SYSTEMS ANALYSIS AND DESIGN IN A CHANGING WORLD

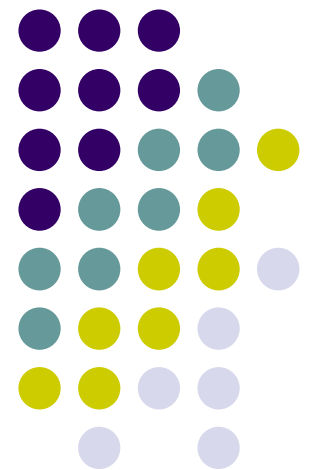## Satzinger | Jackson | Burd

Chapter 1

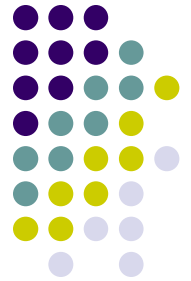**Systems Analysis and Design from Beginning to End: Case Study**

Chapter 1

Systems Analysis and Design
in a Changing World 6th Ed

Satzinger, Jackson & Burd

Ridgeline Mountain Outfitters (RMO)

- ## Large Retail Company
  - outdoor and sporting clothing and accessories
  - Skiing, mountain biking, water sports
  - Hiking, camping, mountain climbing
- ## Rocky Mountain and Western States
  - Started mail order and phone order
  - Added retail stores
  - Added extensive E-business component

Ridgeline Mountain Outfitters (RMO)

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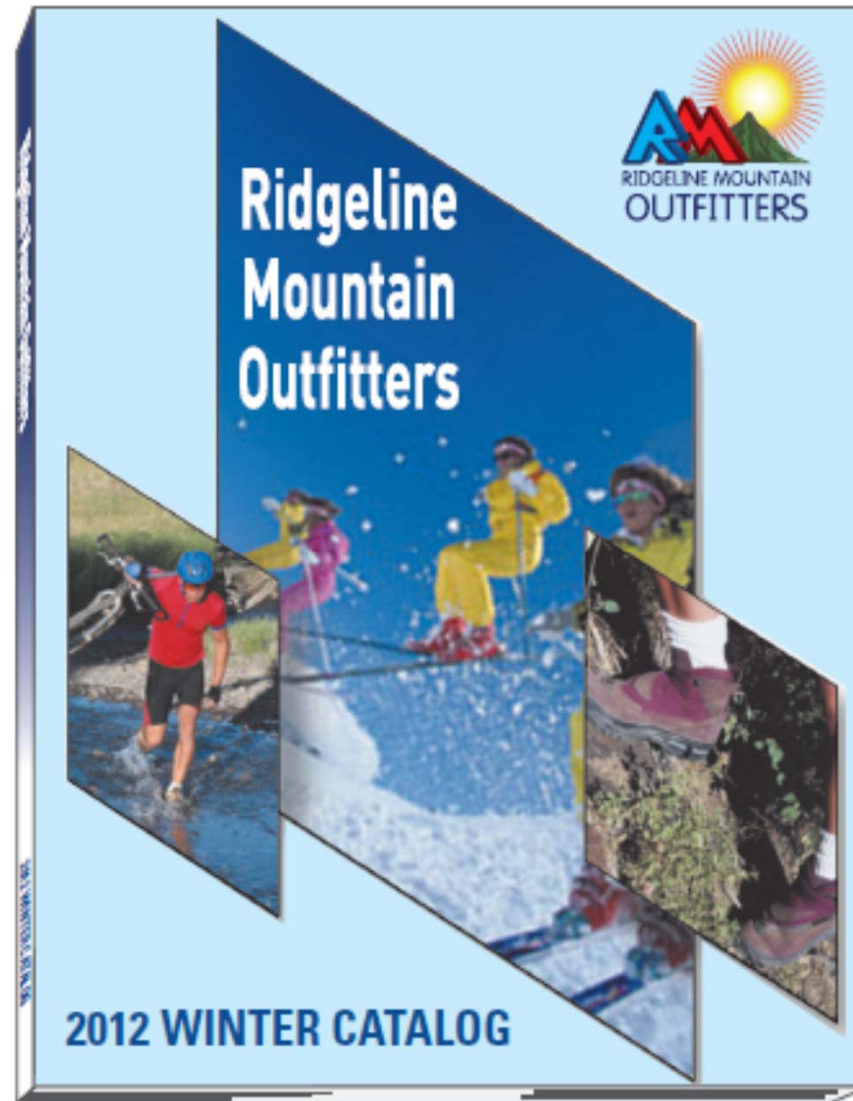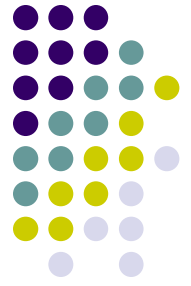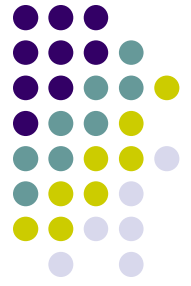
Ridgeline Mountain Outfitters (RMO)
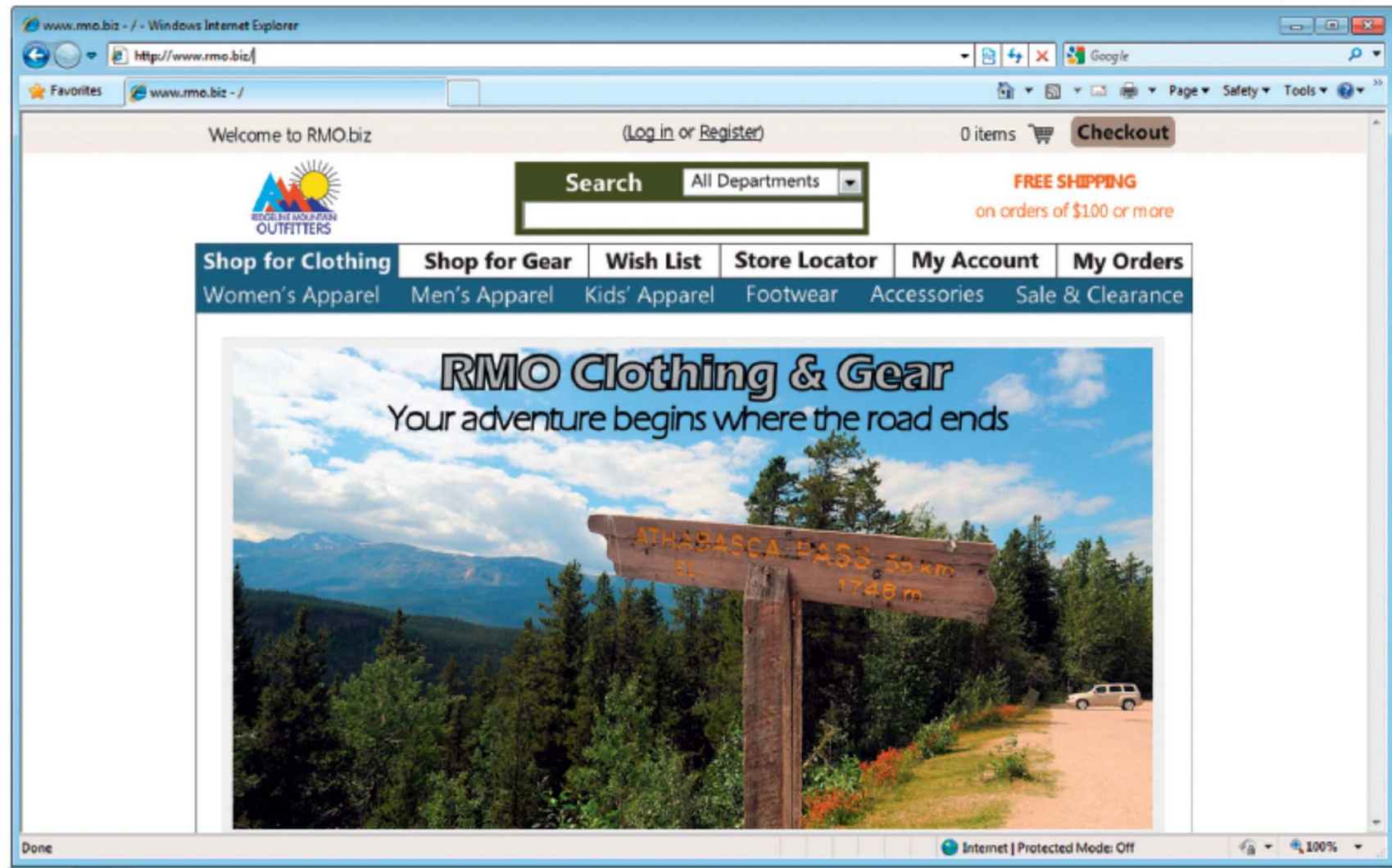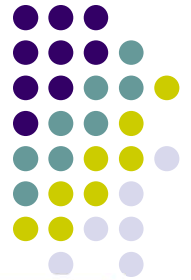
RMO Tradeshow System

- Sample project for chapter
- Small information system (app)
- Being added to larger supply chain management system
- Demonstrates one iteration of the small project, assuming there are more
- Plan is to complete iteration in six days

RMO Tradeshow System

- **Problem**-- purchasing agents attend apparel and fabric trade shows around the world to order new products from suppliers
- **Need**– information system (app) to collect and track information about suppliers and new products while at tradeshows
- **Tradeshow Project**– is proposed
  - Supplier information subsystem
  - Product information subsystem

Pre-Project Activities

- Identify the problem and document the objective of the system
  - Preliminary investigation
  - System Vision Document
- Obtain approval to commence the project
  - Meet with key stakeholders, including executive management
  - Decision reached, approve plan and budget

System Vision Document

Problem description

System capabilities

Business benefits

System Vision Document
RMO Tradeshow System

Problem Description

Trade shows have become an important information source for new products, new fashions, and new fabrics. In addition to the large providers of outdoor clothing and fabrics, there are many smaller providers. It is important for RMO to capture information about these suppliers while the trade show is in progress. It is also important to obtain information about specific merchandise products that RMO plans to purchase. Additionally, if quality photographs of the products can be obtained while at the trade show, then the creation of online product pages is greatly facilitated.

It is recommended that a new system be developed and deployed so field purchasing agents can communicate more rapidly with the home office about suppliers and specific products of interest. This system should be deployed on portable equipment.
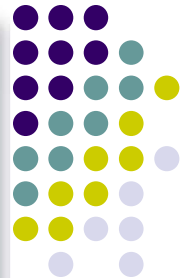
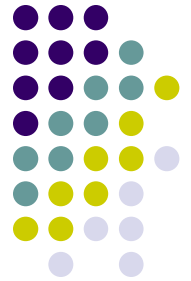**System Capabilities**

The new system should be capable of:

- Collecting and storing information about the manufacturer/wholesaler (suppliers)
- Collecting and storing information about sales representatives and other key personnel for each supplier
- Collecting information about products
- Taking pictures of products (and/or uploading stock images of products)
- Functioning as a stand-alone without connection
- Connecting via Wi-Fi (Internet) and transmitting data
- Connecting via telephone and transmitting data

Business Benefits

It is anticipated that the deployment of this new system will provide the following business benefits to RMO:

- Increase timely communication between trade show attendees and home office, thereby improving the quality and speed of purchase order decisions
- Maintain correct and current information about suppliers and their key personnel, thereby facilitating rapid communication with suppliers
- Maintain correct and rapid information and images about new products, thereby facilitating the development of catalogs and Web pages
- Expedite the placing of purchase orders for new merchandise, thereby catching trends more rapidly and speeding up product availability
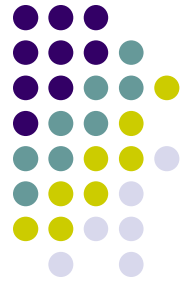
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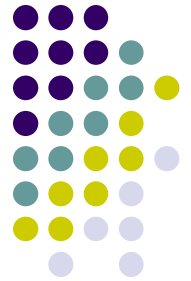
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Day 1 Activities

- Plan the Project
  - Determine the major components (functional areas) that are needed
    - Supplier information subsystem
    - Product information subsystem
  - Define the iterations and assign each function to an iteration
    - Decide to do Supplier subsystem first
    - Plan one iteration as it is small and straight forward
 - Determine team members and responsibilities
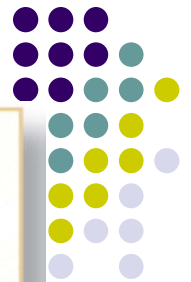
Work Breakdown Structure for Iteration

Work Breakdown Structure

I. Discover and understand the details of all aspects of the problem.
1. Meet with the Purchasing Department manager. ~ 3 hours
2. Meet with several purchasing agents. ~ 4 hours
3. Identify and define use cases. ~ 3 hours
4. Identify and define information requirements. ~ 2 hours
5. Develop workflows and descriptions for the use cases. ~ 6 hours

II. Design the components of the solution to the problem.
1. Design (lay out) input screens, output screens, and reports. ~ 8 hours
2. Design and build database (attributes, keys, indexes). ~ 4 hours
3. Design overall architecture. ~ 4 hours
4. Design program details. ~ 6 hours

III. Build the components and integrate everything into the solution.
1. Code and unit test GUI layer programs. ~ 14 hours
2. Code and unit test Logic layer programs. ~ 8 hours

IV. Perform all system-level tests and then deploy the solution.
1. Perform system functionality tests. ~ 5 hours
2. Perform user acceptance test. ~ 8 hours

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14

Work Sequence Draft for Iteration

Elaborates on Work Breakdown Structure
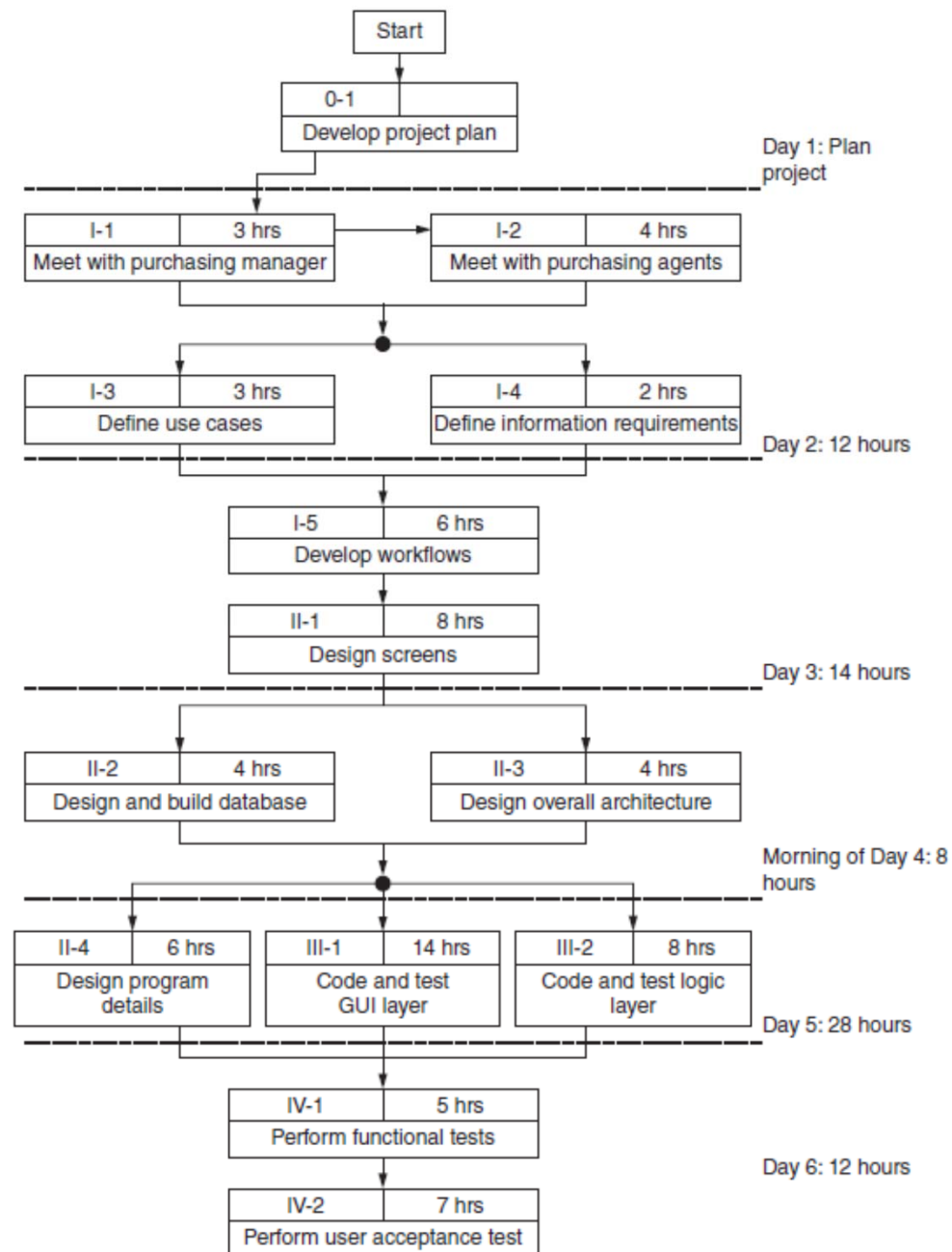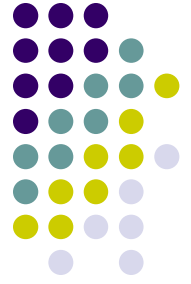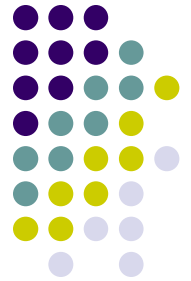
Day 2 Activities

- Discover and Understand Details
  - Do preliminary fact-finding to understand requirements
  - Develop a preliminary list of use cases and a use case diagram
  - Develop a preliminary list of classes and a class diagram

Identify Use Cases- a case or situation where the system is used

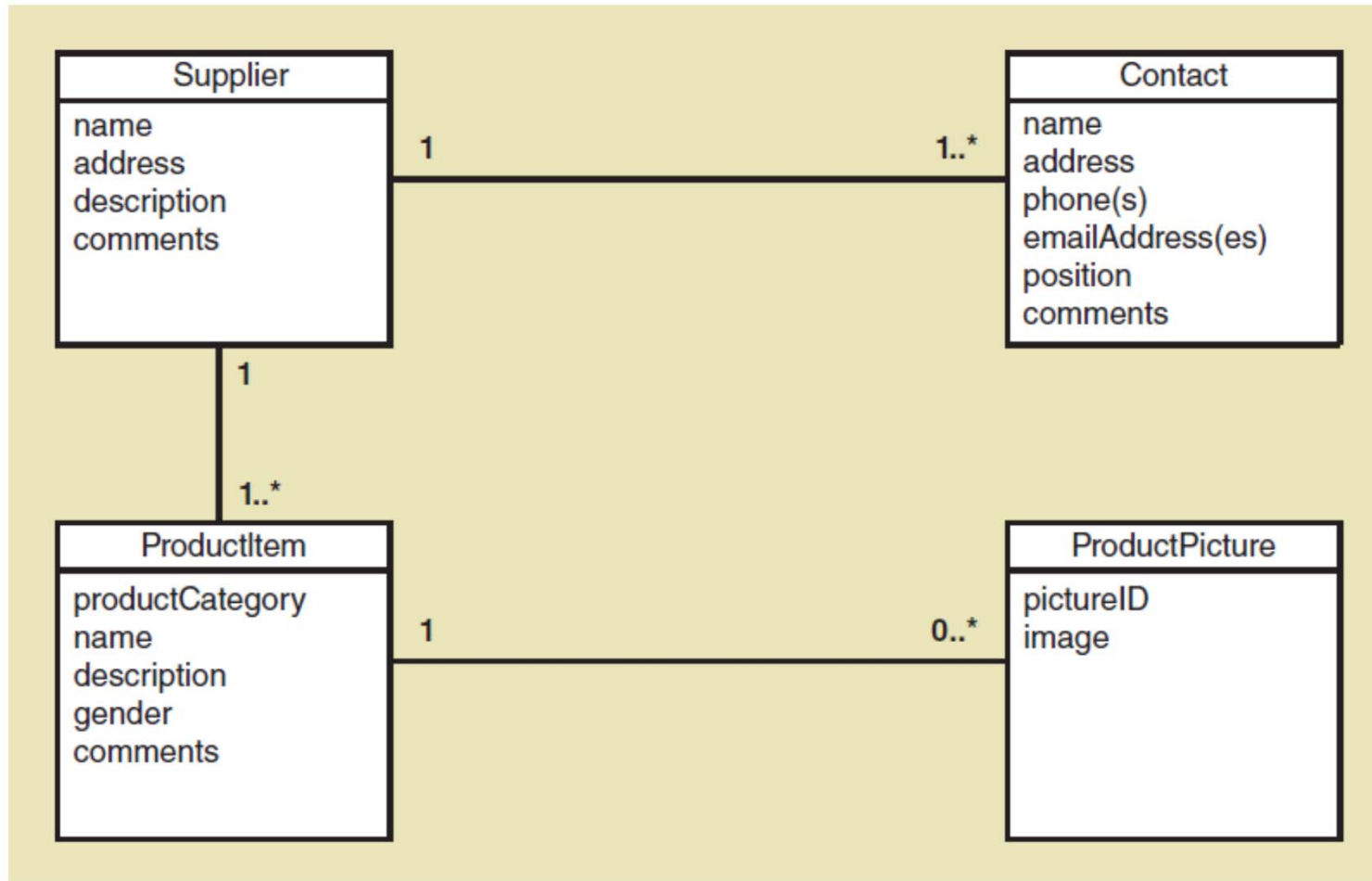| Use Case	Description
Look up supplier	Using supplier name, find supplier information and contacts
Enter/update supplier information	Enter (new) or update (existing) supplier information
Look up contact	Using contact name, find contact information
Enter/update contact information	Enter (new) or update (existing) contact information
Look up product information	Using description or supplier name, look up product information
Enter/update product information	Enter (new) or update (existing) product information
Upload product image	Upload images of the merchandise product

# Identify Object Classes- those things in the real world that the system needs to know about or keep track of

Object Classes	Attributes
Supplier	supplier name, address, description, comments
Contact	name, address, phone(s), e-mail address(es), position, comments
Product	category, name, description, gender, comments
ProductPicture	ID, image

Preliminary Class Diagram

Both subsystems
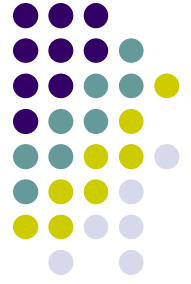
Day 3 Activities

- Discover and Understand Details

  - Do in-depth fact-finding to understand requirements

  - Understand and document the detailed workflow of each use case

- Design System Components

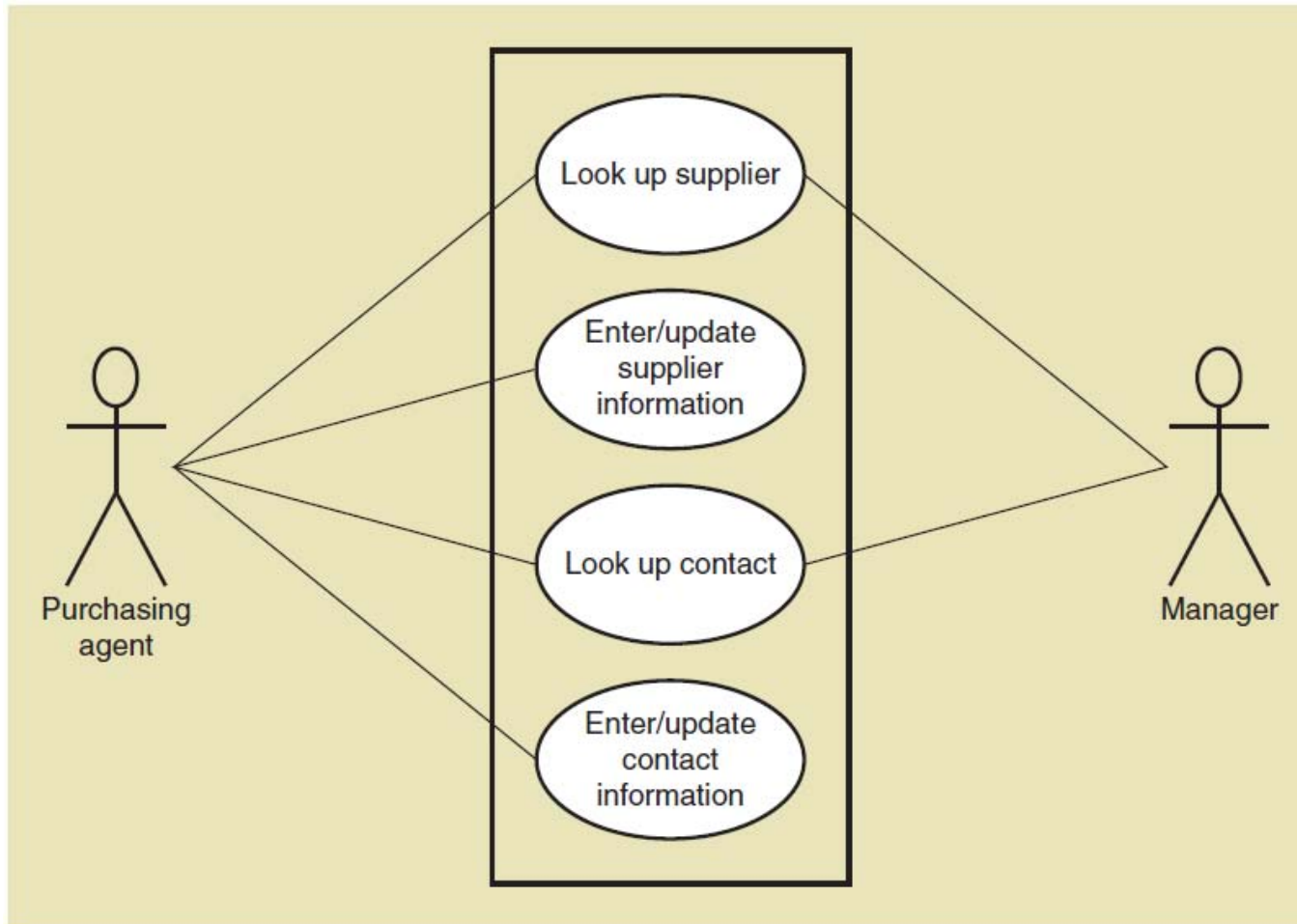 - Define the user experience with screens and reports
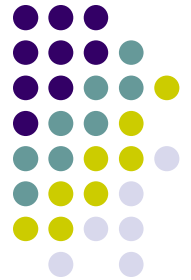
Details Focus on Supplier Information Subsystem

- Use cases:
  - Look up supplier
  - Enter/update supplier information
  - Lookup contact information
  - Enter/update contract information
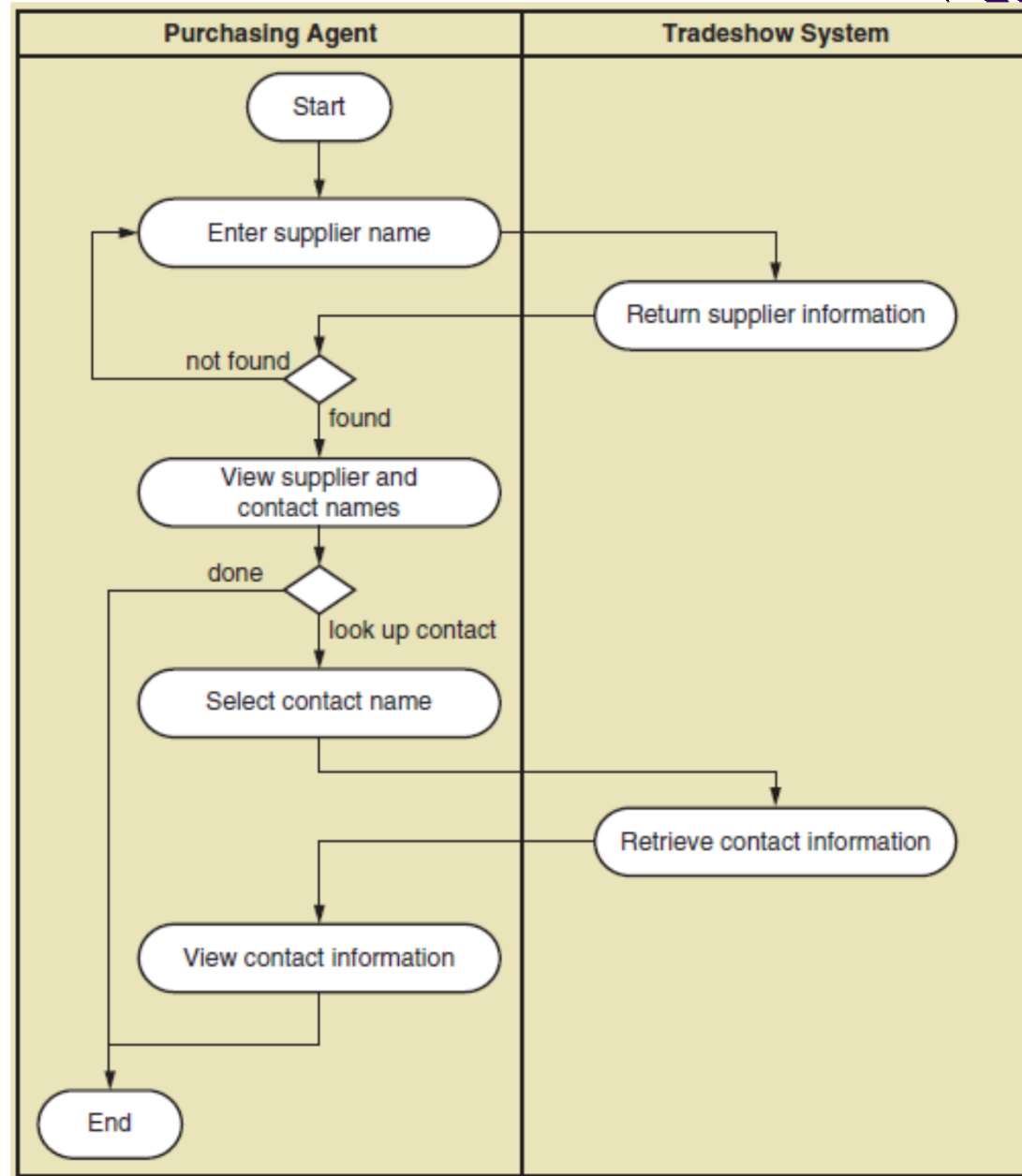
Use Case Diagram
Supplier information subsystem

Activity Diagram (Workflow)

Look up supplier use case

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Draft Screen Layout
Look up supplier use case

Day 4 Activities

- Design System Components
  - Design the database (schema)
    - Table design
    - Key and index identification
    - Attribute types
    - Referential integrity
  - Design the system's high level structure
    - Browser, Windows, or Smart phone; OO or procedural
    - Architectural configuration (components)
    - Design class diagram
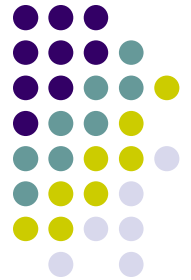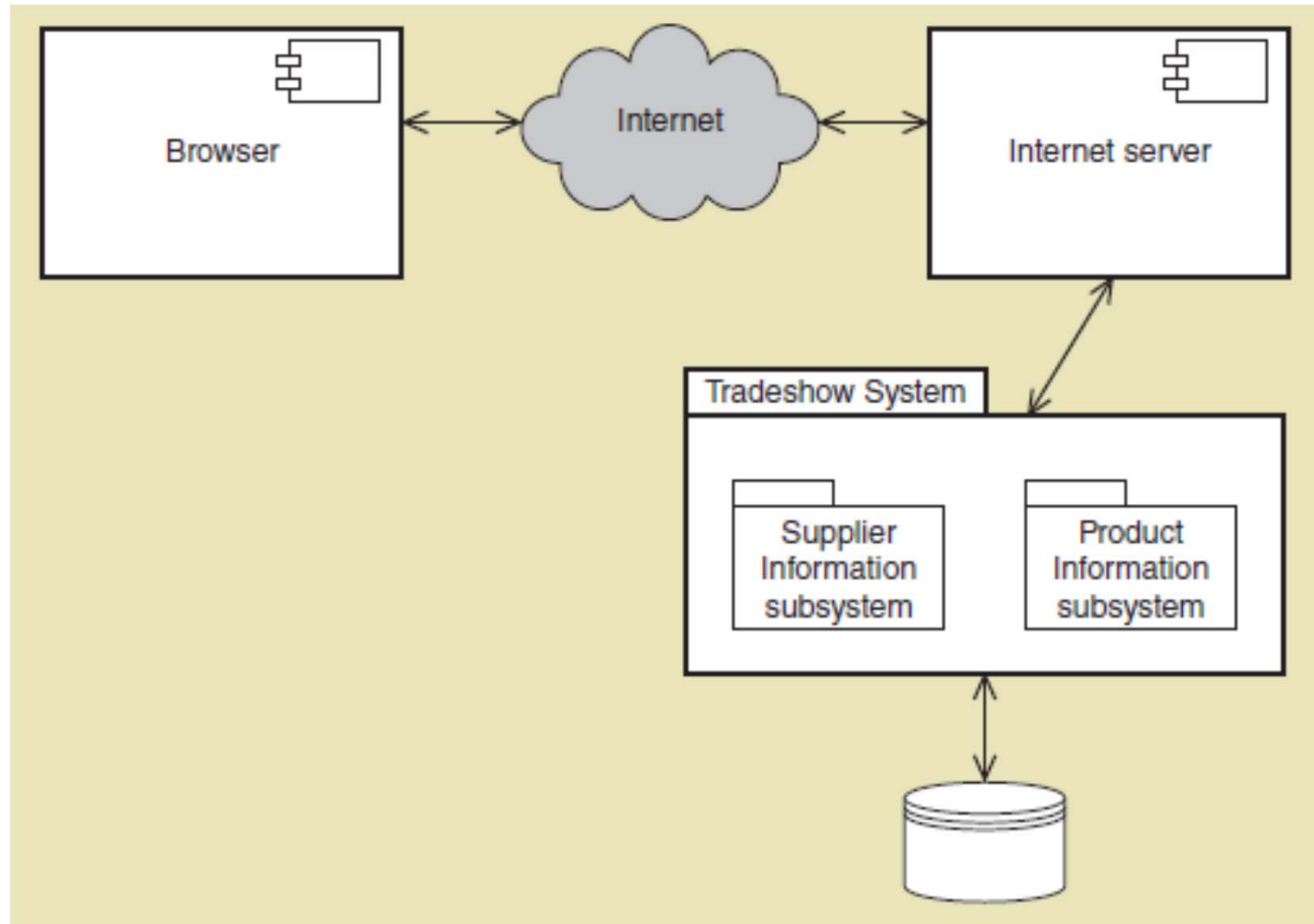   - Subsystem architectural design

Database Schema

Table Name	Attributes
Supplier	SupplierID: integer {key} Name: string {index} Address1: string Address1: string City: string State-province: string Postal-code: string Country: string SupplierWebURL: string Comments: string
Contact	ContactID: integer {key} SupplierID: integer {foreign key} Name: string {index} Title: string WorkAddress1: string WorkAddress2: string WorkCity: string WorkState: string WorkPostal-code: string WorkCountry: string WorkPhone: string MobilePhone: string EmailAddress1: string EmailAddress2: string Comments: string

Architectural Configuration Diagram
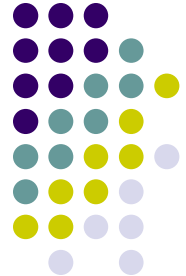
Preliminary Design Class Diagram

Includes View Layer Classes and Domain Layer Classes

Need to add Utility Classes as well

SupplierView
lookupSupplier ( )   displaySupplier ( )

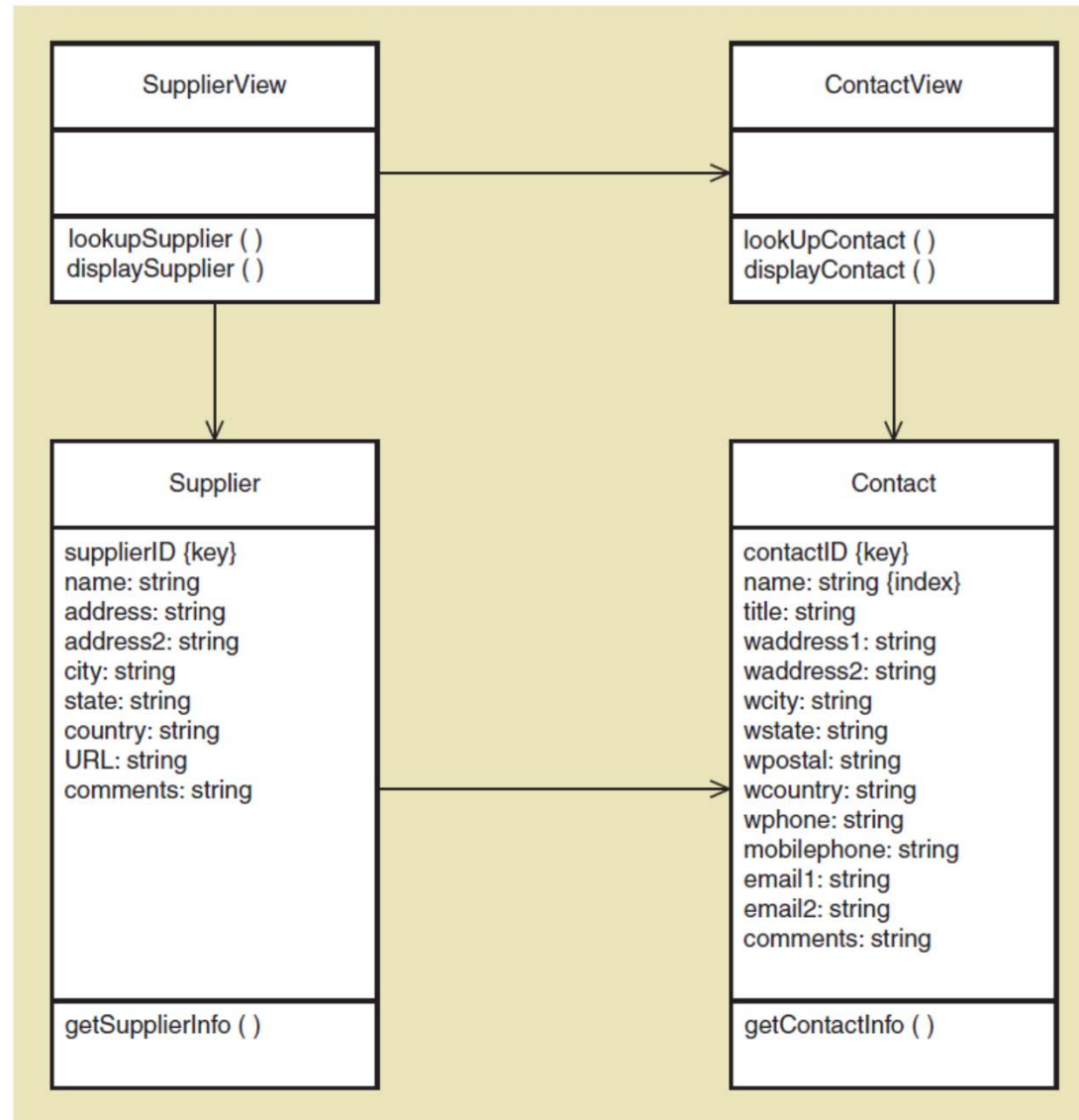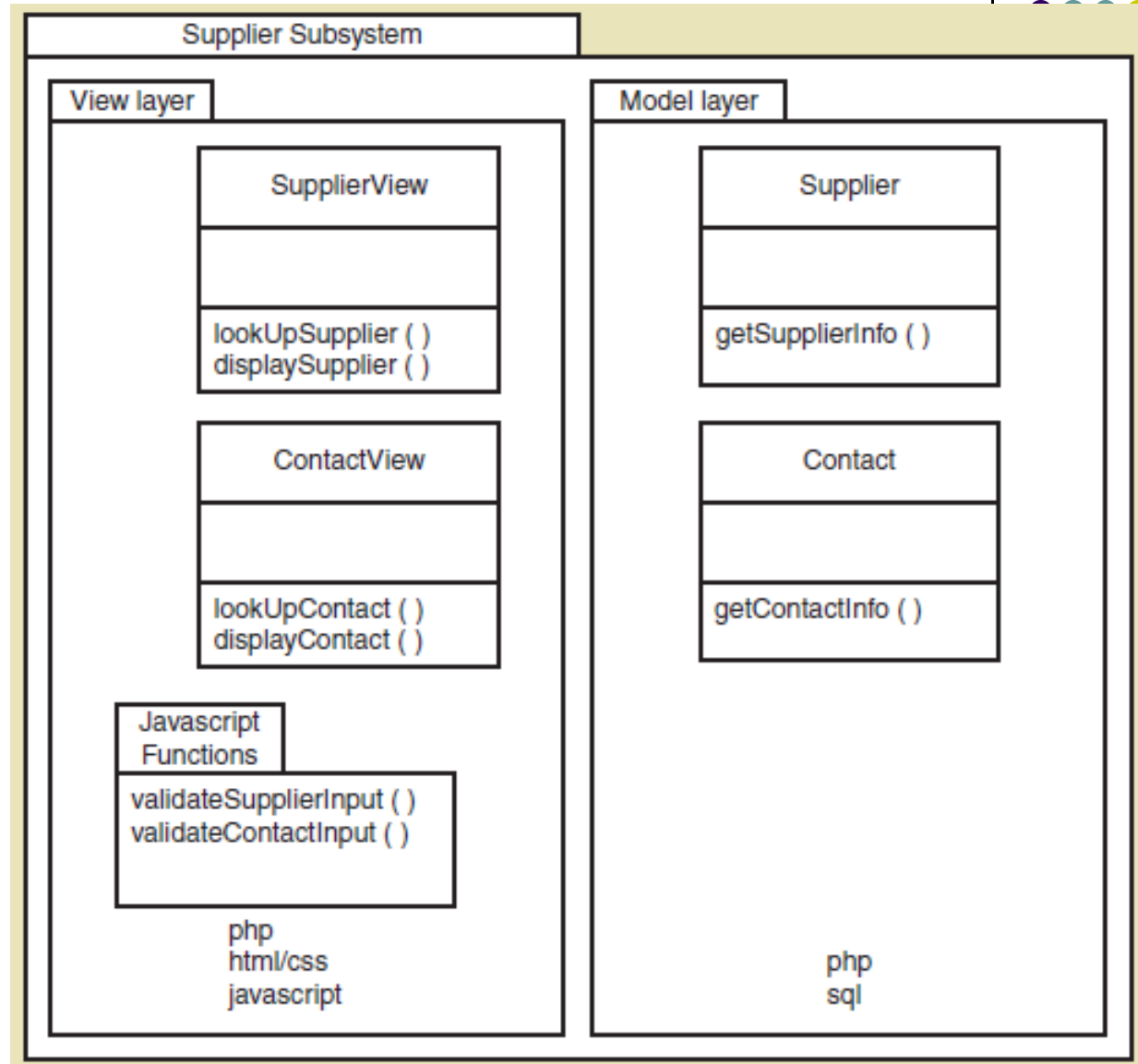| ContactView |
| --- |
| |
| lookUpContact ( )
 displayContact ( ) |

Supplier
supplierID {key}   name: string   address: string   address2: string   city: string   state: string   country: string   URL: string   comments: string
getSupplierInfo ( )

Contact
contactID {key}   name: string {index}   title: string   waddress1: string   waddress2: string   wcity: string   wstate: string   wpostal: string   wcountry: string   wphone: string   mobilephone: string   email1: string   email2: string   comments: string
getContactInfo ( )

Subsystem Architectural Design Diagram

Supplier Subsystem

View layer

SupplierView

lookUpSupplier ( )
displaySupplier ( )

ContactView

lookUpContact ( )
displayContact ( )

Javascript Functions

validateSupplierInput ( )
validateContactInput ( )

php
html/css
javascript

Model layer

Supplier

getSupplierInfo ( )

Contact

getContactInfo ( )

php
sql

Notes on Managing the Project

- Lots of design diagrams shown
  - Design in a complex activity with multiple levels
    - High level architectural
    - Low level detailed design
  - One diagram builds on/complements another
  - Not everything is diagrammed, especially for a small project. Pick and choose.
- Programming is also done concurrently
  - You don't design everything then code
  - You do some design, some coding, some design, some coding

Day 5 Activities

- Design System Components
  - Continue with design details
  - Proceed use case by use case
- Build, Test, and Integrate System Components
  - Continue programming (build)
  - Build use case by use case
  - Perform unit and integration tests

Code Example for One Class

```php
<?php
    class SupplierView
    {
        private Supplier $theSupplier;

        function __construct()
        {
            $this->theSupplier = new Supplier();
        }

        function lookupSupplier()
        {
          include('lookupSupplier.inc.html');
        }

        function displaySupplier()
        {
            include('displaySupplierTop.inc.html');
            extract($_REQUEST);    // get Form data
          //Call Supplier class to retrieve the data
          $results = $theSupplier->getSupplierInfo($supplier, $category,
                                            $product, $country, $contact);

          foreach ($results as $resultItem){
          ?>
                <tr>
                    <td style="border:1px solid black">
                            <?php echo $resultItem->supplierName?></td>
                    <td style="border:1px solid black">
                            <?php echo $resultItem->contactName?></td>
                    <td style="border:1px solid black">
                        <?php echo $resultItem->contactPosition?></td>
                </tr>
          <?php }
          include('displaySupplierFoot.inc.html');
        }
    }
?>
```
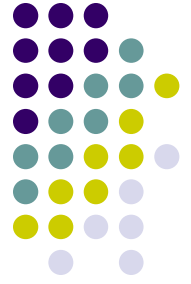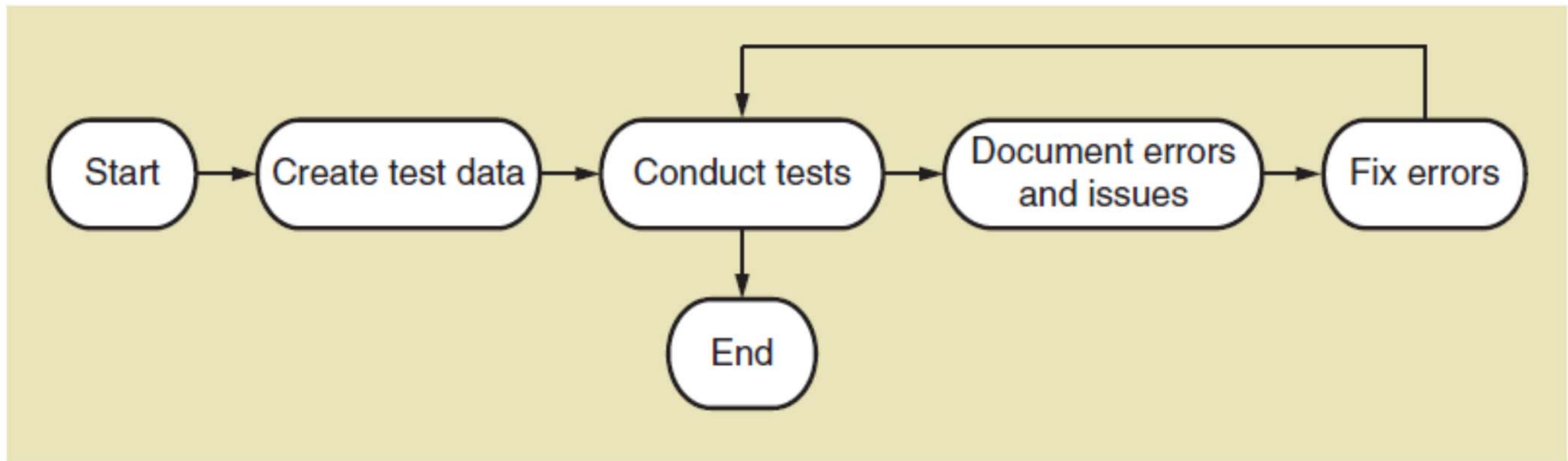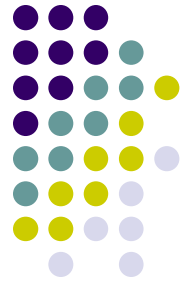
Workflow of Testing Tasks
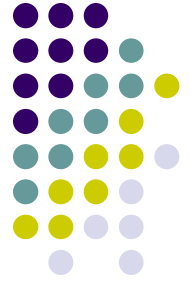
Screen Capture for Look up supplier use case

Day 6 Activities

- Complete System Testing and Deploy System
  - Perform system functional testing
  - Perform user acceptance testing
  - Possibly deploy part of system