ОТЧЕТ

По лр-4

Дисциплина «Парадигмы и конструкции языков программирования»

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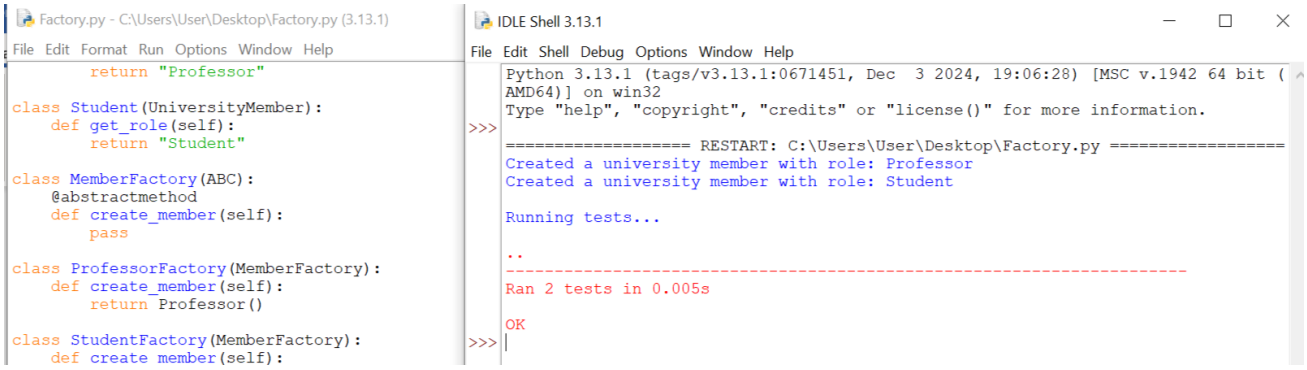
В качестве предметной области была выбрана университетская среда: преподаватели и студенты

1. Factory Method (TDD-фреймворк)

```
from abc import ABC, abstractmethod
import unittest

class UniversityMember(ABC):
    @abstractmethod
    def get_role(self):
        pass

class Professor(UniversityMember):
    def get_role(self):
        return "Professor"

class Student(UniversityMember):
    def get_role(self):
        return "Student"

class MemberFactory(ABC):
    @abstractmethod
    def create_member(self):
        pass

class ProfessorFactory(MemberFactory):
    def create_member(self):
        return Professor()

class StudentFactory(MemberFactory):
    def create_member(self):
        return Student()
```

```
def client_code(factory: MemberFactory):
    member = factory.create_member()
    print(f"Created a university member with role: {member.get_role()}")


class TestMemberFactory(unittest.TestCase):
    def test_professor_factory(self):
        factory = ProfessorFactory()
        prof = factory.create_member()
        self.assertEqual(prof.get_role(), "Professor")


    def test_student_factory(self):
        factory = StudentFactory()
        student = factory.create_member()
        self.assertEqual(student.get_role(), "Student")


if __name__ == "__main__":
    client_code(ProfessorFactory())
    client_code(StudentFactory())
    print("\nRunning tests...\n")
    unittest.main(argv=['first-arg-is-ignored'], exit=False)
```



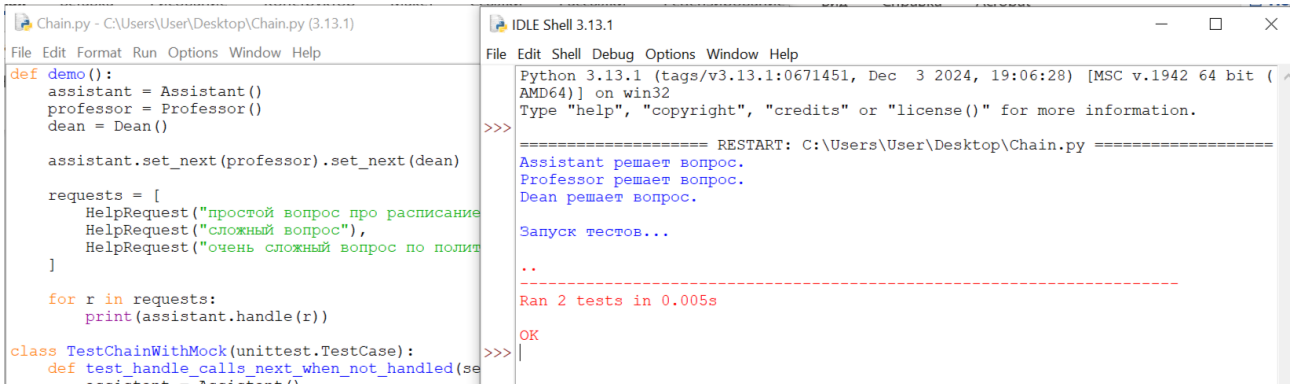
2. Chain of Responsibility + Mock-объекты

```
from abc import ABC, abstractmethod
```

```
import unittest
from unittest.mock import Mock

class HelpRequest:
    def __init__(self, description):
        self.description = description

class Handler(ABC):
    def __init__(self):
        self._next_handler = None

    def set_next(self, handler):
        self._next_handler = handler
        return handler

    @abstractmethod
    def handle(self, request):
        pass

class Assistant(Handler):
    def handle(self, request):
        if "простой вопрос" in request.description:
            return "Assistant решает вопрос."
        elif self._next_handler:
            return self._next_handler.handle(request)
        else:
            return "Запрос не может быть обработан."

class Professor(Handler):
    def handle(self, request):
```

```
        if request.description.strip() == "сложный вопрос" or
request.description.strip().startswith("сложный вопрос "):
            return "Professor решает вопрос."
        elif self._next_handler:
            return self._next_handler.handle(request)
        else:
            return "Запрос не может быть обработан."


class Dean(Handler):
    def handle(self, request):
        return "Dean решает вопрос."


def demo():
    assistant = Assistant()
    professor = Professor()
    dean = Dean()

    assistant.set_next(professor).set_next(dean)

    requests = [
        HelpRequest("простой вопрос про расписание"),
        HelpRequest("сложный вопрос"),
        HelpRequest("очень сложный вопрос по политике факультета")
    ]

    for r in requests:
        print(assistant.handle(r))


class TestChainWithMock(unittest.TestCase):
    def test_handle_calls_next_when_not_handled(self):
        assistant = Assistant()
```

```
        mock_handler = Mock()
        mock_handler.handle.return_value = "Mocked handler processed"
        assistant.set_next(mock_handler)

        req = HelpRequest("сложный вопрос")

        response = assistant.handle(req)

        mock_handler.handle.assert_called_once_with(req)
        self.assertEqual(response, "Mocked handler processed")

    def test_assistant_handles_easy_question(self):
        assistant = Assistant()
        req = HelpRequest("простой вопрос")
        self.assertEqual(assistant.handle(req), "Assistant решает вопрос.")

if __name__ == "__main__":
    demo()
    print("\nЗапуск тестов...\n")
    unittest.main(argv=['first-arg-is-ignored'], exit=False)
```



3. Bridge + TDD

```
from abc import ABC, abstractmethod
import unittest
```

```
class Person(ABC):
    def __init__(self, role_impl):
        self._role_impl = role_impl

    @abstractmethod
    def perform_duty(self):
        pass

class RoleImpl(ABC):
    @abstractmethod
    def duty(self):
        pass

class StudentRole(RoleImpl):
    def duty(self):
        return "Студент учится и выполняет домашние задания."

class TeacherRole(RoleImpl):
    def duty(self):
        return "Преподаватель читает лекции и проверяет работы."

class Student(Person):
    def perform_duty(self):
        return self._role_impl.duty()

class Teacher(Person):
    def perform_duty(self):
        return self._role_impl.duty()
```

```
class TestUniversityBridge(unittest.TestCase):


    def test_student_duty(self):

        student_role = StudentRole()

        student = Student(student_role)

        self.assertEqual(student.perform_duty(), "Студент учится и выполняет домашние задания.")


    def test_teacher_duty(self):

        teacher_role = TeacherRole()

        teacher = Teacher(teacher_role)

        self.assertEqual(teacher.perform_duty(), "Преподаватель читает лекции и проверяет работы.")


    def test_role_swap(self):

        student_role = StudentRole()

        teacher_role = TeacherRole()

        person = Student(student_role)

        self.assertEqual(person.perform_duty(), "Студент учится и выполняет домашние задания.")

        person._role_impl = teacher_role

        self.assertEqual(person.perform_duty(), "Преподаватель читает лекции и проверяет работы.")


if __name__ == "__main__":

    student = Student(StudentRole())

    teacher = Teacher(TeacherRole())


    print("Студент:", student.perform_duty())

    print("Преподаватель:", teacher.perform_duty())

    print()
```

print("Запуск тестов...\n")

unittest.main(argv=['first-arg-is-ignored'], exit=False)