

GridView - metrics calculation and visualisation

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Outline of the Presentation

- Target Users
- Goals
- Service Monitoring and Visualization Architecture
- Computation of Availability Metrics
- Visualization Components
- On-going Work

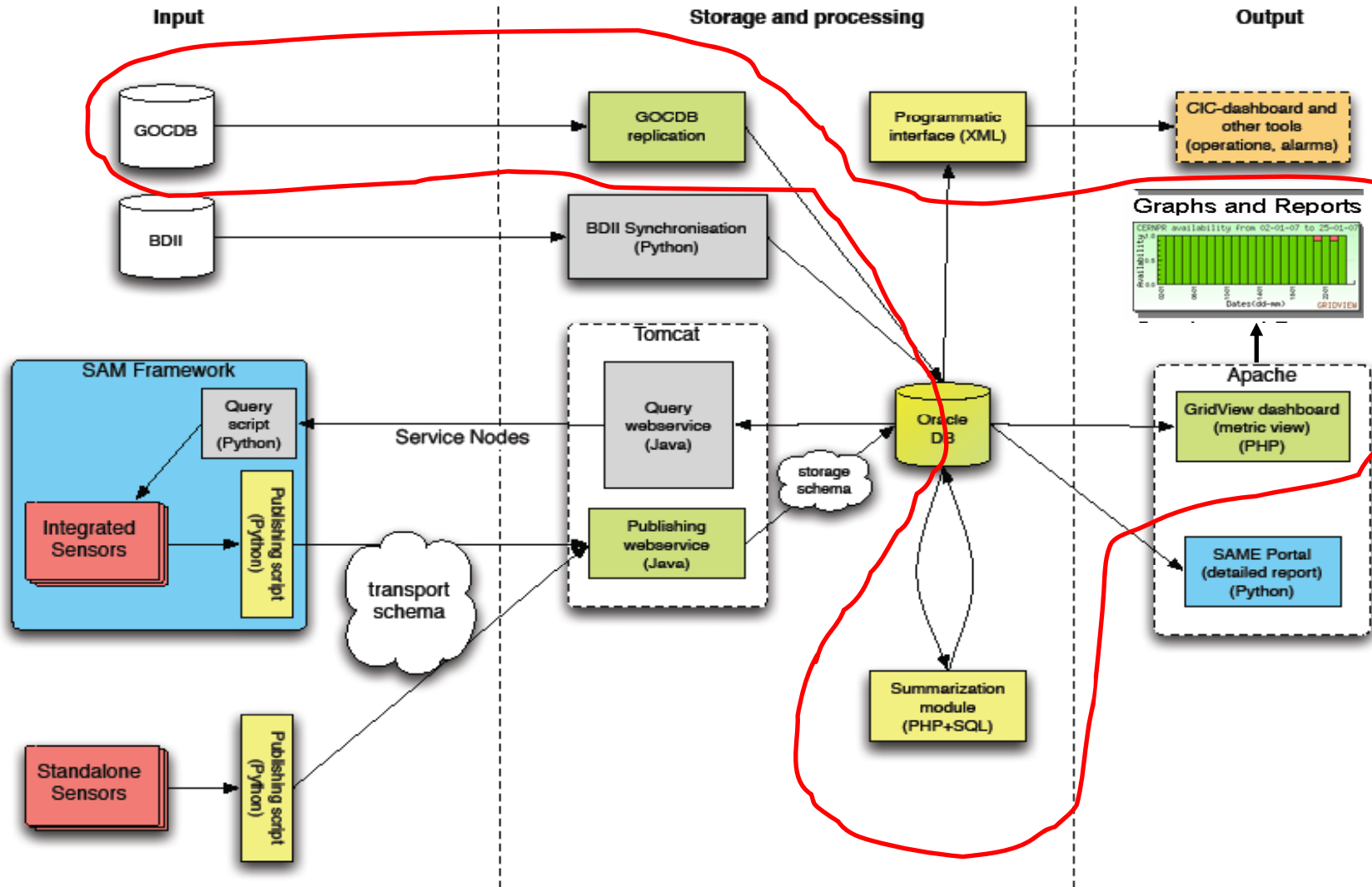
Target Users

- Site Administrators
- VO Administrators
- WLCG Management
- Grid Operations - ROCs/CIC on Duty (COD)
- Experiments

Goals

- To provide a service level view, a snapshot of the current operational status of the Entire Grid
- To help the operations team locate and troubleshoot the problems
- To monitor the Availability and Reliability of various services and sites in the Grid Infrastructure
- To provide VO specific view of the service, enable each VO to look at the service in its own perspective

Service Monitoring and Visualization Architecture



Metric Generation and Visualization

- GridView's Metric Generation Module analyzes the test results and Generates Service Status and Availability Metrics
- GridView's Visualization Module displays test results as well as Service Availability Metrics in graphical form
 - It displays multiple views with various levels of details and provision to drill down

Computation of Availability Metrics

- Gridview computes Service Availability per VO based on Critical Tests
- Service Availability is computed
 - per Service Instance
 - per Service Type (eg. CE) for a site
 - Per Site
 - Aggregate of all Tier-1/0 sites in WLCG
 - over various periodicities like Hourly, Daily, Weekly and Monthly
- Computation of Aggregate Metrics
 - Redundant services are ORed
 - Critical services are ANDed

Availability metrics - algorithm I

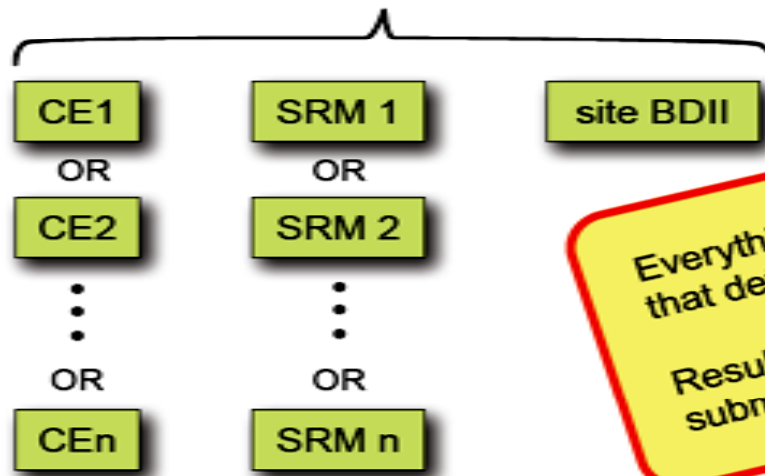
$$\text{Status of node } N = \bigwedge_{t \in \text{CriticalTests}} \text{TestResult}(N,t)$$

\wedge = boolean AND
 \vee = boolean OR

$$\text{Status of central service } C = \bigvee_{N \in \text{instances}(C)} \text{Status}(N)$$

Status of site S =

AND



Everything is calculated for each VO that defined critical tests in FCR
Results make sense only if VO submits tests!!!

Availability metrics - algorithm II

- Service and site status values are recorded every hour (24 snapshots per day)
- Daily, weekly, monthly availability is calculated using integration (averaging) over the given period
- Aggregate Tier1/0 availability is calculated using integration (averaging) of all Tier1/0 sites.

Visualization Components

- Visualization of SAM Test Results in Gridview
 - Bar Graphs indicating status
 - Summary tables displaying result summaries
 - Detailed results displaying output of the tests (useful for troubleshooting purposes)
- Visualization of Service Availability Metrics in Gridview
- All Visualization components display metrics for the specified VO
- This enables VOs to have their own perspective of the service

Visualization of Availability Metrics

- Gridview displays graphs for various availability metrics
 - GREEN portion on Graph indicates Availability
 - RED indicated Non-Availability
- GridView displays include Graphs and Reports for
 - Central Service Availability (FTS, LFC, RB)
 - Aggregate tier-1 site Availability
 - Site-wise availability for individual tier-1 sites
 - Site-wise service availability of tier-2 sites (grouped by associated VOs)
 - Detailed availability of various services (CE, SE, SRM) and their individual instances running at a particular site
- Full traceability from aggregate Availability to detailed SAM test results
- Provision for saving user preferences based on certificates

Service Availability Monitoring : Central Service Availability

The screenshot displays the Gridview web application interface. At the top, the browser window title is "Gridview: Visualization and Monitoring Tool for LCG - Opera". The address bar shows the URL "http://gridview.cern.ch/GRIDVIEW/same_index.php". The main content area is titled "Monitoring and Visualization Tool for LCG" and includes navigation links for "Data Transfer", "Job Status", and "Service Availability". The current view is "OPS Central Service Availability : Current Status".

On the left side, there is a sidebar with the following sections:

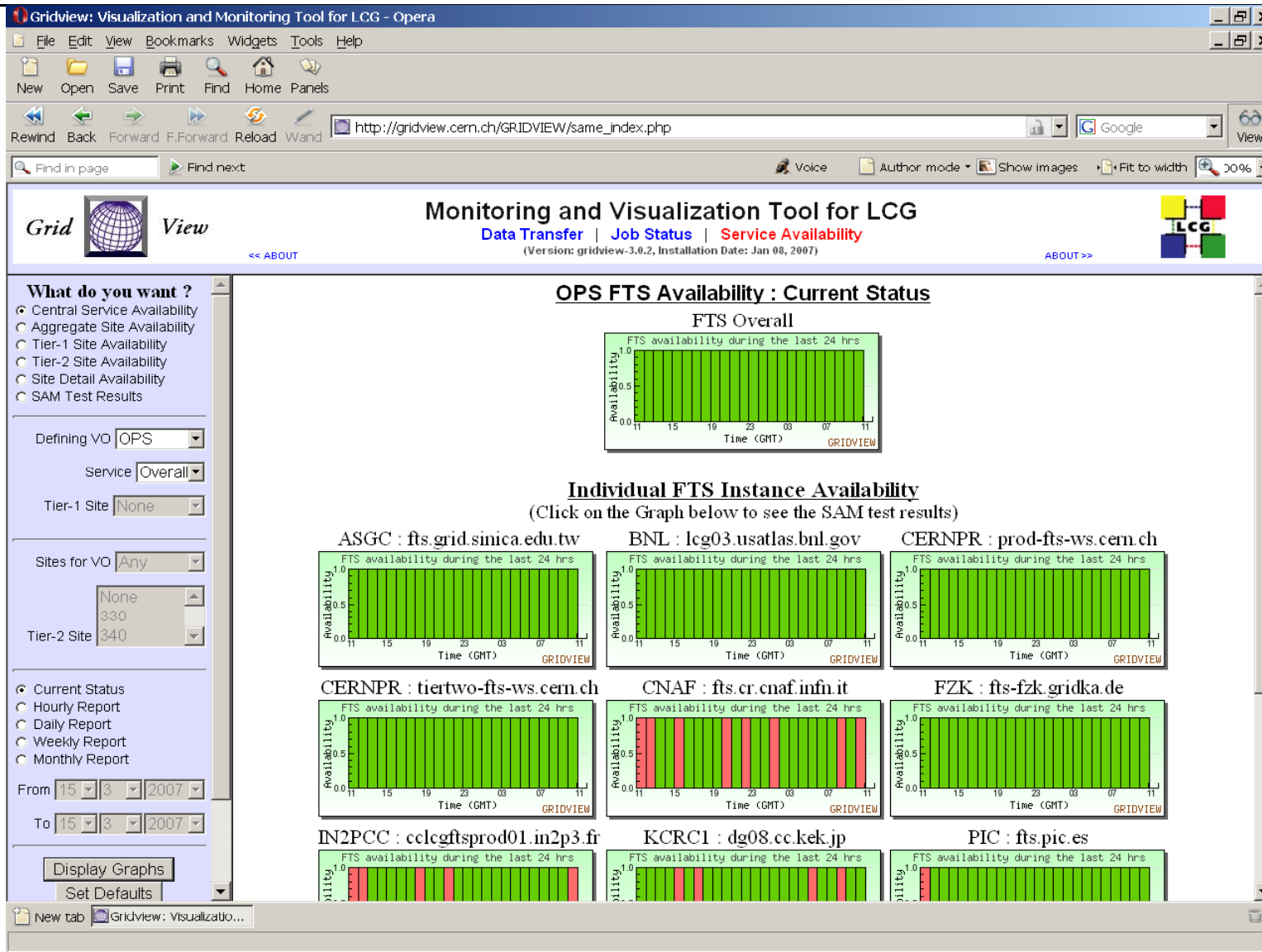
- What do you want ?**
 - Central Service Availability
 - Aggregate Site Availability
 - Tier-1 Site Availability
 - Tier-2 Site Availability
 - Site Detail Availability
 - SAM Test Results
- Defining VO: OPS
- Service: Overall
- Tier-1 Site: None
- Sites for VO: Any
- Tier-2 Site: 330 (None), 340
- Current Status (selected), Hourly Report, Daily Report, Weekly Report, Monthly Report
- From: 15/3/2007, To: 15/3/2007
- Buttons: Display Graphs, Set Defaults

The main content area displays four bar charts showing availability over the last 24 hours:

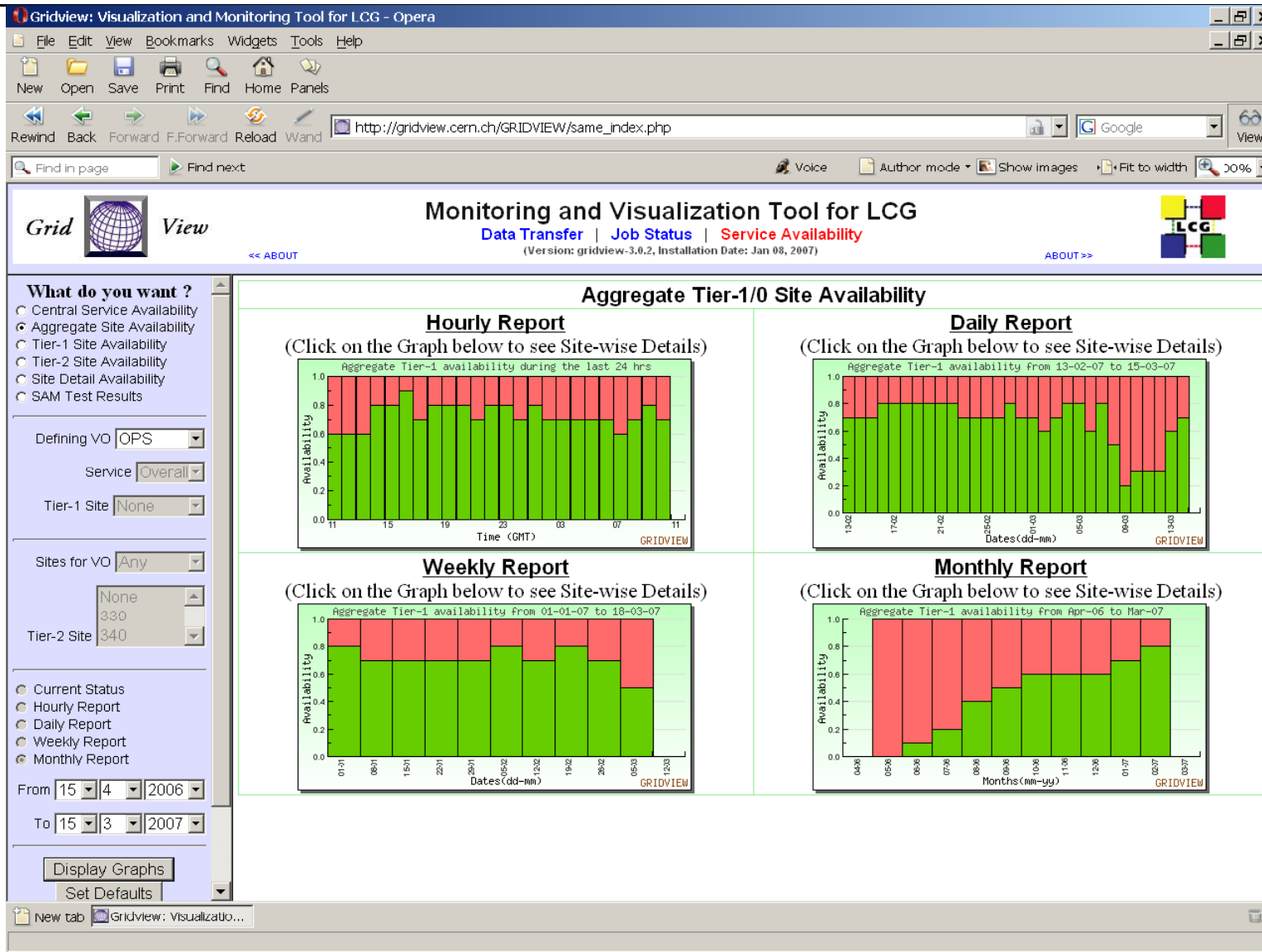
- Overall:** OPS availability during the last 24 hrs. The chart shows a constant availability of 1.0.
- Individual Service Availability:** (Click on the Graph below to see Individual Service Instance Availability)
 - BDII:** BDII availability during the last 24 hrs. The chart shows a constant availability of 1.0.
 - FTS:** FTS availability during the last 24 hrs. The chart shows a constant availability of 1.0.
 - LFC:** LFC availability during the last 24 hrs. The chart shows a constant availability of 1.0.
 - RB:** RB availability during the last 24 hrs. The chart shows a constant availability of 1.0.

A "Back" button is located at the bottom of the main content area.

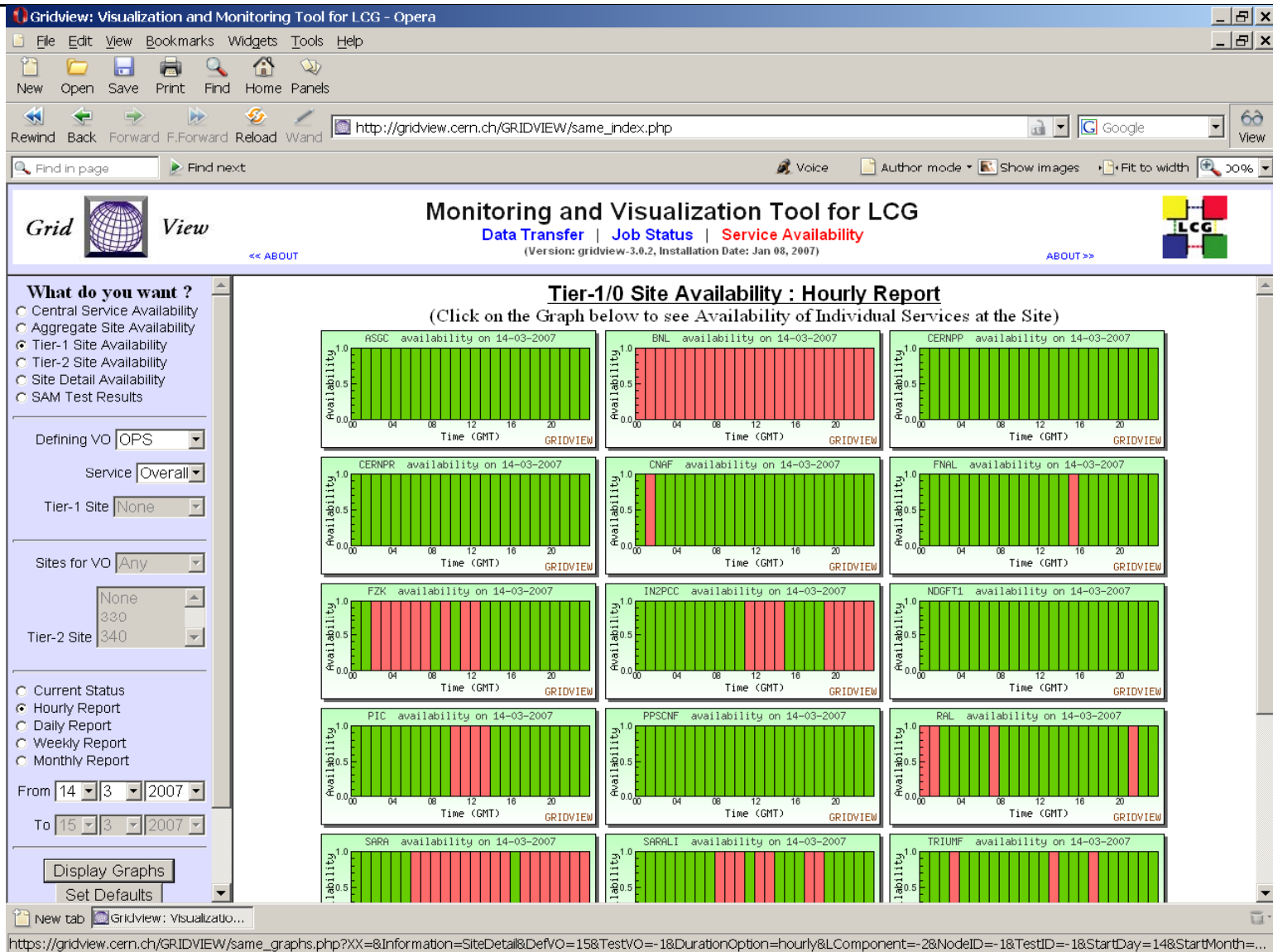
Service Availability Monitoring : FTS Instance Availability



Service Availability Monitoring : Aggregate T1 Site Availability



Service Availability Monitoring : Tier-1 Site Availability



Service Availability Monitoring : Site Detail Availability

Gridview: Visualization and Monitoring Tool for LCG - Windows Internet Explorer provided by CERN

http://gridview.cern.ch/GRIDVIEW/same_index.php

Monitoring and Visualization Tool for LCG
Data Transfer | Job Status | Service Availability
(Version: gridview-3.0.2, Installation Date: Jan 08, 2007)

What do you want ?

- Central Service Availability
- Aggregate Site Availability
- Tier-1 Site Availability
- Tier-2 Site Availability
- Site Detail Availability
- SAM Test Results

Defining VO: OPS
Service: Overall
Tier-1 Site: CERNPR
Sites for VO: Any
Tier-2 Site: 339, 340

Current Status: Hourly Report
From: 19/1/2007 To: 25/1/2007

Display Graphs | Set Defaults

Overall Service Availability for site CERNPR : Hourly Report

CERNPR availability on 19-01-2007

Individual Service Availability for site CERNPR : Hourly Report

**Implements missing feature of SAM Portal:
Site overview**

CE : ce106.cern.ch | CE : ce107.cern.ch | SE : castorsrm.cern.ch

W3C HTML 4.01 | W3C CSS

start | Gridview: Visualizatio... | https://gridview.cern... | gridview_MWG_25Ja... | gridview_chep | gridview | CERN Alert Notification | 10:43 AM

Service Availability Monitoring : SAM Test Results

Monitoring and Visualization Tool for LCG
 Data Transfer | Job Status | Service Availability
 (Version: gridview-3.0.2, Installation Date: Jan 08, 2007)

SAM Test Results for site CERNPR
 Test Criticality Defining VO : OPS
 (Click on the Test Result Graph to View Details)

Service	Node	Test Name	Test VO	Test Help	Critical	Test Results						
						na	ok	info	note	warn	error	crit
		Availability										
		CE-runjob	OPS	?	N							
		Atlas	OPS	?	N							
		DTeam	OPS	?	N							
		LHCb	OPS	?	N							
		OPS	OPS	?	N							

Will replace SAM history report

What do you want ?

- Central Service Availability
- Aggregate Site Availability
- Tier-1 Site Availability
- Tier-2 Site Availability
- Site Detail Availability
- SAM Test Results

Defining VO: OPS
 Service: Overall
 Tier-1 Site: CERNPR
 Sites for VO: Any
 Tier-2 Site: 340

Current Status:
 Hourly Report
 Daily Report
 Weekly Report
 Monthly Report

From: 19 1 2007
 To: 25 1 2007

Display Graphs
 Set Defaults

Sites Abbreviations

W3C HTML 4.01 ✓ W3C CSS ✓

Service Availability Monitoring : Detailed Test Results

Monitoring and Visualization Tool for LCG
 Data Transfer | Job Status | Service Availability
 (Version: gridview-3.0.2, Installation Date: Jan 08, 2007)

Detailed SAM Test Results

Site : CERNPR Node : ce107.cern.ch Service : CE
 Test Name : CE-sft-job Test VO : OPS Test Help : ?
 Critical : Y Criticality Defining VO : OPS

Timestamp	Status ID	Status Info	Test Env	Result Summary	Detail Result
at 08:13:15 on 15/03/2007	10	ok	Test Env		Detail Result
at 20:13:26 on 15/03/2007	10	ok	Test Env		Detail Result
at 21:13:18 on 15/03/2007	10	ok	Test Env		Detail Result
at 22:13:05 on 15/03/2007	10	ok	Test Env		Detail Result
at 23:14:16 on 15/03/2007	10	ok	Test Env		Detail Result
at 00:13:24 on 16/03/2007	10	ok	Test Env		Detail Result
at 01:13:37 on 16/03/2007	10	ok	Test Env		Detail Result
at 02:13:34 on 16/03/2007	10	ok	Test Env		Detail Result

What do you want ?

- Central Service Availability
- Aggregate Site Availability
- Tier-1 Site Availability
- Tier-2 Site Availability
- Site Detail Availability
- SAM Test Results

Defining VO: OPS
 Service: Overall
 Tier-1 Site: None
 Sites for VO: Any
 Tier-2 Site: 339, 340

Current Status
 Hourly Report
 Daily Report
 Weekly Report
 Monthly Report

From: 16/4/2006
 To: 16/3/2007

Display Graphs
 Set Defaults

Sites Abbreviations

W3C HTML 4.01 W3C CSS

Service Availability Monitoring : Test output for Debugging

Monitoring and Visualization Tool for LCG
Data Transfer | Job Status | Service Availability
(Version: gridview-3.0.2, Installation Date: Jan 08, 2007)

What do you want ?

- Central Service Availability
- Aggregate Site Availability
- Tier-1 Site Availability
- Tier-2 Site Availability
- Site Detail Availability
- SAM Test Results

Defining VO: OPS
Service: Overall
Tier-1 Site: None
Sites for VO: Any
Tier-2 Site: 339, 340

Current Status:
Hourly Report:
Daily Report:
Weekly Report:
Monthly Report:
From: 23/1/2007 To: 25/1/2007

Display Graphs | Set Defaults

Sites Abbreviations

W3C HTML 4.01 | W3C CSS

Detailed SAM Test Results

Site	: CERNPR	Node	: ce107.cern.ch	Service	: CE
Test Name	: CE-sft-job	Test VO	: LHCb	Test Help	: ?
Critical	: N			Criticality Defining VO	: OPS

Timestamp	Status ID	Status Info	Test Env	Result Summary	Detail Result
at 00:09:05 on 23/01/2007	10	ok	Test Env		Detail Result
at 00:13:43 on 23/01/2007	10	ok	Test Env		Detail Result

Will replace detailed SAM test result

```
duration0 - Wi...  
-exec -c same.conf -
```

Submitting a LHCb job

```
at 04:55:02 on 23/01/2007 50 error Test Env timeout Detail Result  
at 05:13:34 on 23/01/2007 10 ok Test Env Detail Result
```

On-going Work

- Summarisation
 - Switching to continuous time scale calculation model
 - Generation of New Availability Metrics
- Visualisation
 - Standardization of Visualization Components according to Monitoring WG recommendation
 - Enhancement of Service Availability views/displays
 - Visualization of New Metrics
 - Generation of Site Availability and Reliability Report for WLCG MB

Summarisation Continuous timescale

- No Loss of Information
 - In discrete timescale status is sampled hourly
- Less amount of data
 - The new record is added only when the status is changed
- Scheduled Downtime

Generation of New Availability Metrics

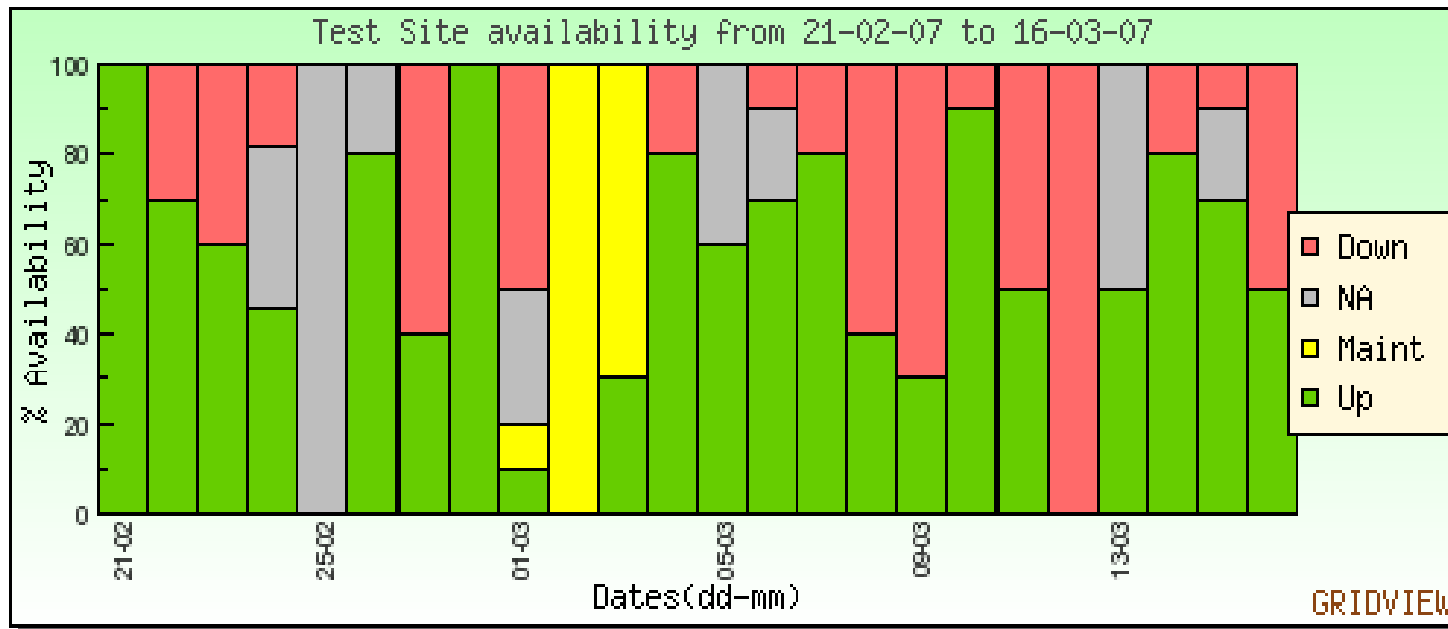
- Following new Metrics will be Generated
 - Service Reliability
 - Availability excluding scheduled Downtimes
 - Test Result Summaries
 - Status over a time interval
 - Service Status (Over Continuous Time Scale) with values like
 - UP (GREEN)
 - DEGRADED below 80 % (BLUE)
 - DEGRADED below 50 % (VIOLET)
 - Scheduled Down (YELLOW)
 - DOWN (RED)
 - UNKNOWN (GREY)

Standardization of Visualization Components

- WLCG Service Monitoring WG has drafted a standard for request of service metrics and visual components
- Standard URL based access to all visualization components
 - Full pages
 - Individual graphs
- Facilitates easy integration of visual components into other monitoring tools
- Primarily needed to integrate GridView components into COD Dashboard used by CIC/ROCs and other operational tools

Enhancement of Availability Views

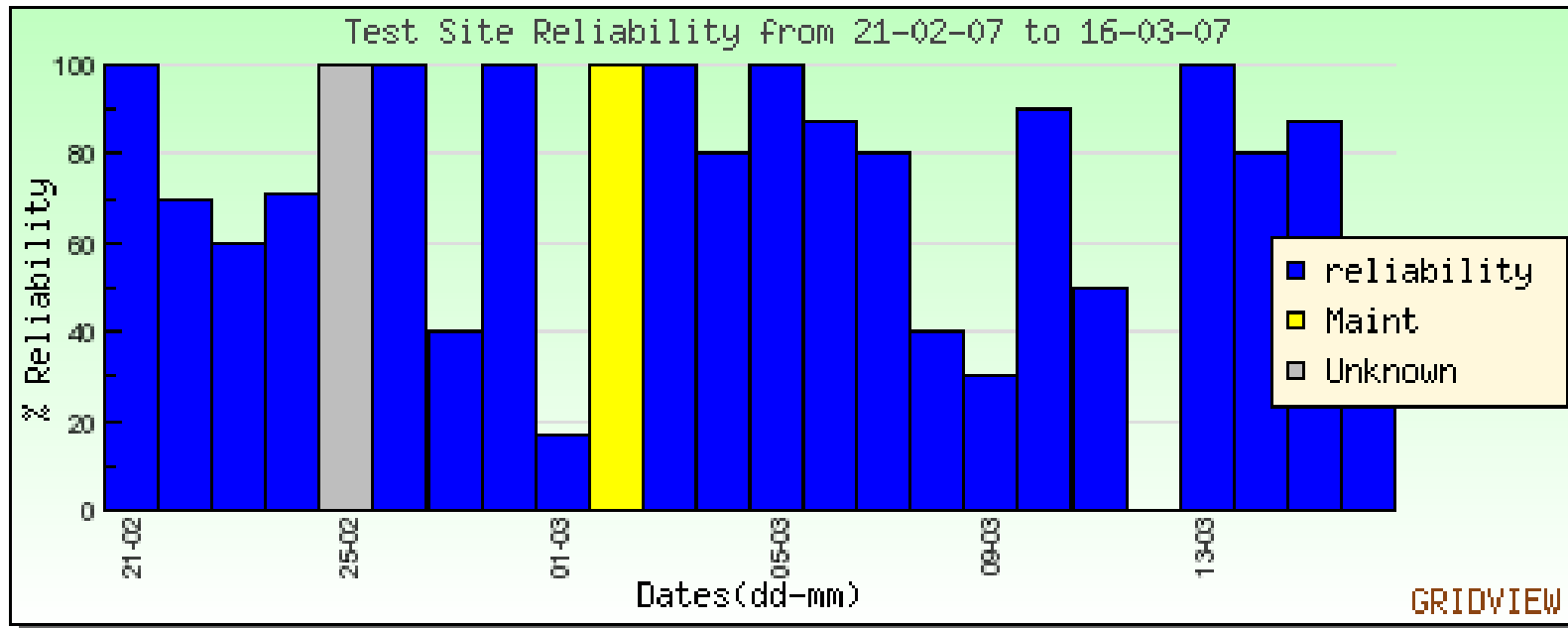
- All service Availability Graphs displayed by Gridview are to be enhanced to include
 - Maintenance Interval (Scheduled Downtime, YELLOW)
 - Interval for which Availability is N/A (Unknown Status, GREY)



Visualization of New Metrics

- Following new metrics need to be visualized
 - Service Reliability
 - Test Result Summaries
 - Service Status
- We have planned two types of views for Test Result Summaries and Service Status
 - Instantaneous View (Snapshot at a given point in time)
 - Continuous View (Follow-up over a period of time)

Service Reliability (Sample View)



Thank You

Your comments and suggestions please

GOCDDB3 Synchronization Module

- Grid Resource Information
- GOCDDB2 was Used
- Existing schema will be used first
- Redesign of schema according to Monitoring WG recommendation