

Resources Monitoring and Automatic Management System for Multi-VO Distributed Computing System

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Introduction

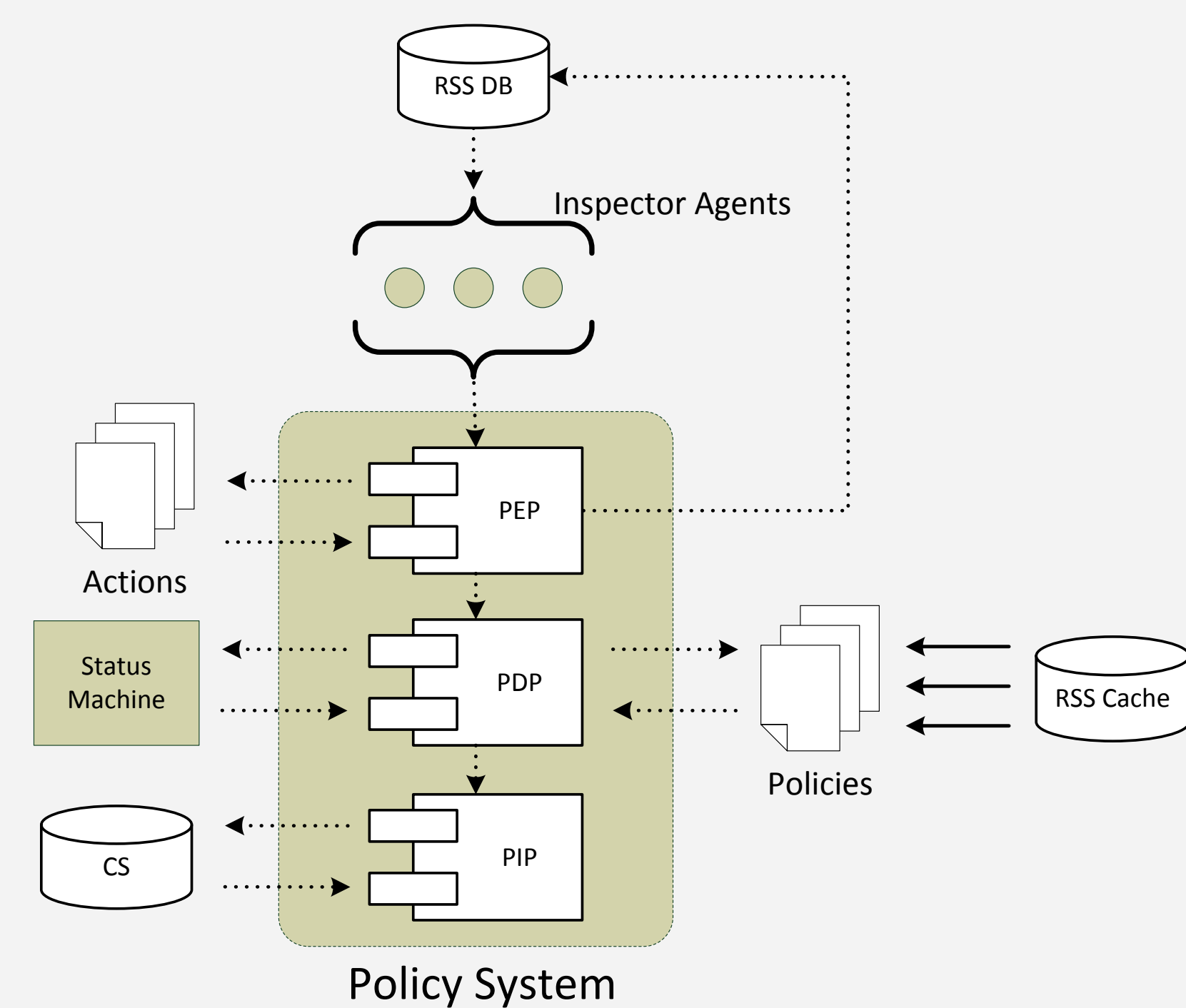
- Multi-VO supports based on DIRAC have been set up to provide workload and data management for several high energy physics experiments in IHEP.
- About 28 heterogeneous sites have been integrated in the distributed computing system, these sites includes CLUSTER, GRID and CLOUD sites.
- All the VOs registered in the distributed computing system can access the resources fairly.
- A monitoring and management system is required to ensure the distributed sites and resources work stably and reliably.
- The idea of DIRAC Resource Status System(RSS) is adopted to design this resources monitoring and management system.

Purposes

- Monitor and manage all the heterogeneous resources in an unified way.
- Support for multi-VO to satisfy their special requirements.
- Collect the dispersed monitoring information from different sources.
- Collect resource availability information through active tests.
- Expose a single endpoint to fetch the collected information.
- Evaluate the resource status by combining the collected information and achieve automatic management according to the status.

Decision and Control

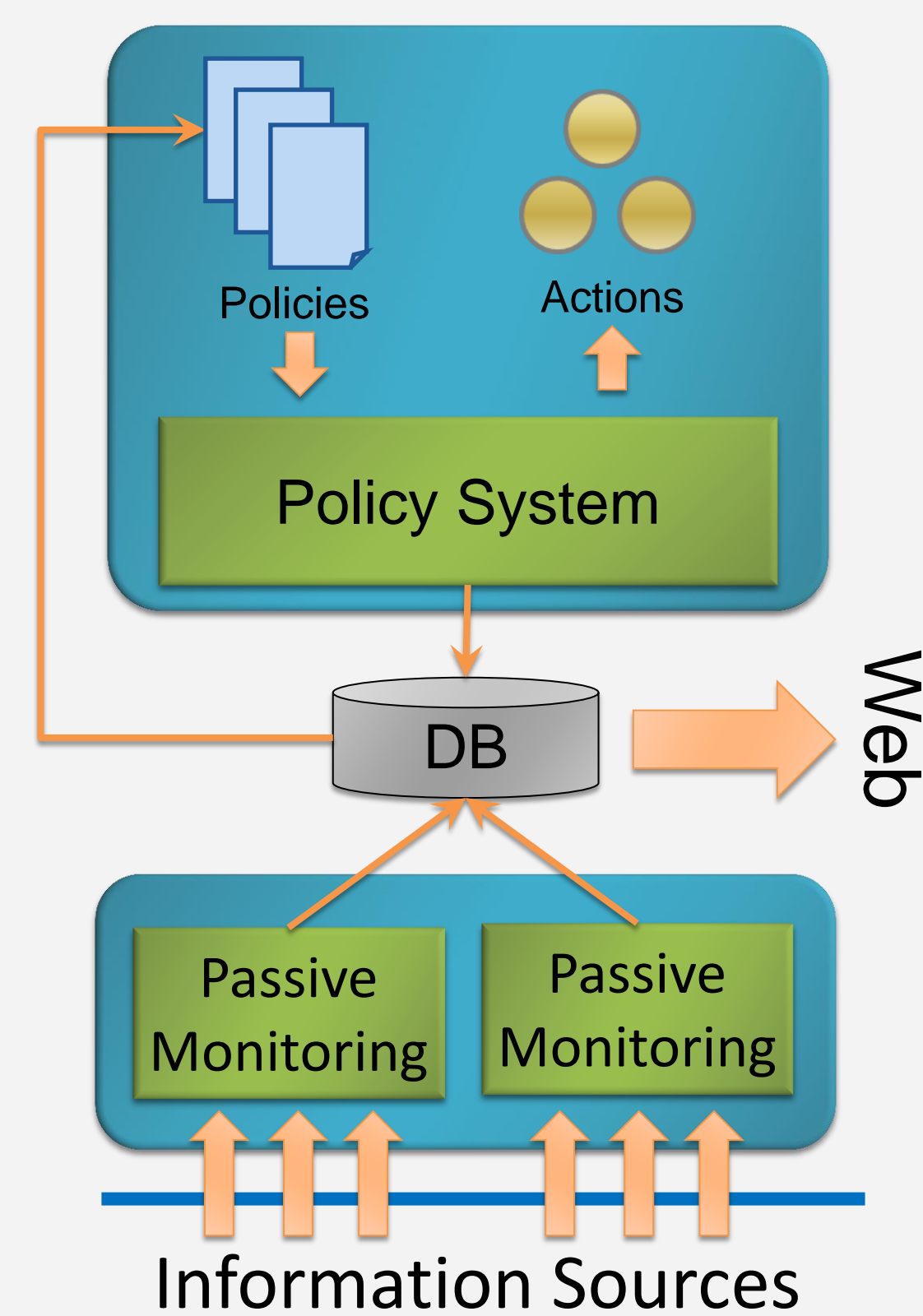
- The Policy System of RSS is used to achieve status decision and automatic control.
- Use policies to evaluate the resources status. Each policy will judge the status with specific monitoring information. Combining the results of all applied policies to get the final status.
- Use actions to manage the resources automatically. The applied actions will be matched and executed according to the resources status.



Architecture

The monitoring and management system is divided into the following three parts :

- Information collection** : collect the interested information which is disperse in different sources by passive and active ways.
- Status decision and automatic control** : similar to RSS, use policies to evaluate the status of resources and execute actions according to the status.
- Information display** : display both monitoring and control information through web pages. Real-time information is provided as well as historical information.

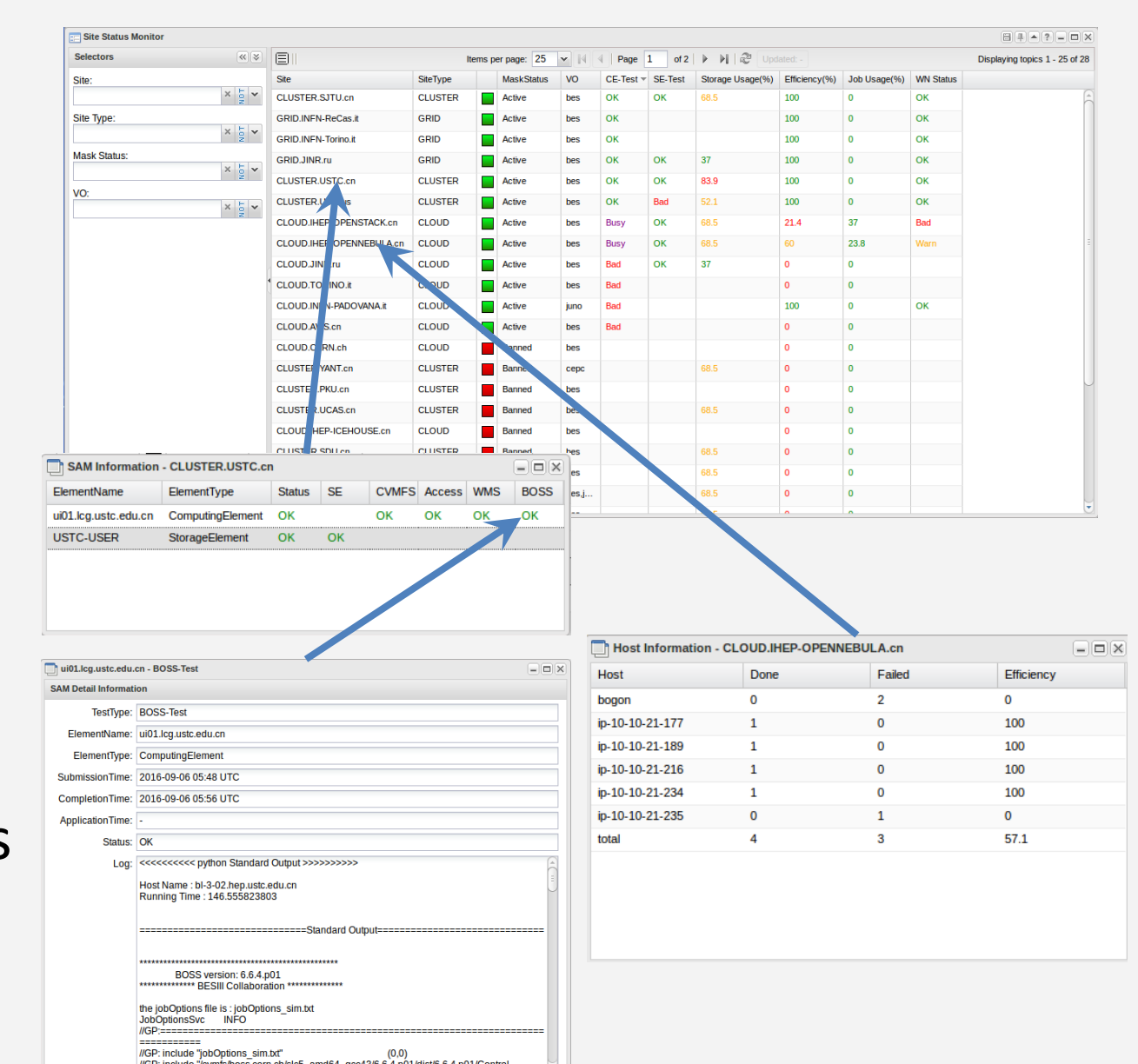


Information Display

- Design a VO-centric web portal acting as an unified endpoint for the monitoring information based on WebAppDIRAC framework.
- Real-time information and historical information can be obtained from the web portal.
- Each VO can only see the related resources and monitoring information form the web portal.

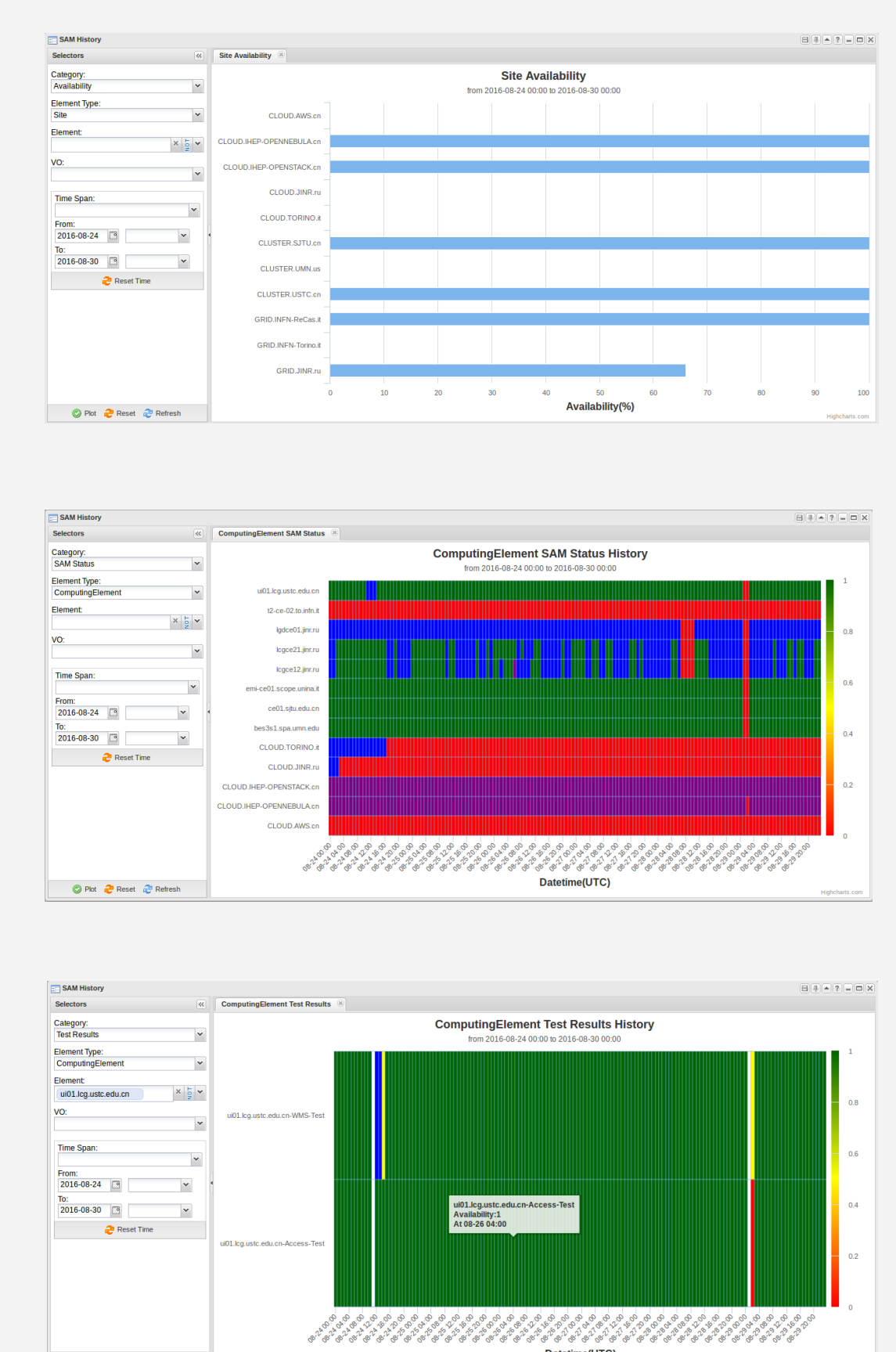
➤ Real-time information:

- A main web page to display the sites summary information.
- The detail information can be obtained by tracking down from the top.
- The log information of tests is provided to find out the fault reasons for sites.



➤ Historical information:

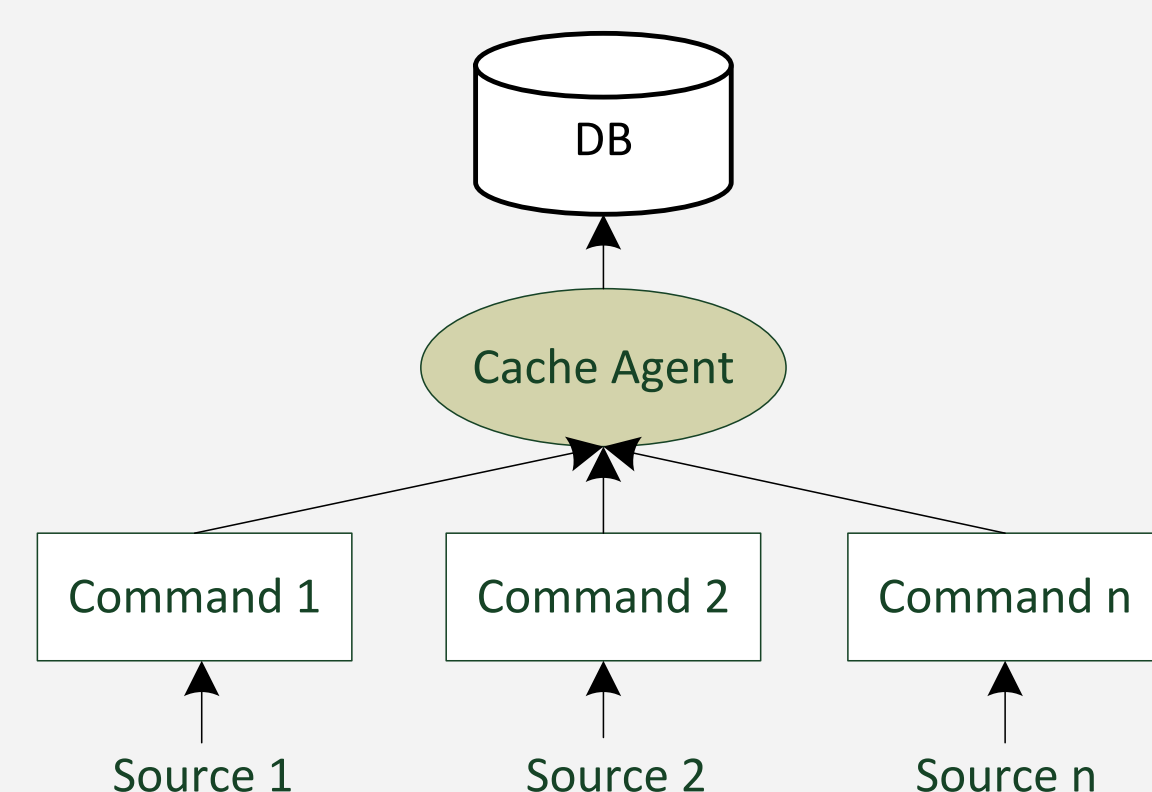
- Display the tests historical information.
- Provide three types of charts to show the historical information in different grain.
 - Total Availability: show the total availability metric of the resources for a certain period of time.
 - Availability Status: show the resources availability status of each time slot in the selected period of time.
 - Tests Results: show the tests results of each time slot for a certain resource in the selected period of time.



Information Collection

➤ Passive Monitoring:

- Use commands to collect monitoring information.
- Each command connects to one source to collect certain information.
- A cache agent has been developed to do these commands.



➤ Active Monitoring:

- Collect the availability information of the sites by running the tests.
- The tests will send standard test jobs to the sites and evaluate the availability with the jobs' results.
- Every VO is allowed to define the dedicated tests to satisfy its special requirement.

