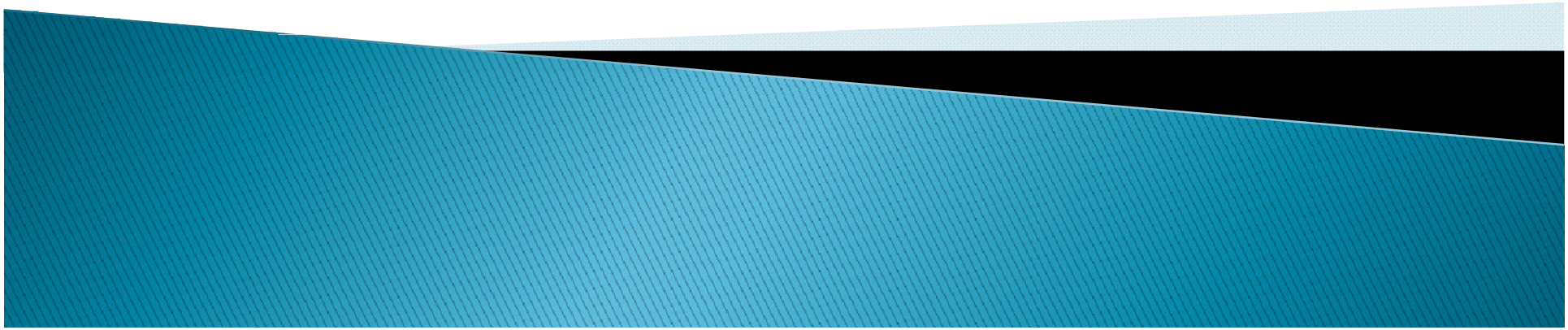
CernVM Status and Demo

36th LHCb Software Week

Pere Mato/CERN

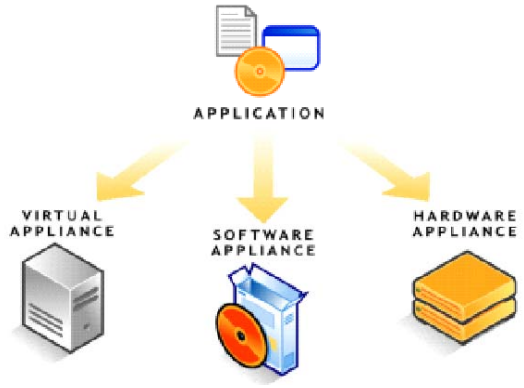


CernVM Project Goal

- Provide a complete, portable and easy to configure user environment for developing and running LHC data analysis locally and on the Grid independent of physical software and hardware platform (Linux, Windows, MacOS)
  - Decouple application lifecycle from evolution of system infrastructure
  - Reduce effort to install, maintain and keep up to date the experiment software
  - Lower the cost of software development by reducing the number of compiler-platform combinations

Key Building Blocks

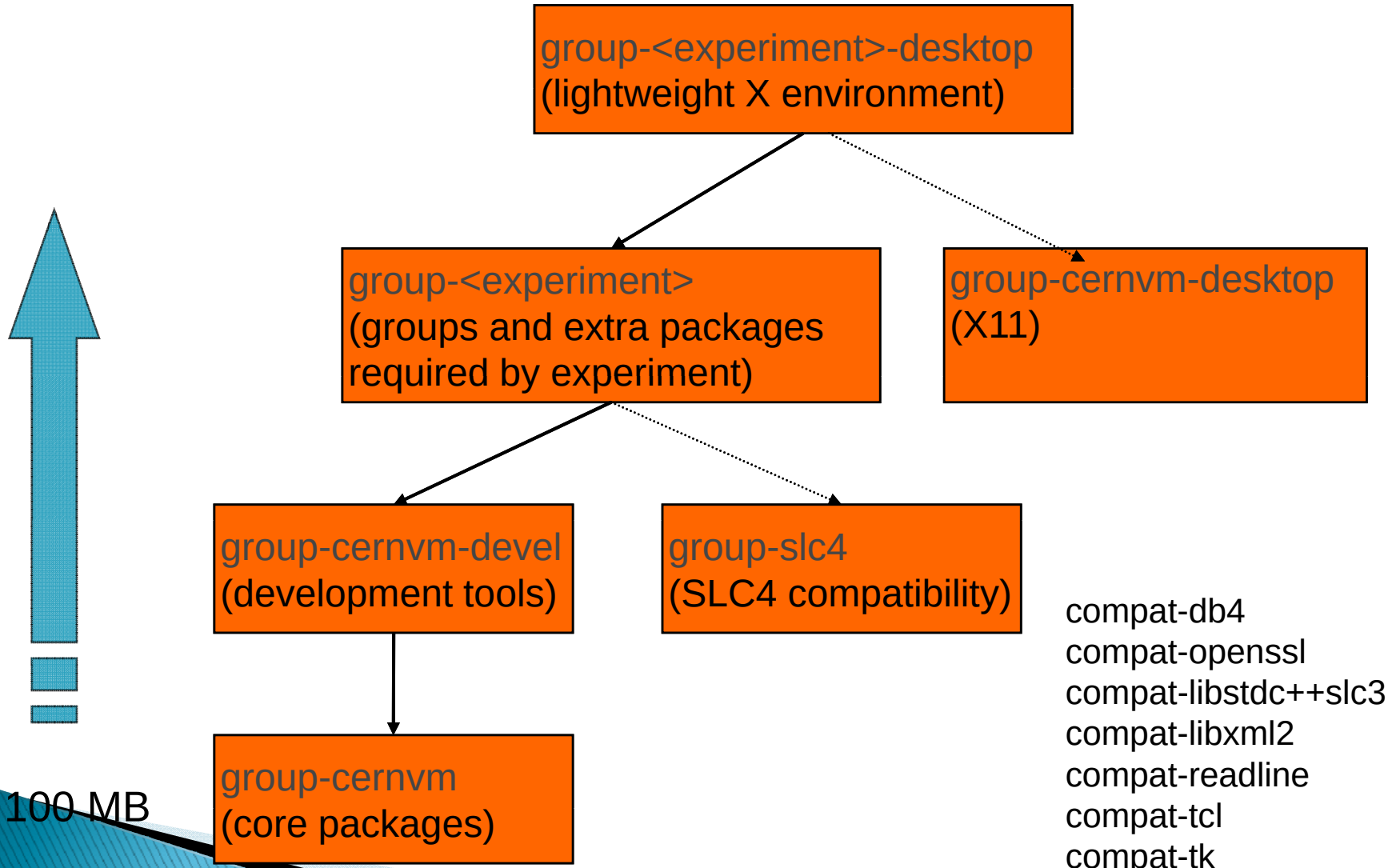
- rPath Linux 1 (www.rpath.org)
  - Slim Linux OS binary compatible with RH/SLC4
- rAA – rPath Linux Appliance Agent
  - Web user interface
  - XMLRPC API
- rBuilder
  - A tool to build VM images for various virtualization platforms
- CVMFS – CernVM file system
  - Read only file system optimized for software distribution
    - Aggressive caching
  - Operational in offline mode
    - For as long as you stay within the cache



Build types

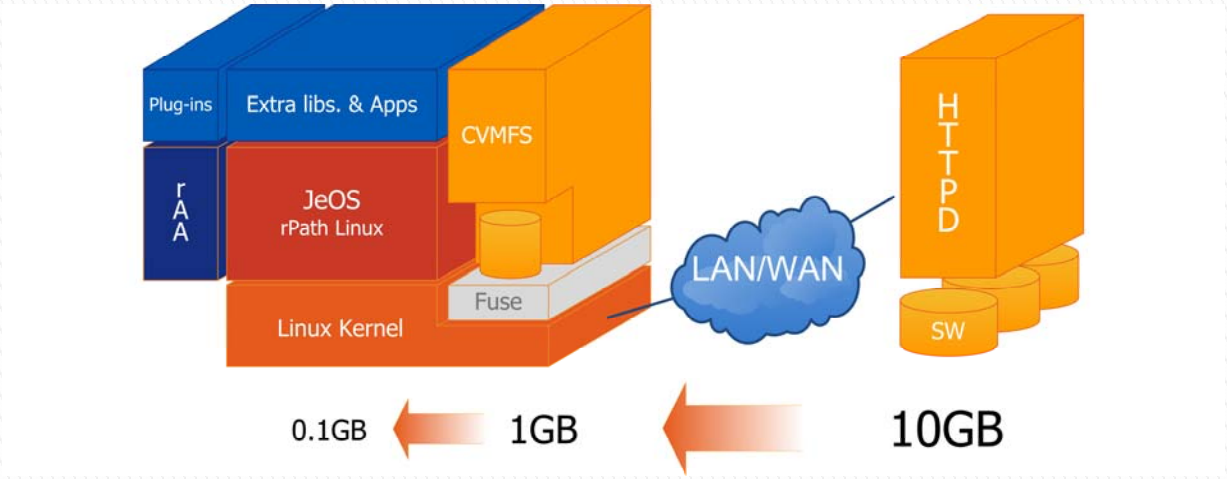
- Installable CD/DVD
- Stub Image
- Raw Filesystem Image
- Netboot Image
- Compressed Tar File
- Demo CD/DVD (Live CD/DVD)
- Raw Hard Disk Image
- Vmware ® Virtual Appliance
- Vmware ® ESX Server Virtual Appliance
- Microsoft ® VHD Virtual Apliance
- Xen Enterprise Virtual Appliance
- Virtual Iron Virtual Appliance
- Parallels Virtual Appliance
- Amazon Machine Image
- Update CD/DVD
- Appliance Installable ISO

CernVM Variations



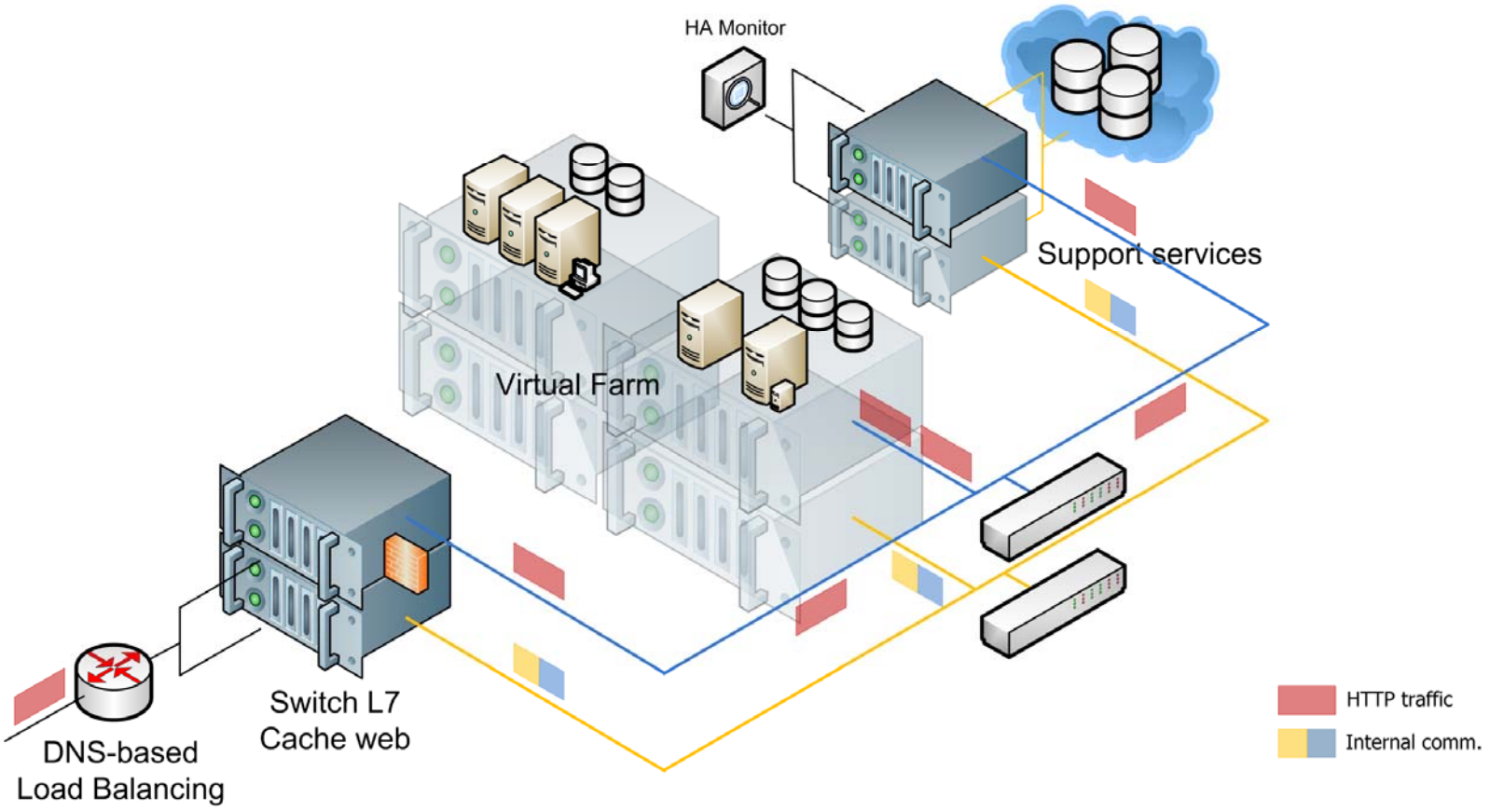
compat-db4
compat-openssl
compat-libstdc++slc3
compat-libxml2
compat-readline
compat-tcl
compat-tk

CVMFS



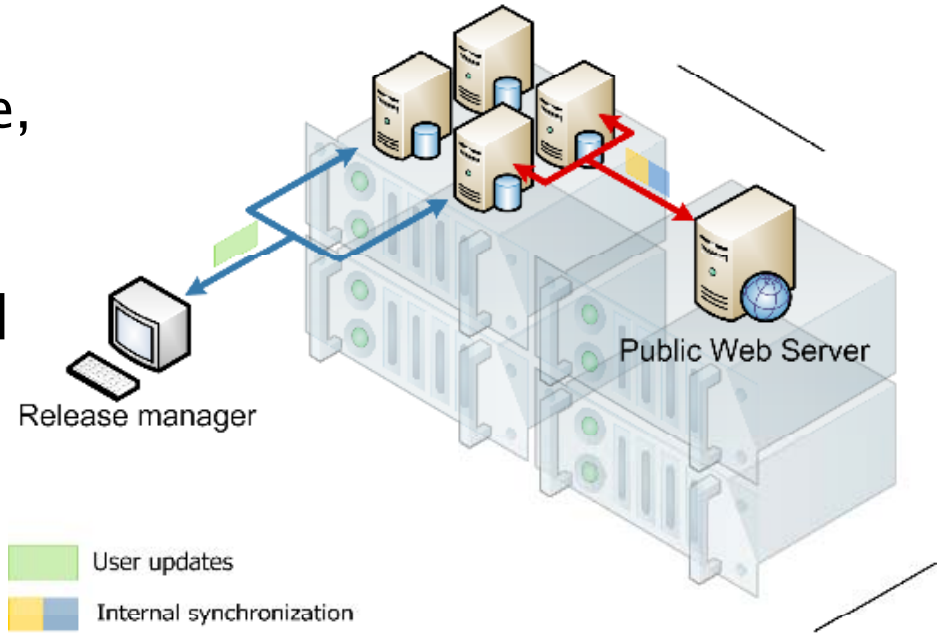
- CernVM File System (CVMFS) is derived from Parrot (http://www.cctools.org) and its GROW-FS code base and adapted to run as a FUSE kernel module adding extra features like:
  - possibility to use multiple file catalogues on the server side
  - transparent file compression under given size threshold
  - dynamical expansion of environment variables embedded in symbolic links

Scalable CVMFS Infrastructure



Publishing Releases

- Experiments publish new releases themselves
  - Installation done in a dedicated Virtual machine, which then synchronizes with Web Server
- Transparent to CernVM end-users
  - New versions appear in the 'local' file system



The CernVM Environment

- A complete Data Analysis environment is available for each Exp.
  - Code check-out, edition, compilation, local small test, debugging, …
  - Castor data files access, Grid submission, …
  - Event displays, interactive data analysis, …
- No user installation required !!
- Suspend/Resume capability !!

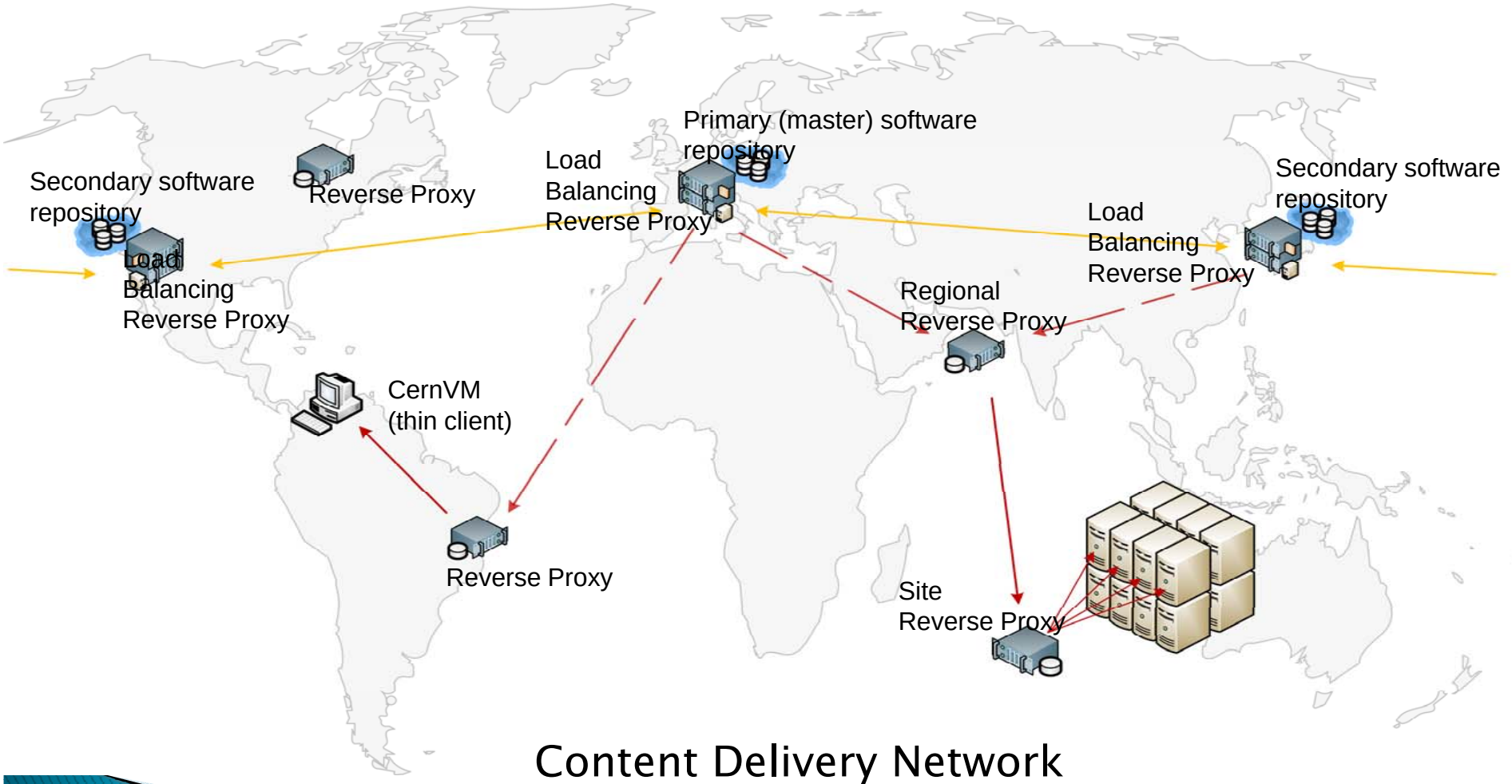
1.01 Release

- Available now for download from
  - http://cern.ch/cernvm/?page=Release1.01
- Can be run on
  - Linux (KVM, Xen,VMware Player, VirtualBox)
  - Windows(WMware Player, VirtualBox)
  - Mac (Fusion, Parallels, VirtualBox)
- Release Notes
  - http://cern.ch/cernvm/?page=ReleaseNotes
- HowTo
  - http://cern.ch/cernvm/?page=HowTo
- Appliance can be configured and used with ALICE, LHCb, ATLAS (and CMS) software frameworks

CernVM Next Steps

- Remove single point of failure, develop and test a Content Delivery Network
- Migrate CernVM to rPath Linux 2 (SLC5 compatible)
- Migration of our pilot services on IT hosted resources
- Investigate CernVM as job hosting environment
  - Voluntary computing such as BOINC
  - Dedicated virtual facilities

Removing Single Point of Failure



Content Delivery Network

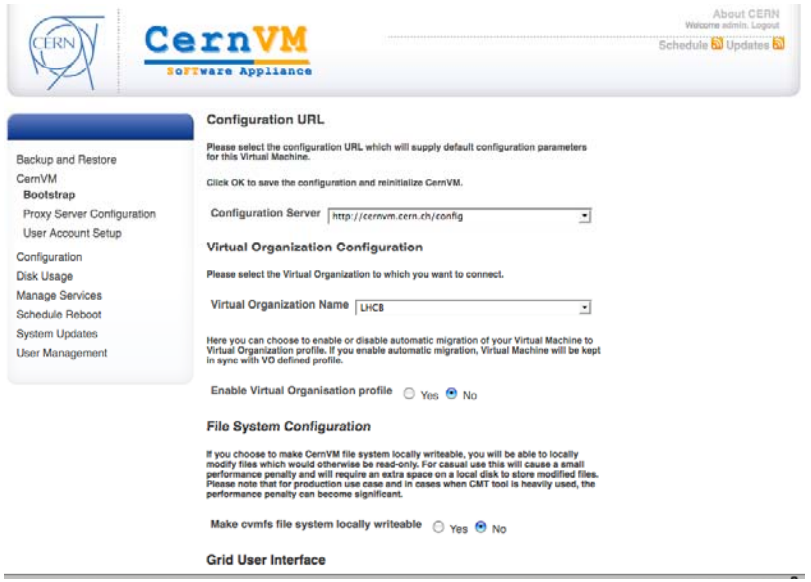
Supporting CernVM by LHCb

- To be really useful new software releases of LHCb needs to be published on CVMF
  - Nightlies will be also desirable
- The basic instructions to *Librarians*
  - ssh -l <experiment> <experiment>-webfs.cern.ch
  - setenv MYSITEROOT /opt/<experiment>/…
  - **install_project.py** -p <project> -v <version> -b
  - …test installation…
  - /usr/bin/cvmfs-update -c <tag_name> (create tag)
  - /usr/bin/cvmfs-update -p <tag_name> (publish)
- No different than installing in any other platform

Demo

Summary of Instructions

- Install VMWare Fusion (http://www.vmware.com/) or VirtualBox (http://www.virtualbox.org/)
- Step-by-step instructions (from ATLAS)
  - https://twiki.cern.ch/twiki/bin/view/Atlas/CernVMGuideDetail
  - Additional instructions for VirtualBox (port forwarding)
- Optionally add a User disk
- Boot CernVM
- Configure using Web Browser
  - LHCb configuration
  - User account
  - Upgrade to 'group-lhcb-desktop'
- Start desktop (startx)
- Start using as 'lxplus'



User Disk

- It is convenient to separate the ‘system’ disk from the ‘user’ disk
- Instructions
  - create the disk using VMware settings (SCSI)
  - create partition (fdisk /mnt/sdb ...)
  - format (fsmake -L home -t ext3 /mnt/sdb1)
  - edit /etc/fstab and add the line "LABEL=home /home ext3 defaults 1 1”
  - create user home directory (mkdir /home/<user>)