eTICS2
The Grid Quality Process

e-infrastructure

INFSO-RI-223782

# SA1
# Service Management

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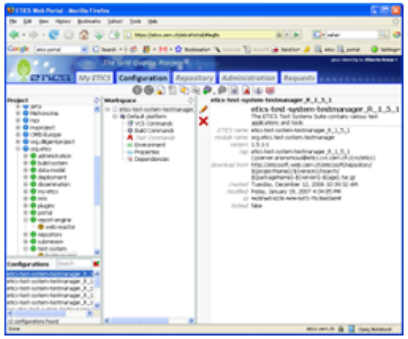
ETICS 2 Final Review
Brussels - 11 May 2010

# Contents



# SA1 Services

Web Application



Command Line User Interface


Repository Service

Build/Test Artefacts

Reports and Metrics

Configuration and Workflow Service

Configuration and Workflow

Worker Nodes

debian

redhat.

Mac OS X

CERN

Execution Engines (Metronome, gLite, UNICORE, etc)

Virtual OS Images

ETICS Architecture

# Objectives and Results

# SA1 Objectives
## from the ETICS2 Technical Annex

Maintain and extend existing ETICS core functionality

Deliver federated and secure repositories and release mgmt tools

Provide second level user support  with tracking of support tickets

Assess and implement scalable strategies

Ensure high availability of core services and infrastructure

Automate core service monitoring (e.g. alerts triggered, thresholds)

Review and integrate extensions from SA2 and  from JRA activities

Improve core services, sites autonomy and preserve security

Apply ETICS Certification Process to ETICS Services

# SA1 Objectives and Results (1/3)

**Maintain, extend existing ETICS core functionality**

The ETICS services and infrastructure reliability always above targets

Improved Service, User Interfaces (both CLI, WUI), QA Metrics, Reports

**Deliver federated secure repositories, release tools**

Moved to High Availability secure storage for all repositories (AFS)

Automated generation of packaging for RPM, APT, YUM, TAR, etc

**Provide second level user support , tracking tickets**

Second level support fully integrated with the SA2 support

Using the GGUS ticketing system for all user support activities

# SA1 Objectives and Results (2/3)

**Assess and implement scalable strategies**

Moved  from local disk servers to central scalable storage

Moved from physical to virtual worker nodes, static and on demand

**Ensure high availability core services/infrastructure**

All Services are on high availability systems, with defined procedures

Automated installations, backup and restore of servers and nodes

**Automate core service monitoring, alerts, thresholds**

Implemented verification sensors, integrated monitoring systems

Alerts/diagnostics are immediately propagated by email and sms

# SA1 Objectives and Results (3/3)

**Review and integrate extensions from SA2, JRA activities**

SA2 job submission engines (gLite, UNICORE, Amazon) integrated

JRA2 metrics plugins, test and plugin designers integrated

**Improve services, autonomy and preserve security**

ETICS services successfully installed in many partner sites

Security assessed. Access to services allowed only to registered users

**Apply ETICS Certification to ETICS Services**

AQCM reports generated and applied to the ETICS services

Services certified with the AQCM evaluation modules available (DSA1.5)

# Major Achievements

# Major Year 1 Achievements

## Monitoring and Alarms System

Integrated Monitoring System (web, sms, messaging, etc) at CERN

## Client Performance

Improved performance for users and usage of the available hardware (200% to 900% better, gLite < 4h)

## Web Interface

Better launch, information and control on the jobs

Runs on IE, Firefox, Chrome on Windows, OS X, Linux

## Repository

Major important improvements, scalable and much faster

New browser interface and addressing based on URLs

## Expanded Infrastructure

High Availability and scalable resources (AFS, VM, etc)

All ETICS Worker Nodes are Virtual Machines

Added platforms SL5 and Debian 5, 32 and 64 bits

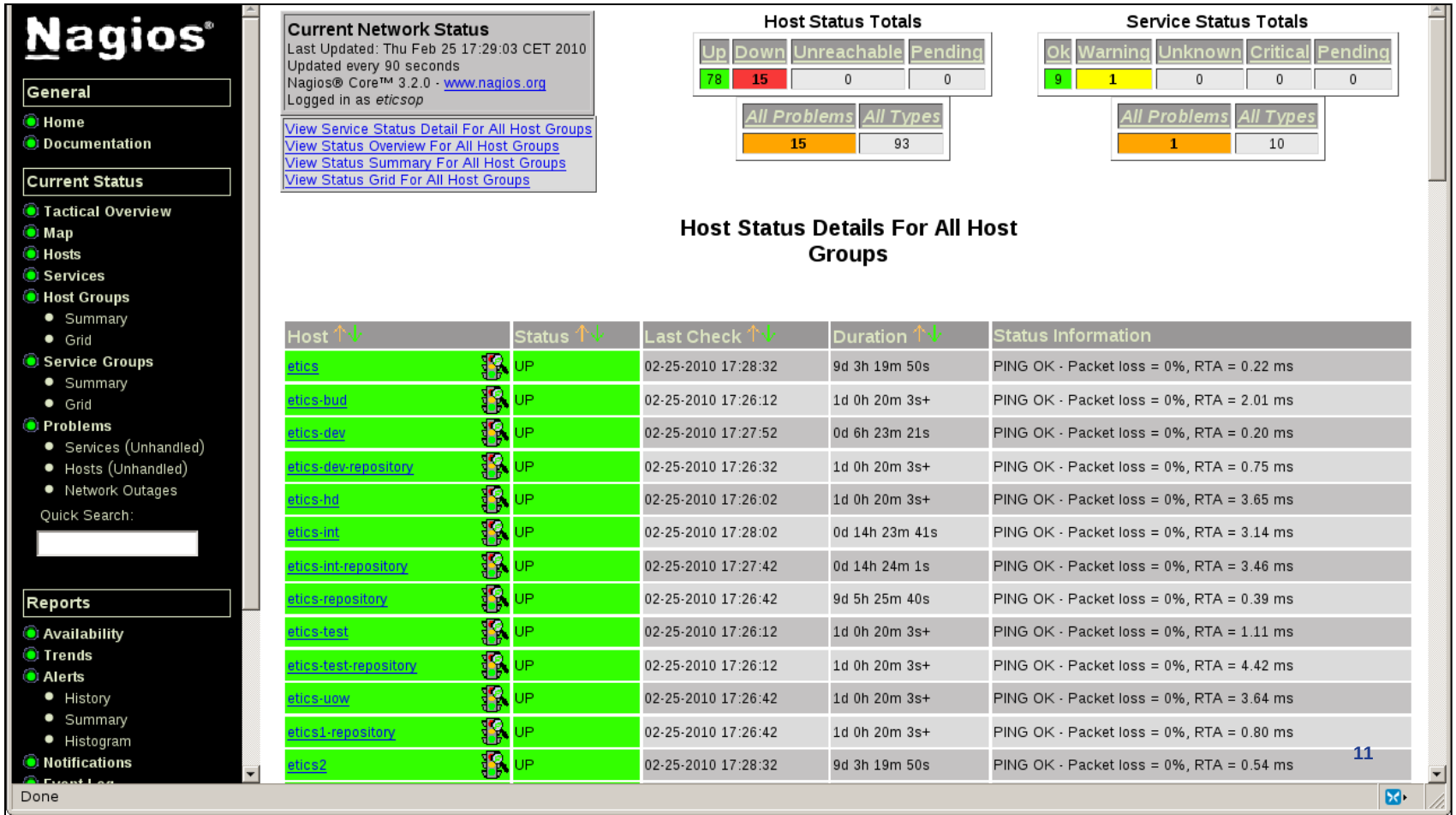
Automated generation of packaging for RPM, APT, YUM, TAR, etc

# Improved Alarms and Monitoring in Year 2

## Added NAGIOS Sensors

Integrated using the Nagios Monitoring System

Widely used in grid and industry



# Metrics Disseminator and Project Dashboard

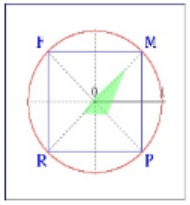
Every project, subsystem, component has metrics collected, nicely presented

Can be grouped in a dashboard for a comprehensive view on the status and metrics of the software and of the whole project

## Project Summary

Project Name : org.etics
Description:
The ETICS System

ETICS
VCS
Repository
Hompage
Created :
Wed Mar 22 08:51:42
Modified :
Sat Aug 01 01:15:06

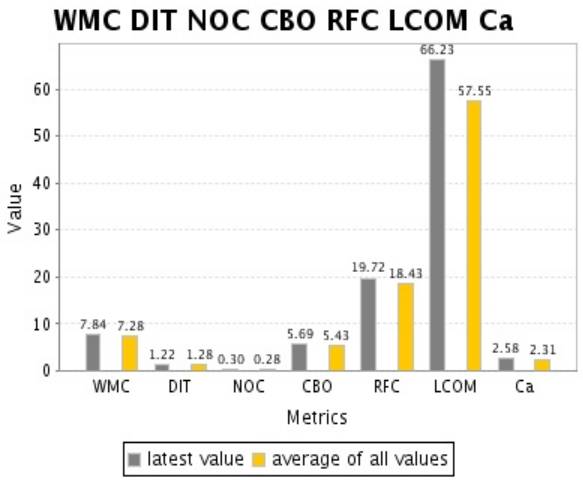



**AQCM** Results :

| | |
|---|---|
| Maintenability | 0.6553551 |
| Portability | 0.2694004 |
| Reliability | 0.2694004 |
| Functionality | 0.04082789 |

Complete Report

show



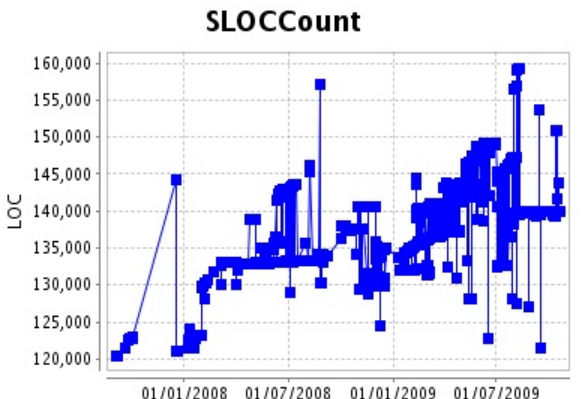

## Portability Per Platform

| Configurations: | slc4_ia32_gcc346 |
|---|---|
| Refresh | |
| **etics-dev** 20 October 2009 10:08:23 | Success |
| **etics_int** 20 October 2009 02:01:56 | Success |
| **etics_R_2_4_4_RC3** 06 August 2009 20:38:52 | Success |
| Refresh | |

## Jobs History

| | Type | Date | User | Project | Configuration | Platform | Status |
|---|---|---|---|---|---|---|---|
| Refresh | | | | | | | |
| 1 | build | 20 October 2009 18:46:53 | ETICS Scheduler | org.etics | etics_branch_2_5_0 | Submitting | Submitting |
| 2 | build | 20 October 2009 12:46:53 | ETICS Scheduler | org.etics | etics_branch_2_5_0 | Submitting | Submitting |
| 3 | build | 20 October 2009 10:08:23 | Marco Canaparo | org.etics | etics-dev | slc4_ia32_gcc346 | Success |
| 4 | build | 20 October 2009 06:46:53 | ETICS Scheduler | org.etics | etics_branch_2_5_0 | Submitting | Submitting |
| 5 | build | 20 October 2009 02:01:56 | ETICS Scheduler | org.etics | etics-dev | slc4_ia32_gcc346 | Success |
| 6 | build | 20 October 2009 02:01:56 | ETICS Scheduler | org.etics | etics_int | slc4_ia32_gcc346 | Success |
| 7 | build | 20 October 2009 00:46:51 | ETICS Scheduler | org.etics | etics_branch_2_5_0 | Submitting | Submitting |
| 8 | build | 19 October 2009 18:46:54 | ETICS Scheduler | org.etics | etics_branch_2_5_0 | Submitting | Submitting |
| 9 | build | 19 October 2009 15:01:12 | Marco Canaparo | org.etics | etics-dev | slc4_ia32_gcc346 | Success |
| 10 | build | 19 October 2009 14:10:21 | Marco Canaparo | org.etics | etics-dev | slc4_ia32_gcc346 | Success |
| Refresh | | | | | | | |

show



# Multi-Node Dynamic Testing

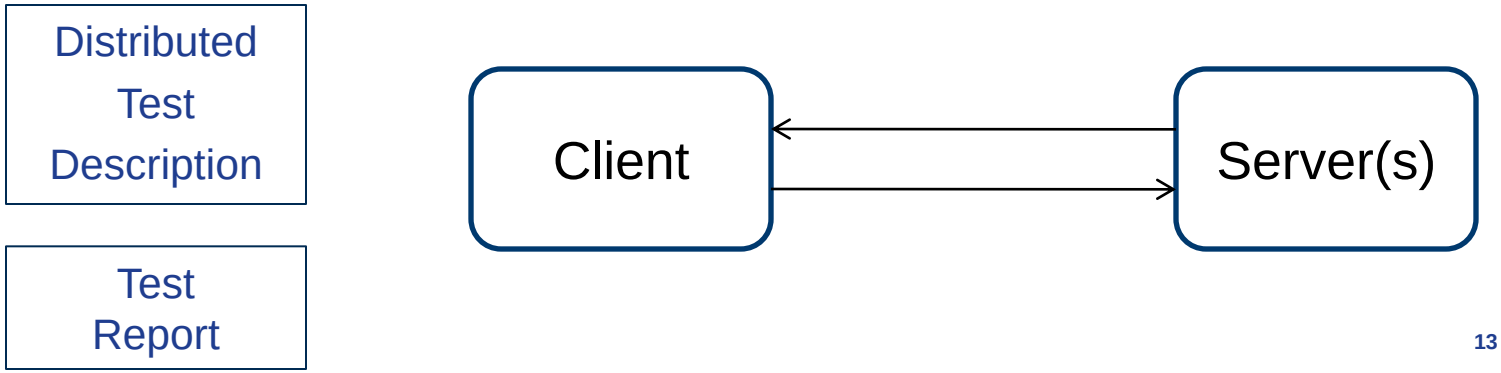
Ability to setup scenarios where multiple services are automatically deployed and started on multiple nodes

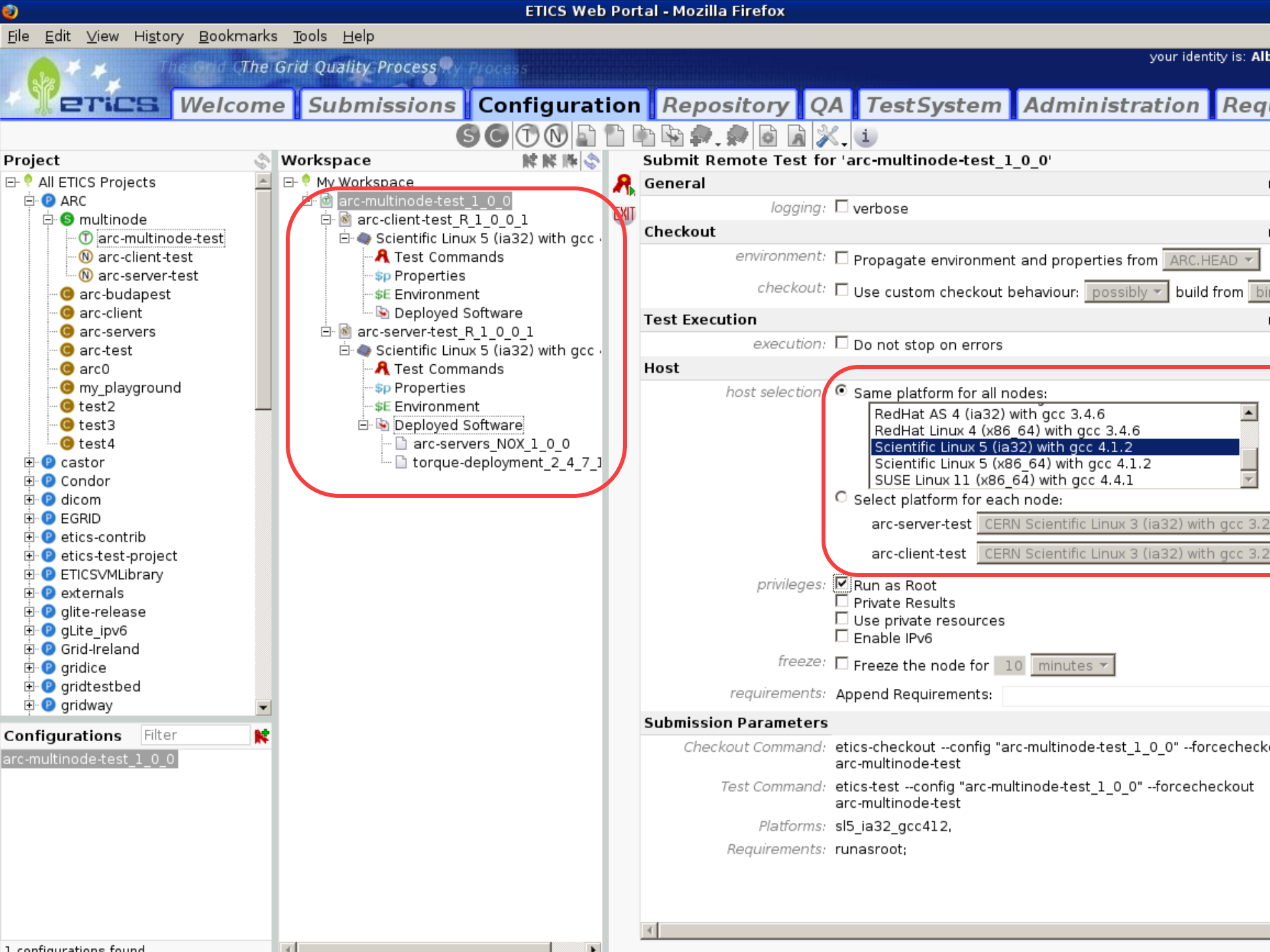
These services must be able to work as if they would be installed performing any operation in the required order

Multi-node distribute testing is crucial for grid services

Very important (and unique) feature of ETICS
Is that AUTOMATICALLY

- Start the test nodes
- Synchronize them
- Run the distributed test
- Collect and report the test results

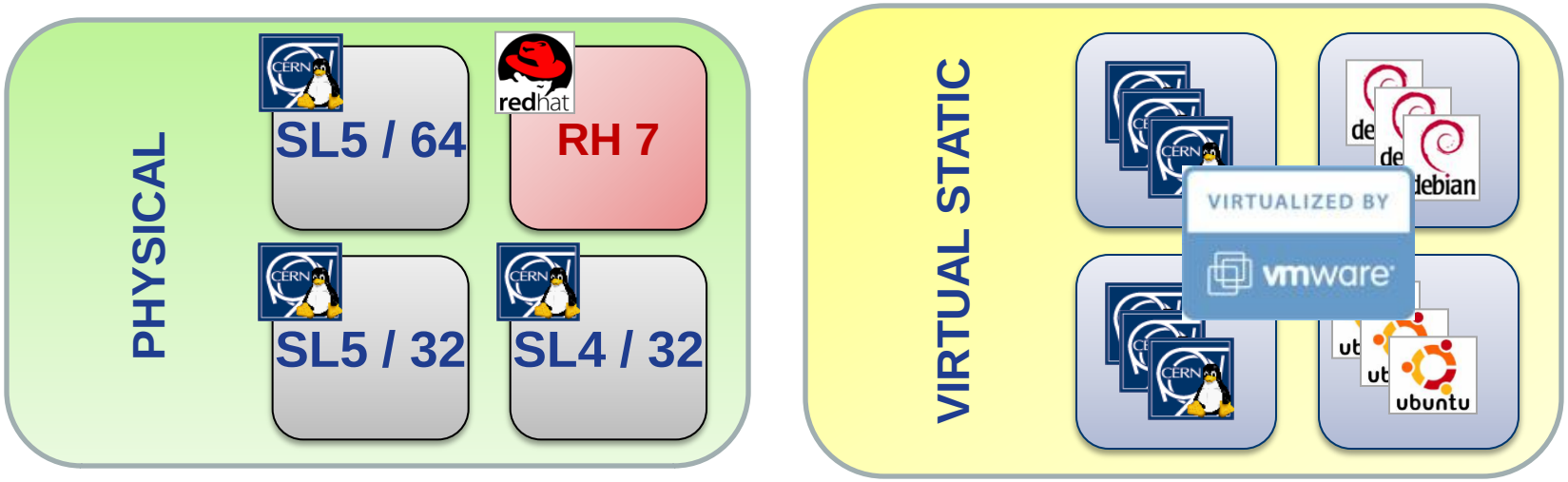



ETICS Web Portal - Mozilla Firefox
File Edit View History Bookmarks Tools Help
your identity is: Al
The Grid Quality Process
ETICS
Welcome
Submissions
Configuration
Repository
QA
TestSystem
Administration
Project
All ETICS Projects
ARC
multinode
arc-multinode-test
arc-client-test
arc-server-test
arc-budapest
arc-client
arc-servers
arc-test
arc0
my_playground
test2
test3
test4
castor
Condor
dicom
EGRID
etics-contrib
etics-test-project
ETICSVMLibrary
externals
glite-release
gLite_ipv6
Grid-Ireland
gridice
gridtestbed
gridway
Configurations
Filter
arc-multinode-test_1_0_0
1 configurations found
Workspace
My Workspace
arc-multinode-test_1_0_0
arc-client-test_R_1_0_0_1
Scientific Linux 5 (ia32) with gcc
Test Commands
$p Properties
$E Environment
Deployed Software
arc-server-test_R_1_0_0_1
Scientific Linux 5 (ia32) with gcc
Test Commands
$p Properties
$E Environment
Deployed Software
arc-servers_NOX_1_0_0
torque-deployment_2_4_7_1
EXIT
Submit Remote Test for 'arc-multinode-test_1_0_0'
General
logging: verbose
Checkout
environment: Propagate environment and properties from ARC.HEAD
checkout: Use custom checkout behaviour: possibly build from
Test Execution
execution: Do not stop on errors
Host
host selection
Same platform for all nodes:
RedHat AS 4 (ia32) with gcc 3.4.6
RedHat Linux 4 (x86_64) with gcc 3.4.6
Scientific Linux 5 (ia32) with gcc 4.1.2
Scientific Linux 5 (x86_64) with gcc 4.1.2
SUSE Linux 11 (x86_64) with gcc 4.4.1
Select platform for each node:
arc-server-test CERN Scientific Linux 3 (ia32) with gcc 3.2
arc-client-test CERN Scientific Linux 3 (ia32) with gcc 3.2
privileges: Run as Root
Private Results
Use private resources
Enable IPv6
freeze: Freeze the node for 10 minutes
requirements: Append Requirements:
Submission Parameters
Checkout Command: etics-checkout --config "arc-multinode-test_1_0_0" --forcecheck
arc-multinode-test
Test Command: etics-test --config "arc-multinode-test_1_0_0" --forcecheckout
arc-multinode-test
Platforms: sl5_ia32_gcc412,
Requirements: runasroot;

# Integration of External Repositories

Developers have access to the external standard repositories from within the ETICS Portal

# ETICS Infrastructure - Static Worker Nodes

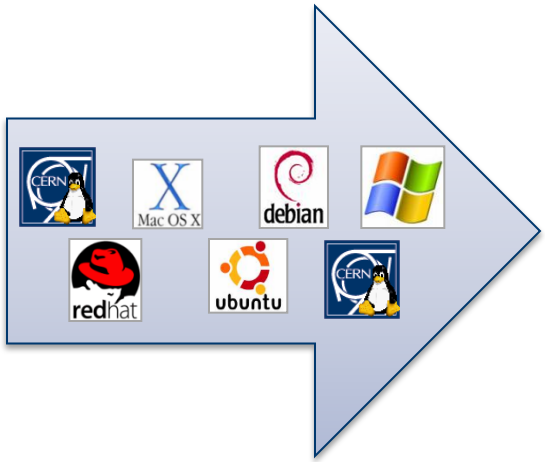



With a STATIC set of worker nodes the composition of the pool is fixed (SL4, SL5, Deb4, Deb5, etc)

Rarely used platforms are IDLE most of the time (ex. RH 7)

Any new platform image or worker node must be created and started by a system administrator's intervention before is used.

# Virtual Dynamic Worker Nodes





Increase availability and scalability

Reduce maintenance

Offer privileged access to the VM (not to the host)

Enable post build analysis (VM snapshots)

Virtual machine image customization

Provide reproducible environments

# A-QCM Report Generation

Reports are now generated for the projects for the trial certifications (see NA2)

**A-QCM Report** | good (0.03) | n/a | good (0.0)

**Quality Aspect:** Maintainability

**Component:** org.etics.repository.client-java


**QA formula:**
min(StaticAnalysis,CodeAnalysis)

**StaticAnalysis** is calculated as **correlation** of the following metrics:

| Metric | Value | Report | Details |
|---|---|---|---|
| lcom | 19.0 | ckjm | doc |
| wmc | 7.0 | ckjm | doc |
| cbo | 14.0 | ckjm | doc |
| rfc | 34.0 | ckjm | doc |

**CodeAnalysis** is calculated as **avg** of the following metrics:

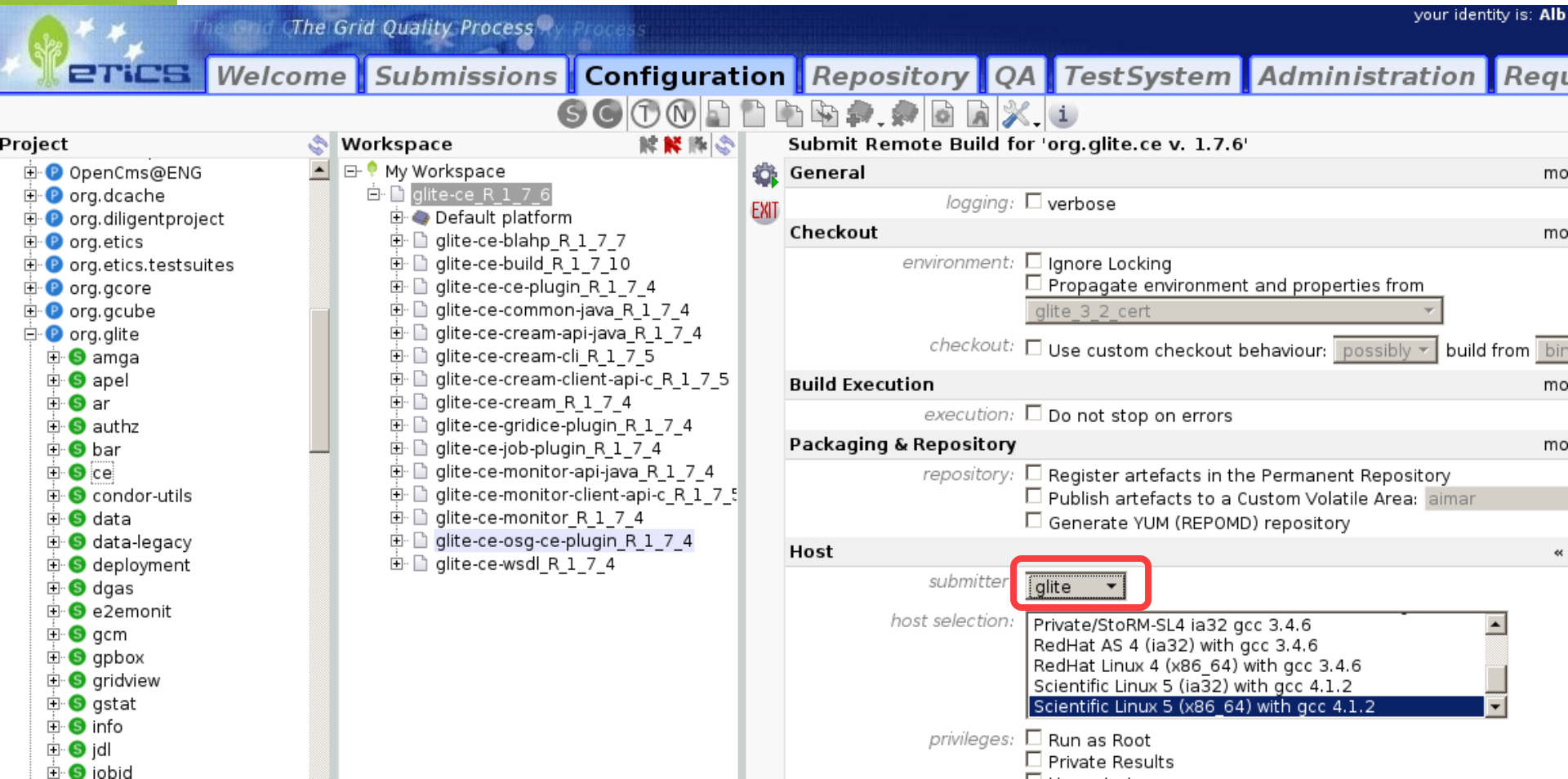
| Metric | Value | Report | Details |
|---|---|---|---|

# Remote Jobs Submission

Submit to WNs resources on remote Sites (see SA2)

General plugins already implemented: NMI/Condor, gLite, unicore, Amazon

Important feature for scalability and adaptability to projects needs



# Metrics and Statistics

# SA1 Deliverables

| | |
|---|---|
| DSA1.1 - Execution plan for first 12 months of infrastructure operation | RELEASED |
| DSA1.2 - ETICS Core Services Design Specification | RELEASED |
| DSA1.3 - ETICS Site Service Level Agreement | RELEASED |
| DSA1.4 - Execution plan for second 12 months of infrastructure operation | RELEASED |
| DSA1.5 - ETICS core services certification and usage report | RELEASED |

# Metric: Usage of the Resources

| Build/test type | Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|
| Build | 20315 | 13703 | 17121 | 22035 |
| Test | ~1500 | ~600 | ~3000 | ~7700 |

| Project | Q1 | Q2 | Q3 | Q4 |
|---|---|---|---|---|
| org.glite | 10382 | 7464 | 3423 | 3415 |
| org.glite. testsuites | 3215 | 2154 | 2221 | 2255 |
| org.gcube | 115 | 135 | 521 | 485 |
| Torque maui | 9 | 35 | 132 | 42 |
| externals | 148 | 34 | 68 | 79 |
| unicore | - | 33 | 131 | 87 |
| ARC | - | - | - | 86 |

| Platform Y2 | % |
|---|---|
| **SLC4 (32-bits)** | **35** |
| SLC4 (64 bits) | 19.6 |
| Debian (32 bits) | 12.9 |
| SL5 (32 bits) | 12.4 |
| SLC3 (32 bits) | 10.1 |
| **SL5 (64 bits)** | **8.2** |
| RH4 | 0.5 |
| Others | 1.3 |

Tests have increased 10 folds in the last year

SLC4 32-bit and SL5 64-bit are the main gLite supported platforms

# Metric: Service Level

## Availability and Reliability Targets

### For accessing different artefacts and the Build and Test processes

| Service | Expected Reliability | YEAR 2 Reliability | Expected Availability | YEAR 2 Availability |
|---|---|---|---|---|
| **Access to Project Binary packages** | **99%** | **99.3%** | 98% | 99.1% |
| **Access to Build Reports and Metrics Repository** | **99%** | | 97% | |
| **Build and Configuration Portal** | **97%** | | 95% | |

## Year 1+2 Downtimes

**Scheduled:** **15h servers, 7h repository**

**Unscheduled:** **3 days (+3 for AFS)**

Reliability is determined by taking into account issues due to the ETICS Services functions; but not those caused by the services used by ETICS. E.g. no network for 2h, will not be considered as an ETICS unreliability

# Challenges

# Challenges and Achievements

## The SA1 collaboration with other activities was very productive

| | |
|---|---|
| New Submission Engines | SA2 |
| Documentation & Support | SA2 |
| New plug-ins + Integration | JRA2 |
| Multi-node Distr. Testing | JRA2 |
| Cross Submission | JRA1 |
| A-QCM + Metrics | NA2 |
| Dissemination Material | NA2 |

## Maintain a Service highly available while adding fundamental new features requires process, infrastructure and testing

Established validation release processes, automated procedures, added virtualization for better resource management

## Establish ETICS Services for build/testing of middleware

ETICS is now a recognized and established Platform as a Service (PaaS) for middleware projects

Foundation for build and testing of the EMI project

# Lessons Learned and Conclusions

# Lessons Learned

## Complementary research vs. commercial and current users vs. long term plans must coexist in your development priorities and release process

But always maintain and give priority to provide a top quality PaaS with incremental improvements.

Collect frequent feedback, provide preview installations to users, refocus the priorities frequently (as needed)

## Plan and develop entry and exit tools from the beginning

Established projects need to feel comfortable with getting easily into ETICS and also easily out if needed. No mature project accepts locking-in solutions

## Follow development of technologies you depend on

Move to new versions of technology asap (e.g. Clouds, Java, GWT, etc) or you will be forced to do it when you do not expect it, and maybe you are not ready

Example: A new version of the browser is adopted immediately by the users. Be ready in advance, participate to Beta programs. Otherwise you will stop everything and migrate to the new technology even if is not the good moment.

# Conclusions

**Achieved Main Objectives (and more)**

Automation, performance, metrics, high availability, A-QCM, remote submissions

**Improved and Upgraded the Services**

Several platforms and updates, better monitoring, based on virtual images

**ETICS Services are ready for EMI**

Selected as foundation of EMI build and test system

- Configuration for EMI quality metrics and reports
- Definition of EMI compliance and multi-node tests

**ETICS Software is published as Open Source**

ETICS available on Sourceforge

Production version: https://etics.cern.ch

Release candidate: https://etics-rc.cern.ch

# Thanks!

eTICS2
The Grid Quality Process

**http://www.eticsproject.eu**