National University of Computer and Emerging Sciences

Laboratory manual # 10
For
Software Design and Architecture

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Instructions for lab submission:
You have to submit source files along with a word document. In the word document you have to give the heading of each exercise/question, then paste your code. Save your word document in the following format: roll number-lab no-section i.e. 21I-0008-lab10-BSE4D.

Objective:

- ☐ Behavioral Design Patterns - I
- ☐ Observer design pattern

Software for this lab:

- Java netbeans
- StarUML

Create class diagrams and write Java code for the following:

Note: Write the main function for all exercises.

1. **Exercise: Marks: 10**

Design and develop a news distribution system where a central news agency (**NewsAgency**) disseminates updates to various news channels (**NewsChannel**).

NewsAgency acts as the subject in this scenario. It maintains a list of registered news channels (observers). Whenever there's a breaking news update, the NewsAgency notifies all the registered channels about the new information.

Each NewsChannel is an observer. It implements an interface with an update method. When the NewsAgency broadcasts a news update, each NewsChannel receives the notification and reacts accordingly. For instance:
NewsChannel A might display the headline on its website.
NewsChannel B could send a push notification to its mobile app users.
NewsChannel C might update its live TV ticker with the latest news.
(You can just print the statements (news parameter in update method) for simplicity)
The NewsAgency doesn't need to know the specific implementations of each channel. New channels can be added or removed without affecting the overall system.

2. **Exercise:** **Marks: 10**

Imagine a smart home automation system with various interconnected devices. Details:

Smart Home Hub (Subject):
The central hub (HomeHub) manages all smart devices in the house: lights, thermostats, security cameras.

Whenever a device state changes (e.g., lights turned on/off, temperature adjusted), HomeHub notifies all registered observers.

Smartphone App (Observer):
The homeowner's smartphone app (SmartApp) serves as an observer.
When the lights are turned on remotely via the app, SmartApp receives a notification from HomeHub.
SmartApp can then update its UI to reflect the current state of the lights (e.g., displaying "Lights On" or "Lights Off").

Voice Assistant (Observer):
Suppose there's a voice assistant (VoiceBot) integrated into the home.
When the homeowner says, "Hey VoiceBot, set the thermostat to 72°F," VoiceBot communicates with HomeHub.
HomeHub notifies VoiceBot about the thermostat adjustment, and VoiceBot acknowledges it verbally.

Security Camera System (Observer):
The security camera system (SecCam) is another observer.
When motion is detected by a camera, SecCam receives an update from HomeHub.
SecCam can then trigger an alert (e.g., send a notification to the homeowner's phone).