FutureGrid Services I

FutureGrid Tutorial at PPAM 2011

Torun Poland

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Future Grid

Overview of Existing Services

Categories

- PaaS: Platform as a Service
  - Delivery of a computing platform and solution stack
- IaaS: Infrastructure as a Service
  - Deliver a compute infrastructure as a service
- Grid:
  - Deliver services to support the creation of virtual organizations contributing resources
- HPCC: High Performance Computing Cluster
  - Traditional high performance computing cluster environment
- Other Services
  - Other services useful for the users as part of the FG service offerings

Future Grid

Selected List of Services Offered

FutureGrid → User

PaaS

Hadoop
(Twister)
(Sphere/Sector)

IaaS

Nimbus
Eucalyptus
ViNE
(OpenStack)
(OpenNebula)

Grid

Genesis II
Unicore
SAGA
(Globus)

HPCC

MPI
OpenMP
ScaleMP
(XD Stack)

Others

Portal
Inca
Ganglia
(Exper. Manag./(Pegasus
(Rain)

(will be added in future)

Services Offered

1. ViNe can be installed on the other resources via Nimbus ☑
2. Access to the resource is requested through the portal ☒
3. Pegasus available via Nimbus and Eucalyptus images

	India	Sierra	Hotel	Foxtrot	Alamo	Xray	Bravo
myHadoop	✔	✔			✔		
Nimbus		✔	✔	✔	✔		
Eucalyptus	✔	✔					
ViNe[1]	☑	✔	☑	✔	☑		
Genesis II	✔	✔			✔	✔	
Unicore	✔	✔				✔	
MPI	✔	✔	✔	✔	✔	✔	✔
OpenMP						✔	
ScaleMP	✔						
Ganglia	✔		✔				
Pegasus[3]	☑	☑	☑	☑	☑		
Inca	✔	✔	✔	✔	✔	✔	
Portal[2]	☒	☒	☒	☒	☒	☒	
PAPI						✔	
Vampir							

Future Grid

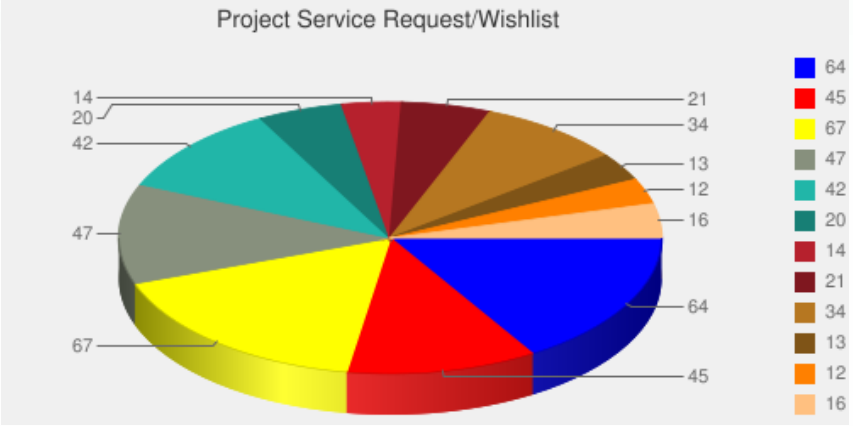
Which Services should we install?

- We look at statistics on what users request
- We look at interesting projects as part of the project description
- We look for projects which we intend to integrate with: e.g. XD TAS, XD XSEDE
- We leverage experience from the community

Future Grid

User demand influences service deployment

- Based on User input we focused on
  - Nimbus (53%)
  - Eucalyptus (51%)
  - Hadoop (37%)
  - HPC (36%)

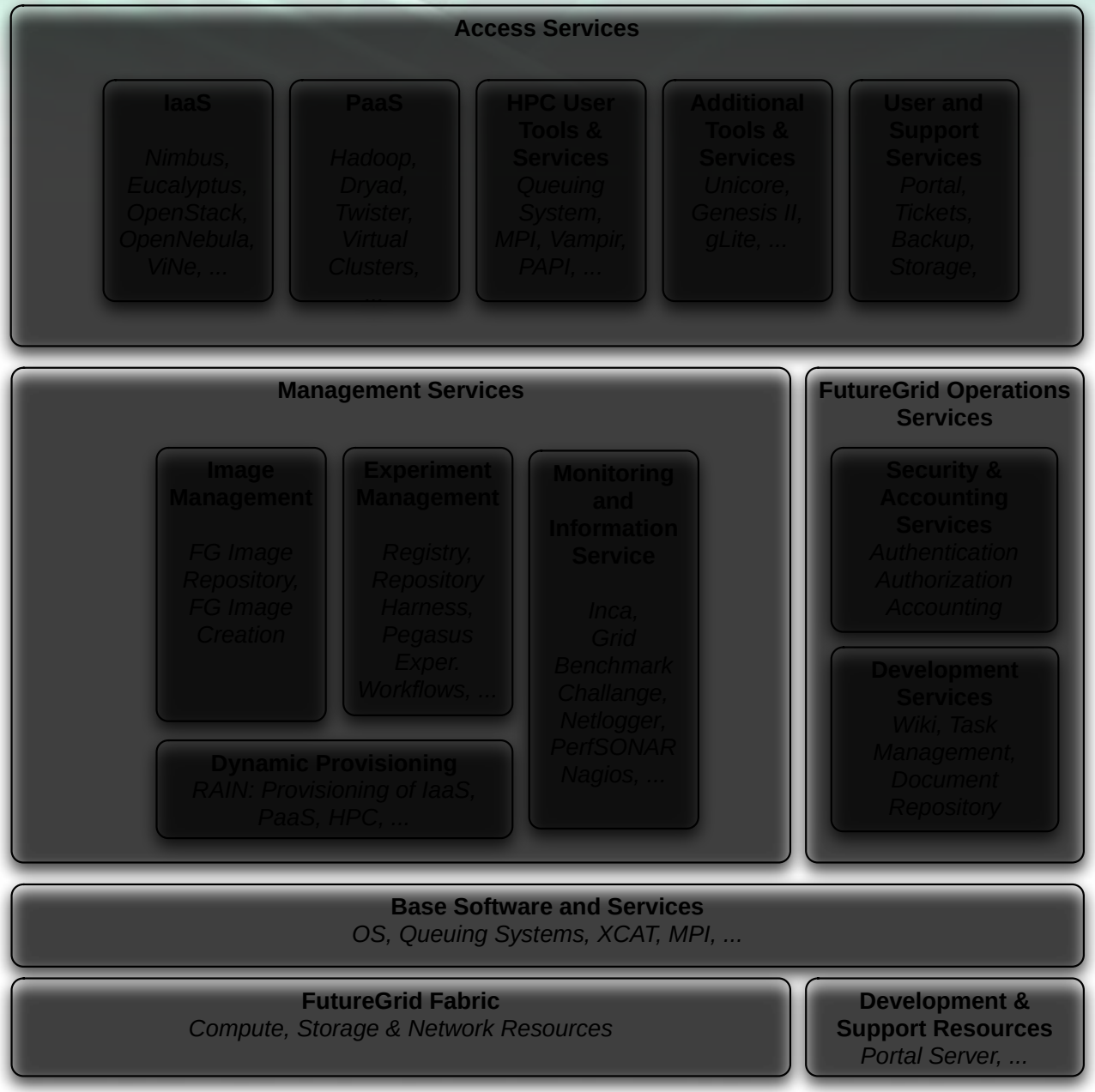


- Eucalyptus: 64(50.8%)
- High Performance Computing Environment: 45(35.7%)
- Nimbus: 67(53.2%)
- Hadoop: 47(37.3%)
- MapReduce: 42(33.3%)
- Twister: 20(15.9%)
- OpenNebula: 14(11.1%)
- Genesis II: 21(16.7%)
- Common TeraGrid Software Stack: 34(27%)
- Unicore 6: 13(10.3%)
- gLite: 12(9.5%)
- OpenStack: 16(12.7%)

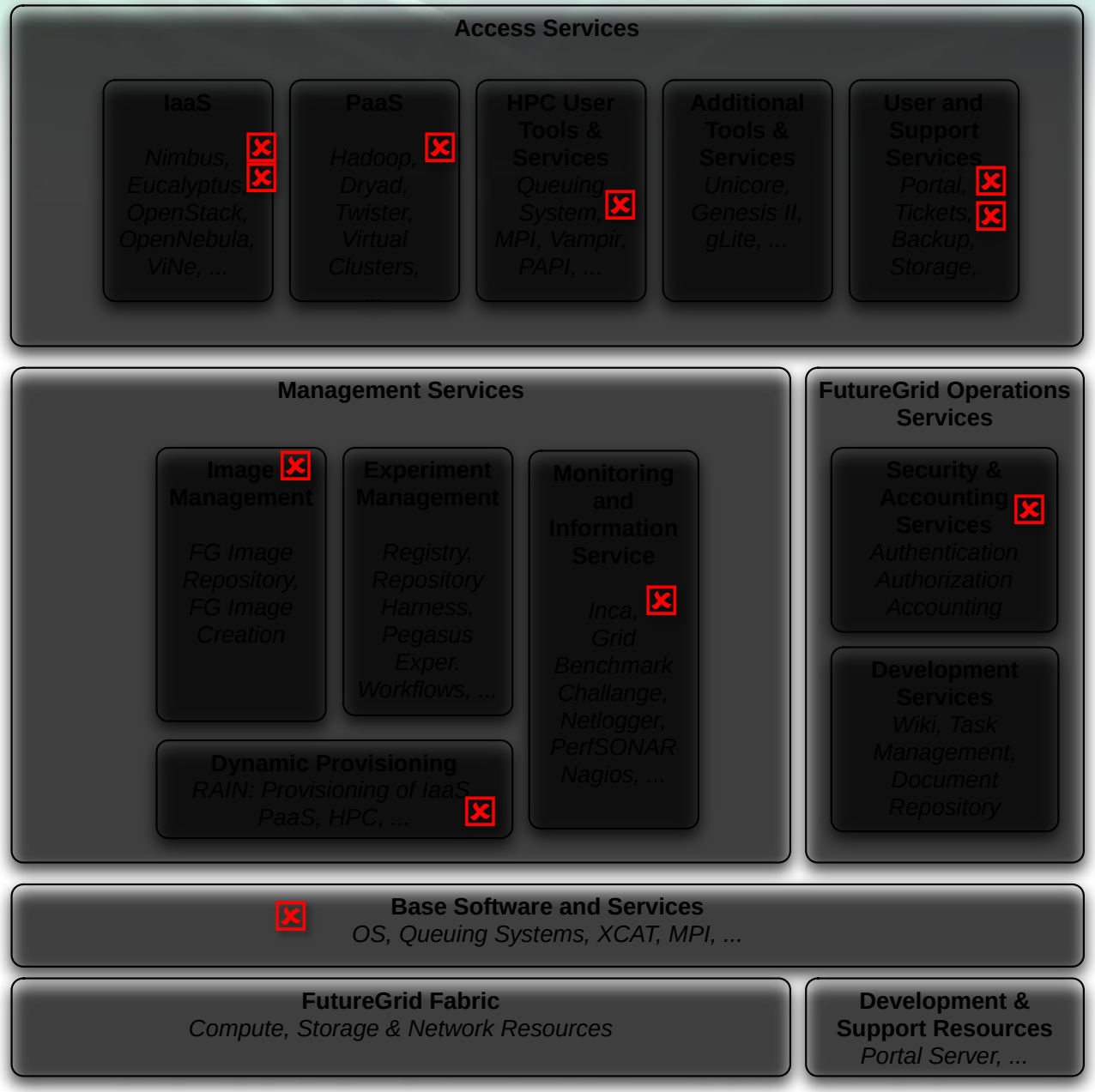
** Note: We will improve the way we gather statistics in order to avoid inaccuracy during the information gathering at project and user registration time.*

Software Architecture

Software Architecture



Next we present selected Services



Cloud Computing with Nimbus on FutureGrid

TeraGrid'11 tutorial, Salt Late City, UT

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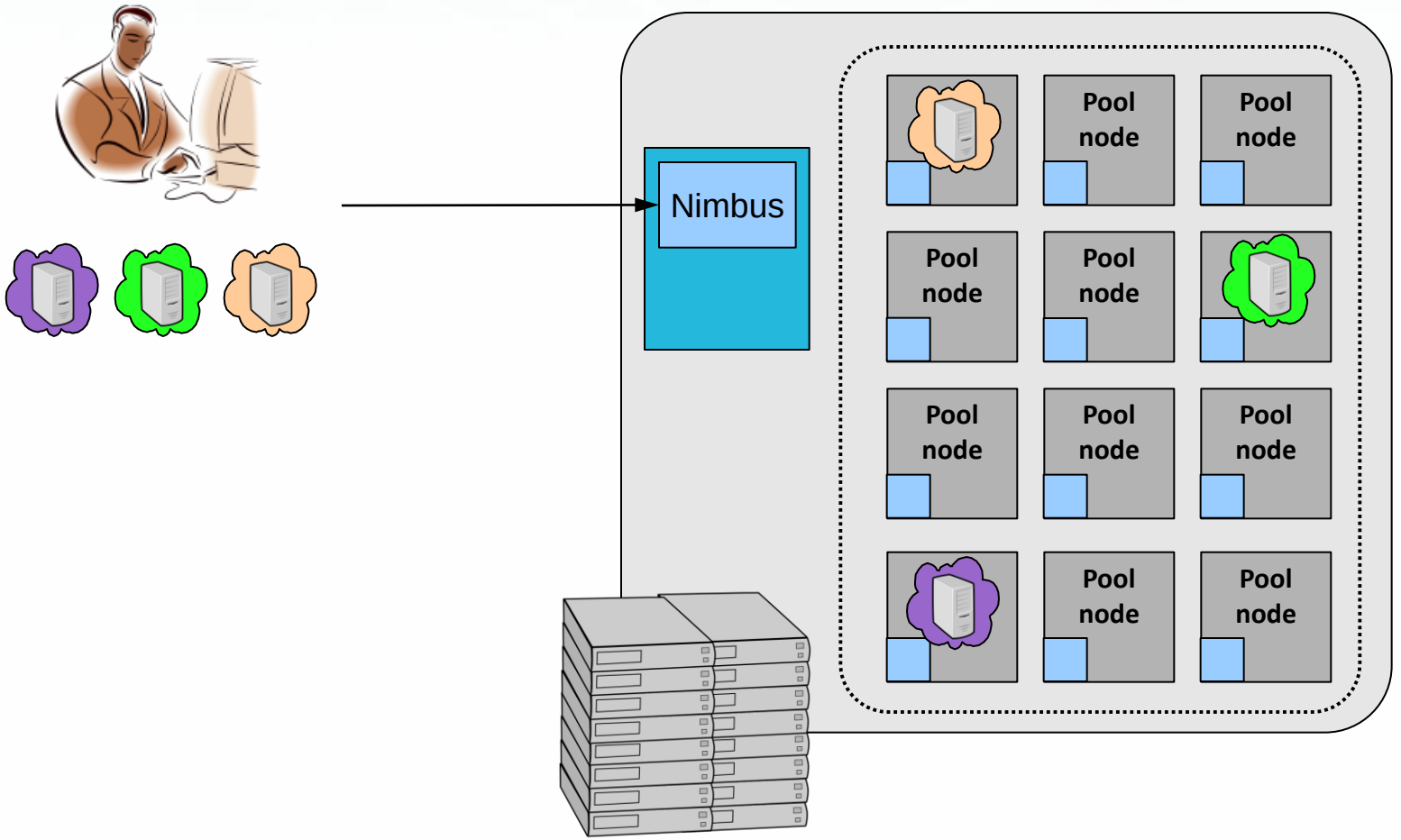
Computation Institute, University of Chicago

Nimbus Infrastructure

IaaS: How it Works

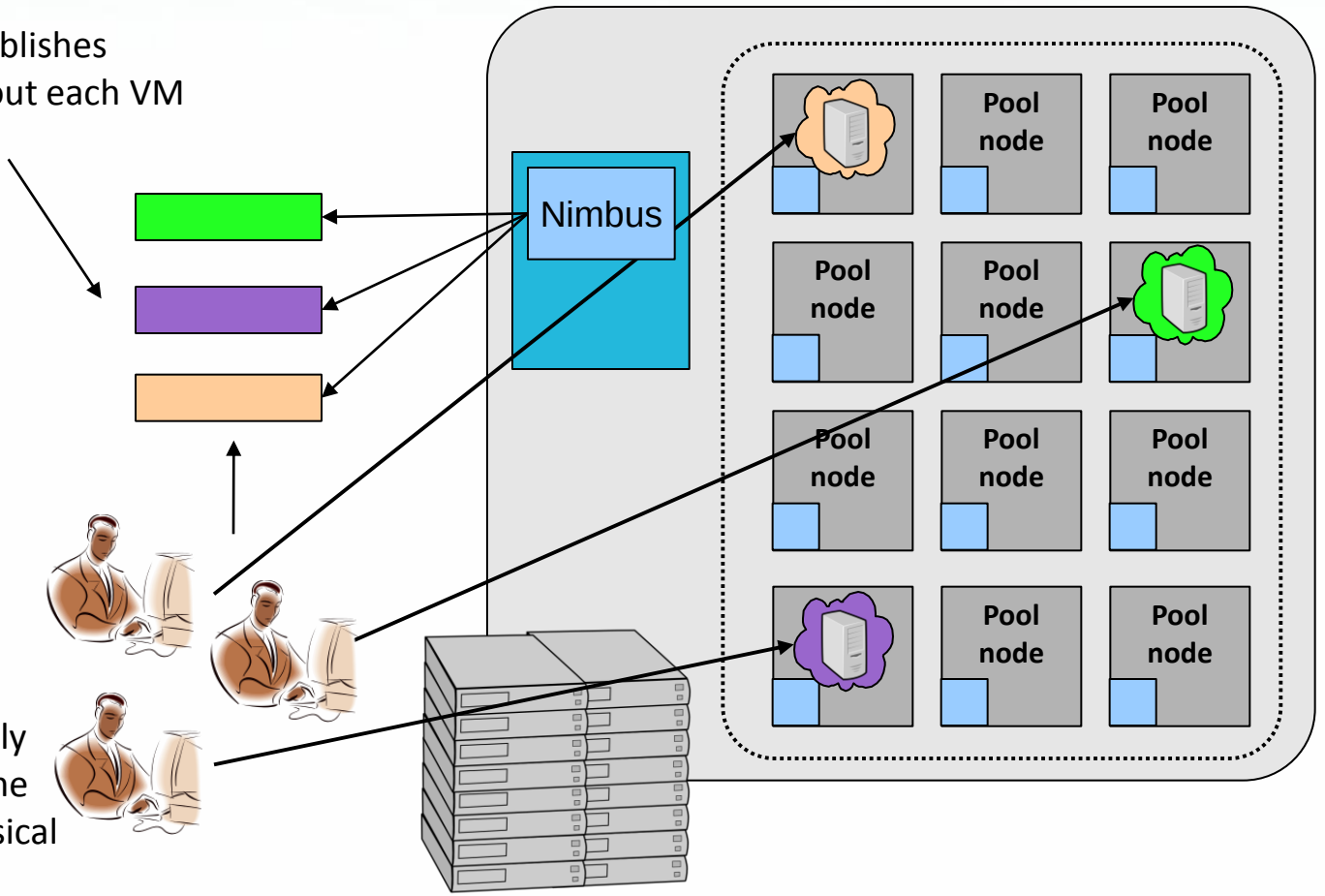


IaaS: How it Works

Nimbus publishes information about each VM

Users can find out information about their VM (e.g. what IP the VM was bound to)

Users can interact directly with their VM in the same way the would with a physical machine.



Nimbus on FutureGrid

- **Hotel** (University of Chicago) -- Xen
  41 nodes, 328 cores
- **Foxtrot** (University of Florida) -- Xen
  26 nodes, 208 cores
- **Sierra** (SDSC) -- Xen
  18 nodes, 144 cores
- **Alamo** (TACC) -- KVM
  15 nodes, 120 cores

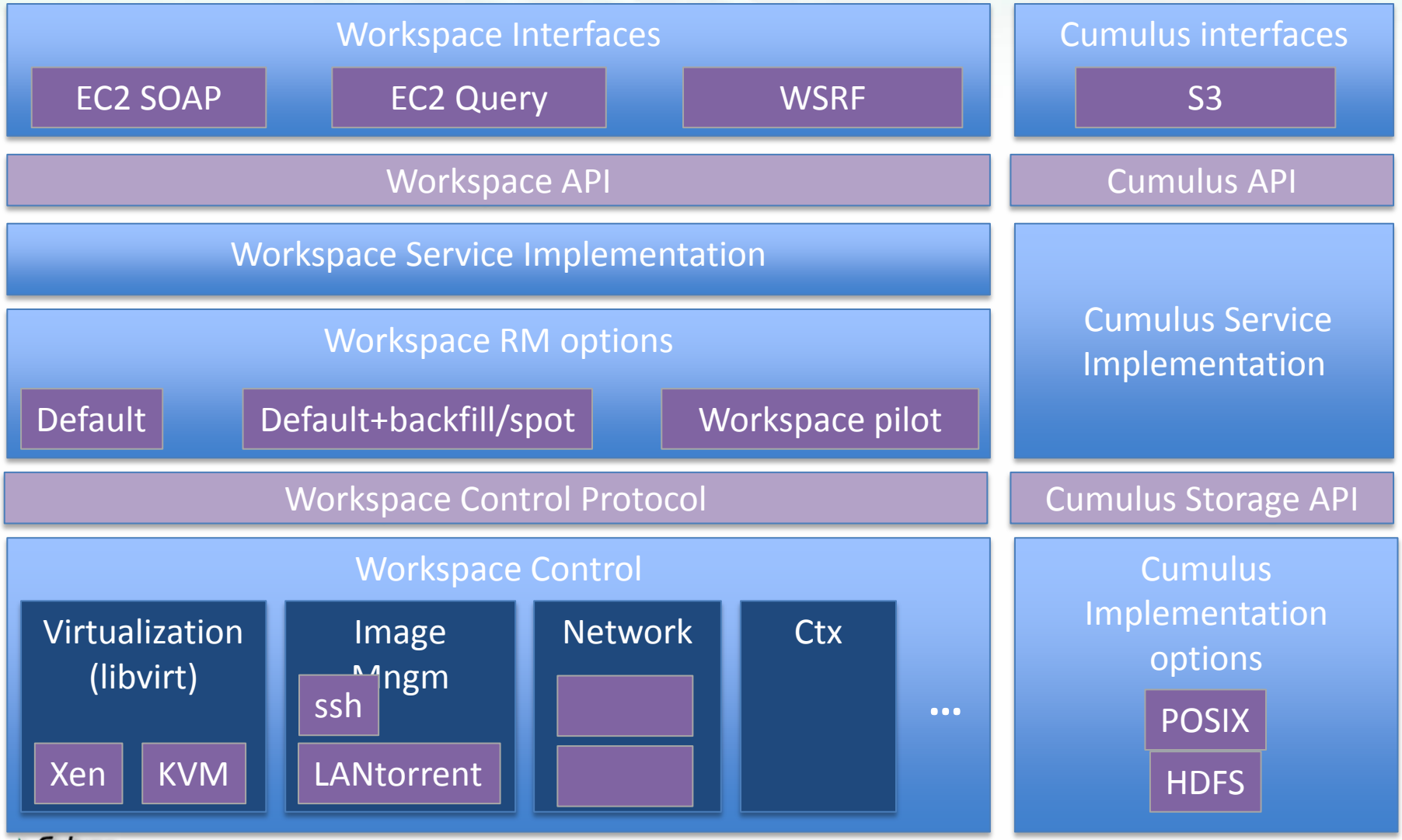
FutureGrid: Getting Started

- To get a FutureGrid account:
  - Sign up for portal account: https://portal.futuregrid.org/user/register
  - Once approved, apply for HPC account: https://portal.futuregrid.org/request-hpc-account
  - Your Nimbus credentials will be in your home directory
- Follow the tutorial at: https://portal.futuregrid.org/tutorials/nimbus
- or Nimbus quickstart at http://www.nimbusproject.org/docs/2.7/clouds/cloudquickstart.html

FutureGrid: VM Images

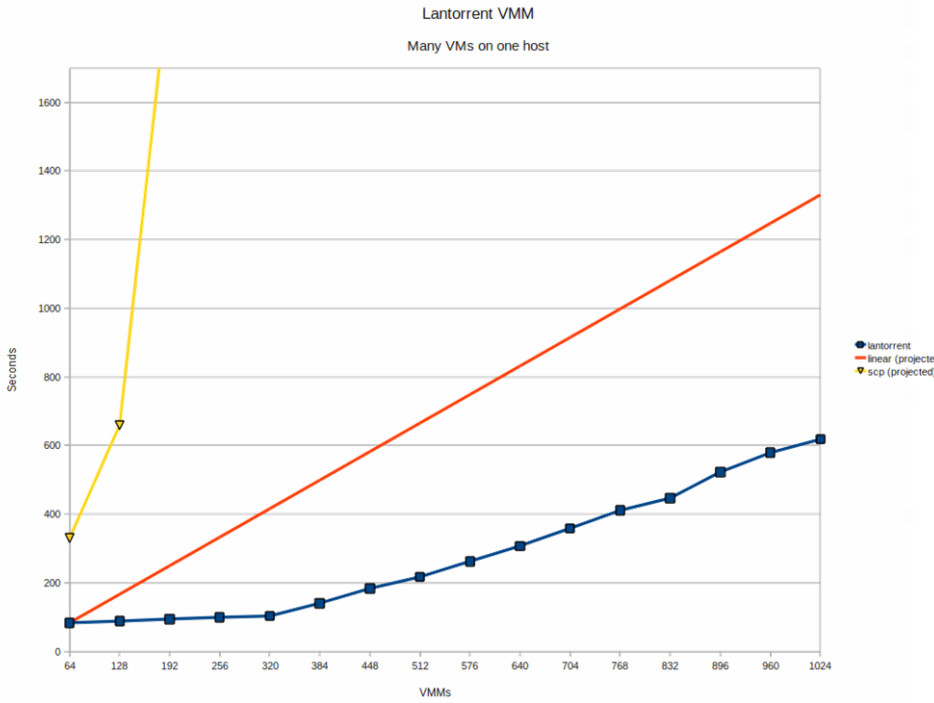
```
[bresnaha@login1 nimbus-cloud-client-018]$ ./bin/cloud-client.sh -conf\
 ~/.nimbus/hotel.conf -list
----
[Image] 'base-cluster-cc12.gz'              Read only
 Modified: Jan 13 2011 @ 14:17   Size: 535592810 bytes (~510 MB)
[Image] 'centos-5.5-x64.gz'                 Read only
Modified: Jan 13 2011 @ 14:17   Size: 253383115 bytes (~241 MB)
[Image] 'debian-lenny.gz'                   Read only
Modified: Jan 13 2011 @ 14:19   Size: 1132582530 bytes (~1080 MB)
[Image] 'debian-tutorial.gz'                Read only
Modified: Nov 23 2010 @ 20:43   Size: 299347090 bytes (~285 MB)
[Image] 'grid-appliance-jaunty-amd64.gz' Read only
Modified: Jan 13 2011 @ 14:20   Size: 440428997 bytes (~420 MB)
[Image] 'grid-appliance-jaunty-hadoop-amd64.gz'  Read only
Modified: Jan 13 2011 @ 14:21   Size: 507862950 bytes (~484 MB)
[Image] 'grid-appliance-mpi-jaunty-amd64.gz'     Read only
Modified: Feb 18 2011 @ 13:32   Size: 428580708 bytes (~408 MB)
[Image] 'hello-cloud'                       Read only
Modified: Jan 13 2011 @ 14:15   Size: 576716800 bytes (~550 MB)
```

Nimbus Infrastructure: a Highly-Configurable IaaS Architecture



LANTorrent: Fast Image Deployment

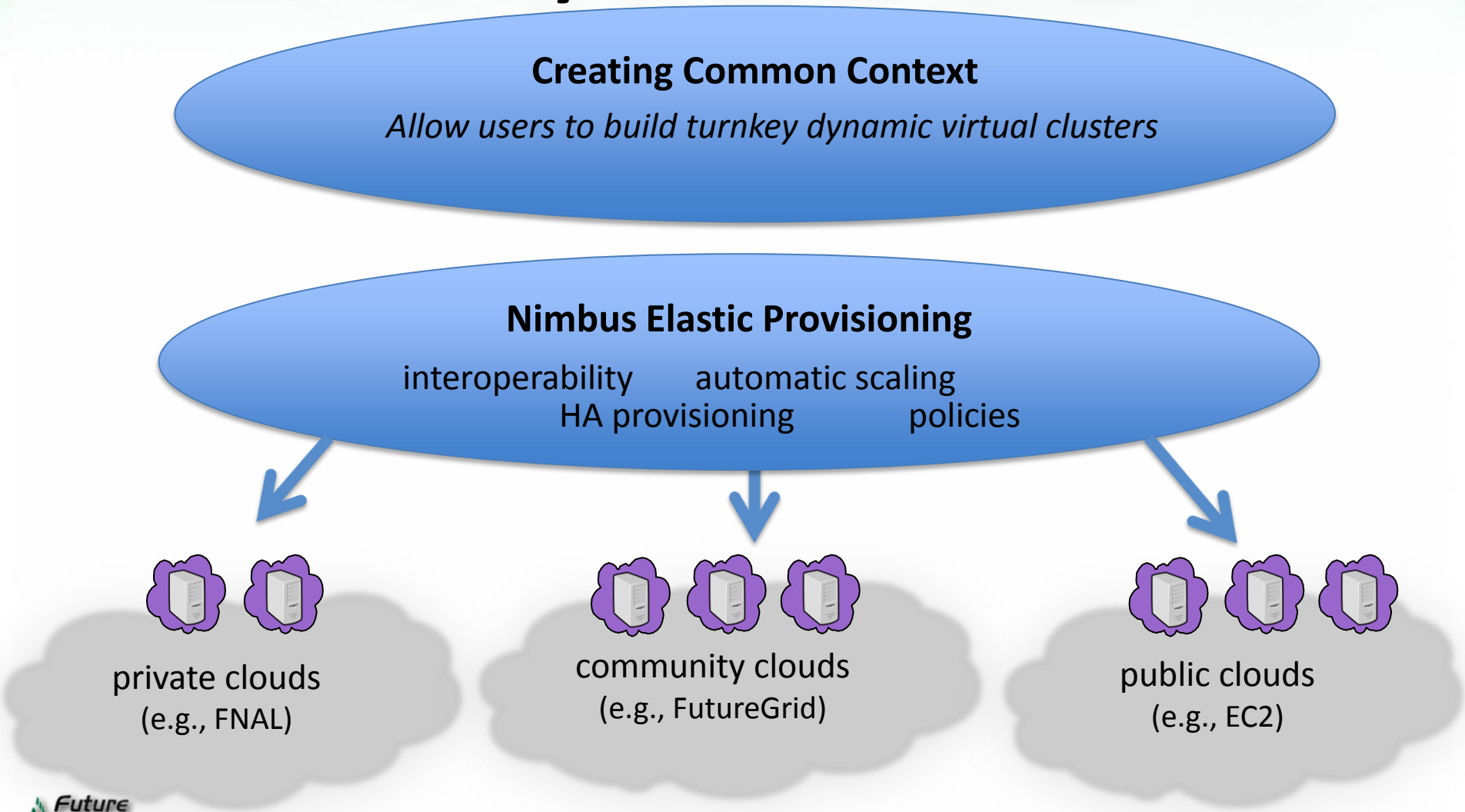
- **Challenge:** make image deployment faster
- Moving images is the main component of VM deployment
- LANTorrent: the BitTorrent principle on a LAN
- Streaming
- Minimizes congestion at the switch
- Detecting and eliminating duplicate transfers
- **Bottom line:** a thousand VMs in 10 minutes on Magellan
- Nimbus release 2.6, see www.sciencecloud.org/blog



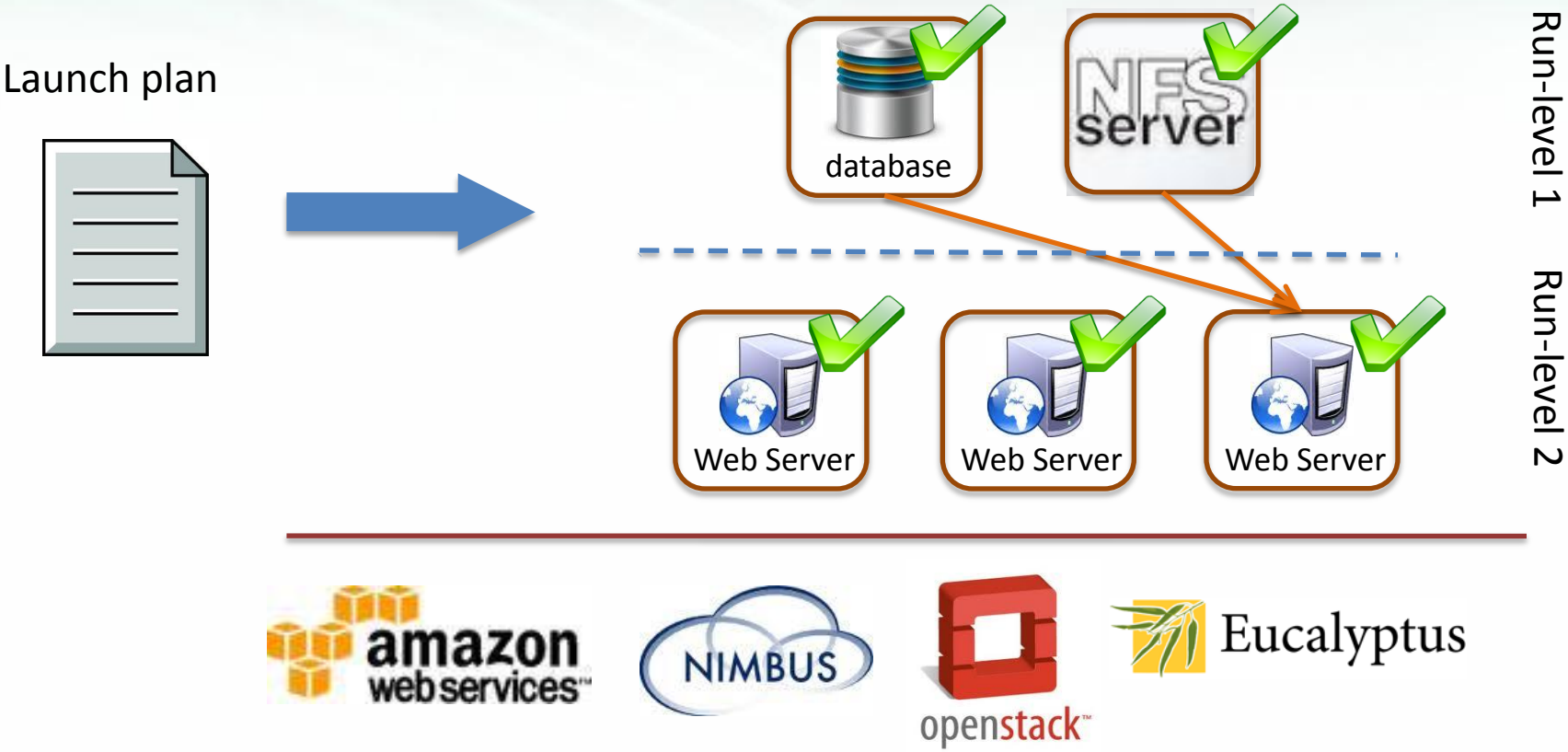
Preliminary data using the Magellan resource
At Argonne National Laboratory

Nimbus Platform

Nimbus Platform: Working with Hybrid Clouds



Cloudinit.d

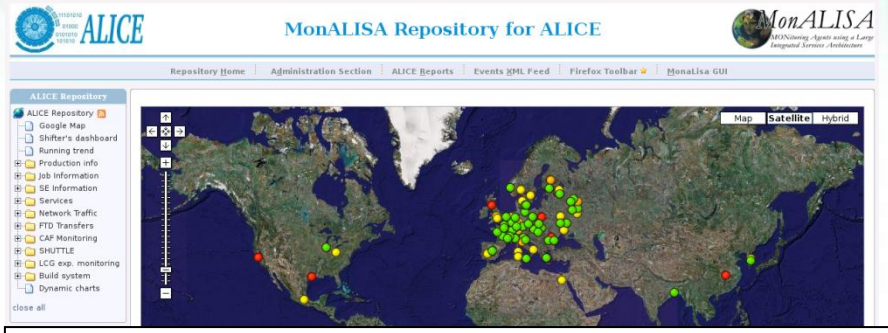


- …and test-based monitoring and repair

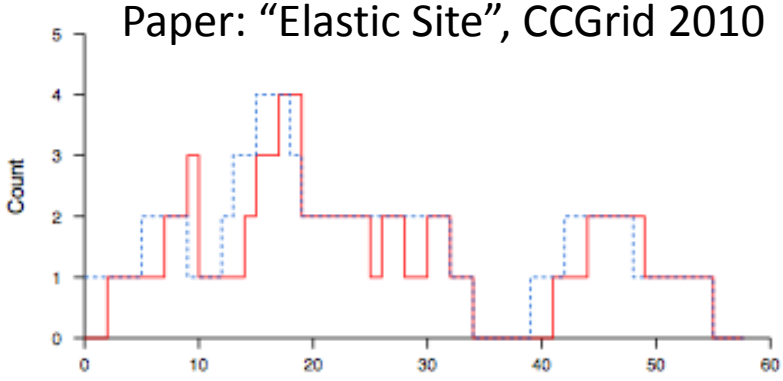
Paper at TeraGrid'11

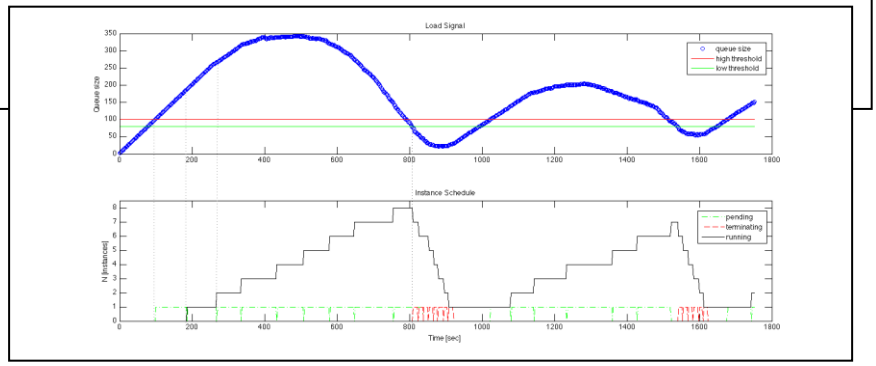
Elastic Scaling Tools: Towards "Bottomless Resources"

- Early efforts:
  - 2008: The ALICE proof-of-concept
  - 2009: ElasticSite prototype
  - 2009: OOI pilot
- **Challenge:** a generic HA Service Model
  - React to sensor information
  - Queue: the workload sensor
  - Scale to demand
  - Across different cloud providers
  - Use contextualization to integrate machines into the network
  - Customizable
  - Routinely 100s of nodes on EC2
- ***Coming out later this year***



Paper: "Elastic Site", CCGrid 2010





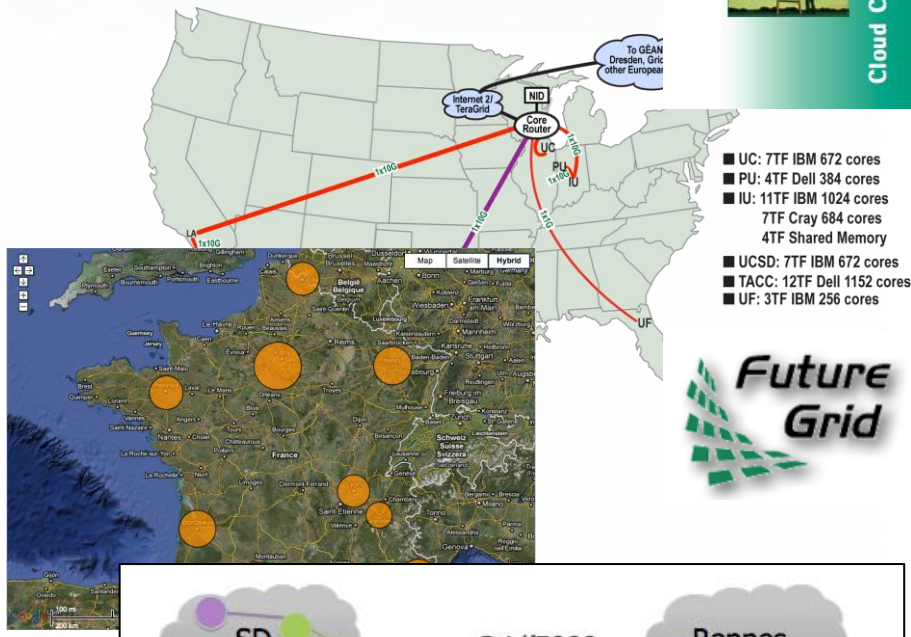
FutureGrid Case Studies

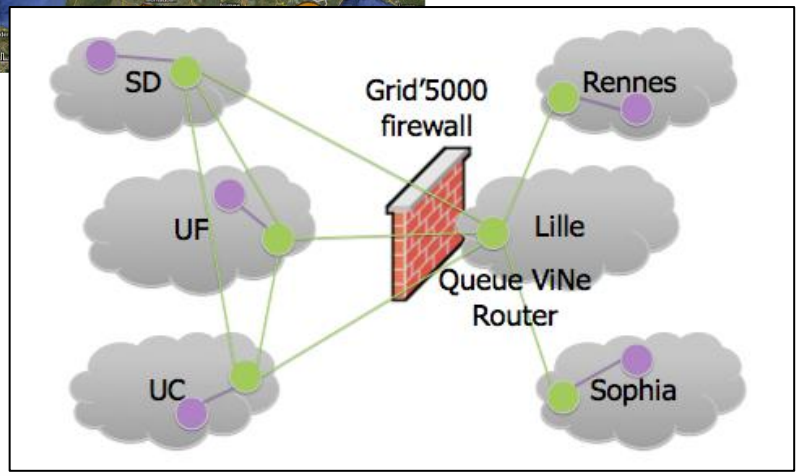
Sky Computing

Work by Pierre Riteau et al, University of Rennes 1

- Sky Computing = a Federation of Clouds
- Approach:
  - Combine resources obtained in multiple Nimbus clouds in FutureGrid and Grid' 5000
  - Combine Context Broker, ViNe, fast image deployment
  - Deployed a virtual cluster of over 1000 cores on Grid5000 and FutureGrid – largest ever of this type
- Grid'5000 Large Scale Deployment Challenge award
- Demonstrated at OGF 29 06/10
- TeraGrid '10 poster
- More at: *www.isgtw.org/?pi* Dr.Dobb's THE WORLD OF SOFTWARE DEVELOPMENT

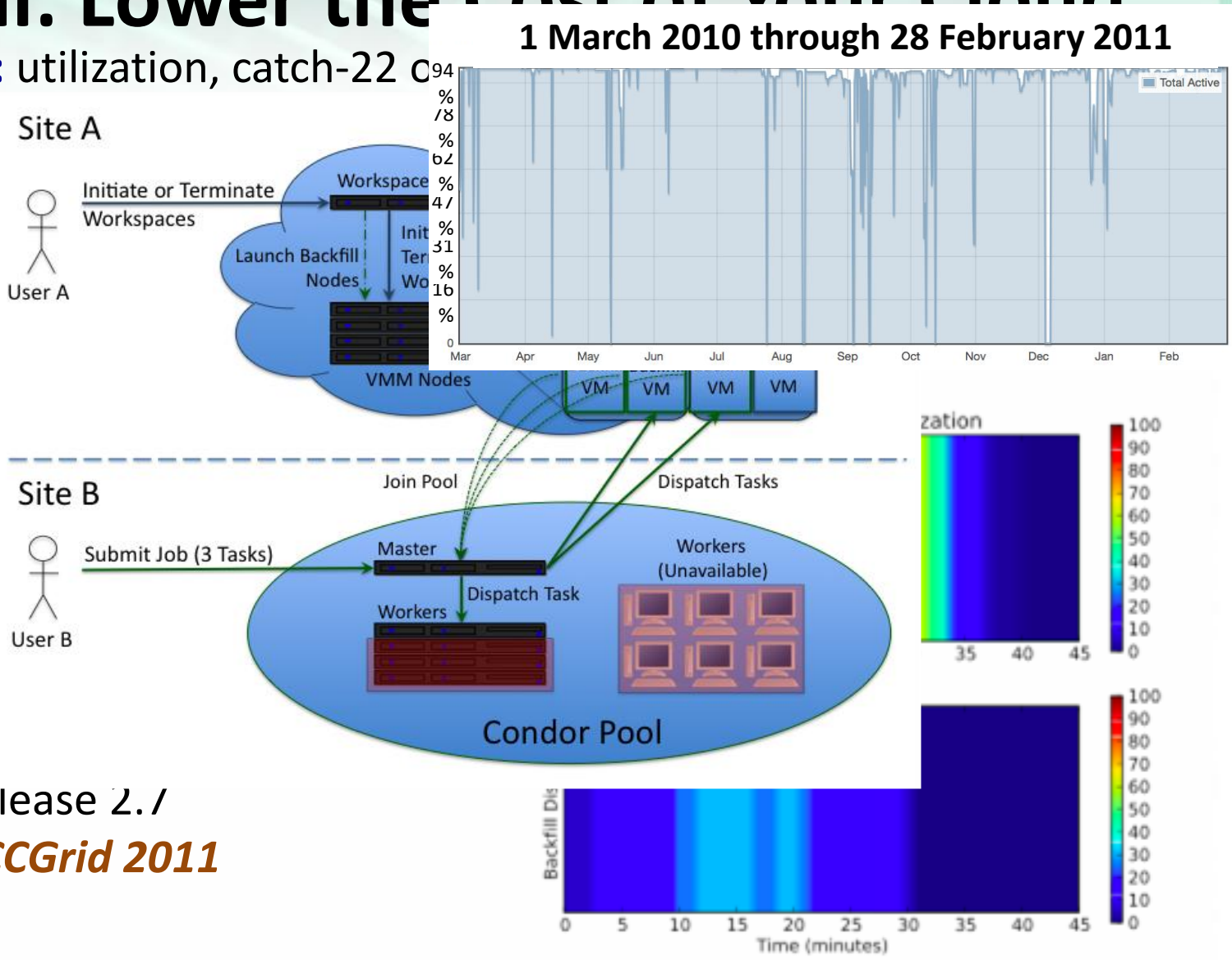
"Sky Computing"
IEEE Internet Computing, September 2009





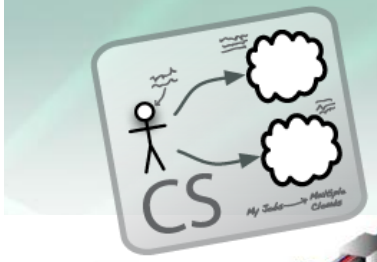
Backfill: Lower the Cost of Your Cloud

- **Challenge:** utilization, catch-22 c
  on-deman
- Solution: r
  - Backfill
- **Bottom li**
  utilization
- Who deci
  run?
- Spot pricir
- Open Sou
  contributi
- Preparing
  productio
  Chicago
- Nimbus release 2.7
- ***Paper @ CCGrid 2011***



BaBar

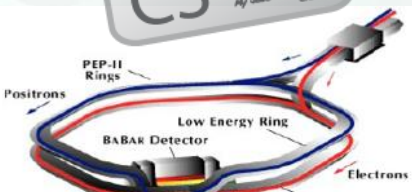
Canadian Efforts



University of Victoria

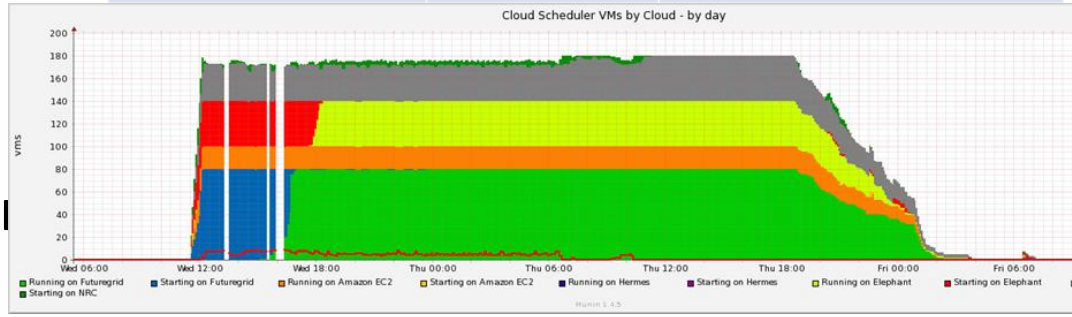
NRC·CNRC

Work by the UVIC team



- BarBar Experiment at SLAC in Stanford, CA
- Using clouds to simulating electron-positron collisions in their detector
- Exploring virtualization as a vehicle for data preservation
- Approach:
  - Appliance preparation and management
  - Distributed Nimbus clouds
  - Cloud Scheduler
- Running production BaBar workloads

Resource	Cores	Notes
FutureGrid @Argonne Lab	100 Cores Allocated	Resources allocation to support BaBar
Elephant Cluster @UVic	88 Cores	Experimental cloud cluster hosts (xrootd for cloud)
NRC Cloud in Ottawa	68 Cores	Hosts VM image repository (repoman)
Amazon EC2	Proportional to $	Grant funding from Amazon
Hermes Cluster @Uvic	Variable (280 max)	Occasional Backfill access



Future Grid

The Nimbus Team

- Project lead: Kate Keahey, ANL&UC
- Committers:
  - Tim Freeman - University of Chicago
  - Ian Gable - University of Victoria
  - David LaBissoniere - University of Chicago
  - John Bresnahan - Argonne National Laboratory
  - Patrick Armstrong - University of Victoria
  - Pierre Riteau - University of Rennes 1, IRISA
- Github Contributors:
  - *Tim Freeman, David LaBissoniere, John Bresnahan, Pierre Riteau, Alex Clemesha, Paulo Gomez, Patrick Armstrong, Matt Vliet, Ian Gable, Paul Marshall, Adam Bishop*
- *And many others*
  - *See http://www.nimbusproject.org/about/people/*

Parting Thoughts

- Many challenges left in exploring infrastructure clouds
- FutureGrid offers an instrument that allows you to explore them:
  - Multiple distributed clouds
  - The opportunity to experiment with cloud software
  - Paradigm exploration for domain sciences
- Nimbus provides tools to explore them
- Come and work with us on FutureGrid!

www.nimbusproject.com

Let's make cloud computing for science happen.

OpenStack

- Why OpenStack?
  - Users want to avoid being locked into a single solution.
  - Has large backing by many industrial partners with contributing efforts (more than 60 companies)
  - Is open source
  - Provides flexibility in deployment

Future Grid

What is OpenStack?

- Originated at NASA to provide a compute cloud infrastructure
- Contains currently three subprojects
  - OpenStack Compute (VM & Networks)
  - OpenStack Image Service (Image Management)
  - OpenStack Object Store (Storage)
- Supports multiple hypervisors
  - Xen, KVM, ESXi, Hyper-V

Future Grid

OpenStack Plans on FG

- Currently we are installing OpenStack on FG and have test instances running
- It will be available to the general users before the end of the year.
- Also expect to have a professional version of Eucalyptus
- Currently Nimbus best supported VM manager on FutureGrid

Future Grid

Virtual Appliances on FutureGrid

Renato Figueiredo (University of Florida)
renato@acis.ufl.edu

Future Grid

Overview

- Traditional ways of delivering hands-on training and education in parallel/distributed computing have non-trivial dependences on the environment
  - Difficult to replicate same environment on different resources (e.g. HPC clusters, desktops)
  - Difficult to cope with changes in the environment (e.g. software upgrades)
- Virtualization technologies remove key software dependences through a layer of indirection

Future Grid

Overview

- FutureGrid enables new approaches to education and training and opportunities to engage in outreach
  - Cloud, virtualization and dynamic provisioning – environment can adapt to the user, rather than expect user to adapt to the environment
  - Availability of plentiful resources to run appliances, the ability for users to create and share appliances, and the variety of VM management systems,
- Leverage unique capabilities of the infrastructure:
  - Reduce barriers to entry and engage new users
  - Use of encapsulated environments ("appliances") as a primary delivery mechanism of education/training modules – promoting reuse, replication, and sharing
  - Hands-on tutorials on introductory, intermediate, and advanced topics

Future Grid

What is an appliance?

- Hardware/software appliances
  - TV receiver + computer + hard disk + Linux + user interface

  - Computer + network interfaces + FreeBSD + user interface

What is a virtual appliance?

- An appliance that packages software and configuration needed for a particular purpose into a virtual machine “image”
- The virtual appliance has no hardware – just software and configuration
- The image is a (big) file
- It can be *instantiated* on hardware

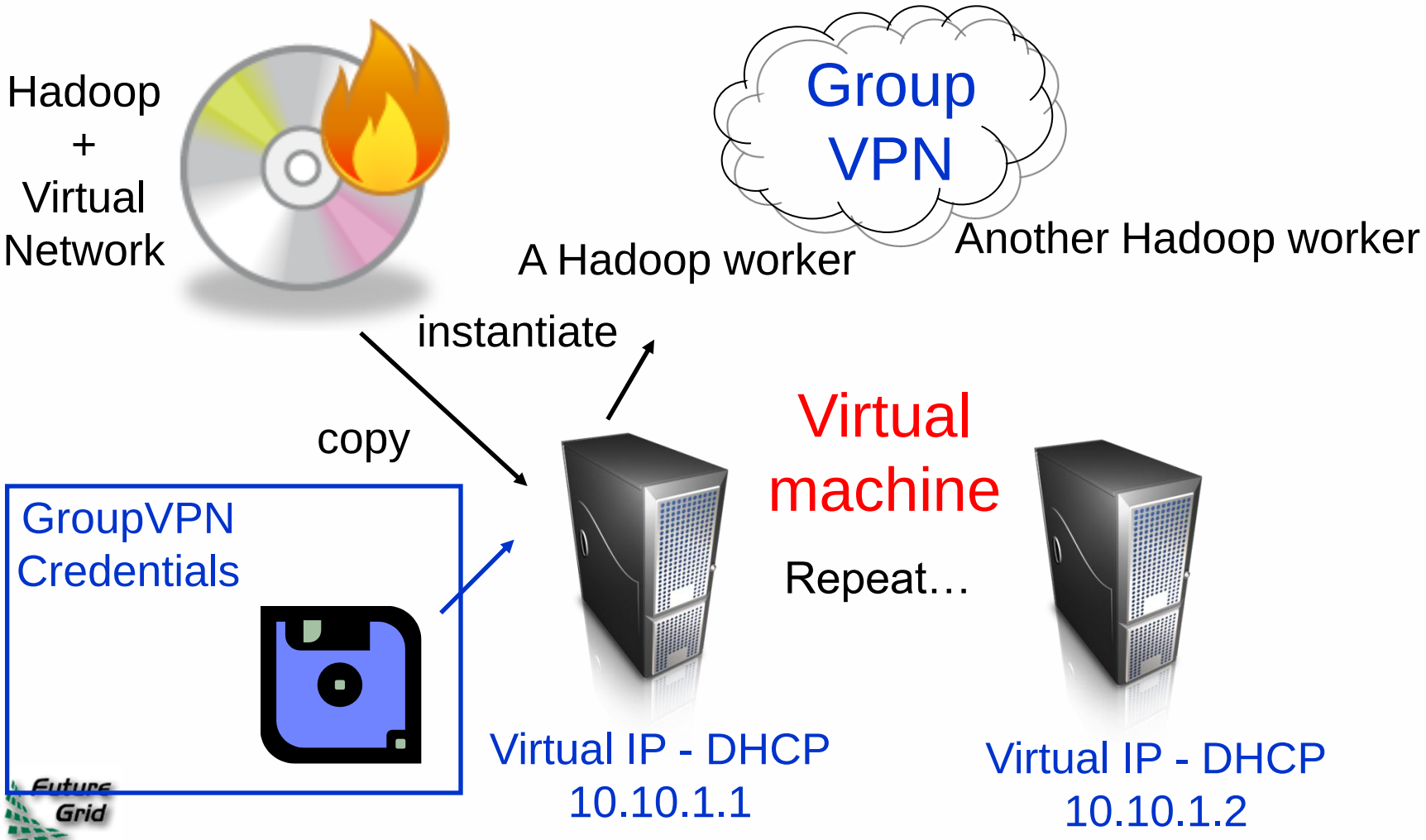
Educational virtual appliances

- A flexible, extensible platform for *hands-on, lab-oriented* education on FutureGrid
- Support *clustering* of resources
  - Virtual machines + social/virtual networking to create sandboxed modules
    - *Virtual "Grid" appliances*: self-contained, pre-packaged execution environments
    - *Group VPNs*: simple management of virtual clusters by students and educators

Future Grid

Virtual appliance clusters

- Same image, different VPNs



Tutorials - examples

- http://portal.futuregrid.org/tutorials
- Introduction to FG IaaS Cloud resources
  - Nimbus and Eucalyptus
  - Within minutes, deploy a virtual machine on FG resources and log into it interactively
  - Using OpenStack – nested virtualization, a sandbox IaaS environment within Nimbus
- Introduction to FG HPC resources
  - Job scheduling, Torque, MPI
- Introduction to Map/Reduce frameworks
  - Using virtual machines with Hadoop, Twister
  - Deploying on physical machines/HPC (MyHadoop)

Virtual appliance – tutorials

- Deploying a single appliance
  - Nimbus, Eucalyptus, or user's own desktop
    - VMware, Virtualbox
  - Automatically connects to a shared "playground" resource pool with other appliances
  - Can execute Condor, MPI, and Hadoop tasks
- Deploying private virtual clusters
  - Separate IP address space – e.g. for a class, or student group
- Customizing appliances for your own activity

Virtual appliance 101

- cloud-client.sh --conf alamo.conf --run --name grid-appliance-2.04.29.gz --hours 24
- ssh root@129.114.x.y
- su griduser
- cd ~/examples/montepi
- gcc montepi.c -o montepi -lm -m32
- condor_submit submit_montepi_vanilla
- condor_status, condor_q

Technology Preview

Dynamic Provisioning & RAIN on FutureGrid

Gregor von Laszewski

Classical Dynamic Provisioning

Technology Preview

- Dynamically
  - partition a set of resources
  - allocate the resources to users
  - define the environment that the resource use
  - assign them based on user request
- Deallocate the resources so they can be dynamically allocated again

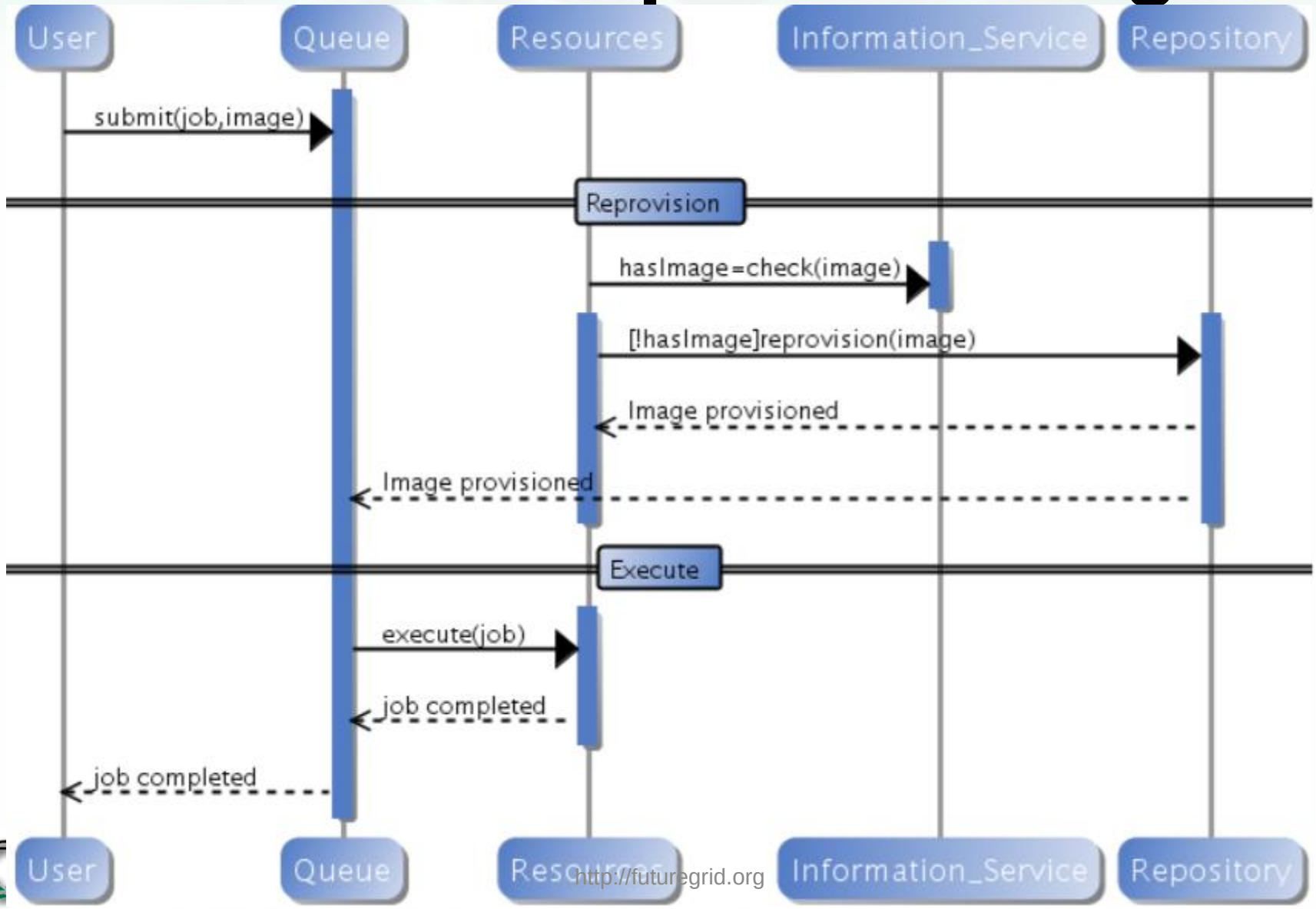
Use Cases of Dynamic Provisioning

Technology Preview

- Static provisioning:
  - Resources in a cluster may be statically reassigned based on the anticipated user requirements, part of an HPC or cloud service. It is still dynamic, but control is with the administrator. (Note some call this also dynamic provisioning.)
- Automatic Dynamic provisioning:
  - Replace the administrator with intelligent scheduler.
- Queue-based dynamic provisioning:
  - provisioning of images is time consuming, group jobs using a similar environment and reuse the image. User just sees queue.
- Deployment:
  - dynamic provisioning features are provided by a combination of using XCAT and Moab

Technology Preview

Generic Reprovisioning



Dynamic Provisioning Examples

Technology Preview

- Give me a virtual cluster with 30 nodes based on Xen
- Give me 15 KVM nodes each in Chicago and Texas linked to Azure and Grid5000
- Give me a Eucalyptus environment with 10 nodes
- Give 32 MPI nodes running on first Linux and then Windows
- Give me a Hadoop environment with 160 nodes
- Give me a 1000 BLAST instances linked to Grid5000

- Run my application on Hadoop, Dryad, Amazon and Azure … and compare the performance

From Dynamic Provisioning to "RAIN"

- In FG dynamic provisioning goes beyond the services offered by common scheduling tools that provide such features.
  - Dynamic provisioning in FutureGrid means more than just providing an image
  - adapts the image at runtime and provides besides IaaS, both PaaS and SaaS
  - We call this "raining" an environment
- Rain = Runtime Adaptable INsertion Configurator
  - Users want to ``rain'' an HPC, a Cloud environment, or a virtual network onto our resources with little effort.
  - Command line tools supporting this task.
  - Integrated into Portal
- Example ``rain'' a Hadoop environment defined by a user on a cluster.
  - fg-hadoop -n 8 -app myHadoopApp.jar …
  - Users and administrators do not have to set up the Hadoop environment as it is being done for them

Technology Preview

FG RAIN Commands

- fg-rain –h hostfile –iaas nimbus –image img
- fg-rain –h hostfile –paas hadoop …
- fg-rain –h hostfile –paas dryad …
- fg-rain –h hostfile –gaas gLite …

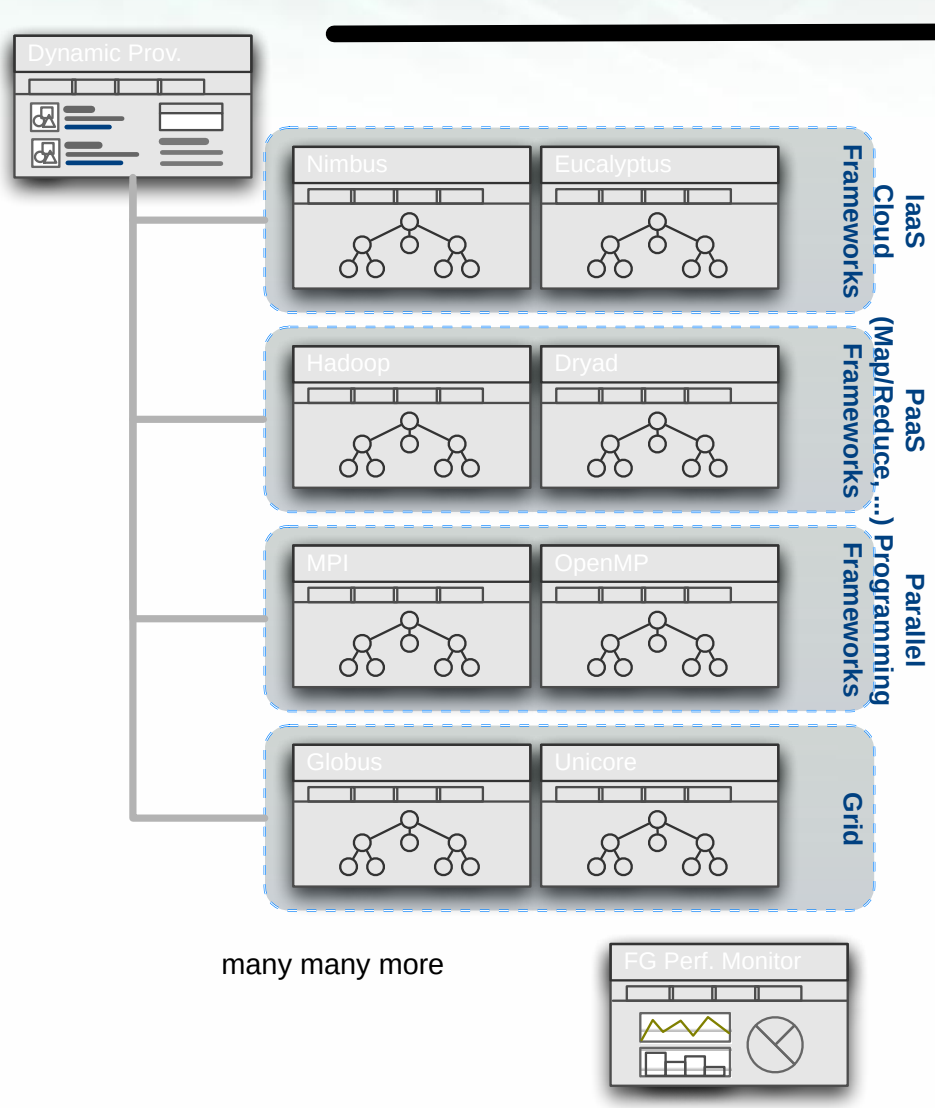
- fg-rain –h hostfile –image img

- fg-rain –virtual-cluster -16 nodes -2 core

- Additional Authorization is required to use fg-rain without virtualization.

Technology Preview

Rain in FutureGrid



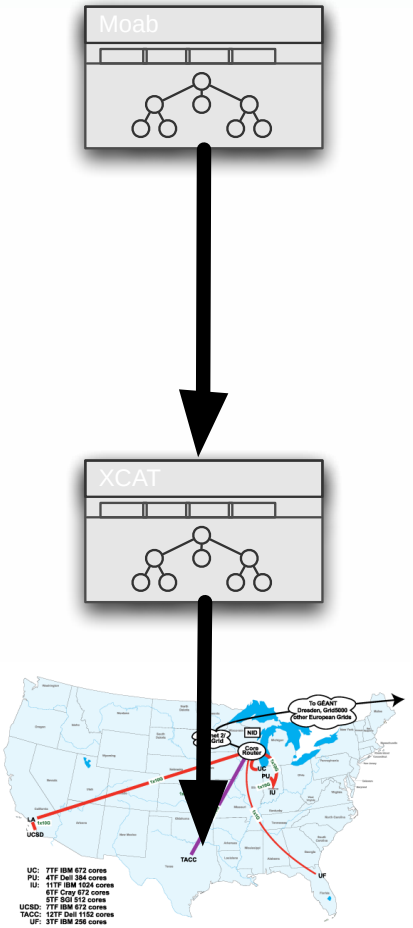


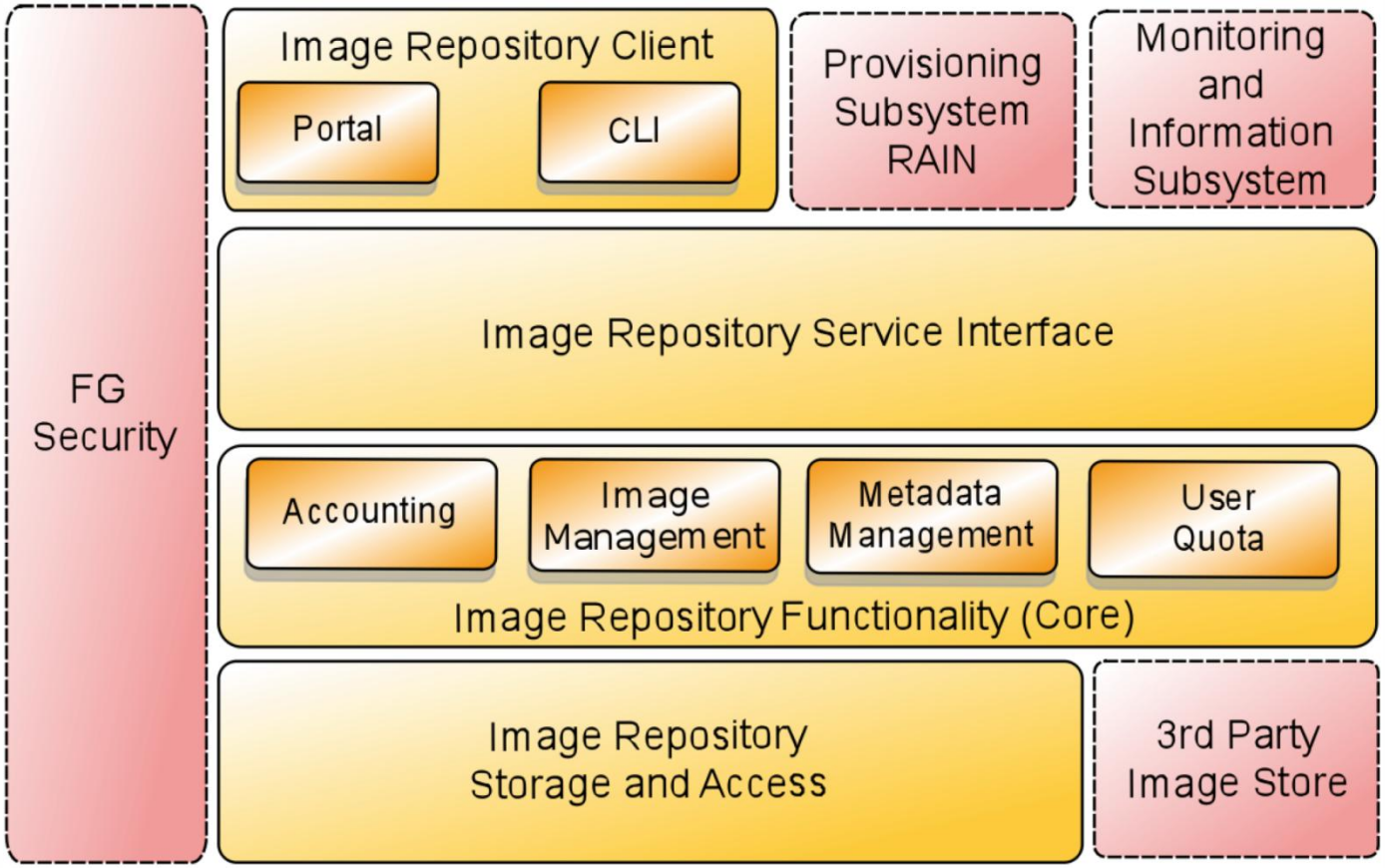
Image Generation and Management on FutureGrid

Javier Diaz
Gregor von Laszewski

FG Image Repository I

- Service to query, store, and update images through a unique and common interface
  - Can distinguish image types for different purposes (IaaS, HPC…)
- Maintains data related with the usage to assist performance monitoring and accounting
- Special features
  - Users can request images that fulfill their requirements. If there is not such image in the repository, it can be generated
  - Store basic images and the description of how to generate new ones

FG Image Repository II



Management Motivation

- The goal is to create and maintain platforms in custom FG VMs that can be retrieved, deployed, and provisioned on demand.
- A unified Image Management system to create and maintain VM and bare-metal images.
- Integrate images through a repository to instantiate services on demand with RAIN.
- Essentially enables the rapid development and deployment of Platform services on FutureGrid infrastructure.

Technology Preview

What happens internally?

- Generate a Centos image with several packages
  - **fg-image-generate –o centos –v 5.6 –a x86_64 –s emacs, openmpi –u javi**
  - **> returns image: centosjavi3058834494.tgz**
- Deploy the image for HPC (xCAT)
  - **./fg-image-register -x im1r –m india -s india -t /N/scratch/ -i centosjavi3058834494.tgz -u jdiaz**
- Submit a job with that image
  - qsub -l os=**centosjavi3058834494** testjob.sh

Future Grid

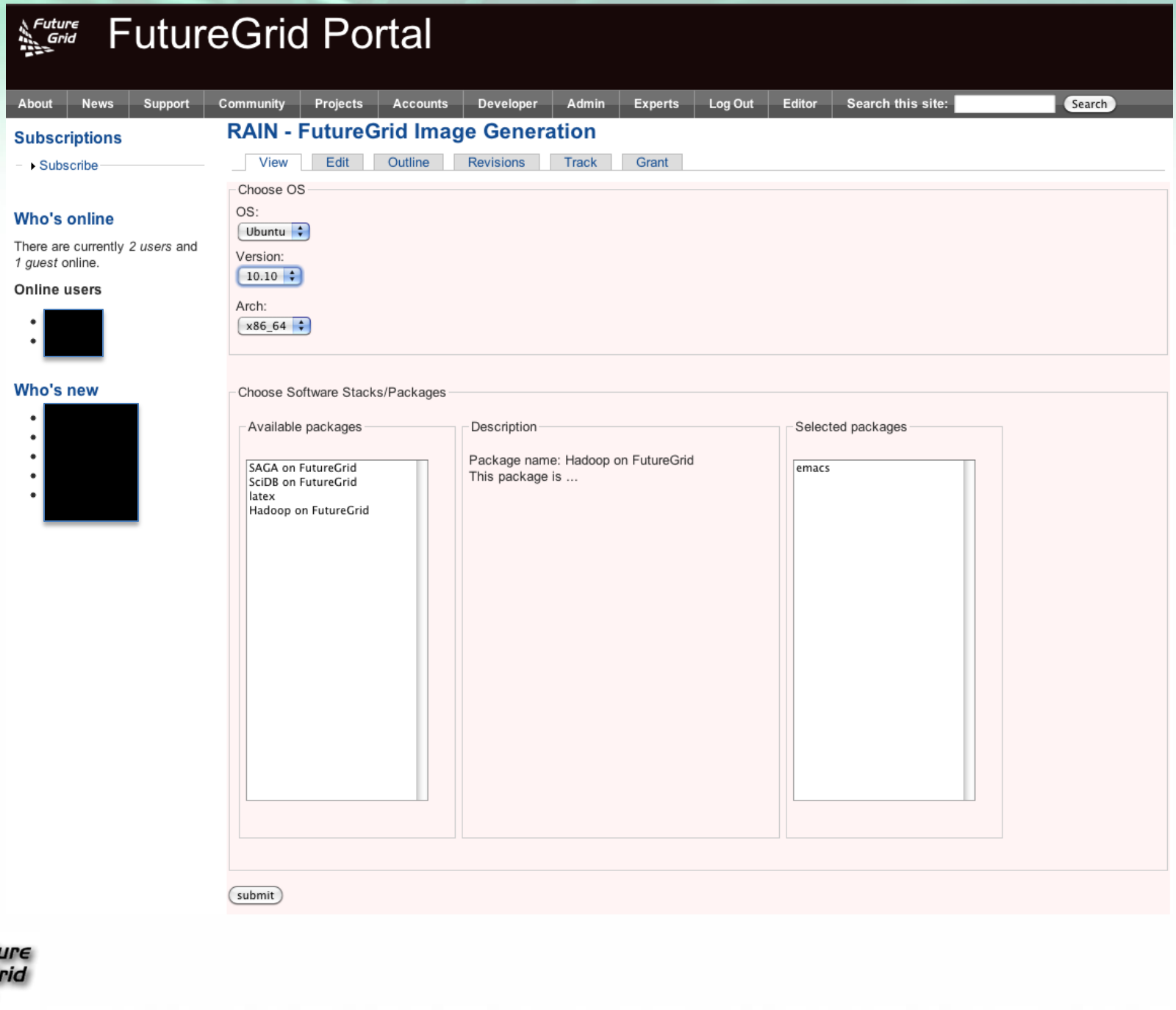
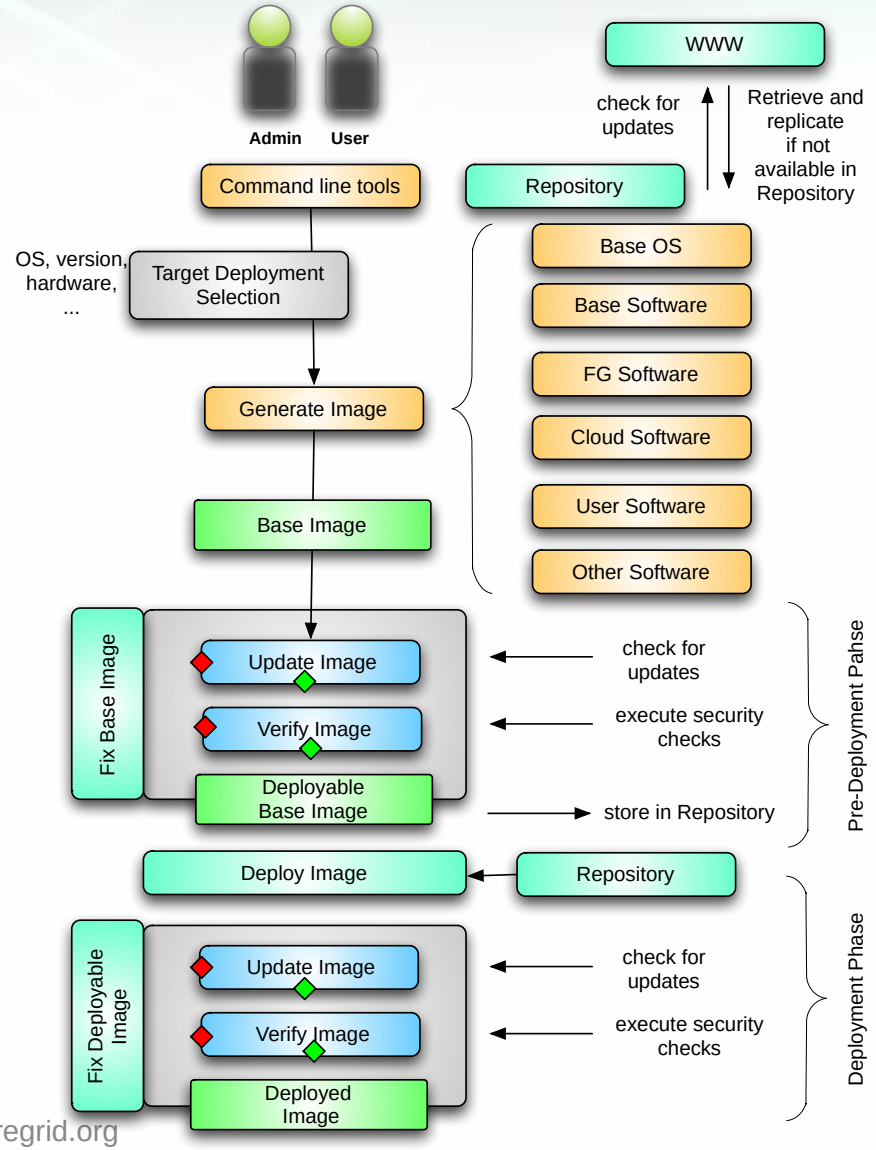
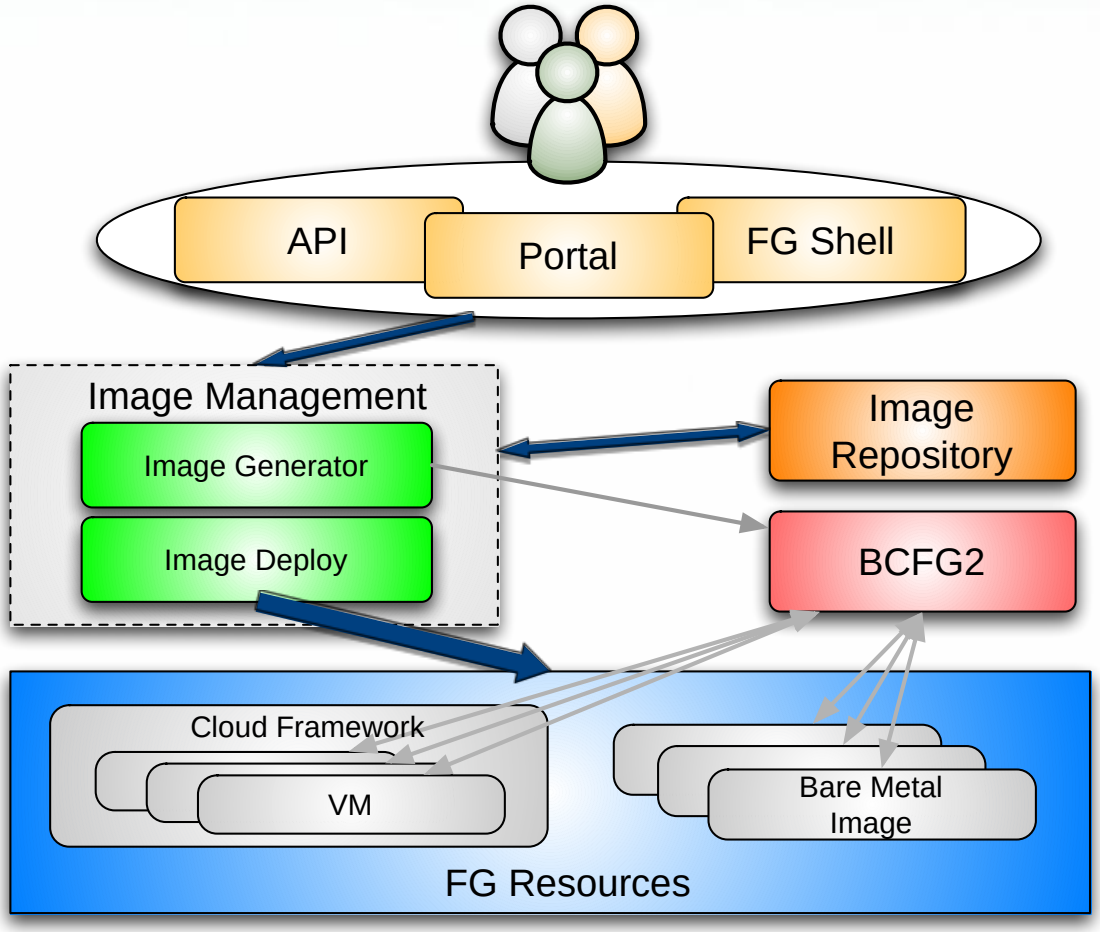

FutureGrid Portal
About
News
Support
Community
Projects
Accounts
Developer
Admin
Experts
Log Out
Editor
Search this site:
Search
Subscriptions
Subscribe
Who's online
There are currently 2 users and 1 guest online.
Online users
Who's new
RAIN - FutureGrid Image Generation
View
Edit
Outline
Revisions
Track
Grant
Choose OS
OS:
Ubuntu
Version:
10.10
Arch:
x86_64
Choose Software Stacks/Packages
Available packages
SAGA on FutureGrid
SciDB on FutureGrid
latex
Hadoop on FutureGrid
Description
Package name: Hadoop on FutureGrid
This package is ...
Selected packages
emacs
submit

Image Generation

- Users who want to create a new FG image specify the following:
  - OS type
  - OS version
  - Architecture
  - Kernel
  - Software Packages
- Image is generated, then deployed to specified target.
- Deployed image gets continuously scanned, verified, and updated.
- Images are now available for use on the target deployed system.



Deployment View



Implementation

- Image Generator
  - alpha available for authorized users
  - Allows generation of Debian & Ubuntu, YUM for RHEL5, CentOS, & Fedora images.
  - Simple CLI
  - Later incorporate a web service to support the FG Portal.
  - Deployment to Eucalyptus & Bare metal now, Nimbus and others later.
- Image Management
  - Currently operating with an experimental BCFG2 server.
  - Image Generator auto-creates new user groups for software stacks.
  - Supporting RedHat and Ubuntu repo mirrors.
  - Scalability experiments of BCFG2 to be tested, but previous work shows scalability to thousands of VMs without problems

Interoperability

Andrew Grimshaw

Future Grid

Interfacing with OGF

- Deployments
  - Genesis II
  - Unicore
  - Globus
  - SAGA
- Some thoughts
  - How can FG get OCCI from a community effort?
  - Is FG useful for OGF community?
  - What other features are desired for OGF community?

Future Grid

Current Efforts

- Interoperability
- Domain Sciences – Applications
- Computer Science
- Computer system testing and evaluation

Grid interoperability testing

Requirements

- Provide a *persistent* set of standards-compliant implementations of grid services that clients can test against
- Provide a place where grid application developers can experiment with different standard grid middleware stacks without needing to become experts in installation and configuration
- Job management (OGSA-BES/JSDL, HPC-Basic Profile, HPC File Staging Extensions, JSDL Parameter Sweep, JSDL SPMD, PSDL Posix)
- Resource Name-space Service (RNS), Byte-IO

Usecases

- Interoperability tests/demonstrations between different middleware stacks
- Development of client application tools (e.g., SAGA) that require configured, operational backends
- Develop new grid applications and test the suitability of different implementations in terms of both functional and non-functional characteristics

Implementation

- UNICORE 6
  - OGSA-BES, JSDL (Posix, SPMD)
  - HPC Basic Profile, HPC File Staging
- Genesis II
  - OGSA-BES, JSDL (Posix, SPMD, parameter sweep)
  - HPC Basic Profile, HPC File Staging
  - RNS, ByteIO
- *EGEE/g-lite*
- *SMOA*
  - *OGSA-BES, JSDL (Posix, SPMD)*
  - *HPC Basic Profile*

Deployment

- UNICORE 6
  - Xray
  - Sierra
  - India
- Genesis II
  - Xray
  - Sierra
  - India
  - Eucalyptus (India, Sierra)

Domain Sciences

Requirements

- Provide a place where grid application developers can experiment with different standard grid middleware stacks without needing to become experts in installation and configuration

Usecases

- Develop new grid applications and test the suitability of different implementations in terms of both functional and non-functional characteristics

Applications

- *Global Sensitivity Analysis in Non-premixed Counterflow Flames*
- *A 3D Parallel Adaptive Mesh Renement Method for Fluid Structure Interaction: A Computational Tool for the Analysis of a Bio-Inspired Autonomous Underwater Vehicle*
- *Design space exploration with the M5 simulator*
- *Ecotype Simulation of Microbial Metagenomes*
- *Genetic Analysis of Metapopulation Processes in the Silene-Microbotryum Host-Pathogen System*
- *Hunting the Higgs with Matrix Element Methods*
- *Identification of eukaryotic genes derived from mitochondria using evolutionary analysis*
- *Identifying key genetic interactions in Type II diabetes*
- *Using Molecular Simulations to Calculate Free Energy*

Test-bed
Use as an experimental facility

- Cloud bursting work
  - Eucalyptus
  - Amazon
- Replicated files & directories
- Automatic application configuration and deployment

Grid Test-bed

Requirements

- Systems of sufficient scale to test realistically
- Sufficient bandwidth to stress communication layer
- Non-production environment so production users not impacted when a component fails under test
- Multiple sites, with high latency and bandwidth
- Cloud interface without bandwidth or CPU charges

Usecases

- XSEDE testing
  - XSEDE architecture is based on same standards, same mechanisms used here will be used for XSEDE testing
- Quality attribute testing, particularly under load and at extremes.
  - Load (e.g., job rate, number of jobs i/o rate)
  - Performance
  - Availability
- New application execution
  - Resources to entice
- New platforms (e.g., Cray, Cloud)

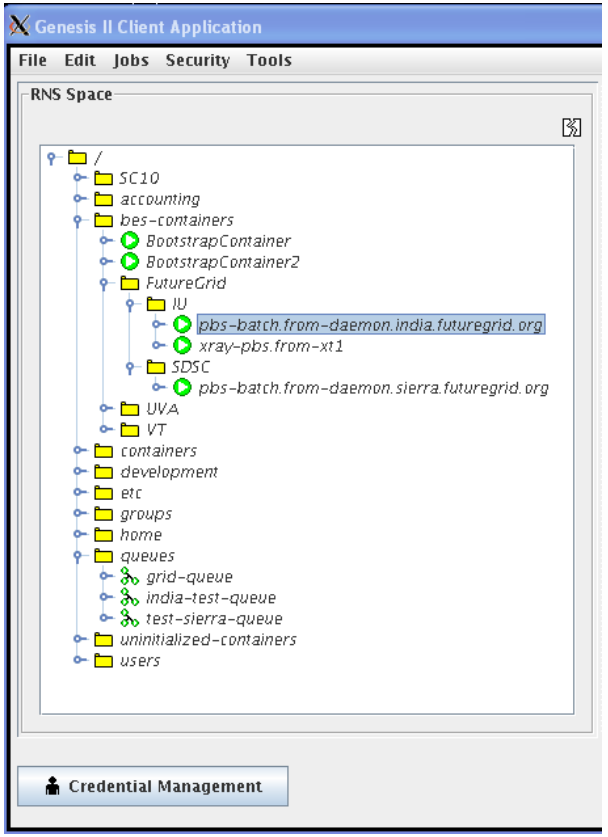
Extend XCG onto FutureGrid

(XCG- Cross Campus Grid)

Design

- Genesis II containers on head nodes of compute resources
- Test queues that send the containers jobs
- Test scripts that generate thousands of jobs, jobs with significant I/O demands
- Logging tools to capture errors and root cause
- Custom OGSA-BES container that understands EC2 cloud interface, and “cloud-bursts”

Image



Getting Access to FutureGrid

Gregor von Laszewski

Portal Account, Projects, and System Accounts

- The main entry point to get access to the systems and services is the FutureGrid Portal.
- We distinguish the portal account from system and service accounts.
  - You may have multiple system accounts and may have to apply for them separately, e.g. Eucalyptus, Nimbus
  - Why several accounts:
    - Some services may not be important for you, so you will not need an account for all of them.
      - In future we may change this and have only one application step for all system services.
    - Some services may not be easily integratable in a general authentication framework

Future Grid

Get access

Project Lead

1. Create a portal account
2. Create a project
3. Add project members

Project Member

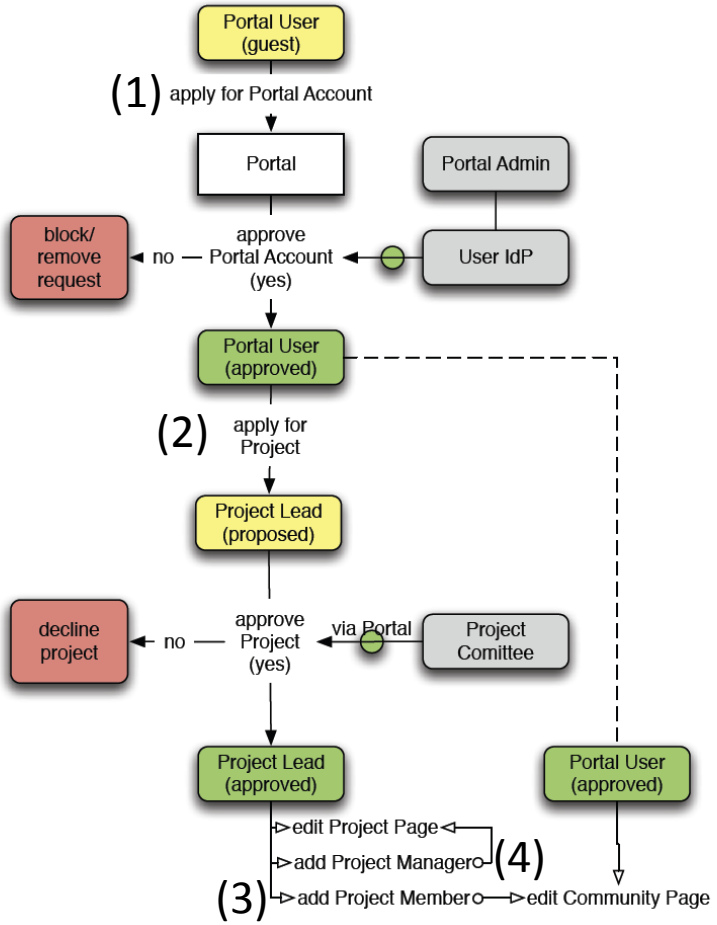
1. Create a portal account
2. Ask your project lead to add you to the project

Once the project you participate in is approved

1. Apply for an HPC & Nimbus account
   - You will need an ssh key
2. Apply for a Eucalyptus Account

Future Grid

The Process: A new Project

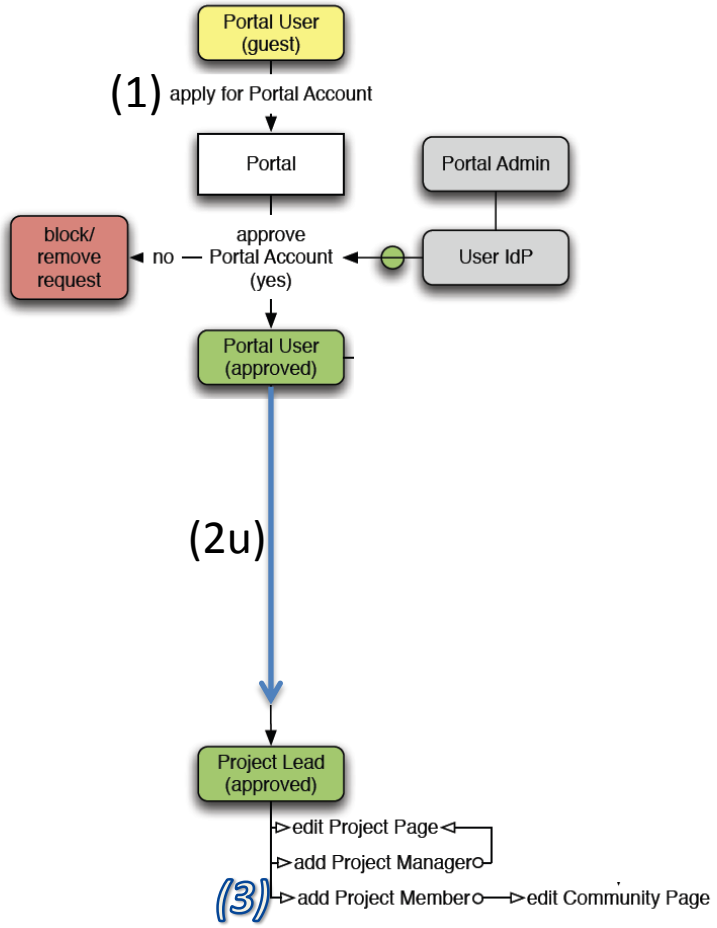


- **(1) get a portal account**
  - *portal account is approved*
- **(2) propose a project**
  - *project is approved*
- **(3) ask your partners for their portal account names and add them to your projects as members**
  - *No further approval needed*
- **(4) if you need an additional person being able to add members designate him as project manager (currently there can only be one).**
  - *No further approval needed*

- **You are in charge who is added or not!**
  - Similar model as in Web 2.0 Cloud services, e.g. sourceforge

Future Grid

The Process: Join A Project



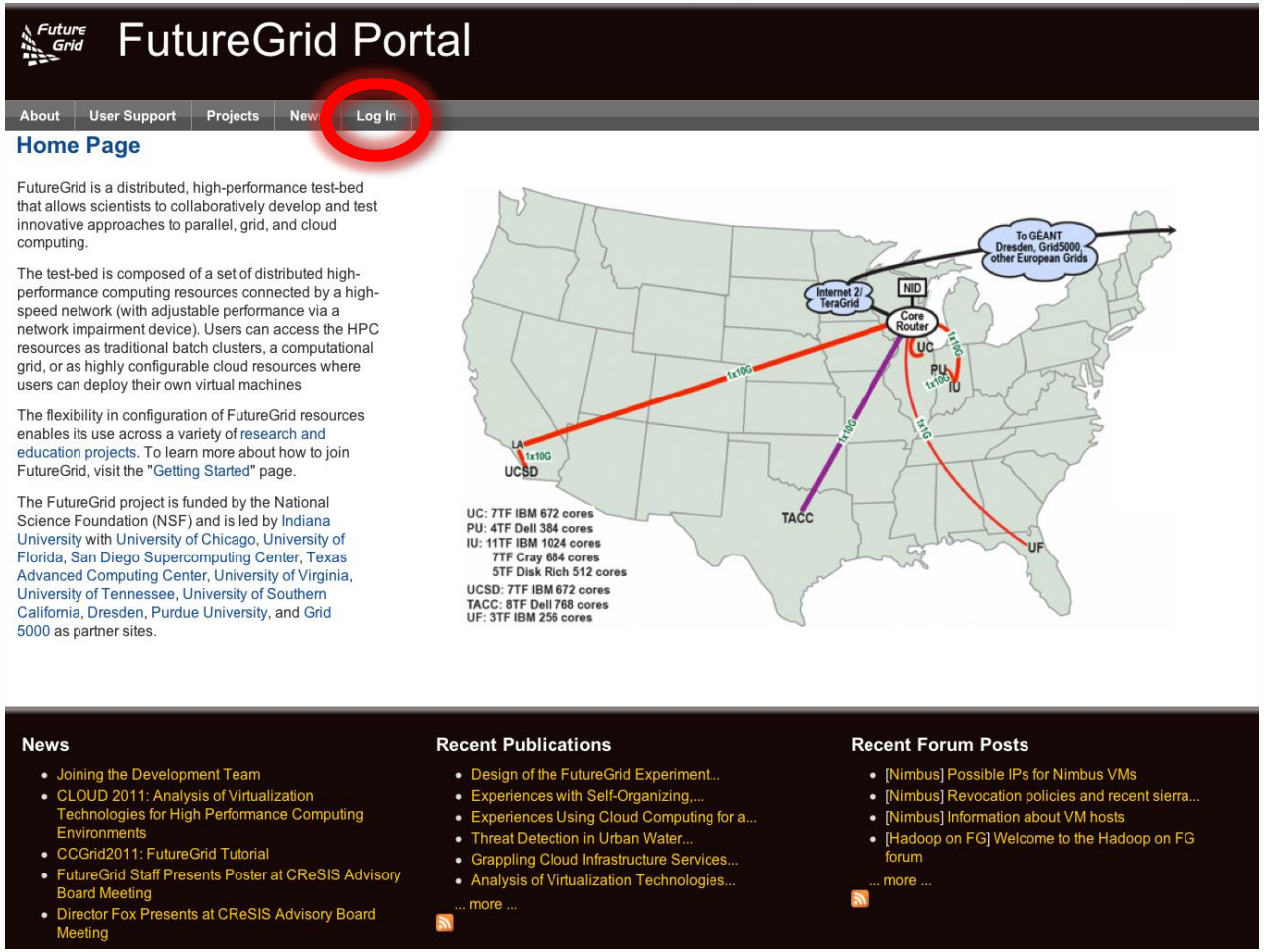
- **(1) get a portal account**
  - *portal account is approved*
- **Skip steps (2) – (4)**
- **(2u) Communicate with your project lead which project to join and give him your portal account name**

- *Next step done by project lead*
  - *(3) The project lead will add you to the project*

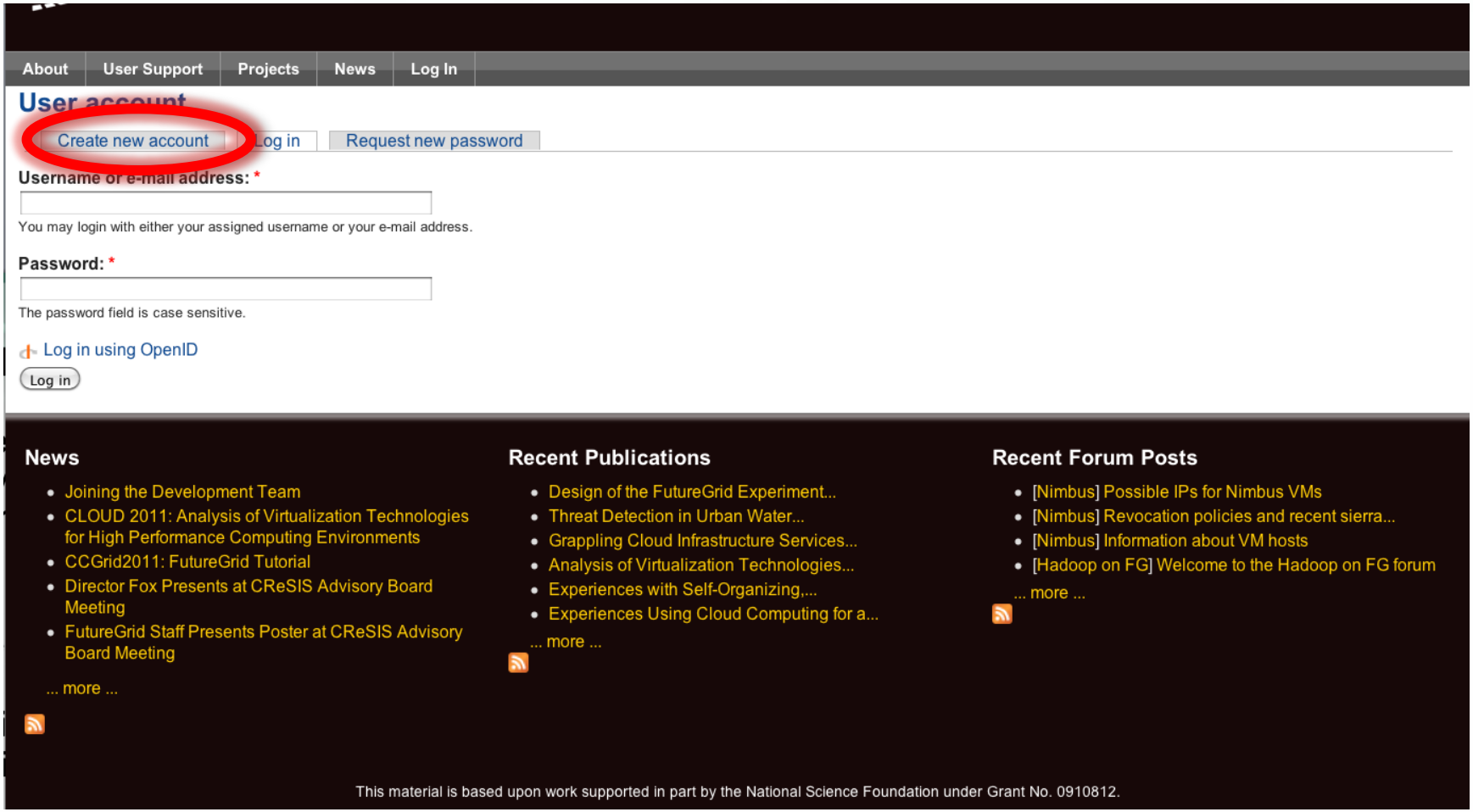
- **You are responsible to make sure the project lead adds you!**
  - Similar model as in Web 2.0 Cloud services, e.g. sourceforge

Future Grid

Apply for a Portal Account

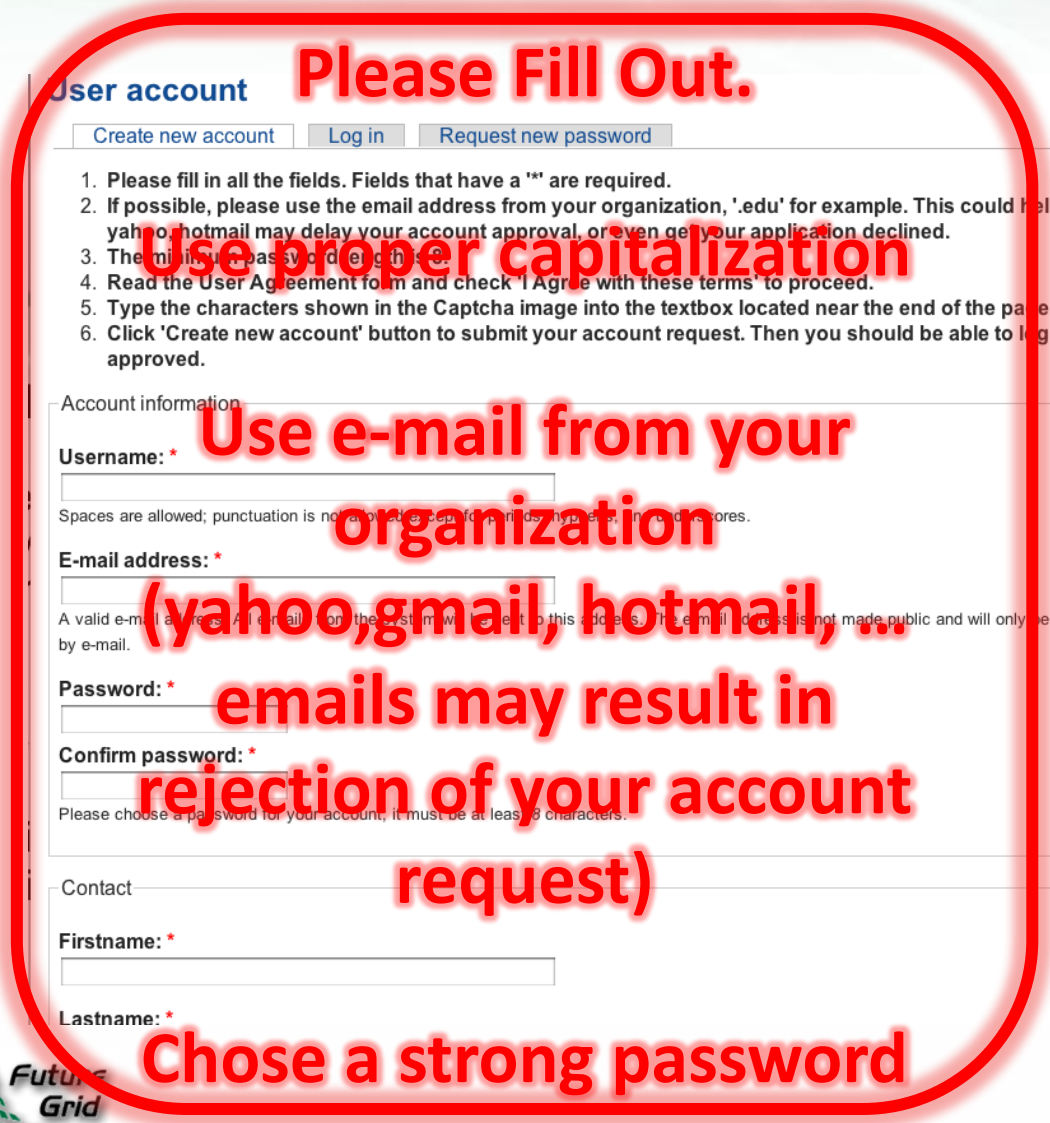


Apply for a Portal Account

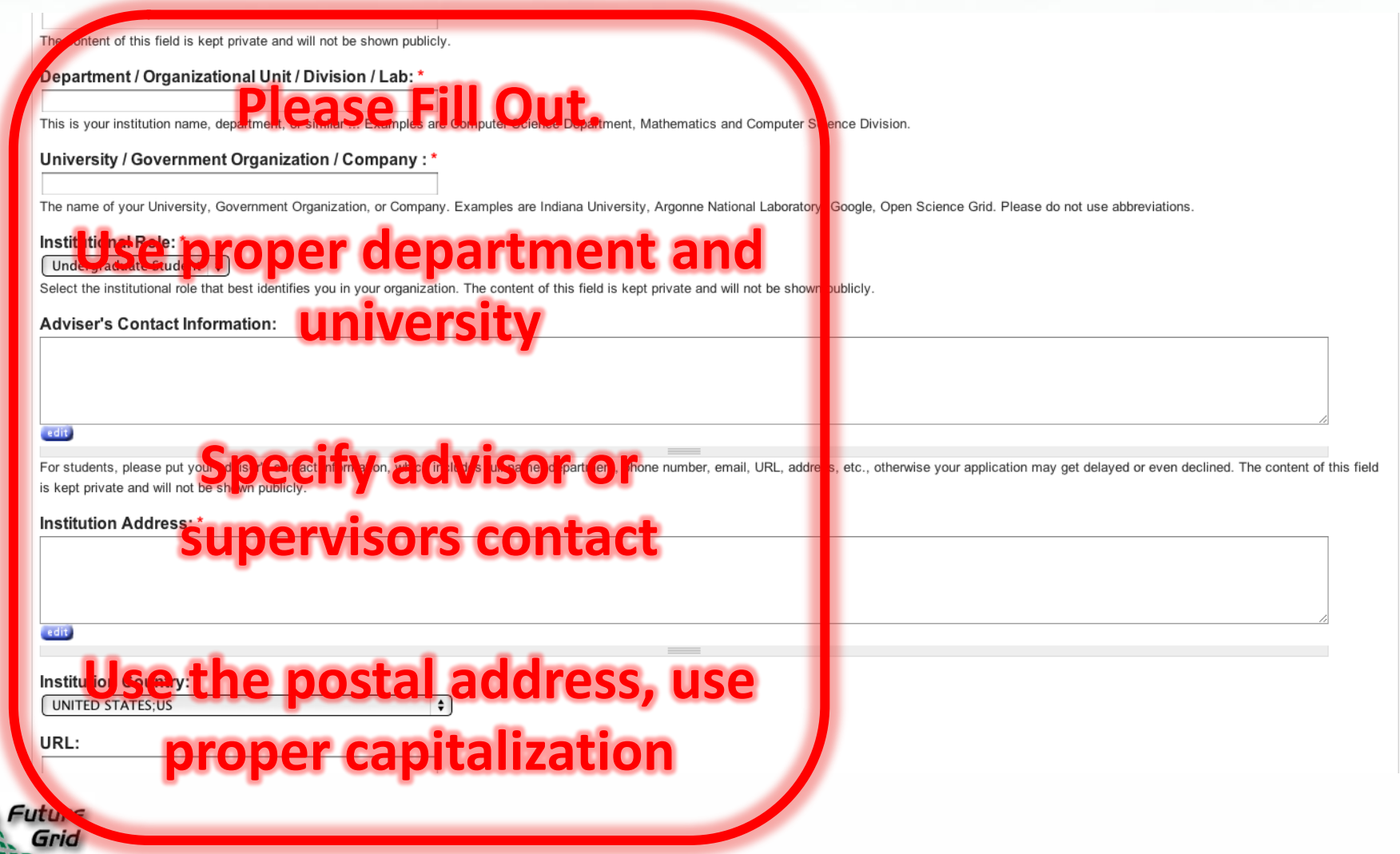


Future Grid

Apply for a Portal Account



Apply for a Portal Account



Apply for a Portal Account

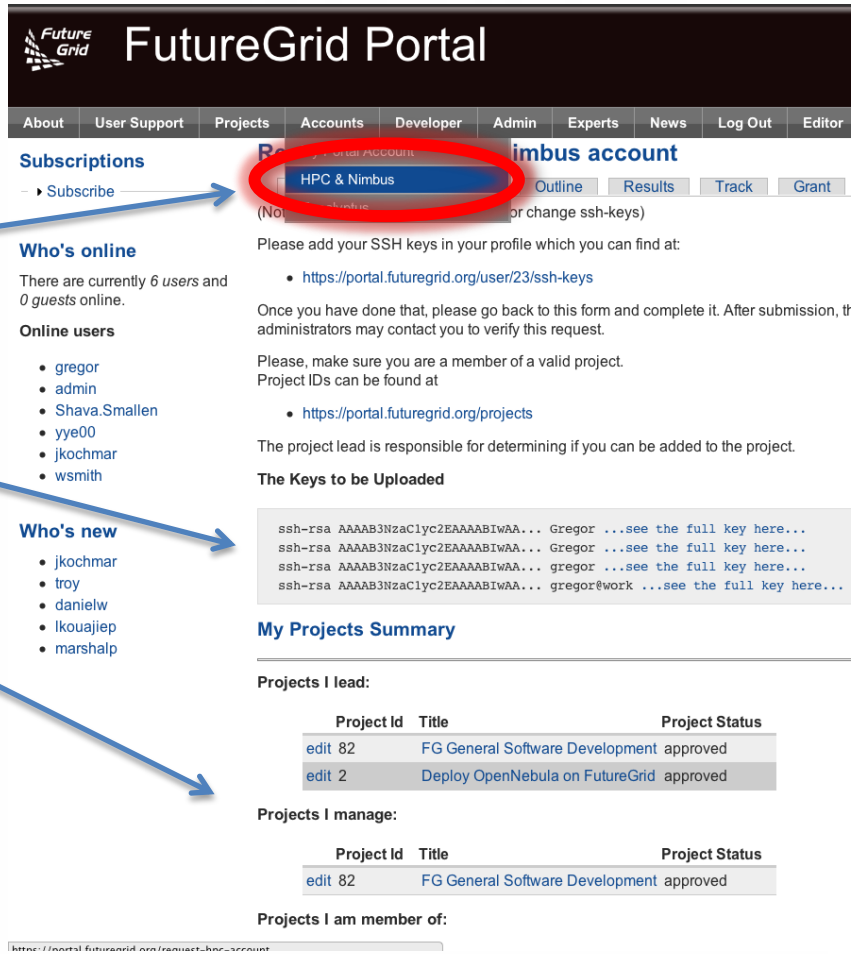
Wait

- Wait till you get notified that you have a portal account.

- Now you have a portal account (cont.)

Apply for an HPC and Nimbus account

- Login into the portal
- Simple go to
  - Accounts-> HPC&Nimbus
- (1) add you ssh keys
- (3) make sure you are in a valid project
- (2) wait for up to 3 business days
  - No accounts will be granted on Weekends
    Friday 5pm EST – Monday 9 am EST



Generating an SSH key pair

- For Mac or Linux users
  - `ssh-keygen -t rsa -C yourname@hostname`
  - Copy the contents of ~/.ssh/id_rsa.pub to the web form

- For Windows users, this is more difficult
  - Download *putty.exe* and *puttygen.exe*
  - Puttygen is used to generate an SSH key pair
    - Run puttygen and click “Generate”
  - The public portion of your key is in the box labeled “SSH key for pasting into OpenSSH authorized_keys file”

Check your Account Status

- Goto:
  - Accounts-My Portal Account
- Check if the account status bar is green
  - Errors will indicate an issue or a task that requires waiting
- Since you are already here:
  - Upload a portrait
  - Check if you have other things that need updating
  - Add ssh keys if needed

Eucalyptus Account Creation

- YOU MUST BE IN A VALID FG PROJECT OR YOUR REQUEST GETS DENIED
- Use the Eucalyptus Web Interfaces at

  https://eucalyptus.india.futuregrid.org:8443/

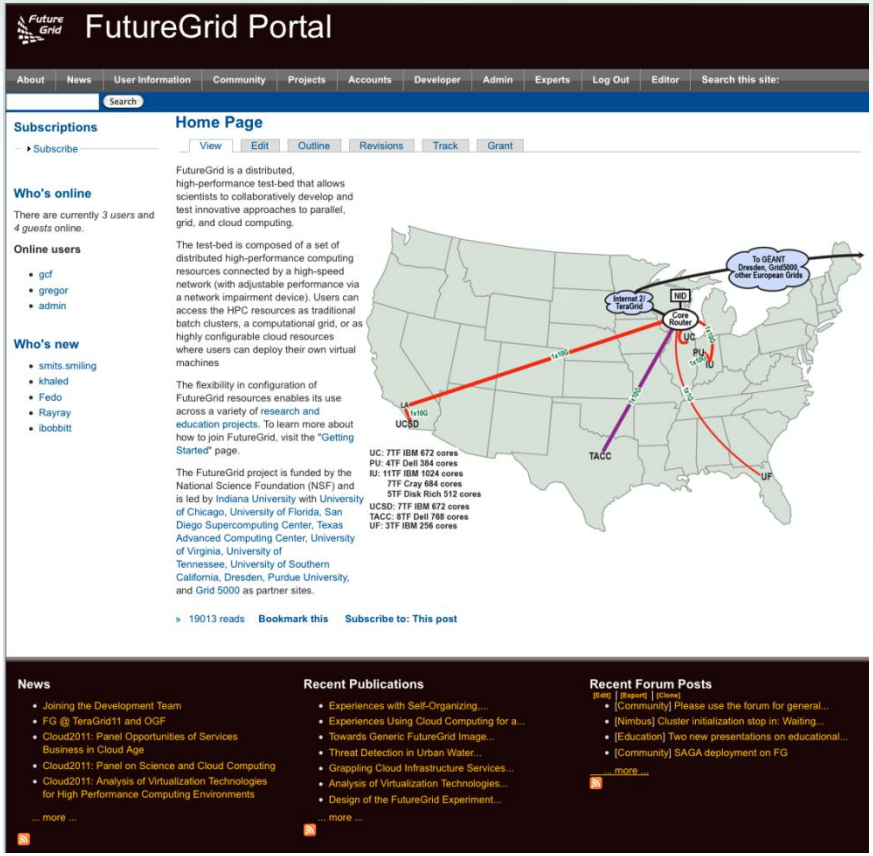
- On the Login page click on Apply for account.
- On the next page that pops up fill out ALL the Mandatory AND optional fields of the form.
- Once complete click on signup and the Eucalyptus administrator will be notified of the account request.
- You will get an email once the account has been approved.
- Click on the link provided in the email to confirm and complete the account creation process

Portal

Gregor von Laszewski

FG Portal

- Coordination of Projects and users
  - Project management
    - Membership
    - Results
  - User Management
    - Contact Information
    - Keys, OpenID
- Coordination of Information
  - Manuals, tutorials, FAQ, Help
  - Status
    - Resources, outages, usage, …
- Coordination of the Community
  - Information exchange: Forum, comments, community pages
  - Feedback: rating, polls
- Focus on support of additional FG processes through the Portal



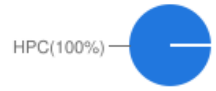
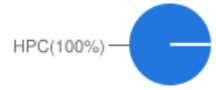
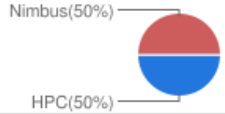
Portal Subsystem

Information Services

- What is happening on the system?
  - System administrator
  - User
  - Project Management & Funding agency
- Remember FG is not just an HPC queue!
  - Which software is used?
  - Which images are used?
  - Which FG services are used (Nimbus, Eucalyptus, …?)
  - Is the performance we expect reached?
  - What happens on the network

Simple Overview

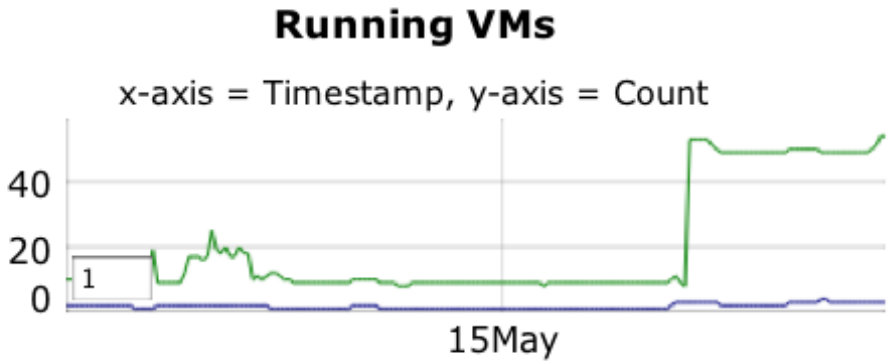
Machine Partition Information *

Resource	HPC	Eucalyptus	Nimbus	
IU-INDIA (1416 cores)	**58.8%** (832 cores)	**28.2%** (400 cores)		
IU-XRAY (664 cores)	**100%** (664 cores)			
TACC-ALAMO (656 cores)	**100%** (656 cores)			
UC-HOTEL (672 cores)	**50%** (336 cores)		**50%** (336 cores)	
UCSD-SIERRA (672 cores)	**46.4%** (312 cores)	**17.9%** (120 cores)	**23.8%** (160 cores)	
UFL-FOXTROT (256 cores)			**96.9%** (248 cores)	

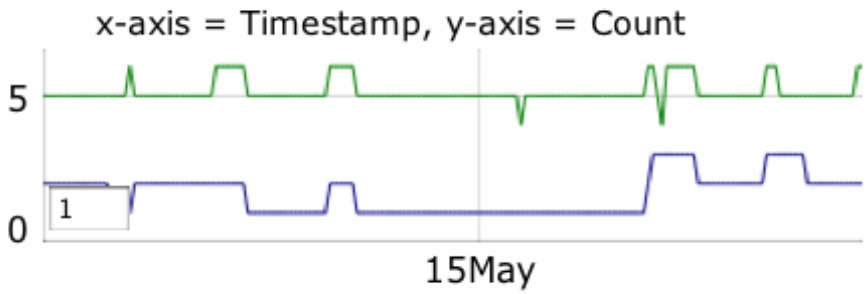
*A small percentage of nodes may be unavailable or used for management

Eucalyptus

This graph shows the number of currently running VMs within the Eucalyptus deployment on each machine.

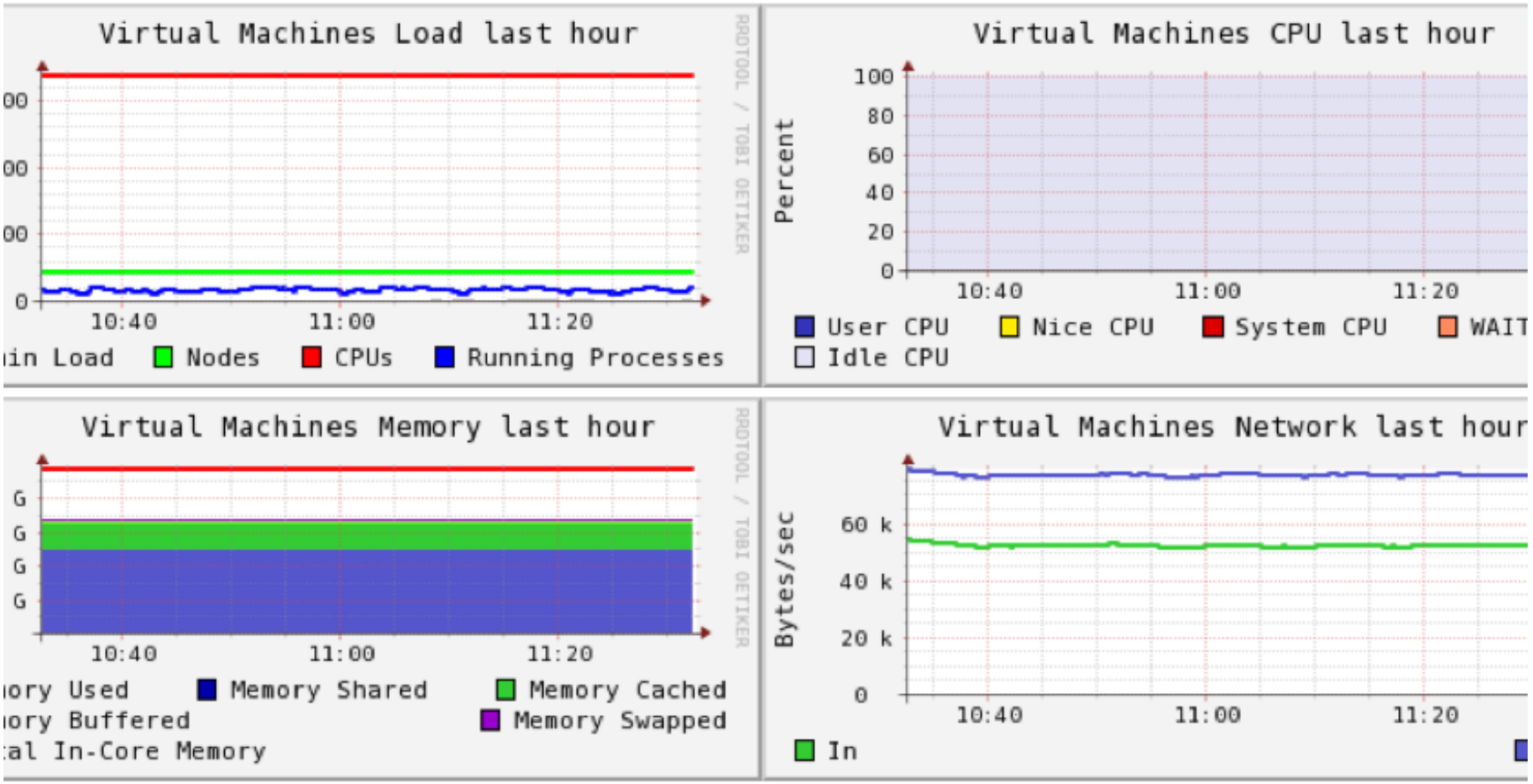


This graph shows the number of users currently running VMs within the Eucalyptus deployment on each machine.



Ganglia

On India



Future Grid

Forums

Forum	Topics	Posts	Last post
Announcements			
User A forum for FG staff to post important information to FG users. This includes information about system status and other important activities.	1	1	23 weeks 5 days ago by gregor
FG User Services Forum			
Community This forum is managed by the FG community and allows posting of questions and answers by all of the FG users and staff members. It is a public forum to which all authenticated users have access to.	20	21	2 days 10 hours ago by gregor
Education This Forum is related to discussion to prepare educational materials for FutureGrid, HPC, Cloud, and Grid Computing	6 1 new	8	2 weeks 5 days ago by mcanonic
HPC For general an public HPC discussions	2	3	21 weeks 6 days ago by gregor
Eucalyptus Eucalyptus related discussions	7	10	14 weeks 3 days ago by archit
Eucalyptus Ops			20 weeks 4 days ago

My Ticket System

FutureGrid tickets

My tickets | Submit a ticket

Your tickets are listed below. Click on a ticket title to expand the details for that ticket.

Please note, there may be some delay before a ticket appears in this view. Recently submitted tickets may not display immediately.

Show 10 entries Search:

ID	Created	Subject	Status	Last updated
303	Wed Jul 13 11:47:17 2011	Eucalyptus account	resolved	Wed Jul 13 12:02:46 2011
300	Wed Jul 06 16:09:23 2011	Machine with fixed IP address to access XD data	new	Wed Jul 06 16:09:24 2011
287	Sun Jun 26 03:26:01 2011	test	resolved	Mon Jul 04 16:18:33 2011
283	Fri Jun 24 09:23:15 2011	Portal account request stalled	resolved	Sun Jun 26 03:43:07 2011
279	Tue Jun 21 16:08:55 2011	python version 2.71 india and sierra	new	Tue Jun 21 16:08:55 2011
278	Tue Jun 21 13:38:46 2011	xemacs	new	Tue Jun 21 13:38:46 2011
265	Wed Jun 08 09:42:06 2011	URGENT	resolved	Wed Jun 08 11:49:27 2011
251	Thu May 26 11:05:24 2011	FG account	resolved	Thu Jun 02 09:40:22 2011
250	Thu May 26 11:02:03 2011	FG portal account	resolved	Thu Jun 02 09:40:50 2011
249	Thu May 26 10:59:43 2011	FG account	resolved	Thu Jun 02 09:41:17 2011

Showing 1 to 10 of 11 entries First | Previous | 1 | 2 | Next | Last

Future Grid

My Ticket Queue

edit Yes	Tutorials	Page		Renato Figueiredo	07/15/2011 - 20:24
edit Yes	Connecting VMs in private networks via ViNe overlay	Community Page		Mauricio Tsugawa	07/15/2011 - 15:34
edit Yes	Accessing FutureGrid	Page		Gregor von Laszewski	07/15/2011 - 11:18
edit Yes	Help and Support	Page		Gregor von Laszewski	07/15/2011 - 09:32
edit Yes	Manage My Portal Account	Page	YES	Gregor von Laszewski	07/15/2011 - 09:16
edit Yes	Status	Page	YES	Gregor von Laszewski	07/14/2011 - 13:09
edit Yes	Host List Manager	Page		Warren Smith	07/12/2011 - 12:03
edit Yes	Contact	Page		Gregor von Laszewski	07/12/2011 - 12:01
edit Yes	Overview	Page		Gregor von Laszewski	07/12/2011 - 12:00
edit Yes	Jobs	Page		Gregor von Laszewski	07/12/2011 - 11:59
edit Yes	Nimbus Services	Page		Gregor von Laszewski	07/12/2011 - 11:59
edit Yes	India	Page		Gregor von Laszewski	07/12/2011 - 11:58

Future Grid

My Projects

My Projects

	Project Id	Title	Project Status	Lead	Manager	Members	Supporting Experts
edit	124	Tutorial: CCGrid2011	approved	Gregor von Laszewski	Andrew Younge	Aaron Vose, Javier Diaz Montes, Cui Lin, Bhanu Rekepalli, Atsuhiro Goto, Marc Frincu, Eshwar Pedamallu, Jesus Montes, Raul Gracia, Alberto Sanchez, Daniel Zinn, Bruno Schulze	Andrew Younge, Fugang Wang
edit	82	FG General Software Development	approved	Gregor von Laszewski	Gregor von Laszewski	Andrew Younge, Mauricio Tsugawa, Bingjing Zhang, Jens-S. Vöckler, Archit Kulshrestha, John Bresnahan, Stephen Mock, Patrick Hurley, Gregory Pike, Matthew Hanlon, Warren Smith, Gregor von Laszewski, Javier Diaz Montes, Michael Lewis, Anh Huy Bui, Joseph Makar, Fugang Wang, meng han	
edit	2	Deploy OpenNebula on FutureGrid	approved	Gregor von Laszewski	Javier Diaz Montes	Javier Diaz Montes	Javier Diaz Montes

Future Grid

Projects I am Member of

Projects I'm a member of

Project Id	Title	Project Status	Lead	Manager	Members	Supporting Experts
89	Support multiple dimensional index in HDFS on the FutureGrid platform	approved	Abhijeet Kodgire	Abhijeet Kodgire	Gregor von Laszewski, Lizhe Wang	Gregor von Laszewski, Lizhe Wang
86	Parallel Analysis of EEG Data with Hadoop on FutureGrid	approved	Rewati Ovalekar	Rewati Ovalekar	Geoffrey Fox, Gregor von Laszewski, Lizhe Wang	
84	Development of an Index File System to Support Geoscience Data with Hadoop	approved	Sonali Karwa	Sonali Karwa	Geoffrey Fox, Gregor von Laszewski, Lizhe Wang	
83	OpenStack on FutureGrid	approved	Archit Kulshrestha	Archit Kulshrestha	Gregory Pike, Gregor von Laszewski	
82	FG General Software Development	approved	Gregor von Laszewski	Gregor von Laszewski	Andrew Younge, Mauricio Tsugawa, Bingjing Zhang, Jens-S. Vöckler, Archit Kulshrestha, John Bresnahan, Stephen Mock, Patrick Hurley, Gregory Pike, Matthew Hanlon, Warren Smith, Gregor von Laszewski, Javier Diaz Montes, Michael Lewis, Anh Huy Bui, Joseph Makar, Fugang Wang, meng han	

Future Grid

Projects I Support

Projects I'm supporting as an expert

[Edit] [Export]

Project Id	Title	Project Status	Lead	Manager	Members	Supporting Experts
133	Supply Chain Network Simulator Using Cloud Computing	approved	Manuel Rossetti	Manuel Rossetti		Gregor von Laszewski, Yuduo Zhou
91	Integrated Information Services (IIS) Testing	approved	John-Paul Navarro	John-Paul Navarro	Aaron Diestelkamp	Lizhe Wang, Gregor von Laszewski
89	Support multiple dimensional index in HDFS on the FutureGrid platform	approved	Abhijeet Kodgire	Abhijeet Kodgire	Gregor von Laszewski, Lizhe Wang	Gregor von Laszewski, Lizhe Wang
62	Evaluation of using XD TAS (Technology Auditing Service) in FutureGrid	approved	Charng-Da Lu	Charng-Da Lu		Gregor von Laszewski, Lizhe Wang
10	TeraGrid XD TIS(Technology Insertion Service) Technology Evaluation Laboratory	approved	John Lockman	John Lockman	Peter Enstrom, Victor Hazlewood, Daniel LaPine	Lizhe Wang, Gregor von Laszewski

Future Grid

My References

My Publications

Title	Authors	Citation Key	URL	Year of Publication	Type of Publication	Type of Work
Analysis of Virtualization Technologies for High Performance Computing Environments	Younge, Andrew J., Robert Henschel, James Brown, Gregor von Laszewski, Judy Qiu, and Geoffrey C. Fox	[fg-1015]		2011	Conference Paper	Paper
Towards Generic FutureGrid Image Management	von Laszewski, Gregor, Javier Diaz, Fugang Wang, Andrew J. Younge, Archit Kulshrestha, and Geoffrey Fox	[fg-1155]	URL	2011	Conference Proceedings	
Grappling Cloud Infrastructure Services with a Generic Image Repository	Diaz, Javier, Andrew J. Younge, Gregor von Laszewski, Fugang Wang, and Geoffrey C. Fox	[fg-1014]	URL	2011	Conference Paper	White Paper
FutureGrid User Manual	von Laszewski, Gregor, and others	[fg-1050]	URL	2011	Miscellaneous	Manual
FuturegGrid Software: Portal Development	von Laszewski, Gregor, and Fugang Wang	[fg-1060]	URL	2011	Report	Report
FutureGrid Software: Image Repository REST API	von Laszewski, Gregor, and Javier Diaz	[fg-1061]	URL	2011	Miscellaneous	Notes/Draft

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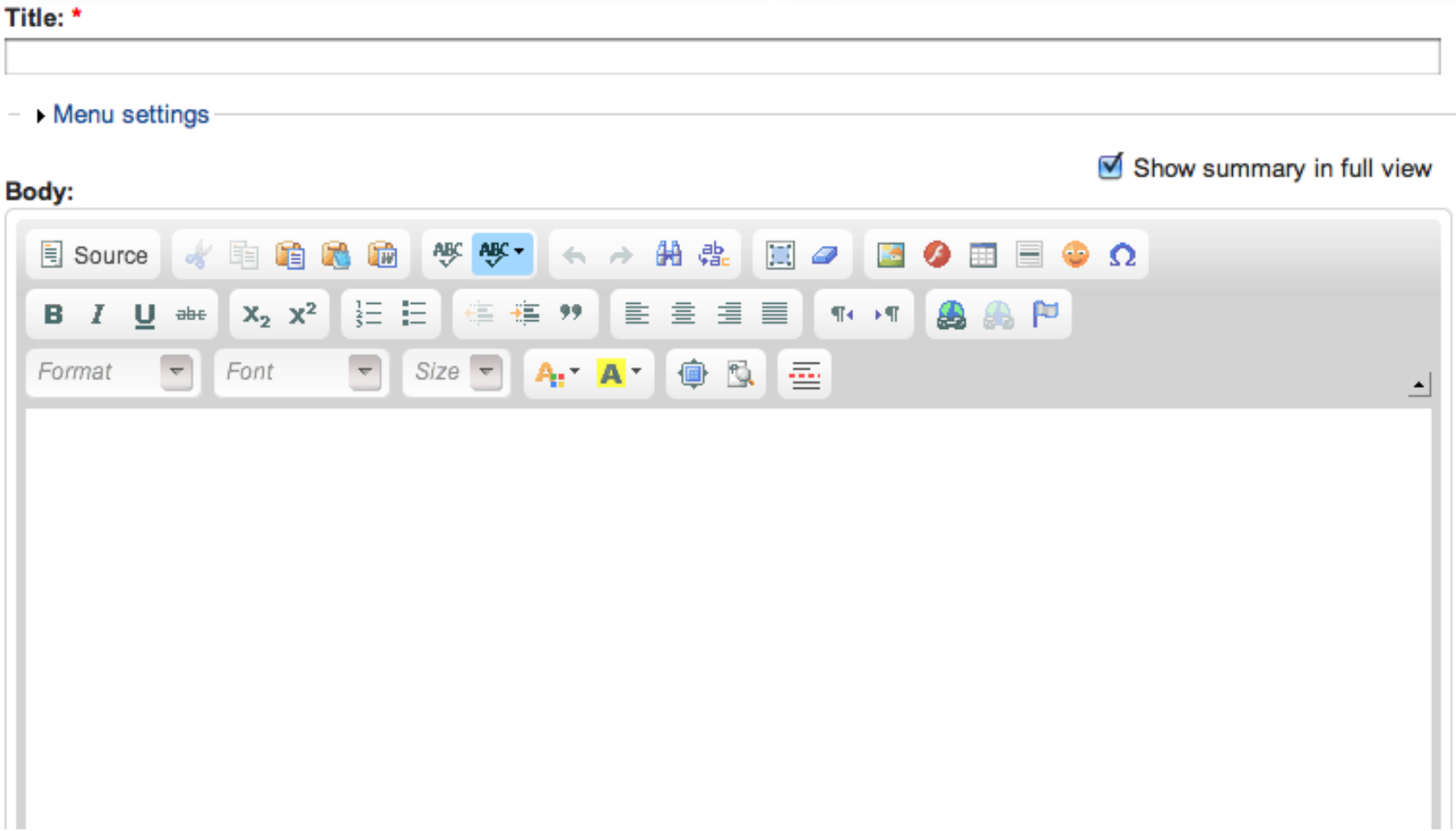
My Community Wiki



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Pages I Manage

Manual pages that I am responsible for updating

Published	Page	Book	Firstname	Lastname	Last Update Activity
Yes	Accessing FutureGrid	User Manual	Gregor	von Laszewski	07/15/2011 - 11:18
Yes	Help and Support	User Manual	Gregor	von Laszewski	07/15/2011 - 09:32
Yes	fg-image-deploy	User Manual	Gregor	von Laszewski	07/12/2011 - 12:51
Yes	Foxtrot	User Manual	Gregor	von Laszewski	07/12/2011 - 12:50
Yes	Developers Manual	Developers Manual	Gregor	von Laszewski	07/12/2011 - 12:50
Yes	User Manual	User Manual	Gregor	von Laszewski	07/12/2011 - 12:49
Yes	Overview (Phase I)	User Manual	Gregor	von Laszewski	07/12/2011 - 12:47
Yes	FG-Image-Generate	User Manual	Gregor	von Laszewski	07/12/2011 - 12:42
Yes	Overview	User Manual	Gregor	von Laszewski	07/12/2011 - 12:00
Yes	Project Management on FutureGrid	Developers Manual	Gregor	von Laszewski	06/06/2011 - 10:02
Yes	fg-hadoop	User Manual	Gregor	von Laszewski	04/27/2011 - 14:18
Yes	Source Code Development Rules	Developers Manual	Gregor	von Laszewski	04/27/2011 - 14:02
Yes	Editorial Processes	Developers Manual	Gregor	von Laszewski	04/27/2011 - 13:55

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Pages to be Reviewed (Editor view)

Published	Title	Type	PHP	Last Modified By	Last Modified Time
edit Yes	Tutorials	Page		Renato Figueiredo	07/15/2011 - 20:24
edit Yes	Connecting VMs in private networks via ViNe overlay	Community Page		Mauricio Tsugawa	07/15/2011 - 15:34
edit Yes	Accessing FutureGrid	Page		Gregor von Laszewski	07/15/2011 - 11:18
edit Yes	Help and Support	Page		Gregor von Laszewski	07/15/2011 - 09:32
edit Yes	Manage My Portal Account	Page	YES	Gregor von Laszewski	07/15/2011 - 09:16
edit Yes	Status	Page	YES	Gregor von Laszewski	07/14/2011 - 13:09
edit Yes	Host List Manager	Page		Warren Smith	07/12/2011 - 12:03
edit Yes	Contact	Page		Gregor von Laszewski	07/12/2011 - 12:01
edit Yes	Overview	Page		Gregor von Laszewski	07/12/2011 - 12:00
edit Yes	Jobs	Page		Gregor von Laszewski	07/12/2011 - 11:59
edit Yes	Nimbus Services	Page		Gregor von Laszewski	07/12/2011 - 11:59
edit Yes	India	Page		Gregor von Laszewski	07/12/2011 - 11:58
edit Yes	Hotel	Page		Gregor von Laszewski	07/12/2011 - 11:57

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