Monitoring User-level Functionality and Performance Using Inca

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Inca detects infrastructure problems by executing periodic, automated, user-level testing of software and services.

http://inca.sdsc.edu

Enables consistent user-level testing across resources:

Emulates a user by running under a standard user account and executing tests using a standard GSI credential. Ensures consistent testing across resources with centralized test configuration.

Easy to collect data from resources:

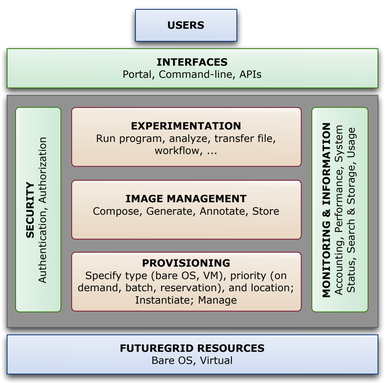
Data is collected by reporters, executables that measure some aspect of the system and output the result as XML. Multiple types of data can be collected. Perl and Python APIs are provided to make it easy to write reporters; most are less than 30 lines of code.

Easy to configure and maintain:

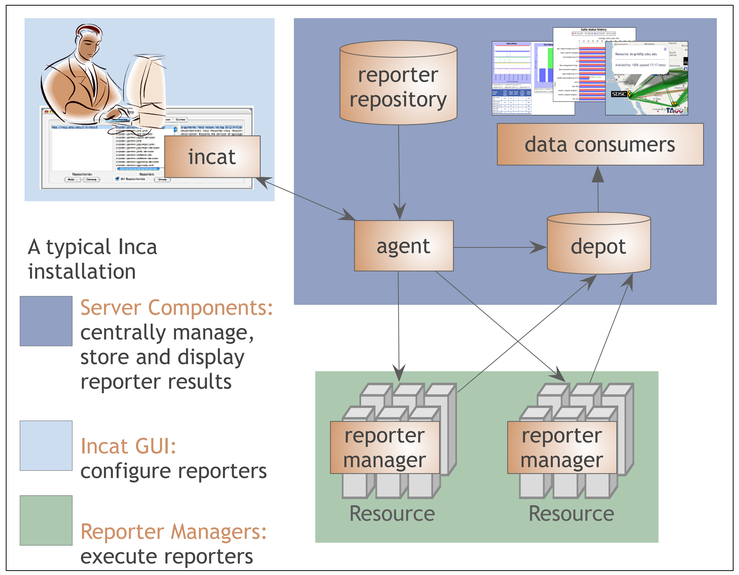
Manages and collects a large number of results through a GUI interface (incat). Measures resource usage of tests and benchmarks to help Inca administrators balance data freshness with system impact.

http://www.futuregrid.org

FutureGrid is a high performance grid test bed, which allows scientists to collaboratively develop and test novel approaches to parallel, grid, and cloud computing. FutureGrid will enable researchers to conduct reproducible experiments on geographically distributed resources. It will provide a growing library of software images to support virtual machine-based environments, as well as native operating systems environments.



Overview of FutureGrid architecture



Inca architecture

Inca Monitoring on FutureGrid

http://inca.futuregrid.org

Inca currently validates the FutureGrid infrastructure

Inca currently executes unit tests of HPC software on FutureGrid resources as well as unit tests of FutureGrid software components such as Eucalyptus and Nimbus. We plan to extend this testing to include end-to-end tests as well. Benchmarks such as HPCC (in side graph) are also collected periodically to detect performance problems.

Inca will validate virtual machine (VM) library images

Inca will be integrated into the FutureGrid image generator (based on BCFG2) to verify that bundled software works on deployed images.

Inca can validate a user's experiment environment

Users can also leverage Inca as part of their FutureGrid experiment to validate their environment. Users will be able to either select Inca to be included in their generated image or install it later using command-line tools. Inca's archived monitoring data will help a user to compare their environment to its previous instantiation.

Comprehensive views of data:

Offers a variety of web status pages from cumulative summaries to reporter execution details and result histories.

Archived results support troubleshooting:

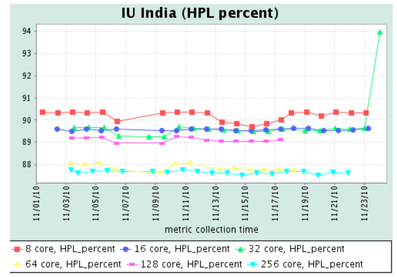
Furthers understanding of Grid behavior by storing and archiving complete monitoring results. Allows system administrators to debug detected failures using archived execution details.

Secure:

Inca components communicate using SSL. Securely manages short-term proxies for Grid service testing.

Used in production:

Inca is deployed on a wide variety of production Grids such as TeraGrid, GEON, TEAM, University of California (UC Grid), ARCS, DEISA, and ZIH.



Archived HPCC data collected on FutureGrid's India machine

	iu-india	iu-xray	tacc-alamo	uc-hotel	ucsd-sierra	ufl-foxtrot
nimbus-clientStatus	n/a	n/a	n/a	pass	pass	pass
eucalyptus-webpage-loads	pass	n/a	n/a	n/a	pass	n/a
nimbus-storage	n/a	n/a	n/a	pass	pass	pass

	iu-india	iu-xray
pbs_version	2.4.8	2.4.4-snap.200912210954
gcc_version	4.1.2	4.1.2
papi_version	n/a	3.6.2.2
pgcc_version	n/a	9.0-4
mpi_version	11.1	n/a
test_batch_job	0 seconds elapsed	1 seconds elapsed

Unit test results of cloud and HPC software

Inca on the Cloud

We plan to enable the work we develop for FutureGrid to work in any virtual environment. This includes the tests we use to validate Cloud software as well as using Inca to validate a user's virtual environment. Using Inca in virtual environments will make it easier to validate dynamic Cloud environments thus enabling users to conduct their research.

Inca software and documentation can be found at http://inca.sdsc.edu. For further questions, please email inca@sdsc.edu

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