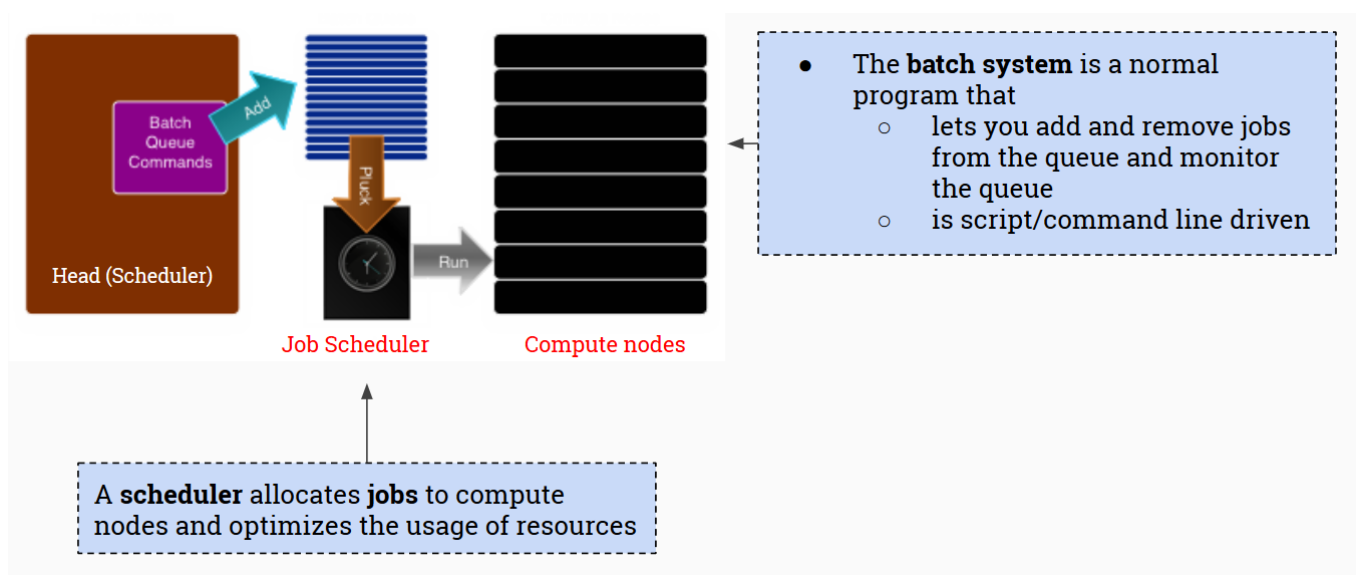# Job Schedulers

What is a HPC Job?

In the arena of HPC, we talk a lot about **jobs**, these are simply commands we wish to run and requests for resources (e.g. `compute time`, `disk space`, `memory amount`, `software environments` etc.). HPC jobs are generally time consuming and resource intensive run **non-interactively**. However, they can be run **interactively**, but mainly for testing purposes.You need add your jobs to a queue and when machines have free resources jobs run. Once jobs are complete, you can inspect their output.

A logical diagram of the HPC batch system and scheduler

Batch queuing systems and job schedulers

PBS

Portable Batch System (PBS) is the name of computer software that performs job scheduling.

Its primary task is to allocate computational tasks, i.e., batch jobs, among the available computing resources.

The following versions of PBS are currently available:
        OpenPBS
        TORQUE
        PBS Professional (PBS Pro)

Slurm

The Slurm Workload Manager (formerly known as Simple Linux Utility for Resource Management or SLURM), or Slurm, is a **free and open-source** job scheduler for Linux and Unix-like kernels, used by many of the world's supercomputers and computer clusters.

Slurm is the workload manager on about 60% of the TOP500 supercomputers, including Tianhe-2 that, until 2016, was the world's faste computer.

Systems/ HPC Job Schedulers

The **batch system** is a program (typically resides on the head node) that lets you add and remove jobs from the **queue** and monitor the queue. It's a script/command line driven program.

The **Job schedulers** manages job queues. Typically, the scheduler will schedule jobs from the queue as sufficient resources (more precisely - cluster compute `nodes`) become idle. You do not need to interact with schedulers directly.

Some widely used cluster batch systems are:

- **Portable Batch System (PBS)**

- **Simple Linux Utility for Resource Management (SLURM)**

- Moab

- Univa Grid Engine

- LoadLeveler, Condor

- OpenLava

- IBM's Platform LSF

The first two in the above list are popular. Therefore, in this course we will

restrict our discussion among these two.