Regionalised SAM Monitoring

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e-infrastructure

Motivation

- **Transition from EGEE to EGI**
  - Infrastructure will be managed by NGIs, not a central entity
  - each region/NGI responsible for monitoring itself and making data available to project
- **Manpower at CERN for Grid Monitoring will decrease**
  - best-in-class OpenSource products preferable to in-house development: (avoid burden of support & maintenance)
  - Choose products which have support contracts available if required, and with a large user/developer community
- **Need to provide sites with integrated fabric monitoring and grid monitoring**
  - Provide site administrators with accurate and timely information
  - Automate as much as possible

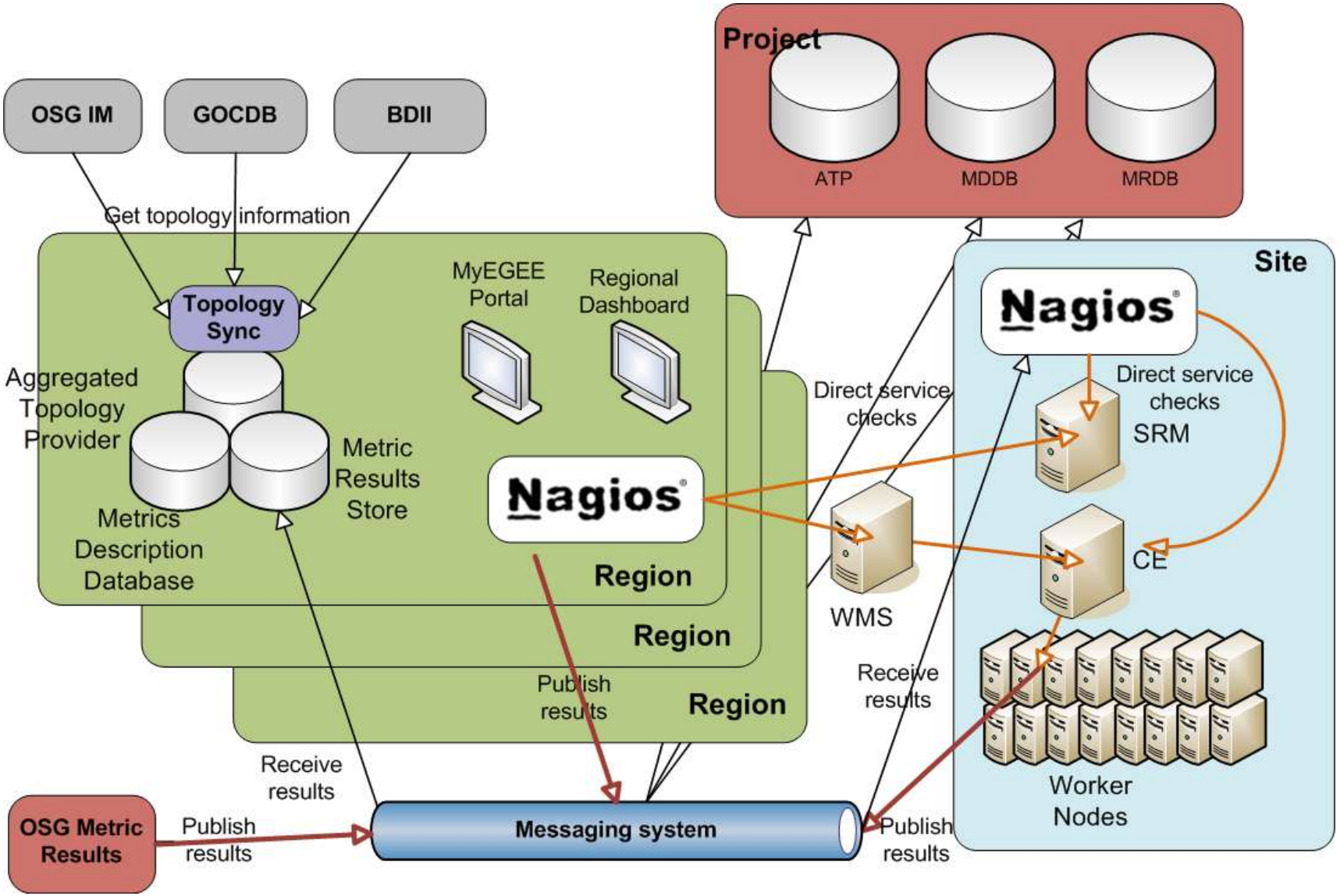
Some limitations and solutions

- **Non-flexible availability calculations**
  - ☑ Develop Metrics Description Database
- **Long time before site admins are alerted to problems**
  - ☑ Run tests locally, with local alarms
- **Sites are blind if central monitoring fails**
  - ☑ Provide sites with local monitoring tools
- **Possible scaling issues if number of services increases significantly**
  - ☑ Introduce regional monitoring instances
- **No history of grid topology**
  - ☑ Develop Aggregated Topology Provider
- **During SAM outages, test results are lost**
  - ☑ Use Message Bus store and forwarding

SAM Lineage

SAM Components	New Components
Execution Framework	Nagios
Topology Tables	Aggregated Topology Provider
Test Criticality & Test Definitions Tables	Metrics Description Database
Test Data Table	Metric Results Store
Sensors	Probes (lots!)
Web Service (for publishing results)	Message Bus
Programmatic Interface	Django data feeds
SAM Portal	MyEGEE

Regionalised SAM architecture



Aggregated Topology Provider

- **What is the ATP?**
  - Repository of topology information containing:
    - Projects (WLCG) and grid infrastructures (EGEE, OSG, NDGF)
    - Sites, Services, VOs and their groupings.
    - Downtimes
    - A history of the above.

- **Why was it needed?**
  - Impossible to map resources that belong to more than one site or to different infrastructures in the old SAM DB schema.
  - For availability re-calculations, history of grid topology is needed.
  - We couldn't name groups of arbitrary grid resources (e.g. ATLAS clouds).

Aggregated Topology Provider

- **What do we have today?**
  - An ATP service for MySQL and Oracle that aggregates information from:
    - OSG Information Management (OIM) system – OSG grid services & downtimes
    - GOCDB - EGEE grid services & downtimes
    - CIC Portal – VO cards
    - BDII – VO / service mappings
  - A programmatic interface to retrieve ATP information

- **What is still missing?**
  - History tables to record changes in topology information.
  - Packaging.

Metrics Description Database

- **What is the MDDB?**
  - Project-level component that contains meta-data about metrics and how those metrics can be combined to calculate different availabilities
- **Why was it needed?**
  - We had no flexible availability calculations
    - one single algorithm for computing availability
  - We need to maintain a history of which metrics and calculations are valid at each point in time.
- **Still to do**
  - Integration with ATP
  - Interface for populating and querying profiles

Metric Results Database

- **What is the MRDB?**
  - Repository of metric results containing:
    - Metric results for service end-points for the grid infrastructure.
    - Status changes for service end-points in the infrastructure.
  - Designed after evaluating the various features of existing SAM database, Nagios NDOUtils DB, and MyOSG schema
- **What do we have today?**
  - MySQL version:
    - Integration with MDDB and mock version of ATP
    - Package for data loading.
- **What is still missing?**
  - Integration with ATP
  - Synchronizing with central MDDB.
  - Per-service status change calculation for Profiles (from MDDB).

Messaging System

- **What is the Messaging System?**
  - Reliable network of brokers that provides guaranteed delivery of messages
  - Recommended communication channel for all operational tools
  - Capabilities include queues, topics, durable and non-durable messaging
- **Why was it needed?**
  - During SAM outages, test results were lost.
  - The SAM infrastructure was completely centralized
  - Way of formalizing the exchange of information between tools
- **Industry support contract is being negotiated, and training organized**

Migration of SAM tests to Nagios

- Current scheduling and submission framework of SAM now has a Nagios equivalent
- Wrappers developed to run existing SAM tests under Nagios (easy migration for VOs!)
- New CE, WN, SRM probes written in Python (equivalent to current SAM tests)
- Python library and framework to ease development of complex Nagios probes for grid services

- Documentation:
  - https://twiki.cern.ch/twiki/bin/view/LCG/SAMToNagios
  - https://twiki.cern.ch/twiki/bin/view/LCG/SAMProbesMetrics

New SAM Portal[1]

[1]Based on MyOSG by Soichi Hayashi

Where are we now?

- **Meta Package Versions: egee-NAGIOS - 1.0.0-26 & egee-NRPE - 1.0.0-12 released today!**
- **ROC level Nagios configurations and probe results are now published to the messaging system**
  - /topic/grid.probe.metricOutput.EGEE.roc.<SITE-NAME>
- **WN tests are submitted by the ROC Nagios through the WMS and CE to a WN. Results are sent back through the messaging system.**
- **A new probe check_ggus has been added.**
  - In Nagios any GGUS ticket that has been assigned to a site or ROC will appear with a link
- **ROC Nagios service incident notifications are now being sent out to the messaging system**
  - Available for consumption by regional dashboards,…

Example Site Nagios View

- Test run locally

Test run by ROC & imported as Passive Check

CE-sft-voms-LHCb	OK	07-08-2009 04:29:47	6d 20h 4m 40s	1/1	SAM status: ok
hr.srce.CAdist-Version-dteam	UNKNOWN	07-08-2009 09:59:55	6d 18h 44m 46s	4/4	WLCG probe execution failed: Download from remote computer failed failed with error: globus_ftp_client: the server responded with an error500 500-Command failed. : globus_l_gfs_file_open failed. 500-globus_xio: Unable to open file /etc/grid-security/certificates/policy-igtf-classic.info 500-globus_xio: System error in open: No such file or directory 500-globus_xio: A system call failed: No such file or directory 500 End.
hr.srce.CAdist-Version-dteam-roc (PASV)	UNKNOWN	07-07-2009 15:14:59	4d 22h 24m 50s	4/4	WLCG probe execution failed: Download from remote computer failed failed with error: globus_ftp_client: the server responded with an error500 500-Command failed. : globus_l_gfs_file_open failed. 500-globus_xio: Unable to open file /etc/grid-security/certificates/policy-igtf-classic.info 500-globus_xio: System error in open: No such file or directory 500-globus_xio: A system call failed: No such file or directory 500 End.
hr.srce.GRAM-Auth-dteam	OK	07-08-2009 09:58:46	0d 0h 9m 25s	1/4	GRAM Authentication test successful
hr.srce.GRAM-Auth-dteam-roc (PASV)	OK	07-08-2009 10:03:43	5d 18h 50m 31s	1/4	GRAM Authentication test successful
hr.srce.GRAM-CertLifetime	OK	07-07-2009 15:04:03	6d 18h 34m 40s	1/2	CERT LIFETIME OK - Certificate will expire in 104.80 days (Oct 20 08:19:49 2009 GMT)
hr.srce.GRAM-CertLifetime-roc (PASV)	OK	07-07-2009 12:28:14	0d 21h 39m 57s	1/2	CERT LIFETIME OK - Certificate will expire in 104.91 days (Oct 20 08:19:49 2009 GMT)

"-roc" added to test name

Summary

- **A broker network is in place (CERN, SRCE, …)**
- **Nagios package available for sites**
  - Excellent fabric monitoring tool (disk space, temperature,..)
  - Excellent alarming & notification features of Nagios now available to the grid world!
  - NCG builds configuration automatically
- **Regional Nagios package also available**
  - NCG automatically figures out which sites ROC should be monitoring & builds configuration
  - Results sent to sites as passive checks via Message Bus
- **At CERN we have 11 ROC Nagios instances running in a test bed.**
  - metric results fed into a SAM database to show equivalence
- **Integrated set of tools is ready for deployment !!!**

Credits

- **Emir Imamagic, SRCE -** *"Mr Nagios", NCG, messaging*
- **James Casey -** *Messaging, overall architecture*
- **Laurence Field:** *BDII Nagios probes*
- **Vaihab Kumar (BARC):** *MDDB*
- **Steve Traylen (CERN):** *Packaging & Release Mgmt.*

And the SAM Team at CERN:

- **David Collados & Joshi Pradyumna (BARC):** *ATP*
- **Wojciech Lapka -** *Metric Results DB, ROC Nagios test infrastructure*
- **Judit Novak (& MyOSG colleagues):** *MyEGEE portal*
- **Konstantin Skaburskas:** *Nagios grid probes, wrappers & porting documentation*