Macromedia University of Applied Sciences

Course Title: **Advanced Coding Skills**
Name of Examiner: **Professor Nazneen Mansoor**

To be completed by students:

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Berlin,22.01.2026	Daniel Rabago Casaña
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Date: **Name, first name First Examiner (to be filled in digitally)**

To be completed by the examiner: (Text area for the second examiner)

D-Money's Shoe World

Full-Stack E-Commerce Web Application

Student: Daniel Rabago
Course: Advanced Coding
Date submitted: January 23, 2026
Repository link: https://github.com/Rexusnat3/D-Money-s-Shoe-World

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1. Project Overview

D-Money's Shoe World is a comprehensive full-stack e-commerce web application for a shoe store, built with Python Flask backend and modern JavaScript frontend. The project demonstrates advanced Object-Oriented Programming (OOP) concepts, database management, RESTful API design, and user authentication using JWT tokens.

The application supports multiple user roles (customers and administrators), product management with inheritance-based categorization (Athletic, Casual, and Formal shoes), shopping cart functionality, and order processing.

2. Technologies Used

Backend

- **Python 3.13:** Programming language
- **Flask 2.3.3:** Web framework
- **Flask-CORS 4.0.0:** Cross-origin resource sharing
- **PyJWT 2.8.0:** JWT authentication
- **SQLite3:** Database (built-in)
- **Werkzeug 2.3.7:** WSGI utilities

Frontend

- **HTML5:** Structure and markup
- **CSS3:** Modern styling with gradients and animations
- **Vanilla JavaScript:** Pure ES6+ without frameworks
- **Fetch API:** RESTful API communication

3. Project Structure

```
D-Money-s-Shoe-World/
├── Main.py                  # Main Flask application
├── config.py                # Configuration settings
├── db_manager.py            # Database operations
├── requirements.txt         # Python dependencies
├── README.md               # Project documentation
├── models/                  # Data models
│   ├── __init__.py
│   ├── product.py          # Product classes (OOP inheritance)
│   ├── user.py             # User classes
│   ├── cart.py             # Shopping cart
│   └── order.py            # Order management
├── templates/              # HTML templates
│   └── index.html          # Main frontend
└── static/                # Static assets
    ├── style.css          # Styles
    └── script.js          # JavaScript logic
```

4. Installation Instructions

Step 1: Clone the repository and navigate to the project directory

```
git clone <repository-url>
cd D-Money-s-Shoe-World
```

Step 2: Install required dependencies

```
pip install -r requirements.txt
```

Step 3: Run the application

```
python Main.py
```

Step 4: Access the application in your web browser

```
http://localhost:5000
```

5. Core Components

5.1 Main Application (Main.py)

The main Flask application file that serves as the entry point for the application. It handles routing, API endpoints, authentication, and coordinates between different components.

Key Features:

- Flask application initialization with CORS enabled
- JWT-based authentication decorators
- RESTful API endpoints for products, users, cart, and orders
- Database initialization and product seeding
- Static file serving for the frontend

Main.py Excerpt:

```
#Main.py the main flask application for the rest stop API
from flask import Flask, request, jsonify, render_template,
send_from_directory
from flask_cors import CORS
from functools import wraps
from db_manager import DatabaseManager

import jwt
import datetime
import json
from config import Config

app = Flask(__name__)
app.config.from_object(Config)
CORS(app) #Enable CORS for all routes
db=DatabaseManager()
```

```
#initialize the database
db.init_db()

def seed_products():
    """Seed initial products if none exist to help demo the app."""
    try:
        conn = db.get_connection()
        cur = conn.cursor()
        cur.execute('SELECT COUNT(*) AS cnt FROM products')
        row = cur.fetchone()
        count = row[0] if row else 0
        conn.close()
    except Exception:
        count = 0

    if count and count > 0:
        return

    from models.product import AthleticShoe, CasualShoe, FormalShoe

    samples = [
        AthleticShoe(name='Air Runner', brand='Nike', price=129.99,
size='10', stock=15, color='Black/White', sport_type='running',
image='https://images.unsplash.com/photo-1542291026-7eec264c27ff?w=600'),
        AthleticShoe(name='Ultra Boost', brand='Adidas', price=159.99,
size='10', stock=10, color='Grey', sport_type='running',
image='https://images.unsplash.com/photo-1600180758890-
6b94519a8ba6?w=600'),
        CasualShoe(name='Everyday Sneaker', brand='Vans', price=69.99,
size='10', stock=25, color='Navy', style='sneaker',
image='https://images.unsplash.com/p
... (truncated for brevity)
```

5.2 Database Manager (db_manager.py)

Manages all database operations using SQLite3. Implements the Data Access Layer pattern to separate database logic from business logic.

Key Methods:

- init_db(): Creates database tables
- add_product(), get_product(), update_product(), delete_product(): Product CRUD operations
- register_user(), get_user(), verify_user(): User management
- add_to_cart(), get_cart(), remove_from_cart(): Cart operations
- create_order(), get_orders(): Order management

```
import sqlite3
import json
from config import Config

class DatabaseManager:
    """This class manages all the database operations for my store"""

    def __init__(self):
        self.db_name = Config.DATABASE_NAME

    def get_connection(self):
        """get the database connected"""
        conn = sqlite3.connect(self.db_name, timeout=10)
        conn.row_factory = sqlite3.Row
        return conn

    def init_db(self):
        """Initialize the database tables"""
        conn = self.get_connection()
        cursor = conn.cursor()

        # Users table

        cursor.execute('''
            CREATE TABLE IF NOT EXISTS users (
                id INTEGER PRIMARY KEY AUTOINCREMENT,
                username TEXT UNIQUE NOT NULL,
                password_hash TEXT NOT NULL,
                email TEXT,
                role TEXT NOT NULL,
                created_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP
                )
            ''')

        # Products Table
        cursor.execute('''
            CREATE TABLE IF NOT EXISTS products (
                        id INTEGER PRIMARY KEY AUTOINCREMENT,
                        name TEXT NOT NULL,
```

```
                        brand TEXT NOT NULL,
                        price REAL NOT NULL,
                        size TEXT NOT NULL,
                        stock INTEGER NOT NULL,
                        color TEXT,
                        category TEXT NOT NULL,
                        attributes TEXT,
                        image TEXT,
... (truncated for brevity)
```

5.3 Configuration (config.py)

Centralized configuration management using a Config class. Uses environment variables with fallback defaults for security.

```
import os
from pathlib import Path

# Resolve project root based on this file's location
BASE_DIR = Path(__file__).resolve().parent

class Config:
    SECRET_KEY = os.environ.get('SECRET_KEY') or 'you-will-never-guess'
    # Store DB file alongside the project (not a hardcoded absolute path)
    DATABASE_NAME = str(BASE_DIR / 'shoe_store_inventory.db')
    DEBUG = os.environ.get('DEBUG', 'False').lower() == 'true'
```

5.4 Models

Product Models (models/product.py):

Demonstrates OOP inheritance with a base Product class and specialized subclasses (AthleticShoe, CasualShoe, FormalShoe). Each subclass adds specific attributes relevant to its category.

```
""" all the product related models """

from datetime import datetime
import json

class Product:
    """base class for all products"""
    def __init__(self, name, brand, price, stock=0, product_id=None):
        self._id = product_id
        self._name = name
        self._brand = brand
        self._price = float(price)
        self._stock = int(stock)
        self._created_at = datetime.now()

    @property
    def id(self):
        return self._id

    @property
    def name(self):
        return self._name

    @property
    def brand(self):
        return self._brand

    @property
    def price(self):
        return self._price
```

```
    @price.setter
    def price(self, value):
        self._price
        """Set the price of the product"""
        if value < 0:
            raise ValueError("Price cannot be negative")
        self._price = float(value)

    @property
    def stock(self):
        return self._stock

    @stock.setter
    def stock(self, value):
        """Set the stock of the product"""
        if value < 0:
            raise ValueError("Stock cannot be negative")
        self._stock = int(value)

    @property
    def created_at(self):
        return self._created_at

    def update_stock(self, quantity):
        """Update stock quantity"""
        self._stock += quantity
        return self._stock

    def shoe_in_stock(self):
        """Check if the product is in stock"""
        return self._stock > 0

    def get_displ
... (truncated for brevity)
```

User Models (models/user.py):

Implements user authentication with password hashing and role-based access control. Demonstrates encapsulation with property decorators.

```
"""User Models for D-Money's Shoe World, here we demonstrate Inheritance.
and Polymorphism with different user roles."""

import hashlib
from datetime import datetime

class User:
    """Base User class representing a generic user with common attributes
    and methods."""

    def __init__(self, username, password, email=None, user_id=None,
role='customer'):
        self.user_id = user_id
        self._username = username
        self._password_hash = self._hash_password(password)
        self._email = email
        self._role = role
        self._created_at = datetime.now()

    #Proprties for encapsulation

    @property
    def id(self):
        """to get the user ID"""

        return self.user_id
    @property
    def username(self):
        """to get the username"""
        return self._username

    @property
    def password_hash(self):
        """to get the password hash"""
        return self._password_hash

    @property
    def email(self):
        """to get the email"""
        return self._email

    @property
    def role(self):
        """to get the user role"""
        return self._role

    @property
    def created_at(self):
        """to get the account creation timestamp"""
```

```
        return self._created_at

    def _hash_password(self, password):
        """Hash the password using SHA-256. This demonstrates
encapsulation by
        keeping the hashing logic private."""
        return hashlib.sha256(password.encode()).hexdigest(
... (truncated for brevity)
```

6. API Endpoints

- **GET /**: Serve the main HTML page
- **POST /api/register**: Register a new user
- **POST /api/login**: Login and receive JWT token
- **GET /api/products**: Get all products
- **GET /api/products/<id>**: Get specific product
- **POST /api/products**: Create new product (admin only)
- **PUT /api/products/<id>**: Update product (admin only)
- **DELETE /api/products/<id>**: Delete product (admin only)
- **GET /api/cart**: Get user's cart (authenticated)
- **POST /api/cart**: Add item to cart (authenticated)
- **DELETE /api/cart/<id>**: Remove item from cart (authenticated)
- **POST /api/orders**: Create order (authenticated)
- **GET /api/orders**: Get user's orders (authenticated)

7. Frontend Components

The frontend consists of three main files:

index.html

Single-page application structure with sections for products, cart, and orders. Uses semantic HTML5 elements and responsive design.

style.css

Modern CSS3 styling with:
• CSS Grid and Flexbox for layouts
• CSS animations and transitions
• Responsive design with media queries
• Custom color schemes and gradients

script.js

Pure JavaScript (ES6+) handling:
• API communication using Fetch API
• JWT token management (localStorage)
• Dynamic DOM manipulation
• Event handling and user interactions
• Shopping cart logic and order processing

8. Key Features

- **User Authentication:** JWT-based authentication with secure password hashing
- **Role-Based Access:** Different permissions for customers and administrators
- **Product Catalog:** Browse shoes by category with detailed information
- **Shopping Cart:** Add, remove, and manage items before checkout
- **Order Management:** Place orders and view order history
- **Admin Panel:** Create, update, and delete products (admin only)
- **Responsive Design:** Works seamlessly on desktop and mobile devices
- **Real-time Updates:** Dynamic content updates without page refresh

9. OOP Concepts Demonstrated

Inheritance

Product class hierarchy (Product → AthleticShoe/CasualShoe/FormalShoe)
User class hierarchy (User → Customer/Administrator)

Encapsulation

Private attributes with property decorators (@property)
Data hiding and controlled access through getters/setters

Polymorphism

Method overriding in subclasses
to_dict() method implementations across different classes

Abstraction

DatabaseManager abstraction for database operations
Clean API interface hiding implementation details

Composition

Cart contains Products
Order contains multiple OrderItems

10. Security Implementation

- **Password Hashing:** SHA-256 hashing for secure password storage
- **JWT Authentication:** Token-based authentication for API endpoints
- **Role-Based Authorization:** Decorator functions to restrict admin-only operations
- **CORS Protection:** Configured CORS to allow specific origins
- **SQL Injection Prevention:** Parameterized queries to prevent SQL injection
- **Input Validation:** Server-side validation of user inputs

Conclusion

D-Money's Shoe World is a complete full-stack web application that demonstrates proficiency in modern web development practices, object-oriented programming, database management, and security implementation. The project showcases the integration of backend and frontend technologies to create a functional e-commerce platform.

The codebase is well-structured, maintainable, and follows best practices for Python development. It serves as an excellent example of applying theoretical programming concepts to practical, real-world applications.