## Putting all pieces together - an R example

<table>
<thead>
<tr>
<th>Quick Links</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HPC Home</strong></td>
</tr>
<tr>
<td>Getting an account</td>
</tr>
<tr>
<td>Gentle Introduction to using HPC</td>
</tr>
<tr>
<td>Getting started on Prince</td>
</tr>
<tr>
<td>Prince How-to Articles</td>
</tr>
<tr>
<td><strong>Logging in</strong></td>
</tr>
<tr>
<td>Windows</td>
</tr>
<tr>
<td>Mac / Linux</td>
</tr>
<tr>
<td><strong>Clusters and Storage</strong></td>
</tr>
<tr>
<td>Prince (HPC)</td>
</tr>
<tr>
<td>Dumbo (Hadoop)</td>
</tr>
<tr>
<td>Brooklyn (OpenStack)</td>
</tr>
<tr>
<td>Dalma (NYU Abu Dhabi)</td>
</tr>
<tr>
<td>Transferring data to/from the clusters</td>
</tr>
<tr>
<td>Transferring data to/from Prince cluster using Globus</td>
</tr>
<tr>
<td>Submitting jobs with sbatch</td>
</tr>
<tr>
<td>Available software</td>
</tr>
<tr>
<td>Licensed Software</td>
</tr>
<tr>
<td>Available on the HPC Cluster</td>
</tr>
</tbody>
</table>
## Running jobs on the Prince Cluster

### Accessing the Prince Cluster
- From Windows workstation
- From Mac workstation

### Software and Environment Module
- Job script and resource request
  - Introduction to job scheduling
  - Submitting jobs with `sbatch`
  - Requesting resources
  - Using computing nodes interactively

### Monitoring batch jobs
- Monitoring batch jobs - `squeue`
- What is running and where? `slurmtop`

### Canceling your jobs

### Compiling your own software

### Putting all pieces together
- An Amber example
- A R example

### Summary

---

## Pulling it all together - Preparing, submitting and monitoring a job on Prince

*In this section we will prepare, submit and monitor a small R job.* Our test case comes from the NYU Data Services "Introduction to R" tutorial

**Exercise**

Start a terminal session on Prince and replicate this example in it.

**Choose your own example**

After - or instead of - following this example through, prepare and submit a run of something genuinely relevant to your research. This way, if you are doing this tutorial in a classroom, the presenter will be available should you have questions or strike difficulties.
We're using R, so first we'll look for available modules. On Prince:

```
$ module avail r
----------------------------- /share/apps/modulefiles -----------------------------
gstreamer/intel/1.10.2  mothur/intel/1.35.1  r/intel/3.3.2
```

There's a few modules starting with r, and a couple of versions of R. We'll use the latest version, 3.1.2.

```
$ module purge
$ module list
No Modulefiles Currently Loaded.
$ module load r/intel/3.3.2
```  

Take a look at what it did:

```
$ module list
Currently Loaded Modulefiles:
  1) jdk/1.8.0_111   2) intel/17.0.1   3) openmpi/intel/2.0.1   4) r/intel/3.3.2
```

... clearly, R uses a lot of other packages. The modulefile has looked after loading the correct ones.

```
$ module show r/intel/3.3.2
-------------------------------------------------------------------------------------------
/share/apps/modulefiles/r/intel/3.3.2.lua:
-------------------------------------------------------------------------------------------
whatis("R: a language and environment for statistical computing and graphics")
whatis("Name: r version: 3.3.2 compilers: intel")
load("intel/17.0.1")
load("jdk/1.8.0_111")
load("openmpi/intel/2.0.1")
prepend_path("MANPATH","/share/apps/r/3.3.2/intel/share/man")
prepend_path("PATH","/share/apps/r/3.3.2/intel/bin")
prepend_path("LD_LIBRARY_PATH","/share/apps/r/3.3.2/intel/lib64/R/lib")
prepend_path("PKG_CONFIG_PATH","/share/apps/r/3.3.2/intel/lib64/pkgconfig")
setenv("R_ROOT","/share/apps/r/3.3.2/intel")
setenv("R_INC","/share/apps/r/3.3.2/intel/lib64/R/include")
setenv("R_LIB","/share/apps/r/3.3.2/intel/lib64/R/lib")
family("R")
```

For our example, we'll get some code and data from /share/apps/examples:

```
$ mkdir /beegfs/$USER/R-example
$ cd !
$ cp /share/apps/examples/r/basic/* .
```

Take a look at the job script:
There are a few steps we can try here:

1. Start an interactive batch session, and run the example.R script interactively
2. Close the interactive session, and submit the batch script as a job:

```
$ sbatch my_R_job.s
```

You'll get a job id returned.

Is it running yet?

```
$ squeue -u $USER
```

You could watch the output in the run directory:

```
$ ls -l ${SCRATCH}/R-example
```

Finally, when the job finishes, you should see a .out file in the directory you submitted from.

**Exercise**

Experiment with sbatch options for the job name, output and error file merging and location, resource limits.