

Instruction Set Architecture & MIPS — Quiz

1 Instruction Set Architectures (ISA)

Which of the following statements are true?

1. The ISA defines a contract between the program and the hardware.
2. The ISA determines how the processor will implement the operations the ISA defines.
3. The ISA defines a set of basic operations that the processor can perform.
4. The ISA that a computer uses determines which programming languages can be used to program the computer.

2 MIPS ISA

Which of the following statements are true?

1. MIPS is the dominant ISA in use in computers today.
2. MIPS instructions are 8 bytes long.
3. MIPS instructions can read up to 2 register values from the register file and write at most 1 register.
4. Regardless of instruction type, the opcode is always in the same location in a MIPS instruction.
5. MIPS is more complex than the x86 ISA.

3 Moore's Law

Statement:

Moore's Law specifies that processor performance doubles every 18–24 months.

Answer:

☐ True ☐ False

4 Benchmark Suites

Which of the following statements are true?

1. They are collections of well-defined, stand-alone programs.
2. They always provide an accurate representation of the applications that will run on a computer system.
3. It is likely that a properly chosen set of benchmarks could be used as a universal measure of computer performance.
4. Benchmarks are selected via an inherently fair and balanced process.
5. Benchmarks are generally not very useful.

5 MIPS Code Analysis

```
ori $t0, $zero, 4
sw  $t0, 0($sp)
beq $t0, $t0, foo
lw  $t1, 0($sp)
ori $t2, $zero, 0
foo:
or  $t2, $t1, $zero
or  $t3, $t1, $zero
```

Question: What will the values of `$t2` and `$t3` be after executing this code?

Answer Key

1 Instruction Set Architectures (ISA)

- ✓ 1. The ISA defines a contract between the program and the hardware.
- ✗ 2. The ISA determines how the processor will implement the operations the ISA defines.
- ✓ 3. The ISA defines a set of basic operations that the processor can perform.
- ✗ 4. The ISA determines which programming languages can be used.

2 MIPS ISA

- ✗ 1. MIPS is the dominant ISA in use in computers today.
- ✗ 2. MIPS instructions are 8 bytes long.
- ✓ 3. MIPS instructions can read up to 2 registers and write at most 1.
- ✓ 4. Opcode location is fixed in all MIPS instruction formats.
- ✗ 5. MIPS is more complex than x86.

3 Moore's Law

- ✗ **False** — It refers to transistor count doubling, not performance.

4 Benchmark Suites

- ✓ 1. Collections of well-defined, stand-alone programs.
- ✗ 2. Do not always represent real workloads.
- ✗ 3. Not a universal performance measure.
- ✗ 4. Not always fair or balanced.
- ✗ 5. They are useful — just not perfect.

5 MIPS Code Analysis

Execution:

1. `$t0 ← 4`
2. `sw $t0, 0($sp)` stores 4 to memory.
3. `beq $t0, $t0, foo` is **always true** → jumps to `foo`.
4. Lines between `beq` and `foo` are skipped.
5. `$t1` never loaded → **undefined**.
6. `$t2 = $t1`, `$t3 = $t1` → both undefined.

Result:

- `$t0 = 4`
- `$t1 = undefined`
- `$t2 = undefined`
- `$t3 = undefined`