OLTP :

Online Transactional Processing in a software program or operating system that supports transactions-oriented applications in a three-tier architecture.

It facilitates and supports the execution of a large number of real-time transactions in a database.

The defining characteristic of OLTP transaction is atomicity and concurrency. Concurrency prevents multiple users from changing the same data simultaneously.

OLTP Transaction Examples :-

1. Automated Teller machines
2. Online banking applications
3. Online booking for airline ticketing, hotel reservations, etc.
4. Order entry
5. E-Commerce and in-store purchases.

OLTP systems are found in a broad Spectrum of industries with a concentration in client-facing environments.

OLTP characteristics :-

i. Short response time :-

OLTP Systems maintain very short response times to be effective for users.

ii. Process small transactions :-

OLTP Systems support numerous small transactions with a small amount of data executed simultaneously over the network.

iii. Data maintenance operations

Data maintenance operations are data-intensive computational reporting and data update programs that run alongside OLTP Systems without interfering with user queries.

iv. High-Level transaction volume and multi-user access :-

OLTP systems are synonymous with a large number of users accessing the same data at the same time.
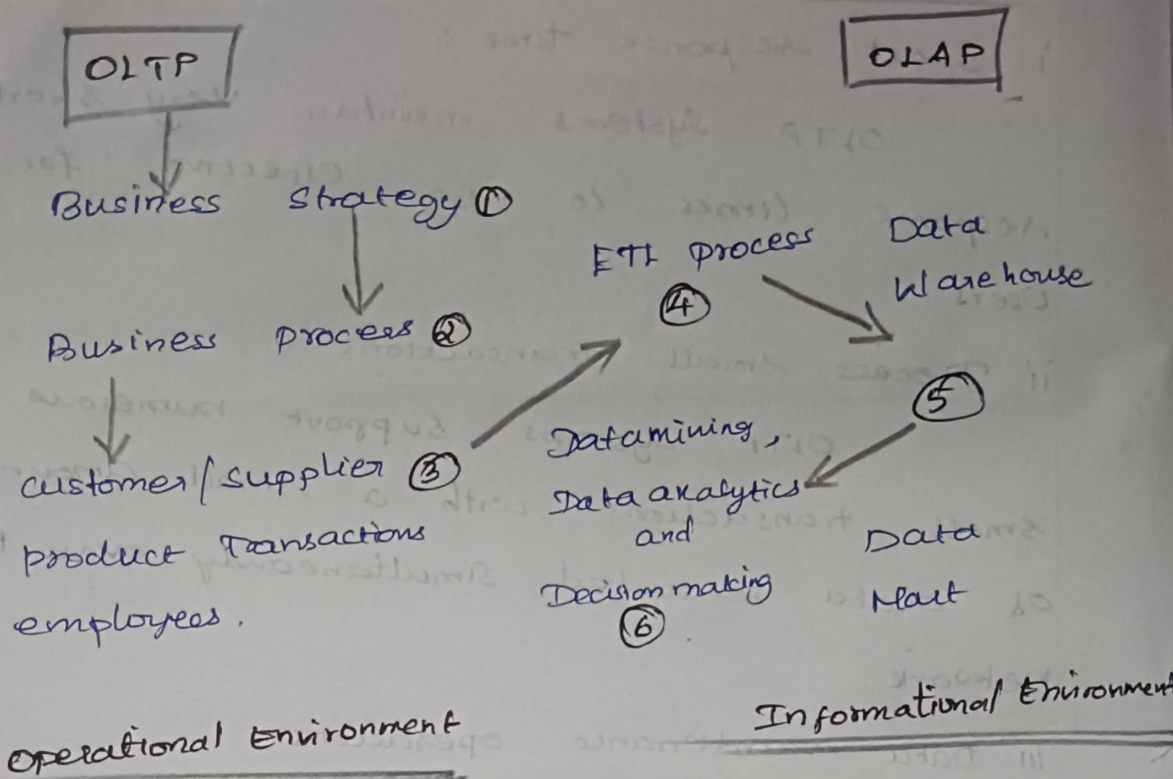
V. Normalized Schema :-

OLTP Systems utilize a fully normalized schema for database consistency.

vi. Storage :-

OLTP stores data records for the past few days or about a week.

OLTP Architecture and System Design :-

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┌────────┐                              ┌────────┐
│  OLTP  │                              │  OLAP  │
└────────┘                              └────────┘
    │                                       
    ▼                                       
Business   Strategy ①                      
    │                     ETL process   Data
    ▼                        ④          Warehouse
Business   Process ②          ↗              
    │                   Datamining ,        ⑤
    ▼                   Data analytics    
customer/supplier ③          and          Data
product  Transactions    Decision making   Mart
employees.                   ⑥             
```

operational Environment _____   Informational Environment

OLAP :

OLAP is a classification of software technology which authorizes analysts, managers and executives to gain insight into information through fast, consistent, interactive access in a wide variety of possible views of data that has been transformed from raw information to reflect the real dimensionality of enterprise as understood by clients.

Who Uses OLAP and Why ?

OLAP Applications are used by a variety of functions of an organization.

Finance and accounting:

1. Budgetting
2. Activity - based costing
3. Financial performance analysis
4. And financial modeling.

Sales and marketing:

1. Sales analysis and forecasting
2. Market research analysis
3. promotion analysis
4. customer analysis
5. Market and customer segmentation.

Production:

1. Production planning.
2. Defect analysis.

Types of OLAP servers:-

The three major types of OLAP servers are as follows!

a. ROLAP - Relational OLAP.

b. MOLAP - Multidimensional OLAP

c. HOLAP - Hybrid OLAP.

Other types of OLAP include:-

d. Web OLAP - WOLAP

e. Desktop OLAP - DOLAP.

SCHEMA :-

Datawarehouse schema is a description, represented by objects such as tables and indexes of how data relates logically within a datawarehouse.

Star, Galaxy and Snowflake schema are types of warehouse schema that describe different logical arrangements of data.

Also known as multi-dimensional Schemas these schemas define rules for how these data warehouses manage the names, descriptions, associated data items and aggregates within a datawarehouse.

Fact Table :.

A Fact table aggregates metrics, measurements or facts about business Processes.

In this example, fact tables are connected to dimension tables to form a schema architecture representing how data relates within the data warehouse.

Example :- Fact Table :-

	Dealer-id	Data-id
Revenue —	Model-id	Unites-sold
	Branch-id	

Dimension Table :-

Dimension tables are non-denormalized tables used to store data attributes or dimensions.

The primary key of a dimension table is stored as a foreign key in the fact table.

Dimension tables are not joined together. Instead, they are joined via association through the central fact table.

Dimension table :- Example :.

Dealer   —   Dealer -id

location -id

country -id

Dealer- NH

Dealer -CNTCt

Three types of schema used in datawarehouses

a. Star Schema

b. Snowflake Schema

c. Galaxy Schema.

a. Star Schema :-

Star Schema in a datawarehouse is historically one of the most straightforward designs.

Snowflake Schema :-

Snowflake Schema is a datawarehouse Schema that encompasses a logical arrangement of dimension tables.

Galaxy Schema :-

Galaxy Datawarehouse Schema also known as a Fact constellation Schema, acts as the next iteration of the data warehouse schema.

Key differences between Star, Snowflake and Galaxy Schema :-

	Elements
Star Schema	Single Fact Table connected to multiple dimension tables with no Sub-dimension table.
Snowflake Schema	Single Fact table connects to multiple dimension tables that Connects to multiple Sub-dimension tables.
Galaxy Schema.	Multiple Fact tables connects to multiple dimension tables that Connects to multiple Sub-dimension tables.

ER - MODEL :-

Peter chen developed the ER diagram in 1976. The ER Model was created to provide a simple and understandable model for depresenting the structure and logic of databases.

It has since evolved into variations such as the enhanced ER model and the object Relationship model.

The Entity relational model is a model for identifying entities to be represented in the database and representation of how those entities are related.

Symbols used in ER Model :-

ER Model is used to model the logical view of the system from a data perspective which consists of these symbols:

Rectangles :

Rectangles represent entities in ER Model.

Ellipses :-

Ellipses represent attributes in the ER Model.

Diamond :-

Diamonds represent relationships among entities

Lines :-

Lines represent attributes to entities and entity sets with other relationship types

Double Ellipse :

Double ellipses represent multi-valued Attributes

Double Rectangle :

Double Rectangle represents a weak entity

Components of ER Diagram :-

ER Model consists of entities, Attributes and relationships among entities in a database system.

ER MODEL

ENTITY	ATTRIBUTE	RELATIONSHIP
Strong Entity	Key Attribute	One to one
Weak Entity	Composite Attribute	One to many
	Multivalued "	Many to one
	Derived "	Many to Many

Diagram for ER Model :-

Stu-id Stu-name Stu-ph

Student — Stu-Blog Address

Course

Bootc

Book id Book-name

Book-authors

Library

Book-category

Book-code

☐ - Entity

⬭ - Attributes

◇ - Relationship