AC22005 - Computer Systems 2B

Coursework 2 - Multi-core Processing

This assignment is designed to give you practice in working in a group to research current hardware and software issues and in presenting your findings to your peers.

A Brief History of Threads

Early microcomputers had a single microprocessor and ran a single program/process, which could thus utilise the microprocessor 100% of the time. However, it was desirable to be able to run (or ***appear*** to be able to run) **multiple** programs/processes *concurrently*. Thus, operating systems developed to incorporate **scheduling**, allowing multiple processes to be "time sliced", allowing the *single* microprocessor to run *multiple* processes (apparently) concurrently. A further refinement was the ability to split a process up into a number of smaller **independent** sub-processes (called **threads**), still made to run on a single microprocessor via scheduling.

As systems with **multi-core** microprocessors (and computers with **multiple processors**) have become available, these offer the computer the ability to run multiple threads with **genuine** concurrency, with different threads running on different cores *at the same time*.

Requirements

Your task is to research (in groups of **FOUR** students) the history of multi-core hardware and the operating systems which support it

Your research should cover:

- the rise of multi-core processors and multi-processor PCs, describing the **main types** and how these have **changed over time**
- an outline of which **main operating systems** can utilise multi-core processors and how these have **changed over time**
- a detailed description of how **one** of these operating systems does this
- comments on the **scalability** of the hardware and software (e.g. if you double the number of cores available, does the computer run twice as fast?)
- optionally, you might also consider what the (near) future has in store for this topic

Your group should present your findings in **both** a written report and a presentation to the rest of the class.

Background

Wikipedia has a good introduction to threads and multicore architecture at:
`http://en.wikipedia.org/wiki/Thread_%28computing%29`
and
`http://en.wikipedia.org/wiki/Multicore`
You should never cite Wikipedia itself, but you can make use of the **reference lists** at the end of the articles to access further research.

Most computer science books on operating systems will include material on threads.

Submission & Assessment

This coursework is due for submission via MyDundee (under AC22005 Assignments) at 4pm on Monday 24th February 2014 (Monday of Week 7) and is worth 14% of your total grade for this module. You should submit a **written report** of 1800-2000 words describing your findings (reference citations should be included, but these do not contribute to your word count), and a **PowerPoint presentation** to accompany your group presentation on your work (6-10 slides). Keep a copy of what you submit in case there are problems with your submission.

During a class session following submission, you will make a 10-minute group presentation on your research to the rest of the AC22005 class. The presentations will constitute a part of the marking process for this coursework so attendance of all group members is compulsory. You will also be required to complete a peer assessment form to indicate the performance of members within the group (including yourself) - group members who make a lesser contribution will receive fewer marks.

Marking Guidance

A minimal solution which covers the only the bare outline of the topic, will achieve 40% (D3). A complete solution with a clear report and presentation covering all major points (and properly referenced) will achieve 70% (A3). Marks will be lost for poor or incomplete research or documents, for a poor presentation or an incomplete group of presenters (all members of the group are expected to contribute to both the submitted materials and the oral presentation). Extra marks will be given for particularly deep research and outstanding written submissions (including figures) or presentation skills.