考試科目	計算機概論與程式設計	系所別	數位內容碩士學位學程/資訊應用組	考試時間	2月17日(日) 第 3 節

1. Single-choice (45%)

(1) Which of the following statements is wrong?
   (a) A failure of a component may not lead to system failure
   (b) MTTR means mean time to repair
   (c) To improve availability, we either reduce MTTF or increase MTTR
   (d) To improve MTTF, we can perform fault avoidance, fault tolerance, or fault forecasting.

(2) Which of the following statement is true?
   (a) Pipelining improves instruction throughput and reduces the time it takes to complete an individual instruction
   (b) A multi-cycle implementation of the MIPS processor requires that a single memory be used for both instructions and data
   (c) Increasing the depth of pipeline increases the impact of hazards
   (d) Forwarding is a method to resolve a control hazard.

(3) Which of the following statement is true?
   (a) JPEG is a lossless data compression format
   (b) MP3 is a lossless data compression format
   (c) Pixel is the smallest unit in an digital image
   (d) DPI refers to a display's resolution

(4) Which of the following interface/protocol does not transmit digital data?
   (a) HDMI
   (b) Bluetooth
   (c) D-Sub
   (d) DVI

(5) Which of the following statement is true?
   (a) UML is a visual tool to generate executable code
   (b) UML is a visual tool to generate code template
   (c) UML is a visual programming language
   (d) UML is a software development process

(6) Which of the following statements is wrong?
   (a) DRAM write can wear out memory bits
   (b) SRAM is low density, high power, expensive, but fast
   (c) Data stored in DRAM as a charge in a capacitor so that it must periodically be refreshed
   (d) DRAM addresses in 2 halves

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(7) Which of the following statement is true?
(a) MongoDB is a persistence technology
(b) jQuery is a back-end technology
(c) Express.js is client-end technology
(d) None of the above

(8) What is $(-128)_{10}$ in two's complement?
(a) 01111111 (b) 11111111 (c) 10000000 (d) 11111110

(9) Which of the following statement is false?
(a) It makes no sense to implement a write-through scheme in a Virtual memory
(b) On a data cache miss, the system first stalls the CPU pipeline, fetches data in memory, and restart instruction fetch
(c) Write back refers to on data-write hit, just update the block in cache and write back to memory when a dirty block is replaced.
(d) In order to reduce to operation time of a write-through cache, a write buffer is used to hold data waiting to be written to memory.

(10) Which of the following is not a video container format?
(a) H.264
(b) MP4
(c) AVI
(d) Ogg

(11) In order to persist the data, which of the following memory needs to be recharged?
(a) ROM
(b) SRAM
(c) DRAM
(d) Flash Memory

(12) How many bits are required to address 8G bytes memory?
(a)16 (b)32 (c)64 (d)128

(13) Which of the following programming language does not need a compiler?
(a)Java (b)JavaScript (c)Python (d)C++

(14) Which of the following software is responsible for assembling all necessary functions from required libraries and source code?
(a)loader (b)linker (c)assembler (d)interpreter

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(15) CPU Time is determined by IC, CPI and Clock Cycle time (CC). Which of the following statements is true?

(a) Instruction Set Architecture determines IC

(b) CC and CPI is determined by CPU design

(c) Non-pipelined CPUs tend to have low CPI and high CC

(d) All of the above

2. Please explain the following terms, you will get no credit if you just translate the terms into Chinese: (20%)

(1) Socket

(2) Frame rate

(3) Distributed Ledger

(4) Vector images

(5) DevOps

3. (8%) Rewrite the following program so that it computes a greatest common divisor using iteration instead of recursion.

```
unsigned greatest_common_divisor (unsigned a, unsigned b)
{
  if (a > b)
      return greatest_common_divisor ( a-b, b );
  else if (b > a)
      return greatest_common_divisor ( a, b-a );
  else // (a == b)
     return a;
}
```

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4. (7%) The following is a piece of code written by a programming language in an asynchronous way, what is the output order of A, B, and C? (Assuming that fs.readFile and fs.writeFile are I/O operations and take relative longer time to complete than other operations)

```
const fs = require("fs");

let john = {
    id: 1031,
    name: "John",
    age: 18
};

fs.writeFile('john.json', JSON.stringify(john), function() {
    console.log('A');
    fs.readFile('john.json', function(data){
        console.log('B');
    })
});

console.log('C');
```

5. (10%) Web Assembly is a binary instruction format for a stack-based virtual machine intended to be embedded in any browser. Web Assembly is designed as a portable target for compilation of any high-level programming language.
   (1) According to the description above, what is the key benefit of Web Assembly?
   (2) Please propose/sketch an application or a system that is straightforward to implement based on Web Assembly but is not easy to realize before the birth of Web Assembly?

6. (10%) What are the computational complexities for the following mechanism? (1) Worst case of Mergesort (2) Average case of Insertion Sort (3) Worst case of Heapsort (4)Deleting the whole Circularly Linked List

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。