

CSC 218: Foundation of Sequential Program

(2 units) - Compulsory

The Relationships between H/L Languages and
the Computer Architecture that Underlies their
Implementation: basic machine Architecture,
Assemblers Specification and translation of P/L
Block Structured Languages, Parameter passing
Mechanisms.

csc 218

24/01/2022

I Describe Programming Language

Explain Levels of Programming Language

Compare Computer Program and English Comments
Language Processor / Translator

Programming Language

This is a set of instruction that allows the User to interact with the Computer

are set of rules and instruction to the Computer to perform Specific instructions. These are language Syntax that the Computer Understands in Order to perform Specific task

Levels Of Programming Language.

TWO Levels.

* High Level Language.

* Low Level Language.

i) High Level Language : It can be divided into two

Procedural / traditional language.

ii) Non-Procedural / Object Oriented Programming/L

8bits-1b

4bits-1b

Procedural : Examples : Step by Step. How will Solve
Pascal, FORTRAN, ADA, COBOL, C-Language.

Non Procedural : What Problem is Solved.

JAVA, PYTHON, C++, JavaScript, RUBY, ANACONDA, DO FORTRAN,
PEARL, OO PASCAL, PHP

LOW LEVEL LANGUAGE : It can be divided into 2

i) Machine Language And Assembly Language.

Machine Language : It is a set of code/language
understood by the Computer. It uses binary number
System 0 and 1, 0 or 1 is referred to as Bit.
if it is in base three and above it is no longer a Bit
but a byte

8bits-1byte EBCDIC - Extended binary-coded decimal
Interchange Code. 0000 zone bit 0000 magnitude / size.

ASCII - American Standard Code for Information
Interchange.

4bits-1byte BCD - 0000 - Binary Coded Decimal.

Gray Code

X5 - 3 Also known as Excess 3 is a non weighted code used to express decimal numbers.

A - 1

S - 2

B - 2

T - 3

C - 3

U - 4

D - 4

V - 5

E - 5

W - 6

F - 6

X - 7

G - 7

Y - 8

H - 8

Z = 9

I - 9

magnitude / size

J - 1

0000 - 0

K - 2

0001 - 1

L - 3

0010 - 2

M - 4

0011 - 3

N - 5

0100 - 4

O - 6

0101 - 5

P - 7

0110 - 6

Q - 8

0111 - 7

R - 9

1000 - 8

1001 - 9

10 - 1010

11 - 1011

12 - 1100

13 - 1101

14 - 1110

15 - 1111

Java: while count < 10

English.com: while the value of count is less than 10

Python Number = int(input("Type in a Number"))

English expression: Input a Number.

Write 10 program and their equivalent expression in English Language.

Language Processor / Translator.

A Software that converts a programming Language from One Language to Another.

A program that perform tasks, such as translating and interpreting, required for processing a specified programming language. It can be divided into three

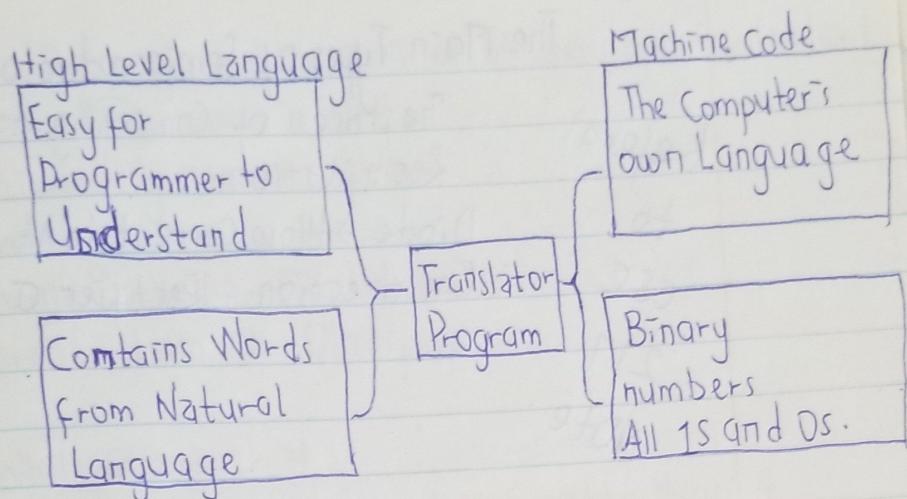
- 1) Compiler
- 2) Interpreter
- 3) Assembler.

Compiler And Interpreter: Converts Programs from high Level to machine Language and Vice Versa.

Assembler: Converts programs from Assembly Language to machine Language and Vice Versa.

Interpreter reads the Code / Program Line by Line.

Compiler reads the program One after the Other noting error in each Case allowing the programmer to correct the error then execute at a time.



Mnemonic Action / function.

LDA - Load a value from a Memory Address.

STA - Stores a value in a Memory Address.

ADD - Add the value held in a memory address to the value held in the Accumulator.

SUB - Subtracts from the Accumulator the value held in a memory address.

MOV - Moves the contents of One memory address to another.

Types of Translators

Advantages and Disadvantages of High Level Language

Advantages and Disadvantages of Low Level Language

Computer Architecture

Types of Architecture

The Main Types of Semiconductor Chips.

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Note

The process of Converting Ac to Dc is
Rectification.

Diode → Allow Current to Move in Only
One direction - Rectifier Circuit.

Definition of Semiconductor

Types of Semiconductor and Explanation-

Diode & Triode-

Wheeler bridge Connection

CISC & RISC.

Energy band diagram.

Integrated Circuits.

Scale of Integrated Circuits.

(SoC) System on Chip.

Active and passive Component.

ISA (Instruction Set Architecture.)

CISC (Complex Instruction Set Computer)

RISC (Reduced Instruction Set Computer)

find the Comparisons between CISC & RISC.

PHP
English

C
English

Java
English

Python
English

CSS
English

CSS
English

Python
English

10 Program and their English Language Equivalent

PHP echo "My name is Victor";

English Eq, Print My Name is Victor.

C printf("Hello Mr Oladipupo\n");

English Eq, print Hello Mr Oladipupo.

Java While Count > 4;

English Eq, While the Value of Count is Greater than 4

Python Number = int(input("Type in a Number"))

English Eq, Input a number

CSS <div align="center">

English Eq, Move Everything within the Range of the div to the center.

CSS <body style="background-color: blue;" />

English Eq, The background colour of the body of a webpage should be blue.

Python Count = Count + 1

English Eq, Add One to the Value of Count.

Java `Println("Hello Mrs Davids");`

English Eq. Print Hello Mrs Davids.

C++ `cout << "This is a boy!";`

English Eq. Print This is a boy.

JavaScript `alert(2 + 3);`

English Eq. Pop-up a box showing result of $2 + 3$. Here is 5.

Computer Architecture. 07-02-2022

Computer Architecture deals with the design of Computers, data storage devices, and Networking Components that store and run programs, transmit data, and drive interactions between computers, across networks, and with users.

Computer Architecture consists of rules and methods or procedures which describe the implementation, functionality of a computer systems.

Types of Computer Architecture.

1 Von - Neumann Architecture.

2 Harvard Architecture

3 Instruction Set Architecture.

4 Microarchitecture.

5 System Design

Software Layers

Desktop computer Complex embedded , simple embedded computer

The meaning of what they entail.

Bootloader Meaning

Processor

Basic Computer System diagram.

Microprocessor.

Microcontroller.

Data flow Diagram for instruction and data.
Classical Von Neumann machine characteristics.
Harvard Architecture Diagram-

Bus

Data bus

Address bus

Control Bus

Processor Operation : six basic types of access that a processor can perform from external chip

ALU -

Operation perform on ALU.

ALU Block diagram.

Logic Gate.

Interrupts also known as traps or exception

Hardware Interrupt

Software Interrupt

CISC & RISC

RAM Memorys

- Explain the concept of Structure Languages and give at least 10 examples.

What is Nested Block.

Variable

Local Variable

Global Variable.

Differentiate with Relevant diagram.

28/02/2022

Von Neumann And Harvard.

Simple embedded - complex embedded

Microprocessor - Microcontroller.

Concept of three Bus system

Names of all the Number System and the Numbers they contain

Categories of Programming Language and 5 examples

Program and their English Equivalent

Block structured Languages

Algol 60 - Describe it and give the data type, identifier
variable and reserved word

Pascal -

C - Write code to solve problem

Java.

Parameter Passing Mechanism.

Difference between Parameter & Parameter Passing

Parameter-Passing techniques.

Eager Evaluation (Applicative Order) Techniques

- * Call-by-value

- * Call-by-reference

- * Call-by-copy-restore (Also known as Value-result or Copy-in-Copy-out).

Lazy evaluation (Normal Order) techniques. What these methods have in common is that the evaluation of the argument

- * Macro expansion

- * Call-by-name

- * Call-by-need

Techniques Used for Argument passing:

- Call by value

- Call by result

- Call by value-result

- Call by reference

- Call by name

Stored program Computers.

Storage Devices

Registers in Computer Architecture

- * Logic Gates Used in Digital Computers
- * What are Gates?

The various Logical Gates are.

1) AND, 2) OR 3) NOT, 4) NAND, 5) NOR, 6) XOR, 7) XNOR

* Registers

* Loading the Registers.

* Register Transfer Language.

* Register transfer

Commonly Used Registers.

1) Accumulator.

2) General Purpose Registers

3) Special purpose Registers.

Language.

PICK OR, AND, NOR 3, 4, 5, input Variable.

NAND, XOR, XNOR

Micro Operation.

RS-flipflop, JK-flipflop, D-flipflop, T-flipflop

construct the truth table and circuit symbol.

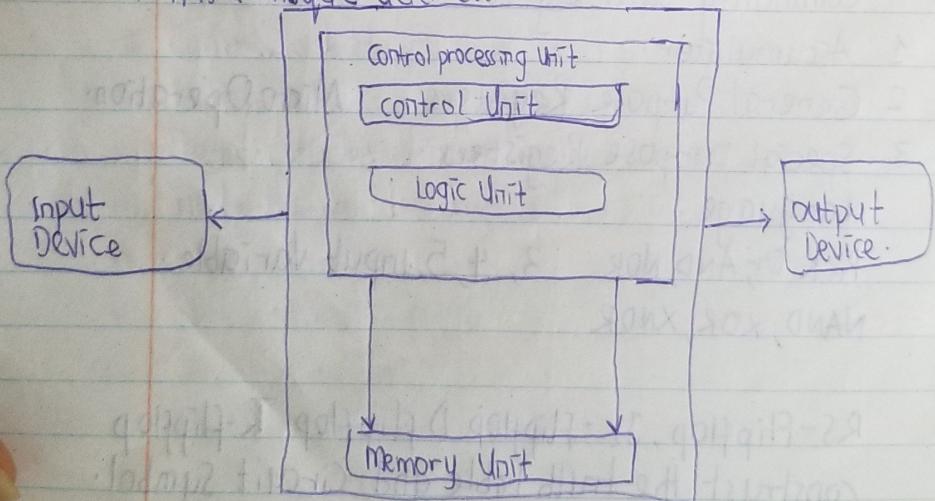
Read to A LU.

Von-Neumann Architecture.

This architecture is proposed by John Von Neumann

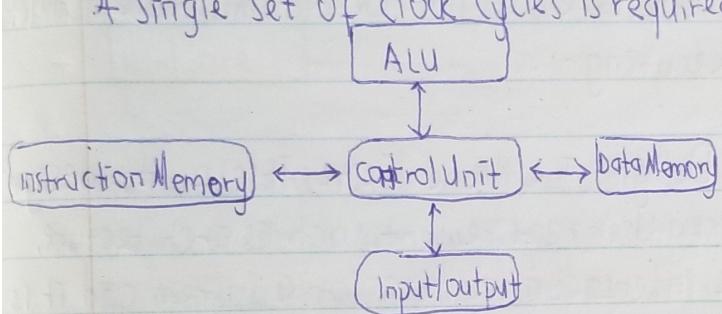
Now a day's computer we are using are based on Von-Neumann Architecture. It is based on some concepts

When we talk about memory ; The memory we have a single read/write memory available for read and write instructions and data ; When we talk about memory, It is the single location which is used for reading and writing instructions for the data and instruction are also present in it . Data and Instructions are stored in a single read/write memory within the Computer System. Each Memory has Multiple Locations and each location has a Unique address



Harvard Architecture

Harvard Architecture is used when data and code is present in different memory blocks. A separate memory block is needed for data and instruction. Data can be accessed by one memory location and instruction can be accessed by a different location. It has data storage entirely contained within the Central Processing Unit (CPU). A single set of clock cycles is required.



Instruction Set Architecture.

To make up the architecture, Instruction set architecture is needed because it has a set of instruction that the processor understands. It has two instruction set One is RISC and CISC.

Microarchitecture

Microarchitecture is known as Computer Organizations and it is the way when instruction set architecture is built-in processor. Instruction set architecture is implemented

with various microarchitecture and it varies because of changing technology.

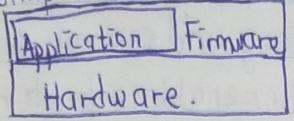
Microarchitecture performs in a certain way. It reads the instruction and decodes it, will find parallel data to process the instruction and then will process the instruction and output will be generated.

It is used in Microprocessors, Microcontrollers.

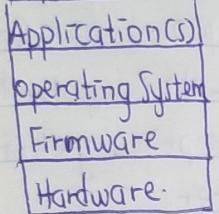
Microarchitecture does not overlap multiple instructions while executing.

- 5 System Design: The name defines itself, the design will satisfy user requirement such as architecture, module interface and data for a system and it is connected to product development. It is the process of taking marketing information and creating product design to be manufactured. Modular systems are made by standardizing hardware and software.

Simple embedded Computer



Complex embedded Computer And Also Desktop Computer.



The Software Controls the operation and functionality of a Computer. There are many "Layers" of software in the computer. Typically, a given layer will only interact with the layers immediately above or below it.

Firmware are programs that are run by the processor when the computer first powers up. These programs initialize the other hardware subsystem to a known state and configure the computer for correct operation. This software, because it is permanently stored in the computer's memory, is known as firmware.

Bootloader is located in the firmware. The bootloader is a special program run by the processor that reads the operating system from disk and places it in memory so that the processor may then run it.

Operating System Controls the Operation of the Computer
It Organises the Use of memory and controls devices.
It provides Interface to the User, enabling her to run application programs and access her files on disk.

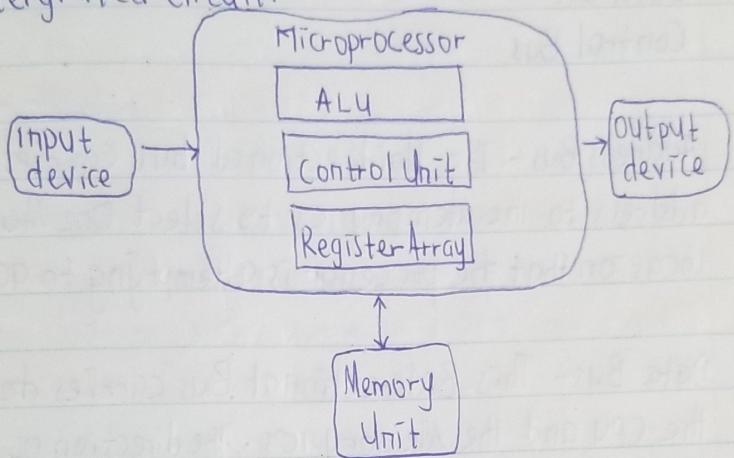
Hardware refers to the physical Components of a Computer
Computer Hardware is any part of the Computer that we can touch these parts. There are the primary electronic devices used to build up the Computer

Software is a collection of instructions, procedures, documentation that performs different tasks on a Computer System. We can also say Computer Software is a programming code executed on a Computer Processor. The code could be Machine-level code or written for APIs. Tell the Computer exactly what to do.

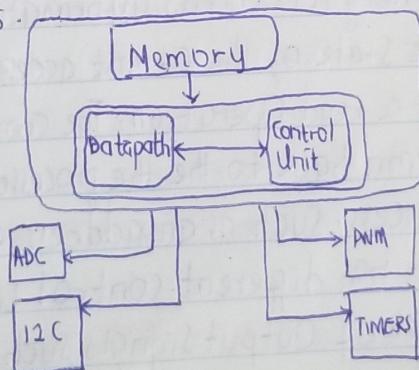
Application is a computer Software package that performs a specific function directly for an end user or in some cases, for another application. An application can be self-contained or a group of programs.

Microprocessor.

A microprocessor is a processor implemented on a single, integrated circuit.



Microcontrollers are very similar to System-on-Chip (SoC) processors. Intended for use in conventional computers such as PCs and workstations.



A Bus is a physical group of signal lines that have a related function. allows the transfer of electrical signals between different parts of the computer system and thereby concept of three Bus System. transfer info from one devices to another.

Address Bus

Data Bus

Control Bus

- 1) Address Bus : This Unidirectional bus carries the binary address to the Memory IC's to select one memory location that the processor is attempting to access.
- 2) Data Bus : This Bidirectional Bus carries data between the CPU and the Memory IC's. The direction of transfer being determined by the processor.
- 3) Control Bus : This Bus carries control signals from CPU to the Memory IC's. Carries information from the processor about the state of the current access, such as whether it is a write or a read operation. The control bus also carries information back to the processor regarding the current access, such as an address error. Different processor has different control line. The control bus may consist of output signals such as write, read, valid address.

Number System

1 = Unary = 0

2 = binary = 0, 1

3 = Ternary = 0, 1, 2

4 = Quaternary (positional system) = 0, 1, 2, 3

5 = Quinary = 0, 1, 2, 3, 4

6 = Senary = 0, 1, 2, 3, 4, 5

7 = Septenary = 0, 1, 2, 3, 4, 5, 6

8 = Octal = 0, 1, 2, 3, 4, 5, 6, 7

9 = Nonary = 0, 1, 2, 3, 4, 5, 6, 7, 8

10 = Decimal = 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

11 = Undecimal = 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A

12 = Duodecimal = 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, X, B[^]

13 = tri / tredecimal = 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C

14 = Tetradecimal = 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D.

15 = Pentadecimal = 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E

16 = Hexadecimal = 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F

Categories of programming Languages and Examples

1 Object Oriented programming

Examples :- JAVA, C++, C#, Python, Javascript

2 Procedural Oriented programming

Examples :- ALGOL, COBOL, BASIC, PASCAL, FORTRAN, C

3 Declarative Programming

Examples :- Prolog, LISP, ML, pure Lisp and Pure prolog

4 Functional Programming

Example :- Closure, Wolfram Language, Erlang, OCaml, Haskell

5 Logic Programming

Examples :- Absys, Algebraic logic functional prog Lang
ALICE Alma-O, ASP(Answer set prog) CHIP, Ciao.

Data Representation and Number Bases 19 March 2022

Number System

Following are Commonly Used Registers.

- 1 **Accumulator**: This is the Most Common Register, used to store data taken out of the Memory.
- 2 **General Purpose Registers**: This is used to store data & intermediate results during program execution. It can be accessed through Assembly Language programming.
- 3 **Special Purpose Registers**: Users do not access these registers. These Registers are for Computer System.
 - **MAR** : Memory Address Register are those registers that holds the address for Memory Unit.
 - **MBR** : Memory Buffer Register Stores instructions and data received from the memory and Sent from the Memory.
 - **PC** Program Counter points to the Next instruction to be executed.

- IR: Instruction Register holds the Instructions to be executed.

Register Transfer

Information transferred from one Register to another is designated in symbolic format by means of replacement Operators.

Micro Operation.

How to Solve One's Complement and 2's complement
Binary to Gray Code Conversion.

The Real World Life Application of Binary to Gray
code Conversion.

Addition, Subtraction and Multiplication of Number System