

ORACLE

Oracle Fleet Patching and Provisioning 23ai

Technical Presentation

Philippe Fierens

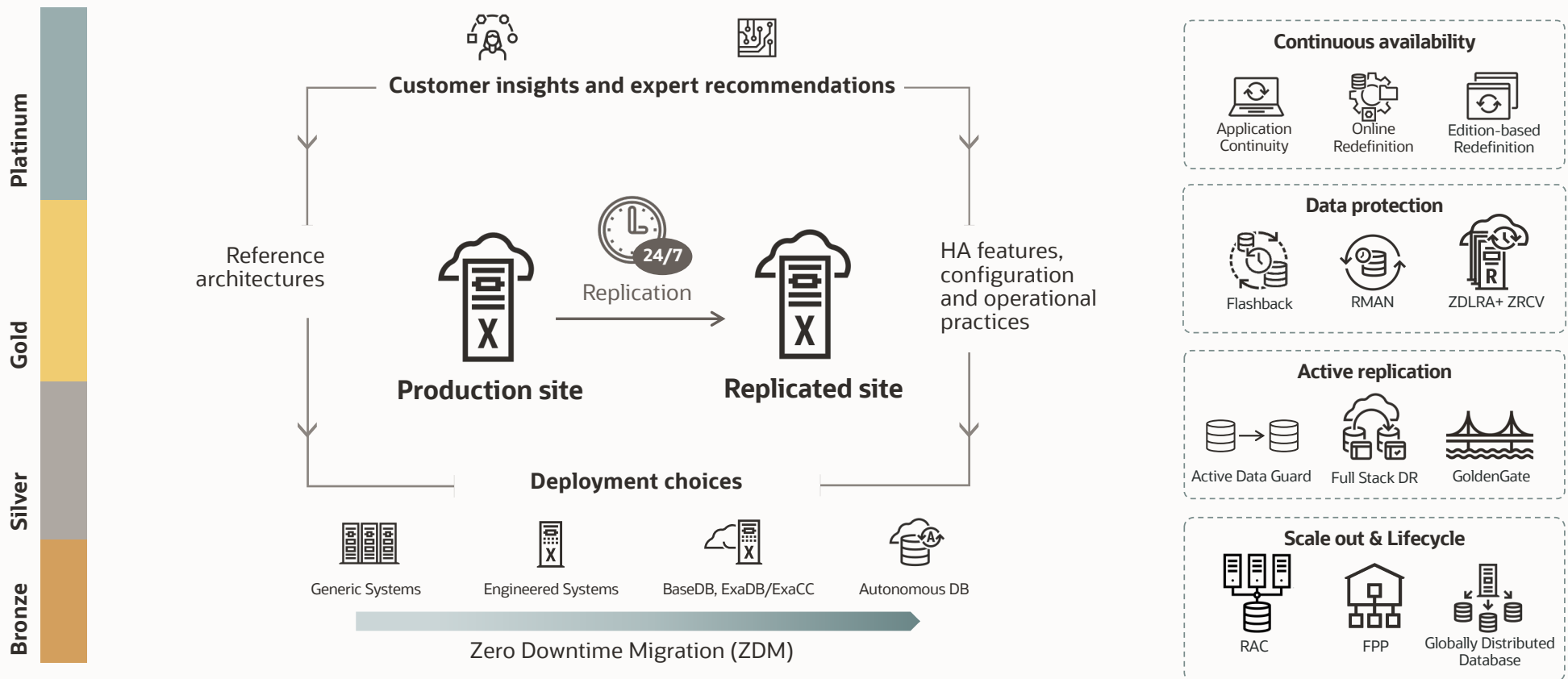
Product Manager / FPP / Exadata MAA / Exadata Fleet Update

Oracle Database High Availability (HA),
Scalability and Maximum Availability Architecture (MAA)







Oracle Maximum Availability Architecture (MAA)

Standardized Reference Architectures for Never-Down Deployments



MAA reference architectures

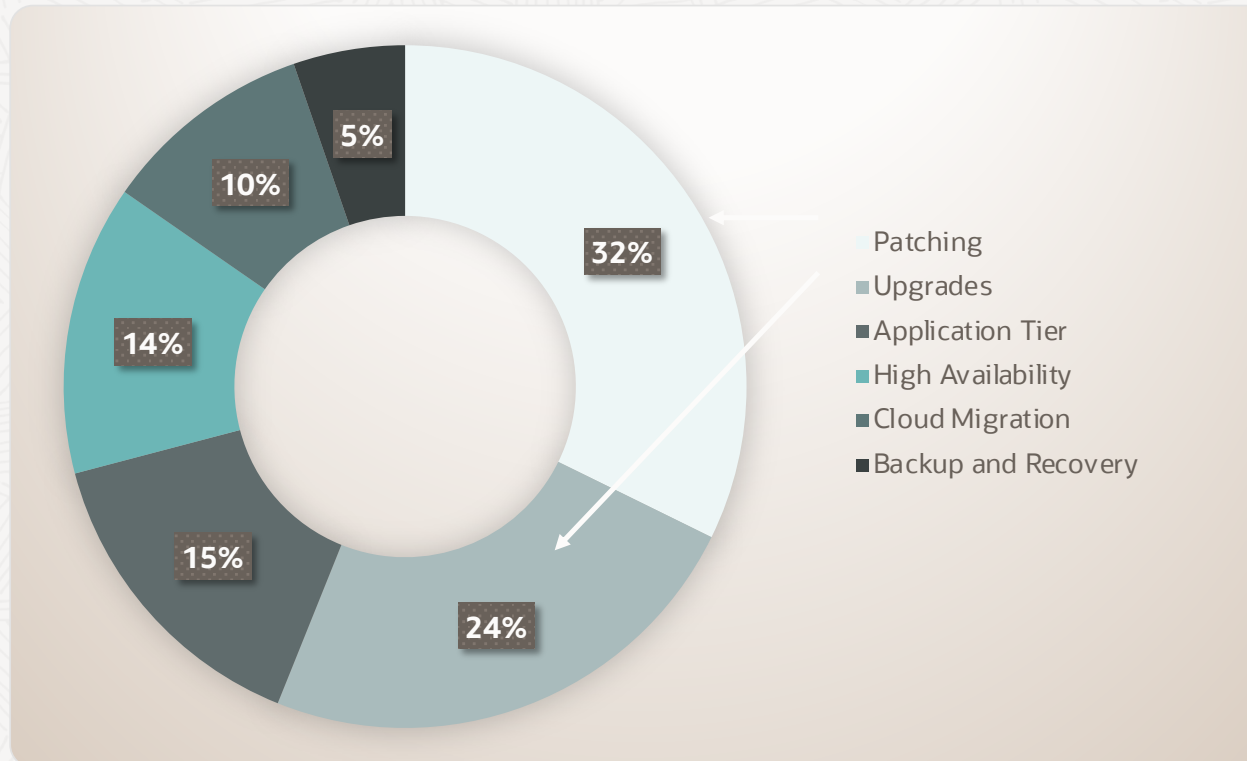
Availability service levels

Bronze	Silver	Gold	Platinum
Dev, test, prod	Prod/departmental	Business critical	Mission critical
	Bronze +	Silver +	Gold +
Single instance DB Restartable Backup/restore	Database HA with RAC Application continuity	DB replication with Active Data Guard	GoldenGate Edition-Based Redefinition
			

All tiers exist with on-premises and cloud. However, platinum currently must be configured manually while bronze to gold are covered with cloud tool automation for the most part depending on the desired RTO (i.e. FSFO and multiple standby databases still must be manually configured for example)



Planned Maintenance – a major pain point*



*Maximum Availability Architecture (MAA) Customer Summit survey results

Lifecycle management challenges

Top lifecycle management challenges



Keeping up with updates is time-consuming

Quarterly & Monthly patches are released to reduce risk of :

- Security issues
- Functional issues



Maintenance windows are difficult to obtain from application owners

Non-rolling patching requires longer downtime windows



Patching is a complex and labor intensive activity

Expanding fleets need more personnel to maintain



Keeping software releases standardized is difficult

Configuration drift can lead to unexpected results and avoidable downtime

Fleet Patching and Provisioning

Automating out-of-place patching of the Oracle Database and Exadata Stack

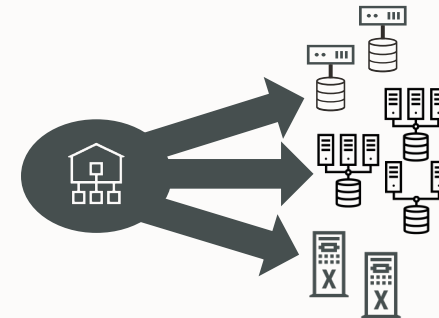
FPP Flavours

FPP Local Mode



Start small
DB and GI patching in local cluster
Zero configuration needed
Custom user scripts are possible
Resumable actions

FPP

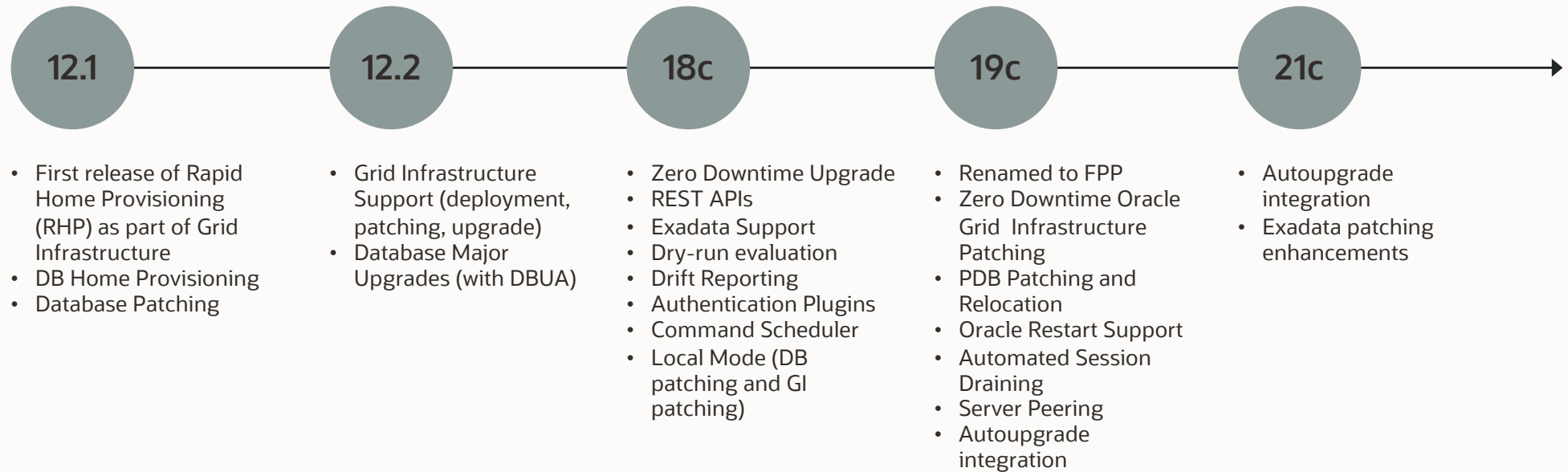


Complete Lifecycle Management
Full functionality
Rich feature set
Centralized Management
Centralized Image repository

Some history

A brief History of Fleet Patching and Provisioning

Pioneers in Gold Image based Patching



New In
23^{ai}

What's New in Oracle FPP 23ai

Oracle Fleet Patching & Provisioning **23^{ai}**

Exadata Full Stack Patching enhancements

Full standby Database Maintenance Automation

Support for RAC Two Stage Rolling Updates

Backup restore and relocation FPP server

Store images as zip files

Move pre and post check enhancements (CVU, Exachk, Datapatch)

Transfer working copies as ZIP files

Scheduler improvements

Archiving & unarchiving of gold images

Local mode without Java Container

Single Server Rolling Database Maintenance

Register home as working copy

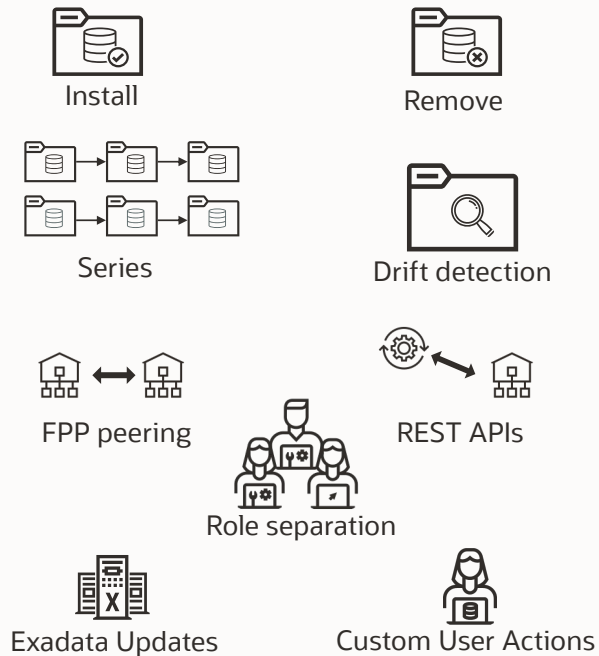
Add tags to resources for easy filtering and scheduling



Overview

Central mode Fleet Patching and Provisioning – Benefits

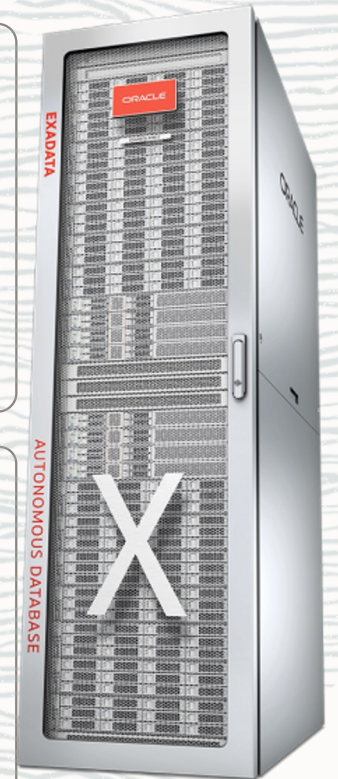
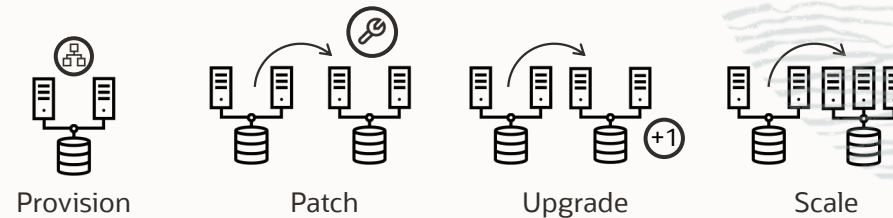
Rich feature set



Oracle Database (SI, RAC, RACONE)



Oracle Grid Infrastructure



Fleet patching and provisioning support

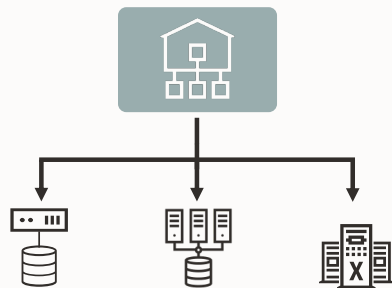
Database, GoldenGate and grid infrastructure



- Single instance
- Oracle restart
- Oracle RAC one
- Oracle RAC



FPP server



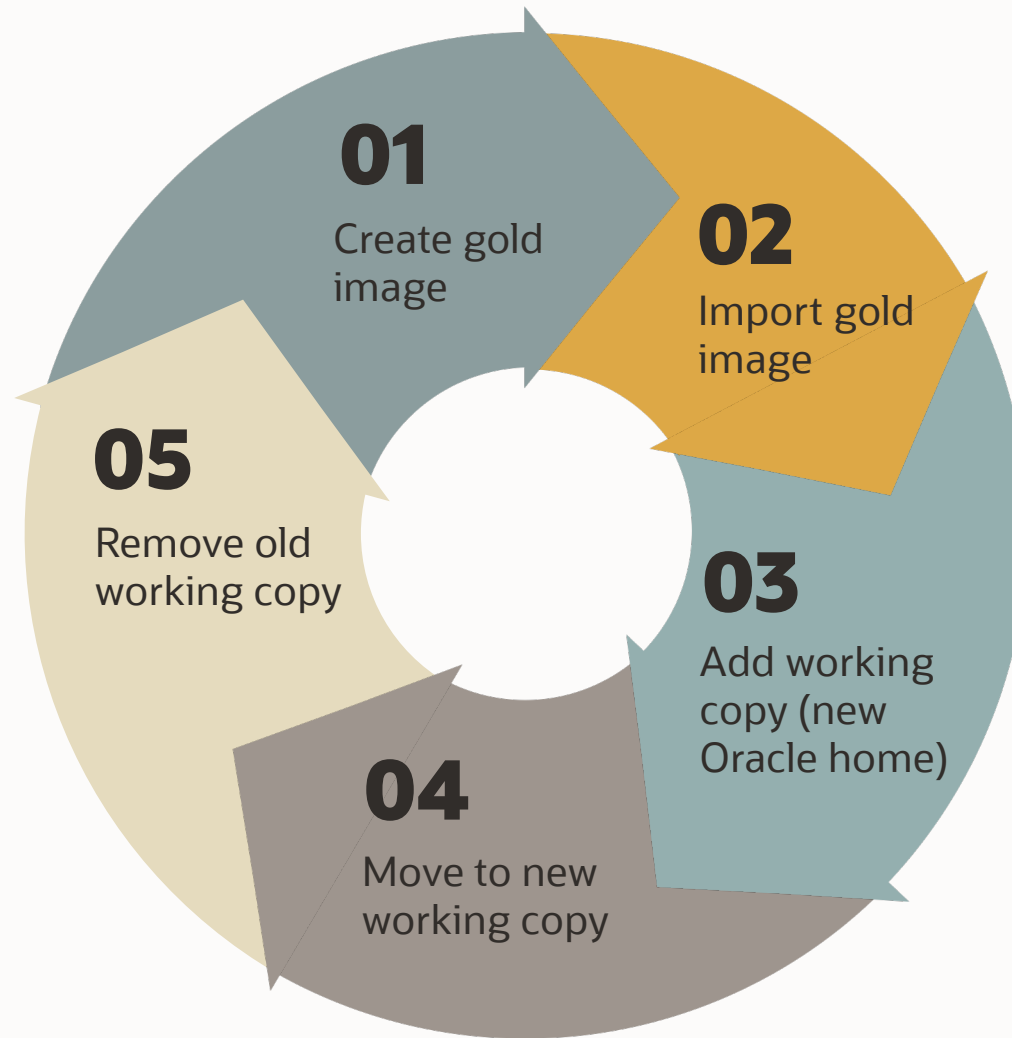
- Generic Software
- Customizable

Multi-OS



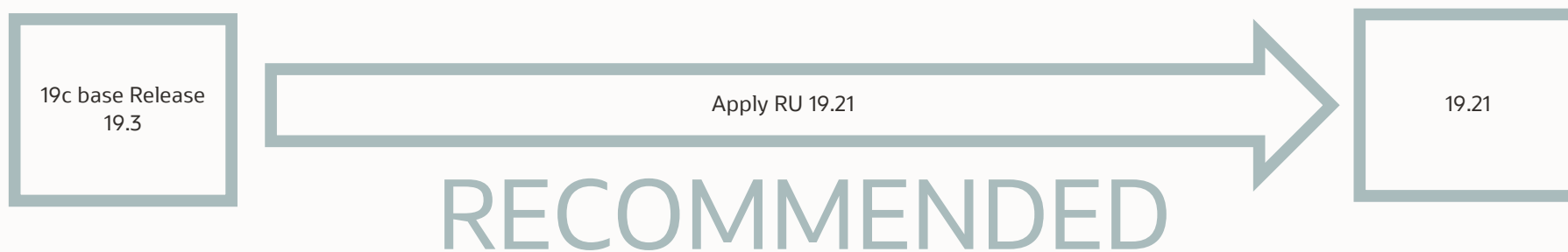
Workflow and Methodology

Workflow

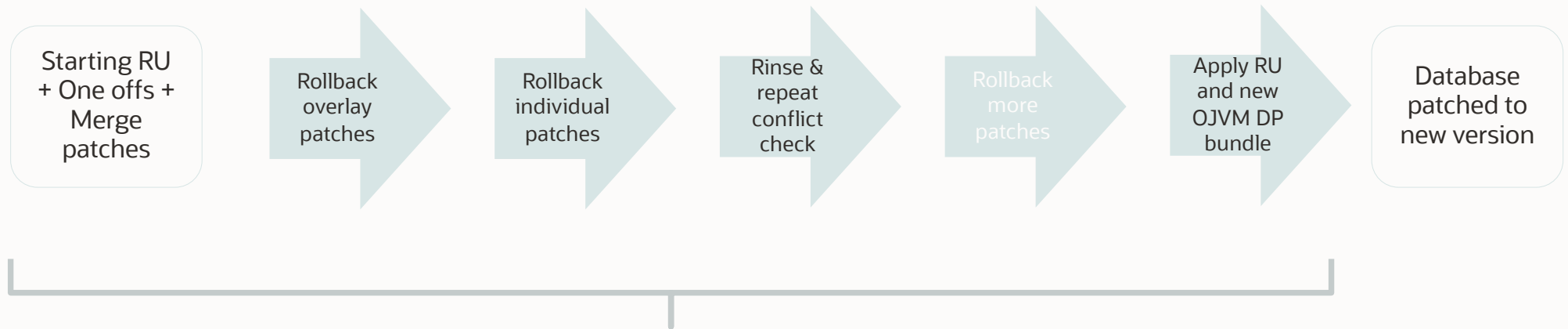


Recommended strategy for gold image creation

Example creating a gold image for 19.16



In-place patching

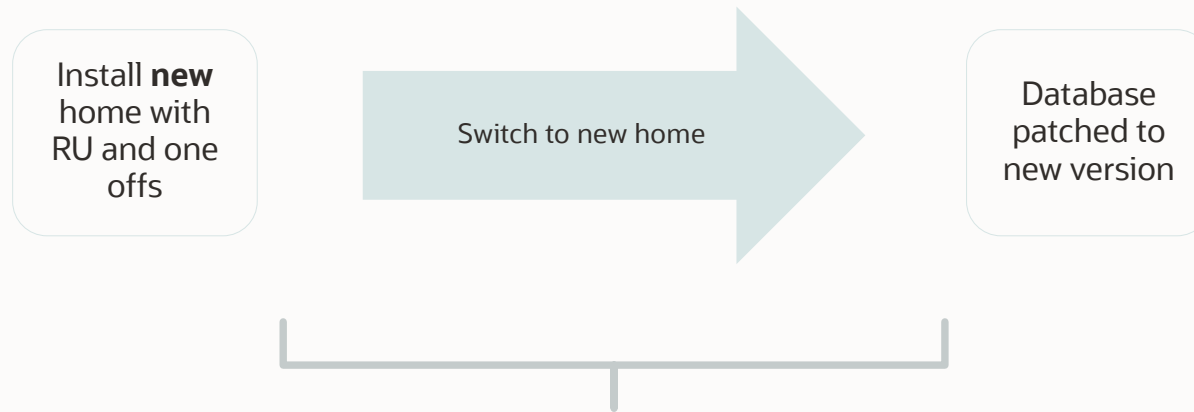


Database instance down during rollback and instance stop/start and datapatch apply

Example from <https://mikedietchde.com/2024/01/10/the-downsides-of-in-place-patching-and-a-patching-lab/>



Out-of-place patching



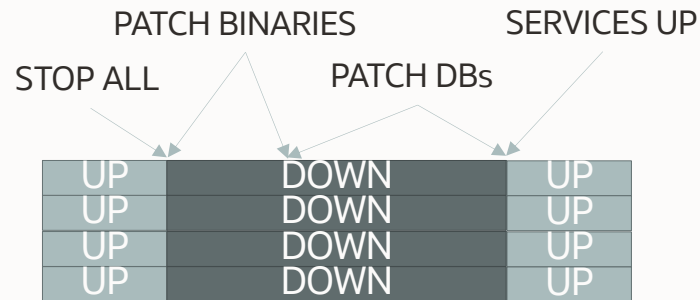
Database instance down for instance reboot and datapatch execution



FPP uses out-of-place patching

Leading the way to standardization and rolling patching

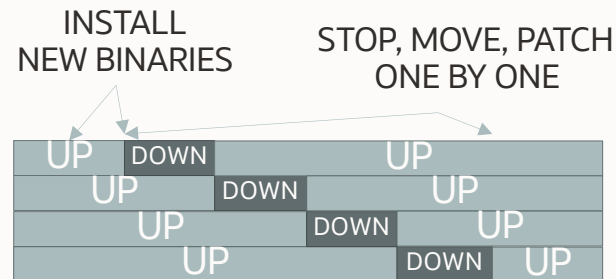
In-place patching:



- No easy rollback
- Long downtime
- Complex process
- Error prone
- Standards not enforced

Out-of-place patching:

ORACLE RECOMMENDED



- Easy rollback
- Shorter downtime
- **Build binaries once** and use everywhere
- Easier Planning
- Built-in standardization

How to get gold images

19c

Create yourself check :

<https://blogs.oracle.com/maa/post/fpp-by-example-part-3-creating-gold-images>

Create MOS ticket and ask support to create

Check MOS note :

Creating Gold Image for Oracle Database and Grid Infrastructure Installations (Doc ID 2915366.2)

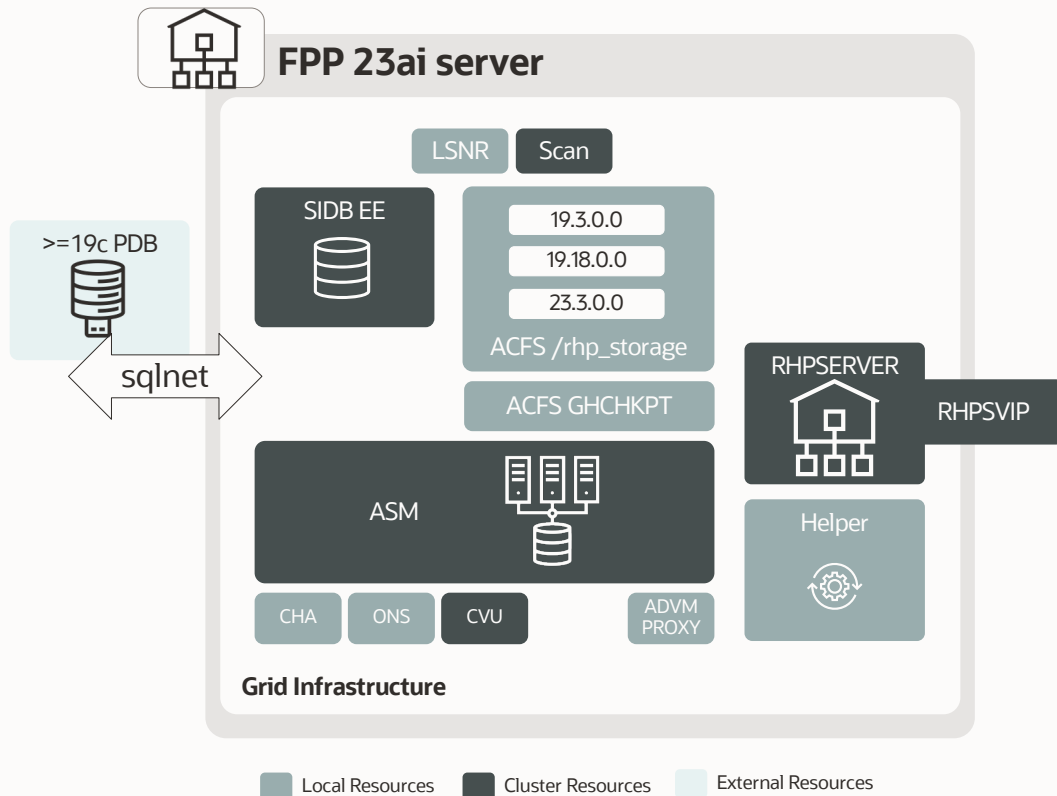
23ai

RUs are distributed as Full versions including OJVM, TZ and JDK / PERL



Architecture and concepts

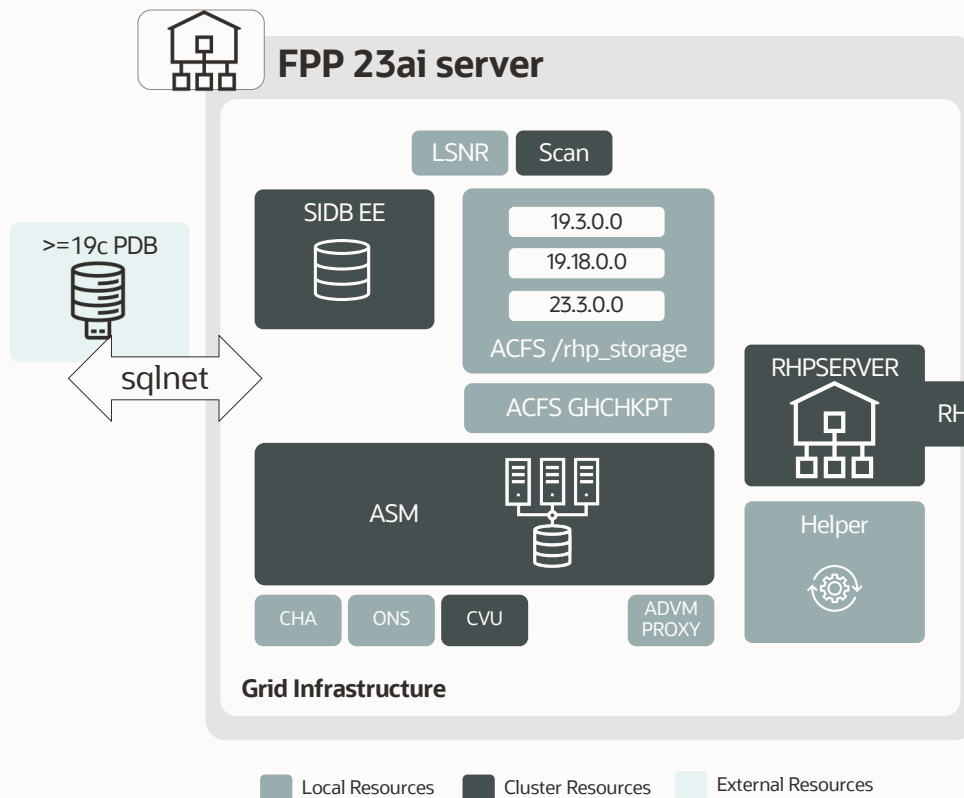
FPP server architecture 23ai



- Server installed, ready to host Grid Infrastructure
Required firewall ports are open between FPP server and targets
- As from 23ai metadata can be stored in :
 - Single Instance Oracle EE database (Limited license included)
 - Oracle Database of choice RAC (One)
- Remove the local automaton
`srvctl remove rhpserver -f`
- Create the Oracle EE Single Instance Database
\$GRID_HOME/crs/install/reposcript.sh
-db_home=database_home -mode="Install"
-diskgroup=disk_group_name
- Configure and start the RHPSERVER (as root)
`srvctl add rhpserver -storage /rhp_storage`
-diskgroup data -rhpsvip_address xxx.xxx.xxx.xxx
-dbType FPPDB
`srvctl start rhpserver`
- Start working with RHPCTL
`rhpctl import image -image DB233_Base \`
-zip /tmp/LINUX.X64_233000_db_home.zip \
-imagetype ORACLEDBSOFTWARE



FPP server architecture 23ai

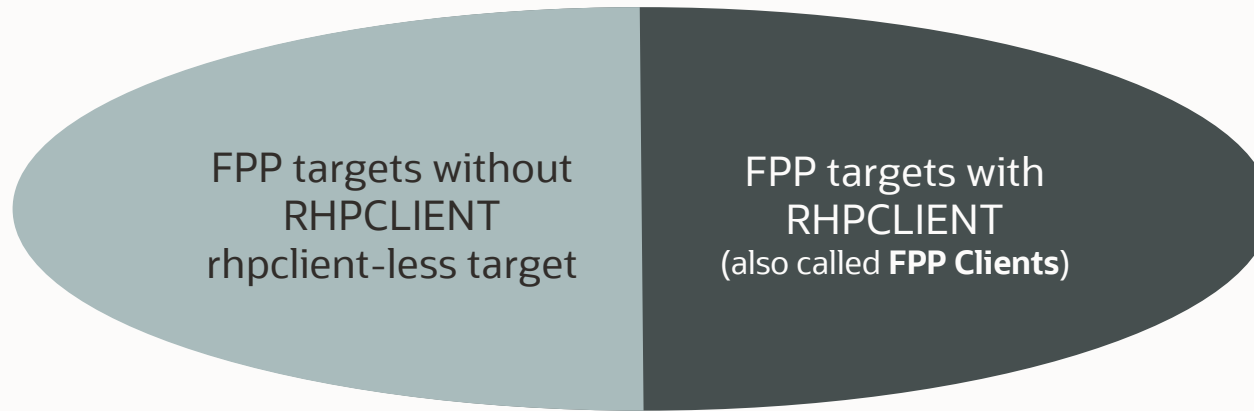


- The **RHPVIP** is needed by RHPCLIENT clusters, it acts as APP VIP for the RHPSERVER with a floating IP address. It simplifies networking firewall flows.
- The **RHPSERVER** orchestrates the tasks, invoking external processes and services. It listens to ports TCP 8894 (HTTPS) and TCP 8896 (JMX RMI) runs in a Micronoid container
- The **HELPER** is present on all FPP Servers and Clients nodes and executes local tasks under the supervision of the RHPSERVER
- FPP uses the GHSUSER23 schema in **Oracle EE single instance DB or External Oracle Database** to store the metadata of everything related to FPP. (Working Copies, Images, Credentials, Audit...)
- The **GHCHKPT** is used to persist the status of tasks so that a restart can pick up from that point.
- The **/rhp_storage/image** mount point contains the ACFS file systems that host copies and snapshots of images and working copies



Target Types

FPP TARGETS



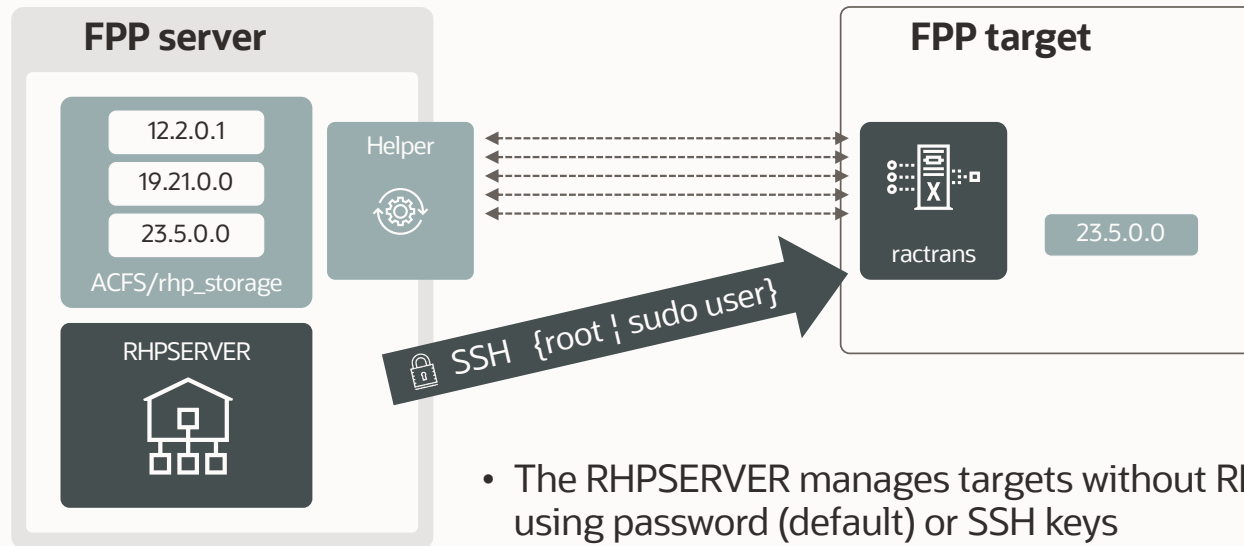
- **GI 12.1 or non-GI target deployments**
- Operations initiated from FPP server only
- Connection via remote SSH commands

- **Grid Infrastructure Clusters release 12.2+**
- Operations initiated from FPP server or client
- Connection via JMX and local processes
- Supports some additional capabilities compared to non-RHPC targets



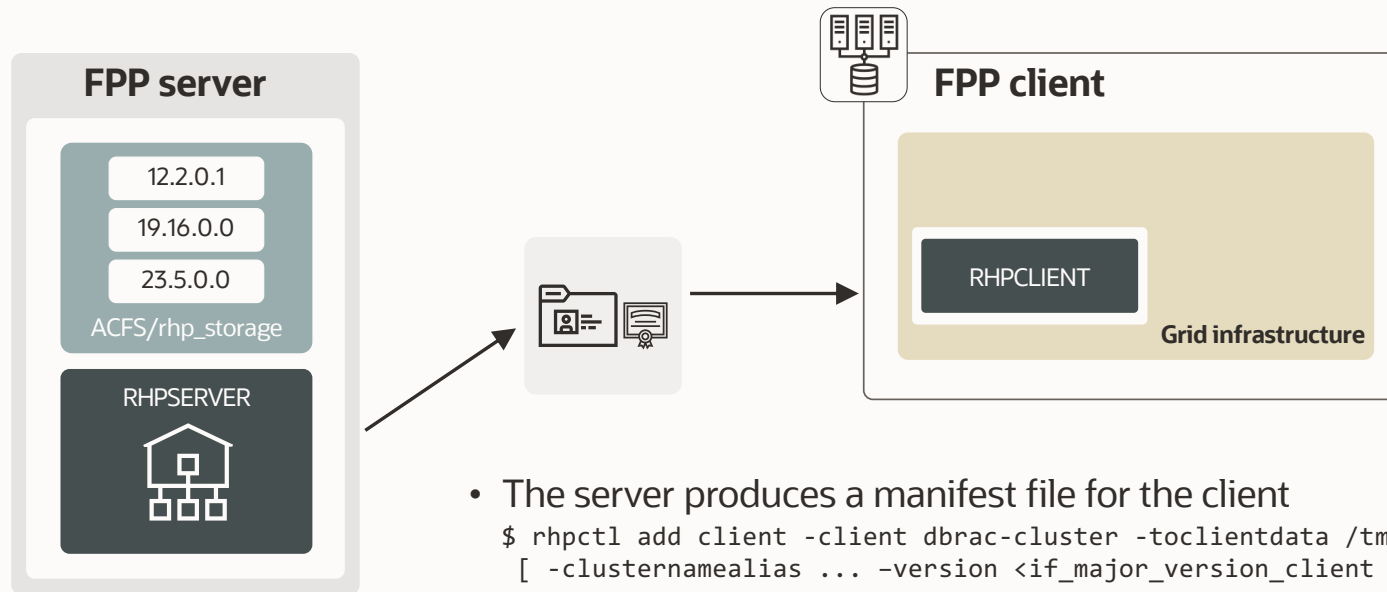
Getting started

FPP targets without RHPCLIENT



- The RHPSERVER manages targets without RHPCLIENT through SSH using password (default) or SSH keys
- Named credentials are stored in the FPP Server OCR
- Working copies are transferred to the target using «ractrans»
`$ rhpctl add workingcopy -image ... -path ... -workingcopy ... -targetnode ... -root`
- The progress is tracked thanks to a listener on the FPP Server.

Adding FPP clients

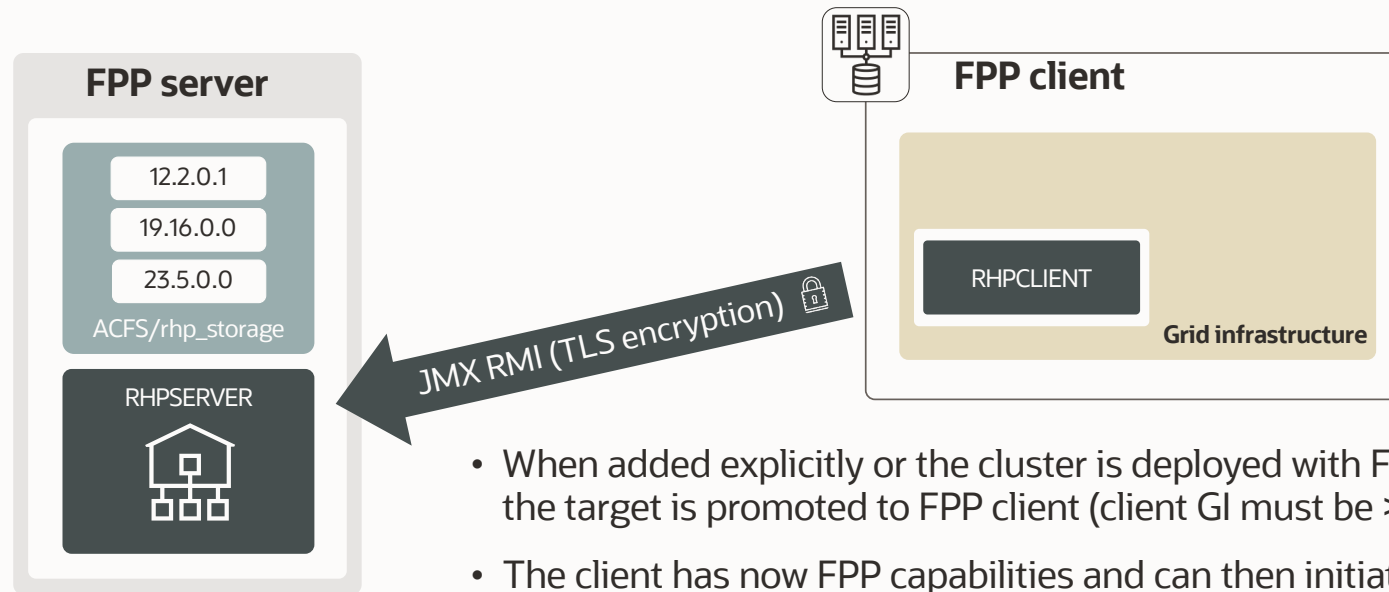


- The server produces a manifest file for the client
- It must be copied on the client, which uses it to connect to the server (as root)

```
$ rhpctl add client -client dbrac-cluster -toclientdata /tmp  
[ -clusternamealias ... -version <if_major_version_client < major_version server>]
```

```
# svcctl add rhpclient -clientdata /tmp/dbrac-cluster-cluster.xml  
$ svcctl start rhpclient  
$ rhpctl query server  
Rapid Home Provisioning Server (RHPS): fpps01  
Storage base path: /rhp_storage  
Disk Groups: DATA  
Port number: 8896
```

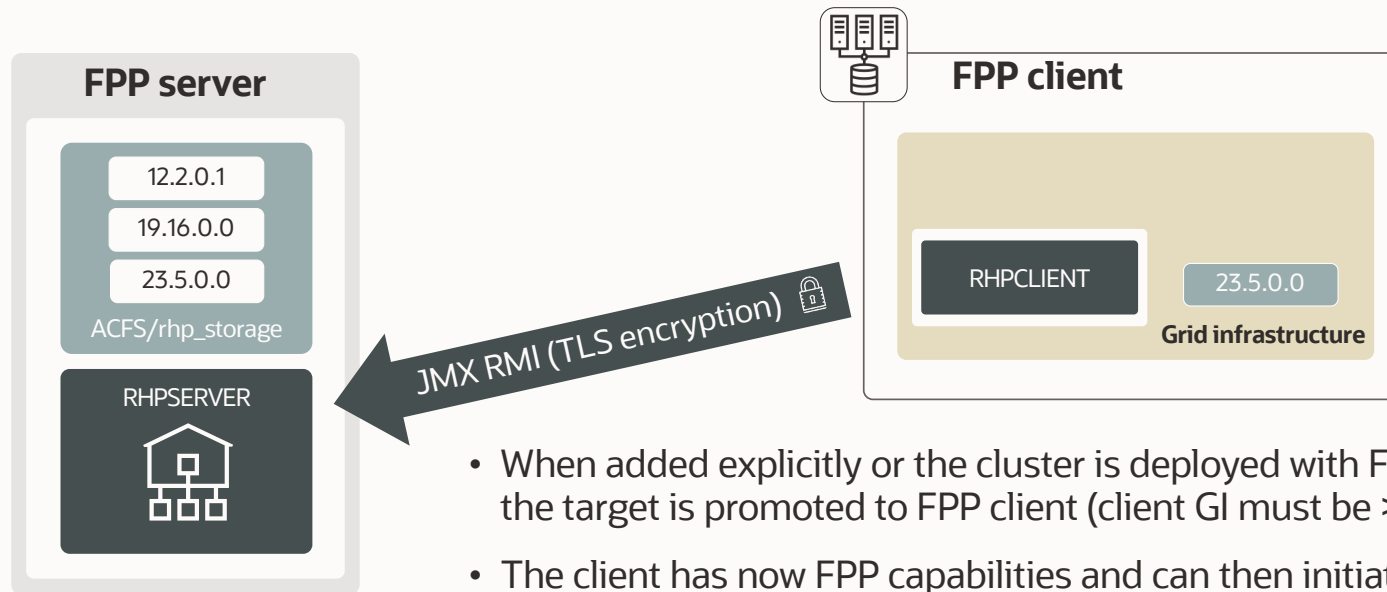
FPP clients



- When added explicitly or the cluster is deployed with FPP, the target is promoted to FPP client (client GI must be ≥ 12.2)
- The client has now FPP capabilities and can then initiate its own operations
- FPP client and server can communicate through TLS encrypted JMX:RMI. SSH is not needed anymore, root credentials or sudo also not needed.
- file transfer via "rctrans".

```
rhctl add workingcopy -image ... -path ... -workingcopy ... -client ...
```

FPP clients



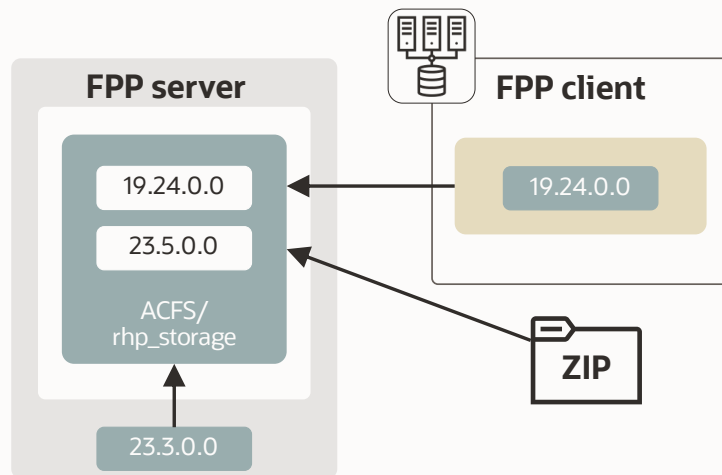
- When added explicitly or the cluster is deployed with FPP, the target is promoted to FPP client (client GI must be ≥ 12.2)
- The client has now FPP capabilities and can then initiate its own operations
- FPP client and server can communicate through TLS encrypted JMX:RMI. SSH is not needed anymore, root credentials or sudo also not needed.
- file transfer via "rctrans".

```
rhctl add workingcopy -image ... -path ... -workingcopy ... -client ...
```



Importing images

rhpcctl import image



- From zip file
- From existing unmanaged home (local or remote)

- Recommended to :
 - 1) Import on the FPP server itself, using local home or zip
 - 2) Start from base release 19.3 (for 19c) then apply RU's and one offs

Check <https://blogs.oracle.com/maa/post/fpp-by-example-part-3-creating-gold-images>

In 23ai RUs are always full versions
Custom images with one-offs on a specific RU can be asked via MOS

Creating Gold Image for Oracle Database and Grid Infrastructure Installations (Doc ID 2915366.2)

Importing images - Example

```
rhpcctl import image -image gi_19_24_0 -path /u01/app/19.0.0.0/grid -imagetype ORACLEGISOFTWARE
fpps01.pub.fpplivelab.oraclevcn.com: Audit ID: 4
fpps01.pub.fpplivelab.oraclevcn.com: Creating a new ACFS file system for image " gi_19_24_0" ...
fpps01.pub.fpplivelab.oraclevcn.com: Copying files...
fpps01.pub.fpplivelab.oraclevcn.com: Copying home contents...
fpps01.pub.fpplivelab.oraclevcn.com: Changing the home ownership to user grid...
fpps01.pub.fpplivelab.oraclevcn.com: Changing the home ownership to user grid...
```

```
rhpcctl import image -image db_19_24_0 -path /u01/app/oracle/product/19.0.0.0/dbhome_1
fpps01.pub.fpplivelab.oraclevcn.com: Audit ID: 5
fpps01.pub.fpplivelab.oraclevcn.com: Creating a new ACFS file system for image " db_19_24_0" ...
fpps01.pub.fpplivelab.oraclevcn.com: Copying files...
fpps01.pub.fpplivelab.oraclevcn.com: Copying home contents...
fpps01.pub.fpplivelab.oraclevcn.com: Changing the home ownership to user oracle...
fpps01.pub.fpplivelab.oraclevcn.com: Changing the home ownership to user grid...
```


Querying images - Example

```
rhpcctl query image -image gi_19_24_0
fpp19c-c11.sub01171652351.lab.oraclevcn.com: Audit ID: 1775
Image name: GI_1924_0
Owner: grid@dbSysmzylwmqq
Site: dbSysmzylwmqq
Access control: USER:grid@dbSysmzylwmqq
Access control: ROLE:OTHER
Access control: ROLE:GH_IMG_PUBLISH
Access control: ROLE:GH_IMG_ADMIN
Access control: ROLE:GH_IMG_VISIBILITY
Parent Image:
Software home path: /rhp/images/iGI_1924_0612605/.ACFS/snaps/iGI_1924_0/swhome
Image state: PUBLISHED
Image size: 11248 Megabytes
Image Type: ORACLEGISOFTWARE
Image Version: 19.0.0.0.0:19.24.0.0.0
Groups configured in the image:
OSDBA=oinstall,OSASM=oinstall,OSBACKUP=oinstall,OSDG=oinstall,OSKM=oinstall,OSRAC=oinstall
Image platform: Linux_AMD64
Interim patches installed: 34697081,36414915,36538667,36758186,36648174,36590554,36587798,36582781
Contains a non-rolling patch: FALSE
Complete: TRUE
```



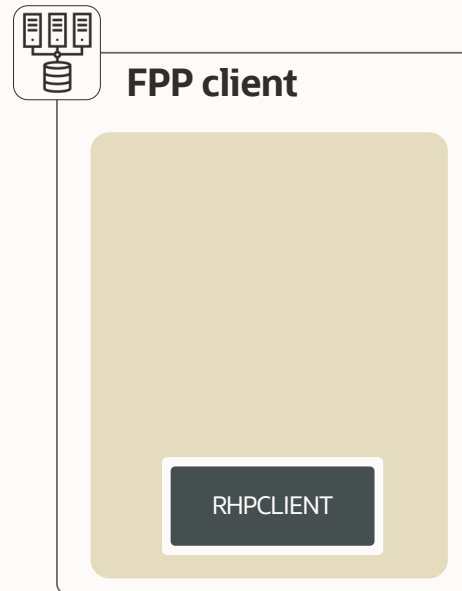
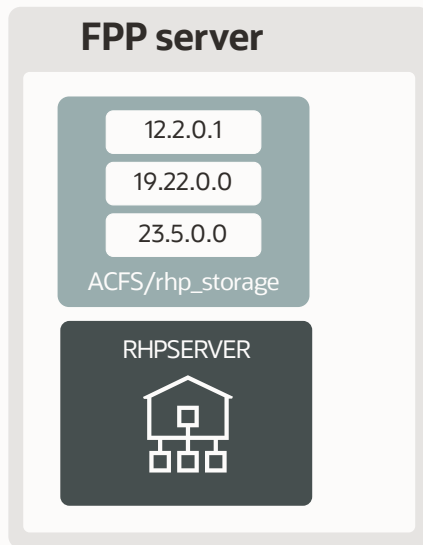
Gold image storage on the FPP server

```
df -h /rhp/images/iGI_1924_0612605/.ACFS/snaps/iGI_1924_0/swhome
Filesystem                Size  Used Avail Use% Mounted on
/dev/asm/ghvol1277286-41  24G   14G   11G   57% /rhp/images/iGI_1924_0612605

acfsutil snap info /rhp/images/iGI_1924_0612605
snapshot name:             iGI_1924_0
snapshot location:        /rhp/images/iGI_1924_0612605/.ACFS/snaps/iGI_1924_0
RO snapshot or RW snapshot: RO
parent name:              /rhp/images/iGI_1924_0612605
snapshot creation time:   Mon Aug 12 12:03:18 2024
file entry table allocation: 168165376 ( 160.38 MB )
storage added to snapshot: 168165376 ( 160.38 MB )
```

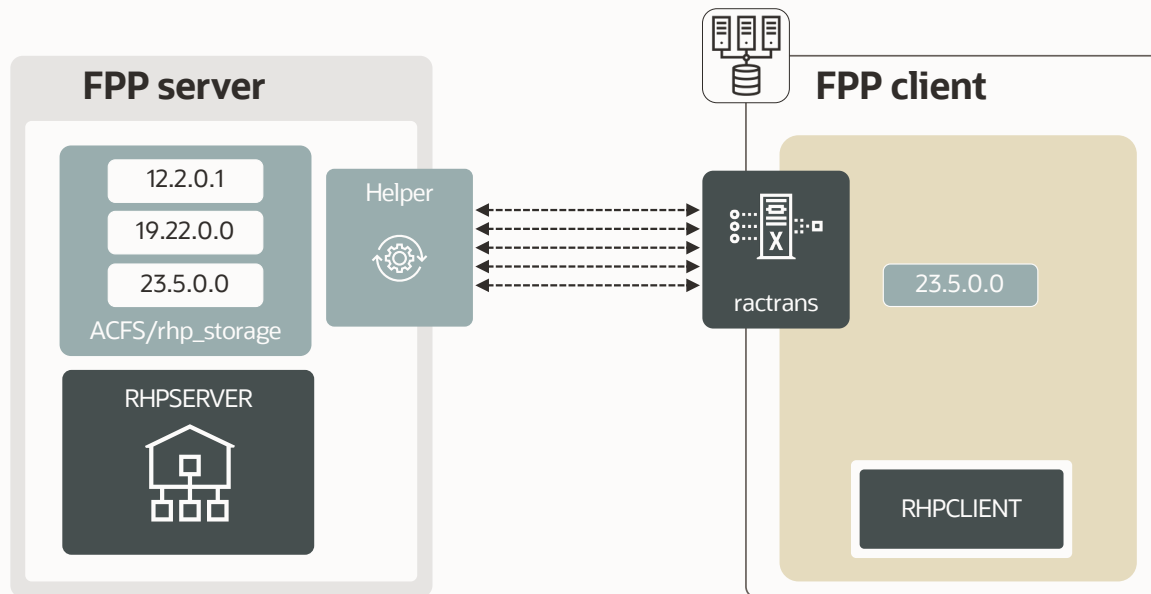
Patching and Provisioning

Adding workingcopies with LOCAL storagetype



- Filesystem existence and size are not managed by FPP
- The Oracle Home will be on a local filesystem (must provision on all cluster nodes)
- Whether client (JMX) or not (SSH), the transfer is done via ractrans.
- Minimum 6 ports needed, configurable with:
`srvctl modify rhpserver - port_range <range>`

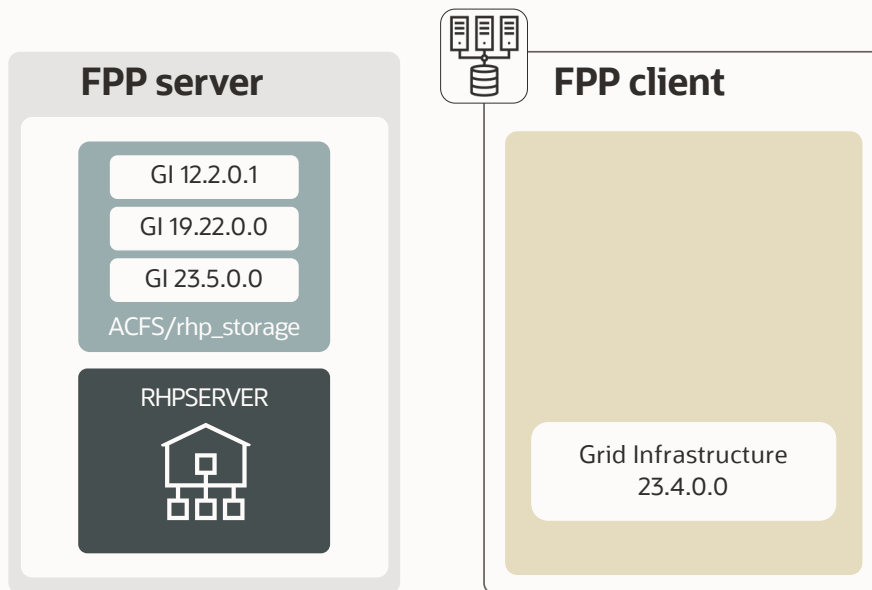
Adding workingcopies with LOCAL storagetype



- Filesystem existence and size are not managed by FPP
- The Oracle Home will be on a local filesystem (must provision on all cluster nodes)
- Whether client (JMX) or not (SSH), the transfer is done via ractrans.
- Minimum 6 ports needed, configurable with:
`srvctl modify rhpserver - port_range <range>`



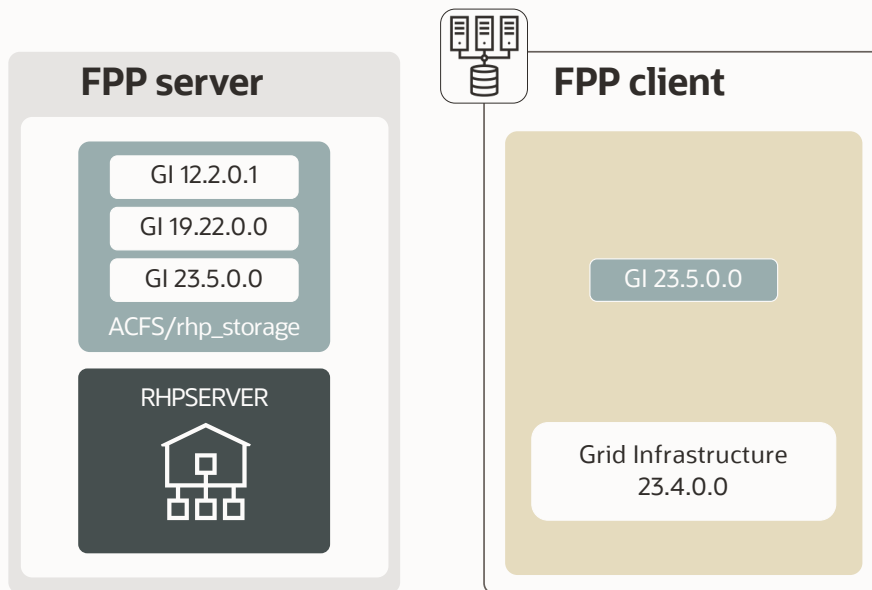
Adding grid infrastructure workingcopy to an existing server/cluster



- GI working copies can only be LOCAL
- GI Software copy works like database software copies
- FPP detects users and groups and assign correct ownership
- A GI stack already exists, the install is «software_only»



Adding grid infrastructure workingcopy to an existing server/cluster

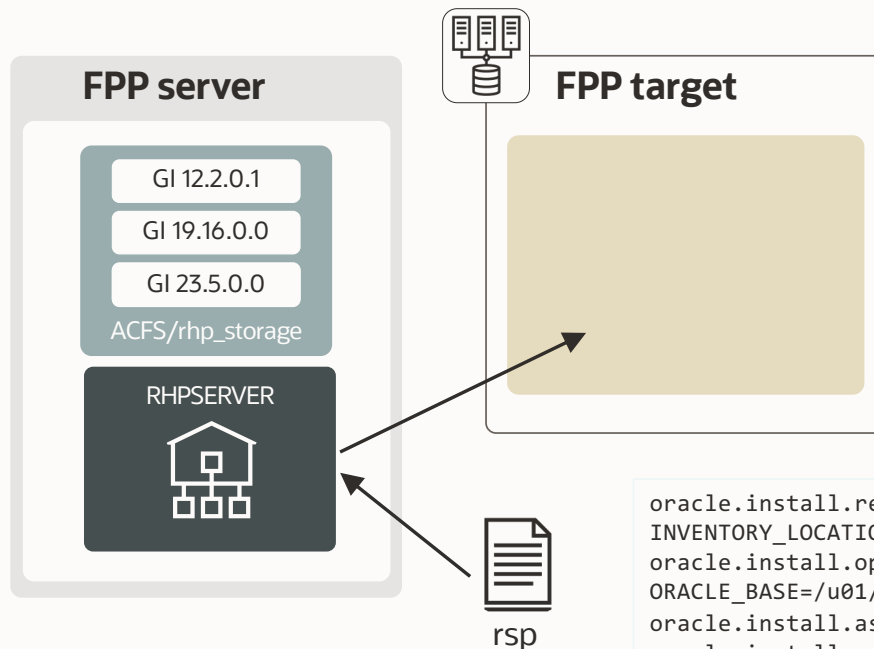


- GI working copies can only be LOCAL
- GI Software copy works like database software copies
- FPP detects users and groups and assign correct ownership
- A GI stack already exists, the install is «software_only»

```
rhctl add workingcopy -workingcopy <workingcopy_name> \
-image <image_name> \
-oraclebase <..> -softwareonly \
-path <..>
```



Adding grid infrastructure workingcopy to a new server/cluster



- A responsfile can be provided to configure the cluster
- GI Software is copied
- FPP takes care of installing and configuring the cluster

```
oracle.install.responseFileVersion=/oracle/install/rspfmt_crsinstall_response_schema_v19.0.0
INVENTORY_LOCATION=/u01/app/oraInventory
oracle.install.option=HA_CONFIG
ORACLE_BASE=/u01/app/grid
oracle.install.asm.OSDBA=dba
oracle.install.asm.OSOPER=oper
oracle.install.asm.OSASM=asmadmin
oracle.install.asm.SYSASMPasswd=WelcomeWelcome##123
oracle.install.asm.diskGroup.name=DATA
oracle.install.asm.diskGroup.redundancy=EXTERNAL
oracle.install.asm.diskGroup.AUSize=4
oracle.install.asm.diskGroup.disks=/dev/oracleasm/asm-disk1
oracle.install.asm.diskGroup.diskDiscoveryString=/dev/oracleasm/*
oracle.install.asm.monitorPassword=WelcomeWelcome##123
```



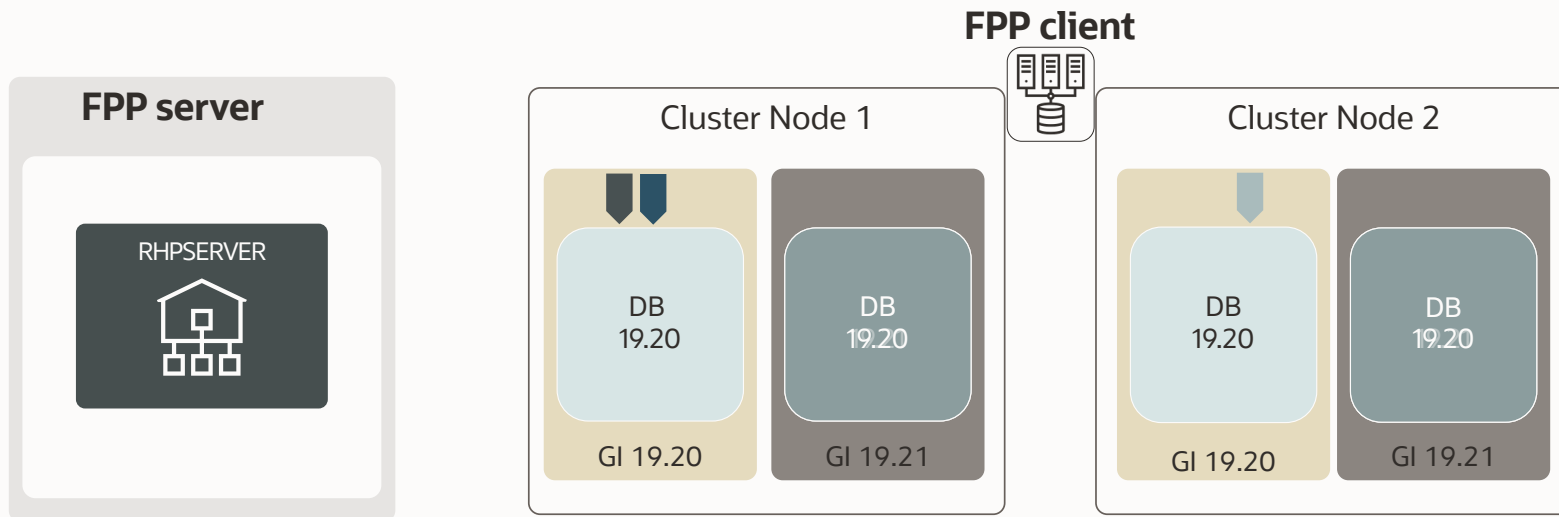
Example: Deployment of an Oracle Restart environment

```
[grid@fpps01 ~]$ rhpctl add workingcopy -workingcopy WC_gi_19_24_0_FPPC -image gi_19_24_0 -responsefile ~/fppc.rsp \  
-path /u01/app/grid/WC_gi_19_24_0_FPPC -user oracle -oraclebase /u01/app/oracle \  
-targetnode fppc -sudouser opc -sudopath /bin/sudo -ignoreprereq  
  
Enter user "opc" password: FPP11##123  
fpps01.pub.fpplivelab.oraclevcn.com: Storing metadata in repository for working copy "WC_gi_19_24_0_FPPC" ...  
fpps01.pub.fpplivelab.oraclevcn.com: Creating snapshot "tmpgi_19_24_0WC_gi_19_24_0_FPPC" ...  
fpps01.pub.fpplivelab.oraclevcn.com: Changing the home ownership to user oracle...  
fpps01.pub.fpplivelab.oraclevcn.com: Copying software contents to Local File System ...  
fpps01.pub.fpplivelab.oraclevcn.com: Changing the home ownership to user oracle...  
[ . . . ]  
fppc: As a root user, execute the following script(s):  
fppc: 1. /u01/app/oraInventory/orainstRoot.sh  
fppc: 2. /u01/app/grid/WC_gi_19_24_0_FPPC/root.sh  
fppc: ..... 100% Done.  
fpps01.pub.fpplivelab.oraclevcn.com: Successfully executed clone operation.  
fpps01.pub.fpplivelab.oraclevcn.com: Executing root script on nodes [fppc].  
fppc: Changing permissions of /u01/app/oraInventory.  
fppc: Adding read,write permissions for group.  
fppc: Removing read,write,execute permissions for world.  
fppc:  
fppc: Changing groupname of /u01/app/oraInventory to oinstall.  
fppc: The execution of the script is complete.  
fpps01.pub.fpplivelab.oraclevcn.com: Successfully executed root script on nodes [fppc].  
fpps01.pub.fpplivelab.oraclevcn.com: Executing configuration script on nodes [fppc]  
fpps01.pub.fpplivelab.oraclevcn.com: Successfully executed configuration script on nodes [fppc]  
fpps01.pub.fpplivelab.oraclevcn.com: Executing root script on nodes [fppc].  
fppc: Check /u01/app/grid/WC_gi_19_24_0_FPPC/install/root_fppc_2021-03-31_13-24-06-546102180.log for the output of root script  
fpps01.pub.fpplivelab.oraclevcn.com: Successfully executed root script on nodes [fppc].  
fpps01.pub.fpplivelab.oraclevcn.com: Executing post configuration script on nodes [fppc]  
fpps01.pub.fpplivelab.oraclevcn.com: Successfully executed post configuration script on nodes fppc]  
fpps01.pub.fpplivelab.oraclevcn.com: Oracle home provisioned.  
fpps01.pub.fpplivelab.oraclevcn.com: Working copy creation completed.
```



Grid patching

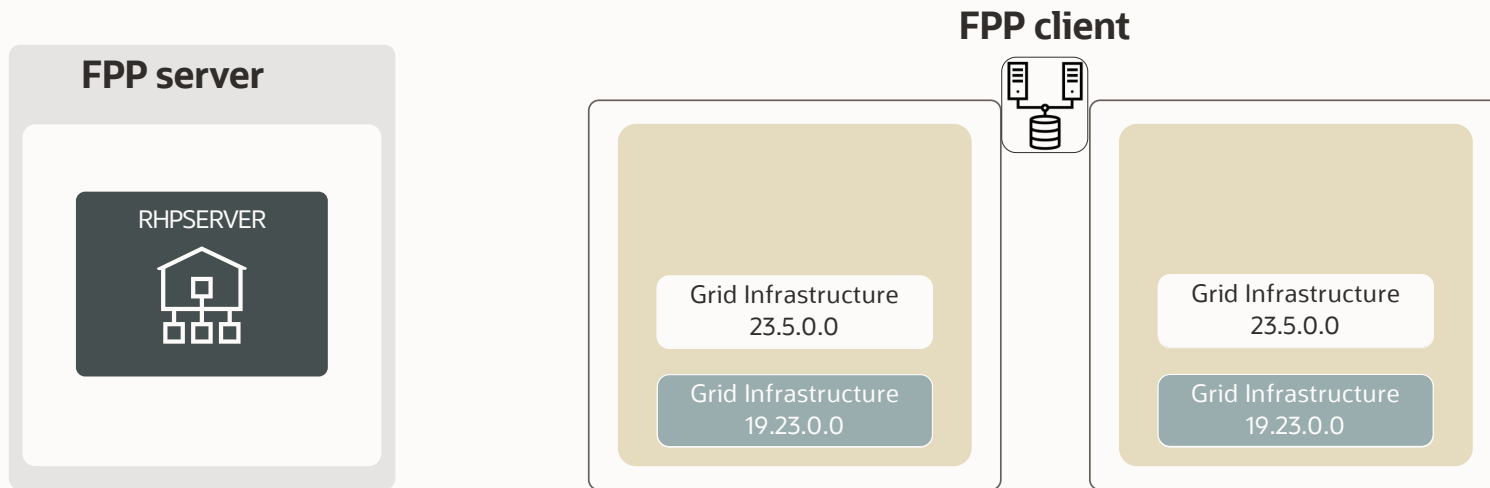
Rolling patching to new grid home



```
rhctl move gihome \  
-destwc WC_gi192000_c11 \  
-sourcewc WC_gi192100_c11 \  
-drain_timeout 600
```

- Rolling by default
- Automated datapatch execution
- Service Drain Timeout honored
- Optionally possible to patch "Vertically" GI + DB in one flow

Grid infrastructure upgrade



```
rhpcctl upgrade gihome \  
-sourcewc WC_gi19230_cl1 \  
-destwc WC_gi23400_cl1
```



Adding workingcopies FPP Client vs rhpclient-less target

FPP Client

Rhpclient-less target

```
rhpctl add workingcopy -image <img_name> -workingcopy <wc_name>  
-oraclebase <oracle_base> -path <oracle_home> -user <oracle_home_user>  
-groups OSDBA=dba,...,OSKM=dba,OSRAC=dba
```

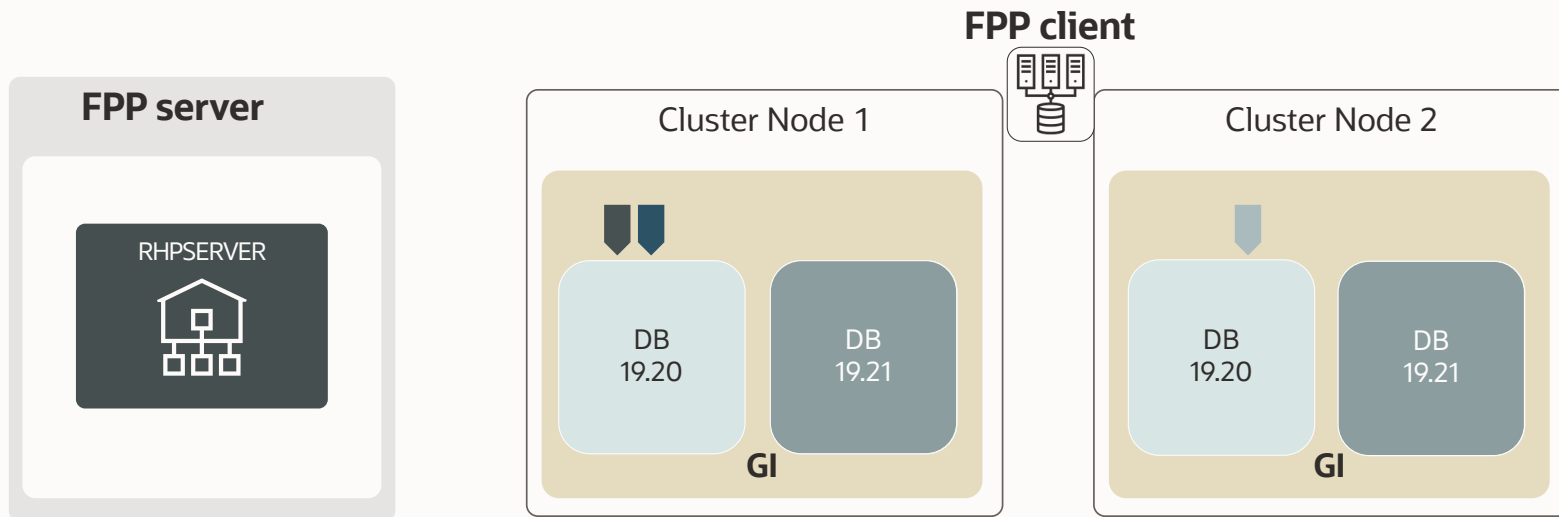
```
-client <client_name>
```

```
-targetnode target  
-root | -cred cred_name | -sudouser  
sudo_username | -auth sshkey  
-arg1 user:ssh_user  
-arg2 identity_file:path_to_identity_file  
-arg3 sudo_location:path_to_sudo_binary
```

Unless the environment is well standardized always specify the groups

Database patching

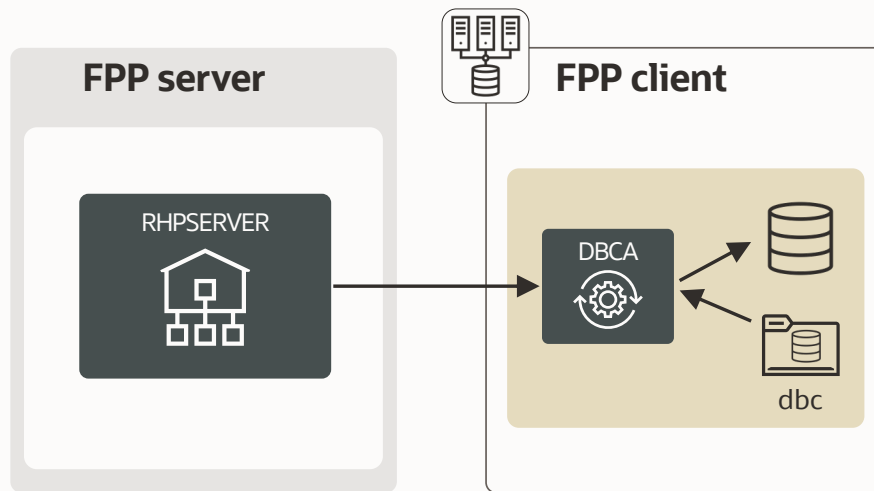
Rolling patching to new database home



```
rhpcctl move database \  
-sourcewc WC_db192000_c11 \  
-patchedwc WC_db192100_c11 \  
-drain_timeout 600
```

- Rolling by default
- Automated datapatch execution
- Service Drain Timeout honored
- Optionally possible to patch "Vertically" GI + DB in one flow

Provisioning databases



- FPP can provision SINGLE Instance, RAC, RACONENODE databases to FPP Clients
- It executes database creation assistant (DBCA)
- Template files must exist either in the Gold Image or locally on the FPP Client

```
rhpcctl add database -workingcopy <workingcopy> \  
-dbname <dbuqname> ... \  
-dbtemplate <template_file>
```

Provisioning databases

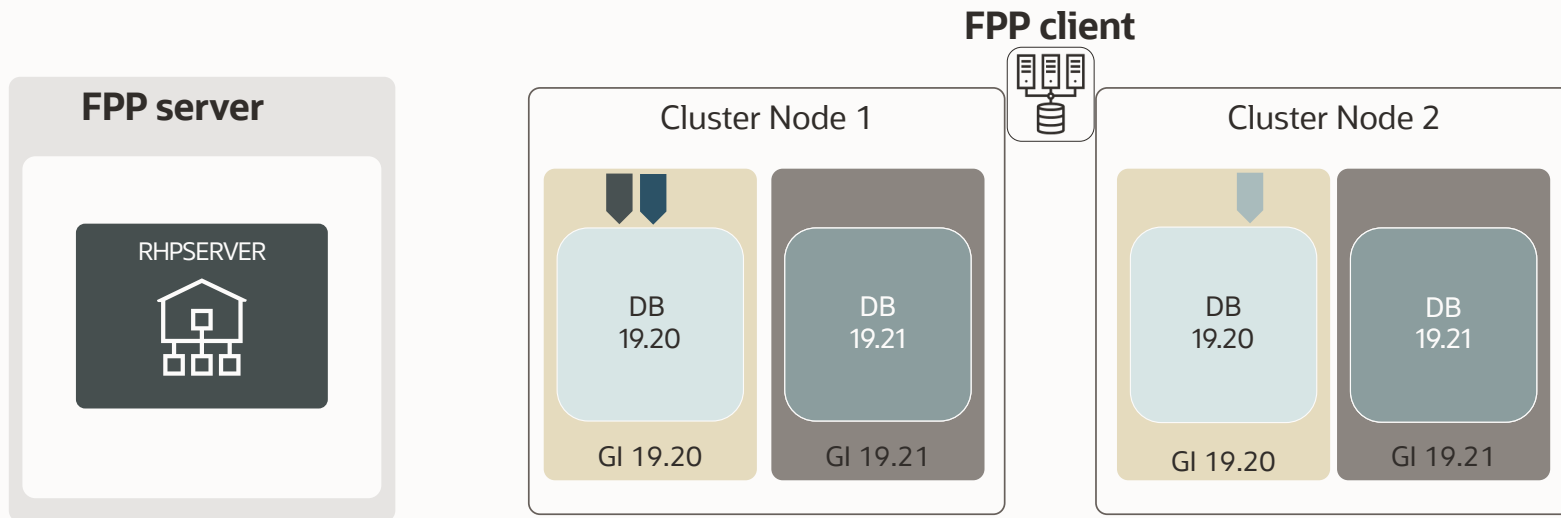
```
rhpcctl add database \  
-workingcopy WC_db_19_12_0_oci_FPPC1_RHP \  
-dbname racldb2_fra1nn \  
-datafileDestination DATA \  
-targetnode fppc1 \  
-dbtype RAC \  
-cdb \  
-dbtemplate db_19_12_0_oci:assistants/dbca/templates/seed_db.dbc
```

```
$ ls -tr /u01/app/oracle/cfgtoollogs/dbca/racldb2_fra1nn  
initracldb2frTempOMF.ora.1115202092759 cloneDBCreation.log catclust_catcon_77650.lst  
racldb2_fra1nn.log rmanUtil CreateClustDBViews.log  
trace.log_2020-12-14_05-55-05PM plugDatabase.log lockAccount.log  
initracldb2frTempOMF.ora.1115202094834 ordlib0.log utlrp0.log  
rmanDeleteFiles.sql ordlib_catcon_75303.lst utlrp_catcon_85815.lst  
racldb2_fra1nn0.log execemx0.log postDBCcreation.log  
trace.log_2020-12-15_09-25-26AM execemx_catcon_76689.lst racldb2_fra1nn1.log  
tempControlctl postScripts.log trace.log_2020-12-15_09-45-48AM  
CloneRmanRestore.log catclust0.log
```



Vertical patching

Combined GI + DB patching

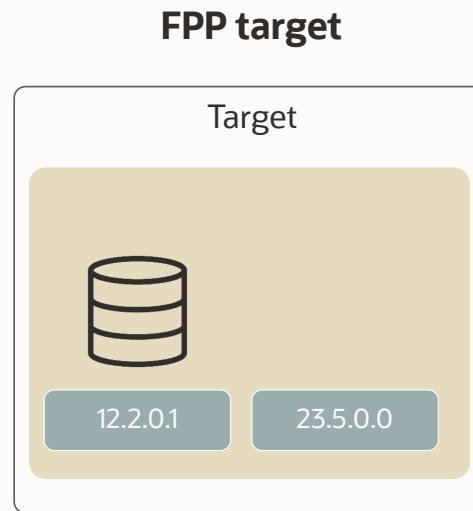
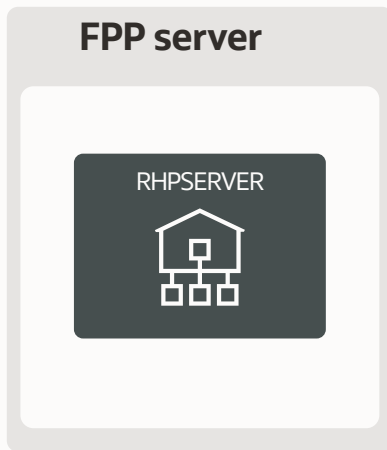


```
rhctl move gihome -destwc WC_GI_1921_c11 \  
-sourcewc WC_GI_1920_c11 -auto \  
-dbhomes WC_DB_1920_c11=WC_DB_1921_c11 \  
-drain_timeout 600
```

- Compute OS + GI patching possible on Exadata



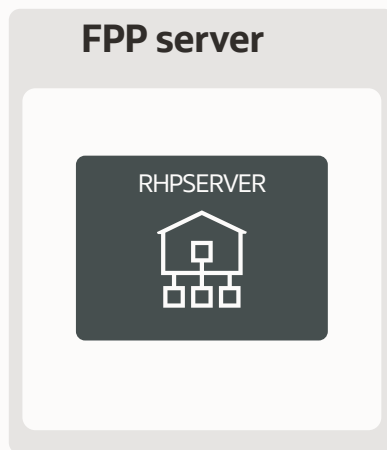
Database upgrades



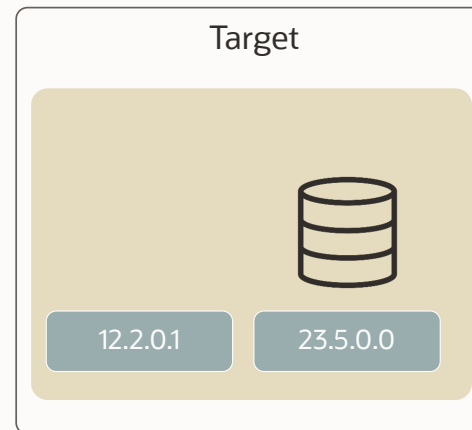
```
rhpcctl upgrade database \  
-dbname single_fra1nn \  
-sourcewc WC_db12201_c11 \  
-destwc WC_db2300_c11 \  
-autoupg \  
-upgtimezone YES | NO \  
-grp YES | NO \  
-restart
```



Database upgrades



FPP target



```
rhpcctl upgrade database \  
-dbname single_fra1nn \  
-sourcewc WC_db12201_c11 \  
-destwc WC_db23400_c11 \  
-autoupg \  
-upgtimezone YES | NO \  
-grp YES | NO \  
-restart
```

- Uses autoupgrade
 - Upgrade timezone as part of the process
 - Creates a guaranteed restore point
- Make sure to put the most recent autoupgrade version in the target image `~/rdbms/admin` check MOS note 2485457.1
- Multitenant conversion possible in 23ai
- Upgrade required downtime



Advanced options

Image series

- Ordered list of images
- Users can subscribe and get notified via e-mail about new images
- Order is useful to get the latest image to patch the DBs

FPP server

series_db_19c

19.3.0.0

19.11.0.0

19.18.0.0

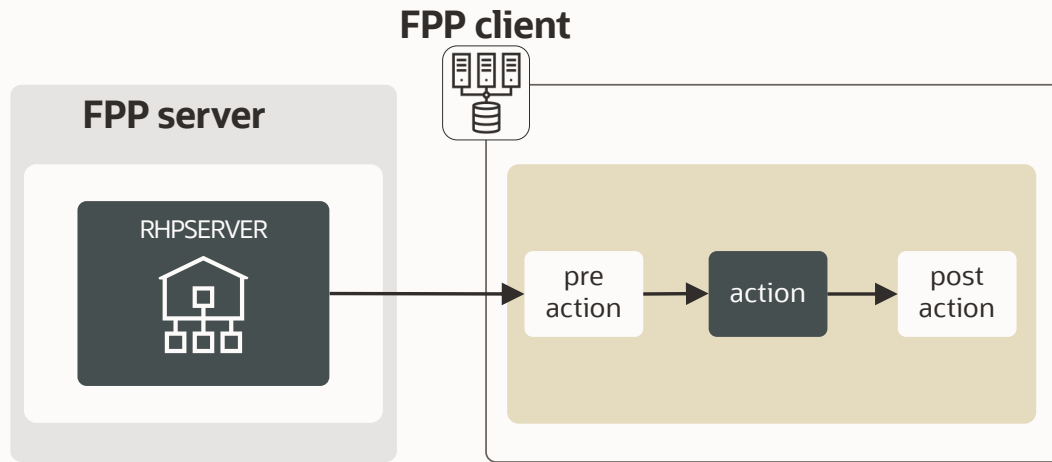
```
rhctl add series -series series_db_19c
```

```
rhctl insertimage series -series series_db_19c -image db_19_3_0
```

```
rhctl insertimage series -series series_db_19c -image db_19_11_0
```

```
rhctl insertimage series -series series_db_19c -image db_19_18_0
```

User actions



- Pre or Post actions
- On one or all nodes
- On server or client

```
rhptl add useraction -post -optype ADD_DATABASE \  
-onerror CONTINUE \  
-useraction action_post_add_database \  
-actionsript /var/opt/dbascripts/action_post_add_database.sh \  
-runscope ONENODE
```

User actions: example script

```
#!/bin/sh
# convert parameters to variables
for i in "$@" ; do
    export $i
done

L_CRG_HOME=$(cat /etc/oracle/olr.loc | grep crs_home | awk -F= '{print $2}')
L_OH=$(($L_CRG_HOME/bin/rhpctl query workingcopy -workingcopy $RHP_WORKINGCOPY -metadataonly | grep "Software
home path:" | awk '{print $NF}')
L_HOSTNAME=$(($L_CRG_HOME/bin/olsnodes -l)
L_SID=$(echo $RHP_DBNAME | cut -c 1-8)

# add EMCC target
/var/opt/dbascripts/emcli/emcli add_target -name="$RHP_DBNAME" \
    -type="oracle_database" -host="$L_HOSTNAME" \
    -credentials="UserName:dbsnmp;password:secret;Role:Normal" \
    -properties="SID:$L_SID;Port:1521;OracleHome:$L_OH"

# register in RMAN catalog
export ORACLE_HOME=$L_OH
$L_OH/bin/rman target / catalog rman/secret@rcvcat <<EOF
    register database;
    exit
EOF
```

Drift reporting

```
$ rhpctl query image -drift
fpp19c-c12.sub01171652351.lab.oraclevcn.com: Audit ID: 857
Image "DB_1914_oci" with additional bug fixes on its working copies "33563137,31844357,33184467"
Image "DB_1914" with additional bug fixes on its working copies
"31306261,29224710,29445548,31359215,29415774,
32165759,28777073,31844357,29540327,30895577,33184467,30134746,32069696,32124570,31247838,31776121,
29774362,29512125,29254623,31668872,32032733,30534662,33223248,30855101,29540831,32327201,30889443,
26716835,30674373,29942275,32167592,33563137,32892883,32523206,30160625"

rhpctl query workingcopy -image DB_1914 -drift
fpp19c-c12.sub01171652351.lab.oraclevcn.com: Audit ID: 859
Working copy "WC_DB1914_fppc01_2" with additional bug fixes
"29445548,29254623,29540327,29774362,30134746,30160625,30534662,29512125,29942275,30855101,31306261,31359215,
30895577,29224710,26716835,31668872,32165759,32069696,32032733,30889443,30674373,32167592,32523206,29415774,2
8777073,32124570,31247838,29540831,32892883,31776121,33223248,33563137,33184467,31844357,32327201" fetched on
4/26/22 2:57 PM
```

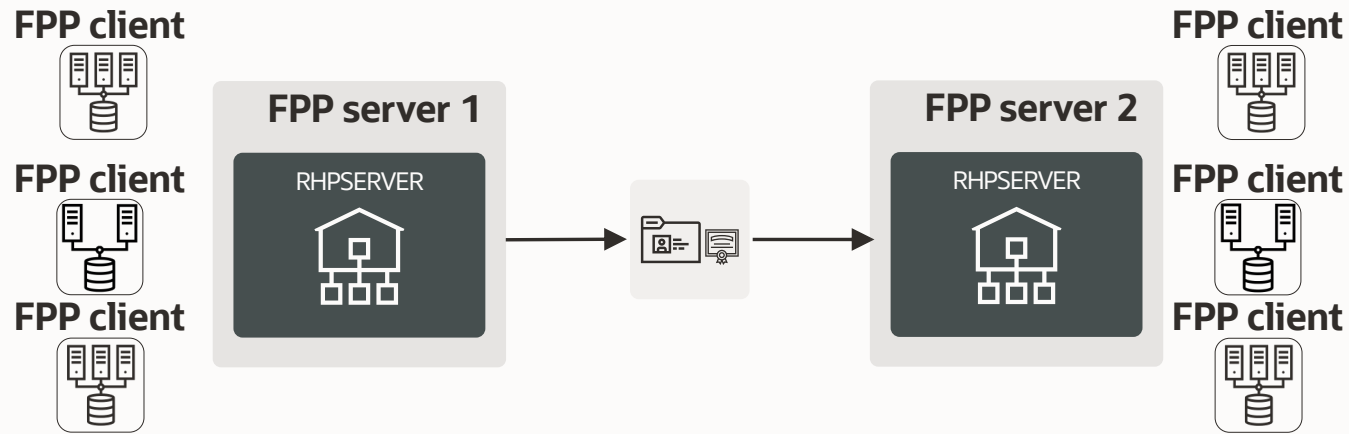
Audit

```
$ rhpctl query audit -operation add -entity workingcopy
Audit ID: 37
Start time: 2021-08-11T15:35:25.852
Command executed: rhpctl add workingcopy -image db_19_12_0_oci -storagetype LOCAL -workingcopy
WC_db_19_12_0_oci_FPPC1 -user oracle -oraclebase /u01/app/oracle -client dbSys67uwrlqq -path
/u01/app/oracle/product/db_19_12_0_oci
End time: 2021-08-11T15:42:35.000
Command result: SUCCESS
User name: grid
Node name: fpps@dbSysxcfydga
Target cluster: dbSys67uwrlqq

Audit ID: 47
Start time: 2021-08-14T15:49:40.166
Command executed: rhpctl add workingcopy -image db_19_12_0_giaas -storagetype RHP_MANAGED -workingcopy
WC_db_19_12_0_giaas_FPPC1_RHP -user oracle -oraclebase /u01/app/oracle -client dbSys67uwrlqq
End time: 2021-08-14T16:01:03.000
Command result: SUCCESS
User name: grid
Node name: fpps@dbSysxcfydga
Target cluster: dbSys67uwrlqq
```

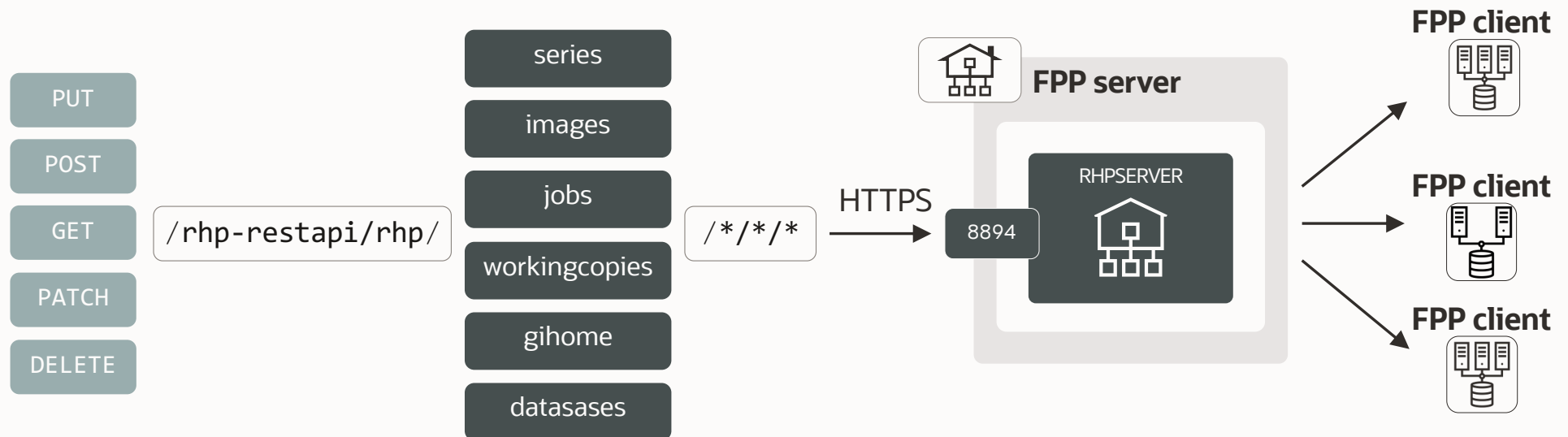


Server peering concept



- Used when you have different distant networks
 - Each FPP server has its own targets / clients
 - Reduces latency because server are closer to the clients
- Images are synced between the two peering servers : uniform images across regions
- Sync Direction can be chosen / configured

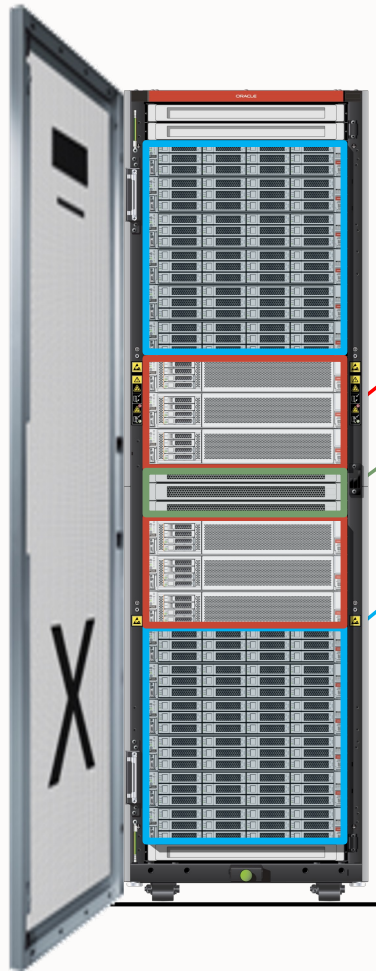
REST APIs



- Integrate FPP with Ansible, APEX, Rundeck, custom applications
- REST API documentation **REST APIs for Oracle Database** book
<https://docs.oracle.com/en/database/oracle/oracle-database/19/dbrst/>



Exadata Software Patching



Exadata software patching :

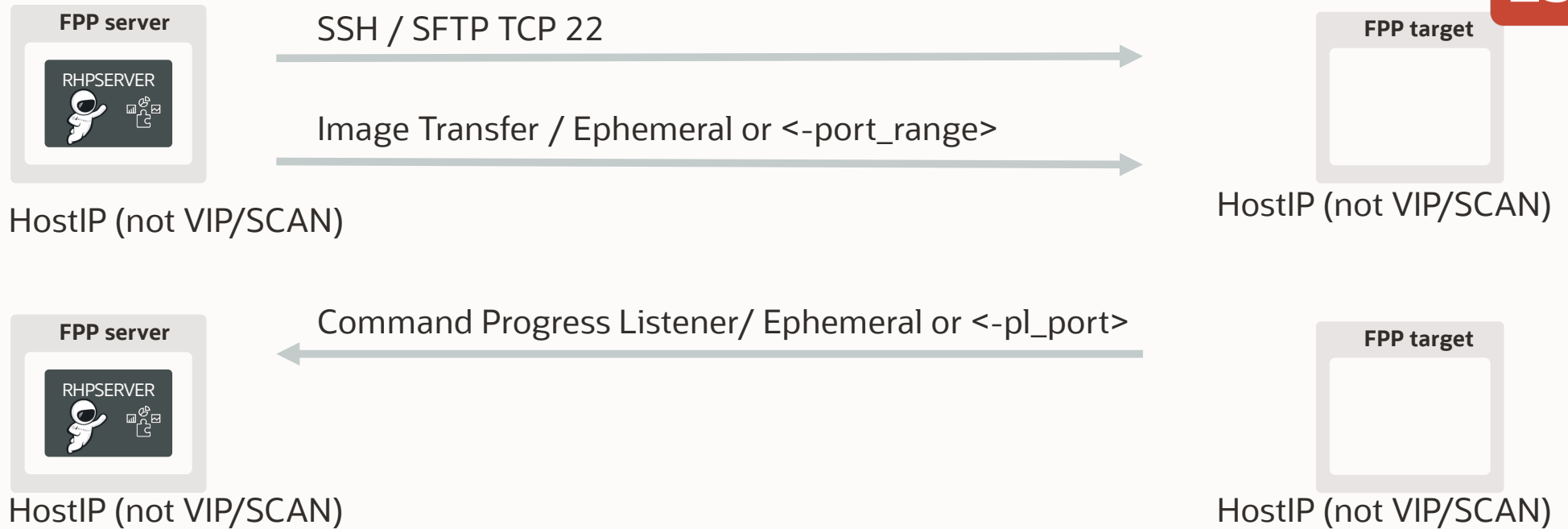
- DB Nodes, Dom0, KVMHost, DomU, KVMGuest
- Network Switches (IB,RoCE)
- Storage Servers

- Vertical Patching : DB Node + GI Patching – with a single bounce of Grid Infrastructure and Database



Networking setup

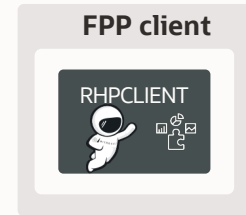
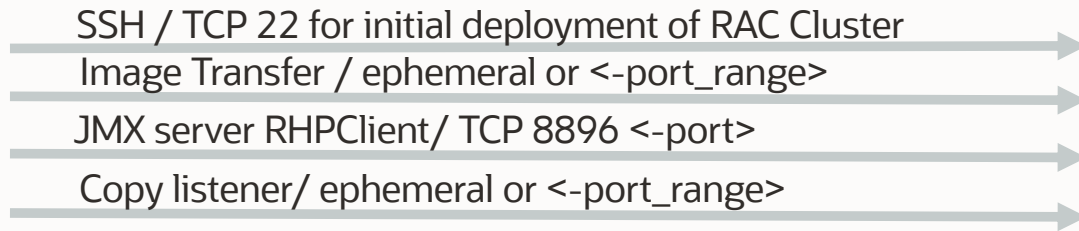
Networking Flows to open : FPP Target



To change Ports :

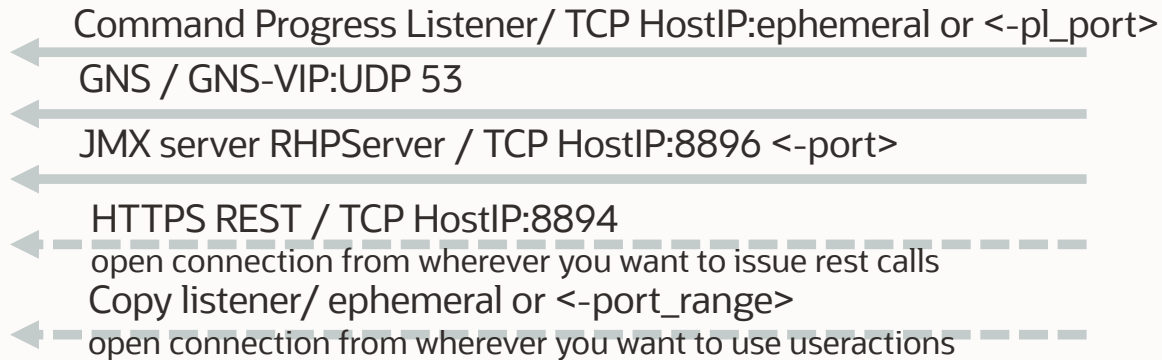
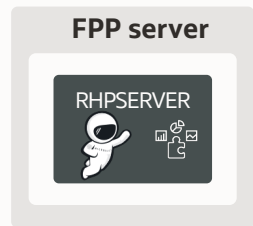
```
srvctl modify rhpserver -pl_port <portnumber>  
srvctl modify rhpserver -port_range <port_number_range>
```

Networking Flows to open : FPP Client



HostIP (not VIP/SCAN)

HostIP (not VIP/SCAN)



HostIP (not VIP/SCAN)

HostIP (not VIP/SCAN)

GNS VIP

To change Ports :

```

srvctl modify rhpserver -pl_port <port_number>
srvctl modify rhpserver -port <port_number>
srvctl modify rhpserver -port_range <port_number_range>
    
```

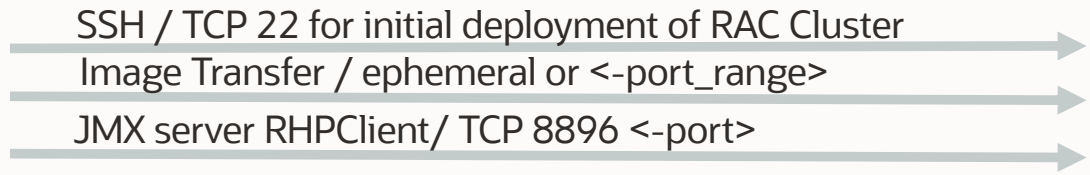
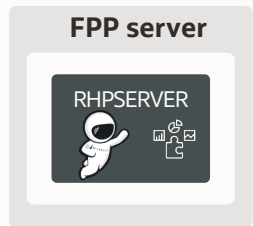
```

srvctl modify rhpclient -port <port_number>
    
```



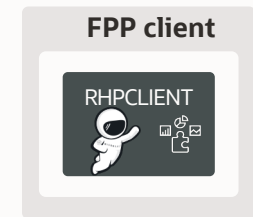
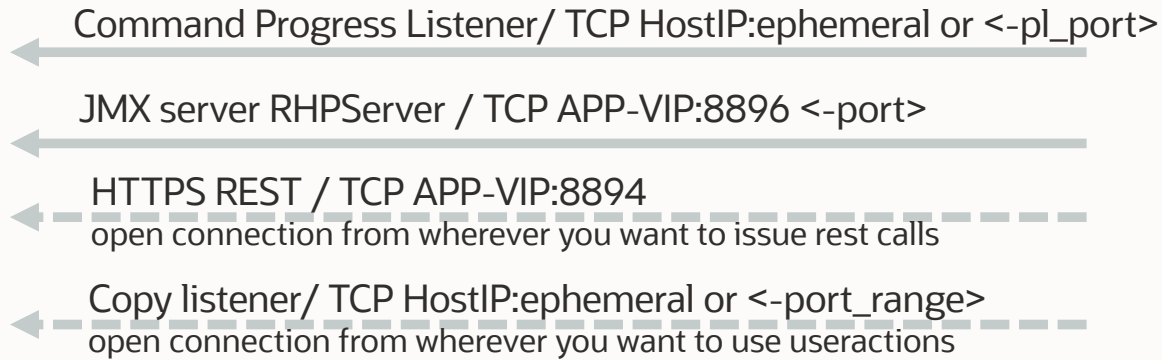
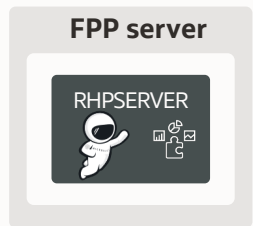
Networking Flows to open : FPP Client 23ai APP-VIP

New In
23^{ai}



HostIP (not VIP/SCAN)

HostIP (not VIP/SCAN)



HostIP (not VIP/SCAN)

HostIP (not VIP/SCAN)

APP_VIP

To change Ports :

```

srvctl modify rhpserver -pl_port <port_number>
srvctl modify rhpserver -port <port_number>
srvctl modify rhpserver -port_range <port_number_range>
    
```

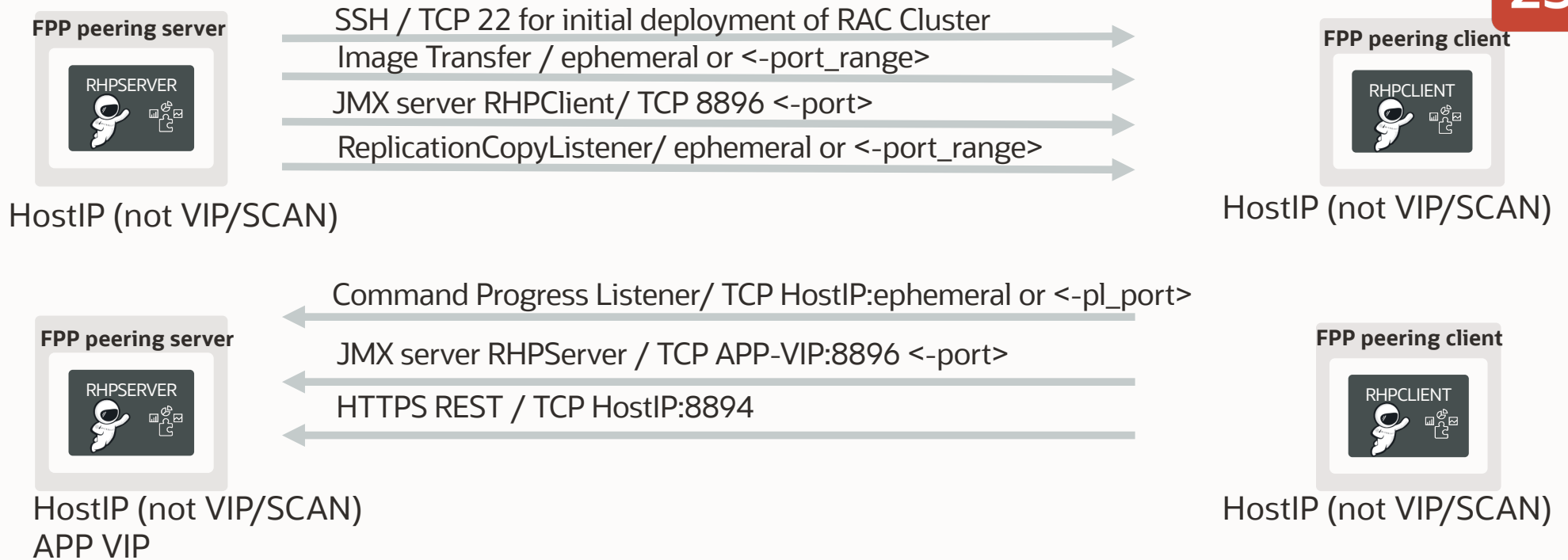
```

srvctl modify rhpclient -port <port_number>
    
```



Networking Flows to open : FPP Peering

New In
23^{ai}



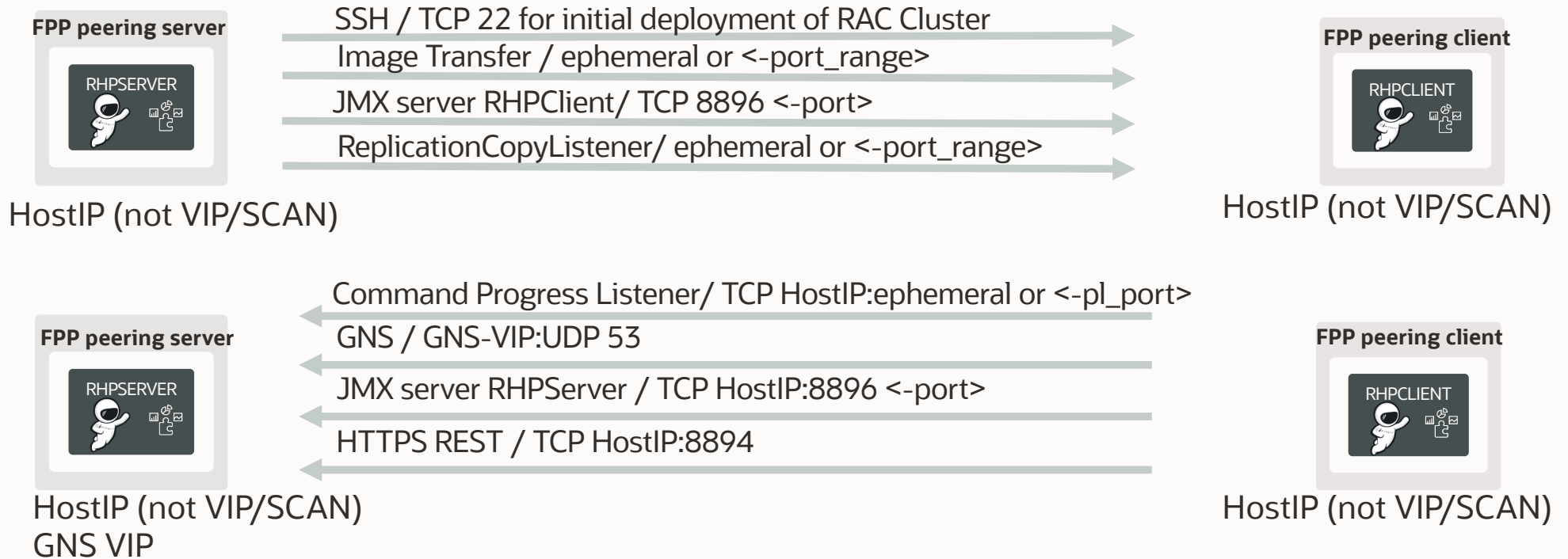
To change Ports :

```
srvctl modify rhpserver -pl_port <port_number>  
srvctl modify rhpserver -port <port_number>  
srvctl modify rhpserver -port_range <port_number_range>
```

```
srvctl modify rhpserver -port <port_number>
```



Networking Flows to open : FPP Peering



To change Ports :

```

srvctl modify rhpserver -pl_port <port_number>
srvctl modify rhpserver -port <port_number>
srvctl modify rhpserver -port_range <port_number_range>
    
```

```

srvctl modify rhpserver -port <port_number>
    
```



Licensing



Targets need to be licensed with either :

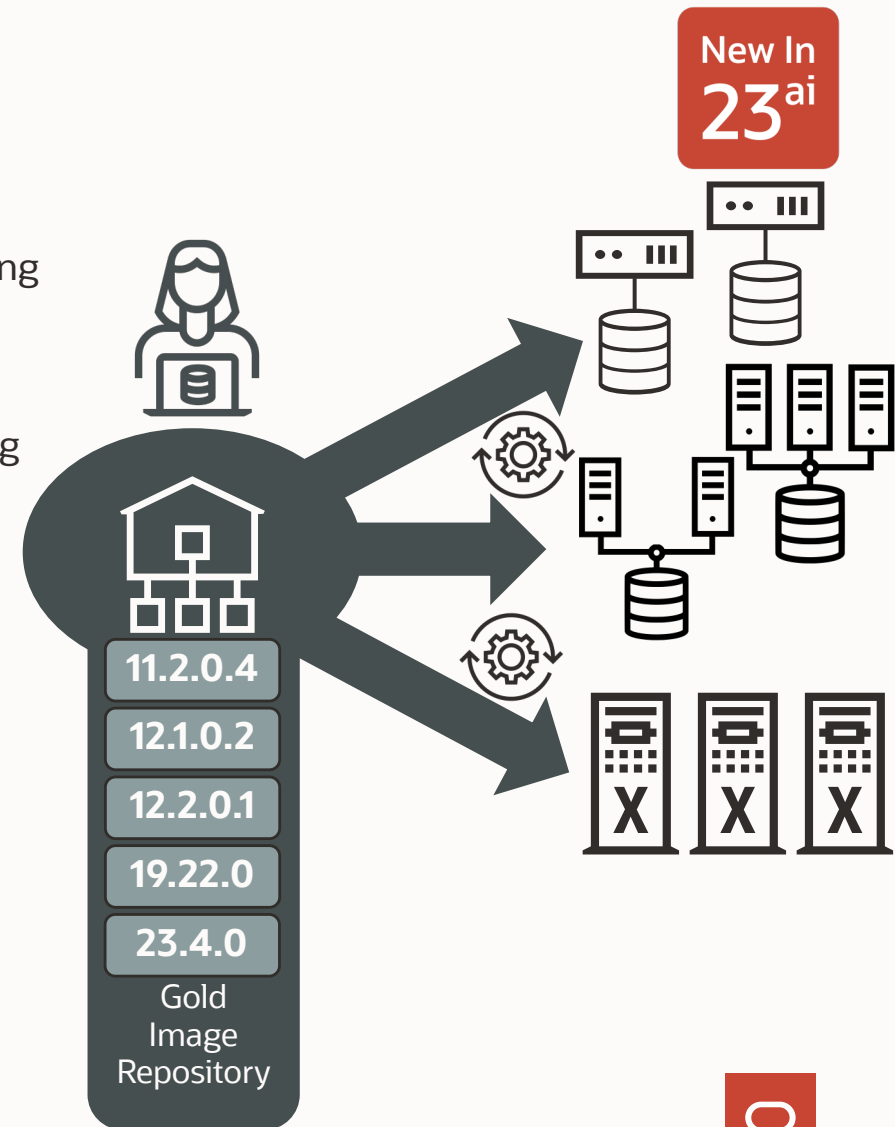
- Oracle RAC or RAC One Node licenses
- Oracle Database Lifecycle Management Pack for Single Instances

When using FPP through Enterprise Manager Oracle Database Lifecycle Management Pack is needed for all targets.

Fleet Patching & Provisioning

Automated Oracle software management

- Supports all Oracle deployments
 - Oracle Database, Grid Infrastructure, full-stack Exadata patching
 - Licensed with Oracle RAC (One) or Database Lifecycle Management pack
- Provides effortless, repeatable, standardized out-of-place patching and provisioning automation for
 - Shorter downtime, easy rollback
 - "Build once deploy many"
- Includes advanced features such as:
 - Gold image drift detection
 - Full Oracle Data Guard automated patching
 - Advanced job scheduling
 - Custom user action for extensibility
 - Comprehensive Exadata Patching
 - Oracle MAA best practice application



Additional information

Oracle fleet patching and provisioning landing page

<https://www.oracle.com/goto/fpp>

Oracle Fleet Patching and Provisioning Administrator's Guide

<https://docs.oracle.com/en/database/oracle/oracle-database/23/fppad/index.html>

FPP by Example Blog Series

<https://blogs.oracle.com/maa/post/fleet-patching-provisioning-by-example-intro>



Thank you



ORACLE

Our mission is to help people see
data in new ways, discover insights,
unlock endless possibilities.

