Distributed computing status and future plans

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Site setup procedure

Wiki reference page:
http://mailman.fe.infn.it/superbwiki/index.php/How_to_Grid/Site_setup

Three main setup procedure steps:

A) the grid site should enable the VO on each Grid element
B) data handling solution validation: LCG-Utils
C) software installation procedure

For each point, the wiki section for simple test exists:
http://mailman.fe.infn.it/superbwiki/index.php/How_to_Grid/Site_setup/Tests

and job based test:
http://mailman.fe.infn.it/superbwiki/index.php/How_to_Grid/Site_setup/Job

Please send an email to list superb-grid-mng@lists.infn.it reporting the site setup status A, B or C to keep track of progress and permit the planning of next step distributed model validation.

Production tool status

Grid submission: GANGA based job submission test

- job data handling tasks successfully tested
  - lfc name space creation, output transfer via lcg-util
- job submission on remote site with data handling successfully tested
- job output merger solution successfully tested

Production tools development (FastSim)

- web production manager tool:
  - used in successful Nov '09 production
- web monitor tool:
  - the jobs update the SBK DB during run time state

See Luca Tomassetti presentation

What is missing to the full Grid DCM

Grid job communication with bookkeeping DB
in a WAN scenario the job should be able to

- Authenticate it self to the DB service
  - GSI compliant authentication via proxy validation
- Creation of a RESTfull based communication service:
  - Frontier and AMGA systems under study

Grid job management

- Retry policy
  - resubmission procedures and error recovery in Grid env
- Grid based monitor system

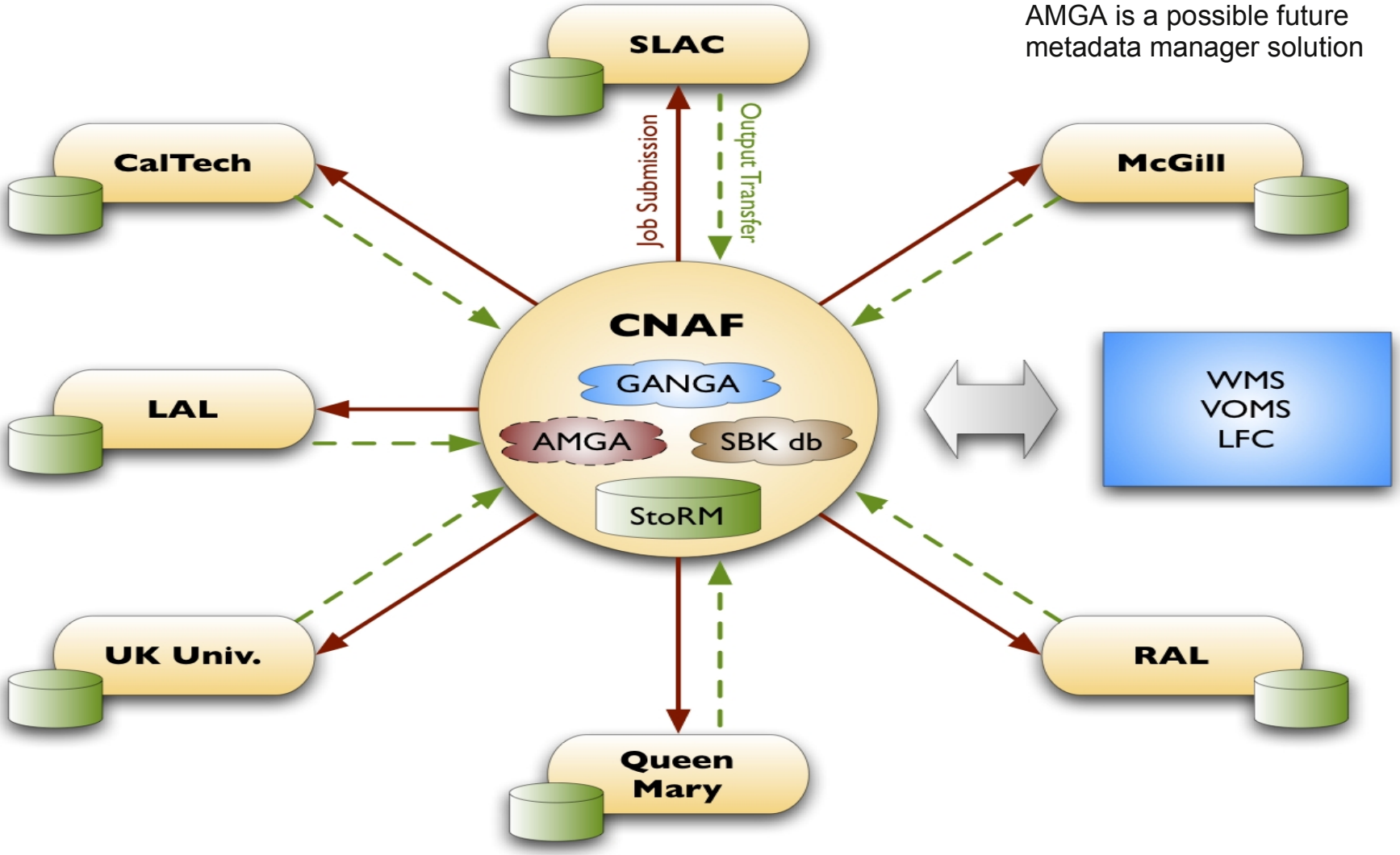
Production design proposals

Next MC productions involve the exploitation of distributed computing resources, two different distributed design systems are proposed:

- the February production distributed system proposal include the installation at remote sites of tools used at CNAF during the Nov '09 test production.
  - the web production interface, local Bookkeeping DB communication, Data handling via direct access to file system
- the setup of a full Grid compliant system will be proposed as solution for April '10 production
  - Full GANGA based job management, Grid Security Interface authentication, central bookkeeping DB communication, data handling via lcg-utils.

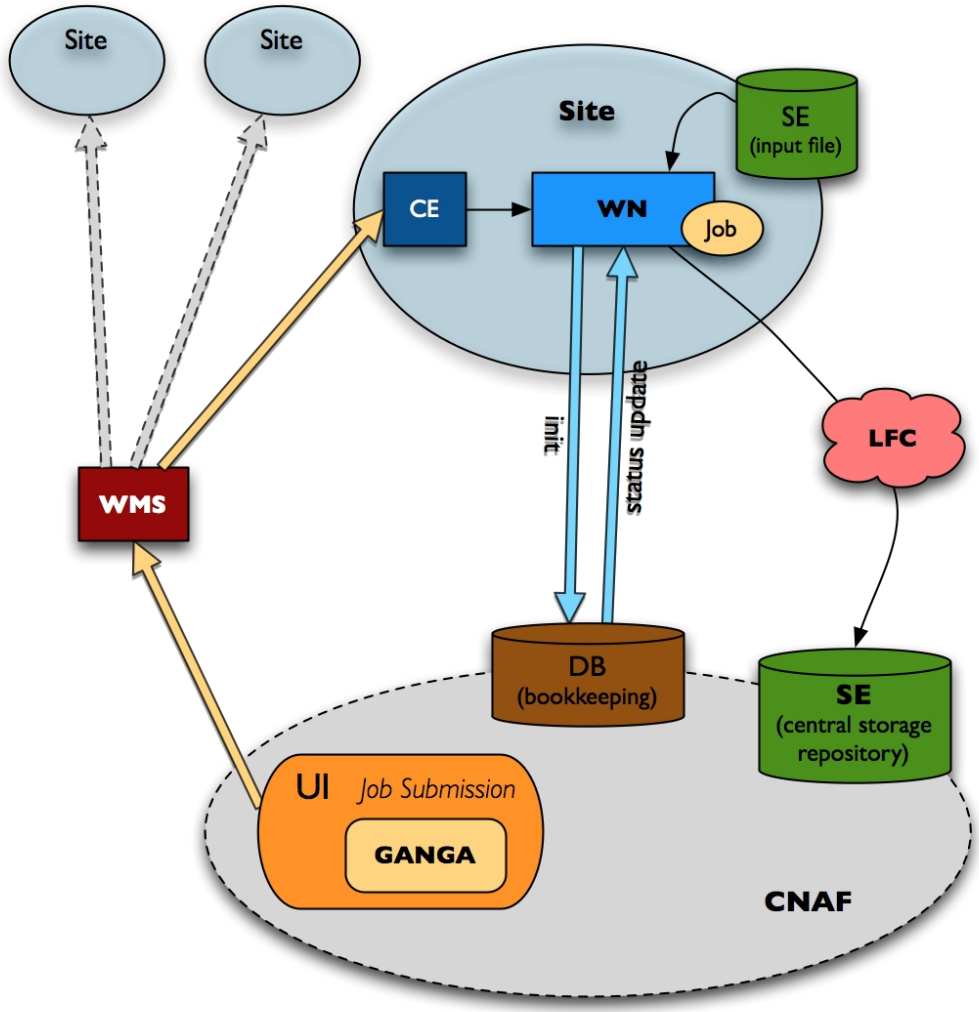
Full Grid integrated production design

AMGA is a possible future metadata manager solution

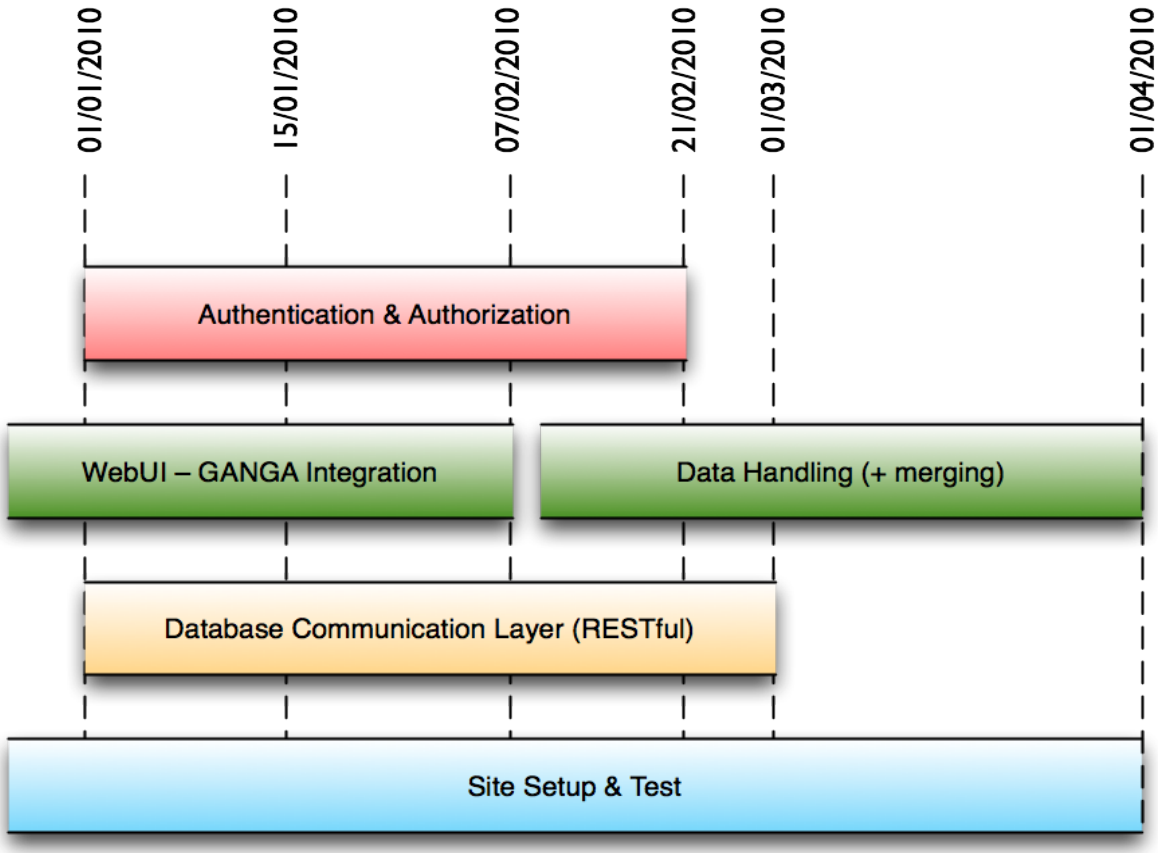


Full Grid integrated production workflow

- The job input files are transferred via
  LCG-Utils to the involved sites
  Storage Elements
- The job submission is performed by GANGA on User Interface at CNAF
- The WMS routes the jobs to the matched sites
- The job is scheduled by the site Computing Element to a Worker Node
- The job during running time
  - accesses the DB for initialization and status update
  - retrieves input files by local Storage Element
  - transfers the output to the CNAF Storage Element



Full Grid integrated production timeline



February production design description

Production system components to be installed at sites:

- Bookkeeping MySQL DB, phpmyadmin as management web interface (optional)
- Apache web server
- PHP 5 scripting language + apache php module
- Web production and monitor interface software (submission to Grid and to batch)

Requirements:

- One server host accessible from worker nodes where the above components should be installed (prod.server@your.site)
- Disk space to contain input production files (local Storage Element)
- Disk space accessible from WN, the output files should be stored in a system five like file system (Eg.: ext3, xfs, jfs, gpfs....). The output files should be copied back to CNAF central storage at end production time.

February production procedure proposal

1) Background files production at CNAF :

- The background files to be used as input for Fast Simulation are produced at CNAF

2) Background files transfer to sites :

- The background files should be transferred to file system accessible from WN

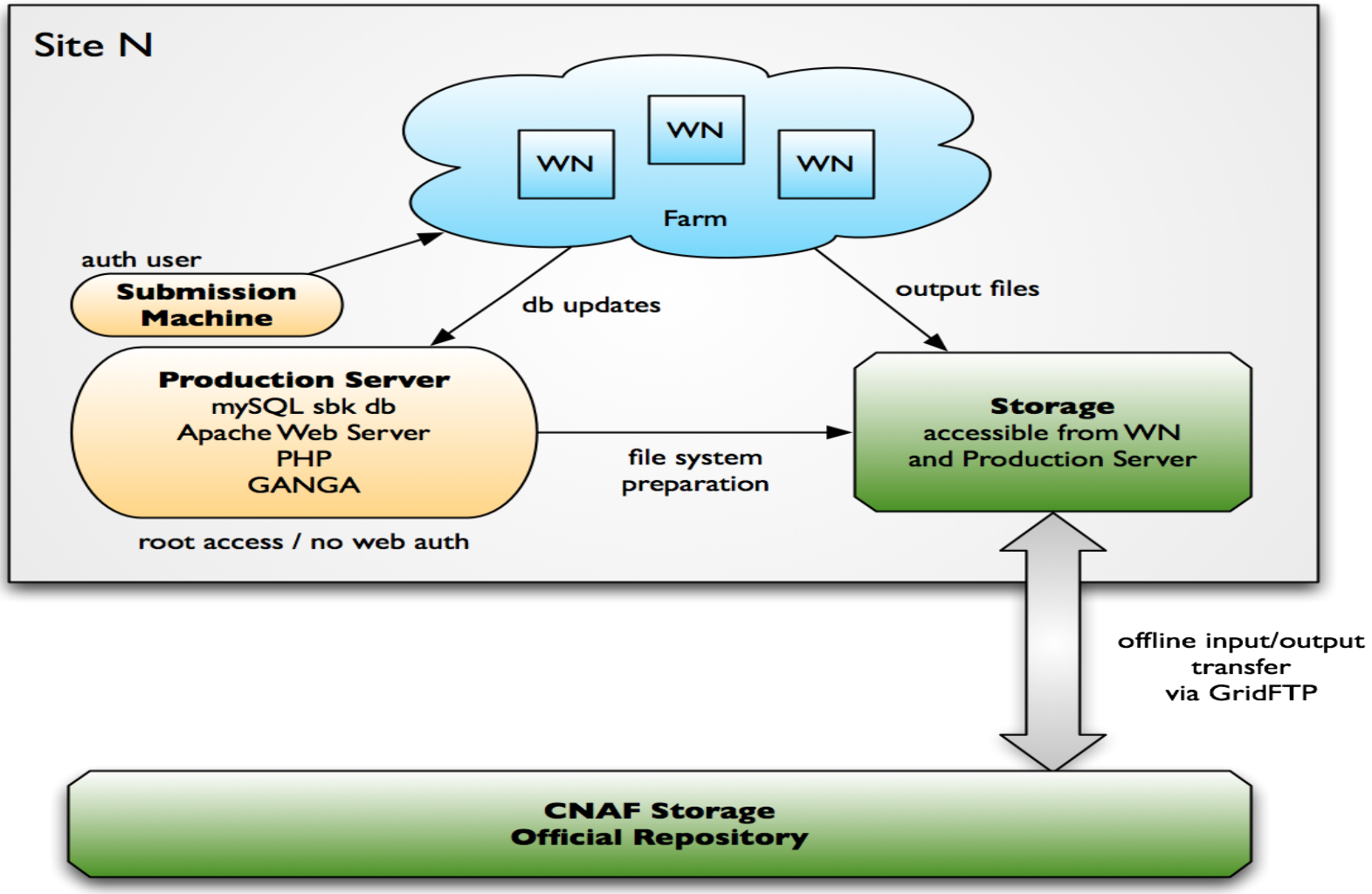
3) Perform the production at sites :

- Use the web User Interface to produce the simulated data
- Store the data into an accessible disk space

4) Output files transfer to CNAF central storage :

- The job output files should be transferred to CNAF

February production procedure proposal



Conclusion & discussion

- The improvement of the actual production system solution moving toward the Full Grid compliant solution is the first point into the to do list.

- What we need to understand/investigate:

- Site resources availability update (CPU, Disk, host)
- sites possible config problems:
  - WN access to disk for accessing r/w input and output files
  - off line files transfer tools

- The site setup procedure is in progress, a new set of requirement should be added to verify the sites capabilities and production system installation procedure

BACKUP Slides

D. C. Proposal II, service description

WMS - Work Load Manager:
- able to manage jobs across different Grid flavors: OSG, EGEE, ARCH
- job routing, bulk submission, retry policy, prologue-job-epilogue structure

LFC - LCG File Catalog:
- file name space manager, map Logical File Name in more replica PFN
- E.g.:/superb/cnaf/2009_July/FastSim/DG_1/B0B0bar_generic/200/s2b.root

LCG-Utils
- data handling LFC compliant, file transfer between SEs, replica manager

GANGA
- Job manager, multi platform (LSF,gLite,Condor,,), job monitor, easy to use
- Wiki: http://mailman.fe.infn.it/superbwiki/index.php/How_to_Grid/How_to_GANGA

SRM (StoRM at CNAF) – Storage Resource Manager V2
- LCG-Utils and LFC compliant, on top of heterogeneous storage systems

Tests with GANGA

- The tests submitted are:
  - Hello World
  - Input/Output Sandbox
  - DataRequirements (with config.LCG.DataRequirements and the lcg-utils)
- The backends where the tests were submitted are:
  - Local
  - LSF
  - LCG (Grid)

Merging

GANGA has different merging tools:

- MultipleMerger
- SmartMerger
- **RootMerger**
- TextMerger
- CustomMerger

During the realization of the job we can integrate some custom functions for the merging of root files (like MergeBkgFiles_C.so);

Custom merging function and sandbox, example

ganga.gpi

```
j=Job()
j.backend="LSF"
j.application=Executable(exe=File('script_for_GANGA_SAND.sh'),args=[])
j.inputsandbox=['InputForFastPatch.root','InputForFastPatch2.root','InputForFastPatch3.r
oot','InputForFastPatch4.root','list.txt','MergeBkgFiles_C.so','merge.C']
j.name="RootLSF_SAND"
j.outputsandbox=['merged.root']
```

script_for_GANGA_SAND.sh

```
#!/bin/sh
root -l hello.C
```

merge.C

```
{
gSystem->Load("MergeBkgFiles_C.so");
MergeBkgFiles("list.txt","merged.root");
}
```

LFC structure

The structure of the LFC for SuperB is

- /grid/
  - superbvo.org/
    - caltech
    - cnaf
    - lal
    - lyon
    - mcgill
    - queenmary
    - ral
    - slac
    - test <== directory used for DH test

Every site has its own name space in /grid/superbvo.org

LCG-utils, most used commands 1/2

- Copy and register a file from localhost to the grid:

```
lcg-cr -v -d t3-srm-01.pd.infn.it -l
  lfn:/grid/superbvo.org/test/<file>
  file:$PWD/<file>
```

- Copy a file from the grid to localhost (used also in the prologue of the job for copying the file from LFC to the Worker Node:

```
lcg-cp -v --vo superbvo.org
 lfn:/grid/superbvo.org/test/locale.txt
 file:$PWD/locale.txt
```

LCG-utils, most used commands 2/2

- Replicate a file from an SE to another:

```
lcg-rep -v --vo superbvo.org -d
  storm02.cr.cnaf.infn.it
  lfn:/grid/superbvo.org/test/<file>
```

Example:

```
#!/bin/sh

lcg-cp -v --vo superbvo.org  lfn:/grid/superbvo.org/test/locale.txt file:$PWD/locale.txt

cp locale.txt ganga_out.txt

echo 'And now...' >> ganga_out.txt
echo 'I am: ' `whoami` >> ganga_out.txt
echo 'My hostname is: ' `hostname` >> ganga_out.txt
echo 'My pwd is: ' `pwd` >> ganga_out.txt


lcg-cr -v -l lfn:/grid/superbvo.org/test/ganga_out.txt -vo superbvo.org file:$PWD/ganga_out.txt
```

Job centric model, step by step

WMS permits to structure the job execution in a three steps procedure:

Prologue - script to be executed before the job start:
- Check the environment – retry policy instance
  - Software availability, services availability, r/w permission on SE, DB access...
- Read from SBK DB job info (http), configuration file creation (eg: MAC,..)
- Fast Sim case: copy the input files (Bkg, Geom) from ClosestSE to Job workspace

Job script – the container of simulation executable:
- Internal checks, Simulation execution
- FullSim case: the job input files (Bkg, Geometry) is transferred via input sandbox

Epilogue - script to be executed after the job completion:
- Check log/err file – retry policy instance
  - Success: Transfer the log, err, output.root to CNAF StoRM (via lcg-utils)
  - Fail: retry submission policy
- Update the SBK DB

GANGA

- Is an easy-to-use frontend for job definition and management
- Allows trivial switching between testing on a local batch system and large-scale processing on Grid resources.
- Is installed in: `/storage/gpfs_babar6/sb/ganga`
- It can be launched with:
- `/storage/gpfs_babar6/sb/ganga/install/5.4.0/bin/ganga`
- Is configured by the file:

  `~/.gangarc`

D. C. Proposal II, workflow

Data management:

- The input files for Fast Sim (Bkg and Geometry) replicated on all the sites
- The WMS accepts bulk submition within 4000 jobs a time
- LCG-utils transfer based has no limit in file size, sandbox limit = 100MB

1) **Production initialization via web interface:**
   - Fill a form with prod parameters (Prod Series, Geometry, Generator...)
   - Submit the form:
     - SBK DB data insertion (status = prepared)
     - Ad-hoc GANGA macro script creation

2) **Launch the GANGA submission via web or via GANGA interface**
   - Monitor I: use GANGA GUI interface to monitor the job status
   - Monitor II: use the web monitor SBK DB based + Data Handling mon

GANGA: job management frontend

http://mailman.fe.infn.it/superbwiki/index.php/How_to_Grid/How_to_GANGA

GANGA has been installed at CNAF accessible on ui01-lcg.cr.cnaf.infn.it
Features of interest:

- bulk submission
- job output merging
- job monitor via GUI interface, text
- multiple backends: LFC, Condor, gLite..

How to Grid/How to GANGA

Contents [hide]

Example 1/2

This is an example of a submission of a job via GANGA in Grid (LCG backend) specifying the CE. The job uses the DataRequirements attribute:

```
/storage/gpfs_babar6/sb/ganga/bin/ganga -i data.gpi
```

data.gpi

```
j=Job()
j.backend='LCG'
j.application=Executable(exe=File('jobscript.sh'), args=[])
j.outputsandbox=['ganga_out.txt']
j.backend.CE='t3-ce-01.pd.infn.it:2119/jobmanager-lcglsf-superbvo'
config.LCG.MatchBeforeSubmit='False'
config.LCG.DataRequirements = '[ DataCatalogType = "DLI"; DataCatalog =
"http://lfcserver.cnaf.infn.it:8085"; InputData = {"lfn:/grid/superbvo.org/test/locale.txt" };]'
config.LCG.RetryCount='1'
config.LCG.ShallowRetryCount='2'
j.submit()
```

Example 2/2

jobscript.sh

```
#!/bin/sh

lcg-cp -v --vo superbvo.org  lfn:/grid/superbvo.org/test/locale.txt file:$PWD/locale.txt

cp locale.txt ganga_out.txt

echo 'And now...' >> ganga_out.txt
echo 'I am: ' `whoami` >> ganga_out.txt
echo 'My hostname is: ' `hostname` >> ganga_out.txt
echo 'My pwd is: ' `pwd` >> ganga_out.txt


lcg-cr  -l lfn:/grid/superbvo.org/test/ganga_out.txt --vo superbvo.org file:$PWD/ganga_out.txt
```