



Things you'll learn:

- ◆ How to enable OpenFlightHPC
- ◆ How to run a simple Slurm job
- ◆ How to run a simple Gridware OpenFOAM job

Option to take a return flight using Conda, Spack, Singularity or Easybuild cluster software package management!

# Welcome to OpenFlightHPC SC19 Bootcamp!



This bootcamp is designed to give you a basic introduction to how a cluster built with OpenFlightHPC works. We'll run you through an overview of the tools followed by a graphical desktop exercise using OpenFOAM running on a public cloud platform. Complete part one and earn some OpenFlight and Alces Flight stickers. Complete both parts and earn a mini-moose!

## What is OpenFlightHPC?

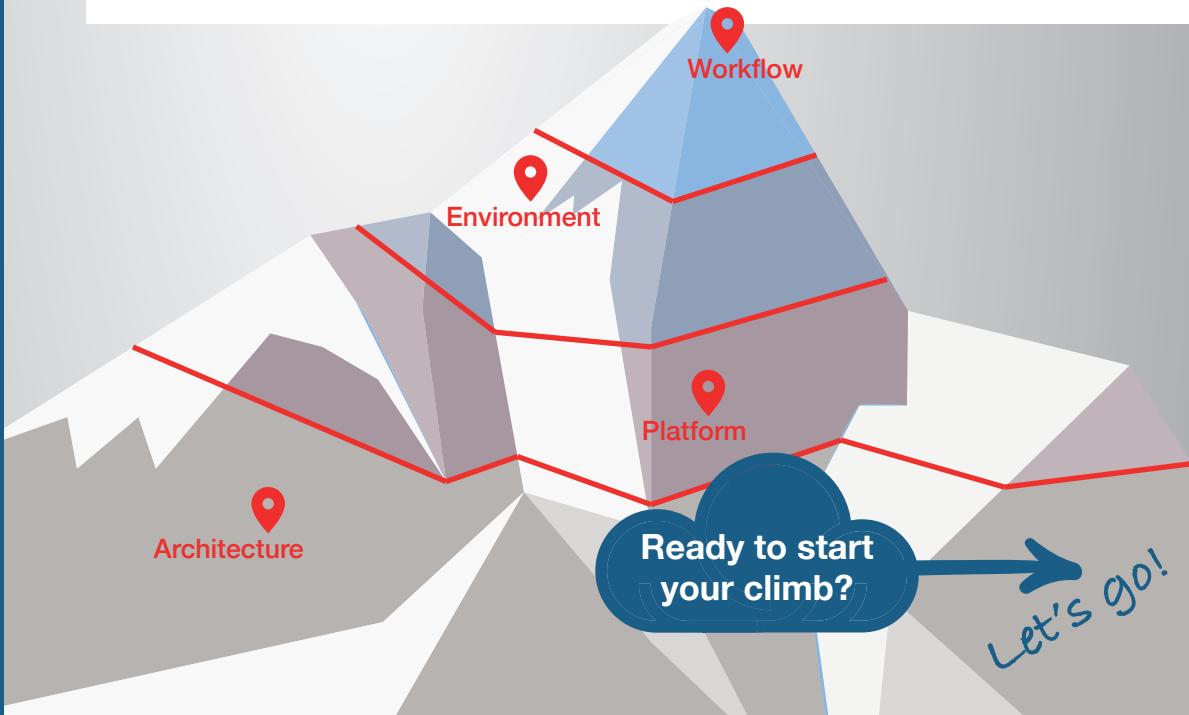
OpenFlightHPC is an open-source community project developing a flexible, functional and stable HPC stack that can be launched on any platform. The aim of this project is to build modular tools that cover the entire cluster building process from designing, to deploying, to managing the cluster architecture for any workflow.

## What's with the mountain?

Part of this project is the inception of the HPC Mountain which breaks down the stages of HPC cluster creation, usage and management into logical stages. The tools which are being developed intend on addressing each stage of the process. All the tools will be stand-alone such that each one can assist cluster creation even if other tools are used for earlier or later stages of the build process.

## Where is OpenFlightHPC in use?

This project has evolved out of the Alces Flight Compute public cloud project which launched in 2016. Over the past three years we've been taking feedback from our user base and created toolkits to help address each stage of the HPC Mountain to ensure the work can be done on cloud and/or bare metal. OpenFlightHPC is an open-source HPC project which can be configured on your own, however, for convenient building blocks to enable rapid deployment, management, and scale please speak with the Alces Flight team.





DID YOU GET SOMTHING LIKE THIS?

Hello from node01  
Fri 8 Nov 15:34:03 GMT 2019  
Goodbye



Congrats!  
You've passed Part One!

## Part Two: The Graphical Desktop

Now that you've done some basics let's see what you can get up to using OpenFlightHPC to run a simple OpenFOAM job.

**OpenFlightHPC is able to start a graphical desktop session using Gnome. To get the session information you'll need the command:**

```
[flight@gateway1 (moosecluster) ~]$ flight desktop start gnome
```

Fantastic! Let's start a desktop session!

Did you produce something like this?

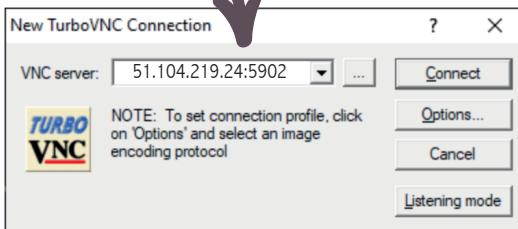
```
> ✓ Starting session
A 'gnome' desktop session has been started.

== Session details ==
Identity: e1439364-37e9-4abc-8fb7-e59466bd6452
Type: gnome
Host IP: 51.104.219.24
Hostname: gateway1
Port: 5902
Display: :2
Password: czB0YcRa

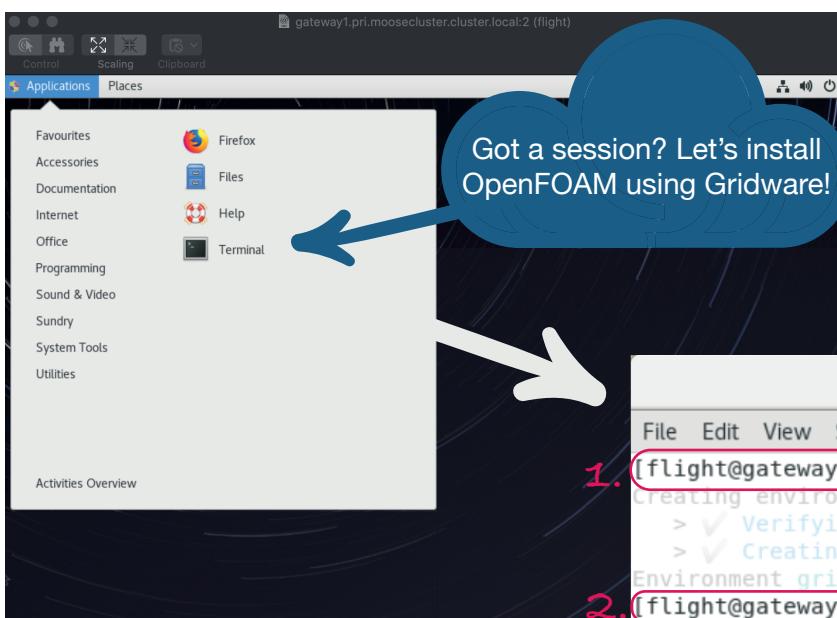
This desktop session is directly accessible from the public internet.
Depending on your client and network configuration you may be able to
directly connect to the session using:

vnc://flight:czB0YcRa@51.104.219.24:5902
51.104.219.24:5902
51.104.219.24:2
```

Using TurboVNC, which is installed on your laptop, grab the IP address and desktop number from your output (as well as the password) to start your session. Here's where we grabbed our info for the example:



```
== Session details ==
Identity: e1439364-37e9-4abc-8fb7-e59466bd6452
Type: gnome
Host IP: 51.104.219.24 ←
Hostname: gateway1 ←
Port: 5902 ←
Display: :2
Password: czB0YcRa ←
```



OpenFlightHPC supports a range of different application management environments. For this part of the SC19 Bootcamp we'll be entering the following commands to create a new gridware application environment and install the OpenFoam application:

```
flight@gateway1:~$ flight env create gridware
Creating environment gridware@default
> ✓ Verifying prerequisites
> ✓ Creating environment (gridware@default)
Environment gridware@default has been created
flight@gateway1:~$ flight env activate gridware
gridware$ [flight@gateway1 ~]$ gridware search openfoam
Repository needs to update ...
Updating repository: main
Update ... OK (At: 55916fd)
main/apps/openfoam/3.0.1 main/apps/openfoam/
main/apps/openfoam/4.1 main/apps/openfoam/
<gridware> [flight@gateway1 ~]$
```

While gridware hosts several versions of OpenFOAM we're going to install the one we've written this particular job for:

Run this command to install OpenFOAM

```
<gridware> [flight@gateway1 ~]$ gridware install apps/openfoam/4.1
```

Make sure you select 'y' to install dependencies!

It takes about 5 to 10 minutes for OpenFOAM to install. While you are waiting you can chat to one of the team, figure out which colour moose you wish to adopt once you finish, admire our stickers or... you can look at a few other things that OpenFlightHPC can do. Back in your original terminal feel free to run these commands:

1. [flight@gateway1 (moosecluster) ~]\$ flight info

Gives you a rundown of basic OpenFlightHPC commands. (Press 'q' to exit.)

2.

[flight@gateway1 (moosecluster) ~]\$ flight env avail

This command shows you all of the software package environments you can use.

Is your installation complete?  
Then let's get started...

Load the module to run the application using the following two commands:

```
flight@gateway1:~$  
File Edit View Search Terminal Help  
<gridware> [flight@gateway1 ~]$ module load apps/openfoam  
apps/openfoam/4.1/gcc-4.8.5/openmpi-1.10.2/boost-1.60.0+cmake-3.5.2+cgal-4.8.0+mgridgen-1.0+qt-  
4.8.4  
| -- libs/gcc/system  
| * --> OK  
| -- mpi/openmpi/1.10.2/gcc-4.8.5i  
| -- libs/gcc/system ... SKIPPED (already loaded)  
  
<gridware> [flight@gateway1 ~]$ icoFoam -help
```

We've created a jobscript for you to download into a file on your cluster by using this command:

```
<gridware> [flight@gateway1 ~]$ curl -L http://tiny.cc/foamjob > myfoamjob.sh
```

Submit your job!

```
<gridware> [flight@gateway1 ~]$ sbatch myfoamjob.sh
```

Check your job status by running this command:

```
<gridware> [flight@gateway1 ~]$ squeue
```

JOBID	PARTITION	NAME	USER	ST
3	all	myfoamjo	flight	R

If this appears hang in there, your job is still running.

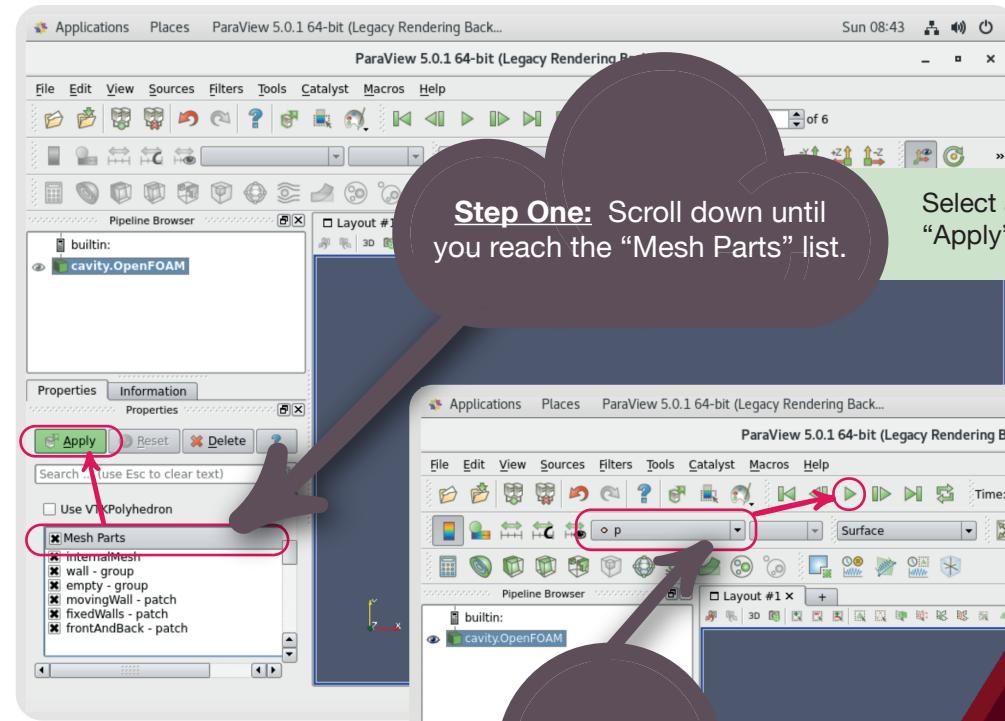
Once your job completes running it's time to look at your output. Launch your CFD graphical visualization tool:

```
<gridware> [flight@gateway1 ~]$ cd cavity  
<gridware> [flight@gateway1 cavity]$ paraFoam
```

Let's view your output!

# You are almost to your goal!

Once ParaView has launched you will need to follow a few easy steps to see your output.



Once you've selected "p" hit the triangular "play" button.

**Step Two:** Select "p" from the display drop-down menu.



**Step Three:** View your output!  
You can click on the main display to rotate your output from different angles.

# congratulations!

You have successfully completed the OpenFlight SC19 Bootcamp. Please show your output to a team member to earn your mini moose!

If you want to continue playing on this cluster feel free to do so. We also have other challenges that might interest you. Check with a team member for exercises in:

- ◆ Conda
- ◆ Spack
- ◆ Singularity
- ◆ Easybuild

Thanks for flying with us!

