Sample Exam Questions (Week 24 Tutorial)

Introduction

The exam will contain one question on HCI, one question on mathematics and information management, one question on the systems material up to Easter, and one question on the systems material after Easter (this question will also bring in issues from HCI and information management).

On this worksheet, Question 1 is an example of the first systems question, and Question 2 is an example of the second systems question. Each question is intended to be answered in 30 minutes. During this week's tutorial you can attempt Question 1, and your tutor will either go through or hand out a model solution. You can attempt Question 2 in your own time, and a model solution will be available later.

Question 1

(a). (i) Explain the difference between a *high-level* language and a *low-level* language, and name one language of each type. [2]

(ii) Explain the function of a D flipflop. [1]

Give an example of the use of flipflops in the design of a CPU. [1]

(iii) Explain what is meant by a *sequential* circuit, and say what the alternative is. [2]

Give an example of a sequential circuit. [1]

(iv) Name three of the main components of a CPU and briefly describe their function. [3]

(b). You are required to design a circuit which, given an input xyz representing a 3 bit binary number n, produces an output abc representing $n+1$. For example, if the input is 011 ($x = 0$, $y = 1$, $z = 1$), representing $n = 3$, then the output is 100, representing 4. If the input is 111 then the output is 000.

(i) Draw a truth table which shows a, b, c as functions of x, y, z. [3]

(ii) Draw a Karnaugh map for each of a, b, c. [3]

(iii) Use the Karnaugh maps to work out formulae for a, b and c in terms of x, y and z. [3]

(iv) Draw a diagram of the circuit which calculates a, b and c from x, y and z. [3]

(v) Compare the number of components in your circuit with the number of components in a standard 3 bit adder. [3]

Question 2

(a). Explain the difference between *circuit switching* and *packet switching*. Give an example of a communications network which uses each style. [4]

(b). Explain why routes in the Internet are not chosen by consulting a central database of all possible host-to-host routes. [5]

(c). Explain in general terms how Internet routing is actually carried out. [6]

(d). Most airline web sites now allow customers to buy tickets online. An alternative way of supporting online ticket sales would be for customers to install specialised client software which would communicate with a server at the airline, either using the Internet or by means of direct telephone connections. What do you think would be the advantages or disadvantages of this alternative system, both technically and in relation to HCI issues? [10]