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

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*** *For both research and system development projects*

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

Requirements

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
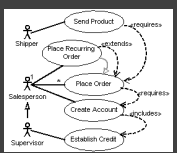- Traditional (DFD)
4.4 Database design (if any)
- ERD (for traditional methodology)
- Normalized tables (to include primary key, foreign key, etc.)
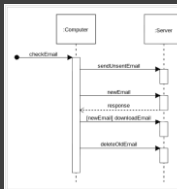4.5 Interface design
- Menu and screen design
- System navigation and content design
- For web page project to include page navigation
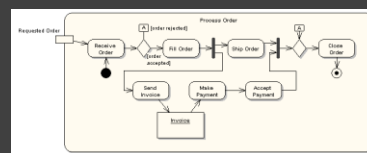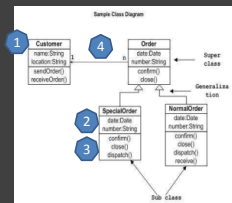4.6 Chapter summary

**Examples only for OOP

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

Sequence: How objects interact in a situation
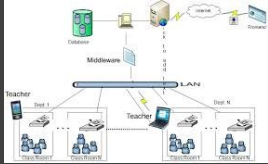*objects are users, machines, process, etc.*

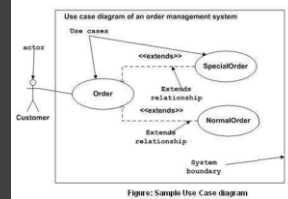**Activity D.:** show how a process or a system is done from beginning to end → **all components included**

Class D.: describes the structure of a system by showing :
•the system's classes 1
•their attributes 2
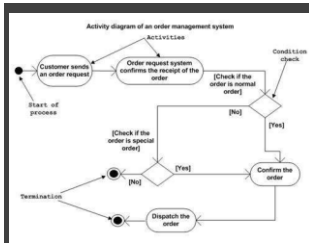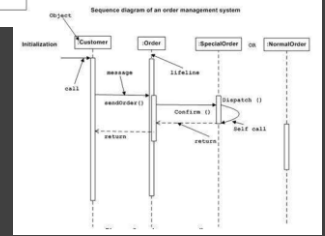•operations (or methods) 3
•the relationships among objects 4

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

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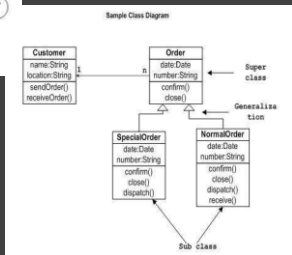**All the diagrams and figures must have an explanation. Not just "stick-n-done".**

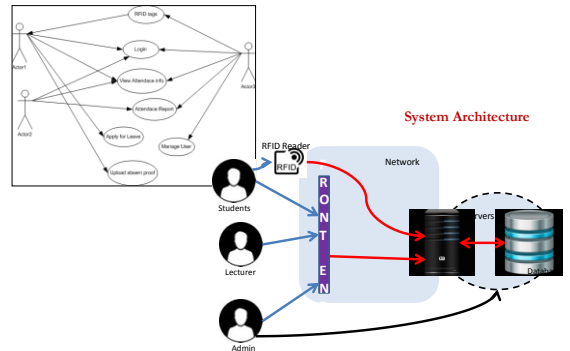
Example: Order Management System

Example: Order Management System

Project: Class attendance system using RFID (CASUR)

Use Case Diagram

System Architecture
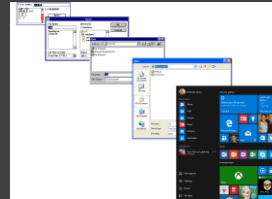
Database Design

Choosing **appropriate data type** for data stored

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

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

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**

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.

Slide 1

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)

Slide 2

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4.5 Chapter summary

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**

Slide 3

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4.5 Chapter summary

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

Slide 4

Example

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4.1 Introduction
4.2 Proposed Solution
4.3 Experiment Design
  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

End of class today