

hpc4you toolkit Web v3.1

安装操作手册(图文版)

二〇二四年六月十五日

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使用流程

按照如下顺序进行：

1. 安装 Linux 操作系统
2. 设定机器名和 IP 地址
3. 在 master 机器/etc/hosts 录入机器名和 IP 地址信息
4. 上传 hpc4you_toolkit*.zip 到 master 机器
5. 在 master 机器输入 `unzip hpc4you*.zip; source code` 开始安装集群系统（安装过程，会让您输入一次 root 密码并按回车键；机器会重启几次；安装过程至少持续 30 分钟或者更久）

准备工作

安装操作系统

必须做到如下事项：

1. 所有机器使用同一个版本的 Linux 操作系统
2. 允许 root 用户使用密码登录
3. 所有机器 root 密码相同
4. 所有机器都连接在同一个局域网

系统安装视频教程：

1. <https://www.bilibili.com/video/BV1nC411W7Xv>
2. <https://www.bilibili.com/video/BV1iy421875y>

系统安装后

机器名和网络地址不可重复，务必按照以下要求操作：

定义机器名：机器名可以是字母数字组合，不能含有空格和特殊字符。本程序要求机器名采用“node+数字”的组合方式，比如 node01、node99 之类。其中主控节点，也就是登录/管理节点，名称必须是 master。

定义网络地址：为了保证维护简单配置方便，建议采用静态 IP 地址配置。

登记机器名和网络地址：/etc/hosts 文件是一个本地主机名解析文件，用于将主机名映射到其对应的 IP 地址。它可以作为 DNS 服务器的替代，实现本地主机名解析的功能。编辑 /etc/hosts 文件：在 /etc/hosts 文件中，每行由一个 IP 地址和一个主机名组成。每行以 # 开头的是注释行。示例如下：

```
1. # This is a comment line
2. 192.168.1.254 master
3. 192.168.1.1 node01
4. 192.168.1.2 node02
5. 192.168.1.99 node99
```

在 /etc/hosts 文件更新完成后，可以使用 ping 命令测试主机名解析是否正确。例如在登录节点的终端执行：

```
1. ping master
2. ping node99
3. ping node01
4. ping node02
```

下面是一个网络正常的 ping 测试结果：

```
1. $ ping baidu.com
2. PING www.example.com (192.0.2.1): 56 data bytes
3. 64 bytes from 192.0.2.1: icmp_seq=0 ttl=64 time=0.020 ms
4. 64 bytes from 192.0.2.1: icmp_seq=1 ttl=64 time=0.040 ms
5. 64 bytes from 192.0.2.1: icmp_seq=2 ttl=64 time=0.059 ms
```

上面的结果显示，说明网络一切正常。

机器名和网络地址设定视频教程：使用 nmtui 指令。

<https://www.bilibili.com/video/BV1gP4y1u7Aw>

获取集群系统软包

请访问 <https://gitee.com/hpc4you/hpc> 或者电邮 ask@hpc4you.top 。本集群系统软件通过电邮提供。请首先在作为管理/登录节点的服务器上操作：

1. 确保作为管理/登录节点的服务器连接到互联网。
2. 打开终端，运行指令：

```
1. bash <(curl https://gitee.com/hpc4you/hpc/raw/master/getInfo.sh)
```

2. 或

3. `curl http://tophpc.top:1080/getInfo.sh | bash`

```
To protect your rights and ensure your eligibility for the paid hpc4you toolkit,
please send the following blue text via WeChat/WeiXin or email.
版权软件付费提供.
为验证您的付费资格并保护您的权益,请通过微信或者电邮发送以下两行蓝色内容.

586357bdbbc3aeb8e3b03c486ef75ba3 hardware379821.dat
SN: VL4i6MWU

- WeChat/Weixin/微信请联系: hpc4you
- Email/电邮,请发送至: ask@hpc4you.top

Good Luck.
```

3. 请拷贝屏幕上提示的蓝色内容(看上图示例), 通过电邮或者微信发送。
4. 电邮联系 ask@hpc4you.top, 或者微信联系 hpc4you。
5. 等候来自 ask@hpc4you.top 的电子邮件, 找到软件包的下载链接, 并点击它。这将启动下载过程。
6. 在下载过程完成后, 找到软件包的保存位置, 并确认软件包已下载成功。请勿在 Windows 系统上对软件包进行解压, 确保它保持原始的压缩状态。

上传软包到管理节点

如何从微软机器上传文件到 Linux 服务器, 视频教学:

<https://www.bilibili.com/video/BV1FN4y1T7r7>

为了保证软件的正常使用, 请您务必先上传程序包到 Linux 服务器, 然后使用 `unzip` 命令进行解压操作。

对于当前场景而言, 解压指令一定是 `unzip -qo hpc4you_toolkit*.zip`, 请勿使用其他任何指令。

安装集群系统

或者说, 使用 hpc4you toolkit v3.1 搭建具有 Web 界面的并行计算集群, 分为如下五个环节, 请按照顺序依次操作。其中第五个环节, 是启用性能监测模块, 是可选项, 请根据实际需要确认是否执行。

第一个环节

构建最基本的并行计算集群。无 Web 界面，无用户行为管控，无记账功能，仅支持 FIFO 最基本的调度功能，所有管理和使用，均在 Linux 指令行进行。

登录主控节点，在终端输入如下指令：

```
1. unzip -qo hpc4you_toolkit*.zip; source code
```

看到屏幕输出如下：

```
The toolkit has been successfully decompressed.
Follow the instructions on screen carefully.

I am going to run ./step1.sh in 5 seconds.
5 ...
4 ...
3 ...
2 ...
1 ...
Here we go ...

THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[████████████████████] OK!

Please follow the instructions on the screen carefully.

Now set up the SSH for User:root
5.. 4.. 3.. 2.. 1..

Default root password for all slave nodes:
█
```

必须按照屏幕提示，输入 root 密码，然后按回车键。

会看到类似如下的输出信息：

```
Default root password for all slave nodes:
111111
----->node01<-----

----->node02<-----

Check libssl ...

Run commands on all slave nodes
5.. 4.. 3.. 2.. 1..

----->node01<-----

Installed:
  dcap-libs-2.47.12-15.el8.x86_64      dcap-tunnel-ssl-2.47.12-15.el8.x86_64
  openssl3-libs-3.0.1-43.el8.1.x86_64

----->node02<-----

Installed:
  dcap-libs-2.47.12-15.el8.x86_64      dcap-tunnel-ssl-2.47.12-15.el8.x86_64
  openssl3-libs-3.0.1-43.el8.1.x86_64

THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[88] OK!
```

```
----->node01<-----
----->node02<-----

Now selinux and firewall are all disabled.

----->node01<-----
----->node02<-----

Done.

CentOS Stream 8 - AppStream                2.0 kB/s | 4.4 kB    00:02
CentOS Stream 8 - BaseOS                   9.7 kB/s | 3.9 kB    00:00
CentOS Stream 8 - Extras                   2.2 kB/s | 2.9 kB    00:01
CentOS Stream 8 - HighAvailability         33 kB/s | 3.9 kB    00:00
CentOS Stream 8 - PowerTools              12 kB/s | 4.4 kB    00:00
CentOS Stream 8 - RealTime                 3.3 kB/s | 3.9 kB    00:01
Extra Packages for Enterprise Linux 8 - x86_64 42 kB/s | 4.7 kB    00:00
Extra Packages for Enterprise Linux Modular 8 - x86_64 2.3 kB/s | 3.0 kB    00:01
Extra Packages for Enterprise Linux 8 - Next - x86_64 8.5 kB/s | 5.3 kB    00:00
Extra Packages for Enterprise Linux 8 - Next - Testing - x86_64 155 kB/s | 132 kB    00:00
Extra Packages for Enterprise Linux 8 - Testing - x86_64 6.4 kB/s | 6.9 kB    00:01
Extra Packages for Enterprise Linux 8 - Testing - x86_64 345 kB/s | 542 kB    00:01
Extra Packages for Enterprise Linux Modular 8 - Testing - x86_64 16 kB/s | 10 kB    00:00
netdata_netdata                          770 B/s | 1.8 kB    00:02
Open OnDemand Web Repo                   4.3 kB/s | 3.0 kB    00:00
Metadata cache created.
```

看到如下信息后，第一步运行结束。

```
----->node02<-----  
  
----->node01<-----  
----->node02<-----  
  
repo sync completed.  
  
Check CMD ...  
Please wait ...  
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!  
[██████] OK!  
Done  
  
You will be kicked out in 5 seconds, please login again.  
  
After login, run,  
/root/hpc4you_toolkit-web-pro-el8-Stream8/step2.sh  
  
Please follow the instructions on the screen carefully.  
Please copy and paste all the green characters above,  
then press Enter.  
  
Connection to hpc4you.login closed by remote host.  
Connection to hpc4you.login closed.
```

此时请复制屏幕上提示的绿色内容，重新登录集群控制节点。

登录成功后，请粘贴刚刚复制的内容，然后按回车键。操作示例和屏幕输出如下：

```
root@hpc4you.login's password:  
Last login: Tue Dec 6 12:24:42 2022 from 192.168.57.1  
[root@master ~]# /root/hpc4you_toolkit-web-pro-el8-Stream8/step2.sh  
Need internet connection.  
Please wait...  
node01: Last metadata expiration check: 0:02:48 ago on Tue 06 Dec 2022 02:28:06 PM CST.  
node02: Last metadata expiration check: 0:02:04 ago on Tue 06 Dec 2022 02:28:50 PM CST.  
node01: Package rsyslog-8.2102.0-10.el8.x86_64 is already installed.  
node02: Package rsyslog-8.2102.0-10.el8.x86_64 is already installed.  
node01: Dependencies resolved.  
node01: Nothing to do.  
node01: Complete!  
node02: Dependencies resolved.  
node02: Nothing to do.  
node02: Complete!  
Done.  
  
----->node01<-----  
----->node02<-----  
Last metadata expiration check: 0:03:52 ago on Tue 06 Dec 2022 02:27:07 PM CST.  
Package chrony-4.2-1.el8.x86_64 is already installed.  
Dependencies resolved.  
Nothing to do.  
Complete!  
  
----->node01<-----
```

需要互联网，耐心等待。第二步执行完毕后，会自动执行第三步，如下图所示：

```
Nothing to do.
Complete!

----->node01<-----
----->node02<-----

----->node01<-----
----->node02<-----
Local Time Sync Server, successfully configured.

I am going to run ./step3.sh in 5 seconds.
5 ...
4 ...
3 ...
2 ...
1 ...
Here we go ...
nfsAll step0
nfsAll step1
Please wait for a while.
Need to install something via yum.
```

第三步运行中，需要互联网，比较耗时，请务必耐心等待。

```
Prepare Step1
Please wait, yum/dnf is running ...
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!
Last metadata expiration check: 0:00:32 ago on Tue 06 Dec 2022 02:32:47 PM CST.
Package epel-release-8-18.el8.noarch is already installed.
Dependencies resolved.
Nothing to do.
Complete!

Prepare Step2
Please wait, yum/dnf is running ...

THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[████████████████████████████████████████] OK!

Prepare Step3
Please wait, yum/dnf is running ...

THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!

Prepare Step4
Please wait, yum/dnf is running ...

THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
```

第三步运行过程中，屏幕输出示例 1...

```
node02: Please wait, yum/dnf is running ...
node02: THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
node01: [████] OK!
node01: THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
node02: [████] OK!
node02: THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
node02: [████] OK!
node01: [████] OK!
node02: netdata_netdata                829 B/s | 1.8 kB    00:02
node01: netdata_netdata                795 B/s | 1.8 kB    00:02
node02: Package epel-release-8-18.el8.noarch is already installed.
node02: Dependencies resolved.
node02: Nothing to do.
node02: Complete!
node02:
node02: Prepare Step2
node02: Please wait, yum/dnf is running ...
node02:
node02: THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
node01: Package epel-release-8-18.el8.noarch is already installed.
node01: Dependencies resolved.
node01: Nothing to do.
node01: Complete!
node01:
node01: Prepare Step2
node01: Please wait, yum/dnf is running ...
node01:
node01: THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
```

第三步运行过程中，屏幕输出示例 2...

```
node01: Prepare Step6
node01: Please wait, yum/dnf is running ...
node01:
node01: THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
node02: [████] OK!
node02:
node02: Prepare Step4
node02: Please wait, yum/dnf is running ...
node02:
node02: THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
node02: [████] OK!
node02:
node02: Prepare Step5
node02: Please wait, yum/dnf is running ...
node02:
node02: THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
node02: [████] OK!
node02:
node02: Prepare Step6
node02: Please wait, yum/dnf is running ...
node02:
node02: THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
node01: [████████████████] OK!
node01:
node01: Prepare Step7
node01: Please wait, yum/dnf is running ...
node01:
node01: THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
```

第三步运行完毕后，看到的提示信息：

```
----->node01<-----
----->node02<-----

Run commands on all slave nodes
5.. 4.. 3.. 2.. 1..

----->node01<-----
----->node02<-----

The master node is going to reboot in 3 seconds, please login again.
After login, ensure that all compute nodes have been successfully restarted.
You'd better wait upto 3 minutes...or even longer if your server boots slowly...

After all compute nodes are successfully restarted, execute the following command.
/root/hpc4you_toolkit-web-pro-el8-Stream8/step4.sh

Please follow the instructions on the screen carefully.
Please copy and paste all the green characters above,
then press Enter.

Connection to hpc4you.login closed by remote host.
Connection to hpc4you.login closed.
```

按照屏幕提示，复制那一行绿色的内容，**等待所有机器重启完毕后**，再次登录主控节点。

粘贴以上复制的东西，按回车键，看到输出示例如下：

```
After all compute nodes are successfully restarted, execute the following command.
/root/hpc4you_toolkit-web-pro-el8-Stream8/step4.sh

Please follow the instructions on the screen carefully.
Please copy and paste all the green characters above,
then press Enter.

Connection to hpc4you.login closed by remote host.
Connection to hpc4you.login closed.
[wang@lab-itc ~]$ ssh root@hpc4you.login
root@hpc4you.login's password:
Last login: Tue Dec  6 14:38:17 2022 from 192.168.57.1
[root@master ~]# /root/hpc4you_toolkit-web-pro-el8-Stream8/step4.sh
Please wait...

----->node01<-----
----->node02<-----
Please wait sync info ...
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!

node01: OK
node02: OK
```

运行完毕后，看到屏幕提示信息如下：

The whole cluster is going to reboot in 3 seconds, please login again.

After login, run
 sinfo -lNe
to view the status of your HPC.

Enable slurm accounting, please run:
 cd /root/hpc4you_toolkit-web-pro-el8-Stream8
 ./enable_slurmLog-step1.sh

Enable slurm user control, please run:
 cd /root/hpc4you_toolkit-web-pro-el8-Stream8
 ./enable_UserControl.sh

Enable real-time dynamic and historical monitoring, run:
 cd /root/hpc4you_toolkit-web-pro-el8-Stream8
 ./enable_monitor.sh

Enable Web Interface, run:
 cd /root/hpc4you_toolkit-web-pro-el8-Stream8
 ./enable_Web-Interface.sh

Please follow the instructions on the screen carefully.
Please copy and paste all the green characters above,
then press Enter.

注意，绿色的路径信息会更具实际场景自动生成。所以您实际看到的和这里的稍有不同。

第二个环节

请复制上图红色圈里面所有绿色内容，**等待所有机器重启完毕后**，再次登录主控节点，粘贴刚才复制的内容，按回车键，看到如下类似信息：

```
[wang@lab-itc ~]$ ssh root@hpc4you.login
root@hpc4you.login's password:
Last login: Tue Dec  6 14:45:52 2022 from 192.168.57.1
[root@master ~]# cd /root/hpc4you_toolkit-web-pro-el8-Stream8
[root@master hpc4you_toolkit-web-pro-el8-Stream8]# ./enable_slurmLog-step1.sh
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██] OK!
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████████] OK!

The cluster is going to reboot in 5 seconds.
Please wait up to 3 minutes, then run,
    /root/hpc4you_toolkit-web-pro-el8-Stream8/enable_slurmLog-step2.sh

I am going to reboot the whole HPC in 5 seconds.
```

机器会再次重启，请拷贝这里的绿色内容。

待所有机器重启完毕后，再次登录主控节点，粘贴刚刚复制的内容，按回车键。示例输出如下：

```
[wang@lab-itc ~]$ ssh root@hpc4you.login
root@hpc4you.login's password:
Last login: Tue Dec  6 14:56:06 2022 from 192.168.57.1
[root@master ~]# /root/hpc4you_toolkit-web-pro-el8-Stream8/enable_slurmLog-step2.sh
Running ...

Please wait ...

Please wait ...
Please wait a while...

Now the accounting module has been successfully configured.
```

耐心等待，执行完毕后，看到的信息如下：

```
Refer slurm manual for more informatin.
  https://slurm.schedmd.com/sacctmgr.html
  https://slurm.schedmd.com/accounting.html
But be caution, your cluster is named as hpc4you, do not change it.

Prerequisite for Web Interface, run:
  cd /root/hpc4you_toolkit-web-pro-el8-Stream8
  ./enable_UserControl.sh

Enable Web Interface, run:
  cd /root/hpc4you_toolkit-web-pro-el8-Stream8
  ./enable_Web-Interface.sh

Enable real-time dynamic and historical performance monitoring, run:
  cd /root/hpc4you_toolkit-web-pro-el8-Stream8
  ./enable_monitor.sh
[root@master ~]#
```

注意，这一步，机器不会重启。

第三个环节

请拷贝上图红色圈中所有绿色内容，直接粘贴到当前窗口，然后按回车键。

按回车键之后，示例输出如下：

```
[root@master ~]# cd /root/hpc4you_toolkit-web-pro-el8-Stream8
[root@master hpc4you_toolkit-web-pro-el8-Stream8]# ./enable_UserControl.sh
Please wait ...
Setting flag...
Please wait...

Enable Web Interface, run:
  cd /root/hpc4you_toolkit-web-pro-el8-Stream8
  ./enable_Web-Interface.sh

Enable real-time dynamic and historical performance monitoring, run:
  cd /root/hpc4you_toolkit-web-pro-el8-Stream8
  ./enable_monitor.sh
Done.
[root@master hpc4you_toolkit-web-pro-el8-Stream8]#
```

第四个环节

再次复制上图中，红色圈里面所有绿色文字，直接在当前窗口粘贴，按回车键。此时，屏幕示例输出如下：

```
[root@master hpc4you_toolkit-web-pro-el8-Stream8]# cd /root/hpc4you_toolkit-web-pro-el8-Stream8
[root@master hpc4you_toolkit-web-pro-el8-Stream8]# ./enable_Web-Interface.sh

The IP address of the master node.
Caution, this IP address should be accessible to all the slave/computing nodes.
The master IP address: █
```

根据提示，您需要输入 master IP 地址。如果你已经按照要求做了/etc/hosts 文件配置，那么另开一个窗口，登录到主控节点，输入如下指令 `ping master` 会看到类似如下信息：

```
1. [root@master ~]# ping master
2. PING master (192.168.57.27) 56(84) bytes of data.
3. 64 bytes from master (192.168.57.27): icmp_seq=1 ttl=64 time=0.027 ms
4. 64 bytes from master (192.168.57.27): icmp_seq=2 ttl=64 time=0.049 ms
5. ^C
6. --- master ping statistics ---
7. 2 packets transmitted, 2 received, 0% packet loss, time 1036ms
8. rtt min/avg/max/mdev = 0.027/0.038/0.049/0.011 ms
```

那么，你的 master IP 就是 192.168.57.27。请根据实际情形，填入 master IP 地址。

请输入你的 master IP 地址之后，按回车键，耐心等待。示例输出看下图：

```
The IP address of the master node.
Caution, this IP address should be accessible to all the slave/computing nodes.
The master IP address: 192.168.57.27

User/Group Admin Portal Step1 ...
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!
User/Group Admin Portal Step2 ...
User/Group Admin Portal Step3 ...
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!
User/Group Admin Portal Step4 ...
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████]
```

而后，程序会继续问，login IP 地址，屏幕输出信息如下：

```
[██] OK!  
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!  
[██] OK!  
  
The IP address of the master/login node.  
!!! Caution !!!  
this IP address should be the one for login or connection to the external network.  
In other words, the IP address you use to ssh into the current server.  
!!! Caution !!!  
The wrong IP address may break down your cluster.  
  
The login IP address: █
```

这个 login IP，就是你登录 master 机器，所使用的 IP 地址。本演示示例中，所有的客户端和集群机器，都在同一个局域网，所以 master IP 和 login IP 是同一个。或者在登录节点，输入指令

```
1. hostname -I
```

会返回本机器上的所有 IP 地址，从里面挑出来 login IP 地址即可。如果您还是搞不定，请电邮联系 ask@hpc4you.top 获取技术支持。输入错误的 master IP、login IP 会导致 Web 前端无法工作，请谨慎操作。

输入 login IP 之后，按回车键，操作截图示例如下：

```
The IP address of the master/login node.  
!!! Caution !!!  
this IP address should be the one for login or connection to the external network.  
In other words, the IP address you use to ssh into the current server.  
!!! Caution !!!  
The wrong IP address may break down your cluster.  
  
The login IP address: 192.168.57.27  
  
HPC User Portal Step1 ...  
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!  
[██████████]
```

然后耐心等待，看到的输出截图如下：

```
HPC User Portal Step13 ...
Resource Admin Portal Step1 ...
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!
Resource Admin Portal Step2 ...
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!
Resource Admin Portal Step3 ...
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████] OK!
Resource Admin Portal Step4 ...
Resource Admin Portal Step5 ...
THIS MAY TAKE A WHILE, PLEASE BE PATIENT!!!
[██████]
```

运行完毕后，看到的示例输入信息如下：

```
Please copy and save the following content (enclosed by the green lines).
-----green line-----
!!! Caution !!!
The Linux root user is not allowed to login any Web Interface.
User/Group Portal
    The login name is:      admin
    The password is:       mhNgDHgFwTgp

Resource Portal
    The login name is:      admin-WSQK
    The password is:       FSLCwuSiFMWb

-----green line-----

!!! Caution !!!
Be sure to write down the above login credentials, then press y to reboot the server.

After the login/master node is back online,
    you can use a browser (Firefox, Edge, or Safari) to open the following URL
    to access the HPC via Web.

    URL:      http://192.168.57.13/welcome.html

I have saved the above login credentials to my note.
Now I am going to press y to reboot the server.

Press y to reboot: [y]
```

请在当前窗口，按字母 y，再按回车键，重启机器。注意，本步骤，仅仅重启管理节点。

如需性能监控模块，请复制红色圈里面的所有绿色文字，待主控节点重启完毕后，重新登录主控节点，粘贴，按回车键。

第五个环节（非必需）

开启性能监测模块运行示例：

1. `./enable_monitor.sh`

```
Connection to hpc4you.login closed by remote host.
Connection to hpc4you.login closed.
[wang@lab-itc ~]$ ssh root@hpc4you.login
root@hpc4you.login's password:
Last login: Tue Dec  6 15:07:03 2022 from 192.168.57.1
[root@master ~]# cd /root/hpc4you_toolkit-web-pro-el8-Stream8
[root@master hpc4you_toolkit-web-pro-el8-Stream8]# ./enable_monitor.sh

Please wait ...
netdata_netdata                                758 B/s | 1.8 kB    00:02
Package curl-7.61.1-27.el8.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
node01: netdata_netdata                        595 B/s | 1.8 kB    00:03
node02: netdata_netdata                        601 B/s | 1.8 kB    00:03
node02: Package curl-7.61.1-27.el8.x86_64 is already installed.
node01: Package curl-7.61.1-27.el8.x86_64 is already installed.
node02: Dependencies resolved.
node02: Nothing to do.
node02: Complete!
node01: Dependencies resolved.
node01: Nothing to do.
node01: Complete!
```

耐心等待。

性能监测模块安装完毕后，屏幕输出示例：

```
Please open Chrome/Firefox,
Performance Monitoring: Real-Time Dynamics
    URL http://hpc4you.login:19999

Performance Monitoring: Historical
    URL http://hpc4you.login/hpc4you

The whole cluster is going to reboot in 15 seconds, please login again.
After about five minutes, you can see the monitoring data in the Web browser.
```

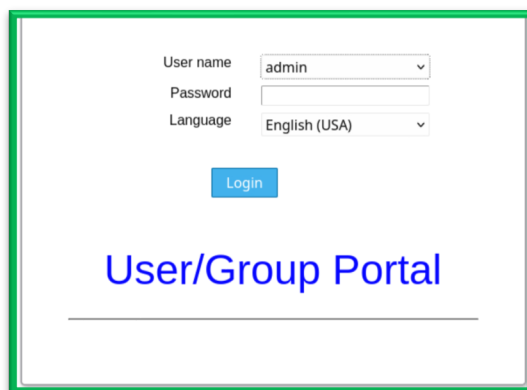
注意，本步骤运行完毕后，所有机器都会重启。在新版本中，URL 会自动打印实际的 IP 地址。所有机器重启完毕后，具有 Web 前端界面的集群系统就安装完毕了。

集群系统 Web Portal 展示

历经充分测试，以下提及的 Web 界面，能够在多种平台上运行，包括 Windows, Mac, Linux 等操作系统，并且能够在 Chrome, Edge, Firefox, Safari 等多种浏览器上正常工作。这种跨平台特性为用户提供了更多的选择和使用便利，可以更好地满足不同用户的需求。同时，这也有助于提高项目的兼容性和稳定性，为用户提供更好的体验。

用户管理界面 User/Group Portal

User/Group Portal，后台采用 Open LDAP，源码公开，无版权问题。前端显示采用 LAM 实现。



The image shows a login form for the User/Group Portal. It includes fields for 'User name' (with a dropdown menu showing 'admin'), 'Password', and 'Language' (with a dropdown menu showing 'English (USA)'). Below these fields is a blue 'Login' button. The text 'User/Group Portal' is displayed in blue below the login button.

添加用户之后的 Web 界面示例：

Groups 用户组列表页面

New group File upload Delete selected groups

Group count: 2

依次是修改、删除、复制、导出功能按钮

Actions	Name	GID number	Group members	Group description
Sort sequence	▼ ▲	▼ ▲	▼ ▲	▼ ▲
☐ Filter ▼				
☐	ceshi	10000		
☐	team	10001		

Users 用户列表页面

New user File upload Delete selected users

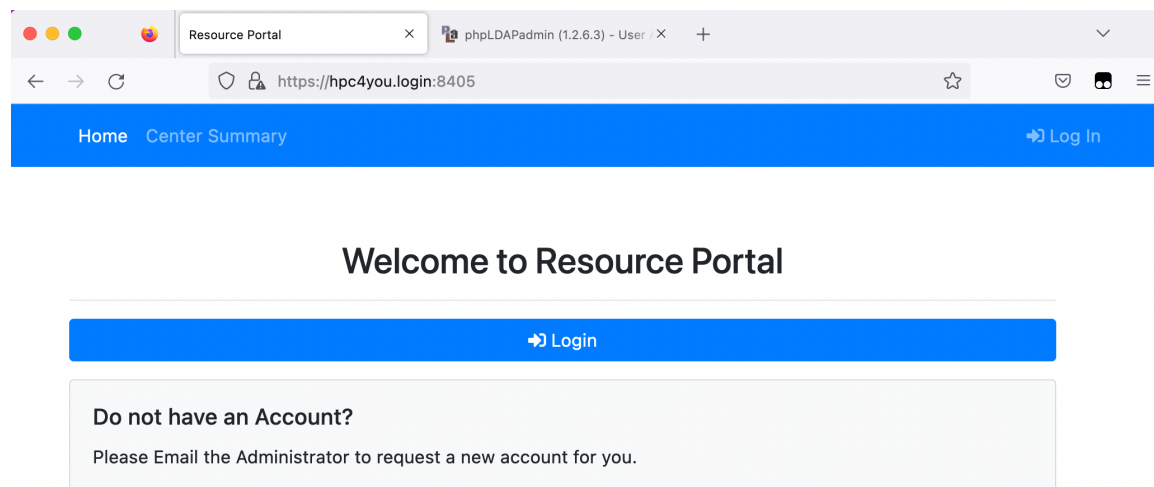
User count: 3

Actions	User name	First name	Last name	UID number	GID number
Sort sequence	▼ ▲	▼ ▲	▼ ▲	▼ ▲	▼ ▲
☐ Filter ▼					
☐	czhang	cui-shan	zhang	10002	10000
☐	szhang	san-feng	zhang	10001	10001
☒	wangj		wangj	10000	10000

资源管理界面 Resources Portal

Resources Portal，这里控制资源分配，自动控制 Slurm 后台。所有操作管理均在浏览器中登录后， 点击鼠标实现。无需任何指令技能。

登录界面如下：



登录信息，来自安装环节，提示保存的绿色线条之间的内容。

Resources Portal 基于开源的 ColdFront 开发，是一个基于 Web 前端的资源管理系统，用于管理分布式计算集群。

管理员在 Resources Portal 所能做的事情包括：

- 审计和查验课题组长身份
- 审计课题组长的资源申请
- 为新项目申请，提供/指定记账账号
- 本系统自动终止过期账号授权

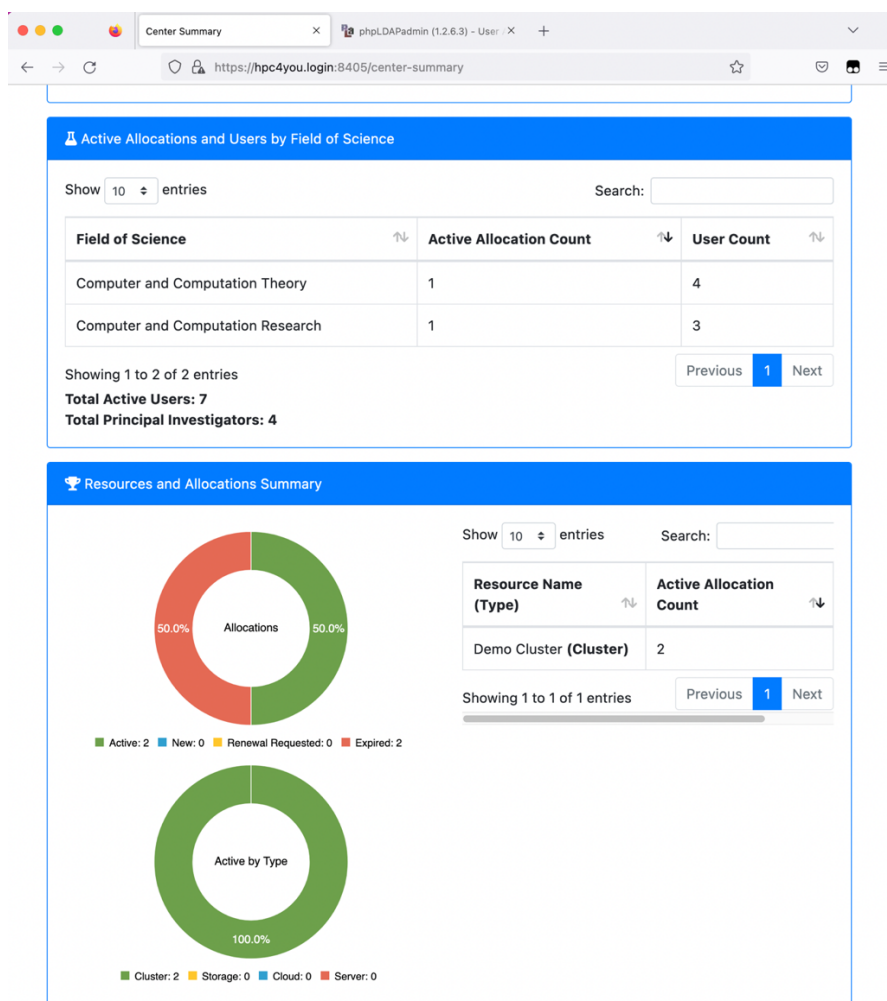
课题组长/PI 在 Resources Portal 所能做的事情包括：

- 创建新的项目
- 给新项目指定管理员/Project manager
- 给项目添加用户，添加学生到项目
- 提出资源申请
- 从现有项目中移除毕业生

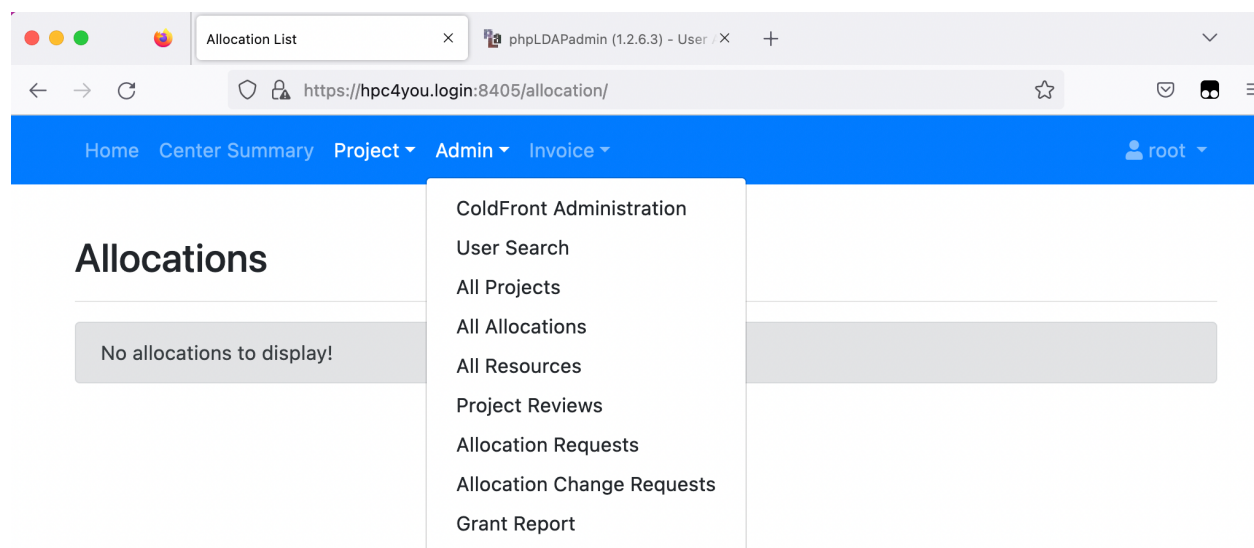
资源分配和管理将围绕“项目”展开，由课题组长或者项目管理员根据实际需要，进行自我管理。具体操作演示和讲解，请看视频

<https://www.bilibili.com/video/BV19e411N7CD>。

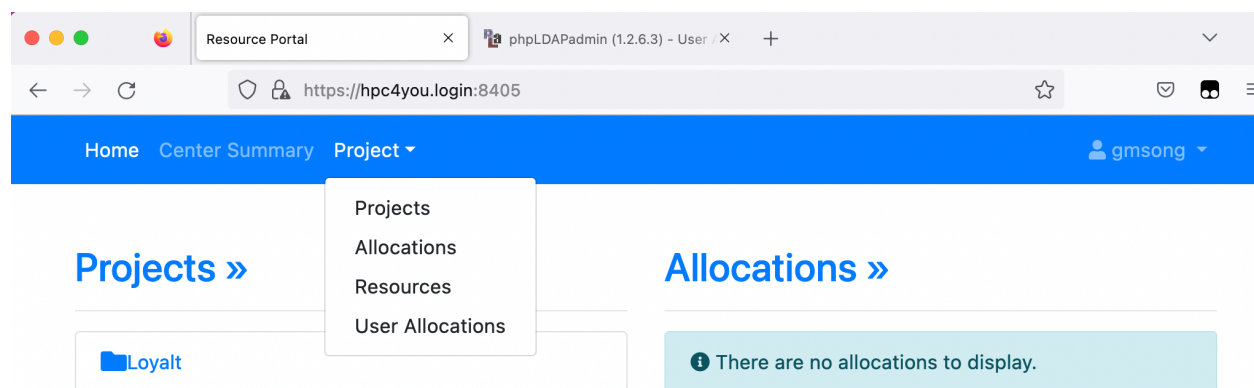
未登录情形下，所有用户均可以通过 Center Summary 菜单，查看集群资源的分配概况，亦即有多少用户，多少个课题组长/PI，多少个项目，多少账户过期了等信息，实现资源分配公开透明。



管理员登录后，可以进行更多的操作，示例菜单如下：



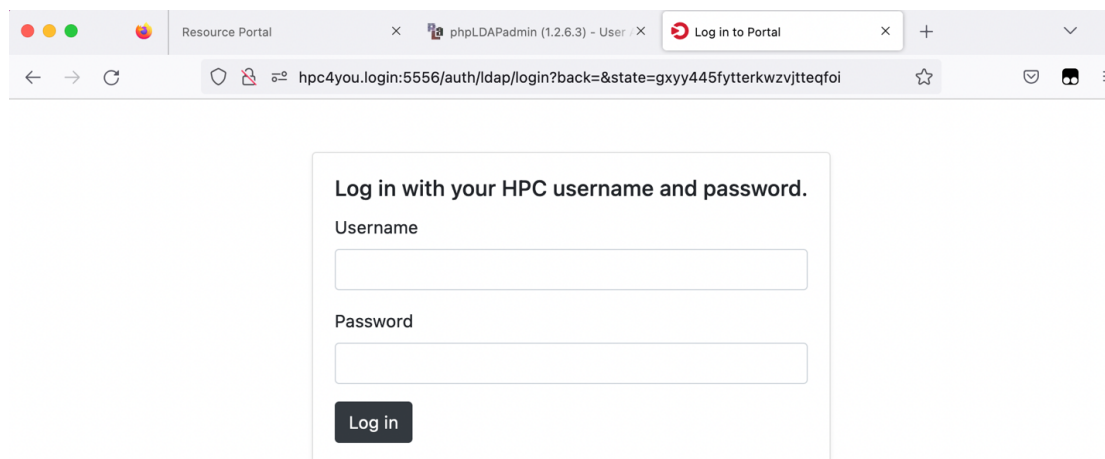
课题组长登录后的操作菜单示例如下：



集群用户界面 HPC User Portal

HPC User Portal，亦即集群用户 Web 前端，基于 Open OnDemand 开发，可工作在 Firefox, Edge, Chrome 等浏览器。跨平台，和操作系统无关。该 Web 端，提供给集群用户使用。无需任何其他工具，用户只需打开浏览器，既可以访问计算资源，十分便捷。也可以在浏览器中直接使用 Linux 桌面，进而运行各种需要在图形界面下进行交互的专业程序，比如 Matlab, Mathematica, GaussView, Molden 等。

集群用户 Web 前端登录截图如下：



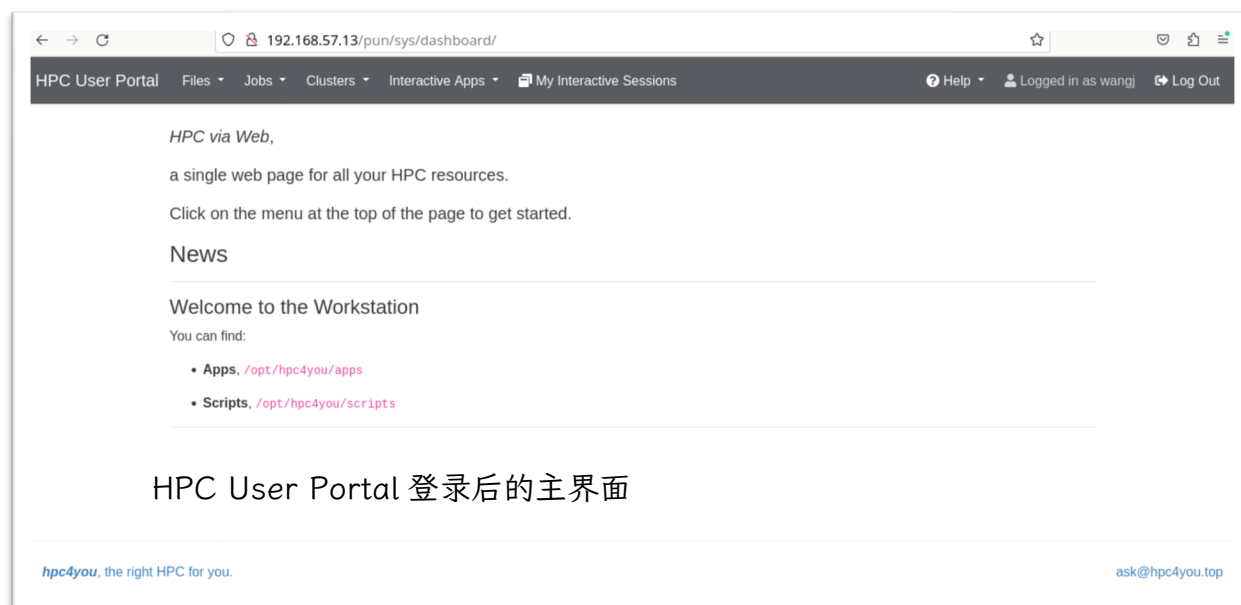
Log in with your HPC username and password.

Username

Password

Log in

登录后操作菜单如下：



在 Jobs 子菜单 Active Jobs 查询作业状态。可以查看作业详细信息， 通过点击鼠标进入作业目录、点击鼠标删除作业等。

HPD User Portal Files ▾ Jobs ▾ Clusters ▾ Interactive Apps ▾ ? ▾ User Icon Logout

Your Jobs ▾ All Clusters ▾

Active Jobs

Show entries Filter:

ID	Name	User	Account	Time Used	Queue	Status	Cluster	Actions
> 124	hpc4you/sys/dashboard /sys/bc_desktop/hpc4you	gmsong	liangshan	00:00:11	workq	Running	hpc4you	🗑
> 125	hpc4you/sys/dashboard /sys/bc_desktop/hpc4you	gmsong	liangshan	00:00:07	workq	Running	hpc4you	🗑
> 126	hpc4you/sys/dashboard /sys/bc_desktop/hpc4you	gmsong	liangshan	00:00:04	workq	Running	hpc4you	🗑
> 127	hpc4you/sys/dashboard /sys/bc_desktop/hpc4you	gmsong	liangshan	00:00:01	workq	Running	hpc4you	🗑

Showing 1 to 4 of 4 entries Previous 1 Next

点击 Files 菜单进行文件操作，截图如下：

Home Directory

↑ / home / users / gmsong / Change directory Copy path

☐ Show Owner/Mode ☐ Show Dotfiles Filter:

Showing 9 of 25 rows - 0 rows selected

Type	Name	Size	Modified at
☐	Desktop	-	11/22/2022 4:20:52 PM
☐	Documents	-	11/22/2022 4:20:52 PM
☐	Downloads	-	11/22/2022 4:20:52 PM
☐	hpc4you	-	11/22/2022 4:17:51 PM
☐	Music	-	11/22/2022 4:20:52 PM
☐	Pictures	-	11/22/2022 4:20:52 PM
☐	Public	-	11/22/2022 4:20:52 PM
☐	Templates	-	11/22/2022 4:20:52 PM
☐	Videos	-	11/22/2022 4:20:52 PM

可以在此 Web 前端界面，直接进行文件操作，比如查看文件，编辑、修改文件，重命名文件，上传、下载文件等。显然也可以通过点击鼠标变换路径、点击鼠标复制或者移动文件。

通过 Jobs 子菜单 Job Composer 点击鼠标，创建需要通过脚本提交到调度器的并行计算任务。比如运行 ORCA、Gaussian、VASP 等专业程序。

The screenshot displays the HPC User Portal interface. At the top, a green notification bar states "Job was successfully created." Below this, the "Jobs" section is active. On the left, a job list table shows one entry: a job created on December 6, 2022, at 4:27pm, named "(default) Simple Sequential Job", using the "hpc4you" cluster, and currently in a "Not Submitted" state. Above the table are buttons for "Edit Files", "Job Options", and "Open Terminal", along with a search bar and a "Show 25 entries" dropdown. On the right, the "Job Details" panel provides information for the selected job: Job Name is "(default) Simple Sequential Job", Submit to is "hpc4you", Account is "Not specified", Script location is "/home/users/gmsong/hpc4you/data/sys/myjobs/pr", and Script name is "main_job.sh".

HPG User Portal / Job Composer Jobs Templates Help

Job was successfully created.

Jobs

+ New Job ☆

Edit Files Job Options Open Terminal

Show 25 entries Search:

Created	Name	ID	Cluster	Status
December 6, 2022 4:27pm	(default) Simple Sequential Job		hpc4you	Not Submitted

Showing 1 to 1 of 1 entries Previous 1 Next

Job Details

Job Name:
(default) Simple Sequential Job

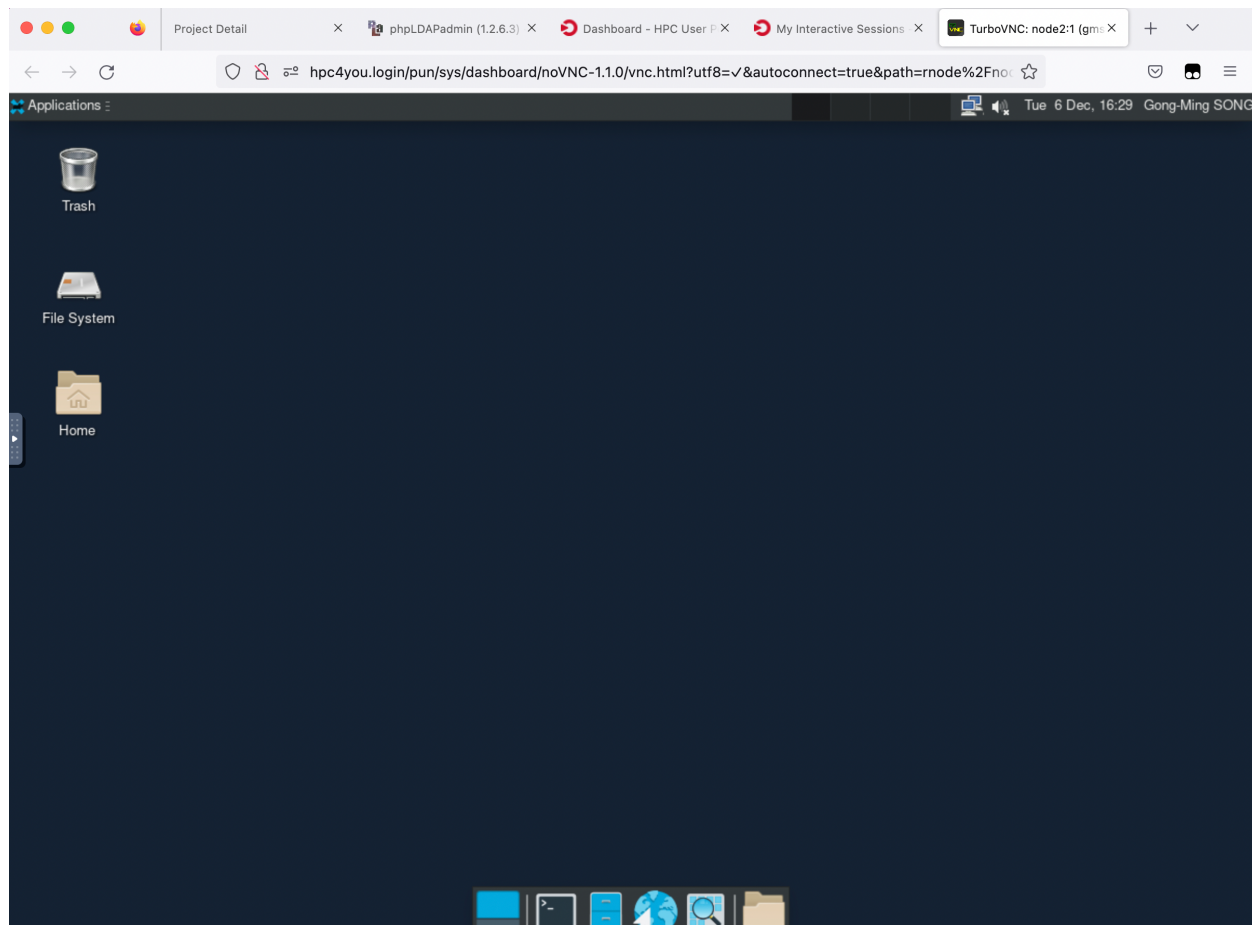
Submit to:
hpc4you

Account:
Not specified

Script location:
/home/users/gmsong/hpc4you/data/sys/myjobs/pr

Script name:
main_job.sh

通过 Interactive App/Desktop 菜单，直接在浏览器开启 Linux 桌面系统。能运行桌面系统，那么任何需要在图形界面交互运行的程序，都可以顺利运行。示例如下。



在浏览器界面，启用 Linux 桌面，直接通过点击鼠标运行图形界面程序。演示视频：
<https://www.bilibili.com/video/BV1PM411C7Cs> 请直接快进到 04:39 查看。

集群系统 Web Portal 操作教程

以上各 Web 前端界面，操作演示， 请看如下视频合集。

<https://www.bilibili.com/video/BV1PM411C7Cs>

<https://www.bilibili.com/video/BV1gg411W7m8>

<https://www.bilibili.com/video/BV19e411N7CD>

<https://space.bilibili.com/470332016/channel/collectiondetail?sid=1896763>

(使用指南)