



Enabling Grids for E-science

Introduction to R-GMA: Relational Grid Monitoring Architecture

www.eu-egee.org



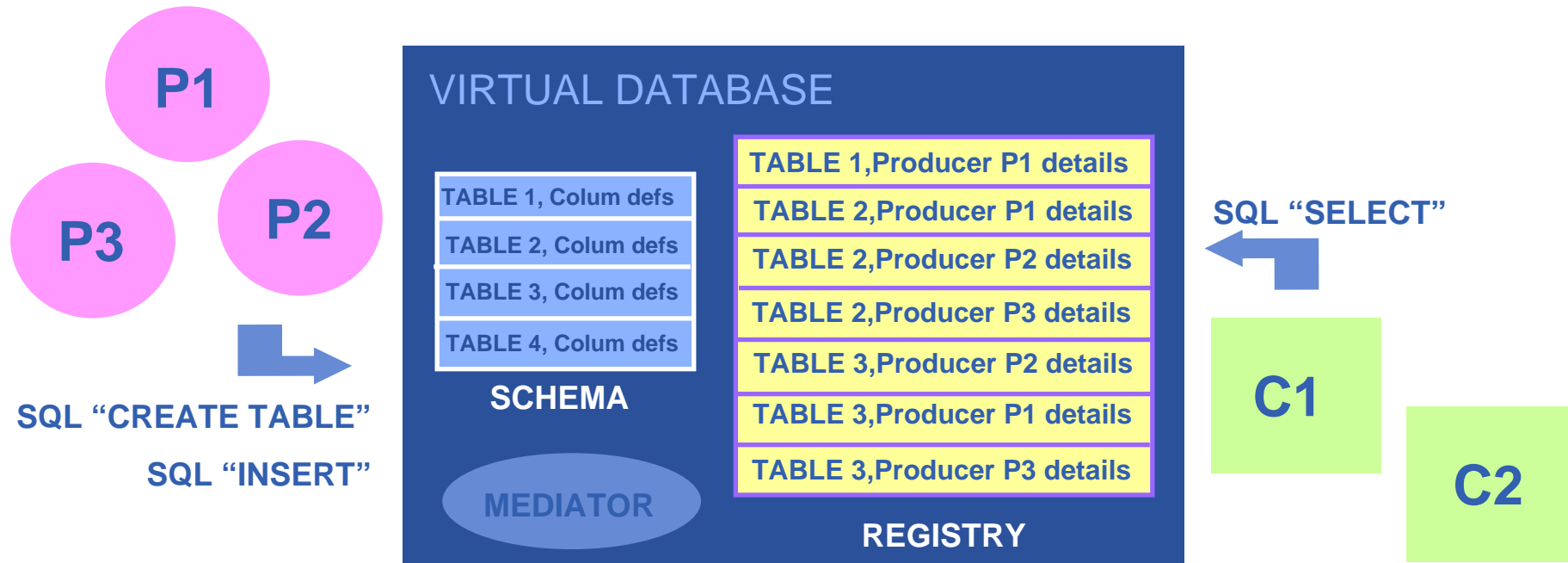
- **Uniform method to access and publish both information and monitoring data.**
- **From a user's perspective, an R-GMA installation currently appears similar to a single relational database.**
- **GMA (Grid Monitoring Architecture) was developed by the GGF**
- **R-GMA (Relational GMA) was created:**
 - To simplify use of GMA (servers “know” about registries, not the client software)
 - To give a relational view

- **Relational Grid Monitoring Architecture (R-GMA)**
 - Developed as part of the EuropeanDataGrid Project (EDG)
 - Now as part of the EGEE project.
 - Evolution from the Grid Monitoring Architecture (GMA)

- **Uses a relational data model.**
 - Data are viewed as a table.
 - Data structure defined by the columns.
 - Each entry is a row (tuple).
 - Queried using Structured Query Language (SQL).

name	ID	birth	Group
Tom	4	1977-08-20	HR
Albert	5	1950-02-12	HR

`SELECT * FROM people WHERE group='HR'`



There is no central repository!!! There is only a “*Virtual Database*”.

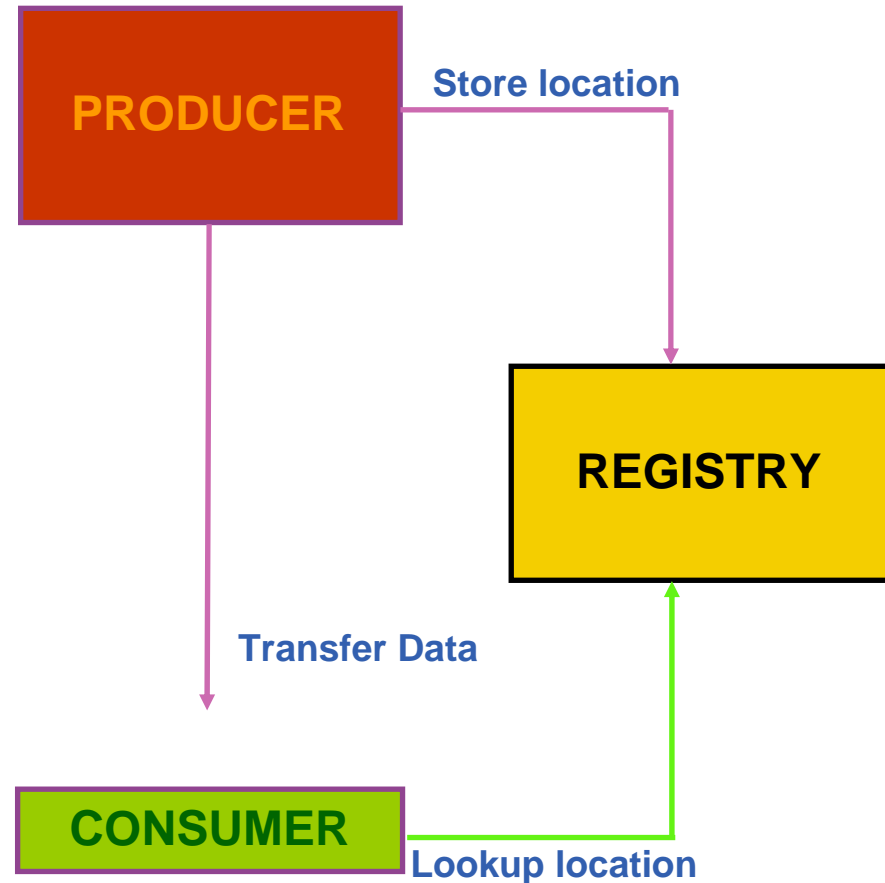
Schema is a list of table definitions: additional tables/schema can be defined by applications

Registry is a list of data producers with all its details.

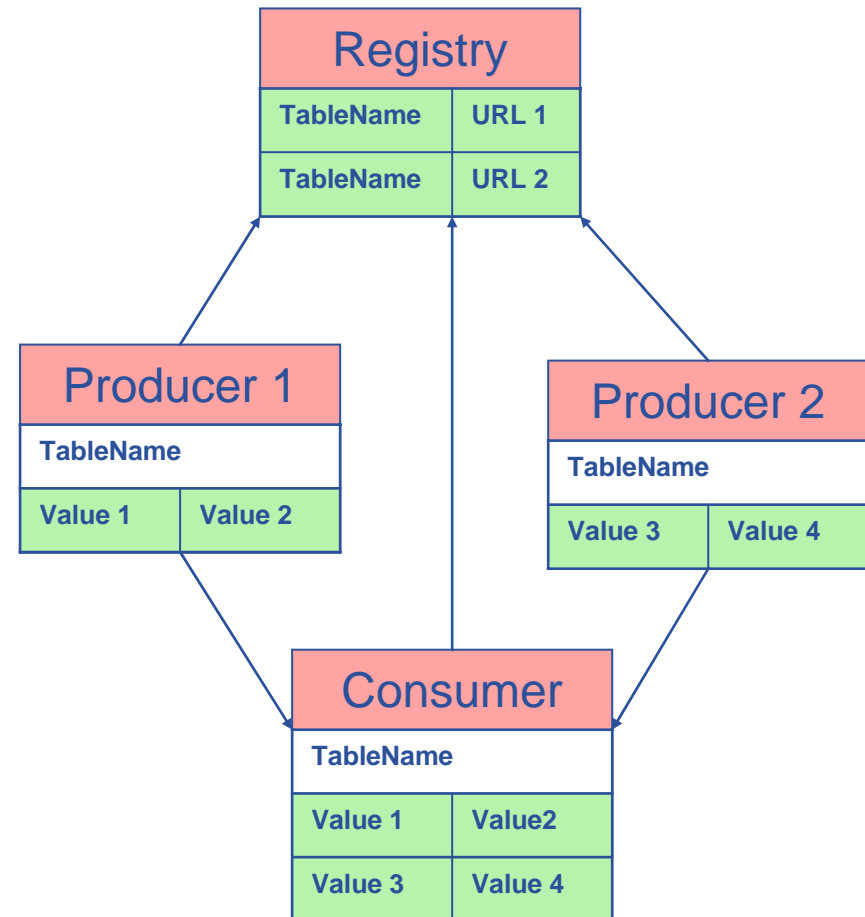
Producers publish data.

Consumers read data published.

- The Producer stores its location (URL) in the Registry.
- The Consumer looks up producer URLs in the Registry.
- The Consumer contacts the Producer to get all the data or the Consumer can listen to the Producer for new data.

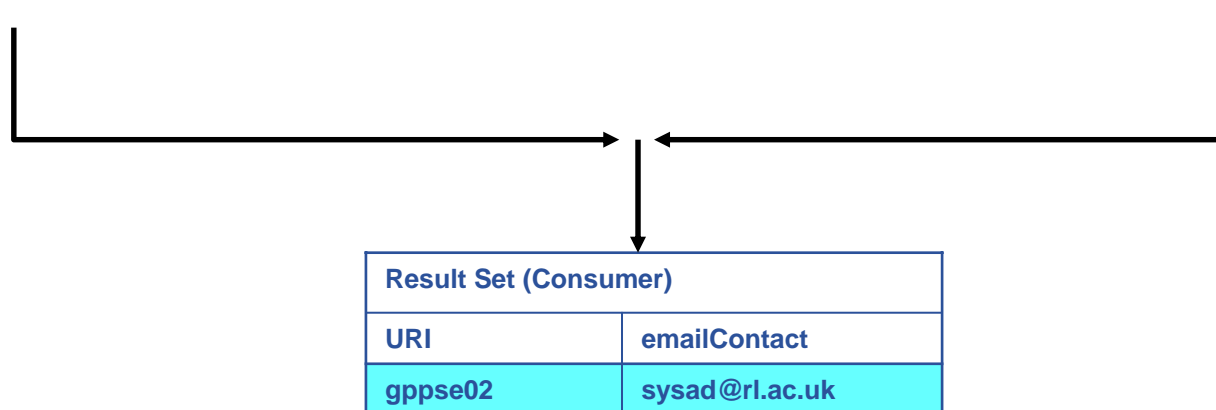


- The Consumer interrogates the Registry to identify all Producers that could satisfy the query.
- Consumer connects to the Producers.
- Producers send the tuples to the Consumer.
- The Consumer will merge these tuples to form one result set.

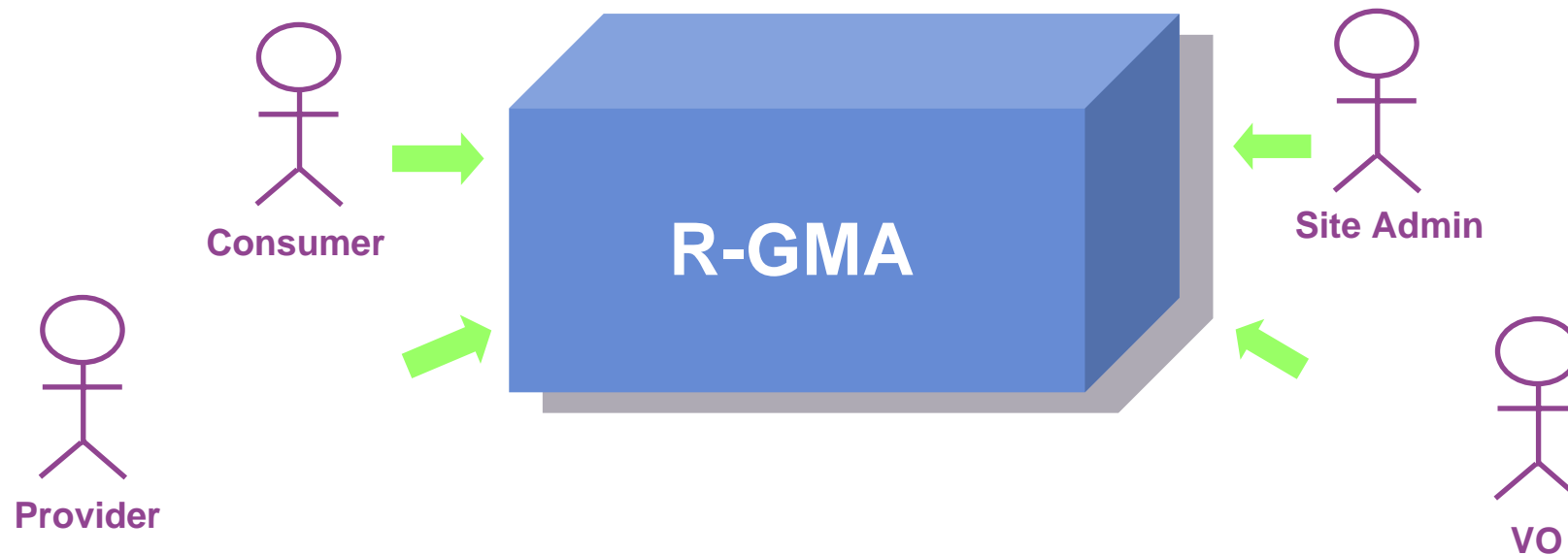


Service				
URI	VO	type	emailContact	site
gppse01	alice	SE	sysad@rl.ac.uk	RAL
gppse01	atlas	SE	sysad@rl.ac.uk	RAL
gppse02	cms	SE	sysad@rl.ac.uk	RAL
lxshare0404	alice	SE	sysad@cern.ch	CERN
lxshare0404	atlas	SE	sysad@cern.ch	CERN

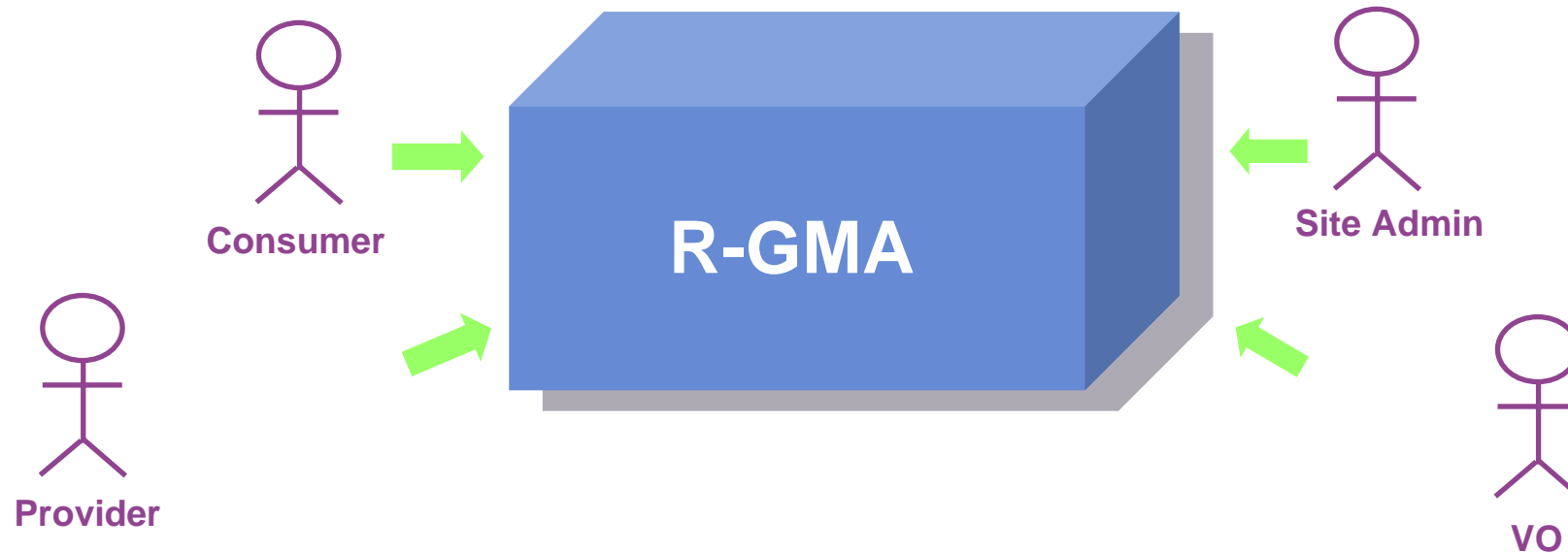
ServiceStatus				
URI	VO	type	up	status
gppse01	alice	SE	y	SE is running
gppse01	atlas	SE	y	SE is running
gppse02	cms	SE	n	SE ERROR 101
lxshare0404	alice	SE	y	SE is running
lxshare0404	atlas	SE	y	SE is running



```
SELECT Service.URI Service.emailContact FROM Service S, ServiceStatus SS
WHERE (S.URI= SS.URI and SS.up='n')
```



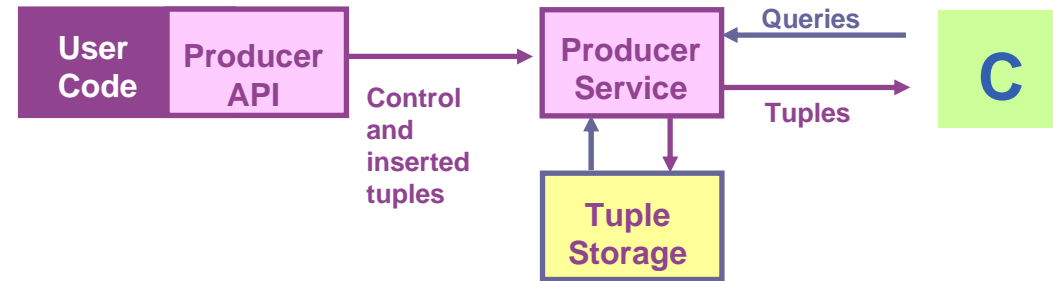
- **Consumer users:** who request information.
- **Producer users:** who provide information.
- **Site administrators:** who run R-GMA services.
- **Virtual Organizations:** who “own” the schema and registry.



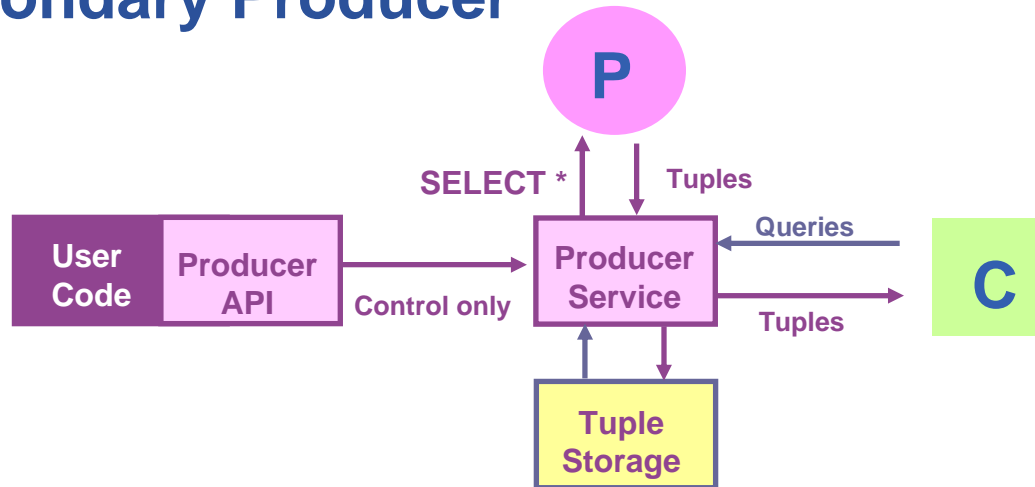
- **Mutual Authentication:** guaranteeing who is at each end of an exchange of messages.
- **Encryption:** using an encrypted transport protocol (HTTPS).
- **Authorization:** implicit or explicit.

- **Producer and Consumer Services are typically on a one per site basis**
- **Centralized Registry and Schema.**
- **The Registry and Schema may be replicated, to avoid a single point of failure**
 - ... when you use RGMA CLI you will see which are being used

- Primary Producer

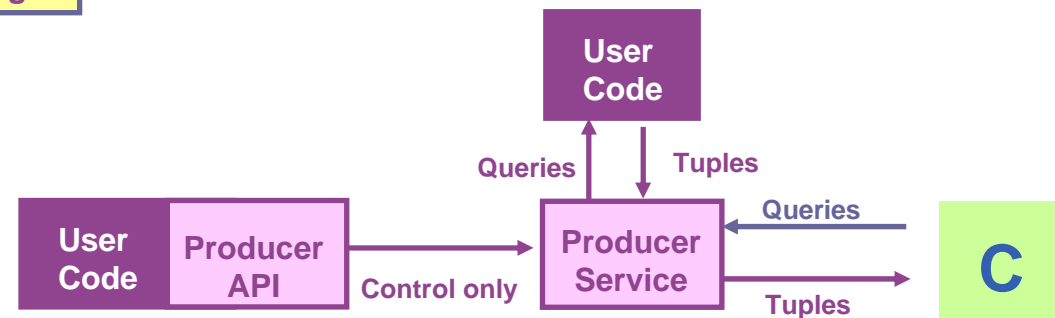


- Secondary Producer



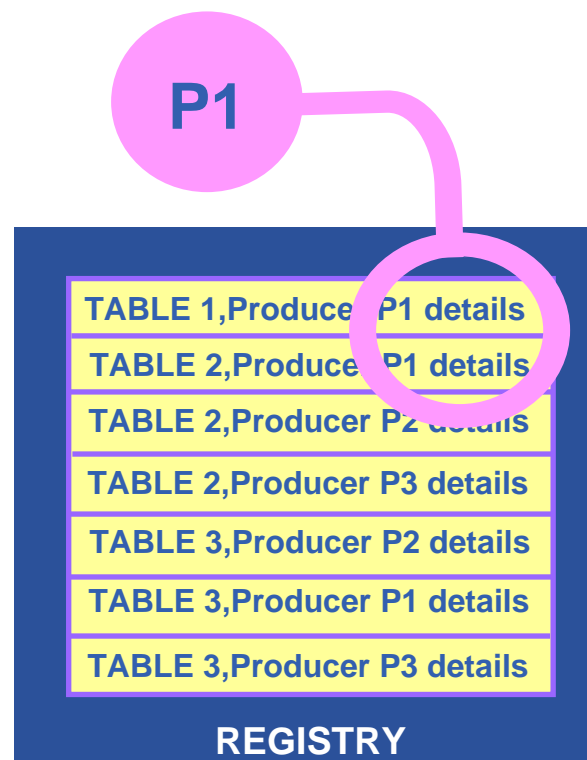
- On-Demand Producer

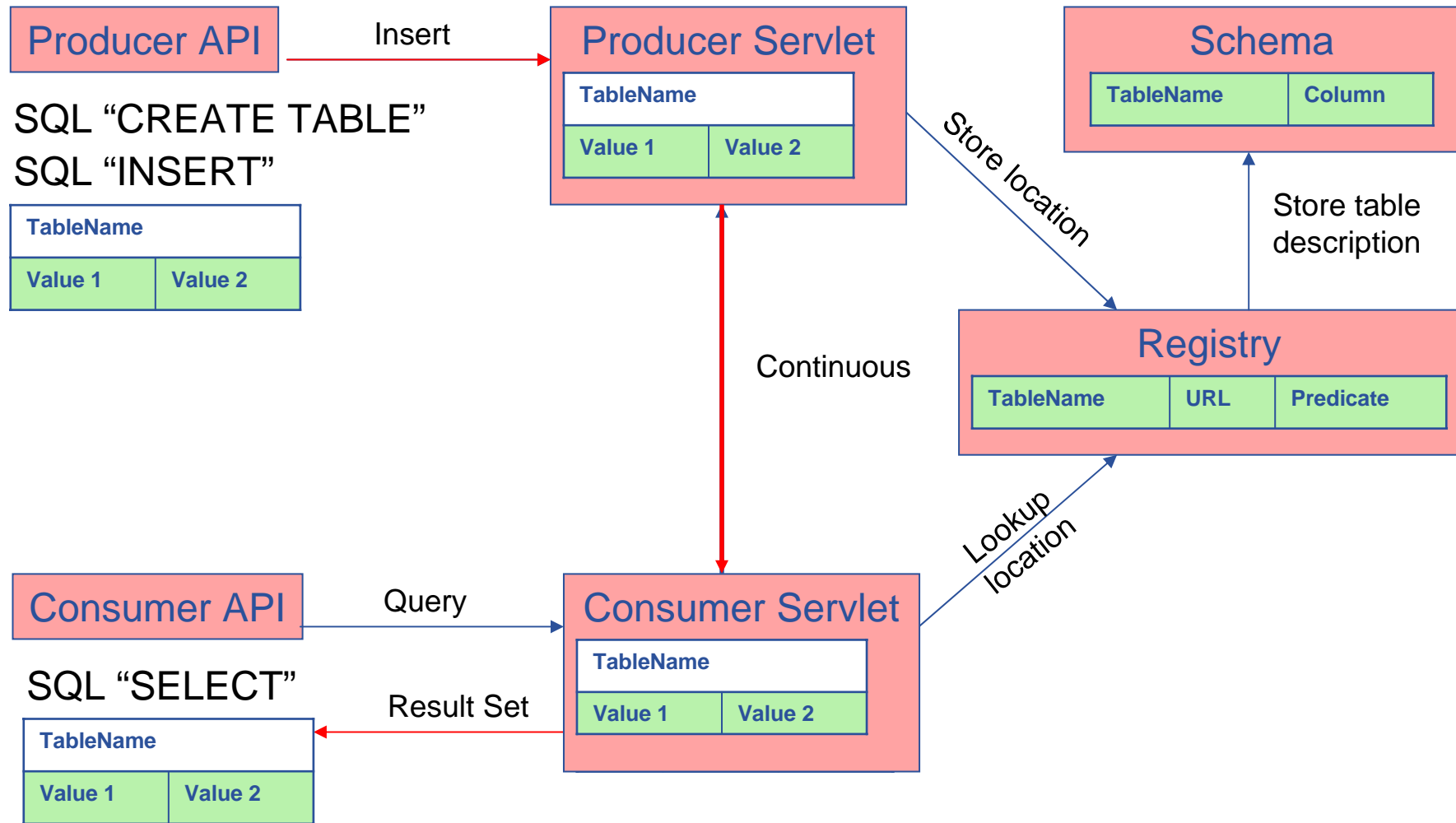
- No internal storage
- Queries passed to user code



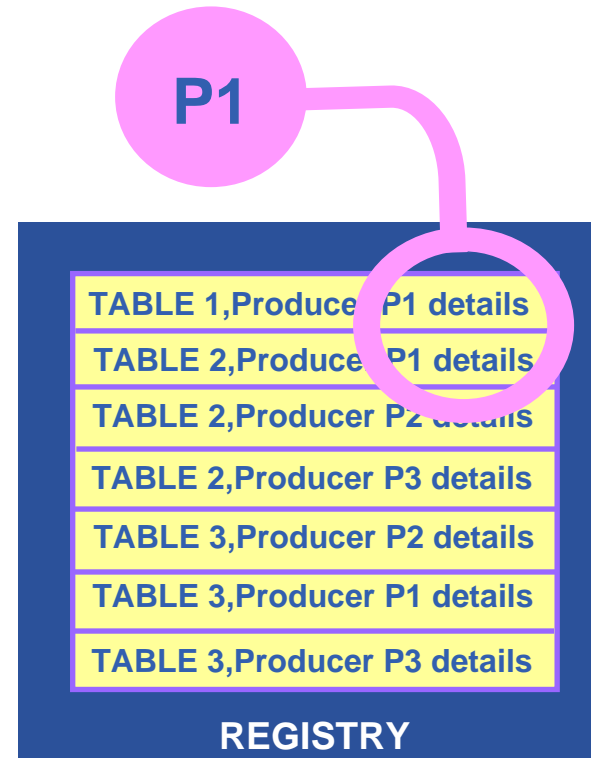
Continuous

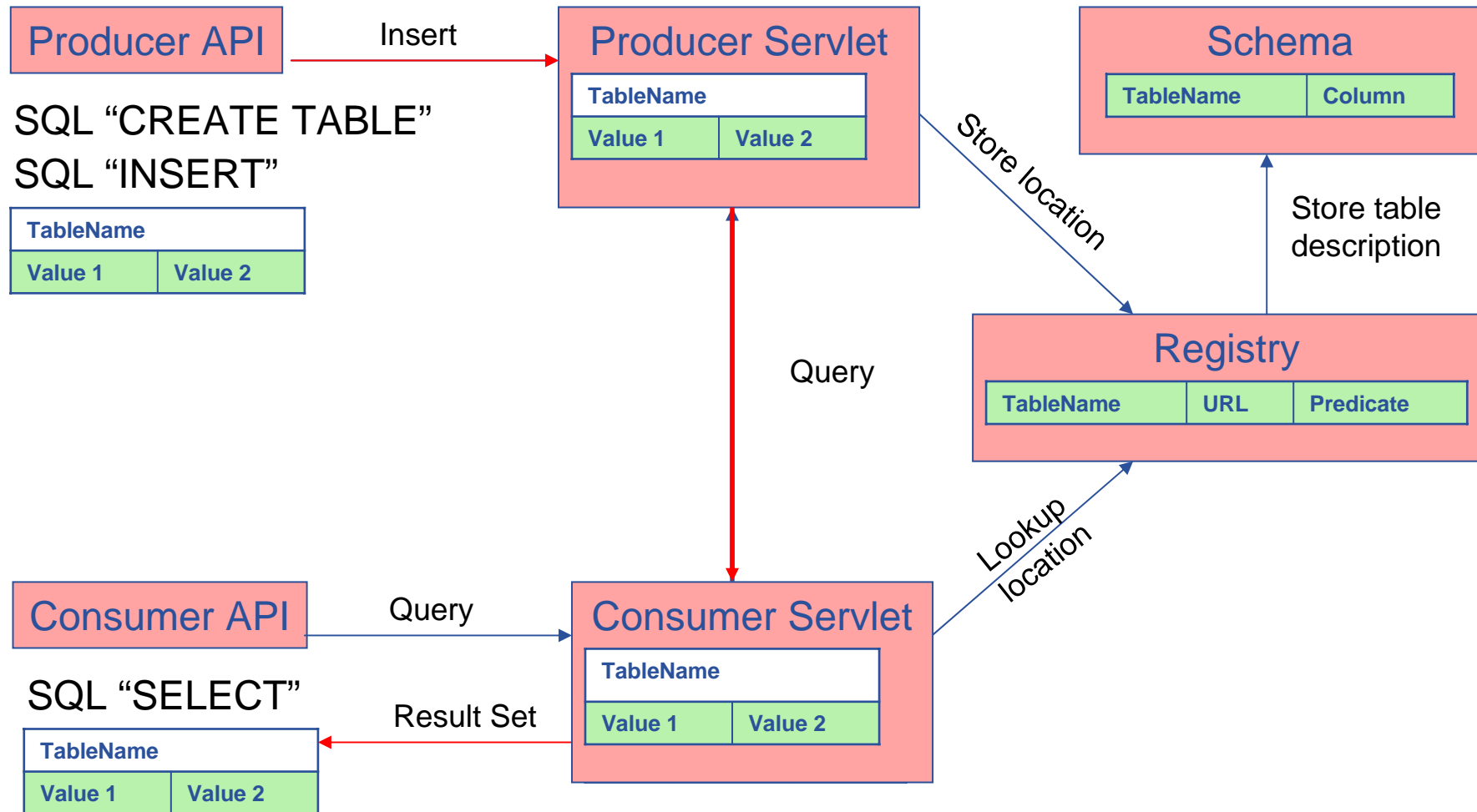
- Latest
- History
- Static



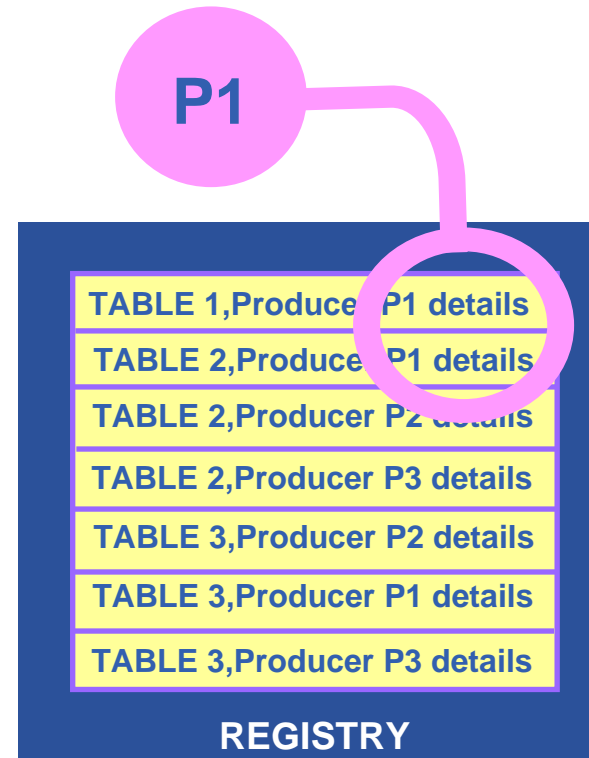
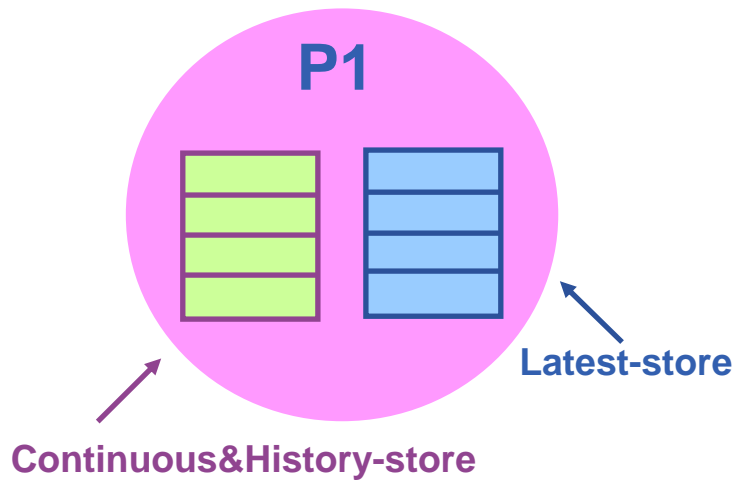


- Continuous
- Latest
- History
- Static





- Continuous
- Latest
- History
- Static



Latest Retention Period
History Retention Period

- **APIs exist in Java, C, C++, Python.**
 - For clients (servlets contacted behind the scenes)
- **They include methods for...**
 - Creating consumers
 - Creating primary and secondary producers
 - Setting type of queries, type of produces, retention periods, time outs...
 - Retrieving tuples, inserting data
 - ...
- **You can create your own Producer or Consumer.**

- **1st practical**
 - We will use a client that gives command-line interfaces to both consumers and producers
 - We will explore the tables on the R-GMA service provided on GILDA
 - Use a table that is set up for training purposes to produce and consume data
- **2nd practical**
 - Use API to monitor an application

Now please follow the “more information” link

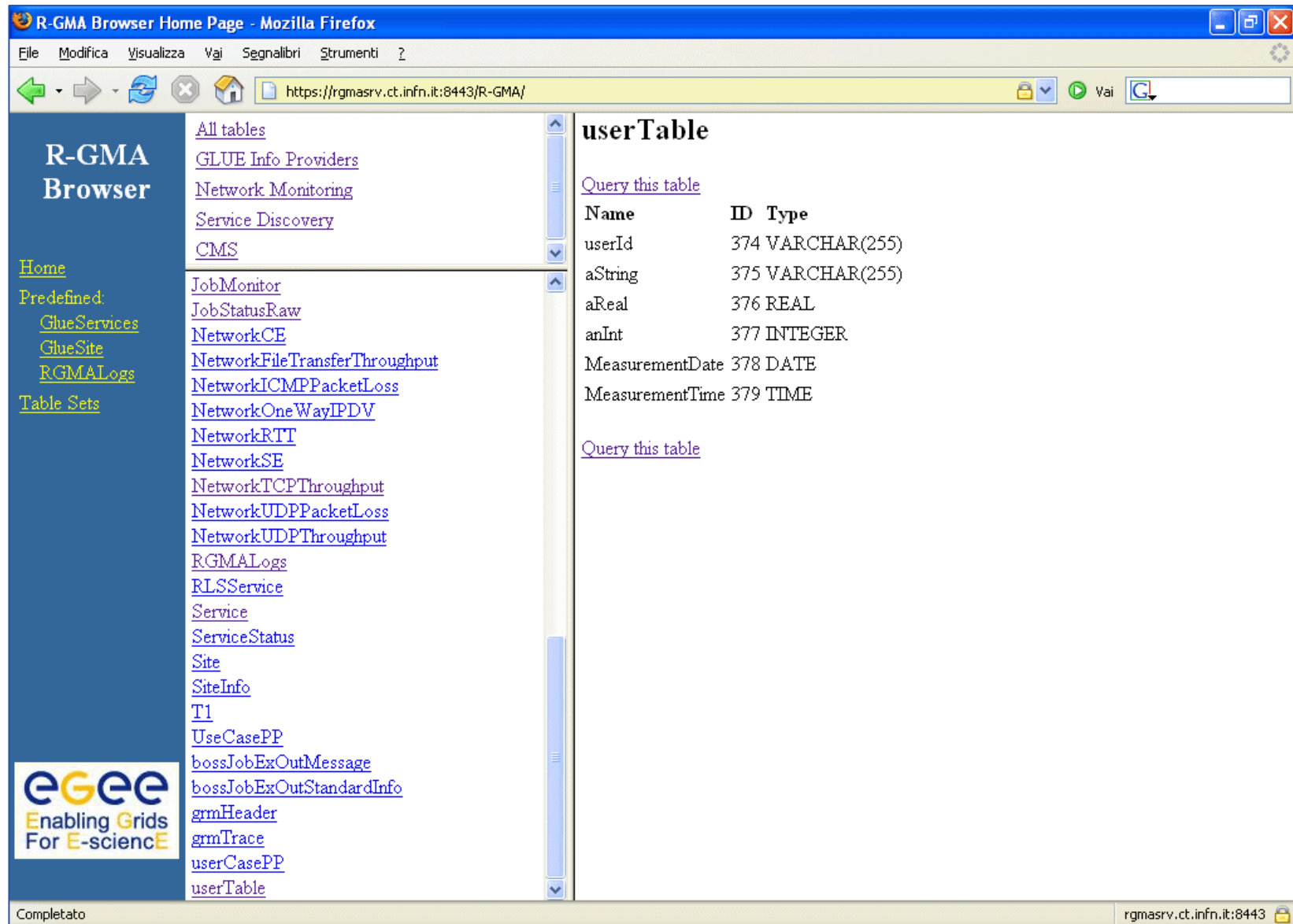
R-GMA : further information

- The command line tool can be used in batch mode in three ways:
 - **rgma -c <command>**
Executes <command> and exits.
The **-c** option may be specified more than once.
 - **rgma -f <file>**
Executes commands in <file> sequentially then exits.
Each line should contain one command.
 - Embedded in a shell script

R-GMA Browser

requires certificate in browser

www.eu-egee.org



R-GMA Browser Home Page - Mozilla Firefox

File Modifica Visualizza Vai Segnalibri Strumenti ?

https://rgmasrv.ct.infn.it:8443/R-GMA/

R-GMA Browser

Home

Predefined:

- [GlueServices](#)
- [GlueSite](#)
- [RGMALogs](#)

Table Sets

- [All tables](#)
- [GLUE Info Providers](#)
- [Network Monitoring](#)
- [Service Discovery](#)
- [CMS](#)
- [JobMonitor](#)
- [JobStatusRaw](#)
- [NetworkCE](#)
- [NetworkFileTransferThroughput](#)
- [NetworkICMPPacketLoss](#)
- [NetworkOneWayIPDV](#)
- [NetworkRTT](#)
- [NetworkSE](#)
- [NetworkTCPThroughput](#)
- [NetworkUDPPacketLoss](#)
- [NetworkUDPThroughput](#)
- [RGMALogs](#)
- [RLSService](#)
- [Service](#)
- [ServiceStatus](#)
- [Site](#)
- [SiteInfo](#)
- [T1](#)
- [UseCasePP](#)
- [bossJobExOutMessage](#)
- [bossJobExOutStandardInfo](#)
- [gmHeader](#)
- [gmTrace](#)
- [userCasePP](#)
- [userTable](#)

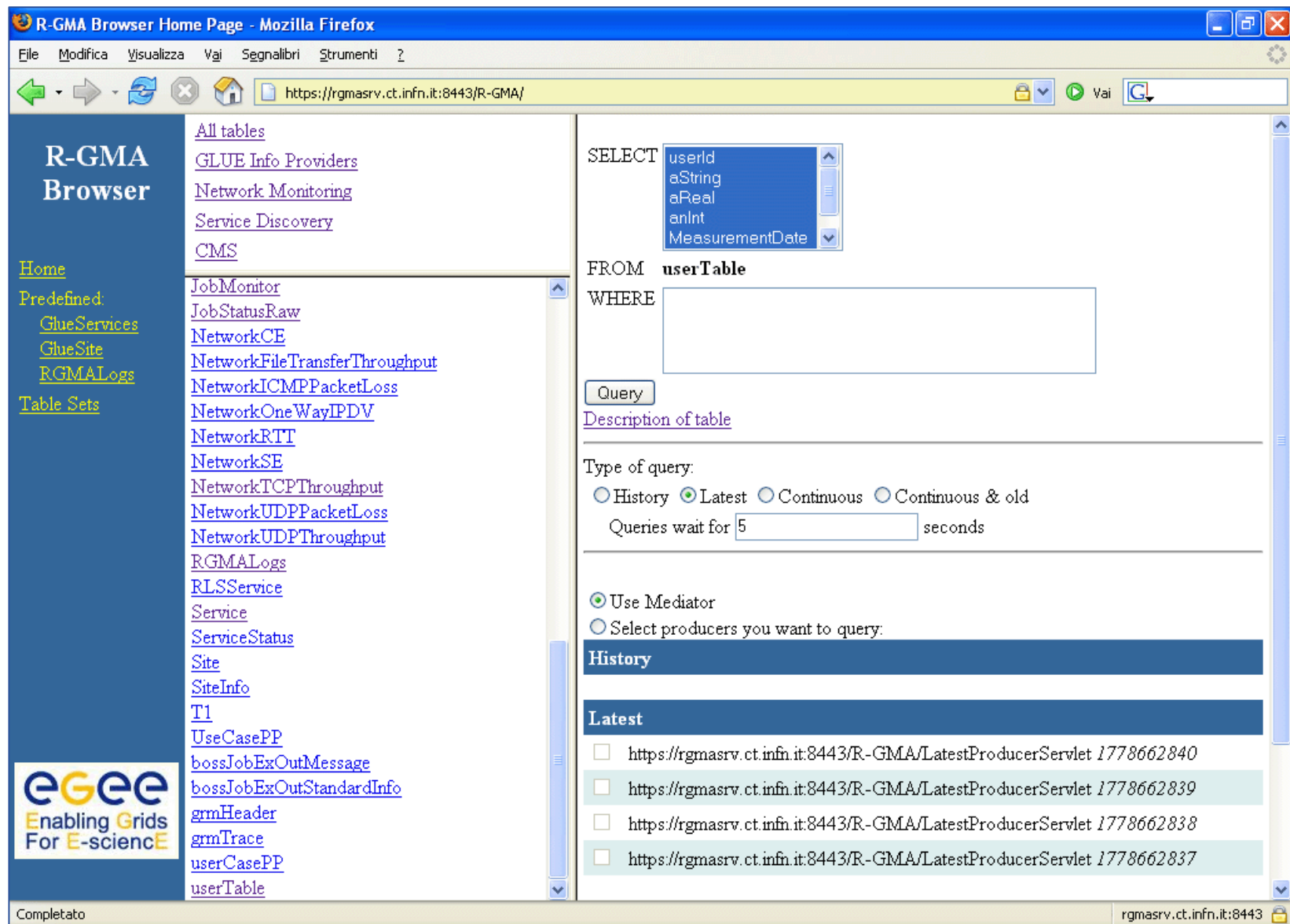
userTable

[Query this table](#)

Name	ID	Type
userId	374	VARCHAR(255)
aString	375	VARCHAR(255)
aReal	376	REAL
anInt	377	INTEGER
MeasurementDate	378	DATE
MeasurementTime	379	TIME

[Query this table](#)

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NetworkTCPThroughput

NetworkUDPPacketLoss

NetworkUDPThroughput

RGMALogs

RLSService

Service

ServiceStatus

Site

SiteInfo

T1

UseCasePP

bossJobExOutMessage

bossJobExOutStandardInfo

grmHeader

grmTrace

userCasePP

userTable

SELECT

userId

aString

aReal

anInt

MeasurementDate

FROM userTable

WHERE

Query

Description of table

Type of query:

History Latest Continuous Continuous & old

Queries wait for 5 seconds

Use Mediator

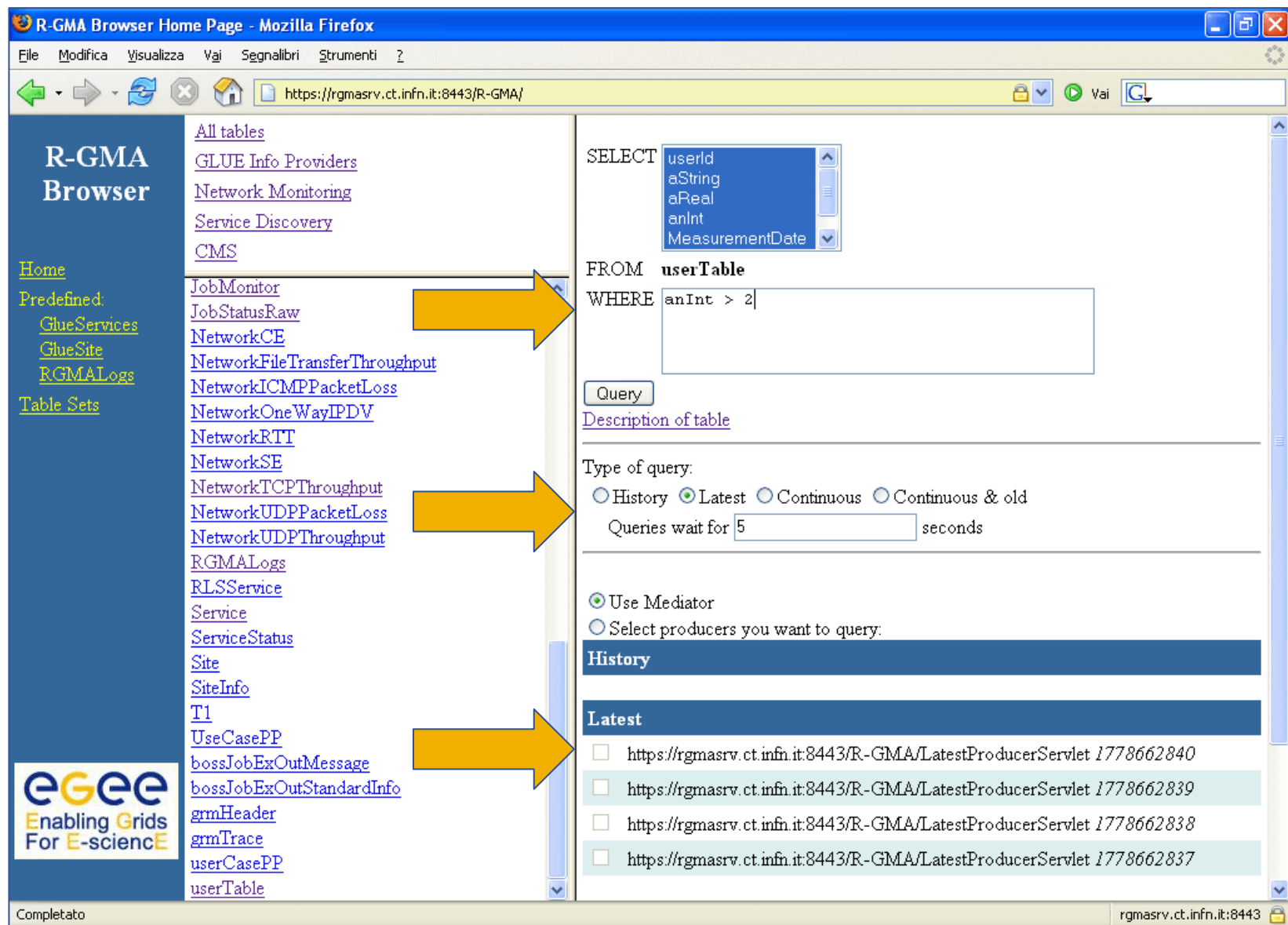
Select producers you want to query:

History

Latest

- https://rgmasrv.ct.infn.it:8443/R-GMA/LatestProducerServlet 1778662840
- https://rgmasrv.ct.infn.it:8443/R-GMA/LatestProducerServlet 1778662839
- https://rgmasrv.ct.infn.it:8443/R-GMA/LatestProducerServlet 1778662838
- https://rgmasrv.ct.infn.it:8443/R-GMA/LatestProducerServlet 1778662837

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- SiteInfo
- T1
- UseCasePP
- bossJobExOutMessage
- bossJobExOutStandardInfo
- gsmHeader
- gsmTrace
- userCasePP
- userTable

SELECT

userId
aString
aReal
anInt
MeasurementDate

FROM userTable

WHERE anInt > 2

Query

Description of table

Type of query:

History Latest Continuous Continuous & old

Queries wait for 5 seconds

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- https://rgmasrv.ct.infn.it:8443/R-GMA/LatestProducerServlet 1778662839
- https://rgmasrv.ct.infn.it:8443/R-GMA/LatestProducerServlet 1778662838
- https://rgmasrv.ct.infn.it:8443/R-GMA/LatestProducerServlet 1778662837

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R-GMA Browser

[All tables](#)

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[AppIMONTI](#)

[GAMIAppStart](#)

[GlueBatchJob](#)

[GlueBatchQueue](#)

[GlueBatchSystem](#)

[GlueCE](#)

[GlueCEAccessControlBase](#)

[GlueCESEBind](#)

[GlueCluster](#)

[GlueHost](#)

[GlueHostLocalFileSystem](#)

[GlueHostNetworkAdapter](#)

[GlueHostPoolAccount](#)

[GlueHostProcess](#)

[GlueHostRemoteFileSystem](#)

[GlueHostRole](#)

[GlueSA](#)

[GlueSAAccessControlBase](#)

[GlueSE](#)

[GlueSEAccessProtocol](#)

[GlueSEAccessProtocolSup](#)

[GlueSL](#)

[GlueService](#)

[GlueServiceAssociation](#)

Query: `SELECT UniqueID, TotalCPUs, Status, MeasurementDate, MeasurementTime FROM GlueCE WHERE TotalCPUs > 2`

UniqueID	TotalCPUs	Status	MeasurementDate	MeasurementTime
glite-ce.ct.infn.it:2119/blah-pbs-short	16	Production	2006-01-25	09:27:22
egee008.cnaf.infn.it:2119/blah-pbs-long	4	Production	2006-01-25	10:01:23
egee008.cnaf.infn.it:2119/blah-pbs-infinite	4	Production	2006-01-25	10:01:23
egee008.cnaf.infn.it:2119/blah-pbs-short	4	Production	2006-01-25	10:01:23
glite-ce.ct.infn.it:2119/blah-pbs-infinite	16	Production	2006-01-25	09:27:22
lxcde01.pd.infn.it:2119/blah-pbs-long	6	Production	2006-01-25	09:36:15
lxcde01.pd.infn.it:2119/blah-pbs-short	6	Production	2006-01-25	09:36:15
lxcde01.pd.infn.it:2119/blah-pbs-infinite	6	Production	2006-01-25	09:36:15
glite-ce.ct.infn.it:2119/blah-pbs-long	16	Production	2006-01-25	09:27:22

Number of rows: 9

Wait for seconds

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- **R-GMA overview page.**
 - <http://www.r-gma.org/>
- **R-GMA in EGEE**
 - <http://hepunix.rl.ac.uk/egee/jra1-uk/>
- **R-GMA command line tool**
 - <http://hepunix.rl.ac.uk/egee/jra1-uk/glite-r1/command-line.pdf>
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