MPhil in Advanced Computer Science
Advanced Computer Design

Leader: Simon Moore
Timing: Lent
Prerequisites: Chip Multiprocessors
                 Some training in VHDL or Verilog HDL and computer architecture
Structure: 8 lectures + 8 practicals

AIMS

This module aims to provide an understanding of multithreaded multiprocessor architecture research using FPGAs as an emulation platform.

SYLLABUS

1. Introduction to Bluespec hardware description language (2L+1P)

2. Implementing a RISC processor in Bluespec (2L+1P)

3. Timing critical circuits and bus interfacing (1L+1P)

4. On-chip networks: implementation and analysis (1L+1P)

5. FPGA processor emulation techniques and a comparison with software simulation (2L+1P)

6. Analysis of multiprocessor designs (3P)

OBJECTIVES

On completion of this module students should:

- Understand how to design and implement a multiprocessor system.

- Appreciate how to instrument a design to obtain research results.

- Understand how to design using Bluespec.

- Appreciate the pros and cons of using FPGA emulation vs. software simulation.

COURSEWORK

Write a 10 page research paper including results from a computer architecture study based on the practical component of the course.

PRACTICAL WORK

Design and use processor emulation hardware using FPGAs in order to obtain research results.

ASSESSMENT

- The research paper will be graded (75%)

- The practical work will be reviewed with the student (a short oral) (25%)

RECOMMENDED READING

Harris, D.M. & Harris, S.L. (2007). *Digital Design and Computer Architecture.* Morgan Kaufmann.
Hennessy, J.L. & Patterson, D.A. (2006). *Computer Architecture: A Quantitative Approach.* Morgan Kaufmann (4th ed.).

Last updated: January 2010