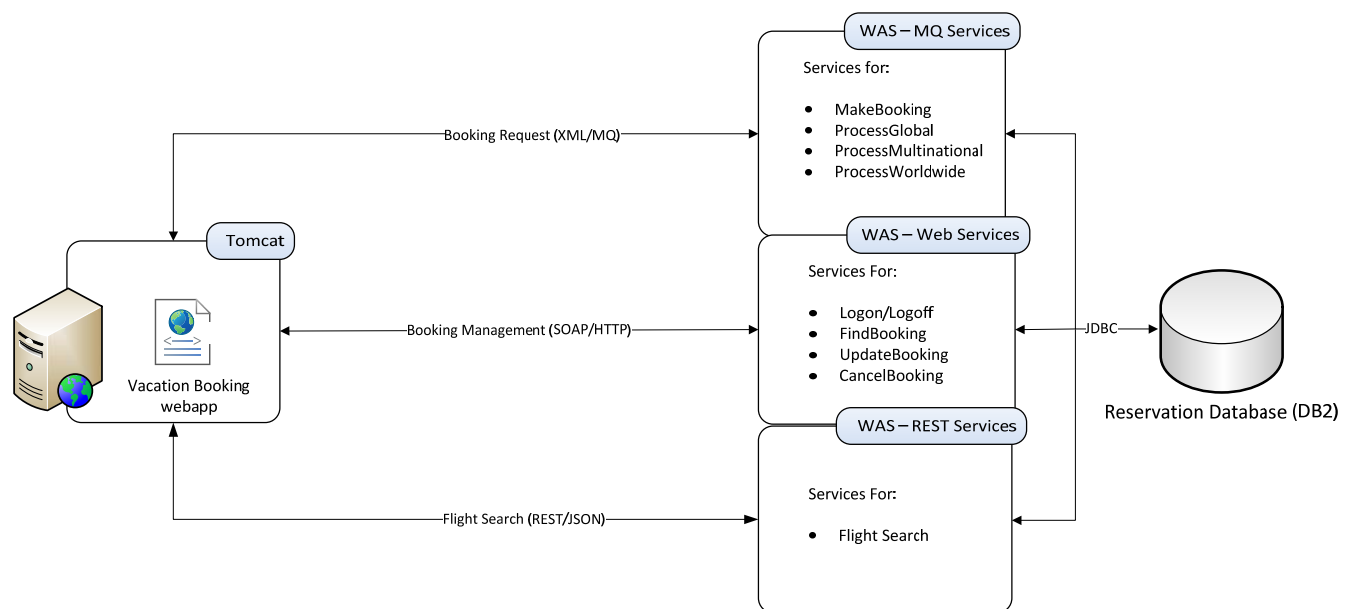
The Flight search and booking system has 3 different sections to it:

- A user may choose to search for a flight from their web browser. The Tomcat web server will then make a REST-based query to an application running inside the WebSphere Application Server, which talks to the DB2 database in turn. A response is sent back to the Tomcat web server in JSON format, which is then formatted as a set of results for the user's web browser

- A user can book a flight from their web browser, either following a search, or by using a quick link to a particular flight. This sends an XML booking request using WebSphere MQ, which is picked up by the MakeBooking service running on the WebSphere Application Server. This also communicates to other services running inside the same application server, also over WebSphere MQ, to handle any credit card information. These services will read and write to the DB2 database, and finally, the MakeBooking service will send a response back to the web server, using XML over WebSphere MQ.

- Finally, a user can lookup, modify, or cancel existing bookings using a set of web services. These are running inside the WebSphere Application Server, talk to the DB2 database, and again are accessed by the Tomcat web server.

Hotel search and booking:

This is a very simple part of the system. A user can search and book a hotel room. The Vacation Booking web application running inside Tomcat will talk to the HotelFinder web service to handle this functionality. Note that the HotelFinder web service is also hosted by Tomcat.

Flight upgrade and check-in:
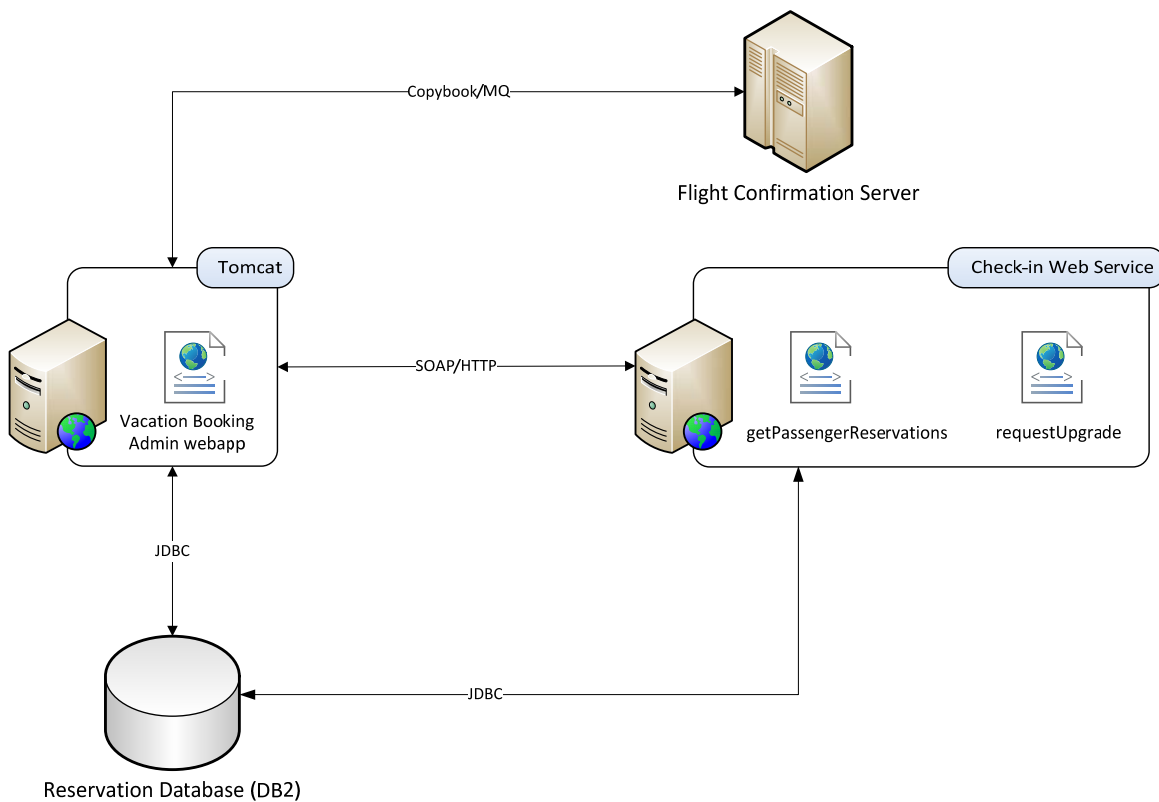
Through the Vacation Booking Administration web application running inside Tomcat, other functionality is also available. Firstly, a couple of web services are provided to allow the user to check whether or not a passenger may be upgraded. On trying to check in a passenger, regardless of whether or not they have been upgraded, a message is sent to the flight confirmation server using WebSphere MQ – this communication is in COBOL Copybook format. A response in the same format is sent back to the web application, at which point it updates the database directly.

4.2   Prerequisites

The Vacation Booking system has a number of different pieces that need to be set up, as might be concluded from the different software packages installed so far. Most of the setup is handled through an install script, but there are a few prerequisites:

1. The vbooking.zip file that contains most of the files required for Vacation Booking.

2. A .zip file containing Apache Tomcat 6 or 7. For Tomcat 7, you can take the Core .zip file from https://tomcat.apache.org/download-70.cgi - note that while there are several other options, such as .tar.gz, the install scripts are not built to use them.

3. All software listed previously must be installed.

4. The WebSphere Application server must be set up with a server instance.

5. The install scripts must be extracted and configured.

The first four steps should require no further explanation, but the final step requires some work. Following that, you'll need to use the install scripts to set up the system.

4.3   Configuration

To commence, you will need to copy the Vacation Booking and Tomcat .zip files to their own folder. Extract the vbooking.zip file to a temporary location, and copy the contents of the /scripts/installer folder to the same location as the two .zip files.

You should now see your two .zip files, a group of .sh shell scripts, a README.txt, and an installer-variables.conf file. Before doing anything else, you'll need to configure installer by filling out the installer-variables.conf file.

A number of the settings will either be the locations where software has been installed, or configuration variables detailing where it should go. These should mainly be self-explanatory; the defaults will work in most cases, if you have installed the software to the default paths.

There are also a number of other settings for usernames and passwords. The script will create users and groups if they do not exist already. It is advised to leave the usernames and group names as they are, though passwords can be changed if desired. That said, changing the passwords within the installer-variables.conf file is preferable to doing

it afterwards; changing the passwords afterwards will require changing the connection details in multiple components of the system.

Finally, there's a Tomcat version setting. Make sure this matches the name of the .zip file that you downloaded earlier.

4.4 Installing

Make sure that all of the .sh files are executable with the command:

```
chmod +x *.sh
```

You can then run `./InstallVBooking.sh`. The script will run through a number of prompts, handling each part of the installation separately. If desired, the script can be used to go through just a single part of the installation, though you will need to go through all parts of the script to complete the setup of the system.

If there are any issues, please examine the log files created in the same folder. Note that some error messages are currently expected. These include:

- A message indicating that there was no data in the database to be dropped when initialising it (this currently uses a script which may also be used to reset the database to a known state).

4.5 Java 7 setup

If you have installed Java 7, you may experience some issues when attempting to use the parts of the system that access MQ while using that version of the JVM, as the Vacation Booking system was compiled against Java 6. To prevent any problems, you will need to edit two files.

1. Open the file `/opt/<tomcat-version>/bin/setenv.sh` in a text editor.

2. Before the line `export JAVA_OPTS=$JAVA_OPTS`, add the following line of text:
   `JAVA_OPTS="$JAVA_OPTS -Djava.util.Arrays.useLegacyMergeSort=true"`

3. Save the file and close it.

4. Open `/opt/vbooking/fcs/FlightConfirmationServer.sh` in a text editor

5. Before the `-cp` argument to the `java` executable, insert the text:
   `-Djava.util.Arrays.useLegacyMergeSort=true`

6. Save and close the file.

7. If either the Tomcat server or the Flight Confirmation Server were running, these will need to be restarted to reflect the changes.

4.6 Post-installation

If you do not want to give the user who will be using the machine root access, you may want to change some of the default settings. You will need to add them to the mqm and db2iadm groups, so that they can update the WebSphere MQ and DB2 resources if required (it is not uncommon within a demonstration or training course that these may need to be reset). You will also want to give them full control over the folders containing the tomcat installation and the flight control server, so that the user can start up and shut down these as required.

Whether or not the end user will have root access, you will want to give them easy ways to access the different parts of the system, as detailed below:

WebSphere MQ:

The end user will need to have access to the WebSphere MQ Explorer, and be able to work with the QM_vbooking queue manager. The WebSphere MQ Explorer is accessible from the main system menu, under Applications > Programming, but the user will need to be added to the `mqm` group in order to be able to do anything useful with that tool.

DB2:

In order to work with DB2, the end user will also need to be a member of the `db2iadm` group (assuming the default name used in the installation configuration). To do this, run the command:

```
usermod –a –G db2iadm1 <username>
```

They will also need the following lines added to the end of their `.bashrc` file:

```
if [ -f /home/db2inst1/sqllib/db2profile ]; then
        . /home/db2inst1/sqllib/db2profile
fi
```

These changes will not take effect until the user logs in again, so you will need to log out first before attempting to access DB2.

Apache Tomcat:

The Apache Tomcat installation is owned by the tomcat user and group by default. The end user will need to have full control over this installation. If they have root access, then this won't be a problem. If not, then you may find that the easiest solution to this is to assign ownership over the entire tomcat installation to the end user's account.

Flight Confirmation Server:

As with the Apache Tomcat installation, the end user will need full control over this software. By default, it is under the ownership of the root user, so if the end user has root access, then nothing needs to be done here. If not, you'll need to change the ownership of the flight control server to the end user account.

5 Validation of the Vacation Booking system

5.1 Introduction

Once Vacation Booking is installed, it's a good idea to check that it is all set up correctly, and that all components are communicating without any issues. Make sure that all parts of the system are running, and that the database has been populated using the startup script discussed in the previous chapter, then follow the instructions in this chapter. Note that WebSphere Application Server may take some time to start up – if you have started it from the console, you will need to wait for the message `open for eBusiness` to appear.

5.2 Tomcat

To verify that Tomcat is running the supplied web applications correctly, try to load the pages at http://localhost:8089/vbooking-home/ and http://localhost:8089/vbooking-admin/ . These should both appear in your browser window.

Vacation Booking Home:

Vacation Booking Admin:

5.3 Tomcat and DB2

To check that Tomcat can communicate with the database, load http://localhost:8089/vbooking-admin/ in your web browser. You can now log into the page – no username or password is required. Following this, you should see that the flights VB047 and VB297 appear. This tells us that the database is up and running, and that we can communicate with it through the JDBC driver installed into Tomcat.

5.4 Tomcat and the Hotels web service

The hotel booking service is available from http://localhost:8089/vbooking-home/ . On the left of the page, search for hotels in Barcelona. There should be 3 hotels listed on the following page. Note that most cities will not return hotels, and that the search is case sensitive – attempting to search for hotels in other cities will not work.

5.5 Tomcat and the Booking Management web services

The WebSphere Application Server hosts a number of web services used by Tomcat. To access these, return to http://localhost:8089/vbooking-home/ and follow the **Amend my flight booking** link. When asked for a username and password, don't enter anything – just press the **login** button. If you are then presented with the option to search for a reservation, then communications with the web service are working correctly. Follow the **logout** link to return to the main booking page.

5.6 Tomcat, WebSphere MQ, WebSphere Application Server and DB2

The final test checks that all components are working together. If you have not already done so, return to http://localhost:8089/vbooking-home/. Choose the **Book Now** link listed under **Stansted to Barcelona**. A booking form will then appear – after filling out all fields in the form, click **Proceed** to submit the form. Following a short delay, the reservation number A00010 should appear in the final screen. If this and the sections above have been successful, then the system is configured correctly, and you are ready to install Rational Integration Tester on top of that system.

6   Installation and configuration of Rational Integration Tester

6.1   Introduction

The installation of Rational Integration Tester consists of 4 main components – Rational Integration Tester, Rational Integration Tester Platform Pack, Rational Integration Tester Agent, and the Rational Test Control Panel. The installation of each of these is fairly straightforward, as it is done through the IBM Installation Manager, though some configuration settings will need to be changed as the software is installed.

Once each piece of software is installed, you will then need to configure the connections with the system under test, and verify that the system under test is still working.

6.2   Starting IBM Installation Manager

In order to install as root, but allow all users to work with the tools, you'll be modifying the default installation procedure somewhat.

1. Before starting, shut down Tomcat, if it is currently running. Doing this will prevent a port clash when installing Rational Test Control Panel, which we'll fix later.

2. As a non-root user, enter the following command in a terminal:

    ```
    umask 0000
    ```

    This will make sure that any files created will have the same levels of access for all users. Failing to do this will mean that only the root user will have access to Rational Integration Tester, which may not be ideal in all environments.

3. Start IBM Installation Manager from the *same terminal window* with the command:

    ```
    sudo /opt/IBM/InstallationManager/eclipse/IBMIM
    ```

4. Make sure that IBM Installation Manager has access to repositories that contain the Rational Integration Tester components. If you have downloaded these repositories to your machine, you can add them through **File > Preferences**.

5. We will now proceed to install the various components one by one. As some components will have options that depend on other components, this will make the process easier.

6.3   Rational Test Control Panel

1. The first component that you should install is the Rational Test Control Panel. During the installation of this software, you can use the default settings, with the exception of anything noted below.

2. Several pages into the configuration process that occurs before installation, you will come to a page listing the Standard Configuration of the Rational Test Control Panel. On this screen, use the default values for the workspace location – `/var/rtcp/` - and the port number, `7819`. You will need to add a Default domain. The domain setting will be blank by default, but that would prevent RTCP from managing any proxies. The OSLC are only relevant if you will be connecting to other tools; for the standard demonstration and training environments, these settings will not matter.

3. On the following page, RTCP Security configuration, you will be asked to setup security credentials for the software. As there will only be a single user, you can just set this up using the built-in authentication. Call the user `admin`, and supply a password for that user.
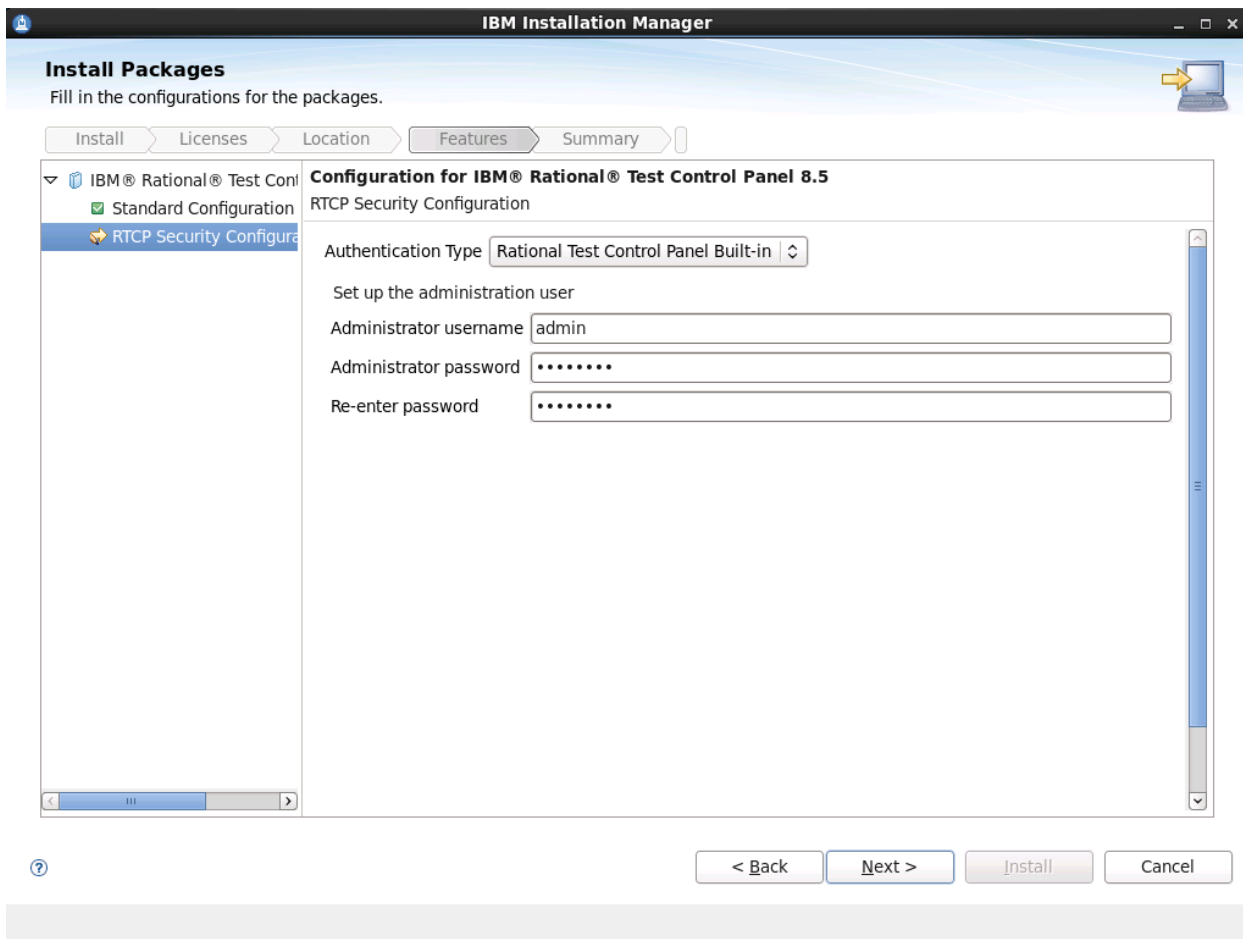
4. Keep the IBM Installation Manager open once the RTCP installation has completed.

6.4 Rational Integration Tester

1. Next, install Rational Integration Tester.

2. During the installation, you can leave all settings at their defaults.

3. After the installation, there will be a page asking whether or not you would like to open the Library Manager at the end of the installation process. We will not use the Library Manager software yet, so set this to **None**.
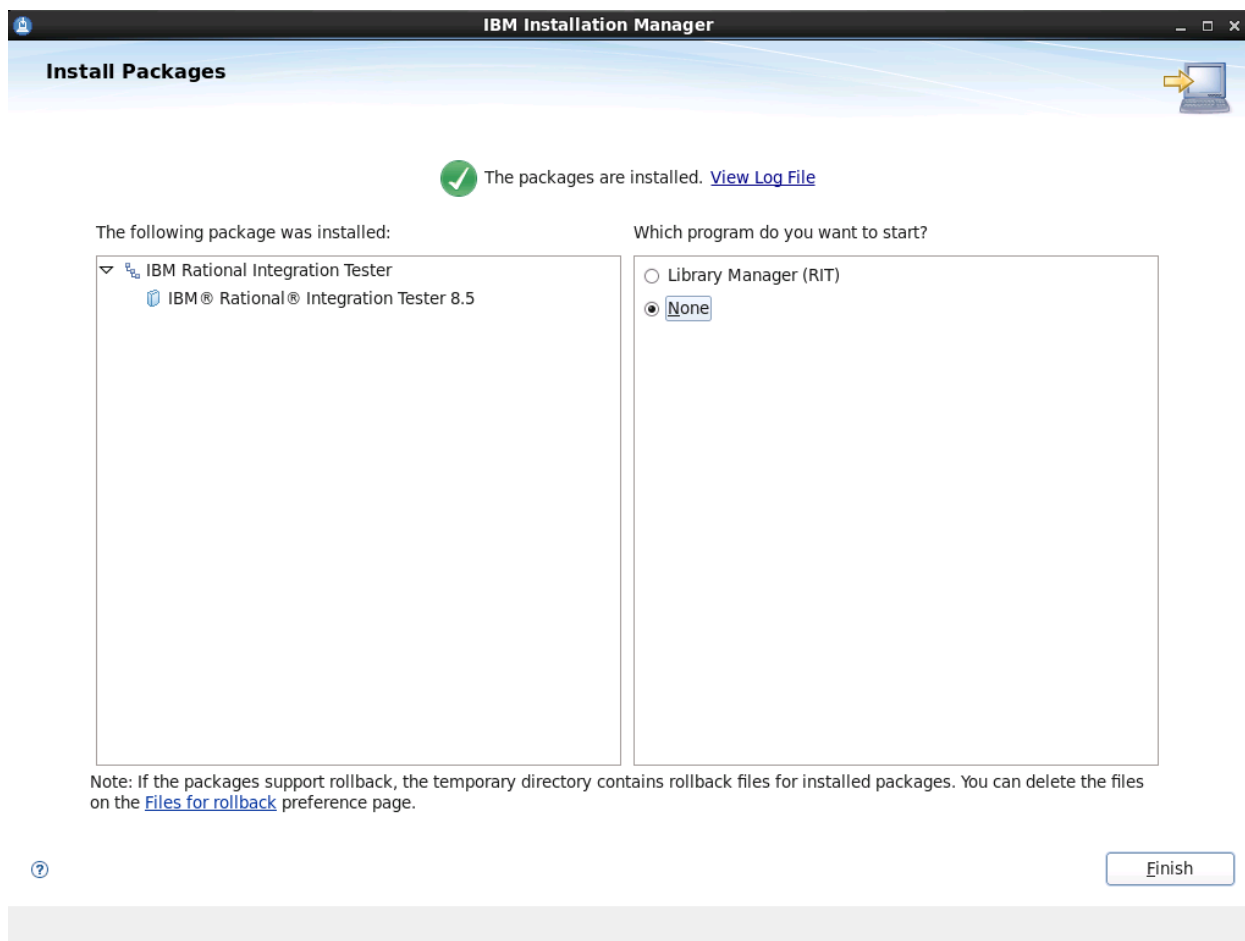
4. Again, once the installation is complete, return to the main screen of the IBM Installation Manager. From here, you can use the **Manage Licenses** option to add a license for your installation of Rational Integration Tester.

5. Once finished with the licensing options, return to the main screen of the IBM Installation Manager,leaving it open for the next installation.

6.5 Rational Integration Tester Agent

1. The next component to install is the Rational Integration Tester Agent, so select that option from IBM Installation Manager.

2. When installing the Agent, you'll need to enter the details for your Rational Test Control Panel installation. If you have used the suggested hostnames provided at the beginning of this document, you can use http://rit.vbooking.com:7819/RTCP . Otherwise, http://localhost:7819/RTCP will also work. Note that if you have not started Rational Test Control Panel, you may see a connection error here, but this is not a problem; you can safely continue with the installation.
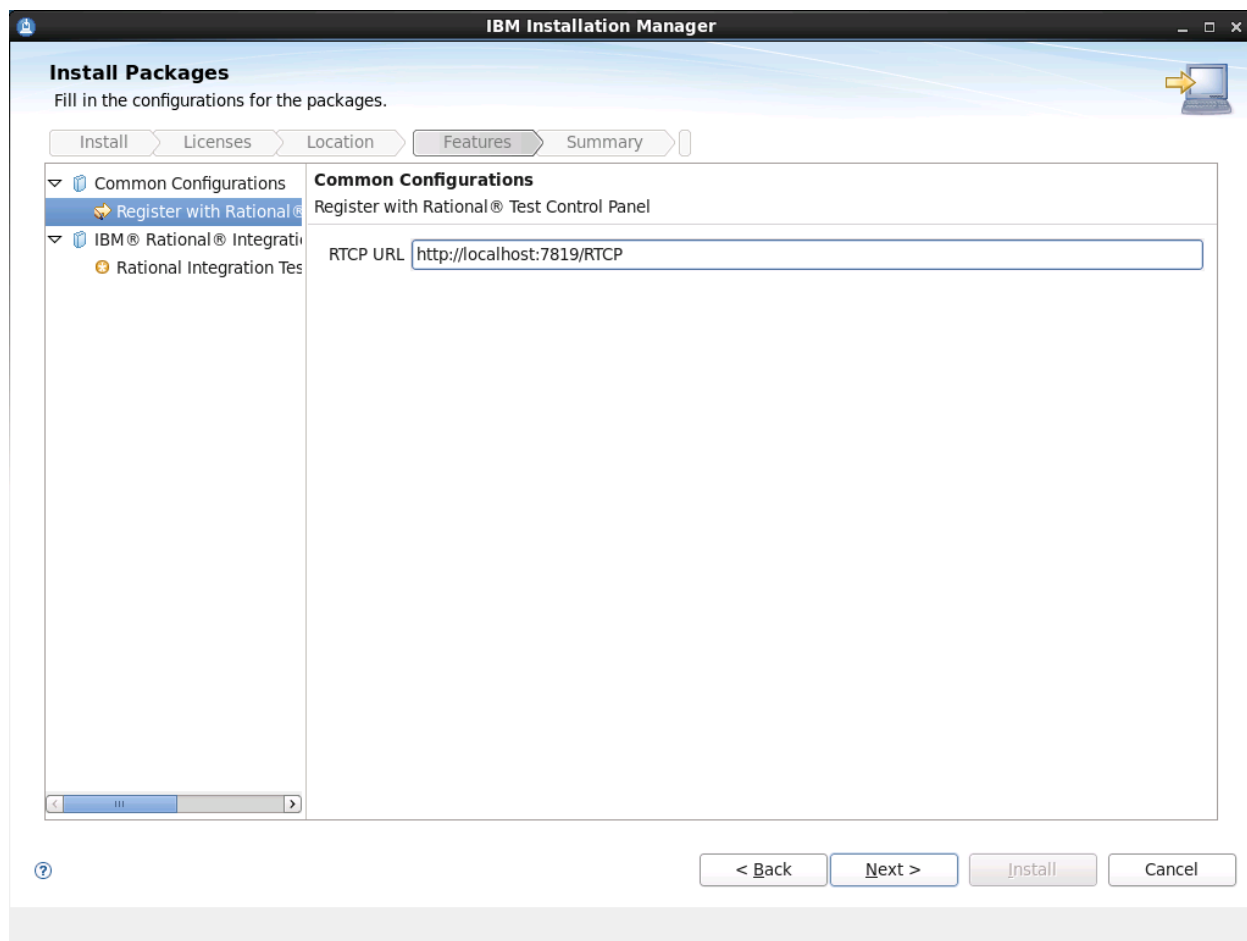
3. You'll also be presented with three choices in terms of the type of Agent to install. Assuming that the training environment will be used for all available Rational Integration Tester training courses, you will need to install the Agent with the **Rational Test Virtualization Server (PVU mode)** option. This will allow you to use it for performance testing and virtualization.

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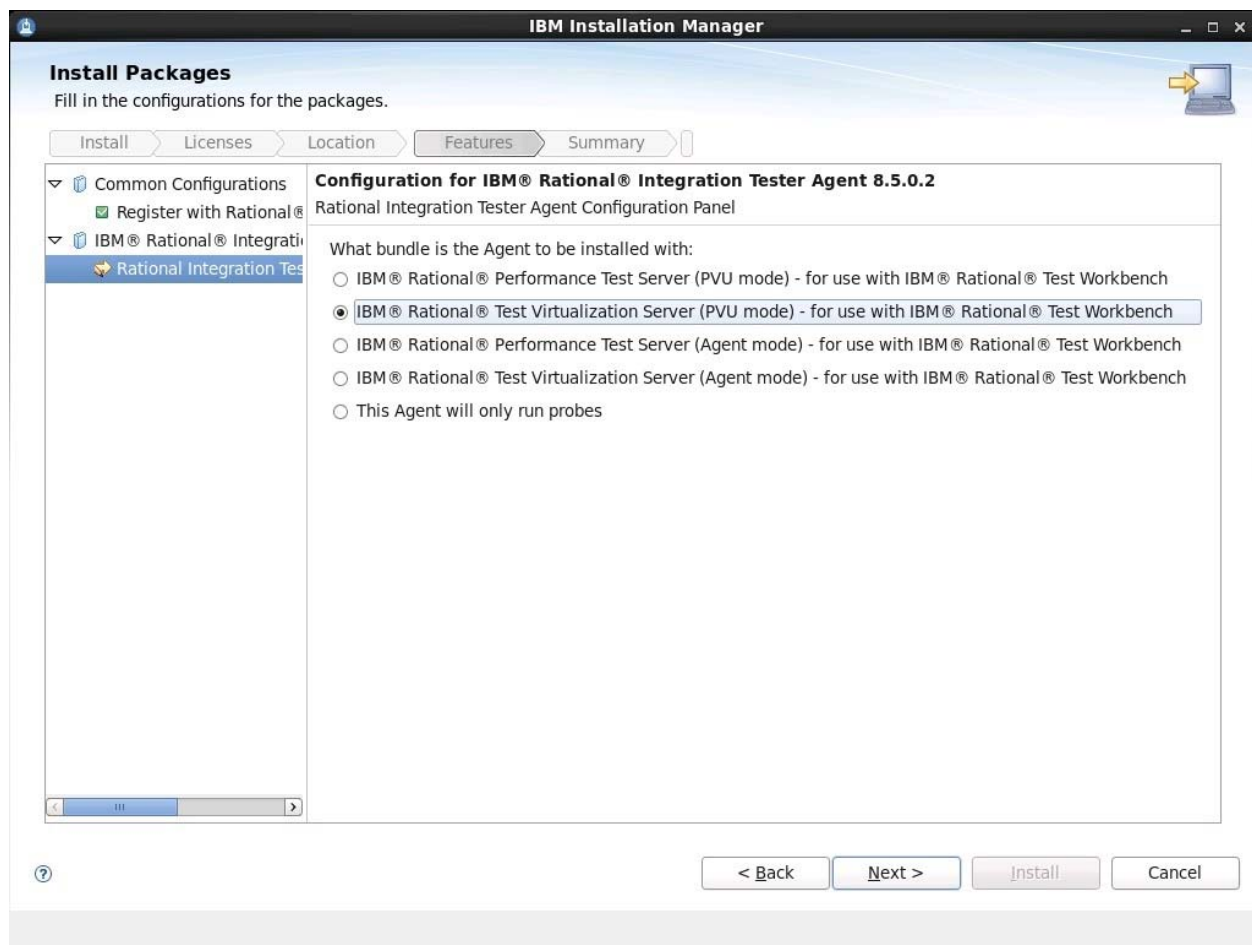
4. As with Rational Integration Tester, do not launch the Library Manager at the end of the installation process.

6.6 Rational Integration Tester Platform Pack

1. Finally, install the platform pack.

2. The options during the installation process should be the same as those selected during the installation of the Agent, so you'll either be pointing the platform pack at http://rit.vbooking.com:7819/RTCP or http://localhost:7819/RTCP.

3. Once this is installed, you can exit the IBM Installation Manager.

6.7 Library Managers

The Library Manager tool must be set up for both Rational Integration Tester and the Rational Integration Tester Agent. To start the Library Manager for the main program, enter:

```
sudo /opt/IBM/RationalIntegrationTester/LibConfig
```

You'll then need to set up the Library Manager to point to your environment for DB2, WebSphere Application Server and WebSphere MQ.   If you have installed everything using the default settings, you should see that the Library Manager has found the necessary files without any help. If you installed your software to a location other than the default, you will need to configure the Library Manager further, making sure that the installation paths are described accurately. Refer to the Rational Integration Tester documentation if further information is needed when doing this. Press **OK** to save the data within the Library Manager, and close it.

If other users will be using Rational Integration Tester, they should execute the same command without `sudo` after the initial configuration has taken place.

Similarly, the Agent may be configured by executing the command
`sudo /opt/IBM/RIT-Agent/LibConfig`

As it is less likely that other users will be executing the Agent, it may not be necessary to have them run the Library Manager, though the root user will need to use the Library Manager at least once.

For more information on using the Library Manager, please refer to the Rational Integration Tester documentation.

6.8   Adding the RIT JDBC driver to Tomcat

In order to be able to record database interactions with Tomcat or to virtualize those interactions, you will need to add the RIT JDBC Driver to your Tomcat installation. Note that all paths that refer to the Tomcat installation will require alteration; the path that Tomcat is installed to depends on the version number of the software.

1. The required files should be in `/opt/IBM/RIT-Platform/jdbc` . First, open `registration.xml` in a text editor, and confirm that the URL for RTCP as supplied in that file is correct. If not, update it and save the file.

2. Close the file, then copy it, along with the .jar files, to `/opt/<apache-tomcat>/lib/`

3. Navigate to the `/opt/<apache-tomcat>/lib/`folder.

4. Update the ownership of all of the files that you have just copied so that they are owned by the `tomcat` user and group, with the command:
   `chown tomcat:tomcat <filename>`

5. Navigate to `/opt/<apache-tomcat>/bin/`.

6. Open the file `setenv.sh` in a text editor.

7. Find the line starting with
   `export JAVA_OPTS="-Djdbc.drivers=com.ibm.db2.jcc.DB2Driver …`

8. Update this so that the beginning of the line reads (on a single line):
   `export JAVA_OPTS="`
   `-Djdbc.drivers=com.greenhat.jdbc.Driver:com.ibm.db2.jcc.DB2Driver …`

9. Save the file and exit the text editor.

6.9 Adding the JDBC driver to WebSphere Application Server

The JDBC driver also needs to be added to the WebSphere Application Server, in order to allow for recording and virtualization of JDBC calls originating from the application server. To do this:

1. Switch to the folder `/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/bin`

2. Run the command:
   `./wsadmin.sh -f /opt/IBM/RIT-Platform/jdbc/WebSphere/setupJDBCProvider.py /opt/IBM/RIT-Platform/jdbc/`

3. The script will execute and install the driver.

6.10 Setting up a virtual database user (optional)

If desired, a virtual database can be configured to be of the same type as the live database. For the sake of an example, it is possible to use the same database under a different username/schema. This is not necessary, as Rational Integration Tester can provide its own integrated database, but may be something you would like to explore. If so, the following steps should provide enough information to configure DB2 appropriately:

1. As the virtual database will require its own user, create another user called `stubuser`.

2. Log into the DB2 as the `db2inst1` user.

3. Add `stubuser` as a user within the `VBOOKING` database, and create a corresponding `STUBUSER` schema within the same database.

4. Close the DB2 connection, and leave the `db2inst1` account.

6.11 Connecting Tomcat to the HTTP Proxy

In order to use the HTTP proxy to record interactions between the Tomcat web server and the various web services, or to use the proxy to help virtualize some of those web services, you'll need to tell Tomcat to route all of its traffic through the proxy.

1. Open the file `/opt/<apache-tomcat>/bin/setenv.sh` in a text editor.

2. Add the following towards the end of the file, before the line `export JAVA_OPTS=$JAVA_OPTS`. It should all be written on a single line:
   `JAVA_OPTS="$JAVA_OPTS -Dhttp.nonProxyHosts= -Dhttp.proxyHost=localhost -Dhttp.proxyPort=3128"`

3. Save the file and exit. Restart Tomcat if it is currently running.

6.12 Connecting WebSphere Application Server to the HTTP Proxy

You will also need to connect the WebSphere Application Server to the proxy to aid with recording and virtualization. To do this:

1. Open the WebSphere console in your web browser; assuming you have created an insecure login, this will be located at http://localhost:9060/ibm/console/unsecureLogon.jsp

2. Using the panel on the left of the page, navigate to **Servers > Server types > WebSphere Application Servers**.

3. This will open a page listing all the available application servers. You should see a single server listed here, **server1**. Click the link for that server.

4. On the page for server1, find the **Server Infrastructure** heading, and then the **Java and Process Management** section under that heading. Expand that section.

5. Click the **Process Definition** link.

6. On the following page, click the **Java Virtual Machine** link.

7. This will open a page where you can enter properties for the Java virtual machine. Find the **Generic JVM arguments** text box, and enter the following flags in that section:
   `-Dhttp.nonProxyHosts= -Dhttp.proxyHost=localhost -Dhttp.proxyPort=3128`

8. Click **Apply**, and on the following page, click **Save**.

6.13 Setting up the WebSphere MQ exit

In order to record and virtualize services over WebSphere MQ, you will need to add the MQ Exit, which is a set of libraries that will function inside WebSphere MQ, communicating with Rational Integration Tester.

1. First you'll need to copy the files for the exit. On a 32 bit system, you'll need to run the following commands, assuming that you're using WebSphere MQ 7.1. Update the file locations as appropriate for other versions:

   ```
   cp /opt/IBM/RationalIntegrationTester/tools/IBM/MQ/7.1/intercept_linux_x86_7.1
   /var/mqm/exits
   ```

   ```
   cp /opt/IBM/RationalIntegrationTester/tools/IBM/MQ/7.1/intercept_linux_x86_7.1_r
   /var/mqm/exits
   ```

2. If you are on a 64 bit system, you'll need to copy 2 more files:

   ```
   cp /opt/IBM/RationalIntegrationTester/tools/IBM/MQ/7.1/intercept_linux_x86_64_7.1
   ```

```
/var/mqm/exits64

cp
/opt/IBM/RationalIntegrationTester/tools/IBM/MQ/7.1/intercept_linux_x86_64_7.1_r
/var/mqm/exits64
```

3. Next, add some soft links to the files using the following commands, making sure that the links are executable (note that the second half of the instructions will only apply for 64 bit systems):

```
cd /var/mqm/exits
ln -s intercept_linux_x86_7.1 intercept
ln -s intercept_linux_x86_7.1_r intercept_r
chown –h mqm:mqm intercept*
chmod 644 intercept*

cd /var/mqm/exits64
ln -s intercept_linux_x86_64_7.1 intercept
ln -s intercept_linux_x86_64_7.1_r intercept_r
chown –h mqm:mqm intercept*
chmod 644 intercept*
```
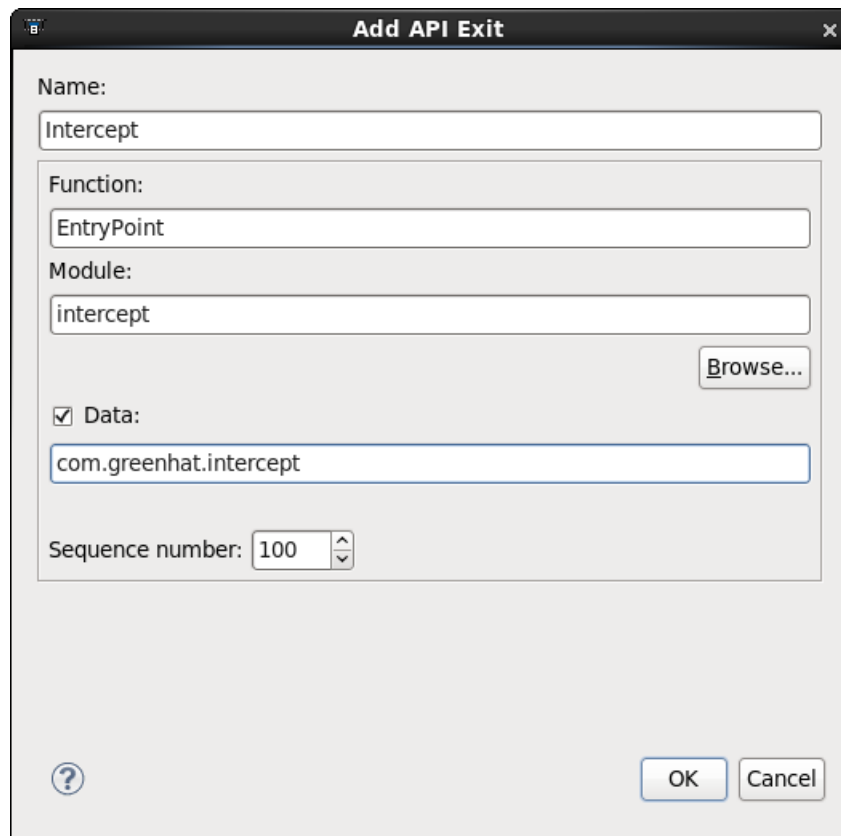
4. From the desktop menu, select **Applications > Programming > IBM WebSphere MQ Explorer** to launch WebSphere MQ Explorer.

5. Right-click on QM_vbooking in the MQ Explorer Navigator view and choose **Stop…** and then click **OK** to stop the queue manager.

6. After the queue manager has stopped, right-click on QM_vbooking again and choose **Properties**, then select **Exits**. The Exits default path and Exits default path (64 bit) are the locations where you just copied the intercept libraries.

7. Click **Add**. Enter the following values (note that they are case-senstive):

   Name: Intercept
   Function: EntryPoint
   Module: intercept
   Data: com.greenhat.intercept

8. Click **OK**, and **OK** again to close both dialogs.

9. Right-click on `QM_vbooking`, choose **Start…** and then **OK**.

Note: If the WebSphere MQ Explorer is responding with error messages in this section, it may be because the user attempting to use the MQ Explorer is not part of the `mqm` group (this should have been done in section 3.8). You may need to log out and log in again after adding the user to the group.

6.14 WebSphere MQ namelist

1. In order to use Sift and Pass Through with WebSphere MQ, an extra namelist must be created inside the WebSphere MQ Explorer. Find the **Namelists** folder under `QM_vbooking`.

2. Right click and choose **New > Namelist…**

3. A new window will appear. Use the name `rit.divert.rules` and press **Finish**.

4. You can now close WebSphere MQ Explorer.

6.15 Java virtualization

1. To set the system up to use Java virtualization, first copy all files from `/opt/IBM/RIT-Platform/JavaVirtualization` to `/opt/vbooking/fcs`

2. Edit the `FlightConfirmationServer.sh` file to include the following parameters when invoking Java:
   `-javaagent:greenhat.javaagent.jar=registration.xml`
   This should go before any other arguments in the `java` command.

3. Make sure that the `registration.xml` in this folder contains the correct URL for your RTCP instance. If the Flight Confirmation Server will be started by a non-root user, make sure that all file owners and permissions have been updated appropriately.

6.16 Rational Integration Tester services

If the machine will be getting stopped and started often, it will be easier for users if they don't need to restart software after a reboot. To remedy this for the Rational Integration Tester software, a set of scripts can be installed to set up the proxy, agent, and RTCP as services. The scripts are located in:
`/opt/IBM/RationalIntegrationTester/examples/ExampleInitScripts`

In the same location, there is a `README.txt` which provides instructions for using these scripts. If you have used the default settings when installing the software, the scripts themselves should not need to be altered. If you have changed the install paths, you will need to update the scripts appropriately.

If you would like the WebSphere MQ queue manager to act as a service, which will be the easier option in many cases, you can follow the same procedure, using the file `/opt/vbooking/scripts/mq/qm_vbooking` .

6.17 Booking System domain

For training courses only, a domain needs to be set up within RTCP. This allows students to organise their stubs during the virtualization training course. This is optional for environments that will only be used for demonstrations.

1. Make sure that RTCP is running, then go to http://localhost:7819/RTCP/

2. Log into RTCP using the admin credentials you created when you installed RTCP.

3. Go to the **Administration** pages within RTCP.

4. Choose the **Domains and Environments** tab.

5. Add a new domain called `Booking System`.

6. **Logout** from RTCP.

6.18 Using Rational Integration Tester as a non-root user

You may wish to set up the system so that the end user will not have root access. If that is the case, then Rational Integration Tester will need to be set up appropriately. The first major part of this has been done during the installation – setting the umask before installation means that you've installed the software so that any user can execute it. However, some other things still need to happen before an end user can use the software successfully.

Firstly, the user will need to be able to operate the Library Manager. This will allow them to setup and change the configuration for connecting to the system under test. To do this:

1. Switch to the Rational Integration Tester installation folder:
   ```
   cd /opt/IBM/RationalIntegrationTester/
   ```

2. Allow all users to edit the required ini and xml files:
   ```
   chmod a+w GHTesterCMD.ini
   chmod a+w GHTester.ini
   chmod a+w RunTests.ini
   chmod a+w librarysettings.xml
   ```

Secondly, this user will need to be able to access the license for Rational Integration Tester. Make sure that all users have read access to the folder `/var/ibm/InstallationManager/license/`LUM, and all files inside it.

7 Extra Components and configuration

7.1 Bookmarks

In your web browser, set up bookmarks for quick access to the following URLs:

- http://localhost:8089/vbooking-home/

- http://localhost:8089/vbooking-admin/

- http://localhost:7819/RTCP/

- http://localhost:9060/ibm/console/unsecureLogon.jsp

This will give the users easy access to the Vacation Booking interface, RTCP, and the WebSphere Application Server.

7.2 Extra files

The training course also requires an extra set of files, in the `RIT_8.6.0_TrainingFiles.zip` file. Extract these files to the Desktop. This should give you a folder called `Data Files` on the Desktop. Move the `Copybook Schema` and `XSD Schemas` folders from the Data Files folder to the desktop.

Note that these files are not required for demonstrations, but may be useful in that context, particularly the schemas.

7.3 Libstatgrab

In order to use the System Statistics probe for measuring the performance of the system, Rational Integration Tester requires a library called libstatgrab. This will be useful when doing performance testing demonstrations, and required by the performance testing training material. Download version 0.17 of this library from http://www.i-scream.org/libstatgrab/ . Note that there is a newer version available, but as this was released after the 8.5 release of Rational Integration Tester and features a number of API changes, that newer version is unlikely to work.

Once downloaded, you may then build and install the library, as described in the README file accompanying the software. Note that this will require that you have installed a C compiler – you may need to add this to your system through your preferred package management software, though it will probably be there as part of the operating system install.

On a 64 bit system, you will need to make sure that the libraries are accessible. To do this, run the following commands after installing the library:

```
ln -s /usr/local/lib/libstatgrab.so.6.2.3 /usr/lib/libstatgrab.so.6
ln -s /usr/local/lib/libstatgrab.so.6.2.3 /usr/lib/libstatgrab.so.6.2.3
ln -s /usr/local/lib/libstatgrab.so.6.2.3 /usr/lib64/libstatgrab.so.6
ln -s /usr/local/lib/libstatgrab.so.6.2.3 /usr/lib64/libstatgrab.so.6.2.3
```

7.4 SQLite

To use the example database in the integration testing course, a JDBC driver for SQLite is required. This is available from https://bitbucket.org/xerial/sqlite-jdbc . Download the .jar file from that site, and put it in `/opt/sqlite/` , making sure that all users have read permission on the folder and file. You will then need to add it to Rational Integration Tester using the Library Manager.

7.5 Results database

In order to run the training course, a results database is required. This will be used to hold results of test suites, performance tests, and stubs.

While it is possible to use DB2 for this purpose, you may decide that you would prefer to use a different server, to avoid confusion between the databases used by the system under test, and your results database.

Alternatives for a results database on Linux are Oracle and MySQL. Each of these has its own advantages in terms of installation. MySQL is included within the RHEL repositories, and so will be easier to download and install initially (though a post-install process of securing the server may still be necessary). On the other hand, Rational Integration Tester includes a JDBC driver for Oracle, but does not do so for MySQL. It is fairly simple to download that driver (the link is listed in the Library Manager), but it will need to be set up in the Library Managers for RIT and the Agent, as well as within the Administration pages of RTCP.

Whichever option you choose, you will need to create a new database, and then run the supplied script to generate the necessary tables and stored procedures. Instructions are provided here for doing this with the copy of DB2 that is already installed on your machine; for other databases, see the Rational Integration Tester Installation Guide for full details of this process.

1. Switch to the user account that owns the DB2 instance on your machine. If you left the username at its default value when configuring the install scripts for Vacation Booking previously, it should be db2inst1.

2. As that user, go to the location of the database scripts provided with Rational Integration Tester:
    `cd /opt/IBM/RationalIntegrationTester/scripts`

3. Run the command:
    `db2 create database resultdb using codeset UTF-8 territory en`

    After a short delay, you should see the response:
    `DB20000I  The CREATE DATABASE command completed successfully.`

4. Connect to DB2:
    `db2 connect to resultdb user db2inst1`

5. Run the ghtester_db2.sql script against the new database:
   ```
   db2 -tvf ghtester_db2.sql
   ```

7.6 Extra queue

If the environment will be used for training purposes, as opposed to just demonstrations, an extra queue will be required in WebSphere MQ. Log into the MQ Explorer, find the `QM_vbooking` queue manager, and then the list of queues.

Right click and choose to add a new local queue, called `queue.orders` ; this can use all of the default properties for a new queue.

7.7 AddNumbers client

For simple demonstrations, or for the training course, there is a simple web service, called AddNumbers, which is bundled with Rational Integration Tester. A client is also available and needs to be available to the user. Both of these can be found in the examples folder of your Rational Integration Tester installation.

7.8 Startup and shutdown of software

The end user will need to be able to start up and shut down the various pieces of software provided to them for the training course. Some of these are run as services, and so can be started automatically for the user. Others need to be started manually.

Services/Automatic start

During the configuration of the system, you have set up services for several Rational Integration Tester components; the WebSphere MQ Queue Manager has also been set up similarly. A user with root access can access these services with the command `service <servicename> <command>`

The service names are:

WebSphere MQ Queue Manager	`qm_vbooking`
Rational Integration Tester Agent	`ritagent`
Rational Integration Tester Proxy	`ritproxy`
Rational Test Control Panel	`rtcp`

Standard commands are `start`, `stop`, `restart`, and `status`.

In addition to these services, DB2 should also be configured to start automatically. If this does not happen for some reason, the end user will need to be able to run the `db2start` command.

Manual Start:

Some items will be started by the end user, and so they will need to have permission to do so. Following the guide so far should have enabled this.   It is suggested that shortcuts are created on the desktop to run this software – note that some items will only trigger a short bit of console output, and it may be useful to provide the user with some more output to confirm that something has actually happened.

Rational Integration Tester	`/opt/IBM/RationalIntegrationTester/GHTester`
Rational Integration Tester Library Manager	`/opt/IBM/RationalIntegrationTester/LibConfig`
Tomcat startup	`/opt/<tomcat-version>/bin/startup.sh`
Tomcat shutdown	`/opt/<tomcat-version>/bin/shutdown.sh`
Flight confirmation server	`/opt/vbooking/fcs/FlightConfirmationServer.sh`
Database reset	`/opt/vbooking/scripts/db2/resetDB2.sh`

Additionally, the end user should have access to the WebSphere MQ Explorer. This should be in their applications menu if you have followed the installation instructions set out in this guide. This will allow them to stop and restart the queue manager if required.

Finally, the WebSphere Application Server will also need to be running for a training course or demonstration to function correctly. It can be started and stopped with the commands (assuming a default installation):

```
/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/bin/startServer.sh server1
/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/bin/stopServer.sh server1
```

Note: The WebSphere MQ queue manager must be running before starting Tomcat, the flight confirmation server, the WebSphere Application Server, or Rational Integration Tester. If it is started after those packages, then they will need to be restarted, with the exception of the application server – in that case, the individual applications can be restarted from the application server console, rather than restarting the entire server.

7.9   Verifying system status

You may want to make sure that all parts of the system are running. To check each part of the system, you can use the following procedures:

Services:

For the services described in the previous section, the root user can check whether each one is running from the console with the command `service <service_name> status`.

DB2:

As the database instance used in Vacation Booking is very simple anyway, the easiest thing to do here is to execute the `db2start` command as either the user account that owns the instance (by default, `db2inst1`), or the end user account, provided you have followed the instructions earlier in this document. If the database is running, the `db2start` command will tell you there is nothing to do; if not, it will start the database. If the command fails to run at all, you may have missed some of the Vacation Booking post-installation steps specified earlier in this document.

Tomcat:

Visit the URLs bookmarked on port 8089, as described earlier in this chapter – the Vacation Booking home page and admin page. If these are working, this indicates that Tomcat is responding.

WebSphere Application Server

Visit the main console page, as bookmarked earlier in this chapter. If you receive a response, then the application server is running. To check the individual applications, log in, then use the menu on the left of the page to navigate to **Applications > Application Types > WebSphere enterprise applications**. You should then be able to see the status of each of the individual applications running on the server. Note that if the WebSphere MQ queue manager or DB2 database were not running when the application server started, some applications may be in a Stopped state, and will need to be started.

Flight Confirmation Server:

This runs in a console, so it should be visible from that console.

8 Final configuration and system validation

Once the system is set up, you can change a few simple settings within Rational Integration Tester for ease of use, and check that you can record, test, and stub against the Vacation Booking System.

8.1 Updating settings – results database

At the beginning of a training course, it is preferable that students are able to start using the software as quickly as possible. To help students with this, you can create a new project that refers to your results database. Any projects created subsequently will then use the same database settings.

To be certain that any database settings will be remembered later, add the connection details for your results database on the Server Settings page while creating a new project.

8.2 Updating settings – file associations

As with results databases, there is little reason to ask students to locate an editor for CSV or Excel files. Rational Integration Tester has settings that state how these types of files should be opened.

1. Once a new project has been created, go to the menu item **Project > Preferences**.

2. The **Preferences** window will appear. Select **Applications** from the left hand column of the dialog.

3. Press **Add**.

4. Another dialog will appear, allowing you to enter a file extension, and a command to use when opening files with that extension. Enter xls as the first file extension, and provide the command to launch an editor that can work with xls files. Press OK once you are finished.

5. Repeat this procedure for xlsx files and csv files. Note that some spreadsheet editors may attempt to change the format of a csv file, so you may prefer to use a text editor to work with those files.

8.3 Final tests

Before concluding, you will need to check that everything is now integrated and working correctly. The checklist below provides a set of checks that you can run on your system to make sure that it can handle training courses and demonstration scenarios. Before attempting to run these checks, make sure that all parts of the system are running.

It is assumed that any system verification is being carried out by an experienced Rational Integration Tester user. Explanations of each check are not provided within this document.

	Run through all checks in Chapter 5 of this guide.

	Start the addNumbers web service and the Login web service
	Connect to RTCP with your web browser, and log in
	View any agents and proxies in the system from RTCP. Note that any JDBC proxies may not appear until the program using the proxy has executed an SQL command.
	Create a new project in Rational Integration Tester, successfully connecting to RTCP and the results database
	Connect to the physical transports for the MQ server, WAS, and DB2
	Connect to all 4 physical http connections, on ports 8086, 8088, 8089 and 9080.
	Record traffic on MQ, as well as on HTTP ports 8089 and 9080
	Run a test using each of the transports used within the system
	Run a test suite, and view the results in both the RIT Results Gallery and RTCP.
	Run a stub over MQ, and for the HTTP services on ports 8089 and 9080
	Run stubs using sift and pass through on MQ and HTTP services; be sure to test scenarios where the stub handles the message, and where the stub passes the message on to the live system.
	Record JDBC interactions through the JDBC proxy
	Create and run a database stub
	Run a performance test on any transport, using the System Statistics probe, and view the results
	Publish and deploy a stub using RTCP and the Agent

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