WNoDeS: Current status and Evolutions

Alessandro Italiano - INFN-Tier1 farming group

Workshop CCR 2010

Agenda

WNoDeS: Introduction

Current Status

Evolutions: Where we would like to get

What is WNoDeS

***W**orker **N**odes **o**n **De**mand **S**ervice is a software INFN is developing. It is built around a tight integration with the LRMS.*

It permits a full integration with existing computing resource scheduling, policing, monitoring, accounting and security workflow.

WNoDeS dynamically provides virtualized and customized computing resources on demand.

Virtualized resources can be used to run applications software, interactive analysis, software development, services and so on.

In a few words, WNoDeS lets local, grid and cloud computing converge upon Dynamically Provided Virtualized Resources.

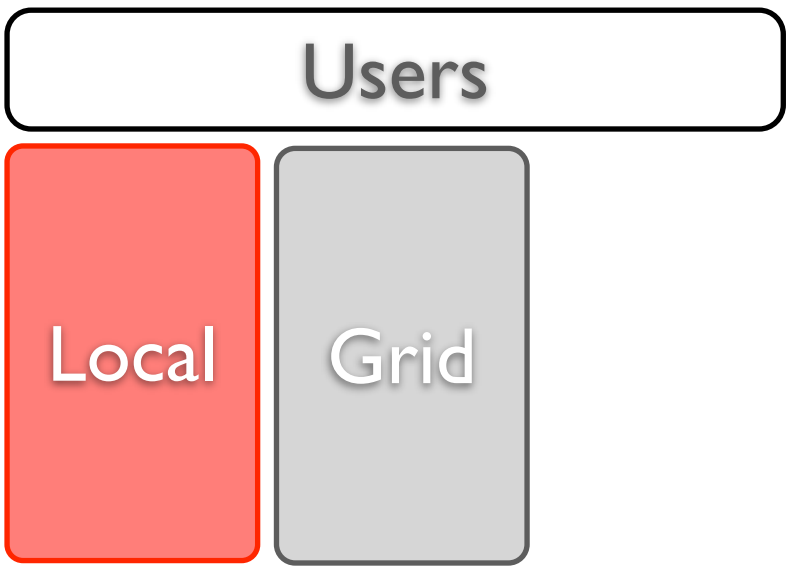
Architectural design

Architectural design

Users

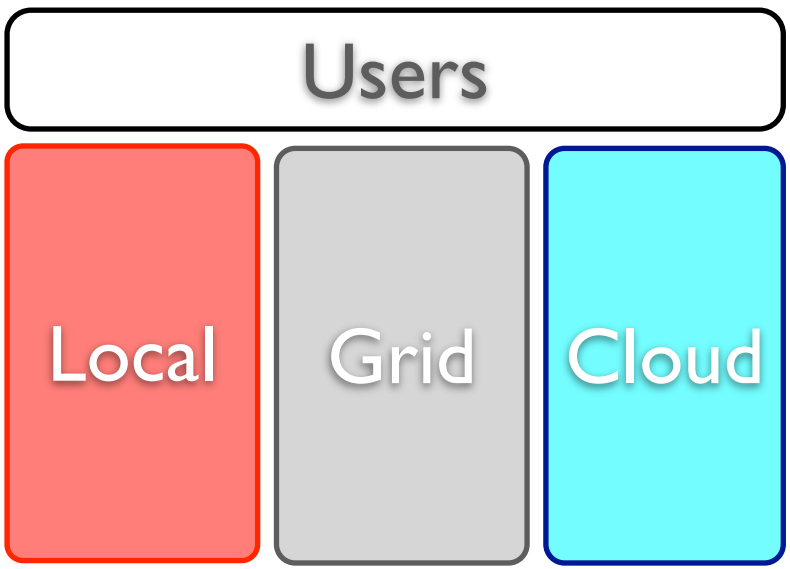
Users can easily access virtualized and customized computing resources through three interfaces

Architectural design



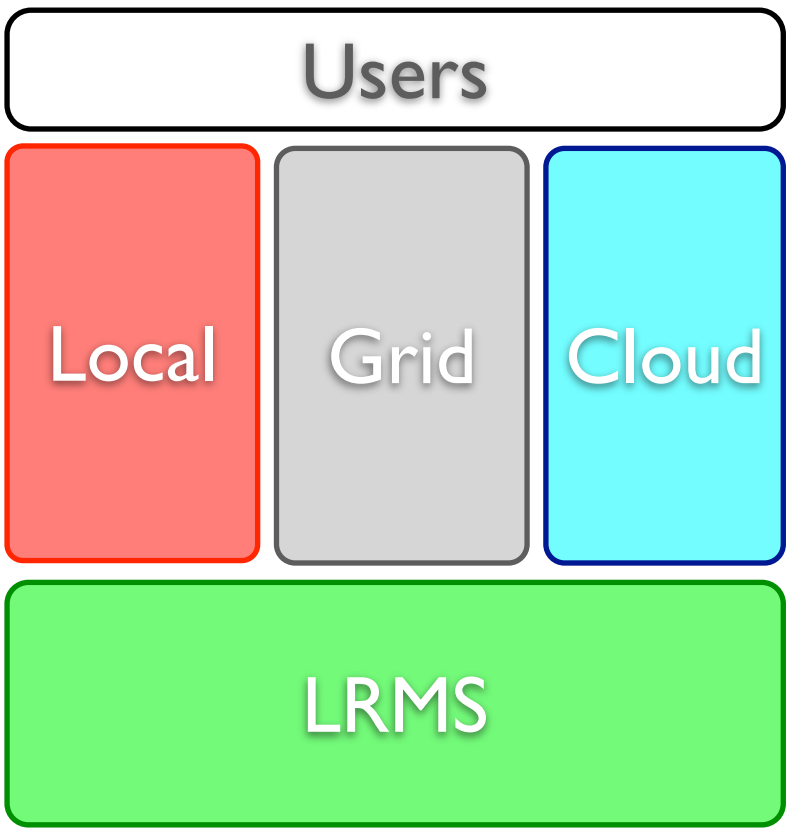
Local and Grid interfaces for batch jobs submission

Architectural design



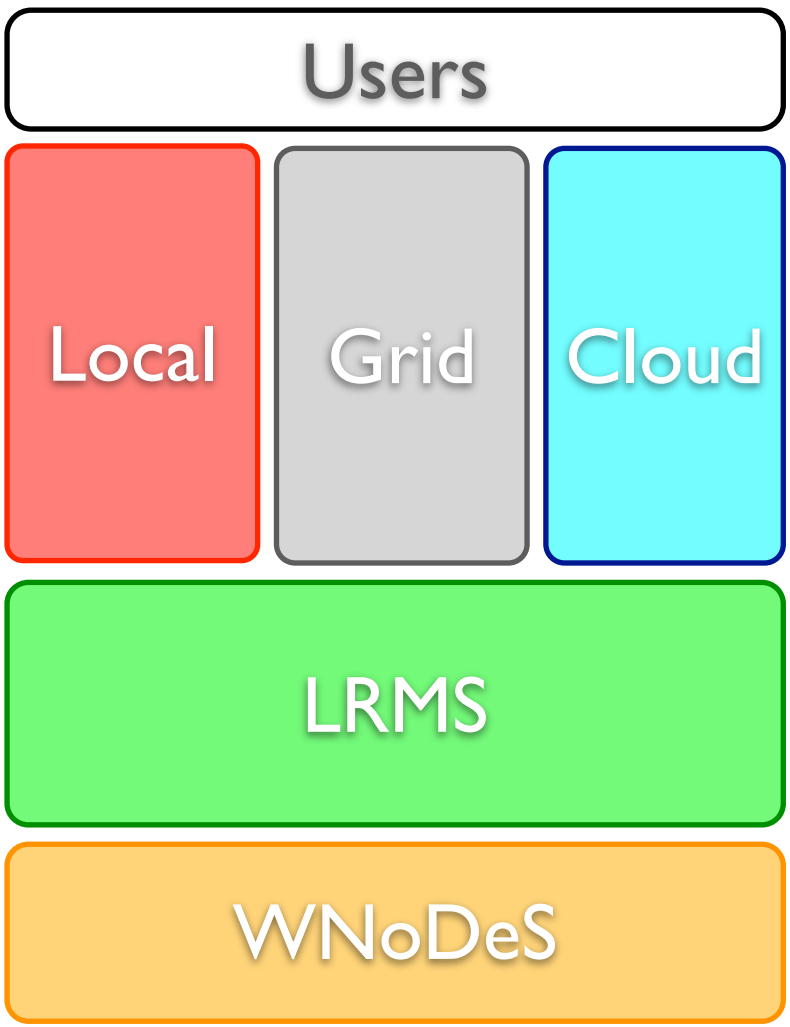
The cloud interface (OCCI) lets users instantiate a Virtual Machine for interactive usage

Architectural design



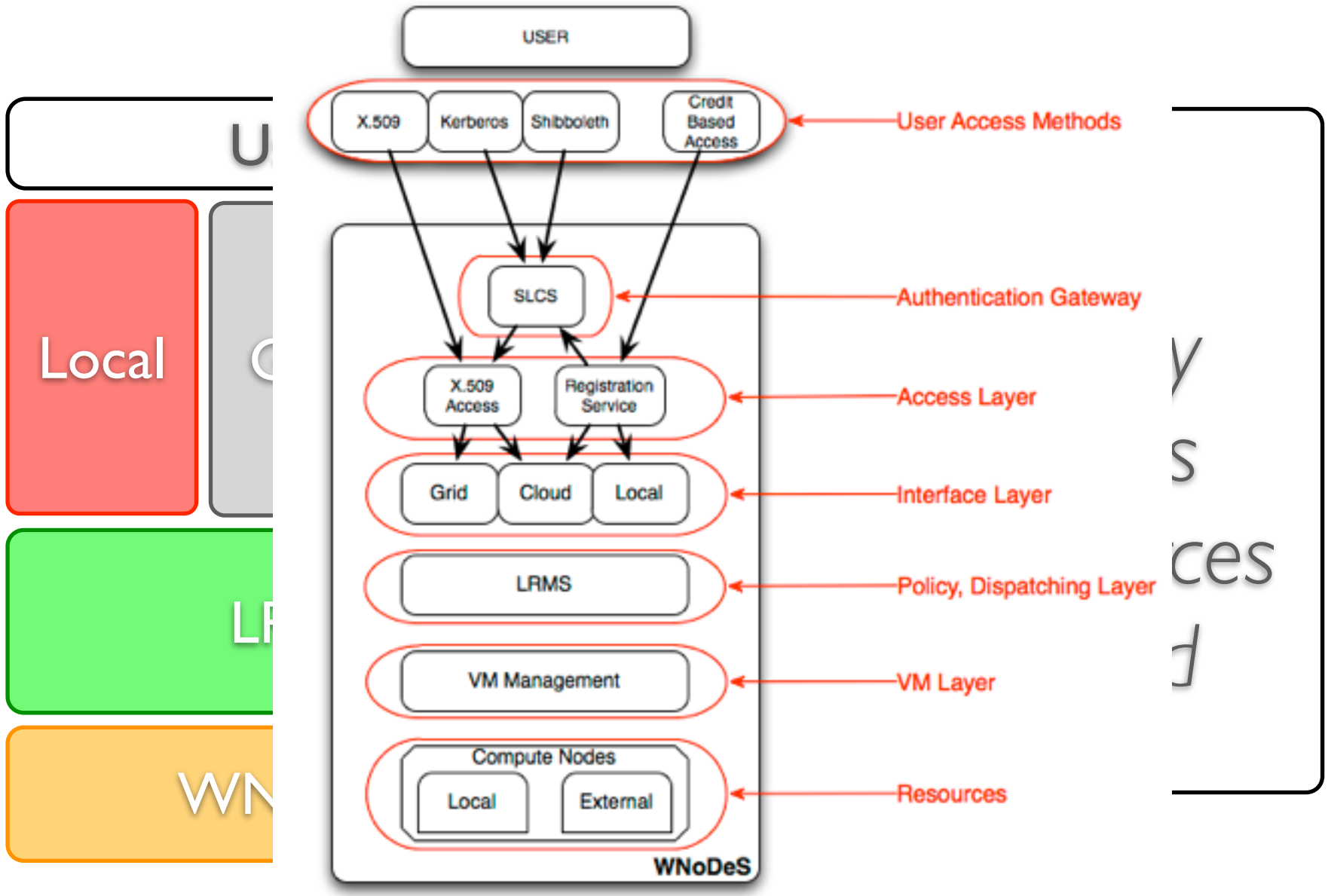
LRMS is still the key component.
It is robust, flexible, scalable and can manage thousands of nodes concurrently.

Architectural design

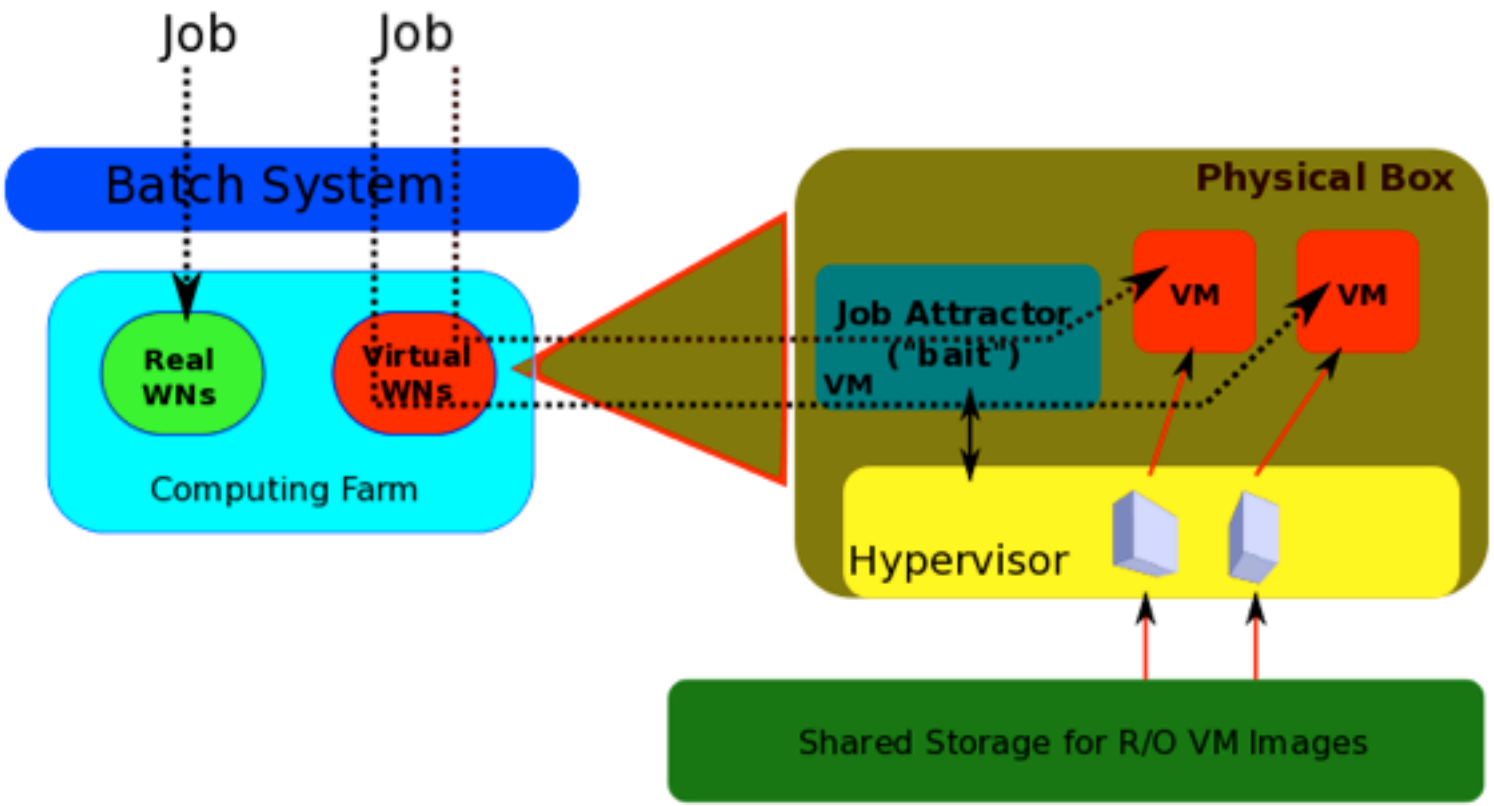


WNoDeS dynamically instantiates virtual resources on demand

Architectural design



WNoDeS: how it works



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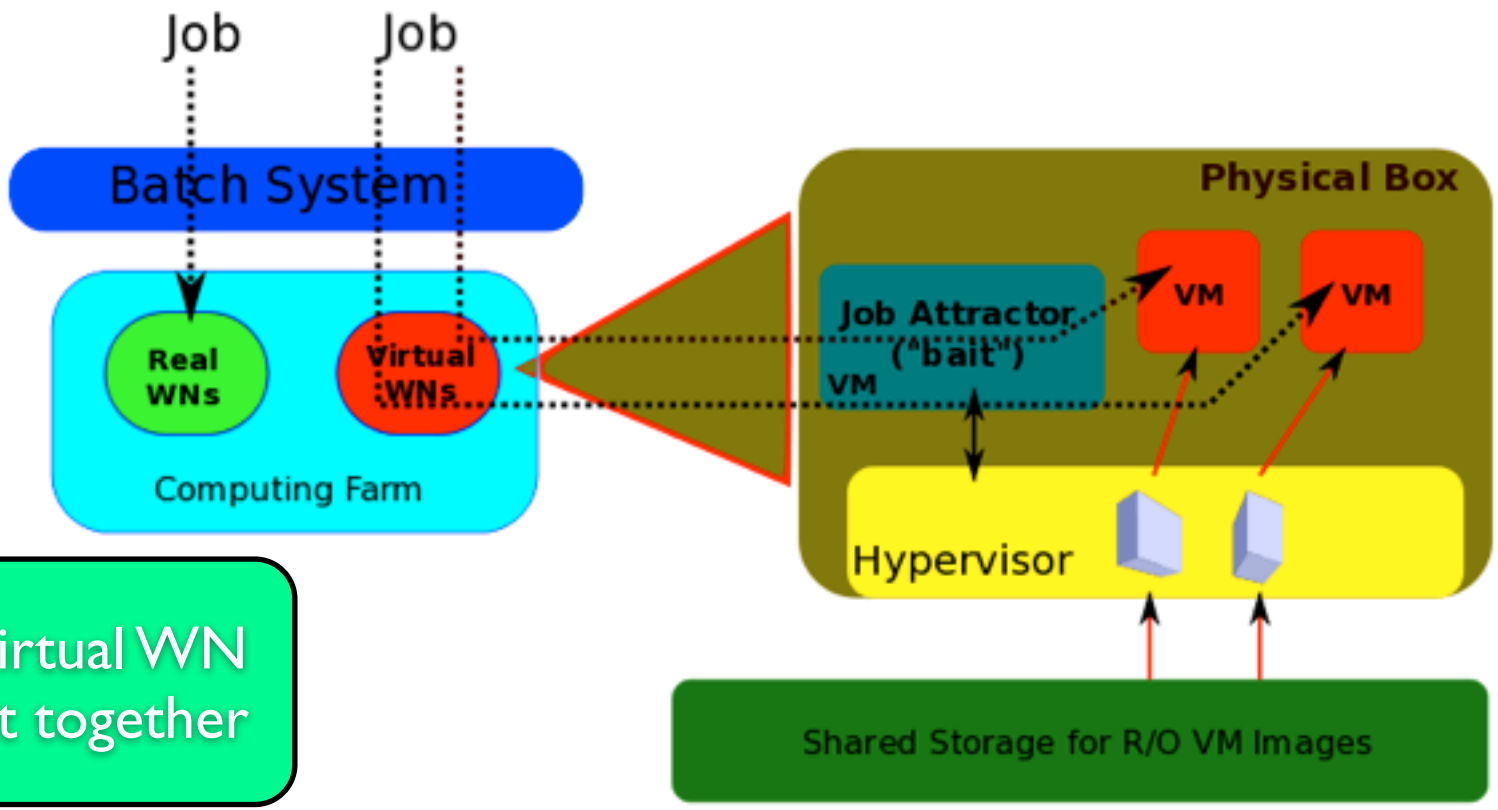
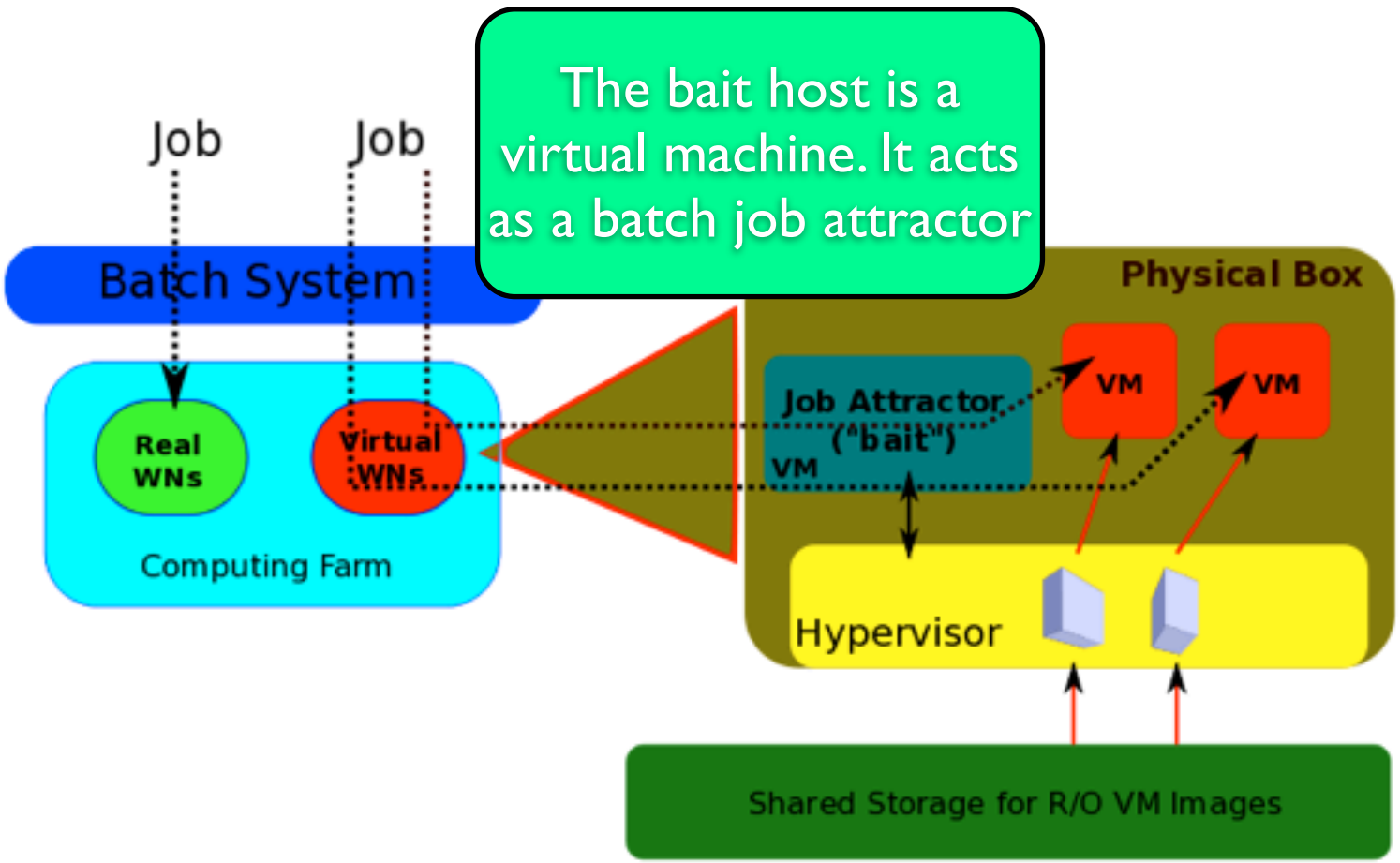
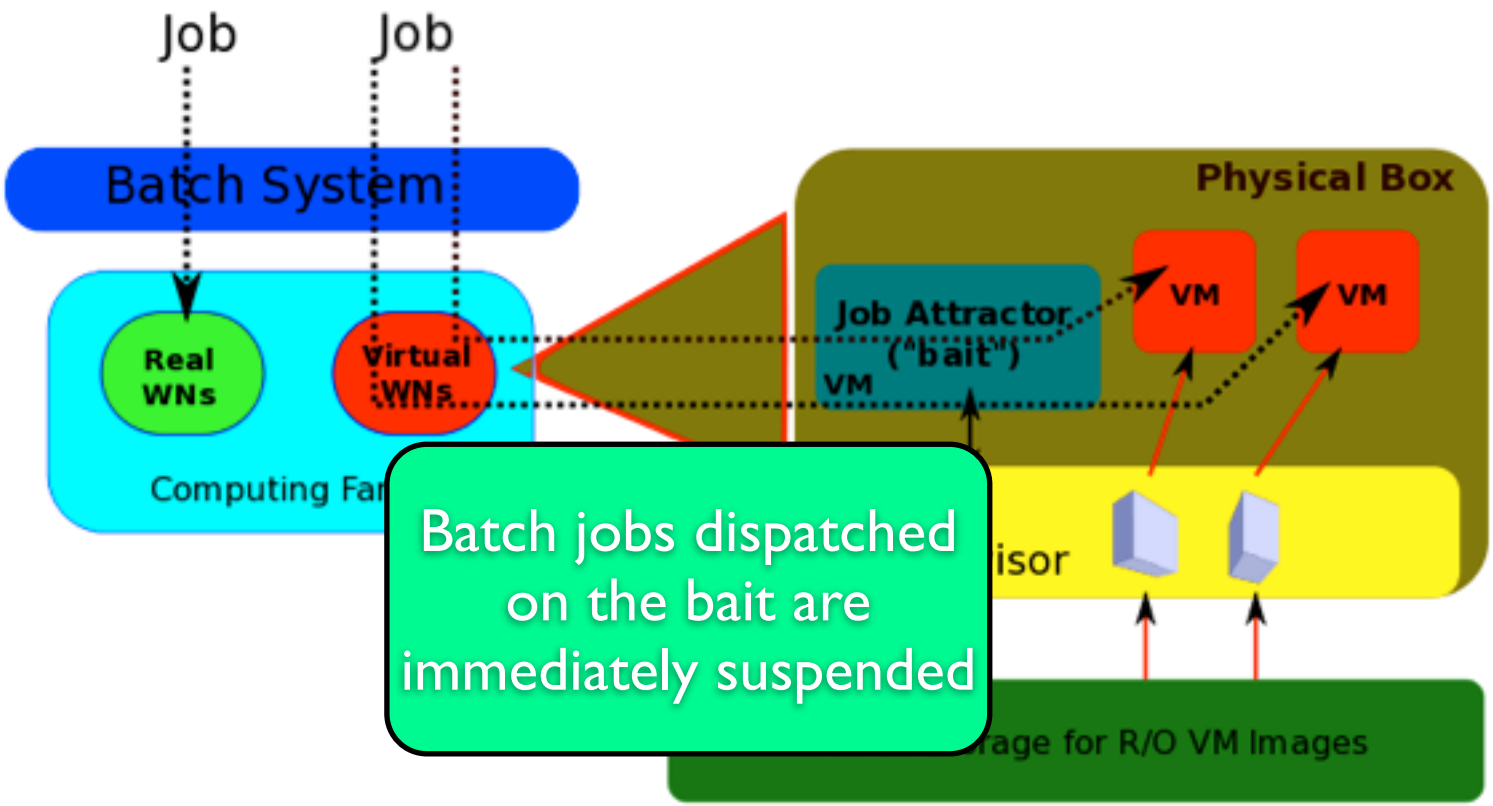


Real and Virtual WN can coexist together

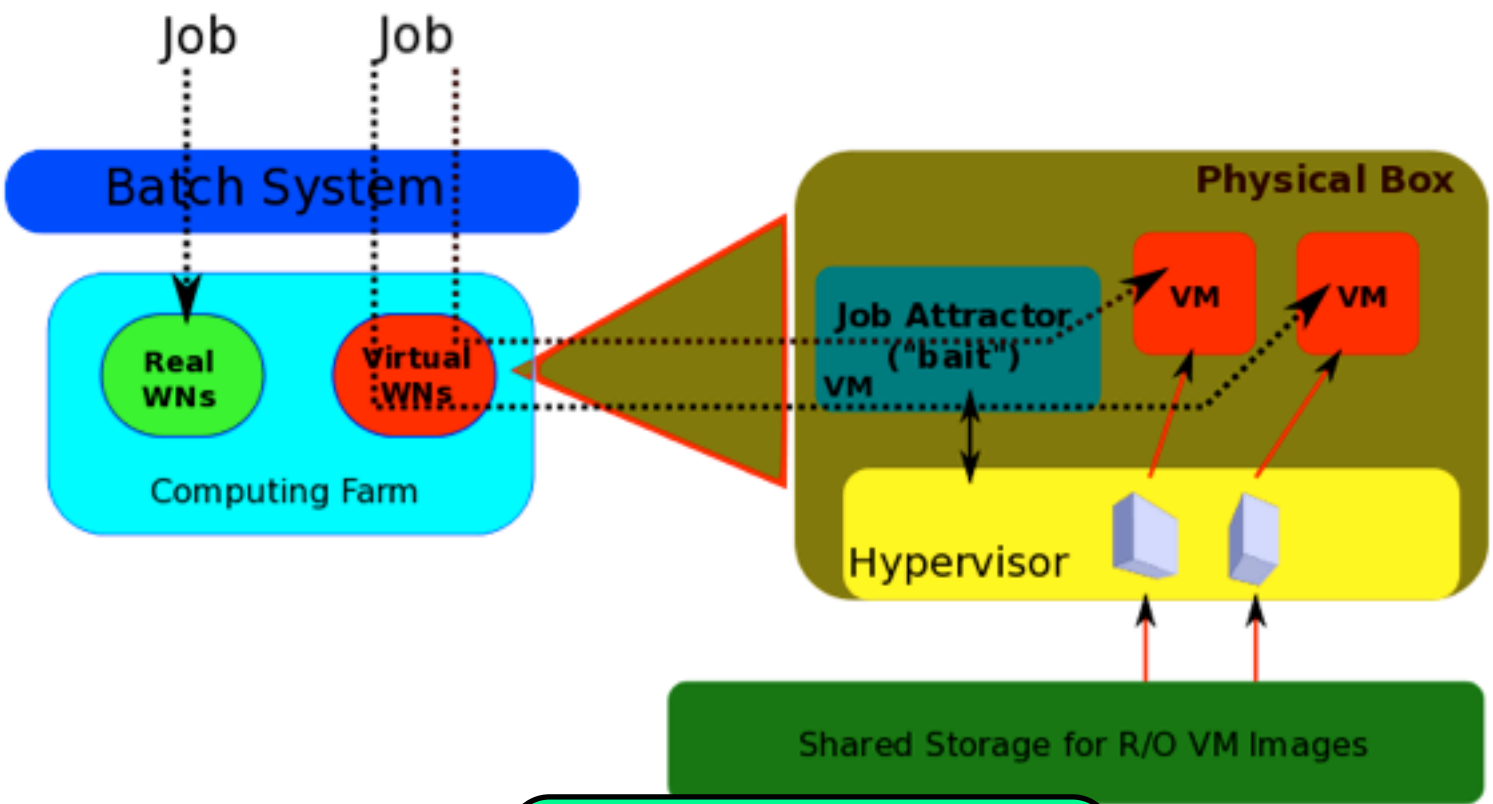
WNoDeS: how it works



WNoDeS: how it works



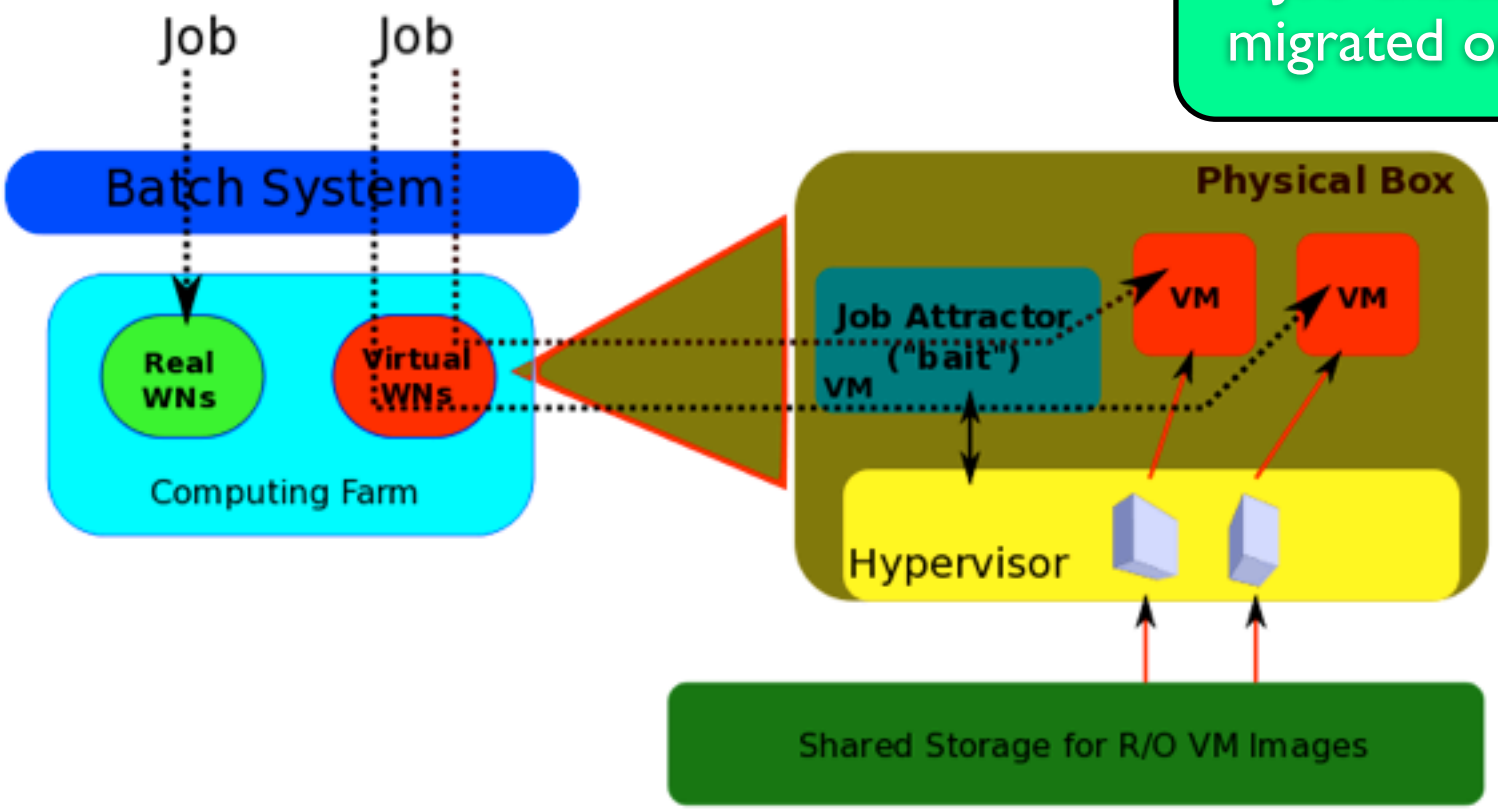
WNoDeS: how it works



The HV instantiates the VM using the requested virtual image

WNoDeS: how it works

Job execution is migrated on the VM



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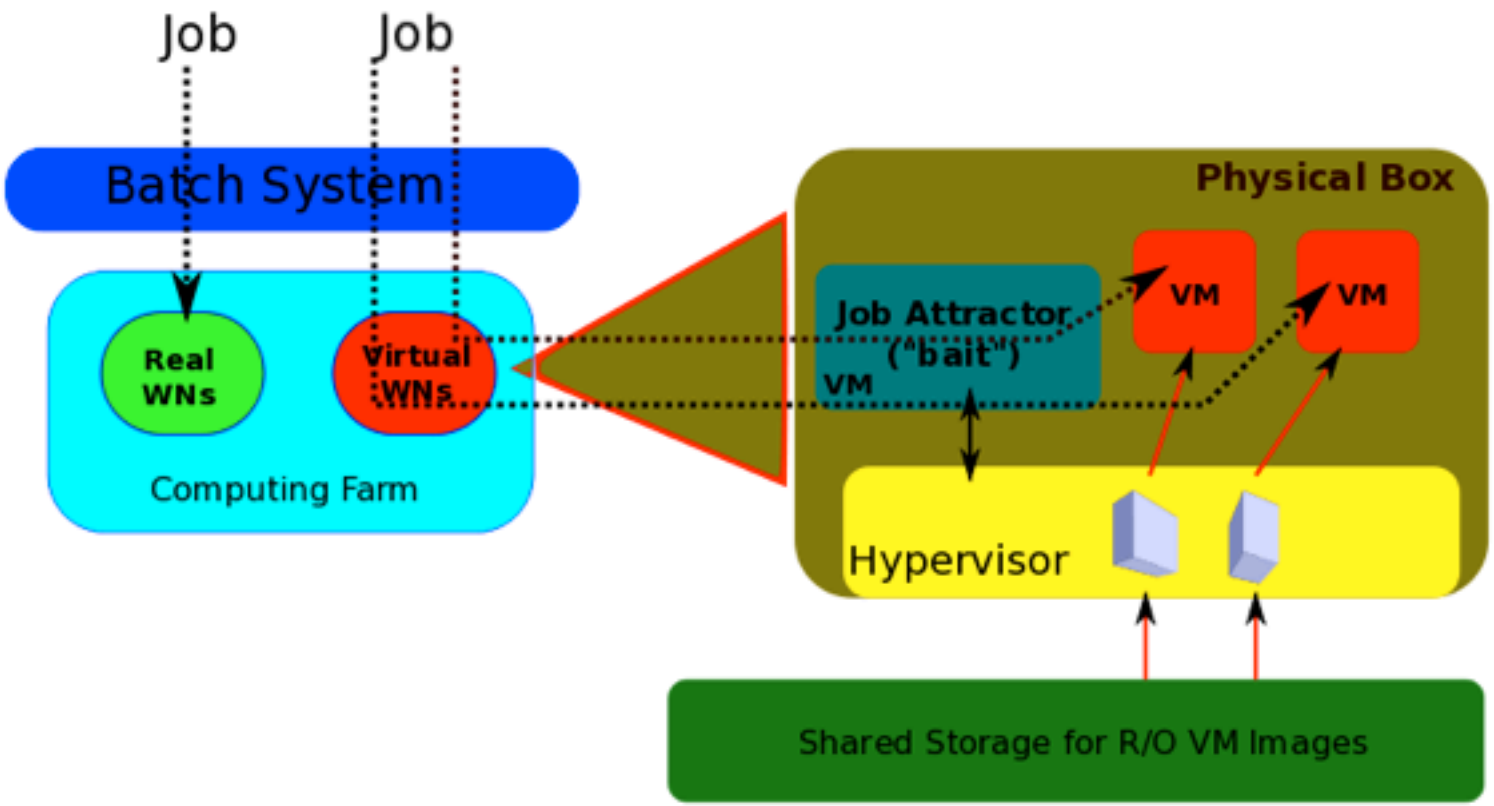

Agenda

WNoDeS: short introduction

Current Status

Evolutions: Where we would like to get

Current status

- *WNoDeS is already deployed on the INFN Tier-1 production infrastructure.*
- *Selection of VM images works either statically or dynamically, through standard local and Grid job submission commands.*
- *All the supported VOs run on WNoDeS.*
- *WNoDeS lets us still provide SLC4 support without allocating resources statically.*
- *Several virtual images available. They really provide a customized virtual environment for different VOs.*

Current status

- *Due to some delays, virtualized slots are still 1600. We hope to grow up to 2600 in a short term. More than 50% slots available in the cluster will be virtualized.*
- *Software development process is too fairly slow due to manpower constraints.*
- *Manage GPFS filesystems on the VM is major issue.*
  - *in terms of time spent to develop the right way to support it (thanks INFN-Tier1 storage group for all the support).*
  - *in terms of time spent to have the filesystem ready on the VM. Usually more than 100% of the time needed to get the machine ready to run the job.*

New feature: VLAN support

Different virtual machines running on the same hypervisor can belong to different VLAN.

- *Reduce the network broadcast domain.*
- *Grant different network access polices to every virtual machine. VLANs provide network isolation, particularly requested for cloud computing, where users get root access to virtual machine.*

New feature: VIRTIO

Enables Virtual Machine to get high performance network and disk operations.

- *Virtio driver currently used only for virtual machine running SL5 OS.*
- *Improve performance when using GPFS filesystem. Poor network performance is a major issue for GPFS cluster consistency.*

New feature: libguestfs

libguestfs is a library for accessing and modifying virtual machine (VM) disk images. Amongst the things this is good for: making batch configuration changes to guests, viewing and editing files inside guests. (libguestfs.org)

We currently use it for:

- *Edit/create local files.*
- *Redirect syslog to the right dom0.*
- *Enable kernel modules.*
- *In general it could be used to apply site specific configuration.*

Agenda

WNoDeS: short introduction

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To do list (I)

Important architectural changes.

- *required by new features.*

Improve software quality and bugs fixing.

- *regular activity for a software deployed in production.*

Support other batch systems.

- *When we achieve this goal, WNoDeS will provide a common resource virtualization layer with three different access interfaces.*

To do list (2)

Improve virtual image update and distribution procedure.

- *Automate virtual image update process and speed up their distribution.*

Improve WNoDeS NameServer scalability and fault tolerance.

Cloud storage.

- *provide dedicated on-demand storage.*

Network QoS for cloud computing.

- *Some interactive activities require a specific network throughput.*

To do list (3)

Implement a web application for WNoDeS management.

Design and develop of the authentication gateway.

- *Map several authentication mechanism (Kerberos and shibboleth) to a dynamically-assigned, short-lived X.509 personal certificate.*
- *See talk "Integrazione X.509/Shibboleth/Kerberos".*

Integration with the ARGUS authorization framework.

- *Use ARGUS to define users polices access to the virtualized resources.*
- *See talk "Introduzione a VOMS e Argus".*

Man power: current status

People already involved in the project:

- *Davide Salomoni - Project architect and manager and core development*
- *Alessandro Italiano - System administration and core development*
- *Michele Orrù (left the project for a new job) - OCCI interface development*

We would like/need to involve more contributors, currently the following people have started to collaborate with us:

- *Elisabetta Ronchieri - Software packaging*
- *Peter Solagna - OCCI interface development*
- *Gianni Dalla Torre - Core development*
- *Andrea Chierici and Riccardo Veraldi - Virtualization topics - HEPIX-Virt WG.*
  - *See talk "The KVM infrastructure at INFN Tier-1"*
- *INFN-Bari will help us to port the software to Torque/Maui LRMS*

Man power: current status

We have a range of topics available for university degrees or other contributions

- http://www.cnaf.infn.it/main/index.php/Link_Utili/Temi_di_ricerca

The new contributions could help us to release a first version of WNoDeS in the Q3 2010.

We are also discussing contributions to IGI and EMI.

For more informations visit or contact us at

http://web.infn.it/wnodes

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