Oracle® R Enterprise

Installation and Administration Guide

Release 1.3.1 for Windows, Linux, Solaris, and AIX

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Oracle R Enterprise Installation and Administration Guide, Release 1.3.1 for Windows, Linux, Solaris, and AIX

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Preface

This book describes how to install and administer Oracle R Enterprise Release 1.3.1.

Audience

This document is intended for anyone who is responsible for installing or administering Oracle R Enterprise. Installation of Oracle R Enterprise requires knowledge of R and Oracle Database.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support. For information, visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

Related Documents

These manuals describe Oracle R Enterprise:

- *Oracle R Enterprise Installation and Administration Guide* (this manual)
- *Oracle R Enterprise User's Guide*
- *Oracle R Enterprise Release Notes*

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
`monospace`	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

Changes in This Release for Installation and Administration Guide

This preface describes:

- Changes in Oracle R Enterprise Installation and Administration Guide for Release 1.3.1
- Changes in Oracle R Enterprise Installation and Administration Guide for Release 1.3

Changes in *Oracle R Enterprise Installation and Administration Guide* for Release 1.3.1

Oracle R Enterprise Release 1.3.1 consists of bug fixes described in *Oracle R Enterprise Release Notes*.

Oracle R Enterprise has components that are open source. Licensing information for these components is in Appendix B.

Instructions for installing RStudio are provided in Appendix D.

Changes in *Oracle R Enterprise Installation and Administration Guide* for Release 1.3

Oracle R Enterprise Release 1.3 includes these new features:

- Installation and administration information has moved from *Oracle R Enterprise User's Guide* to *Oracle R Enterprise Installation and Administration Guide* (this manual).
- Installation of Oracle R Distribution on Linux uses `http://public-yum.oracle.com/` only.
- You can now control memory used by Oracle R Enterprise Server. See Section 7.2, "Controlling Memory Used by Embedded R".
- Deprecated grants
- Supports 64-bit Windows platforms only.

1

Overview of Oracle R Enterprise Installation

This chapter introduces the Oracle R Enterprise installation process. This chapter contains the following topics:

1.1 About Oracle R Enterprise

Oracle R Enterprise integrates R, the open source scripting language and environment, with Oracle Database. R supports advanced statistical analysis and has sophisticated graphical capabilities. A component of the Oracle Advanced Analytics Option of Oracle Database, Oracle R Enterprise enables the R language to operate transparently on Oracle data.

See Also:

- *Oracle R Enterprise User's Guide*
- *Oracle R Enterprise Release Notes*
- Oracle R Enterprise on the Oracle Technology Network:

  `http://www.oracle.com/technetwork/database/options/advanced-analytics/r-enterprise/index.html`

1.2 About Oracle R Enterprise and Open Source R

Oracle R Enterprise requires the installation of R, which is third-party, open source software. Open source R is governed by GNU General Public License (GPL) and not by Oracle licensing. The following Oracle tools facilitate and enable the use of R with Oracle Database:

- **Oracle R Distribution**

  Oracle R Distribution is Oracle's free distribution of open source R. Oracle R Distribution offers these significant advantages for Oracle R Enterprise:

  - Simplifies the installation of R for Oracle R Enterprise
  - Simplifies integration with the Intel Math Kernel Library (MKL), which improves the performance of many mathematical computations in R

> **Note:** Oracle recommends that you use Oracle R Distribution with Oracle R Enterprise whenever possible.

- **ROracle**

  ROracle is an open source R package that enables interaction between R and Oracle Database. Originally developed by a third party, ROracle has been enhanced by Oracle and is now maintained and supported by Oracle. ROracle is one of the client supporting packages of Oracle R Enterprise.

> **Note:** The RStudio Integrated Development Environment (IDE) is not included with Oracle R Enterprise. The RStudio IDE is a free, open source product that you can obtain and license from the RStudio company. See Appendix D, "Installing RStudio" for details.

See Also:

- Section 3.1, "About Oracle R Distribution and Open Source R"
- Appendix B, "License Information for Oracle R Enterprise"
- R Project for Statistical Computing at `http://www.r-project.org`

1.3 About Oracle R Enterprise and Oracle R Connector for Hadoop

Oracle Big Data Connectors facilitate interaction and data exchange between a Hadoop cluster and Oracle Database. Oracle R Connector for Hadoop is a set of R packages that supports the interface between a local R environment, Oracle Database, and Hadoop. The interface enables rapid, interactive analysis on all three platforms.

Oracle R Connector for Hadoop is designed to work independently, but the full power of this connector is achieved when it is used with Oracle R Enterprise. With Oracle R Connector for Hadoop, you can use Oracle R Enterprise R functions to connect to Hive and create and manage Oracle Database objects.

See Also: *Oracle Big Data Connectors User's Guide*

1.4 Oracle R Enterprise Architecture

Oracle R Enterprise has a client-server architecture based on Oracle Database and Oracle Client. R engines run on the server computer and on each client computer.

- **SQL Transparency**

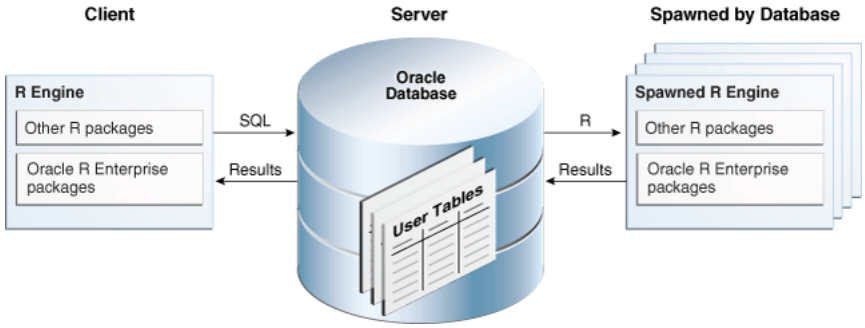
  Oracle R Enterprise packages on the client support SQL transparency, which enables Oracle tables to appear "transparently" as native R objects. With SQL transparency, data analysts can use R to explore, cleanse, and transform data without having to know SQL.

- **Embedded R Execution**

Oracle R Enterprise packages on the server support the execution of R commands within SQL queries and PL/SQL statements. Embedded R is executed in spawned R engines that can run in parallel. With embedded R, you can execute R algorithms on very large data stores and schedule embedded R for lights-out processing.

Figure 1–1 illustrates the client-server architecture of Oracle R Enterprise.

Figure 1–1 Client-Server Architecture of Oracle R Enterprise



1.5 Client and Server Components of Oracle R Enterprise

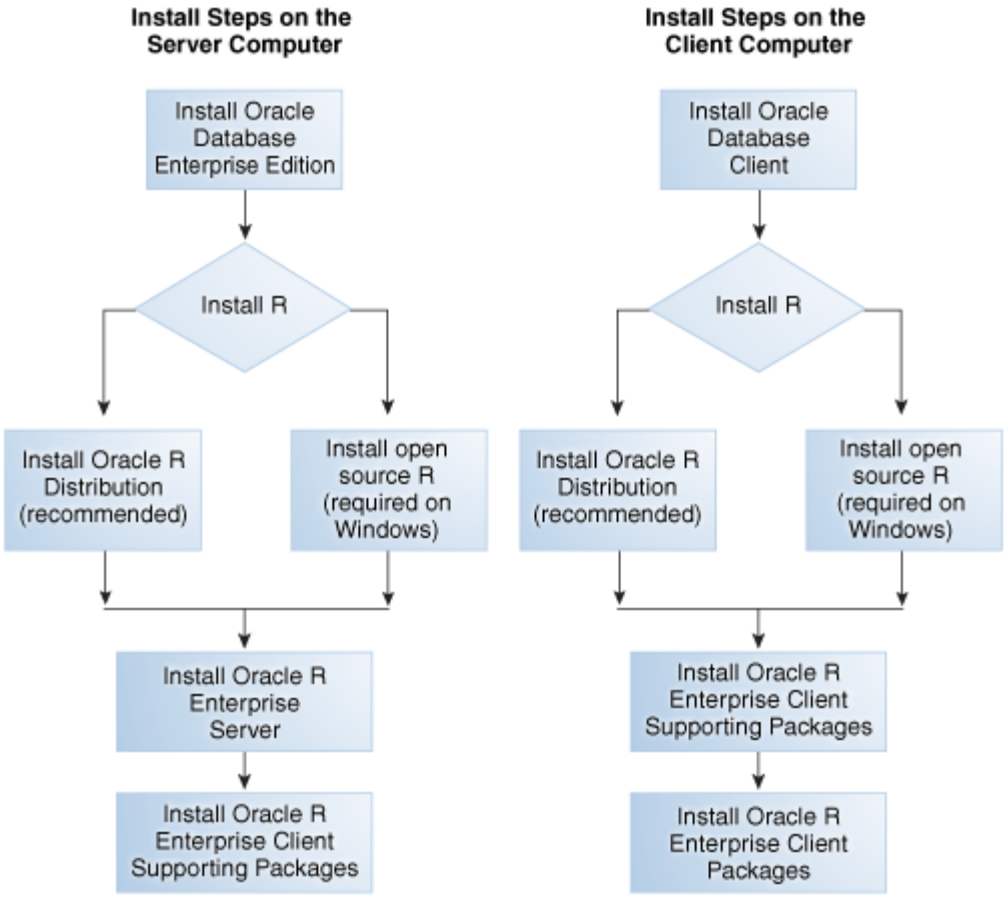
Oracle R Enterprise has client components and server components:

- **Oracle R Enterprise Client Components**:
  - Oracle Database Client
  - Oracle R Enterprise packages and supporting, open source packages
- **Oracle R Enterprise Server Components:**
  - Oracle Database with schema objects and shared libraries for supporting Oracle R Enterprise clients
  - Oracle R Enterprise packages and supporting, open source packages

1.6 Oracle R Enterprise Installation Steps

The Oracle R Enterprise client and server installation steps are illustrated in Figure 1–2.

Figure 1–2 Oracle R Enterprise Client and Server Installation Steps



Note: If you want to use Oracle R Enterprise directly on the server computer, then you do not need a separate client installation. A local installation of Oracle Database Client is automatically included in the installation of Oracle Database.

1.6.1 Postinstallation Steps

After you install the software, you must create at least one database user for Oracle R Enterprise. A script for creating users is provided with Oracle R Enterprise Server.

See Also:

- Chapter 6, "Postinstallation Tasks for Oracle R Enterprise"
- Appendix A, "A Sample Installation of Oracle R Enterprise"

1.7 Oracle R Enterprise System Requirements

Oracle R Enterprise runs on 64-bit platforms only. Both client and server components are supported on each of the platforms described in Table 1–1.

Table 1–1 Oracle R Enterprise Platform Requirements

Operating System	Hardware Platform	Description
Linux x86-64	Intel and AMD	▪ 64-bit Oracle Linux Release 5 update 6 through Oracle Linux 6 ▪ 64-bit Red Hat Enterprise Linux Release 5 update 6 through Red Hat Enterprise Linux 6 Oracle Linux may be running on Oracle Exadata Database Machine.
Oracle Solaris	Intel and SPARC	▪ 64-bit Oracle Solaris 10 update 10 through Oracle Solaris 11 for both SPARC and x86-64 (Intel) platforms ▪ Oracle SPARC SuperCluster ▪ Oracle Solaris Studio (formerly Sun Studio) 12u3 or later Oracle Solaris may be running on Oracle Exadata Database Machine.
IBM AIX	IBM	64-bit IBM AIX 5.3 or higher
Microsoft Windows	Intel	64-bit Microsoft Windows XP, Vista, or Windows 7

Table 1–2 shows the supported configurations of Oracle R Enterprise server components.

Table 1–2 Oracle R Enterprise Server Support Matrix

Oracle R Enterprise	Open source R or Oracle R Distribution	Oracle Database (see Note)
1.0	2.13.2	11.2.0.3, 11.2.0.4, 12.1
1.1	2.13.2	11.2.0.3, 11.2.0.4, 12.1
1.2	2.15.1	11.2.0.3, 11.2.0.4, 12.1
1.3	2.15.1	11.2.0.3, 11.2.0.4, 12.1
1.3.1	2.15.1, 2.15.2, 2.15.3	11.2.0.3, 11.2.0.4, 12.1

Note: Oracle Database versions 11.2.0.1 and 11.2.0.2 are supported on Linux if patched. For instructions, see Section 2.2, "Patching an 11.2.0.1 or 11.2.0.2 Database on Linux".

On other platforms, Oracle Database 11.2.0.3, 11.2.0.4, or 12.1 is required.

Refer to: *Oracle R Enterprise Release Notes* for the latest platform requirements and the latest versions of R that are supported with Oracle R Enterprise.

2

Installing and Configuring the Database for Oracle R Enterprise

This chapter explains how to install and configure Oracle Database to support Oracle R Enterprise Server. This chapter contains these topics:

- Installing Oracle Database for Oracle R Enterprise
- Patching an 11.2.0.1 or 11.2.0.2 Database on Linux
- Configuring EXTPROC for Embedded R Execution

2.1 Installing Oracle Database for Oracle R Enterprise

Oracle R Enterprise requires the 64-bit version of Oracle Database Enterprise Edition. The database can be installed on any of the platforms described in Table 1–1, " Oracle R Enterprise Platform Requirements".

To install Oracle Database, follow the installation instructions for your platform:

- For Linux, see *Oracle Database Installation Guide for Linux*.
- For Oracle Solaris, see *Oracle Database Installation Guide for Oracle Solaris*.
- For IBM AIX, see *Oracle Database Installation Guide for IBM AIX on POWER Systems (64-Bit)*.
- For Microsoft Windows, see *Oracle Database Installation Guide for Microsoft Windows*.

2.2 Patching an 11.2.0.1 or 11.2.0.2 Database on Linux

Oracle R Enterprise 1.3.1 requires Oracle Database 11.2.0.3, 11.2.0.4, or 12.1. On Linux, Oracle R Enterprise can also work with an 11.2.0.1 or 11.2.0.2 database if it is properly patched.

If you are running an earlier release of Oracle Database 11*g* Release 2 on Linux and you are unable to upgrade to 11.2.0.3 or later, then you can follow this procedure to patch the database:

1. Go to My Oracle Support:

   `http://support.oracle.com`

2. Log in and supply your Customer Support ID (CSI).
3. Choose the Patches & Updates tab.
4. In the Patch Search box, type `11678127` and click **Search**.

5. Select the patch for your version of Oracle Database, either 11.2.0.1 or 11.2.0.2.
6. Click **Read M**e, and read the installation instructions and other details about the patch.
7. Click **Download** to download the patch.
8. Install the patch using OPatch. Ensure that you are using the latest version of OPatch.

> **See Also:** "Patching Oracle Software With OPatch" in *Oracle Universal Installer and OPatch User's Guide for Windows and UNIX* for instructions

2.3 Configuring EXTPROC for Embedded R Execution

An external procedure is a procedure invoked from a program that is written in a different language. Oracle Database uses an external procedure agent named `extproc` to support external procedures. Oracle R Enterprise uses `extproc` to support embedded R execution.

2.3.1 About extproc

When an application invokes an external procedure, Oracle Database starts an `extproc` agent. The application uses the network connection established by Oracle Database to pass instructions to the agent for executing the procedure. The agent loads a DLL or shared library, runs the external procedure, and passes back to the application any values returned by the external procedure.

2.3.2 About extproc configuration for Oracle R Enterprise

Oracle R Enterprise uses the default configuration of `extproc`. The `extproc` agent is spawned directly by Oracle Database, and no configuration changes are required for either `listener.ora` or `tnsnames.ora`.

By default, `extproc` supports any external procedure call. If you want to only allow external procedure calls for Oracle R Enterprise, you can edit the `EXTPROC_DLLS` environment variable in `ORACLE_HOME/hs/admin/extproc.ora`.

The following statement on a Linux or UNIX system sets `EXTPROC_DLLS` to only execute external procedures for Oracle R Enterprise:

```
SET EXTPROC_DLLS=ONLY:$ORACLE_HOME/lib/ore.so
```

To allow `extproc` to service any external procedure, set `EXTPROC_DLLS` to `ANY` or simply leave it blank (the default).

> **See Also:** "Default Configuration for External Procedures" in *Oracle Database Net Services Administrator's Guide* for details

3
Installing R

This chapter explains how to install R for Oracle R Enterprise. This chapter contains these topics:

3.1 About Oracle R Distribution and Open Source R

Oracle R Enterprise requires an installation of R on the computer that hosts Oracle R Enterprise Server and on each computer that hosts an Oracle R Enterprise client. If you intend to use Oracle R Enterprise directly on the server, then only one installation of R is necessary.

> **See Also:** Table 1–2, " Oracle R Enterprise Server Support Matrix" for the versions of R that are supported with Oracle R Enterprise

3.1.1 Oracle R Distribution for Oracle R Enterprise

Oracle recommends that you use Oracle R Distribution with Oracle R Enterprise Server. Oracle R Distribution is configured to simplify installation, resolve dependencies, and easily integrate with the Intel Math Kernel Library (MKL).

Benefits of Oracle R Distribution:

- Oracle R Distribution is compiled with the flags that are required by Oracle R Enterprise server components.
- Oracle R Distribution uses MKL to provide high performance mathematical computations on x86 hardware. If you have a licensed installation of MKL, you can configure Oracle R Distribution to use it by simply adding it to `LD_LIBRARY_PATH` path and setting one environment variable. See Section 3.6 for details.

3.1.2 Open Source R for Oracle R Enterprise

You can use open source R with Oracle R Enterprise. Use the following R configuration parameters to build it from source:

```
./configure  --with-lapack --with-ICU=no --enable-R-shlib
```

See Also:

- The *R Installation and Administration* manual for information about building R from source: http://www.r-project.org/
- Section 3.7 for information about installing open source R on Windows

3.2 Installing Oracle R Distribution on Linux

Oracle recommends that you use the Oracle Public Yum server for installing R on Linux. Oracle Public Yum is located at the following URL:

```
http://public-yum.oracle.com/
```

These topics explain how to install Oracle R Distribution on Linux systems:

- Installing Oracle R Distribution on Oracle Linux Using Yum
- Installing Oracle R Distribution on Oracle Linux Using RPMs
- Installing Oracle R Distribution on Red Hat Enterprise Linux

See Also: Section 7.5.2, "Uninstalling Oracle R Distribution on Linux"

3.2.1 Installing Oracle R Distribution on Oracle Linux Using Yum

Before installing Oracle R Distribution, verify that your version of Oracle Linux is supported by Oracle R Enterprise. Refer to Table 1–1, " Oracle R Enterprise Platform Requirements".

To install Oracle R Distribution on Oracle Linux Using Yum:

1. Log in to the Linux server as root and change to the `/etc/yum.repos.d` directory:

   ```
   # cd /etc/yum.repos.d
   ```

2. Execute the following command to download the yum configuration file from Oracle Public Yum:

   ```
   # wget http://public-yum.oracle.com/public-yum-xxx.repo
   ```

   The name of the configuration file is `public-yum-xxx.repo`, where *xxx* is either `el5`, for Oracle Linux 5, or `ol6`., for Oracle Linux 6

   Note: If the yum configuration file is already present in `/etc/yum.d`, then you can skip this step.

3. Open the configuration file in a text editor and specify `enabled=1` for *xxx*`_latest` and *xxx*`_addons`, where *xxx* indicates the version of Linux, either `el5` or `ol6`:

   ```
   [xxx_latest]
   enabled=1

   [xxx_addons]
   enabled=1
   ```

4. Execute the `yum install` command to install R.

   To install R-2.15.3:

```
# yum install R-2.15.3
```

To install the most recent version of R that is available on Oracle Public Yum:

```
# yum install R.x86_64
```

Important: Do not assume that the most recent version of R on Oracle Public Yum is supported by your version of Oracle R Enterprise. Consult Table 1–2, " Oracle R Enterprise Server Support Matrix" to determine which version of R you should use.

3.2.2 Installing Oracle R Distribution on Oracle Linux Using RPMs

Oracle recommends that you use yum to install Oracle R Distribution. However, if yum is not available, you can install Oracle R Distribution using RPMs.

Before installing Oracle R Distribution, verify that your version of Oracle Linux is supported by Oracle R Enterprise. Refer to Table 1–1, " Oracle R Enterprise Platform Requirements".

To download and install the RPMs for Oracle Linux 5, execute the commands shown in Example 3–1. To download and install the RPMs for Oracle Linux 6, execute these same commands but replace `el5` with `ol6`. Note that these RPMs may have dependencies that need resolving.

Example 3–1 Installing Oracle R Distribution on Oracle Linux 5 Using RPMs

```
# rpm -Uvh libXdmcp-devel-1.0.1-2.1.x86_64.rpm
# rpm -Uvh libXau-devel-1.0.1-3.1.x86_64.rpm
# rpm -Uvh R-2.15.3-1.el5.x86_64.rpm
# rpm -Uvh chkfontpath-1.10.1-1.1.x86_64.rpm
# rpm -Uvh libfontenc-1.0.2-2.2.el5.x86_64.rpm
# rpm -Uvh libRmath-devel-2.15.3-1.el5.x86_64.rpm
# rpm -Uvh avahi-compat-libdns_sd-0.6.16-10.el5_6.x86_64.rpm
# rpm -Uvh hicolor-icon-theme-0.9-2.1.noarch.rpm
# rpm -Uvh libFS-1.0.0-3.1.x86_64.rpm
# rpm -Uvh paps-0.6.6-20.el5.x86_64.rpm
# rpm -Uvh bzip2-devel-1.0.3-6.el5_5.x86_64.rpm
# rpm -Uvh ttmkfdir-3.0.9-23.el5.x86_64.rpm
# rpm -Uvh ed-0.2-39.el5_2.x86_64.rpm
# rpm -Uvh zlib-1.2.3-7.el5.i386.rpm
# rpm -Uvh zlib-1.2.3-7.el5.x86_64.rpm
# rpm -Uvh desktop-file-utils-0.10-7.x86_64.rpm
# rpm -Uvh xorg-x11-xfs-1.0.2-5.el5_6.1.x86_64.rpm
# rpm -Uvh poppler-utils-0.5.4-19.el5.x86_64.rpm
# rpm -Uvh xorg-x11-font-utils-7.1-3.x86_64.rpm
# rpm -Uvh R-devel-2.15.3-1.el5.x86_64.rpm
# rpm -Uvh libgcc-4.1.2-54.el5.i386.rpm
# rpm -Uvh libgcc-4.1.2-54.el5.x86_64.rpm
# rpm -Uvh zlib-devel-1.2.3-7.el5.x86_64.rpm
# rpm -Uvh libRmath-2.15.3-1.el5.x86_64.rpm
# rpm -Uvh dialog-1.0.20051107-1.2.2.x86_64.rpm
# rpm -Uvh pcre-devel-6.6-6.el5_6.1.x86_64.rpm
# rpm -Uvh dbus-python-0.70-9.el5_4.x86_64.rpm
# rpm -Uvh cups-libs-1.3.7-30.el5_9.3.x86_64.rpm
# rpm -Uvh gmp-4.1.4-10.el5.x86_64.rpm
# rpm -Uvh atk-1.12.2-1.fc6.x86_64.rpm
# rpm -Uvh libgfortran-4.1.2-52.el5_8.1.i386.rpm
```

```
# rpm -Uvh libgfortran-4.1.2-54.el5.x86_64.rpm
# rpm -Uvh libXfont-1.2.2-1.0.4.el5_7.x86_64.rpm
# rpm -Uvh xorg-x11-proto-devel-7.1-13.el5.x86_64.rpm
# rpm -Uvh avahi-0.6.16-10.el5_6.x86_64.rpm
# rpm -Uvh libtiff-3.8.2-18.el5_8.x86_64.rpm
# rpm -Uvh pango-1.14.9-8.0.1.el5_7.3.x86_64.rpm
# rpm -Uvh bitstream-vera-fonts-1.10-7.noarch.rpm
# rpm -Uvh libstdc++-4.1.2-54.el5.x86_64.rpm
# rpm -Uvh libstdc++-4.1.2-54.el5.i386.rpm
# rpm -Uvh cairo-1.2.4-5.el5.x86_64.rpm
# rpm -Uvh mesa-libGL-devel-6.5.1-7.11.el5_9.x86_64.rpm
# rpm -Uvh tetex-dvips-3.0-33.15.el5_8.1.x86_64.rpm
# rpm -Uvh libX11-devel-1.0.3-11.el5_7.1.x86_64.rpm
# rpm -Uvh ghostscript-fonts-5.50-13.1.1.noarch.rpm
# rpm -Uvh tk-devel-8.4.13-5.el5_1.1.x86_64.rpm
# rpm -Uvh netpbm-10.35.58-10.el5.x86_64.rpm
# rpm -Uvh tcl-devel-8.4.13-6.el5.x86_64.rpm
# rpm -Uvh tcl-8.4.13-6.el5.x86_64.rpm
# rpm -Uvh netpbm-progs-10.35.58-10.el5.x86_64.rpm
# rpm -Uvh libstdc++-devel-4.1.2-54.el5.x86_64.rpm
# rpm -Uvh libstdc++-devel-4.1.2-54.el5.i386.rpm
# rpm -Uvh cpp-4.1.2-54.el5.x86_64.rpm
# rpm -Uvh poppler-0.5.4-19.el5.x86_64.rpm
# rpm -Uvh cups-1.3.7-30.el5_9.3.x86_64.rpm
# rpm -Uvh gcc-gfortran-4.1.2-54.el5.x86_64.rpm
# rpm -Uvh gcc-c++-4.1.2-54.el5.x86_64.rpm
# rpm -Uvh tetex-latex-3.0-33.15.el5_8.1.x86_64.rpm
# rpm -Uvh urw-fonts-2.3-6.1.1.noarch.rpm
# rpm -Uvh gcc-4.1.2-54.el5.x86_64.rpm
# rpm -Uvh gtk2-2.10.4-29.el5.x86_64.rpm
# rpm -Uvh mesa-libGL-6.5.1-7.11.el5_9.x86_64.rpm
# rpm -Uvh tetex-3.0-33.15.el5_8.1.x86_64.rpm
# rpm -Uvh ghostscript-8.70-14.el5_8.1.x86_64.rpm
# rpm -Uvh tetex-fonts-3.0-33.15.el5_8.1.x86_64.rpm
# rpm -Uvh R-core-2.15.3-1.el5.x86_64.rpm
# rpm -Uvh libRmath-2.15.3-1.el5.x86_64.rpm
```

3.2.3 Installing Oracle R Distribution on Red Hat Enterprise Linux

Before installing Oracle R Distribution, verify that your version of Red Hat Enterprise Linux is supported by Oracle R Enterprise. Refer to Table 1–1, " Oracle R Enterprise Platform Requirements".

> **Note:** The following installation instructions are specific to Red Hat Enterprise Linux 6. For Red Hat Enterprise Linux 5, change `ol6` to `el5`.

To install Oracle R Distribution on Red Hat Enterprise Linux 6:

1. Create an RPM build directory structure:

   ```
   % mkdir -p ~/rpmbuild/{BUILD,RPMS,SOURCES,SPECS,SRPMS}
   ```

2. Set up RPM tools to use your own build tree (to avoid `root` login):

   ```
   % echo '%_topdir %(echo $HOME)/rpmbuild' > ~/.rpmmacros
   ```

3. Download the source RPMs (`*.src.rpm`) from Oracle Public Yum. For Red Hat Enterprise Linux 6:

http://public-yum.oracle.com/repo/OracleLinux/OL6/

Save the source RPMs to the `rpmbuild/SRPMS` directory.

4. Rebuild Red Hat Enterprise Linux using `rpmbuild`.

```
% rpmbuild --rebuild ~/rpmbuild/SRPMS/R-2.15.3-1.el6.src.rpm
```

> **Note:** If any dependencies are missing, install them as root.

The binary RPMs are built and saved under `~/rpmbuild/RPMS`.

5. Log in as root and execute this command to install R:

```
# rpm -i path/rpmbuild/RPMS/R-core_RPM
```

For example, this command installs R 2.15.3 on Red Hat Enterprise Linux x86-64 version 6, where the path to `rpmbuild` is `/refresh/home/`.

```
# rpm -i /refresh/home/rpmbuild/RPMS/x86_64/R-core-2.15.3-1.el6.x86_64.rpm
```

3.3 Installing Oracle R Distribution on Oracle Solaris

Oracle R Distribution is supported on Oracle Solaris x86-64 and SPARC. Before installing Oracle R Distribution, verify that your version of Oracle Solaris is supported by Oracle R Enterprise. Refer to Table 1–1, " Oracle R Enterprise Platform Requirements".

To install Oracle R Distribution on Oracle Solaris:

1. Go to the Oracle Open Source Software Download page for Oracle R Distribution:

   https://oss.oracle.com/ORD/

2. Download the files for your installation. The following are the files for R-2.15.3:

   - For x86 64-bit systems:

     ```
     ord-2.15.3-sol10-x86-64-sunstudio12u3.tar.gz
     ord-2.15.3-supporting-sol10-x86-64-sunstudio12u3.tar.gz
     ```

   - For SPARC 64-bit systems:

     ```
     ord-2.15.3-sol10-sparc-64-sunstudio12u3.tar.gz
     ord-2.15.3-supporting-sol10-sparc-64-sunstudio12u3.tar.gz
     ```

3. Uncompress the first file, either `sol110-x86-64` or `sol10-sparc`.

4. Run `install.sh` as root to install the Solaris PKG file for Oracle R Distribution.

   ```
   # install.sh
   ```

5. Uncompress the second file, either `supporting-sol10-x86-64` or `supporting-sol10-sparc`, to a local directory such as `$ORACLE_HOME/lib`. Add that directory to `$LD_LIBRARY_PATH`.

   These tar files contain the shared libraries for `libR.so`:

   - `libiconv.so.2`
   - `libncurses.so.5`
   - `libreadline.so.6`

- `libsunperf.so` (This library and its dependent shared libraries usually ship with Oracle Solaris Studio).

6. Run the following command to verify that `libR.so` is picking up its shared library dependencies correctly from the local directory.

```
# ldd -r /usr/lib/64/R/lib/libR.so
```

7. Start R by typing `R` at the command prompt:

```
% R
```

See Also: Section 7.5.3, "Uninstalling Oracle R Distribution on Oracle Solaris"

3.4 Installing Oracle R Distribution on IBM AIX

Oracle R Distribution is supported on IBM AIX. Before installing Oracle R Distribution, verify that your version of IBM AIX is supported by Oracle R Enterprise. Refer to Table 1–1, " Oracle R Enterprise Platform Requirements".

To install Oracle R Distribution on IBM AIX:

1. Go to the Oracle Open Source Software Download page for Oracle R Distribution:

   https://oss.oracle.com/ORD/

2. Download the files for your installation. The following are the files for R-2.15.3:

```
ORD.2.15.3.0.bff.gz
ord-supporting-aix.tar.gz
```

3. Uncompress and untar `ord-supporting-aix.tar.gz`:

```
$ gunzip ord-supporting-aix.tar.gz  # get ord-supporting-aix.tar
$ tar -xvf ord-supporting-aix.tar   # extract contents of .tar file
$ ls ord-supporting-aix             # list of rpms
bash-4.2-5.aix5.1.ppc.rpm
expat-2.0.1-3.aix5.1.ppc.rpm
gettext-0.17-1.aix5.1.ppc.rpm
glib2-2.28.6-1.aix5.1.ppc.rpm
info-4.13a-2.aix5.1.ppc.rpm
libiconv-1.14-1.aix5.1.ppc.rpm
libpng-1.5.9-1.aix5.1.ppc.rpm
libpng-devel-1.5.9-1.aix5.1.ppc.rpm
pkg-config-0.25-2.aix5.1.ppc.rpm
readline-6.2-3.aix5.1.ppc.rpm
readline-devel-6.2-3.aix5.1.ppc.rpm
texinfo-4.13a-2.aix5.1.ppc.rpm
zlib-1.2.6-1.aix5.1.ppc.rpm
zlib-devel-1.2.6-1.aix5.1.ppc.rpm
```

   You can also download these RPMs from http://www.perzl.org/aix/.

4. Install the RPMs as root using an `rpm` command:

```
$ cd /download_directory
$ su
# rpm -i *.rpm
```

   To upgrade existing dependencies, use:

```
# rpm -UF *.rpm
```

If you experience conflicts with dependencies, use:

```
# rpm -UF --nodeps *.rpm
```

5. Add `/opt/freeware/lib` to the `LIBPATH` environment variable:
   - For ksh:

     ```
     $ export LIBPATH=/opt/freeware/lib:$LIBPATH
     ```

   - For csh:

     ```
     $ setenv LIBPATH /opt/freeware/lib:$LIBPATH
     ```

   Ensure that `/opt/freeware/lib` is before `/usr/lib`.

6. Uncompress `ORD-2.15.1-aix.bff.gz` to get `ORD-2.15.1-aix.bff`:

   ```
   $ gunzip ORD.2.15.1.0.bff.gz
   ```

7. To install all of the filesets in Oracle R Distribution, execute the `installp` command (with the apply option) as root:

   ```
   $ cd /download_directory
   $ su
   # installp -a -d . ORD   # install all the filesets in ORD
   ```

   You can also install independent filesets:

   ```
   # installp -a -d . ORD.core   # installs only ORE.core
   # installp -a -d . ORD.devel  # installs only ORE.devel
   ```

8. Run `ldd` to ensure that shared library dependencies were picked up correctly:

   ```
   $ ldd /usr/lib/R/bin/exec/R
   $ ldd /usr/lib/R/lib/libR.so (libiconv, libreadline)
   $ ldd /usr/lib/R/lib/libRlapack.so
   $ ldd /usr/lib/R/lib/libRblas.so
   ```

9. Add `/usr/lib/R/lib` to the `LIBPATH` environment variable:
   - For ksh:

     ```
     $ export LIBPATH=/usr/lib/R/lib:$LIBPATH
     ```

   - For csh:

     ```
     $ setenv LIBPATH /usr/lib/R/lib:$LIBPATH
     ```

     See Also: Section 7.5.4, "Uninstalling Oracle R Distribution on IBM AIX"

3.5 Installing Oracle R Distribution on Oracle Exadata Database Machine

Oracle recommends that you use Oracle R Distribution for Oracle R Enterprise on Exadata. You must install R on each Exadata node.

For Linux systems, Oracle recommends that you install Oracle R Distribution from Oracle Public Yum:

http://public-yum.oracle.com/

Refer to the instructions in Section 3.2, "Installing Oracle R Distribution on Linux".

For Oracle Solaris systems, Oracle recommends that you install Oracle R Distribution from the Open Source Software Downloads page on the Oracle Technology Network:

https://oss.oracle.com/ORD/

Refer to the instructions in Section 3.3, "Installing Oracle R Distribution on Oracle Solaris".

See Also:

- Section 7.5.2, "Uninstalling Oracle R Distribution on Linux"
- Section 7.5.3, "Uninstalling Oracle R Distribution on Oracle Solaris"

3.6 Using the Intel Math Kernel Library

The Intel Math Kernel Library (MKL) includes highly vectorized and threaded Linear Algebra, Fast Fourier Transforms (FFT), Vector Math and Statistics functions. Oracle R Distribution includes support that dynamically picks up MKL if it is installed on your system.

Follow these steps to use MKL with Oracle R Distribution on Linux:

1. Add `libmkl_rt.so`, `$RHOME/lib`, and `$ORACLE_HOME/lib` to the LD_LIBRARY_PATH system environment variable.
2. Start R and execute this Oracle R Distribution function `Sys.BlasLapack`:

```
R> Sys.BlasLapack()
     $vendor
     [1] "Intel Math Kernel Library (Intel MKL)"
     $nthreads
     [1] -1
```

   The vendor value returned indicates the presence of MKL instead of R's internal BLAS.

3. In order to get the speedup provided by MKL, you must set the `MKL_THREADING_LAYER` environment variable to GNU before you start Oracle R Distribution on your system. In the Bash shell, set the variable as follows:

```
% export MKL_THREADING_LAYER=GNU
```

3.7 Installing R on Windows

Oracle R Distribution is not supported on Windows, however the binaries distributed by the Comprehensive R Archive Network (CRAN) for Windows work with Oracle R Enterprise.

Before installing R, verify that your version of Microsoft Windows is supported by Oracle R Enterprise. Refer to Table 1–1, " Oracle R Enterprise Platform Requirements".

Follow these steps to install R on Windows:

1. Go to the R home page:

   http://www.r-project.org

2. Under **Download, Packages**, choose **CRAN**.
3. Select a CRAN Mirror.
4. Choose **Download R for Windows**.

5. Under **Subdirectories**, choose **base**.
6. Under **Other builds**, choose **Previous releases**.
7. Download the most recent version of R specified in Section 1.7.
8. When the download completes, double-click the executable file to start the Windows installer for R. For example:

   ```
   R-2.15.3-win.exe
   ```

9. Follow the instructions to complete the installation.

See Also: Section 7.5.1, "Uninstalling R on Windows"

4

Installing Oracle R Enterprise Server

This chapter explains how to install Oracle R Enterprise Server. This chapter includes these topics:

4.1 About Oracle R Enterprise Server

4.1.1 What Is Oracle R Enterprise Server?

Oracle R Enterprise Server enables an Oracle database to support an Oracle R Enterprise client.

Oracle R Enterprise Server includes the following:

- The `RQSYS` schema
- Libraries used by Oracle Database
- Oracle R Enterprise packages, which support embedded R execution

4.1.2 Server Components of Oracle R Enterprise

Oracle R Enterprise includes several components that must be installed separately on the server computer.

These Oracle R Enterprise Server components must be installed in this order:

1. Oracle Database Enterprise Edition
2. Oracle R Distribution or open source R
3. Oracle R Enterprise Server, which includes the Oracle R Enterprise packages
4. Oracle R Enterprise client supporting packages

An illustration of the client and server components of Oracle R Enterprise is shown in Figure 1–2.

4.1.3 About the Oracle R Enterprise Server Installation Script

The Oracle R Enterprise Server installation script performs the following:

1. Verifies the environment:
   - Verifies the presence of an R installation
   - Verifies the presence of the `libR.so`, `libRblas.so`, and `libRlapack.so` libraries in `$R_HOME/lib`, where `$R_HOME` is `/usr/lib64/R`
   - Verifies that `$ORACLE_HOME` and `$ORACLE_SID` are set
2. Starts SQL*Plus as sysdba and connects to the database specified in `ORACLE_SID`
3. In the database:
   - Determines if Oracle R Enterprise Server is already installed by querying `DBA_USERS` for the user `RQSYS`.

     If `RQSYS` is found, the installer checks the version of Oracle R Enterprise in the `sys.rq_config` file. The Installer uses the version information later to install the correct PL/SQL packages.
   - Prompts for the location of permanent and temporary tablespaces for `RQSYS`. By default, the tablespaces are created in `SYSAUX` and `TEMP`.
   - Copies Oracle R Enterprise Server libraries to `$ORACLE_HOME/lib`.
   - Creates the `RQSYS` schema, if it does not already exist.
   - Creates objects in `RQSYS` and installs the Oracle R Enterprise PL/SQL packages.
4. Installs the Oracle R Enterprise client packages in `$ORACLE_HOME/R/library`

4.2 Oracle R Enterprise Server Requirements

Before installing Oracle R Enterprise Server, verify the following requirements:

- System Requirements
- Environment Variable Requirements
- User Requirements

4.2.1 System Requirements

- The operating system must conform to the requirements specified in Section 1.7.
- Oracle Database must be installed and configured as described in Chapter 2.
- R must be installed as described in Chapter 3.

4.2.1.1 Verifying 64-Bit Architecture on Microsoft Windows

Oracle R Enterprise only runs on 64-bit operating systems. You can determine if your Windows system is 64-bit by following these steps:

- Windows 7 or Windows Vista:
  1. From Windows Control Panel, choose **System**.

2. Verify that **System type** is **64-bit Operating System**.

- Windows XP:
  1. From the Start menu, choose **My Computer**.
  2. Click **Properties**.
  3. On the **System** tab, verify that the system is **x64 Edition**.

4.2.2 Environment Variable Requirements

Before installing Oracle R Enterprise Server, ensure that environment variables are set as shown in Table 4–1.

Table 4–1 Environment Variable Requirements for Oracle R Enterprise Server

Platform	Environment Variable Requirement
all	**ORACLE_SID** must specify the service identifier (SID) of the database that will support Oracle R Enterprise.
	ORACLE_HOME must specify the home directory of the database identified by ORACLE_SID.
Linux	**LD_LIBRARY_PATH** must include $ORACLE_HOME/lib.
	PATH must include $ORACLE_HOME/bin.
Oracle Solaris	**LD_LIBRARY_PATH** must include $ORACLE_HOME/lib.
	PATH must include $ORACLE_HOME/bin.
IBM AIX	**LIBPATH** must include $ORACLE_HOME/lib.
	PATH must include $ORACLE_HOME/bin.
Microsoft Windows	**PATH** must include %ORACLE_HOME%\bin.

4.2.2.1 Creating Environment Variable on Windows

If the PATH, ORACLE_SID, and ORACLE_HOME environment variables do not exist, you must create them and assign the values specified in Table 4–1. On Windows systems, you must be an administrator to create or modify environment variables.

Follow these steps to create or modify environment variables on Windows:

- Windows 7 and Windows Vista:
  1. Right-click the **Computer** icon and choose **Properties**.
  2. Choose **Advanced system settings**.
  3. On the Advanced tab, choose **Environment Variables**.
  4. Create or modify the environment variables.
- Windows XP:
  1. Right-click the **My Computer** icon and choose **Properties**.
  2. On the Advanced tab, choose **Environment Variables**.
  3. Create or modify the environment variables.

4.2.3 User Requirements

The operating system user that installs Oracle R Enterprise Server must meet the requirements described in Table 4–2.

Table 4–2 User Requirements for Oracle R Enterprise Server Installer

Platform	User Requirement
Linux and UNIX	▪ Member of the `DBA` group ▪ Has write access to `$ORACLE_HOME/lib`
Microsoft Windows	▪ Administrator access ▪ Member of the `ORA_DBA` group ▪ Has write access to `%ORACLE_HOME%\lib`

4.2.3.1 About Operating System Authentication

The Oracle R Enterprise Server installation script uses **system authentication** to connect to the database identified by `ORACLE_HOME` and `ORACLE_SID`. System authentication is based on the operating system credentials of the user instead of the database credentials.

For example, on a Linux system, the Oracle R Enterprise installation script uses this statement to start SQL*Plus without a password:

```
$ORACLE_HOME/bin/sqlplus / as sysdba
```

Membership in a special operating system group enables system authentication for Oracle Database. The operating system group is created during installation of the database, and the identity of the installer is automatically assigned to the group. The generic name for the group is OSDBA. On Linux and UNIX, the name for OSDBA is `DBA`. On Windows, the name for OSDBA is `ORA_DBA`.

The user that installs Oracle R Enterprise Server must belong to OSDBA.

See Also:

- "About Operating System Authentication" in *Oracle Database Administrator's Guide*
- "Operating System Authentication Enabled at Installation" in *Oracle Database Platform Guide for Microsoft Windows*

4.3 Installing Oracle R Enterprise Server on Linux or UNIX

These installation instructions apply to the Linux and UNIX platforms described in Section 1.7.

To install Oracle R Enterprise Server on Linux or UNIX:

1. Ensure that your system satisfies the requirements specified in Section 4.2, "Oracle R Enterprise Server Requirements".
2. Ensure that your user ID has the permissions described in Section 4.2.3, "User Requirements"
3. Create an installation directory for the Oracle R Enterprise server components. The directory can have any name. For example:

   ```
   ~/oreserver_install_dir
   ```

4. Go to the Oracle R Enterprise Downloads page on the Oracle Technology Network:

   http://www.oracle.com/technetwork/database/options/advanced-analytics/r-enterprise/ore-downloads-1502823.html

5. Accept the license agreement and select **Oracle R Enterprise Downloads (v1.3.1)**.
6. Select **Oracle R Enterprise Server Install for Oracle Database** for your platform. Save the file in the installation directory that you created in Step 3.

   ```
   ~/oreserver_install_dir/ore-server-platform-arch-1.3.1.zip
   ```

7. Unzip the file as follows:

   ```
   % unzip ore-server-platform-arch-1.3.1.zip
   ```

   The files are unzipped into the `server` subdirectory:

   ```
   ~/oreserver_install_dir/server/
   ```

8. Run the installation script in the `server` subdirectory.

   ```
   % cd server/
   % ./install.sh
   ```

9. When prompted, provide the locations of permanent and temporary tablespaces for the `RQSYS` schema. `SYSAUX` and `TEMP` are used by default.

   Tip: Refer to Section 4.1.3 for a description of the actions performed by the Oracle R Enterprise Server installation script.

10. When the Oracle R Enterprise Server installation script is finished, complete the installation by installing the client supporting packages.
    1. Return to the Oracle R Enterprise Downloads page on the Oracle Technology Network (Step 4).
    2. Accept the license agreement and select **Oracle R Enterprise Client Supporting Packages** for your platform. Save the file in the installation directory.

       ```
       ~/oreserver_install_dir/ore-supporting-platform-arch-1.3.1.zip
       ```

    3. Unzip the file as follows:

       ```
       % unzip ore-supporting-platform-arch-1.3.1.zip
       ```

       The files are unzipped into the `supporting` subdirectory:

       ```
       ~/oreserver_install_dir/supporting/
       ```

    4. Install the packages:

       ```
       % cd supporting
       % ORE CMD INSTALL ROracle_1.1-9_R_x86_64-unknown-linux-gnu.tar.gz
       % ORE CMD INSTALL DBI_0.2-5_R_x86_64-unknown-linux-gnu.tar.gz
       % ORE CMD INSTALL png_0.1-4_R_x86_64-unknown-linux-gnu.tar.gz
       ```

       The packages are installed in `$ORACLE_HOME/R/library`.

11. Follow the procedures in Section 6.1 to create and configure a database user account for Oracle R Enterprise.

    See Also: Appendix A for the steps in a typical installation of Oracle R Enterprise on a Linux server and Windows client

4.3.1 Installing Additional R Packages on Linux or UNIX

On Linux and UNIX platforms, the Oracle R Enterprise Server installation provides the `ORE` script, which you can run from the operating system prompt to install additional R packages. The `ORE` script is a wrapper for the R installation command: `R CMD INSTALL`.

By default, R packages are installed in `/usr/lib64/R/library`. The `ORE` script, however, installs R packages in a subdirectory under `$ORACLE_HOME/R/library`.

To execute the script:

```
% ORE CMD INSTALL R_package_name
```

4.4 Installing Oracle R Enterprise Server on Microsoft Windows

These installation instructions apply to Microsoft Windows 64-bit platforms, as described in Table 1–1.

To install Oracle R Enterprise Server on Windows:

1. Ensure that your system satisfies the requirements specified in Table 4–2.
2. Ensure that your user ID has the permissions described in Section 4.2.3, "User Requirements"
3. Create an installation directory for the Oracle R Enterprise server components. The directory can have any name. For example:

   ```
   c:\oreserver_install_dir
   ```

4. Go to the Oracle R Enterprise Downloads page on the Oracle Technology Network:

   http://www.oracle.com/technetwork/database/options/advanced-analytics/r-enterprise/ore-downloads-1502823.html

5. Accept the license agreement and select **Oracle R Enterprise Server Install for Oracle Database on Windows 64 bit platform**. Save the file in the installation directory that you created in Step 3.

   ```
   c:\oreserver_install_dir\ore-server-win-x86_64-1.3.1.zip
   ```

6. Unzip the file. The files are unzipped in the `server` subdirectory:

   ```
   c:\oreserver_install_dir\server
   ```

7. In a command window, change to the `server` subdirectory and execute the installation batch file:

   ```
   > cd c:\oreserver_install_dir\server
   > install.bat
   ```

8. When prompted, provide the locations of permanent and temporary tablespaces for the `RQSYS` schema. `SYSAUX` and `TEMP` are used by default.

   Tip: Refer to Section 4.1.3 for a description of the actions performed by the Oracle R Enterprise Server installation script.

9. When the Oracle R Enterprise Server installation script is finished, complete the installation by installing the client supporting packages.

1. Return to the Oracle R Enterprise Downloads page on the Oracle Technology Network (Step 4).
2. Accept the license agreement and select **Oracle R Enterprise Client Supporting Packages for Windows Platform**. Save the file in the installation directory.

   ```
   c:\oreserver_install_dir\ore-supporting-win-x86_64-1.3.1.zip
   ```

3. Unzip the file. The files are unzipped in the `supporting` subdirectory.

   ```
   c:\oreserver_install_dir\supporting\
   ```

4. Start R from the Windows Start menu. If you have installed both 32- and 64-bit R, be sure to choose 64-bit R.

   The R Console window is displayed.

5. Install the packages as follows:

   ```
   R> install.packages("c:/oreserver_install_dir/supporting/
                       ROracle_1.1-9.zip", repos=NULL)
   R> install.packages("c:/oreserver_install_dir/supporting/
                       DBI_0.2-5.zip", repos=NULL)
   R> install.packages("c:/oreserver_install_dir/supporting/
                       png_0.1-4.zip", repos=NULL)
   ```

   The packages are installed in `$ORACLE_HOME/R/library`.

10. Follow the procedures in Section 6.1 to create and configure a user account for Oracle R Enterprise.

4.5 Installing Oracle R Enterprise Server on Oracle Exadata Database Machine

Oracle Exadata Database Machine consists of several compute nodes, along with storage and other facilities. Each node hosts an Oracle database.

To install Oracle R Enterprise Server on Oracle Exadata Database Machine:

1. On *each* node:
   - Install Oracle R Distribution as described in Section 3.5.
   - Ensure that the environment is configured as described in Section 4.2. Environment variables must be set on each node.
   - Install Oracle R Enterprise Server, as described in Section 4.3.
   - Install Oracle R Enterprise client supporting packages, as described in Section 5.2.
2. On the *first* node only, create a user, as described in Section 6.1.

4.6 Verifying the Oracle R Enterprise Server Installation

The Oracle R Enterprise server installation script creates log files in the server subdirectory of the installation directory. Examine the log files to verify the success of the installation process.

The following commands on a Linux or UNIX system list the log files:

```
% cd ./oreserver_install_dir/server
```

```
% ls *.log
rqinst.log  rqproc.log
```

If there are problems with the installation and you are unable to resolve them, you can request help from My Oracle Support or from the Oracle R Enterprise discussion forum.

- My Oracle Support — https://support.oracle.com
- Oracle R Enterprise Forum — https://forums.oracle.com/community/developer/english/business_intelligence/data_warehousing/r

See Also: Section A.4, "Verifying the Oracle R Enterprise Installation"

5

Installing Oracle R Enterprise Client

This chapter explains how to install Oracle R Enterprise Client. This chapter includes these topics:

5.1 About Oracle R Enterprise Client

This topic includes the following:

5.1.1 Client Components of Oracle R Enterprise

Oracle R Enterprise includes several components that must be installed separately on each client computer. The Oracle R Enterprise client components, listed below, can be installed in any order:

- R (See Chapter 3, "Installing R")
- Oracle Database Client Software
- Oracle R Enterprise client packages
- Oracle R Enterprise client supporting packages

An illustration of the client and server components of Oracle R Enterprise is shown in Figure 1–2.

5.1.2 About Oracle Database Client Software

ROracle, one of the client supporting packages used by Oracle R Enterprise, requires an installation of Oracle Database client software to enable communication between an

R client and an Oracle database. The Database client can be either Oracle Database Client or Oracle Database Instant Client:

- **Oracle Database Client** is distributed with Oracle Database and is based in the Oracle Home of the database.
- **Oracle Database Instant Client** is a free, stand-alone implementation of Oracle Database Client. Oracle Instant Client is not based in an Oracle home directory and requires less disk space than Oracle Database Client.

5.1.3 About the Client Packages and Client Supporting Packages

The Oracle R Enterprise client packages and client supporting packages are required on each client computer and on the server computer that hosts Oracle Database with Oracle R Enterprise Server. On the server, the client packages are installed automatically by the Oracle R Enterprise Server installation script.

5.1.3.1 Oracle R Enterprise Client Packages

The client packages, shown in Table 5–1, are a set of Oracle proprietary packages that support Oracle R Enterprise.

Table 5–1 Oracle R Enterprise Client Packages

Package Name	Description
`ORE`	The top-level package for Oracle R Enterprise.
`OREbase`	Corresponds to the open source R `base` package.
`OREdm`	Exposes Oracle Data Mining algorithms through R.
`OREeda`	Contains functions for exploratory data analysis.
`OREgraphics`	Corresponds to the open source R `graphics` package.
`OREmodels`	Contains functions for advanced analytical modeling.
`OREpredict`	Enables scoring data in Oracle Database using R models.
`OREstats`	Corresponds to the open source R `stats` package.
`ORExml`	Supports XML translation between R and Oracle Database.

5.1.3.2 Oracle R Enterprise Client Supporting Packages

The client supporting packages, shown in Table 5–2, are a set of open source packages that support the Oracle R Enterprise client packages.

Table 5–2 Oracle R Enterprise Client Supporting Packages

Package Name	Description
`DBI`	A database interface definition for communication between R and Oracle Database.
`png`	Supports the reading and writing PNG images for Oracle R Enterprise objects.
`ROracle`	Oracle Database interface for R based OCI.

5.2 Installing Oracle Database Instant Client on Windows

As described in Section 5.1.2, Oracle R Enterprise requires Oracle Database client software. Oracle Instant Client is suitable for most configurations of Oracle R Enterprise.

To Install Oracle Instant Client on Windows:

1. Create an installation directory for the Oracle R Enterprise client components. For example:

   ```
   c:\oreclient_install_dir
   ```

2. Go to the Oracle Database Instant Client page on the Oracle Technology Network:

   http://www.oracle.com/technetwork/database/features/instant-client/

3. Select **See Instant Client downloads for all platforms**.
4. On the Instant Client Downloads page, select **Instant Client for Microsoft Windows (x64)**.
5. On the Instant Client Downloads for Microsoft Windows (x64) page, accept the license agreement.
6. Choose **Instant Client Package - Basic** or **Instant Client Package - Basic Lite** for your version of Oracle Database.
7. Save the file in the installation directory that you created in Step 1. For example:

   ```
   c:\oreclient_install_dir\instantclient-basic-windows.x64-12.1.0.1.0.zip
   ```

8. Unzip the file.The files are extracted into a subdirectory called `instantclient_`*`version`*, where *`version`* is your version of Oracle Database. For example:

   ```
   c:\oreclient_install_dir\instantclient_12_1
   ```

9. Return to the Instant Client Downloads for Microsoft Windows (x64) page:

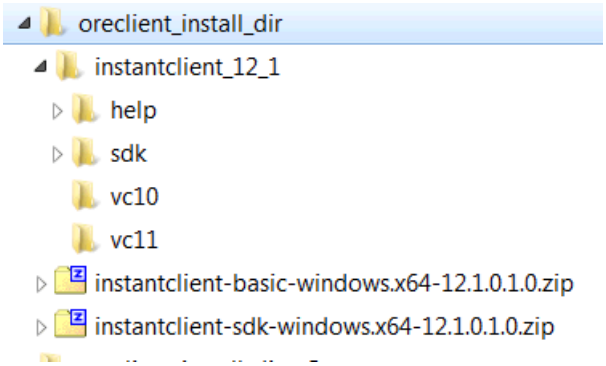
   http://www.oracle.com/technetwork/topics/winx64soft-089540.html

10. Accept the license agreement and select **Instant Client Package - SDK** for your version of Oracle Database.
11. Save the file in the installation directory that you created in Step 1.

    ```
    c:\oreclient_install_dir\instantclient-sdk-windows.x64-12.1.0.1.0.zip
    ```

12. Unzip the file. The files are extracted into the `instantclient_`*`version`* subdirectory. An Instant Client installation directory for Oracle Database 12.1 is shown in Figure 5–1

Figure 5–1 An Instant Client Installation Directory for Oracle Database 12.1



13. Add the full path of the Instant Client to the environment variables `OCI_LIB64` and `PATH`. The following steps set the variables to the path used in this example, `c:\myoreclient\instantclient_12_1`:

To set environment variables for Oracle Instant Client:

1. In Windows Control Panel, choose **System**.
2. Click **Advanced systems settings**.
3. On the **Advanced** tab, click **Environment Variables**.
4. Under **System variables**, create `OCI_LIB64` if it does not already exist. Set the value of `OCI_LIB64` to `c:\oreclient\instantclient_12_1`.
5. Under **System variables**, edit `PATH` to include `c:\oreclient\instantclient_12_1`.

Note: The graphical user interface for creating environment variables may vary slightly, depending on your version of Windows.

See Also:

- Appendix A, "A Sample Installation of Oracle R Enterprise"
- Section 4.2.2.1, "Creating Environment Variable on Windows"

5.3 Installing Oracle Database Instant Client on Linux or UNIX

As described in Section 5.1.2, Oracle R Enterprise requires Oracle Database client software. Oracle Instant Client is suitable for most configurations of Oracle R Enterprise.

This section contains these topics:

- Installing Oracle Instant Client on Linux from RPMs
- Installing Oracle Instant Client on Linux or UNIX from a Zip File

5.3.1 Installing Oracle Instant Client on Linux from RPMs

To Install Oracle Instant Client on Linux from RPMs:

1. Create an installation directory for the Oracle R Enterprise client components. For example:

```
% mkdir oreclient_install_dir
```

2. Go to the Oracle Database Instant Client page on the Oracle Technology Network:

   http://www.oracle.com/technetwork/database/features/instant-client/

3. Choose **See Instant Client downloads for all platforms**.
4. On the Instant Client Downloads page, choose **Instant Client for Linux x86-64**.
5. On the Instant Client Downloads page for Linux, accept the license agreement and select the RPM for **Instant Client Package - Basic** or the **Instant Client Package - Basic Lite**.
6. Save the file in the directory that you created in Step 1. For example:

   ```
   ~/oreclient_install_dir/oracle-instantclient12.1-basic-12.1.0.1.0-1.x86_64.rpm
   ```

7. Return to the Instant Client Downloads page for Linux x86-64:

   http://www.oracle.com/technetwork/topics/linuxx86-64soft-092277.html

8. Accept the license agreement and download the RPM for **Instant Client Package - SDK** for your version of Oracle Database. Save the file in directory that you created in Step 1. For example:

   ```
   ~/oreclient_install_dir/oracle-instantclient12.1-sdk-12.1.0.1.0-1.x86_64.rpm
   ```

9. The RPMs place the files in standard locations that the ROracle configuration script can find. For example, Oracle Instant Client 12.1 will be installed in`/usr/lib/oracle/12.1/client64/lib`.
10. After installing Oracle Instant Client, change `LD_LIBRARY_PATH` to include the Oracle Instant client libraries. For example:

    ```
    % export LD_LIBRARY_PATH=/usr/lib/oracle/12.1/client64/lib:$LD_LIBRARY_PATH
    ```

5.3.2 Installing Oracle Instant Client on Linux or UNIX from a Zip File

To Install Oracle Instant Client on Linux or UNIX for a zip file:

1. Create an installation directory for the Oracle R Enterprise client components. For example:

   ```
   % mkdir oreclient_install_dir
   ```

2. Go to the Oracle Database Instant Client page on the Oracle Technology Network:

   http://www.oracle.com/technetwork/database/features/instant-client/

3. Select **See Instant Client downloads for all platforms**. On the Instant Client Downloads page, select the Instant Client for your platform.
4. Accept the license agreement and select the **Instant Client Package - Basic** or **Instant Client Package - Basic Lite** rpm for your version of Oracle Database.
5. Save the file in the installation directory that you created in Step 1. For example:

   ```
   ~\oreclient_install_dir\instantclient-basic-linux.x64-12.1.0.1.0.zip
   ```

6. Unzip the file. The files are extracted into a subdirectory called `instantclient_`*`version`*, where *`version`* is your version of Oracle Database. For example:

   ```
   % unzip instantclient-basic-linux.x64-12.1.0.1.0.zip
   % ls
   instantclient_12_1/
   ```

```
instantclient-basic-linux.x64-12.1.0.1.0.zip
```

7. Return to the Instant Client Downloads page:

   http://www.oracle.com/technetwork/database/features/instant-client/index-097480.html

8. Select the Instant Client for your platform.
9. On the Instant Client Downloads page for your platform, accept the license agreement and select **Instant Client Package - SDK** for your version of Oracle Database.
10. Save the file in the installation directory that you created in Step 1. For example:

    ```
    ~\oreclient_install_dir\instantclient-sdk-linux.x64-12.1.0.1.0.zip
    ```

11. Unzip the file. The contents are extracted into the `instantclient_`*`version`* subdirectory.

    ```
    % unzip instantclient-sdk-linux.x64-12.1.0.1.0.zip
    % ls
    /instantclient_12_1
    instantclient-basic-linux.x64-12.1.0.1.0.zip
    instantclient-sdk-linux.x64-12.1.0.1.0.zip
    % cd instantclinet_12_1
    % ls
    /help
    /sdk
    /vc10
    /vc11
    ```

5.4 Installing the Client Packages on Windows

Install the Oracle R Enterprise client packages on each client computer. The client packages are automatically included in the installation on the server.

This section contains these topics:

- Downloading the Client Packages on Windows
- Installing the Client Packages on Windows

5.4.1 Downloading the Client Packages on Windows

To download the client packages:

1. Go to the Oracle R Enterprise Downloads page on the Oracle Technology Network:

   http://www.oracle.com/technetwork/database/options/advanced-analytics/r-enterprise/ore-downloads-1502823.html

2. Accept the License Agreement.
3. Choose **Oracle R Enterprise Client Packages for Windows Platform**. Download and save the file in the installation directory that you created for Oracle Instant Client. For example:

   ```
   c:\oreclient_install_dir\ore-client-win-x86_64-1.3.1.zip
   ```

Note: Choose the same installation directory for all Oracle R Enterprise client components.

4. Unzip the file. The contents are extracted into the `client` subdirectory:

   The resulting installation directory, shown in Example 5–1, contains Oracle Instant Client and Oracle R Enterprise client packages.

Example 5–1 Client Installation Directory Containing Client Packages and Instant Client

```
c:\oreclient_install_dir
     \client
          \ORE_1.3.1.zip
          \OREbase_1.3.1.zip
          \OREdm_1.3.1.zip
          \OREeda_1.3.1.zip
          \OREgraphics_1.3.1.zip
          \OREpredict_1.3.1.zip
          \OREstats_1.3.1.zip
          \ORExml_1.3.1.zip
     \instantclient_12_1
instantclient-basic-linux.x64-12.1.0.1.0.zip
instantclient-sdk-linux.x64-12.1.0.1.0.zip
ore-client-win-x86_64-1.3.1.zip
```

5.4.2 Installing the Client Packages on Windows

Choose one of the following methods to install the Oracle R Enterprise client packages on Windows:

- Installing the Client Packages from the R Console
- Installing the Client Packages from the R GUI
- Installing the Client Packages from the Windows Command Prompt

5.4.2.1 Installing the Client Packages from the R Console

1. Start R x64 from the Windows Start menu.
2. Execute this R command for each zip file in the `client` directory:

   ```
   R> install.packages("oreclient_install_dir/client/client_package_name.zip',
   repos=NULL)
   ```

   Each successful package installation produces this message in the R console:

   ```
   package 'package_name' successfully unpacked and MD5 sums checked
   ```

5.4.2.2 Installing the Client Packages from the R GUI

1. Start R x64 from the Windows Start menu.
2. Select **Packages** from the **RGui (64-bit)** menu bar.
3. From the **Packages** menu, select **Install package(s) from local zip files**.
4. Change to the `client` directory.
5. Select all the files in the directory.
6. Click **Open**.

Each package installation produces this message in the R console:

```
package 'package_name' successfully unpacked and MD5 sums checked
```

5.4.2.3 Installing the Client Packages from the Windows Command Prompt

1. Start R x64 from the Windows Start menu.
2. Open a Windows command window.
3. Change directory to the `client` directory and type these commands:

```
> R CMD INSTALL OREbase_1.3.1.zip
> R CMD INSTALL OREstats_1.3.1.zip
> R CMD INSTALL OREgraphcs_1.3.1.zip
> R CMD INSTALL OREeda_1.3.1.zip
> R CMD INSTALL ORExml_1.3.1.zip
> R CMD INSTALL OREdm_1.3.1.zip
> R CMD INSTALL OREpredict_1.3.1.zip
> R CMD INSTALL ORE_1.3.1.zip
```

Each package installation generates this message:

```
package 'package_name' successfully unpacked and MD5 sums checked
```

5.5 Installing the Client Supporting Packages on Windows

Install the Oracle R Enterprise client supporting packages on each client computer and on the server computer.

This section contains these topics:

- Downloading the Client Supporting Packages on Windows
- Installing the Client Supporting Packages on Windows

5.5.1 Downloading the Client Supporting Packages on Windows

To download the client supporting packages:

1. Go to the Oracle R Enterprise Downloads page on the Oracle Technology Network:

   http://www.oracle.com/technetwork/database/options/advanced-analytics/r-enterprise/ore-downloads-1502823.html

2. Accept the License Agreement.
3. Choose **Oracle R Enterprise Client Supporting Packages for Windows Platform**. Download and save the file in the Oracle R Enterprise client installation directory For example:

   ```
   c:\oreclient_install_dir\ore-supporting-win-x86_64-1.3.1.zip
   ```

   Note: Choose the same installation directory for all Oracle R Enterprise client components.

4. Unzip the file. The contents are extracted into the `supporting` subdirectory:

   The resulting installation directory, shown in Example 5–2, contains all the client components: Oracle Instant Client, Oracle R Enterprise client packages, and Oracle R Enterprise client supporting packages.

Example 5–2 Client Installation Directory Containing All Client Components

```
c:\oreclient_install_dir
     \client
     \instantclient_12_1
     \supporting
         \DBI_0.2-5.zip
         \png_0.1-4.zip
         \ROracle_1.1-9.zip
instantclient-basic-linux.x64-12.1.0.1.0.zip
instantclient-sdk-linux.x64-12.1.0.1.0.zip
ore-client-win-x86_64-1.3.1.zip
ore-supporting-win-x86_641.3.1.zip
```

5.5.2 Installing the Client Supporting Packages on Windows

Choose one of the following methods to install the Oracle R Enterprise client supporting packages on Windows:

- Installing the Client Supporting Packages from the R Console
- Installing the Client Supporting Packages Using the R GUI
- Installing the Client Supporting Packages from the Windows Command Prompt

5.5.2.1 Installing the Client Supporting Packages from the R Console

1. Start R x64 from the Windows Start menu.
2. Execute this command for each zip file in the `supporting` directory:

```
R> install.packages("oreclient_install_dir\support\support_package_name.zip",
                    repos=NULL)
```

Each package installation produces this message in the R console:

```
package 'package_name' successfully unpacked and MD5 sums checked
```

5.5.2.2 Installing the Client Supporting Packages Using the R GUI

1. Start R x64 from the Windows Start menu.
2. From the main menu, select **Packages.**
3. Select **Install package(s) from local zip files**.
4. Browse to `\oreclient_install_dir\supporting`.
5. Select all of the files in the directory.
6. Click **Open**.

Each package installation produces this message in the R console:

```
package 'package_name' successfully unpacked and MD5 sums checked
```

5.5.2.3 Installing the Client Supporting Packages from the Windows Command Prompt

1. Start R x64 from the Windows Start menu.
2. Open a command window.
3. Change to `\oreclient_install_dir\supporting` directory and type these commands:

```
> R CMD INSTALL ROracle_1.1-9.zip
```

```
> R CMD INSTALL DBI_0.2-5.zip
> R CMD INSTALL png_0.1-4.zip
```

Each package installation produces this message in the R console:

```
package 'package_name' successfully unpacked and MD5 sums checked
```

5.6 Installing the Client Packages on Linux or UNIX

Install the Oracle R Enterprise client packages on each client computer. The client packages are automatically included in the installation on the server.

5.6.1 Downloading the Client Packages on Linux or UNIX

To download the client packages:

1. Go to the Oracle R Enterprise Downloads page on the Oracle Technology Network:

   http://www.oracle.com/technetwork/database/options/advanced-analytics/r-enterprise/ore-downloads-1502823.html

2. Accept the License Agreement.
3. Choose **Oracle R Enterprise Client Packages** for your platform. Download and save the file in the installation directory that you created for Oracle Instant Client. For example:

   ```
   ~/oreclient_install_dir/ore-client-platform-arch.zip
   ```

   Note: Choose the same installation directory for all Oracle R Enterprise client components.

4. Unzip the file:

   ```
   % unzip ore-client-platform-arch.zip
   ```

   When you unzip the file, the `/client` directory is created and these files are extracted.

   ```
   /client/ORE_1.3.1_R_arch-unknown-platform-gnu.tar.gz
   /client/OREbase_1.3.1_R_arch-unknown-platform-gnu.tar.gz
   /client/OREdm_1.3.1_R_arch-unknown-platform-gnu.tar.gz
   /client/OREeda_1.3.1_R_arch-unknown-platform-gnu.tar.gz
   /client/OREgraphics_1.3.1_R_arch-unknown-platform-gnu.tar.gz
   /client/OREpredict_1.3.1_R_arch-unknown-platform-gnu.tar.gz
   /client/OREstats_1.3.1_R_arch-unknown-platform-gnu.tar.gz
   /client/ORExml_1.3.1_R_arch-unknown-platform-gnu.tar.gz
   ```

5.6.2 Installing the Client Packages on Linux or UNIX

To install the client packages:

1. Change to */oreclient_install_dir*`/client`.
2. Execute the following commands:

   ```
   % R CMD INSTALL ORE_1.3.1_R_arch-unknown-platform-gnu.tar.gz
   ```

```
% R CMD INSTALL OREbase_1.3.1_R_arch-unknown-platform-gnu.tar.gz
% R CMD INSTALL OREdm_1.3.1_R_arch-unknown-platform-gnu.tar.gz
% R CMD INSTALL OREeda_1.3.1_R_arch-unknown-platform-gnu.tar.gz
% R CMD INSTALL OREgraphics_1.3.1_R_arch-unknown-platform-gnu.tar.gz
% R CMD INSTALL OREpredict_1.3.1_R_arch-unknown-platform-gnu.tar.gz
% R CMD INSTALL OREstats_1.3.1_R_arch-unknown-platform-gnu.tar.gz
% R CMD INSTALL ORExml_1.3.1_R_arch-unknown-platform-gnu.tar.gz
```

5.7 Installing the Client Supporting Packages on Linux or UNIX

Install the Oracle R Enterprise client supporting packages on each client computer and on the server computer that hosts Oracle R Enterprise Server.

- Downloading the Client Supporting Packages on Linux or UNIX
- Installing the Client Supporting Packages on Linux or UNIX

5.7.1 Downloading the Client Supporting Packages on Linux or UNIX

To download the client supporting packages:

1. Go to the Oracle R Enterprise Downloads page on the Oracle Technology Network:

   http://www.oracle.com/technetwork/database/options/advanced-analytics/r-enterprise/ore-downloads-1502823.html

2. Accept the License Agreement.
3. Choose **Oracle R Enterprise Client Supporting Packages** for your platform. Download and save the file in the client installation directory. For example:

   ```
   ~/oreclient_install_dir/ore-supporting-platform_arch.zip
   ```

   Note: Choose the same installation directory for all Oracle R Enterprise client components.

4. Unzip the file:

   ```
   % unzip ore-supporting-platform_arch.zip
   ```

   When you unzip the file, the `supporting` directory is created and these files are extracted.

   ```
   /supporting/DBI_0.2-5_R_arch-unknown-platform.tar.gz
   /supporting/png_0.1-4_R_arch-unknown-platform.tar.gz
   /supporting/ROracle_1.1-9_R_arch-unknown-platform.tar.gz
   ```

5.7.2 Installing the Client Supporting Packages on Linux or UNIX

To install the client supporting packages:

1. Change directory to */oreclient_install_dir*`/supporting`.
2. Execute these commands:

   ```
   % R CMD INSTALL DBI_0.2-5_R_arch-unknown-platform.tar.gz
   % R CMD INSTALL ROracle_1.1-9_R_arch-unknown-platform.tar.gz
   % R CMD INSTALL png_0.1-4_R_arch-unknown-platform.tar.gz
   ```

6

Postinstallation Tasks for Oracle R Enterprise

This chapter explains how to establish and verify a working environment for Oracle R Enterprise after the software is installed. This chapter contains these topics:

- Creating a Database User for Oracle R Enterprise
- Connecting Oracle R Enterprise Client to Oracle R Enterprise Server
- Validating Basic Oracle R Enterprise Functionality
- Running the Oracle R Enterprise Example Scripts

6.1 Creating a Database User for Oracle R Enterprise

After the installation of Oracle R Enterprise client and server is complete, the next step is to create at least one database user that is configured for Oracle R Enterprise.

The Oracle R Enterprise `server` directory includes a script that you can run to create a sample user named `RQUSER`. The script verifies the installation of Oracle Database and Oracle R Enterprise before creating the user. You can modify the script to create additional users.

- Creating RQUSER
- Granting Privileges to RQUSER
- Granting the RQADMIN Role to RQUSER

6.1.1 Creating RQUSER

To create a sample user for Oracle R Enterprise:

1. Verify that your operating system user ID is a member of the OSDBA group (`DBA` on Linux and UNIX; `ora_dba` on Windows). See Section 4.2.3.1 for details about OSDBA.
2. Navigate to the Oracle R Enterprise `server` directory:

   ```
   % cd download_directory/server
   ```

3. Run the `demo_user` script:

   ```
   -- Linux or UNIX
   % ./demo_user.sh

   -- Windows
   > demo_user.bat
   ```

The script prompts you to optionally enter the names of permanent and temporary tablespaces for the RQSYS schema. The default tablespaces are SYSAUX and TEMP. To accept the defaults, press ENTER.

6.1.2 Granting Privileges to RQUSER

Oracle R Enterprise users require a basic set of database privileges. Some users may require additional privileges, depending on the tasks they need to perform and the data they need to access.

To grant the basic privileges to RQUSER, start SQL*Plus as sysdba and execute these GRANT statements:

```
% sqlplus /  AS SYSDBA
SQL> GRANT CREATE TABLE TO RQUSER;
SQL> GRANT CREATE PROCEDURE TO RQUSER;
SQL> GRANT CREATE VIEW TO RQUSER;
SQL> GRANT CREATE MINING MODEL TO RQUSER;
```

6.1.3 Granting the RQADMIN Role to RQUSER

The Oracle R Enterprise server installation creates a database role called RQADMIN. A user with the RQADMIN role can create and drop R scripts that use the database embedded R engine. The RQADMIN role is also required for executing embedded R.

To grant RQADMIN to RQUSER, start SQL*Plus as sysdba and execute this GRANT statement:

```
% sqlplus / AS SYSDBA
SQL> GRANT RQADMIN to RQUSER;
```

Note: Use caution when granting the RQADMIN role. Only users that require Oracle R Enterprise administrative privileges should have this role.

6.2 Connecting Oracle R Enterprise Client to Oracle R Enterprise Server

To connect Oracle R Enterprise client to the database, start R using the ORE script:

```
% ORE
R> library(ORE)
```

The following examples connect as user RQUSER with password RQUSERpsw:

- For a remote database, specify the Oracle Database service identifier (SID), the host name, and the port for the connection.

  ```
  R> ore.connect(user="RQUSER", sid="orcl", host="SVR3", password="RQUSERpsw",
                 port=1521, all=TRUE)
  ```

  Note: To avoid specifying the password and other connection details in embedded R scripts, you can use Oracle Wallet. See "Creating an Oracle Wallet for an Oracle R Enterprise Connection" on page 7-1.

- For a local database, specify the connection as follows:

  ```
  R> ore.connect("RQUSER", password="RQUSERpsw", conn_string="", all=TRUE)
  ```

6.3 Validating Basic Oracle R Enterprise Functionality

After connecting as described in Section 6.2, you can test some of the basic functionality of Oracle R Enterprise with these commands:

```
## Is the ORE client connected to the ORE server?
## The output of this command should be TRUE.
R> ore.is.connected()

## List the available database tables
R> ore.ls()

## Push an R dataframe to a database table
R> cars <- ore.push(cars)
R> head(cars)

## Run embedded R
R> ore.doEval(function() { 123 })
```

6.4 Running the Oracle R Enterprise Example Scripts

You can further verify the success of the installation by running the Oracle R Enterprise demo scripts. If a script runs to completion without errors, then the example is successful.

The example scripts are located in `$ORACLE_HOME/R/library/ORE/demo`.

This R command provides a list of available examples:

```
R> demo(package="ORE")
```

These commands run two of the examples before exiting R. The `aggregate` script tests the use of an R function on data that is resident in database memory; the `row_apply` script tests embedded R execution.

```
R> demo("aggregate", package="ORE")
R> demo("row_apply", package="ORE")
R> q()
```

7

Administrative Tasks for Oracle R Enterprise

This chapter describes administrative tasks for maintaining and optimizing Oracle R Enterprise. This chapter contains these topics:

7.1 Creating an Oracle Wallet for an Oracle R Enterprise Connection

An Oracle wallet is a password-protected container for storing security credentials in Oracle Database. Wallets provide a secure mechanism for specifying connection details in embedded R scripts.

To create a wallet for an Oracle R Enterprise connection:

1. Start Oracle Wallet Manager:
   - (Linux and UNIX) At the command line, enter `owm`.
   - (Windows) Select **Start**, **Programs**, **Oracle-HOME_NAME**, **Integrated Management Tools, Wallet Manager.**
2. Follow the instructions in your Oracle Database documentation to create the wallet:
   - For Oracle Database 11.2, see: "Using Oracle Wallet Manager" in *Oracle Database Advanced Security Administrator's Guide*
   - For Oracle Database 12.*1*, see: "Using Oracle Wallet Manager" in *Oracle Database Enterprise User Security Administrator's Guide*.
3. Locate the connection string for the Oracle R Enterprise database in `tnsnames.ora`. For example:

```
mydb_test =
      (DESCRIPTION =
         (ADDRESS =
            (PROTOCOL = TCP)
            (HOST = server23)
            (PORT = 1521)
         )
         (CONNECT_DATA = (sid=ORCL))
      )
```

4. Specify the connection information in the wallet. Follow the instructions in the Oracle Database security documentation referenced in step 2.
5. After you configure the wallet, you can connect to the Oracle R Enterprise server database by simply specifying the connection identifier. For example:

```
ore.connect(conn_string = "mydb_test", all = TRUE)
```

See Also: R help for `ore.connect`

7.2 Controlling Memory Used by Embedded R

You can control the memory used by embedded R execution by limiting the heap memory (vector and cons in R terminology) that is automatically managed by the R `gc` mechanism. To limit the size of heap memory in the database, use the `sys.rqconfigset` utility. The keyword arguments for `sys.rqconfigset` are described in Table 7–1.

Table 7–1 SYS.RQCONFIGSET Keyword Arguments

Keyword	Default	Description
`MIN_VSIZE`	32MB	Minimum R vector heap memory
`MAX_VSIZE`	4GB	Maximum R vector heap memory
`MIN_NSIZE`	1M	Minimum number of R cons cells
`MAX_NSIZE`	20M	Maximum number of R cons cells

Example 7–1 Using SYS.RQCONFIGSET to Control Memory Used by Embedded R

```
-- Set the minimum R vector heap memory to 20MB
SQL> EXEC sys.rqconfigset('MIN_VSIZE', '20MB');

-- Set the maximum R vector heap memory to 100MB
SQL> EXEC sys.rqconfigset('MAX_VSIZE', '100MB')

-- Set the minimum number of R cons cells to 500x1024
SQL> EXEC sys.rqconfigset('MIN_NSIZE', '500K');

-- Set the maximum number of R cons cells to 10x10x1024
SQL> EXEC sys.rqconfigset('MAX_NSIZE', '10MB');

-- Set maximum vector heap memory and maximum cons cells to unlimited
SQL> EXEC sys.rqconfigset('MAX_VSIZE', NULL);
SQL> EXEC sys.rqconfigset('MAX_NSIZE', NULL);
```

Note: The `sys.rqconfigset` procedure does not control the C type memory that may be allocated by Calloc, Realloc, calloc, or malloc. Such C type memory is mainly created to hold temporary values used by R functions that are implemented in C. Under normal circumstances, C type memory is limited in size and does not significantly affect the memory usage of R.

7.3 Upgrading Oracle R Enterprise

You can upgrade Oracle R Enterprise to the current release from any previous release by reinstalling the product.

Note on IBM AIX: Upgrade from Oracle R Enterprise 1.1 is not supported on IBM AIX. To upgrade Oracle R Enterprise 1.1 on IBM AIX, first uninstall Oracle R Enterprise 1.1 (including R) and then download and install the later version.

To upgrade Oracle R Enterprise:

1. Ensure that you have the version of R that is required for the new version of Oracle R Enterprise. See *Oracle R Enterprise Release Notes* for the latest requirements.

   To install R, follow the instructions in Chapter 3, "Installing R".

2. To upgrade Oracle R Enterprise Server, follow the installation procedures. When the installation script detects an earlier version of Oracle R Enterprise, it asks if you want to upgrade. Answering `No` aborts the process; answering `Yes` starts the upgrade.

   See Chapter 4 for the Oracle R Enterprise Server installation instructions.

3. To upgrade Oracle R Enterprise Client, re-install the client packages and client supporting Packages. You do not have to uninstall the current packages before installing the new packages.

   See Chapter 5 for the Oracle R Enterprise Client installation instructions.

7.4 Uninstalling Oracle R Enterprise

To uninstall Oracle R Enterprise, follow the instructions in the following topics:

- Uninstalling Oracle R Enterprise Server
- Uninstalling Oracle R Enterprise Client
- Uninstalling R

7.4.1 Uninstalling Oracle R Enterprise Server

An uninstall script is included with the Oracle R Enterprise Server files in the `server` directory. The script removes the libraries that were installed in `$ORACLE_HOME/lib` and drops all the database objects that were created by the Oracle R Enterprise Server installation.

The user that runs the uninstall script must satisfy the requirements specified in Section 4.2.3, "User Requirements".

On a Linux system, you could uninstall Oracle R Enterprise Server as follows:

```
% cd download_path/server/
% ./uninstall.sh
```

7.4.2 Uninstalling Oracle R Enterprise Client

To uninstall the Oracle R Enterprise Client Packages and Client Supporting Packages, start R and type these commands:

```
R> remove.packages("ORE")
R> remove.packages("ORExml")
R> remove.packages("OREeda")
R> remove.packages("OREgraphics")
```

```
R> remove.packages("OREstats")
R> remove.packages("OREbase")
R> remove.packages("ROracle")
R> remove.packages("DBI")
R> remove.packages("png")
R> remove.packages("OREdm")
R> remove.packages("OREpredict")
```

7.5 Uninstalling R

To uninstall R, follow the instructions in the following topics:

- Uninstalling R on Windows
- Uninstalling Oracle R Distribution on Linux
- Uninstalling Oracle R Distribution on Oracle Solaris
- Uninstalling Oracle R Distribution on IBM AIX

7.5.1 Uninstalling R on Windows

Uninstall Open Source R just as you would uninstall any other Windows program. using **Add or Remove Programs** from the Windows Control Panel.

7.5.2 Uninstalling Oracle R Distribution on Linux

To uninstall Oracle R Distribution on Linux, log in as root and execute these commands in this order. To uninstall a different version of R, replace `2.15.3` with the version number.

```
# rpm -e R-2.15.3
# rpm -e R-devel
# rpm -e R-core
# rpm -e libRmath-devel
# rpm -e libRmath
```

7.5.3 Uninstalling Oracle R Distribution on Oracle Solaris

To uninstall Oracle R Distribution on Oracle Solaris, follow the instructions in the readme on the Oracle R Distribution download page on the Oracle Technology Network:

https://oss.oracle.com/ORD/

The Oracle R Distribution installation directory on Oracle Solaris includes an uninstall script. Log in as root and run the script as follows:

```
# ./uninstall.sh
```

7.5.4 Uninstalling Oracle R Distribution on IBM AIX

To uninstall Oracle R Distribution on IBM AIX, follow the instructions in the readme on the Oracle R Distribution download page on the Oracle Technology Network:

https://oss.oracle.com/ORD/

To uninstall all filesets execute the following command as root:

```
# installp -u ORD
```

You can also uninstall independent filesets. For example, the following commands uninstall only `ORD.dev` and `ORD.core`:

```
# installp -u ORD.devel
# installp -u ORD.core
```

A

A Sample Installation of Oracle R Enterprise

This appendix presents the steps in a typical installation of Oracle R Enterprise on a Linux server and a Windows client. This appendix contains these topics:

A.1 About the Oracle R Enterprise Sample Installation Environment

About the server computer:

- The server is running Oracle Linux 5.
- The server has access to the internet and to Oracle Public Yum.
- Oracle Database Enterprise Edition 12.1 is installed on the server.
- Environment variables:
  - `$ORACLE_SID` specifies the identifier (SID) of the database.
  - `$ORACLE_HOME` specifies the home directory of the database.
  - `$LD_LIBRARY_PATH` includes `$ORACLE_HOME/lib`.
  - `$PATH` includes `$ORACLE_HOME/bin`.
- The Linux user ID of the installer:
  - Has sudo rights or root access for installing Oracle R Distribution.
  - Is a member of the dba group for installing and using Oracle R Enterprise.
  - Has write access to `$ORACLE_HOME/lib`.

About the client computer:

- The client is running 64-bit Windows, for example Windows 7.
- The client has access to the internet.

A.2 Installing Oracle R Enterprise on the Server

To install Oracle R Enterprise on the server computer, first verify that Oracle Database is installed and that the environment is configured as specified in Section A.1. Next, complete these steps in the specified order:

1. Install Oracle R Distribution
2. Install Oracle R Enterprise Server
3. Install the Oracle R Enterprise Client Supporting Packages on the Server
4. Create a Database User for Oracle R Enterprise

A.2.1 Install Oracle R Distribution

To install Oracle R Distribution on the server from Oracle Public Yum, follow these steps:

1. Log in as root and change to `/etc/yum.repos.d`, the location of the yum repository configuration file:

   ```
   # cd /etc/yum.repos.d
   ```

2. The name of the yum repository configuration file for Oracle Linux 5 is `public-yum-el5.repo`. List the contents of `/etc/yum.repos.d` to determine if the configuration file is already present. If the file is not present, then execute the following command to download the file from Oracle Public Yum:

   ```
   # wget http://public-yum.oracle.com/public-yum-el5.repo
   ```

3. Open `public-yum-el5.repo` in a text editor and specify `enabled=1` for `latest` and `addons`:

   ```
   [el5_latest]
   enabled=1

   [el5_addons]
   enabled=1
   ```

4. Install Oracle R Distribution 2.15.3 by executing this command:

   ```
   # yum install R-2.15.3
   ```

A.2.2 Install Oracle R Enterprise Server

Oracle R Enterprise Server includes the `RQSYS` schema in Oracle Database and Oracle R Enterprise packages and shared libraries. Follow these steps to download and install Oracle R Enterprise Server:

To download Oracle R Enterprise Server:

1. Create an installation directory for the Oracle R Enterprise server components. The directory can have any name. For example:

   ```
   /home/myhome/myoreserver
   ```

2. Navigate to the **Oracle R Enterprise Downloads** page on the Oracle Technology Network:

   http://www.oracle.com/technetwork/database/options/advanced-analytics/r-enterprise/ore-downloads-1502823.html

3. Accept the license agreement.
4. Under **Oracle R Enterprise Downloads (v1.3.1)**, select **Oracle R Enterprise Server Install for Oracle Database on Linux 64 bit (92M)**.
5. Download and upzip the file in the installation directory that you created in Step 1:

```
% cd /home/myhome/myoreserver
% unzip ore-server-linux-x86-64-1.3.1.zip
```

6. When you unzip the file, the `server` subdirectory is created. The contents of the installation directory are listed as follows:

```
% ls
ore-server-linux-x86-64-1.3.1.zip
server/
```

To install Oracle R Enterprise Server:

1. Change to the `server` subdirectory:

```
% cd server
```

2. Run the installation script:

```
% ./install.sh
```

3. The installation script prompts you to enter the names of permanent and temporary tablespaces for the `RQSYS` schema. The default tablespaces are `SYSAUX` and `TEMP`. To accept the defaults, press `ENTER`.

> **See Also:** Section 4.1.3, "About the Oracle R Enterprise Server Installation Script"

A.2.3 Install the Oracle R Enterprise Client Supporting Packages on the Server

The Oracle R Enterprise client supporting packages are open source R packages that support Oracle R Enterprise. The client supporting packages must be installed on both the client and on the server.

To download the Oracle R Enterprise client supporting packages:

1. Navigate to the Oracle R Enterprise Downloads page:

   http://www.oracle.com/technetwork/database/options/advanced-analytics/r-enterprise/ore-downloads-1502823.html

2. Accept the license agreement.
3. Under **Oracle R Enterprise Downloads (v1.3.1)**, select **Oracle R Enterprise Client Supporting Packages for Linux 64-bit Platform (1.2M)**.
4. Download and unzip the file in the installation directory that you created in Section A.2.2:

```
% cd /home/myhome/myoreserver
% unzip ore-supporting-linux-x86-64-1.3.1.zip
```

5. When you unzip the file, the `supporting` subdirectory is created. The contents of the installation are listed as follows:

```
% ls
ore-server-linux-x86-64-1.3.1.zip
ore-supporting-linux-x86-64-1.3.1.zip
server/
supporting/
```

The `supporting` subdirectory is populated with the following files:

```
DBI_0.2-5.zip
ROracle_1.1-9.zip
```

```
png_0.1-4.zip
```

To install the Oracle R Enterprise client supporting packages:

1. Change to the `supporting` subdirectory and list the contents:

```
% cd supporting
% ls
DBI_0.2-5_R_x86_64-unknown-linux-gnu.tar.gz
ROracle_1.1-9_R_x86_64-unknown-linux-gnu.tar.gz
png_0.1-4_R_x86_64-unknown-linux-gnu.tar.gz
```

2. Install the packages:

```
% ORE CMD INSTALL ROracle_1.1-9_R_x86_64-unknown-linux-gnu.tar.gz
% ORE CMD INSTALL DBI_0.2-5_R_x86_64-unknown-linux-gnu.tar.gz
% ORE CMD INSTALL png_0.1-4_R_x86_64-unknown-linux-gnu.tar.gz
```

   The packages are installed in `$ORACLE_HOME/R/library`.

A.2.4 Create a Database User for Oracle R Enterprise

Follow these steps to create a database user for Oracle R Enterprise:

1. Change to the Oracle R Enterprise `server` subdirectory:

```
% cd /home/myhome/myoreserver/server/
```

2. Run the `demo_user` script:

```
% ./demo_user.sh
```

3. The script prompts you to enter the names of permanent and temporary tablespaces for the user schema. The default tablespaces are `USERS` and `TEMP`. To accept the defaults, press `ENTER`.
4. The script prompts you to enter a name and password for the user. The default name is `rquser`. To accept the default name, press `ENTER`.
5. When the script completes, start SQL*Plus as sysdba and grant the user privileges that are required by Oracle R Enterprise. For the user `rquser`:

```
% sqlplus /  AS SYSDBA
SQL> GRANT CREATE TABLE TO RQUSER;
SQL> GRANT CREATE PROCEDURE TO RQUSER;
SQL> GRANT CREATE VIEW TO RQUSER;
SQL> GRANT CREATE MINING MODEL TO RQUSER;
SQL> GRANT RQADMIN to RQUSER;
SQL> EXIT;
```

A.3 Installing Oracle R Enterprise on the Client

To install Oracle R Enterprise on the client computer, first verify that the Windows environment meets the requirements specified in Section A.1. Next, complete these steps:

- Install R on the Client
- Install Oracle Instant Client
- Install the Oracle R Enterprise Client Packages
- Install the Oracle R Enterprise Client Supporting Packages

A.3.1 Install R on the Client

Oracle R Distribution is not supported on Windows. Follow these steps to install open source R on the client:

1. Navigate to the R home page:

   http://www.r-project.org

2. Under **Download, Packages**, choose **CRAN**.
3. Select a CRAN Mirror.
4. Choose **Download R for Windows**.
5. Under **Subdirectories**, choose **base**.
6. Under **Other builds**, choose **Previous releases**.
7. Download R-2.15.3. The following executable file is downloaded:

   ```
   R-2.15.3-win.exe
   ```

8. In Windows Explorer, double-click the executable file to start the Windows Installer for R.
9. Follow the instructions in the Installer.

> **Note:** The Installer offers to install both 32-bit and 64-bit R. You must install 64-bit R for Oracle R Enterprise. If you choose to install both 32-bit and 64-bit R, then take care to only use 64-bit R for Oracle R Enterprise.

A.3.2 Install Oracle Instant Client

Oracle R Enterprise requires Oracle Database Client. Instead of installing the full Database Client, which must be installed in an Oracle home directory, you can install Oracle Instant Client.

To download and install Oracle Instant Client, follow these steps:

1. Create an installation directory for the Oracle R Enterprise client components. The directory can have any name. For example:

   ```
   c:\myoreclient
   ```

2. Navigate to the Oracle Database Instant Client page on the Oracle Technology Network:

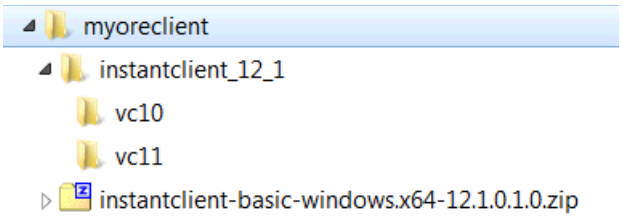
   http://www.oracle.com/technetwork/database/features/instant-client/

3. Select **See Instant Client Downloads**.
4. On the Instant Client Downloads page, select **Instant Client for Microsoft Windows (x64)**.
5. Accept the license agreement.
6. Under **Version 12.1.0.1.0**, select **Instant Client Package - Basic** or **Instant Client Package - Basic Lite** for Oracle Database 12.1.
7. Save the file in the installation directory that you created in Step 1. For example, if you choose the basic package, the following file is downloaded:

   ```
   c:\myoreclient\instantclient-basic-windows.x64-12.1.0.1.0.zip
   ```

8. Unzip the file.

   When you unzip the file, the `instantclient_12_1` subdirectory is created. The contents of the installation directory are shown as follows:



9. Return to the Instant Client download page:

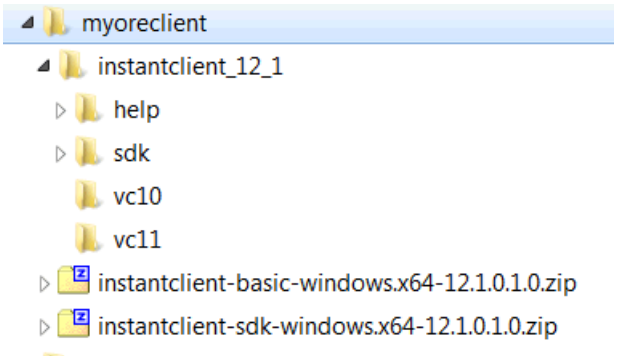
   `http://www.oracle.com/technetwork/topics/winx64soft-089540.html`

10. Accept the license agreement and select **Instant Client Package - SDK**. Save the file in the directory that you created in Step 1.

    `c:\myoreclient\instantclient-sdk-windows.x64-12.1.0.1.0.zip`

11. Unzip the file.

    When you unzip the file, the `sdk` subdirectory is created. The contents of the installation directory are shown as follows:



12. Add the full path of the Instant Client to the environment variables `OCI_LIB64` and `PATH`. The following steps set the variables to the path used in this example, `c:\myoreclient\instantclient_12_1`:

    1. In Windows Control Panel, choose **System**.
    2. Click **Advanced systems settings**.
    3. On the **Advanced** tab, click **Environment Variables**.
    4. Under **System variables**, create `OCI_LIB64` if it does not already exist. Set the value of `OCI_LIB64` to `c:\oreclient\instantclient_12_1`.
    5. Under **System variables**, edit `PATH` to include `c:\oreclient\instantclient_12_1`.

    Note: The graphical user interface for creating environment variables may vary slightly, depending on your version of Windows.

A.3.3 Install the Oracle R Enterprise Client Packages

Follow these steps to download and install the Oracle R Enterprise client packages:

To download the Oracle R Enterprise client packages:

1. Navigate to the Oracle R Enterprise Downloads page on the Oracle Technology Network:

   http://www.oracle.com/technetwork/database/options/advanced-analytics/r-enterprise/ore-downloads-1502823.html

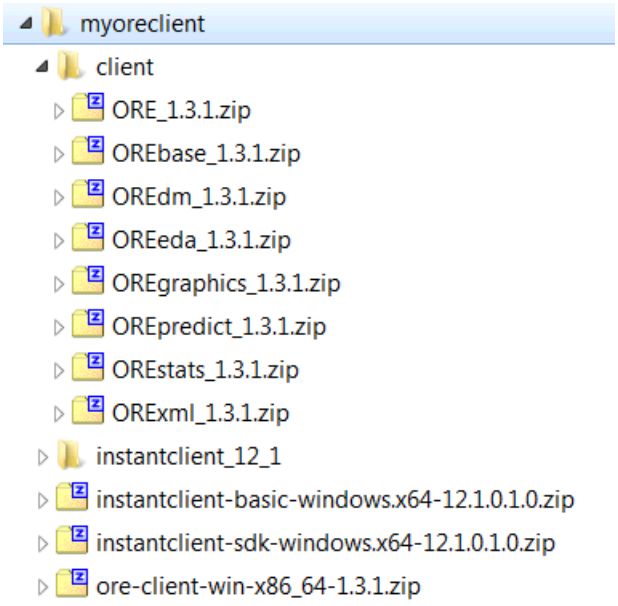
2. Accept the License Agreement.

3. Select **Oracle R Enterprise Client Packages for Windows Platform**. Save the file in the installation directory that you created in Section A.3.2.

   ```
   c:\myoreclient\ore-client-win-x86_64-1.3.1.zip
   ```

4. Unzip the file.

   When you unzip the file, the `client` subdirectory is created. The contents of the installation directory are shown as follows:



To install the Oracle R Enterprise client packages from the R Console:

1. Start R from the Windows Start menu. If you have installed both 32 and 64-bit R, be sure to choose 64-bit R.

   The R Console window is displayed, as shown in Example A–1

2. Install the packages as follows:

```
R> install.packages("c:/myoreclient/client/ORE_1.3.1.zip", repos=NULL)
R> install.packages("c:/myoreclient/client/OREbase_1.3.1.zip", repos=NULL)
R> install.packages("c:/myoreclient/client/OREdm_1.3.1.zip", repos=NULL)
R> install.packages("c:/myoreclient/client/OREeda_1.3.1.zip", repos=NULL)
R> install.packages("c:/myoreclient/client/OREgraphics_1.3.1.zip", repos=NULL)
R> install.packages("c:/myoreclient/client/OREpredict_1.3.1.zip", repos=NULL)
R> install.packages("c:/myoreclient/client/OREstats_1.3.1.zip", repos=NULL)
R> install.packages("c:/myoreclient/client/ORExml_1.3.1.zip", repos=NULL)
```

Each successful package installation produces this message in the R console:

```
package 'package_name' successfully unpacked and MD5 sums checked
```

A.3.4 Install the Oracle R Enterprise Client Supporting Packages

Follow these steps to download and install the Oracle R Enterprise client supporting packages:

To download the Oracle R Enterprise client supporting packages:

1. Navigate to the Oracle R Enterprise Downloads page on the Oracle Technology Network:

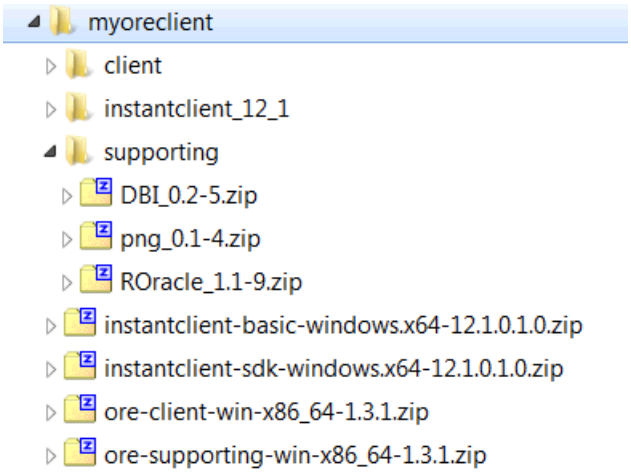
   http://www.oracle.com/technetwork/database/options/advanced-analytics/r-enterprise/ore-downloads-1502823.html

2. Accept the License Agreement.
3. Select **Oracle R Enterprise Client Supporting Packages for Windows Platform**. Save the file in the installation directory that you created in Section A.3.2.

   ```
   c:\myoreclient\ore-supporting-win-x86_64-1.3.1.zip
   ```

4. Unzip the file.

   When you unzip the file, the `supporting` subdirectory is created. The contents of the installation directory are shown as follows:



To install the client supporting packages from the R Console:

1. Start R from the Windows Start menu. If you have installed both 32 and 64-bit R, be sure to choose 64-bit R.

   The R Console window is displayed, as shown in Example A–1.

2. Install the packages as follows:

   ```
   R> install.packages("c:/myoreclient/supporting/ROracle_1.1-9.zip", repos=NULL)
   R> install.packages("c:/myoreclient/supporting/DBI_0.2-5.zip", repos=NULL)
   R> install.packages("c:/myoreclient/supporting/png_0.1-4.zip", repos=NULL)
   ```

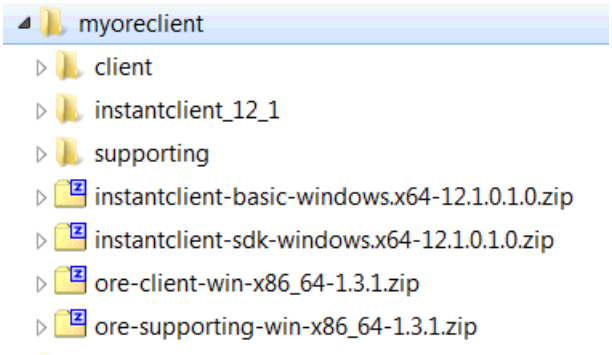
   Each successful package installation produces this message in the R console:

   ```
   package 'package_name' successfully unpacked and MD5 sums checked
   ```

A.3.4.1 The Oracle R Enterprise Client Installation Directory

Figure A–1 shows the structure of the client installation directory after all the client components have been installed.

Figure A–1 Oracle R Enterprise Client Installation Directory



A.4 Verifying the Oracle R Enterprise Installation

To verify that the basic functionality of Oracle R Enterprise is working, establish a connection to Oracle R Enterprise Server, execute several basic commands, and run some of the Oracle R Enterprise demo programs.

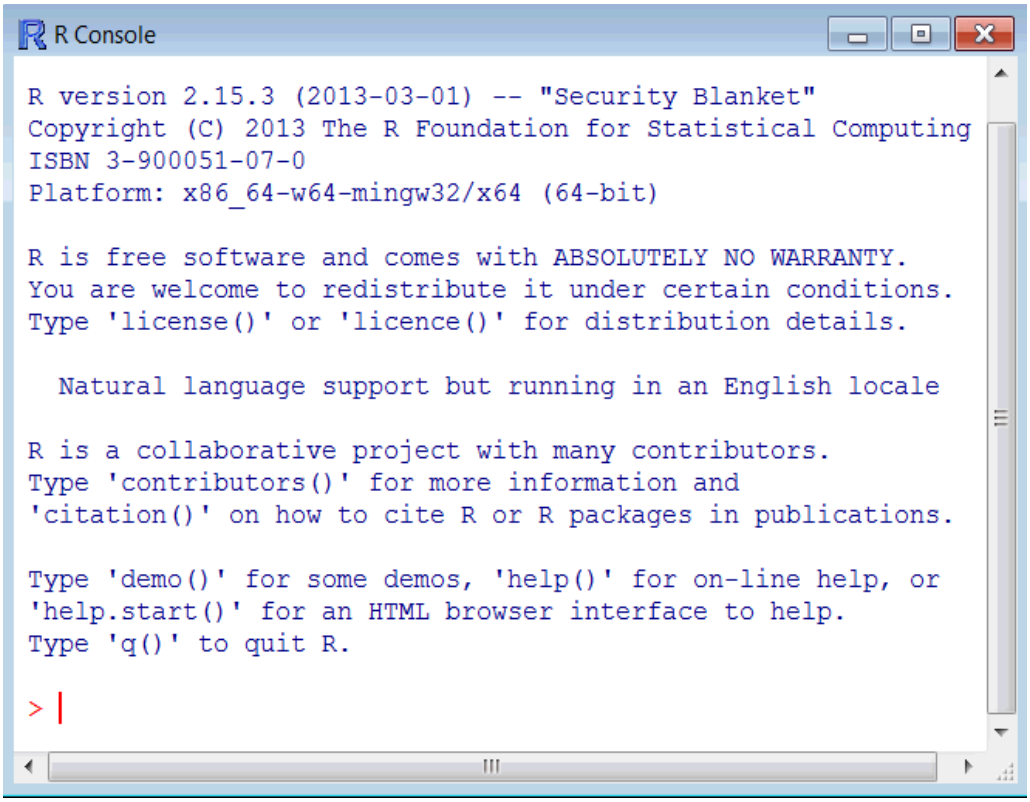
> **Note:** To start and use Oracle R Enterprise, your user ID must have the privileges required for Oracle R Enterprise installation. See Section 4.2.3, "User Requirements" for details.

Example A–1 Connecting to Oracle R Enterprise Server

To connect the Oracle R Enterprise Client to Oracle R Enterprise Server:

1. Select **R x64 2.15.3** from the Windows Start menu.

   The R Console is displayed.



2. Type this command to start Oracle R Enterprise:

```
R> library(ORE)
```

```
> library(ORE)
Loading required package: OREbase

Attaching package: 'OREbase'

The following object(s) are masked from 'package:base':

    cbind, data.frame, eval, interaction, order, paste,
    pmax, pmin, rbind, table

Loading required package: OREstats
Loading required package: MASS
Loading required package: OREgraphics
Loading required package: OREeda
Loading required package: OREdm
Loading required package: lattice
Loading required package: OREpredict
Loading required package: ORExml
>
```

3. Type this command to connect to the Oracle R Enterprise server. The following example connects user `rquser` to the database `orcl` on the server host `serv1` using port 1521:

```
R> ore.connect(user="rquser", sid="orcl", host="serv1", password="rquserpsw",
               port=1521, all=TRUE)
```

```
Loading required package: ROracle
Loading required package: DBI
```

4. Execute `ore.is.connected` to validate the connection. If the connection is successful, the command returns `TRUE`:

```
R> ore.is.connected()
[1] TRUE
```

Example A–2 Listing the Database Tables Accessible to RQUSER

The `ore.ls` command lists the data sets that are available to the current user. For example, if `TABLE1` and `TABLE2` exist in the `rquser` schema:

```
R> ore.ls()
[1] "TABLE1" "TABLE2"
```

Example A–3 Pushing an R Data Frame to a Database Table

The `ore.push` command pushes an R data frame to a database table or a database table to an R data frame. For example:

```
R> cars <- ore.push(cars)
```

Example A–4 Executing an Embedded R Function

The `ore.doEval` command schedules execution of the specified function in the database-embedded R engine and returns the results.

```
R> ore.doEval(function() { 123 })
[1] 123
```

Example A–5 Listing the Oracle R Enterprise Demo Scripts

The Oracle R Enterprise demo scripts are located in `$ORACLE_HOME/R/library/ORE/demo`. The `demo` command provides a list of available demos:

```
R>  demo(package="ORE")

Demos in package 'ORE':

aggregate                   Aggregation
analysis                    Basic analysis & data processing operations
basic                       Basic connectivity to database
binning                     Binning logic
columnfns                   Column functions
cor                         Correlation matrix
crosstab                    Frequency cross tabulations
datastore                   DataStore operations
datetime                    Date/Time operations
derived                     Handling of derived columns
distributions               Distribution, density, and quantile functions
do_eval                     Embedded R processing
freqanalysis                Frequency cross tabulations
glm                         Generalized Linear Models
graphics                    Demonstrates visual analysis
group_apply                 Embedded R processing by group
hypothesis                  Hyphothesis testing functions
matrix                      Matrix related operations
nulls                       Handling of NULL in SQL vs. NA in R
odm_ai                      Oracle Data Mining: attribute importance
odm_dt                      Oracle Data Mining: decision trees
```

```
odm_glm                    Oracle Data Mining: generalized linear models
odm_kmeans                 Oracle Data Mining: enhanced k-means clustering
odm_nb                     Oracle Data Mining: naive Bayes classification
odm_svm                    Oracle Data Mining: support vector machines
push_pull                  RDBMS <-> R data transfer
rank                       Attributed-based ranking of observations
reg                        Ordinary least squares linear regression
row_apply                  Embedded R processing by row chunks
sampling                   Random row sampling and partitioning of an ore.frame
sql_like                   Mapping of R to SQL commands
stepwise                   Stepwise OLS linear regression
summary                    Summary functionality
table_apply                Embedded R processing of entire table
```

A.4.1 Executing Oracle R Enterprise Demo Scripts

You can further verify the success of the installation by running some of the Oracle R Enterprise demo scripts. If a script runs to completion without errors, then the demo is successful.

Example A–6 Executing the aggregate Demo

This example shows the `aggregate` demo with partial output.

```
> demo("aggregate", package="ORE")

        demo(aggregate)
        ---- ~~~~~~~~~

Type  <Return>   to start :

> #
> #     O R A C L E  R  E N T E R P R I S E  S A M P L E  L I B R A R Y
> #
> #     Name: aggregate.R
> #     Description: Demonstrates aggregations
> #     See also summary.R
> #
> #
> #
>
> ## Set page width
> options(width = 80)

> # Push the built-in iris data frame to the database
> IRIS_TABLE <- ore.push(iris)

> # Display the class of IRIS_TABLE
> class(IRIS_TABLE)
[1] "ore.frame"
attr(,"package")
[1] "OREbase"

> # Select count(Petal.Length) group by species
> x = aggregate(IRIS_TABLE$Petal.Length,
+               by = list(species = IRIS_TABLE$Species),
+               FUN = length)

> class(x)
[1] "ore.frame"
```

```
attr(,"package")
[1] "OREbase"
.
.
.
.
```

Example A–7 Executing the row_apply Demo

This example shows the `row_apply` demo with partial output.

```
> demo("row_apply", package="ORE")

        demo(row_apply)
        ---- ~~~~~~~~~

Type  <Return>   to start :

> #
> #     O R A C L E  R  E N T E R P R I S E  S A M P L E  L I B R A R Y
> #
> #     Name: row_apply.R
> #     Description: Execute R code on each row
> #
> #
>
> ## Set page width
> options(width = 80)

> # Push the built-in iris data frame to the database
> IRIS_TABLE <- ore.push(iris)

> # Display the class of IRIS_TABLE
> class(IRIS_TABLE)
[1] "ore.frame"
attr(,"package")
[1] "OREbase"

> # Apply given R function to each row
> ore.rowApply(IRIS_TABLE,
+              function(dat) {
+                  # Any R code goes here. Operates on one row of IRIS_TABLE at
+                  # a time
+                  cbind(dat, dat$Petal.Length)
+              })
$`1`
  Sepal.Length Sepal.Width Petal.Length Petal.Width   Species dat$Petal.Length
1          6.4         2.8          5.6         2.1 virginica              5.6

$`2`
  Sepal.Length Sepal.Width Petal.Length Petal.Width   Species dat$Petal.Length
1          7.2           3          5.8         1.6 virginica              5.8

$`3`
  Sepal.Length Sepal.Width Petal.Length Petal.Width   Species dat$Petal.Length
1          7.4         2.8          6.1         1.9 virginica              6.1

$`4`
  Sepal.Length Sepal.Width Petal.Length Petal.Width   Species dat$Petal.Length
1          7.9         3.8          6.4           2 virginica              6.4
```

```
$`5`
  Sepal.Length Sepal.Width Petal.Length Petal.Width   Species dat$Petal.Length
1          6.4         2.8          5.6         2.2 virginica              5.6

$`6`
.
.
.
.
```

Example A–8 Executing the cor Demo

This example shows the `cor` demo with partial output.

```
> demo ("cor")

        demo(cor)
        ---- ~~~

Type  <Return>   to start :

> #
> #     O R A C L E  R  E N T E R P R I S E  S A M P L E  L I B R A R Y
> #
> #     Name: cor.R
> #     Description: Correlation matrix
> #
> #
> #
>
> ## Set page width
> options(width = 80)

> # Push the built-in iris data frame to the database
> IRIS_TABLE <- ore.push(iris)

> # Display the class of IRIS_TABLE
> class(IRIS_TABLE)
[1] "ore.frame"
attr(,"package")
[1] "OREbase"

> # Remove non numeric columns
> iris_numeric = IRIS_TABLE[, c("Sepal.Length", "Sepal.Width",
+                               "Petal.Length", "Petal.Width")]

> # Pearson's correlation matrix
> cor(iris_numeric, use = "all.obs")
             Sepal.Length Sepal.Width Petal.Length Petal.Width
Sepal.Length    1.0000000  -0.1175698    0.8717538   0.8179411
Sepal.Width    -0.1175698   1.0000000   -0.4284401  -0.3661259
Petal.Length    0.8717538  -0.4284401    1.0000000   0.9628654
Petal.Width     0.8179411  -0.3661259    0.9628654   1.0000000
.
.
.
.

Warning messages:
1: ORE object has no unique key - using random order
2: ORE object has no unique key - using random order
```

```
3: ORE object has no unique key - using random order
4: ORE object has no unique key - using random order
```

Example A–9 Executing the stepwise Demo

This example shows the `stepwise` demo with partial output.

```
> demo("stepwise")

        demo(stepwise)
        ---- ~~~~~~~~

Type  <Return>   to start :

> #
> #     O R A C L E  R  E N T E R P R I S E  S A M P L E  L I B R A R Y
> #
> #     Name: stepwise.R
> #     Description: STEPWISE Multivariate Regression
> #
> #
> #
>
> ## Set page width
> options(width = 80)

> # Push the built-in iris data frame to the database
> IRIS_TABLE <- ore.push(iris)

> # Display the class of IRIS_TABLE
> class(IRIS_TABLE)
[1] "ore.frame"
attr(,"package")
[1] "OREbase"

> # Let us first project out the non numeric columns
> IRIS_TABLE = IRIS_TABLE[, c("Sepal.Length", "Sepal.Width",
+                             "Petal.Length", "Petal.Width")]

> # Predict Sepal.Length based on the other 3 numeric columns
> # Do it stepwise
> model = ore.lm(Sepal.Length ~ ., data = IRIS_TABLE)

> model

Call:
ore.lm(formula = Sepal.Length ~ ., data = IRIS_TABLE)

Coefficients:
 (Intercept)   Sepal.Width  Petal.Length   Petal.Width
      1.8560        0.6508        0.7091       -0.5565
.
.
.
```

B

License Information for Oracle R Enterprise

This appendix contains licensing information for third-party and open source products that are used in combination with Oracle R Enterprise. Licensing information for Oracle R Enterprise is in *Oracle Database Licensing Information*.

This appendix contains these topics:

B.1 Licensing for Open Source R

R is an open source language and environment that is governed by GPL2 and not under the terms of the Oracle license agreement.

R was initially written by Robert Gentleman and Ross Ihaka of the Statistics Department of the University of Auckland.

Since mid-1997 there has been a core group with write access to the R source, currently consisting of:

Douglas Bates
John Chambers
Peter Dalgaard
Seth Falcon
Robert Gentleman
Kurt Hornik
Stefano Iacus
Ross Ihaka
Friedrich Leisch
Uwe Ligges
Thomas Lumley
Martin Maechler
Duncan Murdoch
Paul Murrell
Martyn Plummer
Brian Ripley
Deepayan Sarkar
Duncan Temple Lang
Luke Tierney
Simon Urbanek
plus Heiner Schwarte up to October 1999 and Guido Masarotto up to June 2003.

For more information go to http://www.r-project.org.

Current R-core members can be contacted via email to R-project.org with name made up by replacing spaces by dots in the name listed above.

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That's all there is to it!

C

Oracle R Distribution Packages

This appendix lists the packages supported by Oracle R Distribution.

See Also:

- Section 5.1.3.1 for a list of the packages supported by Oracle R Enterprise
- Section 5.1.3.2 for a list of the open source packages that ship with Oracle R Enterprise

C.1 Packages in Oracle R Distribution

Table C–1 lists the packages in Oracle R Distribution that are used by Oracle R Enterprise.

Table C–1 Packages in Oracle R Distribution Used by Oracle R Enterprise

Package Name	Package Description
`base`	The R Base Package
`boot`	Bootstrap Functions (originally by Angelo Canty for S)
`class`	Functions for Classification
`cluster`	Cluster Analysis Extended Rousseeuw et al
`codetools`	Code Analysis Tools for R
`compiler`	The R Compiler Package
`datasets`	The R Datasets Package
`foreign`	Read Data Stored by Minitab, S, SAS, SPSS, Stata, Systat, dBase, ..
`graphics`	The R Graphics Package
`grDevices`	The R Graphics Devices and Support for Colours and Fonts
`grid`	The Grid Graphics Package
`KernSmooth`	Functions for kernel smoothing for Wand & Jones (1995)
`lattice`	Lattice Graphics
`MASS`	Support Functions and Datasets for Venables and Ripley's MASS
`Matrix`	Sparse and Dense Matrix Classes and Methods
`methods`	Formal Methods and Classes
`mgcv`	GAMs with GCV/AIC/REML smoothness estimation and GAMMs by PQL
`nlme`	Linear and Nonlinear Mixed Effects Models

Table C–1 (Cont.) Packages in Oracle R Distribution Used by Oracle R Enterprise

Package Name	Package Description
nnet	Feed-forward Neural Networks and Multinomial Log-Linear Models
rpart	Recursive Partitioning
spatial	Functions for Kriging and Point Pattern Analysis
splines	Regression Spline Functions and Classes
stats	The R Stats Package
stats4	Statistical Functions using S4 Classes
survival	Survival analysis, including penalised likelihood.
tcltk	Tcl/Tk Interface
tools	Tools for Package Development
utils	T he R Utils Package

D

Installing RStudio

This appendix provides tips for installing RStudio Server for use with Oracle R Enterprise on Linux. This appendix includes these topics:

- About RStudio
- Installing RStudio Server
- Installing RStudio Desktop

D.1 About RStudio

RStudio is a free, open source Integrated Development Environment (IDE) for R. RStudio is available under GNU Affero General Public License (AGPL). You can use RStudio with Oracle R Enterprise, however RStudio is not included with Oracle R Enterprise. If you want to use RStudio, you must install and license it separately.

See Also:

- `http://www.gnu.org/licenses/agpl-3.0-standalone.html` for details about AGPL
- `http://www.rstudio.com/` for details about RStudio

D.2 Installing RStudio Server

RStudio Server is a Linux application that provides a web-based interface to R on a server.

To install RStudio Server for use with Oracle R Enterprise:

1. Download RStudio to your Linux system from the RStudio web site:

   `http://www.rstudio.com/ide/`

2. Edit the configuration file `rserver.conf`. Supply the values of `RHOME` and `ORACLE_HOME`.

   ```
   % sudo vi /etc/rstudio/rserver.conf
       rsession-ld-library-path=RHOME:ORACLE_HOME
   ```

3. Edit the configuration file `Renviron.conf`. Supply the values of `ORACLE_HOME`, `ORACLE_HOSTNAME`, and `ORACLE_SID`. For example, using the BASH shell:

   ```
   % cd /home/oracle
   % sudo vi .Renviron
       ORACLE_HOME=ORACLE_HOME
       ORACLE_HOSTNAME=ORACLE_HOSTNAME
   ```

```
    ORACLE_SID=ORACLE_SID

# export ORACLE_HOME
# export ORACLE_HOSTNAME
# export ORACLE_SID
```

See Also:

http://www.rstudio.com/ide/docs/server/configuration

D.3 Installing RStudio Desktop

RStudio Desktop is an IDE for standalone machines.

To install RStudio Desktop:

1. Install R.
2. Download RStudio Desktop from the RStudio web site:

   http://www.rstudio.com/ide/
3. Run the installer and follow the prompts.
4. Click the desktop icon to initialize RStudio.

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