Submission, monitoring and scheduling of HTC Tasks for bioinformatics applications using Job Submission Tool (JST)

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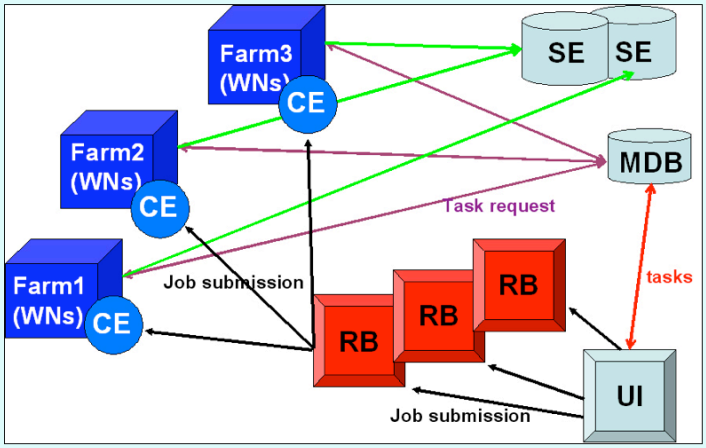
When it is needed to submit a huge number of different job it is important to control them, resubmit the failed jobs etc in the most automatic way. These are requirements typically important in many scientific fields.

Doing this operation manually it is really time consuming, than we build a tool in order to achieve this result.

The tool named Job Submission Tool can be used in order to submit, control, resubmit and manage a huge set of jobs.

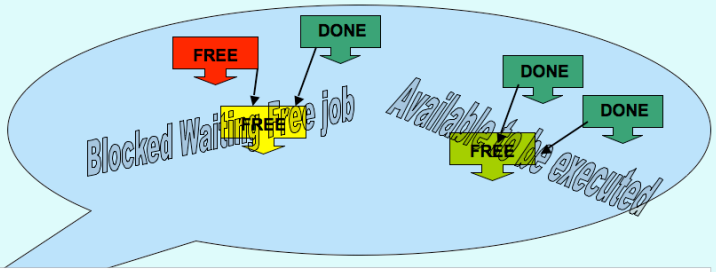


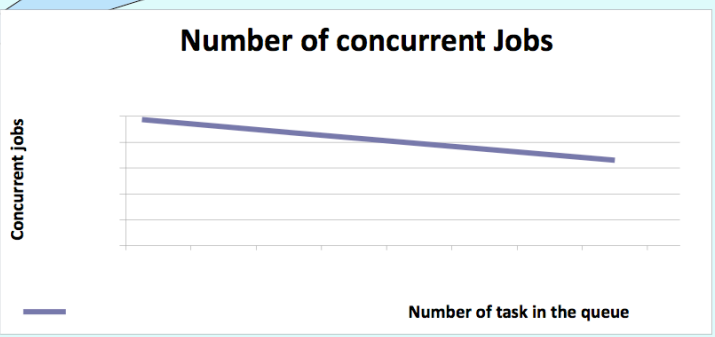
The tool is based on the concept of tasks: the task is a elementary action:

all the atomic tasks were inserted into a monitoring DB (MDB) server that controls the assignment of tasks to the jobs and monitors the job to which that specific task has been assigned

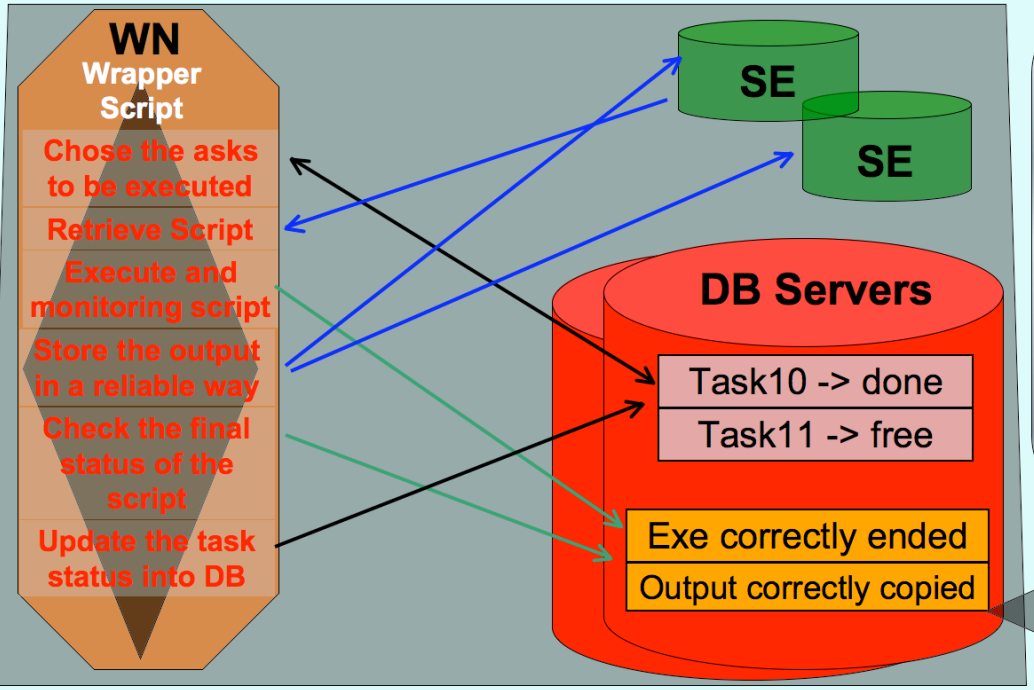
For the proper monitoring of the task assignment and job termination several parameters are associated to each task:

- The status of the task: can be set "Free" (not assigned), "Running" (assigned) and "Done" (job terminated). If the status is "Free" the task can be assigned to a job. Also if the state "Running" was there for more then a fixed time interval, meaning that probably the job has failed, the task can be reassigned to a new job. If the state is "Done" or is "Running" for less then the fixed time interval, the task is ignored during the tasks assignment process.
- The dependencies of each task. It is possible to flag the tasks that need the execution of a different task before its execution. (dependency): only tasks with no dependencies or with all the tasks, from which they depend on, in the "Done" status, can be executed.
- Priority. It is possible to assign an arbitrary priority to each task. Priority is used to select the task that has to be executed first.
- Job provenance. It is possible to know which job has actually performed which task.
- The task description: it can be a string or a link to a specific script to execute, in this way it is possible to better control what is being executed on the WN. As matter of fact, it is possible to change the execution (i.e. if a bug is discovered, or there is a need for a new optimization) also after the submission of the jobs.
- Number of failures. When a task fails, the system logs the event in order to avoid the resubmission of always failing tasks. It is possible to set a maximum number of resubmissions.
- Date and time of execution.





We run several tests, both in a controlled environment and in production using the EGEE infrastructure in order to estimate the scalability of the system



It is very easy to port new applications on the grid using JST, as matter of fact, we have already used it to run on the grid several bioinformatics applications: MrBayes, Aspic, CSTminer, Blast, PAML, Muscle, Biopython, FT Comar …

We used this tool in order to run several challenges with the mentioned applications.

Roughly we have executed job for more than 300 CPU/years

It is possible to use more that one DB server in order to achieve on-line back-up and improved scalability