# COMP 3331/9331: Computer Networks and Applications

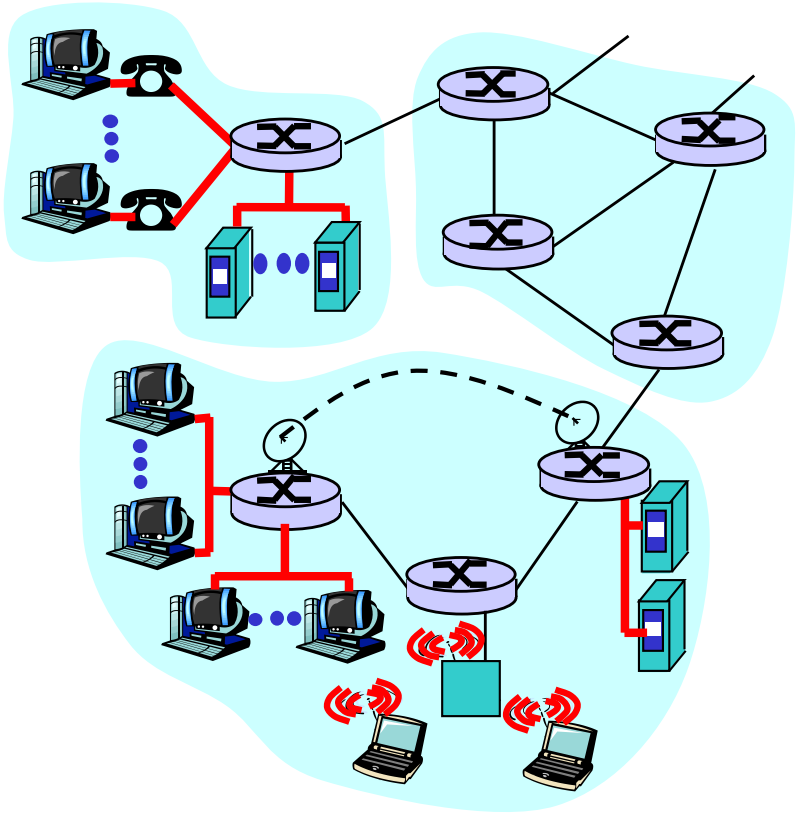
**Recap + Final Exam Review**

**T3, 2020**

# 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, Wireshark and ns-2
- A “real-world” assignment
  - Message forum

# 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

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# Complete your myExperience and shape the future of education at UNSW.

**Click the myExperience link in Moodle**

**or login to myExperience.unsw.edu.au**

(use z1234567@ad.unsw.edu.au to login)

The survey is confidential, your identity will never be released

Survey results are not released to teaching staff until after your results are published

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# Exam Specifics

- **Friday, 4th December from 2:00 pm to 4:15pm** (Sydney time)
- Marks: **40 marks** (towards your final mark)
- **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 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
```

- Online Moodle Exam
  - Two parts, each worth **20 marks** and to be completed in **65 minutes**
    - **Part 1: 2:00 pm – 3:05pm, 5 minute break, Part 2: 3:10pm – 4:15pm**
    - Not possible to start second part early or return to the first part when attempting the second
    - Separate Moodle links to both will be available on the website a day before the exam.
- Open book, notes. You may use calculators
- You may join one of 2 Zoom Meetings 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 an email early next week 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, E-mail – the exception being that you may be asked a question that examines the synthesis of these protocols (see Week 9 Slides)
  - P2P, BitTorrent, DHT – Completely excluded
  - DNS - Included

# 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.

# 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 a bit 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 setting
- In many ways similar to the mid-term exam

# 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
    - Familiarizes you with the type of questions
    - Take it under similar conditions as when you sit for the actual exam
- Don't panic and get stressed if you cannot figure out an answer, move on
- Have a good sleep and grab some food/water before the exam

# Good luck and good bye