COMP 3331/9331: Computer Networks and Applications

Review + Final Exam

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Recap from Week 1: A top-down approach

We've covered networking using a top-down

□ end-system applications, end-end transport

□ network core: routing, hooking nets together

□ link-level protocols, e.g., Ethernet

□ other stuff: security, wireless networks
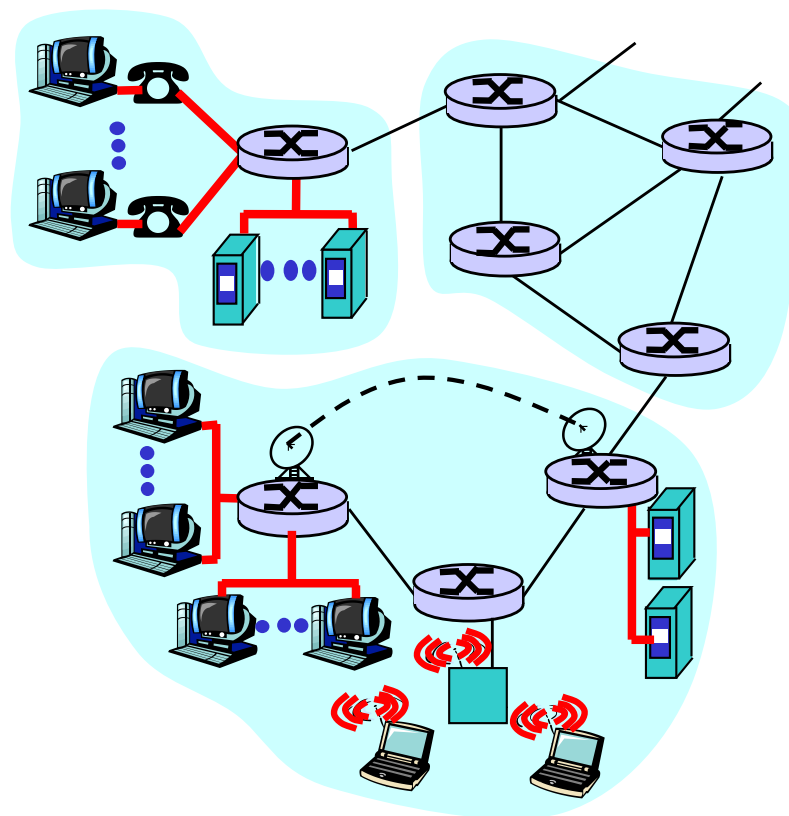
What you have accomplished

- Comprehensive overview of the entire protocol stack with a particular focus on the Internet

- Key principles

  - Layering, scale, hierarchy, etc.

- Key design issues

  - Application architectures, reliability, congestion control, routing, medium access, etc.

- Hands-on practical laboratory experiments using several diagnostic tools and ns-2

- A "real-world" assignment

  - Instant Messaging Application

Key topics (1)

- Organisation principles
    - Layering, hierarchy, encapsulation
- Application layer
    - Protocol design, P2P, socket programming
- Transport layer
    - Error detection, reliable data transfer, flow control, congestion control
    - TCP and UDP

Key topics (2)

- ## Network layer
  - Network addressing, scalability, hierarchical addressing
  - Fragmentation as an example to deal with heterogeneous link layer technologies
  - Routing protocols and algorithms: link state, distance vector

- ## Link layer
  - Addressing, ARP
  - Medium access control, especially random access
  - Interaction between link and network layers

Key topics (3)

- Wireless Networks
  - 802.11
- Security
  - Symmetric key and public key cryptography
  - Confidentiality, message integrity, authentication
  - The role of encryption in these

What next?

- COMP 9332: Network Switching and Routing
- COMP 9334: System Capacity and Planning
- COMP 4336/9336: Mobile Data Networks
- COMP 6441/9441: Security Engineering and Cybersecurity (+ other security courses)
- COMP4337/9337: Wireless Network Security
- COMP6337: IoT Experimental Design Studio
- Undergraduate/Postgraduate Projects and Thesis

Final Exam (1)

- Wednesday, 4th December, 08:45 – 11:00
- Check seating arrangement
- Time: 2 hours + 10 minutes (reading time)
- Maximum Marks: 40
- Recall that, to pass the course, one requirement is that you must score >= 16 marks (40%) in the final exam

```
lab = marks for lab exercises (scaled to 20)
assign = marks for the programming assignment (out of 20 marks)
midTerm = mark for the mid-term exam (out of 20 marks)
finalExamScaled = scaled mark for the final exam (out of 40 marks)
mark = lab + assign + midTerm + finalExamScaled
grade = HD|DN|CR|PS if mark >= 50 && finalExamScaled >= 16
      = FL            if mark < 50
      = UF            finalExamScaled < 16
```

Final Exam (2)

- Closed book
- What to bring
  - Student ID
  - Calculator will NOT be provided. BYO - GET THEM APPROVED (FACULTY OFFICE)
  - Pen, Pencil, etc.

Final Exam (3)

- Not a memory test, questions will examine your understanding of concepts

- Tests your understanding

- Tests whether you can apply the principles in a situation that you haven't seen before

- You can use the mid-session exam as a guide on what the expectations are

Final Exam (4)

- **Syllabus: Comprehensive**
  - See the next few slides for content on the exam
  - More focus on the material after the mid-semester exam
  - Self-study material is **not** examinable
  - External links, News Items and Research Items discussed in lectures not covered
  - Questions may also examine multiple layers at the same time
  - No questions on programming or lab exams
    - However reading through the lab exercise solutions may be instructive for understanding certain concepts

- You are asked to show your steps and tell us your arguments in answering questions

Final Exam (5)

- How to prepare?
  - Read and thoroughly understand all content
  - **Practice, Practice, Practice**
  - Go through all the sample questions, sample exam papers, lecture Q&A, textbook questions, etc. for practice

- Don't panic and get stressed if you come across a hard question

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NOTE: Sample final exam paper has been posted on the Final Exam Page linked to course webpage

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Examinable Content (1)

□ **Introduction and Overview**

  ○ No specific questions but the general concepts may be examined in some questions

  ○ No direct questions on circuit/packet switching

□ **Application Layer**

  ○ 1 question on HTTP, some applications may be referenced in other questions

  ○ General understanding of applications should be sufficient

  ○ No questions on DHT or peer to peer networks

Examinable Content (2)

▢ Transport Layer

 ○ All content is examinable

 ○ No questions on finite state machines (RDT, TCP)

▢ Network Layer

 ○ All content is examinable excluding the following:

  • Router internals

  • IPv6 (general content of tunneling may be examined)

  • ICMP

  • Specific routing protocols such as BGP, OSPF, RIP, etc

  • SDN (centralized control plane)

Examinable Content (3)

❑ Link Layer

    o All content is examinable excluding the following:

        • CRC Arithmetic

        • DOCSIS: Link layer for Cable Internet Access

        • Virtual LANs

        • Link Virtualization

        • Data Centers

❑ Wireless Networks

    o Wireless Links and Network characteristics, WiFi, 802.11 MAC are all included

Examinable Content (4)

□ **Network Security**

  ❍ Symmetric and Public key cryptography

  • General questions only, no math questions, you don't need to know details of AES/DES

  ❍ Message Integrity and Digital Signatures

  ❍ End-Point Authentication

Final Goodbye :(

- Hope you enjoyed the course
- Hope you learnt a lot
- Hope you know more about computer networks than you did 3 months ago
- Good Bye !!
- Good luck for the exam and the future
- Have a great break
- **Please fill in myExperience feedback (both parts)**