Programs:

from tabulate import tabulate as tb

import matplotlib.pyplot as plt

import sys

driver\_data=[]# list to store data from the files

racer\_info={}# dictionary to store data fromn f1\_driver.txt

def racer\_data(file):

     #to store racer name and team from f1\_racer.txt

     with open(file, "r") as f:

          for line in f:

               parts=line.strip().split(",")

               if len(parts) == 4:

                    code, full\_name, team=parts[1],parts[2],parts[3]

                    racer\_info[code]= {"name":full\_name, "team":team}

def lap\_data\_store(lap\_file,lap\_no):

     # to store racer code, full name, team, spped in driver data list as list of dictionaries

     with open(lap\_file,'r')as lap:

          next(lap)

          for line in lap:

               driver\_code=line[:3]

               speed=float(line[3:].strip())

               if driver\_code in racer\_info:

                    full\_name=racer\_info[driver\_code]["name"]

                    team=racer\_info[driver\_code]["team"]

               else:

                    full\_name="unknown"

                    team="unknown"

               driver\_data.append({"driver":driver\_code,

                                   "full name":full\_name,

                                   "team":team,

                                    "car speed":speed,

                                    "lap":lap\_no})

def race\_name(lap\_file, lap\_no):

     # reads first line from every lap file and print the lap name.

    with open(lap\_file, 'r') as f:

        location = f.readline().strip()

        print(f"Lap {lap\_no} race is in {location}.")

def fastest\_racer(lap\_no):

     #to compare and diaplay fastest recer and there speed in every lap

     lap\_data=[entry for entry in driver\_data if entry["lap"]==lap\_no]

     fastest=max(lap\_data, key=lambda x: x["car speed"])

     print(f"the fastest racer in lap {lap\_no}:")

     print(f"Driver: {fastest['full name']} ({fastest['driver']}), team:{fastest['team']}, speed: {fastest['car speed']:.3f}")

def fast\_individual\_racer():

     # to display fast spped of every racer in every lap using table

     individual\_drive\_speed={}

     for entry in driver\_data:

          driver=entry["driver"]

          speed=float(entry["car speed"])

          if driver not in individual\_drive\_speed or speed < individual\_drive\_speed[driver]["speed"]:

               individual\_drive\_speed[driver]={

                    "full name": entry["full name"],

                    "team":entry["team"],

                    "speed":speed

               }

     table= [{"driver":info["full name"], "Team":info["team"], "fastest time":info["speed"]}

             for info in individual\_drive\_speed.values()]

     print("individual fastest time of every racer:")

     print(tb(table, headers="keys", tablefmt="fancy\_grid"))

def fast\_individual\_racer\_descending():

     #to display fast speed of every racer in every lap but in descending order

     individual\_drive\_speed\_descend={}

     for entry in driver\_data:

          driver=entry["driver"]

          speed=float(entry["car speed"])

          if driver not in individual\_drive\_speed\_descend or speed < individual\_drive\_speed\_descend[driver]["speed"]:

               individual\_drive\_speed\_descend[driver]={

                    "full name": entry["full name"],

                    "team":entry["team"],

                    "speed":speed

               }

     table= [{"driver":info["full name"], "Team":info["team"], "fastest time":info["speed"]}

             for info in individual\_drive\_speed\_descend.values()]

     table.sort(key=lambda x: x["fastest time"], reverse=True)

     print("individual fastest time of every racer(in descending order):")

     print(tb(table, headers="keys", tablefmt="fancy\_grid"))

def average\_speed\_racers():

     #to calculate average speed from every racer and display

     total\_speed=sum(entry["car speed"] for entry in driver\_data)

     total\_driver=len(driver\_data)

     average\_time=total\_speed/total\_driver if total\_driver else print("no data on driver.")

     print(f"the average time of overall racers is: {average\_time:.2f}")

def average\_speed\_individual():

     #to calculate and show average speed of all racers in table

     racer\_average={}

     for entry in driver\_data:

          driver=entry["driver"]

          speed=float(entry["car speed"])

          if driver not in racer\_average:

               racer\_average[driver] ={"total time":0, "count":0, "full name": entry["full name"], "team": entry["team"]}

          racer\_average[driver]["total time"] += speed

          racer\_average[driver]["count"] += 1

     average= [{"driver":data["full name"], "team":data["team"],

                "average time": data["total time"]/ data["count"]}

               for data in racer\_average.values()]

     average.sort(key=lambda x:x["average time"], reverse=True)

     print("average speed of every racer:")

     print(tb(average, headers="keys", tablefmt="fancy\_grid"))

def plot\_fastest\_racers():

     #to plot graph on fastest speed of racers

     individual\_drive\_speed={}

     for entry in driver\_data:

          driver= entry["driver"]

          speed=float(entry["car speed"])

          if driver not in individual\_drive\_speed or speed< individual\_drive\_speed[driver]["speed"]:

               individual\_drive\_speed[driver]={

                    "full name":entry["full name"],

                    "speed":speed

               }

     drivers=[info["full name"] for info in individual\_drive\_speed.values()]

     speeds=[info["speed"] for info in individual\_drive\_speed.values()]

     plt.figure(figsize=(10,6))

     plt.barh(drivers, speeds, color="skyblue")

     plt.xlabel("fastest speed(seconds)")

     plt.ylabel("racers")

     plt.title("fastest speed of racers")

     plt.show()

def plot\_average\_speed():

     #to plot graph on average speed of racers

     racer\_average={}

     for entry in driver\_data:

          driver=entry["driver"]

          speed=float(entry["car speed"])

          if driver not in racer\_average:

               racer\_average[driver]={"total time":0, "count":0,

               "full name":entry["full name"], "team":entry["team"]}

          racer\_average[driver]["total time"]+=speed

          racer\_average[driver]["count"]+=1

     drivers=[data["full name"] for data in racer\_average.values()]

     averages=[data["total time"]/data["count"] for data in racer\_average.values()]

     plt.figure(figsize=(10,6))

     plt.barh(drivers,averages,color="lightcoral")

     plt.xlabel("average speed")

     plt.ylabel("racers")

     plt.title("average speed of all racers")

     plt.show()

def option():

     #main menu

     while True:

          print("menu")

          print("1. lap1")

          print("2. lap2")

          print("3. lap3")

          print("4. view graphs")

          print("5. exit")

          choice=input("choose a lap:")

          if choice not in ["1","2","3","4","5"]:

               print("invalid choice, please try again.")

               continue

          if choice=="5":

               print("exiting the data.")

               sys.exit(0)

          elif choice=="4":

               while True:

                    print("option for graph")

                    print("1. graph for fastest")

                    print("2. graph for average")

                    print("3. back to main menu")

                    grpah\_choice=input("enter your option:")

                    if grpah\_choice=="1":

                         plot\_fastest\_racers()

                    elif grpah\_choice=="2":

                         plot\_average\_speed()

                    elif grpah\_choice=="3":

                         break

                    else:

                         print("invalid choice, please enter again.")

          else:

               lap\_no=int(choice)

               race\_name(f"project1/lap\_times\_{lap\_no}.txt",lap\_no)

               while True:

                    print(f"lap{lap\_no} option:")

                    print("1. fastest Racer:")

                    print("2. individual speed list")

                    print("3. individual speed list(descending)")

                    print("4. average speed")

                    print("5. individual average list")

                    print("6. back to main menu")

                    sub\_choice=input("choose the option:")

                    if sub\_choice =="1":

                         fastest\_racer(lap\_no)

                    elif sub\_choice =="2":

                         fast\_individual\_racer()

                    elif sub\_choice =="3":

                         fast\_individual\_racer\_descending()

                    elif sub\_choice =="4":

                         average\_speed\_racers()

                    elif sub\_choice =="5":

                         average\_speed\_individual()

                    elif sub\_choice =="6":

                         break

                    else:

                         print("invalid choice. please enter again.")

if len(sys.argv)<2:#for command line

     print("usage:python program.py <filename>")

     sys.exit(1)

try:

     racer\_data("project1/f1\_drivers.txt")

     for i in range(1,4):

          lap\_data\_store(sys.argv[1].replace("X", str(i)), i)

except FileNotFoundError:

     print(f"file {sys.argv[1]} not found.")

     sys.exit(1)

option()

#function call

Output:































