STUDENT EXAMINATION PORTAL

Submitted by

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Subject: *Programming for Problem Solving with Python*
Subject Code: *IVC101*
Department: *Basic Science and Humanities (BSH)*

Under the supervision of
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Academic Year: 2022-26

PROJECT REPORT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE FIRST SEMESTER

DEPARTMENT OF BASIC SCIENCE AND HUMANITIES
INSTITUTE OF ENGINEERING AND MANAGEMENT, KOLKATA

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CERTIFICATE OF RECOMMENDATION

We hereby recommend that the project prepared under our supervision by *Setu Kumar*, entitled STUDENT EXAMINATION PORTAL be accepted in partial fulfillment of the requirements for the degree of partial fulfillment of the first semester.

Head of the Department
Basic Sciences and Humanities
IEM, Kolkata

Project Supervisor

1. Introduction :

If we take a look at the present scenario we can clearly understand that it is a digital very educational institution or big companies need a system to keep a record of the data of their students and employees respectively. The best way to maintain these record is by creating separate Databases and storing the necessary data. In this project we have mainly used the Python Programming Language to make a database which can be further used to store necessary data. Python is a easy to understandable and user friendly language so anyone can make a programme to make such databases according to their needs

1.1. Objective :

The main objective of this project is to develop a programme for creating a database by which we can take data from the user and store it in the desired cells, Because of these project we got to learn "How to create a Database", "Relationship between several databases" , and "How to create a database using Python Programming Language"

1.2. Organization of the Project

This project consists of three sections :

i) Taking data from the user: When we run the programme a few terminal prompts instruct us to give the correct input.

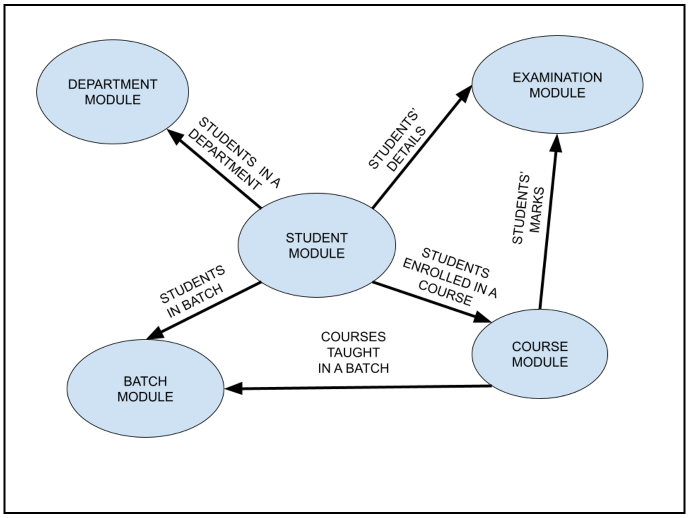
ii)Storing the data into different databases: After taking the inputs from the user the code analyzes data and stores it in its respective databases.

2. Database Descriptions :

There are four databases:

1)STUDENT: Stores details of a student
2)COURSE: Stores details of all courses
3)BATCH: Stores details of all batches
4)DEPARTMENT: Stores details of all departments

3. Data Flow and E-R Diagrams :



4. Programs :

I. main.py :

```
while(True):
    print("Press 1 to do student operations")
    print("Press 2 to do course operations")
    print("Press 3 to do batch operations")
    print("Press 4 to do department operations")
    print("Press 5 to do examination operations")
    print("Press 0 to stop")
    x = int(input("Enter your choice: "))
    if(x == 0):
        break
    elif(x == 1):
        from student import *
        while(True):
            print("Press 1 to create a student")
            print("Press 2 to update a student's details")
            print("Press 3 to remove a student")
            print("Press 4 to generate report card of a student")
            print("Press 0 to return to main menu")
            y = int(input("Enter your choice: "))
            if(y == 0):
                break
            elif(y == 1):
                student_id = input("Enter student ID: ")
                student_name = input("Enter student name: ")
                createStudent(student_id, student_name)
            elif(y == 2):
                ostudent_id = input("Enter old student ID: ")
                updateStudent(ostudent_id)
            elif(y == 3):
                student_id = input("Enter student ID: ")
                removeStudent(student_id)
            elif(y == 4):
                student_id = input("Enter student ID: ")
                reportCard(student_id)
            else:
                print("Invalid input. Try again.")
    elif(x == 2):
        from course import *
        while(True):
            print("Press 1 to create a course")
            print("Press 2 to view performance of students on course")
            print("Press 3 to show course statistics as histogram")
            print("Press 0 to return to main menu")
            y = int(input("Enter your choice: "))
        if(y == 0):
            break
        elif(y == 1):
            course_id = input("Enter course ID: ")
            course_name = input("Enter course name: ")
            createCourse(course_id, course_name)
        elif(y == 2):
            course_id = input("Enter course ID: ")
            checkPerformance(course_id)
        elif(y == 3):
            student_id = input("Enter course ID: ")
            courseStatistics(course_id)
        else:
            print("Invalid input. Try again.")
elif(x == 3):
    from batch import *
    while(True):
        print("Press 1 to create a batch")
        print("Press 2 to view all students in a batch")
        print("Press 3 to show all courses in a batch")
        print("Press 4 to view performance of all students in a batch")
        print("Press 5 to view pie chart of percentage all students in a batch")
        print("Press 0 to return to main menu")
        y = int(input("Enter your choice: "))
        if(y == 0):
            break
        elif(y == 1):
            batch_name = input("Enter batch name: ")
            createBatch(batch_name)
        elif(y == 2):
            batch_id = input("Enter batch ID: ")
            viewStudents(batch_id)
        elif(y == 3):
            batch_id = input("Enter batch ID: ")
            viewCourses(batch_id)
        elif(y == 4):
            batch_id = input("Enter batch ID: ")
            viewPerformance(batch_id)
        elif(y == 5):
            batch_id = input("Enter batch ID: ")
            pieChart(batch_id)
        else:
            print("Invalid input. Try again.")
elif(x == 4):
    from department import *
    while(True):
        print("Press 1 to create a department")
        print("Press 2 to view all betches in a department")
        print("Press 3 to view average performance of all betches in a department")
```

```
            print("Press 4 to view line plot of department statistics")
            print("Press 0 to return to main menu")
            y = int(input("Enter your choice: "))
            if(y == 0):
                break
            elif(y == 1):
                department_id = input("Enter department ID: ")
                department_name = input("Enter department name: ")
                createDepartment(department_id, department_name)
            elif(y == 2):
                department_id = input("Enter department ID: ")
                viewBatches(department_id)
            elif(y == 3):
                department_id = input("Enter department ID: ")
                viewPerformanceD(department_id)
            elif(y == 4):
                department_id = input("Enter department ID: ")
                linePlot(department_id)
            else:
                print("Invalid input. Try again.")
    elif(x == 5):
        from examination import *
        while(True):
            print("Press 1 to enter marks of all students for an exam")
            print("Press 2 to view performance of all students in an exam")
            print("Press 3 to show examination statistics as a scatter plot")
            print("Press 0 to return to main menu")
            y = int(input("Enter your choice: "))
            if(y == 0):
                break
            elif(y == 1):
                course_id = input("Enter course ID: ")
                enterMarks(course_id)
            elif(y == 2):
                course_id = input("Enter course ID: ")
                viewPerformanceE(course_id)
            elif(y == 3):
                scatterPlot()
            else:
                print("Invalid input. Try again.")
    else:
        print("Invalid input. Try again.")
```

II. student.py :

```
import json
import csv
import pandas
```

```
from batch import createBatch

def createStudent(student_id, name):
    class_roll_number = int(student_id[5:7])
    batch_id = student_id[:5]
    data = [student_id, name, class_roll_number, batch_id]
    csv_reader = []
    with open("student.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    with open("student.csv", "a", newline = "\n") as f:
        for i in range(0, len(csv_reader)):
            if(csv_reader[i][0] == student_id):
                print("Student ID already exists")
                return
        csv_writer = csv.writer(f)
        csv_writer.writerow(data)
    with open("batch.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    check = 0
    for i in range(0, len(csv_reader)):
        if(csv_reader[i][0] == batch_id):
            check = 1
            if(csv_reader[i][4] == ""):
                csv_reader[i][4] = csv_reader[i][4] + student_id
            else:
                csv_reader[i][4] = csv_reader[i][4] + ":" + student_id
            df = pandas.read_csv("batch.csv")
            df.loc[i-1, "list_of_students"] = csv_reader[i][4]
            df.to_csv("batch.csv", index = False)
    if(check == 0):
        print("Batch does not exist.... Creating new batch")
        batch_name = batch_id[:3] + " 20" + batch_id[3:] + "-" + str(int(batch_id[3:]) + 4)
        createBatch(batch_name)
    with open("batch.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    courses = []
    for i in range(0, len(csv_reader)):
        if(csv_reader[i][0] == batch_id):
            courses = list(csv_reader[i][3].split(":"))
    with open("course.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    for i in range(0, len(csv_reader)):
        for j in range(0, len(courses)):
            if(csv_reader[i][0] == courses[j]):
                if(csv_reader[i][2] == ""):
                    temp = {}
                    temp[student_id] = 0
                    csv_reader[i][2] = json.dumps(temp)
                else:
                    temp = json.loads(csv_reader[i][2])
                    temp[student_id] = 0
                    csv_reader[i][2] = json.dumps(temp)
                df = pandas.read_csv("course.csv")
                df.loc[i-1, "marks_obtained"] = csv_reader[i][2]
                df.to_csv("course.csv", index = False)

def updateStudent(ostudent_id):
    csv_reader = []
    with open("student.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    check = 0
    for i in range(0, len(csv_reader)):
        if(csv_reader[i][0] == ostudent_id):
            check = 1
            break
    if(check == 0):
        print("Student ID does not exist")
        return
    while(True):
        print("Press 1 to update name")
        print("Press 2 to update student ID")
        print("Press 0 to exit")
        x = int(input("Enter your choice: "))
        if(x == 0):
            break
        elif(x == 1):
            name = input("Enter updated name: ")
            df = pandas.read_csv("student.csv")
            df.loc[i-1, "Name"] = name
            df.to_csv("student.csv", index = False)
        elif(x == 2):
            nstudent_id = input("Enter updated student ID: ")
            df = pandas.read_csv("student.csv")
            df.loc[i-1, "Student_ID"] = nstudent_id
            df.to_csv("student.csv", index = False)
            removeStudent(ostudent_id)
            createStudent(nstudent_id, csv_reader[i][1])
            ostudent_id = nstudent_id
            with open("student.csv", "r", newline = "\n") as f:
                csv_reader = list(csv.reader(f, delimiter=","))
        else:
            print("Invalid input. Try again.")

def removeStudent(student_id):
    csv_reader = []
    with open("student.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    check = 0
    for i in range(0, len(csv_reader)):
        if(csv_reader[i][0] == student_id):
            check = 1
            break
    if(check == 0):
        print("Student ID does not exist")
        return
    df = pandas.read_csv("student.csv")
    df.set_index("Student_ID")
    df = df.drop(df.index[i-1])
    df.to_csv("student.csv", index = False)
    with open("course.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    for i in range(0, len(csv_reader)):
        if(i == 0):
            continue
        temp = csv_reader[i][2]
        temp = json.loads(temp)
        if student_id in temp:
            del temp[student_id]
        csv_reader[i][2] = json.dumps(temp)
    df = pandas.read_csv("course.csv")
    for i in range(1, len(csv_reader)):
        df.loc[i-1, "marks_obtained"] = csv_reader[i][2]
    df.to_csv("course.csv", index = False)
    with open("batch.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    for i in range(0, len(csv_reader)):
        if(i == 0):
            continue
        temp = list(csv_reader[i][4].split(":"))
        if student_id in temp:
            temp.remove(student_id)
        a = ":"
        csv_reader[i][4] = a.join(temp)
    df = pandas.read_csv("batch.csv")
    for i in range(1, len(csv_reader)):
        df.loc[i-1, "list_of_students"] = csv_reader[i][4]
    df.to_csv("batch.csv", index = False)

def reportCard(student_id):
    name = ""
    csv_reader= []
    with open("student.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    check = 0
    for i in range(0, len(csv_reader)):
        if(csv_reader[i][0] == student_id):
            check = 1
            name = csv_reader[i][1]
            break
    if(check == 0):
        print("Student ID does not exist")
        return
    f = open((student_id + ".txt"), "w")
    a = "Student ID: " + student_id + "\n"
    b = "Name: " + name + "\n"
    f.writelines([a, b])
    with open("course.csv", "r", newline = "\n") as fx:
        csv_reader = list(csv.reader(fx, delimiter=","))
    marks = []
    subjects = []
    for i in range(1, len(csv_reader)):
        marks.append(json.loads(csv_reader[i][2]))
        subjects.append(csv_reader[i][1])
    total_marks = 0
    divs = 0
    for i in range(0, len(subjects)):
        temp = marks[i]
        if(isinstance(temp.get(student_id), int)):
            subject_marks = "Marks in " + subjects[i] + ": " + str(temp.get(student_id)) + "% \n"
            divs += 1
            total_marks += temp.get(student_id)
            f.write(subject_marks)
    grade = "Grade obtained: " + gradeCheck(total_marks/divs) + " \n"
    f.write(grade)
    f.close()

def gradeCheck(a):
    if(a >= 90):
        return "A"
    elif(a >= 80):
        return "B"
    elif(a >= 70):
        return "C"
    elif(a >= 60):
        return "D"
    elif(a >= 50):
        return "E"
    else:
        return "F"
```

III. course.py :

```
import json
import csv
import pandas
import matplotlib.pyplot
from collections import Counter
from student import gradeCheck
from batch import createBatch

def createCourse(course_id, course_name):
    csv_reader = []
    with open("course.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    for i in range(0, len(csv_reader)):
        if(csv_reader[i][0] == course_id):
            print("Course ID already exists")
            return
    print("Enter batches in which course is included: ")
    students = []
    while(True):
        batch_id = input("Enter batch ID (to stop enter STOP): ")
        if(batch_id.upper() == "STOP"):
            break
        else:
            check = 0
            for i in range(0, len(csv_reader)):
                with open("batch.csv", "r", newline = "\n") as f:
                    csv_reader = list(csv.reader(f, delimiter=","))
                if(csv_reader[i][3] != ""):
                    temp = csv_reader[i][3].split(":")
                    for x in temp:
                        if(x == course_id):
                            print("Course already added")
                            continue
                if(csv_reader[i][0] == batch_id):
                    check = 1
                    if(csv_reader[i][3] == ""):
                        csv_reader[i][3] = csv_reader[i][3] + course_id
                    else:
                        csv_reader[i][3] = csv_reader[i][3] + ":" + course_id
                    df = pandas.read_csv("batch.csv")
                    df.loc[i-1, "list_of_courses"] = csv_reader[i][3]
                    df.to_csv("batch.csv", index = False)
            if(check == 0):
                print("Batch does not exist.... Creating new batch")
                batch_name = batch_id[:3] + " 20" + batch_id[3:] + "-" + str(int(batch_id[3:]) + 4)
                createBatch(batch_name)
                with open("batch.csv", "r", newline = "\n") as f:
                    csv_reader = list(csv.reader(f, delimiter=","))
                csv_reader[len(csv_reader) - 1][3] = csv_reader[len(csv_reader) - 1][3] + course_id
                df = pandas.read_csv("batch.csv")
                df.loc[len(csv_reader) - 2, "list_of_courses"] = csv_reader[len(csv_reader) - 1][3]
                df.to_csv("batch.csv", index = False)
            with open("batch.csv", "r", newline = "\n") as f:
                csv_reader = list(csv.reader(f, delimiter=","))
            for i in range(0, len(csv_reader)):
                if(csv_reader[i][0] == batch_id):
                    students += csv_reader[i][4].split(":")
    temp = {}
    for a in students:
        temp[a] = 0
    data = [course_id, course_name, json.dumps(temp)]
    with open("course.csv", "a", newline = "\n") as f:
        csv_writer = csv.writer(f)
        csv_writer.writerow(data)

def checkPerformance(course_id):
    csv_reader = []
    data = []
    with open("course.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    check = 0
    student_marks = {}
    for i in range(1, len(csv_reader)):
        if(csv_reader[i][0] == course_id):
            check = 1
            student_marks = json.loads(csv_reader[i][2])
            break
    if(check == 0):
        print("Course ID does not exist")
        return data
    student_ids = list(student_marks.keys())
    with open("student.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    for i in range(0, len(student_ids)):
        for j in range(0, len(csv_reader)):
            if(student_ids[i] == csv_reader[j][0]):
                print("Student ID: " + student_ids[i])
                print("Student Name: " + csv_reader[j][1])
                print("Student Roll Number: " + csv_reader[j][2])
                print("Marks obtained: " + str(student_marks.get(student_ids[i])))
                print()
                data.append([student_ids[i], csv_reader[j][1], csv_reader[j][2],
student_marks.get(student_ids[i])])
    return data

def courseStatistics(course_id):
    csv_reader = []
    with open("course.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    check = 0
    for i in range(0, len(csv_reader)):
        if(csv_reader[i][0] == course_id):
            check = 1
            break
    if(check == 0):
        print("Course ID does not exist")
        return
    x = checkPerformance(course_id)
    grades = []
    for a in x:
        grades.append(gradeCheck(a[3]))
    grades.sort()
    letter_counts = Counter(grades)
    df = pandas.DataFrame.from_dict(letter_counts, orient='index')
    df.plot(kind='bar')
    matplotlib.pyplot.show()
```

IV. Batch_database.py :

```
import csv
import pandas
import json
from matplotlib import pyplot
from department import createDepartment

def createBatch(batch_name):
    batch_id = batch_name[:3] + batch_name[6:8]
    department_id = batch_id[:3]
    csv_reader = []
    with open("batch.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    for i in range(0, len(csv_reader)):
        if(csv_reader[i][0] == batch_id):
            print("Batch ID already exists")
            return
    data = [batch_id, batch_name, department_id, "", ""]
    with open("batch.csv", "a", newline = "\n") as f:
        csv_writer = csv.writer(f)
        csv_writer.writerow(data)
    print("Enter courses in batch: ")
    while(True):
        course_id = input("Enter course ID (to stop enter STOP): ")
        with open("batch.csv", "r", newline = "\n") as f:
            csv_reader = list(csv.reader(f, delimiter=","))
        if(csv_reader[len(csv_reader) - 1][3] != ""):
            check = 0
            temp = csv_reader[len(csv_reader) - 1][3].split(":")
            for x in temp:
                if(x == course_id):
                    print("Course already added")
                    check = 1
            if(check == 1):
                continue
        if(course_id.upper() == "STOP"):
            break
        else:
            with open("course.csv", "r", newline = "\n") as f:
                csv_reader = list(csv.reader(f, delimiter=","))
            check = 0
            for i in range(0, len(csv_reader)):
                if(csv_reader[i][0] == course_id):
                    with open("batch.csv", "r", newline = "\n") as f:
                        csv_reader = list(csv.reader(f, delimiter=","))
                    check = 1
                    if(csv_reader[len(csv_reader) - 1][3] == ""):
                        csv_reader[len(csv_reader) - 1][3] = csv_reader[len(csv_reader) - 1][3] + course_id
                    else:
                        csv_reader[len(csv_reader) - 1][3] = csv_reader[len(csv_reader) - 1][3] + ":" +
course_id
                    df = pandas.read_csv("batch.csv")
                    df.loc[len(csv_reader) - 2, "list_of_courses"] = csv_reader[len(csv_reader) - 1][3]
                    df.to_csv("batch.csv", index = False)
            if(check == 0):
                print("Course does not exist. Please create course first.")
    with open("department.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    check = 0
    for i in range(0, len(csv_reader)):
        if(csv_reader[i][0] == department_id):
            check = 1
            if(csv_reader[i][2] == ""):
                csv_reader[i][2] = csv_reader[i][2] + batch_id
            else:
                csv_reader[i][2] = csv_reader[i][2] + ":" + batch_id
            df = pandas.read_csv("department.csv")
            df.loc[i-1, "list_of_batches"] = csv_reader[i][2]
            df.to_csv("department.csv", index = False)
    if(check == 0):
        print("Department does not exist.... Creating new department")
        department_name = input("Enter department name: ")
        createDepartment(department_id, department_name)
        with open("department.csv", "r", newline = "\n") as f:
            csv_reader = list(csv.reader(f, delimiter=","))
        csv_reader[len(csv_reader) - 1][2] = csv_reader[len(csv_reader) - 1][2] + batch_id
        df = pandas.read_csv("department.csv")
        df.loc[len(csv_reader) - 2, "list_of_batches"] = csv_reader[len(csv_reader) - 1][2]
        df.to_csv("department.csv", index = False)
```

```
def viewStudents(batch_id):
    with open("batch.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    check = 0
    students = []
    for i in range(0, len(csv_reader)):
        if(csv_reader[i][0] == batch_id):
            check = 1
            students = csv_reader[i][4].split(":")
            break
    if(check == 0):
        print("Batch ID does not exist")
        return
    print("Students in " + batch_id + ":")
    for student in students:
        print(student)

def viewCourses(batch_id):
    with open("batch.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    check = 0
    courses = []
    for i in range(0, len(csv_reader)):
        if(csv_reader[i][0] == batch_id):
            check = 1
            courses = csv_reader[i][3].split(":")
            break
    if(check == 0):
        print("Batch ID does not exist")
        return
    print("Courses in " + batch_id + ":")
    for course in courses:
        print(course)

def viewPerformance(batch_id):
    with open("batch.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    check = 0
    students = []
    for i in range(0, len(csv_reader)):
        if(csv_reader[i][0] == batch_id):
            check = 1
            students = csv_reader[i][4].split(":")
            break
    if(check == 0):
        print("Batch ID does not exist")
        return
    for student in students:
        with open("student.csv", "r", newline = "\n") as f:
            csv_reader = list(csv.reader(f, delimiter=","))
        for i in range(0, len(csv_reader)):
            if(student == csv_reader[i][0]):
                print("Student ID: " + student)
                print("Student Name: " + csv_reader[i][1])
                print("Student Roll Number: " + csv_reader[i][2])
        with open("course.csv", "r", newline = "\n") as f:
            csv_reader = list(csv.reader(f, delimiter=","))
        all_marks = []
        for i in range(1, len(csv_reader)):
            all_marks.append(json.loads(csv_reader[i][2]))
        total_marks = 0
        divs = 0
        for subjects in all_marks:
            if(isinstance(subjects.get(student), int)):
                total_marks += subjects.get(student)
                divs += 1
        print("Percentage obtained: " + str(total_marks/divs))
        print()


def pieChart(batch_id):
    with open("batch.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    check = 0
    students = []
    for i in range(0, len(csv_reader)):
        if(csv_reader[i][0] == batch_id):
            check = 1
            students = csv_reader[i][4].split(":")
            break
    if(check == 0):
        print("Batch ID does not exist")
        return
    percentages = [">=90", ">=80", ">=70", ">=60", ">=50", "Failed"]
    numbers = [0, 0, 0, 0, 0, 0]
    for student in students:
        with open("course.csv", "r", newline = "\n") as f:
            csv_reader = list(csv.reader(f, delimiter=","))
        all_marks = []
        for i in range(1, len(csv_reader)):
            all_marks.append(json.loads(csv_reader[i][2]))
        total_marks = 0
        divs = 0
        for subjects in all_marks:
            if(isinstance(subjects.get(student), int)):
                total_marks += subjects.get(student)
                divs += 1
        percentage = total_marks/divs
        if(percentage >= 90):
            numbers[0] += 1
        elif(percentage >= 80):
            numbers[1] += 1
        elif(percentage >= 70):
            numbers[2] += 1
        elif(percentage >= 60):
            numbers[3] += 1
        elif(percentage >= 50):
            numbers[4] += 1
        else:
            numbers[5] += 1
    for i in range(len(numbers) - 1, -1, -1):
        if(numbers[i] == 0):
            del numbers[i]
            del percentages[i]
    pyplot.pie(numbers, labels = percentages)
    pyplot.show()
```

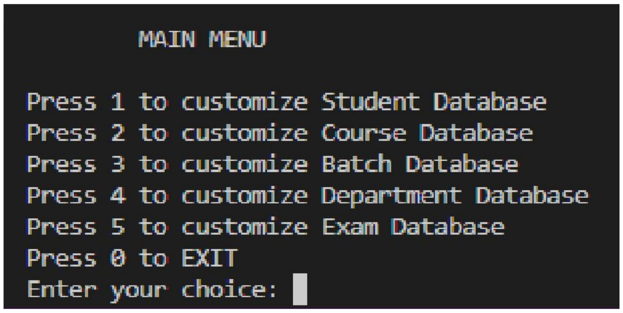
V. departmant.py :

```
import json
import csv
from matplotlib import pyplot

def createDepartment(department_id, department_name):
    csv_reader = []
    with open("department.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    for i in range(0, len(csv_reader)):
        if(csv_reader[i][0] == department_id):
            print("Department ID already exists")
            return
    data = [department_id, department_name, ""]
    with open("department.csv", "a", newline = "\n") as f:
        csv_writer = csv.writer(f)
        csv_writer.writerow(data)

def viewBatches(department_id):
    with open("department.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    check = 0
    batches = []
    for i in range(0, len(csv_reader)):
        if(csv_reader[i][0] == department_id):
            check = 1
            batches = csv_reader[i][2].split(":")
            break
    if(check == 0):
        print("Department ID does not exist")
        return
    print("Batches in " + department_id + ":")
    for batch in batches:
        print(batch)

def viewPerformanceD(department_id):
    with open("department.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    check = 0
    batches = []
    for i in range(1, len(csv_reader)):
        if(csv_reader[i][0] == department_id):
            check = 1
            batches = csv_reader[i][2].split(":")
            break
    if(check == 0):
        print("Department ID does not exist")
        return
    if(len(batches) == 0):
        print("No batches in department")
        return
    performances = []
    for batch in batches:
        students = []
        student_performances = []
        with open("batch.csv", "r", newline = "\n") as f:
            csv_reader = list(csv.reader(f, delimiter=","))
        for i in range(0, len(csv_reader)):
            if(csv_reader[i][0] == batch):
                students = csv_reader[i][4].split(":")
                break
        for student in students:
            with open("course.csv", "r", newline = "\n") as f:
                csv_reader = list(csv.reader(f, delimiter=","))
            all_marks = []
            for i in range(1, len(csv_reader)):
                all_marks.append(json.loads(csv_reader[i][2]))
            total_marks = 0
            divs = 0
            for subjects in all_marks:
                if(isinstance(subjects.get(student), int)):
                    total_marks += subjects.get(student)
                    divs += 1
            if(divs != 0):
                student_performances.append(total_marks/divs)
            else:
                student_performances.append(0)
        total_marks = 0
        divs = 0
        for x in student_performances:
            total_marks += x
            divs += 1
        if(divs != 0):
            performances.append(total_marks/divs)
        else:
            performances.append(0)
    total_marks = 0
    divs = 0
    for i in range(0, len(batches)):
        total_marks += performances[i]
        divs += 1
    avg_percentage = 0
    if(divs != 0):
        avg_percentage = total_marks/divs
    print("Average percantage obtained by all batches in " + department_id + ": " +
str(avg_percentage))

def linePlot(department_id):
    with open("department.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    check = 0
    batches = []
    for i in range(1, len(csv_reader)):
        if(csv_reader[i][0] == department_id):
            check = 1
            batches = csv_reader[i][2].split(":")
            break
    if(check == 0):
        print("Department ID does not exist")
        return
    if(len(batches) == 0):
        print("No batches in department")
        return
    performances = []
    for batch in batches:
        students = []
        student_performances = []
        with open("batch.csv", "r", newline = "\n") as f:
            csv_reader = list(csv.reader(f, delimiter=","))
        for i in range(0, len(csv_reader)):
            if(csv_reader[i][0] == batch):
                students = csv_reader[i][4].split(":")
                break
        for student in students:
            with open("course.csv", "r", newline = "\n") as f:
                csv_reader = list(csv.reader(f, delimiter=","))
            all_marks = []
            for i in range(1, len(csv_reader)):
                all_marks.append(json.loads(csv_reader[i][2]))
            total_marks = 0
            divs = 0
            for subjects in all_marks:
                if(isinstance(subjects.get(student), int)):
                    total_marks += subjects.get(student)
                    divs += 1
            if(divs != 0):
                student_performances.append(total_marks/divs)
            else:
                student_performances.append(0)
        total_marks = 0
        divs = 0
        for x in student_performances:
            total_marks += x
            divs += 1
        if(divs != 0):
            performances.append(total_marks/divs)
        else:
            performances.append(0)
    pyplot.plot(batches, performances)
    pyplot.show()
```

VI. examination.py :

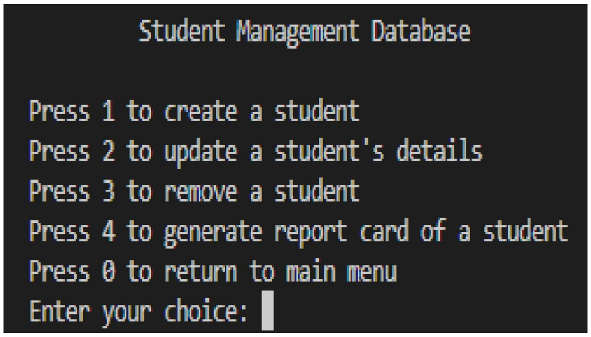
```
import csv
import json
import pandas
from matplotlib import pyplot

def enterMarks(course_id):
    csv_reader = []
    with open("course.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    check = 0
    course_name = ""
    student_marks = {}
    for i in range(1, len(csv_reader)):
        if(csv_reader[i][0] == course_id):
            check = 1
            course_name = csv_reader[i][1]
            student_marks = json.loads(csv_reader[i][2])
            break
    if(check == 0):
        print("Course ID does not exist")
        return
    student_ids = list(student_marks.keys())
    print("Course name: " + course_name)
    for student in student_ids:
        marks = int(input("Enter marks obtained by " + student + ": "))
        student_marks[student] = marks
    df = pandas.read_csv("course.csv")
    df.loc[i - 1, "marks_obtained"] = json.dumps(student_marks)
    df.to_csv("course.csv", index = False)

def viewPerformanceE(course_id):
    csv_reader = []
    with open("course.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    check = 0
    student_marks = {}
    for i in range(0, len(csv_reader)):
        if(csv_reader[i][1] == course_id):
            check = 1
            student_marks = json.loads(csv_reader[i][2])
            break
    if(check == 0):
        print("Course ID does not exist")
        return
    student_ids = list(student_marks.keys())
    for student in student_ids:
        marks = student_marks[student]
        print("Marks obtained by " + str(marks))

def scatterPlot():
    csv_reader = []
    with open("course.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    all_marks = []
    for i in range(1, len(csv_reader)):
        all_marks.append(json.loads(csv_reader[i][2]))
    batches = []
    students = []
    with open("batch.csv", "r", newline = "\n") as f:
        csv_reader = list(csv.reader(f, delimiter=","))
    for i in range(0, len(csv_reader)):
        batches.append(csv_reader[i][0])
        students.append(csv_reader[i][4].split(":"))
    for course in all_marks:
        batch_performances = []
        batchesX = []
        for i in range(0, len(batches)):
            total_marks = 0
            divs = 0
        check = 0
        for student in students[i]:
            if(student == students[i][0]):
                if(not isinstance(course.get(student), int)):
                    check = 1
                    break
            total_marks += course.get(student)
            divs += 1
        if(check == 1):
            continue
        else:
            batchesX.append(batches[i])
            batch_performances.append(total_marks/divs)
    pyplot.scatter(batchesX, batch_performances)
pyplot.show()
```

5. Outputs :

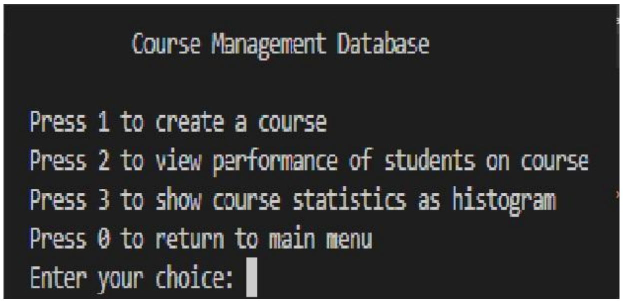


```
        MAIN MENU

 Press 1 to customize Student Database
 Press 2 to customize Course Database
 Press 3 to customize Batch Database
 Press 4 to customize Department Database
 Press 5 to customize Exam Database
 Press 0 to EXIT
 Enter your choice:
```

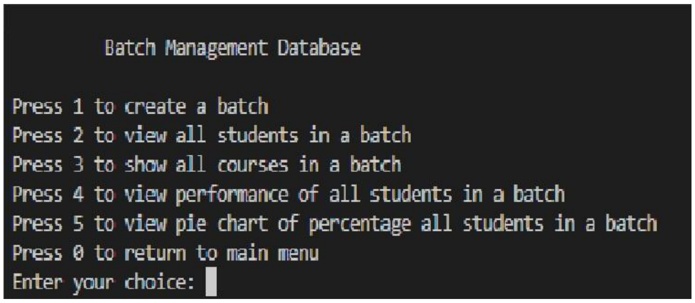
In Main Menu if I enter 1,2,3,4 and 5 then, outputs will be respectively -



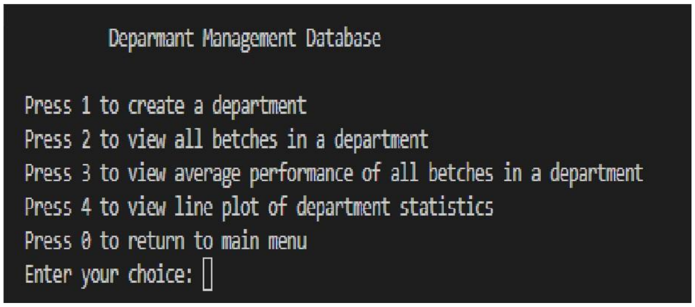
```
         Student Management Database

 Press 1 to create a student
 Press 2 to update a student's details
 Press 3 to remove a student
 Press 4 to generate report card of a student
 Press 0 to return to main menu
 Enter your choice:
```



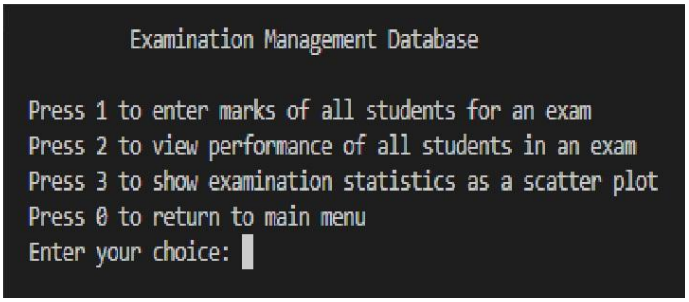
```
        Course Management Database

 Press 1 to create a course
 Press 2 to view performance of students on course
 Press 3 to show course statistics as histogram
 Press 0 to return to main menu
 Enter your choice:
```



```
       Batch Management Database

Press 1 to create a batch
Press 2 to view all students in a batch
Press 3 to show all courses in a batch
Press 4 to view performance of all students in a batch
Press 5 to view pie chart of percentage all students in a batch
Press 0 to return to main menu
Enter your choice:
```



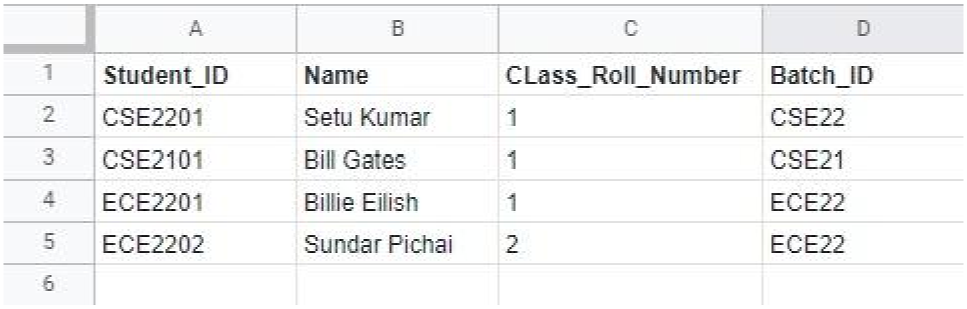
```
        Deparmant Management Database

Press 1 to create a department
Press 2 to view all betches in a department
Press 3 to view average performance of all betches in a department
Press 4 to view line plot of department statistics
Press 0 to return to main menu
Enter your choice:
```



```
        Examination Management Database

Press 1 to enter marks of all students for an exam
Press 2 to view performance of all students in an exam
Press 3 to show examination statistics as a scatter plot
Press 0 to return to main menu
Enter your choice: 
```

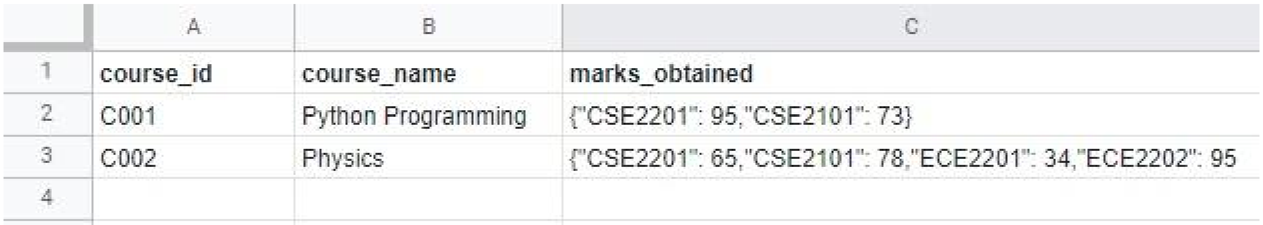
and the created tables are -

1. **student.csv :**



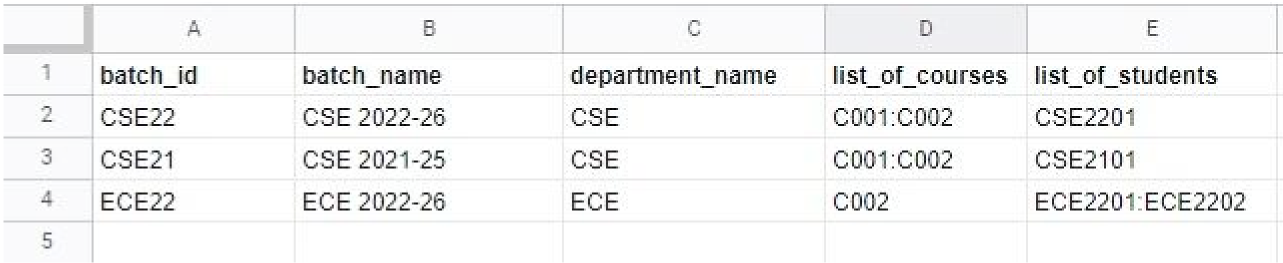
	A	B	C	D
1	Student_ID	Name	CLass_Roll_Number	Batch_ID
2	CSE2201	Setu Kumar	1	CSE22
3	CSE2101	Bill Gates	1	CSE21
4	ECE2201	Billie Eilish	1	ECE22
5	ECE2202	Sundar Pichai	2	ECE22
6				

2. **course.csv :**



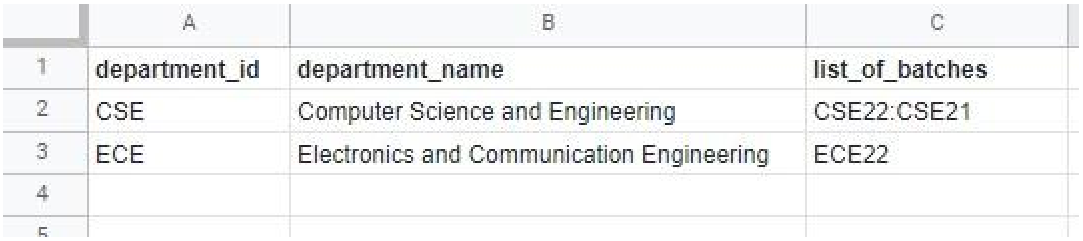
	A	B	C
1	course_id	course_name	marks_obtained
2	C001	Python Programming	{"CSE2201": 95,"CSE2101": 73}
3	C002	Physics	{"CSE2201": 65,"CSE2101": 78,"ECE2201": 34,"ECE2202": 95
4			

3. **batch.csv :**



	A	B	C	D	E
1	batch_id	batch_name	department_name	list_of_courses	list_of_students
2	CSE22	CSE 2022-26	CSE	C001:C002	CSE2201
3	CSE21	CSE 2021-25	CSE	C001:C002	CSE2101
4	ECE22	ECE 2022-26	ECE	C002	ECE2201:ECE2202
5					

4. **department.csv :**



	A	B	C
1	department_id	department_name	list_of_batches
2	CSE	Computer Science and Engineering	CSE22:CSE21
3	ECE	Electronics and Communication Engineering	ECE22
4			
5			