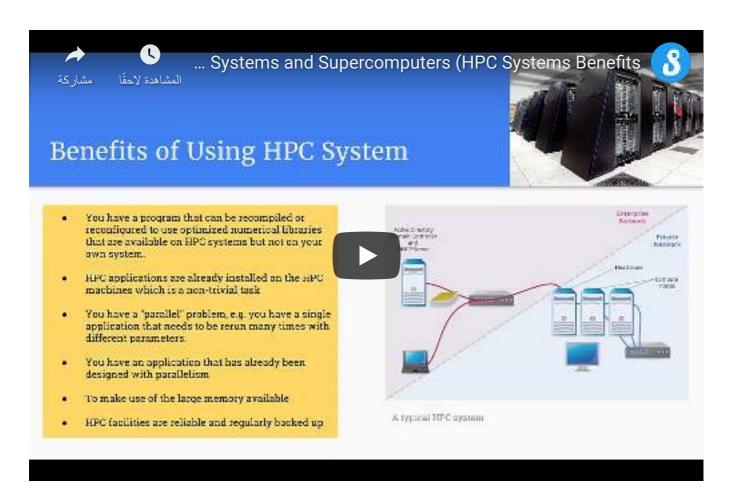# Benefits of using cluster computing

HPC systems derive their computational power by exploiting parallelism. Programs for HPC systems must be **splitted up** into many smaller **sub-programs** which can be executed in parallel on different processors. HPC systems can offer parallelism at a much larger scale, with 100's or 1000's, or even millions of tasks running concurrently.However, writing parallel software can be challenging, and many existing software packages do not already support parallelism & may require development.

Therefore, HPCs are userful when you have:

- A program that can be recompiled or reconfigured to use optimized **numerical libraries that are available on HPC systems** but not on your own system;

- You have a **parallel** problem, e.g. you have a single application that needs to be rerun many times with different parameters;

- You have an **application that has already been designed with parallelism**;

- To make use of the **large memory** available;

- problem solutions require **backups** for future use. HPC facilities are reliable and regularly backed up.

When not to use HPC systems?

- You have a **single threaded job** which will only run one job at a time (typical of MatLab users);

- You rely on **DBMS/ databases**;

- You have a lot of **data to transfer** between your local machine and the HPC on a continuous basis (e.g. per job);

- You need to have a **GUI** to interact with your program.