Enabling Grids for E-science in Europe

www.eu-egee.org

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The EGEE Middleware Architecture

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gLite

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Architecture Guiding Principles

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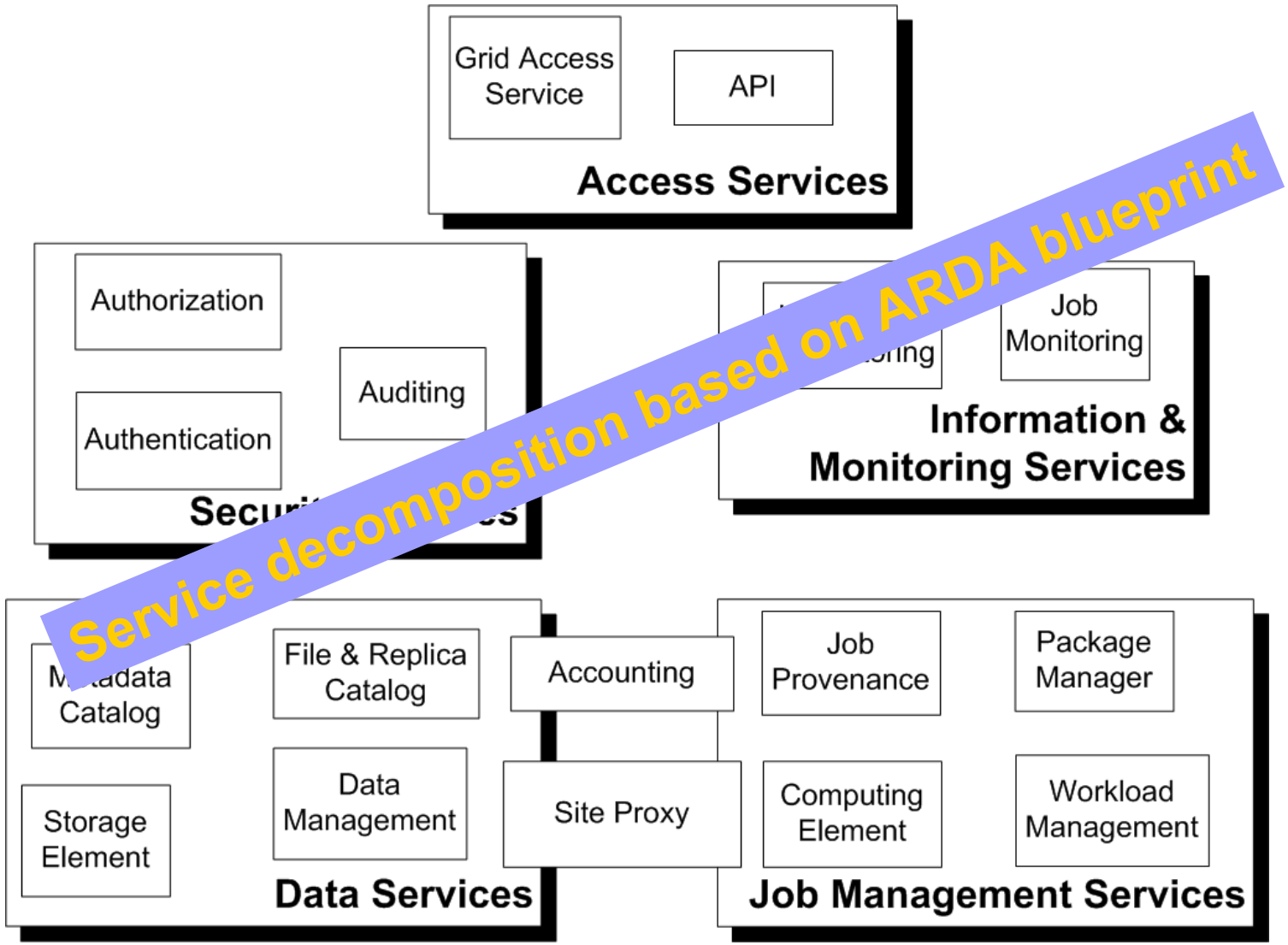
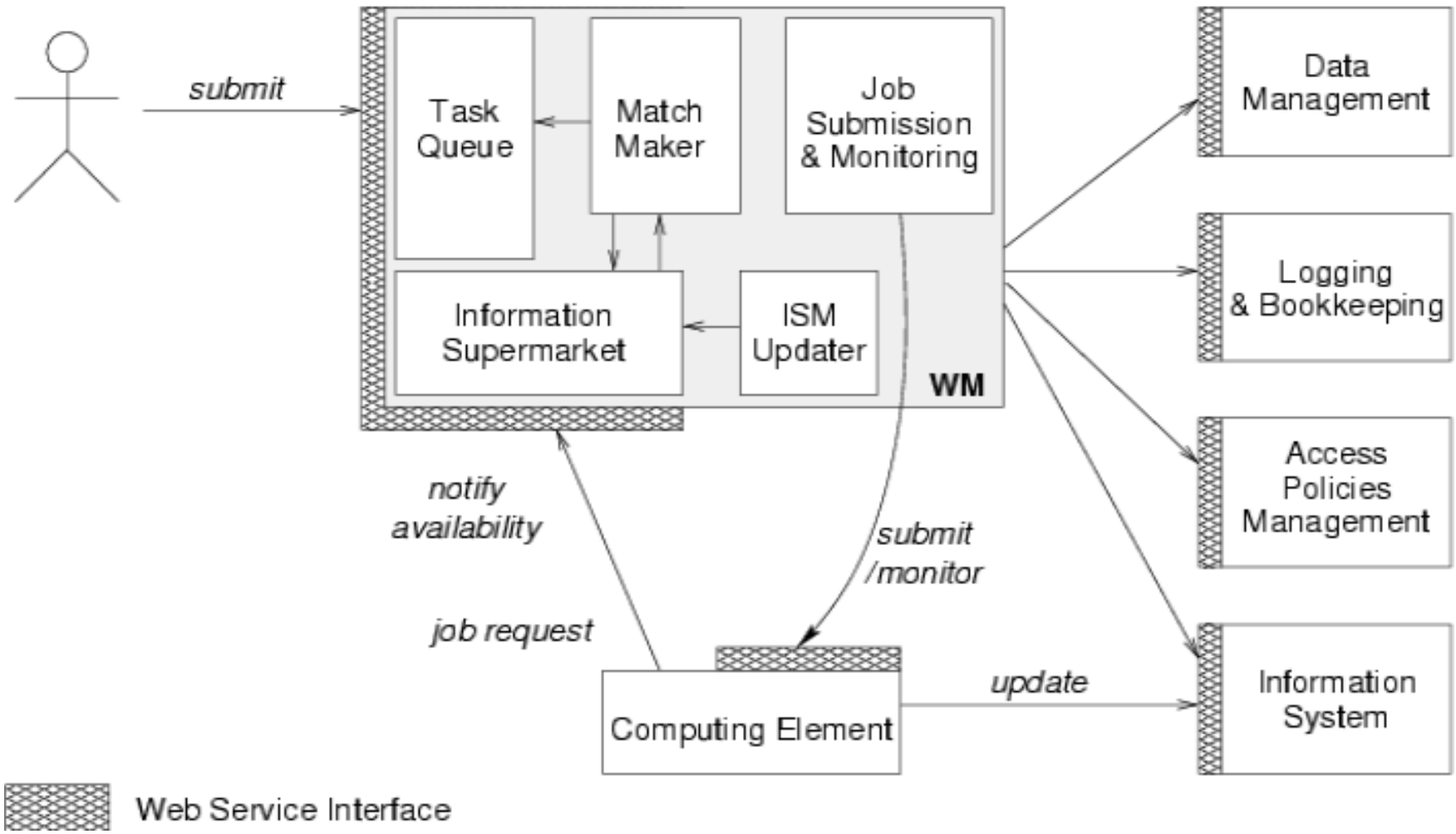
- Lightweight (existing) services
  - Easily and quickly deployable
  - Use existing services where possible as basis for re-engineering
- Interoperability
  - Allow for multiple implementations
- Resilience and Fault Tolerance
- Co-existence with deployed infrastructure
  - Run as an application (e.g. on LCG-2; Grid3)
  - Reduce requirements on site components
    - Basically globus and SRM
  - Co-existence (and convergence) with LCG-2 and Grid3 are essential for the EGEE Grid service
- Service oriented approach
  - WSRF still being standardized
  - No mature WSRF implementations exist to date, no clear picture about the impact of WSRF hence: start with plain WS
    - WSRF compliance is not an immediate goal, but we follow the WSRF evolution
    - WS-I compliance is important

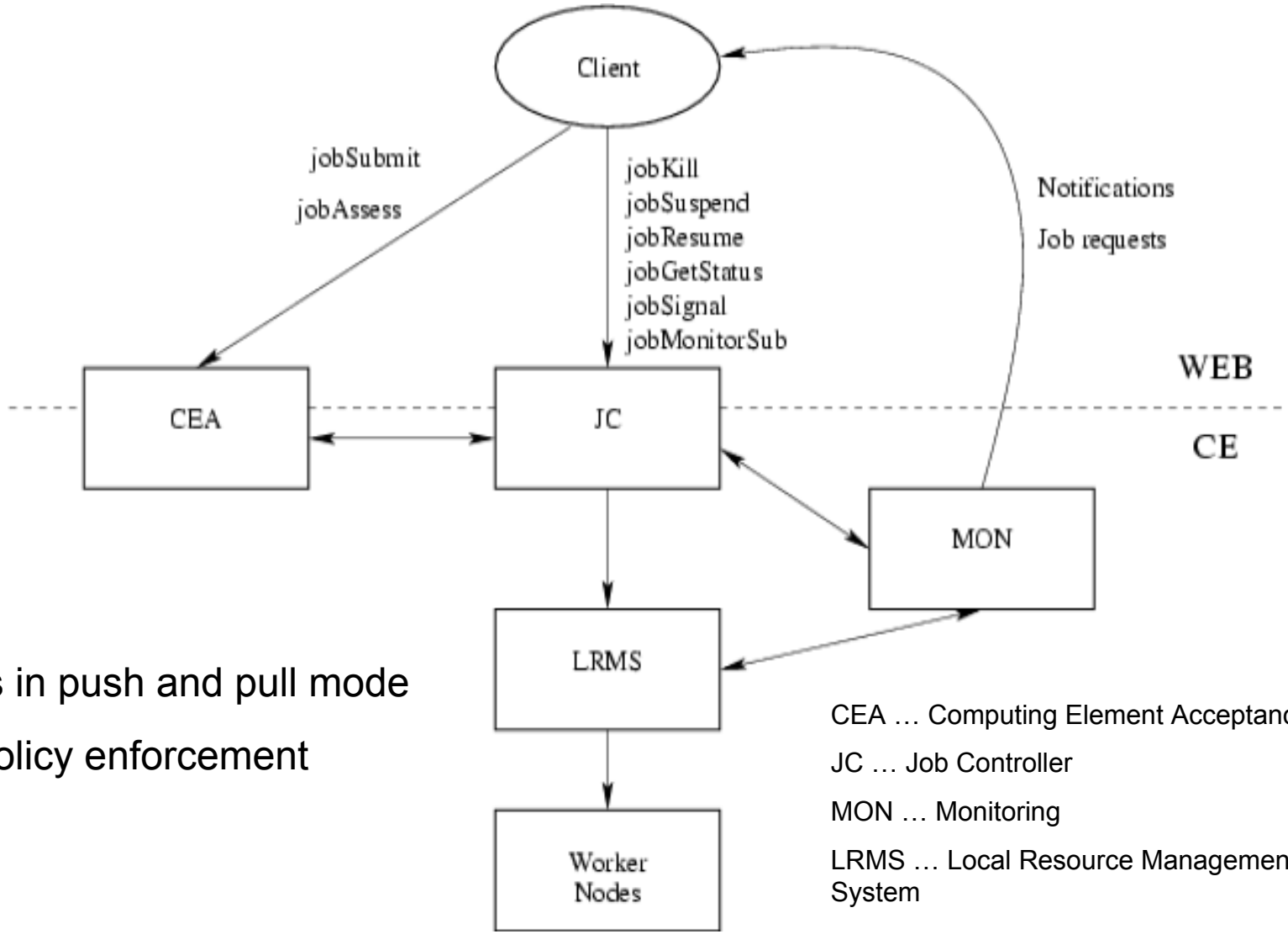
gLite Services



WMS


submit
Task Queue
Match Maker
Job Submission & Monitoring
Information Supermarket
ISM Updater
WM
Data Management
Logging & Bookkeeping
Access Policies Management
Information System
notify availability
submit /monitor
job request
update
Computing Element
Web Service Interface

CE



- Works in push and pull mode
- Site policy enforcement

CEA … Computing Element Acceptance

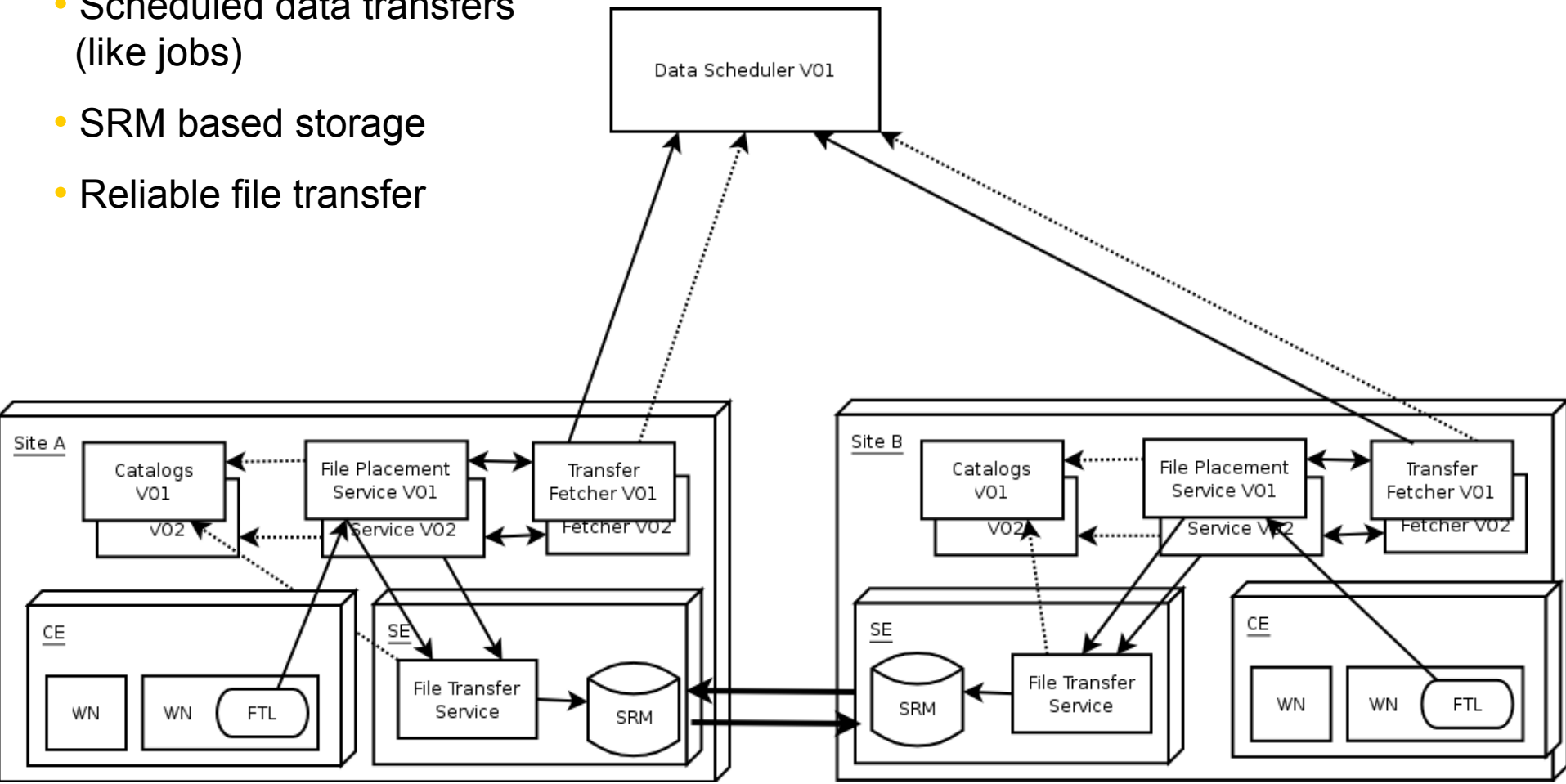
JC … Job Controller

MON … Monitoring

LRMS … Local Resource Management System

Data Management

- Scheduled data transfers (like jobs)
- SRM based storage
- Reliable file transfer



Storage Element Interfaces

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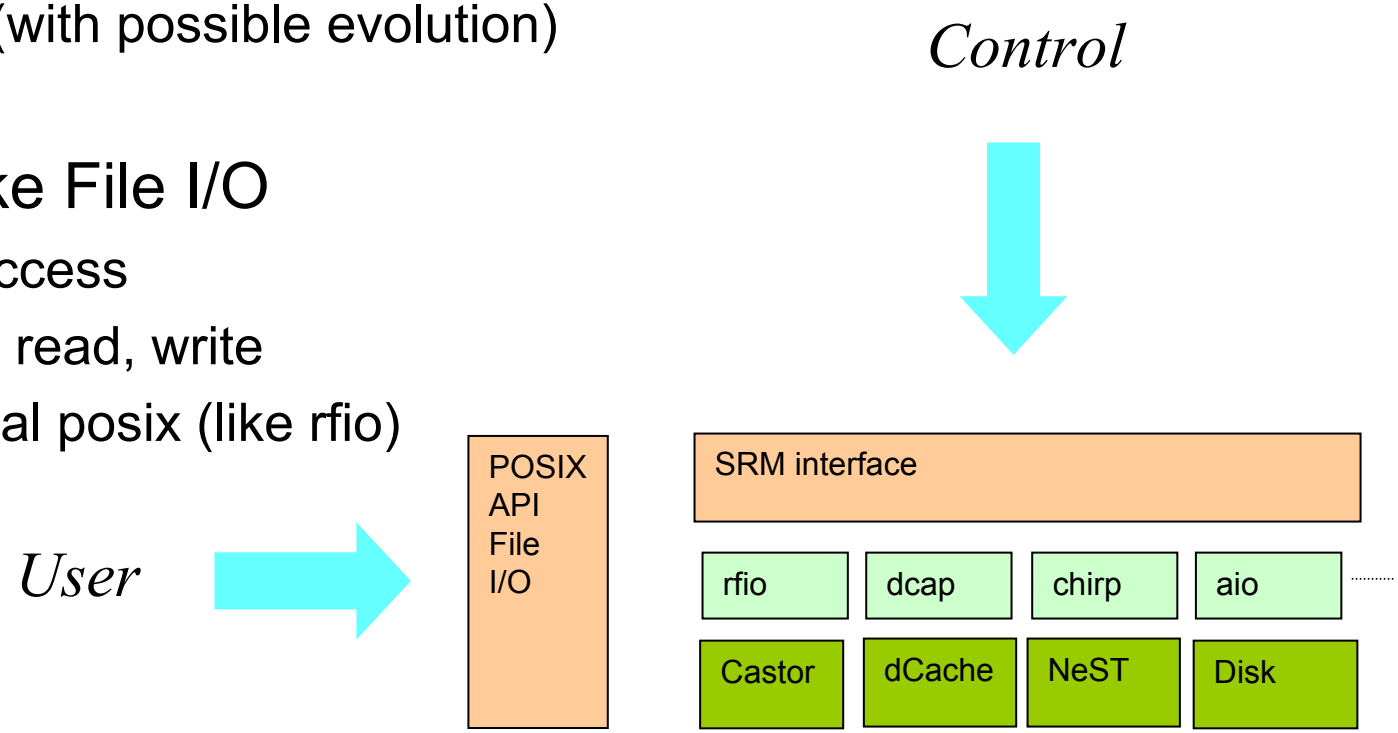
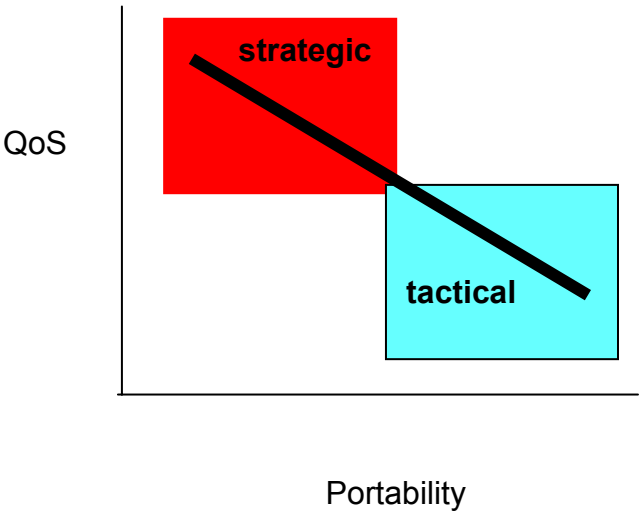
- SRM interface
  - Management and control
  - SRM (with possible evolution)
- Posix-like File I/O
  - File Access
  - Open, read, write
  - Not real posix (like rfio)



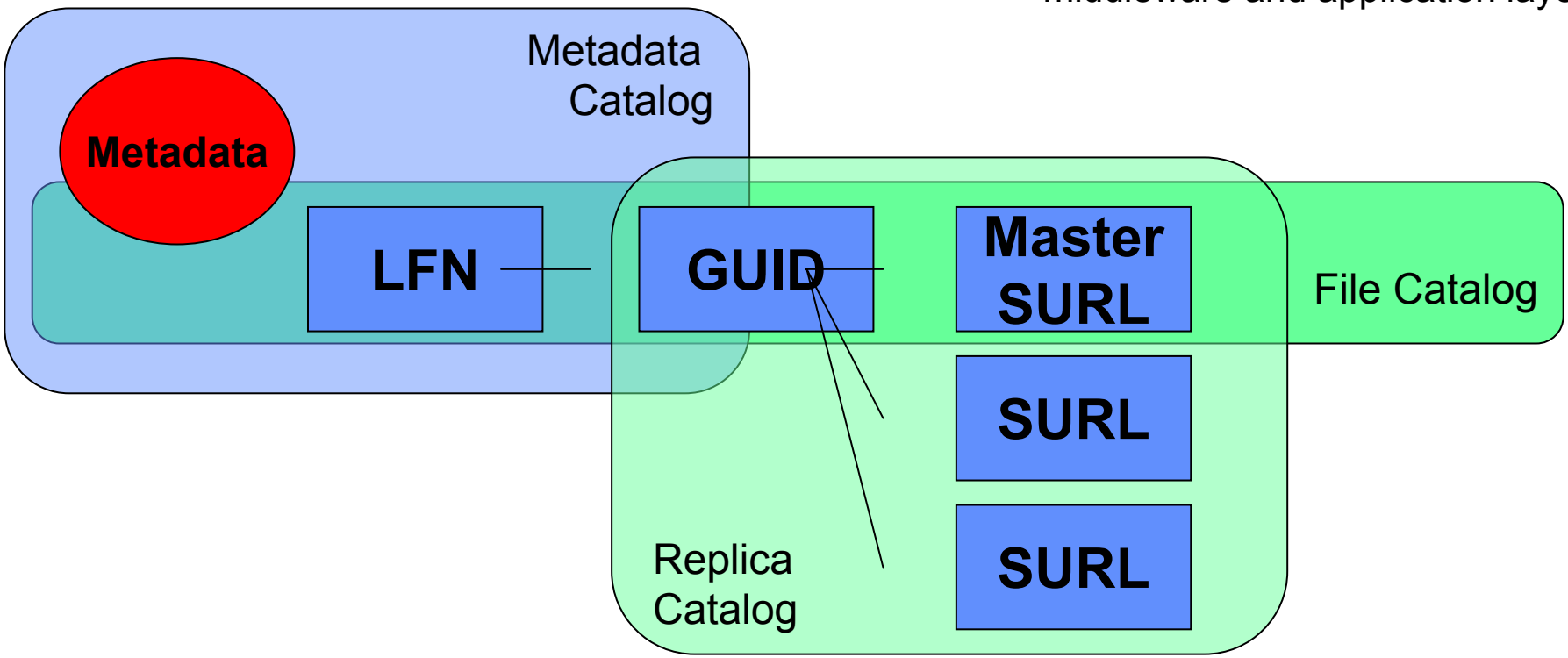
Storage Element

- ‘Strategic’ SE
  - High QoS: reliable, safe..
  - Has usually an MSS
  - Place to keep important data
  - Needs people to keep running
  - Heavyweight
- ‘Tactical’ SE
  - Volatile, ‘lightweight’ space
  - Enables sites to participate in an opportunistic manner
  - Best effort
  - Collaboration with LCG Deployment

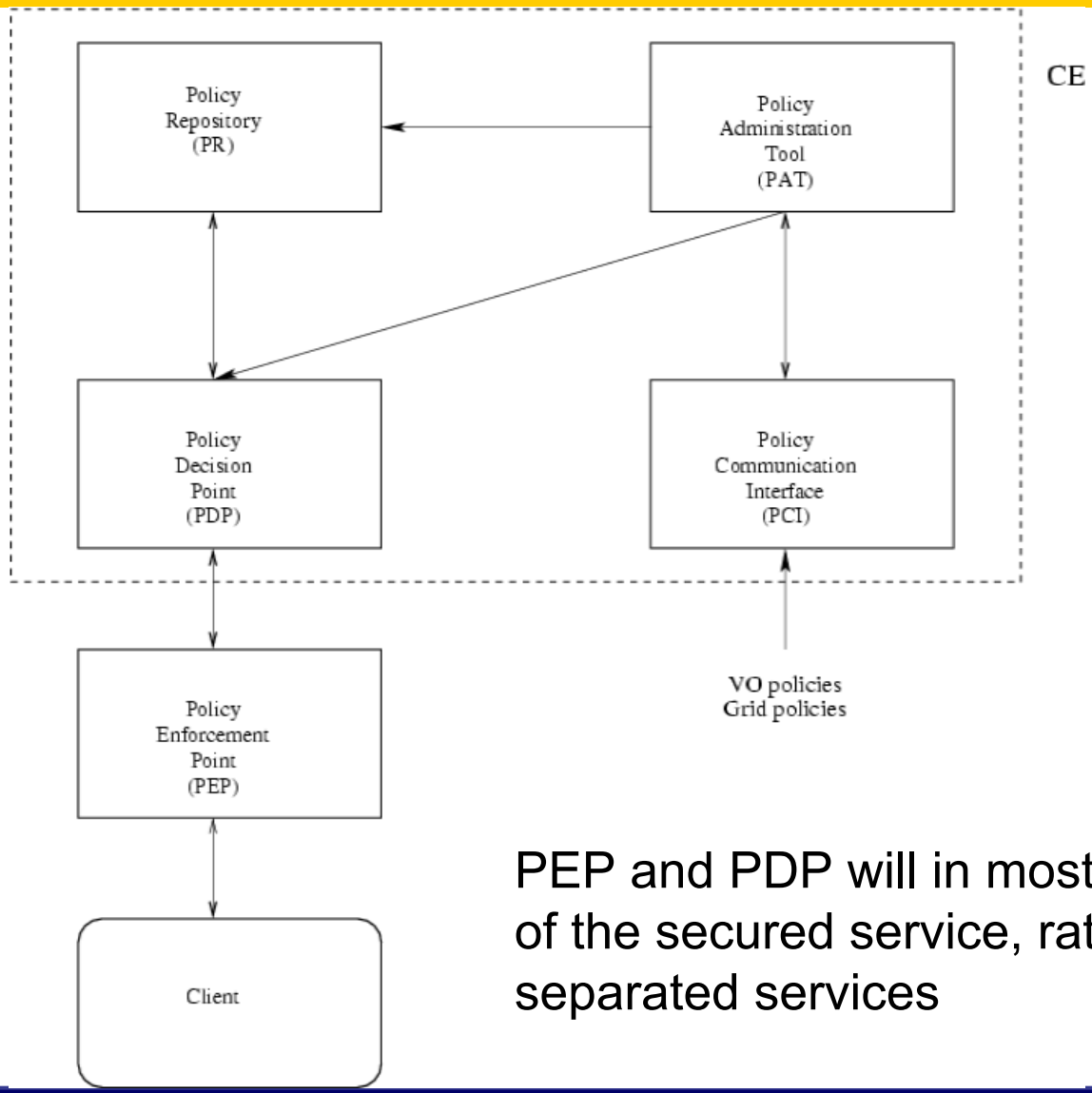


Catalogs

- File Catalog
  - Filesystem-like view on logical file names
- Replica Catalog
  - Keep track of replicas of the same file
- (Meta Data Catalog)
  - Attributes of files on the logical level
  - Boundary between generic middleware and application layer



Security



PEP and PDP will in most cases be part of the secured service, rather than separated services

Information and Monitoring

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- Exploit GGF GMA architecture
- Simple producer/consumer model

Current Implementations

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- WMS
  - AliEn TaskQueue
  - EDG WMS (plus new TaskQueue and Information Supermarket)
  - EDG L&B
- CE
  - Globus Gatekeeper
  - CondorG (CondorC)
  - “Pull component”
    - AliEn CE
    - EGEE MON (tbi by IT/CZ cluster)

Current Implementations Cont'd

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- SE
  - External SRM implementations
    - dCache, Castor, …
    - LCG disk pool manager (tbi)
  - AliEn aio (re-factored to gLite-I/O)(
- Catalogs
  - AliEn FileCatalog
  - RLS (globus and EDG)
  - Combined Catalog Interface (tbi)
- Data Scheduling
  - Stork
  - Phedex (concepts)
  - Data mgmt interface and VO data scheduler (tbi)
- Data Transfer
  - GridFTP
- Metadata Catalog
  - Simple interface defined
  - Assumption that it will be managed by experiments
- Information & Monitoring
  - R-GMA
  - For application monitoring the aim is to plug in other systems as well.

Currents Implementations Cont'd

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- Security
  - VOMS as Attribute Authority and VO mgmt
  - myProxy as proxy store
  - gridmapfile and GSI security as enforcement
    - Plan is to move to more fine-grained authorization (e.g. ACLs)
    - Plans with globus to provide a set-uid service on CE
- Accounting
  - EDG HLR
- User Interface
  - AliEn shell
  - CLIs and APIs
    - Move to autogenerated APIs from WSDL
  - GAS
    - New development
- Package manager
  - Explore existing solutions

Deployment considerations

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- Interoperability and co-existence
  - Exploit different service implementations
    - E.g. Castor and dCache SRM implementations
  - Require minimal support from development environment
    - Sites required to run globus and SRM (might not be required for tactical storage)
  - Flexible service deployment
    - Multiple services running on the same physical machine (if possible)
- Platform support
  - Goal is to have portable middleware
  - Building & Integration on RHEL 3 and windows
  - Initial testing (at least 3 sites) using different Linux flavors (including free distributions)
- Service autonomy
  - User may talk to services directly or through other services (like access service)
- Open source software license
  - Based on EDG license

From Prototype to Release

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- Prototype setup at 2 sites (CERN & Wisconsin)
  - ~45 users registered
  - 2nd release mid August
    - Many bugfixes
    - New functionalities
  - More nodes (more powerful) being added at CERN
  - EDG WMS being added at CNAF
  - Being ported to SLC3 (by end of September)
  - Second VO being set up (core services at Wisconsin)
    - Will use globus RLS

From Prototype to Release

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- Continuous integration system set up
  - First results being put forward to testing team
  - SLC3 version of prototype middleware provided
- SCM convergence being reached
  - SCM plan: https://edms.cern.ch/document/446241
- Common service configuration being worked out
- Deployment scenarios being worked out

- Testing sites (RAL, NIKHEF, CERN) up and running
  - Focus on prototype installation and testing
    - >50 bugs confirmed
  - Plans being made for focused testing of gLite components for pre-production service
- Test plan being defined
  - Based upon architecture document, release plan, and NA4 requirements
  - https://edms.cern.ch/document/477697/

Release Plan

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- Incremental Releases
- Being tracked at weekly basis
- https://edms.cern.ch/document/468699
- Priorities for testing and integration defined

- Goal is to have core services by the end of this year

gLite and LCG-2

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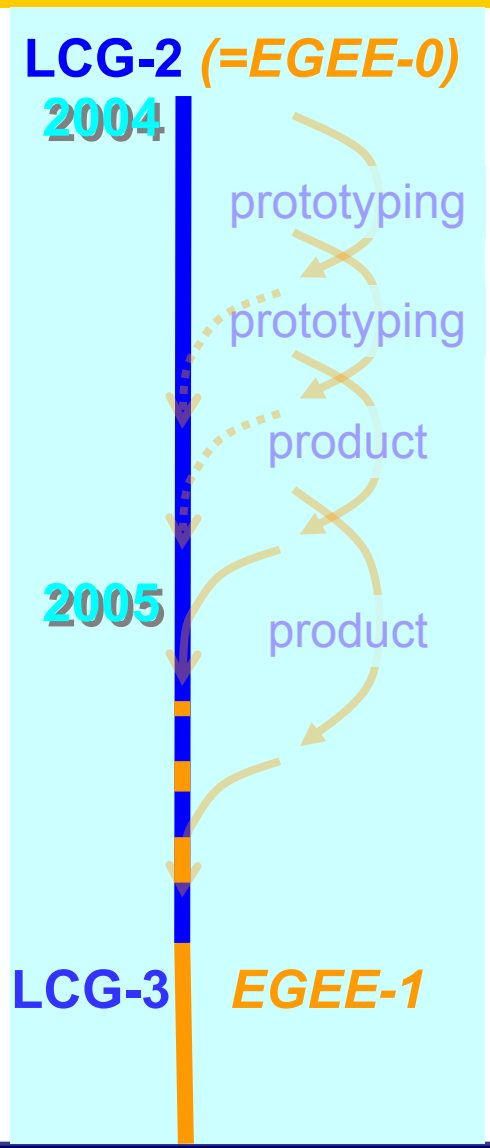
LCG-2 focus on production, large-scale data handling

- The service for the 2004 data challenges
- Provides experience on operating and managing a global grid service
- Development programme driven by data challenge experience
  - Data handling
  - Strengthening the infrastructure
  - Operation, VO management
- Evolves to LCG-3 as components progressively replaced with new middleware

  -- target is to minimise the discontinuities of migration to the new generation
- Aim for migration plan by end of year



gLite focus on analysis

- Developed by EGEE project in collaboration with VDT (US)
- LHC applications and users closely involved in prototyping & development (ARDA project)
- Short development cycles
- Co-existence with LCG-2
- Profit as far as possible from LCG-2 infrastructure, experience

→ Ease deployment – avoid separate hardware

- As far as possible - completed components integrated in LCG-2

→ improved testing, easier displacement of LCG-2

les robertson - cern-it-20

Pre-Production Service

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- Independent components can move from prototype to SA1 for deployment on pre-production service after testing
  - Rule of thumb: release plan + 1 month
- First components (tentatively end of September):
  - CE
  - Resource Broker
  - File I/O

Summary

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- Next generation middleware being designed and assembled
  - Prototype first tangible outcome
    - **BUT this is a PROTOTYPE not a release!**
  - Architectural and design work well advanced
    - Architecture document sent to EU
      - Subject to changes
    - Design document (draft) exists: https://edms.cern.ch/document/487871/
      - Input from Experiments solicited (by mid September; document needs to be sent to EU end of September)
  - Incremental changes to prototype
    - Feedback from applications and operations essential!
- Detailed release plan worked out
  - **https://edms.cern.ch/document/468699**
- First components for pre-production service during autumn
- Continuous integration and testing scheme defined and adopted
- Technology Risk
  - Will WS allow for all upcoming requirements?
  - Divergence to standards

Links

- JRA1 homepage
  - http://egee-jra1.web.cern.ch/egee-jra1/
- Architecture document
  - https://edms.cern.ch/document/476451/
- Release plan
  - https://edms.cern.ch/document/468699
- Prototype installation
  - http://egee-jra1.web.cern.ch/egee-jra1/Prototype/testbed.htm
- Test plan
  - https://edms.cern.ch/document/477697/
- Design document
  - https://edms.cern.ch/document/487871/

Backup Slides

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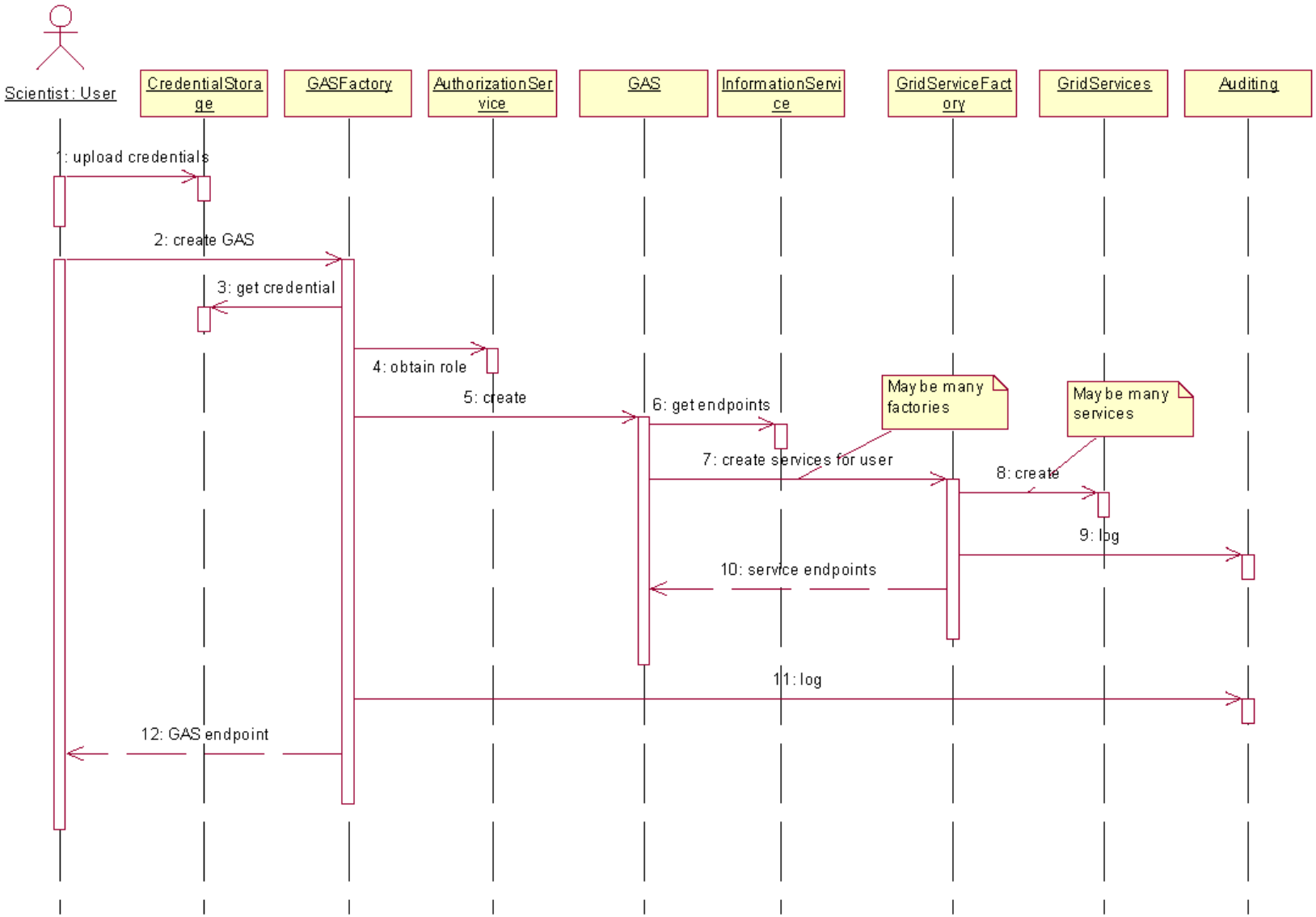
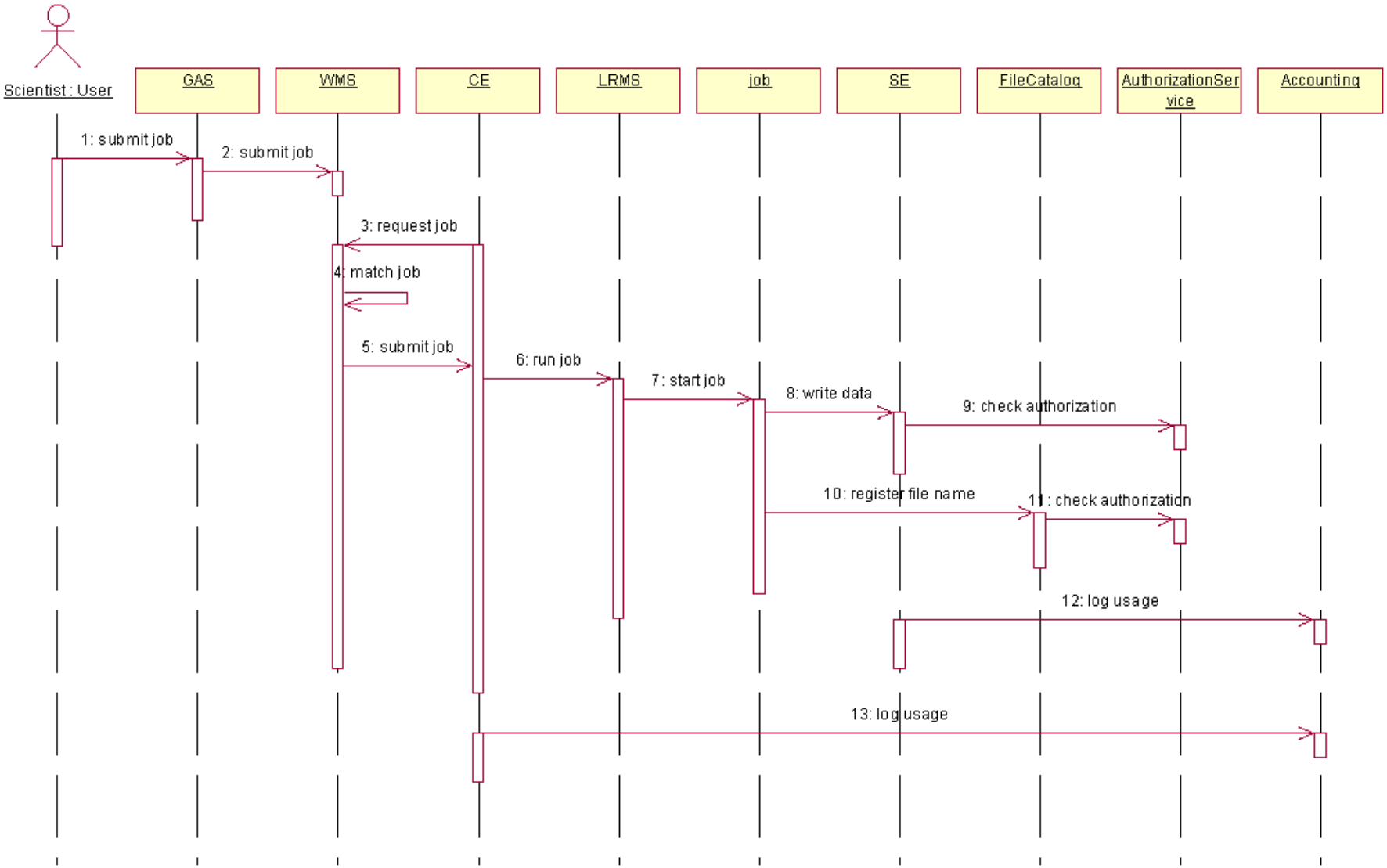
Grid Login


Scientist: User
CredentialStorage
GASFactory
AuthorizationService
GAS
InformationService
GridServiceFactory
GridServices
Auditing
1: upload credentials
2: create GAS
3: get credential
4: obtain role
5: create
6: get endpoints
7: create services for user
8: create
9: log
10: service endpoints
11: log
12: GAS endpoint
May be many factories
May be many services

Generic Production Job



Generic Analysis Job