# Inside the Inca Depot

**Paul Hoover**

phoover@sdsc.edu

**Inca Workshop**
**August 26-27, 2010**

**SDSC** SAN DIEGO SUPERCOMPUTER CENTER

# Depot
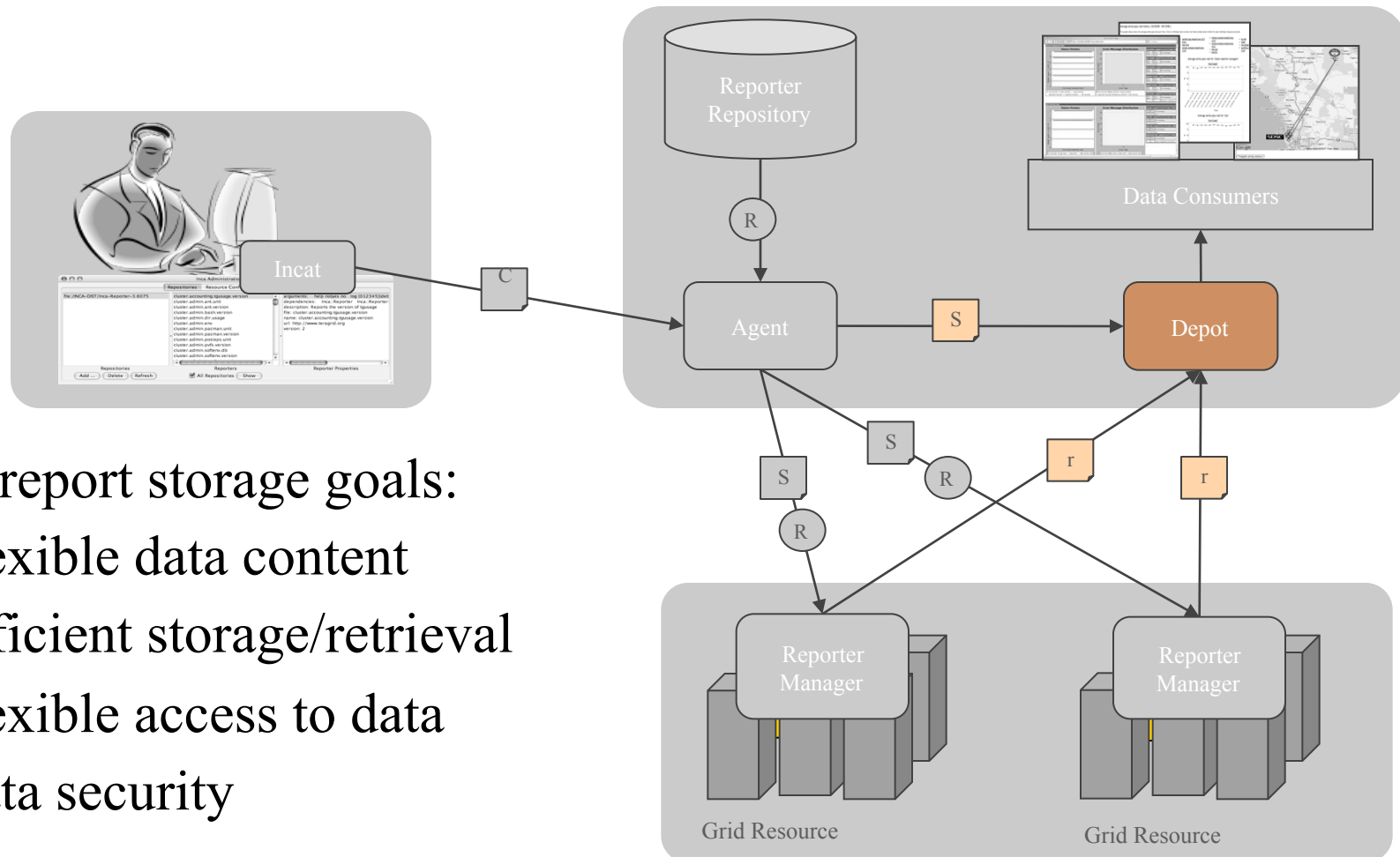


Inca report storage goals:

- Flexible data content
- Efficient storage/retrieval
- Flexible access to data
- Data security

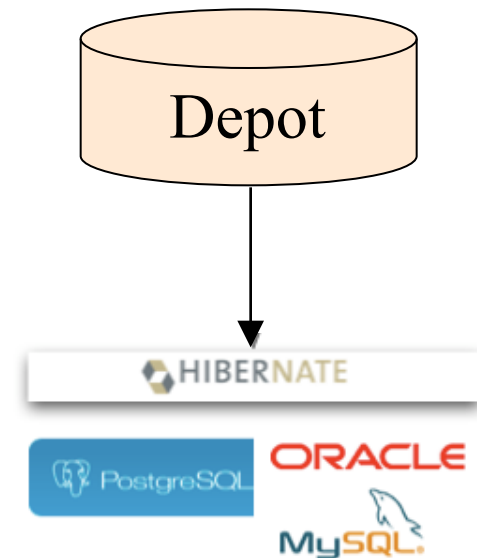# Report Body Provides Flexible Data Content

```xml
<body>
 <performance ID="hpcc">
  <benchmark ID="8">
   <statistics
       EP-STREAM_Triad_GB_s="2.813"
       G-STREAM_Triad_GB_s="22.505"
       Wall_Mins="74.317"
       EP-DGEMM_GFlop_s="8.936"
       G-HPL_TFlop_s="0.067"
       Random_Ring_Latency_usecs="0.744"
       ProcSpeed_GHz="2.60"
       Cores="8.000"
       HPL_percent="80.639"
       G-Random_Access_GFlop_s="0.057"/>
  </benchmark>
 </performance>
</body>
```

```xml
<body>
 <package>
  <ID>openssh</ID>
  <version>3.6.1p1</version>
 </package>
</body>
```
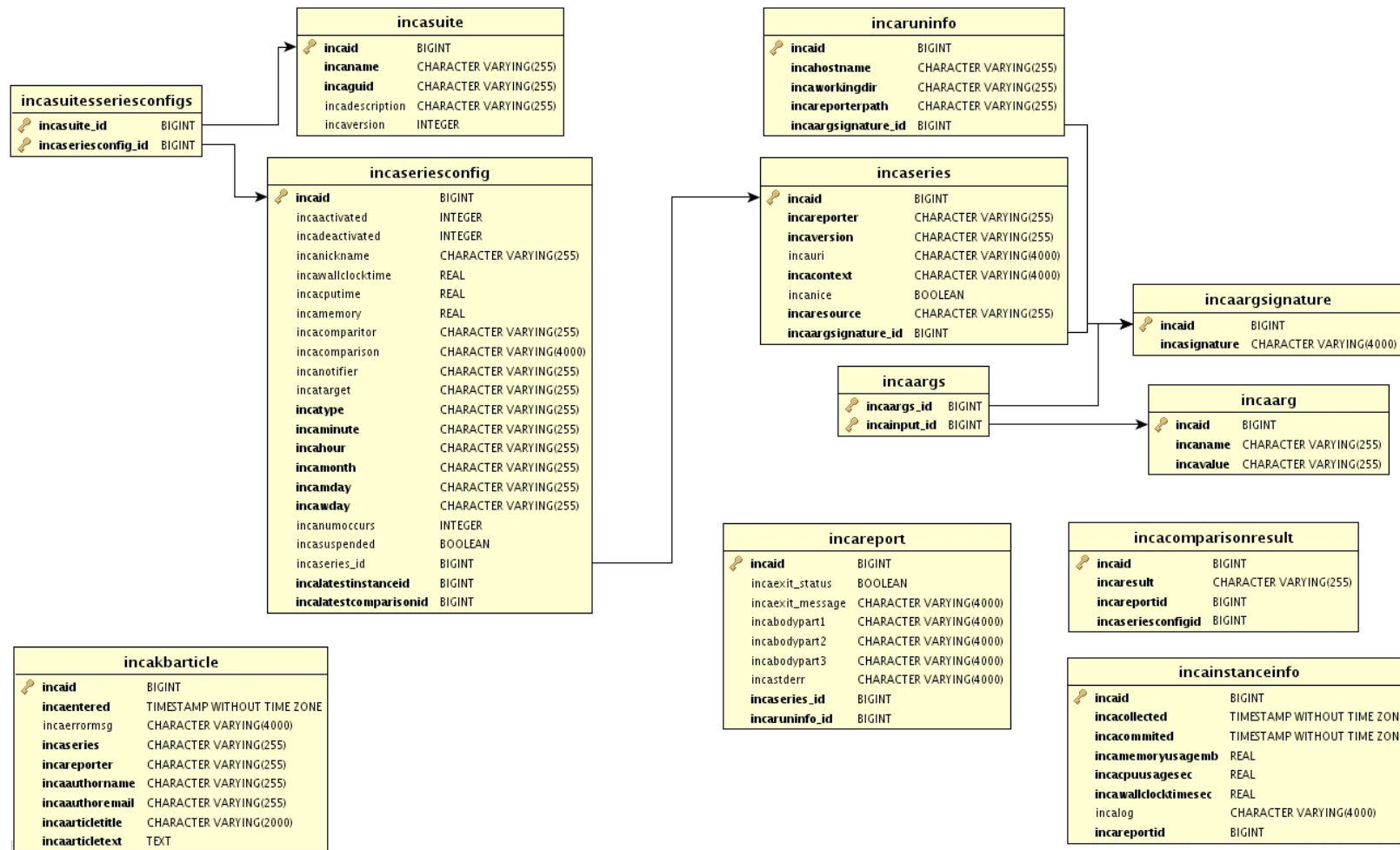
# Hibernate Supports Efficient Data Access

- Hibernate library provides an abstraction layer to DB applications

- Supports PostgreSQL, MySQL, Oracle, HSQLDB, others

- Provides HQL object-oriented SQL dialect

# Database Schema

**incasuite**

| incaid | BIGINT |
|---|---|
| **incaname** | CHARACTER VARYING(255) |
| **incaguid** | CHARACTER VARYING(255) |
| incadescription | CHARACTER VARYING(255) |
| incaversion | INTEGER |

**incasuitesseriesconfigs**

| incasuite_id | BIGINT |
|---|---|
| incaseriesconfig_id | BIGINT |

**incaruninfo**

| incaid | BIGINT |
|---|---|
| **incahostname** | CHARACTER VARYING(255) |
| **incaworkingdir** | CHARACTER VARYING(255) |
| **incareporterpath** | CHARACTER VARYING(255) |
| **incaargsignature_id** | BIGINT |

**incaseriesconfig**

| incaid | BIGINT |
|---|---|
| incaactivated | INTEGER |
| incadeactivated | INTEGER |
| incanickname | CHARACTER VARYING(255) |
| incawallclocktime | REAL |
| incacputime | REAL |
| incamemory | REAL |
| incacomparitor | CHARACTER VARYING(255) |
| incacomparison | CHARACTER VARYING(4000) |
| incanotifier | CHARACTER VARYING(255) |
| incatarget | CHARACTER VARYING(255) |
| **incatype** | CHARACTER VARYING(255) |
| **incaminute** | CHARACTER VARYING(255) |
| **incahour** | CHARACTER VARYING(255) |
| **incamonth** | CHARACTER VARYING(255) |
| **incamday** | CHARACTER VARYING(255) |
| **incawday** | CHARACTER VARYING(255) |
| incanumoccurs | INTEGER |
| incasuspended | BOOLEAN |
| incaseries_id | BIGINT |
| **incalatestinstanceid** | BIGINT |
| **incalatestcomparisonid** | BIGINT |

**incaseries**

| incaid | BIGINT |
|---|---|
| **incareporter** | CHARACTER VARYING(255) |
| **incaversion** | CHARACTER VARYING(255) |
| incauri | CHARACTER VARYING(4000) |
| **incacontext** | CHARACTER VARYING(4000) |
| incanice | BOOLEAN |
| **incaresource** | CHARACTER VARYING(255) |
| **incaargsignature_id** | BIGINT |

**incaargsignature**

| incaid | BIGINT |
|---|---|
| incasignature | CHARACTER VARYING(4000) |

**incaargs**

| incaargs_id | BIGINT |
|---|---|
| incainput_id | BIGINT |

**incaarg**

| incaid | BIGINT |
|---|---|
| incaname | CHARACTER VARYING(255) |
| incavalue | CHARACTER VARYING(255) |

**incakbarticle**

| incaid | BIGINT |
|---|---|
| incaentered | TIMESTAMP WITHOUT TIME ZONE |
| incaerrormsg | CHARACTER VARYING(4000) |
| **incaseries** | CHARACTER VARYING(255) |
| **incareporter** | CHARACTER VARYING(255) |
| **incaauthorname** | CHARACTER VARYING(255) |
| **incaauthoremail** | CHARACTER VARYING(255) |
| **incaarticletitle** | CHARACTER VARYING(2000) |
| **incaarticletext** | TEXT |

**incareport**

| incaid | BIGINT |
|---|---|
| incaexit_status | BOOLEAN |
| incaexit_message | CHARACTER VARYING(4000) |
| incabodypart1 | CHARACTER VARYING(4000) |
| incabodypart2 | CHARACTER VARYING(4000) |
| incabodypart3 | CHARACTER VARYING(4000) |
| incastderr | CHARACTER VARYING(4000) |
| **incaseries_id** | BIGINT |
| **incaruninfo_id** | BIGINT |

**incacomparisonresult**

| incaid | BIGINT |
|---|---|
| **incaresult** | CHARACTER VARYING(255) |
| **incareportid** | BIGINT |
| **incaseriesconfigid** | BIGINT |

**incainstanceinfo**

| incaid | BIGINT |
|---|---|
| **incacollected** | TIMESTAMP WITHOUT TIME ZONE |
| **incacommited** | TIMESTAMP WITHOUT TIME ZONE |
| **incamemoryusagemb** | REAL |
| **incacpuusagesec** | REAL |
| **incawallclocktimesec** | REAL |
| incalog | CHARACTER VARYING(4000) |
| **incareportid** | BIGINT |

**SAN DIEGO SUPERCOMPUTER CENTER**

# incat Series Edit Dialog

# Depot Schema Reduces Redundancy

- Report bodies often identical; Depot merges them

- Instance contains info that varies--timestamps, resource usage

- Series defines reporter execution; SeriesConfig manipulates execution and output

| SeriesConfig | Series | Report | Instance |
|---|---|---|---|
| schedule | reporter | body | collected |
| limits | arguments | stderr | cpuUsage |
| comparison | context | | wallClockTime |
| | resource | | |
| Execution control | | Reporter output | Runtime stats |
| | Execution spec | | |
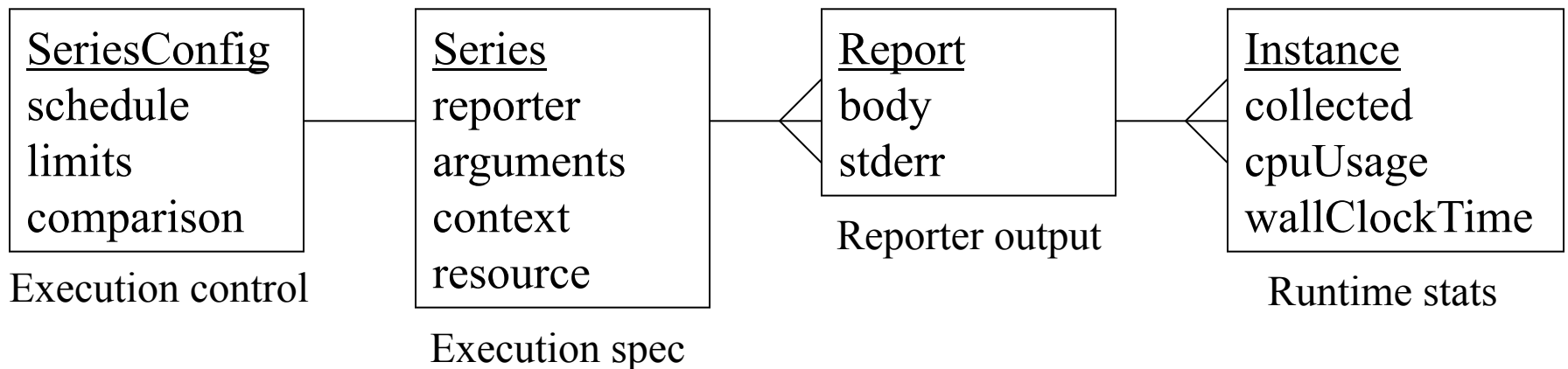
# Depot Provides Flexible Access to Data

- Depot retains history of reporter output

- Protocol supports direct DB access via HQL queries

- Convenience queries provide easy access to common combinations of data
    - Single instance
    - Latest instance of a set of series
    - Instances collected during a specified time period
    - Success/failure history of a set of series

- Special queries report DB schema, suite list

**SAN DIEGO SUPERCOMPUTER CENTER**

# Depot Customization

- Switch underlying database engine

- Add/modify notifier scripts

- Add report filters

# Hibernate Supports Multiple DB Engines

- PostgreSQL, MySQL, Oracle, HSQLDB, others
- Differ in optimizations, tools
- Configured via $INCA_DIST/etc/hibernate.properties
- Needs appropriate JDBC driver

```
# Settings for a local PostgreSQL database.
hibernate.dialect=org.hibernate.dialect.PostgreSQLDialect
hibernate.query.substitutions=yes 'Y', no 'N'
hibernate.connection.driver_class=org.postgresql.Driver
hibernate.connection.url=jdbc:postgresql:test
hibernate.connection.username=test
hibernate.connection.password=
# Settings for a remote MySQL database.
# hibernate.dialect=org.hibernate.dialect.MySQLDialect
# hibernate.connection.driver_class=com.mysql.jdbc.Driver
# hibernate.connection.url=jdbc:mysql://192.168.0.6/test
# hibernate.connection.username=test
# hibernate.connection.password=
```
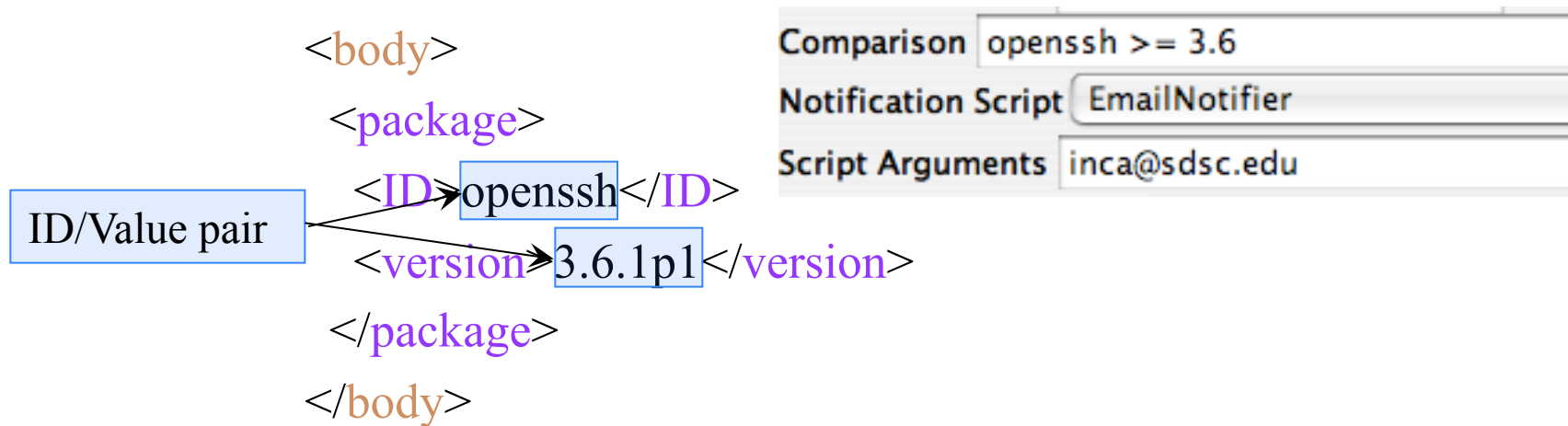
# Notifiers and Report Filters
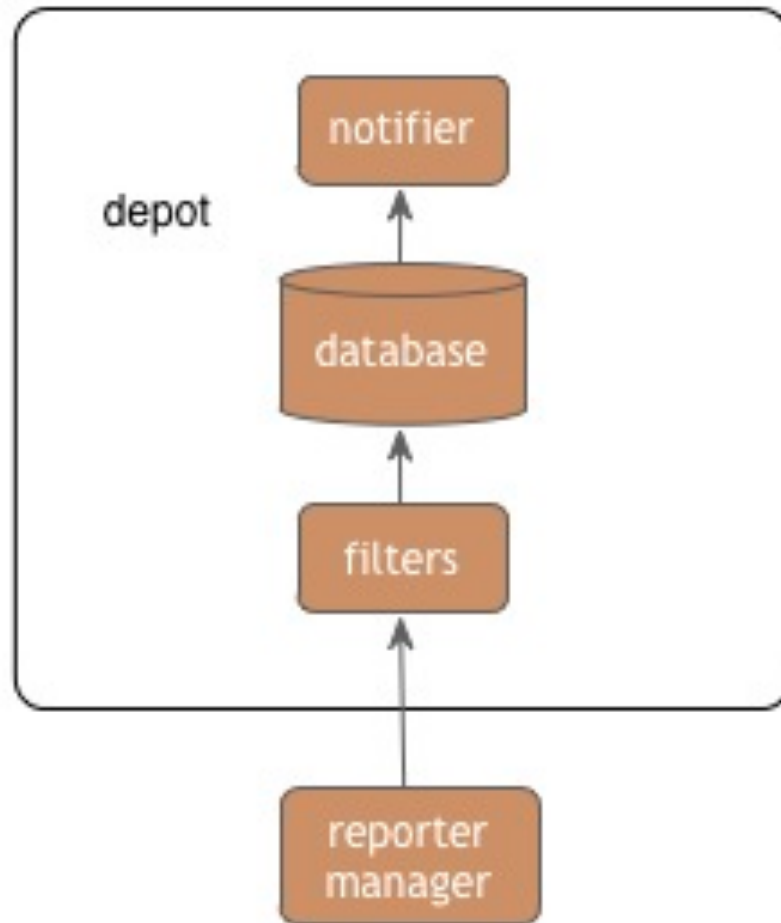
# Notifiers Report Comparison Success/Failure

```
<body>
    <package>
        <ID>openssh</ID>
        <version>3.6.1p1</version>
    </package>
</body>
```

ID/Value pair

Comparison | openssh >= 3.6
Notification Script | EmailNotifier
Script Arguments | inca@sdsc.edu

- Notifier scripts found in installation $INCA_DIST/sbin/

- EmailNotifier, LogNotifier provided; custom notifiers supported

- Invoked on status change (new/changed failure, new success)

**SDSC**  **SAN DIEGO SUPERCOMPUTER CENTER**

inca

# LogNotifier

```perl
use Cwd qw(abs_path getcwd);
my $name = $ENV{incanickname} || $ENV{incareporter};
my $log =
  "Test '$ENV{incacomparison}' on output of series $name on " .
  "$ENV{incaresource} now produces '$ENV{incacomparisonResult}'";
my @timeBits = localtime;
my $timestamp =
  sprintf('%02d:%02d:%02d ', $timeBits[2], $timeBits[1], $timeBits[0]);

my $path = abs_path($ARGV[0]);
open(LOG, ">>$path") || die "Unable to open log $path";
print LOG "$timestamp" if defined($timestamp);
print LOG "$log\n";
close(LOG);
```

# Report Filter Clarifies Reports

- Cooperates with Consumer for more accurate display

- Java class in Depot CLASSPATH extends edu.sdsc.inca.depot.util.ReportFilter

- set/get methods for context, report, resource, stderr, sysusage

- Invoked by Depot before incoming report is examined or stored

- Registered by setting inca.depot.reportFilter property in $INCA_DIST/etc/common/inca.properties

# Depot Redundancy



SAN DIEGO SUPERCOMPUTER CENTER
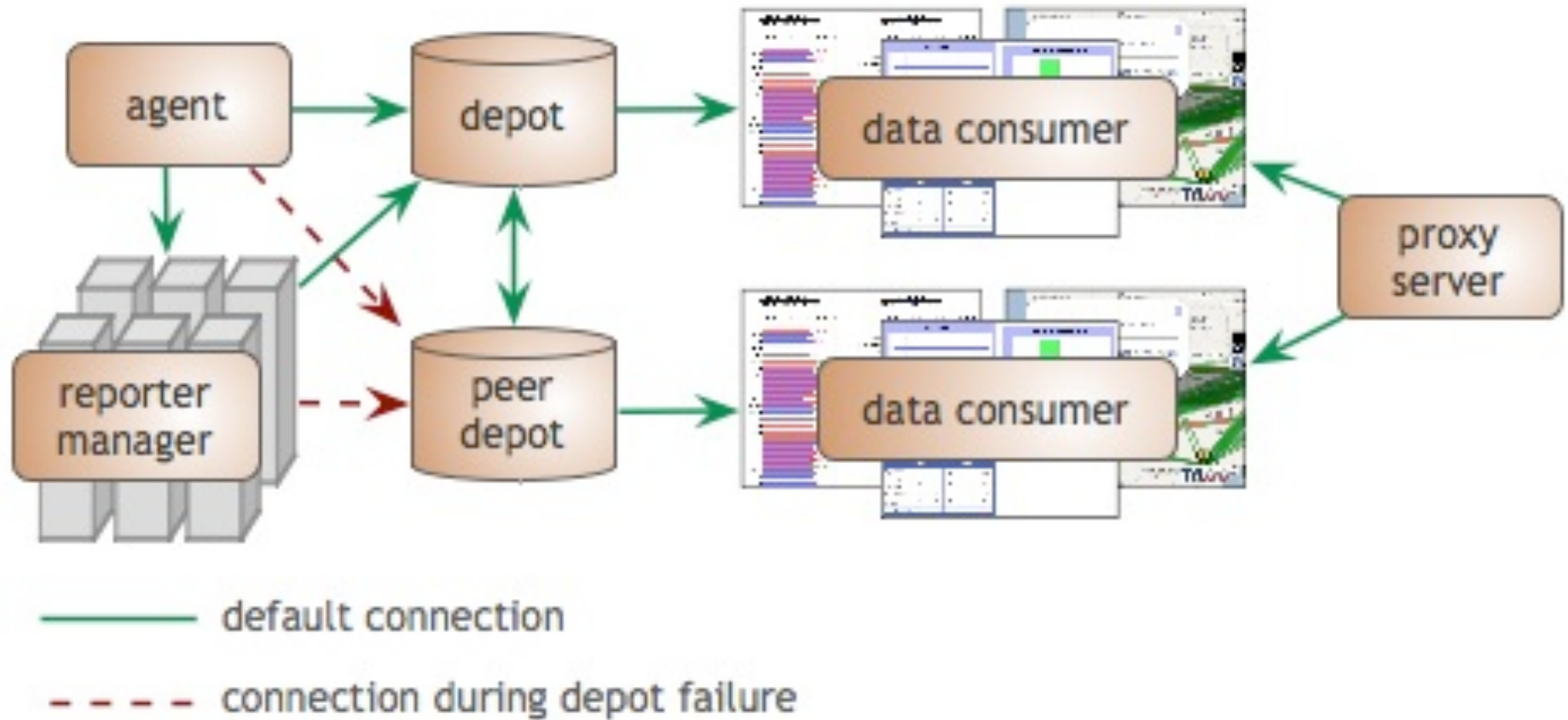
# Depot Redundancy

- Warm backup for the primary depot
- Synchronization with peers occurs at startup
- New configuration property

# URIs of peer depots
inca.depot.peers=incas://some.other.peer:6324 incas://yet.another.peer:6324

# Agenda -- Day 2

| | |
|---|---|
| 9:00 - 9:30 | Inside the Inca Depot |
| 9:30 - 10:10 | Data display (data consumers) |
| 10:20 - 11:00 | Writing data consumers |
| 11:00 - 12:00 | Hands-on: Data display (data consumers) |

**SDSC** SAN DIEGO SUPERCOMPUTER CENTER