CSc 3320: Systems Programming

Spring 2021

Midterm 2: Total points = 100

Assigned: 11th Apr 2021, Sunday 11:59 PM **Submission Deadline: 18th Apr 2021, Sunday, 11.59 PM (No extensions. If your submission is not received by this time then it will NOT be accepted.)**

Submission instructions:

1. Create a Google doc for your submission.
2. Start your responses from page 2 of the document and copy these instructions on page 1.
3. Fill in your name, campus ID and panther # in the fields provided. If this information is missing TWO POINTS WILL BE DEDUCTED.
4. Keep this page 1 intact. If this *submissions instructions* page is missing in your submission TWO POINTS WILL BE DEDUCTED.
5. Start your responses to each QUESTION on a new page.
6. If you are being asked to write code copy the code into a separate txt file and submit that as well. The code should be executable. E.g. if asked for a C script then provide myfile.c so that we can execute that script. In your answer to the specific question, provide the steps on how to execute your file (like a ReadMe).
7. If you are being asked to test code or run specific commands or scripts, provide the evidence of your outputs through a screenshot and/or screen video-recordings and copy the same into the document.
8. Upon completion, download a .PDF version of the google doc document and submit the same along with all the supplementary files (videos, pictures, scripts etc).

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Questions 1-3 are 20pts each. Question 4 is 40pts

All programs have to be well commented. Non commented programs will receive 0 points. Comments have to be easily comprehensible and concise.

1. Consider the array given below. Write a C program that must be able to sort the elements in the array. You must use pointers in your code to work with the arrays. The sort functionality must be implemented as a separate function named "sort_numeric()"

Array for your evaluation

[10, 0.25, -2342, 12123, 3.145435, 6, 6, 5.999, -2, -5, -109.56]

If given user input A or a: sort in Ascending order

If given user input D or d: sort in Descending order

```
[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ vi sortNumeric.c
[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ gcc sortNumeric.c
[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ ./a.out
Press "A" or "a" for Ascending orderor Press "D" or "d" for Descending order: a
-2342.000000 ; -109.559998 ; -5.000000 ; -2.000000 ; 0.250000 ; 3.145435 ; 5.999000 ; 6.000000 ; 6.000000 ; 10.00
0000 ; 12123.000000.[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ ./a.out
Press "A" or "a" for Ascending orderor Press "D" or "d" for Descending order: D
12123.000000 ; 10.000000 ; 6.000000 ; 6.000000 ; 5.999000 ; 3.145435 ; 0.250000 ; -2.000000 ; -5.000000 ; -109.55
```

2. Consider the list of names given below. Write a C program that will first create a string array that will contain this list and then sort the elements in the array as per alphabetical order. You must use pointers in your code to work with the arrays. The sort functionality must be implemented as a separate function named “sort_alphabetic()”. The program can be case insensitive (i.e. capital or small letters are treated the same).

List for your evaluation

Systems
Programming
Deep
Learning
Internet
Things
Robotics
Course

If given user input A or a: sort in alphabetical order (a comes first) If given user input D or d: sort in reverse alphabetical order(z comes first)

```
[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ gcc sortAlphabetic.c
[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ ./a.out
Press "A" or "a" for Alphabetical order or Press "D" or "d" for reverse Alphabetical order: A
The sorted string array in alphabetic order is : Course ; Deep ; Internet ; Learning ; Programmi
ng ; Robotics ; Systems ; Things.
[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ ./a.out
Press "A" or "a" for Alphabetical order or Press "D" or "d" for reverse Alphabetical order: d
The sorted string array in reverse alphabetic order is : Things ; Systems ; Robotics ; Programmi
ng ; Learning ; Internet ; Deep ; Course.
```

3. Repeat Question 1 or Question 2, considering that the number of elements can potentially increase. That is, the size of the array will be unknown at the start of the program. Note that the requirement of using pointers still holds.

Show proof of evaluation of your program being able to work for more than 10 entries. Show 5 evaluation trials in your submission. You can pick any number of entries between 10 and 30 for your trials.

(Hint: *To solve this, use dynamic memory allocation, where you will NOT treat the input array as a known or finite size. Allocate memory space (e.g. malloc()) as and when the number of elements in the list increases).*

```
[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ ./a.out
Enter size of the array you want to sort: 23
Enter the array elements: 12
45
87
0.34
-34
370
78
23
7
8.43
-234
739
73880
28.93
8493.0494
123
34
790
71.23
97
345
823
546
Press "A" or "a" for Ascending order or Press "D" or "d" for Descending order: A
Array elements sorted in asceding order are : -234.000000 ; -34.000000 ; 0.340000 ; 7.000000 ; 8
.430000 ; 12.000000 ; 23.000000 ; 28.930000 ; 34.000000 ; 45.000000 ; 71.230003 ; 78.000000 ; 87
.000000 ; 97.000000 ; 123.000000 ; 345.000000 ; 370.000000 ; 546.000000 ; 739.000000 ; 790.00000
0 ; 823.000000 ; 8493.049805 ; 73880.000000.
```

```
[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ ./a.out
Enter size of the array you want to sort: 12
Enter the array elements: 12
34
56
78
90
24
68
31
53
75
96
4.56
Press "A" or "a" for Ascending order or Press "D" or "d" for Descending order: d
Array elements sorted in asceding order are : 96.000000 ; 90.000000 ; 78.000000 ; 75.000000 ; 68.000000
; 56.000000 ; 53.000000 ; 34.000000 ; 31.000000 ; 24.000000 ; 12.000000 ; 4.560000.
```

```
[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ ./a.out
Enter size of the array you want to sort: 14
Enter the array elements: 92
34.56
0.23
74
-34
7
92
3
5
87.34
85
73
23
8.092
Press "A" or "a" for Ascending order or Press "D" or "d" for Descending order: D
Array elements sorted in asceding order are : 92.000000 ; 92.000000 ; 87.339996 ; 85.000000 ; 74.000000
; 73.000000 ; 34.560001 ; 23.000000 ; 8.092000 ; 7.000000 ; 5.000000 ; 3.000000 ; 0.230000 ; -34.000000.
```

```
[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ ./a.out
Enter size of the array you want to sort: 11
Enter the array elements: 21
34
74
96
-237
738.3
84
39.8755
839
74
9
Press "A" or "a" for Ascending order or Press "D" or "d" for Descending order: a
Array elements sorted in asceding order are : -237.000000 ; 9.000000 ; 21.000000 ; 34.000000 ; 39.875500
 ; 74.000000 ; 74.000000 ; 84.000000 ; 96.000000 ; 738.299988 ; 839.000000.
```

```
[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ ./a.out
Enter size of the array you want to sort: 30
Enter the array elements: 12
52
62
73
84
95
24
7.38
0.34
-83
-73
-7
-8272
6392
0.837
2738
7383.948
740
27
92
36
0.84
263
-721
374
8
30
28
```

```
3.093
738
Press "A" or "a" for Ascending order or Press "D" or "d" for Descending order: A
Array elements sorted in asceding order are : -8272.000000 ; -721.000000 ; -83.000000 ; -73.000000 ; -7.
000000 ; 0.340000 ; 0.837000 ; 0.840000 ; 3.093000 ; 7.380000 ; 8.000000 ; 12.000000 ; 24.000000 ; 27.00
0000 ; 28.000000 ; 30.000000 ; 36.000000 ; 52.000000 ; 62.000000 ; 73.000000 ; 84.000000 ; 92.000000 ; 9
5.000000 ; 263.000000 ; 374.000000 ; 738.000000 ; 740.000000 ; 2738.000000 ; 6392.000000 ; 7383.948242.
```

4. Using C programming and using Structures or Unions in your program, build a COVID vaccine registration form where any user can register by filling in their First Name, Last Name, Date of Birth (mm/dd/yyyy), Sex, Dose number (1 or 2), Date of previous dose, Type of vaccine (Pfizer, Moderna, Johnson&Johnson), Residential zipcode.

Upon registration, the system must output a 8 letter alphanumeric code that will be unique to that user. The code is generated as <First letter of First Name><First Letter of Last Name><current age of user -as of registration date><First letter of Vaccine type><last 3 numbers of zipcode>

Add functionality in your program such that it will display all the user's information on the screen (one item in each line).

Show an evaluation trial for registering at least 10 users. For registration, ,for relevant questions, users must choose values based on the options provided (e.g. sex; options must be Male/Female/Do not wish to identify)

(Hint: Write a program that contains main(), register(), generate_code() and retrieve() functions, at the least).

```
[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ ./a.out
Enter your first name: Sam
Enter your last name: Chey
Enter your date of birth as (mm/dd/yyyy): 03/04/2001
Enter your sex-Male/Female/Do not wish to identify: Female
Enter the dose number- 1 or 2: 2
Enter the date of previous dose as (mm/dd/yyyy): 9/10/2021
Enter the type of vaccine-Pfizer/Moderna/Johnson&Johnson: Pfizer
Enter the residential zipcode: 30974
Current year = 2021

Registration Code is - SC20P974
User details are:
First name :Sam
Last name: Chey
Date of birth: 3/4/2001
Sex: Female
Dose number: 2
Date of previous dose: 9/10/202Pfizer
Type of vaccine : Pfizer
Residential zipcode: 30974
```

```
[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ ./a.out
Enter your first name: Hash
Enter your last name: Bash
Enter your date of birth as (mm/dd/yyyy): 02/03/1998
Enter your sex-Male/Female/Do not wish to identify: Male
Enter the dose number- 1 or 2: 1
Enter the date of previous dose as (mm/dd/yyyy): 9/2/2021
Enter the type of vaccine-Pfizer/Moderna/Johnson&Johnson: Johnson&Johnson
Enter the residential zipcode: 30921
Current year = 2021

Registration Code is - HB23J921
User details are:
First name :Hash
Last name: Bash
Date of birth: 2/3/1998
Sex: Johnson
Dose number: 1
Date of previous dose: 9/2/2021Johnson&Johnson
Type of vaccine : Johnson&Johnson
Residential zipcode: 30921
```

```
[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ ./a.out
Enter your first name: Jon
Enter your last name: Shah
Enter your date of birth as (mm/dd/yyyy): 10/23/1980
Enter your sex-Male/Female/Do not wish to identify: Male
Enter the dose number- 1 or 2: 1
Enter the date of previous dose as (mm/dd/yyyy): 2/13/2000
Enter the type of vaccine-Pfizer/Moderna/Johnson&Johnson: Pfizer
Enter the residential zipcode: 30123
Current year = 2021

Registration Code is - JS41P123
User details are:
First name :Jon
Last name: Shah
Date of birth: 10/23/1980
Sex: Male
Dose number: 1
Date of previous dose:2/13/200Pfizer
Type of vaccine:Pfizer
```

```
Residential zipcode: 30123[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ ./a.out
Enter your first name: Seema
Enter your last name: Lala
Enter your date of birth as (mm/dd/yyyy): 12/12/2010
Enter your sex-Male/Female/Do not wish to identify: Female
Enter the dose number- 1 or 2: 2
Enter the date of previous dose as (mm/dd/yyyy): 9/12/2021
Enter the type of vaccine-Pfizer/Moderna/Johnson&Johnson: Moderna
Enter the residential zipcode: 30456
Current year = 2021

Registration Code is - SL11M456
User details are:
First name :Seema
Last name: Lala
Date of birth: 12/12/2010
Sex: Female
Dose number: 2
Date of previous dose:9/12/202Moderna
Type of vaccine:Moderna
```

```
Residential zipcode: 30456[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ ./a.out
Enter your first name: Watson
Enter your last name: Zen
Enter your date of birth as (mm/dd/yyyy): 03/02/2000
Enter your sex-Male/Female/Do not wish to identify: Male
Enter the dose number- 1 or 2: 1
Enter the date of previous dose as (mm/dd/yyyy): 12/1/2021
Enter the type of vaccine-Pfizer/Moderna/Johnson&Johnson: Johnson&Johnson
Enter the residential zipcode: 30670
Current year = 2021

Registration Code is - WZ21J670
User details are:
First name :Watson
Last name: Zen
Date of birth: 3/2/2000
Sex: Johnson
Dose number: 1
Date of previous dose:12/1/202Johnson&Johnson
Type of vaccine:Johnson&Johnson
```

```
Residential zipcode: 30670[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ ./a.out
Enter your first name: Manu
Enter your last name: Chiga
Enter your date of birth as (mm/dd/yyyy): 09/10/1987
Enter your sex-Male/Female/Do not wish to identify: Female
Enter the dose number- 1 or 2: 2
Enter the date of previous dose as (mm/dd/yyyy): 10/02/2021
Enter the type of vaccine-Pfizer/Moderna/Johnson&Johnson: Moderna
Enter the residential zipcode: 32178
Current year = 2021

Registration Code is - MC34M178
User details are:
First name :Manu
Last name: Chiga
Date of birth: 9/10/1987
Sex: Female
Dose number: 2
Date of previous dose:10/02/20Moderna
Type of vaccine:Moderna
```

```
Residential zipcode: 32178[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ ./a.out
Enter your first name: Noor
Enter your last name: David
Enter your date of birth as (mm/dd/yyyy): 04/12/1976
Enter your sex-Male/Female/Do not wish to identify: Female
Enter the dose number- 1 or 2: 1
Enter the date of previous dose as (mm/dd/yyyy): 9/2/2021
Enter the type of vaccine-Pfizer/Moderna/Johnson&Johnson: Pfizer
Enter the residential zipcode: 39847
Current year = 2021

Registration Code is - ND45P847
User details are:
First name :Noor
Last name: David
Date of birth: 4/12/1976
Sex: Female
Dose number: 1
Date of previous dose:9/2/2021Pfizer
Type of vaccine:Pfizer
```

```
Residential zipcode: 39847[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ ./a.out
Enter your first name: Dan
Enter your last name: Don
Enter your date of birth as (mm/dd/yyyy): 11/02/2002
Enter your sex-Male/Female/Do not wish to identify: Male
Enter the dose number- 1 or 2: 2
Enter the date of previous dose as (mm/dd/yyyy): 1/2/2021
Enter the type of vaccine-Pfizer/Moderna/Johnson&Johnson: Moderna
Enter the residential zipcode: 30213
Current year = 2021

Registration Code is - DD19M213
User details are:
First name :Dan
Last name: Don
Date of birth: 11/2/2002
Sex: Male
Dose number: 2
Date of previous dose:1/2/2021Moderna
Type of vaccine:Moderna
```

```
[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ ./a.out
Enter your first name: Esha
Enter your last name: Bunny
Enter your date of birth as (mm/dd/yyyy): 08/02/1959
Enter your sex-Male/Female/Do not wish to identify: Female
Enter the dose number- 1 or 2: 1
Enter the date of previous dose as (mm/dd/yyyy): 09/21/2021
Enter the type of vaccine-Pfizer/Moderna/Johnson&Johnson: Moderna
Enter the residential zipcode: 31245
Current year = 2021

Registration Code is - EB62M245
User details are:
First name :Esha
Last name: Bunny
Date of birth: 8/2/1959
Sex: Female
Dose number: 1
Date of previous dose: 09/21/20Moderna
Type of vaccine : Moderna
Residential zipcode: 31245
```

```
[vsrikakulapu1@gsuad.gsu.edu@snowball ~]$ ./a.out
Enter your first name: Manny
Enter your last name: Steve
Enter your date of birth as (mm/dd/yyyy): 08/09/1960
Enter your sex-Male/Female/Do not wish to identify: Male
Enter the dose number- 1 or 2: 1
Enter the date of previous dose as (mm/dd/yyyy): 03/05/2021
Enter the type of vaccine-Pfizer/Moderna/Johnson&Johnson: Pfizer
Enter the residential zipcode: 34567
Current year = 2021

Registration Code is - MS61P567
User details are:
First name :Manny
Last name: Steve
Date of birth: 8/9/1960
Sex: Male
Dose number: 1
Date of previous dose: 03/05/20Pfizer
Type of vaccine : Pfizer
Residential zipcode: 34567
```