

Introduzione ai Sistemi Grid

Generalità

- Un sistema Grid permette all'utente di richiedere l'esecuzione di un servizio computazionale, che verrà offerto in modo trasparente da una o più risorse distribuite
- Esistono diverse definizioni, ciascuna che mette in evidenza aspetti diversi

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,

OGSA

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

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

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

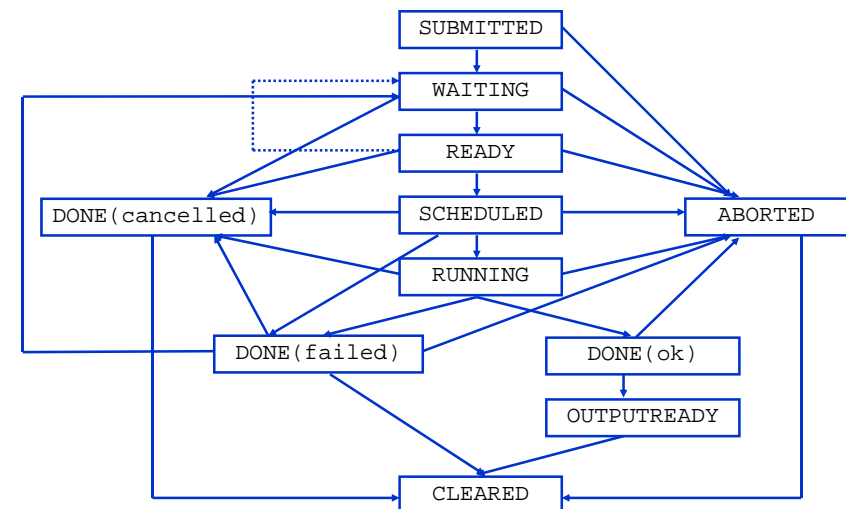
Stati di un Job (3)

- **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.