
Welcome to
COMPUTER ORGANIZATION
(IS F242)

LECT 01: INTRODUCTION

Introduction

- Instructor – in – charge
 - Dr. Biju K Raveendran
 - Assistant Professor
 - A – 413
 - Department of Computer Science & Information Systems
 - biju@goa.bits-pilani.ac.in
 - Consultation Time: Anytime between 10 A.M & 7 P.M

Policies to Follow

■ Class room

- ❑ No entry after 11:00 A.M (No excuses Plz)
- ❑ It is compulsory to attend classes (No excuses Plz)
- ❑ Not allowed to leave in between the class

■ Lab – 6 labs

- ❑ Verilog
 - Simulation (if possible synthesis)
- ❑ Come well before time (No entry after 3:00 P.M)
- ❑ Allowed to leave only after the successful completion of the Lab sheet

Course Administration

■ Lectures

- All the lecture sessions by Dr. Biju K Raveendran

■ Labs

- Best (N-1) out of N for evaluation.
- 10% weightage (30 Marks) for the labs
- One lab session is for 2 hours (or until you finish the problem)
- Based on Digital design and Verilog implementation

Course Administration

■ Tests

□ Test 1

- Day, Date & Time: Friday, 15 – 02 – 2013 (8:30 – 9:30)
- Weightage: 15%
- Mode: Closed Book

□ Test 2

- Day, Date & Time: Thursday, 21 – 03 – 2013 (8:30 – 9:30)
- Weightage: 15%
- Mode: Closed Book

□ Make-up Policy

- Medical certificate from the doctor (Dr. Ragvendra)
- Photocopy of the medical reports & Bills

□ No makeup for relative's marriage

Course Administration

■ Marks for attendance

- ❑ Weightage: 10% (30 Marks)
- ❑ 90% and above 30 Marks
- ❑ 80% to 89% 24 Marks
- ❑ 70% to 79% 18 Marks
- ❑ 60% to 69% 12 Marks
- ❑ Less than 60% 0 Marks

■ Project Assignments and/or Online(s)

- ❑ Programming in Nature. We will put up the details later
- ❑ Weightage: 20%
- ❑ All deadlines are hard deadlines
 - Late submission is same as **NO** submission.
- ❑ See Handout for Malpractice Regulations

Course Administration

■ Comprehensive Examination

- ❑ Day, Date & Time: Wednesday, 01 – 05 – 2013, FN
- ❑ Weightage: 30%
- ❑ Mode: Closed Book

What you should know

- Digital Electronics and Microprocessors (ES C261)
 - Digital Electronics
 - Gates, Boolean algebra, or K-Maps
 - Latches or Flip-Flops
 - MUX, Registers, Memory
 - Binary, Hex and 2's complement
 - Adder, Shifter, Multiplexer,....
 - State Machines
 - Read the following books for refreshing your fundamental concepts
 - Digital Design by Morris Mano & Michael D Ciletti
 - Digital Systems – Principles and Applications by Ronald J. Tocci, Neal S. Widmer & Gregory L. Moss

What you should know

- Digital Electronics and Microprocessors (ES C261)
 - Microprocessors:
 - Microprocessor and its architecture, Address modes, Data movement instructions, Arithmetic and Logic instructions, Program control Instructions, 8086/8088 hardware specifications, Memory interface, Basic I/O interface and Interrupts
 - ALP, Programming concepts....
 - Read the following books for refreshing your fundamental concepts
 - The Intel Microprocessors: Architecture, Programming and Interfacing by Barry B. Brey (Chapters 1 – 6, and 9 – 12, According to ES C261 last semester handout)
 - Microprocessors and Interfacing by Douglas V Hall

-
- This is not a course where the syllabus restricts only with one or two text books.
 - You are advised to follow the classes without break and update upcoming trends in architecture through other means.
 - Syllabus for the exam will be “whatever covered in class” – Not whatever is available in the text book

Course Administration

■ Material:

- <http://photon.bits-goa.ac.in/moodle/>

■ Text Book:

- David A. Patterson and John L. Hennessy, “Computer Organisation and Design: The Hardware/Software Interface”, Elsevier, 4th Edition - ARM Edition, 2010.
- William Stallings, “Computer Organisation & Architecture: Designing for performance”, Pearson Education, 7th Edition, 2006.

■ Reference Book:

- Verilog HDL: A Guide to Digital Design and Synthesis by Samir Palnitkar, Pearson Edu. 2003.
- Barry B. Brey, “The Intel Microprocessors: Architecture, Programming and Interfacing”, PHI, 8th Edition, 2009.

■ Note: Make it a habit to visit course page. The page will be updated on a daily basis

-
- Only a perfectionist can become a good ARCHITECT

Course Outline

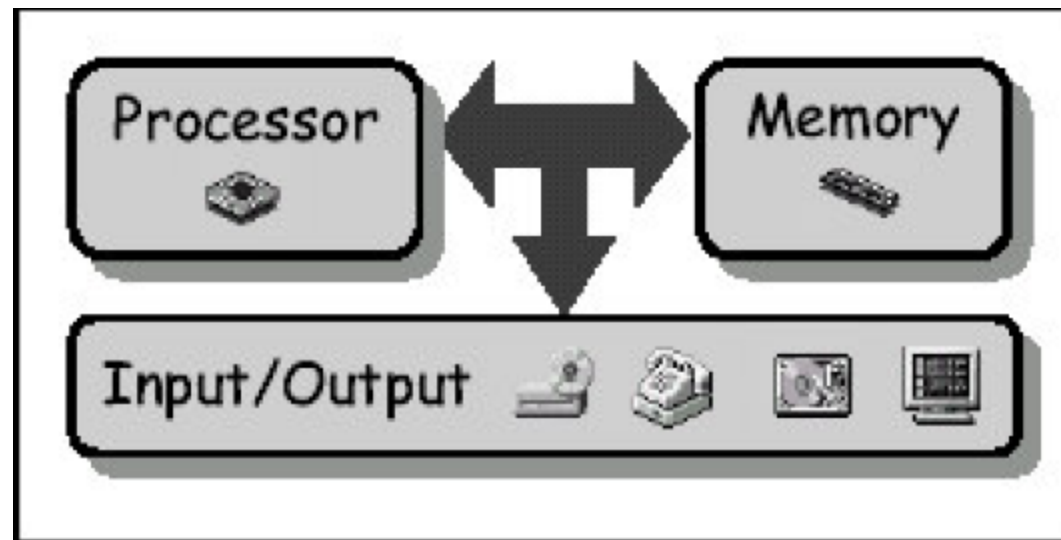
- Computer Arithmetic
- Instruction Set Architecture
- Processor Design (LC – 3, MIPS and ARM)
 - Microprocessor without Interlocked Pipeline Stages
- Single Cycle / Multi-Cycle Data path Design
- Pipelining
- Memory
- I/O
- Parallel and Multi-core Architectures

Course Structure

- Design Intensive Course
- Simulation & Synthesis using verilog HDL
- LC – 3, MIPS and ARM case studies
- Memory Design
- Multi-core case study

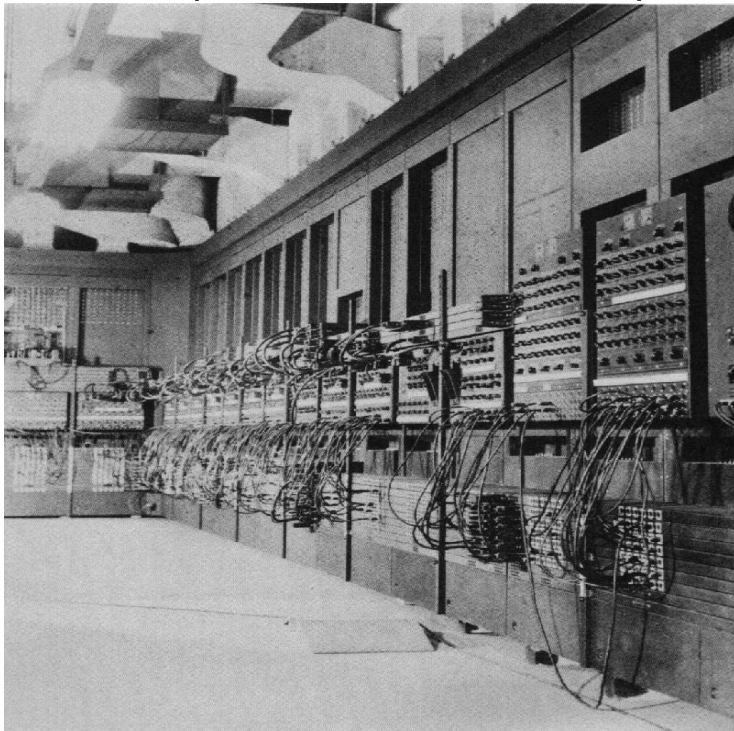
Introduction to CO

- What is Computer Organization?
 - CO is the study of how to build computing systems



Generations

- The first Generation, 1946 – 53
 - Vacuum tubes, Relays, Mercury delay lines
 - **E**lectronic **N**umerical **I**ntegrator **A**nd **C**alculator (ENIAC - 1946), **E**lectronic **D**elay **S**torage **A**utomatic **C**alculator (EDSAC – 1949)



- 17,468 Vacuum tubes
- 7,200 crystal diodes
- 1,500 relays
- 70,000 resistors
- 10,000 capacitors and
- 5 million hand soldered joints

Generations

- The Second Generation, 1953 – 64
 - Discrete Transistors
 - IBM Model 604- 1953
 - IBM Model 608 – 1957
 - TRADIC (TRAnsistor Digital Computer)– 1955 - A fully transistorized Computer – Bell Labs
- The Third Generation, 1964 - 75
 - Small Scale Integration (SSI) – 10s of transistors
 - Medium Scale Integration (MSI) – 100s of transistors
 - Large Scale Integration (LSI) – 10000s of transistors
 - Minicomputer – 1965 – Digital Equipment Corporation

Generations

- The Fourth Generation, 1975 – 2000...
 - VLSI based Microprocessors
 - 100s of thousands to several billion
- The Fifth Generation?
 - Ultra Large Scale Integration (ULSI)?
 - Intel 486 & Pentium uses ULSI (more than 1 million circuit elements in a chip)
 - Wafer Scale Integration (WSI)?
 - System of building VLSI circuits that uses an entire silicon wafer to produce a single “super chip”
 - Reduces cost of systems like parallel supercomputers