Inca User-level Grid Monitoring

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Goal: reliable grid software and services for users

- Over 750 TF
- Over 30 PB of online and archival data storage
- Connected via dedicated multi-Gbps links
- 30-63 software packages and 6-23 services per resource

11 TeraGrid sites, 21 resources
Related Grid monitoring tools

Inca’s primary objective: user-level Grid monitoring
User-level grid monitoring

- Runs from a standard user account
- Executes using a standard GSI credential
- Uses tests that are developed and configured based on user documentation
- Automates periodic execution of tests
- Verifies user-accessible Grid access points
- Centrally manages monitoring configuration
- Easily updates and maintains monitoring deployment
Who benefits from user-level grid monitoring?

- Grid managers
  - Verify requirements are fulfilled by resource providers
  - Identify failure trends

- System administrators
  - Email notification
  - Debugging support

- End users
  - Debug user account/environment issues
  - Advanced users: feedback to Grid/VO
Inca provides user-level grid monitoring

- Stores and archives a wide variety of monitoring results
- Captures context of monitoring result as it is collected
- Eases the writing, deploying, and sharing of new tests or benchmarks
- Flexible and comprehensive web status pages
- Secure
Reporters collect monitoring data

- Executable programs that measure some aspect of the system or installed software
- Supports a set of command-line options and writes XML to stdout
- Schema supports multiple types of data
- Extensive library support for perl and python scripts (most reporters < 30 lines of code)
- Independent of other Inca components
## Libraries support common reporter tasks

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<th>Python Library</th>
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<td>inca.Reporter</td>
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<td>Inca::Reporter::Performance</td>
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## Documentation

- [http://inca.sdsc.edu/releases/latest/repdocs/perl.html](http://inca.sdsc.edu/releases/latest/repdocs/perl.html)
- [http://inca.sdsc.edu/releases/latest/repdocs/python.html](http://inca.sdsc.edu/releases/latest/repdocs/python.html)
Repositories support sharing

- Collection of reporters available via a URL
- Supports package dependencies
- Packages versioned to allow for automatic updates
- Inca project repository contains 150+ reporters
  - Version, unit test, performance benchmark reporters
  - Grid middleware and tools, compilers, math libraries, data tools, and viz tool
Agent provides centralized configuration and management

- Implements the configuration specified by Inca administrator
- Stages and launches a reporter manager on each resource - local, SSH, GRAM, WS-GRAM
- Sends package and configuration updates
- Manages proxy information
- Administration via GUI interface (incat)

Screenshot of Inca GUI tool, incat, showing the reporters that are available from a local repository
Depot stores and publishes data

- Stores configuration information and monitoring results
- Provides full archiving of reports
- Uses relational database backend via Hibernate
- Supports HQL and predefined queries
- Supports plug-in customization (e.g., email notifications, downtimes)
- Web services - Query data from depot and return as XML
Consumer displays data

- Current and historical views
- Web application packaged with Jetty
- JSP 2.0 pages/tags to query data and format using XSLT
- CeWolf/JFreeChart to graph data
- Ability to fetch Inca data in HTML or XML format via REST URLs *new*
- Allow “run nows” from the Inca web status pages *new*
New features

Depot peering provides fault tolerance

“Approval” mode allows system administrators greater control over testing on their resources
Software status and deployments

Current software version: 2.5
(available from Inca website)

http://inca.sdsc.edu
Inca TeraGrid deployment

- Running since 2003
- Resource registration in information services (IIS)
- Total of ~2200 tests running on 18 login nodes, 2 grid nodes, and 3 servers
- Email notifications for critical services
- Cross-site tests
- CA certificate and CRL checking

Screenshot of Inca status pages for TeraGrid

http://inca.teragrid.org/

*IIS paper to be given on Friday at GCE’09 by JP Navarro*
Using Inca and IPM to measure performance variation on TeraGrid

• Joint work with Nick Wright (LBL) and PMaC group
• Performance variation makes code optimization challenging
• Benchmarks: Paratec, WRF, PingPong, and HPCC (naturally ordered ring and random ring)
• Machines: NCSA Abe, NICS Kraken, and TACC Ranger
• 256 processors twice a day during March 2009
• Variance due to network contention; higher for WRF

Inca UC Grid deployment

- University of California campuses
- Lead by UCLA
- First deployed in August and now includes 4 campuses
- Total of 71 tests running on 5 portal servers, 4 appliance nodes, and the myproxy server

http://inca.ucgrid.org
Inca monitoring benefits end users

- Tests resources and services used by LEAD. E.g.
  - Pings service every 3 mins
  - Verifies batch job submission every hour
- Automatically notifies admins of failures
- Show week of history in custom status pages

“Inca reported errors mirror failures we’ve observed and as they are addressed we’ve noticed an improvement in TeraGrid’s stability.”

-- Suresh Marru (LEAD developer)
Benefits of using Inca

• Detect problems before the users notice them

• Easy to write and share tests and benchmarks

• Easy to deploy and maintain

• Flexible and comprehensive displays
Inca Information

• Announcements: inca-users@sdsc.edu

• Email: inca@sdsc.edu

• Website: http://inca.sdsc.edu

• Supported by:
  ![TeraGrid](TeraGrid.png)