Systems Design Fundamentals I

CSIT883 System Analysis and Project Management

UNIVERSITY
OF WOLLONGONG
AUSTRALIA

Outline

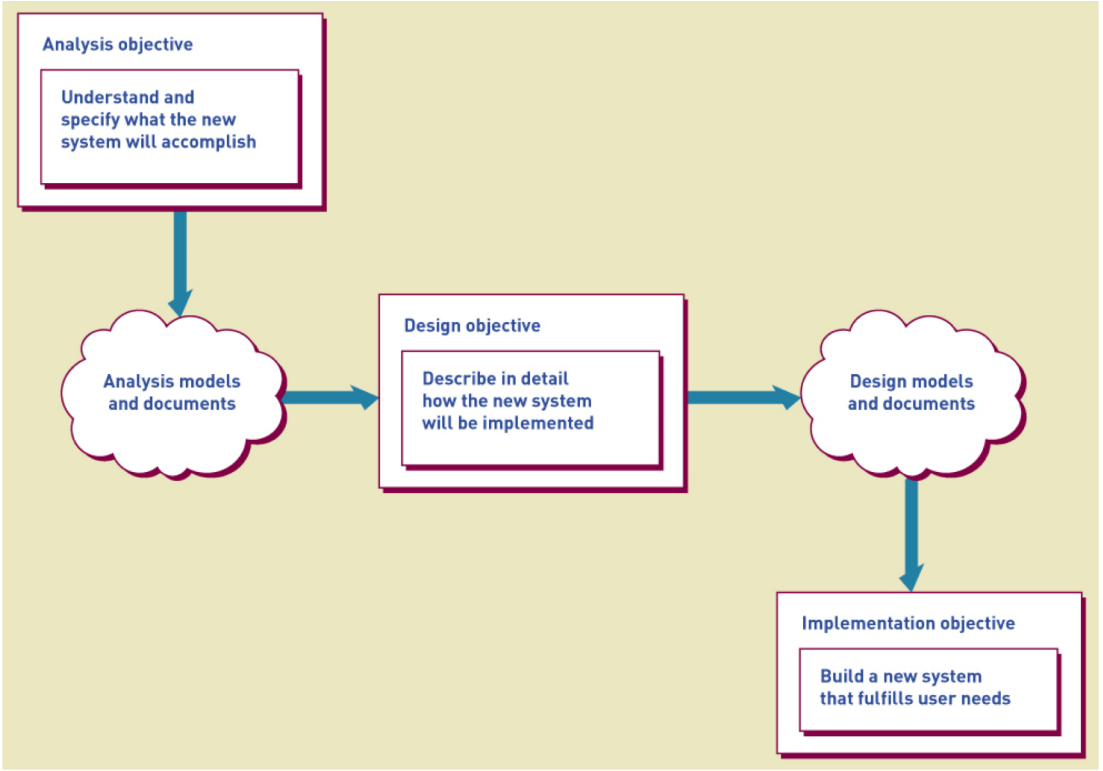
- What Is Systems Design?
- Systems Design Activities
- System Controls and Security

Part I

Part II

Systems Analysis vs Systems Design

- **Systems Analysis**: System development activities that enable a person to *understand* and specify **what** the new system should accomplish.
- **Systems Design**: System development activities that enable a person to describe in detail **how** the resulting information system will actually be *implemented*.



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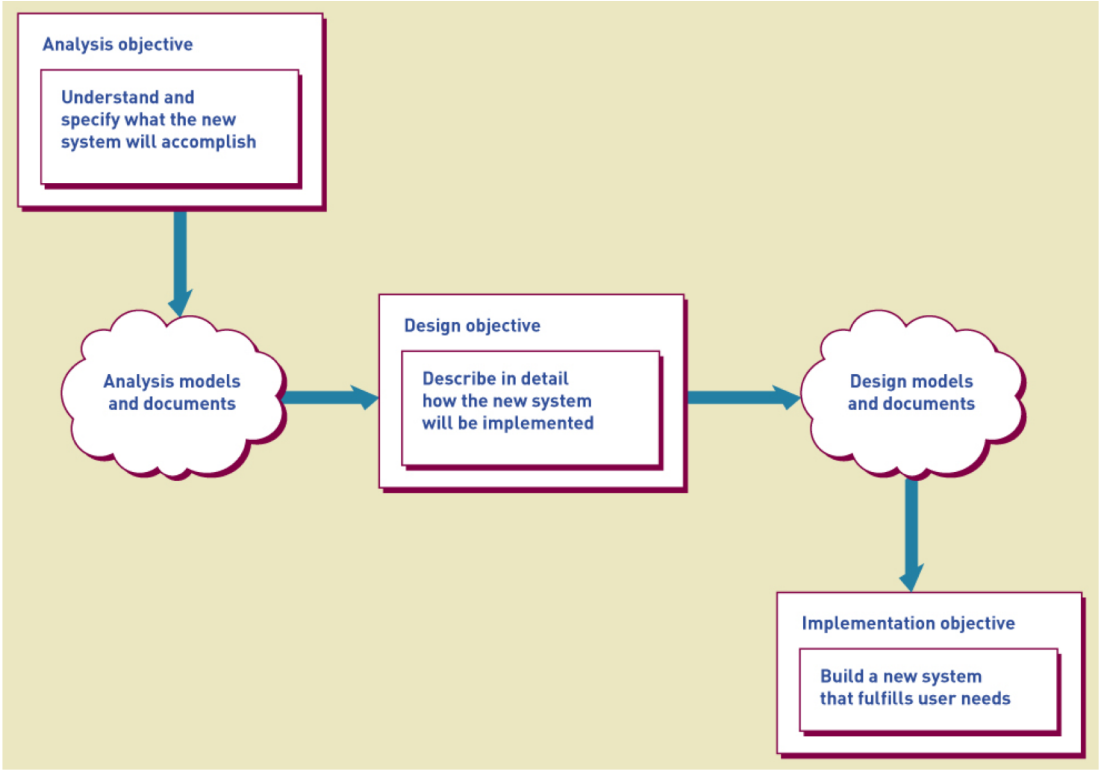
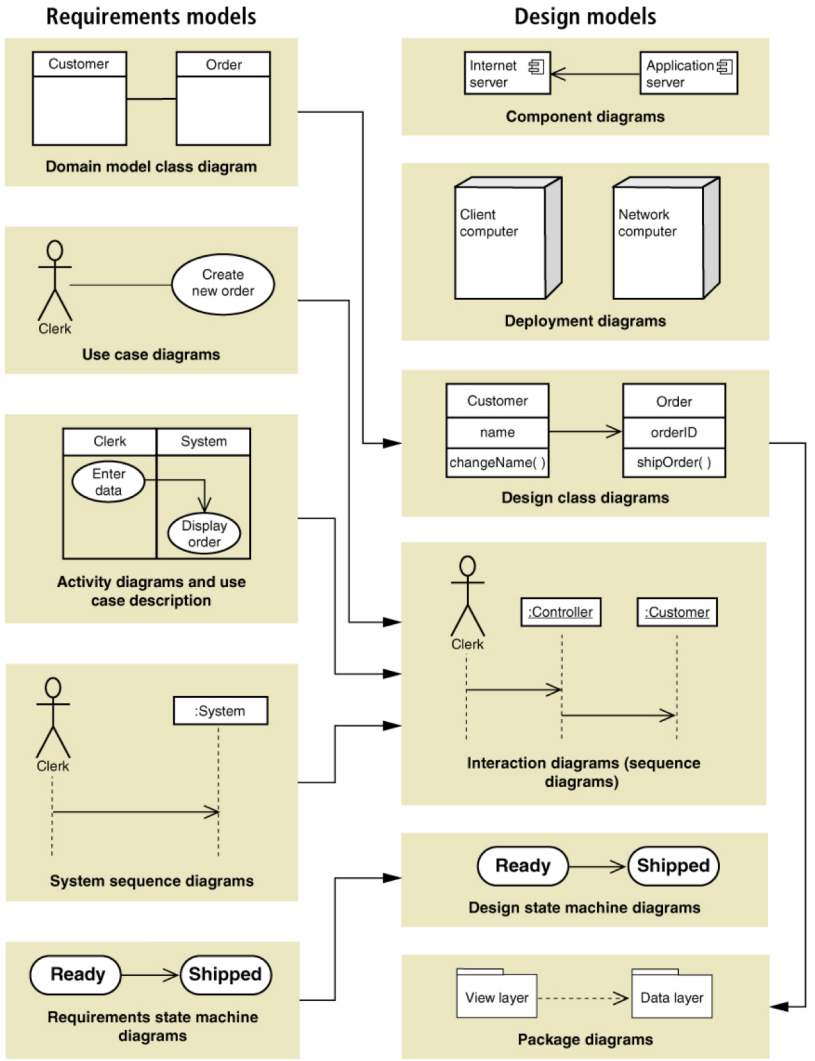


Design Models

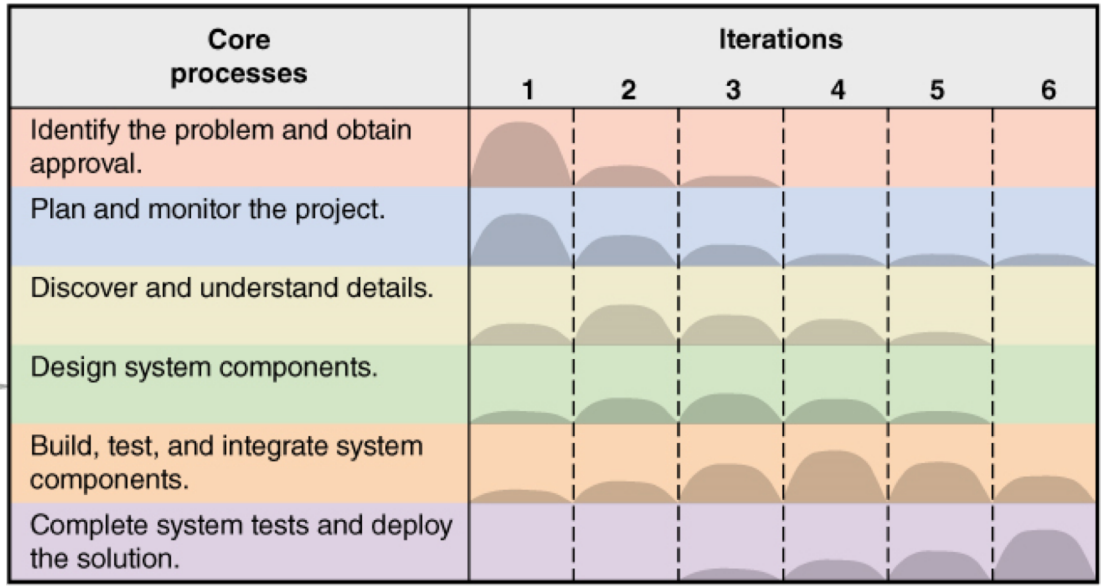
- Design begins with documents and models created during analysis activities.
  - Analysis and design may occur concurrently (e.g., in iterative projects).
- During analysis, requirements models are built to represent the real world and to understand business processes and the information used in those processes.
- Designers convert requirements models into models that represent the solution system.
- The formality of a project also affects how much design details are modeled.

Analysis Models to Design Models



Design Activities and Iterations

Design activities
Describe the environment. Design the application components. Design user interface. Design the database. Design the software classes and methods.



Key Design Questions for each Activity

Design activity	Key question
Describe the environment	How will this system interact with other systems and with the organization's existing technologies?
Design the application components	What are the key parts of the information system and how will they interact when the system is deployed?
Design the user interface	How will users interact with the information system?
Design the database	How will data be captured, structured, and stored for later use by the information system?
Design the software classes and methods	What internal structure for each application component will ensure efficient construction, rapid deployment, and reliable operation?

Describe the Environment

- *Two key elements* in the environment
  - Communications with External Systems
    - Message formats
    - Web and networks
    - Communication protocols
    - Security methods
    - Error detection and recovery
  - Conforming to an existing **Technology Architecture**
    - i.e., the set of computing hardware, network hardware and topology, and system soft- ware employed by an organization.

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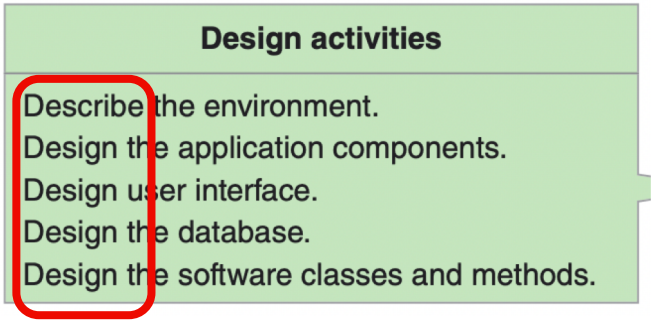

Design the Application Components

- **Application component** is *a well defined unit of software that performs some function(s)*.
- Issues involve how to package components including
  - Scope and size – what are the functions, boundaries, interfaces?
  - Programming language – what are the accepted languages?
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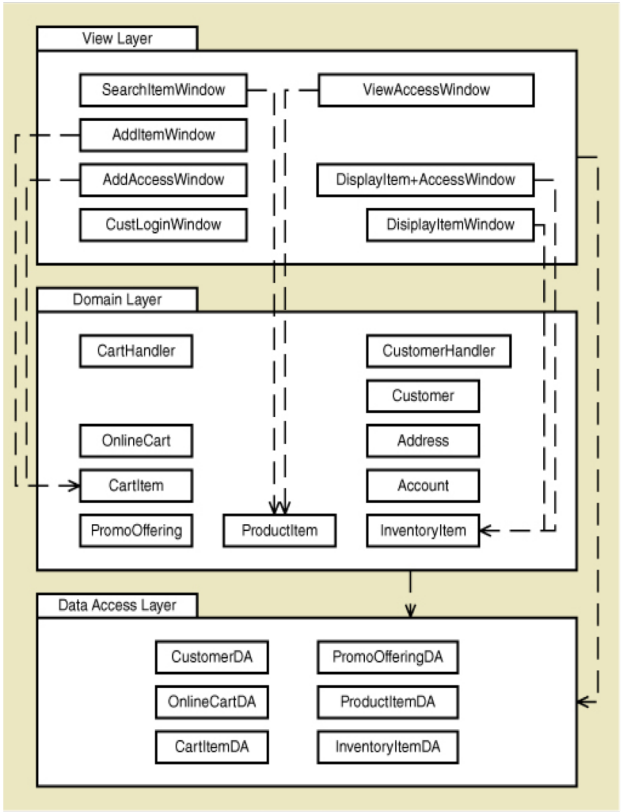
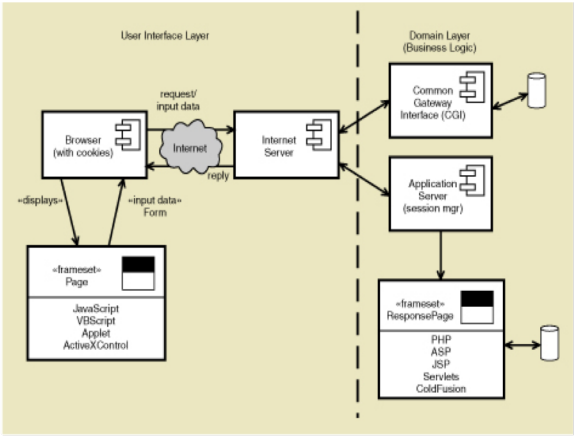
- Key decisions:
  - how functions of the system will be grouped or packaged
  - how they'll interact with one another once built (or acquired) and assembled
- Impact of technology architecture
- Followed by the software class design

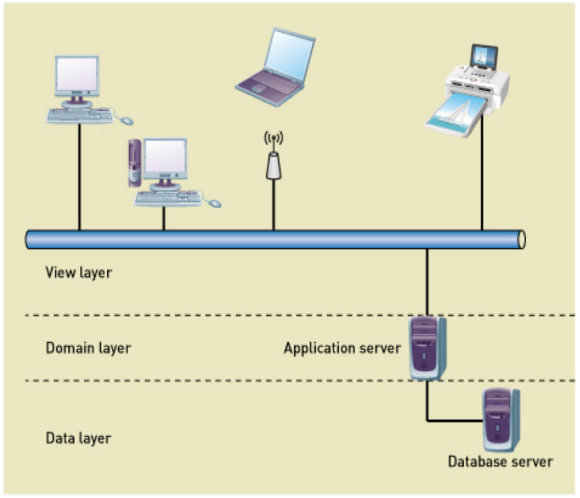
Typical models for defining application components



Package diagram



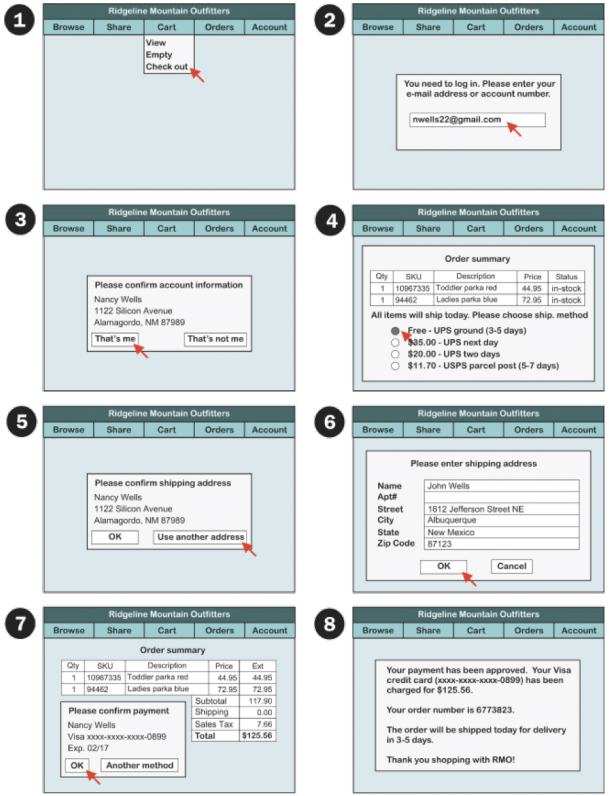
Component diagram



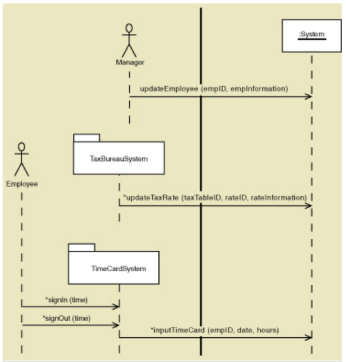
Deployment diagram

Design the User Interface

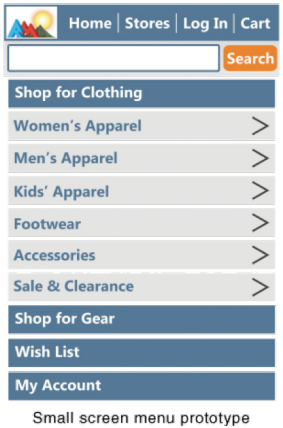
- Importance of user interface design:
  *To the user, the UI **is** the system.*
- The user interface has large impact of user productivity
- Includes both Analysis and Design tasks
  - Requires heavy user involvement
- Current needs require multiple user interfaces
  - Many different devices and environments



Storyboard



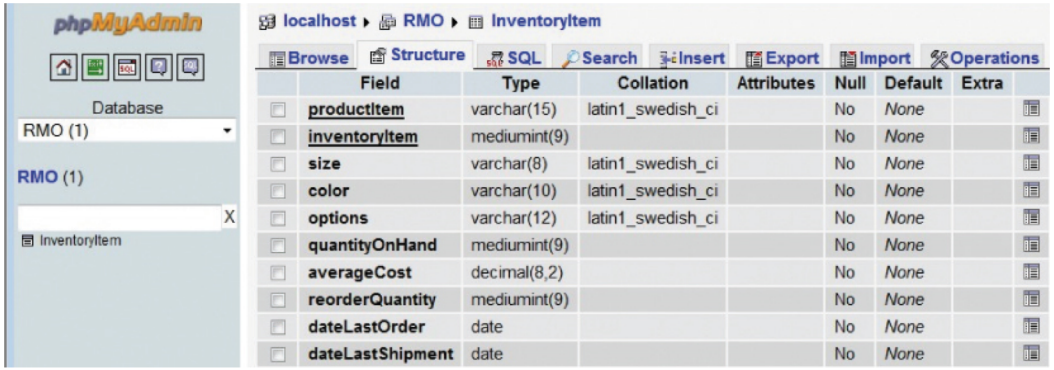
System sequence diagram

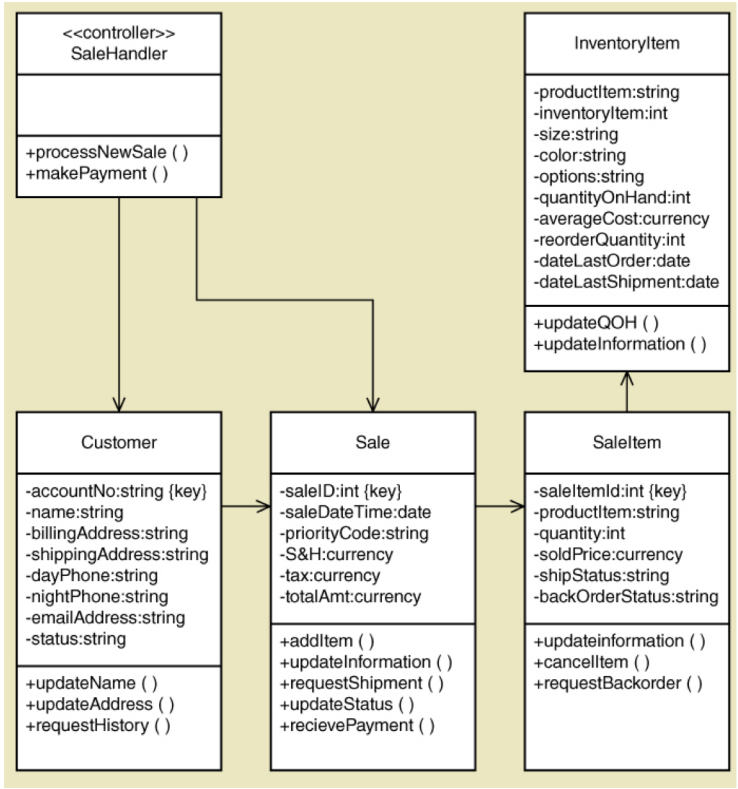


Small screen menu prototype

Design the Database

- By definition, an Information System requires data – usually in a database
- Current technology frequently use Relational Database Management Systems (RDBMS)
- Converts the data model (i.e. domain model class diagram) to a relational database
- Requires addressing of many other technical issues
  - Throughput and response time
  - Security



Design Software Classes and Methods

- Extends the analysis models to incorporate software-specific elements
- Resulted models:
  - Design Class Diagram
  - Sequence Diagrams
  - State-Machine Diagrams