4. Massively parallel computers

Describe what is meant by a massively paralleled computer

- Large number of processors
- … Working collaboratively on the same program
- … Working together simultaneously on the same program
- … Communicating via a message interface

Properties

- A large number of processors
- Collaborative processing // coordinated simultaneous processing
- Network infrastructure
- Communicating using message interface
- It is a much faster way to handle large volumes of independent data
- The data used sometimes relies on result of previous operation, therefore such data cannot be handled in parallel
- Datasets require the same processing for it to work
- It overcomes the Von Neumann bottleneck and therefore greatly improves CPU performance
- Parallel processing requires more expensive hardware

Past-paper Questions

Changes needed for codes in order to run on massively paralleled computer

- Split into blocks of code
- … that can be processed simultaneously
- … instead of sequentially
- Each block is processed by a different processor
- Which allows each of many processors to process the different blocks of code independently
- Requires both parallelism and coordination

Explain one of the hardware issues that will be overcome if a massively parallel computer is to function correctly

- Communication between processors is the issue
- Each processor needs a link to other processors
- Many processors require many of these links
- Challenging topology

A computer has a single processor that contains four processing units.

Explain why this is not an example of a massively paralleled computer:

- Only one separate processor
- Quad core computer system // processing unit shares the same bus

Identify different types of parallelism

- Instruction
- Processor
- Memory usage
- Computer System