Chapter 4: Requirements and Design

Requirements & Design: Analogy

Requirements

Who are you designing for? ➔ male, **female**, large, small, kids
What are you designing for? ➔ dinner party, **wedding**, everyday wear, sports
Any restrictions? ➔ **no red, not too short, must have sleeve, for guest (not bride)**

Design Following the requirements

Important:
Depending on your methodology ➔ consult your user/client during design

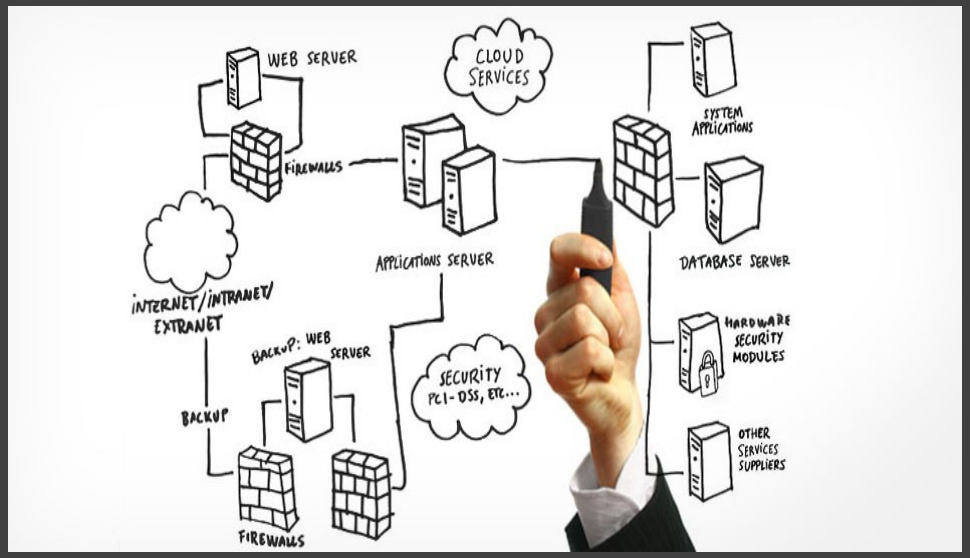
*** For both research and system development projects

Requirements helps you understand **what the user wants.**

Requirements helps you understand **the constraints or limitations of a project.**

Requirements helps you to produce **good designs.**

*** For both research and system development projects



Design is important because it helps you **envision the end product.**

Design is important because it helps you **develop the RIGHT product.**

Design is important because it helps you **test the right parameters.**

Requirements & Design

- A good design will aide in a successful implementation of the project.
- A mishap in design will spell failure in achieving the project objectives.
- Design will outline the flow and modules in research and system development respectively.
- Understanding why and for whom the system is developed will help tremendously.

SYSTEM DEVELOPMENT

System Development Track

Chapter 4: Requirement Analysis and Design

4.1 Introduction

4.2 Requirement analysis

- OOP (use case, sequence, and activity diagrams) or
- Traditional (Software Development Life Cycle)

4.3 Design

- OOP class diagram, overall system architecture or
- Traditional (DFD)

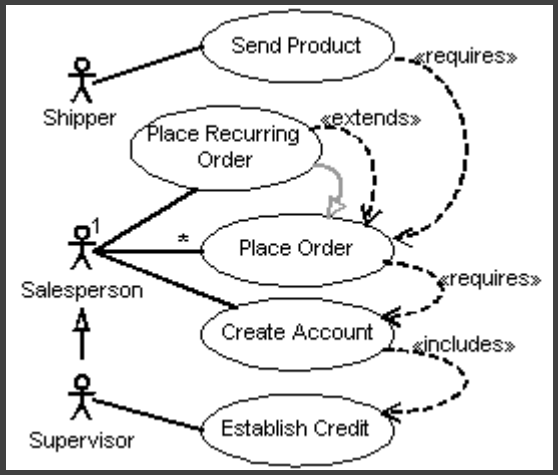
4.4 Database design (if any)

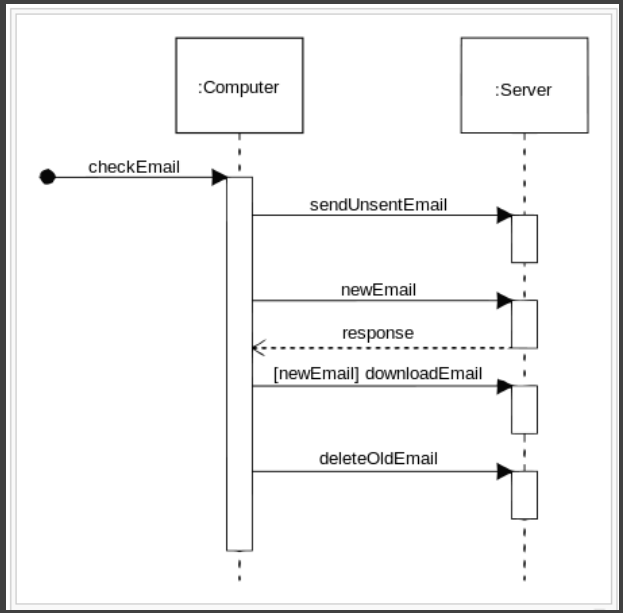
- ERD (for traditional methodology)
- Normalized tables (to include primary key, foreign key, etc.)

4.5 Interface design

- Menu and screen design
- System navigation and content design
- For web page project to include page navigation

4.6 Chapter summary



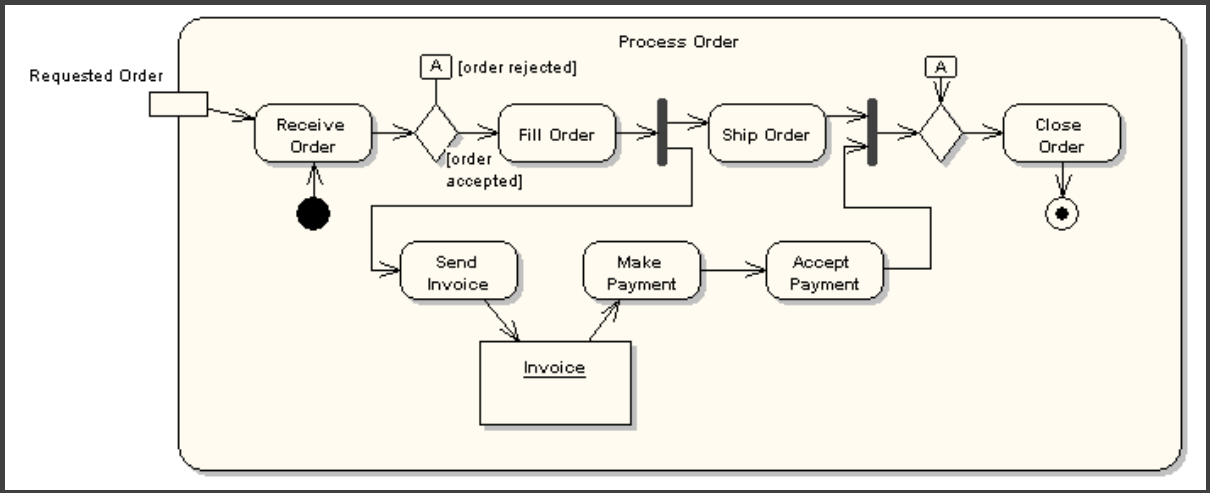


***Examples only for OOP**

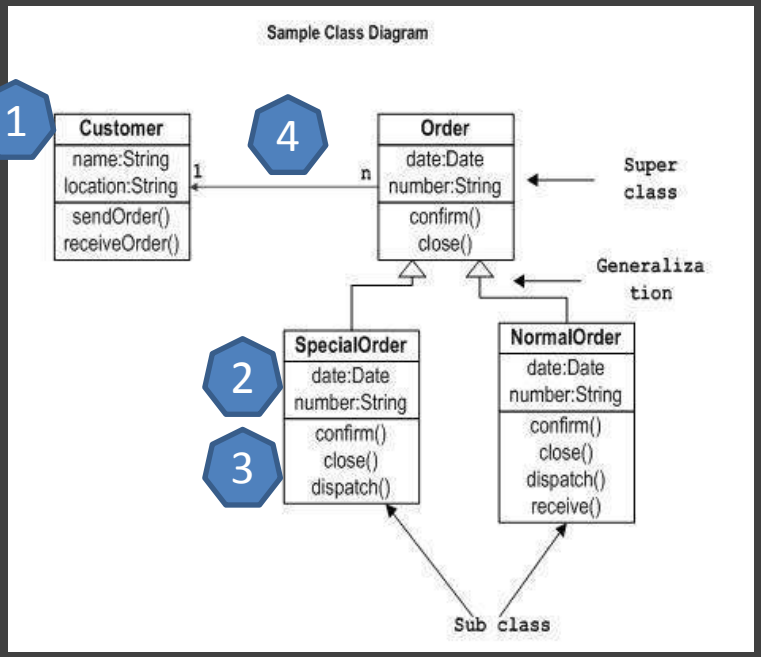
Use case: Who is involved & **what** can they do

Sequence: **How objects interact** in a situation

**objects are users, machines, process, etc.*

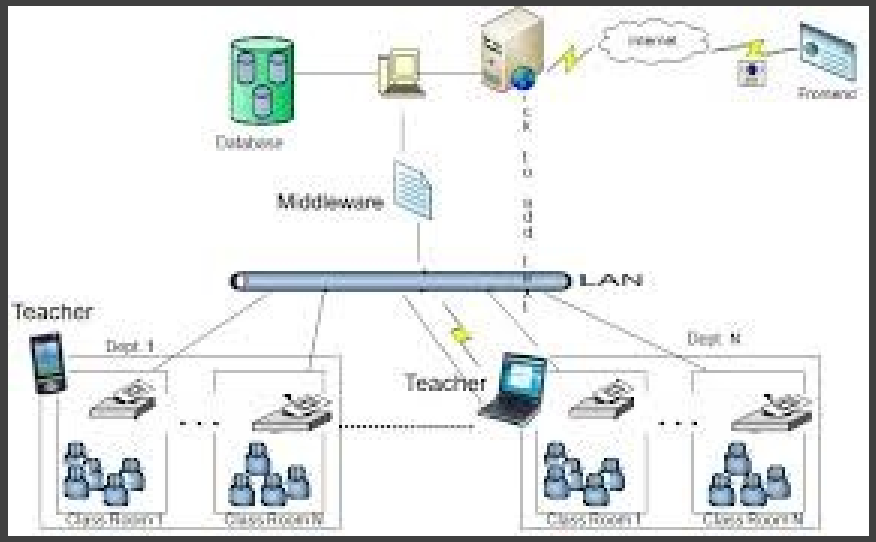


Activity D.: show how a process or a system is done from beginning to end → **all components included**



Class D.: describes the structure of a system by showing :

- the system's classes 1
- their attributes 2
- operations (or methods) 3
- the relationships among objects 4



System architecture: show the overall system in **"birds-eye view"**

Aside:
All the diagrams and figures must have an explanation. Not just "stick-n-done".

Example: Order Management System

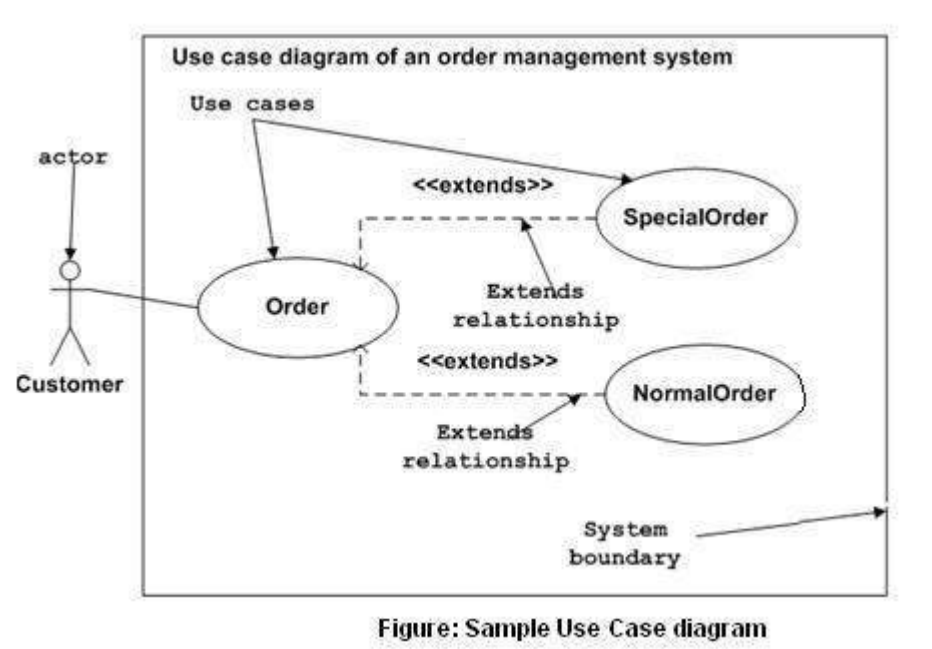
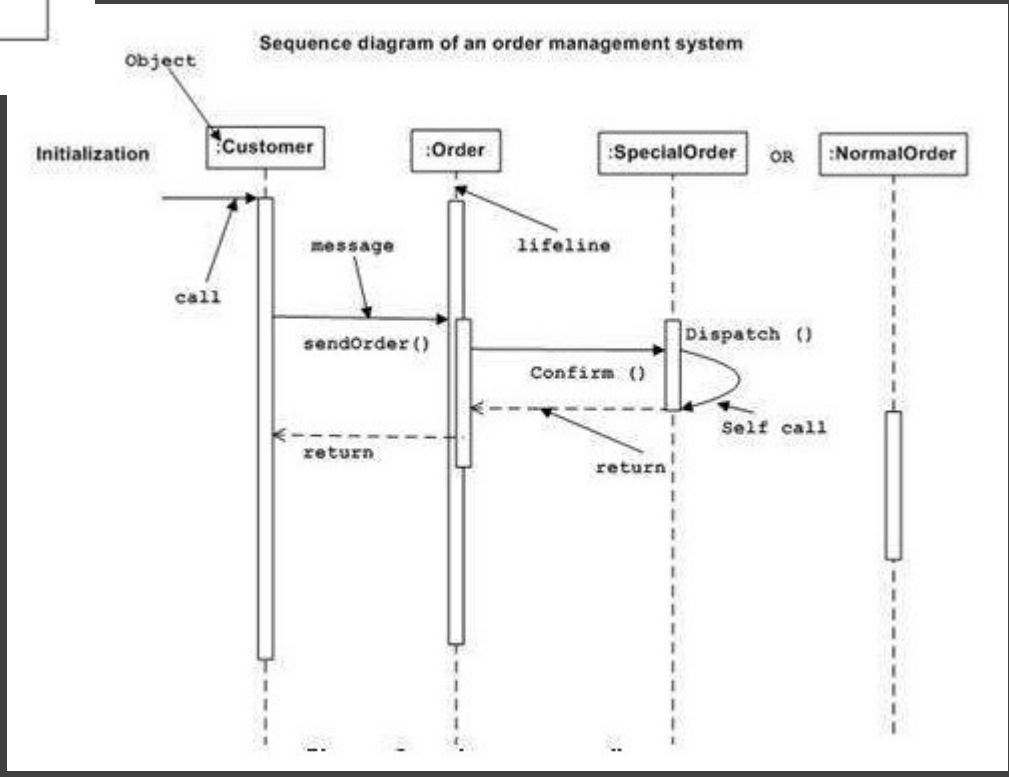
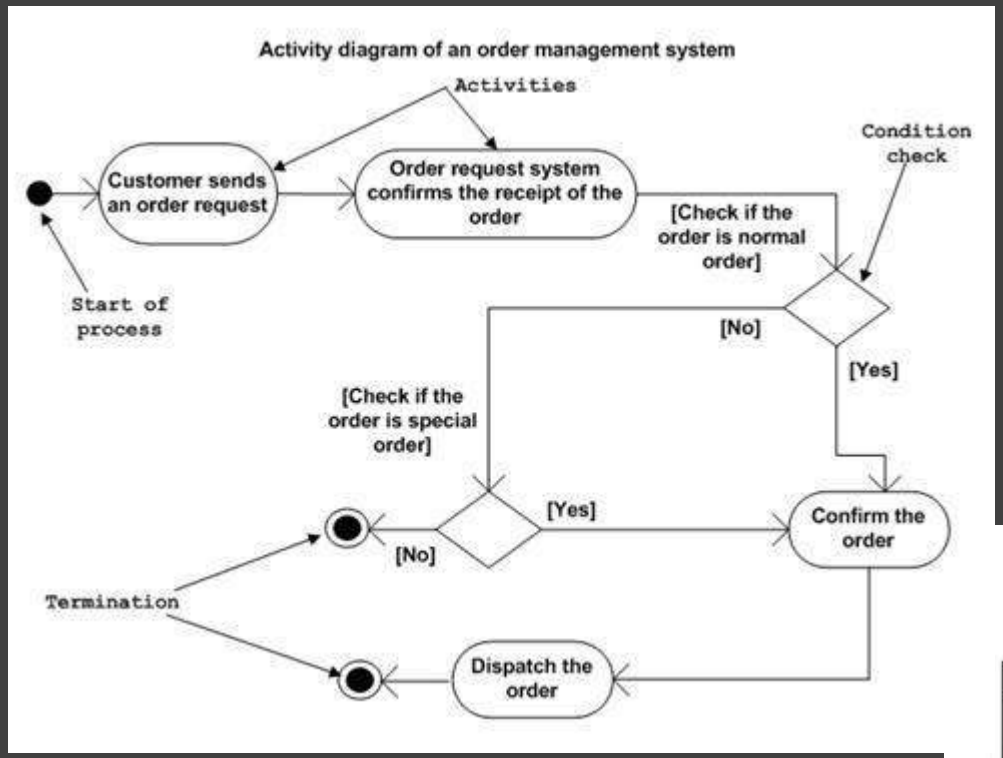
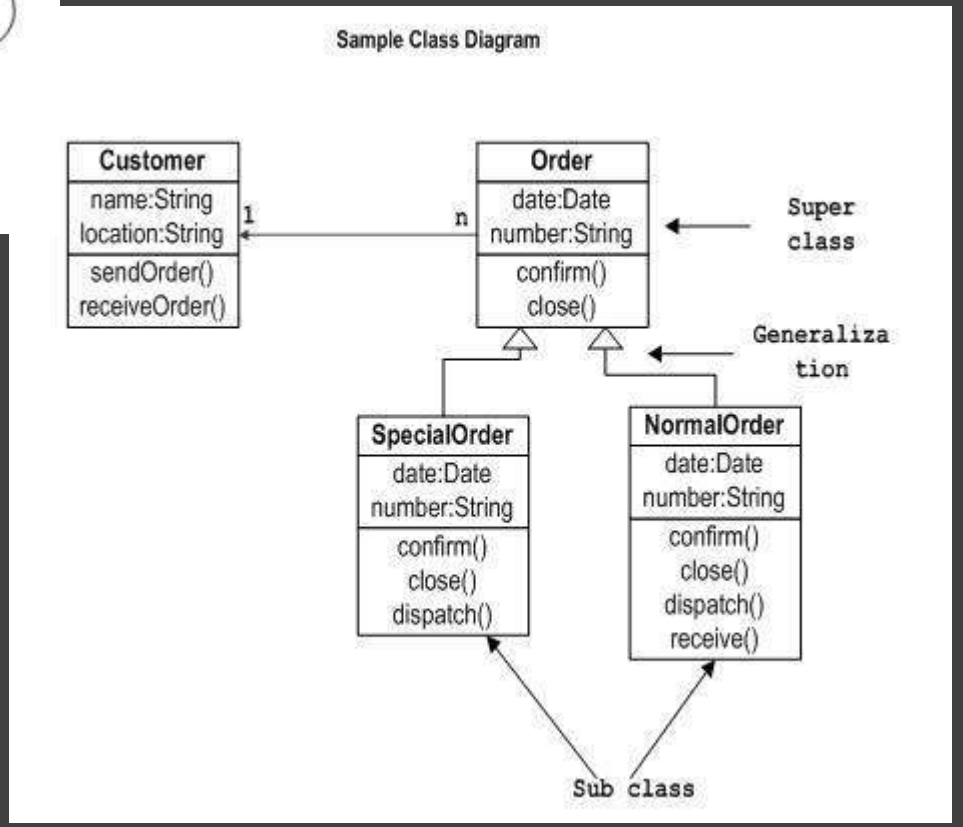


Figure: Sample Use Case diagram



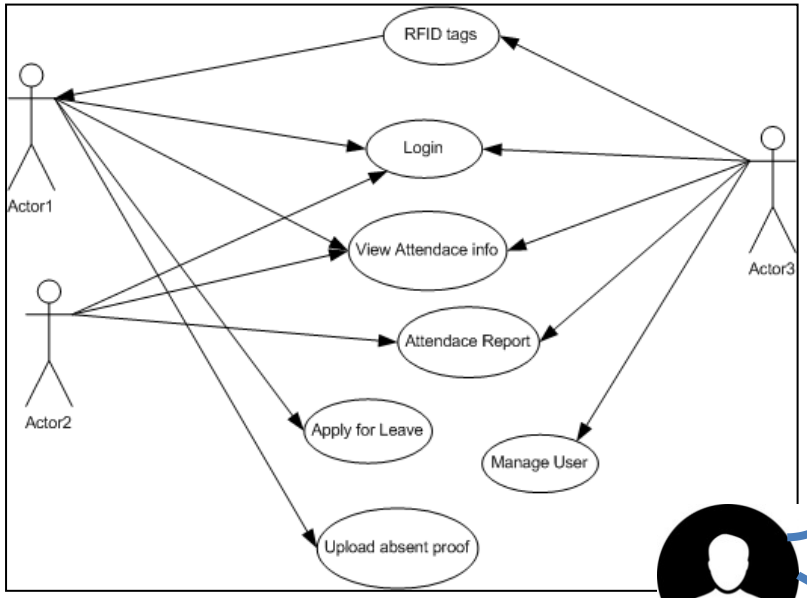
Example: Order Management System



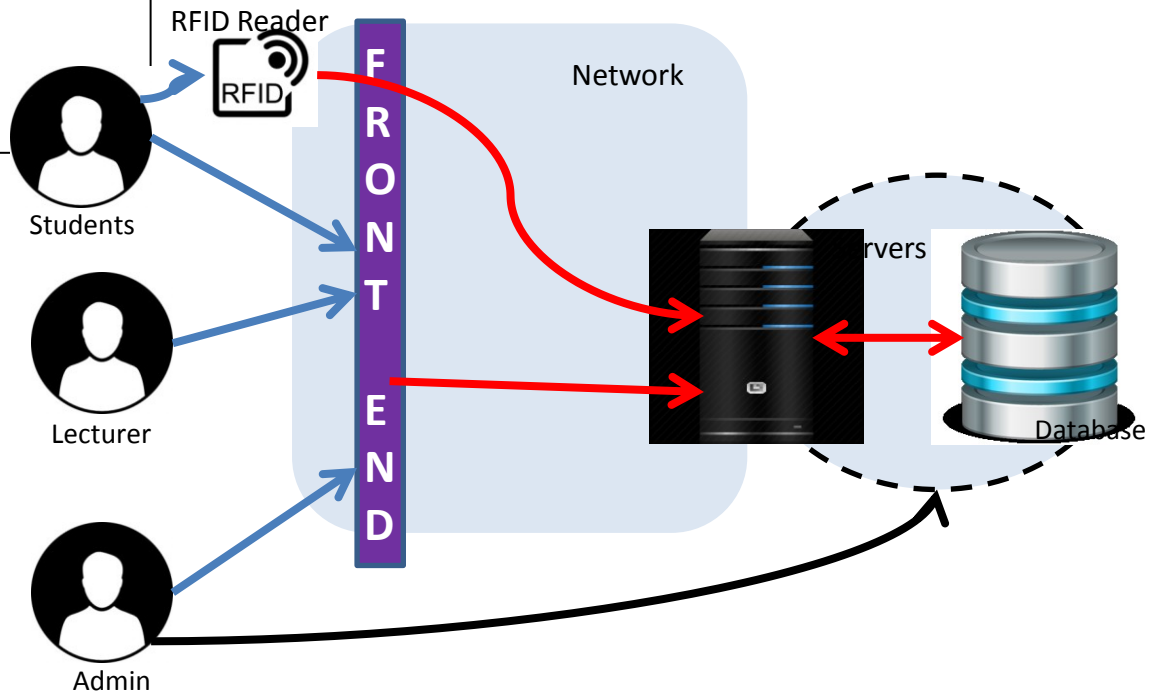


Use Case Diagram

Project: Class attendance system using RFID (CASUR)



System Architecture



Database Design

Determine the **data to be stored** in the database

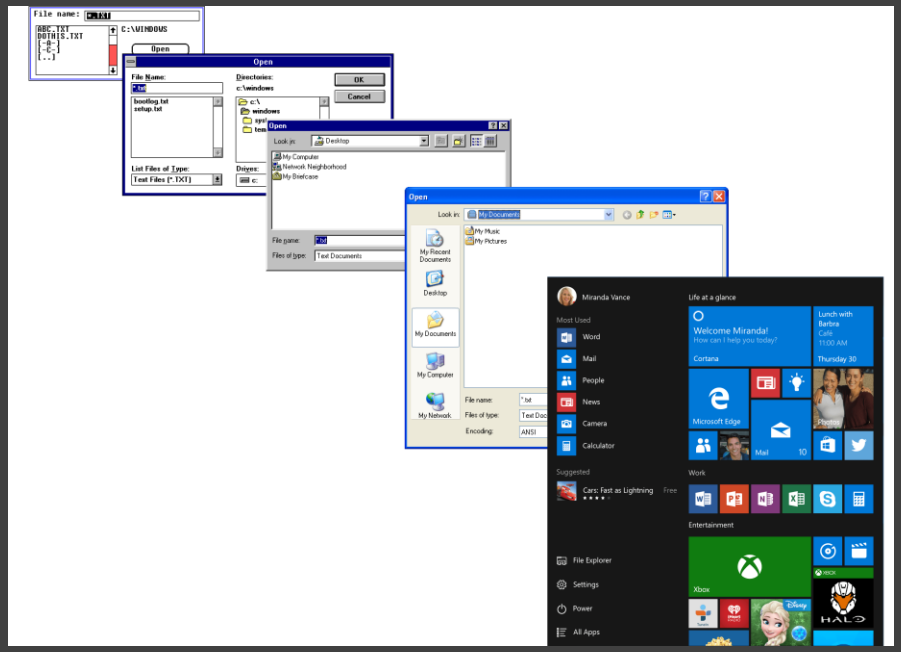
Determine the **relationships between** the different data elements.

Choosing **appropriate data type** for data stored

Construct the **logical and physical structure** of these data base on these relationships

Interface Design

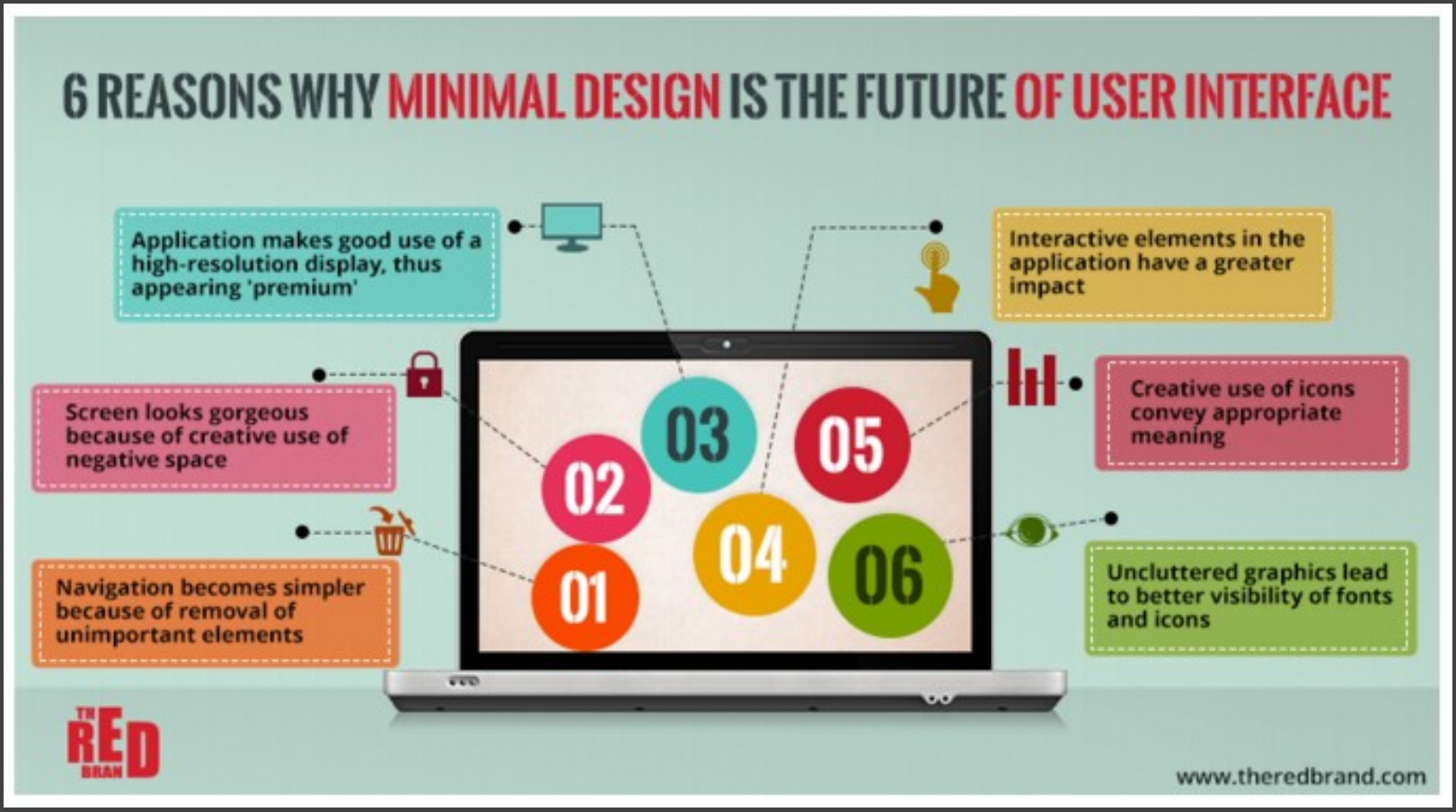
- Menu and screen design
- System navigation and content design
- For web page project to include page navigation



A system **needs users** to be useful

➔ users want **simple and eye-catching features**

10 VITAL TIPS ON UI DESIGN
Create a story
Streamline navigation
Make it responsive
Ensure accessibility
Eliminate errors
Form follows function
Master minimalism
Boost optimized image
Define font families
Use pleasant colour themes
Adapted from: http://www.designmantic.com


6 REASONS WHY MINIMAL DESIGN IS THE FUTURE OF USER INTERFACE
Application makes good use of a high-resolution display, thus appearing 'premium'
Interactive elements in the application have a greater impact
Screen looks gorgeous because of creative use of negative space
Creative use of icons convey appropriate meaning
Navigation becomes simpler because of removal of unimportant elements
Uncluttered graphics lead to better visibility of fonts and icons
01
02
03
04
05
06
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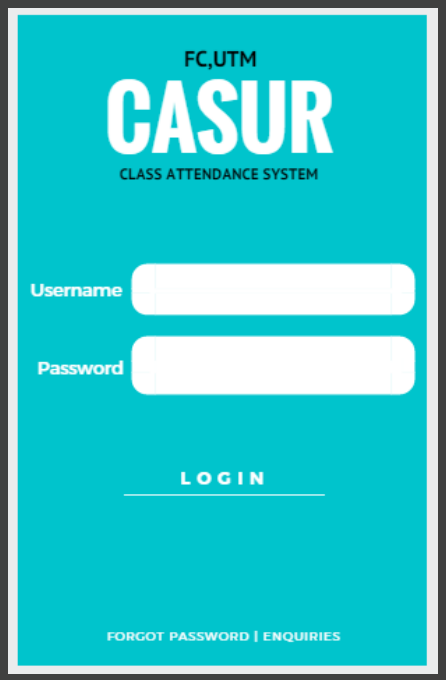
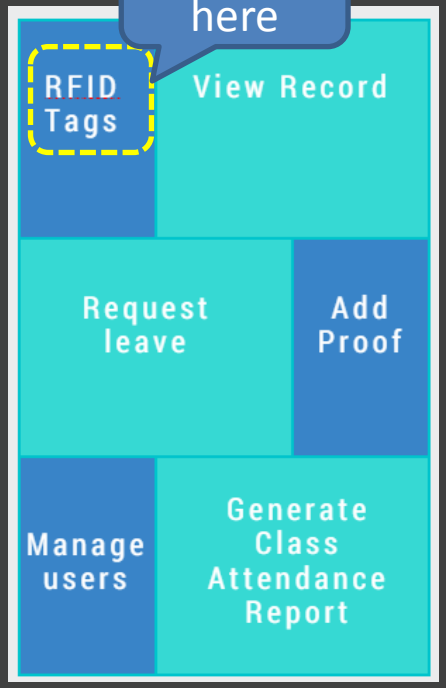
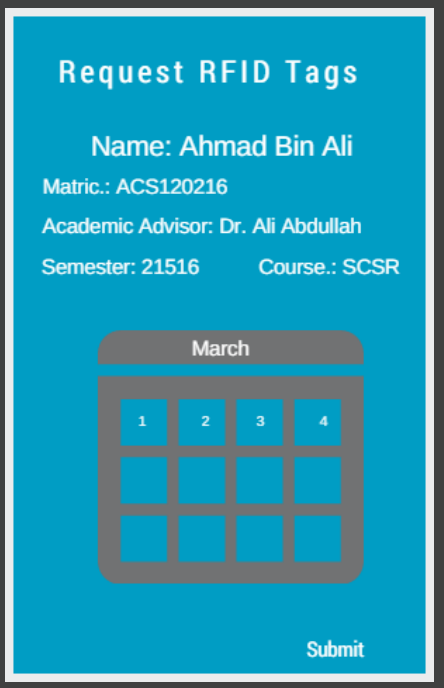
Interface Design







Remember that this section needs to be very explicit. A good rule of thumb is to provide enough detail so that others could replicate all the important points of your research.

RESEARCH

What are you trying to **find out**?

Do you have a **hypothesis**?

Determine the **parameters** that will help you answer your questions

Experiment Design

Determine **how** you will **test and measure** this parameter

Choosing the **appropriate parameters** for your project aim is important

The Importance of Experimental Design

Let's see if the subject responds to magnetic stimuli… ADMINISTER THE MAGNET!

Interesting…there seems to be a significant decrease in heart rate. The fish must sense the magnetic field.

Research Track
Chapter 4: Research Design and Implementation
4.1 Introduction
4.2 Proposed Solution
• Explain possible solution
4.3 Experiment design
• Identify overall flow
• Identify and explain test-bed/simulation setup
4.4 Parameter and testing methods
• Identify parameters involved
• Identify parameters to be measured
• Explain how testing is done
4.5 Chapter summary

This chapter will include:

- equipments used in the experiments
- description of the dataset used
- description of the algorithm(s) used
- what are the parameters used
- If using survey/interview to gather data/info ➔
  - explain the survey/questionnaire design
  - why is the question asked (the purpose or importance)

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4.2 : Explain the proposed solution

-What is it?

- how you plan to implement and test it? (in general)

4.3 : Explain the experiment that you are going to do

- how you plan to implement and test it? (more detailed)

- what are you using?

- Are you developing a system to experiment? If yes, explain the system development

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4.4 : What are you testing and how?

- what parameters? Speed? Performance?

- how you plan to measure these parameters? the algorithm or variable used etc.

- explain the testing → example:

• the test will involve developing a testing module using the xyz algorithm

• the data will run in this module and speed and performance is recorded

• speed is measured by adding…….

• performance is measured by comparing ……

Note: Not all research are the same, so adjust to your own accordingly

Example

Research Track

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  4.3.1 Overall Flow
  4.3.2 RFID Checkout System Phase 1
  4.3.3 RFID Checkout System Phase 2
  4.3.4 RFID Checkout System Phase 3
  4.3.5 Test Bed and Simulation Setup
  4.3.6 Database Design
4.4 Parameter and Testing Method
4.5 Chapter Summary

Tips

- Understand your project → this will help in design
  - Who, what, why, how
- Imagine how you want the system or experiment to work
  - Have the end user in mind always → don't design a system that is not user friendly.
  - Ask yourself: Do I like it? Will I use it?
- A good design can be a big help in development and implementation
- Be creative, critical and inventive → it is OK to break the norm

Solution

great design is not just a solution, it is the elimination of the problem

- *M. Cobanli*

EMBRACE THE COMPETITION.

A'DESIGN AWARD & COMPETITION

End of class today