Introduction

Computer Architecture II
CSU34021

Syed Asad Alam

School of Computer Science and Statistics

Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

September 14, 2021
Name: Syed Asad Alam
Position: Post-Doctoral Research Fellow
Contact
- Email: syed.asad.alam@tcd.ie
- Office: Room 1.13, 1st floor, Lloyd Institute

Unusual Times

- Pre-recorded Lectures
- Usually shorter than regular 50-minutes lecture slot
  - May even be much shorter depending on how the recording goes
- Extra live sessions or recorded sessions for particular problems can be arranged on need basis
- Possibility of face-2-face lectures after study week
- Schedule available (I will upload an image of it on blackboard as well)
- Face-2-Face tutorial sessions for each group every 3rd week
  - Face-2-Face (F2F)
  - 3 – 4 tutorials
Tutorial Sessions

- Tutorial sessions
  - Weeks 3, 6 and more
  - One hour session with each pod (3 ICS and 1 Eng)
  - Tutorials/Courseworks might be released early to align with lectures
  - Deadlines will be at least a week after the F2F tutorial session
  - Feedback one week after the deadline (possibly online)

Syllabus

- IA32 and x64 assembly language programming
- IA32 and x64 procedure calling conventions
- RISC vs CISC
- RISC-1 design criteria and architecture
- Register windows and delayed jumps
- Instruction level pipelining
- DLX/MIPS pipeline
- Resolving data, load and control hazards
- Virtual Memory
- Memory management units [MMUs]
- Multi-level page tables and TLBs
- MMU integration with an OS
Introduction

Syllabus

- Cache organization, operation and performance
- Virtual vs physical caches
- Multiprocessor architectures
- Cache coherency
- Cache coherency protocols

Introduction

Assessment

- Coursework: 40%
  - 5 or 6 tutorials
- Examination: 60%
  - December 2021
  - Nature of exam → Take-Home Exam: An exam that will be released to students at a time determined by College and that students will have 06 hours. The complexity of the exam will be such that it should not take them more than 2 hours to complete.
- Supplemental
  - August 2022
  - 100% exam (will incorporate 40% coursework mark if it yields a better mark)
Module Web Page

https://www.scss.tcd.ie/~alams/csu34021.html

- Lecture slides
- Tutorials
- Miscellaneous materials

Also available on Blackboard

Introduction

Books

- Computer architecture – A quantitative approach by John Hennessey and David Patterson
- High performance computer architecture by Harold S. Stone
Other References

- Computer Organization and Design, John Hennessey and David Patterson
- Assembly Language for x86 Processors, Kip Irvine
- Intel 64 and IA-32 Architectures Software Developer’s Manual, Volume 1: Basic Architecture
- Intel 64 and IA-32 Architectures Software Developer’s Manual, Volume 2: Instruction Set Reference

Software and Languages Used

- Visual Studio
- C++
- Assembly
- Microsoft Assembler
- Linux?
  - GCC
  - Netwide Assembler (NASM)
    - Difference in assembly for NASM (both inline and otherwise)
    - Most welcome to ask questions separately if this tool chain used

Next video → IA32 and x64 assembly language