How to run jobs on the FIAS cluster
Introduction

What is a cluster?

- a set of connected computers (controlled by dedicated software, e.g. SLURM)
- each partition has several nodes and each node owns some CPUs

Why should I use it?

- running computationally expensive jobs non-locally
- parallel jobs (not covered here)
SLURM
(Simple Linux Utility for Resource Management)

Workload manager for Linux clusters that provides:

- allocation of resources (nodes) to the user for a specific duration of time
- framework for starting, executing and monitoring work
- maintaining a queue of pending work

See webpage for detailed information: http://slurm.schedmd.com/slurm.html
## Communicating with the Cluster

```bash
$ sinfo
# returns a list with accessable partitions and nodes

<table>
<thead>
<tr>
<th>PARTITION</th>
<th>AVAIL</th>
<th>TIMELIMIT</th>
<th>NODES</th>
<th>STATE</th>
<th>NODELIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>months</td>
<td>up</td>
<td>infinite</td>
<td>12</td>
<td>down*</td>
<td>april,august,december,february,january,july,june, [...]</td>
</tr>
<tr>
<td>x-men</td>
<td>up</td>
<td>infinite</td>
<td>3</td>
<td>mix</td>
<td>iceman,jubilee,storm</td>
</tr>
<tr>
<td>x-men</td>
<td>up</td>
<td>infinite</td>
<td>2</td>
<td>idle</td>
<td>wolverine,xavier</td>
</tr>
<tr>
<td>x-men</td>
<td>up</td>
<td>infinite</td>
<td>6</td>
<td>down</td>
<td>beast,cyclops,frost,magneto,mystique,shadowcat</td>
</tr>
</tbody>
</table>
```

$ sinfo -Nel | less -S
# produces a human readable output including number of CPUs per node, ...

$ sinfo - -help
# for a list of possible arguments

$ squeue
# list of jobs currently scheduled in queue
$ srun -p x-men - - mem 10MB -c 1 python HelloWorld.py  # runs HelloWorld.py on cluster

Usefull arguments:

- -help    # list of all possible commands
-p PNAME   # partition you want to compute on
- -mem M   # memory preallocation
- -mem M   # number of cores (CPUs) to be reserved
-t HH:MM:SS # maximal running time (default is 72h)
Adding some utility with screen

$ screen  # starts a screen session  -> Now you can run some jobs!

Usefull commands:

When inside screen session:

  Ctrl + a, ?  # displays a list of commands accessable with Ctrl + a
  Ctrl + a, d  # detached from the current session, but keeps it in the background
  Ctrl + a, k  # kills the current session

Outside screen session:

  $ screen -ls  # lists all running screen sessions
  $ screen -r [session]  # returns to the session

Advantage: no permanent connection to server needed