CSE340 - Computer Architecture

1. Don't Get Scared!
   {First Rule}
2. Solid Marking!
3. N-1 Quiz
   (4 or 5)
4. Chapter 1, 2, 3 (Midterm) ← 2 to 3 Weeks
5. Chapter 4 (After Midterm)

Theory + Math (Formula based)

Chapter 1
Computer Abstractions and Technology

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The Computer Revolution

Moore's Law

The Processor Market

What You Will Learn

Understanding Performance

↳ Increase CPU Performance
Decrease Execution Time

$$\uparrow P \propto \frac{1}{T \downarrow}$$

$c = a + b$

```
add $c, $a, $b
```

Below Your Program

↳ Application Software

↳ System Software

↳ Compiler

↳ OS

↳ Hardware

↳ Processor, Memory, I/O Controllers.

Levels of program Code

Important (Question আসে)

Inside the Processor

Abstractions

↳ ISA (Instruction set architecture)

The Hardware/Software Interface.

Some Definitions:

32 bits MIPS Architecture

datapath (Chapter 4)

memory heirarchy

multiprocessor

Role of the (Computer) Architect

Defining Performance

Response Time and Throughput

↓ How long it takes to do a task

↓ Total work done per unit time

$$P = \frac{1}{E \cdot T}$$

$$\frac{P_A}{P_B} = \frac{\frac{1}{E_A}}{\frac{1}{E_B}} = \frac{E_B}{E_A}$$

$$\frac{P_A}{P_B} = \frac{E_B}{E_A} \quad ; \quad \frac{P_B}{P_A} = \frac{E_A}{E_B}$$

$$\frac{P_A}{P_B} = \frac{15}{10} \Rightarrow P_A = 1.5 \times P_B$$

Elapsed time $\approx$ Response Time

CPU Clocking

CPU Time = Execution Time

2s = Time Period

$$F = \frac{1}{T} = \frac{1}{2} = 0.5 \text{ Hz}$$

Number of cycles per second
↳ frequency

$$\text{CPU Time} = \text{CPU Clock Cycles} \times \text{Clock Cycle Time}$$

$$= \frac{\text{CPU Clock Cycles} \downarrow}{\text{Clock Rate} \uparrow}$$

Instruction → 3
Cycles / Instruction → 2
No. of cycles = 3×2 = 6
Clock Period = 2s
CPU Time = 2×6 = 12

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Next Slide → 29
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Give 4hq