**Observer Pattern: News Application**

**Description:**

The **Observer Pattern** is a behavioral design pattern used to create a one-to-many dependency between objects. When one object (the subject) changes its state, all dependent objects (observers) are automatically notified and updated. This pattern is ideal for scenarios where changes in one object need to be reflected in others without tightly coupling them.

**Components:**

1. **Subject (NewsAgency):**  
   Manages a list of observers and notifies them of changes. It maintains the state (e.g., news updates) and provides methods to register, remove, and notify observers.
2. **Observer (NewsSubscriber):**  
   Defines an interface for objects that need to be updated with changes in the subject. Observers implement the update method to handle notifications.
3. **Concrete Subject (NewsAgencyImpl):**  
   Implements the subject interface and manages the state (e.g., latest news). It notifies subscribers when new news is available.
4. **Concrete Observer (NewsSubscriberImpl):**  
   Implements the observer interface to receive and act upon updates from the news agency.

**How It Works:**

1. **Registration:** News subscribers (observers) register with the news agency (subject) to receive updates about news articles.
2. **News Update:** When the news agency receives new news, it updates its state and triggers the notify method.
3. **Notification:** The notify method iterates through all registered subscribers and calls their update method, delivering the latest news.
4. **Unregistration:** Subscribers can opt-out of notifications by unregistering themselves from the news agency.

**Real-Life Example: News Application**

In a news application:

* **NewsAgencyImpl (Concrete Subject):** Represents a news service that publishes updates about news articles.
* **NewsSubscriberImpl (Concrete Observer):** Represents users or news outlets that are interested in receiving news updates.

**Scenario:**

1. **User Registration:** Users subscribe to the news application to receive updates on breaking news and headlines.
2. **News Publication:** When the news agency publishes a new article or update, it updates its internal state.
3. **Notification:** All subscribed users receive notifications about the new news update in real-time.
4. **User Unsubscription:** Users can unsubscribe if they no longer wish to receive news updates.

**Benefits:**

1. **Decoupling:** The Observer Pattern decouples the subject and observers, allowing them to interact without needing to know about each other’s implementation.
2. **Dynamic Subscription:** Users can dynamically subscribe or unsubscribe from news updates, providing flexibility.
3. **Automatic Updates:** Observers receive automatic notifications when the subject's state changes, ensuring timely information delivery.