SAM Grid, Architecture and Status

Igor Terekhov,
Fermilab, Computing Division, PPDG

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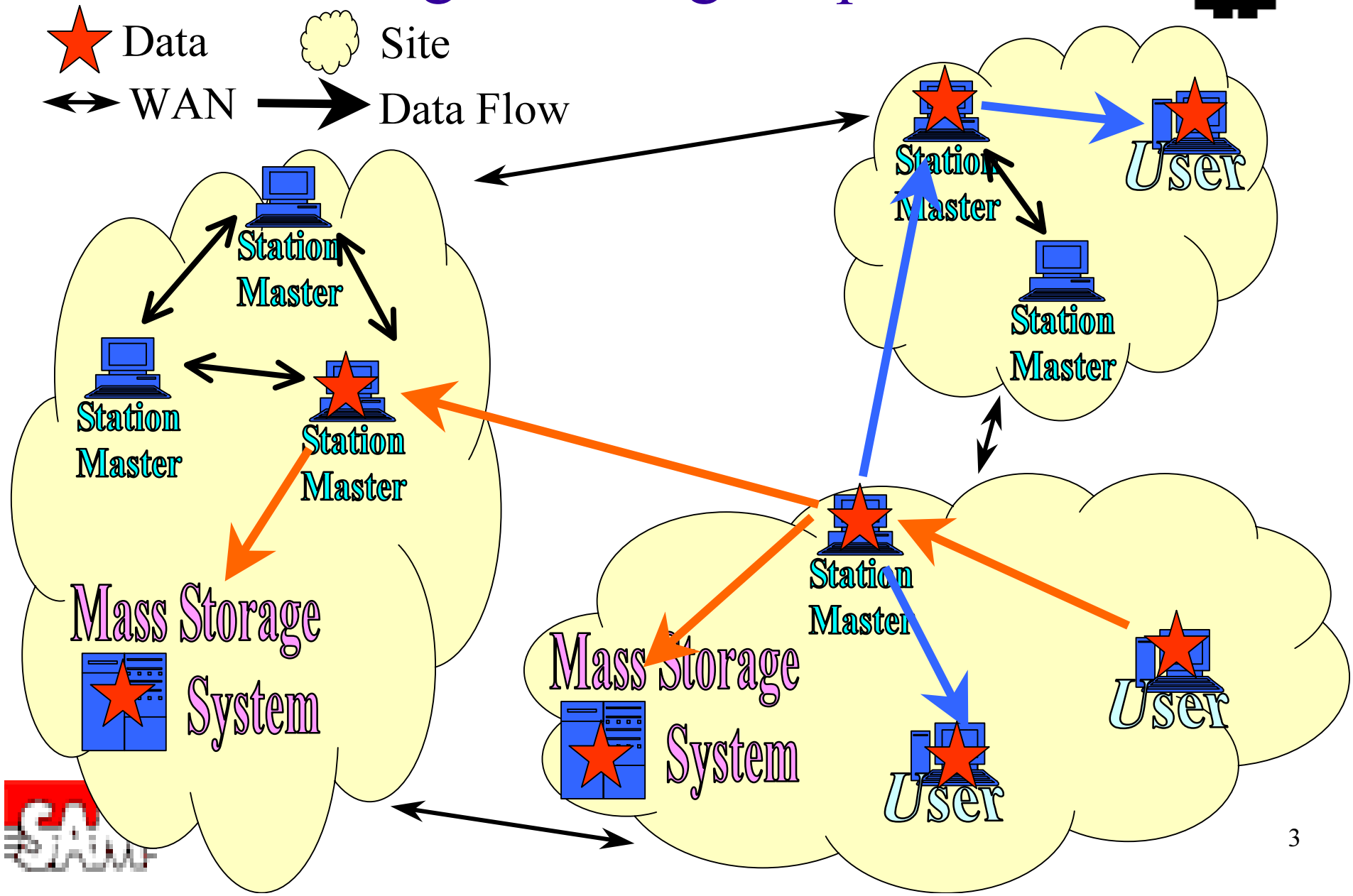
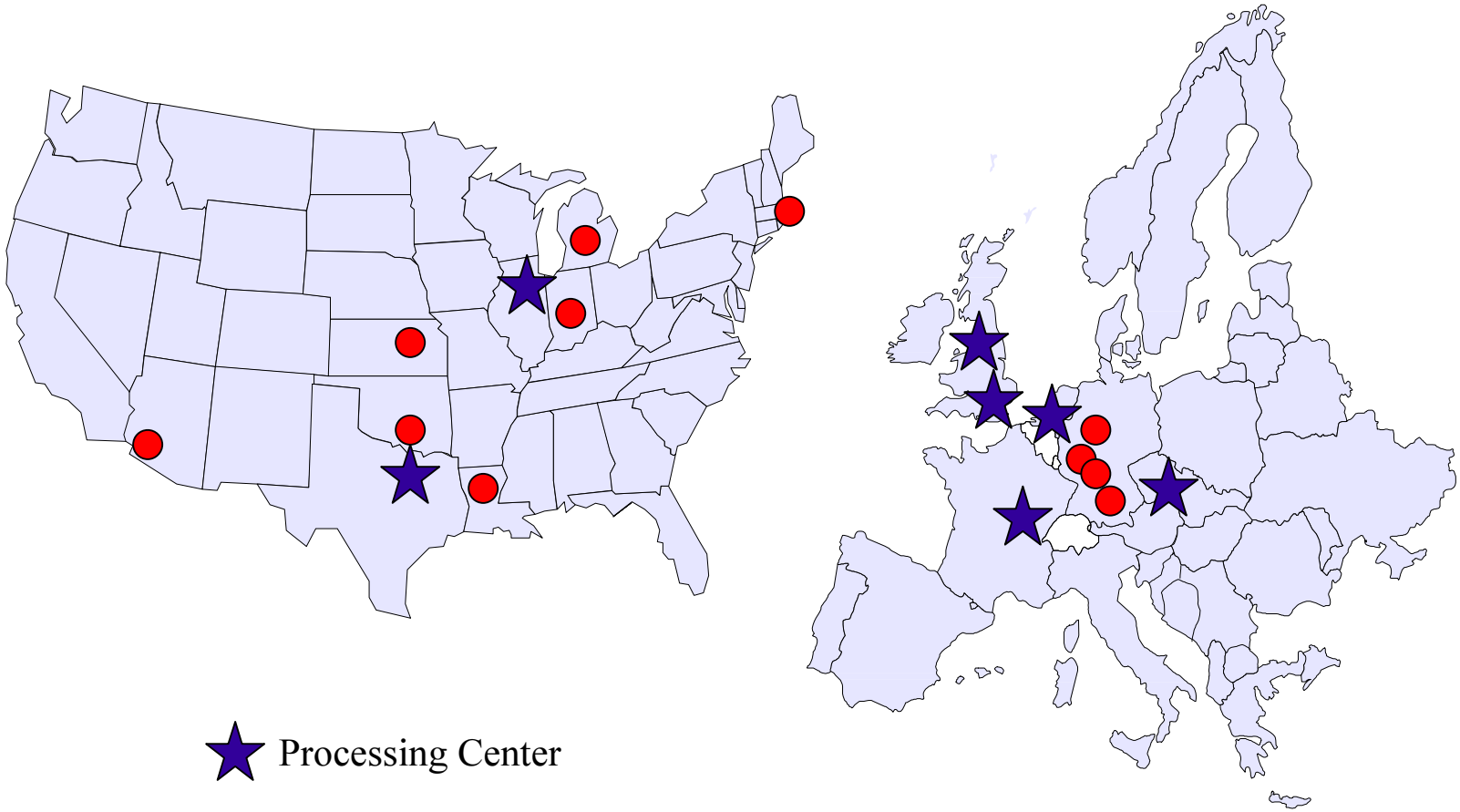
SAM as a Data Grid

- Provides high-level collective services of *reliable* data storage and replication
- Embraces multiple MSS's (Enstore , HPSS, etc) local resource management systems (LSF, FBS, PBS, Condor), several different file transfer protocols (bbftp, kerberos rcp, grid ftp, …)
- Optionally uses Grid technologies and tools
  - Condor as a Batch system (in use)
  - Globus FTP for data transfers (ready for deployment)
- From *de facto* to *de jure*…

Routing+Caching=Replication



Dzero SAM Deployment Map

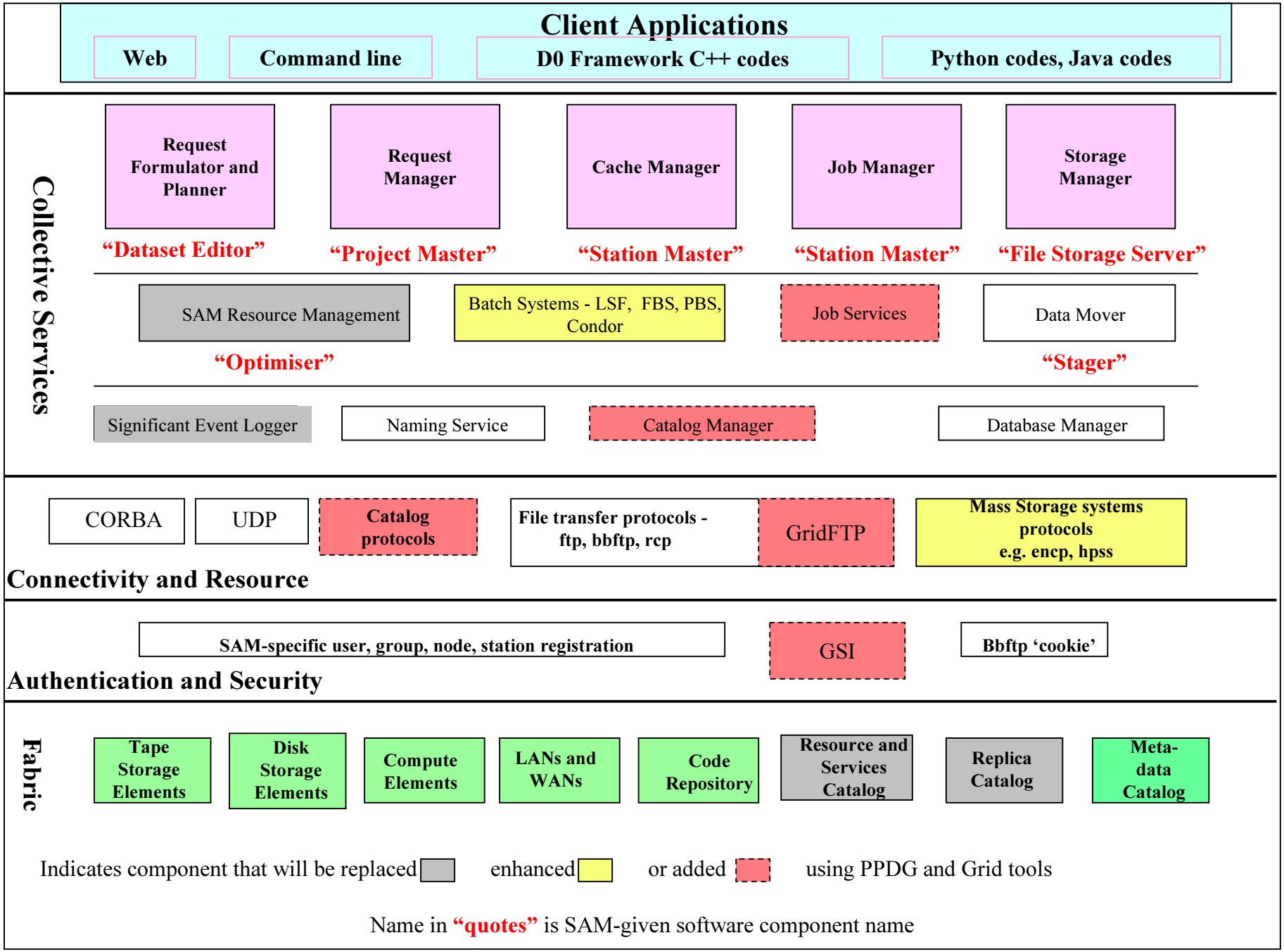


Processing Center

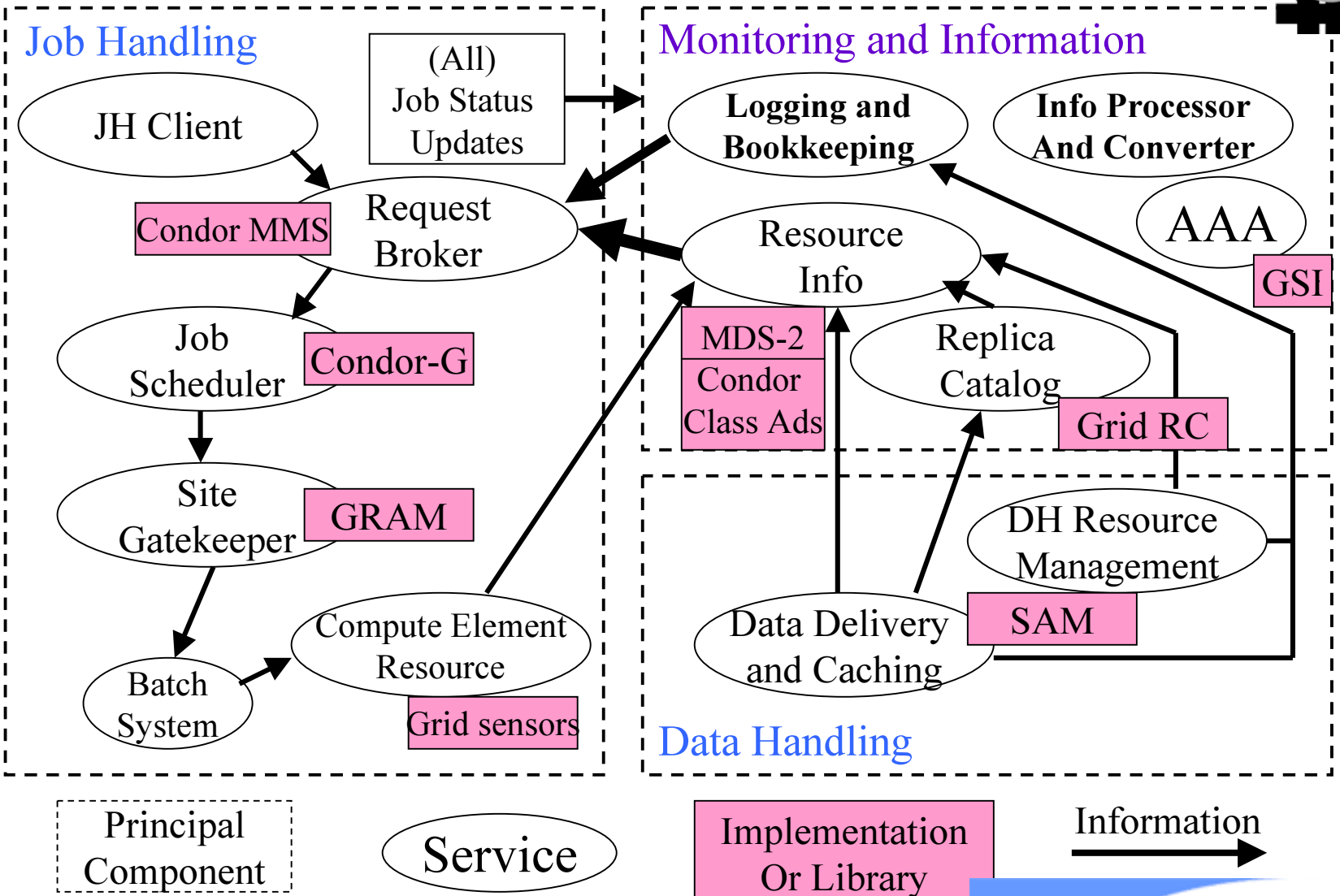
Analysis site

SAM usage statistics for DZero

- 497 registered SAM users in production
  - 360 of them have at some time run at least one SAM project
  - 132 of them have run more than 100 SAM projects
  - 323 of them have run a SAM project at some time in the past year
  - 195 of them have run a SAM project in the past 2 months
- 48 registered stations, 340 registered nodes
- 115TB of data on tape
- 63,235 cached files currently (over 1 million entries total)
- 702,089 physical and virtual data files known to SAM
- 535,048 physical files (90K raw, 300K MC related)
- 71,246 “analysis” projects ever ran
- http://d0db.fnal.gov/sam_data_browsing/ for more info


Client Applications
Web
Command line
D0 Framework C++ codes
Python codes, Java codes
Collective Services
Request Formulator and Planner
Request Manager
Cache Manager
Job Manager
Storage Manager
"Dataset Editor"
"Project Master"
"Station Master"
"Station Master"
"File Storage Server"
SAM Resource Management
Batch Systems - LSF, FBS, PBS, Condor
Job Services
Data Mover
"Optimiser"
"Stager"
Significant Event Logger
Naming Service
Catalog Manager
Database Manager
CORBA
UDP
Catalog protocols
File transfer protocols - ftp, bbftp, rcp
GridFTP
Mass Storage systems protocols e.g. encp, hpss
Connectivity and Resource
SAM-specific user, group, node, station registration
GSI
Bbftp 'cookie'
Authentication and Security
Fabric
Tape Storage Elements
Disk Storage Elements
Compute Elements
LANs and WANs
Code Repository
Resource and Services Catalog
Replica Catalog
Meta-data Catalog
Indicates component that will be replaced
enhanced
or added
using PPDG and Grid tools
Name in "quotes" is SAM-given software component name

SAM-Grid Architecture



Principal Component

Service

Implementation Or Library

Information

SAMGrid Principal Components

- Job Definition and Management: The preliminary job management architecture is aggressively based on the Condor technology provided by through our collaboration with University of Wisconsin CS Group.
- Monitoring and Information Services: We assign a critical role to this part of the system and widen the boundaries of this component to include all services that provide, or receive, information relevant for job and data management.
- Data Handling: The existing SAM Data Handling system, when properly abstracted, plays a principal role in the overall architecture and has direct effects on the Job Management services