COMP 3331/9331: Computer Networks and Applications

Recap + Final Exam Review

T1, 2021

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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

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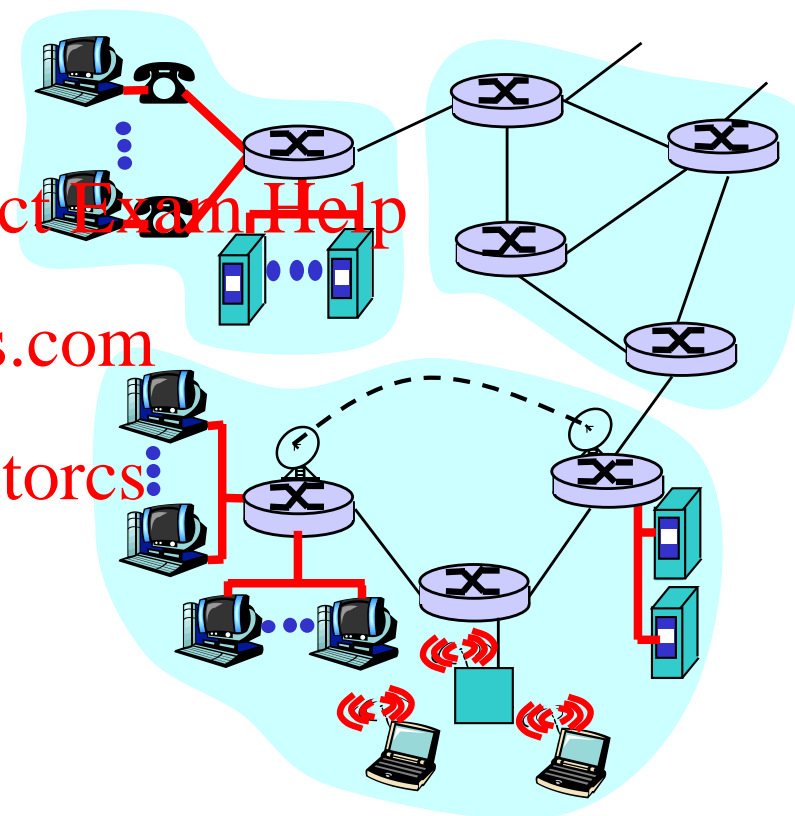
What you have accomplished

- 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, Wireshark and ns-2

- A "real-world" assignment
  - Simplified Transport Protocol

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

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Key topics (3)

- Wireless Networks
  - 802.11

- Security

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  - Symmetric key and public key cryptography

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  - Confidentiality, message integrity, authentication

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  - The role of encryption in these

What next?

- COMP 9332: Network Switching and Routing
- COMP 9334: System Capacity and Planning
- COMP 4336/9536: 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

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Exam Specifics

- **Tuesday, 24ᵗʰ August from 09:45 am to 12:00 noon** (Sydney time)
  - 2 hours + 10 minutes reading time
- Marks: **40 marks** (towards your final mark)
- Answer ALL questions, marks for each question will be noted
- **Hurdle:** must score at **least 40% (16 marks)** on the exam to pass the course

```
lab = marks for lab exercises (scaled to 20)
assign = marks for the programming assignment (out of 20 marks)
midTerm = mark for 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
```

- Online Inspera Exam – same platform as mid-term exam
- Open book, notes. You may use calculators
- You may join the Zoom Meeting if you have questions or technical issues
  - Ask any questions you may have in the meeting chat
  - DO NOT turn on your microphone
- Further details: Final Exam Page on Website

Exam Specifics

- Open book, but by attempting this exam, you AGREE to the following statement:

  "I declare that all of the work submitted for this exam is my own work, completed without assistance from anyone else."

- Please make sure that you are aware of the UNSW policies and expectations for student academic integrity: https://student.unsw.edu.au/conduct

- Special Consideration and Supplementary Exam
  - Make sure you read carefully the updated special consideration rules regarding on-line exams available from the official UNSW site: https://student.unsw.edu.au/special-consideration
  - A supplementary exam can only be offered if you have a valid special consideration application (be aware of the Fit-to-Sit policy of UNSW).

- Equitable Learning Services (ELS)
  - Students with these requirements will receive information with specifics about their exam arrangements

What is and what isn't on exam

- No direct question on any content covered in the Introduction slide set
  - There may be question(s) on computation of throughput, delay, etc. but in different context (e.g., TCP)
- Application Layer
  - No direct questions on basics, HTTP, DNS, E-mail – the exception being that you may be asked a question that examines the synthesis of these protocols (see A Day in the Life of a Web Request in the Link Layer slide sets)
  - P2P, BitTorrent, DHT – Completely excluded

What is and what isn't on exam

- ## Transport Layer

  - Everything covered in lectures is on the exam
    - Sockets (multiplexing/demultiplexing), UDP, Reliable Data Transfer Principles, TCP, Congestion Control
  - Excluded: Complex checksum computations

- ## Network Layer

  - Data Plane: everything covered in lectures is on the exam
    - Overview, IP, Addressing, NAT
    - Excluded: IPv6, What's inside a router, SDN

  - Control Plane: everything covered in lectures is on the exam
    - Overview, link-state routing, distance vector routing, ICMP
    - Excluded: hierarchical routing, specific routing protocols (BGP, OSPF, RIP)

What is and what isn't on exam

- ## Link Layer
  - Everything covered in lectures is on the exam
    - Overview, Error correction detection, multiple access protocols, switched LAN, MAC addressing, ARP, Ethernet, Switches
    - Excluded: VLAN, MPLS, Data Centre Networking

- ## Synthesis of protocol layers (see – A Day in the Life of a Web Request in Week 9 Slides)

- ## Wireless Networks
  - Basics, wireless links and characteristics, IEEE 802.11 LAN

- ## Security
  - Basics, Symmetric and Asymmetric Cryptography, Message Integrity, Authentication, Securing email

Other Exclusions

- No programming related questions

- No questions that ask you to use the tools from the lab exercises such as traceroute, ping, dig, Wireshark, etc.

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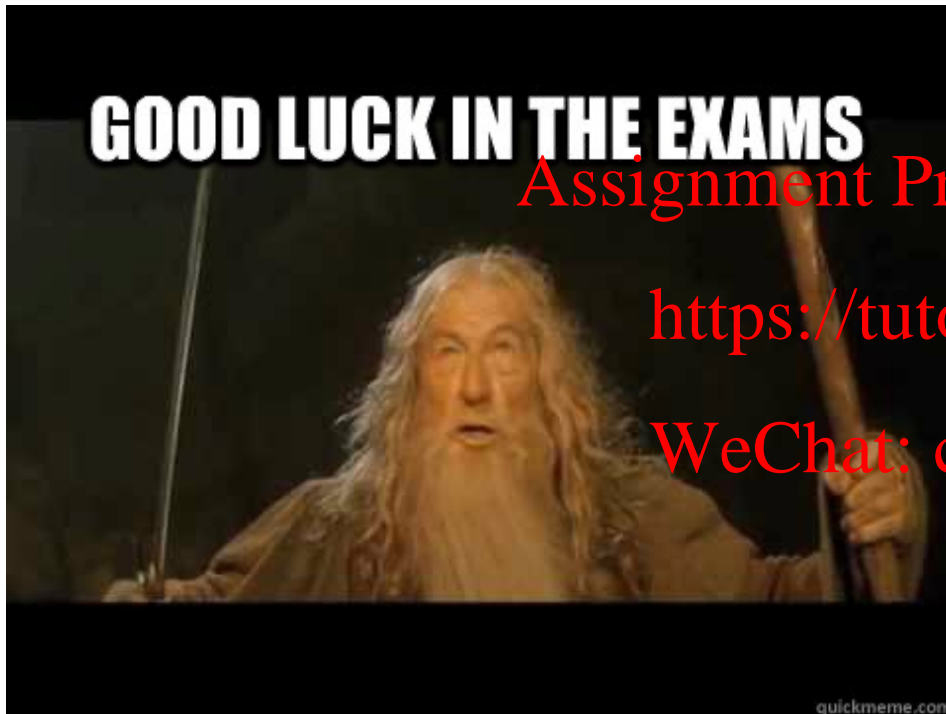
Type of Questions

- A limited number of multiple-choice questions

- A few short answer questions

  - 2-3 sentences at most

- Some questions (possibly multi-part) that may require more elaborate explanations

- Show intermediate work/steps if relevant

- Not a memory (or cut-paste) test, questions will examine your understanding of concepts

- Tests your critical analysis skills

- Tests whether you can apply the concepts in a (new) practical context

- In many ways like the mid-term exam

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Preparation

- How to prepare?
  - Read and thoroughly understand all content
    - You shouldn't be reading a concept for the first time during the exam !!
  - **Practice, Practice, Practice**
  - Go through all the homework questions, quizzes, etc.
    - DO NOT simply read the solutions, attempt to solve them before looking at solutions
  - Practice Final Exam is posted on Final Exam Page
    - Familiarizes you with the exam environment (Inspera)
    - Familiarizes you with the type of questions
    - Take it under similar conditions as when you sit for the actual exam
    - You can ONLY attempt it once

- Don't panic and get stressed if you cannot answer a question, move on

- Sleep well the night before and grab some food/water before the exam

- Quiet and familiar/comfortable room, good Internet

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Good luck and good bye

GOOD LUCK IN THE EXAMS

GOODBYE

THANK YOU

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