請用空白處計算

計算機概論課堂測驗三(Ch.4~5)　2011/11/11

系級：_____學號：_____姓名：_____

一、 選擇題 (每題 2 分，答案不一定只有一個，若認為全錯，請寫"全錯")

(B) 1. A _____ is a storage device to which the user can write information only once.
(A) DVD (B) CD-R (C) CD-RW (D) CD-ROM

(B) 2. In the _____ method for synchronizing the operation of the CPU with an I/O device, a large block of data can be passed from an I/O device to memory directly.
(A) isolated I/O (B) DMA (C) interrupt-driven I/O (D) programmed I/O

(B) 3. _____ is a memory type with capacitors that need to be refreshed periodically.
(A) CD-R (B) DRAM (C) ROM (D) SRAM

(D) 4. 下列那一種記憶體的速度最快?
(A) Level-1 cache memory (B) Level-2 cache memory (C) main memory
(D) registers

(D) 5. To flip all the bits of a bit pattern, make a mask of all 1s and then _____ the bit pattern and the mask.
(A) OR (B) AND (C) NOT (D) XOR

(D) 6. In the interrupt-driven I/O method, the CPU informs the I/O device that a transfer is going to happen, but it does not test the status of the I/O device continuously. The I/O device interrupts the _____ when the I/O device is ready.
(A) memory (B) ALU (C) instruction register (D) CPU

(A) 7. Single-sided single-layer(單面單層)的 DVD 儲存容量為何?
(A) 4.7GB (B) 8.5GB (C) 9.4GB (D) 17GB

(D) 8. 一個二進位數字(unsigned integer)往左移(left shift)二位元後，其值為原來的
(A) 0.5 倍 (B) 2 倍 (C) 0.25 倍 (D) 4 倍

(C) 9. If you are adding two numbers, one of which has an exponent value of 7 and the other an exponent value of 9, you need to shift the decimal point of the smaller number
(A) one position to the left (B) one position to the right
(C) two positions to the left (D) two positions to the right

(D) 10. The strategy behind the _____ architecture is to have a small set of instructions that do a minimum number of simple operations.
(A) Pentium 4 (B) Von Neumann (C) complex instruction set computer
(D) reduced instruction set computer

二、 填空題 (每格 3 分)

1. Show the result of the operation: $(99)_{16}$ OR $(33)_{16}$ AND [$(00)_{16}$ OR $(FF)_{16}$] = (BB)$_{16}$.

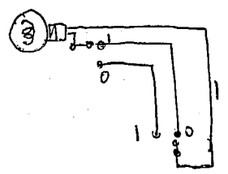
2. 請寫出 CD 的英文全名 compact disk .

3. CPU 的 machine cycle 有 3 個 steps: fetch、decode、excute 。

4. 何謂 Benford's Law?

統計數字當中以1開頭的佔30.1%，其餘的隨數字遞減

5. 試繪出 XOR 對切開關的線路圖。



6. 一般 disk 的 access time = seek time + rotational time + transfer time，請說明何謂 seek time?

讀寫頭移到指定的track / sector的時間

7. Explain the difference between SIMD and MIMD.

SIMD : single instruction stream ~~single~~ multiple data stream

MIMD : multiple instruction stream multiple data stream

8. Most computers typically spend 80% of the time accessing only 20% of the data. The phenomena is called 80-20 rule.

9. 請寫出 ROM 縮寫的英文原名 read only memory 。

10. 請寫出 USB 縮寫的英文原名 universal serial bus 。

11. Adding the following two IEEE 754 floating-point numbers (32 bits):

1 10000110 10110000000000000000000

0 10000010 01100000000000000000000

will get the following IEEE 754 floating-point number 1 10000110 100 1010 0000 0000 0000 0000

12. An imaginary computer has sixteen data registers (R0 to R15), 1024 words in memory, and 16 different instructions (add, subtract, and so on).

(A) What is the minimum size of an instruction in bits if a typical instruction uses the following format: *add M R*. 18

(B) If the computer uses the same size of word for data and instructions, what is the size of each data register? 18

(C) What is the minimum size of the program counter in the computer? 10

(D) What is the minimum size of the instruction register in the computer? 18

(E) What is the minimum size of the address bus in the computer? 10

(F) What is the minimum size of the data bus in the computer? 18

13. 右下圖是我們上課所介紹的一個簡單 CPU 的例子。其中 Program Counter 的功能為

PC 所指的位置即CPU下一步要執行的工作。

14. 接上題。The value in Instruction Register is 1400，What will be done with this instruction?

Load $R_4 \leftarrow M_0$。

15. 接上題。這個 CPU 可視為幾位元的 CPU？ 16 bits

16. 接上題。如果沒有 JUMP 這個指令的話，那麼這個 CPU 會有甚麼問題？

無法執行迴圈或省略一些指令的執行，都必需依序進行。

17. 接上題。這個 CPU 可視為 memory-mapped I/O addressing，為甚麼？

因為 I/O device 和 memory 共用記憶體

18. 接上題。The CPU doesn't have the subtraction instruction $R_D \leftarrow R_{S1}-R_{S2}$. How can we do the subtraction? (這個 CPU 並沒有兩個整數之減法的指令 $R_D \leftarrow R_{S1}-R_{S2}$，如果要做兩個整數的減法運算，那應該怎麼做？)

① NOT $R_{S2} \leftarrow R_{S2}$
INC R_{S2}
ADDI $R_D \leftarrow R_{S1}+R_{S2}$

② DEC R_{S2}
NOT $R_{S2} \leftarrow R_{S2}$
ADDI $\leftarrow R_{S1}+R_{S2}$

取 2's complete 再相加。

19. 接上題。請問以下這個程式的第二行指令及第四行指令分別在做甚麼？

$(1FFE)_{16}$
$(240F)_{16}$ ⇨ 答題處： store $M_{40} \leftarrow R_F$
$(1040)_{16}$
$(B000)_{16}$ ⇨ 答題處： DEC $R_0 \leftarrow R_0 - 1$
$(A000)_{16}$
$(2410)_{16}$
$(1F41)_{16}$
$(2FFF)_{16}$
$(0000)_{16}$

20.請問上題的程式執行完畢後 IR 中的值為何？ $(0000)_{16}$

三、 設計題 (10 分)： Using the instruction set of the simple computer below, write the "machine code" that inputs two integers A and B from the keyboard. If A equals B, the program displays the value of A, otherwise the program displays the value of B. (請依下圖的 CPU 的例子，設計一個「機器指令」程式，它可讓使用者由鍵盤輸入兩個整數 A 和 B，接著判斷 A 是否等於 B，如果 A 等於 B 則透過螢幕來顯示 A 的值，如果 A 不等於 B 則透過螢幕來顯示 B 的值，然後結束程式。)

00	LOAD	$R_0 \leftarrow$ MFE (A)	10FE
01	LOAD	$R_1 \leftarrow$ MFE (B)	11FE
02	JUMP	R_1 05	D105
03	STORE	FF R_0	2FF0
04	HALT		0000
05	STORE	FF R_1	2FF1
06	HALT		0000

Table 5.4 List of instructions for the simple computer

Instruction	Code: d_1	Operands d_2	d_3	d_4	Action
HALT	0				Stops the execution of the program
LOAD	1	R_D	M_S		$R_D \leftarrow M_S$
STORE	2	M_D		R_S	$M_D \leftarrow R_S$
ADDI	3	R_D	R_{S1}	R_{S2}	$R_D \leftarrow R_{S1} + R_{S2}$ 整數加法
ADDF	4	R_D	R_{S1}	R_{S2}	$R_D \leftarrow R_{S1} + R_{S2}$ 浮點數加法
MOVE	5	R_D	R_S		$R_D \leftarrow R_S$
NOT	6	R_D	R_S		$R_D \leftarrow \overline{R_S}$
AND	7	R_D	R_{S1}	R_{S2}	$R_D \leftarrow R_{S1}$ AND R_{S2}
OR	8	R_D	R_{S1}	R_{S2}	$R_D \leftarrow R_{S1}$ OR R_{S2}
XOR	9	R_D	R_{S1}	R_{S2}	$R_D \leftarrow R_{S1}$ XOR R_{S2}
INC	A	R			R ← R + 1
DEC	B	R			R ← R − 1
ROTATE	C	R	n	0 or 1	$Rot_n R$ 若d_4= 0，則將 R 向右旋轉 n 個位置；否則向左旋轉n 個位置。
JUMP	D	R	n		IF $R_0 \neq$ R then PC = *n*, otherwise continue