Important snaps by Team PIS
Class- XIth
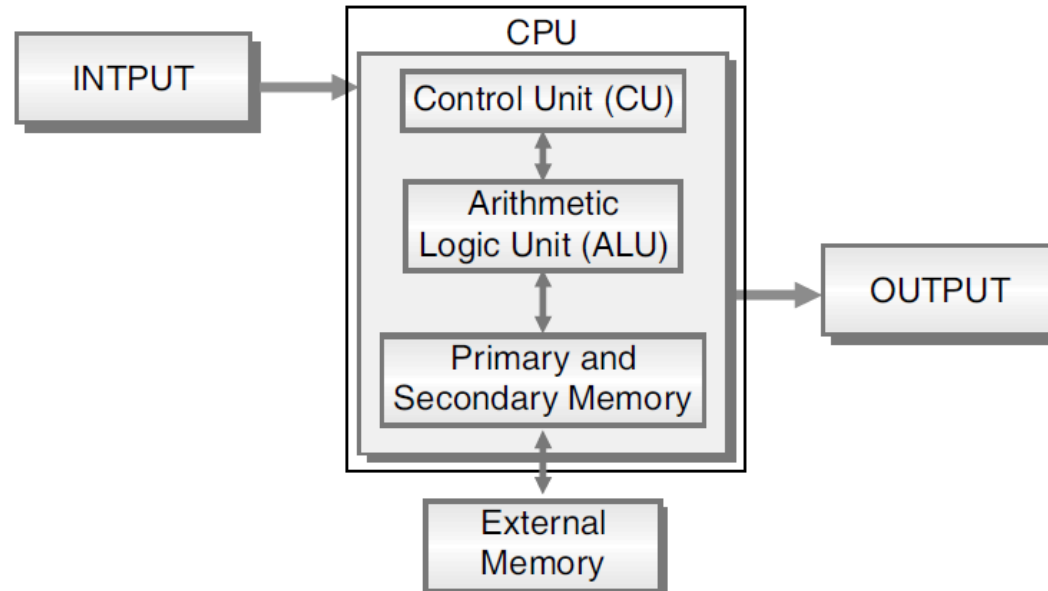
SUBJECT:INFORMATION PRACTICE

CHAPTER: COMPUTER SYSTEM

TEACHER: ARVIND CHOUDHARY

Computer System

➤ **Computer System :** A computer is an electronic device which processes data based upon the instructions provided and generate the desired output.

➤ **IPO Cycle :** The basic principle on which the computer works.

➤ **Computing Process:** Input -> Process -> Output

➤ The characteristics of computer are Speed, Accuracy, Automation, Endurance, Versatility, Storage, Reduction of processing cost, and Intelligence quotient.

➤ CPU and processing system of computer:

```
                          CPU
                   ┌──────────────────────┐
┌──────────┐       │  ┌────────────────┐  │
│  INTPUT  │──────▶│  │ Control Unit (CU)│  │
└──────────┘       │  └────────────────┘  │
                   │          ▲           │
                   │          ▼           │
                   │  ┌────────────────┐  │
                   │  │   Arithmetic   │  │
                   │  │ Logic Unit (ALU)│  │
                   │  └────────────────┘  │      ┌──────────┐
                   │          ▲           │─────▶│  OUTPUT  │
                   │          ▼           │      └──────────┘
                   │  ┌────────────────┐  │
                   │  │   Primary and  │  │
                   │  │ Secondary Memory│  │
                   │  └────────────────┘  │
                   └──────────┬───────────┘
                              ▲
                              ▼
                       ┌────────────┐
                       │  External  │
                       │   Memory   │
                       └────────────┘
```

Computer System

➤ Control unit is a link between memory unit and ALU (Arithmetical and Logical unit).

➤ **Control Unit :** The control unit controls and co-ordinates all the CPUs activities.

➤ **Arithmetical / Logic Unit :** This unit performs all the arithmetical and logical operations.

➤ **Memory :** This unit stores the data and instructions.

➤ **RAM** stands for "Random Access Memory". Every time you open a program, it gets loaded from the hard drive into the RAM. RAM is a very high-speed type of memory.

➤ **ROM** stands for "Read-Only Memory". ROM is a memory containing hardware instructions like BIOS and CMOS that the computer uses when it boots up, before the system software loads.

➤ **External memory or storage device :** These are portable devices to store data for future use.

➤ The hard disk is a spindle of magnetic disks, called plotters, that record and store information.

➤ Tape drive is a removable storage device mainly used for backing up data. It is similar to a Zip drive, but instead of Zip disks, it uses small tapes.

➤ **I/O devices :** The input and output devices attached to the computer like pen drive, memory chip.

Input and Output Devices

Input Devices

Input devices can send data or information to a computer or another device.

Keyboard: It is an input device which sends data in to the computer. The data send depends on the key pressed by the user.

Mouse: A mouse is a small handheld input device which controls a cursor in a graphical user interface. It can move and select text, files, folders etc. on our computer according to the user input.

Scanner: Scanner optically reads and document, file or image and then changes it into digital signal and sends to the computer.

OMR: optical mark recognition/ reader, is used to read marks on a document and send them to computer.

OCR: OCR stands for optical character Recognition, is an input device which reads printed text and sends that to computer.

MICR: Magnetic Ink Character Reader is an input device which generally finds application is banks to process cheques.

Microphone: it receives audio generated by some input source and sends the same to a computer.

Webcam: it sends the captured images to a computer.

Graphics Tablets: This input device is used to draw using hand.

Trackballs: an upside down mouse ,encased within a socket. Is a cursor control device.

Barcode reader: It is used to read the barcode of various items and feed the same to computer.

Gamepad: Also known as joy pad is the input controller for video games.

Joystick: these input devices are used to control video games.

Input and Output Devices

Monitor: A monitor is an output device that is responsible for receiving data from a computer and displaying that information as text or images for users to see.

Speakers: Receives sound signal from a computer and then plays that sound signal and thus we hear songs or music or any other audio.

Projector: Gets data from a computer and displays or projects the same information onto a screen or a wall. Projector cannot directly accept data from a user and send that data to another device.

 Printer : Impact Printer, Non-Impact printer

Classification of Computer

COMPUTER
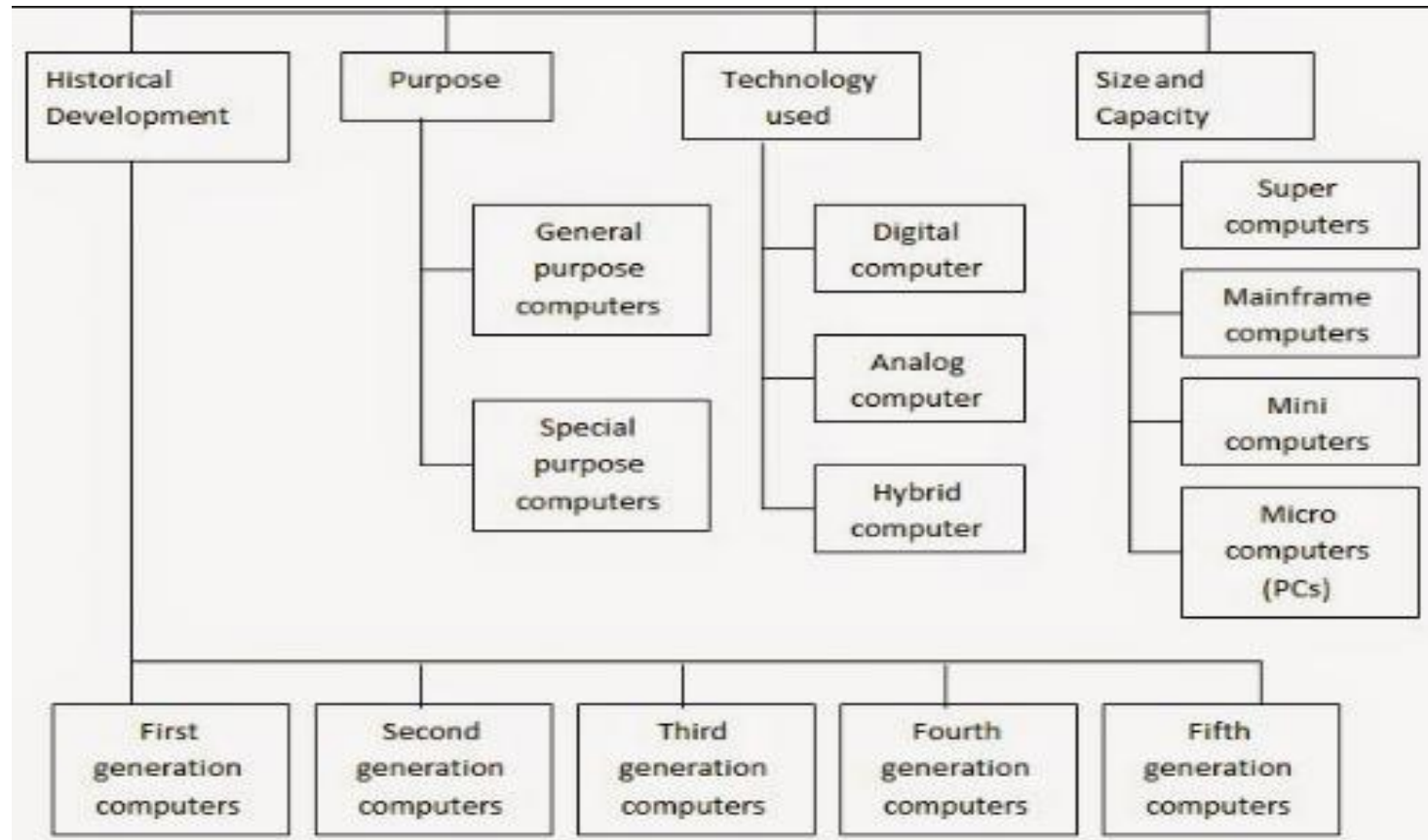
Getting started with Python

It is widely used general purpose,high level programming language.Developed by Guido van Rossum in 1991.

It is used for:

software development,

web development (server-side),

system scripting,

Mathematics.

FEATURES of Python
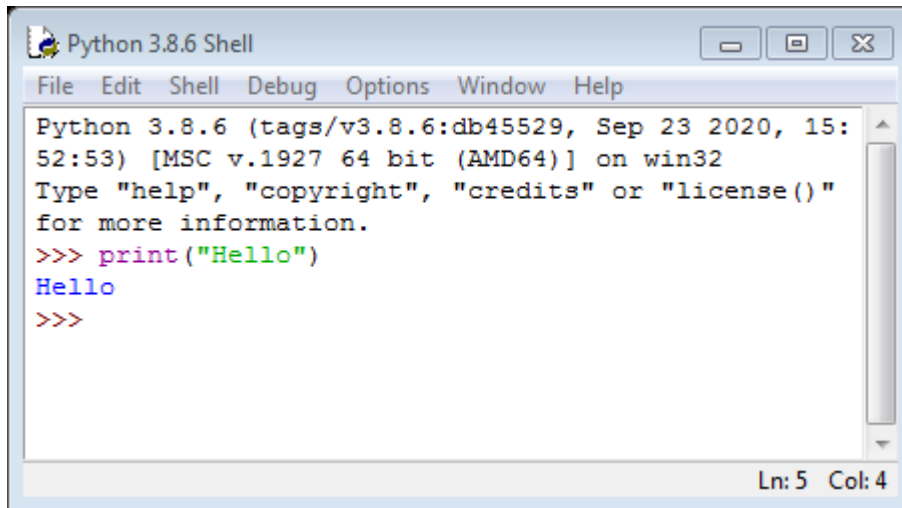
1. Easy to use – Due to simple syntax rule
2. Interpreted language – Code execution & interpretation line by line
3. Cross-platform language – It can run on windows,linux,macinetosh etc. equally
4. Expressive language – Less code to be written as it itself express the purpose of the code.
5. Completeness – Support wide rage of library
6. Free & Open Source – Can be downloaded freely and source code can be modify for improvement

Working in Python

After installation of python ,we can work on it in following ways

(i) in Interactive mode
(ii) in Script mode
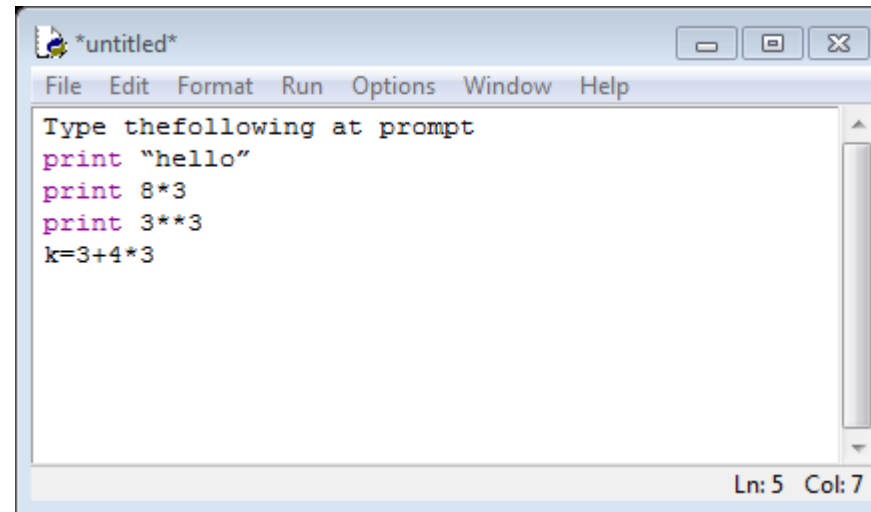
Python Shell / Interactive mode

Python Script mode

Python Programming Fundamentals

Python Character Set

A set of valid characters recognized by python. Python uses the traditional ASCII character set. The latest version recognizes the Unicode character set. The ASCII character set is a subset of the Unicode character set.

Letters :– A-Z,a-z

Digits :– 0-9

Special symbols :– Special symbol available over keyboard

White spaces:– blank space,tab,carriage return,new line, form feed

Other characters:- Unicode

Token

Smallest individual unit in a program is known as token.

1. Keywords
2. Identifiers
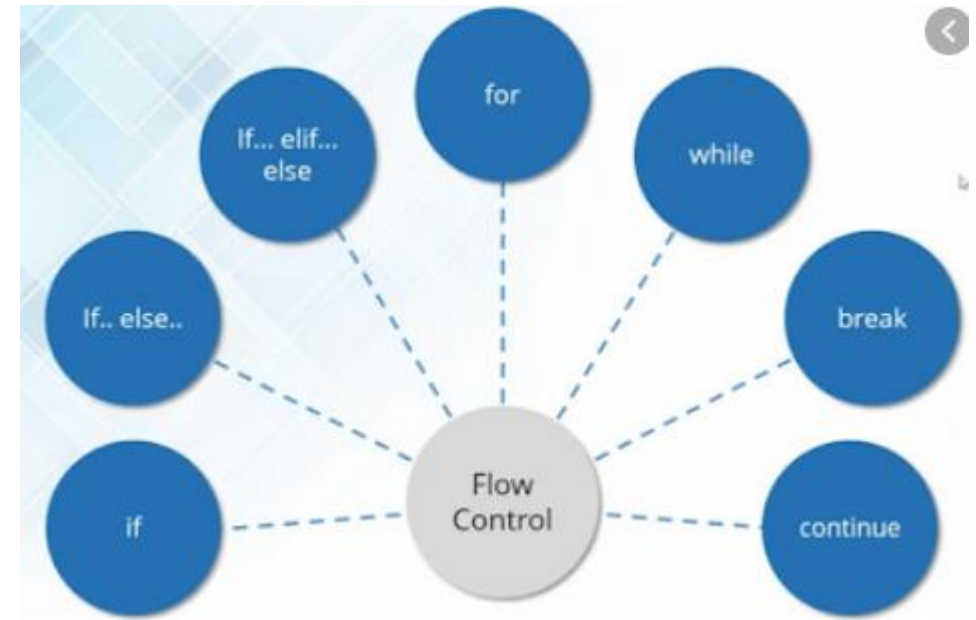3. Literals
4. Operators
5. punctuators

Token

Conditional and Looping Constructs

Control statements are used to control the flow of execution depending upon the specified condition/logic.

There are three types of control statements.

1. Decision Making Statements
2. Iteration Statements (Loops)
3. Jump Statements (break, continue, pass)

Decision Making Statements

1. if statements

Syntax:

```
if(condition):
        statement
        [statements]
```

e.g.

```
noofbooks = 2
if (noofbooks == 2):
        print('You have ')
        print('two books')
print('outside of if statement')
Output
You have two books
```

2. if-else Statements

Syntax:

```
if(condition):
            statements
else:
            statements
```

e.g.

```
a=10
if(a < 100):
   print('less than 100')
else:
   print('more than equal 100')
```

OUTPUT

less than 100

3. Nested if else statement

Syntax

```
If (condition):
        statements
elif (condition):
        statements
else:
        statements
```

E.G.

```
num = float(input("Enter a number: "))
if num >= 0:
   if num == 0:
     print("Zero")
   else:
     print("Positive number")
else:
   print("Negative number")
```

OUTPUT

Enter a number: 5

Positive number

Iterative Statement

while

Syntax
while (condition):
        statement
        [statements]

e.g.

x = 1
while (x <= 4):
  print(x)
   x = x + 1

Output
1
2
3
4

for

Syntax
for val in sequence:
                statements

e.g.
for i in range(3,5):
  print(i)

Output
3
4

List in Python

It is a collections of items and each item has its own index value.

Index of first item is 0 and the last item is n-1.Here n is number of items in a list.

Indexing of list

0	1	2	3	4	index
80	60	70	85	75	value
-5	-4	-3	-2	-1	Negative index

List in Python

Creating a list and accessing its elements	Output

a=[10,20,'abc',30,3.14,40,50]
print(a)
for i in range(0,len(a)):
   print(a[i], end=' ')
print('\n')
for i in range(len(a)-1,-1,-1):
   print(a[i], end=' ')
print('\n')
for i in a[::-1]:
   print(i, end=' ')
print('\n')
for i in reversed(a):
   print(i, end=' ')
	[10, 20, 'abc', 30, 3.14, 40, 50]
	10 20 abc 30 3.14 40 50
	50 40 3.14 30 abc 20 10
	50 40 3.14 30 abc 20 10
	50 40 3.14 30 abc 20 10

Function	Description
list.append()	Add an Item at end of a list
list.extend()	Add multiple Items at end of a list
list.insert()	insert an Item at a defined index
list.remove()	remove an Item from a list
del list[index]	Delete an Item from a list
list.clear()	empty all the list
list.pop()	Remove an Item at a defined index
list.index()	Return index of first matched item
list.sort()	Sort the items of a list in ascending or descending order
list.reverse()	Reverse the items of a list
len(list)	Return total length of the list.
max(list)	Return item with maximum value in the list.
min(list)	Return item with min value in the list.
list(seq)	Converts a tuple, string, set, dictionary into list.

Dictionary in Python

```
# Creating an empty Dictionary
Dict = {}
print("Empty Dictionary: ")
print(Dict)

# Creating a Dictionary with Integer Keys
Dict = {1: 'AAA', 2: 'BBB', 3: 'CCC'}
print("\nDictionary with the use of Integer Keys: ")
print(Dict)

# Creating a Dictionary  with Mixed keys
Dict = {'Name': 'Govind', 1: [10, 11, 12, 13]}
print("\nDictionary with the use of Mixed Keys: ")
print(Dict)

# Creating a Dictionary with dict() method
D=dict({1: 'AAA', 2: 'BBB', 3:'CCC'})
print("\nDictionary with the use of dict(): ")
print(D)

# Creating a Dictionary with each item as a Pair
D=dict([(1, 'AAA'), (2, 'BBB')])
print("\nDictionary with each item as a pair: ")
print(D)
```

```
Output
Empty Dictionary:
{}
Dictionary with the use of Integer Keys:
{1: 'AAA', 2: 'BBB', 3: 'CCC'}
Dictionary with the use of Mixed Keys:
{'Name': 'Govind', 1: [10, 11, 12, 13]}
Dictionary with the use of dict():
{1: 'AAA', 2: 'BBB', 3: 'CCC'}
Dictionary with each item as a pair:
{1: 'AAA', 2: 'BBB'}
```

S.No.	Method & Description
1	dict.clear()Removes all elements of dictionary dict
2	dict.copy()Returns a shallow copy of dictionary dict
3	dict.items()Returns a list of dict's (key, value) tuple pairs
4	dict.keys()Returns list of dictionary dict's keys
5	dict.setdefault(key, default = None)Similar to get(), but will set dict[key] = default if key is not already in dict
6	dict.update(dict2)Adds dictionary dict2's key-values pairs to dict
7	dict.values()Returns list of dictionary dict's values

Understanding Data

Data Types In Python
1. Number
2. String
3. Boolean
4. List
5. Tuple
6. Set
7. Dictionary

Mutable and Immutable Data type
A mutable data type can change its state or contents and immutable data type cannot.
Mutable data type:
list, dict, set, byte array
Immutable data type:
int, float, complex, string, tuple, frozen set [note: immutable version of set], bytes

Python has three numeric types:
1. Integers
2. Floating point numbers
3. Complex numbers.

Understanding Data

Debugging means the process of finding errors, finding reasons of errors and techniques of their fixation.

An error, also known as a bug, is a programming code that prevents a program from its successful interpretation.

Errors are of three types –

- Compile Time Error
- Run Time Error
- Logical Error

DATABASE CONCEPTS

WHY DO WE NEED DATABASE

❑ **To manage large chunks of data:** if size of data increases into thousands of records, it will simply create a problem to manage. Database can manage large amount of data.

❑ **Accuracy:** Through validation rule in database, data accuracy can be maintained.

❑ **Ease of updating data:** With the database, we can flexibly update the data according to our convenience. Moreover, multiple people can also edit data at same time.

❑ **Security of data:** With databases we have security groups and privileges to restrict access.

❑ **Data integrity:** In databases, we can be assured of accuracy and consistency of data due to the built in integrity checks and access controls.

Advantages of Database System

▪ **Databases reduces Redundancy**

It removes duplication of data because data are kept at one place and all the application refers to the centrally maintained database.

▪ **Database controls Inconsistency**

When two copies of the same data do not agree to each other, then it is called Inconsistency. By controlling redundancy, the inconsistency is also controlled.

▪ **Database facilitate Sharing of Data**

Data stored in the database can be shared among several users.

▪ **Database ensures Security**

Data are protected against accidental or intentional disclosure to unauthorized person or unauthorized modification.

▪ **Database maintains Integrity**

It enforces certain integrity rules to insure the validity or correctness of data. For ex. A date can't be like 31/31/2000.

DATABASE CONCEPTS

RELATIONAL DATABASE TERMS

❖ **Relation (Table)**

A Relation or Table is Matrix like structure arranged in Rows and Columns. It has the following properties-

▪ **Atomicity** : Each column assigned a unique name and must have atomic(indivisible) value i.e. a value that can not be further subdivided.

▪ **No duplicity**: No two rows of relation will be identical i.e. in any two rows value in at least one column must be different.

▪ All items in a column are **homogeneous** i.e.same data type.

▪ **Ordering** of rows and column is **immaterial**.

❖ **Domain** :It is collection of values from which the value is derived for a column.

❖ **Tuple / Entity / Record** - Rows of a table is called Tuple or Record.

❖ **Attribute/ Field**- Column of a table is called Attribute or Field.

❖ **Degree** - Number of columns (attributes) in a table.

❖ **Cardinality** - Number of rows (Records) in a table.

Key plays an important role in relational database; it is used for identifying unique rows from table & establishes relationship among tables on need.

Types of keys in DBMS

Primary Key – A primary is a column or set of columns in a table that uniquely identifies tuples (rows) in that table.

Candidate Key –It is an attribute or a set of attributes or keys participating for Primary Key, to uniquely identify each record in that table.

Alternate Key – Out of all candidate keys, only one gets selected as primary key, remaining keys are known as alternate or secondary keys.

Foreign Key – Foreign keys are the columns of a table that points to the primary key of another table. They act as a cross-reference between tables.

KEYS IN A DATABASE
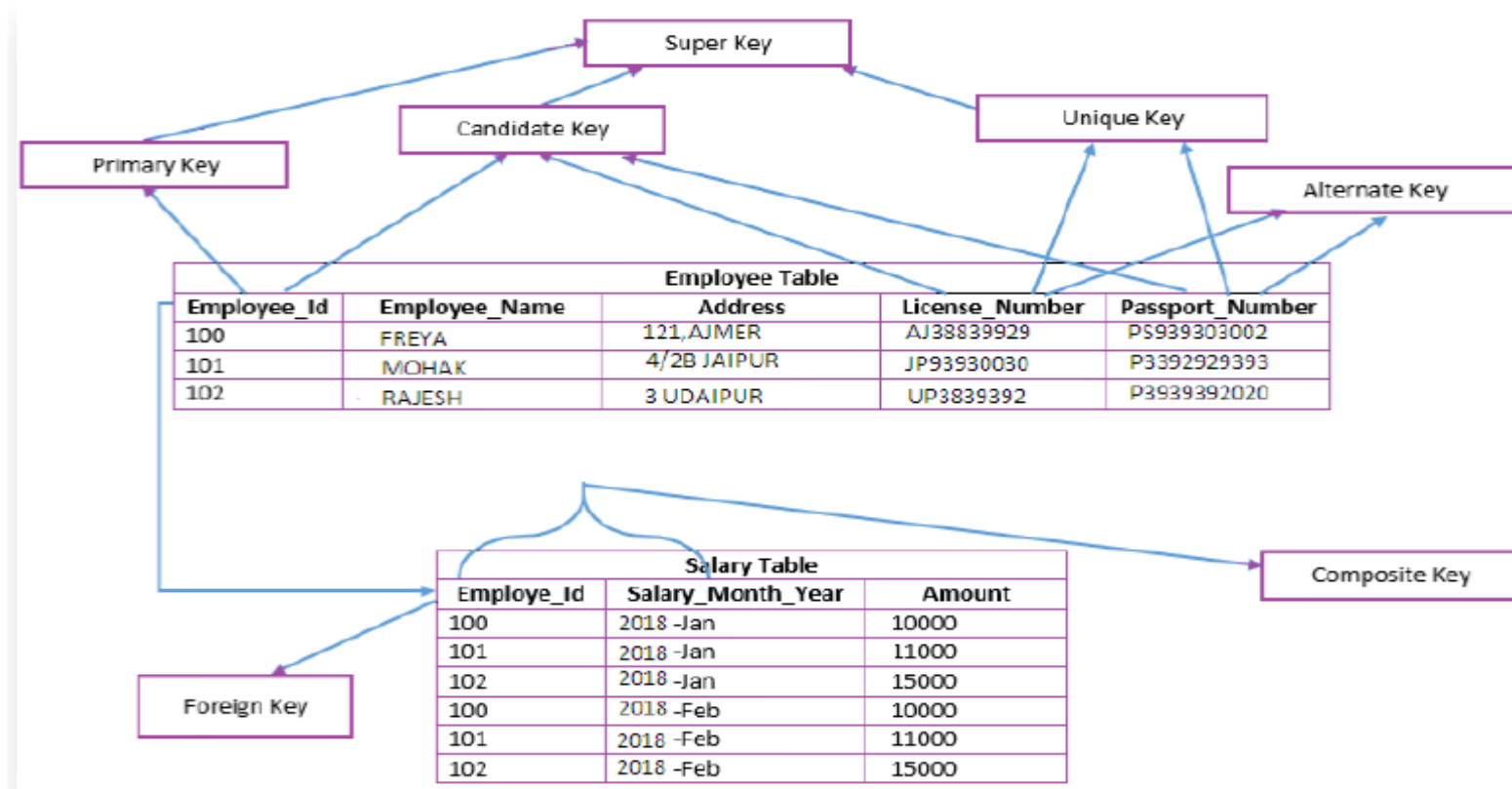
Structure Query Language

Types of SQL Commands

❑ **DDL (Data Definition Language)**

To create database and table structure-commands like CREATE , ALTER , DROP etc.

❑ **DQL (Data Query Language)**

To retrieve the data from database SELECT

❑ **DML (Data Manipulation Language)**

Record/rows related operations.commands like INSERT..., DELETE..., UPDATE.... etc.

❑ **DCL (Data Control Language)**

used to manipulate permissions or access rights to the tables.commands like GRANT , REVOKE etc.

❑ **Transactional control Language.**

Used to control the transactions.commands like COMMIT, ROLLBACK, SAVEPOINT etc.

MySql datatypes

numeric

decimal   -decimal(<precision>, [<scale>]) [zerofill] For storing   floating-point numbers where precision is critical.

Int - int(<size>) [auto_increment] [unsigned] [zerofill] A whole number, 4 bytes, with a maximum range of -2,147,483,648 to 2,147,483,647 (unsigned: 0 to 4,294,967, 295)

string

char-char(<size>) [binary] Fixed length – for storing strings that won't vary much in size. Range of 0 to 255, stores that amount in bytes

Varchar-varchar(<size>) [binary] Variable length – for storing strings that will vary in size. Range of 0 to 255, stores that amount in bytes, plus 1 byte

date

Date-Format: YYYY-MM-DD ,Example: 2006-09-23,Range of years   1000 to 9999

SQL

Database Commands in MySql

To insert new rows into an existing table use the INSERT command:

mysql>INSERT INTO student values('dwivedi','freya','Udaipur','4');

Similarly we can insert multiple records.With the SELECT command we can retrieve previously inserted rows:

mysql> SELECT * FROM student;

Selecting rows by using the WHERE clause in the SELECT command

mysql> SELECT * FROM student WHERE class="4";

Selecting specific columns(Projection) by listing their names

mysql> SELECT first_name, class FROM student;

To modify or update entries in the table use the UPDATE command

mysql> UPDATE student SET class="V" WHERE firstname="freya";

Database Commands in MySql

Deleting selected rows from a table using the DELETE command

mysql> DELETE FROM student WHERE firstname="amar";

A general form of SELECT is:

SELECT *what to select(field name)* FROM *table(s)*

WHERE *condition that the data must satisfy*;

Comparison operators are: < ; <= ; = ; != or <> ; >= ; >

Logical operators are: AND ; OR ; NOT

Comparison operator for special value NULL: IS

mysql> SELECT * FROM Student WHERE City IS NULL ;

BETWEEN- to access data in specified range

mysql> SELECT * FROM Student WHERE class between 4 and 6;

IN- operator allows us to easily test if the expression in the list of values.

mysql> SELECT * FROM Student WHERE class in (4,5,6);

SQL

Altering Table

The SQL ALTER TABLE command is used to add, delete or modify columns in an existing table. You should also use the ALTER TABLE command to add and drop various constraints on an existing table.

Syntax

The basic syntax of an ALTER TABLE command to add a New Column in an existing table is as follows.

ALTER TABLE table_name ADD column_name datatype;

The basic syntax of an ALTER TABLE command to DROP COLUMN in an existing table is as follows.

ALTER TABLE table_name DROP COLUMN column_name;

The basic syntax of an ALTER TABLE command to change the DATA TYPE of a column in a table is as follows.

ALTER TABLE table_name MODIFY COLUMN column_name datatype;

- We can group records by using GROUP BY <column> clause with Select command. A group column is chosen which have non-distinct (repeating) values like City, Job etc.
- Generally, the following Aggregate Functions [MIN(), MAX(), SUM(), AVG(), COUNT()] etc. are applied on groups.

Name	Purpose
SUM()	Returns the sum of given column.
MIN()	Returns the minimum value in the given column.
MAX()	Returns the maximum value in the given column.
AVG()	Returns the Average value of the given column.
COUNT()	Returns the total number of values/ records as per given column.

NOTE – groupby and having clause is not included in class xi syllabus but aggregation functions are there.

Emerging Trends

Artificial intelligence can be divided into three subfields:

- **Artificial intelligence**
- **Machine learning**
- **Deep learning**

According to the father of Artificial Intelligence, John McCarthy, it is "The science and engineering of making intelligent machines

Goals of AI

- To Create Expert Systems – The systems which holds intelligent behavior, learn, demonstrate, explain, and advice its users.
- To Implement Human Intelligence in Machines – Creating systems that can understand, think, learn, and behave like humans.

AI has been dominant in various fields such as –

- Gaming
- Natural Language Processing
- Expert Systems
- Vision Systems
- Speech Recognition
- Handwriting Recognition
- Intelligent Robots

Emerging Trends

As its name, it gives the computer that makes it more similar to humans: The ability to learn.
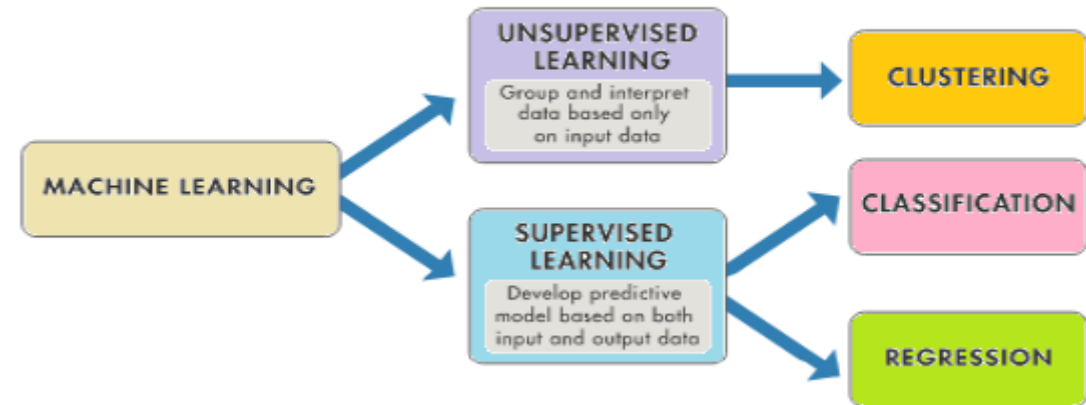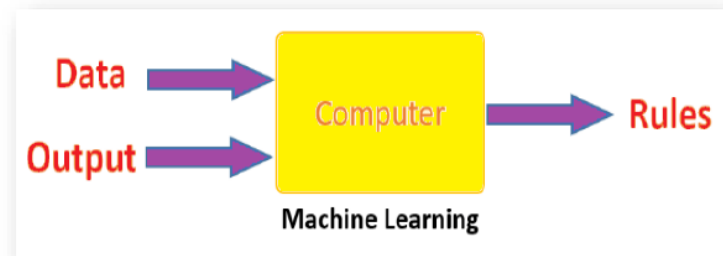
Clustering is the most common unsupervised learning technique. It is used for exploratory data analysis to find hidden patterns or groupings in data. Applications for cluster analysis include gene sequence analysis, market research, and object recognition.

Classification techniques predict discrete responses—for example, whethera n email is genuine or spam, or whether a tumor is cancerous or benign.

Regression techniques predict continuous responses—for example, changes in temperature or fluctuations in power demand.

Emerging Trends

Internet of Things-IOT

The IOT concept was initially proposed by a member of the Radio Frequency Identification (RFID) development community in 1999, and now it has become more relevant to the practical world as the use of mobile devices, embedded devices, communication, cloud computing and data analytics has increased.

Internet connects all people means "Internet of People"

IoT connects all things means "Internet of Things"

What is an IoT Platform?

DEVICES — WIFI/CELLULAR CONNECTIVITY — IOT DEVICE CLOUD — APPS/THIRD PARTY SERVICES
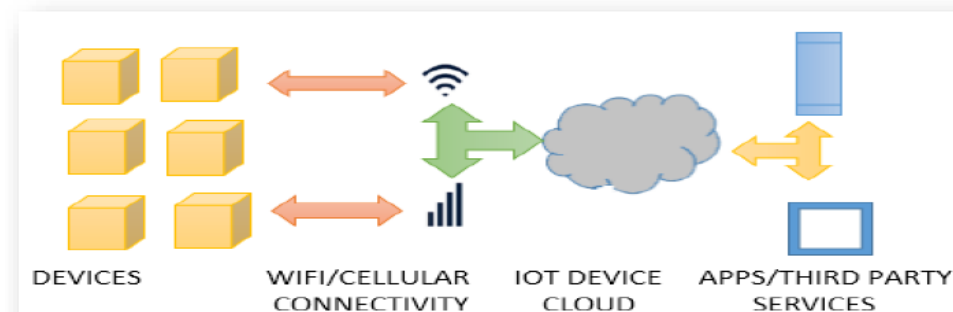
What is an IoT Platform?
Sensors are useful and very important for the devices in order to fetch the data. The data can be real-time, which includes the current temperature, pressure or humidity.

List of Sensors most commonly used in the IoT devices,

- Temperature Sensor
- Pressure Sensor
- Proximity Sensor
- Accelerometer and Gyroscope Sensor
- IR Sensor
- Optical Sensor
- Gas Sensor
- Smoke Sensor

Emerging Trends

In **Cloud Computing**, Cloud refers to a Internet or Network or present at remote location.

Cloud Computing refers to remote access of hardware/software resources for access, configuration, manipulation. Cloud computing offers online data storage, infrastructure, and application. Applications such as customer relationship management (CRM) ,e-mail, web conferencing, execute on cloud. It can work on public and private networks, i.e., WAN, LAN or VPN.
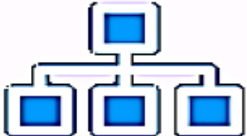
Uses of cloud computing

- Create new apps and services
- Store, back up and recover data
- Host websites and blogs
- Stream audio and video
- Deliver software on demand
- Analyze data for patterns and make predictions

Emerging Trends

WORKING MODELS FOR CLOUD COMPUTING

DEPLOYMENT MODEL
- PUBLIC CLOUD –
  For general public.
- PRIVATE CLOUD –
  For an organization only
- COMMUNITY CLOUD -
  For group of organizations.
- HYBRID CLOUD –
  Mixture of public and private cloud

SaaS Software as a Service	PaaS Platform as a Service	IaaS Infrastructure as a Service
Email	App Dev	Caching
CRM	Decision Support	Networking
Collaborative	Web	Security
ERP	Streaming	System Mgmt
CONSUME IT	BUILD ON IT	MIGRATE TO IT