

FKPPL Virtual Organization : Goal and Status

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On behalf of Grid Computing collaboration

Grid Computing Project @ FKPPL

- **Participating Organizations**
 - CC-IN2P3 and KISTI
- **Group Leaders**
 - Dominique Boutigny, Director of CC-IN2P3, France
 - Soonwook Hwang, KISTI, Korea
- **'08 Budget**
 - France: 5000 Euro
 - Mainly traveling cost supported by IN2P3
 - Korea: 12.500,000 Won
 - Traveling cost and some computing resources supported by KISTI e-Science Project
- **Common Interest**
 - Joint research and development on grid operation & management
 - Collaboration on ALICE computing: CC-IN2P3 (Tier1) and KISTI (Tier2)
 - Co-operation and management of a production-level grid testbed to foster Grid applications development

What has been done in 2008?

- **FKPPL VO Grid Testbed has been constructed, co-operated and managed by KISTI and CCIN2P3**
- **KISTI-CCIN2P3 Workshop on Grid computing was held at KISTI on December 1-2, 2009**



KISTI-CCIN2P3 FKPPPL Workshop

December 1, 2008



Conference Room 2, KISTI



Discussion @ FKPPL Workshop (1/2)

- **ALICE Tier1/Tier2**
 - Contact Federico at CERN first and discuss more later on
- **Network**
 - Set up some monitoring and connection between KISTI and CC-IN2P3
 - Could be a long-term plan
- **CDF farm**
 - Contact person for computing
 - Catalin in LPNHE
 - Will have a short meeting at FKPPL Workshop 2009 in Lyon
- **FKPPL VO**
 - Users
 - HEP communities in Korea
 - Participants to FKPPL scientific projects
 - Applications
 - MD in WISDOM
 - Geant4 applications
 - Education & Training testbed
 - Make announcement of the opening of FKPPL VO at the FKPPL workshop 2009 in Lyon

Discussion @ FKPPL Workshop (2/2)

- **Support for parallel applications**
 - CC-IN2P3 will set up a special farm for supporting parallel applications by the end of the second semester 2009
 - Is part of KISTI supercomputing facility allowed to be used for support for parallel applications?
 - This is something we should clarify later on
- **Grid interoperability**
 - Sylvan is interested in KISTI's involvement in the plug-ins for Gridway with JSAGA
 - KISTI will investigate the possibility of using JSAGA as a framework for Grid interoperability
 - Website: <http://grid.in2p3.fr/jsaga>
- **FKPPL Workshop 2009 in Lyon (Feb. 25-27)**
 - All LIA projects will be presented at the workshop
 - 2009 FKPPPL projects will be announced
 - LIA SC meeting will be followed next day (Feb. 27)
- **Dominique suggested that we might have an internal meeting to have follow-up discussion on Grid right before the FKPPPL Workshop 2009 in Lyon.**

FKPPL VO Grid Testbed

Objectives

- Initial

Provide a production grid environment to new grid users (e-science summer school 2008).

- Long term

Provide a computing platform for FKPPL scientific applications and experiments.

Progress

- **2008.8.30**
 - "fkppl.kisti.re.kr" VO registration done
- **2008.9.15**
 - UI and VOMS Installation and configuration done
- **2008.9.30**
 - WMS/LB Installation and configuration done
- **2008.10.10**
 - SE configuration done
- **2008.10.15**
 - **FKPPL VO Services Opened officially**
 - A FKPPL Wiki site Open
 - http://anakin.kisti.re.kr/mediawiki/index.php/FKPPL_VO
- **2008.11**
 - Geant4 applications has been deployed on FKPPL VO in collaboration with National Cancer Center in Korea

Configuration

- KISTI site

VOMS, WMS, CE+WN*, SE, UI, Wiki

** Infrastructure installation in progress (a cluster of 128 CPU cores has been purchased)*

- CC-IN2P3 site

CE+WN, SE, LFC

Configuration

- VO Registration procedure

- VO name: **fkppl.kisti.re.kr**
- VO manager: **Sunil Ahn**
- Status: **Active**

Status (Operational Services)

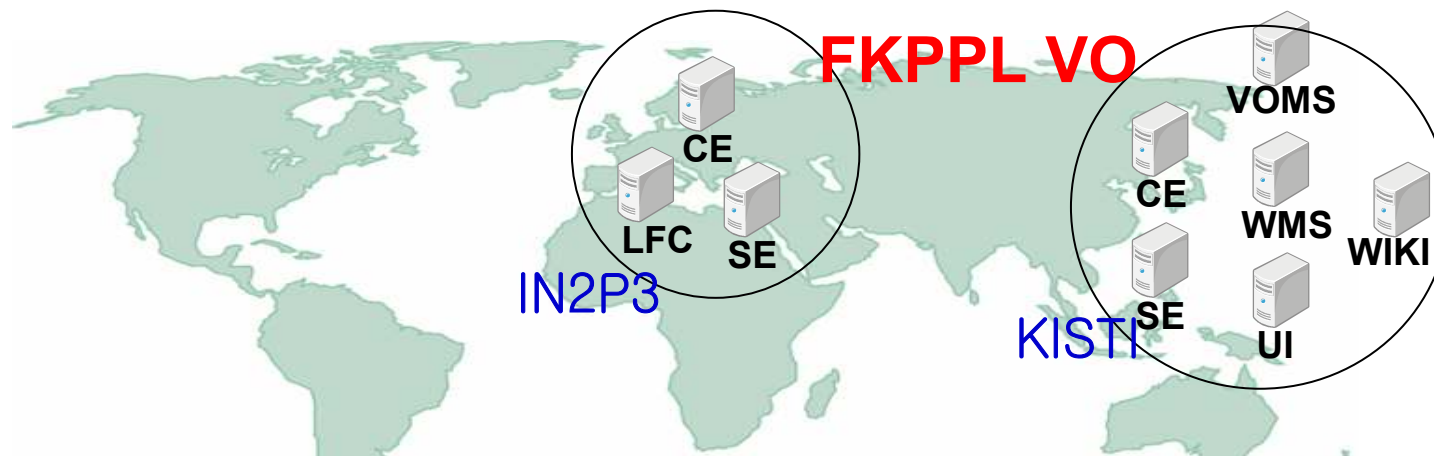
KISTI site:

- VOMS *OK*
- WMS *OK*
- CE *OK*
- WIKI *OK*
- SE *OK*
- WN* *in Progress*

CC-IN2P3 site:

- SE *OK*
- dCache/SRM *OK*
- WN *OK*
- CE *OK*
- LFC *OK*

FKPPL Testbed



Service	Host	Site
UI	kenobi.kisti.re.kr	KISTI
VOMS	palpatine.kisti.re.kr	KISTI
WMS/LB	snow.kisti.re.kr	KISTI
SE	ccsrm02.in2p3.fr (0.5TB)	CC-IN2P3
	hansolo.kisti.re.kr (1.5TB)	KISTI
CE	cclcgceli03.in2p3.fr (5000 CPU cores)	CC-IN2P3
	darthvader.kisti.re.kr (100 CPU cores)	KISTI

Available Services

Job Submission

- Available since October, 2008
- Resource allocation: 5 millions hours CPU SI2K
- CC-IN2P3 Job monitoring
 - Quality of Service
 - Operation team

Available Services

Data storage

dCache SE/SRM

- System for storing and retrieving data, distributed among a large number of heterogeneous server nodes.
- Implements the SRM v2.2 interface
 - required EGEE/LCG
- Resource allocation: 0.5 Terabytes

Utilisation - Services

Jobs Submission

- October
 - 34 jobs for 150 hours CPU SI2K
- November
 - 1690 jobs for 48250 hours CPU SI2K
- December
 - 1721 jobs for 46,410 hours CPU SI2K
- January
 - 304 jobs for 1,859,640 hours CPU SI2K
- February
 - 1274 jobs for 7,166,390 hours CPU SI2K
- Total:
 - **5025 jobs** for **9,118,850** hours CPU SI2K

Utilisation - Services

- **Data Storage**

- 7193 files for 60 G bytes of used space
 - 440 G bytes available.

User Support

- **FKPPL VO Wiki site**
 - http://anakin.kisti.re.kr/mediawiki/index.php/FKPPL_VO
- **User Accounts on UI**
 - 20 User accounts has been created
- **FKPPL VO Membership Registration**
 - 13 Users have joined FKPPL VO membership

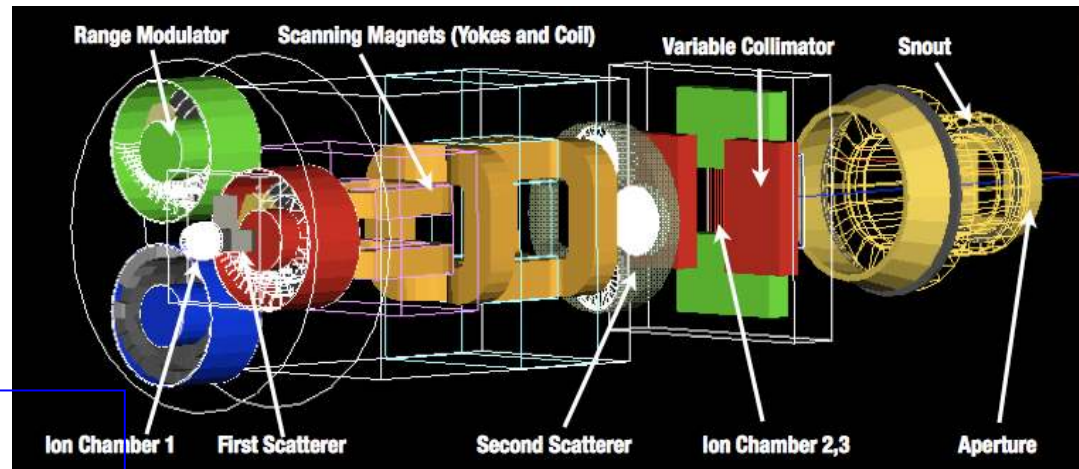
FKPPL VO Usage

- **Deployment of Geant4 applications on FKPPL VO**
 - Detector Simulation Toolkit
 - Working with Jungwook Shin at National Cancer Center, who was one of the e-Science Summer School Students
- **Grid Interoperability Testbed**

Geant4 Application: GTR2_com

- Application name: GTR2_com (G4 app for proton therapy sim s/w developed by NCC)
 - > GTR2 : Gantry Treatment Room #2, com: commissioning
(now GTR2 simulation code is under commissioning phase)
 - > libraries: Geant4 , root (root.cern.ch) as simulation output library

user macro

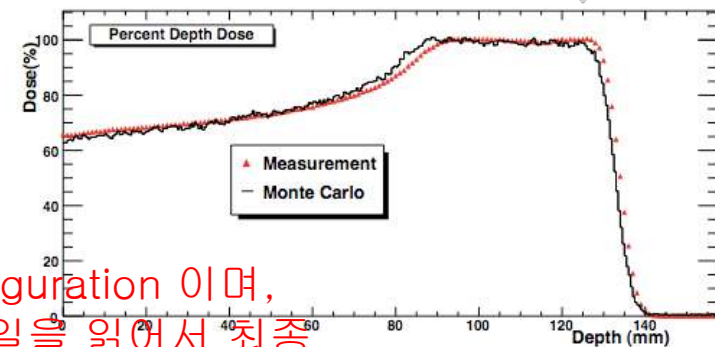


output

```

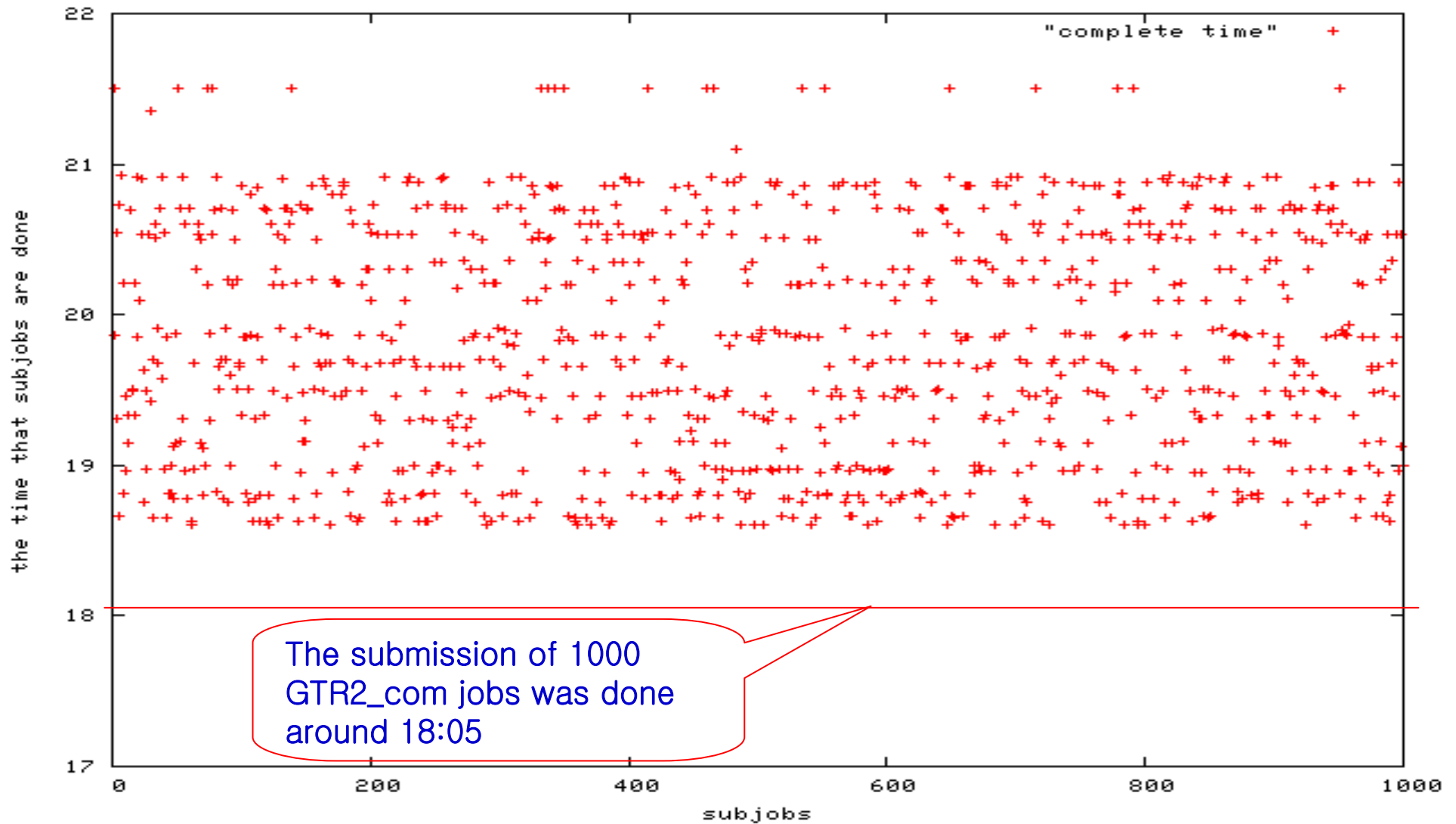
/user/io/OpenFile root B6_1_1_0.root
/GTR2/SNT/type 250
/GTR2/SNT/aperture/rectangle open
#Geant4 kernel initialize
/run/initialize
/GTR2/FS/lollipops 9 5
/GTR2/SS/select 3
/GTR2/RM/track 5
/GTR2/RM/angle 80.26
/GTR2/VC/setVxVy cm 14.2 15.2
/beam/particle proton
/beam/energy E MeV 181.8 1.2
/beam/geometry mm 3 5
/beam/emittance G mm 1.5
/beam/current n 3000000 #SOBP
/beam/bcm TR2_B6_1 164
/beam/juseyo
/user/io/CloseFile
    
```

GTR2_com



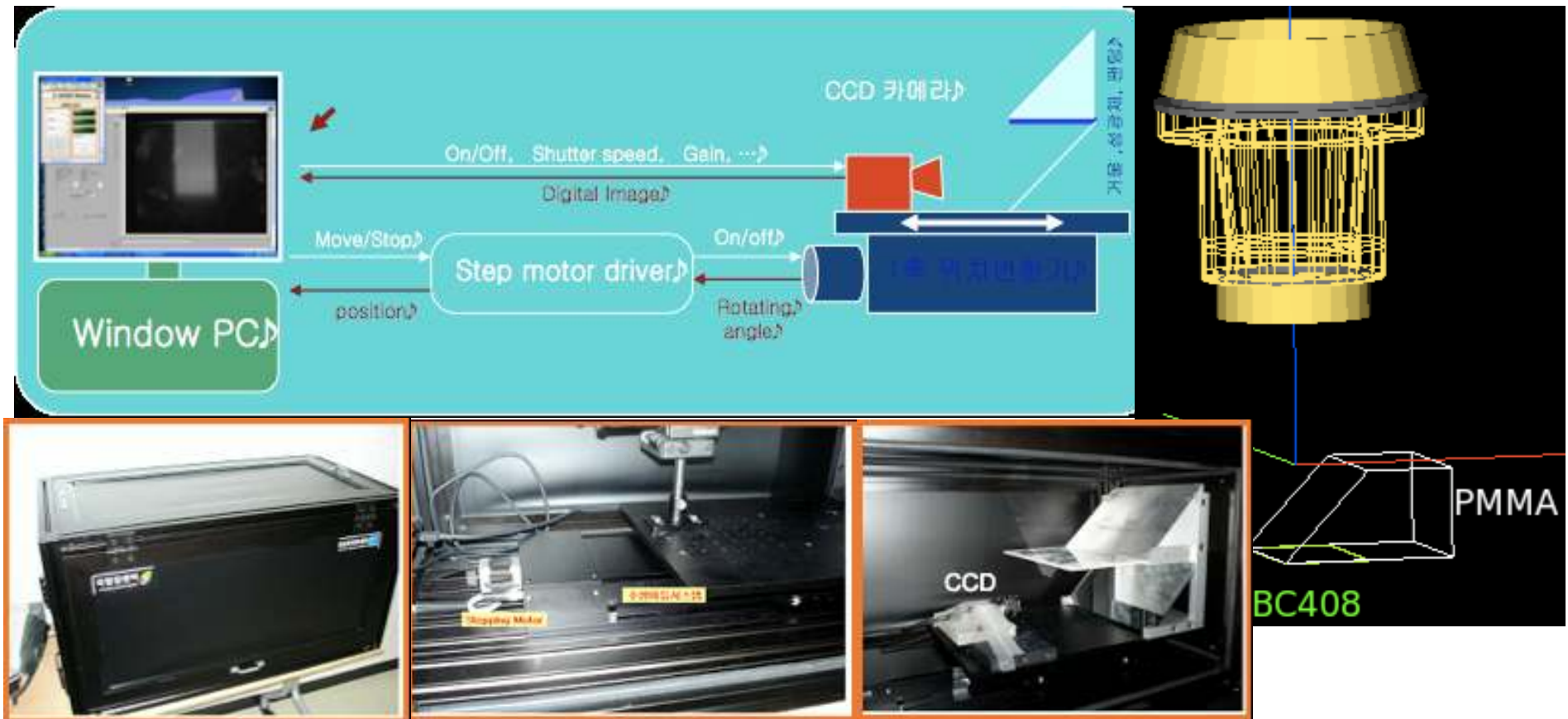
GTR2_com 의 input은 nozzle의 configuration 이며,
 이 configuration 이 명시된 macro 파일을 읽어서 최종
 양성자 빔에 의한 선량분포를 3D-histogram 의 root 파일로 출력

Distribution of the completion time of 1000 GTR2_com jobs on FKPPL VO



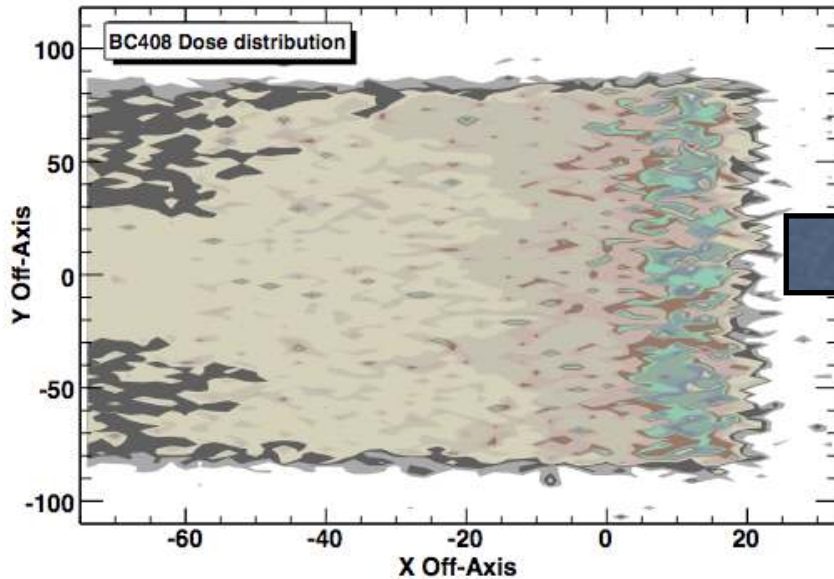
BC408 M.C study

- Purpose : the accurate simulation study will help to design and construct a dosimetry device utilizing the BC408 scintillator

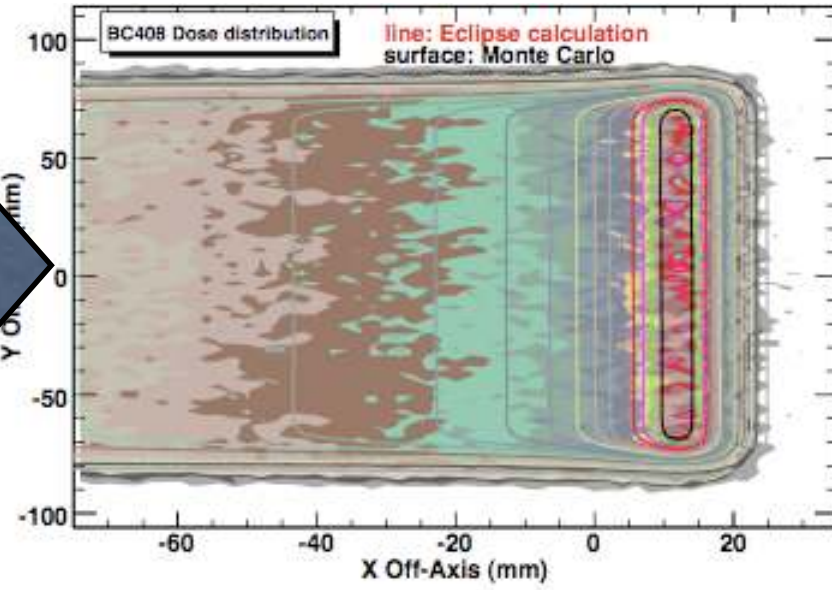
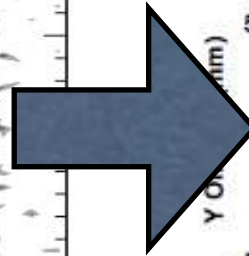


BC408 M.C on FKPPPL

resolution : **2mm** in X,Y and **1mm** thicknes



From 1 file, ~3.5 hrs on WN of FKPPPL



From 589 files, 589 files sucessfully generated among total 99*7 (693) jobs

Trial #	Total job	Completed	Err
1	99	65	34
2	99	66	33
3	99	99	0
4	99	98	1
5	99	84	15
6	99	80	19
7	99	97	2
	693	589	104

I immediately submit parametric job after initializing the proxy

BC408 M.C on FKPPL

What was the last standard output of crashed jobs?

- Case A. Terminated after generating Geant4 Tracking error :

(more investigation is required)

- Case B. Terminated after generating Geant4 Tracking warning :

(I don't think this is the reason, more investigation is required too)

- Case C. Failed loading libpcre.so.0 (perl regular expression) library : **7/104**

hosts (ccwl0703, ccwl0707, ccwl0710, ccwl0715, ccwl0719, ccwl0721, ccwl0730)

- Case D. Proxy expired : **3 /104**

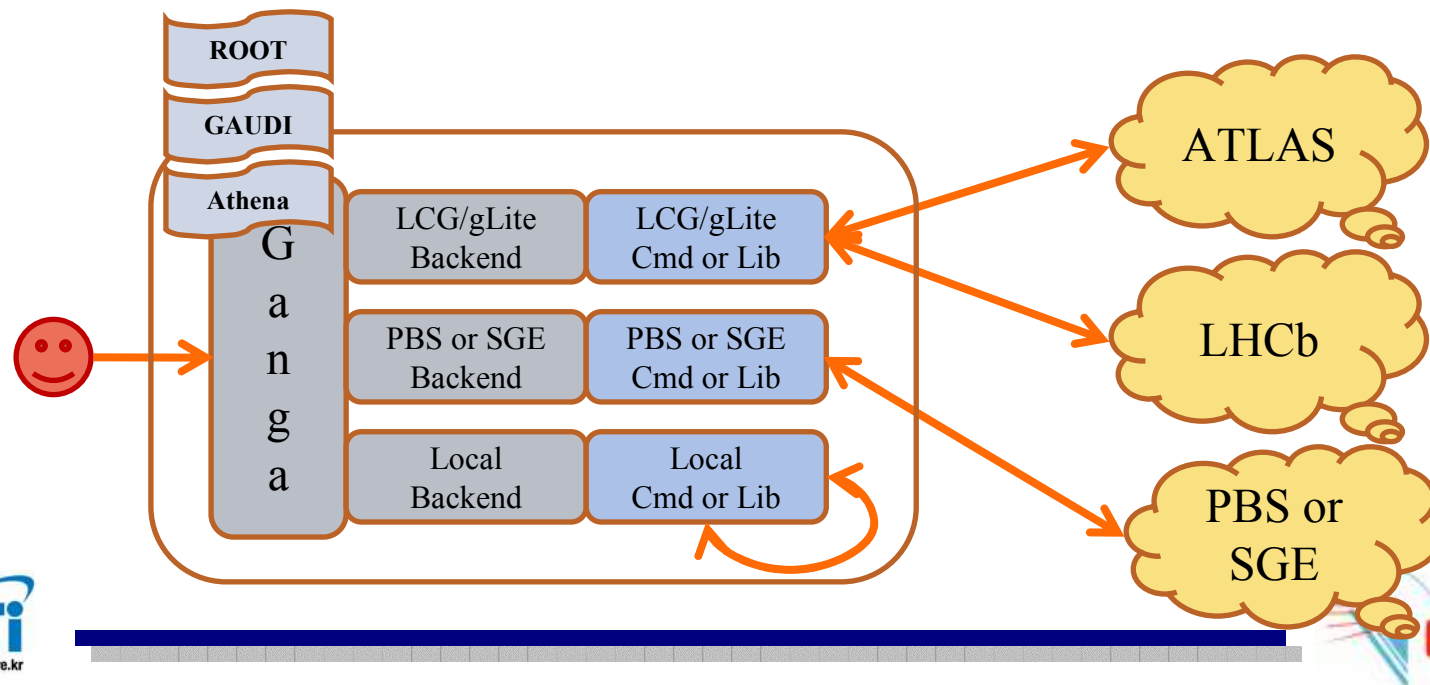
- Case E. without error messages : **58/104**

Grid Interoperability Research on FKPPL

- **Multiple Grid Infrastructures available**
 - EGEE (gLite), PRAGAM, OSG, TeraGrid (Globus), DAISA(Unicore), etc.
 - Users **have to learn commands or tools for each grid infrastructure**
 - **Not easy to use resources across multiple Grids**
- **Our Goal**
 - **High-level Tools that enable the use of as many as grid resources possible from multiple grid infrastructures without having to know the details of each grid middleware**
- **Our Approach**
 - Chose to use the GANGA as a high-level tool for job execution management exploiting multiple Grid infrastructures
 - Chose to use the WISDOM as a target application

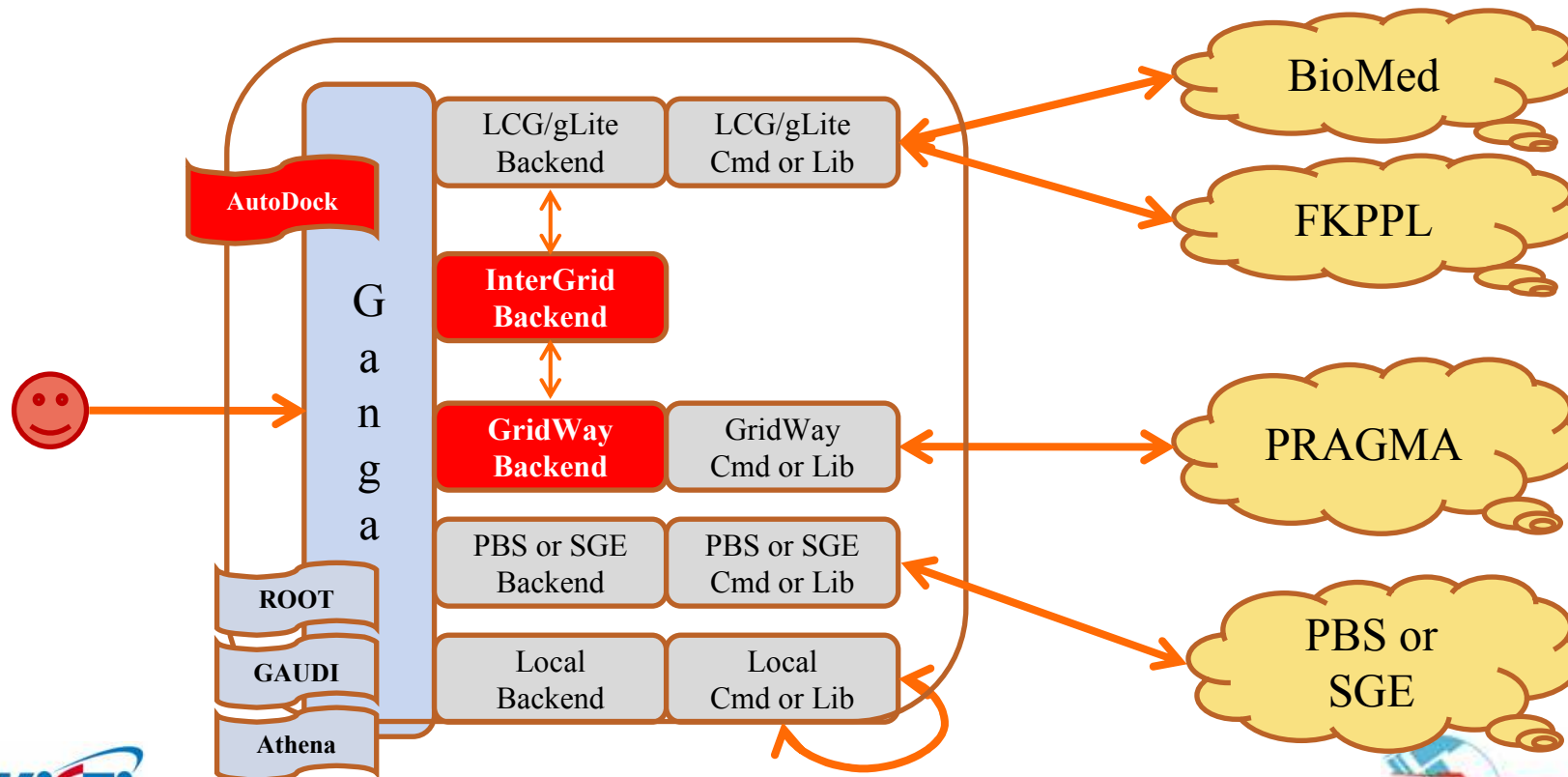
GANGA

- **easy-to-use user interface for job submission and management**
 - Implemented in Python: Interactive shell or Script files
 - Use **python syntax** to submit a job
- **provide a plug-in mechanism for multiple execution back ends (e.g., Grid, Batch and Local) and applications (e.g., ROOT, GAUDI and Athena)**
 - easily extended and customized to meet the needs of different user communities
- **Currently, support only the LCG/gLite backend for Grid, not Globus backend**



New Plug-ins Development in GANGA

- Have developed new plug-ins to GANGA to support:
 - AutoDock applications
 - GridWay backend
 - InterGrid backend



New Plug-ins Development in GANGA

- **AutoDock Application**
 - Customize configuration for running autodock applications on the grid
 - *LigandSplitter* is provided for splitting ligand-protein docking jobs on the grid
- **GridWay Backend**
 - Have access to Globus resources
- **InterGrid Backend**
 - Have access to both LCG/gLite and Globus resources
 - Intelligent resource selection
 - Based on load on Grid

EXAMPLE

- Multiple AutoDock Jobs (*LigandSplitter*)

```
horn@cloud:~/ganga_autodock
In [1]:!cat autodock_inter_split.py
#!/usr/bin/python
j=Job()
j.application=Autodock()
j.application.exe="/bin/sh"
j.application.script="/home/horn/ganga_autodock/autodock.sh"
j.application.binary="/home/horn/ganga_autodock/autodock.tar.gz"
j.application.protein="/home/horn/ganga_autodock/1u2y.tar.gz"
#j.application.ligand="/home/horn/ganga_autodock/ligands/9004736_1.pdbq"
j.application.parameter="/home/horn/ganga_autodock/dpf3gen.awk"
j.splitter=LigandSplitter()
j.splitter.ligandDir="/home/horn/ganga_autodock/ligands/"
j.backend=InterGrid()
j.backend.targetBackends=["LCG","Gridway"]
j.submit()
```

Experiments

- **Performance Evaluation**

		100 Jobs	1000 Jobs
FKPPL	Submission Time	8m 50s	79m 22s
	Success Percentage	100%	98.90%
Biomed	Submission Time	237m 39s	X
	Success Percentage	55%	X

- gLite supports bulk (faster) submission
 - Splitting jobs may be more efficient than submitting bunches of individual jobs

Thank you

Available Services

Data storage

LFC - LCG File Catalog

- Maintains mappings between logical file names (LFN) and SRM file identifiers.
- Supports references to SRM files in several storage elements.

Available Services

Data storage

- **AFS (Andrew File System)**
 - Network file system for personal and group files, experiment software, system tools (compilers, libraries , ...)
 - Indirect use (jobs)
 - Resource allocation: 2 Gigabytes