

Benefits of using cluster computing

HPC systems derive their computational power by exploiting parallelism. Programs for HPC systems must be **split 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.

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... Systems and Supercomputers (HPC Systems Benefits

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Benefits of Using HPC System

- 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.
- HPC applications are already installed on the HPC machines which is a non-trivial task
- 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
- HPC facilities are reliable and regularly backed up

A typical HPC system

Therefore, HPCs are useful 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.