SOEN 387: Assignment 1

Web-Based Enterprise Application Design — Fall 2023
Revision 1

Due Date: Monday, October 23rd, 2023

Introduction

The learning goals for this assignment are:

- Use Java web technologies
- Understand and use Java servlets
- Use of the JSP templating language
- Handling HTTP request and response objects
- Understanding the appropriate use of the HTTP methods, status codes, headers, and bodies

You may use this assignment as a base for future assignments but are not required to.

You may work on this assignment alone or as a team of up to three people.

If you work on this assignment as a team, designate a team leader who will be responsible for submitting the assignment. Only one person should submit the assignment.

Please check Moodle regularly as there may be changes made to the assignment that may modify or clarify requirements.

System Overview

You will be building an online storefront for a merchant that will allow customers to see a list of products offered on the online storefront and allow customers to add products to a virtual cart. The merchant's staff will also be able to add and modify products on the online storefront and download a catalog of all the products in the online store.

A Product has a name, description, vendor, URL slug, SKU, and price. The name is a short string that describes the product. The description is a potentially long detailed description of the product that describes information about the product, its specifications and how to use it. The URL slug is a friendly identifier for the product to be used in URLs and is limited to 100 characters and may only contain lowercase letters, numbers, or dashes. The SKU is a string that is the unique identifier for this product.

A Cart is a set of Products and is associated with a customer. A Product can only be in a Cart once. A customer only ever has one Cart.

Use Cases

There are two main categories of actors, customers and stuff. The following are the use cases that are expected to be implemented.

- Customers
    - View all products
    - View details on a specific product
    - View the products in their cart
    - Add a product to their cart
    - Remove a product from their cart
    - Adjust the quantity of items in their cart
- Staff
    - View all products
    - View details on a specific product
    - Make changes to a product
    - Download a list of all products

Assignment

Business Functions

The storefront business layer is to be implemented as a standalone set of classes that do not depend on any specific web technology. You should be able to use the classes you design outside the context of a web application such as a command line or GUI application with no modifications. Creating a Façade with these functions will help keep this separation.

The expected business functions are:

- CreateProduct(sku, name): Create a new product, with the given name and SKU.
- UpdateProduct(sku, …): Update some of all the fields of a product with the given sku
- GetProduct(sku): Get all the information on a product by SKU
- GetProductBySlug(slug): Get all the information on a product by slug
- GetCart(user): Get the list of products in the cart associated with the user, if there is no cart associated with the user, return the empty list.
- AddProductToCart(user, sku): Add a product to the cart associated with the user. If no cart is associated with the user, create one first.
- RemoveProductFromCart(user, sku): Remove all instances of a product from the cart associated with the user. If no cart is associated with the user, no operation is performed.
- DownloadProductCatalog(): Produce a file that contains a list of all the products in the store which includes name, description, vendor, URL slug, SKU, and price.

Error Handling

In the event an operation is not permitted, the Business Layer should raise a custom exception for the error case which specifies the reason.

User Management

There is no user management at the business layer, the business layer assumes that the caller is authorized to make the method call.

Data Persistence

For simplicity, no database or data storage is required for this assignment. All data can remain in memory.

Java Servlet

You may implement additional paths as needed but you must implement the following paths.

- GET /products
  The page for a list of all products
- GET /products/:slug
  The page for a single product
- POST /products/:slug
  The endpoint to modify a product
- POST /cart/products/:slug
  The endpoint to add a product to the user’s cart
- DELETE /cart/products/:slug
  The endpoint to remove a product from the user’s cart
- GET /products/download
  The endpoint to download the product catalog

The Servlet should check that the requestor is authorized to access a given operation. You may use the servlet session object to authenticate and authorize users.

Web Frontend

The web frontend should have pages for:

- A main page (or home page)
  - Including links to view all products and the user's cart
  - A means of entering a pass code to authenticate as a staff user
  - For staff users only, including a link to create new products
- Viewing all products
  - Including links to specific product pages
  - For staff users only, including functionality to download the product catalog.
  - This page should be accessible via /products/:slug such as /products/green-marker
- Viewing a specific product
  - Including functions for being able add that product to the user's cart.
  - For staff users only, including functionality to make changes to a product
- Viewing Cart Contents
  - Including functions for being able to remove products that are in the user's cart
- For staff only, Creating a new product

All pages must be valid HTML and use the HTML5 doctype. You should style your page with CSS. You may make use of JavaScript libraries to improve your page.

User Management

User management is to be handled in the web frontend and servlet. All users are anonymous and assumed to be customers. You should provide a facility for users to enter a predefined passcode to authenticate as staff members. You must support the passcode "secret", you may add other passcodes.

Source Control

You must keep track of your code with source control software. The use of Git is required. Platforms such as GitHub and GitLab are recommended but not required.

You must submit a copy of the source control repository as part of your assignment. Make sure you are familiar with where this is stored and what to submit before the deadline.

UML Class Diagram

Draw a class diagram of your business layer and include it in the report you submit. You need not include web related classes such as servlets as they are not part of the business layer.

Requirements

- The implementation consists of a backend and a frontend.
    - You may use any front-end technology or framework.
    - The backend must be a Java servlet and you must make use of JSP.
- Your download functionality must cause the browser to detect the file as the appropriate type of file. The browser should not try to interpret your file as HTML
- You must use the appropriate HTTP methods for all interactions with the server
    - Operations that modify state (such as updating product information) must not use the HTTP GET method

What to Submit

The assignment must be submitted on Moodle to the appropriate submission box.

The submission should be a single ZIP file which follows the naming convention below and contain the following:

- The source code and instructions required to compile your assignment
- A compiled .war file
- A PDF formatted report named report.pdf
  The report should include:
    - The names and student numbers of all students who worked on the assignment
    - The development environment used and instructions on how to compile the application
    - The UML Diagram
    - If there was anything outside the assignment's scope, information what it was and where to find it. If included, this will be used to assess bonus marks. If this section is omitted, no bonus marks will be awarded.
- The commit history of your work
    - This can be done by including the hidden ".git" folder of your repository in your ZIP file

Submission File Naming Convention

The file name should be "a1_" followed by an underscore-separated list of student numbers who worked on the assignment followed by ".zip".

Submissions done alone would look like: a1_11111111.zip
Submissions done as a team of two would look like: a1_11111111_22222222.zip
Submissions done as a team of three would look like: a1_11111111_22222222_33333333.zip

Where 11111111, 22222222, and 33333333 are student ID numbers.

Grading Scheme

Business Layer	20%
Java Servlet	15%
Web Frontend	25%
Use of CSS	5%
File Download	10%
Error Handling	10%
Version Control	5%
UML Class Diagram	10%
(Bonus)	10%

Bonus marks are subjectively awarded based on technical merit by implementing technologies or features outside the scope of the assignment but withing the scope of the course. Check with the instructor before implementing a technology or feature for bonus marks to see if it qualifies. The report must include information about the implementation of the technology or feature to qualify.