

**EDGeS**

# **XWHEP: XtremWeb for High Energy Physics**

**XtremWeb 2.0**

**Oleg Lodyginsky, Gabriel Caillat, Gilles FEDAK, *Haiwu HE*  
*IN2P3/CNRS, INRIA, France***



# XWHEP

- **Introduction**
- **Architecture**
- **Rights**
- **Objects management**
- **Client service**
- **Benchmark**



# Presentation

- XWHEP is a generic multi purposes desktop grid platform (*DG*) enabling *eSciences* computations over *volatile nodes*.
- XWHEP ("*XtremWeb 2.0*") is based on *XtremWeb 1.8.0*.  
*Main features are :*
  - three tiers architecture
  - multi platforms (win32, linux, macosx)
  - virtual stable cluster over volatile volunteers individual PCs
  - multi applications
  - multi users
  - firewall bypassing
  - automatic load balancing
  - fault tolerance

# Goal

- XWHEP aims to propose a global computing platform by publishing its own resources and sharing others with different grid platforms, especially focusing on EGEE.
- To achieve this goal, XWHEP :
  - proposes a secured DG, enabling certificate (*Cert*) usage, focusing on EGEE Cert.
  - defines different usage levels including two major ones :  
“public” and “private”



# XW2.0 VS. 1.8 1/2

	XtremWeb 2.0 "XWHEP" (Apr 2008)	XtremWeb 1.8 (Oct 2006)	
Rights managements	++	+	implemented & tested
Data management	+	-	not fully tested
Multi transport protocols	UDP, TCP		not fully implemented
Multi communication layers	XW, HTTP	-	
User application management	+	admin only	
User worker management	+	-	
Proxy	+	-	
ACL	+	-	
SSL / certificates	+	-	





# XW2.0 VS. 1.8 2/2

	XtremWeb 2.0 "XWHEP" (Apr 2008)	XtremWeb 1.8 (Oct 2006)	
Avg ping	+	-	implemented & tested
Avg bandwidth usage	+	-	not fully tested
Custom scheduler	+	-	not fully implemented
Worker launcher	+	-	
Input files / job	+	+	
Input files / app	+	-	
CPU/RAM requirements per job	+	+	
CPU/RAM requirements per app	+	-	





# XWHEP

- Introduction
- **Architecture**
- Rights
- Objects management
- Client service
- Benchmark



# Three tiers architecture

Private Key

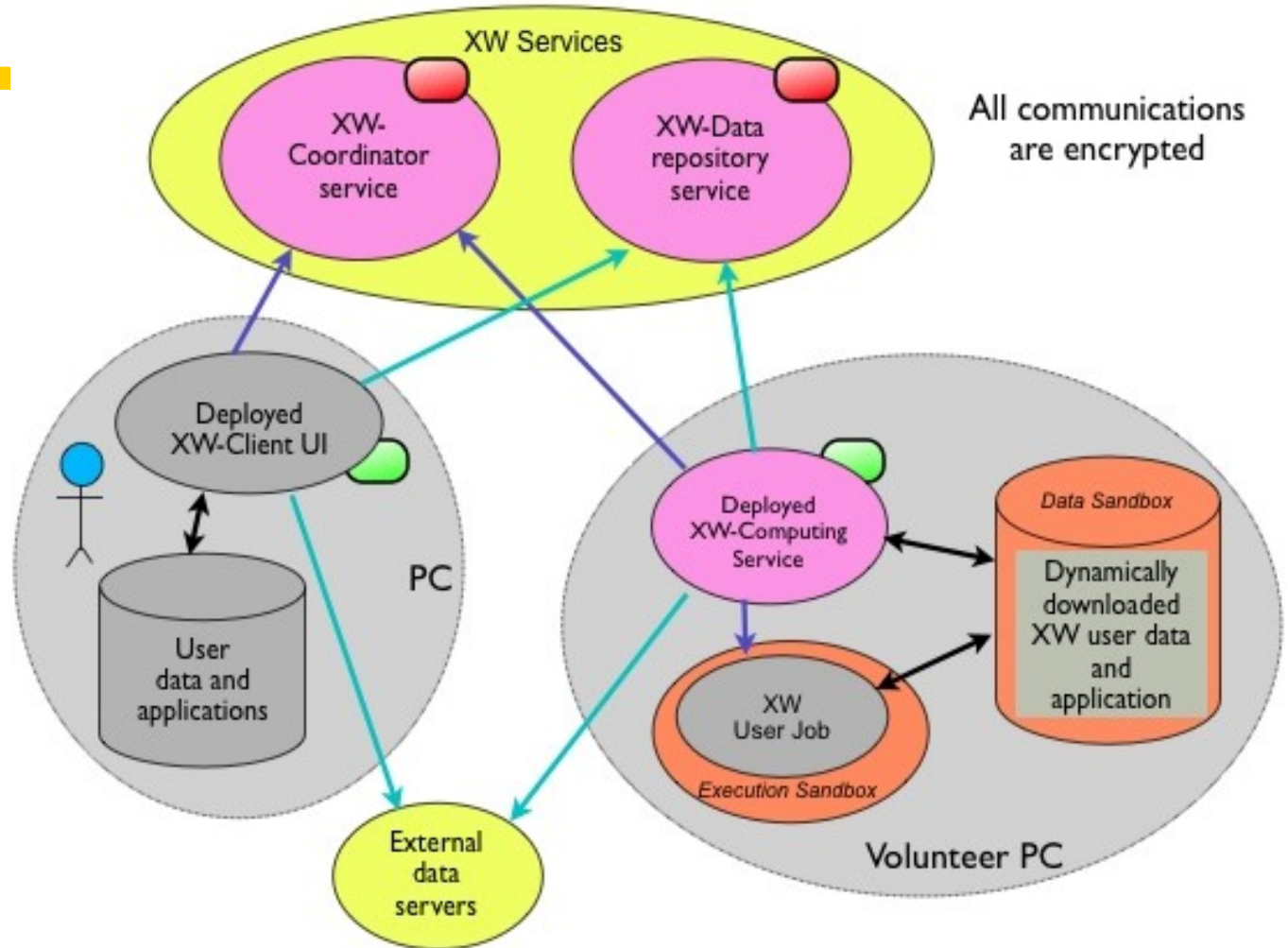
Public key

Job Mgt

Data Mgt

Untrusted resource

Trusted resource  
Service



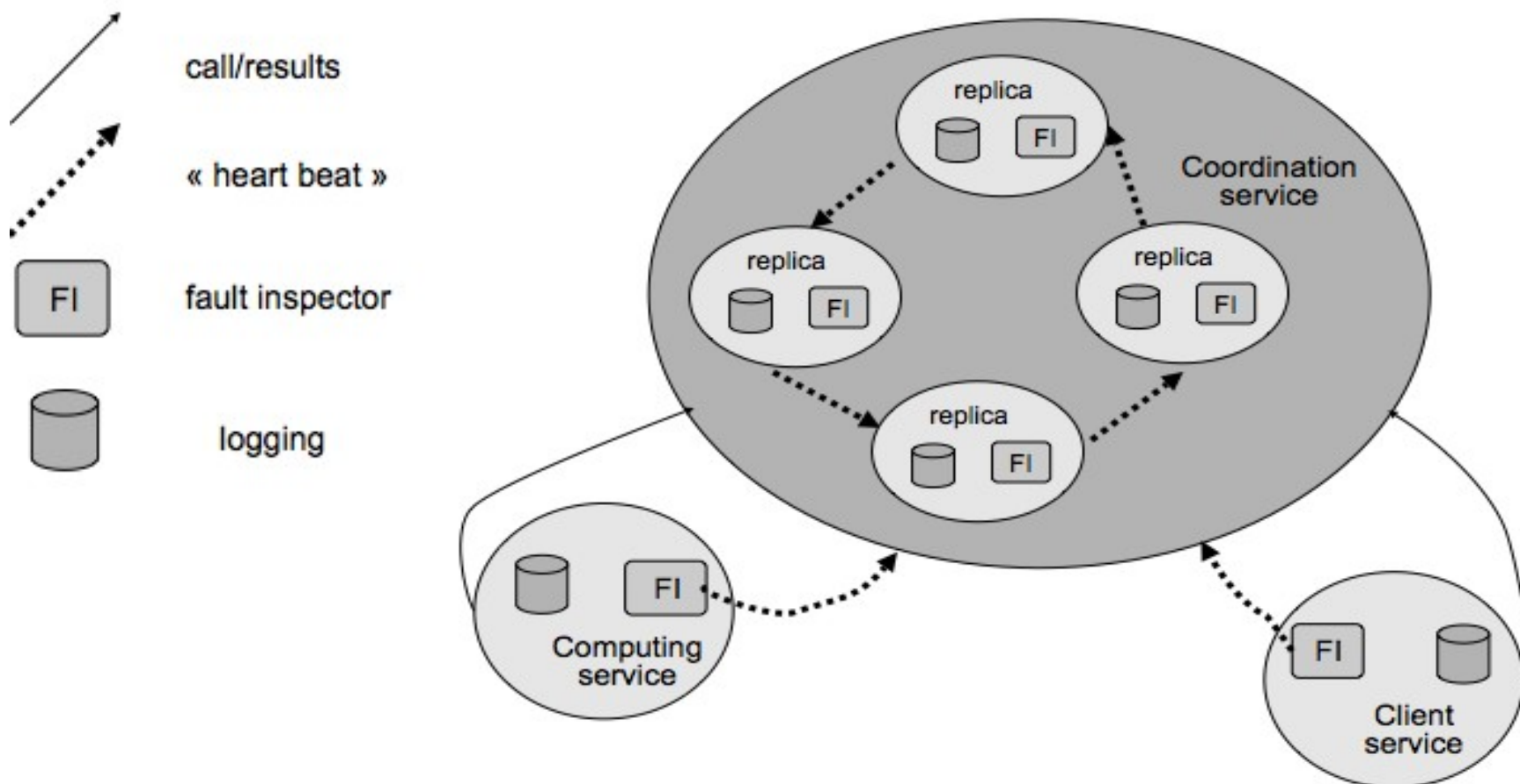
Resources are anonymously shared among individuals

Ensure:

Quality of Service  
Security



# Fault tolerance model





# XWHEP

- Introduction
- Architecture
- **Rights**
- Objects management
- Client service
- Benchmark

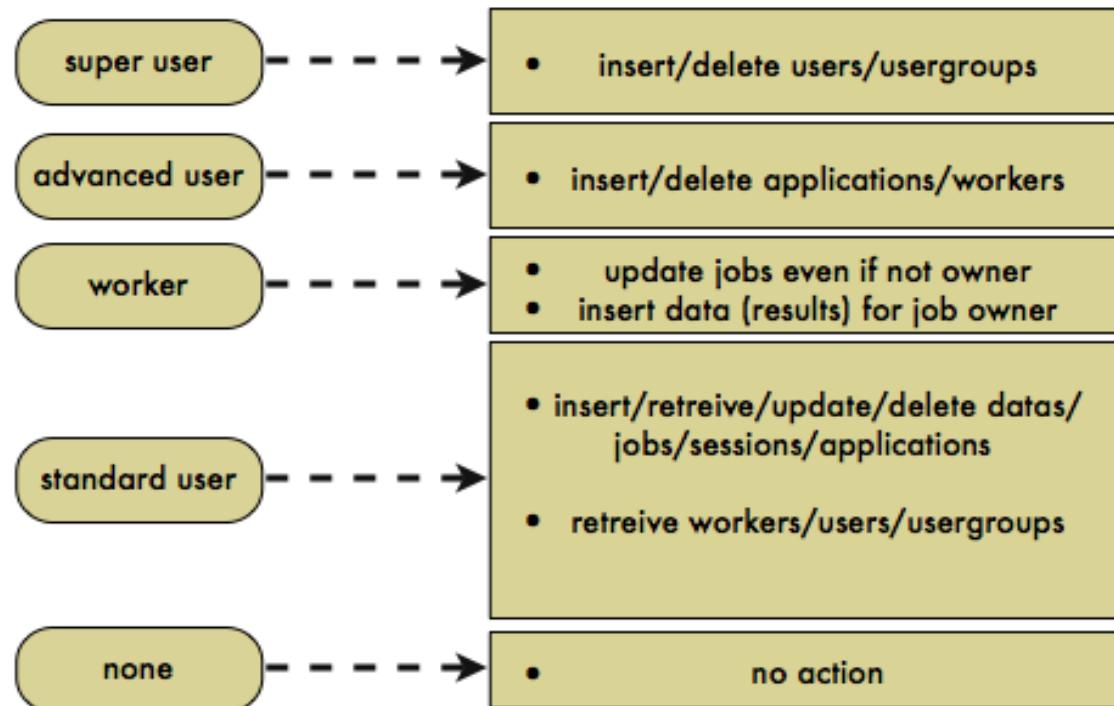


# XWHEP : access rights

- Any object in XWHEP is associated with an access rights. Access rights are linuxfs like : they are defined for the user (owner), the group and others :
  - 0400 Allow read by owner.
  - 0200 Allow write by owner.
  - 0100 For applications, allow execution by owner.
  - 0040 Allow read by group members.
  - 0020 Allow write by group members.
  - 0010 For applications, allow execution by group members.
  - 0004 Allow read by others.
  - 0002 Allow write by others.
  - 0001 For applications, allow execution by others.
  - Default access rights is 0755

# XWHEP : user rights

- User rights define interaction level for each user. XWHEP extends user rights as defined in XtremWeb 1.8.0





# XWHEP : user rights

- The user rights are used coupled with access rights.
- Users can get an object only if this is readable.
- Users can modify/delete an object only if it is writable.
- User can insert job for executable applications only (i.e. applications that user has the right to execute)



# XWHEP

- ***Introduction***
- Architecture
- Rights
- ***Objects management***
- Client service
- Benchmark



# XWHEP : objects management

- **XWHEP defines a set of different objects:**
  - users and user groups
  - data
  - applications
  - jobs
  - workers
- **All objects are identified by an UID composed of five hexadecimal values.**
- **Example :**
  - 81c6e97a-9d85-4aeb-ae07-593980fb611f
- **Null value**
  - 00000000-0000-0000-0000-000000000000



# XWHEP : users and groups

calculated
mandatory
optionnal

Partial vue of the internal user structure.

Partial vue of the internal user group structure.

uid	
login	string
password	string
rights	e.g : STANDARDUSER
usergroupuid	

uid	
label	string







# XWHEP : data

- Data are written only once .
- Data are identified by URI.
- XWHEP coordinator service may serve data. But data can be served by any data server as soon as they are described by an URI.
- Data server insures data security, availability and consistency

# XWHEP : data

uid	
size	content size
md5	md5sum
status	available or not
links	how many objects use this data
insertionDate	the insertion date
accessDate	the last access date
owneruid	the uid of the user who owns the data
name	the name of the file
uri	the content URI
accessrights	e.g. : 0x755
type	raw, binary, text, zip
cpu	ppc, intel
os	linux, mac, win32

calculated
mandatory
optional



# XWHEP : applications

Partial vue of the internal application structure

uid	
owneruid	the uid of the user who owns the data
accessrights	e.g. 0x755
name	the name of the file
binaryURI	the URI of the binary
mincpuspeed	used by scheduler
minmemory	used by scheduler
defaultStdinURI	the URI of the default stdin
baseDirinURI	the URI of the dirin provided to all jobs
defaultDirinURI	the URI of the default dirin

calculated
mandatory
optionnal

if set, this is provided to jobs by default.  
Jobs may override this.

if set, this is always expanded  
on worker FS

if set, this is provided to jobs by default.  
Jobs may override this.



# XWHEP : jobs

Partial view of the internal job structure

calculated
mandatory
optional

uid	
accessrights	e.g. 0x755
appid	the UID of the application to run
userid	the UID of the owner
result	the URI to store the result
cmdLine	the command line
stdin	the URI of the stdin
dirin	the URI of the dirin provided to all jobs
expectedHost	the UID of the worker this job MUST run on

If not set, XWHEP automatically manage the result

If not set, use app default, if any. Set NULLURI if app default is not expected either.



# XWHEP

- ***Introduction***
- **Architecture**
- **Rights**
- **Objects management**
- ***Client service***
- **Benchmark**



# XWHEP:Client

- Control the client : linux like

## Send objects

- xwsendwork
- xwsubmit
  
- xwsendapp
- xwsenddata
- xwsendgroup
- xwsendsession
- xwsenduser
- xwsendusergroup

## Get objects

- xwapps
- xwdatas
- xwgroups
- xwsessions
- xwtasks
- xwusers
- xwusergroups
- xwworkers

## Manage Objects

- xwchmod
- xwrm

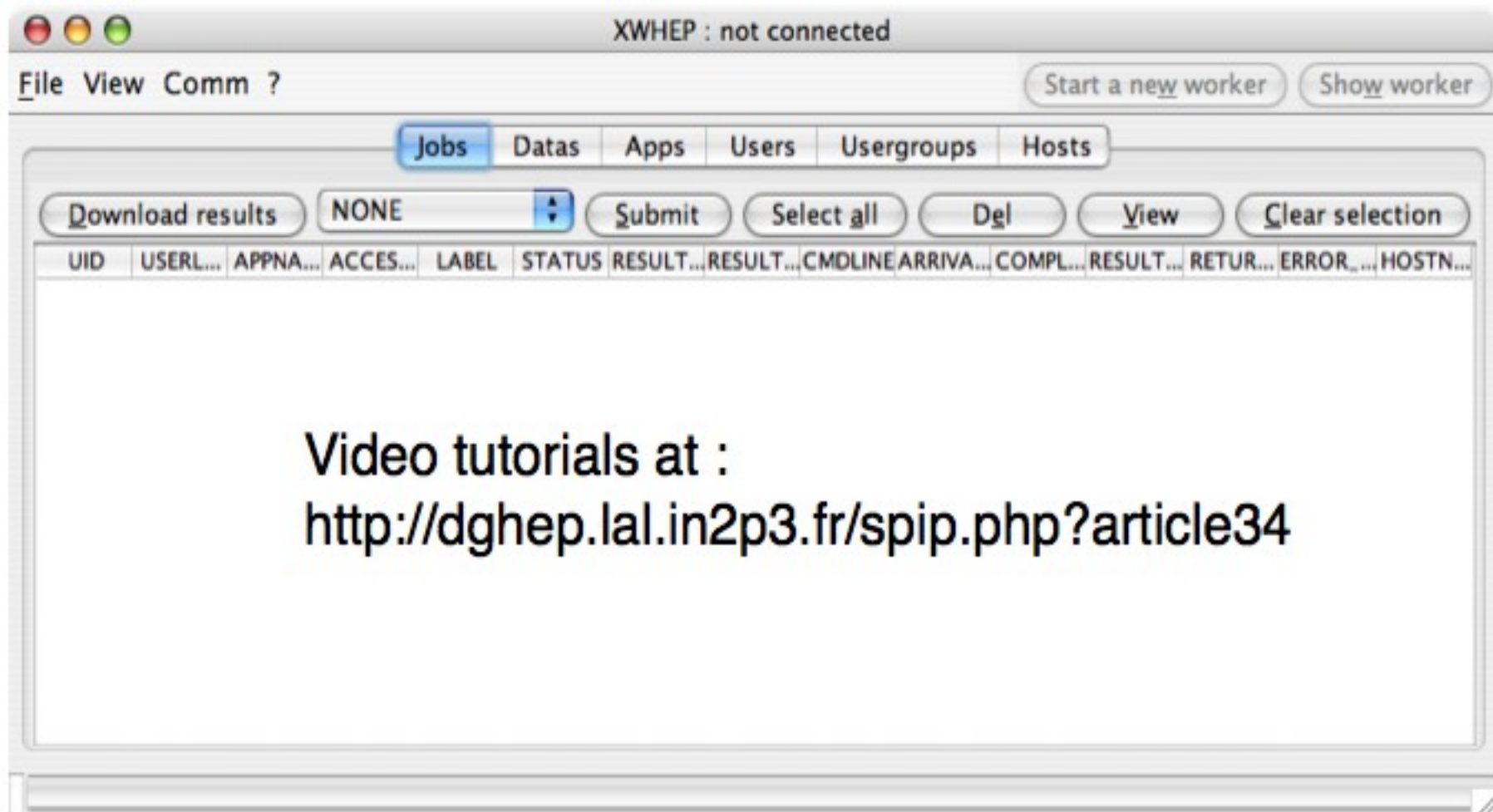
## Misc

- xwgui



# XWHEP:Client

- A GUI Client





# XWHEP

- ***Introduction***
- Architecture
- Rights
- Objects management
- Client service
- ***Benchmark***

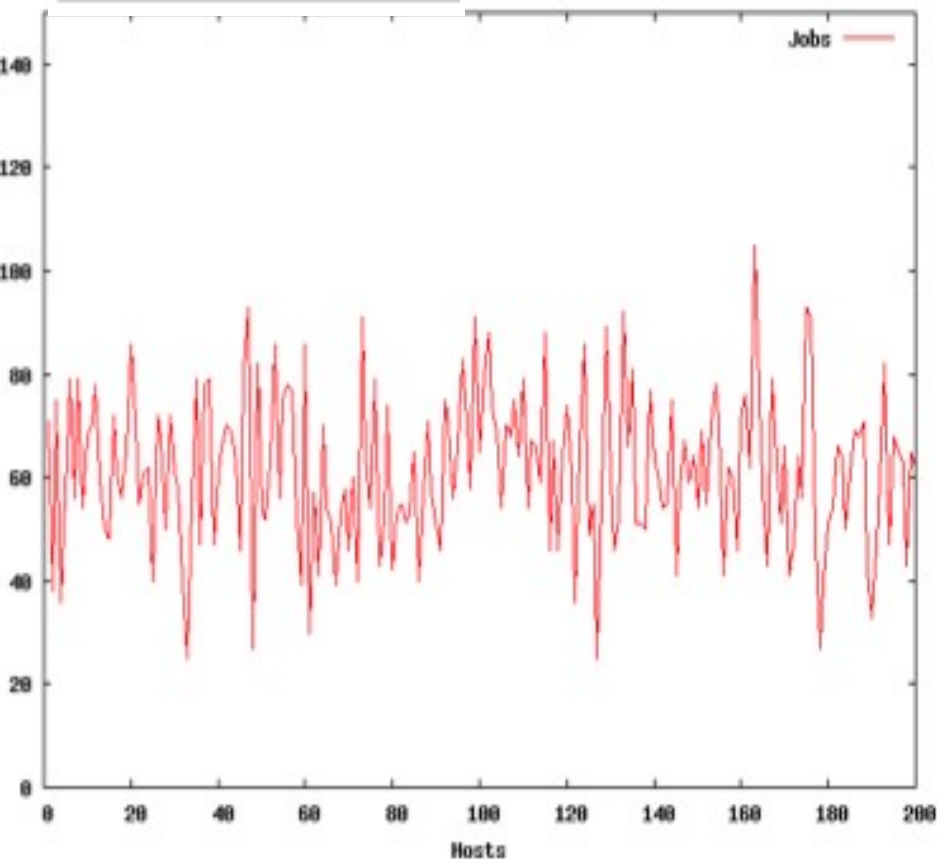




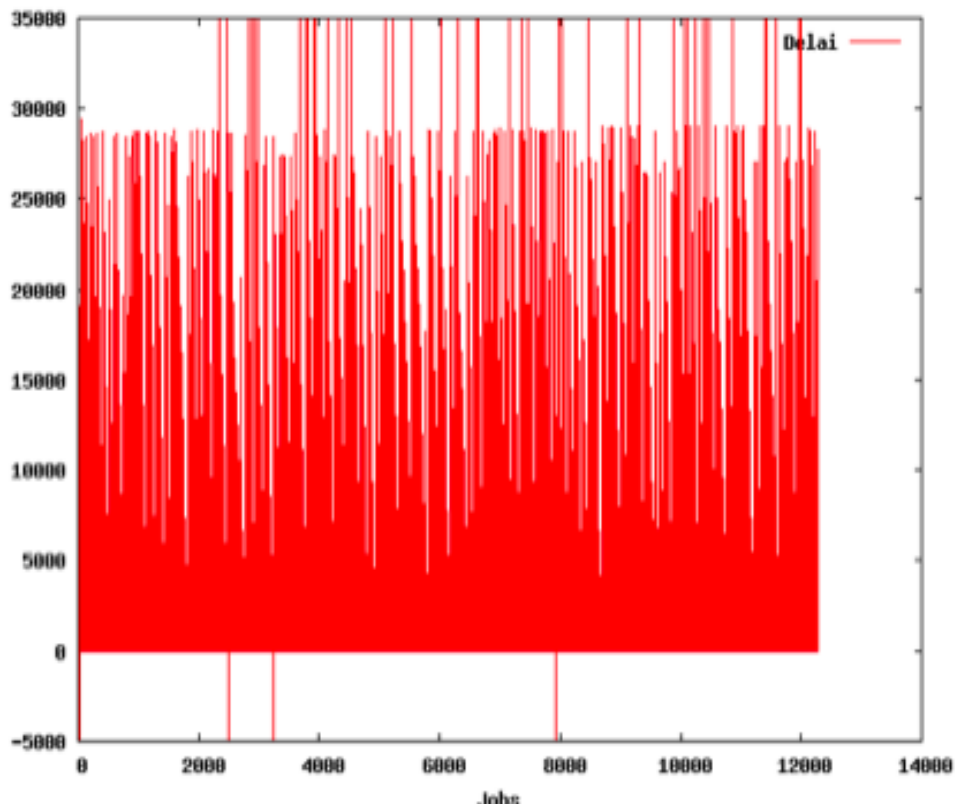
# XWHEP:benchmark

	Hosts
997MHz	1
2GHz	104
2.4GHz	95

jobs per host



Completion in seconds



Status	count(*)
COMPLETED	12283

Summer School, 1st July,  
Budapest, Hungary



# XWHEP

- **sites:**
  - <http://www.xtremweb.net>
  - <http://dghep.lal.in2p3.fr/?lang=en>
- **contact:**
  - Oleg Lodygensky ([lodygens@lal.in2p3.fr](mailto:lodygens@lal.in2p3.fr))
  - Gabriel Caillat ([gcaillat@lal.in2p3.fr](mailto:gcaillat@lal.in2p3.fr))
  - Gilles FEDAK ([gilles.fedak@inria.fr](mailto:gilles.fedak@inria.fr))
  - Haiwu HE [haiwu.he@inria.fr](mailto:haiwu.he@inria.fr)