GridICE: Requirements, Architecture and Experience of a Monitoring Tool for Grid Systems

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CHEP2006, Mumbai (India), 13-17 February 2006

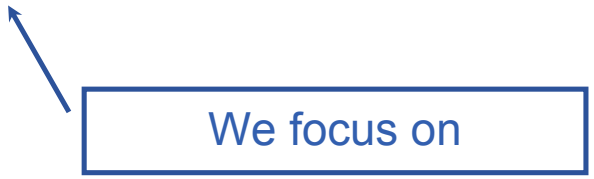
Outline

- **Monitoring a Grid**
  - general introduction
  - users' viewpoints
- **GridICE**
  - architecture
  - implementation
  - experience

What is Monitoring

- We need monitoring functionalities:
  - to observe the composition, state and features of available resources
  - to analyze their behavior and performance
  - to detect and prevent fault situations

- In the context of Grid computing, two important categories of monitoring systems are:
  - **Application monitoring**
  - **Infrastructure monitoring**



Main Phases of the Monitoring Process

Processing

Presenting

abstract the huge number of received events in order to enable the consumer to draw conclusions about the operation of the monitored system

Distributing

transmission of the events from the source to any interested parties

Generation

sensors enquiring entities and encoding the measurements according to a schema

e.g., filtering according to some predefined criteria, or summarising a group of events

Different Viewpoints /1

We focus on the following categories of users:

- **VO manager**
  - ***actual set of resources accessible to VO members***
- **Grid operator**
  - ***all resources under responsibility of a Grid Operator Center***
- **Site administrator**
  - ***site resources offered to a Grid***

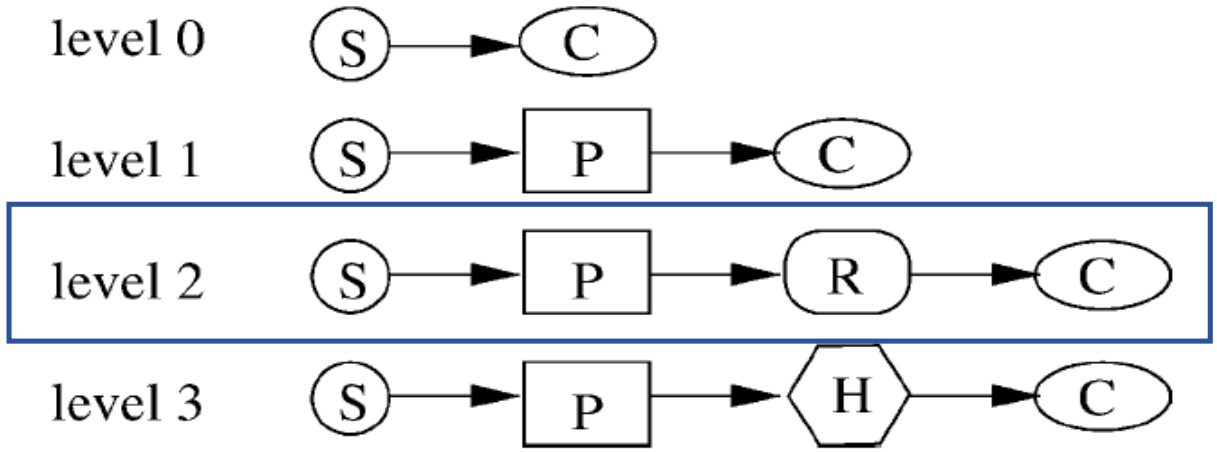
The GridICE Monitoring Tool

Overview

- **GridICE:**
  - **a distributed monitoring tool for Grid systems**
    - **started in late 2002 (EU-DataTAG project)**
    - **is evolving in the context of EU-EGEE**
  - **fully integrated with the LCG-2.x Middleware**
    - **Metering and publishing of data can be configured via LCG standard installation mechanisms**
    - **Self-configurable collection and presentation**
      - ***just give the URL of the root Grid Information Service (GIS)***
  - **using W3C standards to offer easy access to monitoring data**

Taxonomy

- **Taxonomy of monitoring systems** [2]
  - S = sensor C = consumer P = publisher
  - R = republisher H = hierarchy of republishers

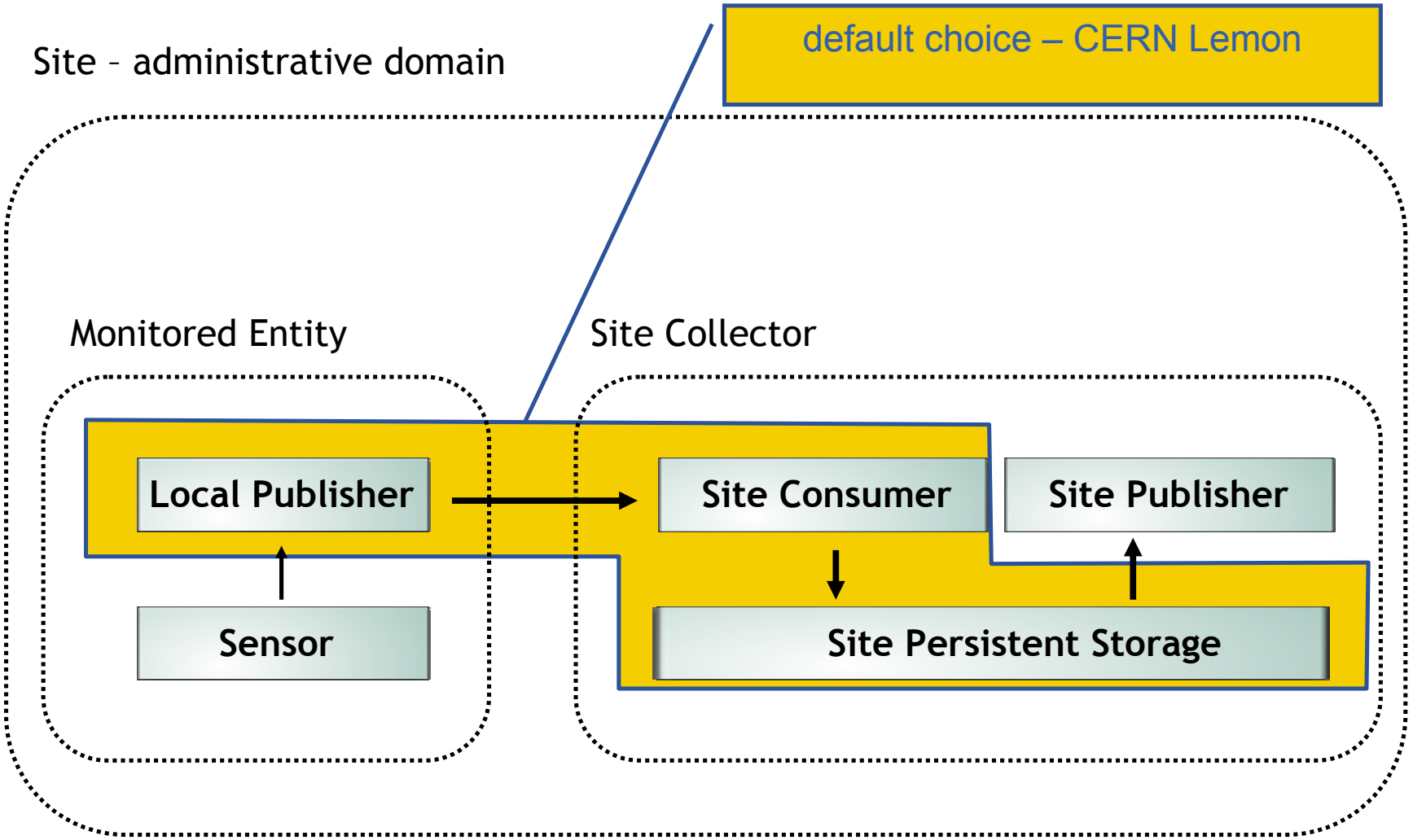


- GridICE is a 2nd level of monitoring systems with a centralized republisher

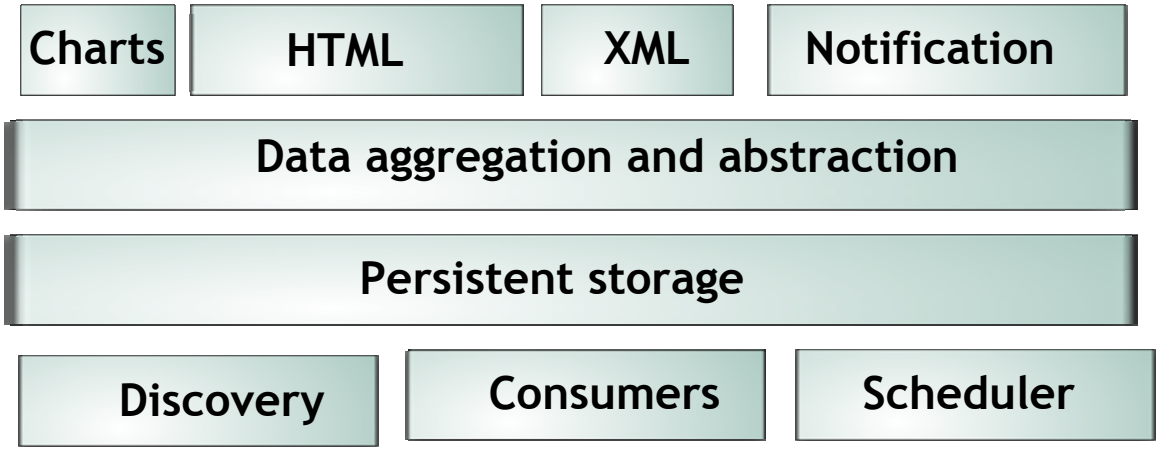
Sensor (S) and Publisher (P)

- **Sensor and publisher are in the scope of each administrative domain:**
  - Sensor
    - Extension of the GLUE Schema-based information already available in the GIS adopted by LCG (i.e., Globus MDS 2.x):
      - *fabric-level information*
      - *job monitoring*
      - *summary info for computing resources*
      - *network connectivity from a Grid viewpoint [4]*
  - Publisher
    - Adopt the available Grid Information Service in LCG

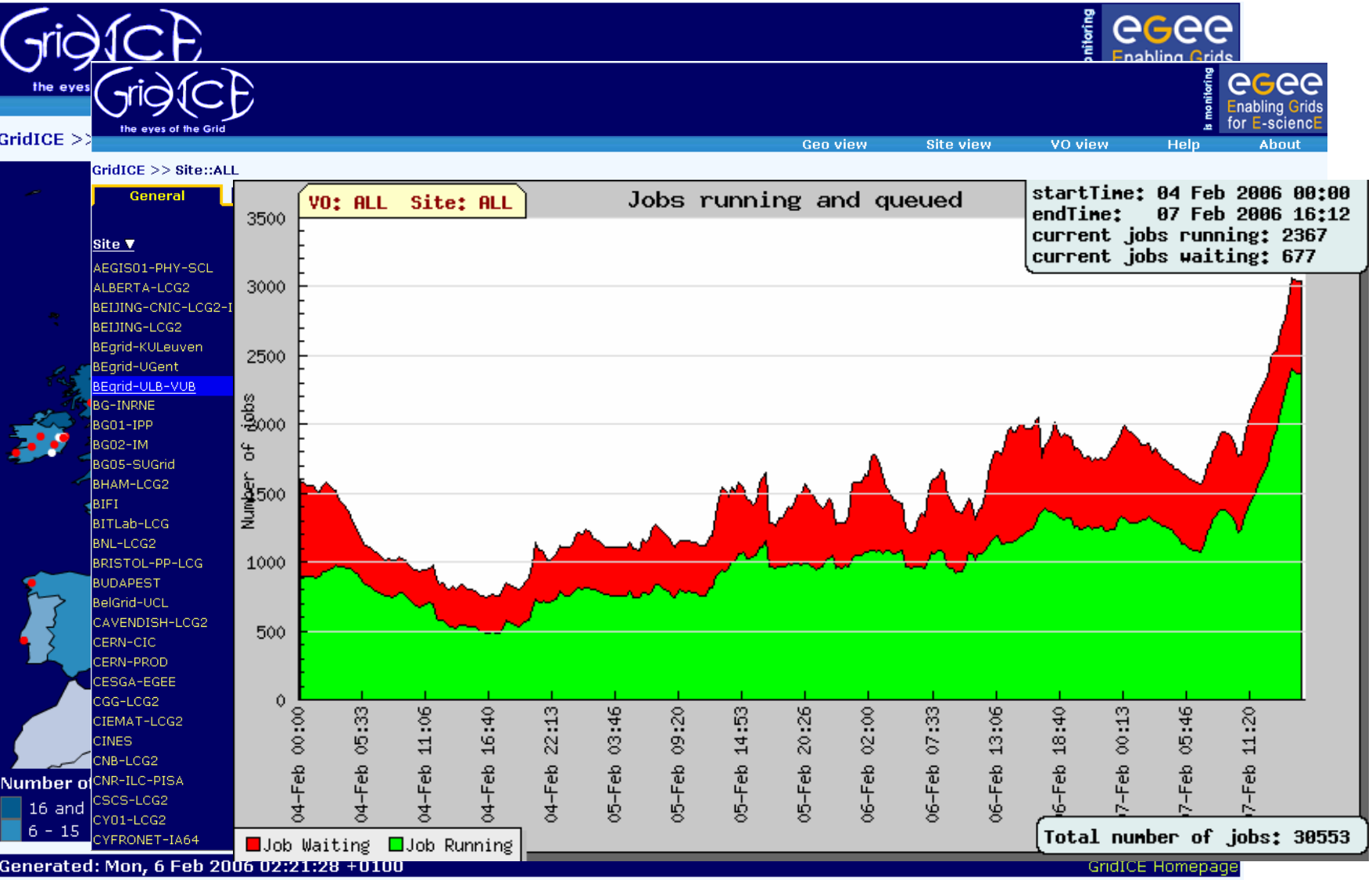
Metering and Site Level Distribution of extended information



Central Republisher (R)



Screenshots



Current Project Status

- Integrated and deployed with LCG 2.x
- Installed servers are monitoring Grid resources in the scope of:

	EGEE	EGEE-SWE	RDIG
	EGEE-SEE	Grid.it	GILDA
CMS	ATLAS	EUMedGrid	EUChinaGRID
	BalticGrid	EELA	BeGrid

- **Next steps:**
  - **Security and Privacy concerns**
  - **Dealing with heterogeneous publisher interfaces**
  - **Adopt new data-warehousing features available in the open source software**
  - **New service-specific sensors**

Conclusion

- **Monitoring of Grid systems is a complex activity in metering, distributing, processing and presenting**
- **GridICE has been designed as an infrastructure monitoring tool for Grid systems**
- **Requirements have been considered from three main different categories of users**
- **The experience in production environments is positive**
  - a stable service working in 24*7
- **Future work targeted at dealing with multiple producer interfaces, improving security aspects and extending the set of measurements**

References

Dissemination: http://grid.infn.it/gridice

[1] S. Andreozzi, N. De Bortoli, S. Fantinel, A. Ghiselli, G. L. Rubini, G. Tortone, M. C. Vistoli **GridICE: a monitoring service for Grid systems**, Future Generation Computer System 21 (2005) 559–571

[2] S. Zanikolas, R. Sakellariou, **A taxonomy of grid monitoring systems**, Future Generation Computer Systems 21 (2005) 163-188

[3] S. Andreozzi, N. De Bortoli, S. Fantinel, G.L. Rubini, G. Tortone. ***Design and Implementation of a Notification Model for Grid Monitoring Events.*** CHEP04, Interlaken (CH), Sep 2004

[4] S. Andreozzi, A. Ciuffoletti, A. Ghiselli, C. Vistoli. **Monitoring the Connectivity of a Grid**. In Proceedings of the 2nd International Workshop on Middleware for Grid Computing (MGC 2004) in conjunction with the 5th ACM/IFIP/USENIX International Middleware Conference, Toronto, Canada, October 2004.