STA 3180 Statistical Modelling: High Performance Computing

High Performance Computing for STA 3180 Statistical Modelling

High Performance Computing (HPC) is a type of computing that utilizes multiple processors and/or computers to solve complex problems. HPC is used in many fields, including scientific research, engineering, finance, and data analysis. HPC enables faster and more efficient processing of large amounts of data.

Key Concepts

* Parallel Processing: This is the use of multiple processors or computers to solve a problem. By splitting up the problem into smaller pieces and running them on different processors, the time required to solve the problem can be reduced.

* Distributed Computing: This is similar to parallel processing, but instead of using multiple processors on one computer, it uses multiple computers connected together over a network.

* Clusters: A cluster is a group of computers connected together to work as a single system. Clusters are often used for distributed computing.

* Grid Computing: This is a type of distributed computing where multiple computers are connected together over the internet to form a virtual supercomputer.

Coding Examples

```
Start of Code
// This code example shows how to use parallel processing to solve a problem.
int num_processors = 4; // Number of processors to use
// Split up the problem into smaller pieces
int[] pieces = split_problem(num_processors);
// Run each piece on a separate processor
for (int i = 0; i < num_processors; i++) {
	run_on_processor(pieces[i], i);
}
// Wait for all processors to finish
wait_for_all_processors();
// Combine the results from each processor
int result = combine_results();
End of Code
```

Practice Questions

Q1. What is parallel processing?

A1. Parallel processing is the use of multiple processors or computers to solve a problem. By splitting up the problem into smaller pieces and running them on different processors, the time required to solve the problem can be reduced.