Monday, 24 April 2017

2.00 ppm – 4.00 pm

(Duration: 2 hours)

DEGREES OF MSc, MSci, MEng, BEng, BSc,MA and MA (Social Sciences)

# System and Networks

Assignment Project Exam Help

https://eduassistpro.github.io/

The use of a calculator is not pe edu_assist_pro amination

1. (a) In a 16-bit two's complement code what are the codewords for:

      i. 255
      ii. -255

Express your answers in hexadecimal.

**[3]**

(b) What is meant by an *overflow* in a numeric code? Give an example of an addition that overflows in the 16-bit two's complement code but not in the 16-bit unsigned code.

**[2]**

(c) Suppose the Sigma16 instruction MUL R1, R2,R3 is executed with $FFFF in R2. Recalling that MUL works exclusively with two's complement numbers, what are the smallest (most negative) and largest (most positive) values that R3 can contain which will NOT produce an overflow?

**[2]**

(d) A Sigma16 system has an array X of *n* 16-bit signed numbers in memory. Write an assembly language program to add the absolute values of all elements in X storing the result in a variable ABSUM. (Note that the *absolute value* of a number, *x*, is equal to *x*, if x ≥ 0, but equal to -*x* if x < 0.)

**[7]**

(e) Would your program work for all two's complement array elements?

**[2]**

(f) What is the maximum value that ABSUM can have without overflow occurring? What is the maximum value that can be added to ABSUM at any one time? Given that Sigma16 does not detect unsigned or signed overflows, using these facts or otherwise, devise a test that a programmer could ~~~~~~~~~~~~~~~~~~~~~~t? (Describe what you would test for, but ~~~~~~~~~~~~~~~~~~~~

**[4]**

For reference, this is part of the instruction set of the ~~~~~~~~~~~~~~~~~~~~

| | | |
|---|---|---|
| lea | Rd, x[Ra] | |
| load | Rd, x[Ra] | Rd:= mem[x +Ra] |
| store | Rd, x[Ra] | mem[x +Ra]:=Rd |
| add | Rd,Ra,Rb | Rd:= Ra+Rb |
| sub | Rd,Ra,Rb | Rd:= Ra-Rb |
| mul | Rd,Ra,Rb | Rd:= Ra*Rb |
| div | Rd,Ra,Rb | Rd:= Ra/Rb |
| cmplt | Rd,Ra,Rb | Rd:= Ra<Rb |
| cmpeq | Rd,Ra,Rb | Rd:= Ra=Rb |
| cmpgt | Rd,Ra,Rb | Rd:= Ra>Rb |
| inv | Rd,Ra,Rb | Rd:= NOT Ra |
| jumpf | Rd, x[Ra] | If Rd=0 then PC:=x+Ra |
| jumpt | Rd, x[Ra] | If Rd<>0 then PC:=x+Ra |
| jal | Rd, x[Ra] | Rd:= pc, pc: =x +Ra |
| trap | Rd,Ra,Rb | PC:= interrupt handler |
| jump | x[Ra] | PC:= x +Ra |

2   (a)   Explain the difference between a memory cycle and an instruction cycle. Explain also how the two ideas are related.

**[4]**

(b)   The following Sigma16 instructions have the same effect:

       LEA   R1,0[R0];
       ADD  R1,R0,R0.

Using your knowledge of Sigma16, give two reasons why the second might be preferable to the first and justify your answer.

**[4]**

(c)   With the aid of a diagram, identify the main components of a von Neumann CPU, their function and how they are connected.

**[6]**

(d)   With reference to the components identified in (c) outline the sequence of events involved in the execution of the instruction:   LOAD R1,5[R2].

**[6]**

Assignment Project Exam Help

3.   (a)   What is meant by                                                   packet protocols limit packet size?

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**[4]**

(b)   What is the difference between a switched and a br                         e advantage of each.

Add WeChat edu_assist_pro

**[4]**

(c)   How do IP packets inform routers of their intended                      the packets are then forwarded and how the mechanism to achieve this adapts to changing conditions in the Internet.

**[5]**

(d)   Give one reason why attempting to adapt the routing mechanism to changing Internet conditions, as suggested in (c), might cause a problem.

**[1]**

(d)   What difficulties might be encountered in using IP to carry streamed video and how might these be overcome? Discuss additional difficulties that might apply to IP based telephone conversations and to IP remote control of a robot vehicle? In each case suggest what might be done to tackle the difficulties you identify.

**[6]**