

# Dynamic Root Disk

October 2011

<http://www.hp.com/go/DRD>

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# Agenda

- DRD overview
- DRD use models
  - Recovery
  - Maintenance
  - Provisioning/Rehosting
  - Update
- DRD status & sync
- Real-life examples
- Wrap-up

# DRD overview

## Mission/benefits

Significantly reduce the downtime needed to perform HP-UX software maintenance

Reduce the downtime required for recovery from administrative errors

Perform software update work during normal business hours, or whenever convenient

Provision systems quickly and efficiently

Simplify testing



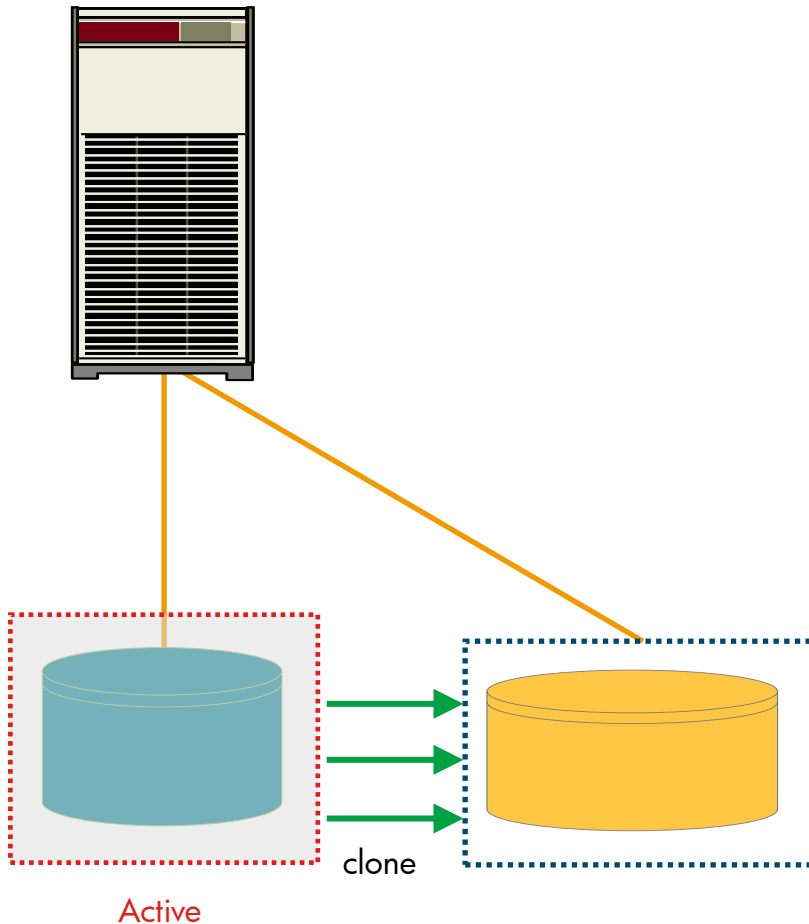
DRD is supported on 11i v2 and v3; the orange lightning bolt on future slides indicates areas of increased feature support on 11i v3

# DRD use models



# DRD use case

## Recovery

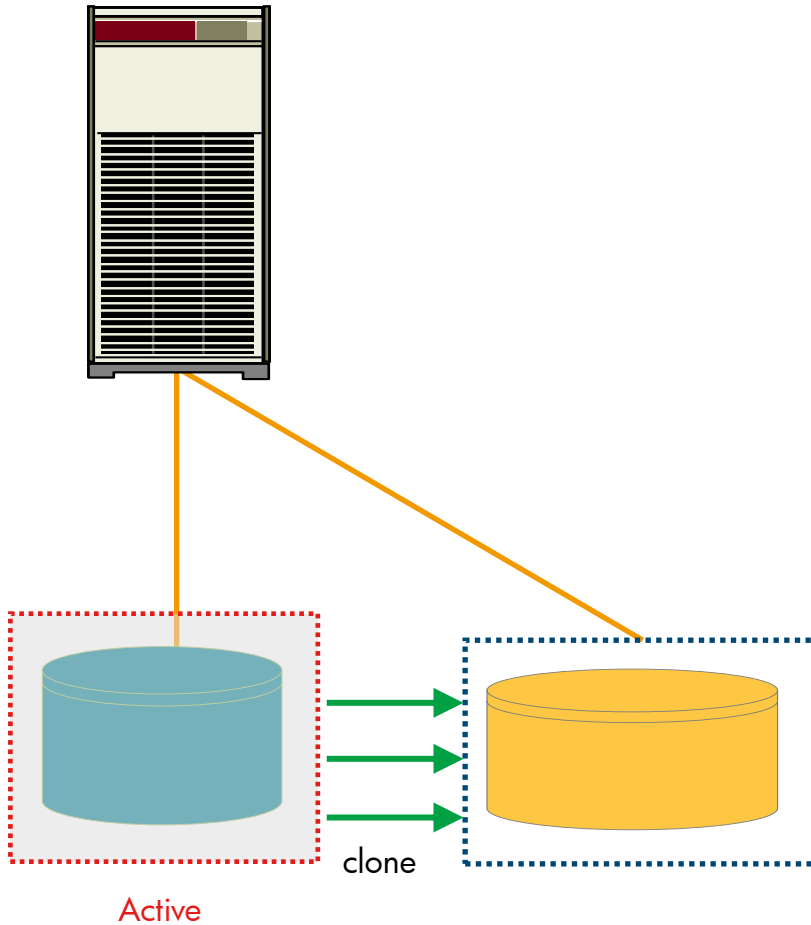


1. Original system image is active
2. Create a clone of the original system image (`drd clone`)
3. When clone completes, two copies of system image exist (`drd status`)
4. If a problem is encountered with original image, boot clone (`drd activate`)



# DRD use case

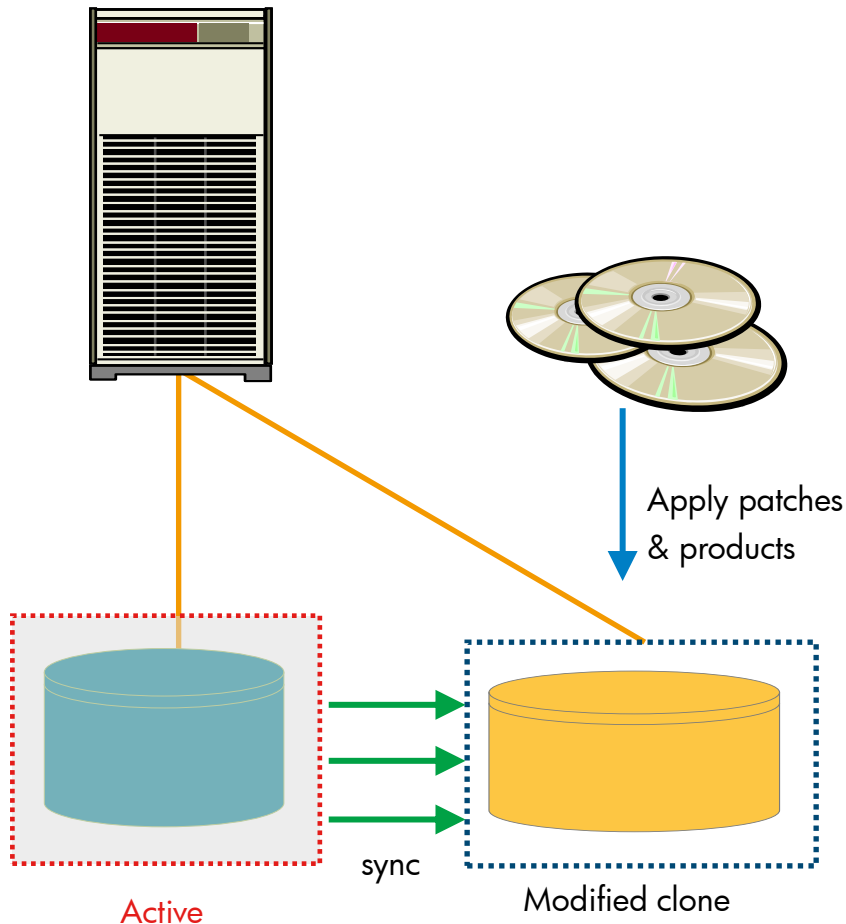
Maintenance (slide 1 of 3)



1. Original system image is active
2. Create a clone of the original system image ([drd clone](#))
3. When complete, two copies of system image exist ([drd status](#))

# DRD use case

Maintenance (slide 2 of 3)



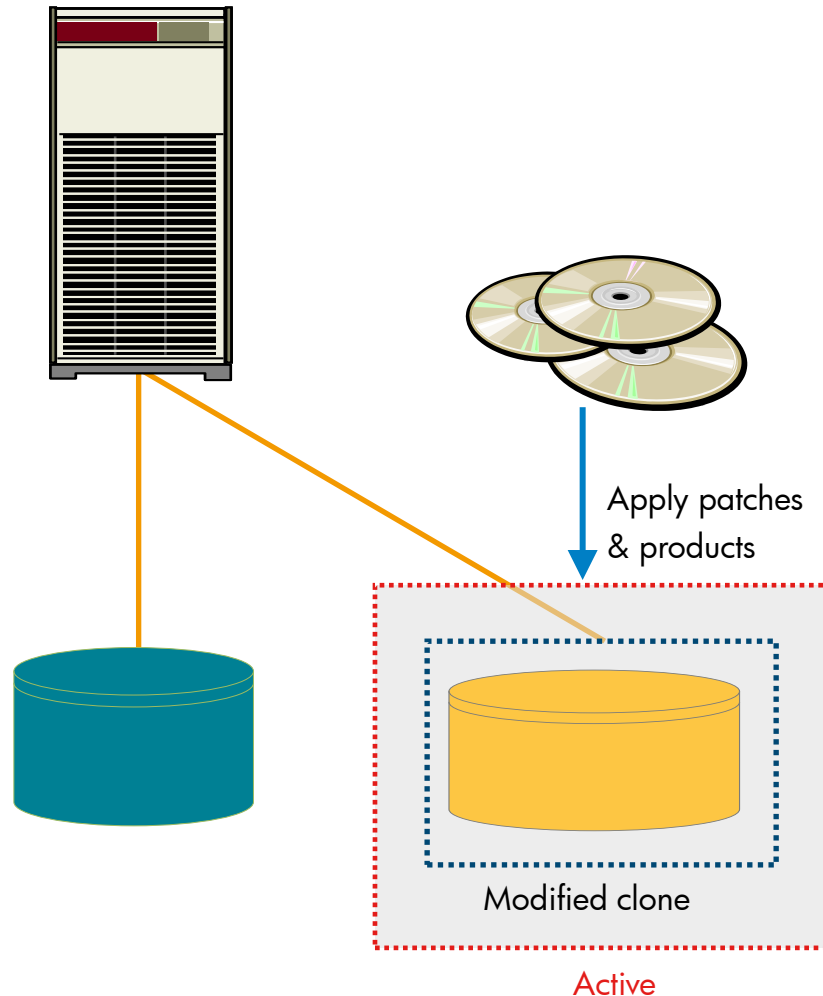
1. Original system image is active
2. Create a clone of the original system image ([drd clone](#))
3. When complete, two copies of system image exist ([drd status](#))
4. Modify inactive image to reach desired state – install patches & products ⚡ ([drd runcmd](#) [swinstall](#))
5. When modification completes, have an unmodified original image and a modified clone
6. Synchronize files from the active image to the clone – password files, log files, etc. ([drd sync](#))



The orange lightning bolt identifies increased feature support for 11i v3; in this case, product installation on a clone is supported only on 11i v3, with patch installation supported on 11i v3 and 11i v2

# DRD use case

Maintenance (slide 3 of 3)

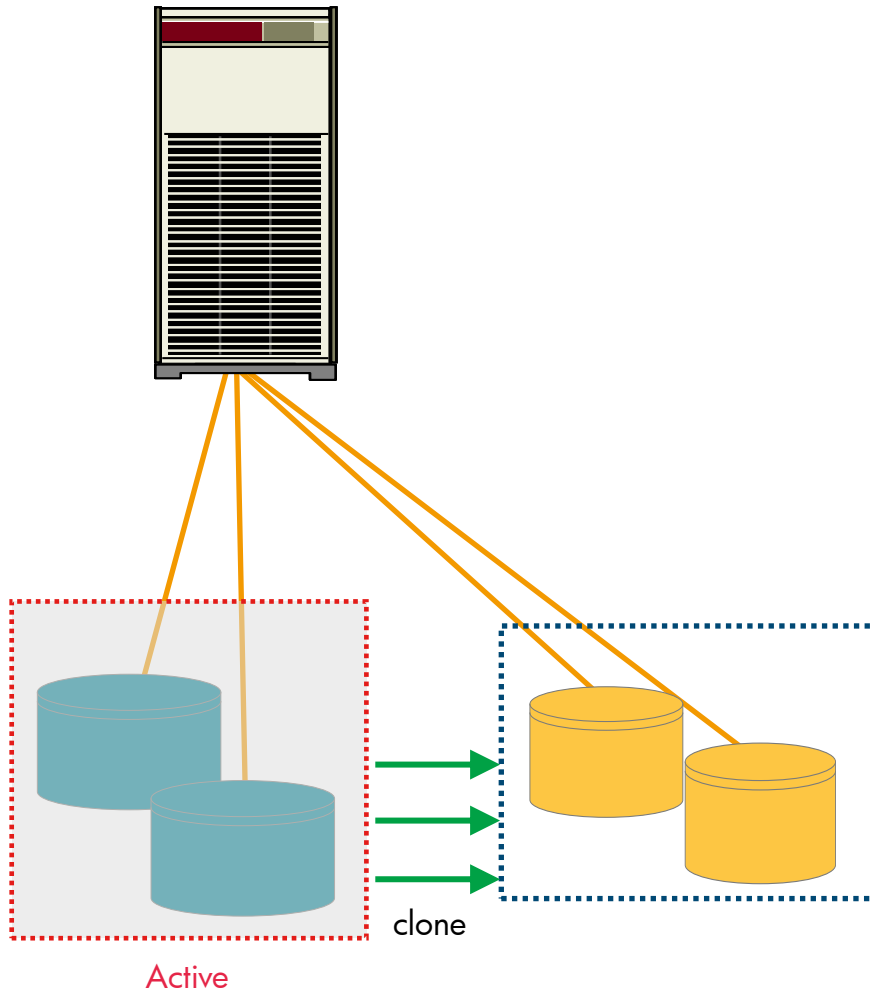


1. Original system image is active
2. Create a clone of the original system image ([drd clone](#))
3. When complete, two copies of system image exist ([drd status](#))
4. Modify inactive image to reach desired state – install patches & products ⚡ ([drd runcmd](#) [swinstall](#))
5. When modification completes, have an unmodified original image and a modified clone
6. Synchronize files from the active image to the clone – password files, log files, etc. ([drd sync](#))
7. Boot the clone when ready ([drd activate](#))
8. If original system preferred, boot the unmodified original image to return to original state ([drd activate](#))



# DRD use case

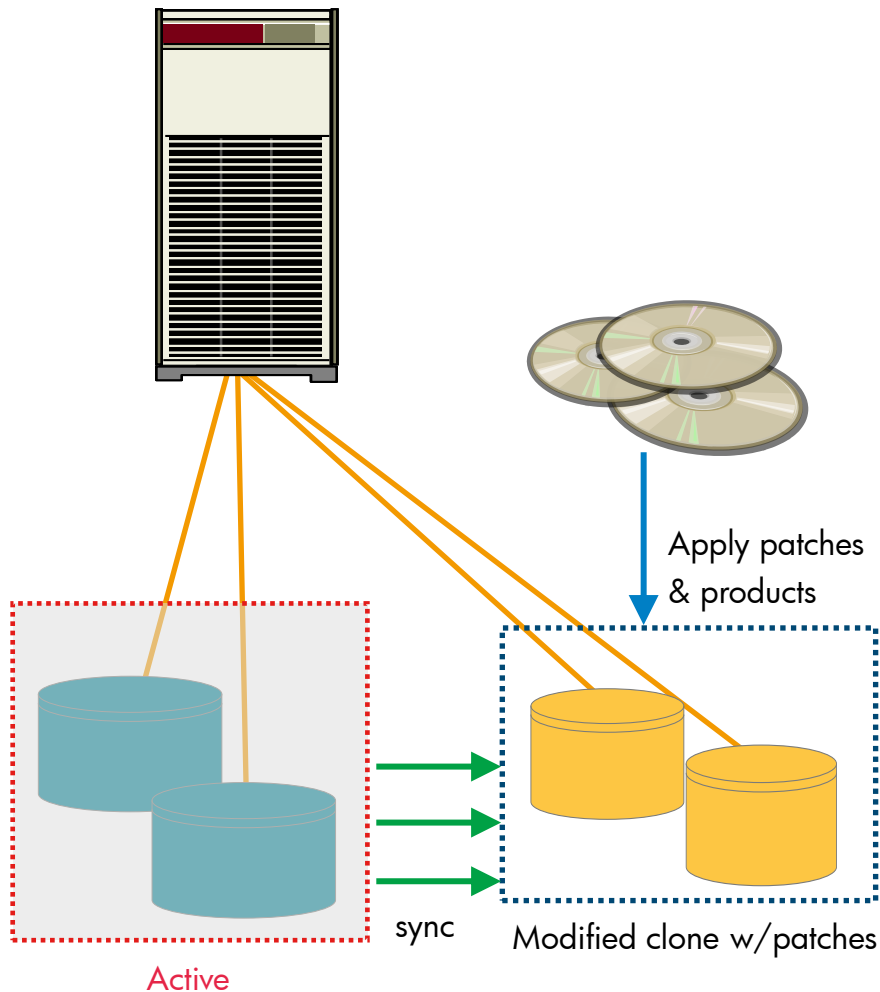
High Availability with DRD and MirrorDisk/UX (slide 1 of 3)



1. Original mirrored system image is active
2. Create mirrored clone of the original system image ([drd clone](#))
3. When complete, four copies of system image exist ([drd status](#))

# DRD use case

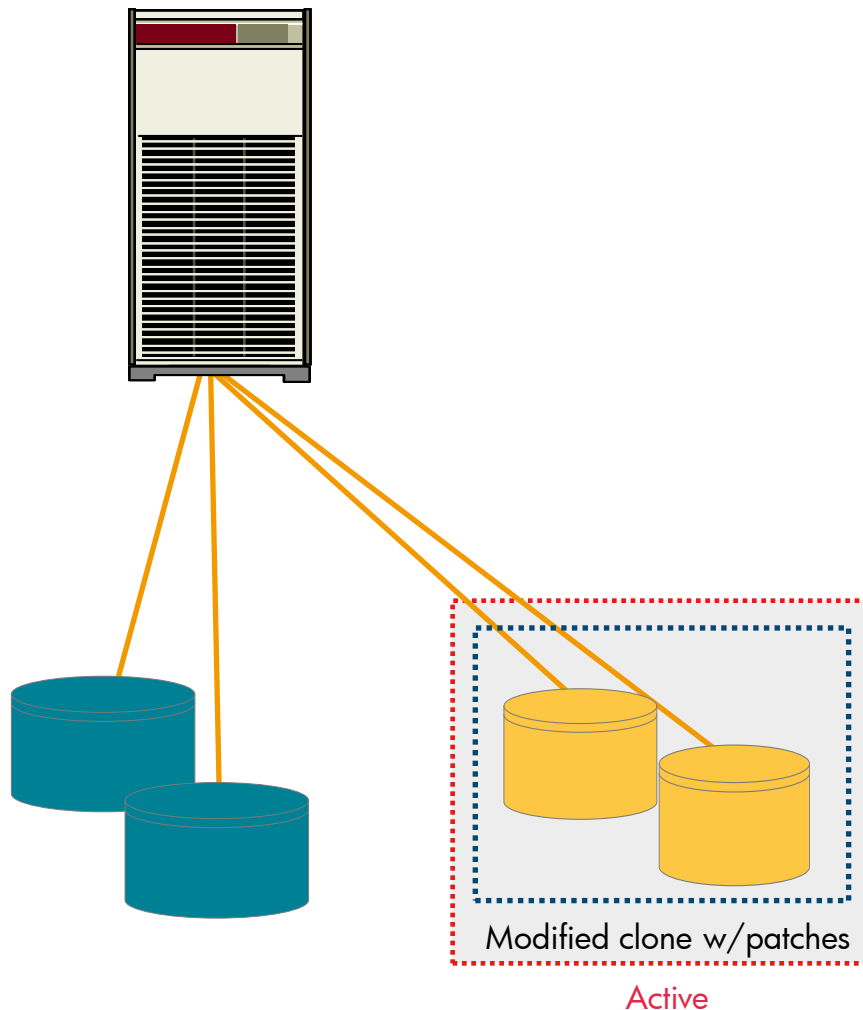
## High Availability with DRD and MirrorDisk/UX (slide 2 of 3)



1. Original mirrored system image is active
2. Create mirrored clone of the original system image (`drd clone`)
3. When complete, four copies of system image exist (`drd status`)
4. Patch inactive image (`drd runcmd swinstall`)
5. When modification completes, have an unmodified original image and a modified clone
6. Synchronize files from the active image to the clone – password files, log files, etc. (`drd sync`)

# DRD use case

## High Availability with DRD and MirrorDisk/UX (slide 3 of 3)



1. Original mirrored system image is active
2. Create mirrored clone of the original system image (`drd clone`)
3. When complete, four copies of system image exist (`drd status`)
4. Patch inactive image (`drd runcmd swinstall`)
5. When modification completes, have an unmodified original image and a modified clone
6. Synchronize files from the active image to the clone – password files, log files, etc. (`drd sync`)
7. Boot the clone when ready (`drd activate`)
8. In event of a sw problem, boot the unmodified original image to return to original state (`drd activate`)
9. In the event of a hw problem, run from mirror

# DRD Customer use models

High Availability with DRD and MirrorDisk/UX



Requires 4 LUNs

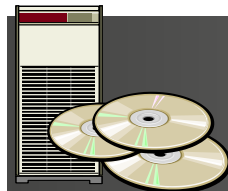
Requires a MirrorDisk/UX license



Enables fast mirrored recovery

Easy to implement

```
drd clone -t/dev/dsk/c3t15d0 -x  
mirror_disk=/dev/dsk/c4t15d0
```

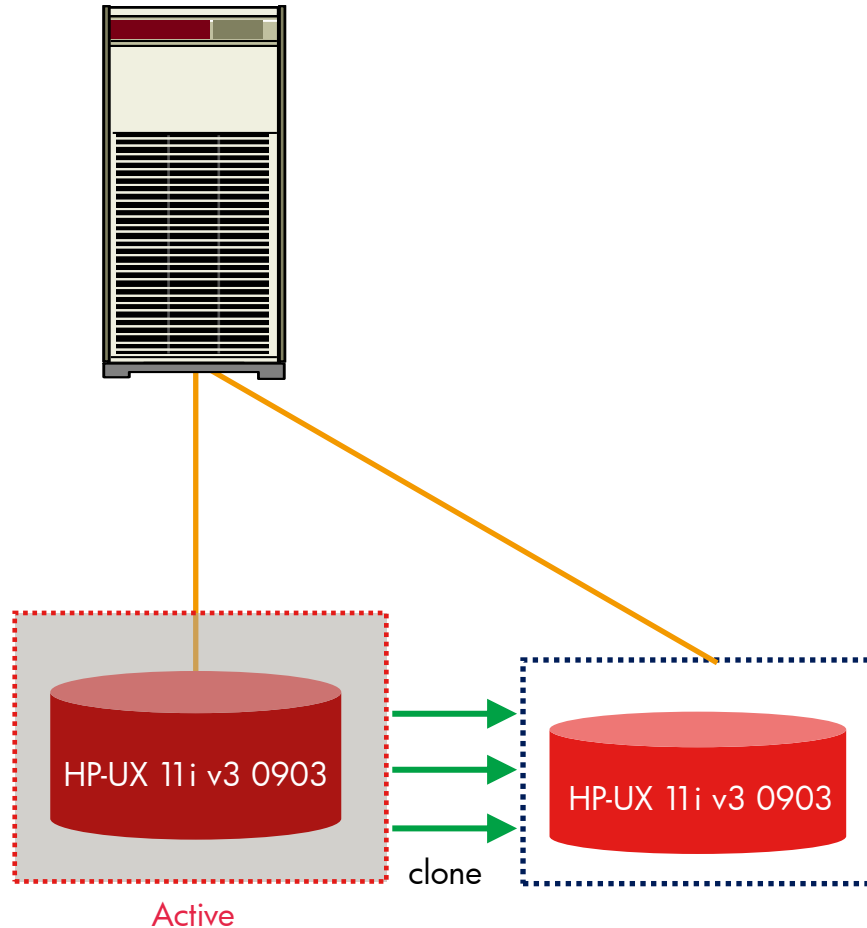


Provides protection against both  
hardware and software failures

# DRD use case



Updating from HP-UX 11i v3 0903 to HP-UX 11i v3 1103 (slide 1 of 3)

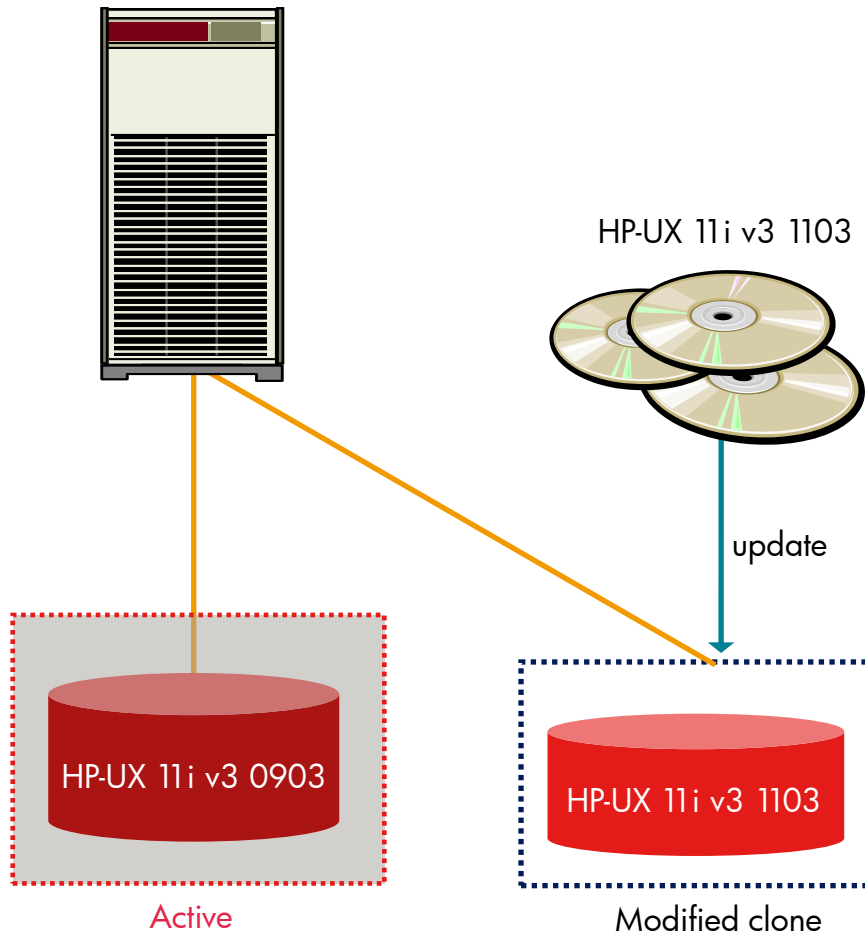


1. Original system image is active
2. Create a clone of the original system image ([drd clone](#))
3. When complete, two copies of system image exist ([drd status](#))

# DRD use case



Updating from HP-UX 11i v3 0903 to HP-UX 11i v3 1103 (slide 2 of 3)

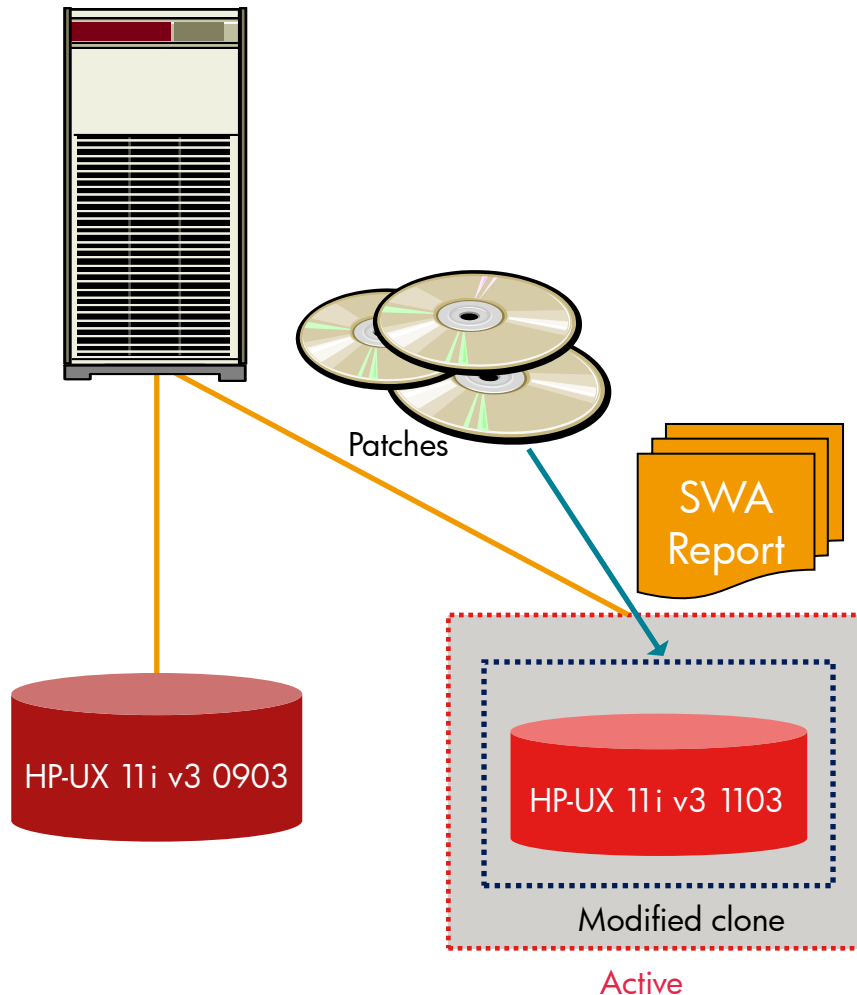


1. Original system image is active
2. Create a clone of the original system image ([drd clone](#))
3. When complete, two copies of system image exist ([drd status](#))
4. Update the inactive image to HP-UX 11i v3 March 2009 or later (1103 or March 2011 in this case) ([drd runcmd update-ux](#))
5. When modification completes, have an original image with HP-UX 11i v3 0903, and a modified clone with HP-UX 11i v3 1103



# DRD use case

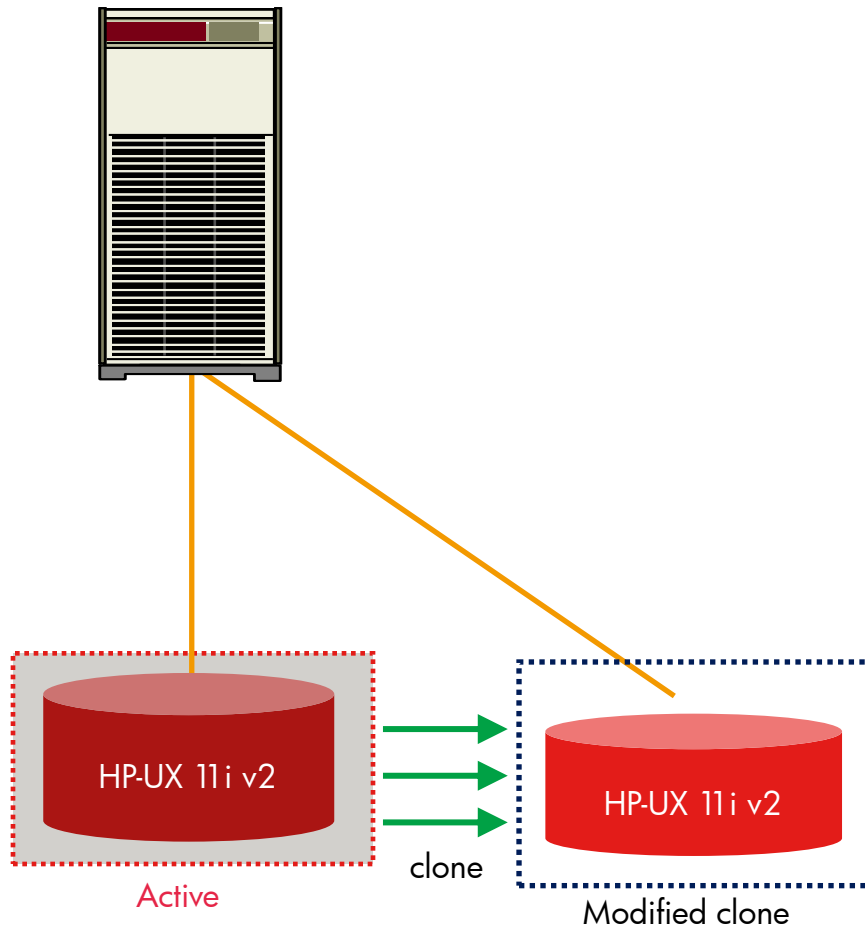
Updating from HP-UX 11i v3 0903 to HP-UX 11i v3 1103 (slide 3 of 3)



1. Original system image is active
2. Create a clone of the original system image ([drd clone](#))
3. When complete, two copies of system image exist ([drd status](#))
4. Update the inactive image to HP-UX 11i v3 March 2009 or later (1103 or March 2011 in this case) ([drd runcmd update-ux](#))
5. When modification completes, have an original image with HP-UX 11i v3 0903, and a modified clone with HP-UX 11i v3 1103
6. Use SWA to identify patches & fixes to security issues ([drd mount](#), [swa report](#), [drd umount](#))
7. Install required patches ([swa get](#), [drd runcmd swinstall](#))
8. Boot the clone when ready ([drd activate](#))
9. If original system preferred, boot the unmodified original image to return to original state ([drd activate](#))

# DRD use case

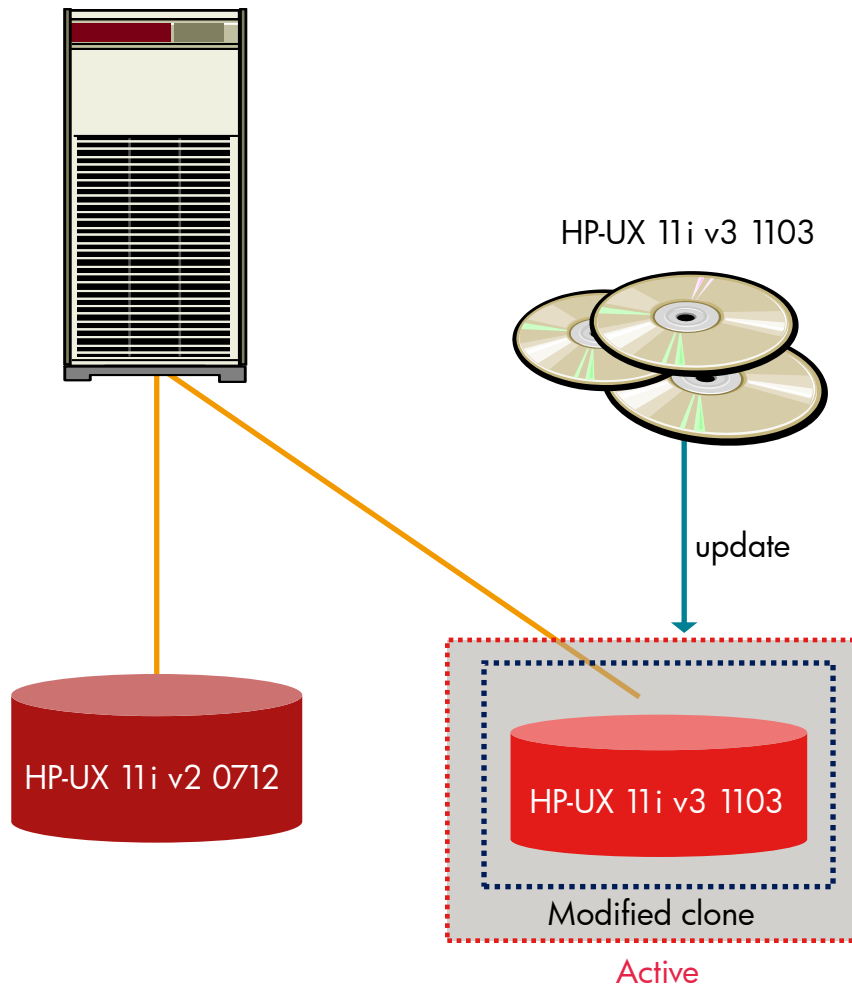
Updating from HP-UX 11i v2 to HP-UX 11i v3 1103 (slide 1 of 4)



1. Create a clone of the original system image ([drd clone](#))
2. Run update-ux in preview mode on the active disk ([update-ux -p](#))
3. Adjust file system sizes on the clone as needed ([www.hp.com/go/drd-docs](http://www.hp.com/go/drd-docs))

# DRD use case

Updating from HP-UX 11i v2 to HP-UX 11i v3 1103 (slide 2 of 4)

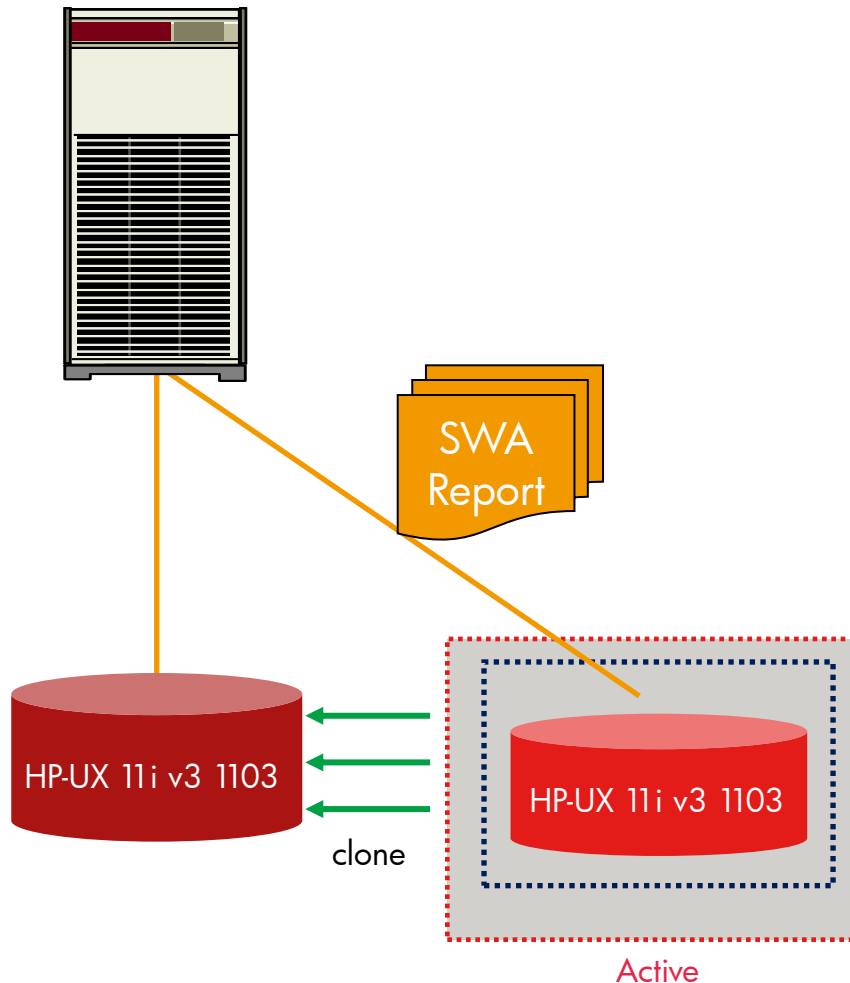


1. Create a clone of the original system image ([drd clone](#))
2. Run update-ux in preview mode on the active disk ([update-ux -p](#))
3. Adjust file system sizes on the clone as needed ([www.hp.com/go/drd-docs](http://www.hp.com/go/drd-docs))
4. Activate the clone & boot when ready ([drd activate](#))
5. Update the active image to HP-UX 11i v3 1103 ([update-ux](#))
6. When update completes, have an active image with 11i v3 1103, and a clone with 11i v2 ([drd status](#))

**Could stop here, OR...**

# DRD use case

Updating from HP-UX 11i v2 to HP-UX 11i v3 1103 (slide 3 of 4)



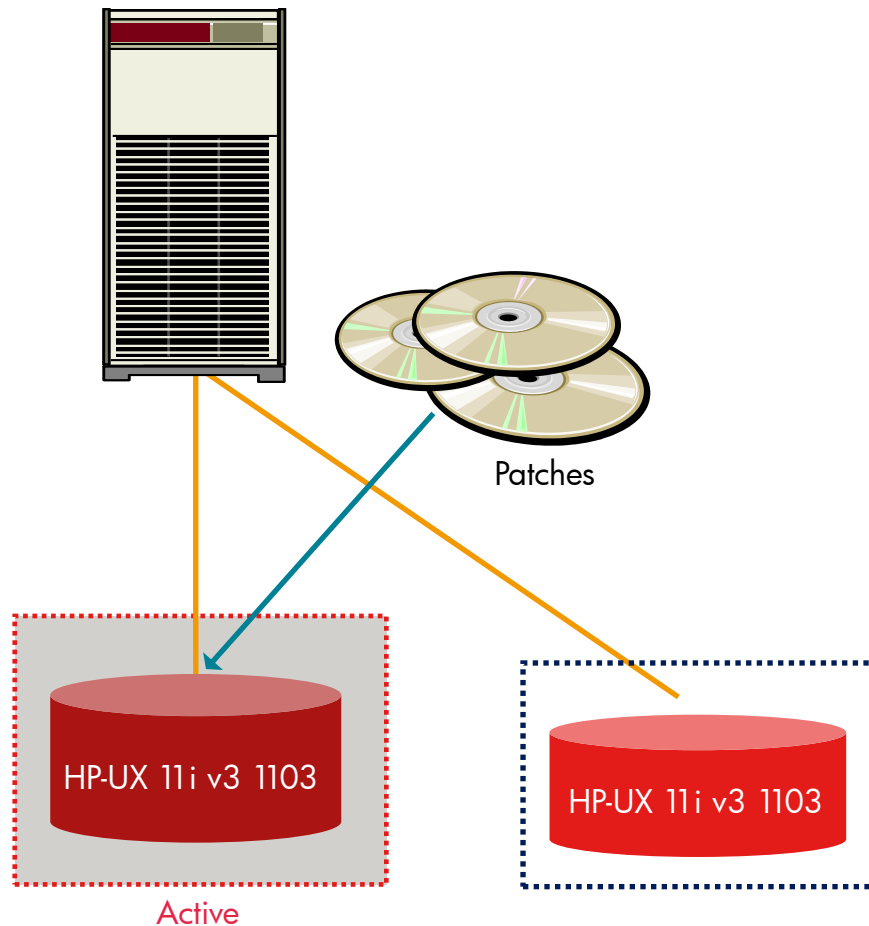
1. Create a clone of the original system image ([drd clone](#))
2. Run update-ux in preview mode on the active disk ([update-ux -p](#))
3. Adjust file system sizes on the clone as needed ([www.hp.com/go/drd-docs](http://www.hp.com/go/drd-docs))
4. Activate the clone & boot when ready ([drd activate](#))
5. Update the active image to HP-UX 11i v3 1103 ([update-ux](#))
6. When update completes, have an active image with 11i v3 1103, and a clone with 11i v2 ([drd status](#))

## Could stop here, OR...

1. Create a clone of the active image ([drd clone -x overwrite=true](#))
2. Use SWA to identify patches & fixes to security issues ([drd mount](#), [swa report](#), [drd unmount](#))

# DRD use case

Updating from HP-UX 11i v2 to HP-UX 11i v3 1103 (slide 4 of 4)



1. Create a clone of the original system image ([drd clone](#))
2. Run update-ux in preview mode on the active disk ([update-ux -p](#))
3. Adjust file system sizes on the clone as needed ([www.hp.com/go/drd-docs](http://www.hp.com/go/drd-docs))
4. Activate the clone & boot when ready ([drd activate](#))
5. Update the active image to HP-UX 11i v3 1103 ([update-ux](#))
6. When update completes, have an active image with 11i v3 1103, and a clone with 11i v2 ([drd status](#))

## Could stop here, OR...

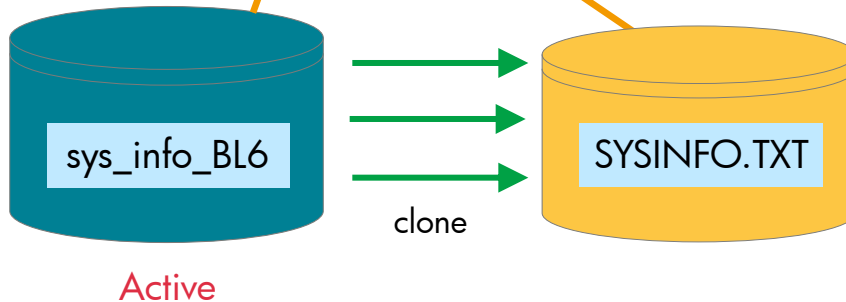
1. Create a clone of the active image ([drd clone -x overwrite=true](#))
2. Use SWA to identify patches & fixes to security issues ([drd mount](#), [swa report](#), [drd unmount](#))
3. Install required patches ([swa get](#), [drd runcmd swinstall](#))
4. Boot the clone when ready ([drd activate](#))

# DRD use case

Rehosting – Provisioning (blade example, slide 1 of 2)



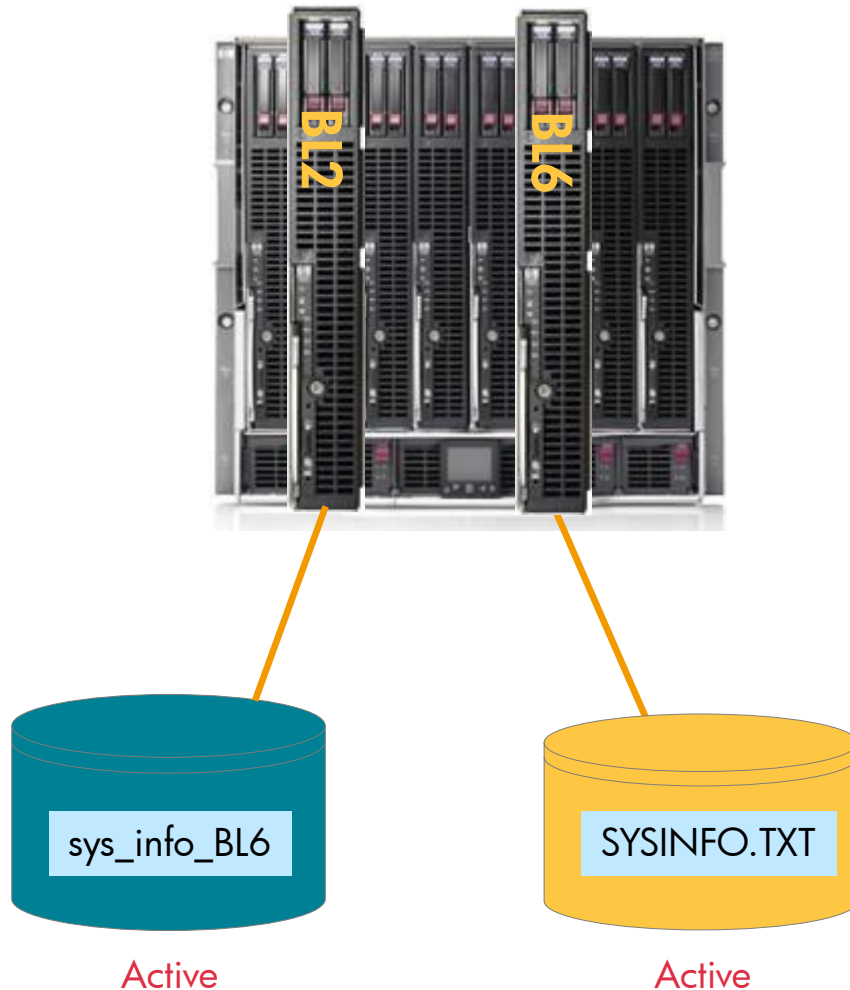
1. Original system image is the active image
2. Create clone of the original system image ([drd clone](#))
3. When clone completes, two copies of system image exist ([drd status](#))
4. Rehost the clone to be BL6:
  - a. Create a system information file
  - b. Copy the system info file to the EFI partition of the clone ([drd rehost](#))





# DRD use case

Rehosting – Provisioning (blade example, slide 2 of 2)



1. Original system image is the active image
2. Create clone of the original system image ([drd clone](#))
3. When clone completes, two copies of system image exist ([drd status](#))
4. Rehost the clone to be BL6:
  - a. Create a system information file
  - b. Copy the system info file to the EFI partition of the clone ([drd rehost](#))
5. Optional: Create a Virtual Connect Profile for BL6
6. Unpresent the LUN from BL2 and present it to BL6
7. Choose the new LUN from the EFI Boot Menu, and boot the BL6 blade

# Rehosting: Is



- Provided by **sysinfo file management**:
  - Ability to change hostname, IP @, network cfg
- Provided by 11i v3 **storage agility**:
  - Persistence of agile device files
    - E.g./dev/disk/disk10 linked to WWN in kernel registry
- Provided by 11i v3 **LVM**
  - Ability to boot from different disk from boot disk recorded in/etc/lvmtab

# Rehosting: Is not



- Additional software is not installed by “drd rehost”:
  - Use “drd runcmd swinstall” for **all drivers needed for target** before rehost
  - Use “drd runcmd mk\_kernel” to configure **all drivers needed for target** into kernel
- For **11iv2**, do not get
  - Storage agility
  - LVM Boot resiliency

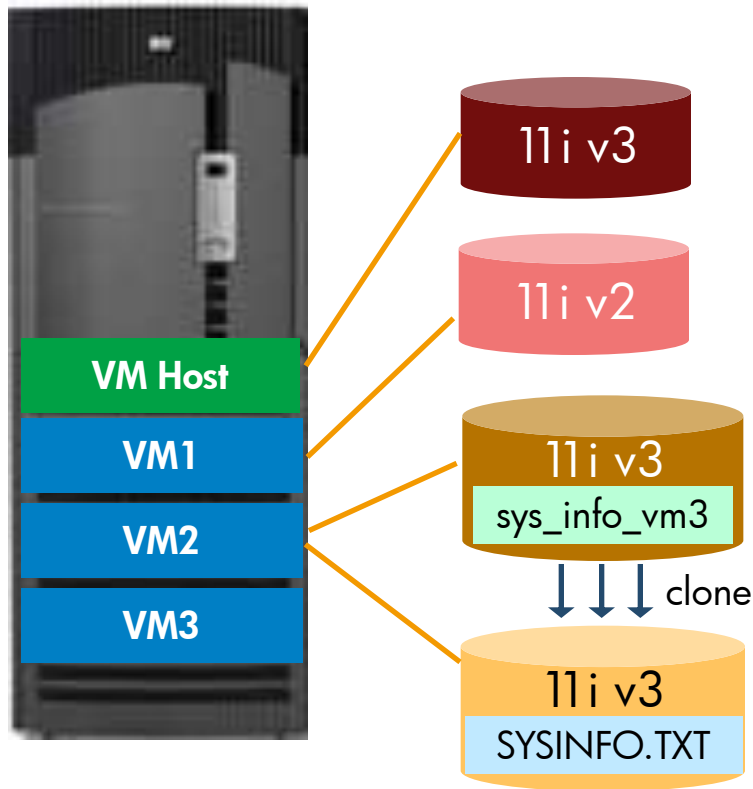
# Rehosting: Additional information



- Rehosting can be done between VMs, blades and even different systems **on 11i v3** – similar systems will be more straightforward, and different systems will require more manual work
- You may need to do **kernel work on the target system** for different systems, including different types of blades. The “Migrating an Integrity HP-UX 11i v3 Instance to New Hardware” whitepaper has additional information

# DRD use case

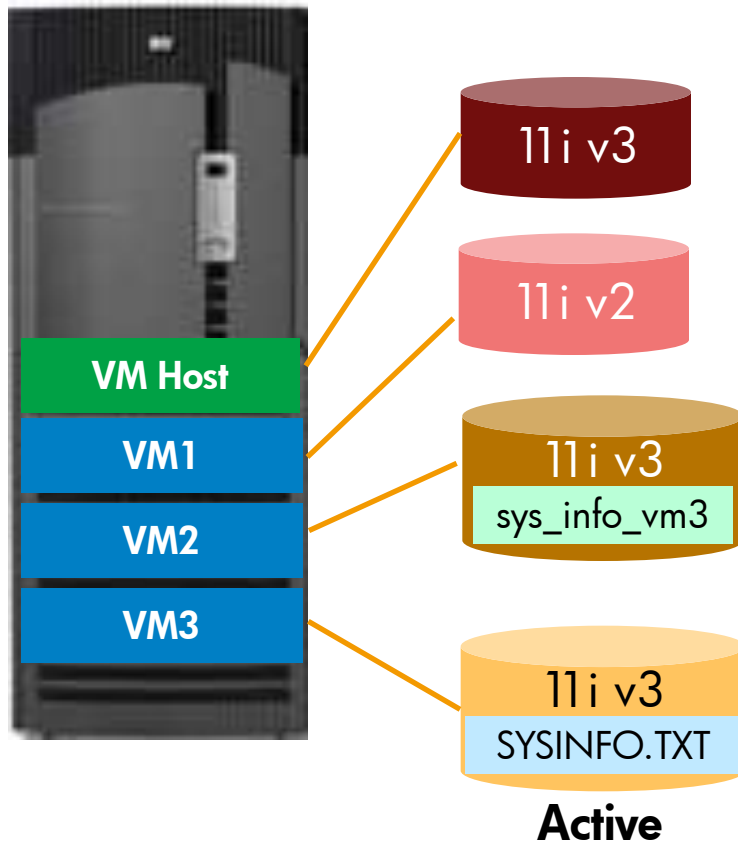
Maintaining a mixed 11i v2/v3 VM environment (slide 1 of 2)



1. Install VM Host, VM1 and VM2 via Ignite
2. VM3 needs to be added
3. On host, setup resources:
  - a. Add disk to VM2
  - b. Create VM3 with just a network interface
4. On VM2, create and rehost the new boot disk:
  - a. Create clone of the VM's system image ([drd clone](#))
  - b. When clone completes, two copies of system image exist ([drd status](#))
  - c. Create the system info file with VM3's personality
  - d. Copy the system info file to the EFI partition of the clone ([drd rehost](#))

# DRD use case

Maintaining a mixed 11i v2/v3 VM environment (slide 2 of 2)



1. Install VM Host, VM1 and VM2 via Ignite
2. VM3 needs to be added
3. On host, setup resources:
  - a. Add disk to VM2
  - b. Create VM3 with just a network interface
4. On VM2, create and rehost the new boot disk:
  - a. Create clone of the VM's system image ([drd clone](#))
  - b. When clone completes, two copies of system image exist ([drd status](#))
  - c. Create the system info file with VM3's personality
  - d. Copy the system info file to the EFI partition of the clone ([drd rehost](#))
5. On the host, activate VM3:
  - a. Move the clone disk from VM2 to VM3
  - b. Boot VM3, choosing clone from EFI menu



# DRD Status & DRD Sync



# DRD status

===== 9/23/11 22:09:00 MDT BEGIN Displaying DRD Clone Image  
Information (user=root) (jobid=drdtest10)

- \* Clone Disk: /dev/disk/disk8
- \* Clone EFI Partition: AUTO file present, Boot loader present
- \* Clone Rehost Status: SYSINFO.TXT not present
- \* Clone Creation Date: 10/24/10 16:41:56 MDT
- \* Last Sync Date: 10/25/10 14:26:16 MDT
- \* Clone Mirror Disk: /dev/disk/disk10
- \* Mirror EFI Partition: AUTO file present, Boot loader present
- \* Mirror Rehost Status: SYSINFO.TXT not present
- \* Original Disk: /dev/disk/disk7
- \* Original EFI Partition: AUTO file present, Boot loader present
- \* Original Rehost Status: SYSINFO.TXT not present
- \* Booted Disk: Clone Disk (/dev/disk/disk8)
- \* Activated Disk: /dev/disk/disk13

===== 9/23/11 22:09:13 MDT END Displaying DRD Clone Image  
Information succeeded. (user=root) (jobid=drdtest10)

#

# DRD sync



## Without DRD Sync

1. A system administrator creates a DRD clone on a Thursday
2. The administrator applies a collection of software changes to the clone on Friday using the `drd runcmd` command
3. On Friday, several log files are updated on the booted system
4. On Saturday, the clone is booted, however the log files are not up to date, so the administrator must copy over the log files and any other files from the original system that changed after the clone was created – for example, `/etc/passwd`

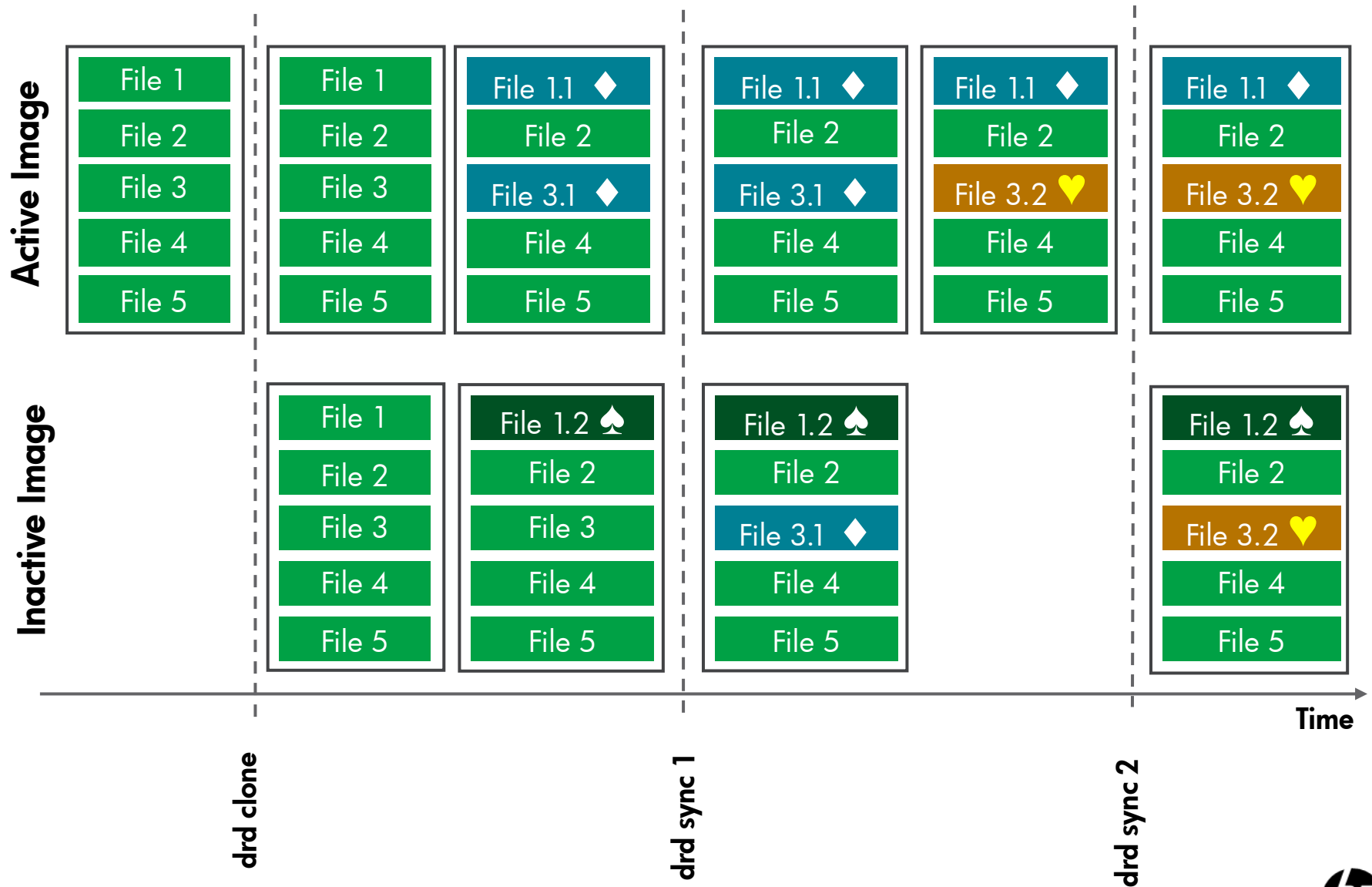


## With DRD Sync

1. A system administrator creates a DRD clone on a Thursday
2. The administrator applies a collection of software changes to the clone on Friday using the `drd runcmd` command
3. On Friday, several log files are updated on the booted system
4. On Saturday, the clone is synced then booted – log files and other files that have changed on the original system have automatically been copied to the clone



# DRD sync



# DRD sync – algorithm

- The list of files on the active system in the root group is the initial list of files to be synchronized

## Trimming the list of files to be synchronized



The following locations are not synchronized: /var/adm/sw/, /var/tmp/, /var/opt/drd/tmp/, /stand/, /tmp, /etc/lvmconf, /etc/vx/, /etc/vxvmconf/, /dev/<clone\_group>, plus files specified by administrator



Files that have changed on the clone because of operations other than 'drd sync' are not synchronized



Nonvolatile files in the Software Distributor Installed Products Database (IPD) are not synchronized



Volatile files in the Software Distributor Installed Products Database (IPD) are only synchronized if templates match



Files that are copies by a special "repair" mechanism such as /etc/fstab or /etc/lvmtab

# DRD real-life examples

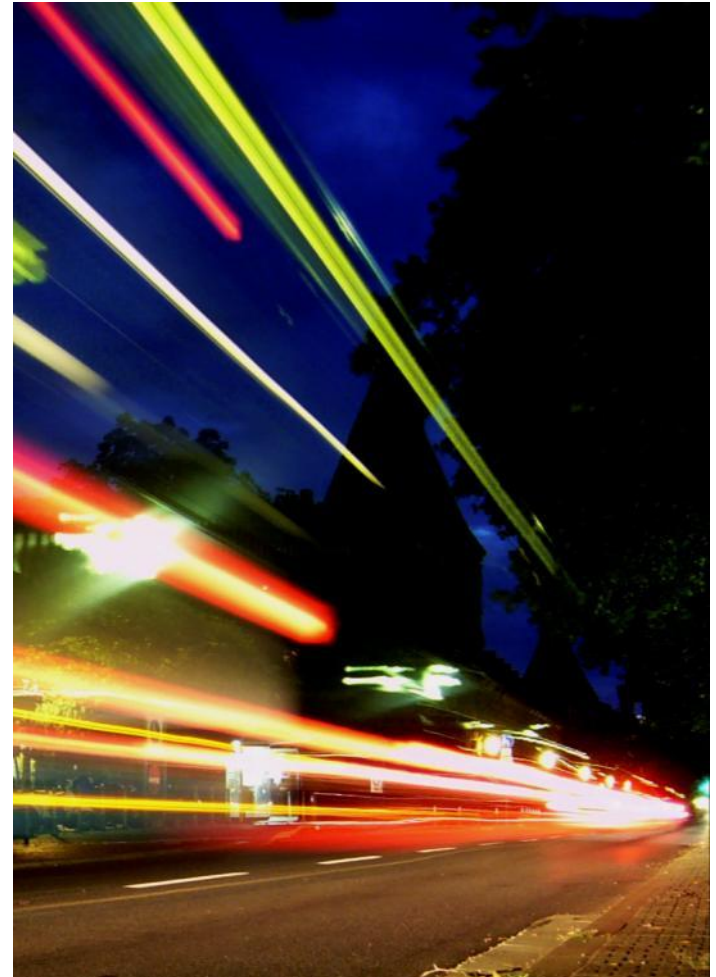




# Scenario 1: Maintenance of an 11i v3 IA system

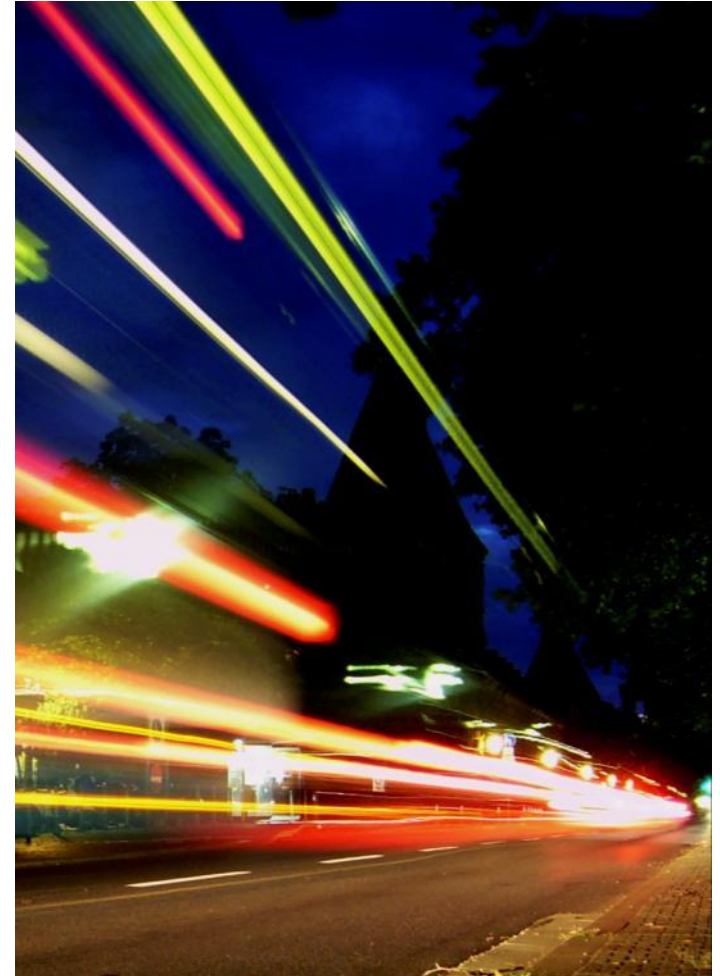
- System setup
  - rx3600, 8 GB RAM
  - HP-UX 11i v3, initial release
- **Without** DRD:
  - Quiesce the system
  - Load:
    - Quality Pack (QPK)
    - Hardware Enablement (HWE)
    - Feature11i
    - HP SIM, Software Assistant, MD5Checksum
  - Reboot system
  - Verify system
- Total downtime: **32:07** (min:sec)

Downtime



# Scenario 1: Maintenance of an 11i v3 IA system (Continued)

- System setup
    - rx3600, 8 GB RAM
    - HP-UX 11i v3, initial release
  - **With** DRD:
    - Create clone
    - Load:
      - Quality Pack (QPK)
      - Hardware Enablement (HWE)
      - Feature 11i
      - HP SIM, Software Assistant, MD5Checksum
    - Reboot system
    - Verify system
- Downtime**
- Total downtime: **13:29** (min:sec)
  - Downtime reduction: **~58%**



# Scenario 2: Updating an HP-UX 11i v3 IA system

- System setup
  - rx3600, 4 GB RAM
  - HP-UX 11i v3, March 2008

- **Without** DRD:

- Quiesce the system
  - Update to HP-UX 11i v3, March 2009
  - Reboot system
  - Verify system

**Downtime**

- Total downtime: **1:14:49**  
(hrs:min:sec)

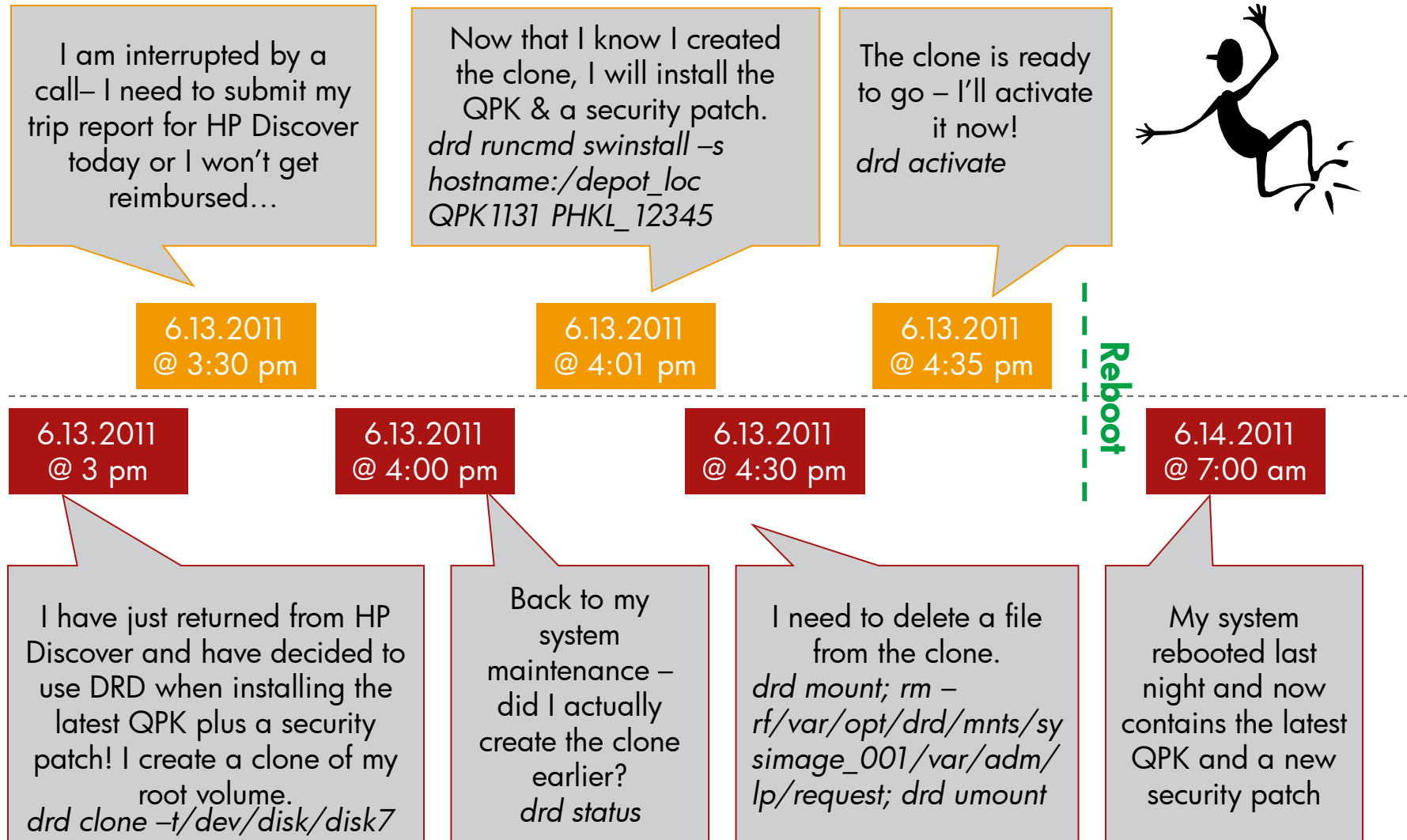


# Scenario 2: Updating an HP-UX 11i v3 IA system (continued)

- System setup
  - rx3600, 4 GB RAM
  - HP-UX 11i v3, March 2008
- **With** DRD:
  - Create clone
  - Update to HP-UX 11i v3, March 2009
  - Reboot system
  - Verify system
- Total downtime: **35:53** (min:sec)
- **Downtime reduction: ~52%**



# DRD sample timeline with command examples





# Wrap-up



# More information

- Get the DRD Toolset!
  - DRD tools and documentation are available as a no-cost download:  
<http://www.hp.com/go/drd>  
<http://www.hp.com/go/drd-docs>
- Documentation includes Administrator's Guide, manpages, FAQ and the following Whitepapers:
  - Quick Start & Best Practices
  - Dynamic Root Disk and Mirrordisk/UX
  - Exploring DRD Rehosting in HP-UX 11i v2 and 11i v3
  - Migrating an Integrity HP-UX 11iv3 Instance to New Hardware
  - DRD-safe Concepts for HP-UX 11i v2 and Later
  - Using DRD Activate and Deactivate Commands



*THANK YOU*

