

User-level Grid monitoring with Inca 2

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TeraGrid

- Origins: national supercomputer centers, funded by the NSF
- 9 TeraGrid sites, 18 resources
- Mix of Architectures:
 - ia64, ia32: LINUX
 - Cray XT3
 - Alpha: True 64
 - SGI SMPs
- Connected via dedicated multi-Gbps links
- 1000s of CPUs, > 250 teraflops
- > 30 petabytes of online and archival data storage
- Coordinated user environment across heterogeneous resources
 - CTSS (Coordinated TeraGrid Software & Services)



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User-level Grid monitoring

- Testing and performance measurement from a generic, impartial user's perspective in order to detect and fix Grid infrastructure problems before the user's notice them.
- User-level Grid monitoring system:
 - Runs from a standard user account
 - Executes using a standard GSI credential
 - Uses tests that are developed and configured based on user documentation
 - Verifies user-accessible Grid access points
 - Centrally manages monitoring configuration
 - Automates periodic execution of tests
 - Easily updates and maintains monitoring deployment



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Inca

- Provides user-level monitoring of Grid functionality and performance
- Features:
 - Collects wide variety of monitoring results
 - Captures context of monitoring result as it executes
 - Eases the writing and deploying of new tests or benchmarks
 - Supports sharing of tests and benchmarks
 - Stores and archives monitoring results
 - Securely manages short-term proxies
 - Measures system impact of tests and benchmarks

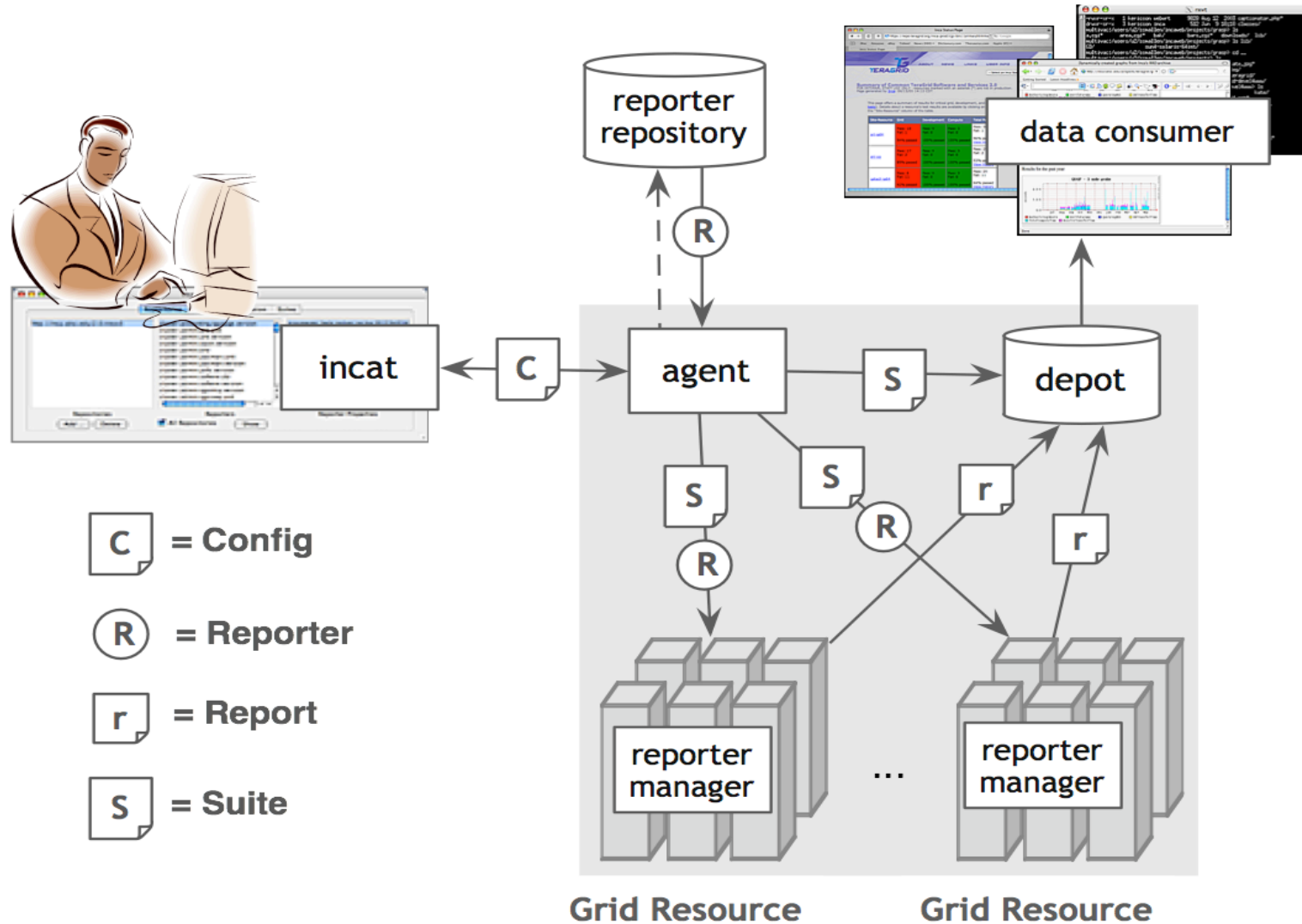


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Inca Architecture



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Collecting Monitoring Data

- Reporters
 - Executable program that measures some aspect of the system or installed software
 - Requirements:
 - Supports specific command-line options
 - Writes XML (Inca Reporter schema) to stdout
 - Supports multiple types of data
 - Extensive library support for perl scripts
 - Most reporters < 30 lines of code
 - Independent of other Inca components



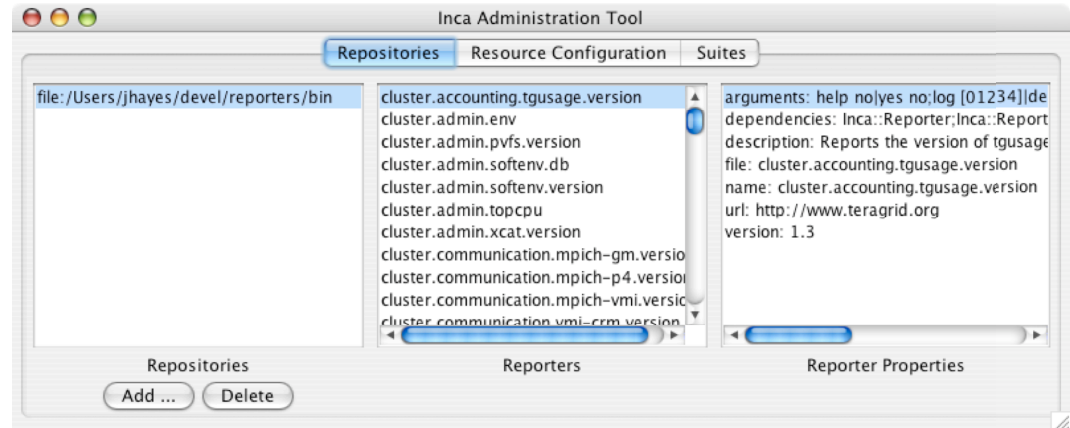
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Sharing Reporters

- Repositories:
collection of reporters
available via a URL
 - Supports package dependencies
(Perl modules, Makefile, autoconf)
 - Packages versioned to allow for automatic updates
 - Inca repository contains 157 reporters
 - Version, unit test, performance benchmark reporters
 - Grid middleware and tools, compilers, math libraries, data tools, and viz tool



Screenshot of a repository using Inca GUI tool



Centralized configuration and deployment

- Incat
 - GUI interface to enable a large number of monitoring results to be collected with a minimum of effort
 - Configure the reporters to execute on a set of resources
 - Configuration stored in a XML file and sent to Agent
- Agent
 - Implements the configuration specified by Inca administrator
 - Stages and launches a reporter manager on each resource
 - Sends package and configuration updates



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Storing data

- Depot
 - Stores configuration information and monitoring results
 - Uses relational database backend via Hibernate
 - Provides full archiving of reporter output
 - Supports SQL queries and provides predefined queries for latest monitoring results, report instance, and report history
 - Supports notifications



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Displaying and publishing data

- Data Consumer
 - Web application that queries and displays monitoring data
 - Packaged with Jetty
 - JSP tags to query data and format using XSL
- Web services
 - Query data from depot and return as XML



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Inca in Use: TeraGrid

- Currently monitoring all 18 allocated TeraGrid resources
 - Monitoring of CTSSv3
 - Monitoring of CTSSv4 (in progress)
 - Grid jobs (Globus gatekeeper logs)
 - CA certificate and CRL checking (notify if 2 weeks from expiration)
 - Resource registration in MDS

ctssv3		
Page loaded: 05-29-2007 06:30 PM (PDT)		
n/a	does not apply to resource	test
	missing (not yet executed)	pkgWait wait
pass	passed	incaWait wait
error	error	incaErr error
<ul style="list-style-type: none"> • ant • blas • compiler-gcc • compiler-intel • compiler-xlc • condor-g • gridshell • gsissh • gt4 • gt4-gr 		
APPS		
ant	anl-ia64	
version: 1.6.5	1.6.5	
ant-unit	pass	
blas	anl-ia64	
blas-level1	pass	
blas-level2	pass	
blas-level3	pass	
condor-g	anl-ia64	
version: >=6.7.18	6.7.18	
condorg-condorg	pass	

Details for "all2all:gram_to_gatekeeper.bigred.iu.teragrid.org" series	
Result:	
completed	
Reporter details:	
reporter name	grid.middleware.globus.unit.gatekeeper (click name for more info)
reporter version	3
Execution information:	
ran at	06-23-2007 02:57 AM (PDT)
age	10 hours 46 minutes
cron	?=57 ?=4 ***
ran on (hostname)	tg-login1.uc.teragrid.org
memory usage (MB)	19.1406
cpu time (secs)	0.800782
wall clock time (secs)	1.16846
Input parameters:	
help	no
host	gatekeeper.bigred.iu.teragrid.org
log	3
verbose	1
version	no
Command used to execute the reporter:	
<pre>% bash -l -c 'set -a; cd /home/inca/inca2install-ia64; cp ~/.soft.v && soft-misc ~/.soft.v3.\$\$ && source ~/.soft.v3.\$\$.cache.sh && expo PERL5LIB=/home/inca/inca2install-ia64/var/reporter- packages/lib/perl:\${HOME}/inca/install-ia64/lib/perl &&/home/inca/: ia64/var/reporter-packages/bin/grid.middleware.globus.unit.gatekee -host="gatekeeper.bigred.iu.teragrid.org" -log="3" -verbose="1" -v -f ~/.soft.v3.\$\$*';</pre>	
System commands executed by the reporter:	
Note that the reporter may execute other actions in between system commands (e.g., change dire	
% globusrun -a -r gatekeeper.bigred.iu.teragrid.org	



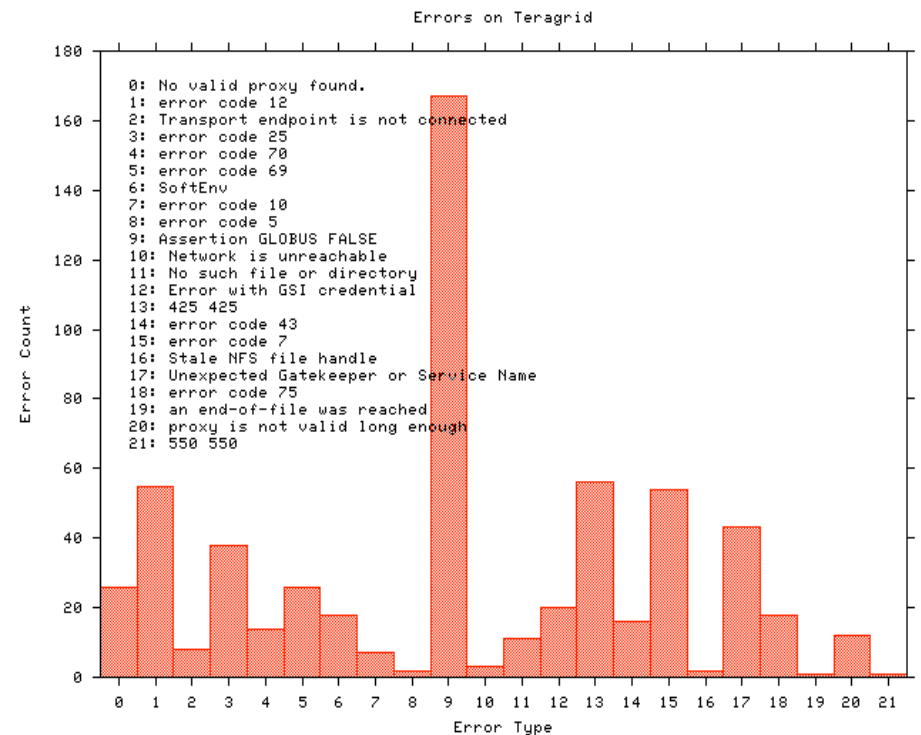
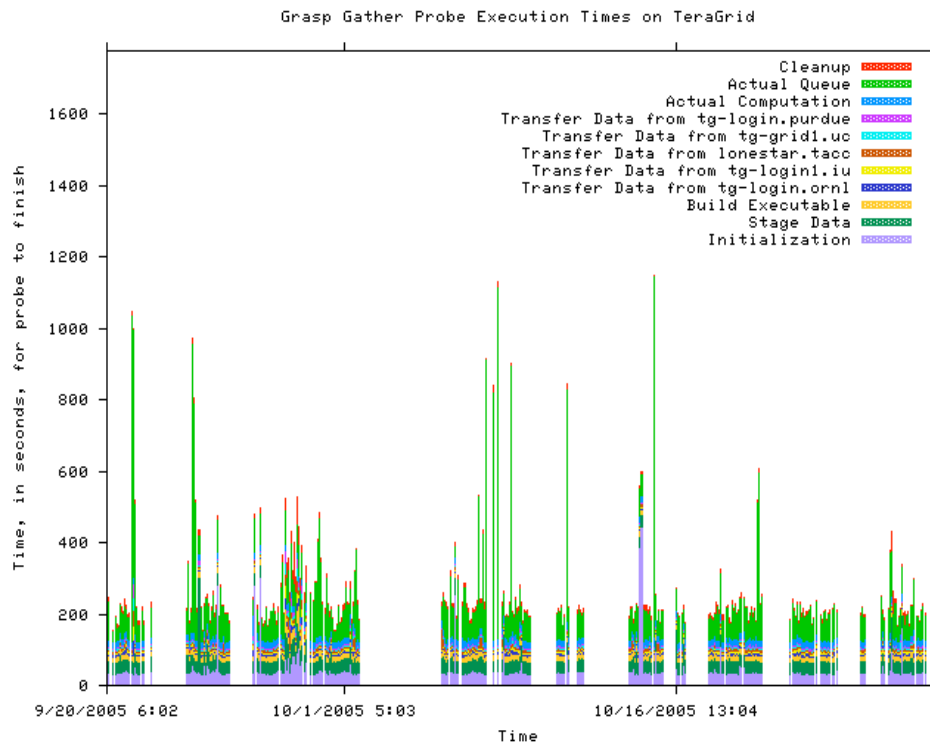
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Inca in use: Grid Assessment Probes

- Set of probes designed to emulate Grid applications
- Deployed using Inca to GEON and TeraGrid



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Software Status

Current software version: 2.03
(available from Inca website)

<http://inca.sdsc.edu>

Other Inca deployments:



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Summary

- User-level Grid monitoring: Testing and performance measurement from an impartial user perspective to detect problems before the users notice them
- Standalone reporter APIs and repositories make it easy to write and share tests and benchmarks (reporters)
- Centralized configuration enables uniform monitoring and makes it easy to deploy Inca monitoring to a set of resources
- Data consumer and web services interface enable publishing and displaying of Inca monitoring data



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More Information

Website:

<http://inca.sdsc.edu>

Announcements:

inca-users@sdsc.edu

Email:

inca@sdsc.edu

Supported by:

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neon
NATIONAL ECOLOGICAL OBSERVATORY NETWORK



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