

CHAPTER 1 DATABASES AND DATABASE USERS

DATABASE MANAGEMENT SYSTEM [DBMS]

**A COMPUTERIZED GENERAL-PURPOSE DATA STORAGE
AND RETRIEVAL SYSTEM**

DATABASE

**A LOGICALLY COHERENT COLLECTION OF DATA
REPRESENTING SOME APPLICATION (CALLED THE
“MINI WORLD” OR UNIVERSE OF DISCOURSE)**

FUNCTIONS

DATABASE DEFINITION

SPECIFY TYPES, STRUCTURES, CONSTRAINTS

DATABASE CONSTRUCTION

POPULATE THE DATABASE WITH DATA

DATABASE MANIPULATION

QUERY THE DATABASE – RETRIEVE DATA

**MODIFY THE DATABASE – REFLECT CHANGES TO
THE MINIWORLD**

DBMS CHARACTERISTICS

⇒ PROGRAM / DATA INDEPENDENCE

USERS OF THE DBMS ARE INSULATED FROM THE PHYSICAL DETAILS OF DATA STORAGE.

⇒ DATA ABSTRACTION

USERS SEE ONLY A CONCEPTUAL VIEW OF THE DATABASE. IMPLEMENTATION DETAILS ARE HIDDEN.

⇒ SELF - DESCRIBING

DATABASE CONTENT AND STRUCTURE DEFINITIONS (META-DATA) ARE STORED IN THE DATABASE.

⇒ SUPPORT FOR MULTIPLE USERS

VIEWS – SUBSETS OF THE DATABASE OR VIRTUAL DATA

⇒ DATA SHARING & MULTIUSER TRANSACTION PROCESSING

ALLOW CONCURRENT ACCESS

ENSURE DATABASE INTEGRITY

DBMS USER TYPES (GENERALIZED)

⇒ **END USERS** **NAÏVE → SOPHISTICATED**

ACCESS

MANIPULATION

⇒ **DATABASE DESIGNERS/PROGRAMMERS**

DEFINITION

CONSTRUCTION

ACCESS

MANIPULATION

⇒ **DATABASE ADMINISTRATOR**

SECURITY

PERFORMANCE

COORDINATION

ACCESS CONTROL

DBMS ADVANTAGES

- ⇒ **CENTRALIZATION**
- ⇒ **INTEGRATED / SHARED DATA**
- ⇒ **DATA INDEPENDENCE**
- ⇒ **REDUCED REDUNDANCY**
- ⇒ **INTEGRITY / CONSISTENCY OF DATA**
- ⇒ **STANDARDIZATION**
- ⇒ **FLEXIBILITY**
- ⇒ **REDUCED DEVELOPMENT TIME**
- ⇒ **BACKUP AND RECOVERY FACILITIES**

DBMS DISADVANTAGES

- ⇒ **CENTRALIZATION**
- ⇒ **RELIABILITY**
- ⇒ **SECURITY**
- ⇒ **COST**

INITIAL

ONGOING

OVERHEAD

CHAPTER 2 DBMS ARCHITECTURE

DATA MODELS - DESCRIBE DATABASE STRUCTURE

- **CONCEPTUAL**

ENTITY-RELATIONSHIP MODEL

DEFINES ENTITIES AND THE RELATIONSHIPS BETWEEN THEM.

- **IMPLEMENTATION**

NETWORK

HIERARCHICAL

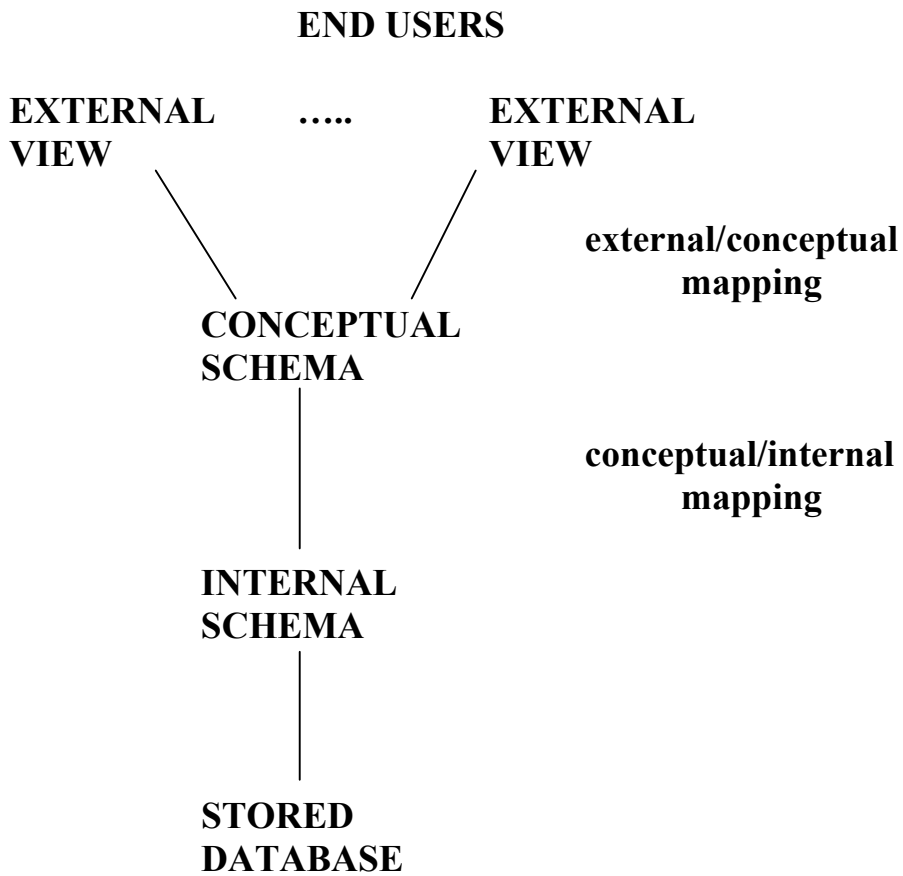
RELATIONAL

OBJECT-ORIENTED

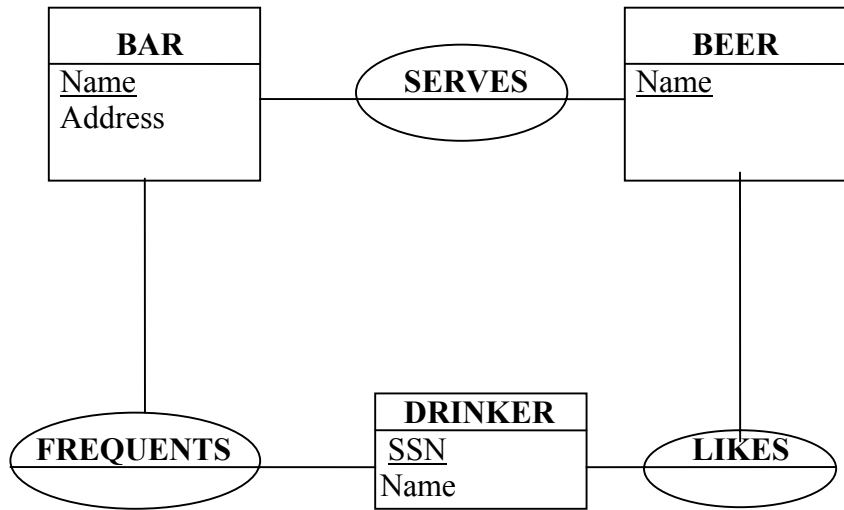
SCHEMA - DESCRIPTION (INTENSION)

INSTANCE - CURRENT STATE (EXTENSION)

THREE-SCHEMA ARCHITECTURE



CONCEPTUAL – ER DIAGRAM



DDL - DATA DEFINITION LANGUAGE

```
CREATE TABLE FREQ
  ( DRINKER          CHAR (10),
    BAR              CHAR (10) );
```

```
CREATE INDEX  FREQ_INDEX  ON
  FREQ ( DRINKER );
```

DML - DATA MANIPULATION LANGUAGE

```
INSERT INTO FREQ VALUES ('Fred', 'The Keg');
```

```
SELECT DRINKER
  FROM FREQ
  WHERE BAR = 'The Keg';
```

```
SELECT UNIQUE BAR
  FROM FREQ
  WHERE DRINKER = 'Fred'
     OR
     DRINKER = 'Joan';
```