



VML and CernVM

Virtualization for ATLAS

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In collaboration with the CernVM Team

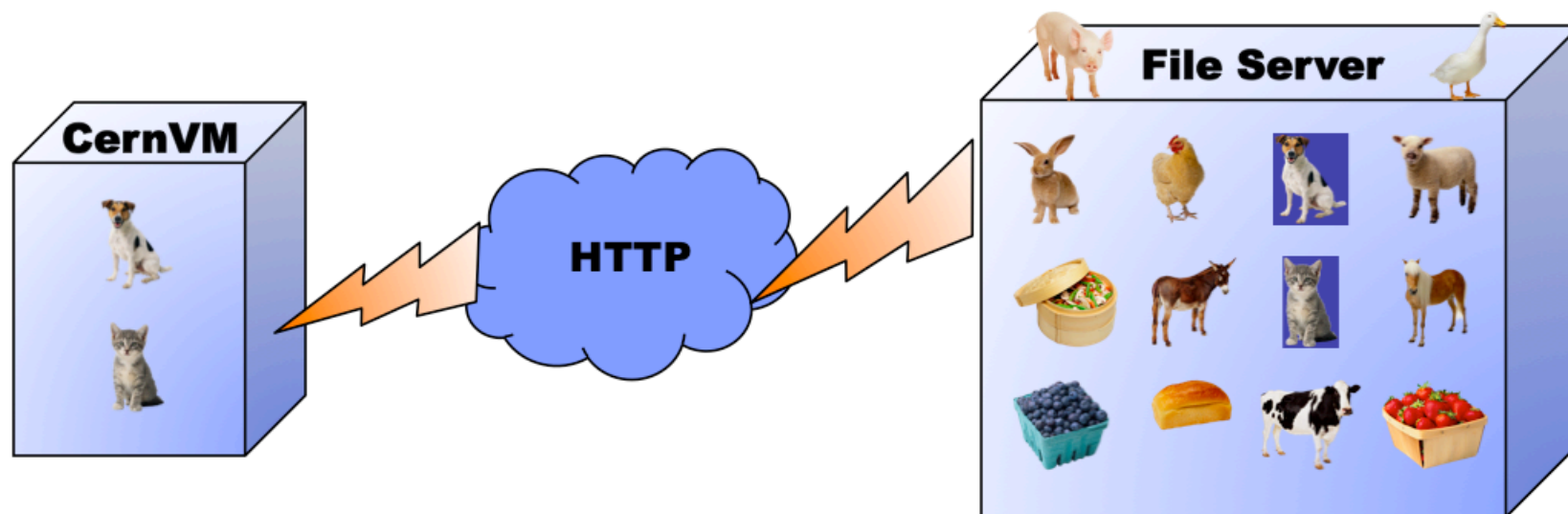


What is CernVM

- Our Goal: do all development/analysis on your own laptop.
- why? Why not lxplus?
 - Always need to connect with ssh, lost connection = lost where I was
 - Always need to compete resources with other users
 - Always need a Network Connection, we are business travellers, we need to work when flying
- Why not download an ATLAS kit into your own laptop?
 - It's TOO BIG (8 GB each release and one release every month, for nightly builds, there is 8GB every day)
 - I don't have SLC on my laptop, so a kit simply doesn't run
- CernVM is a Virtual Machine, which runs on every laptop
- CernVM is Small, but big enough to run ATLAS
- CernVM give you access to ATLAS software, without downloading them.



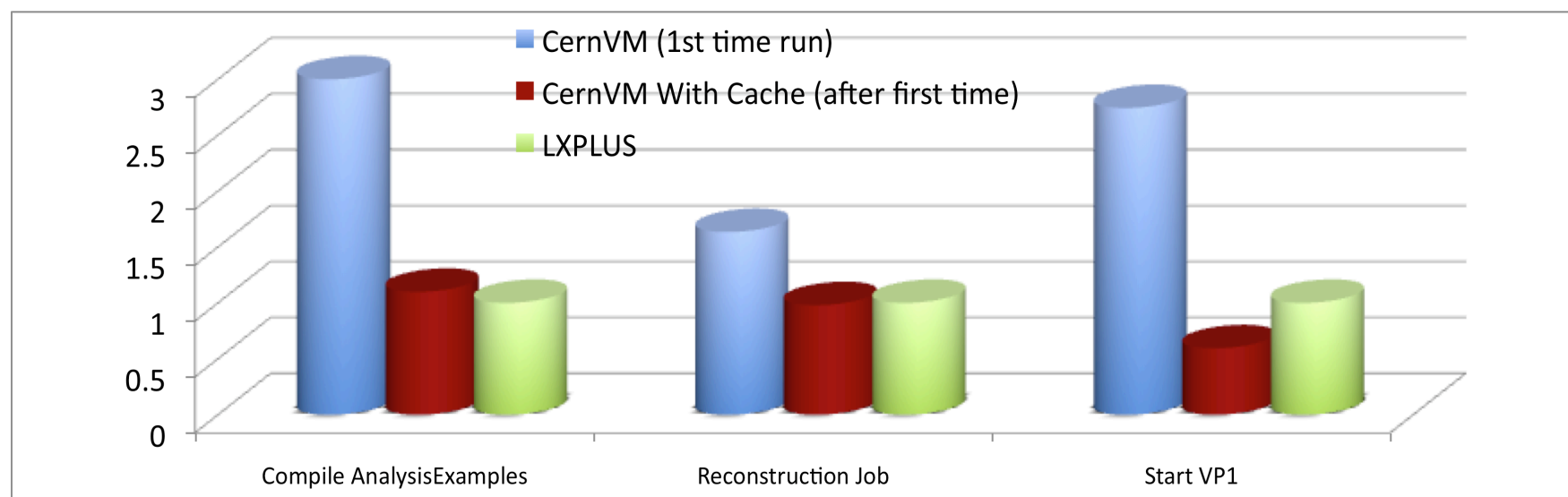
CernVM File System (CVMFS)



- There might be a lot of files inside an ATLAS software kit (8GB)
 - Only a fraction of them are needed for certain development/analysis
 - We put the ATLAS kits on a HTTP server
 - CVMFS will go online to fetch the files when they are first accessed
 - After the files are fetched, they are saved locally for future access
- Only 700MB download is needed to run full reconstruction, and it is done automatically



Performance CernVM vs.. LXPLUS



- For the first time running, CernVM is 2-3 times slower, depending on the network speed, since it needs to cache files
- Once the files are cached, the speed on CernVM is roughly the same as on LXPLUS. CernVM is faster when reading large files (since they are local)
- Note: LXPLUS has a higher CPU rate than my test computer (3GHz vs. 2.66GHz)



ATLAS Extension to CernVM

- Release Manage
 - Now user have access to NIGHTLY BUILDS
 - Individual releases could be mounted via a simple web interface

The screenshot shows a web browser window with the URL `http://localhost:8004/rAA/releasemgr/releasemgr/`. The page title is "Manage Software Releases!". The interface includes a navigation menu on the left with options like "Backup and Restore", "Cache Preload", "CernVM", "Configuration", "Disk Usage", "Manage Services", "Manage Software Releases" (highlighted), "Schedule Reboot", "System Updates", "User Management", and "X11 Server". The main content area has tabs for "Running", "Available (15)", and "Configure". Under the "Available (15)" tab, there is a "List of Available releases:" section. Two releases are listed:

No.1

Name:	2009_03_10_rel_2
MountPath:	/atlasreleases/kits/15.X.0/rel_2
HTTPAddress:	http://128.3.2.13/kits/15.X.0/2009_03_10_rel_2
CacheDir:	/var/cache/releasemgr.cache/http___128_3_2_13_kits_15_X_0_2009_03_10_rel_2
LogFile:	/var/log/releasemgr.log/http___128_3_2_13_kits_15_X_0_2009_03_10_rel_2.log

Buttons: **Start** **Customize&Start**

No.2

Name:	2009_03_09_rel_1
MountPath:	/atlasreleases/kits/15.X.0/rel_1
HTTPAddress:	http://128.3.2.13/kits/15.X.0/2009_03_09_rel_1
CacheDir:	/var/cache/releasemgr.cache/http___128_3_2_13_kits_15_X_0_2009_03_09_rel_1
LogFile:	/var/log/releasemgr.log/http___128_3_2_13_kits_15_X_0_2009_03_09_rel_1.log

Buttons: **Start** **Customize&Start**



1-click X-Windows and Event Display

The screenshot displays the CernVM Virtual Point 1 (VP1) interface. The top bar shows the CERN logo and the text "CernVM Software Appliance". The main window is titled "Virtual Point 1 [run# 0, event# 0]" and has tabs for "Quick Launch", "Configuration", and "Style". The "Configuration" tab is active, showing a "Controls: Geometry" section with sub-tabs for "General", "Guides", and "Geo". The "Geo" sub-tab is selected, displaying a 3D model of the ATLAS detector geometry. The model is a complex, multi-colored structure (yellow, blue, green) representing the detector's internal components. The model is viewed from a perspective angle, showing the barrel and endcap regions. The interface includes various controls for the geometry, such as "Display", "Interactions", "Icon B...", "Misc.", "Browser", and "Chambe...". There are also checkboxes for "Inner Detector" (Pixel, SCT, TRT, Services), "Calorimeters" (LAr, Tile), "Muon systems" (Toroids, feet, shields, etc.), "Barrel stations" (Inner, Middle, Outer), "Endcap stations" (CSC, TGC, MDT), and "Miscellaneous" (Beam Pipe, Cavern Infra, LUCID, ZDC, ALFA). The 3D model is displayed on a grid floor. The interface also includes a "Server(s) Currently" section with a table showing server status and a "Connect Now" button.

Number	Screen Shot	Operations
		Connect Now Stop Server

Click "Connect Now" to connect to the server using the website build-in VNC. You need to have java installed on your system. Please visit the [SUN JAVA](#) website to download java.

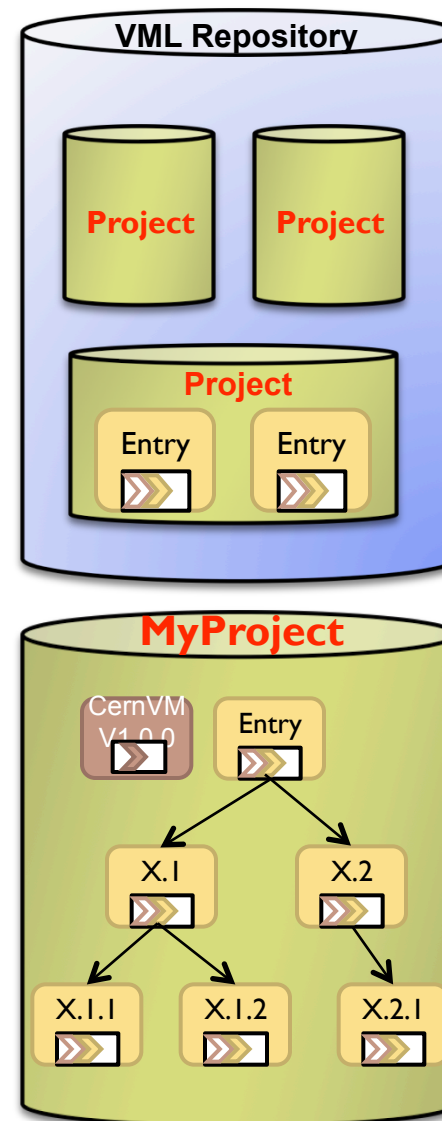
Click "Stop Server" button to stop a running server, all running programs in this server will be terminated and all unsaved work will be lost.

Next time LHC is turned on, remember to Launch CernVM with VP1 and see the events live on your laptop.



Virtual Machine Logbook (VML)

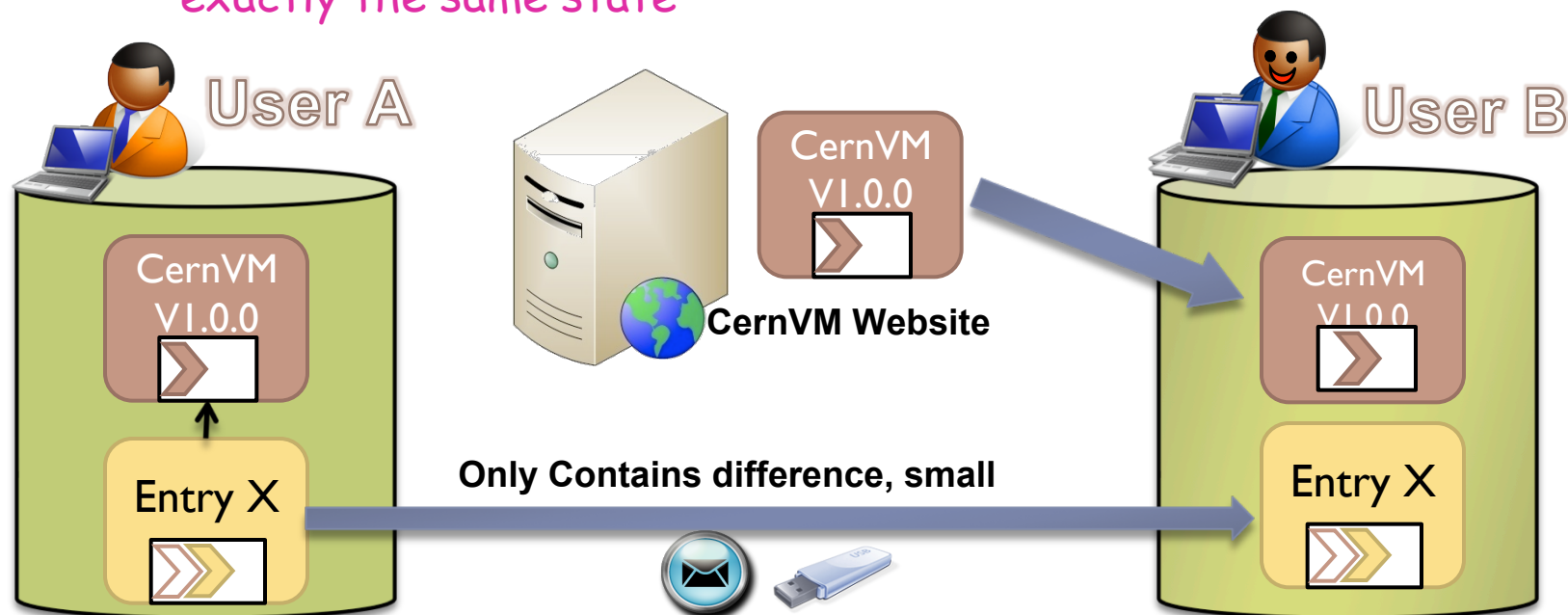
- VML is a tool that helps you organize and share your virtual machines
 - Work on multiple projects at the same time:
 - Analyze data in Project1
 - Develop new code in Project2
 - Bug fix in Project3
 - Save the states of a project, even build a tree of states.
 - Quickly switch between different projects
 - Automation of CernVM initialization
 - Though CernVM setup is already simple, one can make it simpler with VML. One simple command, VML will download, update and setup a ready to use CernVM.
- Available for Linux/Windows with VMware
 - Support for Mac and other hypervisors are in development





Sharing Work with VML

- All your CernVM projects are based on certain version of CernVM (e.g. 1.01)
- VML can save a state of your work
 - the saved state contains only the difference from its base
 - The difference can be very small, that you can send it over email.
- To share your work, just send the difference to another user
 - VML will obtain the base CernVM automatically and reconstruct exactly the same state





CVMFS to Distribute Software

- We have tested CVMFS not only inside CernVM, it also works in SLC4/5
- Comparing CVMFS to AFS/NFS
 - Although AFS/NFS caches data as well, CVMFS gives more flexibility in managing cache, and can work totally offline.
 - Read-only CVMFS might also give better performance over the read/write AFS/NFS.
- CVMFS can be used to distribute ATLAS software
 - It reduces the work load of institution's administrators
 - No need to download a new kit each time one comes out. When a new Release arrives, it's ready-to-use with CVMFS.
 - Currently we are trying to deploy CVMFS to tier 3's, since they normally don't have high speed network drive to distribute the software.
- We are also investigating the possibility of using CVMFS to deploy software for Batch Systems.



Call for Proxies

- A proxy can let your local user have 10X faster CernVM
- Anybody can setup a proxy server:
 - We will provide help on SQUID install and configuration
 - The server can use port 80, which is normally not blocked by firewall
 - You can setup a proxy which only allow user from your own institution
 - The proxy server only have limited traffic.



Summary

- CernVM
 - Do All Development / Analysis on your Laptop
- Virtual Machine Logbook
 - Organize your CernVM projects
 - Share your work with others
 - Not only sharing the code
 - But also sharing the whole environment (state-of-work)
- Standalone CVMFS to distribute software
 - Save a lot of disk space
 - Much faster than AFS (for outside CERN access)
- Please contribute by setting up your own proxy server.