Esempio di Modellazione mediante DASM: Grid

Sommario

- Definizione Grid per OGSA
  - Funzionalità
  - JEMS
- Stati di un Job e Requisiti
- DASM

Grid secondo OGSA

OGSA

- OGSA = Open Grid Service Architecture
- Definisce un insieme di specifiche che documentano i requisiti delle componenti hw/sw di una Grid

Definizione

- Per gli scopi del corso, una Grid è un insieme di unità computazionali indipendenti, distribuite e cooperanti, in grado di raggiungere uno specifico obiettivo computazionale all'interno di organizzazioni virtuali dinamiche e multi-istituzionali (*)
  - (*) I. Foster, C. Kesselman, and S. Tuecke, "The anatomy of the Grid: Enabling scalable virtual organizations", *Int. J. High Perform. Comput. Appl.*, vol. 15, n° 3, pp. 200-222, 2001

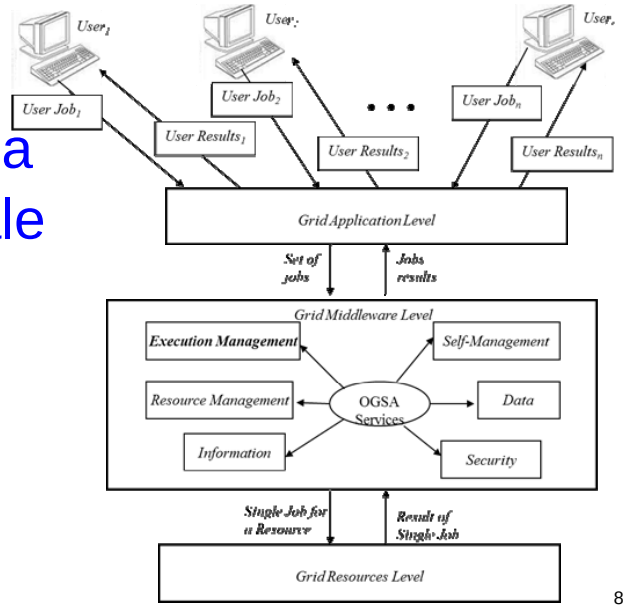
Funzionalità secondo OGSA

- OGSA identifica 6 principali funzionalità di una Grid:
  - Execution Management Services (EMS);
  - Data Services;
  - Resource Management Services;
  - Security Services;
  - Self-Management Services;
  - Information Services
- Per gli scopi del corso è particolarmente interessante EMS

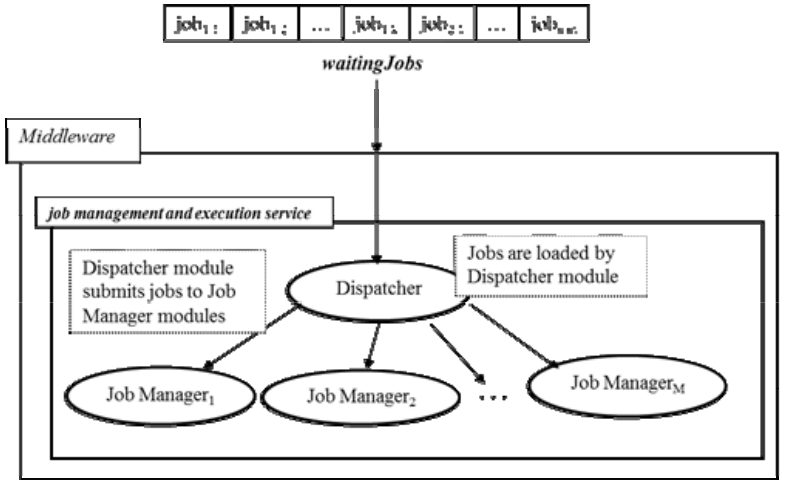
EMS secondo OGSA

- EMS address the job management and execution capability of a grid system and it is concerned with the research of candidate locations for
  - execution
  - preparation for execution
  - initiating and managing the execution of jobs until the end

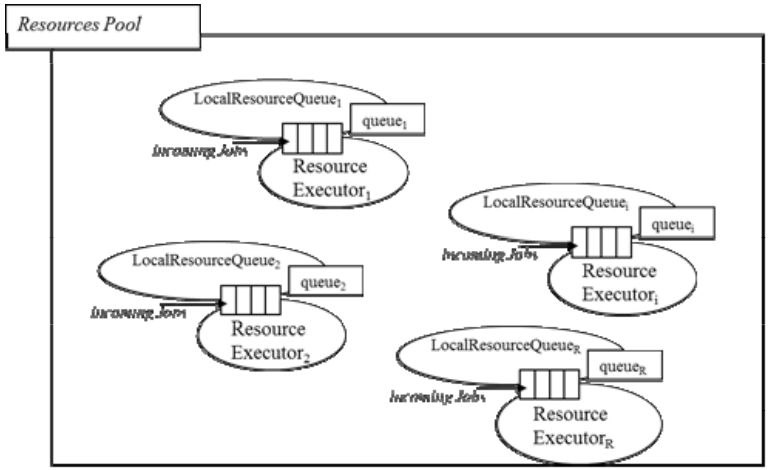
Schema Generale (1)



Schema Generale (2)



Schema Generale (3)



Stati di un Job e Requisiti

Tipi di Job

- Sequenziali / Batch
- Paralleli
- CheckPoint
- Interattivi
- DAG (job con interdipendenze, che possono essere modellati da un Grafo Diretto Aciclico)
- Partizionabili

Stati di un Job (1)

- SUBMITTED:
  - the user has submitted the job via UI
- WAITING
  - the WMS has received the job
- READY
  - A CE, which matches job requirements, has been selected, and the job is transferred to the JSS
- SCHEDULED
  - the JSS has sent the job to the CE

Stati di un Job (2)

- RUNNING
  - the job is running on the CE
- DONE this state has different meanings:
  - DONE (ok) : the execution has terminated on the CE (WN) with success
  - DONE (failure) : the execution has terminated on the CE (WN) with some problems
  - DONE (cancelled) : the job has been cancelled with success

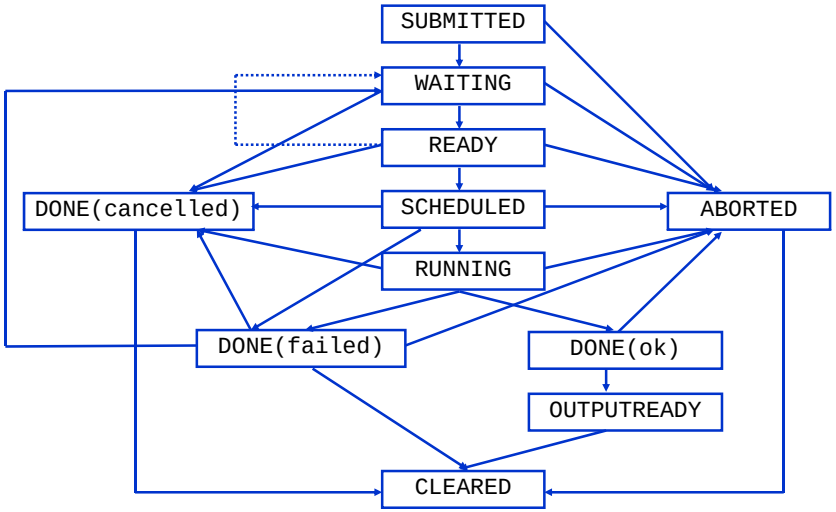
Stati di un Job (3)

- OUTPUTREADY:
  - the output sandbox is ready to be retrieved by the user
  - reflects the time difference between end of computation on CE and the moment WMS got necessary notification about job termination.
- CLEARED:
  - the user has retrieved all output files successfully, and the job bookkeeping information is purged some time after the job enters in this state.

Stati di un Job (4)

- ABORTED:
  - the job has failed
  - The job may fail for several reasons one of them is external to its execution (no resource found).

Diagramma degli Stati



Requisiti (1)

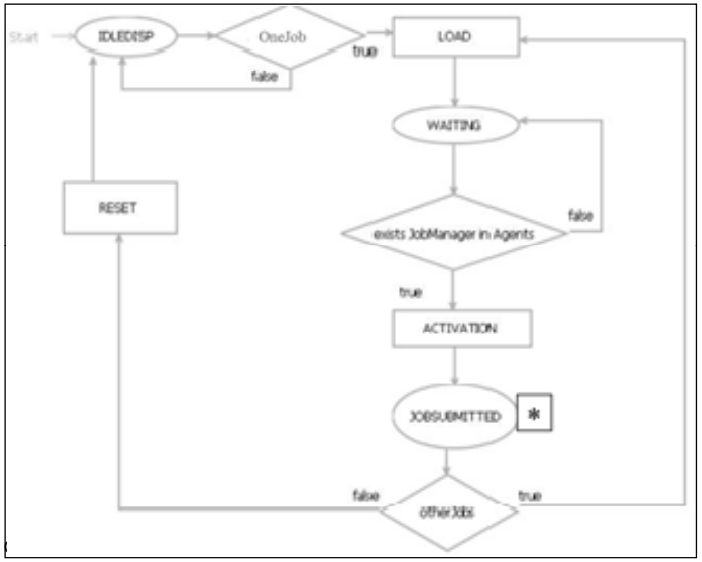
- Req.1 A job can be submitted to the grid; if there is no job, the system remains in a inactivity state.
- Req.2 The grid middleware checks the matchmaking between resources and job constraints before the execution; if there are problems (e.g. lack of memory or of devices, or slow CPU speed, etc.) the system reject the job.
- Req.3 After accepting the job the system runs it.

Requisiti (2)

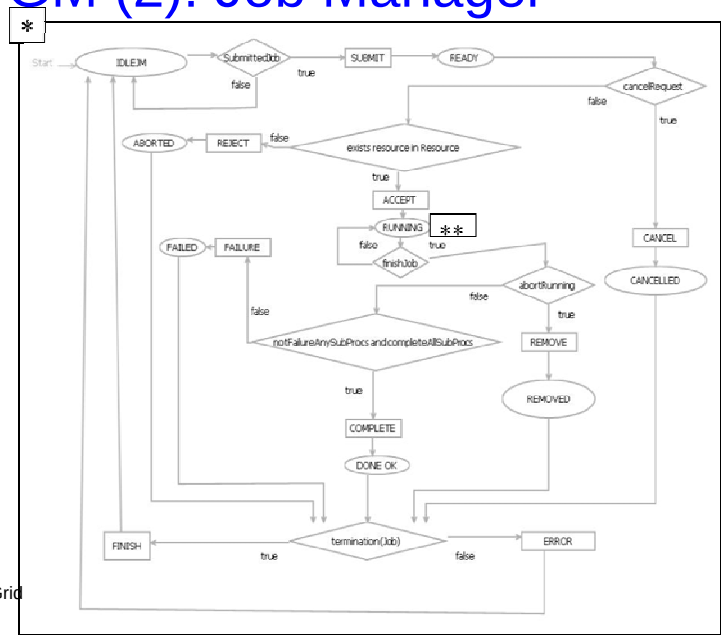
- Req.4 If there are no failures the job is completed; on the other case the job fails.
- Req.5 A user can cancel a job every time.
- Req.6 At the end of the computation (job completed or aborted for every reason) every resource is released.
- Req.7 If software or hardware errors occur the job is aborted.
- Req.8 At the end of every computation the result is communicated to the end user.

DASM

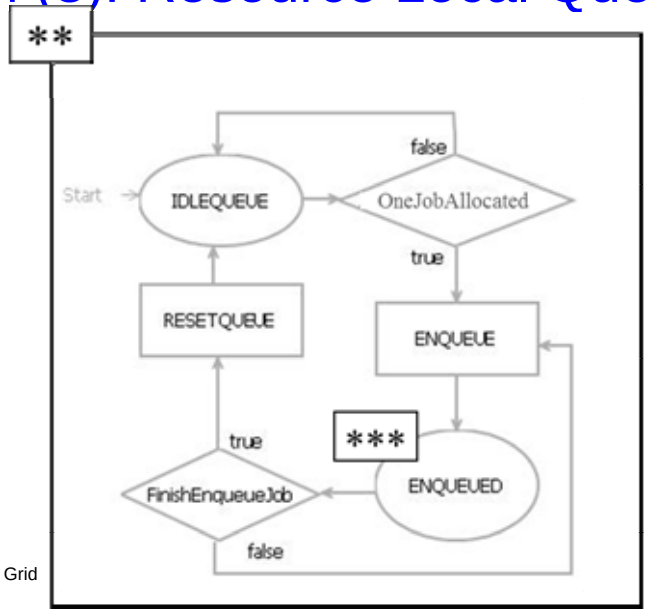
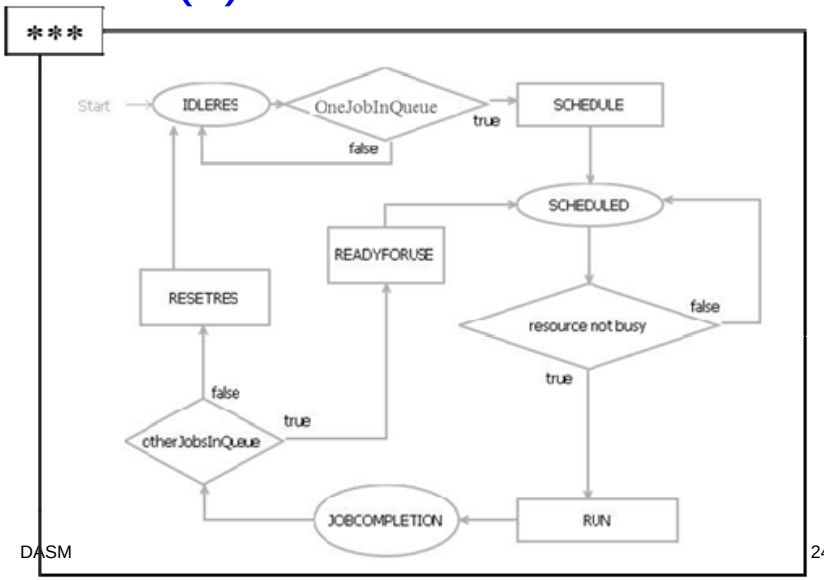
GM (1): Dispatcher



GM (2): Job Manager



GM (3): Resource Local Queue



GM (4): Resource Executor