Fast**National University of Computer & Emerging Sciences, Karachi  
Fall-2022 FAST School of Computing  
Midterm-2**

**31st October 2022, 10:00 am – 11:00am**

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| **Course Code:**CS1002 | **Course Name:** Programming Fundamentals | |
| **Instructor Name:** Mr. M. Shahzad, Dr. Farooque, Dr. Muhammad Farrukh Shahid, Dr. M. Usama,  Mr. Shahbaz, Mr. Musawar, Ms. Atiya, Ms. Aqsa, Ms. Sumaiyah | | |
| **Student Roll No:** | | **Section:** |

**Instructions:**

* Return the question paper and make sure to keep it inside your answer sheet.
* Read each question completely before answering it. There are **three questions and two pages (front plus back)**.
* In case of any ambiguity, you may make assumption. However, your assumption should not contradict any statement in the question paper.
* Do not write anything on the question paper (except your ID and group).

**Total Time:** 1 Hour **Max Points**: **60**

**Question#1:** Give the output when these programs are executed: **[12 points, CLO3, 15 mins]**

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| --- | --- |
| #include <stdio.h>  void main()  { int data[] = {-2, 45, 0, 11, -9},i;  for ( i=0; i <6 ; i++) {  if (data[i] > data[i + 1]) {  int temp = data[i];  data[i] = data[i + 1];  data[i + 1] = temp;  }  }  for ( i = 0; i < 5; i++) {  printf("%d ", data[i]);  }  }  **-2 0 11 -9 0**  ---------------- | #include <stdio.h>  int main()  {  char str[]="PFMIDII";  int i;  for(i = 0; str[i] != '\0'; i++)  {  str[i]=str[i]+i;  printf("%c", str[i]);  }  }  **PGOLHNO** |
| #include <stdio.h>  int main()  { int i=0, j=0;  do  {  while(j < 3)  {  printf("%d", j);  j++;  }  printf("%d\n", ++i);  }  while(++i < 6);  return 0;  }  **0121**  **3**  **5** | #include <stdio.h>  int main()  { int i=1, j=0;  do  {  for(j='A'; j<='E'; j+=i)  {  printf("%c",j );  }  i++;  printf("\n");  }  while(i< 4);  return 0;  }  **ABCDE**  **ACE**  **AD** |

**Question#2:**  **[16 points, CLO2, 20 mins]**

***Scenario:*** Deoxyribonucleic acid (DNA) is an information carrier in humans’ cells that helps in the development and functioning of an organism.  The information in DNA is stored as a code made up of four chemical bases (letters) or nucleotides: adenine (A), guanine (G), cytosine (C), and thymine (T). Human DNA consists of about 3 billion bases, and more than 99 percent of those bases are the same in all people. The meaning of the DNA code lies in the sequence of these nucleotides’ letters i.e. A, G, C & T.

***Task:***

Read a long DNA sequence up to 20 nucleotides and display a histogram of each letter by printing number of **‘\*’** against each letter.

|  |  |
| --- | --- |
| **Sample Input:**  AGCTTACATATTACGAGTTG | **Sample Output:**  A: \* \* \* \* \* \*  G: \* \* \* \*  C: \* \* \*  T:  \* \* \* \* \* \* \*  int main(int argc, char\*\* argv) {  char a[25]={"AGCTTACATATTACGAGTTG"};  char temp;  int count=0 ;  for (int i=0; i<21; i++)  {  temp=a[i];  printf("%c:",temp);  for (int j=i+1; j<21; j++)  {  if (a[j]==temp)  {  count=count+1;  }    }  for (int y=0; y<=count; y++)  {  printf("\*");  }  printf("\n");  count=0;  }  return 0;  } |

**Question#3:**  **[32 points, CLO2, 25 mins]**

Write a program for new red line bus service where we want to keep track of daily ticket sales, for each bus, in every city. The number of cities, buses and tickets are set to following values:

Number of cities = last digit of your ID + 2

Number of buses in each city = last two digits of your ID

Number of ticket sales for each bus = last three digits of your ID

Your program should ask your ID in one variable, for example “22k-1234”, and extract above given values. For every ticket in every bus at every city, your program should also ask user’s age and calculates appropriate ticket price i.e., for every ticket, there are three possible charges:

Full price

Elderly (age > 60) 30% discount on the ticket price

Children (age < 6) 50% discount on the ticket price

Let us assume the total ticket price is set to ***varCharges*** rupees (user specified), then your program should calculate and display sales track in following format:

**All Data:**

**City Bus Passenger age amount rupees**

City 1 Bus 1 Passenger 1 55 500 rupees

City 1 Bus 1 Passenger 2 50 500 rupees

City 1 Bus 1 Passenger 3 75 350 rupees

City 1 Bus 2 Passenger 1 5 250 rupees

City 1 Bus 2 Passenger 2 35 500 rupees

City 2 Bus 1 Passenger 1 15 500 rupees

**Total sales for each bus in each city:**

**City Bus Total Sales**

City 1 Bus 1 1,350 rupees

City 1 Bus 2 750 rupees

City 2 Bus 1 120,000 rupees

City 3 Bus 1 120,000 rupees

City 3 Bus 2 120,000 rupees

How much money has been discounted in total for all the buses and cities [Description: We have discounted 400,000 rupees for elders and 200,000 rupees for children for all cities]

[**hint:** A char variable on any index in string str1 can be converted to int using casting, ex: int a = int(str1[5]- ‘0’);]

**BEST OF LUCK!**

#include<stdio.h>

/\*

CHECKING RUBERICS:

There are four major parts:

- Extracting data from string, Creating and storing all data using 2D or 3D array.

- Printing all data in tabular form

- Calculation of total sales for buses and printing it

- Calculation of discounted amount for all cities

\*/

void main()

{

int countChildren = 0, countElders = 0;

int varCharges = 0;

printf("Enter Ticket Charges: ");

scanf("%d", &varCharges);

char myID[]="22k-1234";

scanf("%s", myID);

int cities = (int)(myID[7] - '0'), buses = ((int)(myID[6] - '0')\*10) + (int)(myID[7] - '0'), tickets = ((int)(myID[5] - '0')\*100) + ((int)(myID[6] - '0')\*10) + (int)(myID[7] - '0');

printf("%d, %d, %d", cities, buses, tickets);

int rows = cities \* buses \* tickets, cols = 5; // Five columns to store city, bus, passenger, age, ticket price

int allData [rows][cols];

int citiCounter = 0, busCounter = 0, ticketCounter = 0;

// Data Input in the array

for(int i=0; i< rows; i++)

{

if(ticketCounter == tickets)

busCounter++;

if(busCounter == buses)

citiCounter++;

allData[i][0] = citiCounter;

allData[i][1] = busCounter;

allData[i][2] = ticketCounter;

int ageTemp =0, ticketTemp = 0;

printf("Enter age for passenger in City %d, Bus %d, Ticket %d\n", citiCounter, busCounter, ticketCounter);

scanf("%d", &ageTemp);

if (ageTemp < 6)

{

ticketTemp = 0.5 \* varCharges;

countChildren += (varCharges - ticketTemp);

}

else if (ageTemp > 60)

{

ticketTemp = 0.3 \* varCharges;

countElders += (varCharges - ticketTemp);

}

else

ticketTemp = varCharges;

allData[i][3] = ageTemp;

allData[i][4] = ticketTemp;

ticketCounter++;

}

// Output in tabular form

for(int i=0; i< rows; i++)

{

printf("City %d, Bus %d, Passenger %d, %d, %d\n", allData[i][0], allData[i][1], allData[i][2], allData[i][3], allData[i][4]);

}

// Total Sales for Each bus:

int busSales = 0;

for(int i=0; i< rows; i++)

{

if(ticketCounter == tickets)

busCounter++;

if(busCounter == buses)

citiCounter++;

if ((i+1) % buses != 0)

busSales += allData[i][4];

else

{

printf("City %d, Bus %d = %d rupees,\n", allData[i][0], allData[i][1], busSales);

busSales = 0;

}

ticketCounter++;

}

// Using variables of countChildren and countElders, we can print all discounted amount

printf("We have discounted %d rupees for elders and %d rupees for children for all cities", countChildren, countElders);

return 0;

}