Ganga User Interface

EGEE Review

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CERN / IT

Material for the GANGA demo

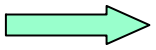
EGEE Review

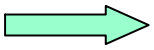
- Based on K. Harrison at the Computing in High-Energy and Nuclear Physics conference Mumbai, India, 13-17 February 2006
- New material from the GANGA team
- New material from Hurng-Chun Lee (ASGC)
- New material from Andrea Manara (ITU)
- Other material from IT/PSS/ED (ARDA and EIS teams)

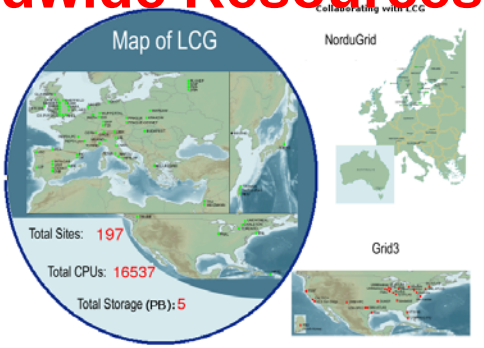
Ganga basics

- **Ganga is an easy-to-use front end for job definition and management**
  - Access to local and remote (Grid) resources through a uniform interface
    - The Grid is *one* of the environment for the scientists
    - If the Grid is not integrated in the everyday environment, its impact is reduced
  - Developed in the context of ATLAS and LHCb
    - built-in support for applications based on Gaudi/Athena framework
    - Potentially interesting for other applications (also non HEP)
      - Component architecture readily allows it

HEP Computing **Uniform User Interface** **Worldwide Resources**







People/groups involved

- **Ganga is an ATLAS/LHCb joint project**

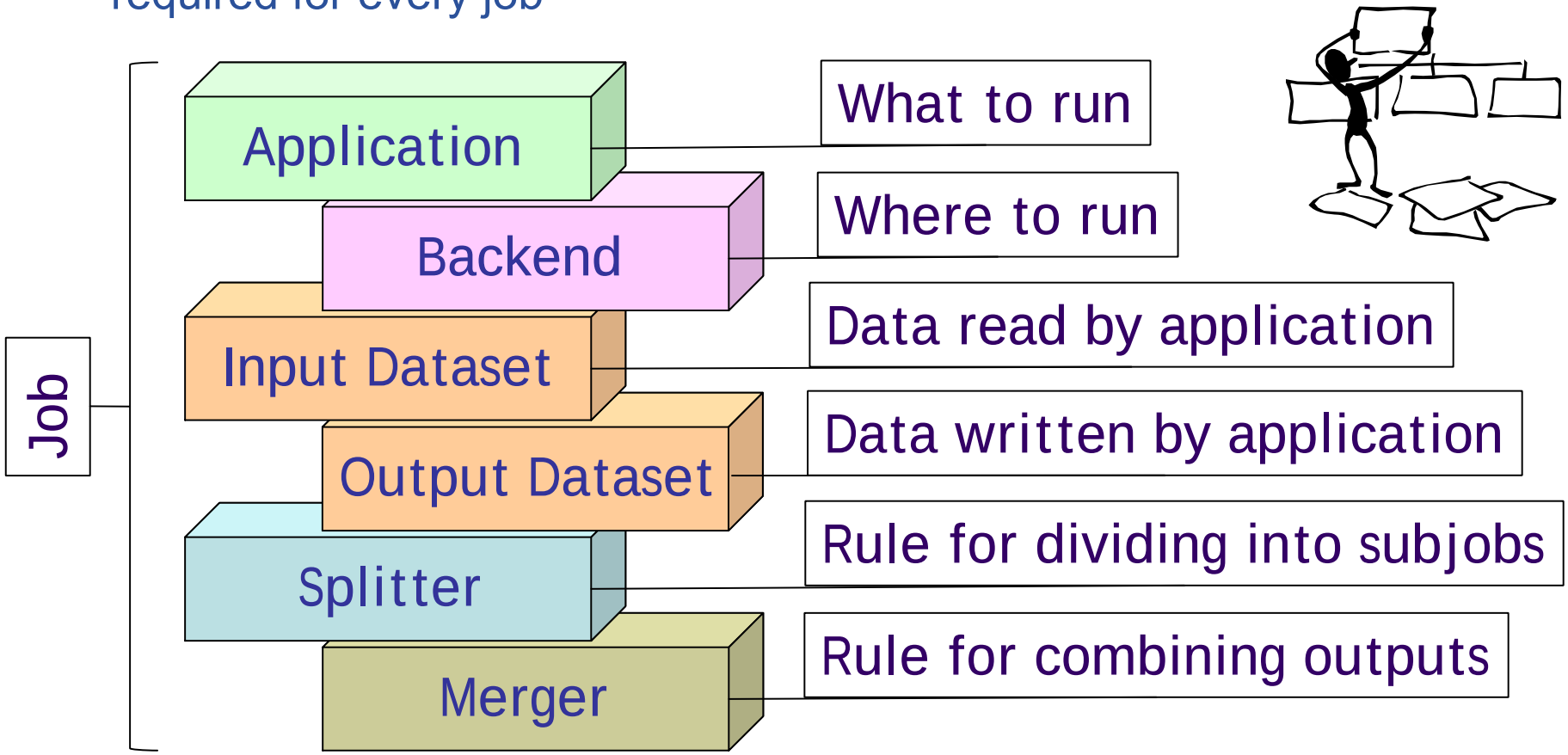
- **Support for development work from UK (PPARC/GridPP) and EU (EGEE/NA4 HEP ARDA)**

- **Core team:**
  - U.Egede (Imperial), K.Harrison (Cambridge), D.Liko (CERN), A.Maier (CERN), J.T.Moscicki (CERN), A.Soroko (Oxford), CL.Tan (Birmingham)

- **Contributions from many others, from summer students to senior researchers from HEP experiments**

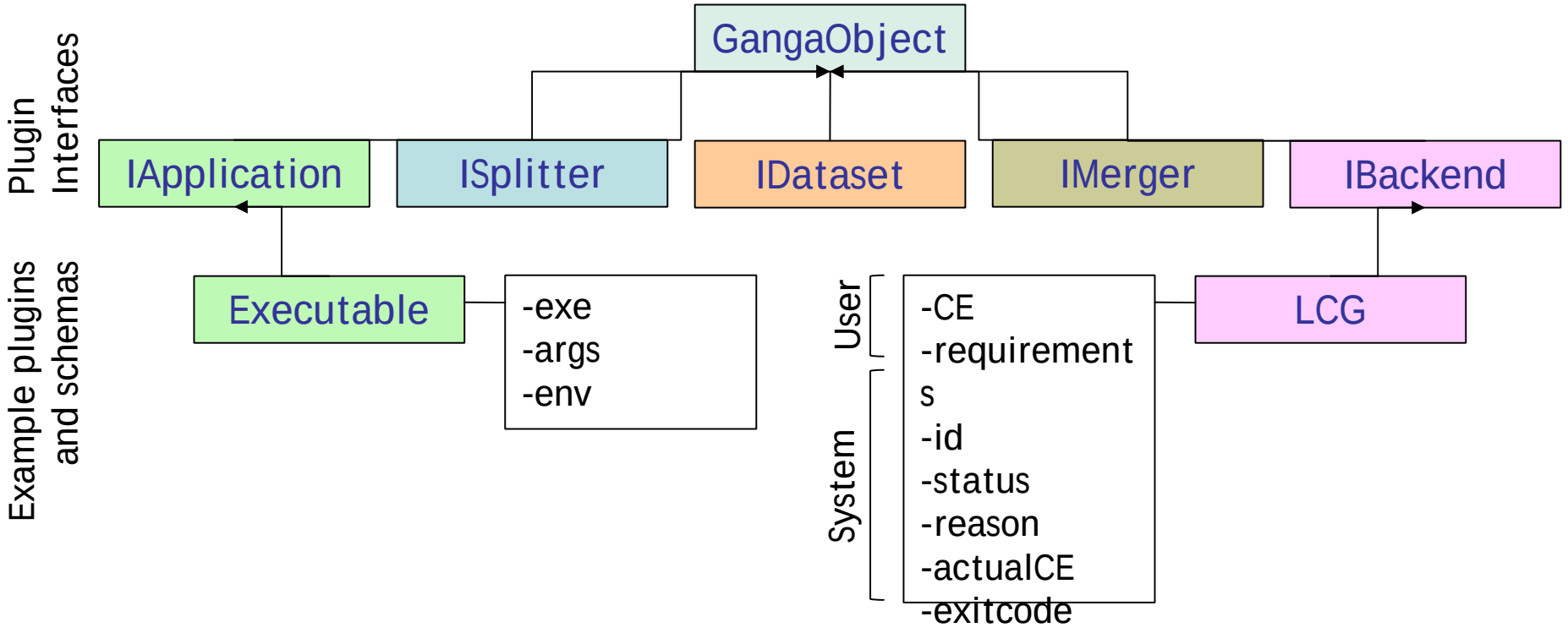
Ganga job abstraction

- A job in Ganga is constructed from a set of building blocks, not all required for every job



Framework for plugin handling

- Ganga provides a framework for handling different types of Application, Backend, Dataset, Splitter and Merger, implemented as plugin classes
- Each plugin class has its own schema



Ganga: single frontend for multiple backends

Applications

Configuration files

User code

Data

Ganga
User interface for job-related operations: configuration, submission, splitting, merging, monitoring, output retrieval, etc

EGEE Production and PPS

EGEE

gLite

DIRAC

LSF

Condor

PBS

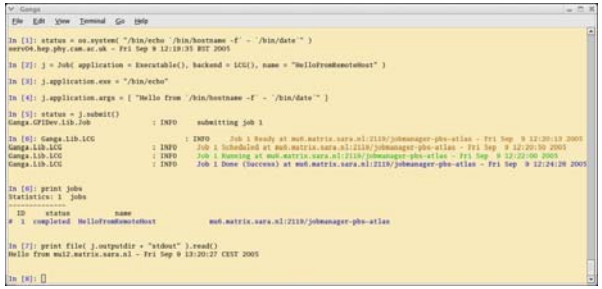
Local

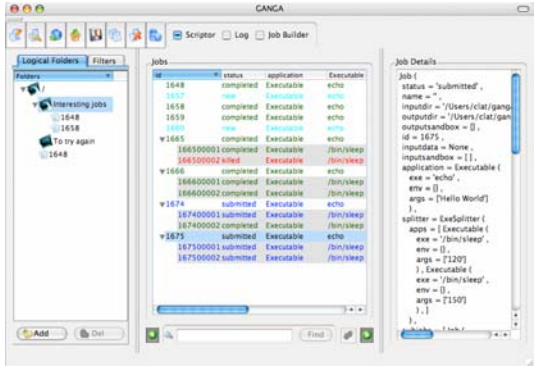
...

LHCb EGEE gateway

Ganga clients (3 scenarios)

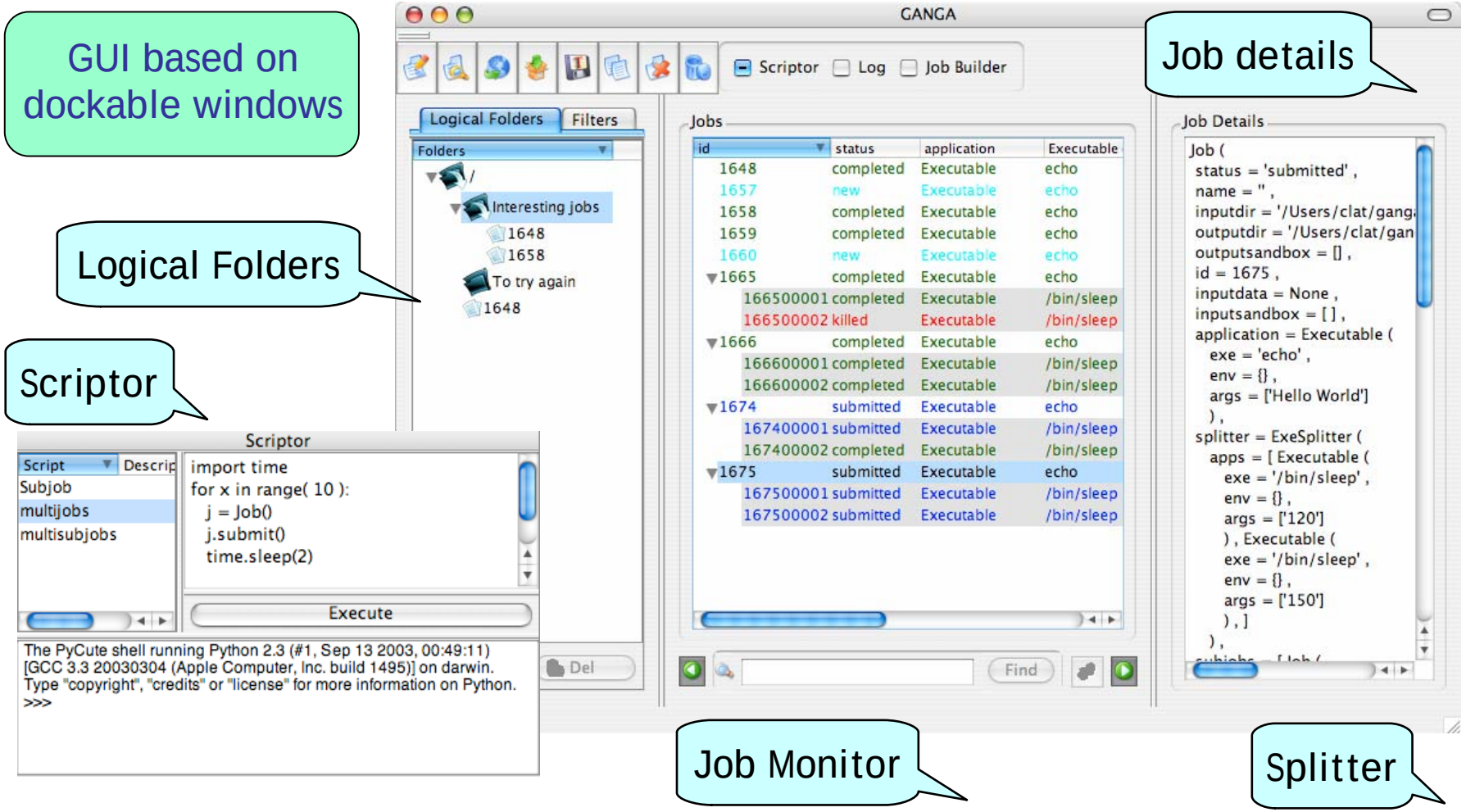
- **Ganga supports different scenarios because different communities have different ways of working**
  - **Command-Line Interface in Python (CLIP)**
    - Interactive job definition and submission from enhanced Python shell (IPython)
      - Possibility to organise jobs in logical folders
      - Possibility to create job templates
  - Python scripts
    - Export Python code in scripts
    - Automate repretitive tasks
    - Examples → starting point for new users
  - Graphical User Interface (GUI)
    - Ease the tasks for newcomers
    - Graphical access to information (job statuses etc..)





Ganga GUI

GUI based on dockable windows



Logical Folders

Scriptor

Job details

Job Monitor

Splitter

Simple job from first principles

Ganga

```
In [1]: status = os.system( "/bin/echo `/bin/hostname -f` - `/bin/date`" )
pcff.hep.phy.cam.ac.uk - Sat Feb 11 09:17:39 GMT 2006

In [2]: j1 = Job( application = Executable(), backend = LCG(), name = "Hello" )

In [3]: j1.application.exe = "/bin/echo"

In [4]: j1.application.args = [ "Hello from `/bin/hostname -f` - `/bin/date`" ]

In [5]: status = j1.submit()
Ganga: INFO     submitting job 1

In [6]: Ganga: INFO     Job 1 Waiting at None - Sat Feb 11 09:18:14 2006
Ganga: INFO     Job 1 Ready at lcgce01.nic.ualberta.ca - Sat Feb 11 09:18:30 2006
Ganga: INFO     Job 1 Scheduled at lcgce01.nic.ualberta.ca - Sat Feb 11 09:19:01 2006
Ganga: INFO     Job 1 Running at lcgce01.nic.ualberta.ca - Sat Feb 11 09:22:26 2006
Ganga: INFO     Job 1 Done (Success) at lcgce01.nic.ualberta.ca - Sat Feb 11 09:29:49 2006


In [6]: !cat $j1.outputdir/stdout
Hello from thuner069.ualberta - Sat Feb 11 02:20:05 MST 2006

In [7]:
```

Time on local machine (Cambridge)

Create job

Specify executable

Specify arguments

Submit job to LCG

Status on LCG monitored

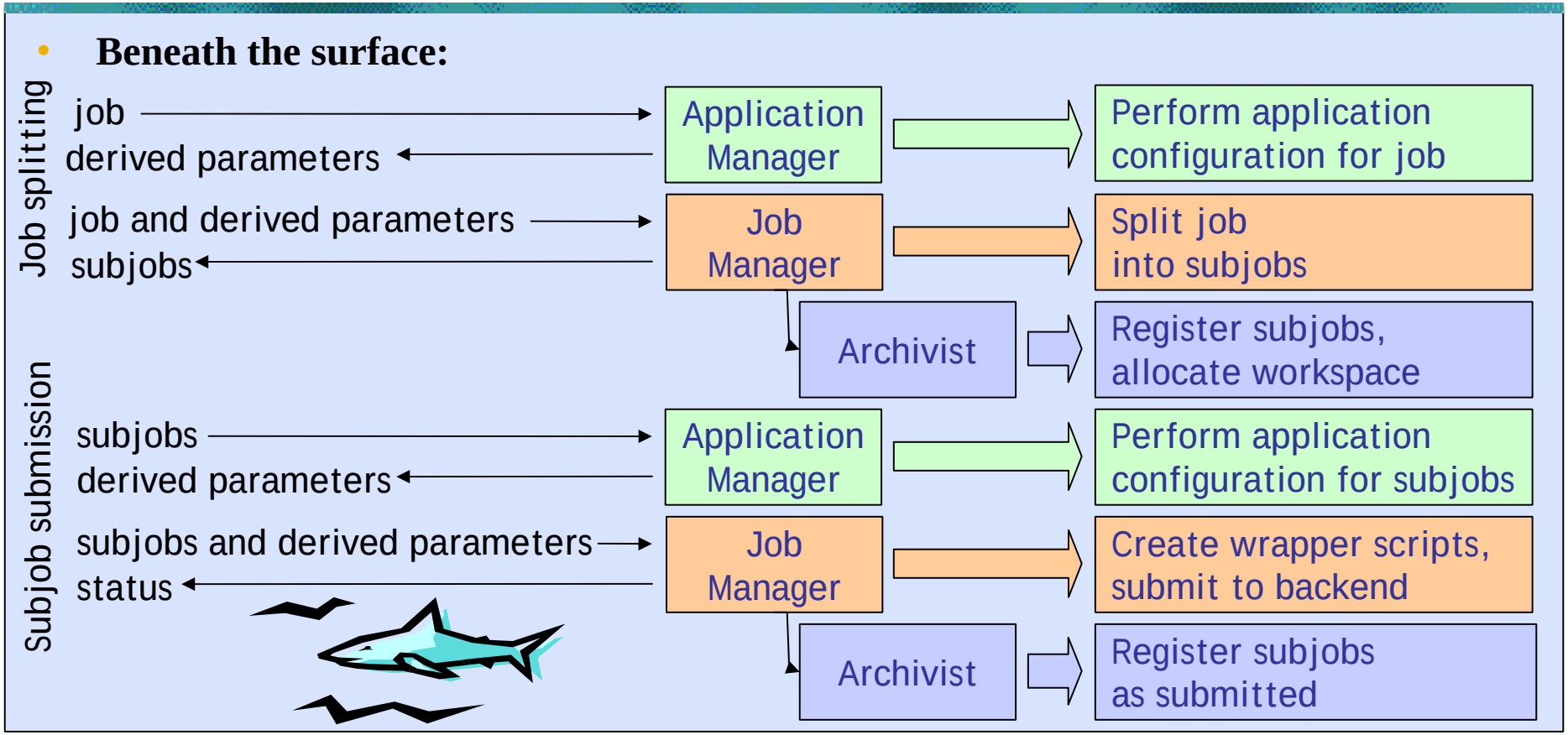
IPython allows combining of shell and Python syntax

Time on remote machine (Alberta)

Job submission

- **User command: job.submit()**
- **Outcome: job submitted, split into subjobs, command status returned**

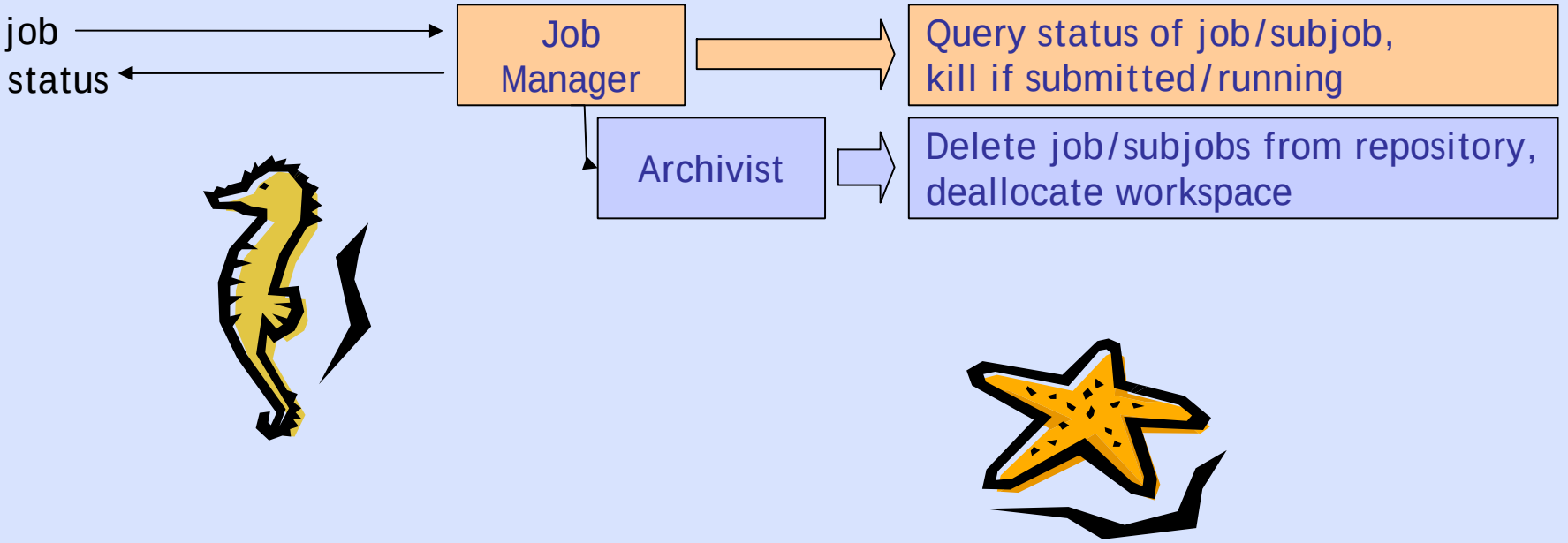
- **Beneath the surface:**



Job cancellation

- User command: **job.remove()**
- Outcome: job/subjobs killed if submitted/running, records deleted from repository, workspace deallocated, command status returned

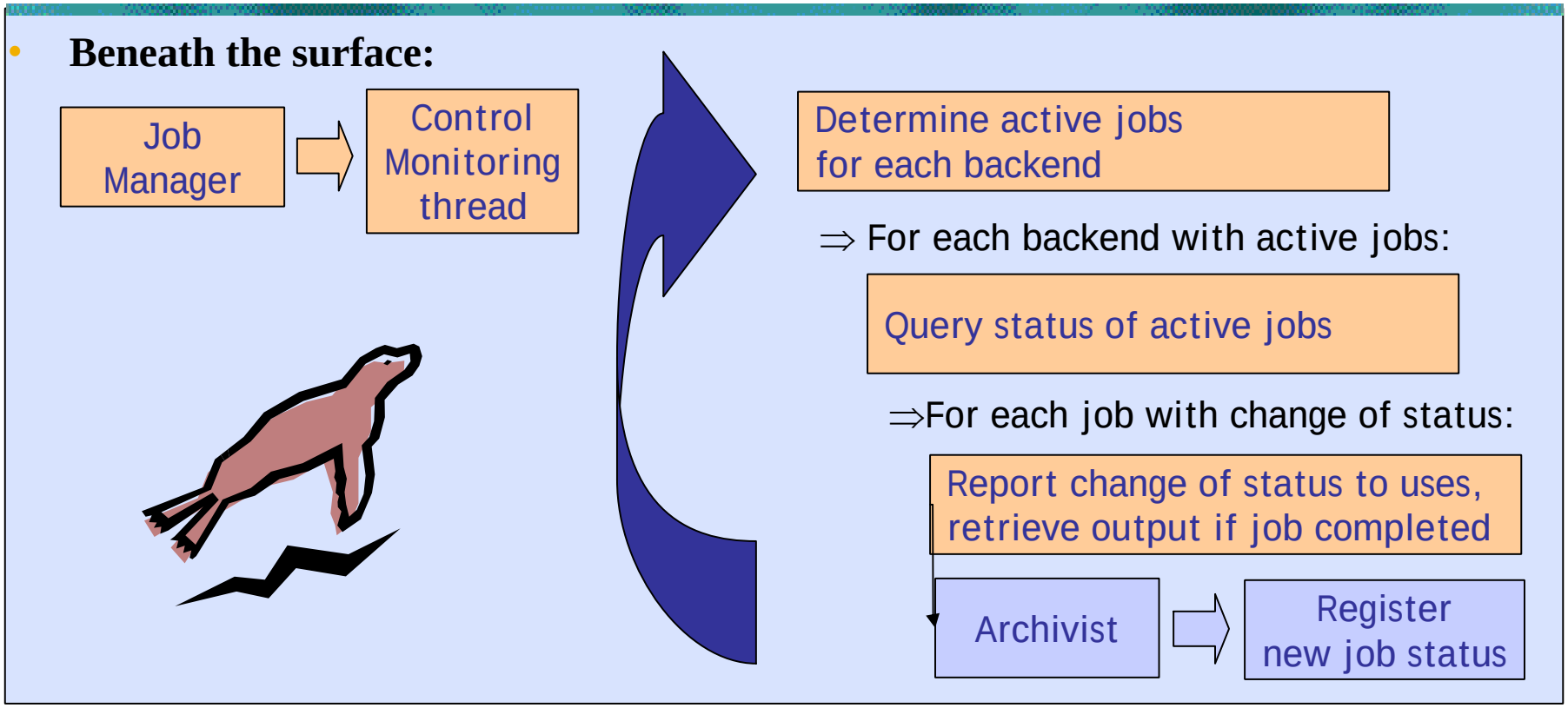
- **Beneath the surface:**



Job monitoring and output retrieval

- **User action: none**
- **Outcome: changes in job status reported/updated periodically, output retrieved automatically when job completes**

- **Beneath the surface:**



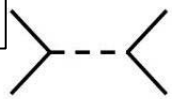
CLIP: creating ATLAS analysis job from template

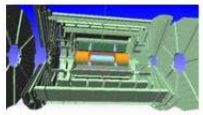
New session started

Ganga

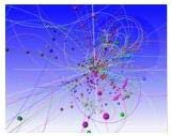
```
In [1]: templates
Out[1]: Statistics: 7  templates
--------------
# id     status          name  application  backend
#  1   template         Hello   Executable      LCG
#  2   template         EvGen       Athena      LCG
#  3   template         Simul       Athena      LCG
#  4   template          Digi       Athena      LCG
#  5   template          Reco       Athena      LCG
#  6   template      ESDtoAOD       Athena      LCG
#  7   template      SusyPlot       Athena      LCG
```

List templates





Event generation | Detector simulation | Digitisation



Reconstruction | Data filtering | Physics analysis

```
In [2]: j4 = Job( templates[ 7 ] )
```

Create job from template

```
In [3]: j4.application
Out[3]: Athena (
 atlas_area = '' ,
 packages = ['PhysicsAnalysis/SUSYPhys/SUSYPhysAlgs/SUSYPhysAlgs-00-04-02/', 'PhysicsAnalysis/SU
SYPhys/SUSYPhysUser/SUSYPhysUser-00-04-01/', 'PhysicsAnalysis/SUSYPhys/SUSYPhysUtils/SUSYPhysUti
ls-00-04-01/'] ,
 pool_catalog = '' ,
 atlas_release = '10.0.2' ,
 option_files = ['/afs/cern.ch/user/h/harrison/public/gangainputs/SusyPlot_joboptions.py'] ,
 options = [] ,
 user_area = '/afs/cern.ch/user/h/harrison/cmtuser' ,
 evt_max = -1 ,
 outputdata = None
 )
```

List application properties

User packages

Application directives (job-options file)

CLIP: running ATLAS analysis on LCG

Ganga

```
In [4]: status = j4.submit()
Ganga: INFO     submitting job 4

In [5]: Ganga: INFO     Job 4 Waiting at None - Sat Feb 11 11:57:59 2006
Ganga: INFO     Job 4 Ready at grid10.lal.in2p3.fr - Sat Feb 11 11:58:14 2006
Ganga: INFO     Job 4 Scheduled at grid10.lal.in2p3.fr - Sat Feb 11 11:58:30 2006
Ganga: INFO     Job 4 Running at grid10.lal.in2p3.fr - Sat Feb 11 11:59:49 2006
Ganga: INFO     Job 4 Done (Success) at grid10.lal.in2p3.fr - Sat Feb 11 12:08:17 2006


In [5]: !ls $j4.outputdir
gangademo_susyplot_hist.root  stderr  stdout

In [6]: jobs
Out[6]: Statistics: 4  jobs
--------------
# id     status          name  application  backend  backend.status          backend.actualCE
#  1  completed         Hello   Executable      LCG  Done (Success)    lcgce01.nic.ualberta.ca
#  2  completed       Bu2D0K      DaVinci      LCG  Done (Success)      t2-ce-02.lnl.infn.it
#  3  completed       Bu2D0K      DaVinci    Dirac     outputready                LCG.CERN.ch
#  4  completed     SusyPlot       Athena      LCG  Done (Success)       grid10.lal.in2p3.fr


In [7]:
```

Submit job to LCG

Status in LCG monitored

Output retrieved automatically from LCG

List jobs

Jobs from previous session(s) remembered

User uptake

- **Ganga tutorials organised for both ATLAS and LHCb**
- **Ganga demo at EGEE 06,**
- **Ganga at EGEE-EELA (Rio 2004)**
- **Ganga Demo at the EGEE User Forum**

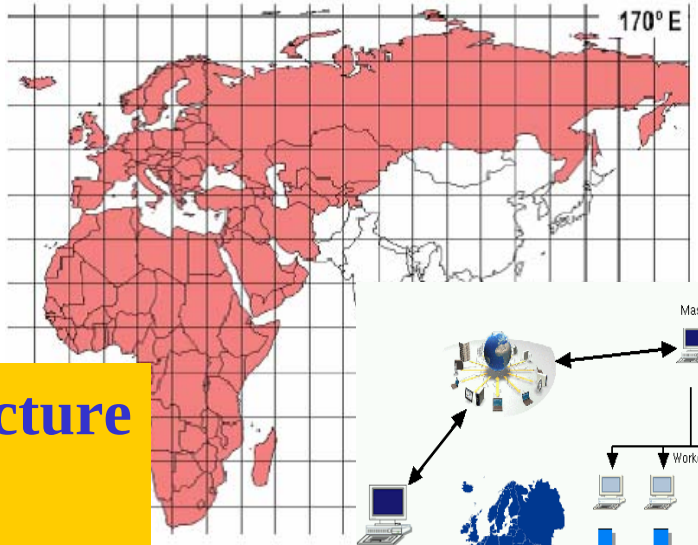
CERN, September 2005

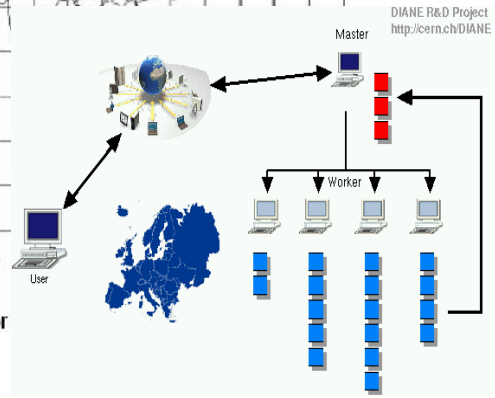
Cambridge, January 2006

- **Ganga tried out by more than 100 people**
- **Feedback positive**
  - "Very handy way to organise job submission" (ATLAS user)
  - "Clever and nicely designed" (LHCb user)
- **Small but growing group of people regularly using Ganga (also from a laptop)**
  - LHCb analyses of up to 10^6 events run successfully on Grid using Ganga
  - …

ITU RRC06

- **International Telecommunication Union**
  - ITU/BR: Radio-communication Sector
    - "management of the radio-frequency spectrum and satellite orbits for fixed, mobile, broadcasting and other communication services
- **RRC-06 (15 May–16 June 2006)**
  - 120 countries will negotiate the new frequency plan
  - a part of a new international agreement
  - introduction of digital broadcasting





Use of EGEE technology and infrastructure
Presented at the EGEE User Forum
GANGA is an important component

- **Geant4 is a toolkit for the simulation of the passage of particles (radiation) through matter.**
  - Its areas of application include high energy, nuclear and accelerator physics, as well as studies in medical and space science.
- **Use of EGEE technology and infrastructure to run large validation of the G4 software package**
  - GANGA is an important tool to run these productions and also to ensure a lightweight bookkeeping

BirdFlu DC (together with WISDOM)

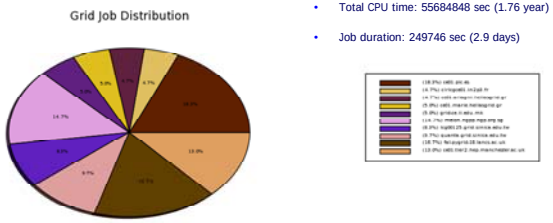
Large Scale Virtual Screening of Drug Design on the Grid

Fighting against Avian Flu

Hurng-Chun Lee and Yin-Ta Wu

Some statistics of DIANE jobs

- Submitted Grid jobs: 300
- "Healthy" jobs: 261 (87%)
- Total number of dockings: 40210
- Total CPU time: 55684848 sec (1.76 year)
- Job duration: 249746 sec (2.9 days)



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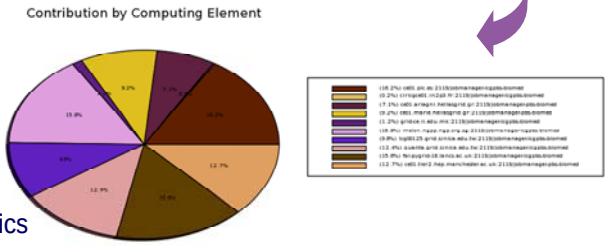
Logging and bookkeeping ... Thanks GANGA

```
Statistics: 325  jobs slice("DIANE_6")
--------------
#   id      status        name   subjobs      application          backend                                  backend.actualCE
# 1610     running     DIANE_6                Executable              LCG  melon.ngpp.ngp.org.sg:2119/jobmanager-lcgpbs-
# 1611     running     DIANE_6                Executable              LCG  node001.grid.auth.gr:2119/jobmanager-lcgpbs-b
# 1612     running     DIANE_6                Executable              LCG  polgrid1.in2p3.fr:2119/jobmanager-lcgpbs-biom
# 1613      failed     DIANE_6                Executable              LCG   polgrid1.in2p3.fr:2119/jobmanager-lcgpbs-sdj
# 1614   submitted     DIANE_6                Executable              LCG  ce01.ariagni.hellasgrid.gr:2119/jobmanager-pb
# 1615     running     DIANE_6                Executable              LCG      ce01.pic.es:2119/jobmanager-lcgpbs-biomed
# 1616     running     DIANE_6                Executable              LCG  ce01.tier2.hep.manchester.ac.uk:2119/jobmanag
# 1617     running     DIANE_6                Executable              LCG  clrlcgce03.in2p3.fr:2119/jobmanager-lcgpbs-bi
```

plain table of GANGA job logging info.



- Helpful for tracing the execution progress and Grid job errors
- Fairly easy to visualize the job statistics

Use of EGEE technology and infrastructure to run large validation of the G4 software packge

GANGA is an important tool also to ensure a lightweight bookkeeping