

Virtualisation usage at CERN

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with contributions from:

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Motivation and Objectives

- ▶ Consolidate low utilized machines with high power consumption on cheap and more powerful ones
 - Reducing costs both direct and indirect
 - Meet increasing demand for test and development machines
- ▶ Having virtualisation technique in place for future use cases and demands
- ▶ Transparency for users
 - Performance – as little difference as possible
- ▶ Virtual machines should be managed like real ones
 - Usage of existing infrastructure frameworks such as ELFms



Xen Configuration

- ▶ Xen 3.0.3
- ▶ Kernel supplied by Linux Team
 - 2.6.18 for hypervisor (dom0)
 - 2.6.9 for virtual machine (domU)
- ▶ SLC 4
- ▶ 32 and 64-bit systems
- ▶ Dual 2.8 GHz Intel Xeon CPUs (no VT support yet)
- ▶ 4 GB memory
- ▶ 250 GB hard disk capacity

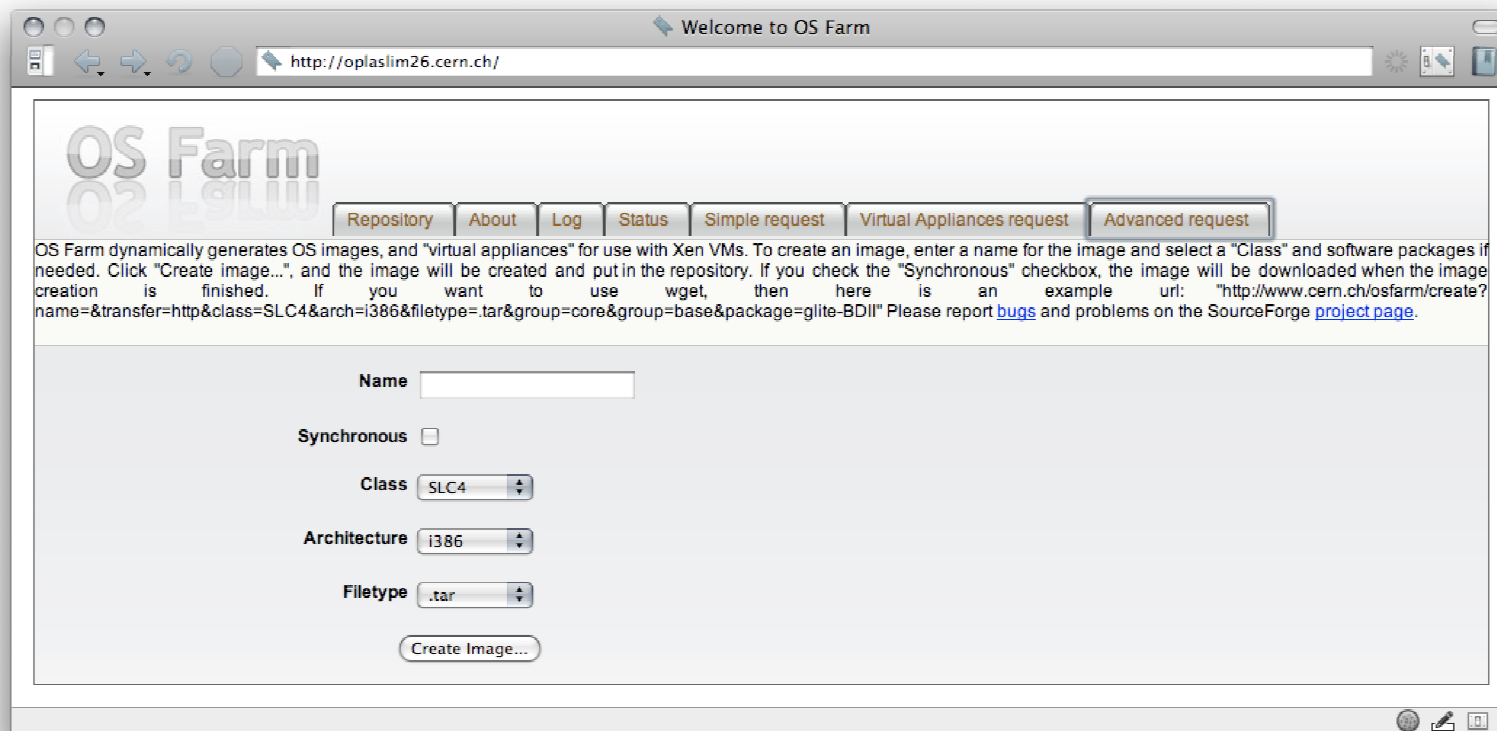
- ▶ Networking
 - Virtual mac addresses and hostnames provided in advance
 - Different subnets for hypervisors and virtual machines
- ▶ Modelling
 - Enclosures in CDB for link between physical and virtual machines
 - System administration
 - Hardware and state management
- ▶ Configuration and Installation (quasi automated)
 - Quattor components (ncm-xen & ncm-fileystems)
- ▶ Console Access
 - Through existing headnodes (virtual machines through hypervisor)
- ▶ Monitoring
 - New lemon sensor for measuring complete CPU utilization
- ▶ Provisioning and Image management
 - No images, full installations with Quattor

Virtualization in gLite certification (1/4)

- ▶ Used in certification testbed of gLite middleware
 - 30 real machines at CERN and partner sites
 - 40 virtual machines at CERN
 - 12 hypervisors (10 machines 32-bit and 2 machines 64-bit)
 - Daily regression tests
 - Installation and configuration patches and special tests
- ▶ Parallel certification of several patches at the same time without spoiling the real test bed
- ▶ Able to quickly switch between different versions of a service
- ▶ Many configurations: SL(C)3/4 – gLite 3.0/3.1 – i386/x86_64
- ▶ Quattorized Xen hypervisor provided by FIO
- ▶ Virtual machines are created by a few standard images

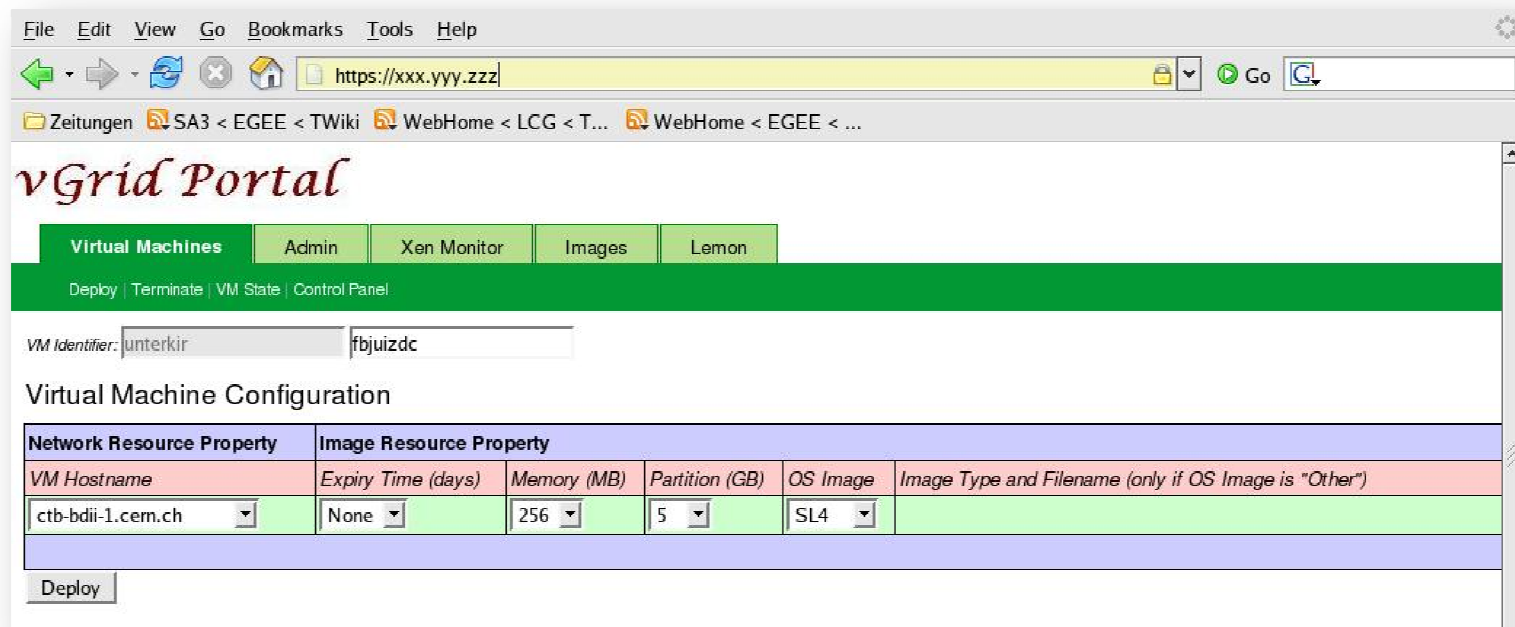
Virtualization in gLite certification (2/4)

- ▶ Home made scripts and web interface (osfarm) to generate linux images (SL(C), Debian, Ubuntu, CentOS, RedHat) and keep them up to date



Virtualization in gLite certification (3/4)

- ▶ vGrid as tool to manage virtual machines via web interface
 - Start/Stop VM
 - Choose HV, VM hostname and baseimage
 - Monitoring



The screenshot shows a web browser window displaying the vGrid Portal. The browser's address bar shows a URL starting with https://xxx.yyy.zzz. The page title is "vGrid Portal" and it features a navigation menu with "Virtual Machines", "Admin", "Xen Monitor", "Images", and "Lemon". Below the menu, there are links for "Deploy", "Terminate", "VM State", and "Control Panel". The "VM Identifier" field contains "unterkir" and "fbjuizdc". The "Virtual Machine Configuration" section includes a table with columns for "Network Resource Property" and "Image Resource Property".

Network Resource Property		Image Resource Property			
VM Hostname	Expiry Time (days)	Memory (MB)	Partition (GB)	OS Image	Image Type and Filename (only if OS Image is "Other")
ctb-bdii-1.cern.ch	None	256	5	SL4	

Deploy

Virtualization in gLite certification (4/4)

- ▶ Observations
 - System heavily used since October 2006
 - Image saving hardly needed
 - About 15 active users

- ▶ Future Plans
 - Fully virtualized grid test bed
 - Move also testing to ETICS



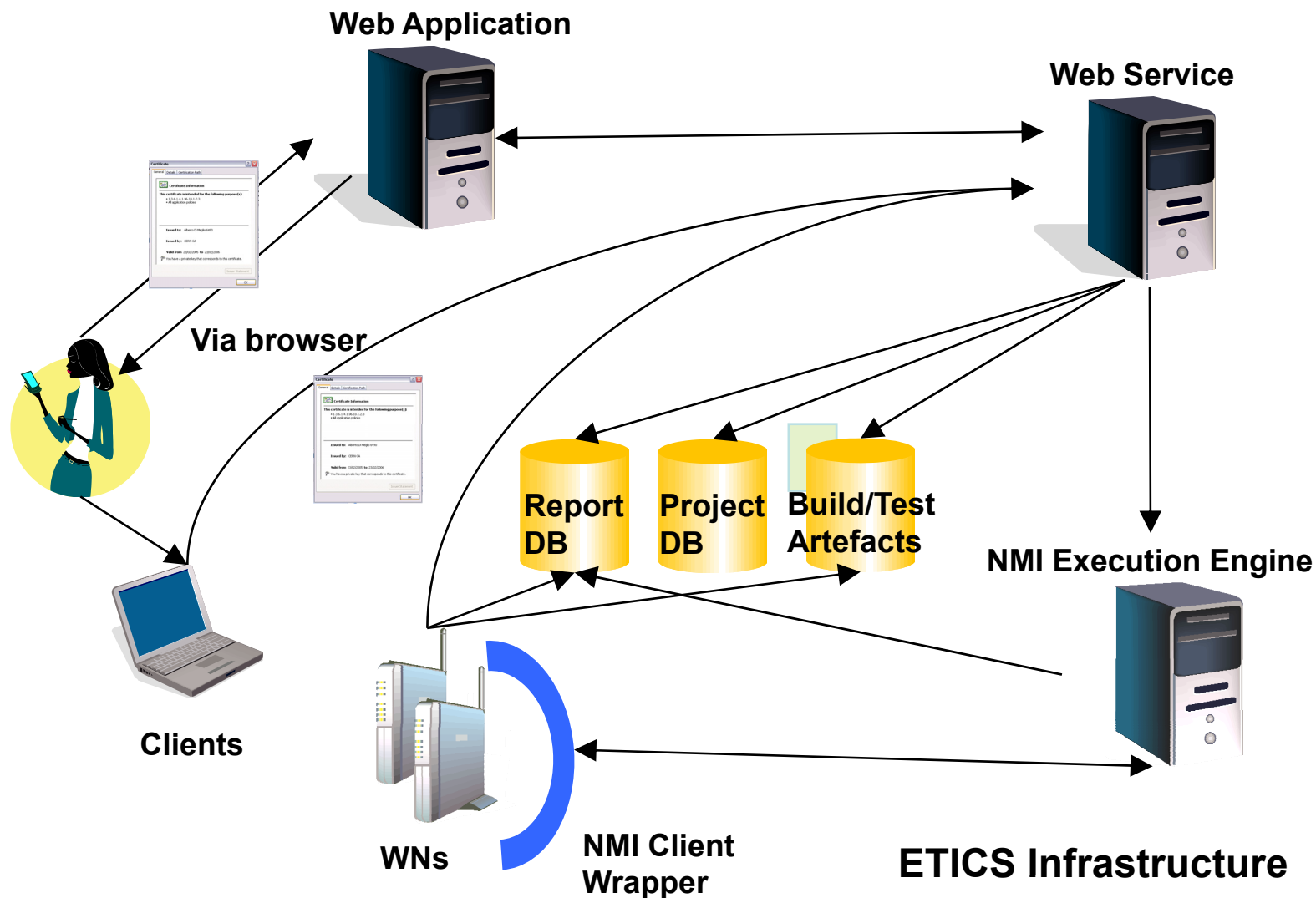
ETICS & Virtualization



- ▶ ETICS – **e**-Infrastructure for **T**esting, **I**ntegration and **C**onfiguration of **S**oftware
- ▶ Goal is to provide efficient automated tools of building and testing (this years focus)
- ▶ Project started January 2006 and has a duration of 2 years
- ▶ 25+ Projects in the database
- ▶ 180+ registered users and 80 active
- ▶ Main features:
 - powerful and flexible automatic dependency management
 - Produces different package formats (rpms, tar, msi, debs)
 - Possibility of building everything from source or use pre-built packages
 - Publishes run-time configuration information
 - Designed to support several Version Control Systems



ETICS – Service Architecture



ETICS & Virtualization



- ▶ 10% of the worker nodes are virtualized
- ▶ VMware is used as virtualization technique
 - Native/full virtualization
 - Multi-plattform
 - Widely adopted, very live community
 - Virtual appliances
 - No host modification needed
 - VMWare infrastructure is free
 - Web interface for management and configuration

- ▶ Why not Xen?
 - Condor has integration with VMWare only
 - Intervention in the hosting OS needed
 - Not available for all platforms
 - „heavy“ approach for WinXX



ETICS & Operational Issues



- ▶ Monitoring
 - Host systems not integrated in existing infrastructure
 - Guest systems are made with proprietary code
- ▶ Configuration
 - Host systems: manual (Quattorized in the future)
 - Guest systems: automated installation and cloning
- ▶ Networking
- ▶ Image management
- ▶ Time synchronisation
- ▶ Costs
- ▶ Hardware requirements
- ▶ Future Plans
 - Request driven resource allocation
 - Full virtualization of ETICS testbed
 - ETICS WN image for download



Thank You!

eGee
Enabling Grids
for E-science



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Any Questions ?

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