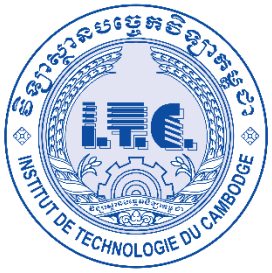

Computer Architecture

TP1

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Questions

1. What is an ISA?

2. What is the difference between computer organization and computer architecture?

3. What is mean by “open architecture”?

4. How does the fetch-decode-execute cycle work?

5. What is meant by parallel computing?

6. Name the three basic components of every computer.

7. What is the mission of IEEE?

8. What is the full name of the organization that uses the initials ISO? Is ISO an acronym?

Exercise

1. Time Unit and Memory Unit

a) How many milliseconds (ms) are in 1 second?

b) How many microseconds (μs) are in 1 second?

c) How many nanoseconds (ns) are in 1 millisecond?

d) How many microseconds are in 1 millisecond?

e) How many nanoseconds are in 1 microsecond?

f) How many kilobytes (KB) are in 1 gigabyte (GB)?

g) How many kilobytes are in 1 megabyte (MB)?

h) How many megabytes are in 1 gigabyte (GB)?

i) How many bytes are in 20 megabytes?

j) How many kilobytes are in 2 gigabytes?

2. By what order of magnitude is something that runs in nanoseconds faster than something

that runs in milliseconds?

3. Suppose a transistor on an integrated circuit chip were 2 microns in size. According

to Moore's Law, how large would that transistor be in 2 years? How is Moore's law relevant

to programmers?

Answer1:

1. What is an ISA?

ISA is part of the abstract model of a computer that defines how the CPU is controlled by the
software.

2. What is the difference between computer organization and computer architecture?

Computer organization explains how a computer works. Computer architecture provides functional behavior of computer system. Computer organization provides structural relationships between parts of computer system. Computer architecture deals with high level design.

3. What is mean by "open architecture"?

Open architecture is a technology infrastructure with specifications that are public as opposed to proprietary**.**

4. How does the fetch-decode-execute cycle work?

There are 3 stages:

• Fetching an instruction from memory - supplying the address and receiving the instruction from memory.

• Decoding the instruction - interpreting the instruction and then reading and retrieving the required data from their addresses.

• Executing the instruction - the CPU carries out the required action.

5. What is meant by parallel computing?

Parallel computing is a type of computing architecture in which several processors
simultaneously execute multiple, smaller calculations broken down from an overall larger, complex problem.

6. **Name the three basic components of every computer**.

At a high level, all computers are made up of a processor (CPU), memory, and input/output devices. Each computer receives input from a variety of devices,

processes that data with the CPU and memory, and sends results to some form of output.

Answer2:

1.Time Unit and Memory Unit.
a) How many milliseconds (mms) are in 1 second? Answer (There are 1000 million seconds are in 1 second).
b) How many microseconds (μs) are in 1 second? Answer (There are 1000000 microseconds are in 1 second).
c) How many nanoseconds (ns) are in 1 millisecond? Answer (There are 1000000000 nanoseconds are in 1 second).
d) How many microseconds are in 1 millisecond? Answer (There are 1000 microsecond to 1 millisecond).
e) How many nanoseconds to 1 microsecond? Answer (There are 1000 nanosecond to 1 microsecond).
f) How many kilobytes (KB) are in 1 gigabyte (GB)? Answer (There are 230 kilobytes are in 1 gigabyte).
g) How many kilobytes are in 1 megabyte (MB)? Answer (There are 220 kilobytes are in 1 megabyte).
h) How many megabytes are in 1 gigabyte (GB) Answer (There are 210 megabytes are 1 gigabyte).
i) How many bytes are in 20 megabytes? Answer (There are 20x220).
j) How many kilobytes are in 2 gigabytes? Answer (There are 2x210).

2. By what order of magnitude is something that runs in nanoseconds faster than something that runs in milliseconds?

The order of magnitude by which something that runs in nanoseconds is faster than
something that runs in milliseconds is (1,000,000 times). This is because there are 1,000,000,
nanoseconds in a millisecond.

3. Suppose a transistor on an integrated circuit chip were 2 microns in size. According to Moore's Law, how large would that transistor be in 2 years? How is Moore's law relevant to programmers?

Moore's Law, proposed by Gordon Moore in 1965, states that the number of transistors on a microchip double approximately every two years, leading to an exponential increase in computing power. This law has held true for several decades and has been a driving force behind the rapid advancement of technology.

If a transistor on an integrated circuit chip were 2 microns in size initially, according to Moore's Law, in 2 years, the size of the transistor would be halved. This means that the transistor would be approximately 1 micron in size after 2 years. Moore's Law is relevant to programmers in several ways:

1. Increased Processing Power: As transistor density increases, so does the processing power of computers. Programmers can take advantage of this increased power to develop more complex and computationally intensive applications.
2. More Capable Hardware: Moore's Law drives the development of more capable hardware, such as multicore processors and higher memory capacities. Programmers can leverage these advancements to create more efficient and responsive software.
3. New Possibilities: The rapid pace of technological advancement driven by Moore's Law opens up new possibilities for software development. Programmers can explore new algorithms, technologies, and approaches that were not feasible before.
4. Performance Expectations: Moore's Law sets expectations for the performance improvements that can be achieved over time. Programmers can use this knowledge to
plan for future hardware advancements and optimize their code accordingly.