# SuperB Simulation Production System

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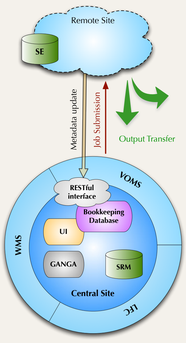
The SuperB asymmetric $e^+e^-$ collider and detector to be built at the newly founded Nicola Cabibbo Lab will provide a uniquely sensitive probe of New Physics in the flavor sector of the Standard Model. Studying minute effects in the heavy quark and heavy lepton sectors requires a data sample of 75 $ab^{-1}$ and a peak luminosity of $10^{36}$ $cm^{-2}$ $s^{-1}$.
The SuperB Computing group is working on developing a simulation production framework capable to satisfy the experiment needs. It provides access to distributed resources in order to support both the detector design definition and its performance evaluation studies. During last year the framework has evolved from the point of view of job workflow, Grid services interfaces and technologies adoption. A complete code refactoring and sub-component language porting now permits the framework to sustain distributed production involving resources from two continents and Grid Flavors.
In this work we will report a complete description of the production system status of the art, its evolution and its integration with Grid services; in particular, we will focus on the utilization of new Grid component features as in LB and WMS version 3. Results from the last official SuperB production cycle will be reported.

## Distributed Architecture & Infrastructure

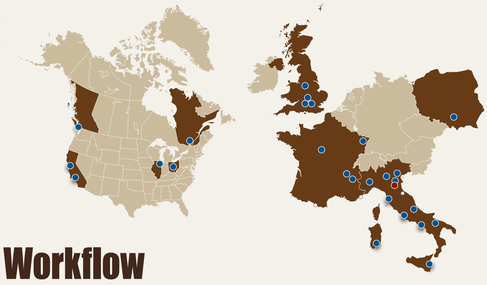



The LHC Computing Grid (LCG) architecture was adopted to provide the minimum set of services and applications upon which the SuperB distributed production system has been built.

Authentication and authorization is provided by VOMS service, LFC is the file catalog, WMS is used for brokering purpose and for Grid flavor interoperability features, transfers are done via Lcg-Utility, GANGA is the submitting interface.

The SuperB distributed computing infrastructure, as of May 2012, includes several sites in Europe and North America, as shown on the map.

EGI and OSG Grid flavour resources have been enabled at present time.

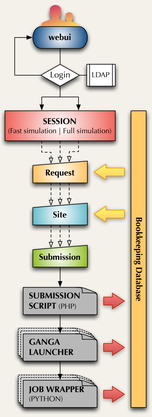


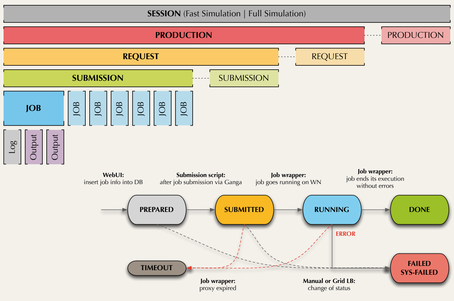
## System Design

The simulation production system heavily relies on a bookkeeping database, storing both application-specific and infrastructure metadata, which is tightly coupled with a Web-based user-interface (WebUI).

The first makes available to the users information on the execution status of jobs and their specific meaning and parameters, and contributes in orchestrating the submission mechanism.

The latter provides job submission management for Full simulation and Fast Simulation, bookkeeping database interactions and basic monitoring functionalities.




The bookkeeping database is implemented with PostgreSQL rDBMS in a centralized way, the WebUI in PHP and JQuery.

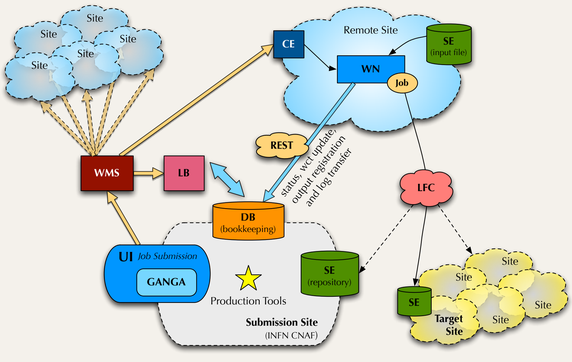
The database interactions with the submission portal and the job in execution on the WNs are managed by a direct interface to PostgreSQL or a RESTful interface (with X509 proxy-certificate cipher-encryption auths), respectively.

## Job Workflow

The structure of services and job workflow follow a semi-centralized design: job management service, bookkeeping database and default storage repository are hosted in a central site.

Jobs executed into remote sites update the bookkeeping database with status, logging and timing information and transfer their output back to central repository or to a predefined site, discriminating on execution metadata.

The system requires a proper configuration of the remote Grid sites.




Bookkeeping metadata are integrated with Grid Logging & Bookkeeping service (LB) information provided by the infrastructure.

In addition, the submission mechanism takes into account sites availability data from Nagios monitoring service.

Simulation jobs are also exposed to the Grid dashboard for monitoring.

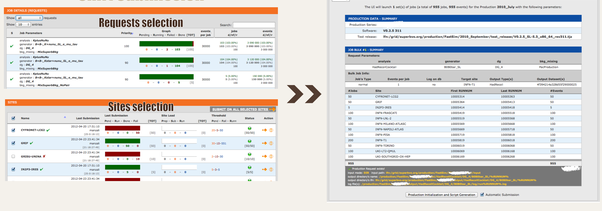
## Web Portal

The WebUI provides separate management for Fast simulation and Full simulation productions. Both sections are divided in configuration, submission and a monitor subsections. Their content is dynamically generated from the bookkeeping database schema and state in order to include the simulation-specific fields.

A production cycle consists of several requests (defined by a specific set of job parameters values and events), which in turn are divided in several submissions, each consisting of several jobs.

A configuration interface for requests definition, per production cycle and simulation type, is provided.

Multi-site submissions based on requests and fine grain parametric submission interfaces complete the set of available services permitting a shift based scheduled session and a debugging specific console, respectively.




The simulation production system has been successfully used in intense production cycles of both Full- and Fast simulation. Several tens of billion simulated events have been produced.

Average failure rate is about 5%, mainly due to executable errors (0.5%), site misconfigurations (2%), and temporary overloading of data repository (2%). The peak performance reached 7000 simultaneous jobs with an average of 3500.

*In a direct test against Dirac submission system, the SuperB non pilot-driven system has shown comparable performances and failure rates w.r.t. Dirac normal mode, despite its smaller footprint. Dirac filling mode, when applicable to SuperB simulation use case, gives equal or better performances, depending on submission mode and rate of SuperB system.*