Important snaps by Team PIS
Class- XIIth

SUBJECT:INFORMATION PRACTICE

CHAPTER: PANDAS-I

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Highlights from Pandas - I

- Pandas Series can be created using:
  - Array
  - Dict
  - Scalar value or constant
- Create Pandas Data-Frame using:
  - Lists
  - dict
  - Series
- Data-Frame to CSV

Creating Series from ndarray

Without index

e.g.

```
import pandas as pd1
import numpy as np1
data = np1.array(['a','b','c','d'])
s = pd1.Series(data)
print(s)
```

Output

```
1    a
2    b
3    c
4    d
dtype: object
```

Note : default index is starting from 0

With index position

e.g.

```
import pandas as p1
import numpy as np1
data = np1.array(['a','b','c','d'])
s = p1.Series(data,index=[100,101,102,103])
print(s)
```

Output

```
100    a
101    b
102    c
103d  dtype:
object
```

Note : index is starting from 100

Creating Series from dict

Eg.1(without index)

```
import pandas as pd1
import numpy as np1
data = {'a' : 0., 'b' : 1., 'c' : 2.}
s = pd1.Series(data)
print(s)
```

Output

```
a    0.0
b    1.0
c    2.0
dtype: float64
```

Eg.2 (with index)

```
import pandas as pd1
import numpy as np1
data = {'a' : 0., 'b' : 1., 'c' : 2.}
s = pd1.Series(data,index=['b','c','d','a'])
print(s)
```

Output

```
b    1.0
c    2.0
d    NaN
a    0.0
dtype: float64
```

Creating Series from Scalar

```
import pandas as pd1
import numpy as np1
s = pd1.Series(5, index=[0, 1, 2, 3])
print(s)
```

Output

```
0    5
1    5
2    5
3    5
dtype: int64
```

Note :- here 5 is repeated for 4 times (as per no of index)

Maths operations with Series

```
import pandas as pd1
s = pd1.Series([1,2,3])
t = pd1.Series([1,2,4])
u=s+t #addition operation  print (u)
u=s*t # multiplication operation

print (u)
```

output

```
0    2
1    4
2    7
dtype: int64

0     1
1     4
2    12
dtype: int64
```

Create Pandas Data-Frame using List

e.g.1

```
import pandas as pd1
data1 = [1,2,3,4,5]
df1 = pd1.DataFrame(data1)
print (df1)
```

output

```
0  1
1  2
2  3
3  4
4  5
```

e.g.2

```
import pandas as pd1
data1 = [['Freya',10],['Mohak',12],['Dwivedi',13]]
df1 = pd1.DataFrame(data1,columns=['Name','Age'])
print (df1)
```

output

```
      Name  Age
1    Freya   10
2    Mohak   12
2  Dwivedi   13
```

Write below for numeric value as float

```
df1 = pd1.DataFrame(data,columns=['Name','Age'],dtype=float)
```

Create Pandas Data-Frame using List of Dict

```
import pandas as pd1
data1 = [{'x': 1, 'y': 2},{'x': 5, 'y': 4, 'z': 5}]
df1 = pd1.DataFrame(data1)
print (df1)
```

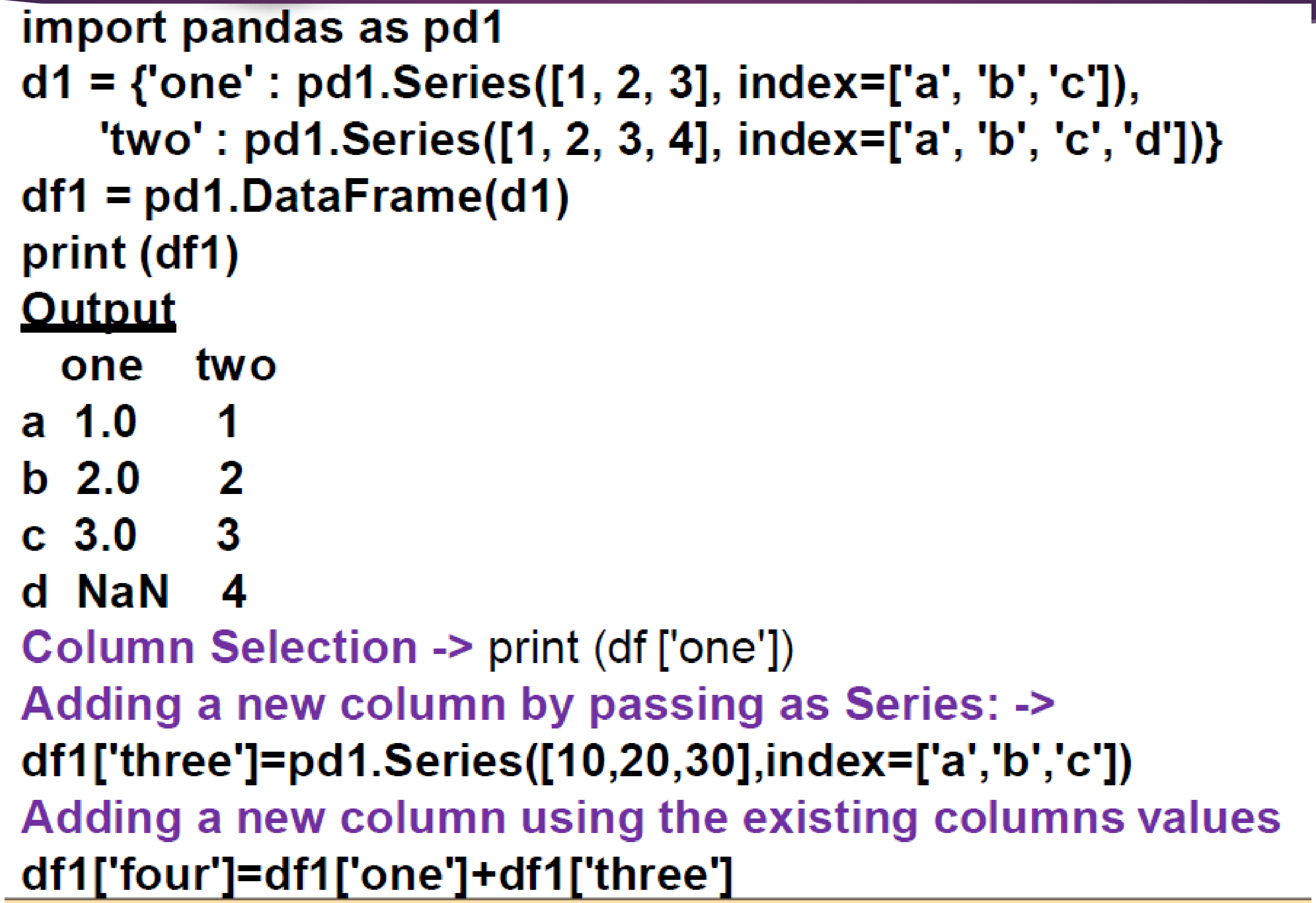
Output

```
   x  y   z
0  1   2  NaN
1  5   4  5.0
```

Write below as 3rd stmnt in above program for indexing

```
df = pd.DataFrame(data, index=['first', 'second'])
```

Create Pandas Data-Frame using dict of series



```
import pandas as pd1
d1 = {'one' : pd1.Series([1, 2, 3], index=['a', 'b', 'c']),
     'two' : pd1.Series([1, 2, 3, 4], index=['a', 'b', 'c', 'd'])}
df1 = pd1.DataFrame(d1)
print (df1)
```

Output

```
   one   two
a  1.0     1
b  2.0     2
c  3.0     3
d  NaN    4
```

Column Selection -> print (df ['one'])

Adding a new column by passing as Series: ->

```
df1['three']=pd1.Series([10,20,30],index=['a','b','c'])
```

Adding a new column using the existing columns values

```
df1['four']=df1['one']+df1['three']
```

Pandas Data Structure operation

Column addition

```
df = pd.DataFrame({"A": [1, 2, 3], "B": [4, 5, 6]})
c = [7,8,9]
df[‘C'] = c
```

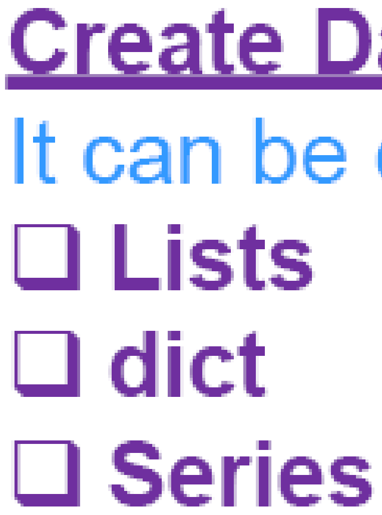
Column Deletion

```
del df1['one'] # Deleting the first column using DEL function
df.pop('two') #Deleting another column using POP function
```

Rename columns

```
df = pd.DataFrame({"A": [1, 2, 3], "B": [4, 5, 6]})
>>> df.rename(columns={"A": "a", "B": "c"})
   a  c
0  1  4
1  2  5
2  3  6
```

Create Data Frame Using following method



Create DataFrame

It can be created with followings

□ Lists

□ dict

□ Series

Create Data Frame using List

Create a DataFrame from Lists

e.g.1

```
import pandas as pd1
data1 = [1,2,3,4,5]
df1 = pd1.DataFrame(data1)
print (df1)
```

output

```
   0
0  1
1  2
2  3
3  4
4  5
```

e.g.2

```
import pandas as pd1
data1 = [['Freya',10],['Mohak',12],['Dwivedi',13]]
df1 = pd1.DataFrame(data1,columns=['Name','Age'])
print (df1)
```

output

```
      Name  Age
1    Freya   10
2    Mohak   12
2  Dwivedi   13
```

Write below for numeric value as float

```
df1 = pd1.DataFrame(data,columns=['Name','Age'],dtype=float)
```

Create Data Frame using Dict

Pandas DataFrame

Create a DataFrame from Dict of ndarrays / Lists

e.g.1

```
import pandas as pd1
data1 = {'Name':['Freya', 'Mohak'],'Age':[9,10]}
df1 = pd1.DataFrame(data1)
print (df1)
```

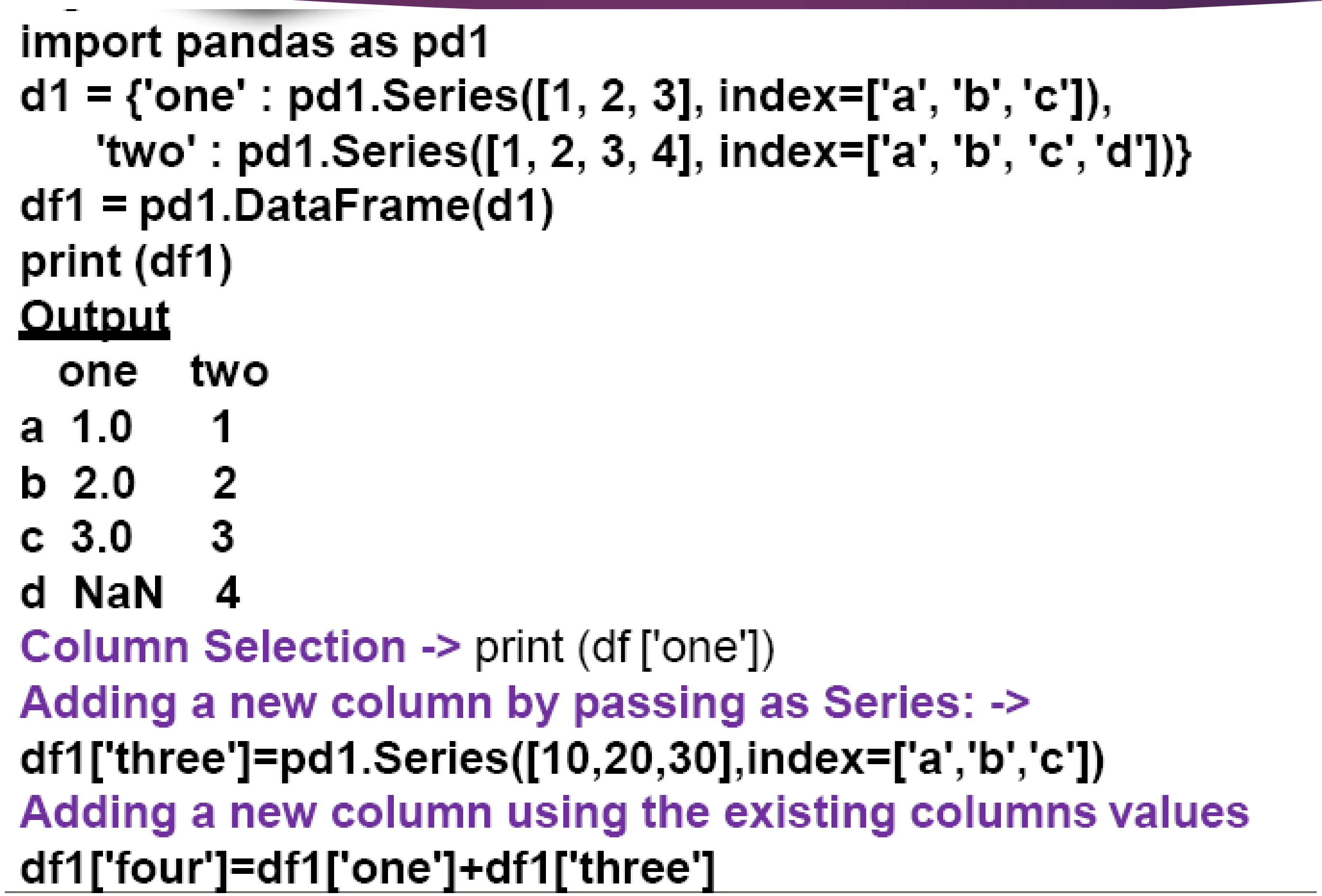
Output

```
    Name  Age
1   Freya   9
2   Mohak  10
```

Write below as 3rd statement in above prog for indexing

```
df1 = pd1.DataFrame(data1, index=['rank1','rank2','rank3','rank4'])
```

Create Data Frame using Series



```
import pandas as pd1
d1 = {'one' : pd1.Series([1, 2, 3], index=['a', 'b', 'c']),
     'two' : pd1.Series([1, 2, 3, 4], index=['a', 'b', 'c', 'd'])}
df1 = pd1.DataFrame(d1)
print (df1)
```

Output

```
  one   two
a  1.0     1
b  2.0     2
c  3.0     3
d  NaN   4
```

Column Selection -> print (df ['one'])

Adding a new column by passing as Series: ->

```
df1['three']=pd1.Series([10,20,30],index=['a','b','c'])
```

Adding a new column using the existing columns values

```
df1['four']=df1['one']+df1['three']
```

Data-Frame to CSV

Export Pandas DataFrame to a CSV File

e.g.

```
import pandas as pd

cars = {'Brand': ['Honda Civic','Toyota Corolla','Ford Focus','Audi A4'],
        'Price': [22000,25000,27000,35000]
        }

df = pd.DataFrame(cars, columns= ['Brand', 'Price'])

df.to_csv (r'C:\export_dataframe.csv', index = False, header=True)

print (df)
```

Chapter – 2 : Data Visualization using Pyplot

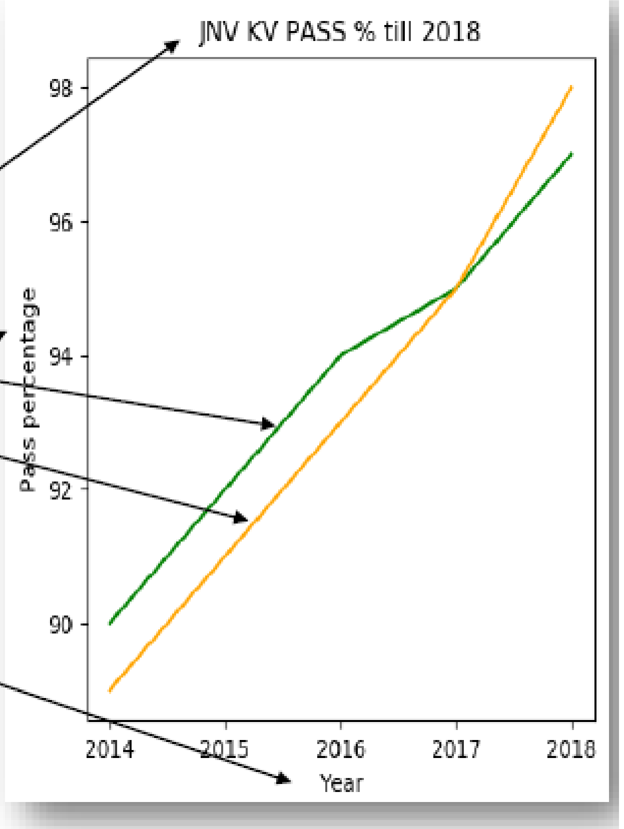
Types of plot using Matplotlib

- LINE PLOT
- BAR GRAPH
- HISTOGRAM

LINE PLOT

E.G.PROGRAM

```
import numpy as np
import matplotlib.pyplot as plt
year = [2014,2015,2016,2017,2018]
jnvpasspercentage = [90,92,94,95,97]
kvpasspercentage = [89,91,93,95,98]
plt.plot(year, jnvpasspercentage, color='g')
plt.plot(year, kvpasspercentage, color='orange')
plt.xlabel(‘Year')
plt.ylabel('Pass percentage')
plt.title('JNV KV PASS % till 2018')
plt.show()
```



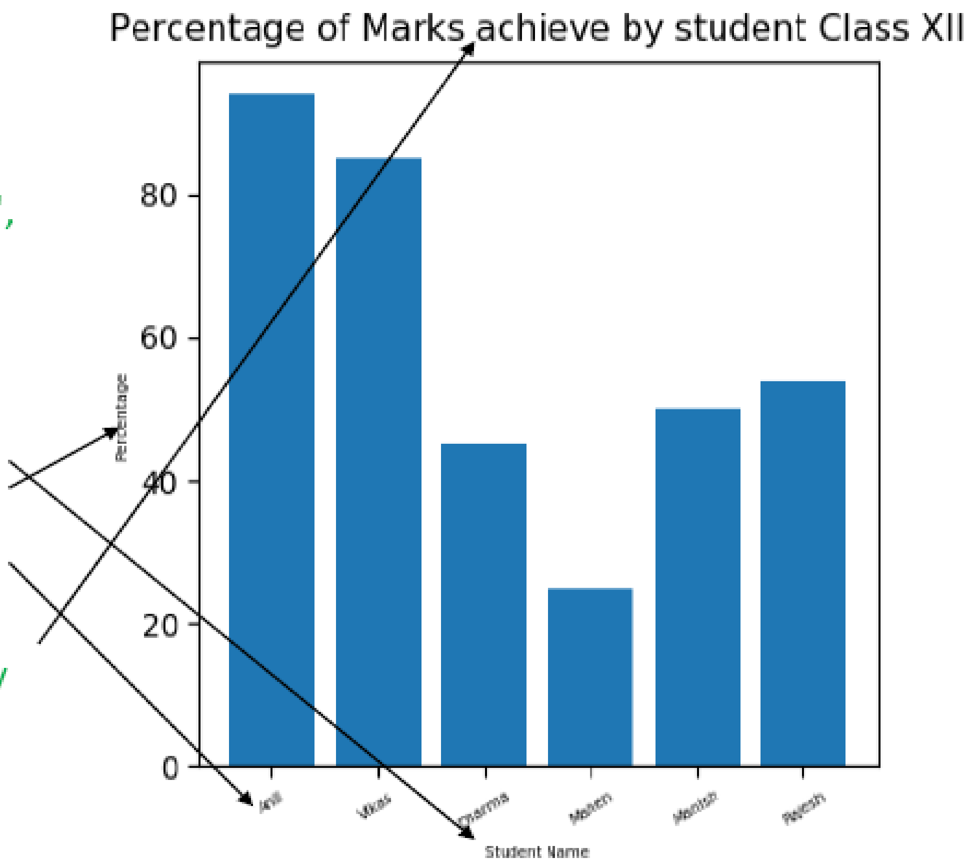
Note:- As many lines required call plot() function multiple times with suitable arguments.

BAR GAPH

Plot bar graphs

e.g program

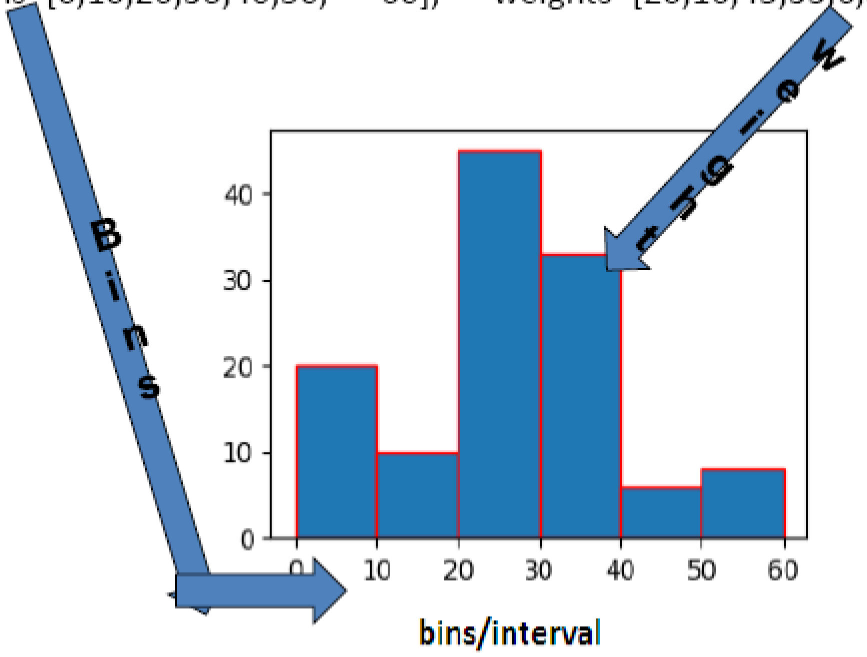
```
import matplotlib.pyplot as plt
import numpy as np
label = ['Anil', 'Vikas', 'Dharma', 'Mahen',
'Manish', 'Rajesh']
per = [94,85,45,25,50,54]
index = np.arange(len(label))
plt.bar(index, per)
plt.xlabel('Student Name', fontsize=5)
plt.ylabel('Percentage', fontsize=5)
plt.xticks(index, label, fontsize=5,
rotation=30)
plt.title('Percentage of Marks achieve by
student Class XII')
plt.show()
#Note – use barh () for horizontal bars
```



HISTOGRAM

Histogram in Python –

```
import numpy as np
import matplotlib.pyplot as plt
data = [1,11,21,31,41]
plt.hist([5,15,25,35,45, 55], bins=[0,10,20,30,40,50, 60], weights=[20,10,45,33,6,8], edgecolor="red")
plt.show()
```



#first argument of hist() method is position (x,y Coordinate) of weight, where weight is to be displayed.
No of coordinates must match with No of weight otherwise error will generate

#Second argument is interval

#Third argument is weight for bars

Chapter – 3 : Database Query using SQL

POWER() – power() returns the value of a number raised to the power of another number. The synonym of power() is pow().

ROUND() – the round() function returns a number rounded to a certain number of decimal places.

MOD() – The MOD() function returns the remainder of one number divided by another. The following shows the syntax of the MOD() function:

Syntax - MOD(dividend,divisor)

UPPER() – UPPER(str)

Returns the string str with all characters changed to uppercase.

UCASE(str)-UCASE() is a synonym for UPPER().

LOWER(str)-Returns the string str with all characters changed to lowercase

LCASE(str)

LCASE() is a synonym for LOWER().

Text functions- Perform operation over string values.

SUBSTRING(str,pos) - SUBSTRING(str FROM pos),

SUBSTRING(str,pos,len)- SUBSTRING(str FROM pos FOR len)

Text functions- Perform operation over string values.

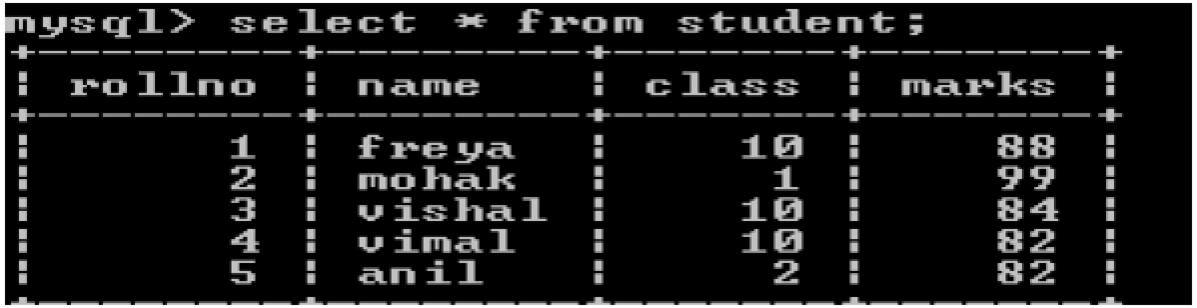
LENGTH(str) - Returns the length of the string str

LEFT(str,len) - Returns the leftmost len characters from the string str, or NULL if any argument is NULL.

RIGHT(str,len)-Returns the rightmost len characters from the string str, or NULL if any argument is NULL.

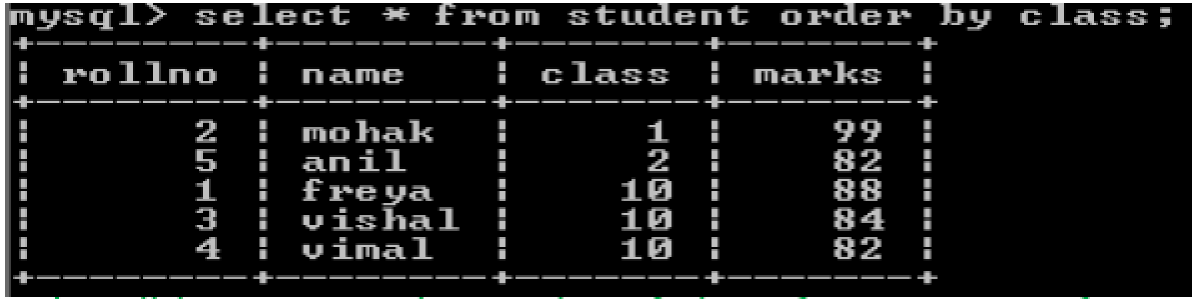
MySQL Order By

Suppose we are having student table with following data.



```
mysql> select * from student;
+--------+----------+-------+-------+
| rollno | name     | class | marks |
+--------+----------+-------+-------+
|      1 | freya    |    10 |    88 |
|      2 | mohak    |     1 |    99 |
|      3 | vishal   |    10 |    84 |
|      4 | vimal    |    10 |    82 |
|      5 | anil     |     2 |    82 |
+--------+----------+-------+-------+
```

Now we write the query – select * from student order by class;

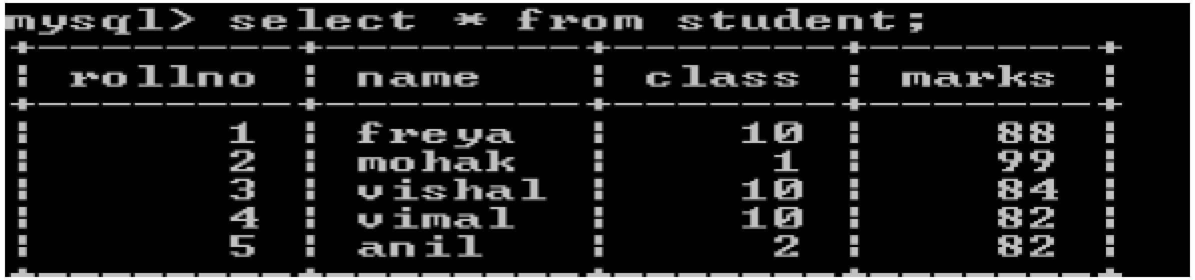


```
mysql> select * from student order by class;
+--------+--------+-------+-------+
| rollno | name   | class | marks |
+--------+--------+-------+-------+
|      2 | mohak  |     1 |    99 |
|      5 | anil   |     2 |    82 |
|      1 | freya  |    10 |    88 |
|      3 | vishal |    10 |    84 |
|      4 | vimal  |    10 |    82 |
+--------+--------+-------+-------+
```

Query result will be in ascending order of class.If we not specify asc/desc in query then ascending clause is applied by default

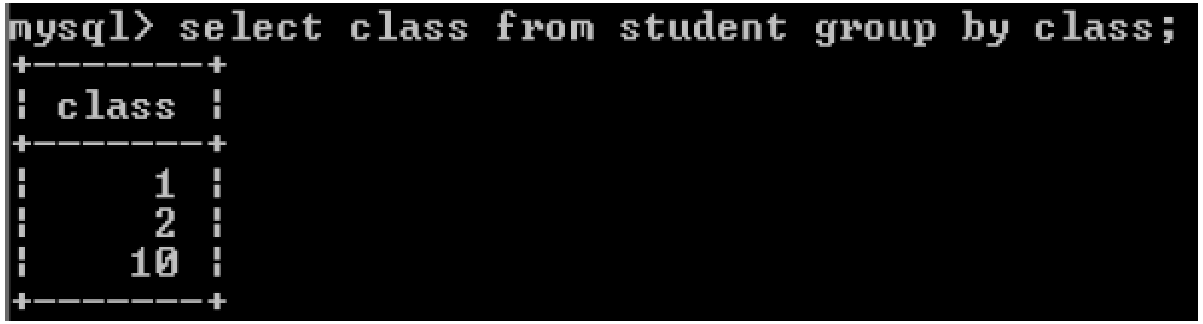
MySQL Group By

Suppose we are having student table with following data.



```
mysql> select * from student;
+--------+---------+--------+--------+
| rollno | name    | class  | marks  |
+--------+---------+--------+--------+
|      1 | freya   |     10 |     88 |
|      2 | mohak   |      1 |     99 |
|      3 | vishal  |     10 |     84 |
|      4 | vimal   |     10 |     82 |
|      5 | anil    |      2 |     82 |
```

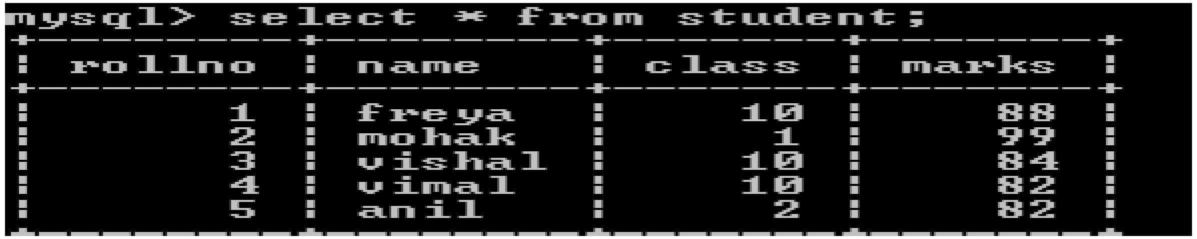
Now we write query–select class from student group by class;



```
mysql> select class from student group by class;
+-------+
| class |
+-------+
|     1 |
|     2 |
|    10 |
+-------+
```

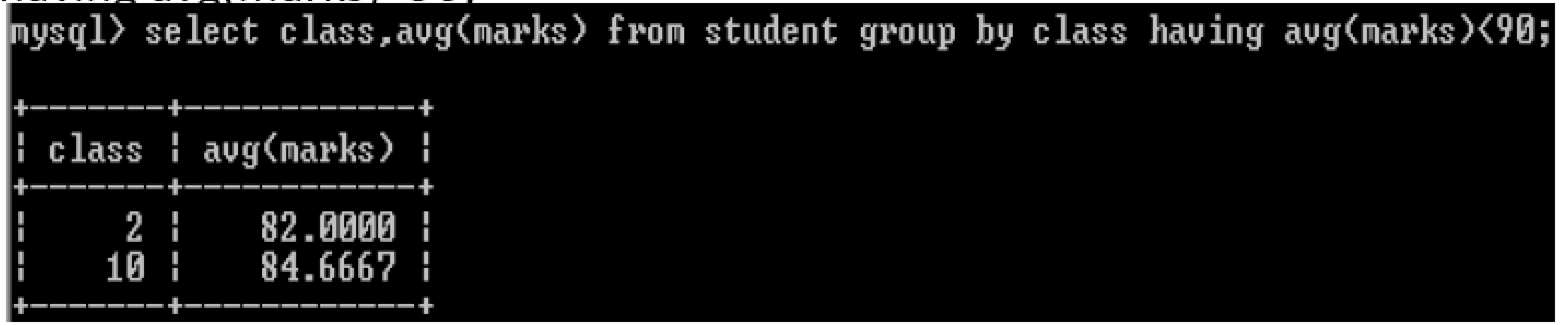
MySQL Group by with Having

we are having student table with following data.



```
mysql> select * from student;
+---------+-----------+---------+---------+
| rollno  | name      | class   | marks   |
+---------+-----------+---------+---------+
|       1 | freya     |      10 |      88 |
|       2 | mohak     |       1 |      99 |
|       3 | vishal    |      10 |      84 |
|       4 | vimal     |      10 |      82 |
|       5 | anil      |       2 |      82 |
```

Now we write query–select class,avg(marks) from student group by class having avg(marks)<90;



```
mysql> select class,avg(marks) from student group by class having avg(marks)<90;

+-------+------------+
| class | avg(marks) |
+-------+------------+
|     2 |    82.0000 |
|    10 |    84.6667 |
+-------+------------+
```

Query result will be unique occurrences of class values along with average marks of each class(sub group) and each class having average marks<90.

SQL - basic

```
CREATE TABLE <tablename>
(<columnname><datatype>[(<Size>)],... ..... );
CREATE TABLE Student(SRollNo integer, Sname char(20));
```

INSERTING DATA INTO TABLE

The rows are added to relations using INSERT command.

```
INSERT INTO <tablename>[<columnname>]
VALUES (<value>, <value>…);
INSERT INTO student (Sid, Sname)
VALUES (100,’ABC’);
```

SELECT COMMAND:

It lets us make queries on the database. SELECT * FROM table name WHERE condition; SELECT * FROM student WHERE Sid=100;

Eliminating Redundant Data

DISTINCT keyword eliminates redundant data

```
SELECT DISTINCT Sid FROM Student;
```

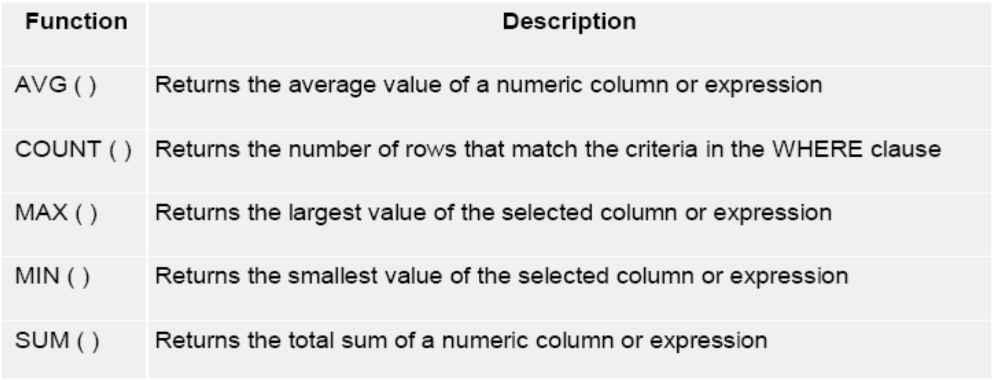
Selecting from all the rows-ALL Keyword

```
SELECT ALL Sid FROM Student;
```

Viewing structure of table:

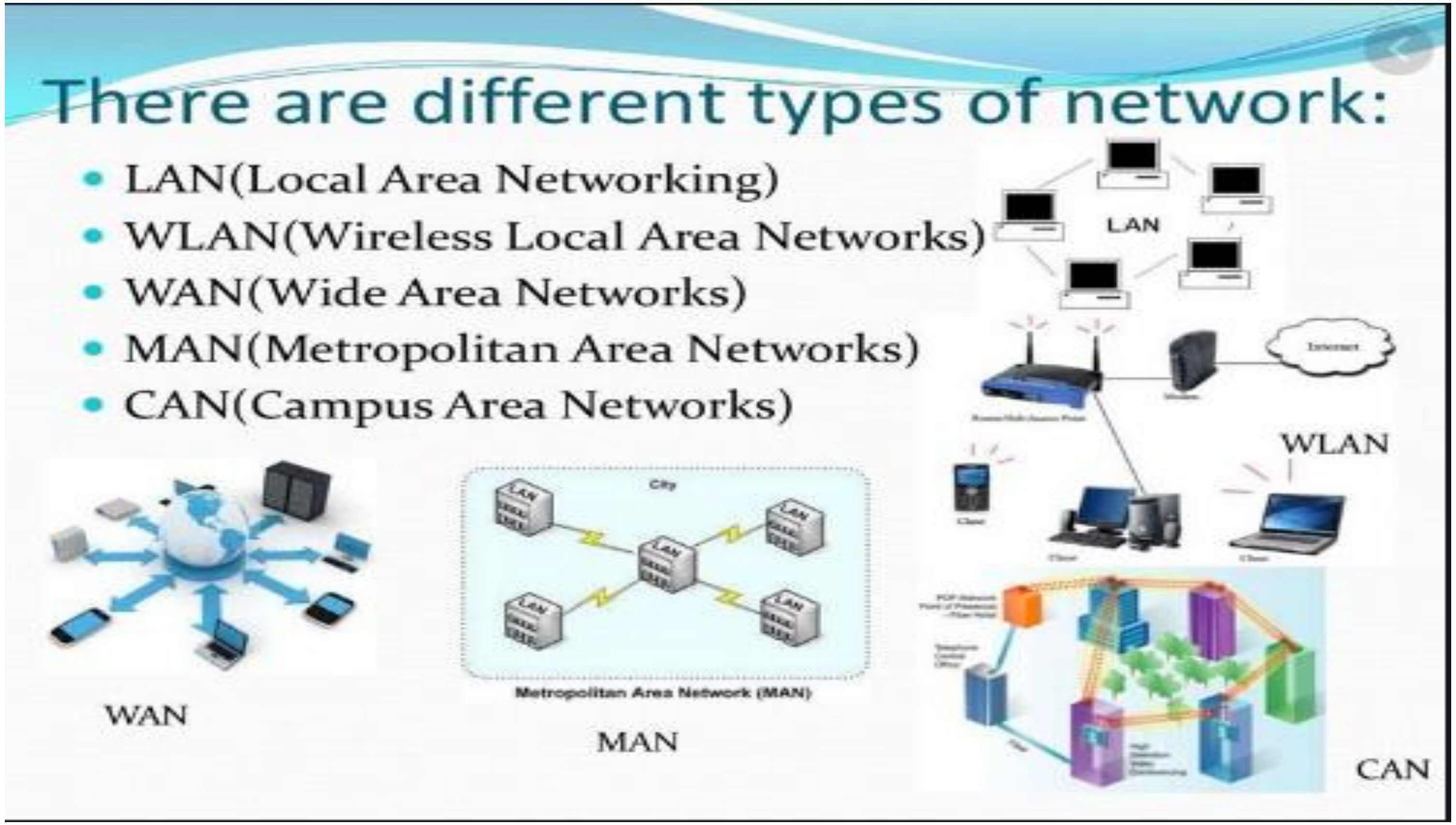
```
DESCRIBE/DESC <tablename>;
DESCRIBE student;
```

The most common aggregate functions used are listed below:



Function	Description
AVG ( )	Returns the average value of a numeric column or expression
COUNT ( )	Returns the number of rows that match the criteria in the WHERE clause
MAX ( )	Returns the largest value of the selected column or expression
MIN ( )	Returns the smallest value of the selected column or expression
SUM ( )	Returns the total sum of a numeric column or expression

Computer Network

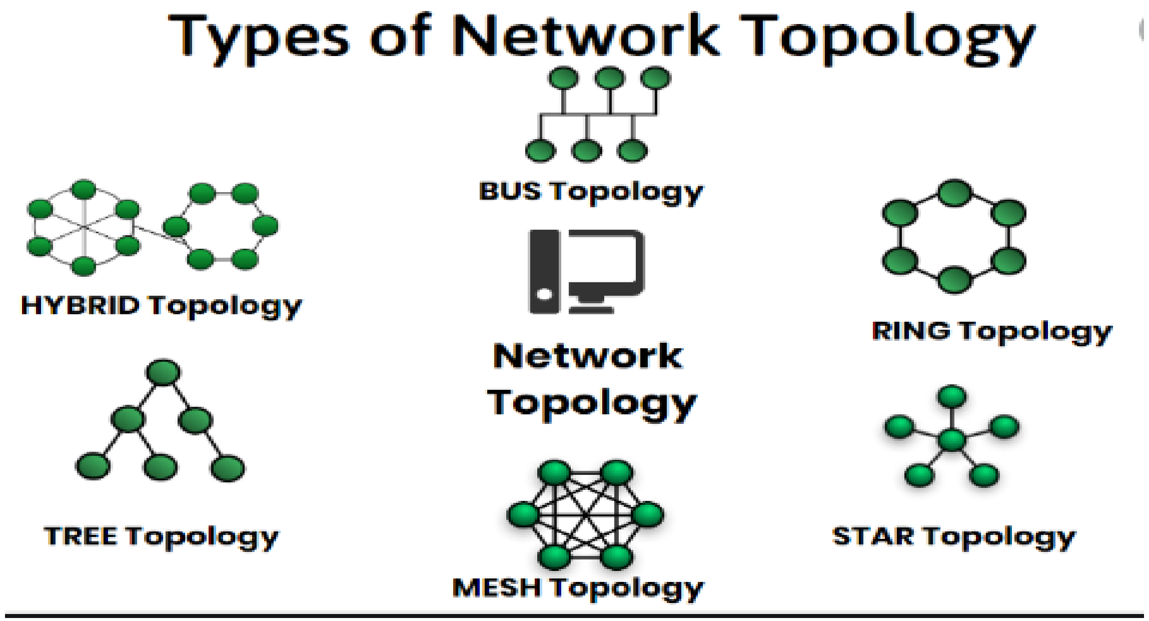


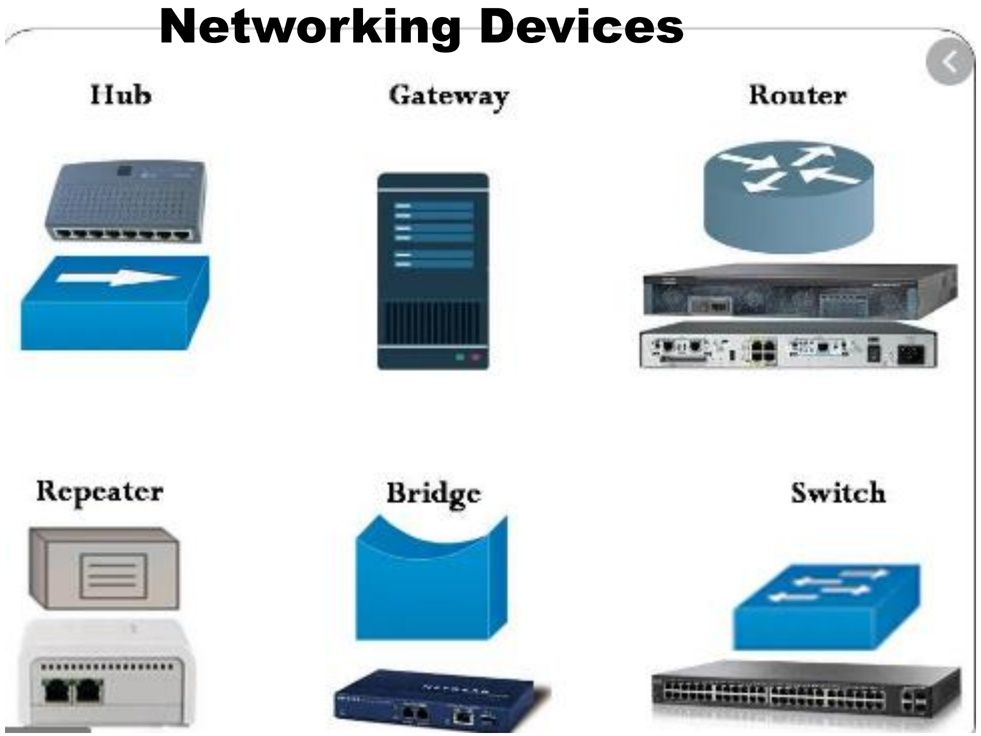
There are different types of network:

- LAN(Local Area Networking)
- WLAN(Wireless Local Area Networks)
- WAN(Wide Area Networks)
- MAN(Metropolitan Area Networks)
- CAN(Campus Area Networks)

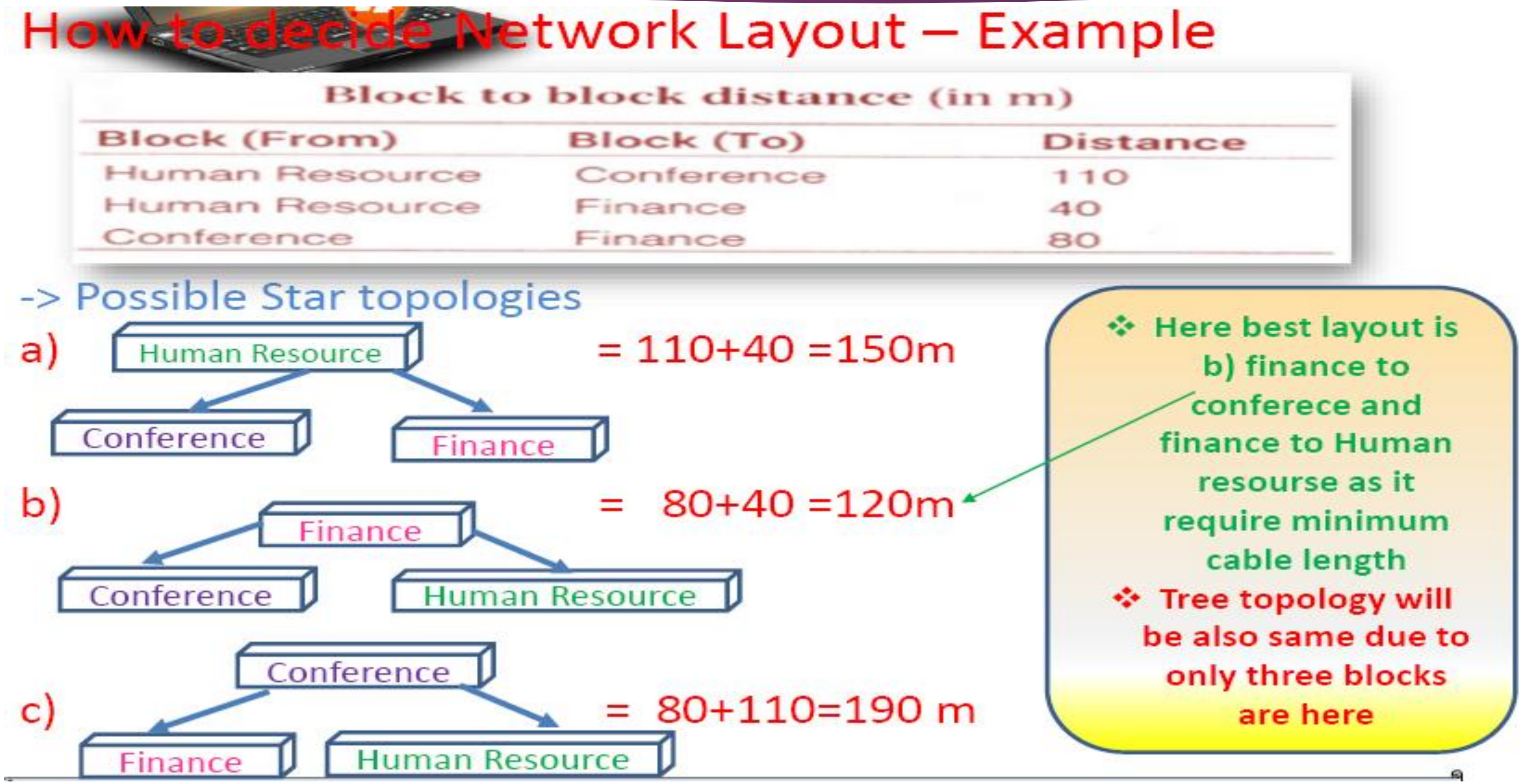
LAN
Internet
WLAN
City
LAN
LAN
LAN
LAN
LAN
Metropolitan Area Network (MAN)
WAN
MAN
CAN

Network Topology & Devices





Sample Question



How to decide Network Layout – Example

Block to block distance (in m)

Block (From)	Block (To)	Distance
Human Resource	Conference	110
Human Resource	Finance	40
Conference	Finance	80

-> Possible Star topologies

a)

Human Resource

Conference

Finance

= 110+40 =150m

b)

Finance

Conference

Human Resource

= 80+40 =120m

c)

Conference

Finance

Human Resource

= 80+110=190 m

- ❖ Here best layout is b) finance to conferece and finance to Human resourse as it require minimum cable length
- ❖ Tree topology will be also same due to only three blocks are here

Chapter – 6 : Societal Impacts

why we should care about managing our digital footprint

For following four reasons

1. To protect our reputation
2. To make safe personal information
3. To prevent financial loss
4. To preserve our freedom

Risk due to digital footprint

- Privacy concern
- Scam
- Identity theft
- Fake websites

How we can protect our personal data online

- Through Encrypt our Data
- Keep Passwords Private
- Don't Overshare on Social Networking Sites
- Use Security Software
- Avoid Phishing Emails
- Be Wise About Wi-Fi
- Be Alert to Impersonators
- Safely Dispose of Personal Information

Intellectual Property Right(IPR)

Intellectual Property Right (IPR) is the statutory right granted by the Government, to the owner(s) of the intellectual property or applicant(s) of an intellectual property (IP) to exclude others from exploiting the IP commercially for a given period of time, in lieu of the discloser of his/her IP in an IPR application.

Kinds of IPRs

- Patent (to protect technologies - The Patent Act)
- Trade Mark (to protect words, signs, logos, labels –The Trade Mark Act)
- Design (to protect outer ornamental configuration –The Designs Act)
- Geographical Indications (GI) (to protect region specific product –The Geographical Indications of Goods Act)
- Copyright (to protect literary and artistic work –The Copyright Act)

Intellectual Property Right(IPR)

IPRs are protected in accordance with the provisions of legislations of a country specific. In India, IPRs can be protected and monopolized as per the act. Some of them are

1- The Patent Act, 1970,
2- The Designs Act, 2000,
3- The Trade Mark Act, 1999,
4- The Geographical Indications of Goods Act, 1999,
5- The Copyright Act, 1957,
6- Protection of Integrated Circuits Layout and Designs Act, 2000,
7- Protection of Plant Varieties and Farmers Rights Act, 2001, and also Trade Secret

Plagiarism

“the act of presenting the words, ideas, images, sounds, or the creative expression of others as it is your creation or your own.”
The word *plagiarism* is derived from the Latin word *plagiare*, which means to *kidnap* or *abduct*

Why is it important to understand Plagiarism?

- Plagiarism is stealing of intellectual property
- Plagiarism is cheating
- Plagiarism is an *Academic offence*
- Plagiarism is *Academic theft*!

Two Types of Plagiarism

- Intentional Plagiarism

  *Copying other’s work

  * Borrowing/buying assignments

  * Cut , paste from electronic resources

  * Downloading essays/text from the Internet and presenting as our own work

- Unintentional Plagiarism

  * Not knowing how to acknowledge or incorporate sources of information through proper paraphrasing, summarizing and quotation

  *Careless copying or cutting and pasting from electronic databases

  *Quoting excessively

  * Failure to use our own “voice”

Types of Software based on use:

- ❑ Proprietary Software: These Software are neither open nor freely available. They must have some cost and Source codeis also not given since it is property of the developer organization. No change, copy and distribution are allowed.
- ❑ Freeware:These are available free of cost. They can be used, copied, distributed but no modification isallowed because Source Code is not available.
- ❑ Shareware:These software are freely used, copied and distributed for a certain period of time. After expiry,you have to purchase or uninstall them. Modification is not possible due to non-availability of thesource code. These are the Demo version and freely distributed for trial purpose.