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ORACLE 补丁安装操作说明

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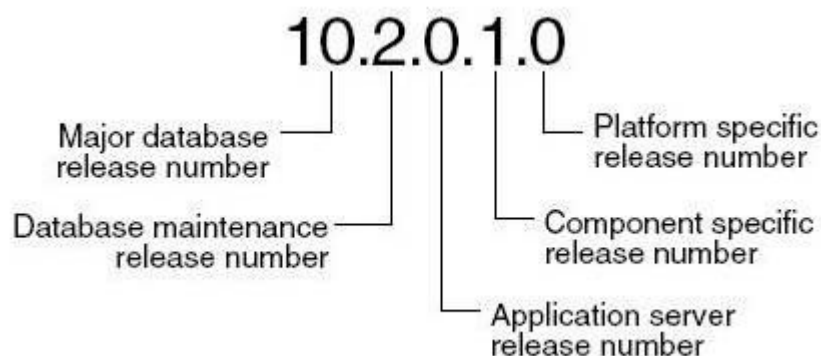QQ:23828728

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1. Oracle 数据库的版本号

Oracle 数据库的发行版本号(release number)一般由五位数字组成。

● Major Database Release Number

第一位数字是我们最常提到的一个大版本标识,它代表了**数据库主要发行版本号**;譬如我们说的 10g 不管是 R1 还是 R2,其版本号的第一位总是 10;不同 Major release Number 之间预示着存在功能上的巨大差别,例如在 11g 中加入了许多 10g 上永远不会有的新特性。

● Database Maintenance Release Number

第二位数字代表**数据库维护版本发行号**,也就是**我们常说的 R1 或者 R2**。已有的 Maintenance Release Number 包括:8.1(比较特殊)、9.1、9.2、10.1、10.2 和 11.1、11.2。从 9i 开始每一个大版本都有 2 个 release,一般来说 R1 总是显得不那么稳定(至少 11g 之前是这样),通过在 R1 中引入大量特性后发行并根据用户实际使用情况不断修正 Bug,到 R2 发行时 R1 中引入的新特性已经日渐成熟,当然按照 Oracle 的风格在 R2 中还会引入部分特性,一些特性甚至可能是颠覆性的。

● Application Server Release Number

第三位数字代表了 Oracle Application Server (OracleAS)的发行版本号;对于 Oracle database 软件而言这一位总是为 0。

● Component-Specific Release Number

第四位数字代表了某个**组件的发行版本号**。这里说的组件是指我们在使用 DBCA 创建数据库是选择安装的 Component,例如 Oracle OLAP、Label Security 等(如果是手动创建数据库,那么必然运行了安装组件的脚本,一般位于$ORACLE_HOME/rdbms/admin 目录下)

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取决于数据库上所打过的 Component Patch set 补丁集或 interim release 临时版本，同一个数据库中**不同组件可能存在不同的组件版本号**。在给数据库软件打上 Patch Set 后我们需要给已经存在的数据库升级组件版本，通俗地说是**给数据库升级数据字典**，这样数据库内的组件版本一般是一致的，如我将一个 10.2.0.1 的数据库升级到 10.2.0.4，那么这个数据库里的组件版本也会是 10.2.0.4。我们可以通过查询 **DBA_SERVER_REGISTRY** 视图来了解数据库中的组件版本情况。

● Platform-Specific Release Number

第五位数字代表了平台相关发行版本号。通常意义上该位数字受到另一种补丁(不是 Patch Set)的影响。在 10g 以后 Oracle 引入了在某个特定的补丁集的基础上发行的补丁集的更新(PSU-patch set update)；通过 PSU 的发行，Oracle 可以针对某个特定的补丁集版本上发生的 Bug 集中性地修复，例如 10.2.0.4 是一个 10g 使用十分广泛的版本，如果在 10.2.0.4 上发现了 Bug 那么就可以将 fix 合并到 PSU 中。一般来说**PSU 会每年的 1、4、7、10 月份 release**，最近的一次 PSU 释放是在 2011 年的 4 月，包含了 10.2.0.4 的第 8 个 PSU 也就是 10.2.0.4.8。注意 Oracle 只会为某个大版本上的几个 final release 制作 PSU 补丁，目前在 10g 上保持 PSU 发布的版本是 10.2.0.4 和 10.2.0.5，而对于 10.2.0.3 则不再有 PSU 的支持。可以通过查询 **registry$history** 表了解数据库(DB ,not Database Software)的 PSU 信息。

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2. 补丁类型介绍

名称	说明
Release	标准产品发布。如 Oracle Database 10g Release 2 的第一个发行版本为 10.2.0.1，可以在 OTN、edelivery 等站点上公开下载。
Patch Set Release	就是早期大家常说的 **PSR**。这是在主版本号上发布的补丁集，修复了较多的 Bug，可能会包含一些增强功能（Enhancement）。比如 11.2.0.1 是一个主版本，那么 11.2.0.2、11.2.0.3 就是 2 个不同的 Patch set。这种补丁集经过了严格的集成测试，也是累积型的。所以推荐安装最新的 Patch Set。
Patch Set Update	就是 DBA&DMA 们常论道的 **PSU**。Oracle 选取在每个季度用户下载数量最多，并且得到验证具有较低风险的补丁放入到每个季度的 PSU 中，修复比较严重的一些问题，**包含每个季度的 CPU**，是累积型的。虽然在描述 PSU 的时候会用到数据库版本第 5 位，比如 Database PSU 11.2.0.3.5，但实际上**打完 PSU 后并不会真正改变数据库的版本**，从 v$version 中看到的版本还是 4 位的(11.2.0.3.0)，第 5 位仍然是 0。 **注意** 1. Windows 上没有CPU 和 PSU，对于 Windows 和 Exadata，Oracle 使用 BundlePatch 代替 PSU，Bundle Patch 会包含 PSU 的内容 2. 从 11.2.0.2 版本开始，一个新的补丁策略被引入，11.2.0.1 之后发布的 Patch Set 本身就是一个完整的安装包，不再需要基础的 Release 版本安装。
Critical Patch Update	这个指的就是 **CPU** 补丁。每季度发布一次，用来修复安全方面的一些补丁，是累积型的。目前(2012 年 10 月)已经更名为 Security Patch Update (SPU)。 这类问题本来不属于软件错误,在正常使用中不会出现任何问题。但是别有用心的人可以通过运行非常精巧设计的代码 ，绕过数据库系统的安全管理机制,达到非授权存取的目的。
Interim Patch/	是我们常说的小补丁，为了修复某(几)个 Bug 而发布的补丁。这种

One-Off Patch	补丁推荐在测试库上测试无误后再安装在生产库上。
Merged Patch	合并的补丁。当几个小补丁之间有冲突，不能同时安装的时候，需要提供这种 Merged Patch。补丁冲突主要是由于 2 个或者多个补丁修改同一个文件，但是修改的内容是不同的。
Bundle Patch(BP)	补丁集，修复多个 Bug。**在 Windows 平台上的 Oracle 没有小补丁，只有这种 Bundle Patch**。这种累积型的补丁集会周期性的发布（至少每季一次),也就是每个 Bundle Patch 会包含之前所有的 Bundle Patch。比如 Windows Bundle Patch 16，它会包含之前所有 15 个 Bundle Patch，所以我们总是推荐安装最新的 Bundle Patch。Oracle 的集群软件和数据库软件的 Window Bundle Patch 是同一个，比如 Windows Bundle Patch 16(补丁号 16167942，既可以打在集群上，也可以打在数据库上）。 要了解 Windows Bundle Patch 的补丁号，可以参考 MOS 文档：Note 161549.1 Oracle Database, Networking and Grid Agent Patches for Microsoft Platforms
Diagnostic Patch	诊断补丁。顾名思义，这类补丁不是用来解决问题的，而是用来寻找问题的原因的。这类补丁只在 Oracle 技术支持部门要求安装时，才需要安装。在得到需要的诊断信息后，应立即卸载这一补丁。
Composite Patch	从 2012 年 4 月份的 Database PSU 11.2.0.3.2 和 11.2.0.2.0.7 开始，推出一种新的概念叫 Composite Patches。这是一种新型的补丁包，它不同于其他的累积型补丁包。如果是第一次安装 Composite Patches，那么该 Composite Patches 所包括的全部补丁都会被安装，后续安装的 Composite Patches，只会安装对比前一次 Composite Patches 有变化的部分和新增加的补丁。 Composite Patche 的改进包括减少补丁安装时间，减少回滚以前应用的 overlay patches 的需要。新的 Composite Patches 格式，使以前 PSU 应用的 overlay patches 和新安装的 PSU 并存成为可能。更多信息。

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3. 补丁安装过程前的准备工作

You can back up the ORACLE_HOME using your preferred method. You can use any method such as zip, cp -r, tar, and cpio to compress the ORACLE_HOME.

执行 opatch lsinventory -detail 命令，进行 ORACLE_HOME 信息检查。如果反馈结果中的 ORACLE_HOME 与实际软件安装的 ORACLE_HOME 不一致。 可能存在 ORACLE_HOME/inventory 信息错误或不一致。

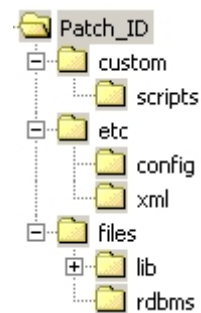执行任何补丁操作前，一定要备份 $ORACLE_HOME 以及 $ORACLE_BASE/oraInventory。

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4. 关于 OPatch

OPatch 支持下列操作:

- 应用过渡性补丁.

- 回滚已经应用的过渡性补丁.

- 检查安装补丁与已安装补丁是否冲突. 并给出冲突解决建议.

- 提供已安装过渡性补丁的报告信息.

4.1. 过渡性补丁结构

过渡性补丁通常为 zip 文件格式. 在应用补丁之前，需要进行解压缩处理。

过渡性补丁包含下面内容:

- Patch Metadata: This contains information on the patch ID, the bugs fixed, the files affected, and the actions to be performed.

- Payload: This contains the files that will be modified by OPatch.

- Custom Scripts: Pre-processing and post-processing scripts that needs to be run before and after patching.

4.2. 过渡性补丁版本

OPatch 10.2 支持维护补丁版本信息。

You can have two or more different versions of the same patch (with the same patch ID). This version information is stored in the OPatch metadata. The metadata has a tag date_of_patch, that stores the patch version information.

The sample of the tag is as follows:

<date_of_patch year="YYYY" month="mmm" day="Day" time="Time" zone="TimeZone"/>: Date on which the patch was created

OPatch 将补丁信息存放在 $ORACLE_HOME/.patch_storage 目录下. 安装到 $ORACLE_HOME 下的补丁将被单独进行存放. 同一之间只有进行一个 OPatch 的操作。

```
[oracle@nmacct1 ~]$ cd $ORACLE_HOME

[oracle@nmacct1 db]$ ls -la | grep patch

drwxr-x---   6 oracle oinstall    4096 Aug 23 14:06 .patch_storage


[oracle@nmacct1 .patch_storage]$ ll

total 28

drwxr-xr-x 7 oracle oinstall 4096 Aug 23 10:24 14275629_Oct_3_2012_18_33_12

drwxr-xr-x 6 oracle oinstall 4096 Aug 23 13:43 9952245_Jan_17_2011_03_04_34

-rw-r--r-- 1 oracle oinstall 1748 Aug 23 13:43 interim_inventory.txt

-rw-r--r-- 1 oracle oinstall   91 Aug 23 13:43 LatestOPatchSession.properties

drwxr-xr-x 4 oracle oinstall 4096 Aug 23 13:43 NApply

-rw-r--r-- 1 oracle oinstall    0 Aug 23 13:43 patch_free

-rw-r--r-- 1 oracle oinstall 1547 Aug 23 13:43 record_inventory.txt

drwxr-xr-x 2 oracle oinstall 4096 Aug 23 10:24 verify
```

多个 OPatch 进程运行时，系统会出现如下错误信息：

Inventory load failed... OPatch cannot load inventory for the given Oracle Home.

LsInventorySession failed: LsInventory cannot create the log directory /oracle/product/10.2.0/db/cfgtoollogs/opatch/lsinv/lsinventory2013-08-22_17-19-15PM.txt

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OPatch failed with error code 73.

通过 opatch lsinventory -detail 命令可以查看本地补丁安装信息。

Patch Location in Storage area:
/home1/HOMEtoiir571/.patch_storage/300200_Dec_24_2003_04_57_13

You will also find an unzipped version of the patch in the following location:
$ORACLE_HOME/.patch_storage/<patch_id_timestamp>/original_patch

4.3. 获取过渡性补丁

通过 patch ID 在 OracleMetalink 上查询补丁信息:
http://www.oracle.com/support/metalink/index.html

4.4. 运行 OPatch 所需环境

- ORACLE_HOME 环境变量必须指定到正确的 Oracle 软件的安装目录。

- 需要 Java SDK 1.4 或者更高的版本, ar, cp, fuser, make 等命令必须可用.

- Oracle Real Application Clusters 环境下 library path 必须正确设置.
  For Solaris
  LD_LIBRARY_PATH = $ORACLE_HOME/lib32:$ORACLE_HOME/lib

  For HP-UX -
  SHLIB_PATH=$ORACLE_HOME/lib32:/usr/lib

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4.5. OPatch 特性

The OPatch 10.2 utility has the following features:

- **Scalability**: OPatch is scalable to support large number of patches.
- **Reliability**: OPatch is reliable and protects the Oracle home and inventory. It can bring the Oracle home back to a stable state from patch application failures. It can also easily detect patch conflicts.
- **Portability**: OPatch is compatible with all operating systems for which Oracle releases software.
- **Robust**: OPatch is very robust. It is very easy to apply a patch as well as remove it.
- **Easy to maintain**: OPatch is easy to maintain and is also extensible.
- **Support for Silent Operation**: OPatch supports silent operation. This mode allows you to run the software without any user interaction.
- **Support for Real Application Clusters**: OPatch supports Real Application Clusters and works well in that setup. It is easy to extend it to the Grid Control.
- **Easy to debug**: OPatch has various levels of logging and tracing mechanisms. It also has a debug option that helps to diagnose problems with the software easily.

4.6. OPatch 使用环境检查

4.6.1. ORACLE_HOME

OPatch verifies if the Oracle home is present. You must ensure that the ORACLE_HOME environment variable is set to the Oracle home of the product you are trying to patch. Check the respective vendor documentation for the details to set the environment variable.

4.6.2. JRE and JDK

OPatch requires **JDK 1.4 or higher** to work properly. JRE comes as a part of JDK.

OPatch 10.2 uses the **jar utility** that comes with JDK for its jar, war, and ear operations.

Opatch will look for JDK inside the Oracle home specified. 如果 oracle 安装目录中不含 JDK 信息，需要使用 -jdk 选项提供 JDK 路径. OPatch 如果找不到 JDK 路径，在对 jar/war/ear 文件进行操作时会报错.

In order to find the version of JDK installed, execute the following command:

JDK/bin/java -version

Note:

If the patch you are applying does not have a jar action, you might not need JDK and OPatch will work fine with JRE alone.

4.6.3. Check for System Space

When OPatch processes the script for the installation of a patch, it simultaneously (同时) generates a rollback script and saves a copy of every file edited or deleted during the patching. OPatch also backs up the inventory information. So, Oracle recommends that you have sufficient system space to accommodate the patch and the backup information.

4.6.4. Oracle Universal Installer 与 OPatch 版本兼容检查

OPatch 10.2 requires Oracle Universal Installer 10.2 or higher to work properly. If the Oracle Universal Installer version is less than what OPatch requires, then OPatch errors out.

4.7. OPatch 工具的操作和选项

OPatch 工具位置在 $ORACLE_HOME/OPatch 目录下。

<Path_to_OPatch>/opatch <option> [-command_line_arguments]

[oracle@nmacct1 OPatch]$ ./**opatch -h**

Invoking OPatch 10.2.0.4.9

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```
Oracle Interim Patch Installer version 10.2.0.4.9

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 Usage: opatch [ -help ] [ -r[eport] ] [ command ]


        command := apply

                 lsinventory

                 napply

                 nrollback

                 rollback

                 query

                 version

                 prereq

                 util


 <global_arguments> := -help       Displays the help message for the command.

                      -report      Print the actions without executing.
```

[oracle@nmacct1 OPatch]$ ./**opatch lsinventory -h**

```
Invoking OPatch 10.2.0.4.9


Oracle Interim Patch Installer version 10.2.0.4.9

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DESCRIPTION

    List the inventory for a particular $ORACLE_HOME or display all

    installations that can be found.
```

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```
SYNTAX

opatch lsinventory [-all ] [-all_nodes] [-bugs_fixed <asc | desc> ]

                    [-delay <value> ] [-detail ] [-group_by_date ]

                    [-invPtrLoc <Path to oraInst.loc> ]

                    [-jre <LOC>] [-local ]

                    [-oh <ORACLE_HOME> ] [-patch <asc | desc> ]

                    [-patch_id <asc | desc> ]

                    [-property_file <path to property file>]

                    [-retry <value> ]
```

命令参数列表：

Option	Description
apply	Installs an interim patch.
lsinventory	Lists what is currently installed on the system.
query	Queries a given patch for specific details.
rollback	Removes an interim patch.
version	Prints the current version of the patch tool.

To view additional information for any option, use the following command:

<Path_to_OPatch>/opatch option -help

If using Perl, then use the following command:

perl opatch.pl option -help

4.7.1. apply Option (补丁安装选项)

The apply option applies an interim patch to a specified Oracle home. The
ORACLE_HOME environment variable must be set to the Oracle home to be patched.

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Command-line Argument	Description
delay	Specifies **how many seconds to wait before attempting to lock the inventory** in the case of a previous failure. You can use this option only if -retry option is specified. 锁定目录需要等待多久，需要配合 **retry** 参数。
force	Removes conflicting patches from the system. If a conflict exists which prevents the patch from being applied, then the -force command-line argument can be used to apply the patch. 删除有冲突的补丁。
invPtrLoc	Specifies the location of the oraInst.loc file. This command-line argument is needed when the -invPtrLoc argument was used during installation. Oracle recommends the use of the default Central Inventory for a platform.
jdk	Specifies the location of a particular JDK (jar) to use instead of the default location under the Oracle home directory. You cannot use -jdk and -jre options together.指定 **JDK** 路径替换 **oracle** 默认目录下的。
jre	Specifies the location of a particular JRE (Java) to use instead of the default location under the Oracle home directory. You cannot use -jdk and -jre options together. 不能同时使用 **JDK** 和 **JRE** 选项。
local	Specifies that the OPatch utility patch the local node and update the inventory of the local node. It does not propagate the patch or inventory update to other nodes. This command-line argument can be used on Oracle Real Application Clusters environments and non-clustered environments. If an entire cluster is shutdown before patching, then this argument can be used for non-rolling patches. 进行本地节点补丁安装，更新本地节点的 **inventory** 目录。
local_node	Specifies to the OPatch utility the local node for this cluster. This command-line argument can be used on Oracle Real

	Application Clusters environments.
minimize_downtime	Specifies the order of nodes to be patched by the OPatch utility. This command-line argument only applies to Oracle Real Application Clusters environments. It cannot be used with the -local command-line argument or a rolling patch.
no_bug_superset	Specifies to error out if the current patch bugs-to-fix is a superset or the same as an installed patch bugs-fixed in the Oracle home directory.
no_inventory	Bypasses the inventory for reading and updates. This command-line argument cannot be used with the -local command-line argument. This command-line argument puts the installation into an unsupported state.
no_sysmod	Specifies that the OPatch utility need not update the files in the system. It will only update the inventory.不更新 **system** 文件，只更新 **inventory** 记录。
no_relink	This option does not perform any make operation. It can be used during multiple patch applications and to perform the linking step only once. OPatch does not keep track of the make operations it did not perform. You need to make sure to execute OPatch without this option at the end for compilation. 不进行任何编译操作。对多个补丁进行操作时，最后统一进行编译，需要用户自己记录是否做过编译操作。
oh	Specifies the Oracle home directory to use instead of the default.指定 **ORACLE_HOME** 目录。替换默认目录。
opatch_post_end	Marks the end of the post option. This command-line argument is used with the post command-line argument. If this argument is not used, then everything after post is passed into post.
opatch_pre_end	Marks the end of the pre options. This command-line argument is used with the pre command-line argument. If this argument is not used, then everything after pre is passed into

	pre.
post	Specifies the parameters to be passed inside the post script besides the standard parameters.
pre	Specifies the parameters to be passed inside the pre script besides the standard parameters.
remote_nodes	Specifies to the OPatch utility the list of remote nodes. This command-line argument can be used on Oracle Real Application Clusters environments.
report	Prints the action to the screen without executing it.打印动作信息，但是不进行执行操作。
retry	Specifies how many times the OPatch utility should try when there is an inventory lock failure.
silent	Suppresses user interaction, and defaults any answers to "yes."
verbose	Prints output to the screen as well as to the log file.

4.7.1.1. Report

./opatch apply -report

4.7.2. lsinventory Option

The lsinventory option reports what has been installed on the system for a particular Oracle home directory, or for all installations.
<Path_to_OPatch>/opatch lsinventory [-all] [-delay (value)] [-detail] [-invPrtLoc (path)] \
[-jre (location)] [-retry (value)] [-patch] [-oh (Oracle Home location)]

4.7.3. query Option

The query option queries a specific patch for specific details. It provides information about the patch and the system being patched.

<Path_to_OPatch>/opatch query [-all] [-jre (Location)] [-jdk (Location)]\

  [-oh (Location)] [patch_location]

4.7.4. rollback Option (补丁回退选项)

The rollback option removes a specific interim patch from the appropriate Oracle home directory.

<Path_to_OPatch>/opatch rollback -id (patch_id) [-ph (patch directory)] \

[-delay] (value) [-invPtrLoc (path)] [-jdk (location)] [-jre (location)]\

[-local] [-oh (Oracle Home location)] \

[-post (options to be passed into post) [-opatch_post_end]] \

[-pre (options to be passed into pre) [-opatch_pre_end]] [-retry (value)] \

[-silent] [-verbose] [-no_relink] [-no_sysmod][-remote_nodes (node1,node2)][-local_node (node_name)]

Command-line Argument	Description
delay	Specifies how many seconds the OPatch utility should wait before attempting to lock inventory again, if the -retry command-line argument is used with the apply option.
id	Indicates the patch to be rolled back. Use the -lsinventory option to display all patch identifiers. To successfully rollback a patch, the patch identifier must be supplied.指定需要回退的补丁编号。
invPtrLoc	Specifies the location of the oraInst.loc file. This command-line argument is needed when the -invPtrLoc command-line argument was used during installation. Oracle recommends the use of the default Central Inventory for a platform.

jdk	Specifies the location of a particular JDK (jar) to use instead of the default location under the Oracle home directory.
jre	Specifies the location of a particular JRE (Java) to use instead of the default location under the Oracle home directory.
local	Specifies that the OPatch utility rollback and update the local node and update the inventory of the local node. It does not propagate the patch or inventory update to other nodes. This command-line argument can be used on Oracle Real Application Clusters environments and non-clustered environments. If an entire cluster is shutdown before patching, then this argument can be used for non-rolling patches.
local_node	Specifies to the OPatch utility that this is the local node for the cluster. This command-line argument can be used on Oracle Real Application Clusters environments.
no_sysmod	Specifies that the OPatch utility need not update the files in the system. It will only update the inventory.
no_relink	This option does not perform any make operation in the patch. It can be used during multiple patch removal and to perform the compilation step only once.
oh	Specifies the Oracle home directory to use instead of the default directory.
opatch_post_end	Marks the end of the post option. This command-line argument is used with the post command-line argument. If this argument is not used, then everything after post is passed into post.
opatch_pre_end	Marks the end of the pre options. This command-line argument is used with the pre command-line argument. If this argument is not used, then everything after pre is passed into pre.
ph	Specifies the valid patch directory area. The utility will use the command types found in the patch directory to identify which

	commands are used for the current operating system.
post	Specifies the parameters to be passed inside the post script besides the standard parameters.
pre	Specifies the parameters to be passed inside the pre script besides the standard parameters.
remote_nodes	Specifies to the OPatch utility the list of remote nodes. This command-line argument can be used on Oracle Real Application Clusters environments.
report	Prints the action to the screen without executing it.
retry	Specifies how many times the OPatch utility should try in case of an inventory lock failure.
silent	Suppresses user interaction, and defaults any answers to "yes". Real Application Clusters setup does not support this option.
verbose	Prints output to the screen as well as to the log file.

4.7.5. rollback prereq (补丁安装前检查)

4.7.5.1. 检查以上 2 个 patch 之间是否存在冲突

./opatch prereq CheckConflictAmongPatchesWithDetail -phBaseDir
$ORACLE_HOME/patches

4.7.5.2. 补丁与系统中现有的补丁检查是否存在冲突

./opatch prereq CheckConflictAgainstOHWithDetail -phBaseDir
/s01/db_1/patches/9696904

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4.7.5.3. 查询数据库进程是否活动

CheckActiveFilesAndExecutables

4.8. 使用 OPatch 解决补丁安装失败问题

During patching, updates can occur in two phases:

- **System Update**: In this phase, the files get replaced in the Oracle home.
- **Inventory Update**: In this phase, the details of the patch applied is recorded in the inventory.

For UNIX:

$ORACLE_HOME/.patch_storage/<patch-id_timestamp>/restore.sh

On UNIX, source $ORACLE_HOME/.patch_storage/<patch-id_timestamp>/make.txt file (if available) as follows:

/bin/sh make.txt

$ORACLE_HOME/OPatch/opatch rollback -local -id <Patch_ID>

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5. Real Application Clusters 补丁安装的几种方式

5.1. All Node Patching

All Node Patching 中，集群中的所有节点都被停掉，补丁应用到所有节点。Then all the nodes are brought back up. This mode is normally used for very critical patches and it leads to maximum downtime 停机时间较长，主要用于比较重要的补丁升级操作。OPatch uses this mode as default for patch application, unless specified otherwise. The All Node Patching is explained with the help of an example below:
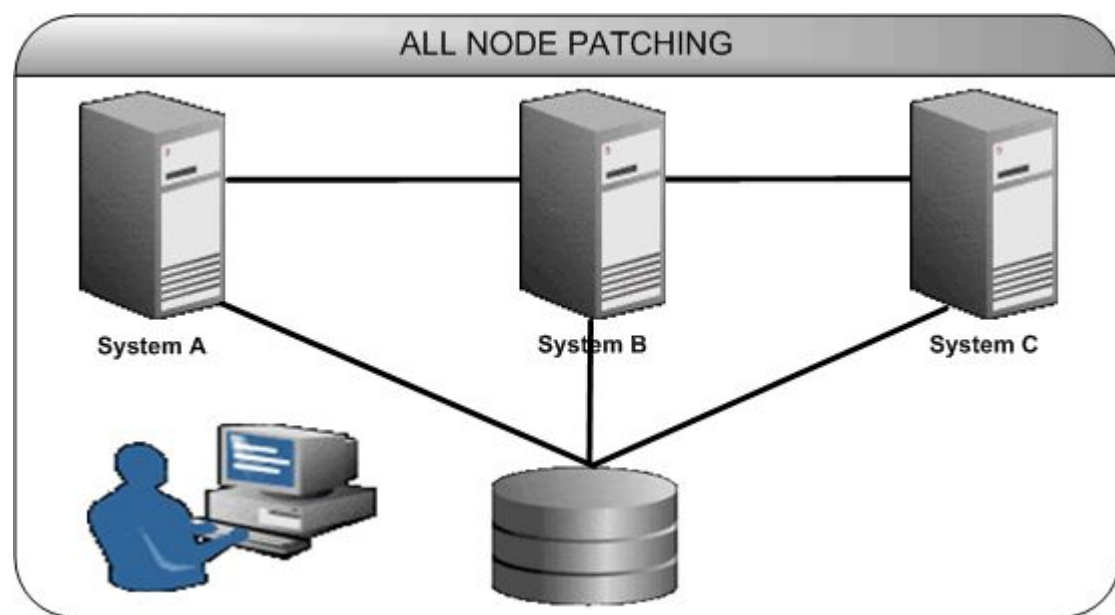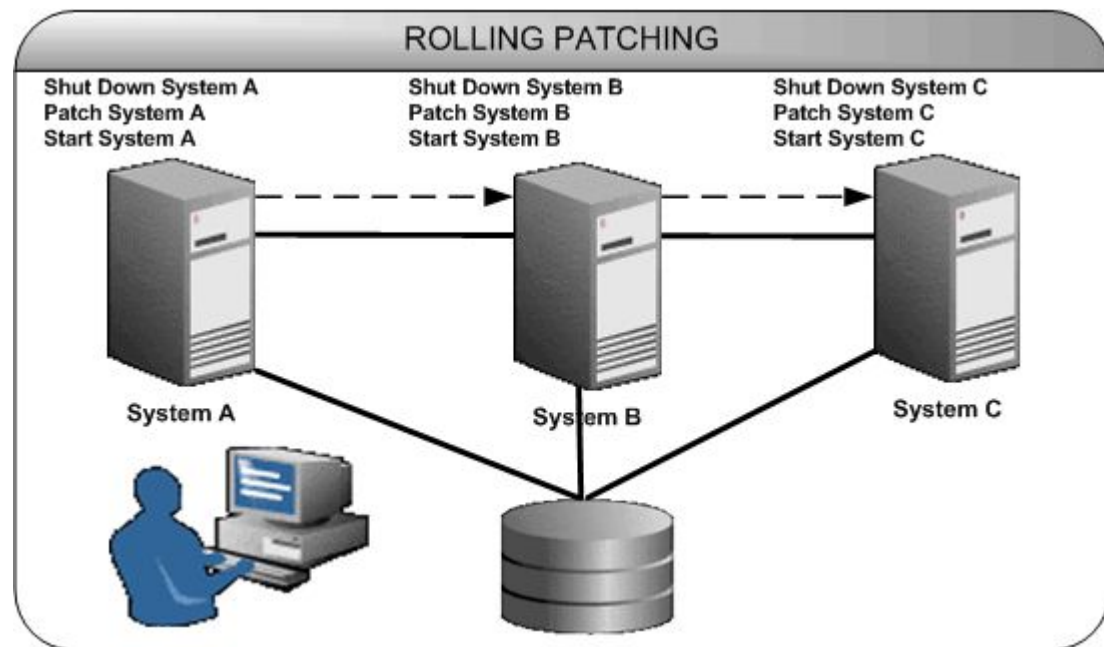

5.2. Rolling Patching

In Rolling Patching, each node is shutdown, the patch applied and brought back up again. 循环升级。This is done node by node separately until all nodes in the Real Application Clusters are patched. 单个节点逐步升级。

This is the most efficient mode of applying an Interim patch to a Real Application Clusters setup because this results in zero downtime. 停机最近较短。

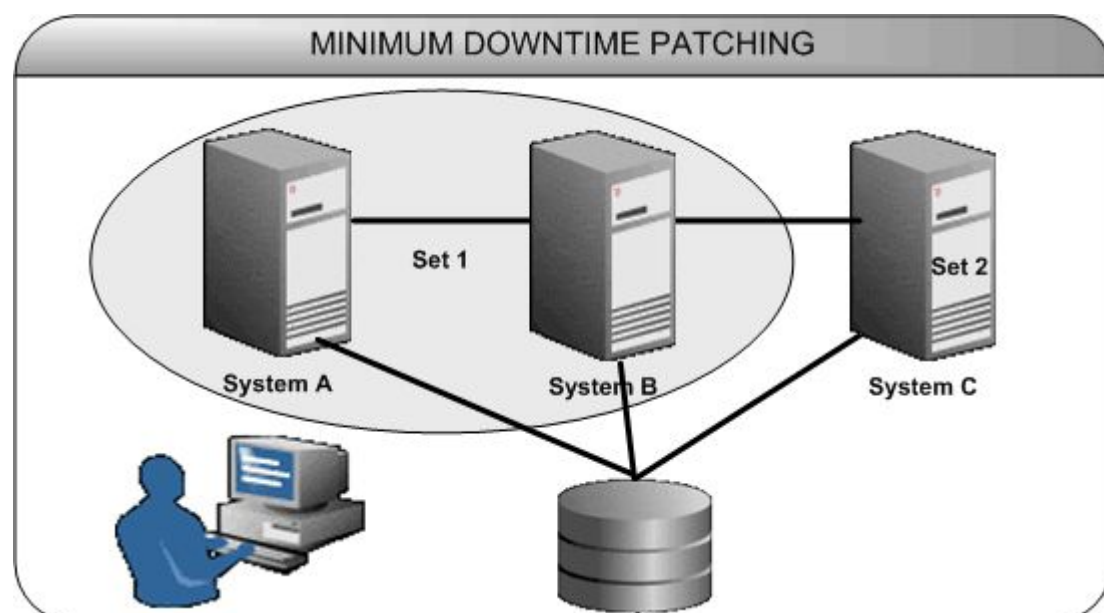## 5.3. **Minimum Downtime Patching**

In Minimum Downtime Patching, the nodes are divided into sets. Initially, the first set is shut down and the patch is applied to it.

After this, the second set is shut down. The first set is brought up and patch is applied to the second set.

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6. 补丁冲突

All patches may not be compatible with one another. For example, if a patch has been applied, all the bugs fixed by that patch could re-appear once another patch is applied. This is called a conflict situation. OPatch detects such situations and raises an error when a conflict is detected.

6.1. 冲突类型

OPatch can detect the following types of conflicts:

- **Bug Superset (Bug 超级)**: If all the bugs fixed by a patch in the system are also fixed by the patch to be applied, then this patch (the patch to be applied) is considered to be a superset of the patch already applied. If a bug superset condition is detected, it is not considered an error situation. All the subset patches are removed from the system and the new patch is applied. 当 bug 子集被检测到后，opatch 会自动回退子集补丁。父级补丁将被应用。
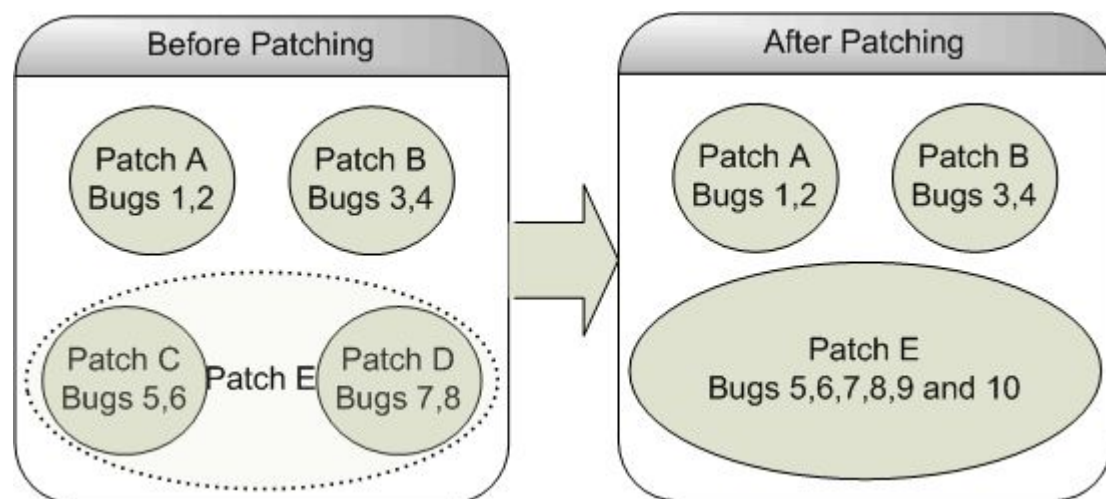
If you want OPatch to error out if the current patch bugs-to-fix is a superset or the same as an installed patch bugs-fixed in the Oracle home directory, you can use the -no_bug_superset flag.

$ OPatch/opatch apply -no_bug_superset <Path_To_Patch>

- **Bug Conflict (Bug 冲突)**: If a set of bugs to be fixed by the current interim patch includes some but not all bugs already fixed by one or more previously installed interim patches it is called a bug conflict. You must remove the bug conflict before you proceed with the patching by using the apply command with -force flag, that rolls back the conflicting patches before applying the new one. 必须在安装补丁前删除冲突的 bug。使用 -force 选项，在应用补丁前删除冲突补丁。
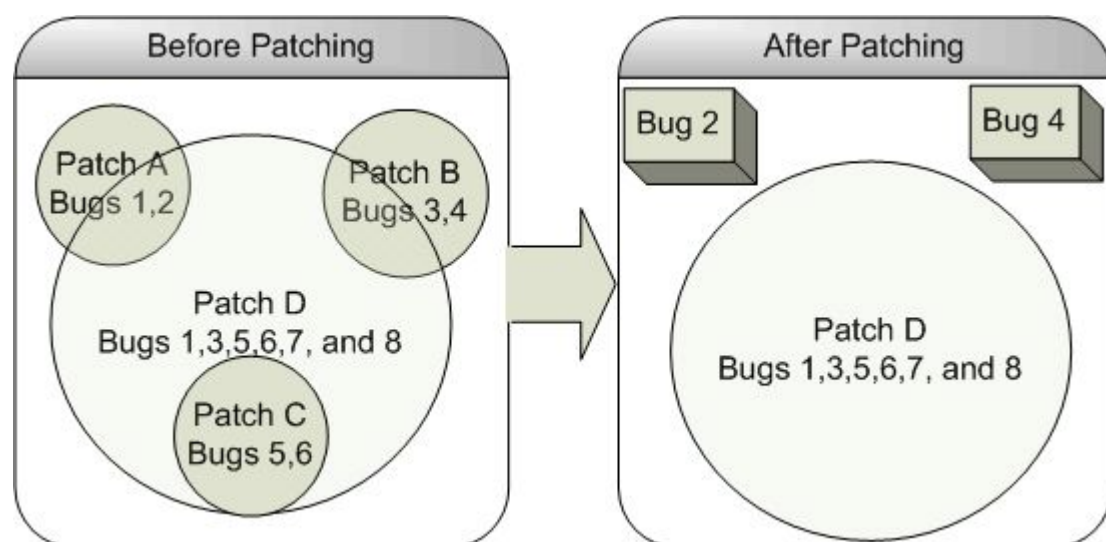
- **File Conflict**: If a set of files to be patched by the current interim patch include files already patched by one or more previously installed interim patches and it is not a bug superset, it is called a file conflict. You must remove the file conflict before you proceed with the patching by using the apply command with -force flag, that rolls back the conflicting patches before applying the new one. 与 bug 冲突类似，使用 -force 参数进行处理。

- **Combination Conflict**: If a set of patches has a combination of bug superset, and bug or file conflict, it is called a Combination Conflict. It is an error situation. In this case, OPatch removes all conflicting patches as well as the subset patches and then re-applies the new patch.

6.2. Patch Conflict Detection and Resolution

OPatch detects and reports any conflicts encountered when applying an Interim patch with a previously applied patch. The patch application fails in case of conflicts. The -force option of OPatch can be used to override this failure. If -force is specified, the installer will first rollback any conflicting patches and then proceed with the installation of the desired interim patch. 指定 -force 以后，会先删除冲突的补丁，然后应用新的补丁。

During patch installation, OPatch saves copies of all the files that were replaced by the new patch before the new versions of these files are loaded and stores it in $ORACLE_HOME/.patch_storage. These saved files are called rollback files and are the key to making patch rollback possible. When you rollback a patch, these rollback files are restored to the system. You should only override the default behavior by using the -force flag, if you have gained a complete understanding of the patch rollback process. To rollback a patch, execute the following command:

$ OPatch/opatch rollback -id <Patch_ID>

6.3. Restoring Oracle Homes

Every time you apply a patch, you make changes to your inventory. Sometimes that change may corrupt the inventory. You can use the restore.sh or restore.bat script that comes with OPatch to remove any changes that were made to the inventory after the application of the patch.When you apply a patch, OPatch creates a snapshot of your inventory and stores it in $ORACLE_HOME/.patch_storage/<patch-id_timestamp> directory.

$ORACLE_HOME/.patch_storage/<patch-id_timestamp>/restore.sh

/bin/sh make.txt

6.4. Logging and Tracing

Logging and Tracing is a common aid for debugging. OPatch maintains logs for all apply, rollback, and lsInventory operations. The log files are located in **<ORACLE_HOME>/cfgtoollogs/opatch** directory. Each log file will be tagged with the timestamp of the operation. Log files are named as opatch_<date mm-dd-yyyy>_<time hh-mm-ss>.log. Each time OPatch is executed a new log file is created.

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Note:

You can set OPatch to debug mode by setting the environment variable OPATCH_DEBUG to TRUE.

[oracle@nmacct1 OPatch]$ export OPATCH_DEBUG=TRUE

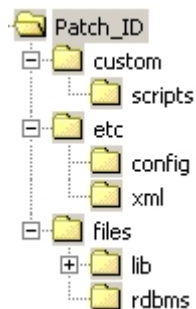[oracle@nmacct1 OPatch]$ ./opatch -h

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7. PUS 补丁安装 (以 10.2.0.5.9 为例)

7.1. 解压补丁包

[oracle@nmacct1 patch]$ unzip p14275629_10205_Linux-x86-64.zip | more

Archive: p14275629_10205_Linux-x86-64.zip

   creating: p14275629_10205_Linux-x86-64/

   creating: p14275629_10205_Linux-x86-64/14275629/

  inflating: p14275629_10205_Linux-x86-64/14275629/README.html

 extracting: p14275629_10205_Linux-x86-64/14275629/README.txt

   creating: p14275629_10205_Linux-x86-64/14275629/custom/

   creating: p14275629_10205_Linux-x86-64/14275629/etc/

   creating: p14275629_10205_Linux-x86-64/14275629/etc/config/

  inflating: p14275629_10205_Linux-x86-64/14275629/etc/config/actions

  inflating: p14275629_10205_Linux-x86-64/14275629/etc/config/inventory

   creating: p14275629_10205_Linux-x86-64/14275629/etc/xml/

  inflating: p14275629_10205_Linux-x86-64/14275629/etc/xml/GenericActions.xml

  inflating:
p14275629_10205_Linux-x86-64/14275629/etc/xml/ShiphomeDirectoryStructure.xml

   creating: p14275629_10205_Linux-x86-64/14275629/files/

   creating: p14275629_10205_Linux-x86-64/14275629/files/bin/

```
Patch_ID
├── custom
│   └── scripts
├── etc
│   ├── config
│   └── xml
└── files
    ├── lib
    └── rdbms
```

目录结构与前面提到的过渡性补丁一致。

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[oracle@nmacct1 patch]$ cd p14275629_10205_Linux-x86-64

[oracle@nmacct1 p14275629_10205_Linux-x86-64]$ ls

14275629

[oracle@nmacct1 p14275629_10205_Linux-x86-64]$ cd 14275629/

[oracle@nmacct1 14275629]$ ls

custom   etc   files   patchmd.xml   README.html   README.txt

[oracle@nmacct1 14275629]$ ls -la

total 72

drwxr-xr-x   5 oracle oinstall   4096 Aug 23 09:01 .

drwxr-xr-x   3 oracle oinstall   4096 Dec 19   2012 ..

drwxr-xr-x   3 oracle oinstall   4096 Dec 19   2012 custom

drwxr-xr-x   4 oracle oinstall   4096 Dec 19   2012 etc

drwxr-xr-x 12 oracle oinstall   4096 Dec 19   2012 files

-rw-r--r--   1 oracle oinstall   2872 Oct   4   2012 patchmd.xml

-rw-r--r--   1 oracle oinstall 42526 Oct 15   2012 README.html

-rw-r--r--   1 oracle oinstall   21 Oct   4   2012 README.txt

补丁安装说明参考补丁目录下的 README.html 文件。

7.2. 检查补丁信息

Patch Set Update (PSU) patches are cumulative. That is, the content of all previous PSUs is included in the latest PSU patch.

PSU 补丁是累积的，因此最新的 PSU 补丁包含以前所有的 PSU 补丁信息。

To install the PSU 10.2.0.5.9 patch, the Oracle home must have the 10.2.0.5.0 Database installed.

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7.3. 安装前置条件检查

You must use the OPatch 10.2 version **10.2.0.5.0** or later to apply this patch. Oracle recommends that you use the latest released OPatch 10.2, which is available for download from My Oracle Support patch 6880880 by selecting the 10.2.0.0.0 release.

安装 PUS 补丁， OPatch 版本必须大于 10.2.0.5.0。

[oracle@nmacct1 ~]$ cd $ORACLE_HOME/OPatch

[oracle@nmacct1 OPatch]$ ./opatch -version

Invoking OPatch 10.2.0.4.9

当前 OPatch 版本为 10.2.0.4.9，不符合安装要求，因此首先要对 OPatch 进行升级。

如果使用低版本的 OPatch 进行补丁安装，会得到一个错误信息反馈：

[oracle@nmacct1 14275629]$ $ORACLE_HOME/OPatch/opatch apply

Invoking OPatch 10.2.0.4.9

Oracle Interim Patch Installer version 10.2.0.4.9

Copyright (c) 2009, Oracle Corporation.   All rights reserved.

Oracle Home   : /oracle/product/10.2.0/db

Central Inventory : /oracle/oraInventory

    from   : /etc/oraInst.loc

OPatch version   : 10.2.0.4.9

OUI version   : 10.2.0.5.0

OUI location   : /oracle/product/10.2.0/db/oui

Log file location：
/oracle/product/10.2.0/db/cfgtoollogs/opatch/opatch2013-08-23_09-17-56AM.log

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Patch history file: /oracle/product/10.2.0/db/cfgtoollogs/opatch/opatch_history.txt

ApplySession applying interim patch '14275629' to OH '/oracle/product/10.2.0/db'

ApplySession failed: ApplySession failed to prepare the system.

Patch 14275629 requires OPatch version 10.2.0.5.0.

The OPatch version being used (10.2.0.4.9) doesn't meet the minimum version required by the patch(es). Please download latest OPatch from My Oracle Support.

补丁所需 OPatch 版本为 10.2.0.5.0，当前版本为 10.2.0.4.9

System intact, OPatch will not attempt to restore the system

OPatch failed with error code 73

7.4. 升级 OPatch

● 备份现有 Opatch

[oracle@nmacct1 ~]$ cd $ORACLE_HOME

[oracle@nmacct1 db]$ tar cvf OPatch.tar ./OPatch/

● 使用最新的 OPatch 进行替换

[oracle@nmacct1 patch]$ unzip p6880880_102000_Linux-x86-64.zip

Archive: p6880880_102000_Linux-x86-64.zip

[oracle@nmacct1 db]$ rm -rf $ORACLE_HOME/OPatch

[oracle@nmacct1 patch]$ cp -R ./OPatch/ $ORACLE_HOME/

● 重新检查 OPatch 版本

[oracle@nmacct1 OPatch]$ ./opatch -version

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Invoking OPatch 10.2.0.5.1

当前版本为 10.2.0.5.1，满足安装条件。

● 配置 OPatch 环境变量

[oracle@nmacct1 ~]$ vi .bash_profile

PATH=$PATH:$HOME/bin:$ORA_CRS_HOME/bin:$ORACLE_HOME/bin:$ORACLE_HOME/**OPatch**:/sbin

[oracle@nmacct1 ~]$ . .bash_profile

[oracle@nmacct1 ~]$ opatch -version

Invoking OPatch 10.2.0.5.1

注意：

替换 OPatch 时，建议对 $ORACLE_HOME 和 $CRS_HOME 下的 OPatch 都进行替换。

集群中所有节点的 OPatch 都进行替换。

[oracle@nmacct1 db]$ scp -r ./OPatch nmacct2:/oracle/product/10.2.0/db

7.5. 安装补丁包

7.5.1. 安装前检查

Before you install PSU 10.2.0.5.9, perform the following actions to check the environment and to detect and resolve any one-off patch conflicts.

在进行 PSU 补丁安装前，检查环境信息以及小补丁冲突情况。

7.5.1.1. 环境检查

需要保证 $PATH 环境变量中有如下程序: make, ar, ld, and nm。

1．make - GNU make utility to maintain groups of programs

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2．ar - create, modify, and extract from archives

3．ld - The GNU linker

4．nm - list symbols from object files

程序所处位置和操作系统类型有关。 例如某些平台下，程序位于 /usr/ccs/bin 目录下，因此 PATH 环境变量需要设置为:

export PATH=$PATH:/usr/ccs/bin

查找程序位置的方法：

[oracle@nmacct1 bin]$ whereis make

make: /usr/bin/make /usr/share/man/man1/make.1.gz /usr/share/man/man1p/make.1p.gz

[oracle@nmacct1 bin]$ which make

/usr/bin/make

7.5.1.2. One-off Patch 冲突检测和解决方案

● 检查当前安装的 one-off 补丁是否与 PUS 补丁冲突:

opatch prereq CheckConflictAgainstOHWithDetail -phBaseDir ./14275629

```
Invoking prereq "checkconflictagainstohwithdetail"


Prereq "checkConflictAgainstOHWithDetail" passed.


OPatch succeeded.
```

7.5.2. 补丁安装

● If you are using a Data Guard Physical Standby database, you must install this patch on both the primary database and the physical standby database.

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- If you are patching an ASM instance, shut down all Oracle Database instances that use this ASM instance. (To see which Oracle Database instances are connected to this ASM instance, query the V$ASM_CLIENT view.)

- If this is a RAC environment, install the PSU patch using the OPatch rolling (no downtime) installation method as the PSU patch is rolling RAC installable. Refer to My Oracle Support Document 244241.1 Rolling Patch - OPatch Support for RAC.

- If this is not a RAC environment, shut down all instances and listeners associated with the Oracle home that you are updating.

- Set your current directory to the directory where the patch is located and then run the OPatch utility by entering the following commands:

```
unzip p14275629_10205_<platform>.zip
cd 14275629
opatch apply
```

7.5.3. 补丁安装后工作

ASM instances 不需要进行下面的操作. 在为数据库进行下面操作之前，必须启动 ASM 实例。

- 应用冲突解决补丁

如果在安装检测时，发现有冲突的情况，此时应解决冲突问题。

- 执行数据操作脚本

RAC 环境中，只需要对一个节点操作即可.

Connect as SYSDBA and run the catbundle.sql script as follows:
cd $ORACLE_HOME/rdbms/admin

```
sqlplus /nolog
SQL> CONNECT / AS SYSDBA
```

```
SQL> STARTUP
SQL> @catbundle.sql psu apply
SQL> -- Execute the next statement only if this is the first PSU applied for 10.2.0.5 or this
is the first PSU applied since 10.2.0.5.3.
SQL> @utlrp.sql   --改过程的作用是编译失效对象
SQL> QUIT
```

检查环境中是否存在报错信息：

$ORACLE_HOME/cfgtoollogs/catbundle or $ORACLE_BASE/cfgtoollogs/catbundle for
any errors:

catbundle_PSU_<database SID>_APPLY_<TIMESTAMP>.log

catbundle_PSU_<database SID>_GENERATE_<TIMESTAMP>.log

where TIMESTAMP is of the form YYYYMMMDD_HH_MM_SS.

7.5.4. RAC 环境 PSU 补丁安装实例

7.5.4.1. 停数据库所有相关进程

[oracle@nmacct1 ~]$ srvctl stop listener -n nmacct1

[oracle@nmacct1 ~]$ srvctl stop listener -n nmacct2

[oracle@nmacct1 ~]$ srvctl stop database -d acct

[oracle@nmacct1 ~]$ srvctl stop nodeapps -n nmacct1

CRS-0216: Could not stop resource 'ora.nmacct1.LISTENER_NMACCT1.lsnr'.

[oracle@nmacct1 ~]$ srvctl stop nodeapps -n nmacct2

CRS-0216: Could not stop resource 'ora.nmacct2.LISTENER_NMACCT2.lsnr'.

[oracle@nmacct1 ~]$ crs_stat -t

Name   Type   Target   State   Host

----

ora....t1.inst application   OFFLINE   OFFLINE

ora....t2.inst application   OFFLINE   OFFLINE

ora.acct.db	application	OFFLINE	OFFLINE
ora....T1.lsnr	application	OFFLINE	OFFLINE
ora....ct1.gsd	application	OFFLINE	OFFLINE
ora....ct1.ons	application	OFFLINE	OFFLINE
ora....ct1.vip	application	OFFLINE	OFFLINE
ora....T2.lsnr	application	OFFLINE	OFFLINE
ora....ct2.gsd	application	OFFLINE	OFFLINE
ora....ct2.ons	application	OFFLINE	OFFLINE
ora....ct2.vip	application	OFFLINE	OFFLINE

7.5.4.2. 停所有节点 CRS 所有相关进程 (root 用户)

```
[root@nmacct1 ~]# crsctl stop crs
Stopping resources. This could take several minutes.
Successfully stopped CRS resources.
Stopping CSSD.
Shutting down CSS daemon.
Shutdown request successfully issued.
```

7.5.4.3. 确认进程是否全部停止

```
[oracle@nmacct1 ~]$ ps -ef | grep oracle
[oracle@nmacct1 ~]$ ps -ef | grep d.bin
```

7.5.4.4. 单个节点逐一安装 PSU 补丁

```
[oracle@nmacct1 p14275629_10205_Linux-x86-64]$ ls
14275629
[oracle@nmacct1 p14275629_10205_Linux-x86-64]$ opatch apply -local ./14275629/
Invoking OPatch 10.2.0.5.1
```

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Make failed to invoke "/usr/bin/make -f ins_net_client.mk client_sharedlib
ORACLE_HOME=/oracle/product/10.2.0/db"....'genclntsh: genclntsh: Could not locate
/oracle/product/10.2.0/db/network/admin/**shrept.lst**

make: *** [client_sharedlib] Error 1

注意在安装过程中的报错信息。

7.5.4.5. 启动数据库执行数据库脚本

[root@nmacct2 ~]# crsctl start crs

Attempting to start CRS stack

The CRS stack will be started shortly

[oracle@nmacct1 admin]$ crs_stat -t

Name	Type	Target	State	Host
ora....t1.inst application		ONLINE	ONLINE	nmacct1
ora....t2.inst application		ONLINE	ONLINE	nmacct2
ora.acct.db	application	ONLINE	ONLINE	nmacct1
ora....T1.lsnr application		ONLINE	ONLINE	nmacct1
ora....ct1.gsd application		ONLINE	ONLINE	nmacct1
ora....ct1.ons application		ONLINE	ONLINE	nmacct1
ora....ct1.vip application		ONLINE	ONLINE	nmacct1
ora....T2.lsnr application		ONLINE	ONLINE	nmacct2
ora....ct2.gsd application		ONLINE	ONLINE	nmacct2
ora....ct2.ons application		ONLINE	ONLINE	nmacct2
ora....ct2.vip application		ONLINE	ONLINE	nmacct2

[oracle@nmacct1 admin]$ pwd

/oracle/product/10.2.0/db/rdbms/admin

[oracle@nmacct1 admin]$ sqlplus / as sysdba

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SQL*Plus: Release 10.2.0.5.0 - Production on Fri Aug 23 10:28:40 2013

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SQL> @catbundle.sql psu apply

SQL> @utlrp.sql

脚本执行完成后，$ORACLE_HOME/rdbms/admin 目录下会产生以 PSU APPLY 和 ROLLBACK 命名的脚本。

[oracle@nmacct1 admin]$ ls -la *PSU*

-rw-r--r-- 1 oracle oinstall 3122 Oct   4   2012 bundledata_PSU.xml

-rw-r--r-- 1 oracle oinstall 1488 Aug 23 10:29 catbundle_PSU_ACCT_APPLY.sql

-rw-r--r-- 1 oracle oinstall 1497 Aug 23 10:29 catbundle_PSU_ACCT_ROLLBACK.sql

7.5.4.6. 检查安装完成后 OPatch 补丁信息

[oracle@nmacct2 p14275629_10205_Linux-x86-64]$ opatch lsinventory

Installed Top-level Products (2):

Oracle Database 10g   10.2.0.1.0

Oracle Database 10g Release 2 Patch Set 4   10.2.0.5.0

There are 2 products installed in this Oracle Home.

Interim patches (1) :

Patch   **14275629**   : applied on Fri Aug 23 10:15:03 CST 2013

Unique Patch ID: 15394595

    Created on 3 Oct 2012, 18:33:12 hrs PST8PDT

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SQL> select * from registry$history;

ACTION_TIME   ACTION   NAMESPACE   VERSION   ID
COMMENTS   BUNDLE_SERIES

----------------------------- ---------- ---------- ---------- --- ------------------- ---------------

23-AUG-13 10.29.04.349805 AM   APPLY   SERVER   10.2.0.5   9 PSU
10.2.0.5.9   PSU

7.6. 回退补丁包

7.6.1. 回退安装补丁

opatch rollback -id 14275629

需要注意脚本参数顺序

[oracle@nmacct1 p14275629_10205_Linux-x86-64]$ opatch rollback -id 14275629 -local

7.6.2. 回退数据库脚本

cd $ORACLE_HOME/rdbms/admin

sqlplus /nolog

SQL> CONNECT / AS SYSDBA

SQL> STARTUP

SQL> @catbundle_PSU_<database SID>_ROLLBACK.sql

SQL> -- Execute the next statement only if this is the first PSU applied for 10.2.0.5 or this
is the first PSU applied since 10.2.0.5.3.

SQL> @utlrp.sql

SQL> QUIT

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8. CRS PUS 补丁安装

8.1. OPatch 工具检查

You must use the OPatch 10.2 version 10.2.0.4.7 or later to apply this patch. Oracle recommends that you use the latest released OPatch 10.2, which is available for download from My Oracle Support patch 6880880 by selecting the 10.2.0.0.0 release.

直接使用新版本替换旧的 OPatch， CRS 软件安装目录下有部分文件属组为 root 用户，建议用 root 用户备份和补丁覆盖。

[root@nmacct1 crs]# tar cvf crs_opatch ./OPatch

[root@nmacct1 crs]# rm -rf ./OPatch

[root@nmacct1 crs]# cp -R /home/oracle/software/patch/OPatch/ ./

[root@nmacct1 crs]# chown -R oracle:oinstall ./OPatch/

[root@nmacct2 crs]# scp -r nmacct1:/oracle/product/10.2.0/crs/OPatch ./

检查 opatch 版本，需要使用 oracle 用户。

[root@nmacct2 OPatch]# ./opatch -version

Invoking OPatch 10.2.0.5.1

The user is root. OPatch cannot continue if the user is root.

OPatch failed with error code 255

[oracle@nmacct2 OPatch]$ ./opatch -version

Invoking OPatch 10.2.0.5.1

Oracle Interim Patch Installer version 10.2.0.5.1

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8.2. 其他环境信息检查

Your system configuration (Oracle Server version and patch level, and operating system version) must exactly match those in the bug database entry. Any one-off patches that were installed before applying PSU 10.2.0.5.2 for CRS will need to be removed; otherwise, they will be superseded by this patch.

Oracle recommends that you not apply any temporary patch unless directed by an Oracle Support analyst who has reviewed your system and determined that it is applicable.

8.3. 手工安装补丁

8.3.1. 安装前环境检查

● 确保环境变量 PATH 中定义了 opatch 脚本的目录：

which opatch

● 手工安装前，确保环境变量正确配置：

CRS_HOME = the full path to the CRS home
RDBMS_HOME = the full path to the Oracle Database server home

● 确保所有软件和进程已经关闭。

● CRS 补丁安装，同一时间，不得在 2 个及以上节点同时进行。

8.3.2. 补丁安装

8.3.2.1. 确保 Oracle Inventory 目录正确配置

As the Oracle Clusterware (CRS) software owner:
% opatch lsinventory -detail -oh <CRS_HOME>

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As the RDBMS (Oracle Database) server owner:

% opatch lsinventory -detail -oh <RDBMS_HOME>

备注： detail 信息太多。可以去掉 -detail 参数。

These commands should list the components for the list of nodes. If the Oracle inventory is not set up correctly, one or both of these commands will fail.

8.3.2.2. CRS 目录不共享的情况

停掉所有数据库实例，ASM 实例，监听程序，nodeapp，以及所有本地节点的 CRS 进程。

● To shut down the RDBMS instance, enter the following command:

% $ORACLE_HOME/bin/srvctl stop instance -d dbname -i <instance_name>

● To shut down ASM instances, enter the following command:

% $ORACLE_HOME/bin/srvctl stop asm -n <node_name>

● To shut down nodeapps, enter the following command:

% $ORACLE_HOME/bin/srvctl stop nodeapps -n <node_name>

● To shut down CRS daemons, enter the following command as root:

$CRS_HOME/bin/crsctl stop crs

8.3.2.3. 运行 prerootpatch.sh 脚本，解锁受保护文件 (root 用户)

 (CRS 目录不共享时，所有节点都需要运行)) as root to unlock protected files:

[root@nmacct1 ~]# cd /home/oracle/software/patch/

[root@nmacct1 patch]# cd 9952245/

[root@nmacct1 scripts]# ./prerootpatch.sh -crshome /oracle/product/10.2.0/crs -crsuser oracle

Checking to see if Oracle CRS stack is down...

Oracle CRS stack is down now.

\# custom/scripts/prerootpatch.sh -crshome <CRS_HOME> -crsuser <username>

where <username> is the software installer/owner for the CRS home.

8.3.2.4. 执行 prepatch.sh 脚本备份重要信息 (crs 安装用户)

Run the following script (on only one node if the CRS home is shared, but on each node if the CRS home is not shared) as the CRS software installer/owner to save important configuration settings:

% custom/scripts/prepatch.sh -crshome <CRS_HOME>

[oracle@nmacct1 scripts]$ ./prepatch.sh -crshome /oracle/product/10.2.0/crs

./prepatch.sh completed successfully.

Note: The RDBMS portion can only be applied to an RDBMS home that has been upgraded to 10.2.0.5.0.

Also, If the CRS Version and RDBMS version are the same at patch set level, enter the following command as the RDBMS software owner:

% custom/server/9952245/custom/scripts/prepatch.sh -dbhome <RDBMS_HOME>

[oracle@nmacct2 9952245]$ custom/server/9952245/custom/scripts/prepatch.sh -dbhome /oracle/product/10.2.0/db

custom/server/9952245/custom/scripts/prepatch.sh completed successfully.

注意，CRS 和 DB 执行脚本的目录是不同的，DB 目录要深几层。

8.3.2.5. 执行 OPatch 进行本地节点 CRS 补丁安装

Enter the following command from the top-level directory where 9952245 exists (on only one node if the CRS home is shared, but on each node if the CRS home is not shared) to patch the CRS home files:

% opatch **napply** -local -oh <CRS_HOME> -id 9952245

执行脚本需要在 **9952245** 补丁包的外层进行。

[oracle@nmacct2 patch]$ opatch napply -local -oh /oracle/product/10.2.0/crs -id 9952245

Verifying the update...

Inventory check OK: Patch ID 9952245 is registered in Oracle Home inventory with proper meta-data.

Files check OK: Files from Patch ID 9952245 are present in Oracle Home.

The local system has been patched and can be restarted.

UtilSession: N-Apply done.

OPatch succeeded.

8.3.2.6. 执行 OPatch 进行本地 db 补丁安装

Note: This step can be applied only to an RDBMS home that has been upgraded to 10.2.0.5.0.

Enter the following command from within the 9952245 directory (进入补丁目录进行操作)
(on only one node if the CRS home is shared, but on each node if the CRS home is not shared) to patch the RDBMS home files:

% opatch napply custom/server/ -local -oh <RDBMS_HOME> -id 9952245

执行脚本需要在 **9952245** 补丁包的内层进行。

[oracle@nmacct1 9952245]$ opatch napply custom/server/ -local -oh /oracle/product/10.2.0/db/ -id 9952245

If there are multiple Oracle Database (RDBMS) homes in your configuration, then apply the patch to each home before continuing.

8.3.2.7. 配置 CRS HOME 目录

Configure the CRS home, because after the opatch command finishes, some configuration settings need to be applied to the patched files. As the Oracle Clusterware (CRS) software owner, enter the following command (on only one node if the CRS home is shared, but on each node if the CRS home is not shared):

% custom/scripts/postpatch.sh -crshome <CRS_HOME>

[oracle@nmacct2 9952245]$

custom/scripts/postpatch.sh -crshome /oracle/product/10.2.0/crs/

8.3.2.8. 配置 ORACLE HOME 目录

Configure the RDBMS home, because after the opatch command finishes, some configuration settings need to be applied to the patched files. As the Oracle Database software owner, enter the following command (on only one node if the CRS home is shared, but on each node if the CRS home is not shared):

% custom/server/9952245/custom/scripts/postpatch.sh -dbhome <RDBMS_HOME>

Note: This step can be applied only to an RDBMS home that has been upgraded to 10.2.0.5.0.

注意 CRS 和 DB 目录结构的不一致。

8.3.2.9. 使用 root 启动 CRS 进程

Restore security settings to the CRS home (这个是什么) using CRS software owner and restart the CRS daemons by running the following script (on all nodes) as root:

\# custom/scripts/postrootpatch.sh -crshome <CRS_HOME>

If the CRS home is shared, run this script on each node, one node at a time. Do not run this script in parallel on two or more nodes.

Do not run this script in any other context than as part of the patching process.

[root@nmacct1 9952245]# custom/scripts/postrootpatch.sh -crshome /oracle/product/10.2.0/crs

Checking to see if Oracle CRS stack is already up...

Checking to see if Oracle CRS stack is already starting

WARNING: directory '/oracle/product/10.2.0' is not owned by root

WARNING: directory '/oracle/product' is not owned by root

WARNING: directory '/oracle' is not owned by root

Startup will be queued to init within 30 seconds.

Waiting for the Oracle CRSD and EVMD to start

Oracle CRS stack installed and running under init(1M)

8.3.2.10.　检查 CRS 和 Database 版本

[oracle@nmacct2 ~]$ opatch lsinventory -oh /oracle/product/10.2.0/crs

Interim patches (1) :
Patch   9952245   : applied on Fri Aug 23 13:42:16 CST 2013 Unique Patch ID: 13197883 　Created on 17 Jan 2011, 03:04:47 hrs PST8PDT 　Bugs fixed: 　　9952245, 9879181, 9610672, 9872299, 9577921, 8308495, 9103966, 8996060 　　6899183, 9261837, 8487143, 9646836

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Rac system comprising of multiple nodes
Local node = nmacct2
Remote node = nmacct1

[oracle@nmacct1 9952245]$ opatch lsinventory -oh /oracle/product/10.2.0/db

Interim patches (2) :

Patch   9952245   : applied on Fri Aug 23 13:43:04 CST 2013
Unique Patch ID: 13197883
   Created on 17 Jan 2011, 03:04:34 hrs PST8PDT
   Bugs fixed:

Patch   14275629   : applied on Fri Aug 23 10:24:20 CST 2013
Unique Patch ID: 15394595
   Created on 3 Oct 2012, 18:33:12 hrs PST8PDT
   Bugs fixed:

8.4. 补丁回退

To roll back the patch, follow these steps:

8.4.1. 查看 **Oracle Inventory** 配置信息:

As the Oracle Clusterware (CRS) software owner:
% opatch lsinventory -detail -oh <CRS_HOME>

As the RDBMS (Oracle Database) server owner:
% opatch lsinventory -detail -oh <RDBMS_HOME>

These commands should list the components for the list of nodes. If the Oracle inventory is not set up correctly, one or both of these commands will fail.

8.4.2. Unzip the PSE container file:

% cd 9952245
% unzip 9952245.zip

8.4.3. CRS home 共享方式，停应用:

To shut down the RDBMS instance on all nodes, enter the following command:
% $ORACLE_HOME/bin/srvctl stop database -d <dbname>

To shut down ASM instances, enter the following command on each node:
% $ORACLE_HOME/bin/srvctl stop asm -n <node_name>

To shut down nodeapps, enter the following command on each node:
% $ORACLE_HOME/bin/srvctl stop nodeapps -n <node_name>

To shut down CRS daemons on each node, enter the following command as root:
$CRS_HOME/bin/crsctl stop crs

If the oprocd is running, then as root stop the oprocd:
$CRS_HOME/bin/oprocd stop

8.4.4. CRS home 不共享方式停应用:

To shut down the RDBMS instance, enter the following command:
% $ORACLE_HOME/bin/srvctl stop instance -d dbname -i <instance_name>

To shut down ASM instances, enter the following command:
% $ORACLE_HOME/bin/srvctl stop asm -n <node_name>

To shut down nodeapps, enter the following command:

% $ORACLE_HOME/bin/srvctl stop nodeapps -n <node_name>

To shut down CRS daemons, enter the following command as root:

$CRS_HOME/bin/crsctl stop crs

8.4.5. 使用 root 执行 prerootpatch.sh 脚本，解锁保护文件

custom/scripts/prerootpatch.sh -crshome <CRS_HOME> -crsuser <username>

where <username> is the software installer/owner for the CRS home.

8.4.6. 执行 prepatch.sh 脚本，备份重要信息

Run the following script (on only one node if the CRS home is shared, but on each node if the CRS home is not shared) as the CRS software installer/owner to save important configuration settings:

% custom/scripts/prepatch.sh -crshome <CRS_HOME>

Note: The RDBMS portion can only be applied to an RDBMS home that has been upgraded to 10.2.0.5.2.

Also, If the CRS Version and RDBMS version are the same, enter the following command as the RDBMS software owner:

% custom/server/9952245/custom/scripts/prepatch.sh -dbhome <RDBMS_HOME>

8.4.7. 回退安装补丁

Enter the following commands (on only one node if the CRS home is shared, but on each node if the CRS home is not shared) to roll back the patch on all homes:

% opatch rollback -id 9952245 -local -oh <CRS_HOME>

% opatch rollback -id 9952245 -local -oh <RDBMS_HOME>

8.4.8. 重新配置 CRS HOME

Configure the CRS home, because after the opatch command finishes, some configuration settings need to be applied to the patched files. As the Oracle Clusterware (CRS) software owner, enter the following command (on only one node if the CRS home is shared, but on each node if the CRS home is not shared):

% custom/scripts/postpatch.sh -crshome <CRS_HOME>

Note: This step can be applied only to an RDBMS home that has been upgraded to 10.2.0.5.2. For more information, see My Oracle Support Note 363254.1 Applying one-off Oracle Clusterware patches in a mixed version home environment.

8.4.9. 重新配置 RDBMS HOME

Configure the RDBMS home, because after the opatch command finishes, some configuration settings need to be applied to the patched files. As the Oracle Database software owner, enter the following command (on only one node if the RDBMS home is shared, but on each node if the CRS home is not shared):

% custom/server/9952245/custom/scripts/postpatch.sh -dbhome <RDBMS_HOME>

8.4.10. 重启 CRS 核心进程

Restore security settings to the CRS home and restart the CRS daemons by running the following script (on all nodes) as root:

% custom/scripts/postrootpatch.sh -crshome <CRS_HOME>

If the CRS home is shared, run this script on each node, one node at a time. Do not run this script in parallel on two or more nodes.

Do not run this script in any other context than as part of the patching process.

8.4.11. 检查 CRS 和 Database 版本

You can determine whether the patch has been successfully rolled back by entering the following commands:

As the Oracle Clusterware (CRS) software owner:

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% opatch lsinventory -detail -oh <CRS_HOME>

As the RDBMS (Oracle Database) server owner:

% opatch lsinventory -detail -oh <RDBMS_HOME>

These commands should list the components for the list of nodes.

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9. CPU/SPU 补丁安装

9.1. 了解 Oracle Critical Patch Update

Critical Patch Update(以下简称 CPU)，是 Oracle 在 2005 年开始引入的产品安全更新策略。一般来说 CPU 包含了 Oracle 产品安全漏洞的修复补丁集(set of security bug fix)。

通常 CPU 补丁会在每季度开始第一个月的 15 号发布，按照发布日期的不同可以划分为：

- January ： CPU JAN
- April ： CPU APR
- July ： CPU JUL
- October ： CPU OCT

存在以下 3 种类型的 CPU 补丁：

- Normal CPU：在 10.2.0.2 之前所有的 CPU 均是 Normal CPU
- Molecular CPU：Molecular 解释为分子，从 10.2.0.3 开始以后版本的 CPU patches 均以 Molecular 格式发布，之后我们会介绍 Normal/Molecular 格式的区别
- CPU Bundle Patch：由于在 Windows 平台无法利用替换共享库文件后 relink 的方式来更新 Oracle binary，所以 Oracle 特别针对 Windows 发布区别于 Unix 上 Normal/Molecular CPU 的 CPU Bundle patch(也因此 Bundle Patch 会别较大)。

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10. Oracle 补丁集的补丁号 Patch ID/Number 速查

10.1. 数据库建议补丁 (文档 ID 756671.1)

https://support.oracle.com/epmos/faces/ui/km/SearchDocDisplay.jspx?_afrLoop=981000245817454&recommended=true&type=DOCUMENT&id=756671.1&_afrWindowMode=0&_adf.ctrl-state=26ma9d39h_481

10.1.1. 10.2.0.4 Current Recommended Patches

Patch Set Updates

Document	Description	Rolling RAC
Note:16619897.8	10.2.0.4.17 (Jul 2013) Database Patch Set Update (PSU) Overlay [limited platforms]	Yes
Note:9352164.8	10.2.0.4.4 (Apr 2010) Database Patch Set Update (PSU)	Yes

CRS

Document	Description	Rolling RAC
Note:9294403.8	10.2.0.4.4 CRS Patch Set Update (CRS PSU)	Yes

10.1.2. 10.2.0.5 Current Recommended Patches

Patch Set Updates

Document	Description	Rolling RAC
Note:16619894.8	10.2.0.5.12 (Jul 2013) Database Patch Set Update (PSU)	Yes

CRS

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Document	Description	Rolling RAC
Note:9952245.8	10.2.0.5.2 CRS Patch Set Update (CRS PSU)	Yes

10. 1. 3. **11.2.0.3 Current Recommended Patches**

Patch Set Updates

Document	Description	Rolling RAC
Note:16619892.8	11.2.0.3.7 (Jul 2013) Database Patch Set Update (PSU)	Yes

Grid Infrastructure

Document	Description	Rolling RAC
Note:16742216.8	11.2.0.3.7 (Jul 2013) Grid Infrastructure Patch Set Update (GI PSU)	Yes

10. 2. **PSU, CPU 补丁速查 (文档 ID 1454618.1)**

https://support.oracle.com/epmos/faces/ui/km/SearchDocDisplay.jspx?_afrLoop=980998
784313004&recommended=true&type=DOCUMENT&id=854428.1&_afrWindowMode=0
&_adf.ctrl-state=26ma9d39h_460

10. 2. 1. **11.2.0.3**

11.2.0.3					
Description	PSU	SPU(CPU)	GI PSU	Bundle	Bundle

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				Patch (Windows64 bit)	Patch(Windows 32bit)
JUL2013	16619892 (11.2.0.3.7)	16742095	16742216 (11.2.0.3.7)	16803775	16803774
APR2013	16056266 (11.2.0.3.6)	16294378	16083653 (11.2.0.3.6)	16345834	16345833
JAN2013	14727310 (11.2.0.3.5)	14841409	14727347 (11.2.0.3.5)	16042648	16042647
OCT2012	14275605 (11.2.0.3.4)	14390252	14275572 (11.2.0.3.4)	14613223	14613222
JUL2012	13923374 (11.2.0.3.3)	14038787	13919095 (11.2.0.3.3)	14223718	14223717
APR2012	13696216 (11.2.0.3.2)	13632717	13696251 (11.2.0.3.2)	13885389	13885388
JAN2012	13343438 (11.2.0.3.1)	13466801	13348650 (11.2.0.3.1)	13413168	13413167

10.2.2. **10.2.0.5**

10.2.0.5					
Description	PSU	SPU(CPU)	Bundle Patch (Windows64 bit)	Bundle Patch (Windows32 bit)	Bundle Patch(Windows Itanium)
abJUL2013	16619894 (10.2.0.5.12)	16742123	16803782	16803780	16803781
bAPR2013	16056270	16270946	16345857	16345855	16345856

	(10.2.0.5.11)			
bJAN2013	14727319 (10.2.0.5.10)	14841459	15848062	15848060	15848061
bOCT2012	14275629 (10.2.0.5.9)	14390396	14553358	14553356	14553357
bJUL2012	13923855 (10.2.0.5.8)	14038805	14134053	14134051	14134052
bAPR2012	13632743 (10.2.0.5.7)	13632738	13654815	13654814	13870404
JAN2012	13343471 (10.2.0.5.6)	13343467	b13460968	b13460967	N/A
bOCT2011	12827745 (10.2.0.5.5)	12828105	c12914913	12914911	N/A
JUL2011	12419392 (10.2.0.5.4)	12419258	12429524	12429523	N/A
APR2011	11724962 (10.2.0.5.3)	11725006	12328269	12328268	N/A
JAN2011	10248542 (10.2.0.5.2)	10249537	10352673	10352672	N/A
OCT2010	9952230 (10.2.0.5.1)	9952270	10099855	10058290	N/A

10. 2. 3. 10.2.0.4

10.2.0.4					
Description	PSU	SPU(CPU)	Bundle Patch	Bundle Patch	Bundle Patch(Windows

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			(Windows32 bit)	(Windows64 bit)	Itanium)
bgJUL2013	16619897 (10.2.0.4.17)	16742253	N/A	N/A	N/A
bgAPR2013	16056269 (10.2.0.4.16)	16270931	N/A	N/A	N/A
bgJAN2013	14736542 (10.2.0.4.15)	14841471	N/A	N/A	N/A
bgOCT2012	14275630 (10.2.0.4.14)	14390410	N/A	N/A	N/A
bgJUL2012	13923851 (10.2.0.4.13)	14038814	N/A	N/A	N/A
abAPR2012	12879933 (10.2.0.4.12)	12879926	13928775	13928776	N/A
JAN2012	12879929 (10.2.0.4.11)	12879912	b13654060	N/A	N/A
bOCT2011	12827778 (10.2.0.4.10)	12828112	12914908	12914910	12914909
JUL2011	12419397 (10.2.0.4.9)	12419249	12429519	12429521	12429520
APR2011	11724977 (10.2.0.4.8)	11725015	12328501	12328503	12328502
JAN2011	10248636 (10.2.0.4.7)	10249540	10349197	10349200	10349198
OCT2010	9952234 (10.2.0.4.6)	9952272	10084980	10084982	10084981
JUL2010	9654991	9655017	9777076	9777078	9777077

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	(10.2.0.4.5)				
APR2010	9352164 (10.2.0.4.4)	9352191	9393548	9393550	9393549
JAN2010	9119284 (10.2.0.4.3)	9119226	9169457	9169460	9169458
OCT2009	8833280 (10.2.0.4.2)	8836308	8880857	8880861	8880858
JUL2009	8576156 (10.2.0.4.1)	8534387	8559466	8559467	8541782
APR2009	N/A	8290506	8307237	8307238	8333678
JAN2009	N/A	7592346	7584866	7584867	N/A
OCT2008	N/A	7375644	7386320	7386321	N/A
JUL2008	N/A	7150470	7218676	7218677	N/A

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11. Oracle 9i/10g/11g 升级线路图

11.1. 升级到 9.2
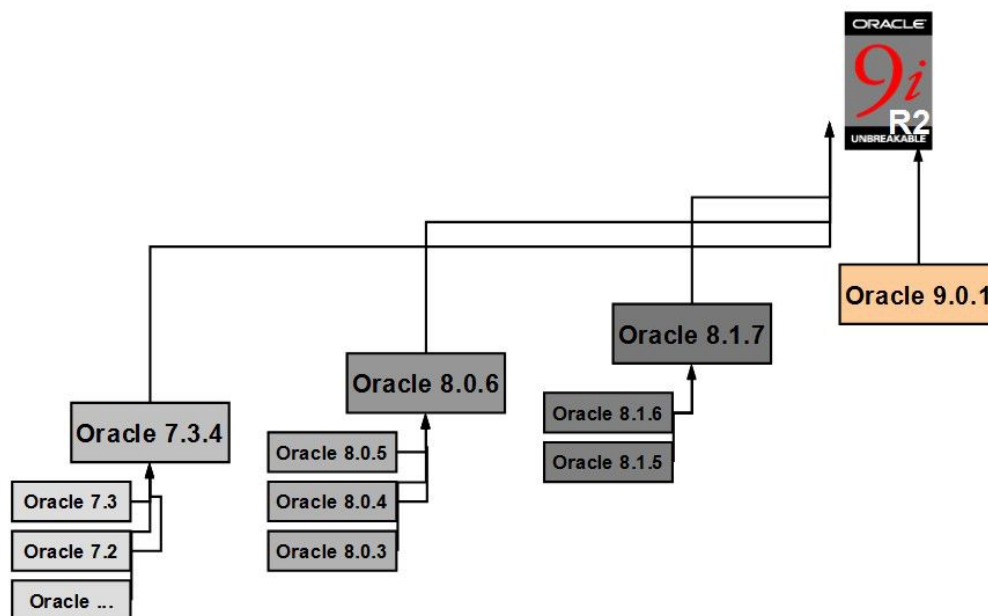
11.2. 升级到 10.2

Upgrade to Oracle Database 10g Release 2
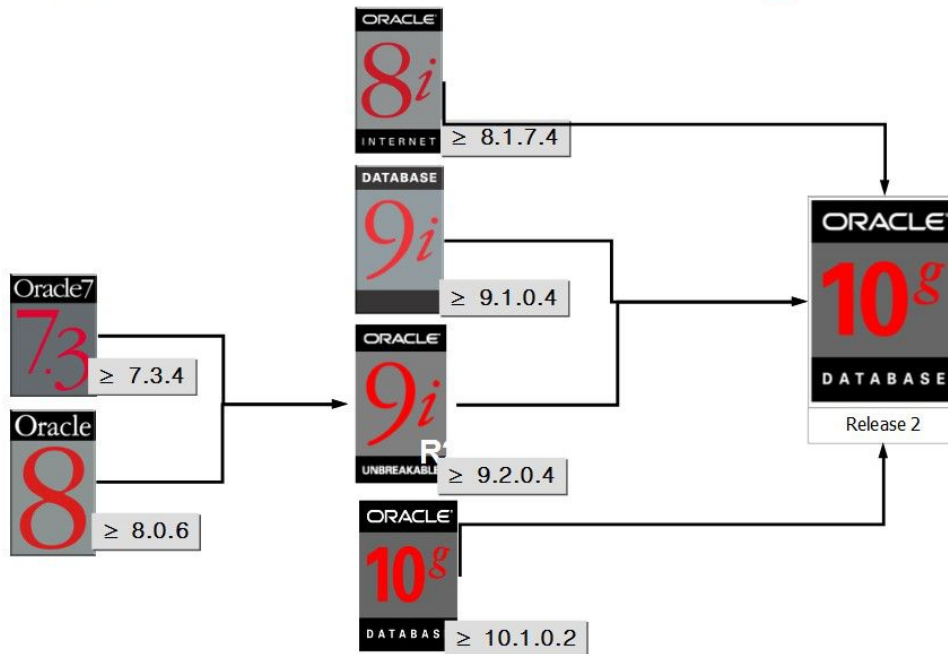
11. 3. 升级到 11.2

Upgrade to Oracle Database 11g

"Empty" arrows mean: no specific patch release required
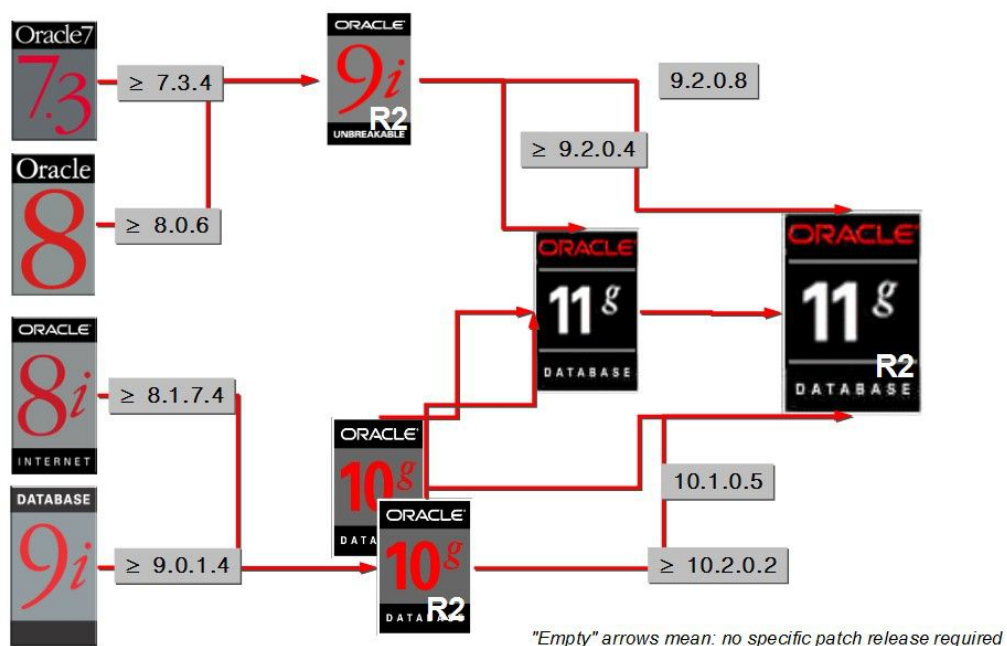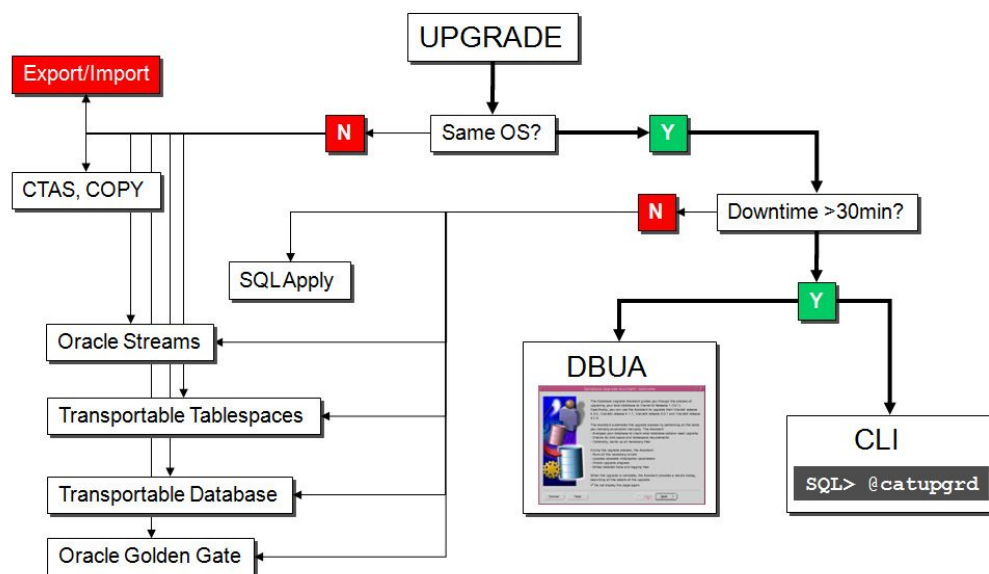
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11.4. 升级方式

Upgrade Alternatives

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11.5. 数据库支持信息
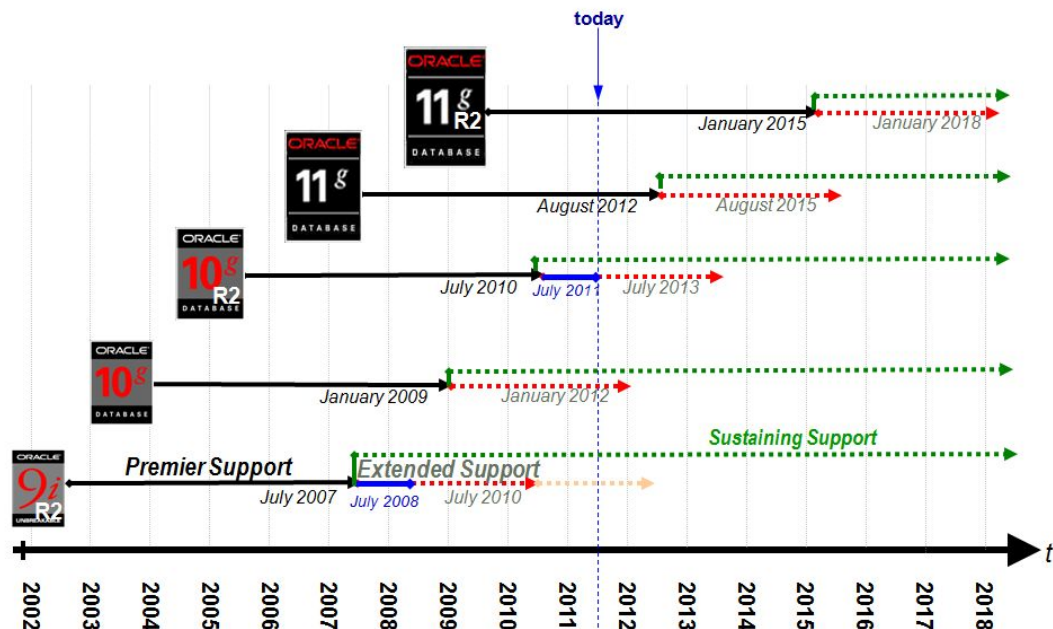
Feature	Premier Support	Extended Support	Sustaining Support
Major Product and Technology Releases	✓	✓	✓
Technical Support	✓	✓	✓
Access to Knowledge Base (MetaLink/Customer Connection/SupportWeb)	✓	✓	✓
Updates, Fixes, Security Alerts and Critical Patch Updates	✓	✓	Pre-existing Only
Tax, Legal and Regulatory Updates	✓	✓	No
Upgrade Scripts	✓	✓	No
Certification with existing Third Party Products/Versions	✓	✓	No
Certification with New Third Party Products/Versions	✓	No	No
Certification with new Oracle Products	✓	✓	No

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12. 常见问题

12. 1. OPatch failed with error code 73

OPatch Failed To Locate The Central Inventory - Error Code 73 (Corrupted OraInst.loc)
(Doc ID 433424.1)

12. 1. 1. Applies to:

 Oracle Server - Enterprise Edition - Version 10.2.0.3 and later
Information in this document applies to any platform.
Checked for relevance on 16-Jul-2012

12. 1. 2. Symptoms

The command "opatch lsinventory" fails with error code 73:

% opatch lsinventory
 Invoking OPatch 10.2.0.3.0

 Oracle interim Patch Installer version 10.2.0.3.0
 Copyright (c) 2005, Oracle Corporation. All rights reserved..

 Oracle Home : /opt/oracle/product/10.2.0
 Central Inventory : /opt/oracle/oraInventory_10.2.0
 from : /var/opt/oracle/oraInst.loc
 OPatch version : 10.2.0.3.0
 OUI version : 10.2.0.3.0
 OUI location : /opt/oracle/product/10.2.0/oui
 Log file location :
/opt/oracle/product/10.2.0/cfgtoollogs/opatch/opatch2007-05-24_10-28-16AM.log

 OPatch failed to locate Central Inventory.
 Possible causes are:
 The Central Inventory is corrupted
 The oraInst.loc file specified is not valid.

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LsInventorySession failed: OracleHomeInventory::createInventoryObj() gets a null OiicStandardInventorySession object

OPatch failed with error code 73

12.1.3. **Cause**

The oraInst.loc in the ORACLE_HOME is correct:

```
% cat $ORACLE_HOME/oraInst.loc
inst_group=dba
inventory_loc=/opt/oracle/oraInventory_10.2.0
```

but the /var/opt/oracle/oraInst.loc has the two lines in the wrong order:

% cat /var/opt/oracle/oraInst.loc

```
inventory_loc=/opt/oracle/oraInventory_10.2.0
inst_group=dba
```

12.1.4. 文件不一致的解决

To resolve the problem, copy $ORACLE_HOME/oraInst.loc to /var/opt/oracle/oraInst.loc

12.1.5. 重建 **oraInventory**

实际上，可能 oraInst.loc 文件不存在，或者内容信息和实际数据库不一致，这种情况下，需要备份好现在的 oraInventory 目录，然后通过修复的方式来恢复 oraInventory 信息。

$ cd $ORACLE_HOME/oui/bin

$ ./runInstaller -silent -ignoreSysPrereqs -attachHome
ORACLE_HOME="<Oracle_Home_Location>" ORACLE_HOME_NAME="<Name_Of
_Oracle_Home>"

10.2.0.3 以后版本

$./attachHome.sh

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官方参考问:

Steps To Recreate Central Inventory(oraInventory) In RDBMS Homes (文档 ID 556834.1)

12.2. 出现库文件被占用或进程在运行状态

12.2.1. 故障现象

Following executables are active :
/oracle/product/10.2.0/db_1/bin/oracle

12.2.2. 通过 fuser 命令解决

通过 fuser 命令解决:

[oracle@ora10g 9352164]$ fuser /oracle/product/10.2.0/db_1/bin/oracle

/oracle/product/10.2.0/db_1/bin/oracle: 2855e 2857e 2859e 2861e 2863e 2865e 2867e 2869e 2871e 2873e 2875e 2877e 2881e 2889e 2891e

[oracle@ora10g 9352164]$ ps -ef | grep 2855

oracle   2855   1   0 22:38 ?   00:00:00 ora_pmon_sky

杀掉进程，即可释放资源。

12.2.3. 通过 lsof 命令解决

lsof 在 Linux 平台比较常用，但是 AIX，HP 等平台也提供该命令。

[oracle@ora10g 9352164]$ /usr/sbin/lsof | grep "/oracle/product/10.2.0/db_1/bin/oracle"

oracle   2855   oracle   txt   REG   252,0 112704643 2557428 /oracle/product/10.2.0/db_1/bin/oracle

oracle   2857   oracle   txt   REG   252,0 112704643 2557428 /oracle/product/10.2.0/db_1/bin/oracle

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oracle 2859 oracle txt REG 252,0 112704643 2557428
/oracle/product/10.2.0/db_1/bin/oracle

oracle 2861 oracle txt REG 252,0 112704643 2557428
/oracle/product/10.2.0/db_1/bin/oracle

oracle 2863 oracle txt REG 252,0 112704643 2557428
/oracle/product/10.2.0/db_1/bin/oracle

12.3. 补丁修复后，绿盟扫描仍然不通过

绿盟通过端口扫描的方式，来检查数据库版本等信息。但是无法获取数据库准确的补丁信息。
因此安全补丁安装后，漏洞扫描仍然不通过。