Computer Systems

Examination Format

&

Preparation

Examination Process

The School's guidance is definitive. These notes are just to help you

- The January exams for all modules will take place online.
- The exam for Computer Systems is at:
  - Wednesday, January 12, 09:30-12:00 UK time
- All exams have the following durations:
  - 1 hour 30 minutes for the exam itself
  - An extra 1 hour to allow for resolving any internet connectivity issues and typing up, scanning and uploading your answers, giving a total of 2 hours 30 minutes to complete the exam and your submission
  - Finally, late submissions will be accepted, with penalty, for a further 1 hour
- Any further queries about the exams (either before or during the exam) should be emailed to: csoffice@contacts.bham.ac.uk

Notes:

- Prepare your answers in a word processor and generate a .pdf document
  - You can include images etc. as necessary
  - You must make sure that everything is easily readable
  - You can submit multiple times:
    - The last version is the one that will be marked
  - Practice!
- Your answers must be entirely your own work
  - But see school's detailed guidance
- My advice:
  - Use a word processor
  - If you want to include pictures/diagrams, then do them on paper, scan them and include in your document
  - Submit an early version and then review. You can upload revised versions.

Module Content

Numbers

Memory, CPU & Program Execution
Instructions Assembly and Machine Code

High and low level; Compilation and Interpretation
Subroutines and Stacks
Java Virtual Machine (JVM) and Bytecode

Efficiency (Algorithm Complexity)

Introduction to OS and its Elements
Computer Systems Architecture and OS Structures

Process Management
Process Scheduling

Multithreading and its Challenges
Concurrency and Synchronization
Deadlocks

Introduction to Networks
- Application Layer
- Transport Layer
- Network Layer
- Network Security

Preparing for examinations

- Understand the course content
  - Study
  - Revisit exercises & Quizzes
  - Look at the example paper

- Make sure that you are in a fit state to take the exam:
  - Concentrate & focus
  - Sleep well
  - Have a light meal beforehand
  - …….

- Read the Questions:
  - What is being asked?
  - What is the weighting of parts?

- Answer the questions
  - Completely!
    - Give 3 Reasons …..
      - And that they are different
    - Using Examples …..
    - Compare and contrast/Advantages and Disadvantages
    - Be explicit!
  - Don’t assume that marking is done globally:
    - You might say X in Q1 ii) – but that will not get you credit in Q2 iii) !
  - Make sure your answer is clear, understandable, legible ……
  - Think about the question & your answer from the examiners’ perspective!

Format of examination

- 3 questions
- Answer all questions
- Each question may have subparts
- These subparts may not be related

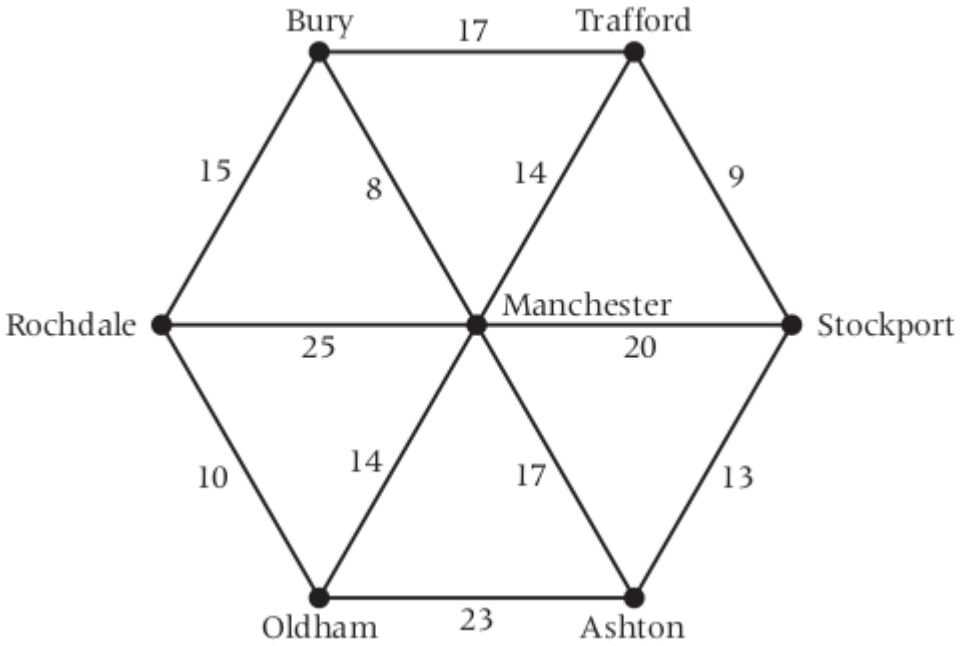
- There will NOT be any ‘recall’ questions:
  - All questions expect you to *apply* your understanding

- Every paper is marked out of 60
- Each question carries 20 marks
- The marks for each subpart:
  - May vary
  - Are shown explicitly
- The overall mark (out of 60) is scaled to a percentage
- Overall grade:
  - 50% Examination
  - 50% Continuous Assessment

Computer Systems
Sample Questions

Example Question #1

The diagram below shows roads connecting towns near to Rochdale. The numbers on each arc represent the time, in minutes, required to travel along each road. Peter is delivering books from his base at Rochdale to Stockport. Use Dijkstra's algorithm to find the minimum time for Peter's journey.



Example Question #2

Consider that you live in a small town where only dial-up access is available, with a maximum possible speed of 300-Kbps (using V.44 modems). You are interested in uploading a large video file of 2 gigabytes to a server on the Internet.

A bus visits your town everyday from the closest city, which is located at 210km away, and stops in front of your house for 5 minutes max (but it can leave as soon you indicate you are done). The bus has a 100-Mbps WiFi connection and it can collect data from users in rural areas and transfer them to the Internet through a 2-Gbps link once it gets back to the city.

Suppose the average speed of the bus is 70 km/h. What is the fastest way the user can transfer the data to the server?

Example Question #3

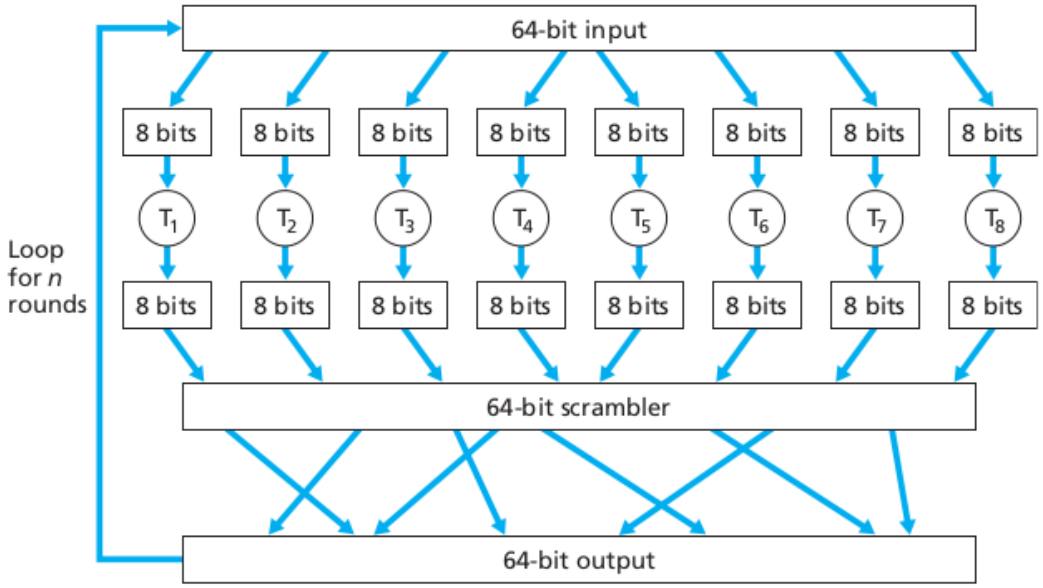
You are designing a network for a multinational corporation with offices in 50 different countries. Each office is required to be on a different subnet and the corporation has obtained a Class B network address of 150.32.0.0.

Design subnets for all of the site offices and indicate how many hosts (usable ones) can be assigned to each site office. Also, indicate if there is any room for expansion to 10 more countries, using the same network IP address and subnetting scheme.

You are not required to list all subnets, however, you can mention the subnet addresses, subnet masks and host address ranges for the first three and last subnet.

Example Question #4

Consider the block cipher shown in the following figure.



(see the question in the next slide)

Example Question #4 (contd)

Suppose that each block cipher Ti simply reverses the order of the eight input bits (so that, for example, 11110000 becomes 00001111).
Further suppose that the 64-bit scrambler does not modify any bits (so that the output value of the mth bit is equal to the input value of the mth bit).

(a) With n = 3 and the original 64-bit input equal to 10100000 repeated eight times, what is the value of the output?
(b) Repeat part (a) but now change the last bit of the original 64-bit input from a 0 to a 1.
(c) Repeat parts (a) and (b) but now suppose that the 64-bit scrambler inverses the order of the 64 bits.

Questions?

- Post in the chat