1. Explain the need of a Data Warehouse? Differentiate clearly OLTP and OLAP systems.

   Ans.
   1. Data Integration : A data warehouse provides a unified platform to integrate data from various sources, such as operational databases, spreadsheets, and external sources.

   2. Historical Data storage : Data warehouses store historical data, allowing organizations to analyze trends and changes over time.

   3. Business Intelligence and Analytics.

2. Differentiate clearly between OLTP and OLAP ?

   OLTP : Online Transaction Processing : -
   1. Transactional Processing
   2. Support for operational activities.
   3. Normalized data structure.

   OLAP: Online Analytical Processing:-
   1. Analytical Processing
   2. Denormalized data structure.
   3. Multiple dimension data representation

3. Normalization : Normalization is used to remove the data redundancy and solve the problem of different anomalies.
   The first three forms of normalization are :

   1. 1NF : The table is said to be in 1NF when the table contains all atomic values meaning there should be no multi-valued attributes.

   2. 2NF: The table is said to be in 2NF when the table is already in 1NF form and it does not have the case of partial dependency:

   For eg: A, B, C are my Prime attributes and D, E are non-prime attributes then if
   D -> {A, B} then it is the case of partial dependency.

   3. 3NF : The table is said to be in 3NF when the table is already in 2NF and there is no such case of transitive dependency.

4. Different types of data warehouse modelling ?

   1. Star Schema : In star schema it consists of central fact table which basically contains the quantitative data that the business want to analyze.
   It is surrounded by the fact table or we say it as dimension table which is de normalized.

   2. Snow flake schema: In snow flake schema it consists of central fact table which basically contains the quantitative data that the busines want to analyze.
   It is surrounded by the fact table which is normalized.

   SQL :

```
/* CREATING EMPLOYEE TABLE */
create table EMP(
  Eno INT not NULL,
  EmpName varchar(50),
  Mgr varchar(50),
  Sal float,
  DeptNo int
);

/* ADDING JOB COLUMN USING ALTER TABLE */
ALTER TABLE EMP ADD JOB varchar(25);

/* CREATING DEPT TABLE */
create Table DEPT(
   DeptNo int not NULL,
   DeptName varchar(25),
   Location varchar(30)
);

/* INSERTING RANDOM DATA INTO EMPLOYEE TABLE */
INSERT INTO EMP VALUES(1, 'Harshit Mishra', 'John Doe', 45000.00, 1, 'SDE');
INSERT INTO EMP VALUES(2, 'Prateek Tewary', 'John Smith', 45000.00, 2, 'SDE');
INSERT INTO EMP VALUES(3, 'Rishav Singh', 'Mary Smith', 45000.00, 3, 'SDE');
INSERT INTO EMP VALUES(4, 'Mark Twain', 'John Doe', 45983.00, 1, 'SDE');
INSERT INTO EMP VALUES(1, 'Harry', 'John Doe', 55000.00, 1, 'SDE');

ALTER TABLE DEPT ALTER COLUMN location varchar(100);

/* INSERTING RANDOM DATA INTO DEPT TABLE */
INSERT INTO DEPT VALUES(1, 'IT-WEB', 'Bellandur, Bangalore');
INSERT INTO DEPT VALUES(2, 'IT-Mobile', 'Whitefield, Bangalore');
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INSERT INTO DEPT VALUES(3, 'IT-Ecom', 'California, USA');
INSERT INTO DEPT VALUES(4, 'IT-Esearch', 'Winonna, Minnesota');
INSERT INTO DEPT VALUES(5, 'IT-QA', 'Winonna, Minnesota');

INSERT INTO EMP VALUES(6, 'John Smith', 'Karin Smith', 34555.00, 10, 'Clerk');

INSERT INTO EMP VALUES(7, 'John Mccgrath', 'Harry Smith', 34555.00, 20, 'Analyst');
INSERT INTO EMP VALUES(8, 'John Twain', 'Harry Smith', 34555.00, 20, 'Analyst');
INSERT INTO EMP VALUES(9, 'Glenn Smith', 'Harry Smith', 34555.00, 20, 'Analyst');

INSERT INTO EMP VALUES(10, 'John Max', 'Karin Max', 34555.00, 12, 'Clerk');
INSERT INTO EMP VALUES(11, 'John Broook', 'Karin Brook', 34555.00, 10, 'Clerk');


/* DELETE EMPLOYEE WHOSE EMPLOYEE NAME IS JOHN BROOK */
DELETE FROM Emp WHERE empname = 'John Broook';

/* ADD PRIMARY KEY CONSTRAINT USING ALTER TABLE */
ALTER TABLE EMP ADD CONSTRAINT ek_id PRIMARY KEY(eno);

SELECT *FROM DEPT;

UPDATE EMP SET eno = 5 WHERE empname = 'Harry Rocks';

/* Employee name whose job is clerk and dept no is 10 or job is analyst and dept no is
20 */
SELECT empname as Employee_Name FROM EMP WHERE job = 'Clerk' and deptno
= 10 or job = 'Analyst' and deptno = 20;

/* Employee name and salary whose job is clerk and sal >= 30000 */
SELECT empname as Employee_Name, sal as Salary FROM Emp WHERE job =
'Clerk' and sal > 3000.00;

/* Drop Primary Key Constraint */
ALTER TABLE EMP DROP CONSTRAINT ek_id;

/* REDEFINE ENO COLUMN FOR REMOVING NOT NULL */
ALTER TABLE EMP ALTER COLUMN Eno int;

INSERT INTO EMP VALUES(null, 'John karin', 'John Doe',  45689.00, 5, 'QA');

DELETE FROM EMP WHERE eno is null;

/* ADD NOT NULL CONSTAINT USING ALTER TABLE */
```

```
ALTER TABLE EMP ALTER COLUMN Eno int not null;

/* Add primary key constraint using alter table */
ALTER TABLE EMP ADD CONSTRAINT pk_id PRIMARY KEY(eno);

/* Describe table */
EXEC sp_columns EMP;

INSERT INTO EMP VALUES(13, 'John karin', 'John Doe',  45689.00, 5, 'QA', 16);

/* Drop check constraint */
ALTER TABLE EMP DROP CONSTRAINT CK__EMP__AGE__6E01572D;

/* Add check constraint using alter table */
ALTER TABLE EMP add CONSTRAINT check_age_constraint check(age >= 12);

select *from EMP;
```