The University Of Sheffield.

Electronic & Electrical Engineering.

EEE6031 ADVANCED COMPUTER ARCHITECTURES

Credits: 10

Course Description including Aims

1. To equip the student with an understanding of high-performance processing system architectures.
2. To introduce the concepts of parallelism as a means of enhancing system performance.

Outline Syllabus

Memory Systems : virtual memory, memory hierarchies, locality, coherence, address translation, paging/segmentation, memory management, cache memories. Processor Classifications. **Pipelining:** speed-up constraints, static/dynamic pipelines, reservation tables and collision vectors. **Pipelined Processors :** architecture, constraints, interlock and register forwarding/scoreboarding, stalling, branching, superscalar, VLIW. **Parallel Processors :** array processors, loosely-coupled processors, tightly-coupled processors, vector processors. **Connection Networks :** structures, complexity, performance, limitations, memory organisation and interleaving, multi-processing caches. **Task partitioning :** compute/IO bounds.

Time Allocation

24 lectures plus 12 hours of additional support material.

Recommended Previous Courses

EEE343 “Computer Architecture”

Assessment

2 hour examination, answer 3 out of 4

Recommended Books

Hennessy & Patterson	*Computer Architecture - A Quantitative Approach*	Morgan Kaufmann
Hwang & Briggs	*Computer Architecture and Parallel Processing*	McGraw-Hill
Stone, H.S.	*High Performance Computer Architectures*	Addison-Wesley
Van de Goor, A.J.	*Computer Architecture and Design*	Addison-Wesley

Objectives

On successful completion of this module students will be able to

1. Identify the crucial importance of memory system design in high performance computer systems, analyse/estimate the performance of a given memory system and to evaluate the design options and alternatives.
2. Identify appropriate forms of parallelism (temporal and spatial) for particular problems/application, to analyse the effect on system performance and evaluate the costs/benefit.
3. Describe various structures and issues which are important to the design of parallel processors, identifying their strengths and weaknesses and to analyse the likely performance of key components.