Operating System Upgrades At RHIC

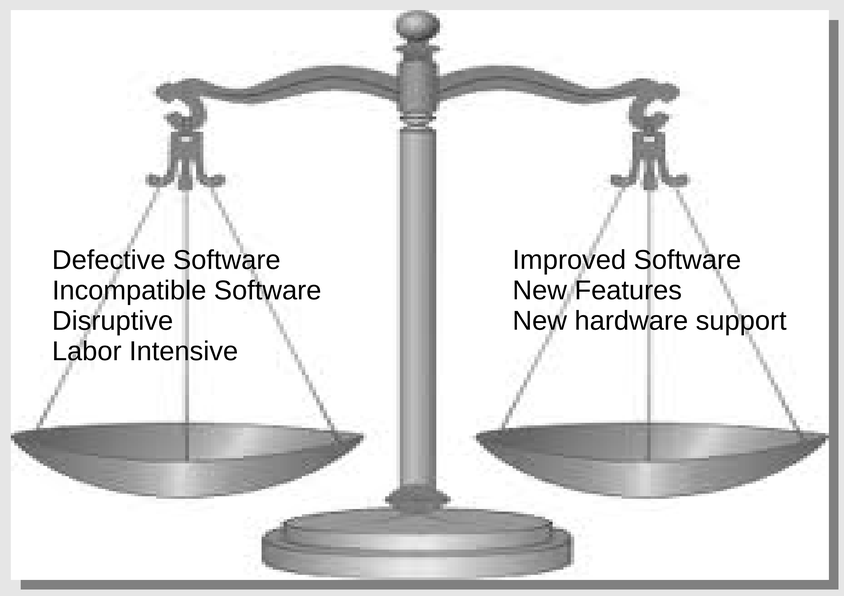
S. Binello, J. Laster, R. Katz, J.Piacentino, A. Fernando
Brookhaven National Laboratory, Upton, New York, USA

To Upgrade Or Not To Upgrade ?

Upgrading hundreds of machines to the next major release of an Operating system (OS), while keeping the accelerator complex running, presents a considerable challenge.

- Why should an upgrade be considered?
  (An upgrade is labor intensive and includes potential risks due to defective software.)
- When is it appropriate to make incremental upgrades to the OS?
  (Incremental upgrades can also be labor intensive and include similar risks.)
- When is the best time to perform an upgrade?
  (An upgrade can be disruptive.)
- Should all machines be upgraded to the same version at the same time?
  (It may not always be possible, and there may not be much reason to upgrade certain machines.)
- Should the compiler be upgraded at the same time?
  (A compiler upgrade can also introduce risks at the software application level.)

This poster examines our current answers to these questions, and describes how upgrades to the RedHat Linux OS are implemented by the Controls group at RHIC.



What is your answer ?

What Tips the scale at RHIC:

RedHat's 5.5 years full support, that is closely related to OS release schedule.

The Red Hat Enterprise Linux 5 and 6 life cycle:

Production 1 *(approx. 5 ½ years)*					Production 2 *(approx. 1 year)*	Production 3 *(approx. 3 ½ years)*				Extended Life Phase *(approx. 3 years)*		
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13

Production 1 phase provides for software enhancements and new hardware support.

Red Hat Enterprise Linux Life Cycle

Description	Production 1	Production 2	Production 3	Extended Life Phase[7]	Extended Life Cycle Support (ELS) Add-On[8]	Extended Update Support (EUS) Add-On[8]
Access to Previously Released Content through the Red Hat Customer Portal	Yes	Yes	Yes	Yes	Yes	Yes
Self-help through the Red Hat Customer Portal	Yes	Yes	Yes	Yes	Yes	Yes
Technical Support[1]	Unlimited	Unlimited	Unlimited	Limited[9]	Unlimited	Unlimited
Asynchronous Security Errata (RHSA)	Yes	Yes	Yes	No	Yes[8]	Yes[8]
Asynchronous Bug Fix Errata (RHBA)[2]	Yes	Yes	Yes	No	Yes	Yes
Minor Releases	Yes	Yes	Yes	No	No	No
Refreshed Hardware Enablement[3]	Native	Limited[4] Native	Using Virtualization	Using Virtualization	Using Virtualization	Using Virtualization
Software Enhancements[5]	Yes[6]	No	No	No	No	No
Updated Installation Images	Yes	Yes	Yes	No	No	No

What We Upgrade:

Machine Type	Purpose	Upgrade
Developer Consoles	Software development.	Yes
Process Servers	Controls servers & managers.	Yes
MCR Consoles	Multi-headed displays in MCR.	Yes
Field Consoles	Provide access to Controls system throughout complex.	Yes
Assorted Specialty Servers	Provide dedicated functions: NX, Compute, Compile, Version Control.	Yes
Archive Servers	NFS servers that store logged data.	No
System Servers	System services : NIS, NTP, FTP, DHCP.	No

Approach:

Controls group is used to test OS upgrades.

STEP 1:
- Upgrade one developer console.
- Create environment to allow development in both versions of the OS.
- Recompile all applications and libraries to eliminate any software incompatibilities.
- Release a small but critical subset of applications for testing.
- Do not rebuild and release all applications.

STEP 2:
- Upgrade additional developer consoles.
- Upgrade sample machines MCR console. Process servers, Field Consoles.
- Do not upgrade machines providing system services ex: NTP, NIS, FTP, DHCP.
- Do not upgrade machines used to archive logged data.

STEP 3:
- Complete Controls Group upgrade.
- Upgrade Physicist's consoles.
- Complete upgrade of MCR, Field Consoles and Process Servers.

Policies:

- Wait one year before adopting a new major OS release, i.e. WS5 to WS6.
- Disable automatic updates from Red Hat.
- Perform OS upgrades/updates annually to coincide with RHIC shut-down.
- Only critical security fixes required by ITD, or bug fixes we need are installed when accelerators are running.
- Maintain internal repository of all installed software.
- Upgrade most machines to the same level.
  - Exclude some file servers, and machines performing system services, ex: NTP, NIS, FTP, DHCP.
- Upgrade compiler separately, either before or after OS upgrade.

Testing:

- Upgrade and test sample machines by putting them to actual use.
- Gradually expand the group of machines upgraded.
- Upgrades tested as smaller accelerators start-up well before RHIC.
- Upgrades tested as a suite of applications are tested during the RHIC dry-run.