Information and Monitoring within LCG

Overview

The LCG information system
- BDII
- Enhancements
- Testing

- Generic Information provider
  - Glue Schema

- Monitoring
  - Grid ICE
  - RGMA

BDII

- Berkley Database Information Index
  - Because MDS is not production quality.
  - Standard openLDAP database.
  - Database populated by a Perl script.
- Recent improvements
  - Parallel population.
  - Improved configuration.
  - Automatic configuration update via web.
  - Can run information providers directly.

BDII Architecture
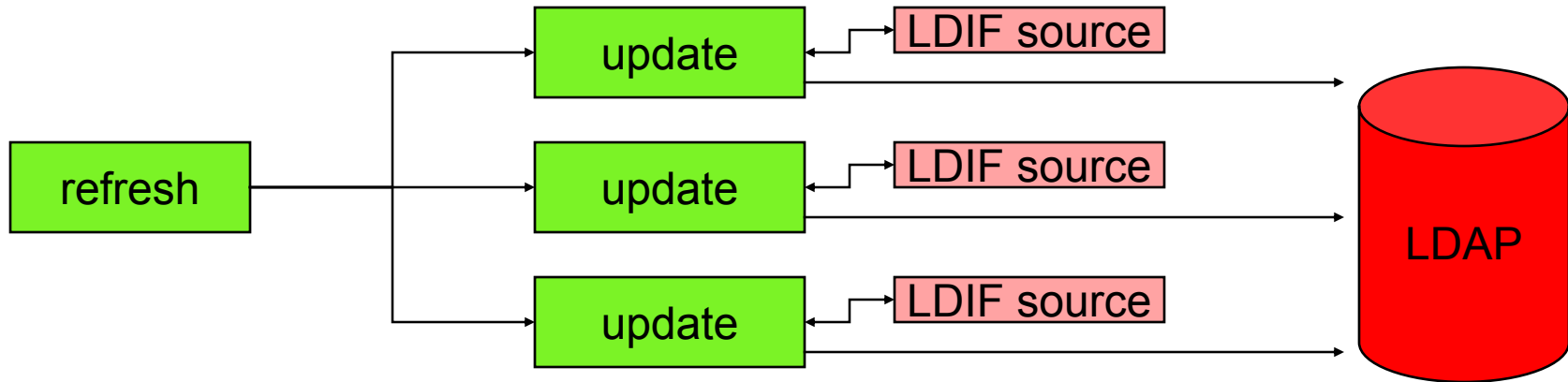
- Refresh script is run as cron job
- Refresh queries run on separate threads
- Threads time-out if they fail to complete
- LDIF sources can be a script or an ldapsearch

Performance Tests

- Three difference entry points tested
  - The top level, one stream.
  - The regional level, three streams.
  - The GIIS level, 25 streams.
  - All streams produced the same 1.8mb of data.
    - Equivalent to the data from 50 sites.
  - Tests re-tried with different query loads.

Streams	No load, add	10 queries, add	No load, mod	10 queries, mod
1	20s	24s	7s	16s
3	29s	50s	7s	39s
25	16s	24s	9s	17s

Stress Test

- **One Stream with a load of 10 queries**
  - Simulated 50 sites with constant load.
  - Ran every 30s for 2 weeks.
  - Over 2 million queries.
  - No database corruption.
  - No re-starts required.

- **Conclusions from the Test**
  - Robust enough for production.
  - Use small data size and many streams.
    - BDII should go directly to site GIIS

A BDII view

- The lcg-bdii-update config file
  - Contains list of site GIISs.
  - Different BDIIs could contain different lists of GIISs.
    - The list will give the BDII a "view" of the grid.
  - Name associated with LDIF URL.
    - "BDII LDIF Region"
    - Used for fault tolerance

- Automatic update
  - Config file automatically updated from a web page.
    - Can be centrally controlled.
    - BDIIs using the same page will have the same view.

Example Configuration

```
Date=02/03/04 19:00


http://grid-deployment.web.cern.ch/grid-deployment/gis/lcg2-bdii-update.conf
```

#CERN, Geneva, Switzerland

CERN-LCG2 ldap://lxn1181.cern.ch:2135/mds-vo-name=cernlcg2/o=grid

#CNAF, Italy

CNAF-LCG2 ldap://wn-04-07-02-a.cr.cnaf.infn.it:2135/mds-vo-name=cnaflcg2/o=grid

#RAL, UK

RAL-LCG2 ldap://lcgce02.gridpp.rl.ac.uk:2135/mds-vo-name=rallcg2/o=grid

#NIKHEF, Netherlands

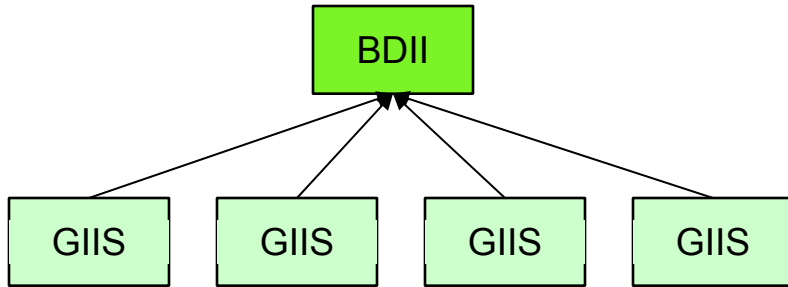NIKHEF ldap://tbn18.nikhef.nl:2135/mds-vo-name=nikheflcgprod/o=grid

#FZK, Germany

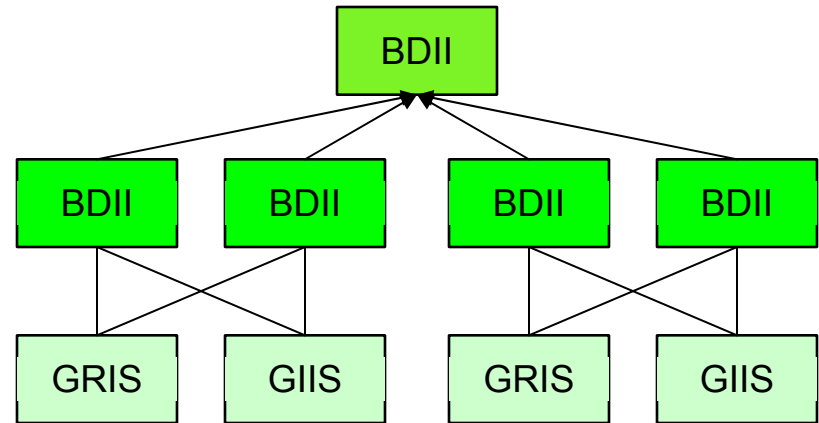FZK-LCG2 ldap://gridkap01.fzk.de:2135/mds-vo-name=fzklcg2/o=grid

#Taiwan

Taiwan-LCG2 ldap://lcg00125.grid.sinica.edu.tw:2135/mds-vo-name=taipeilcg2/o=grid
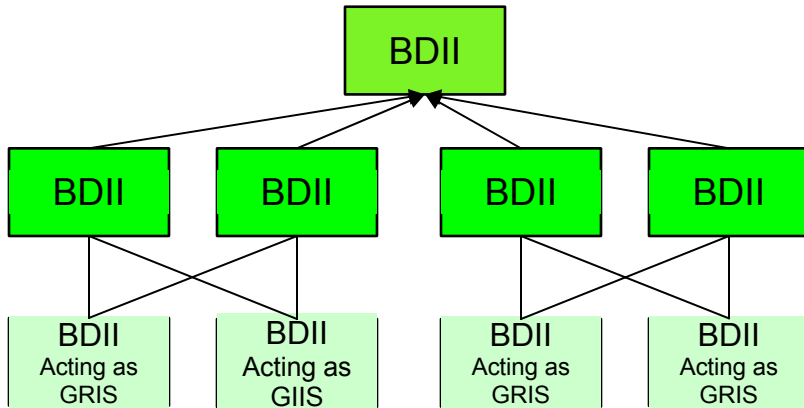
Topologies

BDII

GIIS   **GIIS**   **GIIS**   **GIIS**

Flat Topology
(scales up to at least 50 sites)

BDII

BDII   **BDII**   **BDII**   **BDII**

GRIS   **GIIS**   **GRIS**   **GIIS**

With regional fault tolerance
(increases scalability)

BDII

BDII   **BDII**   **BDII**   **BDII**

BDII Acting as GRIS   **BDII** Acting as GIIS   **BDII** Acting as GRIS   **BDII** Acting as GRIS

BDIIs can replace GIISs and GRISs
(no more dependency on globus MDS,
but interoperates)

Virtual Partitioning

Will appear as a grid made of sites in set A

RB
BDII

RB
BDII

RB
BDII

Web Server (or local file)

http://Set-of-sites-A

Web Server (or local file)

http://Set-of-sites-B

Only sites from B

RB
BDII

RB
BDII

All sites from A&B

RB
BDII

Web Server (or local file)

http://Set-of-sites-A&B
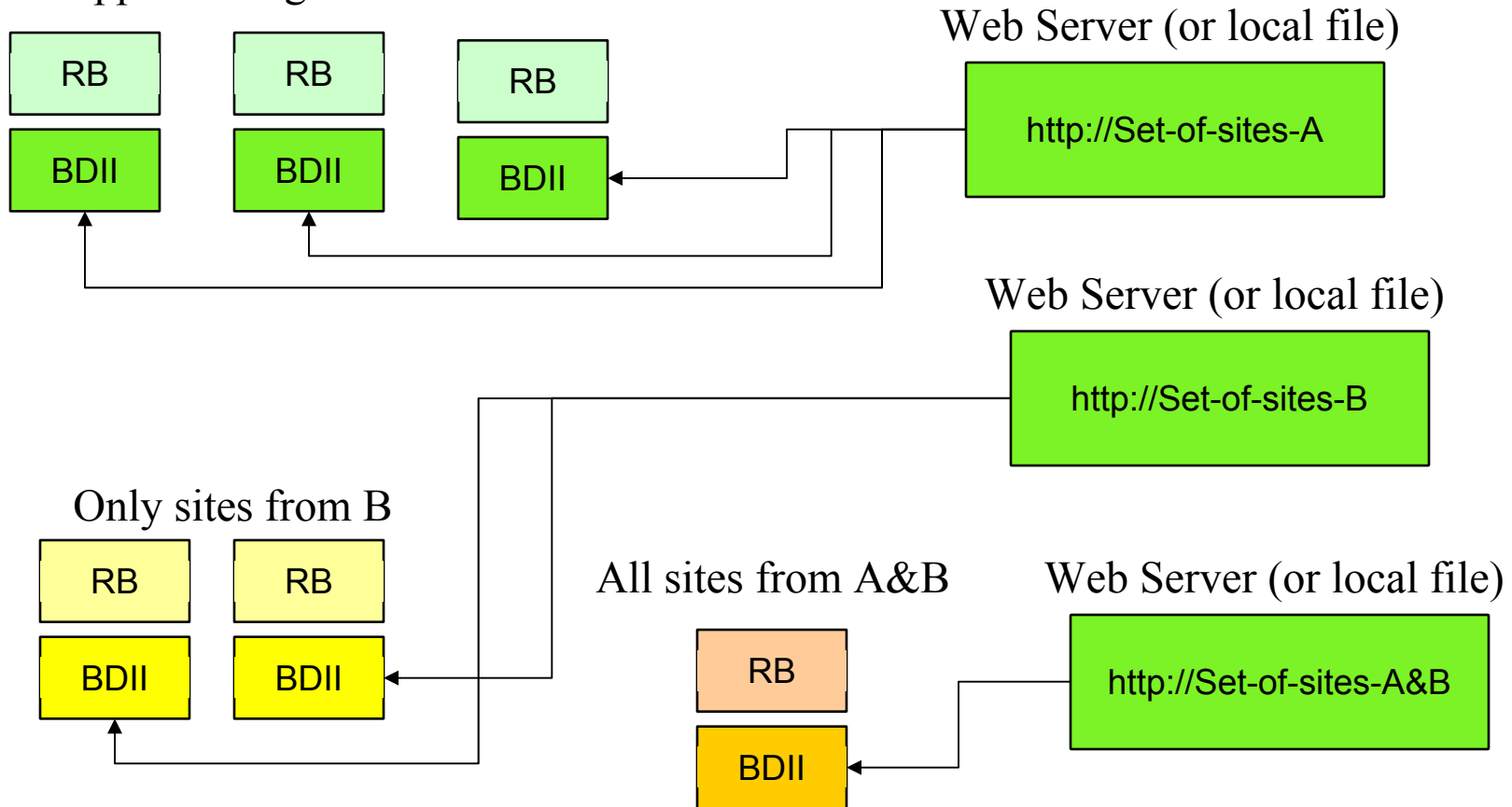
Generic Information provider

- **A basic Information provider**
  - Prints a static ldif file.
  - Glue Schema defines attributes.
  - Only need to create static ldif file.
- **The problem is with dynamic information**
  - Only a few attributes.
  - Use plug-in script to obtain the information.
  - Over-write the values when printing.
- **Common components for all providers**
  - Require a template file for each type.
    - Derived from the schema.
  - A plug-in script for each different system.
    - Eg. batch system, storage system
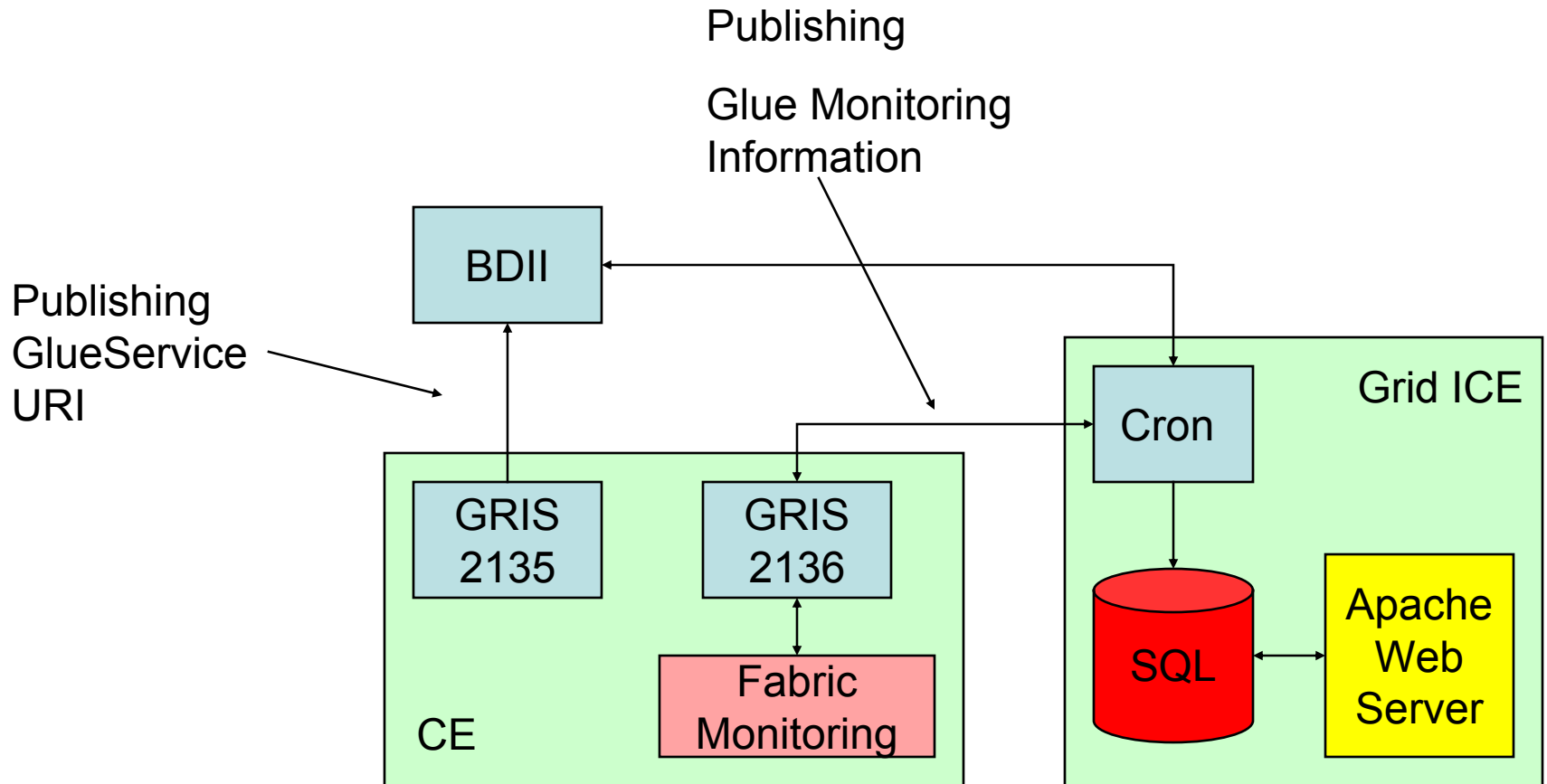 - Uses same configuration framework for all.

Glue Schema

- Having a common schema is good
- The current schema has many problems
  - Weakly defined.
  - Semantics not always clear
  - Affects interoperation between US & EU Grids
- "Misuse" of the schema
  - Use cases not defines
- How do we solve this?

Information and Monitoring

- **Information systems**
  - Shows what is there.
  - Mainly static information.
  - Well defined schema.
- **Monitoring systems**
  - Shows what is not there.
    - Time-stamped data.
    - Some concept of history.
  - Mainly dynamic information.
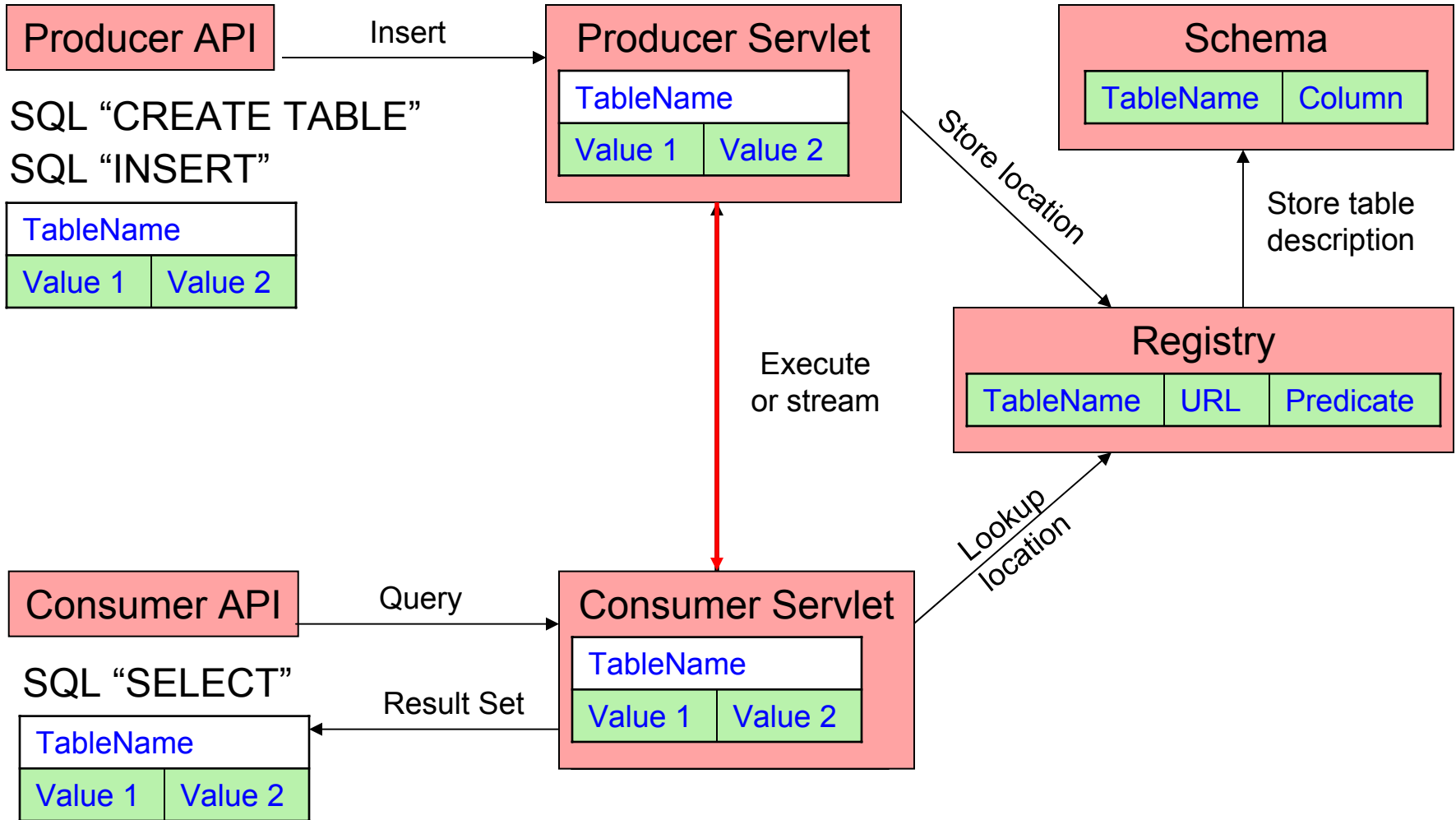 - Dynamic schema required.
- **An overlapped grey area between the two**

Monitoring Example, Grid ICE

Publishing

Glue Monitoring
Information

Publishing
GlueService
URI

BDII

Grid ICE

Cron

GRIS
2135

GRIS
2136

SQL

Apache
Web
Server

Fabric
Monitoring

CE

LCG Monitoring

- **Grid ICE**
  - Web interface to information in an SQL database.
  - Uses MDS based system.
    - MDS is for information and not monitoring.
      - Keep information data size small.
    - Static schema.
      - New information can't be created by users.
  - LDAP to SQL?!
    - Why not use use R-GMA

- **Relational Grid Monitoring Architecture.**
  - Dynamic schema.
  - Well defined API.

R-GMA

An example R-GMA system
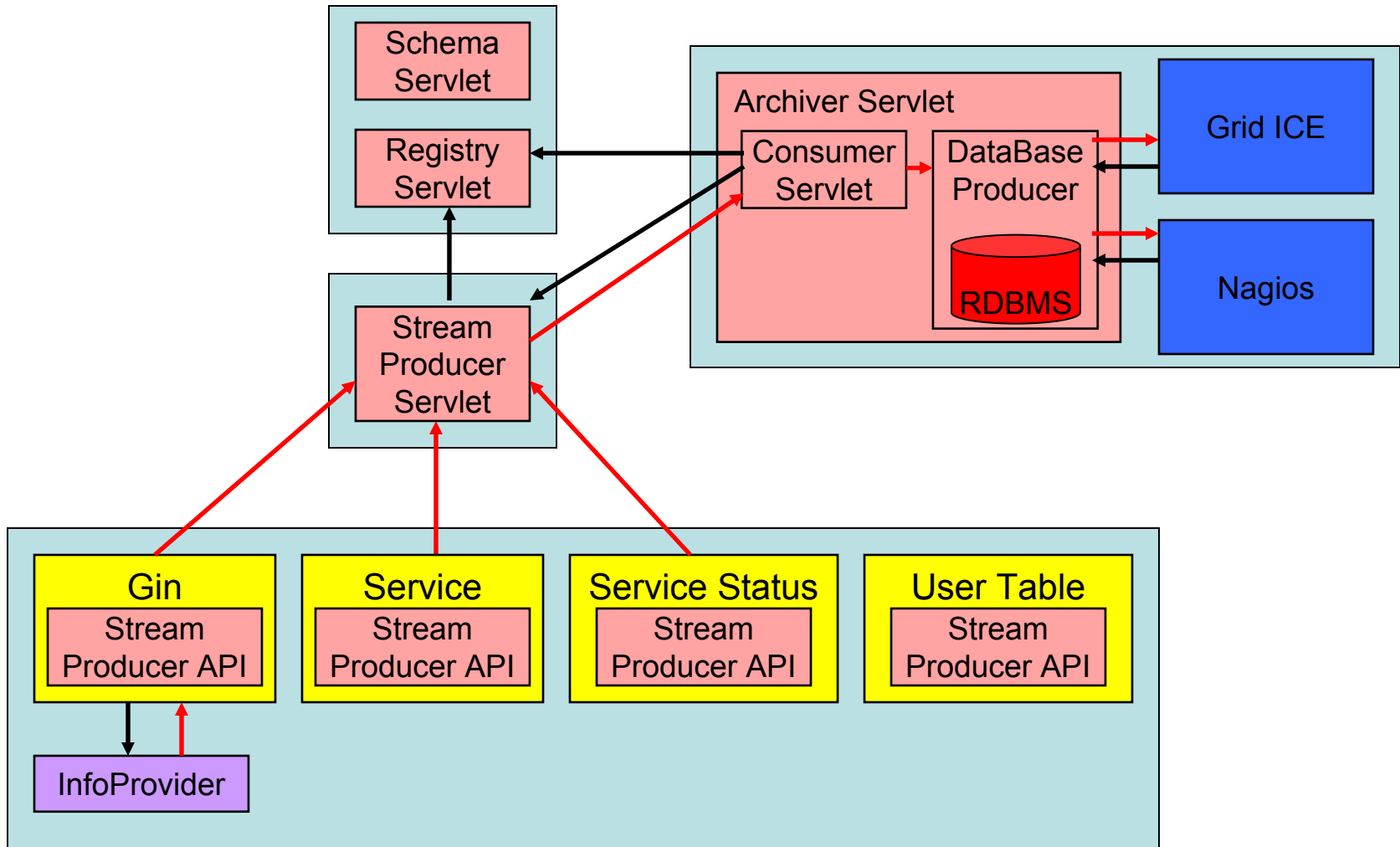
Summary

- **LCG is successfully using the BDII**
  - Can also use as the site GIIS and GRIS.

- **Use Generic information provider**
  - Can publish any information.
    - Just requires a template and dynamic plug-in.

- **Glue Schema need improvements**

- **Grid ICE**
  - Currently using MDS, would benefit from R-GMA

- **R-GMA**
  - Should be used for the monitoring infrastructure.
  - Can be used by the experiments for application level monitoring.