



Red Hat Enterprise Linux 8 In-Place Upgrade

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Mike Pagan
Sr. Platform Strategist

Demo Prep Work

Build a suitable virtual machine

- Separate /boot and root (/) volumes
- Root volume as an LVM volume
- Swap on the same physical volume as root
- At least 4 GB RAM allocated
- At least 2 vCPUs allocated

Have copies of the RHEL 6.10 and RHEL 7.6 DVD binary .iso files handy

You will need RHEL 6.10 to install the base demo VM, and the in-place upgrade tool will ONLY upgrade to RHEL 7.6

Install RHEL 6.10 on your demo virtual machine

A simple base install is fine, and possibly preferred as the preupgrade check can take a long time if many extra packages are installed. There will be more than enough interesting info in the preupgrade output to show off.

Update your 6.10 demo machine to the latest packages

Just to be safe, run “yum update” on your demo VM to make sure that it is at the latest and greatest versions

Demo timing pointers

Timing

- On a basic RHEL 6.10 install, the preupgrade check takes about 8 minutes
- On that same system, the actual upgrade takes 30+ minutes
- Also, on a base RHEL 6.10 install the preupgrade check will show a large number of show-stopper errors due to GNOME and KDE desktop environments

Strategy to keep the flow going

- Begin by very quickly starting the preupgrade check
- Then switch to the slides and show all the prep work
- When the preupgrade check is finished, COPY it to another system and...
- Start the actual upgrade (you will need to use `..force`)
- Show the contents of the preupgrade check output and further details of the upgrade process while the upgrade runs
- Switch back and forth to the running upgrade to show what it is doing
- When it is done, THEN switch back to the upgraded system to say “Voila!”

Things to remember

Errors

- A straight in place upgrade of RHEL 6 with X11 Gnome/KDE will show “EXTREME” risk
- It’s the GUI...
- This is useful, as it will show what an IPU with errors looks like and how to force it
- ...but when the system reboots, it will not have X11 running

Solution

- On reboot, explain how we knew this was coming because the preupgrade check warned us
- Just reinstall the GUI group:

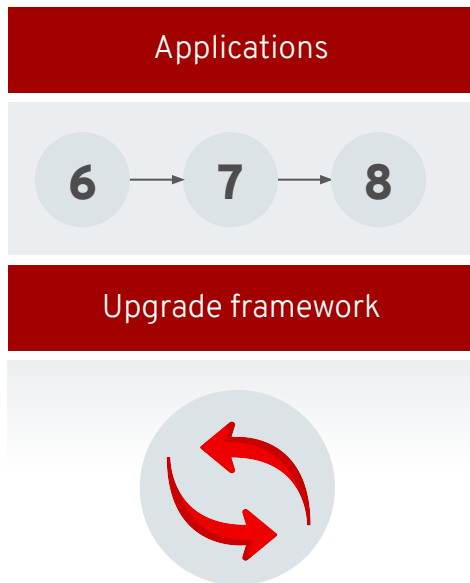
```
# yum groupinstall "server with GUI"  
# systemctl start graphical.target  
# systemctl set-default graphical.target  
# shutdown -r 0
```



Red Hat Enterprise Linux 8

The purpose of this session: To help in selecting the most secure, efficient and cost effective process for updating RHEL systems supporting business workloads across major OS releases, provide a technical introduction to the RHEL 6->7->8 in-place upgrade tools, thus ensuring that you are able to gain the greatest possible value from your investment in Red Hat.

In-place upgrades for your systems



Reduced migrations

Analyze systems to determine if upgrading in place can avoid a costly migration

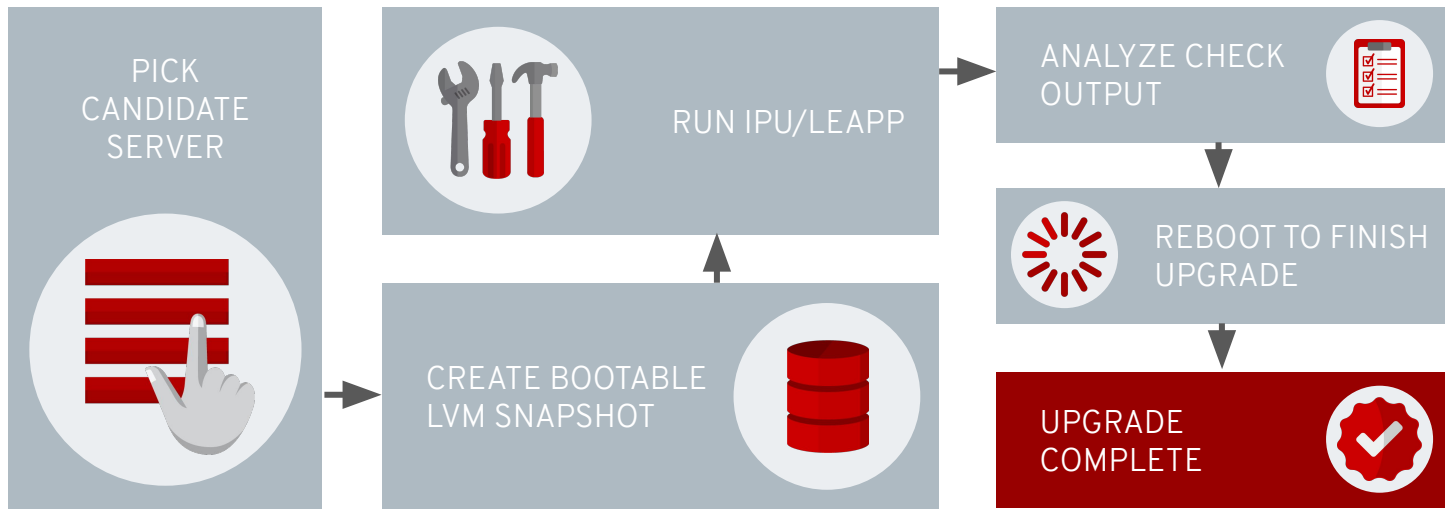
Easy rollback options

Combine with bootable LVM snapshots for safety

Improved framework

Get better analysis and a simplified process with a more extensible framework

Can I upgrade this host?



RHEL 6 -> 7 via IPU

Preparation & Caveats

AWS and Azure instances of RHEL 6 are NOT SUPPORTED

You can still use yum for minor updates in these public clouds

Get to RHEL 6.10 first

This in-place upgrade procedure is only tested for going from RHEL 6.10 to RHEL 7.6. If you are on an earlier minor release of RHEL 6, you should do a “yum update” to RHEL 6.10 before proceeding

Subscription Manager

RHEL 7 only supports subscription manager. If your RHEL 6 system is still using rhn_register, then you must convert to subscription manager.

Network Manager

RHEL 7 enables network manager by default on a normal fresh install. However, in the IPU upgrade process, network manager will NOT be enabled unless the service is already active in the initial RHEL 6 environment.

Step 1: Preparing your RHEL 6 System

For systems managed by Satellite:

```
# rhn-channel --add --channel rhel-x86_64-server-extras-6  
# rhn-channel --add --channel rhel-x86_64-server-optional-6
```

For systems not managed by Satellite:

```
# subscription-manager repos --enable  
rhel-6-server-extras-rpms  
# subscription-manager repos --enable  
rhel-6-server-optional-rpms
```

```
# yum -y install preupgrade-assistant  
preupgrade-assistant-ui preupgrade-assistant-el6toel7  
redhat-upgrade-tool
```

Make Sure the RHEL 6 repos are enabled

Enable the “extras” and “optional” repos

Ensure the system can consume the latest content

Unset the release

Clear the versionlock

Install the upgrade pre-check tools

preupgrade-assistant

Step 1: Some extra considerations

Disable automation tools

Turn off Ansible, Puppet, chef, Salt...

Custom NIC issues

If you custom NIC device naming (anything other than /dev/eth) you will need some extra steps. However, IPU and LEAPP will maintain whatever network naming you already have in place though the upgrade.

Make sure you have a backup!

LEAPP will make a rollback snapshot, but having a fresh, clean, separate backup is just as good common sense.

Step 2: Run the preupgrade check tool

```
# preupg  
  
-or-  
  
# preupg --riskcheck --verbose
```

Run the preupgrade check
“preupg”

Examine the output
Output to the command line and
placed in `./result.html`

Step 2: Some extra considerations

Viewing preupg output

Output from the preupgrade check will be placed in `/root/preupgrade/result.html`

Web GUI?

A web UI has been added to the RHEL 6->7 upgrade tools. You must have `httpd` running on the target system, with proper firewall (and SELinux) settings in order to access it.

Step 2: pre-upgrade check output

| Result Keyword | Explanation |
|------------------|--|
| PASS | Everything is fine. You should be able to proceed to the upgrade when all exit codes are listed as PASS. |
| FAIL | Extreme upgrade risk. In-place upgrade is not possible. |
| NEED_ACTION | High upgrade risk. Some administrator action is needed before running the Red Hat Upgrade Tool. |
| NEEDS_INSPECTION | Lower or medium risks. This exit code does not necessarily mean the upgrade will fail, but it might result in a system that is not fully functional. Some parts of the system need to be checked and, if needed, fixed by the administrator. |

Step 2: pre-upgrade check output (continued)

| Result Keyword | Explanation |
|----------------|--|
| FIXED | Changes required for the upgrade were fixed automatically. You do not need to review them further. |
| INFORMATIONAL | Useful, but not critical, information. |
| NOT_APPLICABLE | The package you asked to test is not on your system. |
| ERROR | This usually indicates errors in the tools themselves. Report this type of problem to Red Hat Support. |
| notchecked | The respective module has not been checked. See Known Issues for more details. |

Step 3: Perform the upgrade!

```
# redhat-upgrade-tool --network 7.6 --instrepo <REPO>
-or-
# redhat-upgrade-tool --device /dev/sdb
-or-
# redhat-upgrade-tool --iso /var/isos/rhel7dvd.iso
```

Run the upgrade tool

“Redhat-upgrade-tool”, aka RUT

Point RUT at the location of your RHEL 7 install media

That can be an on-premises repository (Satellite), a mounted install media, or (most commonly) a local .iso file

Step 3: Some extra considerations

Multiple NIC configurations

If the system uses static routes, apply this fix BEFORE the upgrade:

<https://access.redhat.com/solutions/4972431>

If the system uses network manager, apply this fix BEFORE the upgrade:

<https://access.redhat.com/solutions/4927561>

Non Red Hat repositories?

If you use any non-install-media or non-Red Hat repos (most commonly “extras” and “epel”), add them with the “**--addrepo optional=<REPO_URL>**” directive in the **redhat-upgrade-tool** command.

Step 4: Post upgrade check & cleanup

Verify...

```
# cat /etc/redhat-release
# yum repolist
```

Fix bad repo connections if needed:

```
# subscription-manager remove --all
# subscription-manager unregister
# subscription-manager register
# subscription-manager attach --pool=poolID
# subscription-manager repos --enable=repoID
```

Verify new RHEL version

...by checking redhat-release

Verify that you are attached to the proper subscription

...by checking “yum repolist”

If things are not right, follow the steps on the left to re-attach to the proper repos.

Step 4: Potential further tasks

Update to GRUB2

RHEL 7 does not legacy GRUB. Once you are satisfied with the upgrade, this would be the time to upgrade the system to GRUB2 in order to be fully supported and avoid future problems.

Instructions here:

https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/7/html/system_administrators_guide/sec-upgrading_from_grub_legacy_to_grub_2

Get to your preferred minor release

This puts you at RHEL 7.6, which at the time of this document is not the most recent version. Use a “yum update” to get to whichever minor release you are currently targeting.

In Case of Emergency:
Setting up RHEL 7-> 6 Rollback

Restrictions of RHEL 7 -> RHEL 6 Rollbacks

Bootloader

Rollbacks are only supported on GRUB, not GRUB2. Do not migrate to GRUB2 until you are sure your upgrade is tested.

LVM

Rollback is only supported for systems with LVM root volumes. Rollback uses LVM snapshots to retain the original configuration

/boot considerations

/boot must be stored on a separate partition

Free space

The root partitions must have enough free space to handle the snapshot (zero needed at first, but it will grow over time as the system is used - standard copy-on-write situation)

X86-64 systems only!

Rollback not available on zLinux, RHEL on Power, RHEL on ARM

Defining the rollback snapshot volumes

```
# redhat-upgrade-tool --snapshot-root-lv VolGroup/lv_root  
.  
.  
.  
$
```

Use these options to define rollback volumes:

```
--snapshot-root-lv
```

```
--snapshot-lv
```

Snapshot volume definition format:

```
<volume-name>[:<snapshot-name>[:<snapshot-size>]]
```

Install upgrade pre-check tools

```
preupgrade-assistant
```

Snapshot root volume configuration options

- take snapshot of the root partition with a specific name and size

```
# redhat-upgrade-tool --snapshot-root-lv VolGroup/lv_root:snap_lv_root:5G ...
```

- take snapshot of the root partition with an autogenerated name, but with a custom snapshot size

```
# redhat-upgrade-tool --snapshot-root-lv VolGroup/lv_root::5G ...
```

Snapshot other volume configuration options

The **--snapshot-root-lv** might be passed only once to the RUT and aside of creating the snapshot it is also responsible for creating a grub entry. **This option is required in order to be able to rollback to RHEL 6.**

Example usage of **--snapshot-lv**:

- take snapshot of the /var partition with a specific name and with the size of the origin

```
# redhat-upgrade-tool --snapshot-root-lv VolGroup/lv_root --snapshot-lv  
VolGroup/lv_var:var_snapshot ...
```

NOTE: Information about snapshots created by the RUT is stored in /boot/grub/snapshot.metadata file.

In case the user interrupts the RUT execution before reboot and wants to change what is to be snapshotted, it is required to execute the RUT with the **--clean-snapshots** option first without any additional parameters:

```
# redhat-upgrade-tool --clean-snapshots
```


Performing a rollback

```
# /boot/rollback/do_rollback
```

...then clean up after the system reboots into RHEL 6

```
# yum reinstall redhat-upgrade-tool  
# redhat-upgrade-tool --clean
```

If the upgrade completed successfully

...and you can boot into RHEL 7, the rollback tools will reside in `/boot/rollback` and will automatically roll back to the last saved snapshot

If the upgrade was unsuccessful

You can still roll back, but the process is more complicated and beyond the scope of this presentation. Refer to the manual

Can I save more than one rollback snapshot?

Red Hat does not support that. But if you look at the rollback directory, you will see that you could do this yourself.

Once you are happy with an upgrade

```
# /boot/rollback/do_cleanup
```

Perform a cleanup!

This will delete the rollback snapshot partition so that it does not continue to grow every time the root volume is modified

Questions?