CHAPTER 12:
SYSTEM ANALYSIS AND DESIGN

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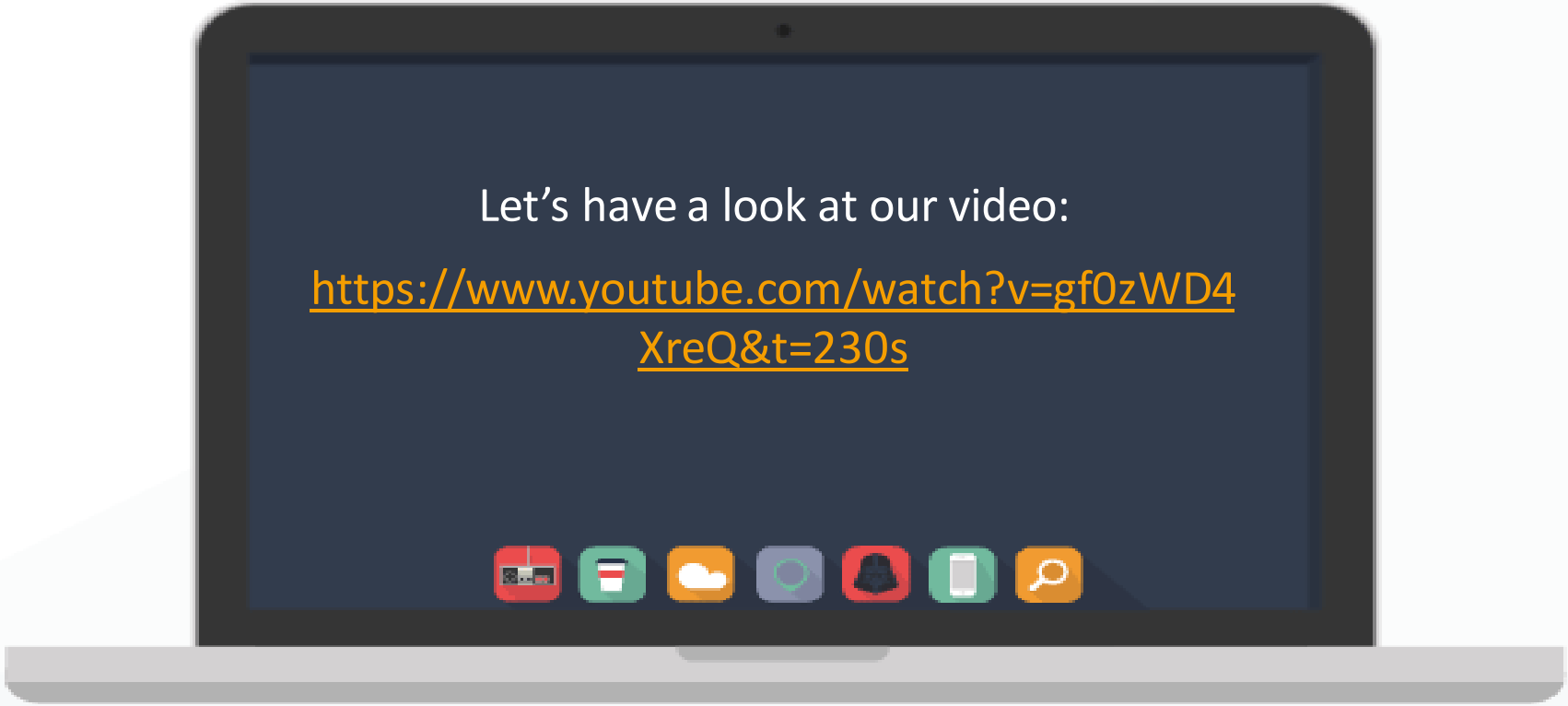

Let’s have a look at our video:
https://www.youtube.com/watch?v=gf0zWD4XreQ&t=230s

WHAT IS A SYSTEM ?

- The word ‘System’ is derived from Greek word ***Systema***, which means an organized relationship between any set of components to achieve a common objective.

- The characteristics of a good system is ;
  i. Must have the **structure and behavior** which is designed to achieve the defined objective
  ii. **Interconnectivity** and **Interdependence**
  iii. Priotize the **objectives of the organization** than the objectives of the subsystems.
- Example of Systems

TYPES OF SYSTEM

1) **Open or Closed Systems**

- An open system must interact with its environment. It receives inputs from and delivers outputs to the outside of the system. For example, an information system which must adapt to the changing environmental conditions.
- A closed system does not interact with its environment. It is isolated from environmental influences.

2) **Adaptive and Non Adaptive System**

- Adaptive System responds to the change in the environment in a way to improve their performance and to survive.
- Non Adaptive System is the system which does not respond to the environment.

3) Permanent or Temporary System

- Permanent System persists for long time but a Temporary System is made for specified time and after that they are demolished

4) Human-Machine, Machine System

- In Human-Machine System, both human and machines are involved to perform a particular task.
- Machine System is where human interference is neglected. All the tasks are performed by the machine.

5) Man-Made Information Systems

- This system includes hardware, software, communication, data, and application for producing information according to the need of an organization.

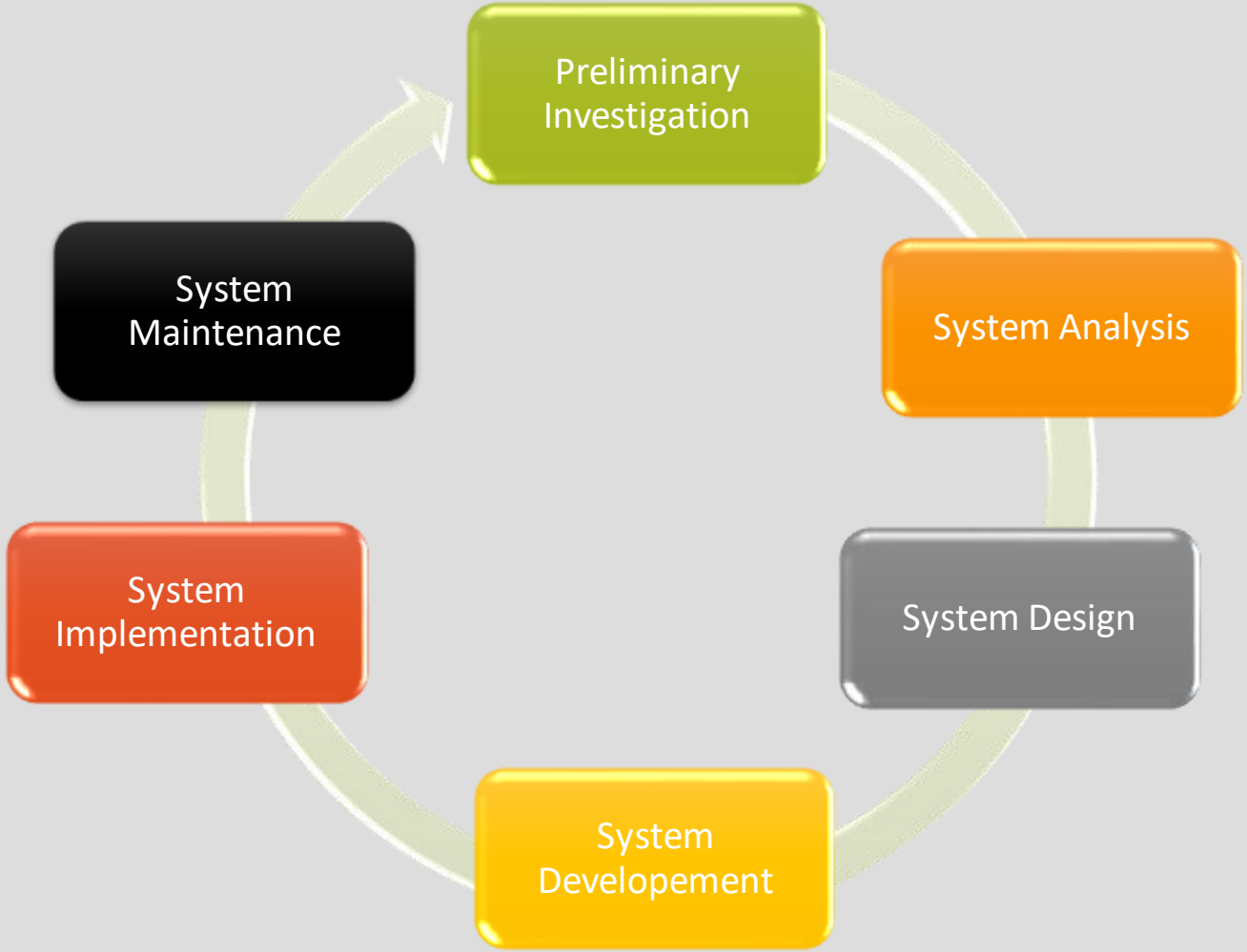
Formal Information System − It is based on the flow of information in the form of memos, instructions, etc., from top level to lower levels of management.

Informal Information System − This is employee based system which solves the day to day work related problems.

Computer Based System − This system is directly dependent on the computer for managing business applications.

Systems Development Life Cycle is a systematic approach which explicitly breaks down the work into phases that are required to implement either new or modified Information System.

There are six phases in System Analysis and Design:



WHY SDLC IS IMPORTANT ?

An effective System Development Life Cycle (SDLC) is able to produce a high quality system that ;

- ✓ Meet customer requirements and expectations
- ✓ Reaches completion within time and cost evaluations
- ✓ Works effectively and efficiently in the current Information Technology infrastructure.

PRELIMINARY INVESTIGATION

- The objective of this phase is to conduct an initial analysis and findings of the existing system.

- Determines and defines the exact nature of the problems or improvements required in the existing system.

- Involves studying the existing system and gathering details to find out what are the requirement specifications, how the system works, description of features for new system and where improvements should be made.

PRELIMINARY INVESTIGATION TECHNIQUES

1. INTERVIEWING

- Systems analyst collects information from individuals or groups by interviewing either in the unstructured or a structured manner.
- Advantages :
  - Best source of gathering qualitative information.
  - It can handle the complex subjects
  - Easy to discover key problems by seeking opinions
  - Bridges the gaps in the areas of misunderstandings and minimizes future problems

2. QUESTIONNAIRES

- This method is used by analyst to gather information about various issues of system from large number of persons.

Open-ended Questionnaires − It consists of questions that can be easily and correctly interpreted. They can explore a problem and lead to a specific direction of answer.

Closed-ended Questionnaires − It consists of questions that are used when the systems analyst effectively lists all possible responses, which are mutually exclusive.

3. OBSERVATION

- This is a method of gathering information by visiting the organization to observe the working of current system and understands the requirements of the system.
- Advantages :

- It is useful in situation where authenticity of data collected is in question or when complexity of certain aspects of system prevents clear explanation by end-users.

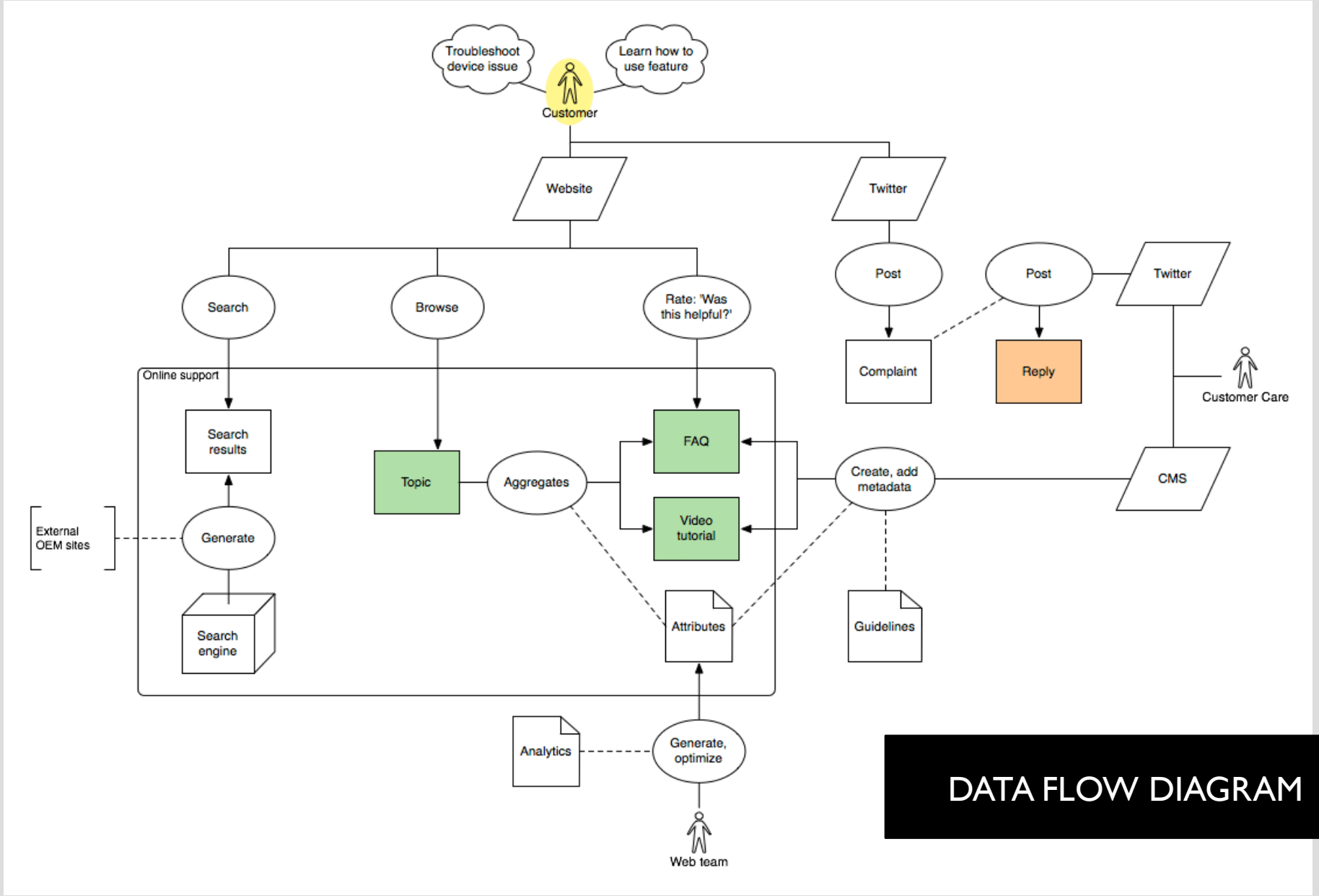
- It produces more accurate and reliable data.

SYSTEM ANALYSIS

- The analyst collects information about the current system and analyze it to identify the new requirements for the new system.
- They will analyze the data by using various methods like Data Flow Diagram (DFD), Decision Table, Decision Tree or Pseudocode.
- The data will be present to the client before proceed to the next step.

Data Flow Diagrams (DFD)

- Consist of symbols like rectangle, parallelogram, circle and arrow.
- Shows the flow of data and specifies how the system will be implemented.
- A good communication tool between user and analyst that allow the user able to see how the systems will work



DATA FLOW DIAGRAM

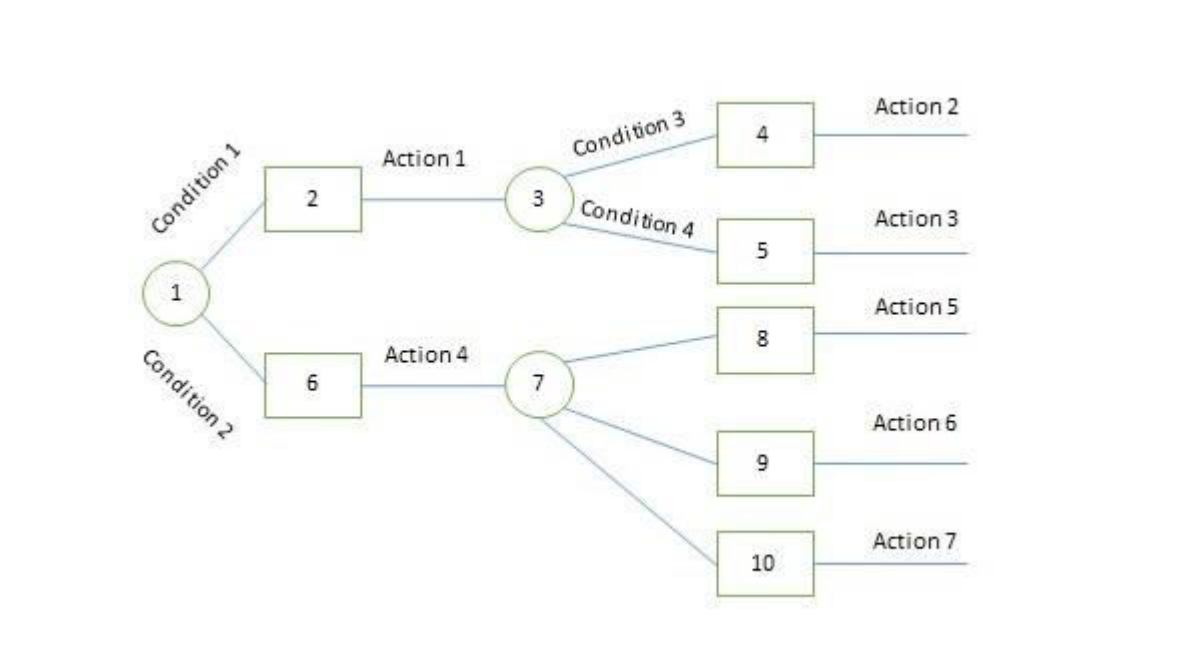
DECISION TREE	DECISION TABLE
A method for defining complex relationships by describing decisions based on which conditions to consider first, second, and so on.	A method of describing the complex logical relationship in a precise manner which is easily understandable.
Use when sequencing of conditions is important	Use when there are a large number of conditions to check and logic is complex.

ID valid?	N	N	N	N	Y	Y	Y	Y	N	N	Y	Y	Y	N	N	Y
Password valid?	N	N	N	Y	Y	N	Y	Y	Y	Y	N	N	Y	N	Y	N
Third invalid password attempt?	N	N	Y	Y	Y	N	N	Y	N	Y	N	Y	N	Y	N	Y
Access to system?	N	Y	Y	Y	Y	N	N	N	N	N	Y	Y	Y	N	Y	N

	All combinations with "ID valid?" = "N" are treated the same way, so only one test case is needed
	The combination "Password valid?" = "Y" and "Third invalid password attempt?" = "Y" is impossible; eliminate

DECISION TABLE

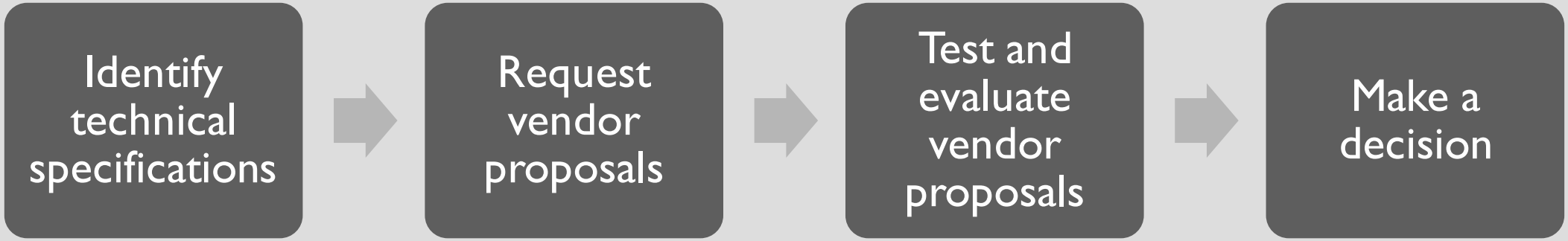
DECISION TREE



SYSTEM DESIGN

- The system developer makes various alternative designs of the system.
- System analyst will analyze all the requirement according to the practicality of the system in various areas and select the best design.
- This process include database design, input output design and program design. Prototype will be do as their draft.

1. Acquire necessary hardware and software



2. Develop all of the details design of the new or modified information system

DATABASE DESIGN

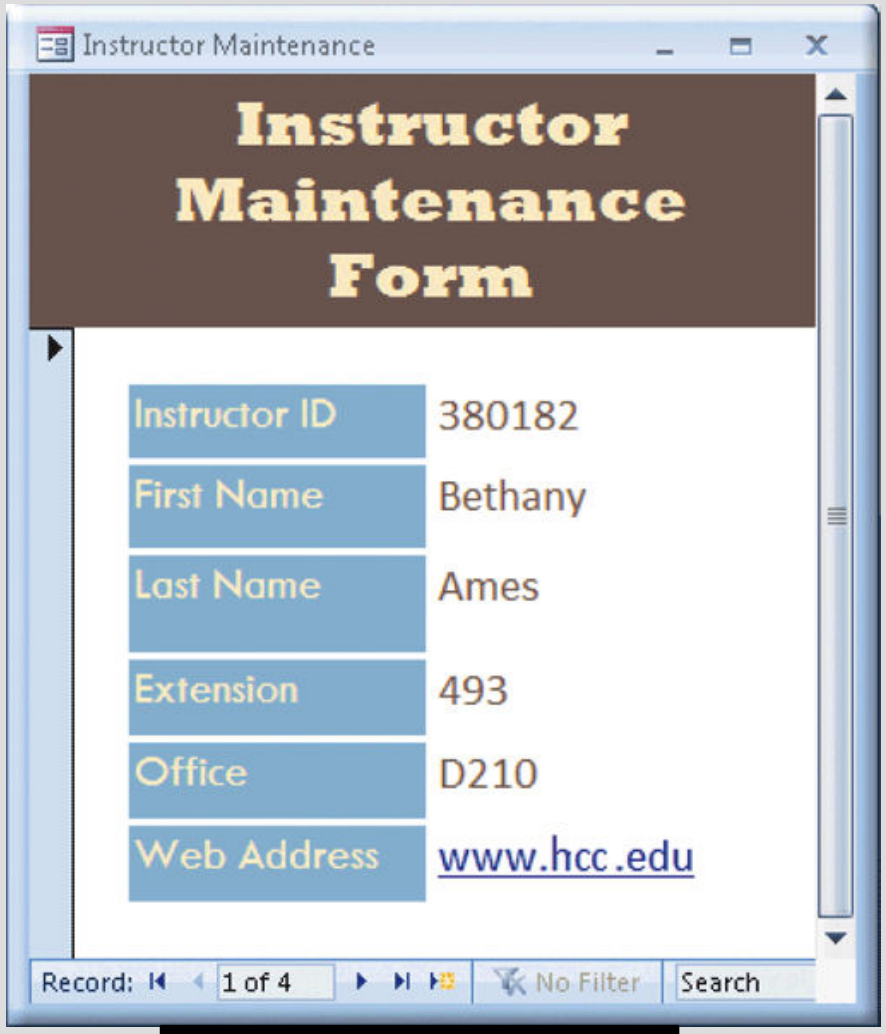
Design the database upon the data dictionary that developed during the analysis phase.

INPUT OUTPUT DESIGN

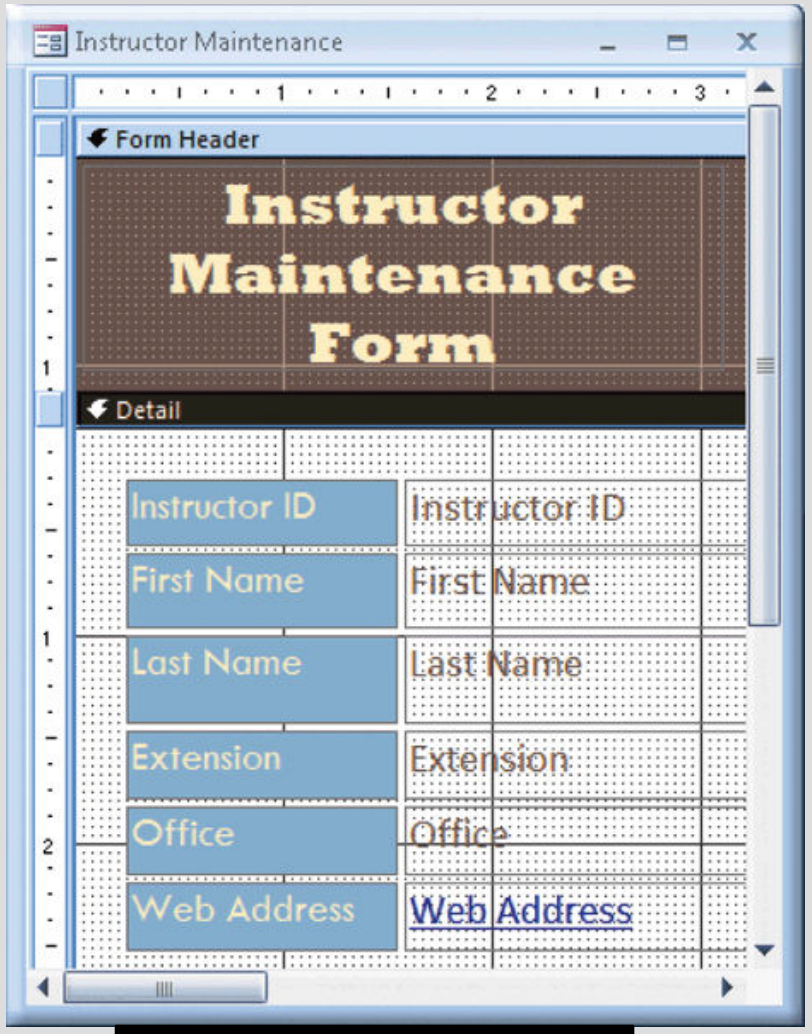
Design for every menu, screen and report specified in the requirements. Mockup and layout design will be create.

PROGRAM DESIGN

The system analysts prepares the program specification package.



MOCKUP DESIGN



LAYOUT DESIGN

SYSTEM DEVELOPMENT

Programming phase

- the programs must be modular in nature
- helps in fast development, maintenance and future changes

Testing phase

1. Developers test the new code
2. System tested by experienced testers
3. Repeated until all requirements are met

SYSTEM IMPLEMENTATION

- The old system will be converted to the new system.
- This phase also involves training the users on how to use the system.
- There are 4 types of system conversion.

PILOT CONVERSION

- When a small group of users within an organization uses a new system prior to wider use

- **Advantages:**
  1. Failure or problems can be identified and addressed without wide-spread impact to the organization

- **Disadvantages:**
  1. Scale can cause problems

PHASED CONVERSION

- Small parts of the new system gradually replace small parts of the old system

- **Advantages:**
  1. A failure of the new system has minimal impact
  2. Training can be completed in small parts
- **Disadvantages:**
  1. Takes more time to get the new system fully online
  2. Possible risk of data loss

PARALLEL CONVERSION

- Consist on running old system alongside a new system for a specified time

- **Advantages:**
  1. Users can can compare the output of the old system with the output of the new system
  2. Little risk of data loss
- **Disadvantages:**
  1. High cost
  2. Data could be different in two different systems

DIRECT CONVERSION

- Complete replacement of the old system by the new system

- **Advantages:**
  1. Quick and easy

- **Disadvantages:**
  1. If system fails, whole organization will suffer
  2. Risk of data loss
  3. Difficult to track small errors

SYSTEM MAINTENANCE

- This phase involves the process of maintaining, evaluating, and modifying of existing information systems to make needed improvements.

- The purpose of this phased is to provide ongoing assistance for the system and its user after the system is implemented.

- Example of activity in maintenance phase are monitor system performance and system security.

CAREER RELATED TO SYSTEM ANALYSIS AND DESIGN

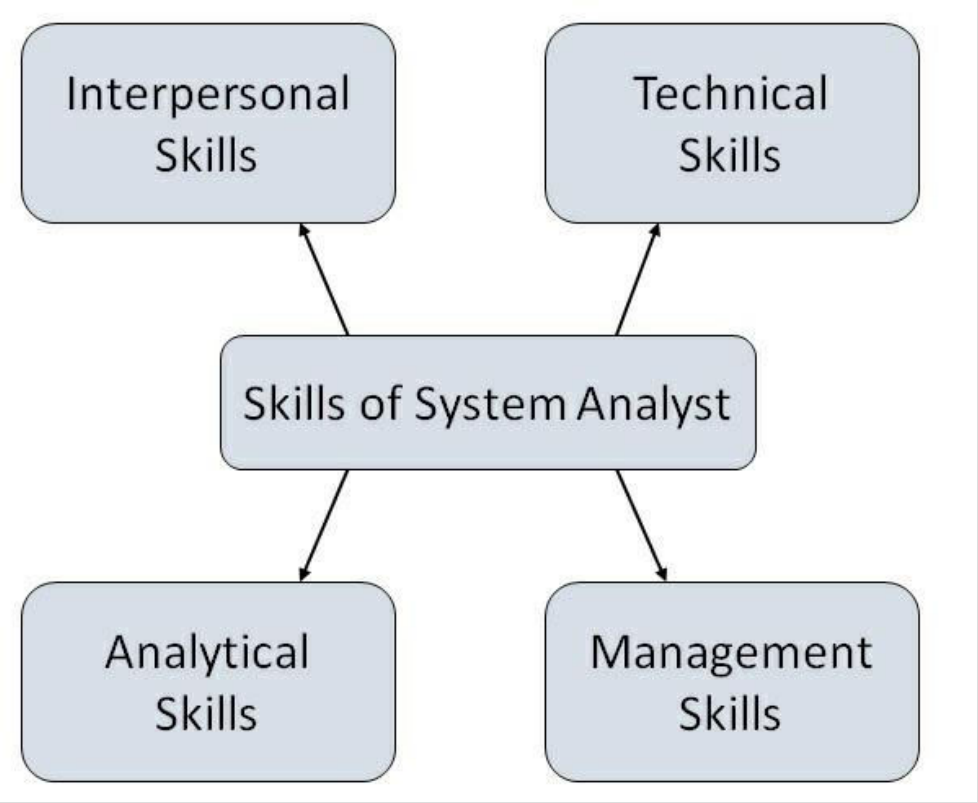
- The system analyst is a person who is thoroughly aware of the system and guides the system development project by giving proper directions. He is an expert having technical and interpersonal skills to carry out development tasks required at each phase.

- He pursues to match the objectives of information system with the organization goal.

MAIN ROLE

- Defining and understanding the requirement of user through various fact finding techniques.
- Prioritizing the requirements by obtaining user consensus.
- Gathering the facts or information and acquires the opinions of users.
- Maintains analysis and evaluation to arrive at appropriate system which is more user friendly.
- Suggests many flexible alternative solutions, pick the best solution, and quantify cost and benefits.
- Draw certain specifications which are easily understood by users and programmer in precise and detailed form.
- Implemented the logical design of system which must be modular.
- Plan the periodicity for evaluation after it has been used for some time, and modify the system as needed.

ATTRIBUTES OF A SYSTEMS ANALYST



INTERPERSONAL SKILLS

- Interface with users and programmer.
- Facilitate groups and lead smaller teams.
- Managing expectations.
- Good understanding, communication, selling and teaching abilities.
- Motivator having the confidence to solve queries.

ANALYTICAL SKILLS

- System study and organizational knowledge
- Problem identification, problem analysis, and problem solving
- Sound commonsense
- Ability to access trade-off
- Curiosity to learn about new organization

MANAGEMENT SKILLS

- Understand users jargon and practices.
- Resource & project management.
- Change & risk management.
- Understand the management functions thoroughly.

TECHNICAL SKILLS

- Knowledge of computers and software.
- Keep abreast of modern development.
- Know of system design tools.
- Breadth knowledge about new technologies.

THANK YOU ☺