PYTHON LAB ASSIGNMENT – 2

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Class ID - 9

Objective: The main objective of this lab assignment is to learn Object Oriented Programming in Python and get familiar with the numpy library.

Features:

The programs in the offers the following features:

1. Display Books that are in price range given by the User
2. A Contacts application, where user can see and edit the contact info
3. A School Management System
4. Display most frequently occurred numbers from a random list using Numpy

Configuration:

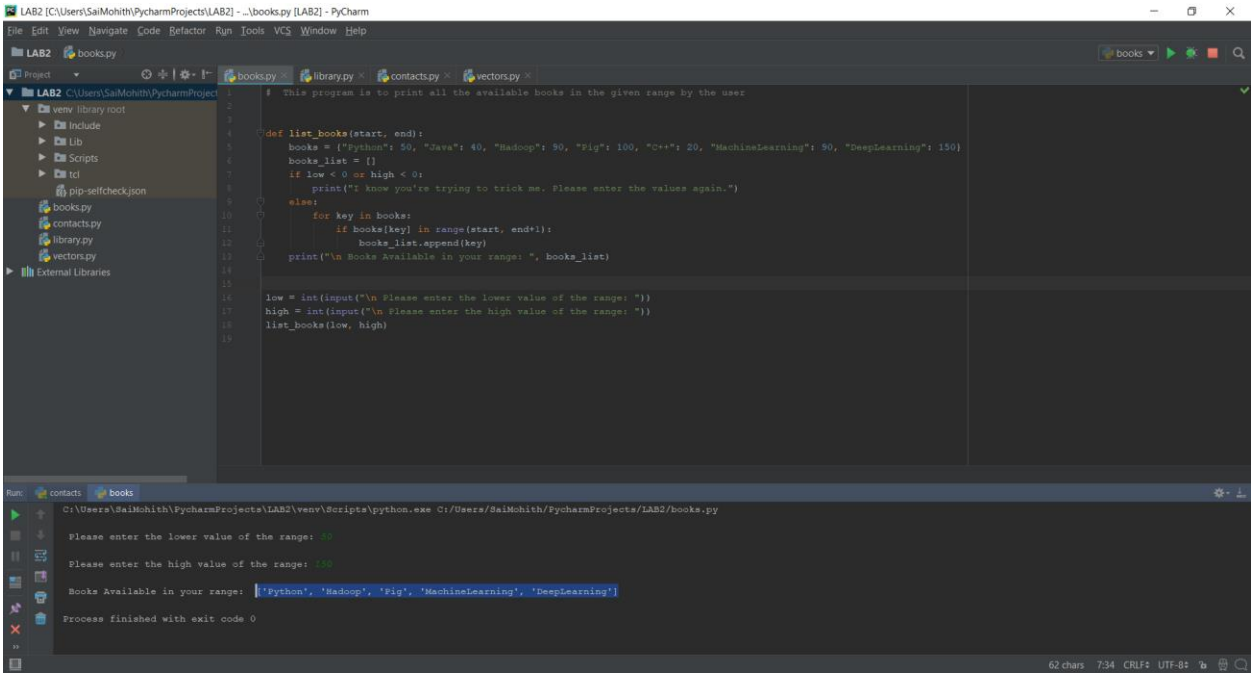
Python 3.6 interpreter

Numpy Library

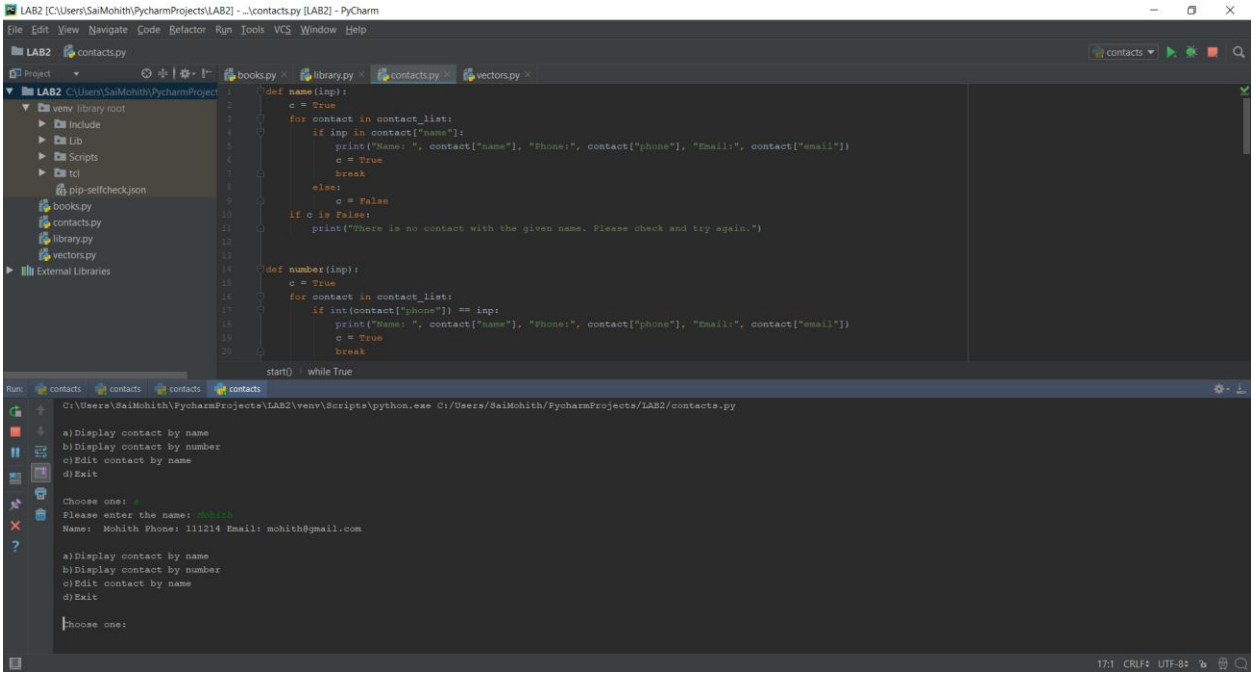
JetBrains Pycharm Community Edition

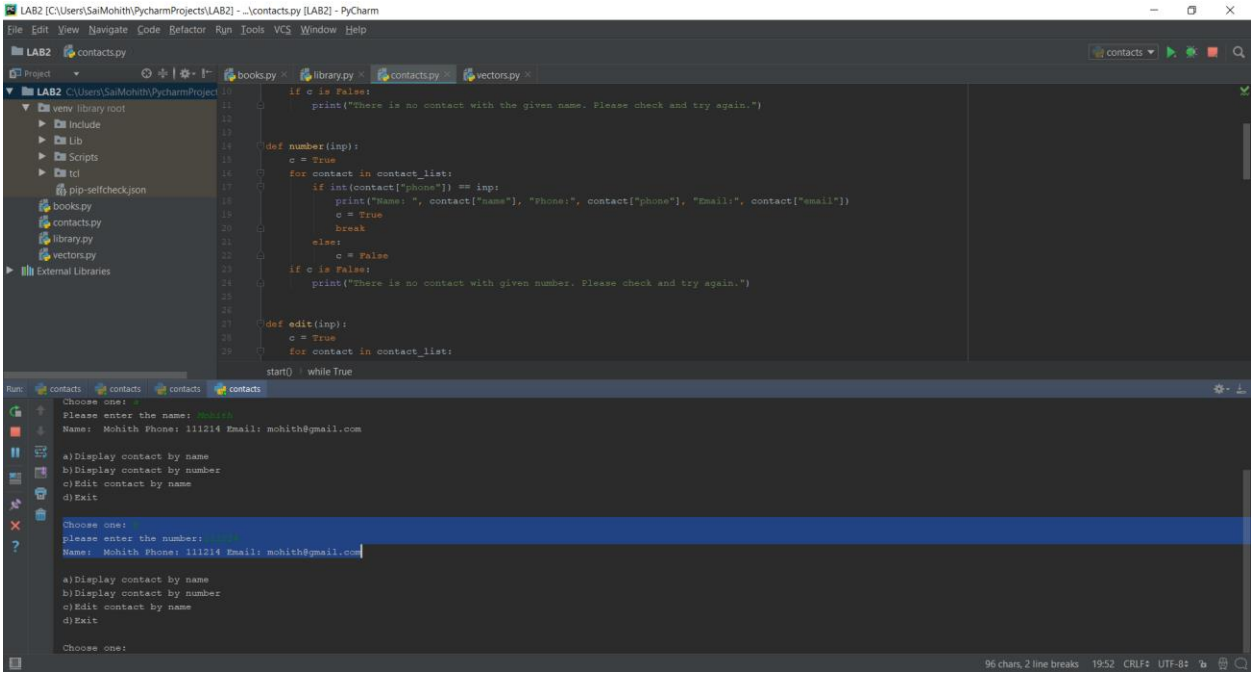
Screenshots:

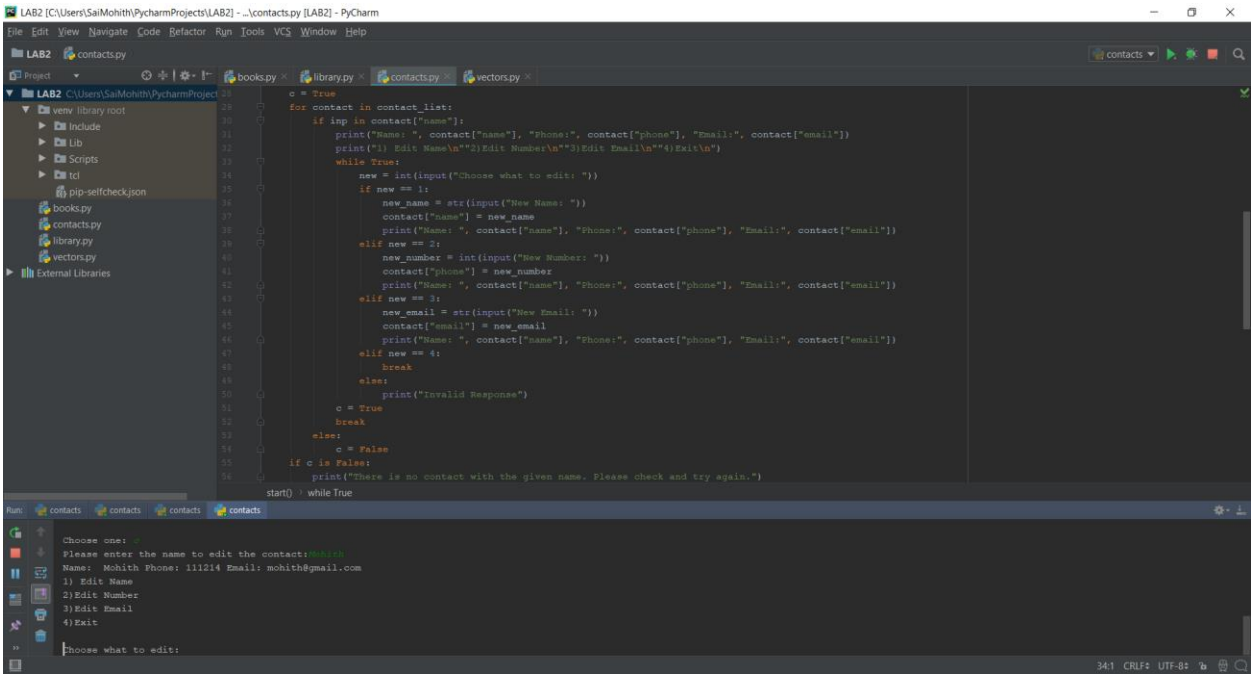
1. Books in the given price range:

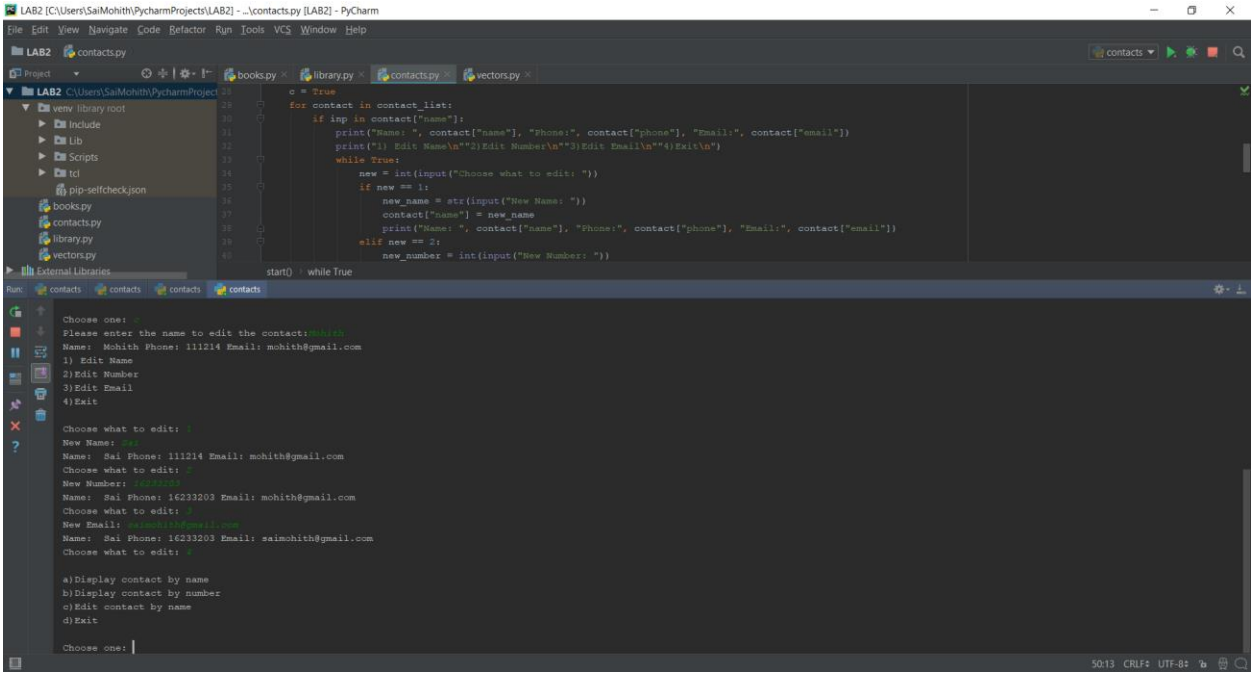


2. Contacts Application:

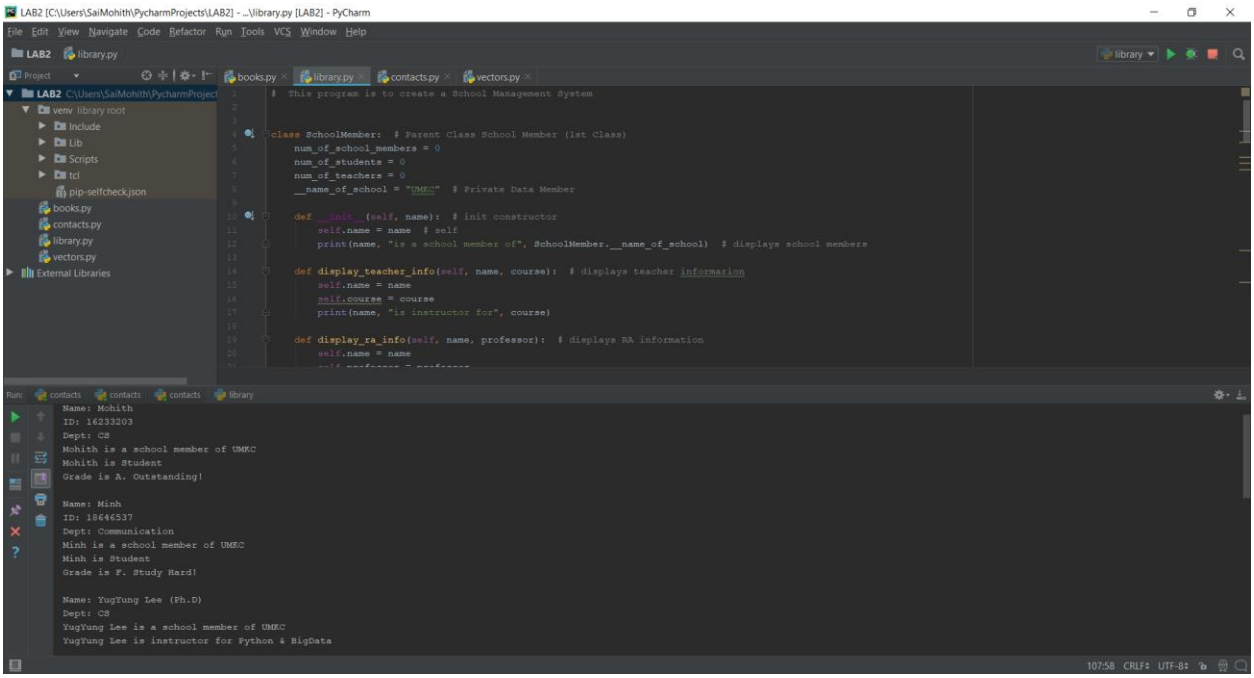



LAB2 [C:\Users\SaiMohith\PycharmProjects\LAB2] - ...\contacts.py [LAB2] - PyCharm
File Edit View Navigate Code Refactor Run Tools VCS Window Help
LAB2 contacts.py
Project
LAB2 C:\Users\SaiMohith\PycharmProject
venv library root
Include
Lib
Scripts
tcl
pip-selfcheck.json
books.py
contacts.py
library.py
vectors.py
External Libraries
books.py library.py contacts.py vectors.py
if c is False:
print("There is no contact with the given name. Please check and try again.")
def number(inp):
c = True
for contact in contact_list:
if int(contact["phone"]) == inp:
print("Name: ", contact["name"], "Phone:", contact["phone"], "Email:", contact["email"])
c = True
break
else:
c = False
if c is False:
print("There is no contact with given number. Please check and try again.")
def edit(inp):
c = True
for contact in contact_list:
start() while True
Run: contacts contacts contacts contacts
Choose one: a
Please enter the name: Mohith
Name: Mohith Phone: 111214 Email: mohith@gmail.com
a)Display contact by name
b)Display contact by number
c)Edit contact by name
d)Exit
Choose one: b
please enter the number: 111214
Name: Mohith Phone: 111214 Email: mohith@gmail.com
a)Display contact by name
b)Display contact by number
c)Edit contact by name
d)Exit
Choose one:
96 chars, 2 line breaks 19:52 CRLF UTF-8


LAB2 [C:\Users\SaiMohith\PycharmProjects\LAB2] - ...\contacts.py [LAB2] - PyCharm
File Edit View Navigate Code Refactor Run Tools VCS Window Help
LAB2 contacts.py
Project
LAB2 C:\Users\SaiMohith\PycharmProject
venv library root
Include
Lib
Scripts
tcl
pip-selfcheck.json
books.py
contacts.py
library.py
vectors.py
External Libraries
books.py library.py contacts.py vectors.py
c = True
for contact in contact_list:
if inp in contact["name"]:
print("Name: ", contact["name"], "Phone:", contact["phone"], "Email:", contact["email"])
print("1) Edit Name\n""2)Edit Number\n""3)Edit Email\n""4)Exit\n")
while True:
new = int(input("Choose what to edit: "))
if new == 1:
new_name = str(input("New Name: "))
contact["name"] = new_name
print("Name: ", contact["name"], "Phone:", contact["phone"], "Email:", contact["email"])
elif new == 2:
new_number = int(input("New Number: "))
contact["phone"] = new_number
print("Name: ", contact["name"], "Phone:", contact["phone"], "Email:", contact["email"])
elif new == 3:
new_email = str(input("New Email: "))
contact["email"] = new_email
print("Name: ", contact["name"], "Phone:", contact["phone"], "Email:", contact["email"])
elif new == 4:
break
else:
print("Invalid Response")
c = True
break
else:
c = False
if c is False:
print("There is no contact with the given name. Please check and try again.")
start() while True
Run: contacts contacts contacts contacts
Choose one: c
Please enter the name to edit the contact:Mohith
Name: Mohith Phone: 111214 Email: mohith@gmail.com
1) Edit Name
2)Edit Number
3)Edit Email
4)Exit
Choose what to edit:
34:1 CRLF UTF-8



3. School Management Systems:



LAB2 [C:\Users\SaiMohith\PycharmProjects\LAB2] - ...\library.py [LAB2] - PyCharm

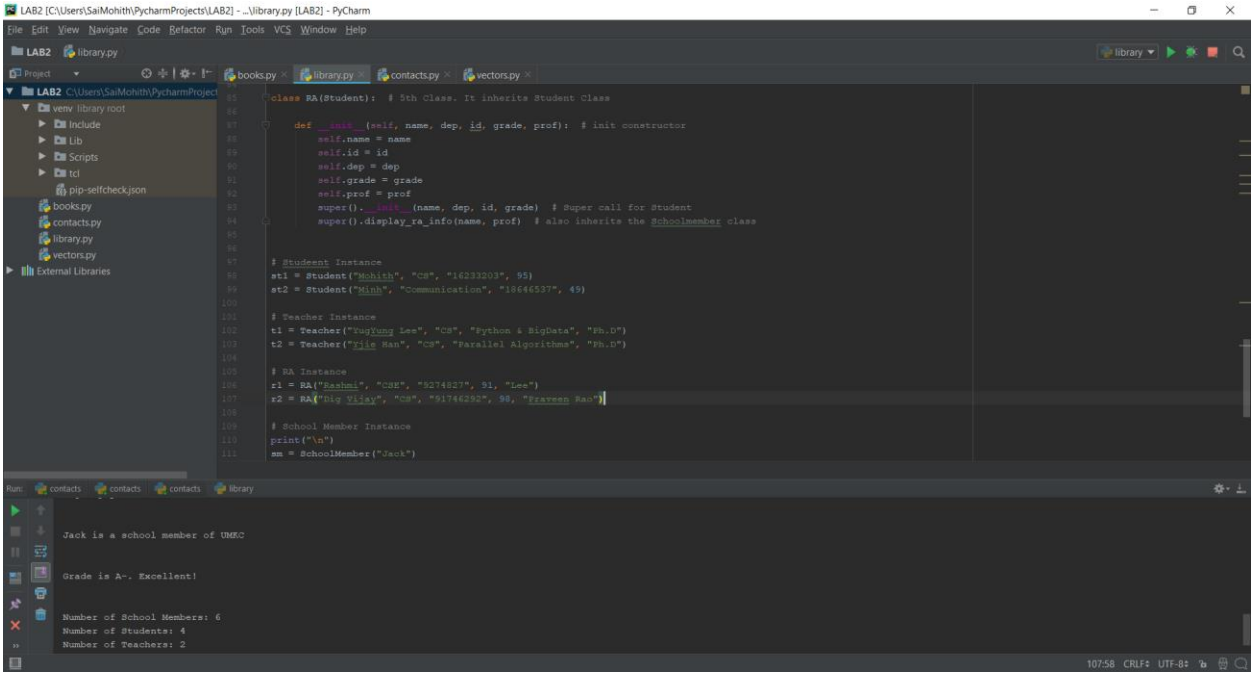
```python
    def add_teacher(self, i):
        SchoolMember.num_of_teachers += i


class Grade:  # Another parent class for getting the Grade (2nd Class)

    def __init__(self, g):  # init constructor
        self.g = g
        if self.g in range(90, 101):
            print("Grade is A. Outstanding!")
        elif self.g in range(80, 90):
            print("Grade is A-. Excellent!")
        elif self.g in range(70, 80):
            print("Grade is B. Good!")
        elif self.g in range(60, 70):
            print("Grade is B-. Average!")
        elif self.g in range(50, 60):
            print("Grade is C. Below Average!")
        else:
            print("Grade is F. Study Hard!")
```

```
Name: Yjie Han (Ph.D)
Dept: CS
Yjie Han is a school member of UMKC
Yjie Han is instructor for Parallel Algorithms

Name: Rashmi
ID: 9274827
Dept: CSE
Rashmi is a school member of UMKC
Rashmi is Student
Grade is A. Outstanding!
Rashmi works under Lee as RA

Name: Dig Vijay
ID: 91746292
Dept: CS
Dig Vijay is a school member of UMKC
Dig Vijay is Student
```

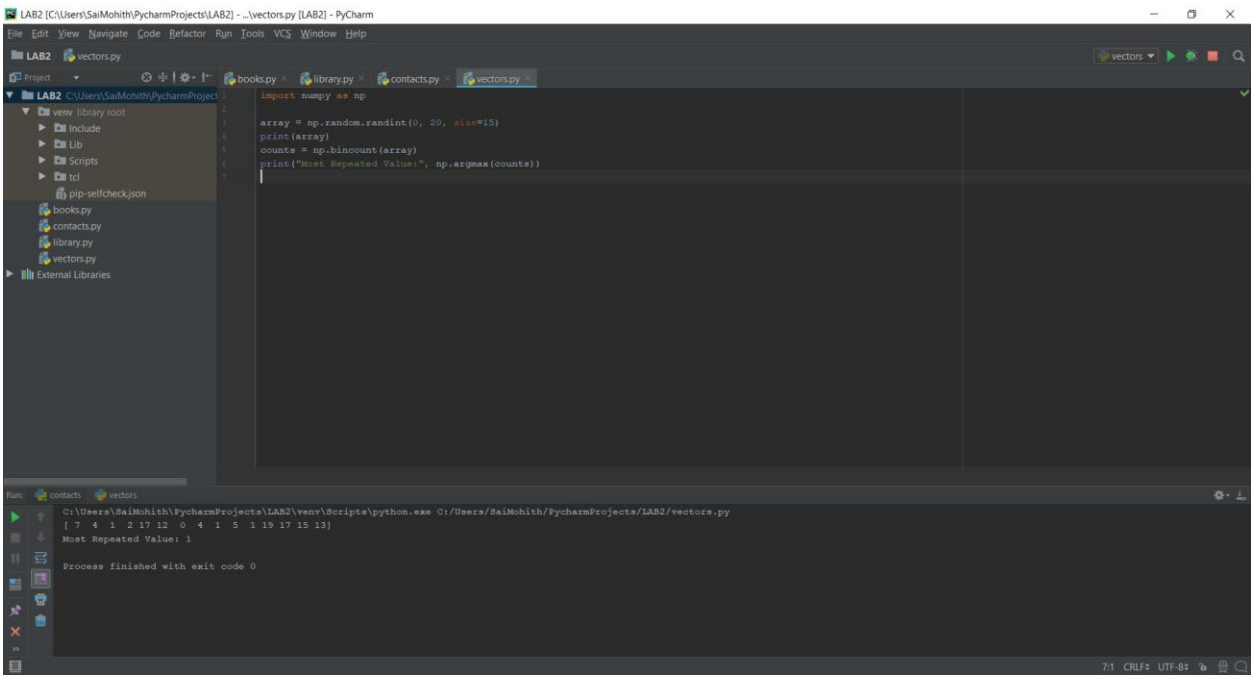
LAB2 [C:\Users\SaiMohith\PycharmProjects\LAB2] - ...\library.py [LAB2] - PyCharm

```python
class Teacher(SchoolMember):  # Single Inheritance (3rd Class)

    def __init__(self, name, dep, c, suffix):  # init constructor
        self.name = name
        self.dep = dep
        self.c = c
        self.suffix = suffix
        print("\nName:", name, ('({})'.format(suffix)), "\nDept:", dep)
        super().__init__(name)  # Super call for SchoolMember
        super().display_teacher_info(name, c)
        super().add_member(1)
        super().add_teacher(1)


class Student(SchoolMember, Grade):  # Multiple Inheritance (4th Class). Inherits SchoolMember and Grade Classes

    def __init__(self, name, dep, id, grade):  # init constructor
        self.name = name
        self.dep = dep
        self.id = id
        self.grade = grade
        print("\nName:", name, "\nID:", id, "\nDept:", dep)
        super().__init__(name)  # Super call for SchoolMember
        super().display_st_info(name)
        Grade(grade)  # Calls the Grade Class
        super().add_member(1)
        super().add_student(1)
```

```
Name: Dig Vijay
ID: 91746292
Dept: CS
Dig Vijay is a school member of UMKC
Dig Vijay is Student
Grade is A. Outstanding!
Dig Vijay works under Praveen Rao as RA
```



4. Vectors output:



Code Implementation:

1. Books program:

This program is to display all the books in the library available according to the price range given by the user.

We define a function list_books here to check the books available in the price range. Also we create a dictionary of books available in the library in this function. Keys are the titles and the values are the prices.

```
def list_books(start, end):
books = {"Python": 50, "Java": 40, "Hadoop": 90, "Pig": 100, "C++": 20, "MachineLearning": 90, "DeepLearning": 150}
books_list = []
if low < 0 or high < 0:
    print("I know you're trying to trick me. Please enter the values again.")
else:
    for key in books:
        if books[key] in range(start, end+1):
            books_list.append(key)
print("\n Books Available in your range: ", books_list)
```

Price ranges will be entered by the user and the function will be called.

```
low = int(input("\n Please enter the lower value of the range: "))
high = int(input("\n Please enter the high value of the range: "))
list_books(low, high)
```

2. Contacts List Application:

This program is to display contacts in the contact list based on the user specification. We can display the contact by name or by number. User can also edit the contact in this program.

To get the contact info by name, we define a function **name** which takes the user given input and displays the contact info if available. If the name given by user is not available, it displays **There is no contact with the given name. Please check and try again.**

```
def name(inp):
c = True
for contact in contact_list:
    if inp in contact["name"]:
        print("Name: ", contact["name"], "Phone:", contact["phone"], "Email:", contact["email"])
        c = True
        break
    else:
        c = False
if c is False:
    print("There is no contact with the given name. Please check and try again.")
```

In the same way, we define a function **number** to display the contact info based on the given number.

```
def number(inp):
c = True
for contact in contact_list:
    if int(contact["phone"]) == inp:
        print("Name: ", contact["name"], "Phone:", contact["phone"], "Email:", contact["email"])
        c = True
        break
    else:
        c = False
```

```
    if c is False:
        print("There is no contact with given number. Please check and try again.")
```

We, define a function **edit** to edit the contact info. We ask user to choose to edit by name, number or email. After editing the info the edited contact is displayed.

```
    def edit(inp):
    c = True
    for contact in contact_list:
        if inp in contact["name"]:
            print("Name: ", contact["name"], "Phone:", contact["phone"], "Email:", contact["email"])
            print("1) Edit Name\n""2)Edit Number\n""3)Edit Email\n""4)Exit\n")
            while True:
                new = int(input("Choose what to edit: "))
                if new == 1:
                    new_name = str(input("New Name: "))
                    contact["name"] = new_name
                    print("Name: ", contact["name"], "Phone:", contact["phone"], "Email:",
contact["email"])
                elif new == 2:
                    new_number = int(input("New Number: "))
                    contact["phone"] = new_number
                    print("Name: ", contact["name"], "Phone:", contact["phone"], "Email:",
contact["email"])
                elif new == 3:
                    new_email = str(input("New Email: "))
                    contact["email"] = new_email
                    print("Name: ", contact["name"], "Phone:", contact["phone"], "Email:",
contact["email"])
                elif new == 4:
```

```
            break
        else:
            print("Invalid Response")
    c = True
    break
else:
    c = False
if c is False:
    print("There is no contact with the given name. Please check and try again.")
```

Then we define a function **start** and call it to start the application. In the start function, we ask the user to choose the action by giving different options a, b, c, d as shown below. If User choose a, function name will be called. number will be called when b, edit will be called when c, application will stop when user choose d. If user enters any other, then it prompts user to select a valid option. Then we create a contact list and start the application.

```
def start():
while True:
    print("\na)Display contact by name \n"
        "b)Display contact by number \n"
        "c)Edit contact by name \n"
        "d)Exit \n")
    ch = str(input("Choose one: "))
    if ch == 'a':
        n = str(input("Please enter the name: "))
        name(n)
    elif ch == 'b':
        n = int(input("please enter the number:"))
        number(n)
    elif ch == 'c':
```

```
        n = str(input("Please enter the name to edit the contact:"))
        edit(n)
    elif ch == 'd':
        exit()
    else:
        print("please choose from the given options")

contact_list = [{"name": "Uma", "phone": "910529", "email": "dad@gmail.com"},
                {"name": "Srinivasa", "phone": "910210", "email": "mom@gmail.com"},
                {"name": "Sumanth", "phone": "910928", "email": "bro@gmail.com"},
                {"name": "Mohith", "phone": "111214", "email": "mohith@gmail.com"}]
start()
```

3. School Management Systems:

This program is to create a school management system. We have five classes:

1. **SchoolMember** which is responsible for displaying the info and adding the members etc.

2. **Grade** which provides the grade to the student depending on their score.

3. **Student** which takes the info of the students. It inherits the class SchoolMember and Grade (Multiple Inheritance).

4. **Teacher** which takes the info of the students. It also inherits the class SchoolMember. (Single Inheritance)

5. **RA** which takes the info of the RA. It inherits the Student Class and SchoolMember.

We used __init__ constructor to build all classes. Different methods are used in each class. We invoke classes by creating instances at the end of the code. Super function is used to call upon single inheritance and multiple. We use self argument which automatically points to the current object

Each class have different methods to display info as shown below:

```
class SchoolMember:  # Parent Class School Member (1st Class)
num_of_school_members = 0
num_of_students = 0
num_of_teachers = 0
__name_of_school = "UMKC"  # Private Data Member

def __init__(self, name):  # init constructor
    self.name = name  # self
    print(name, "is a school member of", SchoolMember.__name_of_school)  # displays
school members

def display_teacher_info(self, name, course):  # displays teacher informarion
    self.name = name
    self.course = course
    print(name, "is instructor for", course)

def display_ra_info(self, name, professor):  # displays RA information
    self.name = name
    self.professor = professor
    print(name, "works under", professor, "as RA")

def display_st_info(self, name):  # displays Student information
    self.name = name
    print(name, "is Student")

def add_member(self, i):
    SchoolMember.num_of_school_members += i
```

```
def add_student(self, i):
    SchoolMember.num_of_students += i

def add_teacher(self, i):
    SchoolMember.num_of_teachers += i


class Grade:  # Another parent class for getting the Grade (2nd Class)

    def __init__(self, g):  # init constructor
        self.g = g
        if self.g in range(90, 101):
            print("Grade is A. Outstanding!")
        elif self.g in range(80, 90):
            print("Grade is A-. Excellent!")
        elif self.g in range(70, 80):
            print("Grade is B. Good!")
        elif self.g in range(60, 70):
            print("Grade is B-. Average!")
        elif self.g in range(50, 60):
            print("Grade is C. Below Average!")
        else:
            print("Grade is F. Study Hard!")


class Teacher(SchoolMember):  # Single Inheritance (3rd Class)
```

```
    def __init__(self, name, dep, c, suffix):  # init constructor
        self.name = name
        self.dep = dep
        self.c = c
        self.suffix = suffix
        print("\nName:", name, ('({})'.format(suffix)), "\nDept:", dep)
        super().__init__(name)  # Super call for SchoolMember
        super().display_teacher_info(name, c)
        super().add_member(1)
        super().add_teacher(1)

class Student(SchoolMember, Grade):  # Multiple Inheritance (4th Class). Inherits SchoolMember and Grade Classes

    def __init__(self, name, dep, id, grade):  # init constructor
        self.name = name
        self.dep = dep
        self.id = id
        self.grade = grade
        print("\nName:", name, "\nID:", id, "\nDept:", dep)
        super().__init__(name)  # Super call for SchoolMember
        super().display_st_info(name)
        Grade(grade)  # calls the Grade Class
        super().add_member(1)
        super().add_student(1)
```

```
class RA(Student):  # 5th Class. It inherits Student Class

    def __init__(self, name, dep, id, grade, prof):  # init constructor
        self.name = name
        self.id = id
        self.dep = dep
        self.grade = grade
        self.prof = prof
        super().__init__(name, dep, id, grade)  # Super call for Student
        super().display_ra_info(name, prof)  # also inherits the Schoolmember class
```

We create instances for all the above classes with the info of students, teachers, RA.

```
# Studeent Instance
st1 = Student("Mohith", "CS", "16233203", 95)
st2 = Student("Minh", "Communication", "18646537", 49)

# Teacher Instance
t1 = Teacher("YugYung Lee", "CS", "Python & BigData", "Ph.D")
t2 = Teacher("Yjie Han", "CS", "Parallel Algorithms", "Ph.D")

# RA Instance
r1 = RA("Rashmi", "CSE", "9274827", 91, "Lee")
r2 = RA("Dig Vijay", "CS", "91746292", 98, "Praveen Rao")

# School Member Instance
print("\n")
sm = SchoolMember("Jack")
```

```
# Grade Instance
print("\n")
gd = Grade(89)


print("\n")
print("Number of School Members:", SchoolMember.num_of_school_members)
print("Number of Students:", SchoolMember.num_of_students)
print("Number of Teachers:", SchoolMember.num_of_teachers)
```

4. Vectors:

This program to get the most frequently repeated element in the array created by ramdom numbers between 0-20 using Numpy.

We first import the numpy library as shown below:

```
import numpy as np
```

We create a array of size 15 with the random elements between 0-20. We use bincount function in the numpy to get the counts of each element. Then we use argmax from the numpy to get the element with has max value in the count.

```
array = np.random.randint(0, 20, size=15)
print(array)
counts = np.bincount(array)
print("Most Repeated Value:", np.argmax(counts))
```

Code Deployment:

1. Books Program:

Program output for the input ranges 50 and 150 is shown below:

```
Please enter the lower value of the range: 50
Please enter the high value of the range: 150
Books Available in your range:  ['Python', 'Hadoop', 'Pig', 'MachineLearning', 'DeepLearning']
```

2. Contact List Output:

The output for the program for the user actions:

```
a)Display contact by name
b)Display contact by number
c)Edit contact by name
d)Exit

Choose one: a
Please enter the name: Mohith
Name:  Mohith Phone: 111214 Email: mohith@gmail.com
a)Display contact by name
b)Display contact by number
c)Edit contact by name
d)Exit

Choose one: b
please enter the number:111214
Name:  Mohith Phone: 111214 Email: mohith@gmail.com
a)Display contact by name
b)Display contact by number
```

c)Edit contact by name

d)Exit

Choose one: c

Please enter the name to edit the contact:Mohith

Name: Mohith Phone: 111214 Email: mohith@gmail.com

1) Edit Name

2)Edit Number

3)Edit Email

4)Exit

Choose what to edit: 1

New Name: Sai

Name: Sai Phone: 111214 Email: mohith@gmail.com

Choose what to edit: 2

New Number: 16233203

Name: Sai Phone: 16233203 Email: mohith@gmail.com

Choose what to edit: 3

New Email: saimohith#gmail.com

Name: Sai Phone: 16233203 Email: saimohith#gmail.com

Choose what to edit: 4

a)Display contact by name

b)Display contact by number

c)Edit contact by name

d)Exit

Choose one: c

```
Please enter the name to edit the contact:Mohith
There is no contact with the given name. Please check and try again.
a)Display contact by name
b)Display contact by number
c)Edit contact by name
d)Exit

Choose one: e
please choose from the given options
a)Display contact by name
b)Display contact by number
c)Edit contact by name
d)Exit

Choose one: d

Process finished with exit code 0
```

3. School Management System:

Output for the given instances:

```
Name: Mohith
ID: 16233203
Dept: CS
Mohith is a school member of UMKC
Mohith is Student
Grade is A. Outstanding!
```

Name: Minh

ID: 18646537

Dept: Communication

Minh is a school member of UMKC

Minh is Student

Grade is F. Study Hard!

Name: YugYung Lee (Ph.D)

Dept: CS

YugYung Lee is a school member of UMKC

YugYung Lee is instructor for Python & BigData

Name: Yjie Han (Ph.D)

Dept: CS

Yjie Han is a school member of UMKC

Yjie Han is instructor for Parallel Algorithms

Name: Rashmi

ID: 9274827

Dept: CSE

Rashmi is a school member of UMKC

Rashmi is Student

Grade is A. Outstanding!

Rashmi works under Lee as RA

Name: Dig Vijay

ID: 91746292

```
Dept: CS
Dig Vijay is a school member of UMKC
Dig Vijay is Student
Grade is A. Outstanding!
Dig Vijay works under Praveen Rao as RA

Jack is a school member of UMKC

Grade is A-. Excellent!

Number of School Members: 6
Number of Students: 4
Number of Teachers: 2

Process finished with exit code 0
```

4. Vectors:

The output for randomly created array:

```
[ 0  5  2 13 13  0  8 19 12 14  2 13 18  0 13]
Most Repeated Value: 13
Process finished with exit code 0
```

Limitations:

Python 3.6 is used for writing this code. Some functions may not work properly when run on python 2(2.x) version.

References:

https://docs.python.org/2/tutorial/classes.html

https://www.geeksforgeeks.org/object-oriented-programming-in-python-set-2-data-hiding-and-object-printing/

https://www.pythonlearn.com/html-008/cfbook022.html

www.stackoverflow.com