

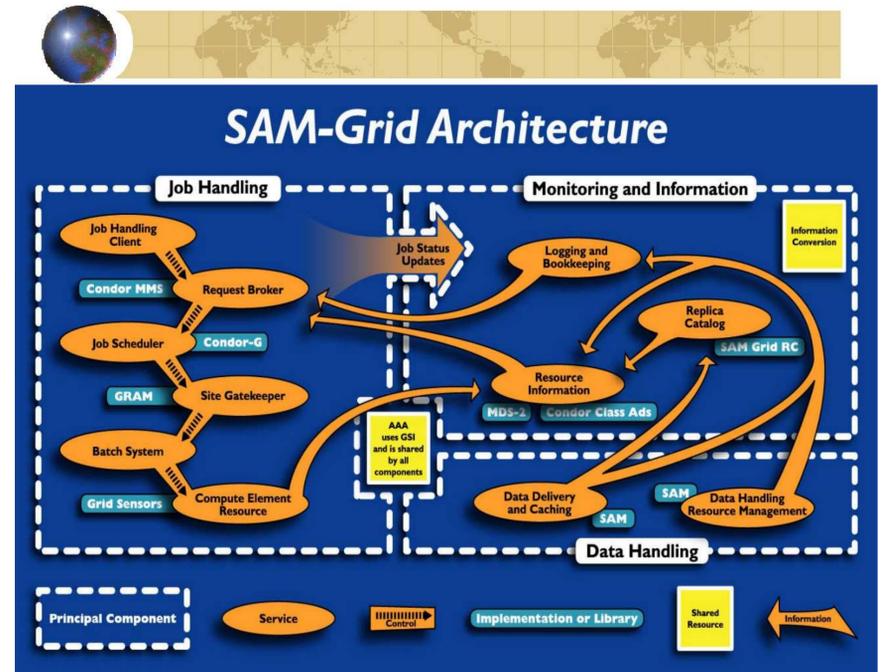
SAMGRID EXPERIENCES WITH CONDOR

SAMGrid Team, Fermilab, PPDG



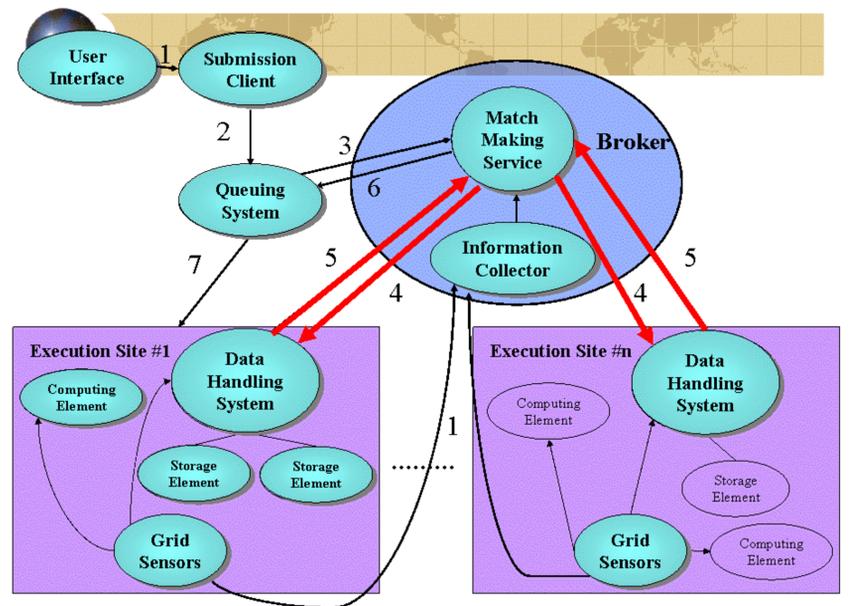
SAMGrid experiences with Condor

I. Terekhov and the SAMGrid team



Condor-G

- Used to schedule and broker jobs
- In SAMGrid architecture, is the resource broker
- SAMGrid and D0 re-introduced match-making at the Grid level (initial Condor-G was scheduler only)
- Enhanced the matchmaking service (MMS) by the ability to query resource advertisers for additional information *at match time* (red arrows on the next slide)



Three-Tier Condor-G architecture

- SAMGrid changed Condor-G from two to three tiers in job submission:
 - Client** (user) tier – pure clients, no daemons, installable on a laptop
 - Scheduler** tier (in the past, was the client site as well) – spools the jobs, runs *schedd*, *Gridmanagers* (schedule jobs and follow through) runs DAG jobs (scheduler universe)
 - Execution** site – advertises resources and receives jobs
- Ease of deployment – no root password on scheduler site
- Secured job submission to schedd site via X509 mechanisms (all Condor-G daemons use credentials)



Uses of Condor-G in SAMGrid

- MMS chooses the site to run based on the amount of input data available (cached) at the site (analysis only)
- Monte-Carlo: choose the site that has *jobmanagers* suitable for job at hand (D0 mc_runjob, mcfarm, CDF environment, etc)
- Choose the site by the station name/properties
- Choose the site where the user is authorized to run (note *dynamic* queries again) – disabled temporarily

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Back to local level: classic Condor

- ✦ University of Wisconsin in Madison, WI – host of a large cluster available “by subscription” to affiliated users
- ✦ The cluster leverages the power of idling desktops (classic Condor idea) plus provides several sub-clusters with varying properties described in classAds (including booleans such as whether can preempt jobs)
- ✦ D0 was able to borrow CPU cycles on this resource. Note that it does not belong to D0 – step towards true Grid computing



Condor cluster configuration

- ✦ No shared file system (for pre-installed products, etc)
- ✦ No home area! (this is the way it should be on a Grid cluster). Condor provides TCP-based mechanisms for job file transfer
- ✦ Condor provides true *scratch disk management*.
- ✦ Only one machine (not necessarily powerful) designated as the *SAMGrid headnode*, runs jobmanagers, SAM data handling services, etc.
- ✦ This helped JIM advance it's job management architecture on the Grid-Fabric interface:
 - ✦ Globus job managers receive job via GRAM
 - ✦ Control passed to JIM job managers that know how to handle SAMGrid jobs
 - ✦ SAM batch adapters store configuration about commands needed to talk to the BS

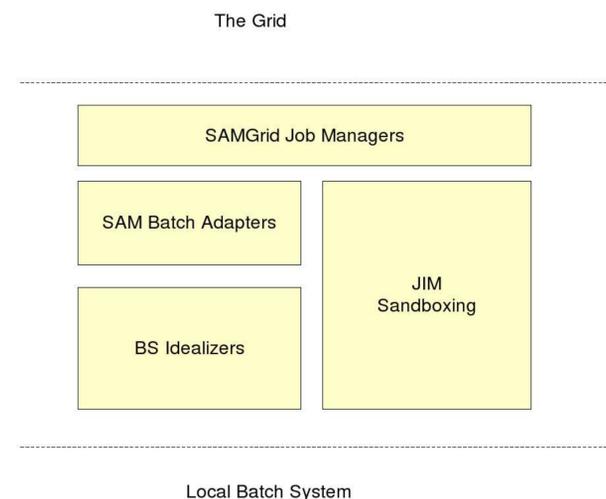


Local job management in SAMGrid

- ✦ The Condor cluster configuration helped JIM advance it's job management architecture on the Grid-Fabric interface:
 - ✦ Globus job managers receive job via GRAM
 - ✦ Control passed to JIM job managers that know how to handle SAMGrid jobs
 - ✦ SAM batch adapters store configuration about commands needed to talk to the BS
- ✦ The Sandbox concept: abstracts collections of small files:
 - ✦ allows for its explicit, controllable transfer using native BS mechanisms and gridFTP (unlike NFS)
 - ✦ Is independent of the local cluster configuration and therefore drops annoying assumptions of the shared file system etc



Grid to Fabric Job Submission



JIM sandbox bootstrap



Summary and Acknowledgements

- ✦ Through the collaboration with the Condor team, the SAMGrid project benefitted from the Condor technology in two ways, Grid-level and cluster-level.
- ✦ At the Grid level, we have been able to deploy an enhanced matchmaking service instead of developing VO-specific (or even SAMGrid-specific) resource broker
- ✦ At the cluster level, we have enjoyed dealing with the proper abstractions that present a true-Grid, non-dedicated computing cluster with minimal assumptions to our system, which helped factorize our local architecture and simplify deployment elsewhere.
- ✦ This has been made possible by the PPDG collaboration in the USA, specifically between FNAL D0 and UW Condor team
- ✦ Special thanks to our colleagues Alain Roy, Todd Tannenbaum, Peter Couvares.