

CHAPTER 11

Databases

Why Study Databases?

- Definition of database - A database is an electronic system that allows data to be easily accessed, manipulated and updated.
 - A database is used by an organization as a method of storing, managing and retrieving information. Modern databases are managed using a database management system (DBMS).
-

Foundation Data Concepts

Abstract Concepts

- **Entity** – person, place, object or event
 - stored as a record or a **table row**
 - **Attribute** – characteristic of an entity
 - stored as field or **table column**
-

Foundation Data Concepts

Database Concepts

- **Database** – a collection of related tables
 - **Tables** – a collection of related records
– collection of related entities
 - **Record** – collection of fields (**table row**)
– represents an entity
 - **Field** – collection of characters (**table column**)
– represents an attribute
 - **Character** – single alphabetic, numeric or other symbol
-

Fields

- Characters “O X L O N G” form a field

Last Name
Oxlong

- A field is an attribute of an entity

Records

- A bunch of fields form a record

First Name	Last Name	Height	Weight
Mike	Oxlong	178	69

- A record is an entity

Tables

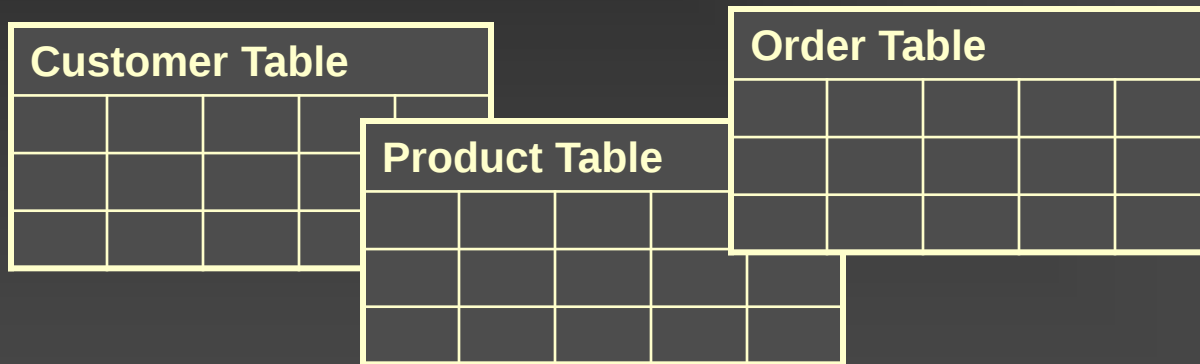
- A bunch of records forms a table

First Name	Last Name	Gender	Age
Mike	Oxlong	M	30
Ali	Puteh	M	22
Jackie	Chan	F	21

- A table is a group of related entities

Databases

- A bunch of tables form a database



- A database represents an organization or business

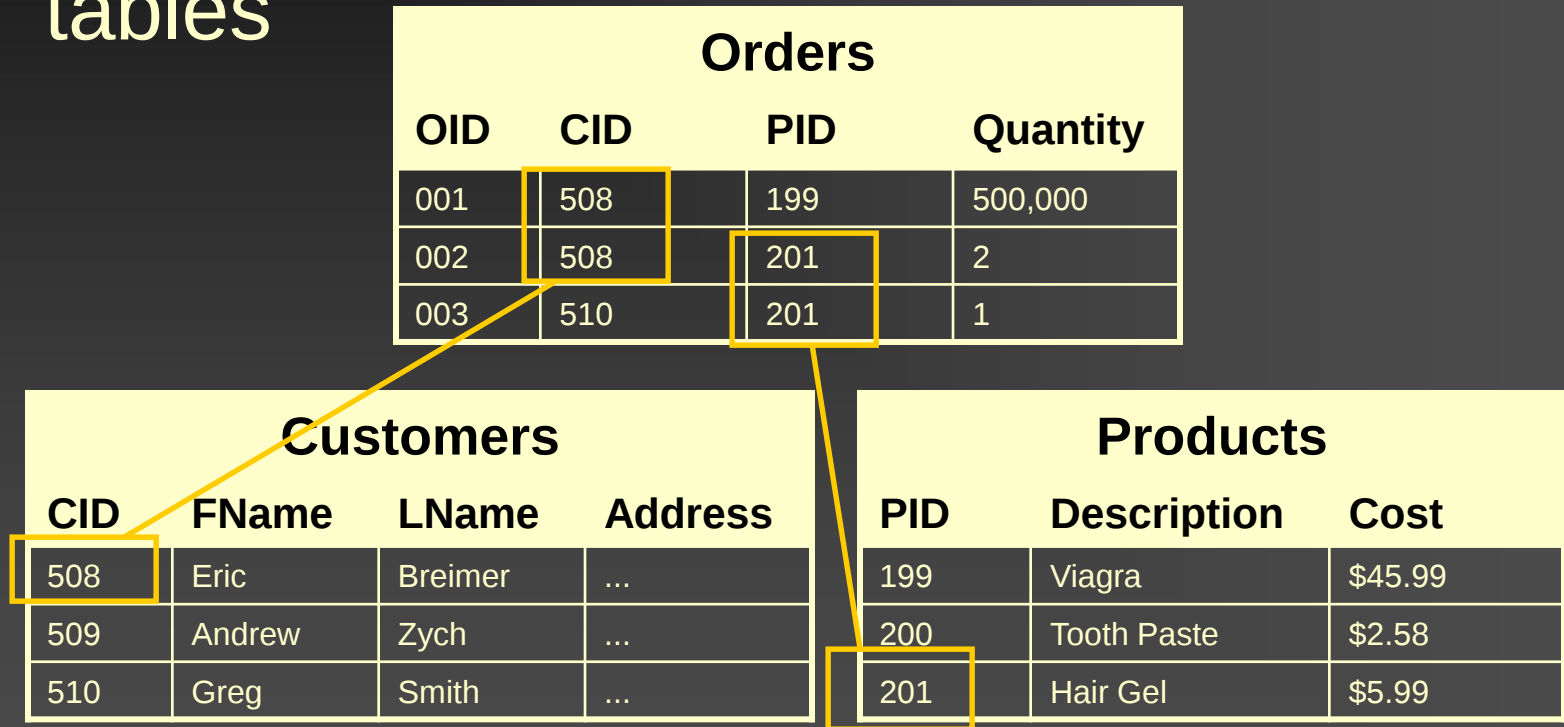
Databases

- But, databases are not just a bunch of tables

Orders			
OID	CID	PID	Quantity
001	508	199	500,000
002	508	201	2
003	510	201	1

Customers			
CID	FName	LName	Address
508	Eric	Breimer	...
509	Andrew	Zych	...
510	Greg	Smith	...

Products		
PID	Description	Cost
199	Viagra	\$45.99
200	Tooth Paste	\$2.58
201	Hair Gel	\$5.99

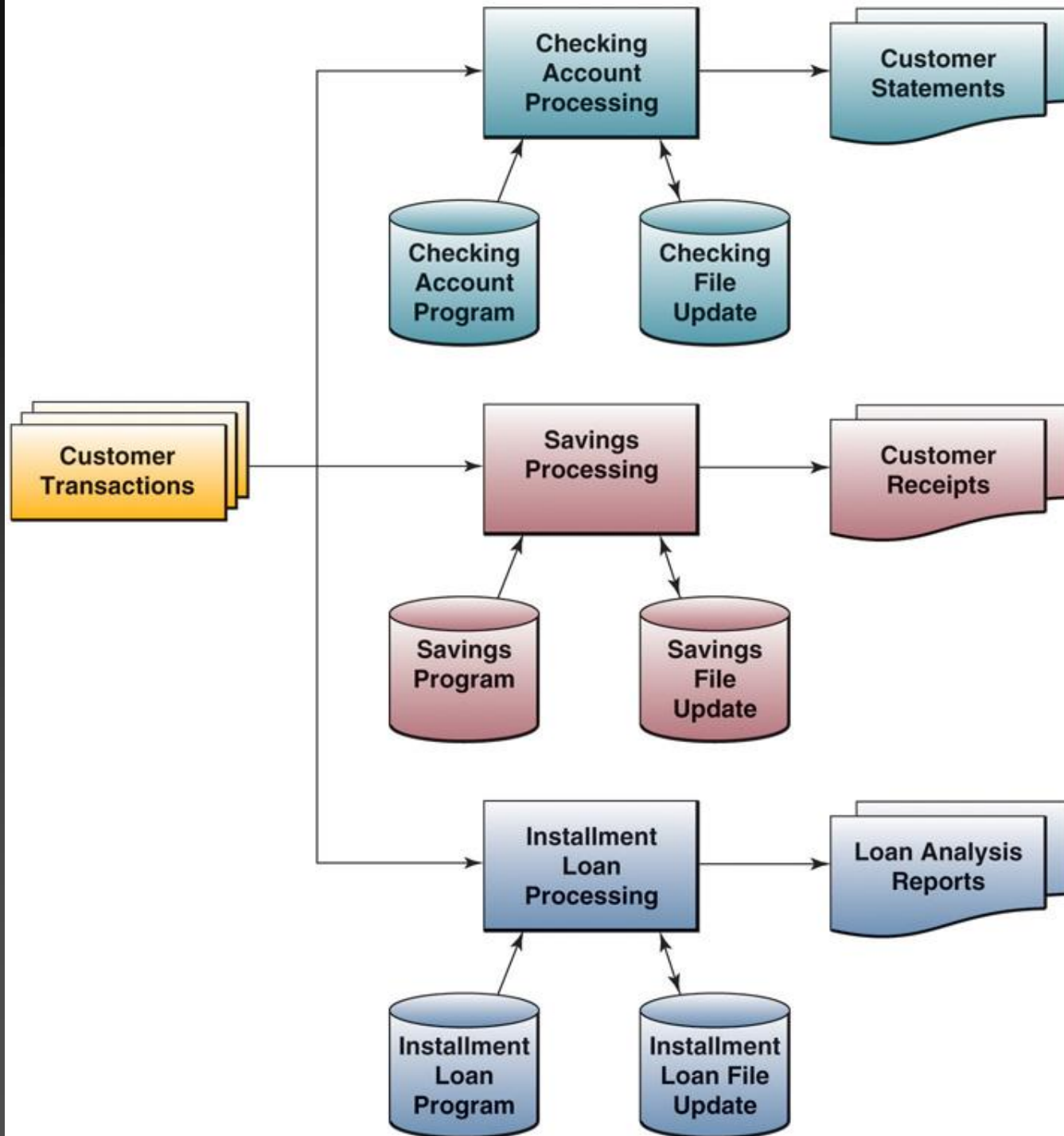


- A database also includes relationships between the different tables

Traditional File Processing

Definition:

- Data is organized, stored, and processed in independent files of data records



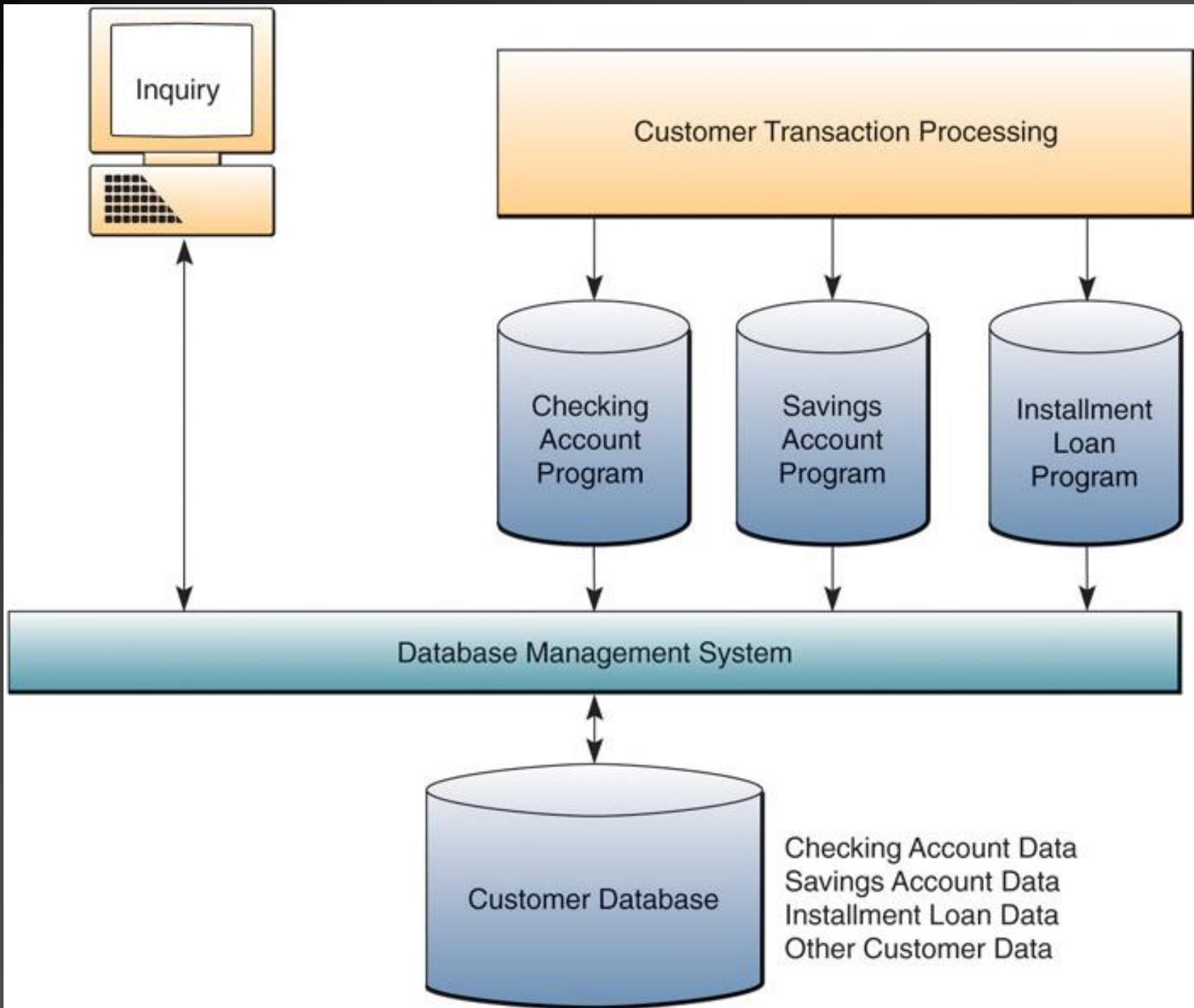
Problems of File Processing

- **Data Redundancy** – duplicate data requires an update to be made to all files storing that data
 - **Lack of Data Integration** – data stored in separate files require special programs for output making the reporting difficult
 - **Data Dependence** – programs must include information about how the data is stored so a change in storage format requires a change in programs
-

Database Management Approach

Definition:

- Consolidates data records into one database that can be accessed by many **different application programs**.
 - Software interface between users and databases
 - Data definition is stored once, separately from application programs
-



Database Management Software (DBMS)

Definition:

- Software that controls the creation, maintenance, and use of databases
-

DBMS Software Components

- Database Definition

- Language and graphical tools to define entities, relationships, integrity constraints, and authorization rights

- Application Development

- Graphical tools to develop menus, data entry forms, and reports
-

DBMS Software Components

- Transaction Processing
 - Controls to prevent interference from simultaneous users and
 - Controls to recover lost data after a failure
 - Database Tuning
 - Tools to monitor and improve database performance
-

Database Interrogation

Definition:

- Capability of a DBMS to report information from the database in response to end users' requests
 - **Query Language** – allows easy, immediate access to data requests
 - **Report Generator** - allows quick, easy specification of a report format for information users have requested
-

Natural Language vs. SQL Queries

A Sample Natural Language-to-SQL Translation for Microsoft Access

Natural Language

WHAT CUSTOMERS HAD NO ORDERS LAST MONTH?

SQL

```
SELECT [Customers].[Company Name],[Customers].[Contact Name]
FROM [Customers]
WHERE not Exists {SELECT [Ship Name] FROM [Orders]
    WHERE Month {[Order Date]}=1 and Year {[Order Date]}=2004 and
    [Customers].[Customer ID]=[Orders].[Customer ID]}
```

Database Maintenance

- Updating a database continually to reflect new business transactions and other events
 - Updating a database to correct data and ensure accuracy of the data
-

Application Development

- Today, even non-technical staff can use languages and tools to build little programs that use a database.
 - Database Management Systems have all kinds of tools to develop custom application programs.
 - The College's MIS (Banner) is actually an application built on top of a Oracle Database.
-

5 Characteristics of Good Database

Data Integrity	Ensuring data is valid
Data Independence	Data is separated from software
Avoiding data Redundancy	Repetition of input data is avoided
Data Security	Data is not accessible to unauthorized users
Data Maintenance	Set procedures for adding OR deleting records for the purpose of optimization



DESIGN THINKING

Databases

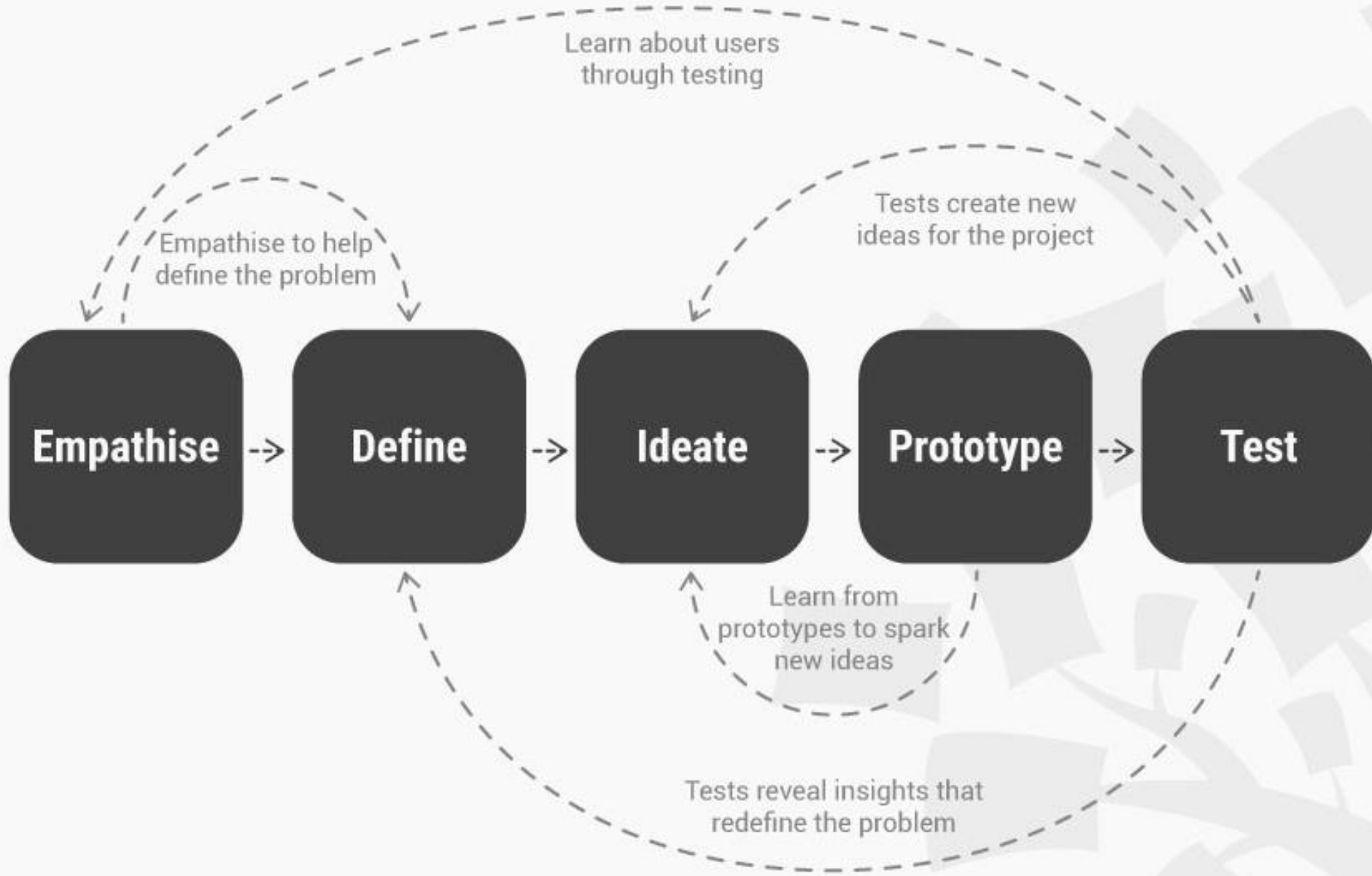
What is Design Thinking ?

- deep interest in developing an understanding of the people for whom we're designing the products or services
 - observe and develop empathy with the user
 - questioning the problem
 - creating ideas in brainstorming sessions
 - hands-on approach in prototyping and testing
-

DESIGN THINKING PHASES

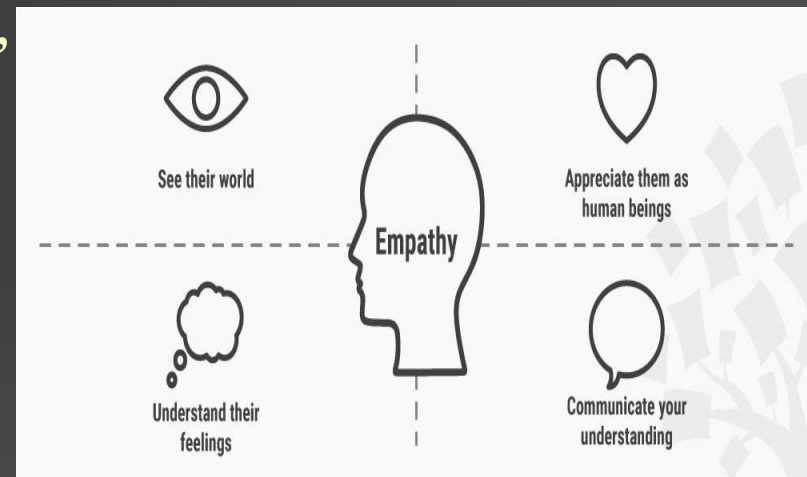
1. EMPATHIZE
 2. DEFINING PROBLEM
 3. IDEATE
 4. PROTOTYPING
 5. TESTING
-

DESIGN THINKING: A NON-LINEAR PROCESS



1. EMPATHIZE

The first step (or mode) of the Design Thinking process includes developing a sense of understanding towards the individuals you are designing with, getting insight into what they need, what they want, how they perform, feel, and think, and why they display these attitudes, emotions, and thoughts while Engaging in a real-world environment with goods.



That is, "request" and set up a place to think about the issue for the user. To be empathetic, three steps must be performed

1. EMPATHIZE

To be empathetic, three steps must be performed.

First of all, it is necessary to observe not only the user's behavior, but also the reasons behind the user's behavior and the causal effects of the dilemma.

Secondly, to do more communication with users, do more research and questionnaires, use various ways to understand the user's real ideas.

Finally, to be immersed, assuming that you are the user yourself, with this idea to personally experience the product or service. In short, the first step of empathize is to do everything possible from the user's point of view to think about the problem and discover their real needs and pain points.

2. DEFINE PROBLEMS

- The second process of Design Thinking is defining the problems faced by the everyday people
 - Analyze our observations and synthesize them in order to define the core problems proposed by Dr Iqbal and Mr. Hafiz
 - Problem - disorganized cluster of increasing amount of contacts
 - Disadvantage - various sources of his or her contacts & waste a lot of the user's time searching for a specific contact
 - During an emergency, a person's life could be at stake
-

3. IDEATE

- The third process is to Ideate.
- To brainstorm and to formulate proposals in order to be possible solutions to the hurdle as mentioned in the above process.
- Come up with various ideas for our product
- Able to reorder the ideas from best to worst or even by just picking a few of the ideas which we think that will benefit the user the most.
- Sat down together, thought of our ideas and started spluttering out our ideas while one of us writes it down.
- Some ideas were respectable and some were not and as this third process is ideate, it was all part of the process.
- Then chose to narrow down the ideas into one and began cracking on with our prototype.

4. PROTOTYPE

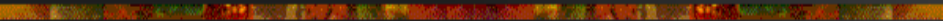
- A preliminary stage.
 - play a major role in solving the usability issues before the launch of the product.
 - Recognize the most ideal answer for every one of the issues distinguished during the past stage.
 - A real prototype is good enough to tested.
-

5. TESTING

- A repetitive process.
 - Test the total item utilizing the best arrangements recognized in the Prototype stage.
 - It is part of an iterative process that provides practitioners with feedback
-

REFLECTION ON DESIGN THINKING

- insight into the process of developing a particular product
 - come up with ideas and solutions for some problems present in our everyday life
 - enhance our creative critical thinking ability, time management skills, communication skills and observation ability
 - It doesn't matter whether you achieve the "right" answer the first time, but it's the value of the process as they solve problems and inevitably experiment with different solutions
-



GROUP 8 DESIGN THINKING VIDEO

[FINAL TIS VIDEO.mp4](#)

