



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 5, Examination, July 2017

Module No: EE5201 Module Name: Computer Architecture

Part I

Instructions for candidates

- Write your index number on top of every page.
- Question paper contains 40 multiple choice questions.
- Each question carries 0.5 marks.
- Answer all questions. Each question has only one answer.
- For each question, put an X mark on the letter: (a), (b), (c), or (d) which corresponds to the correct answer, by using a black or blue pen.
- Time allowed is 1 hour 15 Minutes.

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1. What is Computer Architecture?
 - (a) Attributes of a System visible to a programmer.
 - (b) Attributes that have direct impact on the logical execution of a program
 - (c) Both (a) and (b)
 - (d) None of the above
 2. What is the observation of Gordon Moore of Intel Corporation regarding computer processors?
 - (a) Number of transistors that could be put on a single chip doubles every year.
 - (b) Manufacturing cost of a processor reduced by half every year.
 - (c) Number of computers manufactured on that particular year doubles every year.
 - (d) Both (a) and (c)
 3. Performance of an application is independent from
 - (a) The instruction set.
 - (b) Choice of implementation language.
 - (c) Efficiency of the compiler.
 - (d) None of the above
 4. What is the correct equation for the Amdahl's law (N = Number of processors execute in parallel, f = Fraction of the code which execute in parallel)

- (a) $Speedup = \frac{1}{(1-f) + \frac{f}{N}}$
- (b) $Speedup = \frac{1}{(1-f) + \frac{N}{f}}$
- (c) $Speedup = \frac{1}{(1-N) + \frac{f}{N}}$
- (d) $Speedup = \frac{1}{(1-N) + \frac{N}{f}}$
5. Memory is addressable by location, in order to
- Differentiate instructions from data
 - Identify instructions
 - Access content of memory by CPU
 - Refresh semiconductor level capacitors of memory
6. Cache in memory hierarchy is between
- Hard Disk and Registers
 - Main Memory and Registers
 - Optical Drive and Hard Disk
 - Main Memory and CPU Buffers
7. L1 Cache supposed to cache the content of
- L3 Cache
 - L4 Cache
 - L1-Data or L1-Instructions Cache
 - L2 Cache
8. Principle of locality of reference says
- After the execution of a program, memory references tend to vanish
 - Data and instructions are in the same read-write memory
 - Program execution occurs in a sequential fashion
 - During the execution of a program, memory references tend to cluster
9. What is correct about DRAM and SRAM?
- DRAM is used for Cache while SRAM is used for internal memory
 - Size per bit in DRAM is smaller than SRAM
 - DRAM is faster than SRAM
 - SRAM is less expensive than DRAM
10. DRAM needs "refreshing" even when powered because DRAM is
- Constructed based on transistors
 - No resistors used in the refresher circuit
 - Constructed based on capacitors
 - Address line and bit line are not connected
11. Flags register in CPU holds
- Address of next instruction to be fetched
 - Status of the last operation
 - Pointer to program stack
 - Code segment address
12. When we perform subtraction on -7 and -5 the answer in two's compliment form is
- 11110
 - 1110
 - 1010
 - 0010

13. The method of mapping the consecutive memory blocks to consecutive cache blocks is called
- Set associative
 - Associative
 - Direct
 - Indirect
14. While using the direct mapping technique, in a 24-bit system the higher order 8-bits are used as the
- Tag
 - Block
 - Word
 - Mapping
15. The register which contains a word of data to be written to memory or the word most recently read
- MAR
 - MBR
 - IR
 - PC
16. Instruction cycle does not include the stage
- Indirect
 - Fetch
 - Interrupt
 - None of the above
17. Correct integer representation of the two's compliment
- $A = -2^{n-1}a_{n-1} + \sum_{i=0}^{n-2} 2^i a_i$
 - $A = -2^n a_n + \sum_{i=0}^{n-1} 2^i a_i$
 - $A = 2^n a_n - \sum_{i=0}^{n-1} 2^i a_i$
 - None of the above
18. Two's compliment representation of -28 using 16-bits is
- 1111111100011100
 - 1000000000011100
 - 1111111111100100
 - 1000000011100100
19. What are the operations done by the ALU to divide two integers in binary?
- Addition and Subtract
 - Addition and Shift
 - Shift and Subtract
 - divide and assign
20. Wave lengths used by CD, DVD and Blue-ray are
- 650nm, 405nm and 780nm
 - 405nm, 650nm and 780nm
 - 780nm, 650nm and 405nm
 - 780nm, 405nm and 650nm
21. What are the starting addresses of blocks map into the cache line number 12 under direct mapping with 8-bit tag and 2-bit word
- 000000, 00000C and C00000
 - C00000, C00001 and C00002
 - 0C0001, 0C0002 and 0C0003
 - 0C1000, 0C0100 and 0C0010
22. The reason for using point-to-point interconnect rather than shared buses
- At higher data rates it becomes increasingly difficult to perform the synchronization
 - The shared bus is not suitable with multi-core chips

- (c) Point-to-point interconnect has lower latency and higher data rate
- (d) All of the above reasons
23. To get the physical address from the logical address generated by CPU we use
- (a) Control Unit
- (b) MAR
- (c) MMU
- (d) IR
24. Which memory device is generally made of semi-conductors?
- (a) Hard-disk
- (b) RAM
- (c) Floppy disk
- (d) Compact disk
25. Number of cycle/s required to complete each stage in instruction pipelining?
- (a) 6
- (b) 2
- (c) 1
- (d) None of the above
26. Select the appropriate comment for the following code fragment.
- ```
mov EDX, 4
mov ECX, W_buf
mov EBX, 1
mov EAX, 4 ;.....
int 0x80
```
- (a) Length of the message.
- (b) System Call Number (sys write)
- (c) System Utility
- (d) File Handle (stdout).
27. If you need to declare 32 bits of memory starting at address x initialized to contain 8, then what special assembler directives should be used?
- (a) section .x
- (b) section .bss
- (c) global \_start
- (d) section .data
28. What is true about following Assembly code fragment?
- ```
buf resw 25
```
- (a) Declare 25 number of uninitialized memory location with the size of two byte
- (b) Declare four byte containing the value 25 and the memory location is labeled as buf
- (c) Declare a word at the address of 25 and the memory location is labeled as buf
- (d) Declare two byte containing the value 25 and the memory location is labeled as buf
29. What is true about following Assembly code fragment?
- ```
OUT 61H, AL
```
- (a) copy the contents of the port 61H to the AL register
- (b) copy the contents of the AL register to the port 61H
- (c) copy the contents of the AL register to the register 61H
- (d) copy the contents of the 61H register to the port AL

30. What will be the memory address of 8?  
`count DB 5,6,7,8`
- (a) `count + 1`  
 (b) `count + 2`  
 (c) `count + 3`  
 (d) `count + 4`
31. After execution of the following code fragment
- ```
mov EAX, 0x1234
mov EBX, 0x1235
cmp EBX, EAX
inc EAX
add EBX, EAX
```
- what are the final values of EAX and EBX (respectively)?
- (a) 0x1234 and 0x2469
 (b) 0x1235 and 0x246a
 (c) 0x2469 and 0x1235
 (d) 0x0001 and 0x1234
32. Consider following code fragment.
- ```
mov EAX, 0
```
- Which of the following instructions will produce the same result?
- (a) `nand EAX, EAX`  
 (b) `and EAX, EAX`  
 (c) `xor EAX, EAX`  
 (d) `or EAX, EAX`
33. What are the final values of EAX and EBX, respectively, after execution of the following code
- ```
mov EAX, 0x9014
mov EBX, 0x1803
shr EAX, BL
shl EBX, AL
```
- (a) 0x1202 and 0x600c
 (b) 0x4050 and 0x1202
 (c) 0x600c and 0x4050
 (d) 0x0600 and 0x0600
34. The following code
- ```
inc DWORD PTR [var]
```
- (a) adds one to the 32-bit integer stored at memory location `var`.  
 (b) increases `var` by one.  
 (c) increases `var` by one and the 32-bit integer stored at `var` moves to new location.  
 (d) does nothing.
35. What is the final value of EAX after execution of the following code?
- ```
mov EAX, 0x0
mov EBX, 0x0
Loop: inc EAX
add EBX, EAX
cmp EAX, 0x5
j1 Loop
mov EAX, EBX
```
- (a) 0x000a
 (b) 0x000f
 (c) 0x0015
 (d) 0x0000
36. What is the final value of EAX, EBX, ECX and EDX, respectively, after the execution of the following code fragment?
- ```
mov EAX, 0x1234
mov EBX, 0x5678
mov ECX, 0x9abc
mov EDX, 0xde01
```
- Push EAX  
 Push EBX

```
Push ECX
Push EDX
Pop EBX
Pop EDX
Pop EAX
Pop ECX
```

- (a) 0x1234, 0x1234, 0xde01 and 0x9abc
- (b) 0x5678, 0xde01, 0x1234 and 0x9abc
- (c) 0x9abc, 0x1234, 0x9abc and 0xde01
- (d) 0xde01, 0x9abc, 0x5678 and 0x1234
37. The following code  
sub [var], ESI  
subtracts the contents of
- (a) ESI from the 32-bit integer stored at memory location var.
- (b) ESI from the 8-bit integer stored at memory location var.
- (c) memory location var from the 32-bit integer at ESI.
- (d) memory location var from the 8-bit integer at ESI.
38. Consider following code fragment.  
mov EAX, 0  
Which one gives the same result?
- (a) nand EAX, EAX
- (b) and EAX, EAX
- (c) xor EAX, EAX
- (d) or EAX, EAX
39. The command `ld myprogram.o` at the Linux prompt creates
- (a) a.out file.
- (b) myprogram.o file.
- (c) Both (a) and (b)
- (d) None of above.
40. If you need to compare last four bits of EAX with any value, what is the command you need to use for "extracting" only last four bits of EAX?
- (a) or EAX, 0xf
- (b) xor EAX, 0xf
- (c) nand EAX, 0xf
- (d) and EAX, 0xf