COMP H3031
NETWORK DISTRIBUTED SYSTEMS

Dr. Christina Thorpe

WHO AM I?

- Dr. Christina Thorpe
- B.Sc. (Hons) Computer Science – UCD 2005
- Ph.D. Computer Science – UCD 2011
- Technical Research Manager UCD: 2011 – Present
- Lecturer ITB: 2011 – Present
- Research Interests
  - Networking
  - Software Engineering
  - Testing the Cloud
  - Security
- Research Projects
  - SFI FAME
  - SFI Lero 2
  - SFI Lero 3

CONTACTING ME

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- Chat before or after class

COURSE MATERIAL

- All material available on moodle:
  - moodle.itb.ie
  - COMP H3031
  - Enrolment key: 1234

MODULE DESCRIPTION

The aim of this module is to provide an understanding of the fundamental **software engineering** and **computer systems** issues raised by programming for **networked** computers.

The module will enable learners to **develop applications** for **distributed systems** and to understand the networked computer systems support that is desirable and necessary to allow such applications to be developed and implemented.

LEARNING OUTCOMES

1. Understand the basic and fundamental characteristics that define distributed systems.
2. Have specialist knowledge in the design, implement and evaluate simple distributed applications.
3. Implement a variety of simple server applications and P2P systems and be able to demonstrate specialist technical and creative skills.
4. Compare and contrast approaches to distributed programming and be able to recognise the limitations of each approach.
5. Discuss the issues raised in designing for performance and reliability and to be able to integrate new ideas and technologies to benefit systems.
6. Understand clock synchronisation and election algorithms and their role in distributed systems.

MODULE TOPICS

- Introduction
- Architectures
- Basic Network Protocols
- Synchronous models in distributed environments
- Messaging Systems
    - Multicast, group communication, overlay networks
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- Asynchronous models in distributed environments
- Consistent State
    - Distributed transactions, replication: Paxos and Congruity

MODULE OUTLINE

Wk	Wednesday	Topic
1	Jan 30th	Overview of Module
2	Feb 6th	Introduction to Distributed Systems
3	Feb 13th	Architectures
4	Feb 20th	Basic Network Protocols
5	Feb 27th	Synchronous models in distributed environments
6	March 6th	Synchronous models in distributed environments
7	March 13th	Messaging Systems
8	March 20th	Messaging Systems
9	March 27th	Multicast, group communication, overlay networks
10	April 3rd	Multicast, group communication, overlay networks
11	April 10th	**Easter Break**
12	April 17th	**Easter Break**
13	April 22nd	Asynchronous models in distributed environments
14	April 31st	Asynchronous models in distributed environments
15	May 8th	Consistent State
16	May 15th	Revision Week

MODULE ASSESSMENT

- For this module you'll be expected to complete two continuous assessments and a final exam.
  - Assessment 1: 25%
    - Out week 4, due week 8
    - Demo
  - Assessment 2: 25%
    - out week 8, due week13
    - Demo
  - Final Exam: 50%

* subject to change

PLAGIARISM

"To use the words or ideas of another person as if they were your own words or ideas." – Merriam-Webster

- Some types of plagiarism :
    - Complete copying
    - Copying key results
    - Copying unpublished work
    - Copying auxiliary text
    - Copying figures
    - Improper quoting
- **One of the most serious examples of professional misconduct imaginable in an academic setting.**
- Verbatim copying (text/illustrations) or paraphrasing from any publication including your own (self- plagiarism) without adequately referencing the original text is considered plagiarism
- Familarise yourself with the ITB guidelines
- View the turnitin report before you submit final version!

REPEATING

- If you fail this module, you will be given an opportunity to repeat during the summer.

- Reassessment of this module will consist of a repeat examination.

- It is possible that there will also be a requirement to be reassessed in a coursework element.

PRACTICAL EXERCISES

Communication using sockets:

- Reliable p2p communication (TCP/IP)
- Unreliable p2p communication (UDP/IP)
- Unreliable Broadcast, Multicast (UDP/IP)
- Spread Toolkit

TEXT BOOK

Andrew S. Tanenbaum, Maarten Van Steen 2007, *Distributed Systems - Principles and Paradigms*, Second Edition Ed., Pearson [ISBN: 0136135536]