



SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE NAME : 19CS402 - DATABASE MANAGEMENT
SYSTEMS

II YEAR / IV SEMESTER

Unit 1- Introduction to Data Base

Topic 5 : Three level schema and DBMS
Architecture



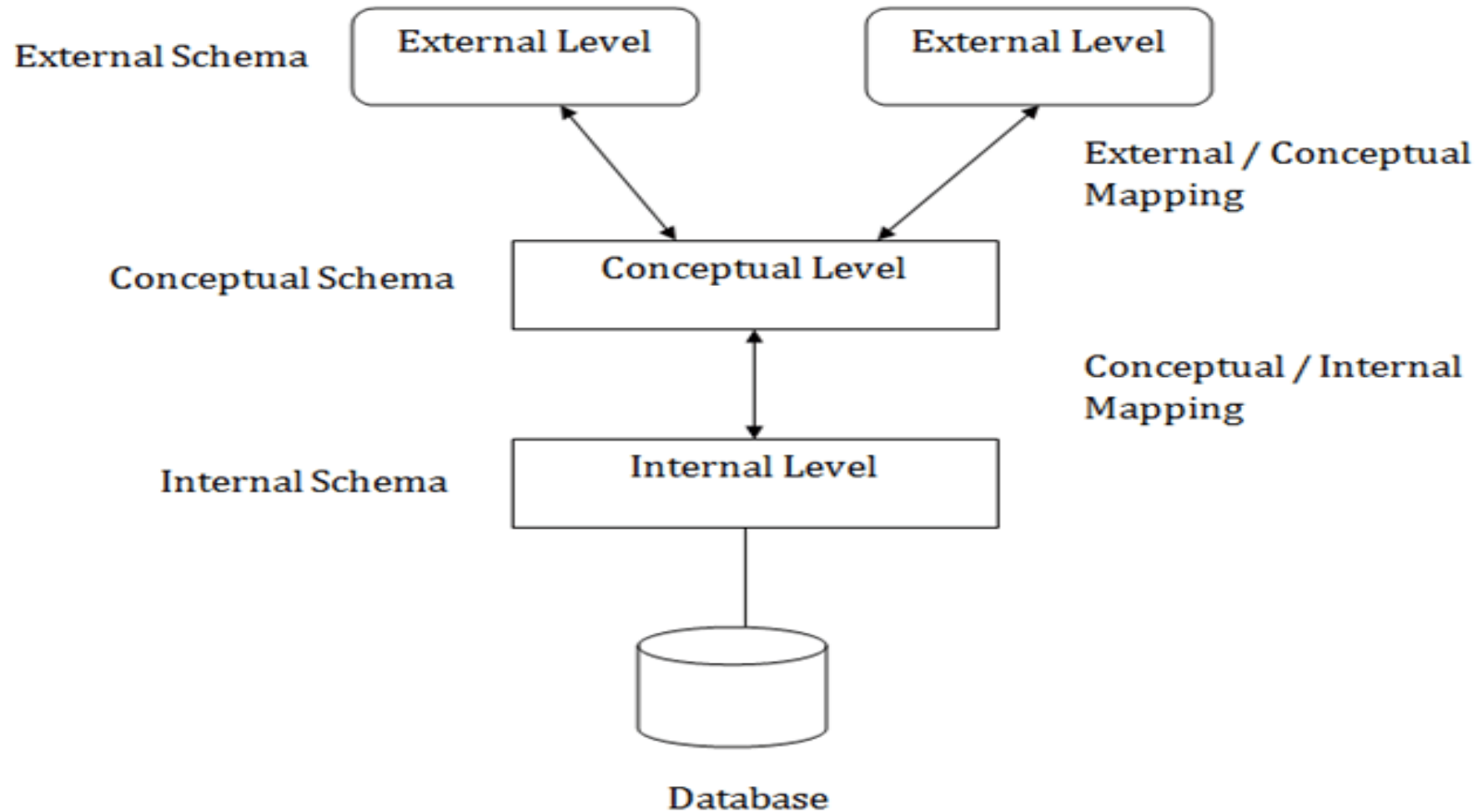
Three level schema



- 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





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.



Objectives of Three schema Architecture – Cont..



2. Conceptual Level

Global view

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

- 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.

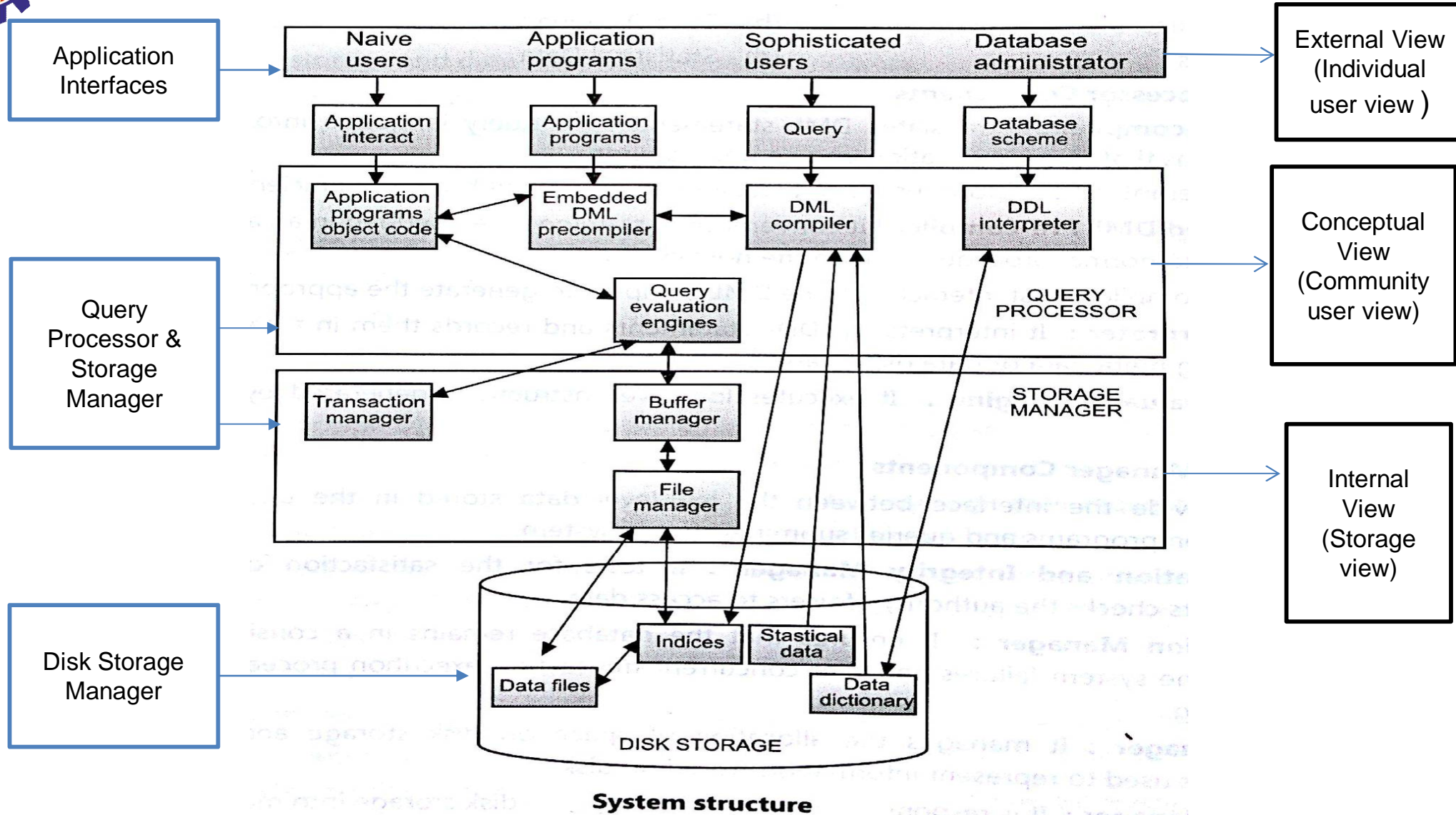
External View

| | |
|--------------|--------------|
| Empno | Ename |
|--------------|--------------|

| | | | |
|--------------|--------------|---------------|---------------|
| Empno | Ename | Salary | DeptNo |
|--------------|--------------|---------------|---------------|



DATABASE ARCHITECTURE





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 Compiler



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 of the information on disk.

4. Buffer Manager

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

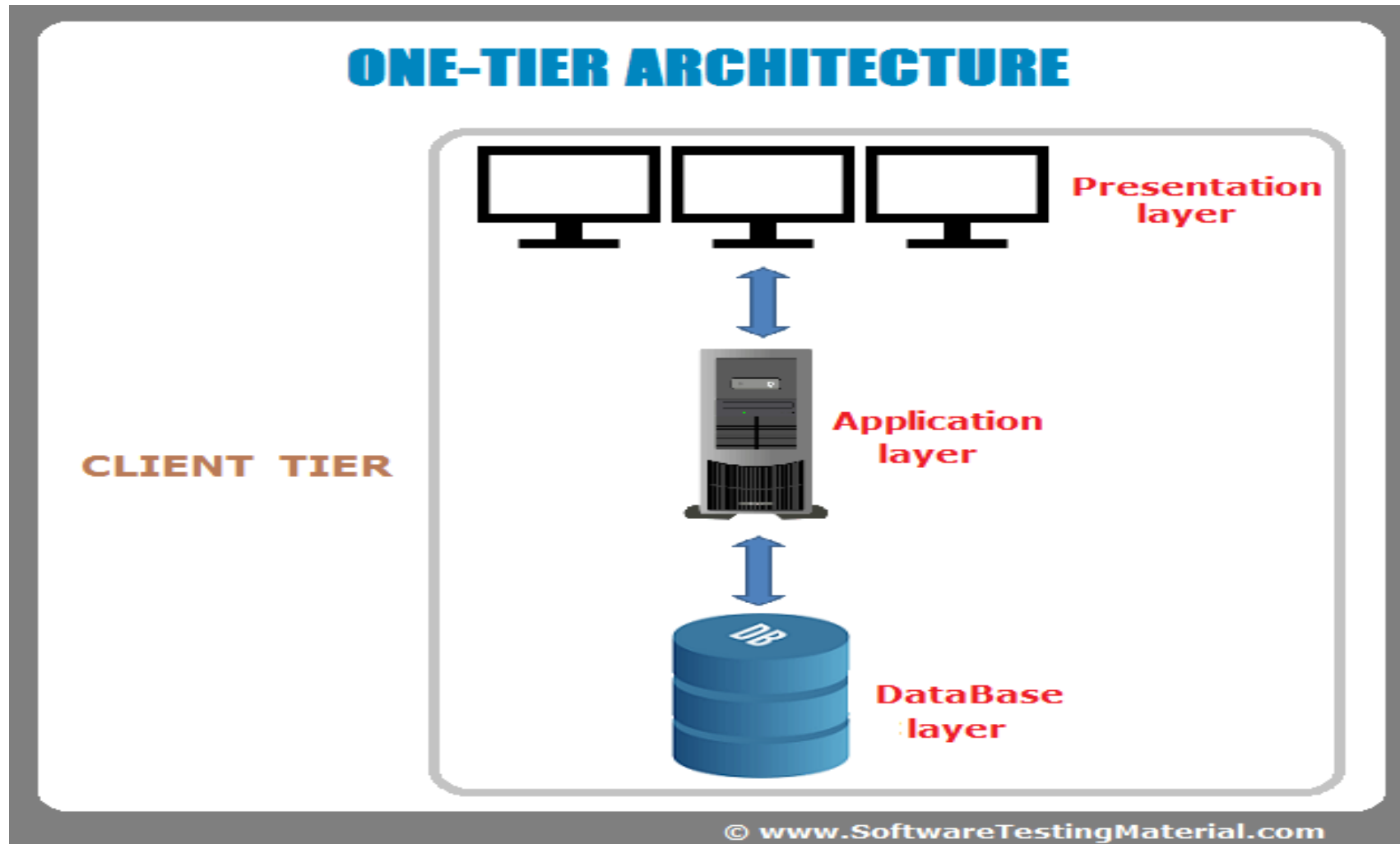


1-Tier Architecture

- 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.

Break

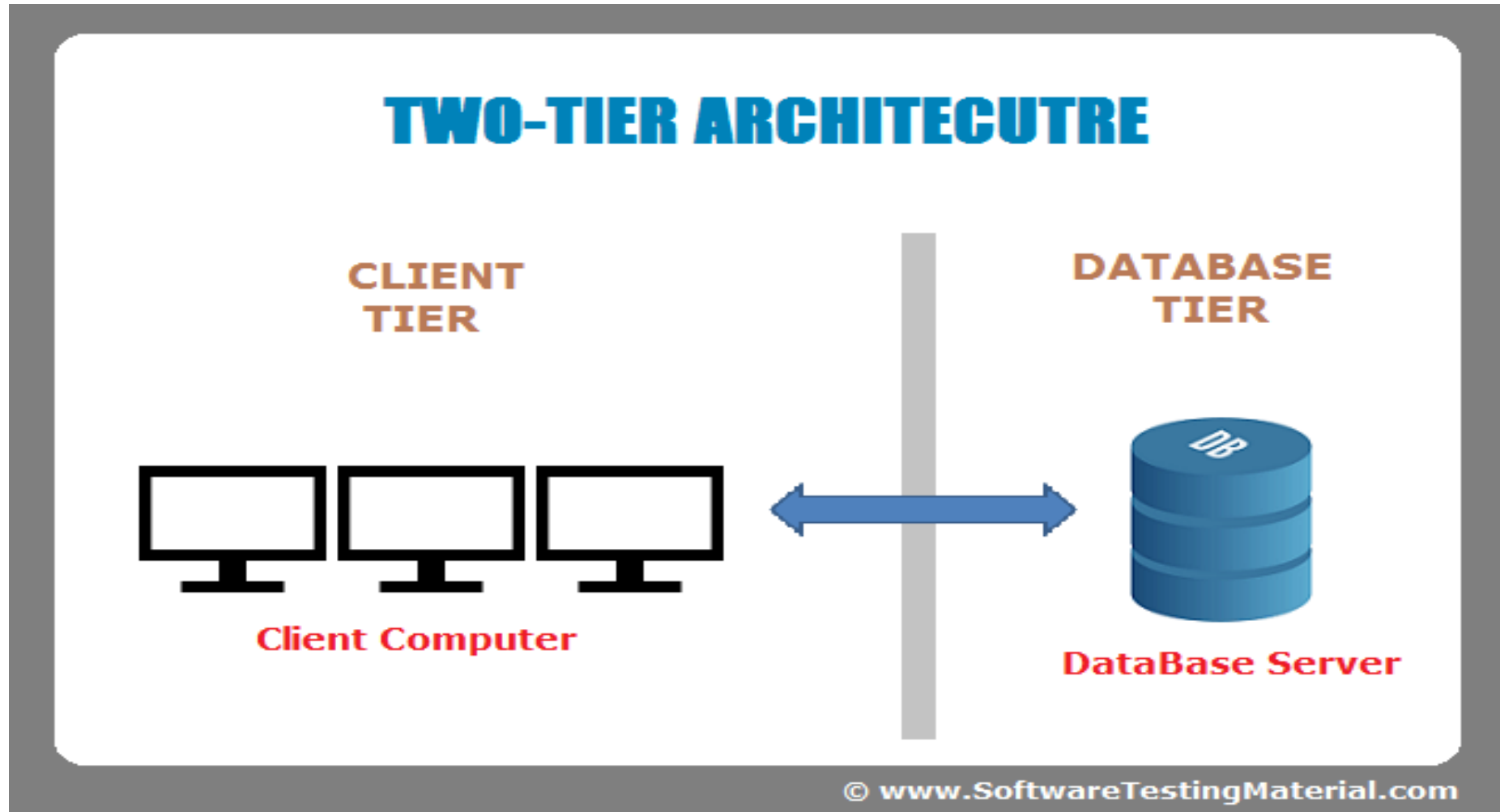






2-Tier Architecture

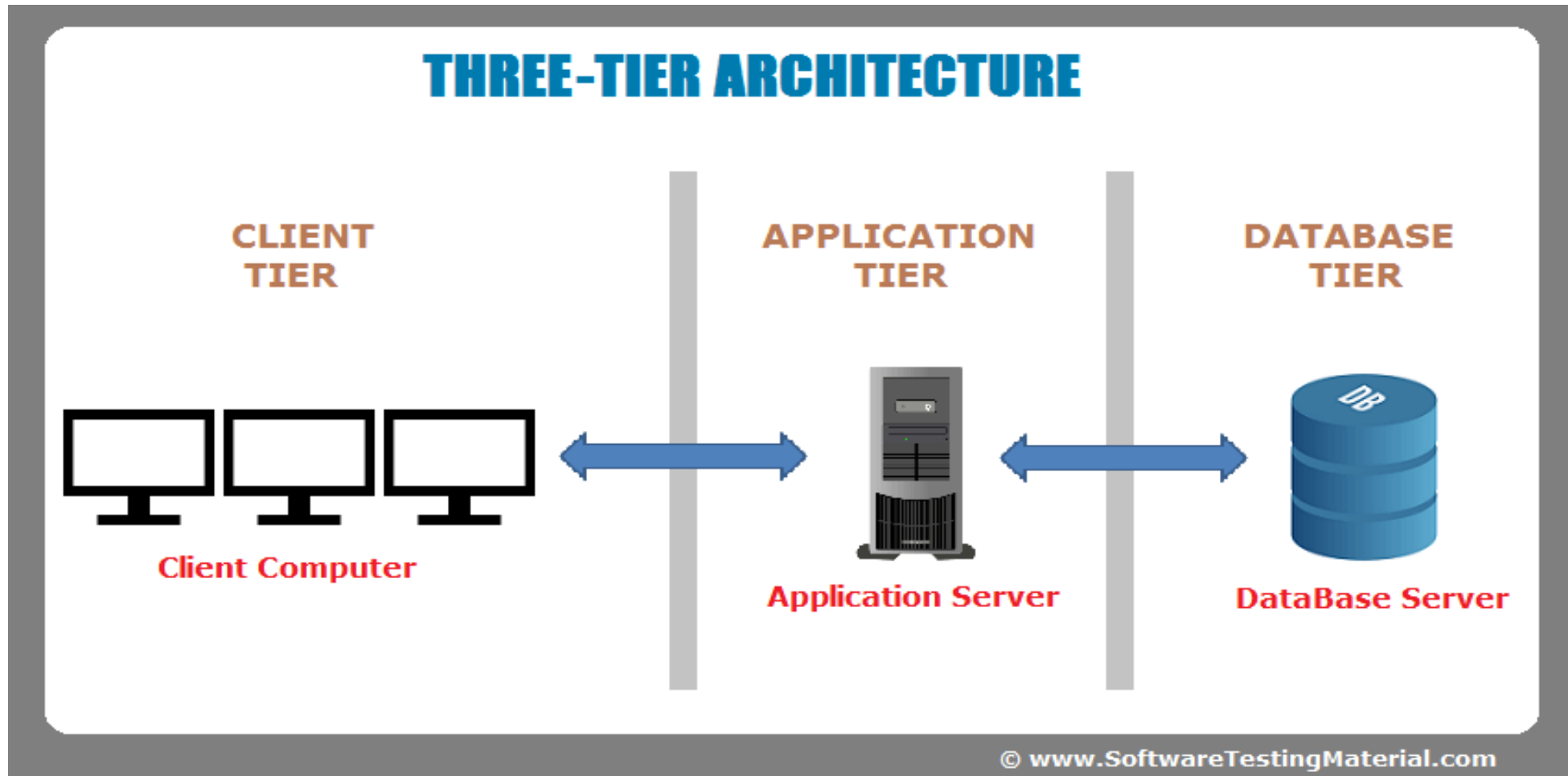
- If the architecture of DBMS is 2-tier, then it must have an application through which the DBMS can be accessed.
- Programmers use 2-tier architecture where they access the DBMS by means of an application.
- Here the application tier is entirely independent of the database in terms of operation, design, and programming.





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.





Evaluation



1. List out the types of structure view

a) _____

b) _____

c) _____

Answer :

a) External View

b) Conceptual View

c) Internal View



REFERENCES



1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, - Database System Concepts||, Sixth Edition, Tata McGraw Hill, 2011.
2. Ramez Elmasri, Shamkant B. Navathe, –Fundamentals of Database Systems, Sixth Edition, Pearson Education, 2011.
3. C.J.Date, A.Kannan, S.Swamynathan, –An Introduction to Database Systems, Eighth Edition, Pearson Education, 2006.
4. Raghu Ramakrishnan, –Database Management Systems||, Fourth Edition, McGraw-Hill College Publications, 2015.

THANK YOU