PlaFRIM

Technical presentation of the platform
Contents

01. Overview
02. Nodes description
03. Networks
04. Storage
05. Evolutions
06. How to acces PlaFRIM ?
07. Need Help ?
Overview
2 platforms (1 research and 1 formation)

- More than 100 nodes and 3000 cores
- More than 35 GPUs accelerators
- More than 350 users

Heterogeneous cluster

- Nodes for modelization (equivalent nodes of mesocentres or computer center of GENCI)
  - Miriel Cluster (88 nodes)
  - Souris node (1 SGI UV200 96 cores and 3TB memory)

- Nodes for experimentation (more innovative nodes)
  - Mistral cluster (18 nodes with 2 x Xeon Phi accelerator)
  - Sirocco cluster (13 nodes with Nvidia GPU accelerator)
  - Kona cluster (4 nodes with KNL)
  - Brise node (1 node with 96 cores and 1TB memory)
The hidden side

- a security audit has been carried out from which certain security rules have been applied (access with SSH key pair, isolated network between formation and research cluster, internet filtering,...)

- 1 master node which provides:
  - Name resolution (DNS), IP attribution (DHCP), SLURM server, Server TFTP, deployment node tool (Bright Cluster Manager), internet gateway, and more...

- 2 hypervisors (oVirt nodes) to provide infrastructure virtual servers:
  - 2 LDAP in master/master mode and 1 LDAP for the formation cluster to
  - 2 server GUIX (formation and research clusters)
  - 1 supervision based on zabbix
  - 1 HIDS (intrusion detection system)
  - 1 NFS for the formation cluster
  - Bastion SSH (ssh.plafrim.fr, formation.plafrim.fr, ...)
  - And more...
The hidden side

• Storage:
  • Luster Parallel File System:
    • 2 MDS servers (in manual failover mode with only 1 MDT)
    • 2 OSS servers (in manual failover mode with 2 OST mounted on each)
  • 2 NetApp which serves NFS for /home, /projets and modules. 1 located at Inria and 1 at IMB

• Network:
  • Compute network: 4 switches 10Gbit/s Ethernet
  • Management network: 5 switches 1Gbit/s Ethernet
  • Omnipath Network: 4 switches 100Gbit/s
  • Infiniband: 7 switches 40Gbit/s
Nodes description

→ https://www.plafrim.fr/en/the-platform/hardware-documentation/
miriel[001-088] : 88 standards computational nodes

• **2 x 12 cores Haswell** Intel® Xeon® E5-2680 v3 @ 2.5 GHz
• **128GB** RAM (2133 MHz)
• **Infiniband** QDR TrueScale: 40Gbit/s for miriel[001-088]
• **Omnipath** 100Gbit/s for miriel[001-043]
• Ethernet : 10Gbit/s
• /tmp : ~300GB
brise : 96 cores node

- **4 x 24 cores Broadwell** Intel(R) Xeon(R) CPU E7-8890 v4 @ 2.20GHz
- **1TB** RAM (1600 MHz)
- Ethernet : 10Gbit/s
- /tmp : ~400GB
Nodes description

**souris : 96 cores node**

- **12 x 8(16HT) cores Ivy Bridge** Intel(R) Xeon(R) CPU E5-4620 v2 @ 2.60GHz
- **3TB** RAM (1333 MHz)
- Ethernet : 10Gbit/s
**kona[01-04] : 4 KNL nodes**

- **1 x 64 cores Knights Landing** Intel(R) Xeon Phi(TM) CPU 7230 @ 1.30GHz
- **96GB** RAM (2400 MHz) + **16 Go MCDRAM** (7200 MHz)
- OmniPath : 100Gbit/s
- Ethernet : 1Gbit/s
- /tmp : ~600GB

<table>
<thead>
<tr>
<th>Node</th>
<th>Memory mode</th>
<th>Cluster mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>kona01</td>
<td>flat</td>
<td>quadrant</td>
</tr>
<tr>
<td>kona02</td>
<td>cache</td>
<td>quadrant</td>
</tr>
<tr>
<td>kona03</td>
<td>flat</td>
<td>snc-4</td>
</tr>
<tr>
<td>kona04</td>
<td>cache</td>
<td>snc-4</td>
</tr>
</tbody>
</table>
## sirocco[01-13] : Nvidia GPU accelerator nodes

<table>
<thead>
<tr>
<th>Node</th>
<th>CPU</th>
<th>Memory</th>
<th>GPU</th>
<th>Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>sirocco[01-05]</td>
<td>2 x 12 cores <strong>Haswell</strong> Intel(R) Xeon(R) CPU E5-2680 v3 @ 2.50GHz</td>
<td><strong>128GB</strong> RAM (2133 MHz)</td>
<td>4 x Nvidia <strong>Tesla K40m</strong></td>
<td>Infiniband QDR Mellanox 10Gbit/s Ethernet</td>
</tr>
<tr>
<td>sirocco06</td>
<td>2 x 10 cores <strong>Ivy Bridge</strong> Intel(R) Xeon(R) CPU E5-2670 v2 @ 2.50GHz</td>
<td><strong>128GB</strong> RAM (1866 MHz)</td>
<td>2 x Nvidia <strong>Tesla K40m</strong></td>
<td>Infiniband QDR Mellanox 10Gbit/s Ethernet</td>
</tr>
<tr>
<td>sirocco[07-13]</td>
<td>2 x 16 cores <strong>Broadwell</strong> Intel(R) Xeon(R) CPU E5-2683 v4 @ 2.10GHz</td>
<td><strong>256 GB</strong> RAM (2133 MHz)</td>
<td>2 x Nvidia <strong>Tesla P100</strong></td>
<td>Omnipath 10Gbit/s Ethernet</td>
</tr>
</tbody>
</table>
visu01 : visualization node

- **2 x 10 cores Haswell** Intel(R) Xeon(R) CPU E5-2650 v3 @ 2.30GHz
- **128GB** RAM (2133 MHz)
- **2 x Nvidia Quadro K4000**
- Ethernet : 10Gbit/s
- /tmp : ~1.8TB

Networks
Multiples networks

- **Omnipath** 100Gbit/s network
- **Infiniband** QDR 40Gbit/s network: **Qlogic** and **Mellanox**
- **Ethernet** 10Gbit/s network
Omnipath Network

Switch 48 ports

16 link

Switch 48 ports

miriel[001-024]

devel[11-13]
miriel[025-43]
Infiniband Network

Network diagram showing the connections between switches and servers.
04 Storage

## Storage available

<table>
<thead>
<tr>
<th>Name</th>
<th>Max size</th>
<th>Deletion</th>
<th>Hardware Protection</th>
<th>Backup</th>
<th>Use</th>
<th>How to obtain</th>
</tr>
</thead>
<tbody>
<tr>
<td>/home</td>
<td>20GB / user</td>
<td>never</td>
<td>ON</td>
<td>ON</td>
<td>individual</td>
<td>automatic</td>
</tr>
<tr>
<td>/projets</td>
<td>200GB / user</td>
<td>never</td>
<td>ON</td>
<td>ON</td>
<td>group</td>
<td>On demand</td>
</tr>
<tr>
<td>/lustre</td>
<td>1TB / user 400 000 files / user</td>
<td>If needed</td>
<td>ON</td>
<td>OFF</td>
<td>individual</td>
<td>automatic</td>
</tr>
<tr>
<td>/tmp</td>
<td>Variable At reboot and if needed</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>individual</td>
<td>automatic</td>
</tr>
</tbody>
</table>
Evolutions
Before the end of 2018:

- 1 ARM node with **2 x 28 cores Cavium ThunderX2 (R) CPU CN9975 v2.1 @ 2.0GHz** and **256GB** memory.

- 4 nodes with **2 x 16 cores Skylake** Intel Xeon Gold 6142 2.6 GHz, **2x Nvidia V100 GPU** and **NVMe** and **384GB** memory

- 1 nodes with **2 x 20 cores Skylake** Intel Xeon Gold 6148 2.4 GHz, **2x Nvidia V100 GPU** and **1TB** memory

Second half of 2019:

- Renewal of computational nodes cluster
How to access PlaFRIM?

How to access PlaFRIM?

ssh-plafrim.math.u-bordeaux1.fr

ssh-plafrim.bordeaux.inria.fr

inria

IMB

devd11-13

PlaFRIM
1. if you don’t have one yet, create your ssh key pair with ssh-keygen

2. ask your account on : https://www.plafrim.fr/en/connection/registration/

3. Your ssh client must use a "ProxyCommand" to reach the target server

Sample configuration of .ssh/config to reach plafrim on port 22 :
(replace LOGIN_PLAFRIM with your actual login)

```
Host plafrim
User LOGIN_PLAFRIM
ForwardAgent yes
ForwardX11 yes
ProxyCommand ssh -A -l LOGIN_PLAFRIM ssh.plafrim.fr -W plafrim:22
```

Check that your private key is loaded with ssh-add -l. If not, load it with ssh-add ~/.ssh/private_key

Then use ssh LOGIN_PLAFRIM@plafrim
Need Help?
If you need Help


2. PlaFRIM support: plafrim-support@inria.fr
   For technical problems (access, account, administration, modules ...)

3. Users community: plafrim-users@inria.fr
   If you need help about more specific use or want to share with others users platform:
   contact plafrim-users@inria.fr or view archives here
   https://sympa.inria.fr/sympa/arc/plafrim-users
Some tools

- Performance monitoring: https://plafrim.fr/ganglia
Some tools

• **GUIX** to easy install your packages (→ the last presentation of the day by L. Courtès)

• **Modules** to modify your environment and load/unload programs (→ next presentation by F. Rué)

• **SLURM** to submit jobs on the cluster (→ next presentation by F. Rué)
Thank you!

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