CHAPTER – V

SYSTEM DESIGN

5.1 Introduction

5.2 Input Design

5.3 Output Design

5.4 Screen Design

5.5 Schema Design(Entity Relationship Diagram)

5.6 Data Dictionary

5.7 Data Base Design

5.7.1 Normalization

5.8 File Specification

5.1 INTRODUCTION

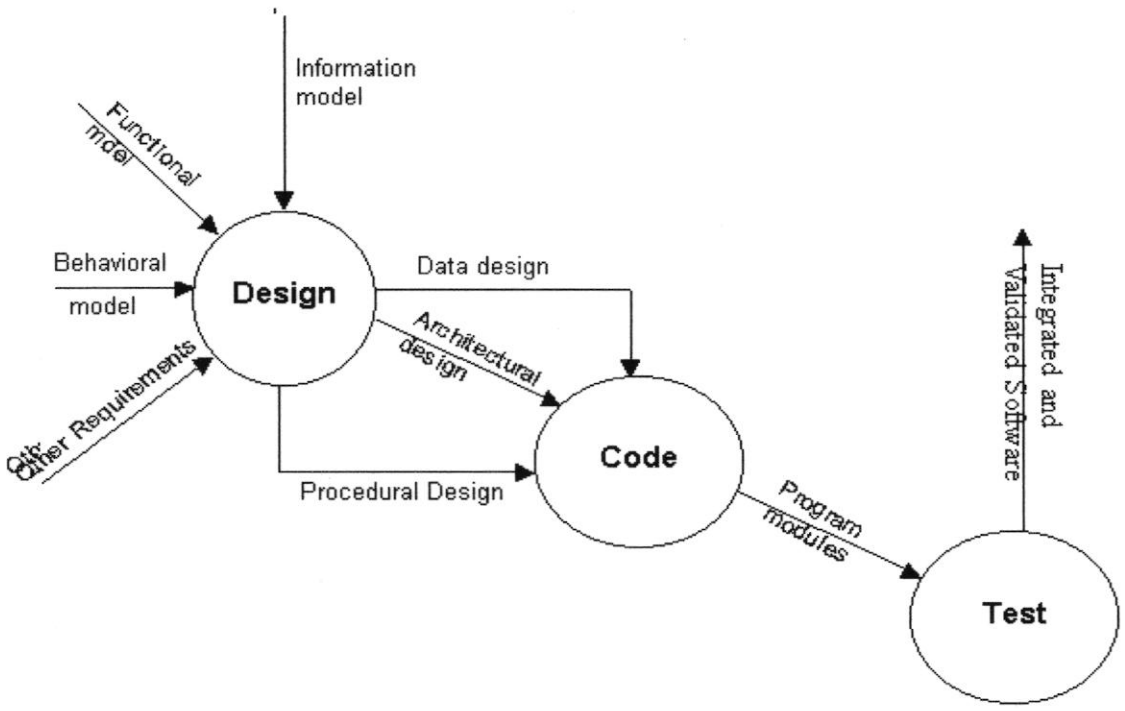
Software design is a process through which requirements are translated into a representation of Software. It may be defined as *"the process of applying various techniques for the purpose of defining a device, a process or a system in sufficient detail to permit its physical realization"*[2]. It facilities the understanding and provide the procedural details necessary for implementation of the system recommended in the feasibility study. Emphasis is given on translating the performance requirements into design specifications. Design goes through logical and physical stages of development. Logical design reviews the present physical system; prepares input and output specifications; make edit; security and control specifications; details the implementation plan, and prepare logical design walk through. The physical design maps out the details of the physical system, plans the system implementation plan and specifies any hardware and software. System design translates the system requirements in to a ways of the system recommended in the feasibility study. So system design is a translation from a user–oriented document to a document oriented to a programmers or database personnel. System design is a highly creative process which can be greatly facilitate by the following–

- ✓ Strong Problem Definition
- ✓ Pictorial description of the Existing System
- ✓ Set of Requirements of the new system.

The database design phase covers E-R diagram, database design and integrity constraint diagram. Similarly architectural design covers menu hierarchy design, form design, report format design, application

[2] Software Engineering by Rogor S. Pressman

flow diagram and security measures. In the procedural design phase we have considered the pseudocodes of designed module.



5.2 INPUT DESIGN

It is the first step in design within predefined guideline. Here, user–oriented inputs are converted to a computer based format. Input design is a crucial part of any system design. Inaccurate input data are the most common causes of errors in data processing. Error entered can be controlled by input design. The goal of displaying input data is to make data as easy as possible, logical and free from errors. Keeping the user requirements in view, the input screen have been designed and developed for easy and error free data entry. We design the source documents that capture the data and enter them into a computer. Several input forms have been designed. These input

screens are of the fill–in blank type and are provided with system prompt and message to guide the data entry operator step by step.

5.3 OUTPUT DESIGN

In output design, the emphasis is on providing a hard copy of the information requested or displaying the output on a CRT screen in a predefined format. Computer output is the most important and direct source of information to the user. Efficient, intelligent output design should be prepared to improve the system relationships with its user and help in decision making. A major form of output is a hardcopy from the printer. In the system under consideration, printouts are designed around the requirement of the user.

5.4 SCREEN DESIGN

With data there is no system, but some data must be provided in the right screen for input and the information produces must be in a format acceptable to the user. The screen carries some data, which come from people, and information output of the system goes to the people. Screen is a physical carrier of data or information.

5.5 SCHEMA DESIGN (ENTITY RELATIONSHIP DIAGRAM)

The most important consideration in database design is how the information will be stored. The various applications and procedures will be use in the database to introduce requirements upon the structure of data.

In a relational database, representation of the data and data relationship as collection of tables. Each table has one or more columns.

The first step in creating a database is designing it. First plan, what tables we require and what they will contain. It also determines how the tables are related. This is an important step and deserves careful consideration.

It should be determined what things we want to store information about (entities) and how these are related (relationship). A useful technique in designing the database is to draw a picture of tables. The graphical display of a database is called **E**ntity–**R**elationship **D**iagram. Usually, each box in an **E–R D**iagram corresponds to a table in a relational database and each line from the diagram corresponds to a foreign key.

Entity-**R**elationship model is a popular high-level conceptual data model. This model and its variation are frequently used for conceptual design of database application, and many database design tools employ its concept.

The following diagram illustrates the notations, the system used to create in the E–R Diagram.

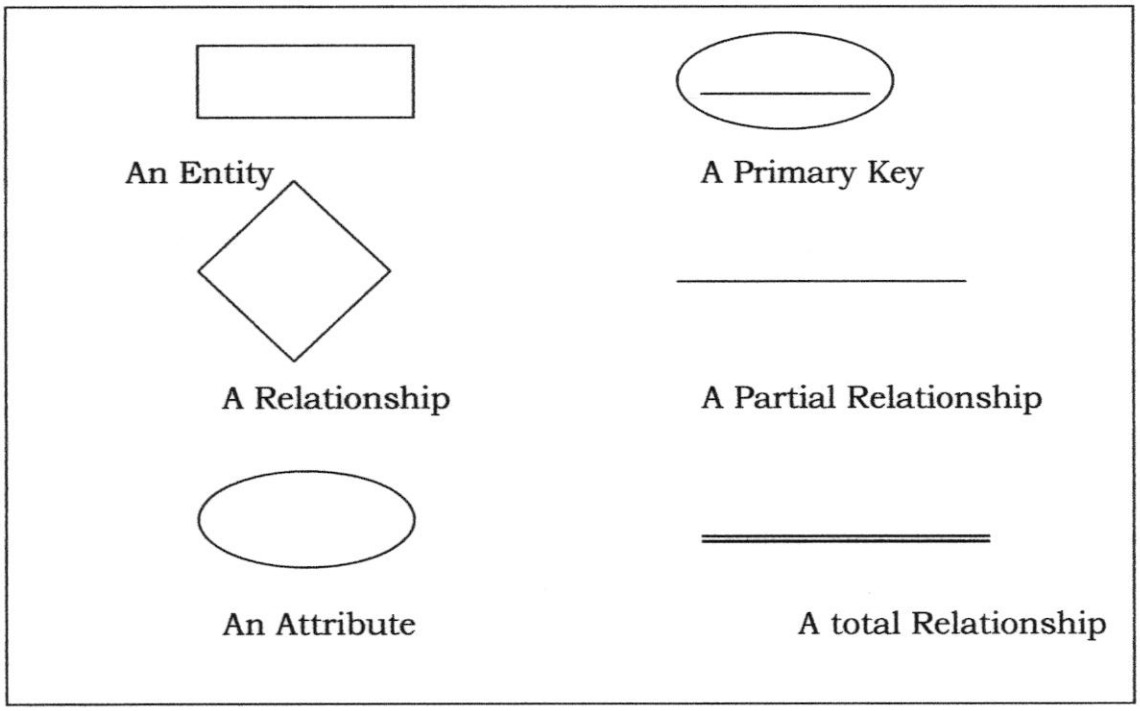
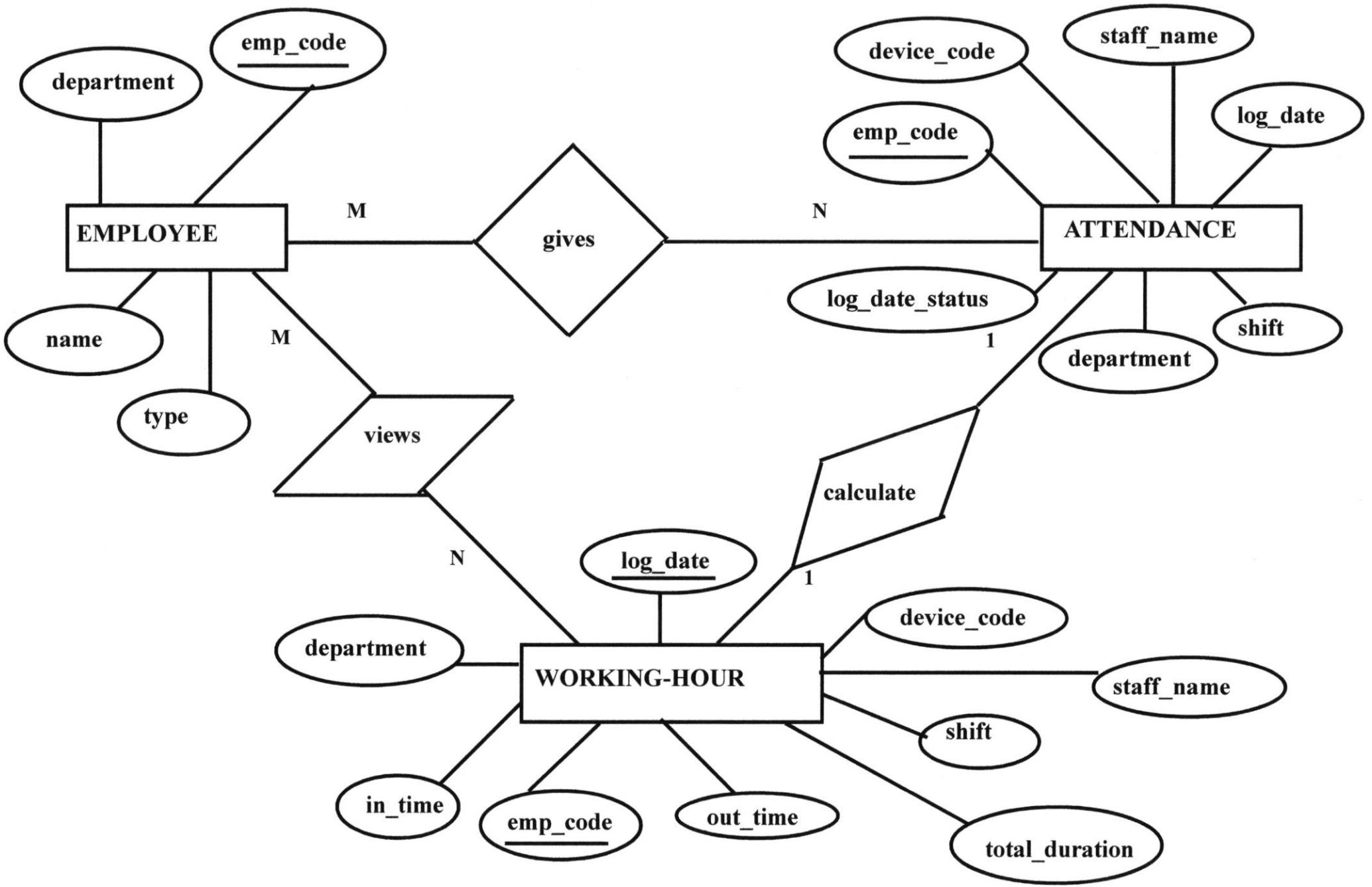


Fig. : Notation used to create E-R Diagram


emp_code
department
EMPLOYEE
M
gives
N
ATTENDANCE
device_code
staff_name
log_date
emp_code
log_date_status
1
department
shift
name
type
M
views
N
calculate
1
log_date
department
WORKING-HOUR
device_code
staff_name
shift
in_time
emp_code
out_time
total_duration

5.6 DATA DICTIONARY

A data dictionary is a structured repository of data about data. It is a set of rigorous definition of all DFD data elements and structures.

A data dictionary has many advantages. The most obvious is documentation; it is a valuable reference in any organization. Another advantage is improving analyst \user communication by establishing consistent definitions of various elements, teams and procedures. Also a data dictionary is an important step in building a database.

The data dictionary of the proposed **AUTOMATED EMPLOYEE ATTENDANCE ANALYSIS SYSTEM** is mentioned below:-

Sl. No	**ITEM DATA**	**ITEM TYPE**	**CONSTRAINTS**	**ITEM DESCRIPTION**
1.	Emp_Code	Text	Primary Key	Stores employee code
2.	Device_Code	Text		Stores device code
3.	Staff_Name	Text	Primary Key	Stores name of the staff
4.	Department	Text		Stores department of the employee
5.	Shift	Text		Stores shift of the employee
6.	Log_Date	date		Stores the present date
7.	In_Time	time		Stores entry time of the employee

Contd..

Sl. No	ITEM DATA	ITEM TYPE	CONSTRAINTS	ITEM DESCRIPTION
8.	Out_Time	Time		Stores exit time of the employee
9.	Total_duration	Double		Stores total time duration of the employee
10.	Emp_Code	Text		Stores employee code
11.	Device_Code	Text		Stores device code
12.	Staff_Name	Double		Phone
13.	from_date	date		Stores the starting date
14.	to_date	date		Stores the end date

5.7 DATA BASE DESIGN

The collection of data is usually referred to as the database. The objective of the database is accuracy and integrity, successful recovery from failure, privacy and security of data, and good overall performance. The database contains information about the particular enterprise. Database systems are designed to store and manage large volume of information. The management of data involves both the definition of structures of the storage of information and provides mechanism for the manipulation of information. In addition, the database system must be responsible for safety of information stored in the database, despite system crashes or unauthorized access.

As regards the system under consideration, as it is to be developed and installed on a relational DBMS. The database has been

designed in the form of some normalized relational tables. For the purpose, the system has been analyzed to determine the entities and their attributes. After that, considering the relationship between different entities as depicted while studying the existing system and talking in to account the requirements of the proposed system. The database tables have been designed for the proposed system as described at the end of this chapter.

5.7.1 NORMALIZATION

In logical database we have discussed E-R diagram. Normalization is also a logical database design where step-by-step decomposition of complex records into simple record is being done. Precisely we can define normalization as the process during which unsatisfactory relation schemes are decomposed by breaking up their attributes into smaller relation schemes in desirable properties. The main objective of normalization is to reduce redundancy-using principle of no loss decomposition. No loss decomposition implies reduction of table into smaller without loss of information.

One objective of the normalization process is to ensure that the update anomalies do not occur.

Normal form provides us the following facilities:

i) A formal framework for analyzing relations schema based on their keys and on functional dependencies among their attributes.

ii) A series of tests that can be carried out on individual relation schemas so that relational database can be normalized to any degree. When a test fails the relation

violating that test must be decomposed into relations that individually meet the normalization tests.

We have normalized our tables up to BCNF.

Validating 1NF All the tables are in 1NF since

(i) Their attributes are atomic i.e. simple and individual

(ii) There is no repetition of data.

Validating 2 NF All the tables in 2NF since

(i) Tables are identified with more than one key.

(ii) Data that depends on only one part of the key are removed,

(iii) One or more tables and relationships are created with the data that has been removed.

Validating 3NF All the tables in 3NF since

(i) Data that depends on other data in the table and not on the key are removed.

(ii) One or more tables and relationship are created with the data has been removed.

Validating BCNF All the tables are BCNF since

(i) Data that depends on other keys in the table and not on the super key are removed.

One or more tables and relationships are created with the data has been removed.

5.8 FILE SPECIFICATION

The most important consideration in designing the database is how the information will be used. The various applications and

procedures will be used in the database to introduce requirements upon the structure of the data.

In order to create a good database design, we (as a designer) need to consider the following points-

- Business activities that will be performed using database.
- Business rules that apply to these activities.
- Data that will be maintained in the database

1. **TABLE NAME** : **daily_attn**

Index: *Emp_code+Log_date*

Description: This table is used to keep the records of employee's attendance extract from the bio-metric device. From the device data will be exported in MS Excel format then it will be imported to database.

Sl. No	Field Name	Type	Width	Description
1	Emp_Code	varchar	10	Stores employee code
2	Device_Code	varchar	10	Stores device code
3	Staff_Name	varchar	100	Stores name of the staff
4	Department	varchar	25	Stores department of the employee
5	Shift	varchar	10	Stores shift of the employee
6	Log_Date	varchar	15	Stores present date
7	Log_Time_Status	varchar	1000	Stores the status of the log time

2. TABLE NAME:- daily_atten

Index: *Emp_code+Log_date*

Description: This table is used to keep the records of Employee's daily attendance including total working hours.

Sl. No	Field Name	Type	Width	Description
1	Emp_Code	varchar	10	Employee code
2	Device_Code	varchar	10	Stores device code
3	Staff_Name	varchar	50	Stores name of the staff
4	Department	varchar	25	Stores department of the employee
5	Shift	varchar	10	Stores shift of the employee
6	Log_Date	date		Stores the present date
7	In_Time	time		Stores entry time of the employee
8	Out_Time	time		Stores exit time of the employee
9	Total_duration	float		Stores total time duration of the employee

3. TABLE NAME : daily_atten_t

Index: *Emp_code+Log_date*

Description: This is a temporary table used for reporting purpose.

Sl. No	Field Name	Type	Width	Description
1	Emp_Code	varchar	10	Stores employee code

2	Device_Code	varchar	10	Stores device code
3	Staff_Name	varchar	50	Stores name of the staff
4	Department	varchar	25	Stores department of the employee
5	Shift	varchar	10	Stores shift of the employee
6	Log_date	date		Stores present date
7	In_Time	time		Stores entry time of the employee
8	Out_Time	time		Stores exit time of the employee
9	Total_duration	float		Stores total time duration of the employee
10	from_date	date		Stores the starting date
11	to_date	date		Stores the end date

4. TABLE NAME:-login

Index: *uname*

Description: This table is used to keep the records user name and password.

Index: *uname*

Sl. No	FIELD NAME	DATA TYPE	WIDTH	DESCRIPTION
1	uname	Text	15	User id
2	password	Text	15	Password