**What is High Performance Computing?**

* **HPC is the use of Super Computers and Parallel computing techniques in a way that delivers much high performance in order to solve large problems in Science, Medicine, Engineering or Business through the use of Computing resources.**
* **It is used for solving advanced problems and performing research activities through computer Modelling, Simulation and Analysis.**

**Who uses HPC?**

**Government Labs, Universities, Industry and Research Institutes for fields like;**

* **Health and Bioscience-** **Used for modelling purposes where physical testing is unsuitable. Examples include the development of remote surgery techniques, aging and genetics research and the design of new drugs.**
* **Creative Organisations-Used for development of virtual technologies, the production of high-end visualisations, animation and film-making.**
* **Weather and Climate Research-Used to simulate how weather patterns move over time, in order to identify long term weather patterns, predict the possibility of extreme storms and help organisations to prepare for climate change.**
* **Construction – It’s used to model and design new structures, develop new building material and test site safety in an environment.**
* **Financial Institutions- Every day in finance institutions, there are new regulations, cyber security risks and surges in electronic payments, so HPC helps in building mathematical models completing financial transactions in very short time and allows them to react quickly to market movements.**

**Why do we use HPC? (When you have time limitations,when you have a variety of data,and large data sets to process).**

* **When we have a large amounts of data to process.**
* **When we different types of data to process**
* **Or when we have to process a lot of data in very short time.**

**Using HPC may provide a flexible and cost effective environment when you have to perform complex computations.**

**What does it consist of?**

* **Hardware –Computer Architecture(e.g. Super Computers, Clusters) and Network Connections(e.g. Ethernet)**
* **Software-Programming Models and Applications.**
* **Algorithm design**
* **Tool-kits**

**There are four different classes of HPC**

1. **Single Instruction with Single Data-** There’s o**ne algorithm** that handles **one source of data** at a time.
2. **Single Instruction with Multiple Data-** There’s **one** algorithm handles **multiple sources of data** at a time.
3. **Multiple Instruction with Single Data-** There are **multiple** algorithms handles **one source of data** at a time.
4. **Multiple Instruction with Multiple Data-** There are **multiple** algorithms handles **one source of data** at a time.