Status of SAM-Grid / Future Plans for SAM-Grid

- **Some brief requirements**
- **Status and deployments of SAM**
- **Status and deployments of JIM**
- **The SAM-Grid team**
- **Near term developments for SAM-Grid**
- **SAM-Grid: The work plan for the next 2 years**
- **Data handling in context**

General Overview of SAM

◆ **The SAM data handling system…**

➔ **Depends on/uses:**
   Central ORACLE database at Fermilab (central metadata repository)
   ENSTORE mass storage system at Fermilab (central data repository)

➔ **Provides access to:**
   Various file transfer protocols: bbftp, GridFTP, rcp,dccp..
   Several mass storage systems: ENSTORE, HPSS, TSM

➔ Supports job submission via:
   direct SAM command (sam submit)
   d0tools (most usually)
   MCRunjob (in development)
   JIM (in testing)

➔ **Provides tools to define datasets:**
   Web-based GUI
   Command line interface
   Dataset definition wizard (in development)

Some brief requirements for a data handling system

◆ **Minimum** data handling requirements:

1) **Distribute data files from the primary mass store to all computing systems in the experiment which install the data handling system. Route data in a configurable way.**
2) Receive for storage in the primary mass store simulated or derived data sets from remote institutions which have installed the DH system. Accommodate secondary storage locations.
3) Track processing apps at central and remote stations.

◆ **Next level requirement:**
Distribute applications from arbitrary submission sites with the code distribution available to generally available computing resources.

◆ **And then:**
Provide tools for the automatic scheduling of jobs and for priorization: co-locate data and processing

Functionality

Some brief requirements for onsite & remote computing

- **Maintain high availability of services**
- **Minimize operational load**
- **Provide for error handling:**
    - **Worker node failure**
    - **File transfer failure**
    - **User application crashes/hangs/is killed by user/goes berserk**
- **Tune systems for most common use cases / expected bottlenecks / …**
- **Provide for system monitoring & debugging**
- **Provide for user monitoring & accounting**
- **Mitigate security risks**

Operational

Status and deployments of SAM

At DØ:

- **Operational 24/7: online, reco farm, d0mino, cab, clued0**
- **Operational at Monte Carlo production sites**
- **Operational at remote analysis sites: ~20 active, ~40 deployed**
- **Coming on line for remote reconstruction sites: U Mich now, others later**
- **Statistics: ~55000 proj FNAL, ~6000 proj remote (since 1/1/03)**

At CDF:

- **Operational 24/7 to receive online metadata, send data to remote stations (UK, Karlsruhe)**
- **In testing for Monte Carlo production**
- **Statistics: ~1700 proj total (since 1/1/03)**

Status and deployments of SAM

◆ **Active stations: 36 DØ (9 @ FNAL)**
9 CDF

◆ **Accomplishments since January 03:**

➔ Agreement on common schema for CDF and DØ

➔ Deployment of new sam_user_api with faster performance

➔ Deployment of new sam_batch_adapter

➔ Significant improvements in station robustness

➔ SAM operations at DØ transitioned to shifter/expert on call model with good results

➔ CDF operations for remote stations functional

➔ New monitoring tool: SAM TV

➔ Work in progress on enhanced dbserver for new schema

➔ SBIR grant obtained to work on distributed DB functionality

Status and deployments of JIM

- ◆ **Current JIM version**
  V1.0 – Job broker, execution and submission site software, job monitor, client software

- ◆ **Current push to deploy JIM V1.0**
  - → **Deployment of demo last November – proof of principle**
  - → **Deployment of submission site on clued0 with execution site on CAB – immediately pointed out lack of viable model for job transfer (either input or output). Working on that now. (Note we can already submit SAM jobs to CAB from clued0 using d0tools.)**
    Request: can job broker pick between clued0 and CAB based on queue status?
  - → **Deployment of submission and execution sites at Wuppertal, GridKA, IC, RAL, Lancaster. In progress or envisioned at several other sites: U Wisc, U Mich, LMU Munich, U Mainz, NIKHEF, …**

The SAM-Grid Team

Project Co-Leaders:

Wyatt Merritt   CD/DØCA

Rick St. Denis CDF/ Glasgow U

Developers:

Sinisa Veseli, Lauri Loebel Carpenter, Andrew Baranovski, Steve White, Carmenita Moore, Igor Terekhov, Gabriele Garzoglio

Support for CDF Migration:

Rob Kennedy, Fedor Ratnikov, Randy Herber, Art Kreymer, Roberto Rossini, Charles Cornelius, Morag Burgon-Lyon

Database support:

Diana Bonham, Anil Kumar

Associated external projects:

PPDG

SBIR II

Near term developments for SAM-Grid

- **JIM: Complete deployment of GridFTP as WAN transfer protocol**

- **SAM: Deploy new schema and accompanying dbserver improvements**

- **SAM: Complete testing of dcache-enabled station at CDF; dcache write pool for DØ online**

- **JIM: Devise and implement viable input/output sandbox model**

- **Both: Bring new CDF and DØ stations online**

- **JIM: Migrate to new version of Globus software**

SAM-Grid: The work plan for the next 2 years

Functionality

- Implement Schema Update I. (file_type, runs changes)
- Automate MC production; understand issues in automating job distribution for re-processing and analysis.
- Revise caching strategies. (local vs fileserving; merging operations; connections w/ other layers)
- Implement Schema Update II. (processing requirements for jobs, group info)
- Equip optimizers and job brokers to deal w/ info in Schema Update II.
- Sort out parallelization issues.
- Implement Virtual Organization tools.
- Implement Monitoring and Information server on the SAM side
- Provide for distributed database: two parts, file location info and processing info.; equip servers for more autonomous operation

SAM-Grid: The work plan for the next 2 years

Operational

- ◆ **Evaluate technology changes/upgrades**
  - ➔ **Improvements for installation/config management?**
  - ➔ **Move to VDT suite (production version of Condor, Globus, etc.)**
  - ➔ **Possible CORBA replacements – WebServices?**
  - ➔ **XML-based logging – will this be the way to go?**
  - ➔ **Which solution for distributed DB's?**
- ◆ **Plan for interoperability**
  - ➔ **Merge SAM catalog w/ other replica schemas? Follow example of DØ/CDF merge? Interoperation with other replica catalogs?**
  - ➔ **GLUE schema for resource description; job description language**
  - ➔ **Sam_batch_adapter technology**
  - ➔ **Working with SRM's – await outcome of caching strategy discussions**
  - ➔ **Interactions of tools w/ data handling system: cf. mc_runjob & d0tools w/ JIM and CAF(CDF)**
  - ➔ **VO organization issues**
  - ➔ **Security issues (VO, file transfer, job submission)**

Data handling in context

- ◆ **We have the ability to distribute data to onsite and remote locations, allowing institutions to utilize their local resources for analysis (sam station)**

- ◆ **We have a system for job processing and analysis bookkeeping which can be deployed remotely as well (sam station, project master, user api,…)**

- ◆ **We have the ability to interface to local storage and batch systems (HPSS, TSM; LSF, PBS, FBS, Condor, SGE)**

- ◆ **We see distinct opportunities to add the ability for automated job scheduling and remote submission capabilities, using Grid strategies (and Grid tools when available)**

Data handling in context

◆ **For Run II experiments, maintaining stable operation and current functionality is a priority**

◆ **The operational load remains a concern: we need more shifters, and adding development projects that impose a larger operational load would be a time for cost/benefit calculations**

◆ **Taking data handling to the next level involves both technical and sociological challenges: learning to build a robust and performant grid, and learning how to install/deploy/use one**