

A special processor called DML precompiler, converts the DML statements to normal procedure calls in host language.

2. Sophisticated Users:-

They interact with systems without writing code. Instead, they form their request in a database query language. Each subquery is submitted to a query processor whose function is to break down DML statement into instructions that the storage manager understands.

3. Specialized Users:-

Specialized users are sophisticated users who write specialized database applications that do not fit into the traditional data processing framework. Among these applications are computer aided design systems, knowledge-base & expert systems.

4. Naive Users:-

They are unsophisticated users who interact with the system by invoking one of the permanent application programs that have been written previously.

Centralized and Client-server DBMS Architectures:

Centralized DBMS:

- It combines everything into single system including DBMS software, hardware, application programs, and user interface processing software.
- Users can still connect through a remote terminal however, all processing is done at centralized site.

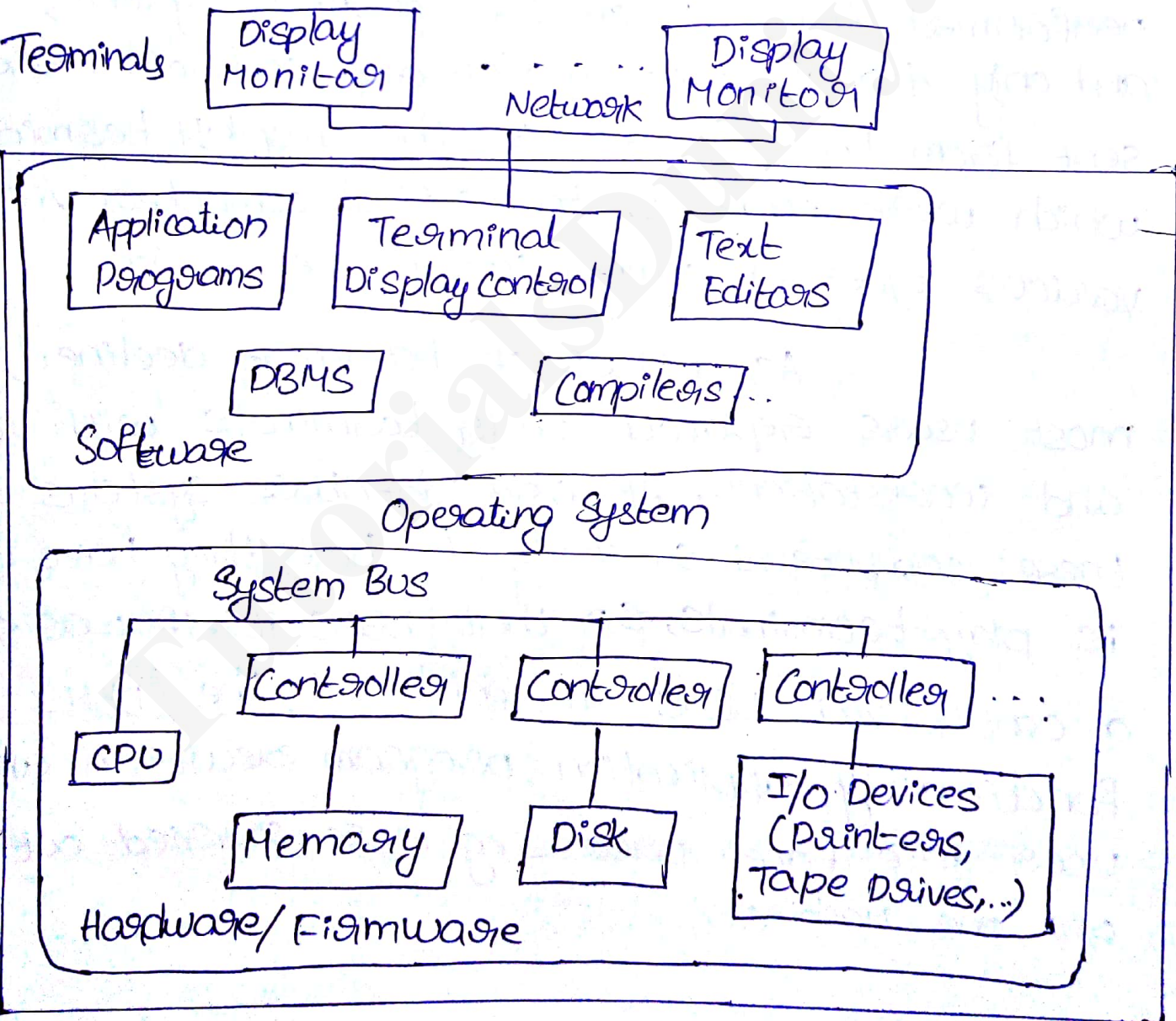


Fig: A physical centralized architecture

Architectures for DBMS have evolved over time, similar to those generating computer system architectures. Earlier architectures used mainframes computers to provide the main processing for all system functions, including user application programs and user interface programs as well as DBMS functionality. The reason was that most users accessed such systems via computer terminals that did not have processing power and only provided display capabilities. Therefore all processing was performed remotely on the computer system, and only display information and controls were sent from the computer to the display terminals, which were connected to central computer via various types of communication networks.

As prices of hardware declined, most users replaced their terminals with PCs and workstations. At first database systems used these computers similarly to how they have used display terminals, so that DBMS itself was still a centralized DBMS in which all the DBMS functionality, application program execution and user interface processing were carried out on one machine.

Basic 2-Tier Client-Server Architecture:

- Specialized servers with specialized functions
- Print server
- File server
- DBMS server
- Web server
- Email server
- clients can access the specialized servers as needed.

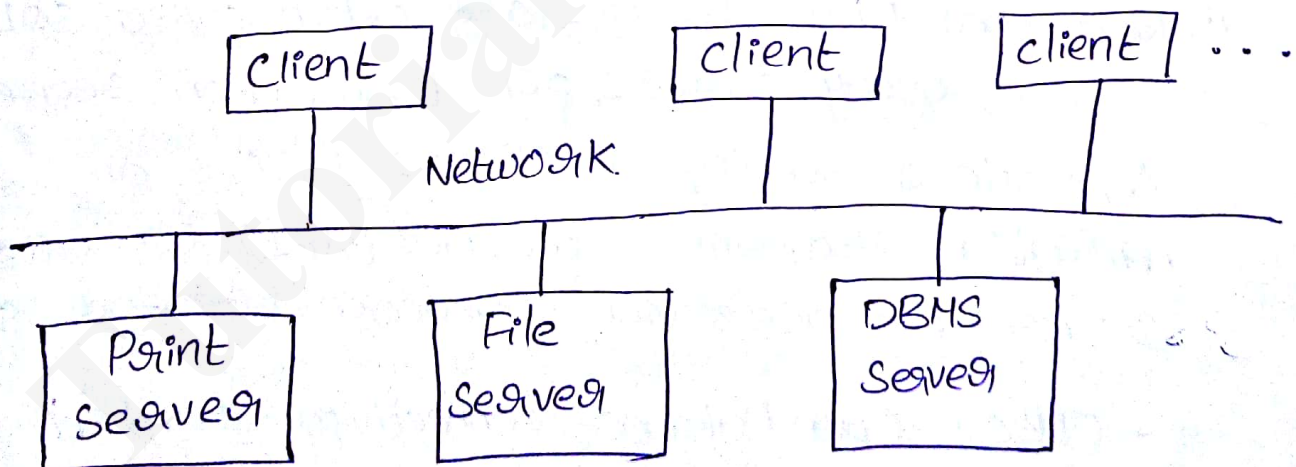


Fig: Logical two-tier client/server architecture

Clients:

- i, clients provide appropriate interfaces through a client software module to access and utilize the various server resources.
- ii, clients may be diskless machines or PCs or workstations with disks with only the client software installed.
- iii, connected to the servers via some form of a network like local area network (LAN), wireless network etc..

DBMS server:

- i, It provides database query and transaction services to the clients.
- ii, Relational DBMS servers are often called SQL servers, query servers, or transaction servers. Applications running on clients utilize an Application Program Interface (API) to access server databases via standard interface such
 - ODBC: Open Database Connectivity standard
 - JDBC: for Java programming access
- iii, client and server must install appropriate client module and server module software for ODBC or JDBC

Two Tier Client-Server architecture:

Page No. 5

- * A client program may connect to several DBMSs, sometimes called the data sources.
- * In general, data sources can be files or other non-DBMS software that manages data. Other variations of clients are possible.

Ex: In some object DBMSs, more functionality is transferred to clients including data dictionary functions, optimization and recovery across multiple servers etc.

Three Tier client-server architecture:

- * Common for web applications.
- * Intermediate layer called Application Server or Web Server.
- * It stores the web connectivity software and the business logic part of the application used to access the corresponding data from the database server.
- * It acts like a conduit for sending - partially processed data between the database server and the client.

- Three-tier Architecture can enhance security.
- Database server only accessible via middle tier.
- clients cannot directly access database server.

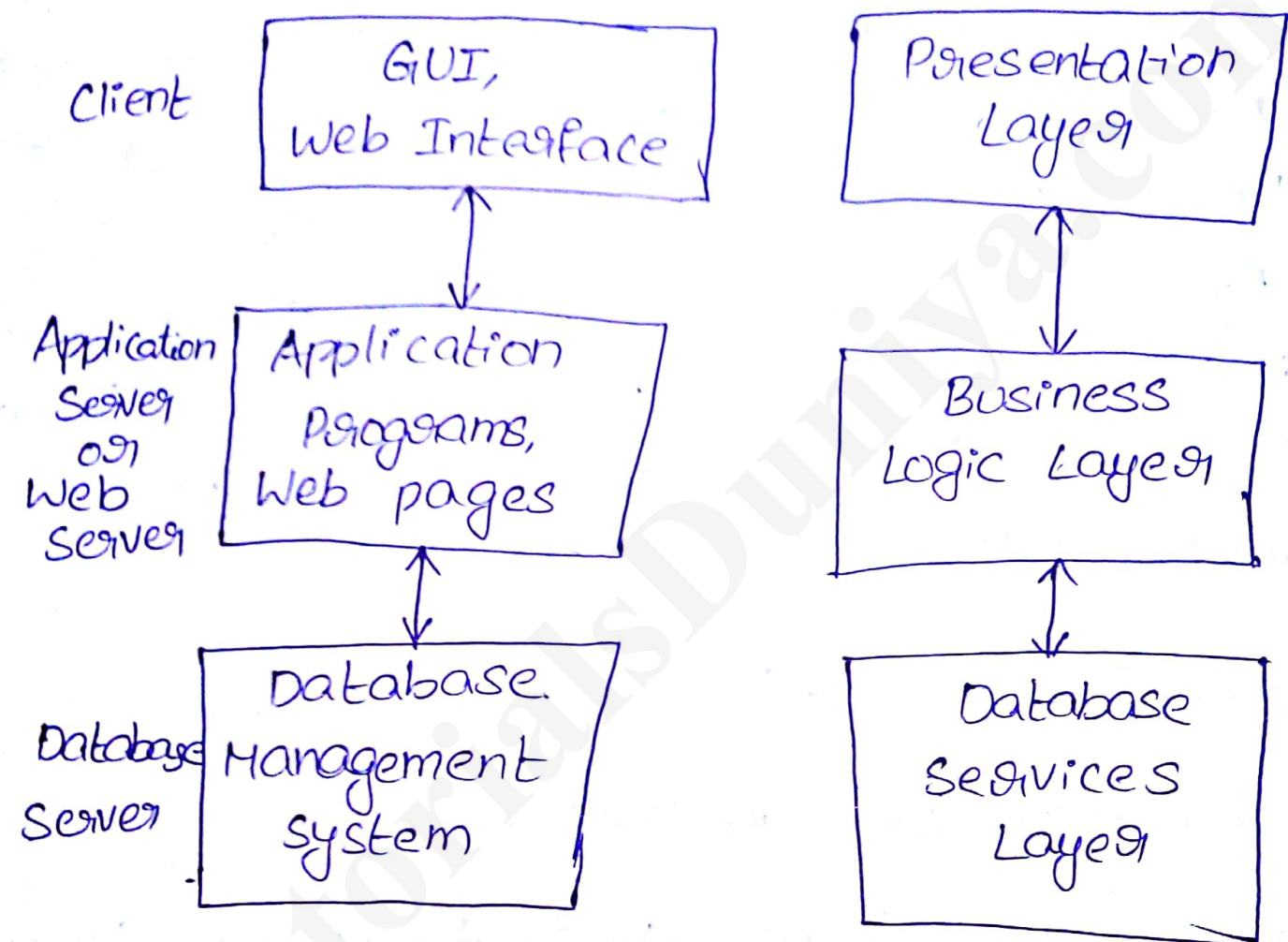
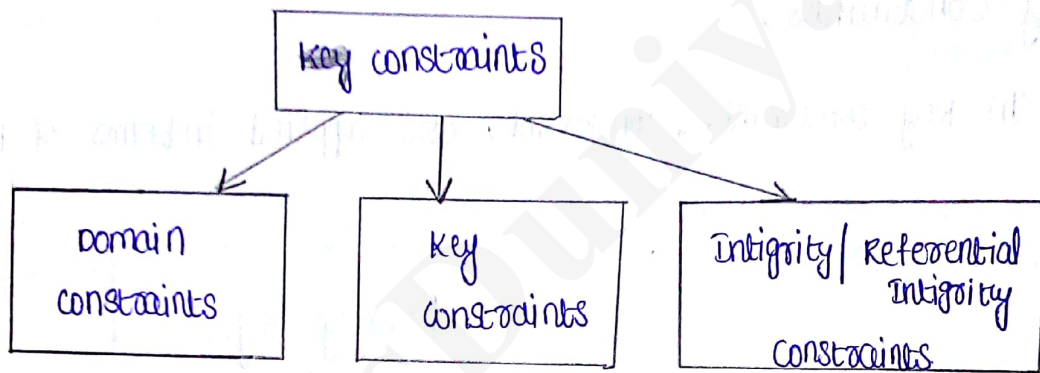


Fig: Logical three-tier client/server architecture.

Key Constraints:

A key constraint is a statement that a certain minimal subset of the fields of a relation is a unique identifier for a tuple. A set of fields that uniquely identifies a tuple according to a key constraint.



(1) Domain Constraints : This domain constraints are applied a particular field.

* CHECK key is one of the Domain key.

CHECK constraint:

Its a check constraint is a type of Domain constraint in SQL which specifies a requirement that must be met by each row in a database table.

- It is used to check the condition.

Example:

```
create domain D1  
sal float  
check sal_value >= 20,000;
```

Checks conditions as follows by using check:

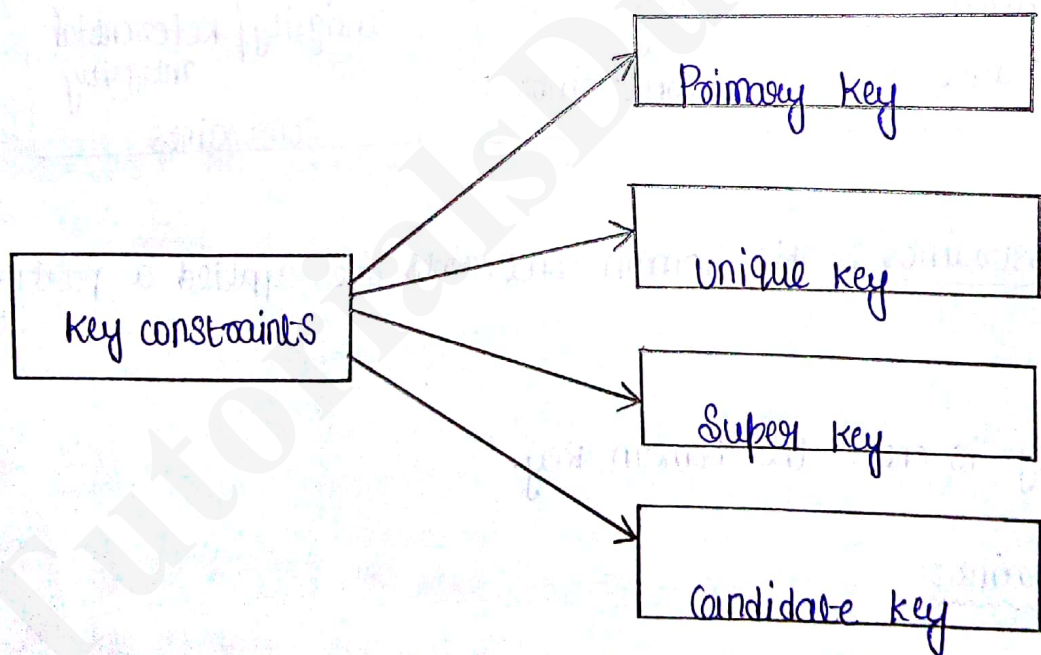
1. First check salary in float (or) not

2. second check enter sal_value > 20,000 (or) not.

If you enter sal_value < 20,000 it generate's an error.

(2) Key Constraints:

In key constraints, constraints are applied in terms of keys.



(a) Primary key: A primary key is a field in a table which uniquely identifies each row/record in a database table. primary keys must contain unique values. A primary key column cannot have duplicate values and null values.

characteristics of a primary key:

- * one per base table
- * cannot be null
- * Is defined as a table constraint
- * Best practice is a single column

usage: create table student (sid integer PRIMARY KEY, Name varchar(20),
class integer, Age integer);

<u>SID</u>	NAME	class	AGE
------------	------	-------	-----

Not allow duplicate and null values because of
SID ^{contains} applied by primary key.

prime attribute: An attribute contains primary key constraint that attribute is called as prime attribute.

Example: SID (in above table)

(b) Unique Key:

Unique key constraints are used to ensure that data is not duplicate in two rows in the database. one row in the database is allowed to have null for the value of unique key constraint.

characteristics of a unique key:

- * one or more per base table
- * can be null
- * one or more columns
- * Any data type