Python -pytest

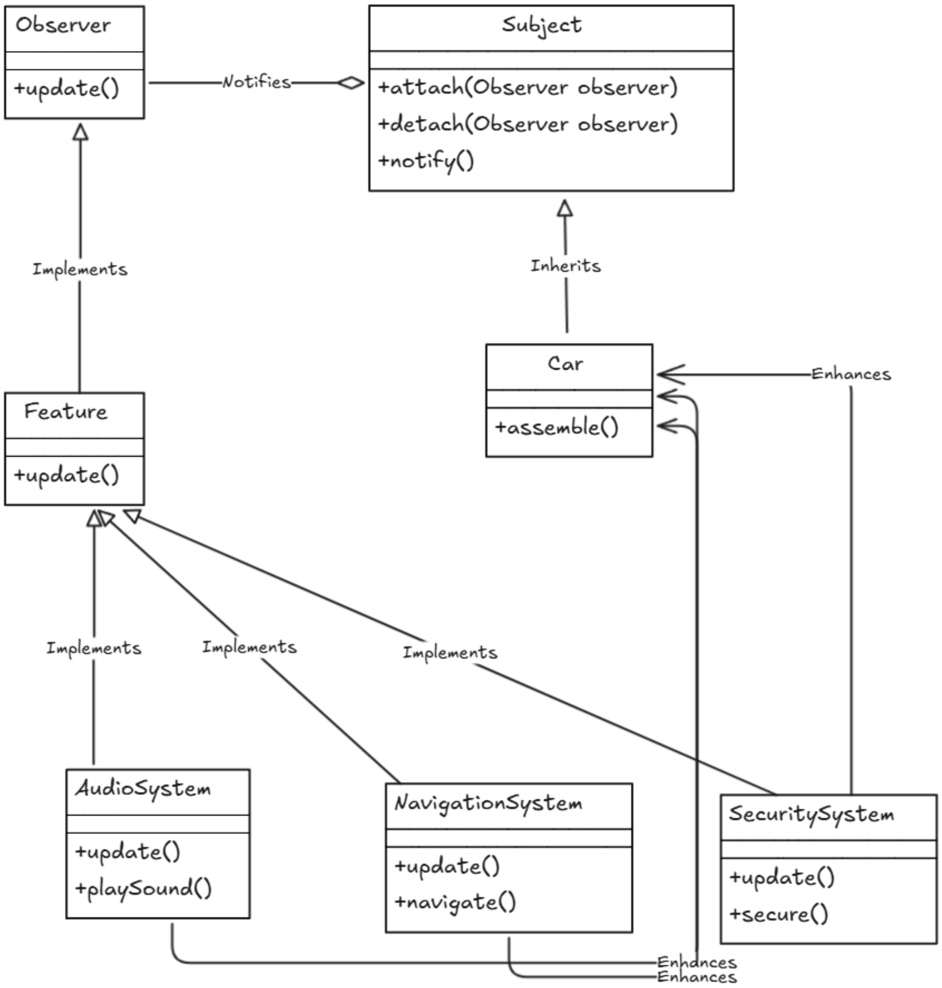
Prompt

-Observer

Use the Observer pattern to write code in Python programming language and write pytest to test the given code that have 100% statement coverage from the requirements below. Use Observer pattern to design automotive system development by adding features to cars, such as audio system, navigation system or security systems without changing the main structure of the car.

Diagram

Observer



ChatGPT4o

Observer

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Code.py

```
from abc import ABC, abstractmethod

# Subject (Observable)
class Car:
    def __init__(self):
        self._features = []
        self._state = None

    def add_feature(self, feature):
        self._features.append(feature)

    def remove_feature(self, feature):
        self._features.remove(feature)

    def notify(self):
        for feature in self._features:
            feature.update(self)

    @property
    def state(self):
        return self._state

    @state.setter
    def state(self, state):
        self._state = state
        self.notify()


# Observer
```

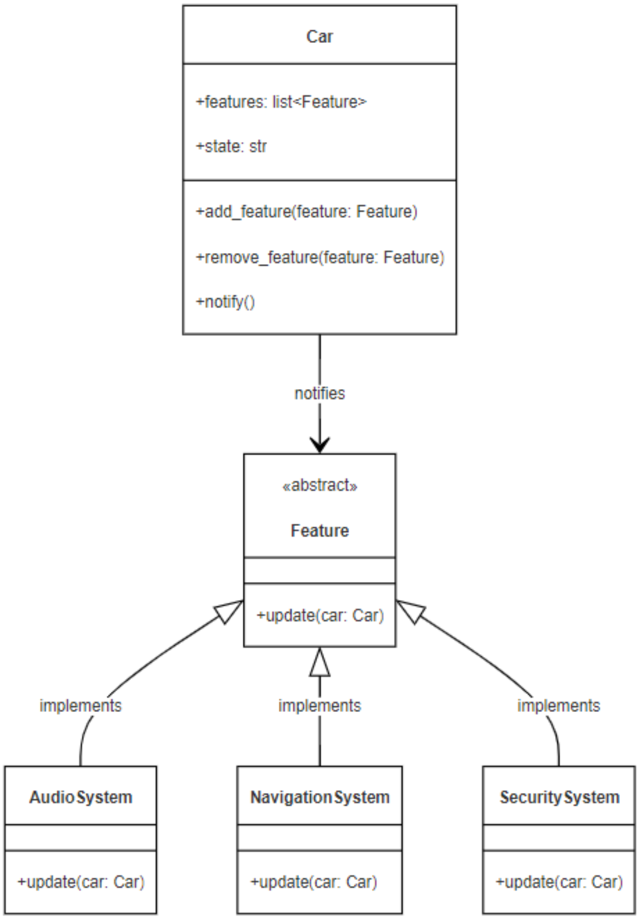
```
class Feature(ABC):
    @abstractmethod
    def update(self, car):
        pass

# Concrete Observers
class AudioSystem(Feature):
    def update(self, car):
        if car.state == "audio_on":
            print("Audio System: ON")
        elif car.state == "audio_off":
            print("Audio System: OFF")

class NavigationSystem(Feature):
    def update(self, car):
        if car.state == "navigation_on":
            print("Navigation System: ON")
        elif car.state == "navigation_off":
            print("Navigation System: OFF")

class SecuritySystem(Feature):
    def update(self, car):
        if car.state == "security_on":
            print("Security System: ON")
        elif car.state == "security_off":
            print("Security System: OFF")

# Example Usage
if __name__ == "__main__":
    car = Car()

    audio = AudioSystem()
    navigation = NavigationSystem()
    security = SecuritySystem()
    car.add_feature(audio)
    car.add_feature(navigation)
    car.add_feature(security)

    car.state = "audio_on"
    car.state = "navigation_on"
    car.state = "security_on"

    car.state = "audio_off"
    car.state = "navigation_off"
    car.state = "security_off"
```

Test.py

```
import pytest
from code import Car, AudioSystem, NavigationSystem, SecuritySystem

@pytest.fixture
def car():
    return Car()

@pytest.fixture
def audio_system():
    return AudioSystem()

@pytest.fixture
def navigation_system():
    return NavigationSystem()

@pytest.fixture
def security_system():
    return SecuritySystem()
```

```
def test_audio_system_on(car, audio_system, capsys):
    car.add_feature(audio_system)
    car.state = "audio_on"
    captured = capsys.readouterr()
    assert "Audio System: ON" in captured.out

def test_audio_system_off(car, audio_system, capsys):
    car.add_feature(audio_system)
    car.state = "audio_off"
    captured = capsys.readouterr()
    assert "Audio System: OFF" in captured.out

def test_navigation_system_on(car, navigation_system, capsys):
    car.add_feature(navigation_system)
    car.state = "navigation_on"
    captured = capsys.readouterr()
    assert "Navigation System: ON" in captured.out

def test_navigation_system_off(car, navigation_system, capsys):
    car.add_feature(navigation_system)
    car.state = "navigation_off"
    captured = capsys.readouterr()
    assert "Navigation System: OFF" in captured.out

def test_security_system_on(car, security_system, capsys):
    car.add_feature(security_system)
    car.state = "security_on"
    captured = capsys.readouterr()
    assert "Security System: ON" in captured.out

def test_security_system_off(car, security_system, capsys):
    car.add_feature(security_system)
    car.state = "security_off"
    captured = capsys.readouterr()
    assert "Security System: OFF" in captured.out

def test_remove_feature(car, audio_system, capsys):
    car.add_feature(audio_system)
    car.remove_feature(audio_system)
    car.state = "audio_on"
    captured = capsys.readouterr()
    assert "Audio System: ON" not in captured.out
```

Diagram From Code:



Result:

split class in code.py

TestCar.py(Edit)

```
import pytest
from Car import MyCar
from Feature import AudioSystem,NavigationSystem,SecuritySystem
```

7 Pass