SNS COLLEGE OF ENGINEERING

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE NAME : 23CST207 - DATABASE MANAGEMENT SYSTEMS

II YEAR / IV SEMESTER

Unit 1- Introduction to Data Base
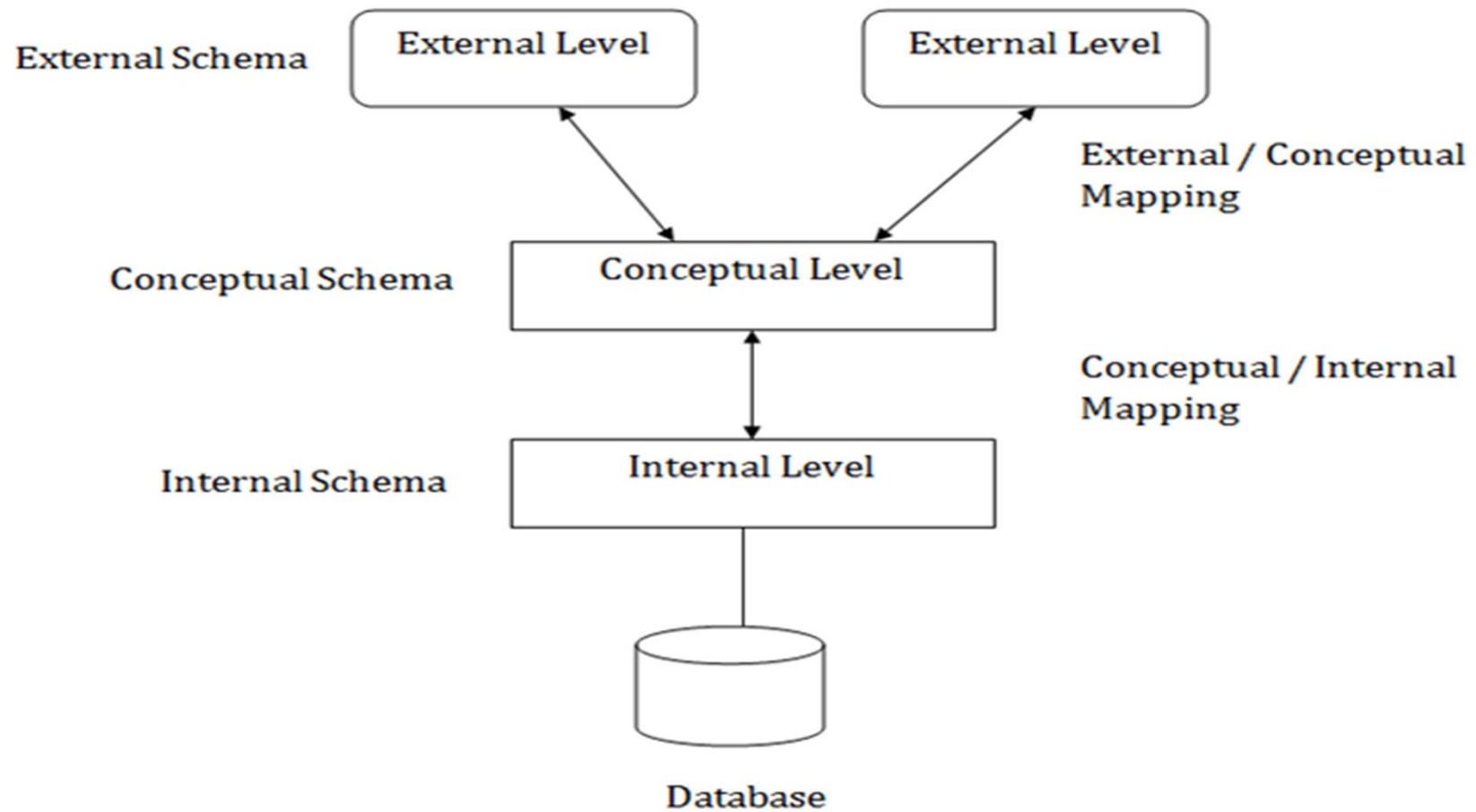
Topic 5 : Three level schema and DBMS Architecture

Three level schema

➢The three schema architecture is also called ANSI/SPARC architecture or three-level architecture.

➢This framework is used to describe the structure of a specific database system.

➢The three schema architecture is also used to separate the user applications and physical database.

➢The three schema architecture contains three-levels. It breaks the database down into three different categories.

Three level schema

External Schema   External Level   External Level

External / Conceptual Mapping

Conceptual Schema   Conceptual Level

Conceptual / Internal Mapping

Internal Schema   Internal Level

Database

Objectives of Three schema Architecture

➢Different users need different views of the same data.

➢The approach in which a particular user needs to see the data may change over time.

➢All users should be able to access the same data according to their requirements.

➢DBA should be able to change the conceptual structure of the database without affecting the user's

➢Internal structure of the database should be unaffected by changes to physical aspects of the storage.

Objectives of Three schema Architecture – Cont..

1.Internal Level

Internal view

STORED_EMPLOYEE record length 60

Empno : 4 decimal offset 0 unique
Ename : String length 15 offset 4
Salary : 8,2 decimal offset 19
Deptno : 4 decimal offset 27
Post   : string length 15 offset 31

➢ The internal level has an internal schema which describes the physical storage structure of the database.

➢ The internal schema is also known as a physical schema.

➢ It uses the physical data model. It is used to define that how the data will be stored in a block.

➢ The physical level is used to describe complex low-level data structures in detail.

Objectives of Three schema Architecture – Cont..

1.Internal Level

➢Storage   space   allocations.

For Example: B-Trees, Hashing etc.

➢Access   paths.

For Example: Specification of primary and secondary keys, indexes, pointers and sequencing.

➢Data compression and encryption techniques.

➢Optimization of internal structures.
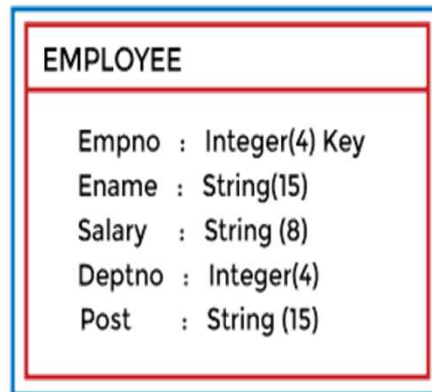
➢Representation of stored fields.

2. Conceptual Level

EMPLOYEE

Empno : Integer(4) Key
Ename : String(15)
Salary : String (8)
Deptno : Integer(4)
Post : String (15)

Global view

➢ The conceptual schema describes the design of a database at the conceptual level. Conceptual level is also known as logical level.

➢ The conceptual schema describes the structure of the whole database.

➢ The conceptual level describes what data are to be stored in the database and also describes what relationship exists among those data.

➢ In the conceptual level, internal details such as an implementation of the data structure are hidden.

➢ Programmers and database administrators work at this level.

Objectives of Three schema Architecture – Cont..

3.External Level

➢ At the external level, a database contains several schemas that sometimes called as subschema. The subschema is used to describe the different view of the database.

➢An external schema is also known as view schema.

➢Each view schema describes the database part that a particular user group is interested and hides the remaining database from that user group.

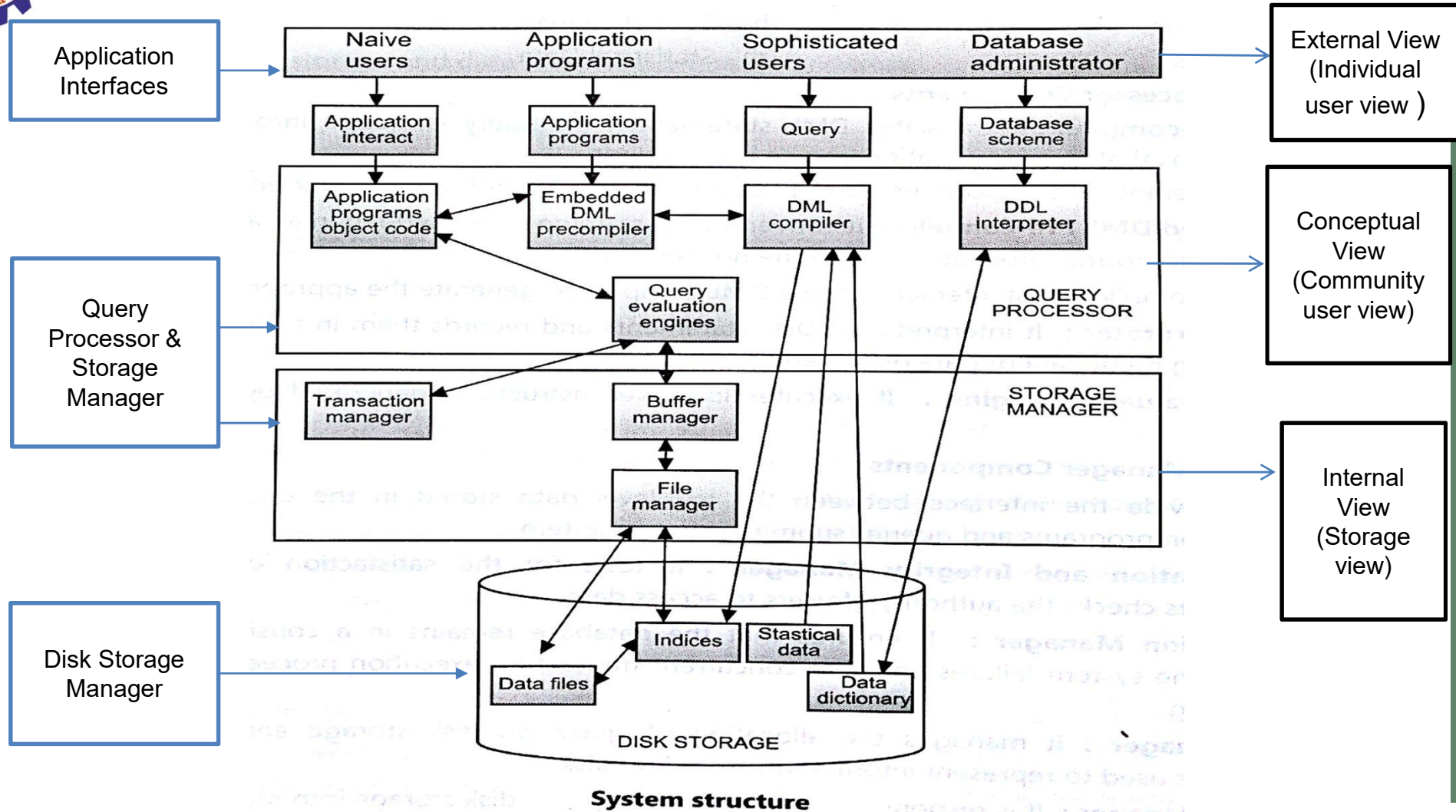➢The view schema describes the end user interaction with database systems.

External View

Empno	Ename

Empno	Ename	Salary	DeptNo

DATABASE ARCHITECTURE

Application Interfaces → Naive users | Application programs | Sophisticated users | Database administrator → External View (Individual user view)

Query Processor & Storage Manager → QUERY PROCESSOR / STORAGE MANAGER → Conceptual View (Community user view)

Internal View (Storage view)

Disk Storage Manager → DISK STORAGE

System structure

Query processor

1.DDL Interpreter

- This is basically a translator which interprets the DDL statement in Data dictionaries.

2. DML Compiler

- It translates DML statements query Languages into an evaluation plan.

3.Query Evaluation Engine

- It executes the low-level instructions generated by the DML Complier

Storage Manager

1.Authorization and Integrity Manager

- Who want to access the data and test for integrity constraints.

2.Transaction Manager

- Concurrent transaction execution processed without conflicting.

3.File Manager

- Manages allocation of space on disk storage and representation pf the information on disk.

4.Buffer Manager

- Fetching the data from disk storage into main memory and what data to cache in main memory.

1-Tier Architecture

• In 1-tier architecture, the DBMS is the only entity where the user directly sits on the DBMS and uses it.

• Any changes done here will directly be done on the DBMS itself. It does not provide handy tools for end-users.

• Database designers and programmers normally prefer to use single-tier architecture.
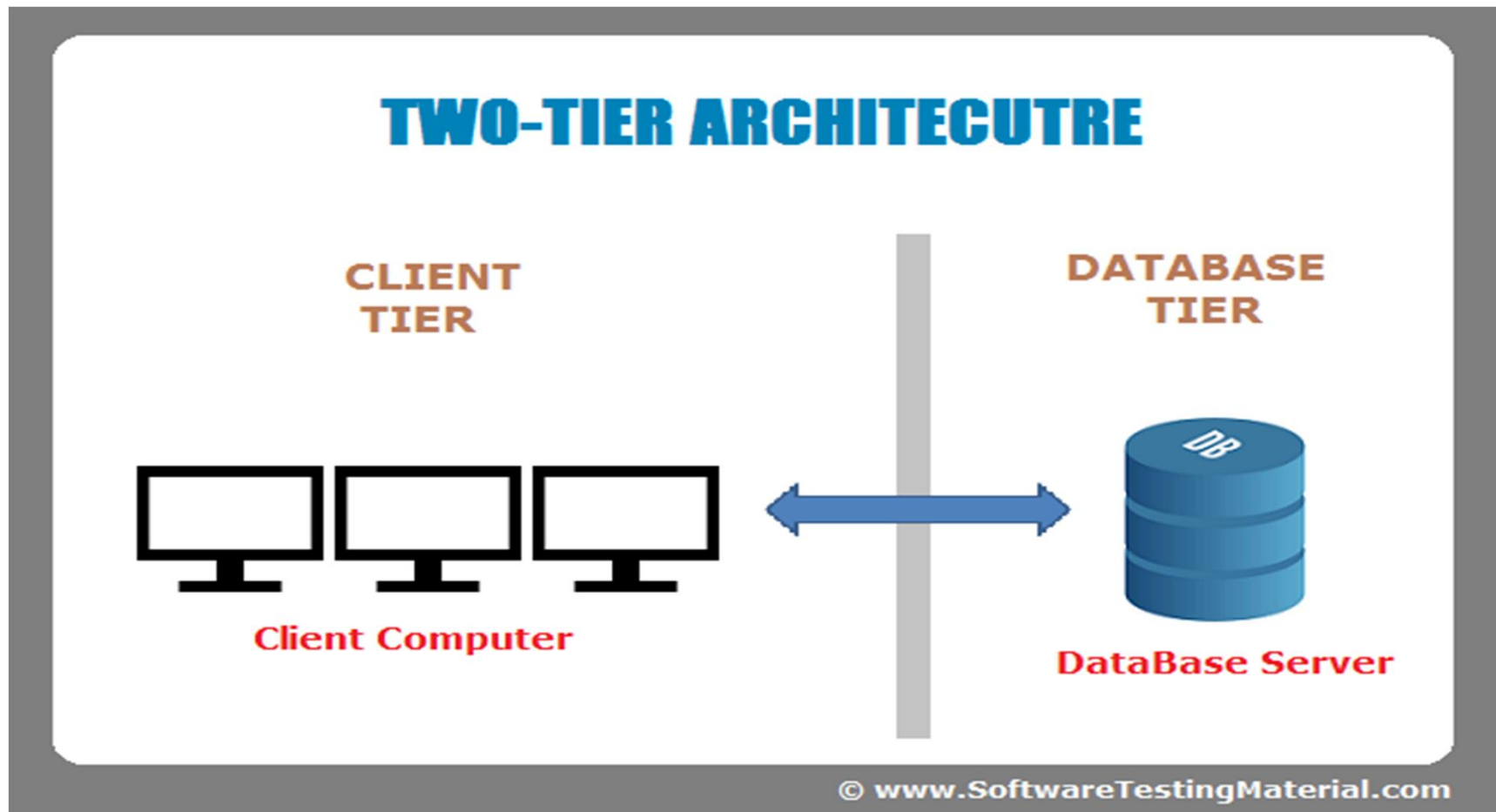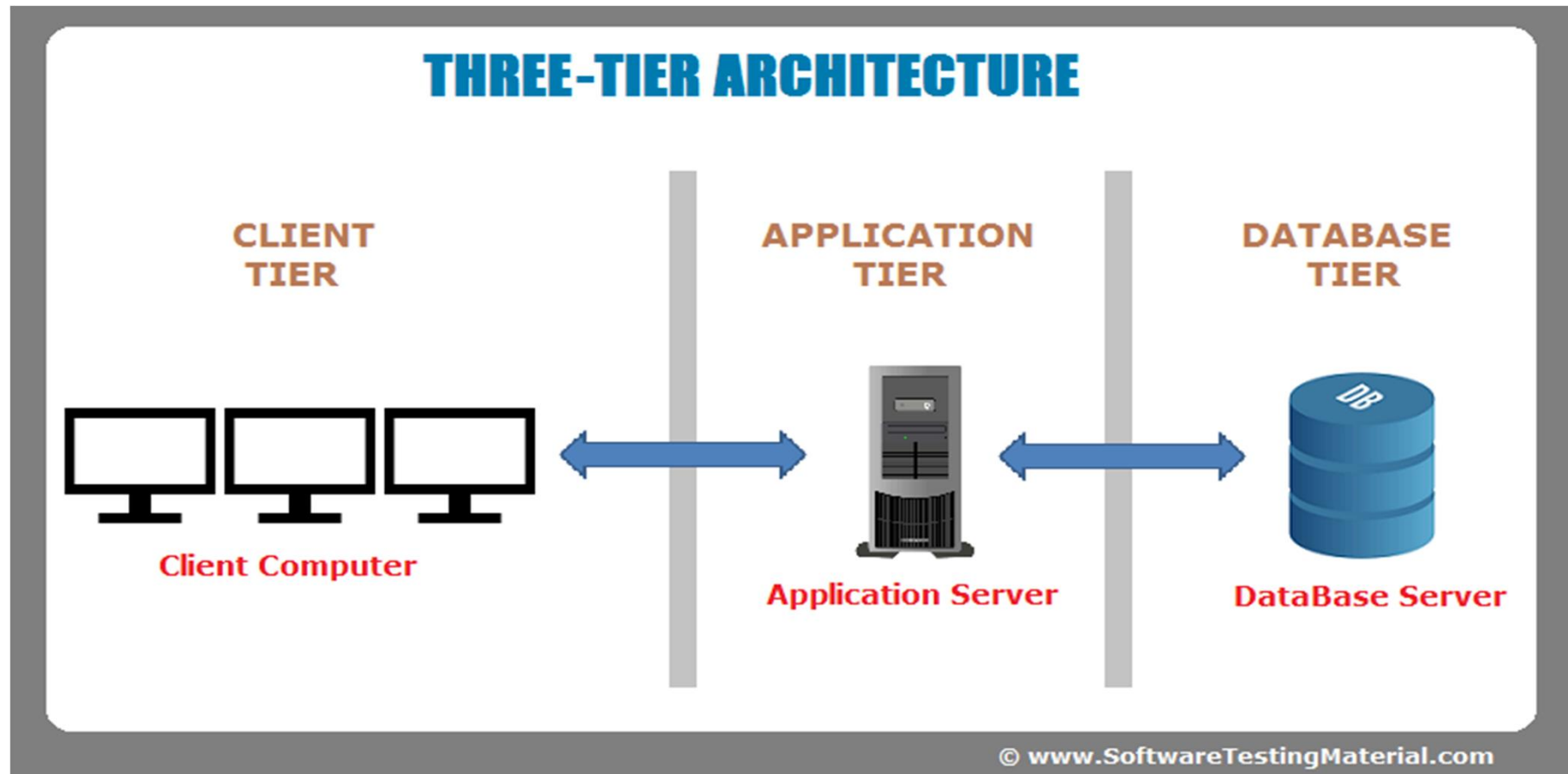
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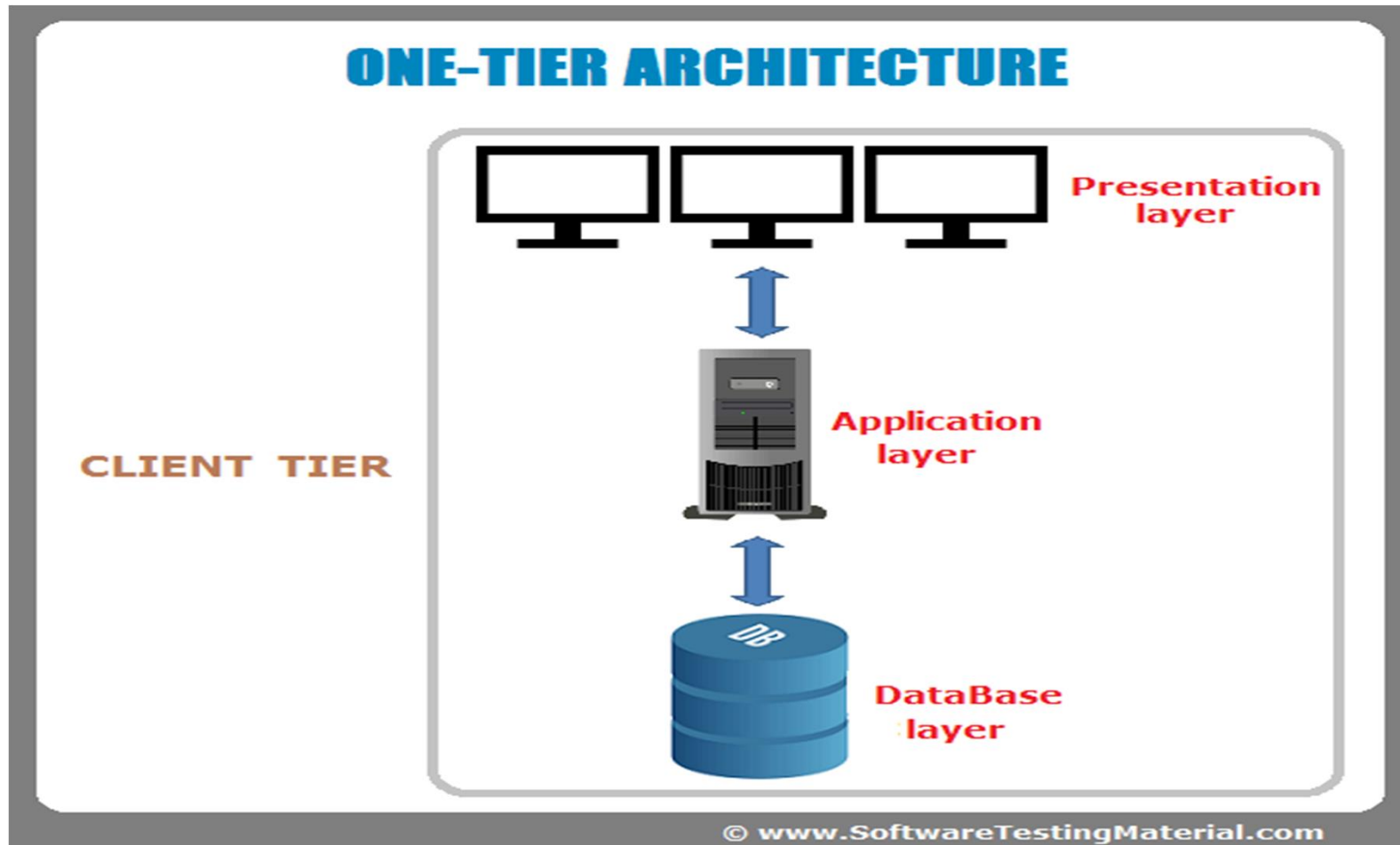
2-Tier Architecture

➢If the architecture of DBMS is 2-tier, then it must have an application through which the DBMS can be accessed.

➢Programmers use 2-tier architecture where they access the DBMS by means of an application.

➢Here the application tier is entirely independent of the database in terms of operation, design, and programming.

TWO-TIER ARCHITECUTRE

CLIENT TIER

DATABASE TIER

Client Computer

DB

DataBase Server

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3-Tier Architecture

➢A 3-tier architecture separates its tiers from each other based on the complexity of the users and how they use the data present in the database.

➢It is the most widely used architecture to design a DBMS.

THREE-TIER ARCHITECTURE

CLIENT TIER

Client Computer

APPLICATION TIER

Application Server

DATABASE TIER

DB

DataBase Server

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Evaluation

1.List out the types of structure view

a)_____

b)_____

c)_____

Answer :

a) External View

b) Conceptual View

c) Internal View

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THANK YOU