

Assignment Scenario

Background

For this assignment, you are assisting a “small-medium enterprise” (SME) to manage its employee records and details by developing a C program that provides user with the following menu - functionalities :

1. Get current no. of records in Employee Database
2. Read Data From File and Populate Employee DB
3. Display All Records
4. Search for records by IC
5. Search for records by Name
6. Search for records by Email
7. Search for records by Phone Number
8. INSERT New Employee Record
9. Search (by ic) and UPDATE Existing Employee Record
10. Search (by ic) and DELETE Existing Employee Record
11. Write Data From Employee DB To File
12. Quit Program

With reference to option (2) above, the Employee DB (Database) in your program must be populated with records read in from a filename entered by the user. The input file could be a (*.txt) text file or (*.csv) comma separated value file.

With reference to option (11) above, after user has performed the necessary insertion / update / deletion of employee records, your program must allow user to “export” or “store” its Employee DB into another external file, and saved in a filename specified by the user.

A sample *.csv input file with some sample records is provided for your reference, and subsequent testing purposes. (refer to the section on Resources)

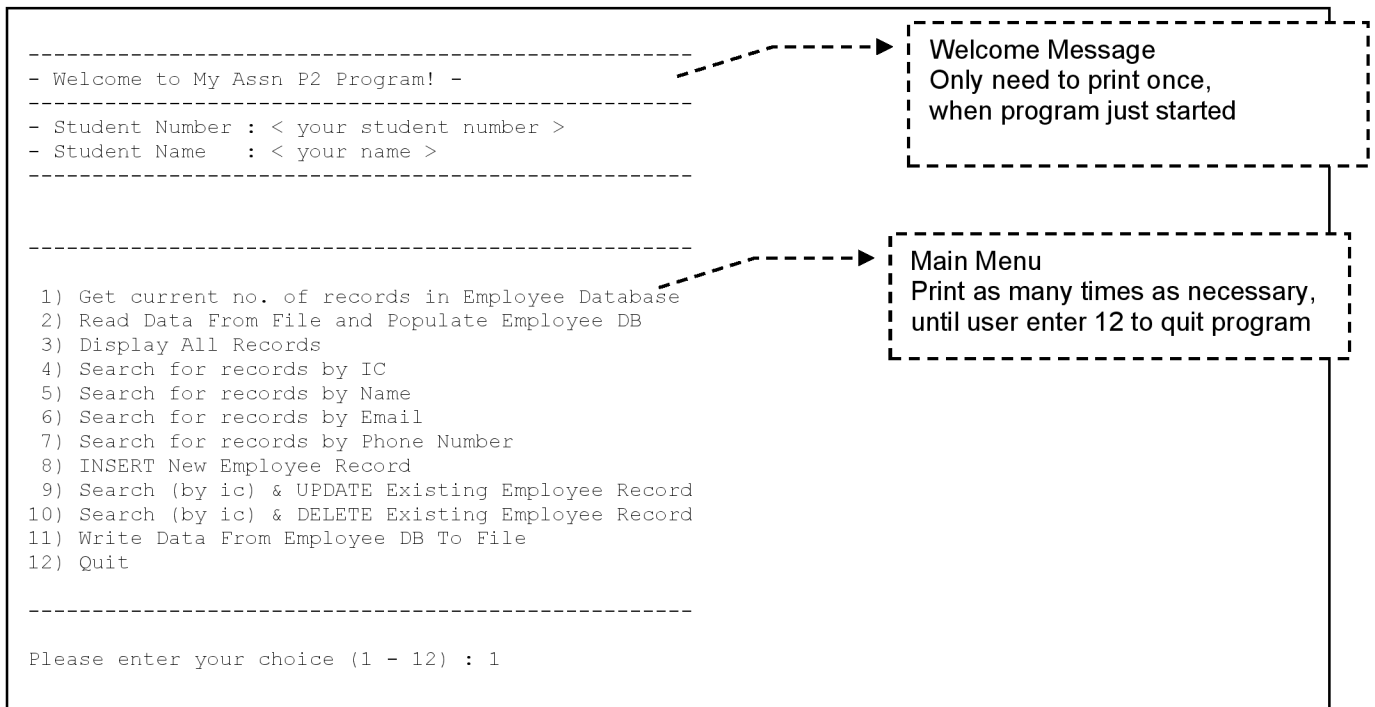
Note #1 : please refer to section on Sample Output(s), which contain examples of possible interactions as user choose various menu options from 1-11

Note #2 : please refer to section on Resources, which contain additional information that guides you in terms of program design and real life possible usage scenarios that various functions’ algorithms (esp. those in listed in the header “Employee.h” file) should take into account, when implementing them.

Note #3 : to simulate “limited computing resources” for SME, the database it maintains is stored in an array of a pre-determined fixed size.

Program Menu(s)

Upon program startup, your program should print a welcome message, followed by the main menu, before prompting user to enter his choice.



For some options (e.g. 4, 9), there could be sub-menus as well. Please refer to the section on Sample Output(s) for further details.

Sample Output(s)

From main menu, if the user chooses '1', please analyze / implement similar interaction sequence(s) below :

```
-----  
1) Get current no. of records in Employee Database  
2) Read Data From File and Populate Employee DB  
3) Display All Records  
4) Search for records by IC  
5) Search for records by Name  
6) Search for records by Email  
7) Search for records by Phone Number  
8) INSERT New Employee Record  
9) Search (by ic) & UPDATE Existing Employee Record  
10) Search (by ic) & DELETE Existing Employee Record  
11) Write Data From Employee DB To File  
12) Quit  
-----
```

Please enter your choice (1 - 12) : 1

```
-----  
Get current no. of records in Employee Database  
-----
```

Current no. of Employee Records in Database : 0

```
-----  
1) Get current no. of records in Employee Database  
2) Read Data From File and Populate Employee DB  
3) Display All Records  
4) Search for records by IC  
5) Search for records by Name  
6) Search for records by Email  
7) Search for records by Phone Number  
8) INSERT New Employee Record  
9) Search (by ic) & UPDATE Existing Employee Record  
10) Search (by ic) & DELETE Existing Employee Record  
11) Write Data From Employee DB To File  
12) Quit  
-----
```

Please enter your choice (1 - 12) :

When the program just started, without user choosing option 2 or 8, there should ZERO employee records in the database

Note : By default, MAX_NO_OF_RECORDS is set to 300, however, assume that in this case, it has been set to 21 ...

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From main menu, if the user chooses '2', please analyze / implement similar interaction sequence(s) below :

```
-----  
Please enter your choice (1 - 12) : 2  
-----  
Reading data from file to populate Employee DB ...  
-----  
Please enter the input (CSV) file's name : sample-50-recs.csv  
Maximum number of records reached. Ignoring additional data from file 'sample-50-recs.csv' !!!  
Done! Total no. of records read in and stored in DB : 21  
-----  
1) Get current no. of records in Employee Database  
2) Read Data From File and Populate Employee DB  
3) Display All Records  
4) Search for records by IC  
5) Search for records by Name  
6) Search for records by Email  
7) Search for records by Phone Number  
8) INSERT New Employee Record  
9) Search (by ic) & UPDATE Existing Employee Record  
10) Search (by ic) & DELETE Existing Employee Record  
11) Write Data From Employee DB To File  
12) Quit  
-----  
Please enter your choice (1 - 12) :
```

In this scenario, MAX_NO_OF_RECORDS in "StuAssnSampleMain.cpp" file was edited to 21, resulting in the size of the EmployeeRecordsDB [] array initialized to 21 only, hence when user enters a filename containing > 21 records, ONE APPROACH is to "store as many records as possible, until the DB is full", and output some error message to inform user that only the 1st 21 records are read in, the rest are ignored => For this assignment, implement this approach!

ANOTHER APPROACH : edit MAX_NO_OF_RECORDS in "StuAssnSampleMain.cpp" file to a larger value, re-compile and re-run the program

YET ANOTHER APPROACH : Inform user that no. of records in the filename exceeds database capacity, inform user the max no. of records program can handle, and EITHER allow user to cancel operation and go back to main menu, OR prompt user to enter yet another filename that has "lesser records" than the database capacity

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From main menu, if the user chooses '3', please analyze / implement similar interaction sequence(s) below :

```
-----
Please enter your choice (1 - 12) : 3
Show array index? (y/n) : y

All Employee Records (total = 21) ...

=====
Idx  IC      Name      Phone      Birth Date  Hired Date  Email
=====
0    S1754299L  Frank Johnson  (79)-32118966  09/12/1998  09/03/1987  qkwtv@consultingfirm.net
1    S2495281Y  Grace Lee     (75)-60536119  29/12/1994  14/01/1993  voabp@softwaredev.com
2    S6190344B  Henry Adams   (76)-18837574  15/12/1985  13/11/1986  sjvit@innovatech.io
3    S6714771C  Eve Brown     (11)-43795543  23/06/1984  03/09/1996  dkhzy@healthcareplus.org
4    S6351711Y  Eve Brown     (75)-72256520  08/04/1974  31/01/1978  yzddi@marketplace.biz
5    S3818194F  Carol White   (70)-82266698  12/05/1987  08/08/1993  bodey@innovatech.io
6    S8566435T  Jane White    (31)-37007071  30/12/1989  02/07/1977  cnmam@innovatech.io
7    S3994947V  Henry White   (79)-23900913  14/07/1984  11/11/1986  ojipx@techcorp.com
8    S9085419T  Henry Johnson (30)-60760992  15/08/1970  11/06/1974  nwtrj@softwaredev.com
9    S4335497O  Carol Brown   (73)-07636602  09/03/1970  20/01/1977  jztxi@techcorp.com
10   S2874438W  Alice Smith   (32)-99535281  07/08/1972  26/12/1985  oxttdt@businessinc.net
11   S5126881B  Carol Black   (77)-47934303  16/12/1981  02/02/1977  rmxcn@webservices.org
12   S2848066A  Alice Lee     (36)-26430067  11/05/1987  30/04/1981  gprum@healthcareplus.org
13   S9813767T  John White    (62)-19432985  26/06/1997  28/06/1997  yxtrj@financesolutions.com
14   S1935739Y  Jane Smith    (40)-17467156  24/09/1985  10/06/1991  xondf@webservices.org
15   S7061107M  Grace Johnson (34)-62703816  23/06/1995  25/08/1995  upgvm@webservices.org
16   S4639297P  Grace Harris  (53)-24939104  21/07/2000  11/07/1984  ooqle@webservices.org
17   S9847904R  Bob White     (90)-48249148  24/11/1974  20/06/1987  anqwc@marketplace.biz
18   S7186600X  Eve Johnson   (76)-48108455  06/11/1988  14/05/1997  voxlc@webservices.org
19   S9804148G  Henry Black   (82)-89358624  14/01/1995  08/06/1983  ksukh@logistics.co
20   S3132549L  Alice Doe     (40)-15638416  09/03/1972  03/09/1996  cqxag@financesolutions.com
=====
```

```
-----
Please enter your choice (1 - 12) : 3
Show array index? (y/n) : n

All Employee Records (total = 21) ...

=====
IC      Name      Phone      Birth Date  Hired Date  Email
=====
S1754299L  Frank Johnson  (79)-32118966  09/12/1998  09/03/1987  qkwtv@consultingfirm.net
S2495281Y  Grace Lee     (75)-60536119  29/12/1994  14/01/1993  voabp@softwaredev.com
S6190344B  Henry Adams   (76)-18837574  15/12/1985  13/11/1986  sjvit@innovatech.io
S6714771C  Eve Brown     (11)-43795543  23/06/1984  03/09/1996  dkhzy@healthcareplus.org
S6351711Y  Eve Brown     (75)-72256520  08/04/1974  31/01/1978  yzddi@marketplace.biz
S3818194F  Carol White   (70)-82266698  12/05/1987  08/08/1993  bodey@innovatech.io
S8566435T  Jane White    (31)-37007071  30/12/1989  02/07/1977  cnmam@innovatech.io
S3994947V  Henry White   (79)-23900913  14/07/1984  11/11/1986  ojipx@techcorp.com
S9085419T  Henry Johnson (30)-60760992  15/08/1970  11/06/1974  nwtrj@softwaredev.com
S4335497O  Carol Brown   (73)-07636602  09/03/1970  20/01/1977  jztxi@techcorp.com
S2874438W  Alice Smith   (32)-99535281  07/08/1972  26/12/1985  oxttdt@businessinc.net
S5126881B  Carol Black   (77)-47934303  16/12/1981  02/02/1977  rmxcn@webservices.org
S2848066A  Alice Lee     (36)-26430067  11/05/1987  30/04/1981  gprum@healthcareplus.org
S9813767T  John White    (62)-19432985  26/06/1997  28/06/1997  yxtrj@financesolutions.com
S1935739Y  Jane Smith    (40)-17467156  24/09/1985  10/06/1991  xondf@webservices.org
S7061107M  Grace Johnson (34)-62703816  23/06/1995  25/08/1995  upgvm@webservices.org
S4639297P  Grace Harris  (53)-24939104  21/07/2000  11/07/1984  ooqle@webservices.org
S9847904R  Bob White     (90)-48249148  24/11/1974  20/06/1987  anqwc@marketplace.biz
S7186600X  Eve Johnson   (76)-48108455  06/11/1988  14/05/1997  voxlc@webservices.org
S9804148G  Henry Black   (82)-89358624  14/01/1995  08/06/1983  ksukh@logistics.co
S3132549L  Alice Doe     (40)-15638416  09/03/1972  03/09/1996  cqxag@financesolutions.com
=====
```

Please arrange the columns according to the above order, from left to right, and display in Ubuntu terminal (Follow the left/right justify for each column as well!)

Hint : the various constants (e.g. EMP_IDX_LENGTH) in "Employee.h" provides clues as to the required field widths (no. of char spaces) to allocate for each column of data!

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IMPT! => sample outputs from option 4 onwards, could be using employee data from DIFFERENT FILES, hence the output may differ from the data in sample file provided to you!

From main menu, if the user chooses '4', please analyze / implement similar interaction sequence(s) below :

```
-----
Please enter your choice (1 - 12) : 4

-----
1) Enter an ic      (current value = '00')
2) Search for employee IC      = '00' (i.e. EXACT MATCH)
3) Search for employee IC containing '00' (i.e. PARTIAL MATCH)
4) Back to main menu ...
-----
```

This sub-menu will be displayed, processing choices 1) to 3), until user chooses 4), to return to main menu !

```
-----
Please enter your choice (1 - 4) : 1

Please type in ic value to search for (< 10 chars) : 12345abcde

Input too long. Please enter data again ( < 10 chars ) : 001
-----
```

```
-----
1) Enter an ic      (current value = '001')
2) Search for employee IC      = '001' (i.e. EXACT MATCH)
3) Search for employee IC containing '001' (i.e. PARTIAL MATCH)
4) Back to main menu ...
-----
```

```
-----
Please enter your choice (1 - 4) : 2

Records with IC EXACTLY matching '001' :

No matching records found !!!
-----
```

```
-----
1) Enter an ic      (current value = '001')
2) Search for employee IC      = '001' (i.e. EXACT MATCH)
3) Search for employee IC containing '001' (i.e. PARTIAL MATCH)
4) Back to main menu ...
-----
```

```
-----
Please enter your choice (1 - 4) : 3

Records with IC PARTIALLY matching '001' :
```

IC	Name	Phone	Birth Date	Hired Date	Email
S6337001Q	Henry Doe	(52)-98806733	23/06/1973	28/02/1990	omesh@innovatech.io
S0014467H	Henry Harris	(10)-12986270	14/12/1998	10/09/1991	avqtb@innovatech.io

```
2 records found, with IC PARTIALLY matching 001 !!
-----
```

```
-----
1) Enter an ic      (current value = '001')
2) Search for employee IC      = '001' (i.e. EXACT MATCH)
3) Search for employee IC containing '001' (i.e. PARTIAL MATCH)
4) Back to main menu ...
-----
```

```
-----
Please enter your choice (1 - 4) :
```

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(con't) From main menu, if the user chooses '4', please analyze / implement similar interaction sequence(s) below :

```
-----
1) Enter an ic      (current value = '00')
2) Search for employee IC      = '00' (i.e. EXACT MATCH)
3) Search for employee IC containing '00' (i.e. PARTIAL MATCH)
4) Back to main menu ...
-----
Please enter your choice (1 - 4) : 1

Please type in ic value to search for (< 10 chars) : S7386604L

-----
1) Enter an ic      (current value = 'S7386604L')
2) Search for employee IC      = 'S7386604L' (i.e. EXACT MATCH)
3) Search for employee IC containing 'S7386604L' (i.e. PARTIAL MATCH)
4) Back to main menu ...
-----
Please enter your choice (1 - 4) : 2

Records with IC EXACTLY matching 'S7386604L' :
=====
IC           Name           Phone           Birth Date      Hired Date      Email
=====
S7386604L    Grace Brown           (93)-18945714   16/12/1989      11/08/1972      smirk@softwaredev.com

1 records found, with IC EXACTLY matching S7386604L !!

-----
1) Enter an ic      (current value = 'S7386604L')
2) Search for employee IC      = 'S7386604L' (i.e. EXACT MATCH)
3) Search for employee IC containing 'S7386604L' (i.e. PARTIAL MATCH)
4) Back to main menu ...
-----
Please enter your choice (1 - 4) : 3

Records with IC PARTIALLY matching 'S7386604L' :
=====
IC           Name           Phone           Birth Date      Hired Date      Email
=====
S7386604L    Grace Brown           (93)-18945714   16/12/1989      11/08/1972      smirk@softwaredev.com

1 records found, with IC PARTIALLY matching S7386604L !!

-----
1) Enter an ic      (current value = 'S7386604L')
2) Search for employee IC      = 'S7386604L' (i.e. EXACT MATCH)
3) Search for employee IC containing 'S7386604L' (i.e. PARTIAL MATCH)
4) Back to main menu ...
-----
Please enter your choice (1 - 4) :
```

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From main menu, if the user chooses '5', please analyze / implement similar interaction sequence(s) below :

```
-----
Please enter your choice (1 - 12) : 5
-----
1) Enter a name          (current value = 'SAMPLE_NAME')
2) Search for employee name      = 'SAMPLE_NAME' (i.e. EXACT MATCH)
3) Search for employee name containing 'SAMPLE_NAME' (i.e. PARTIAL MATCH)
4) Back to main menu ...
-----
Please enter your choice (1 - 4) : 1
-----
Please type in name value to search for (< 35 chars) : Henry
-----
1) Enter a name          (current value = 'Henry')
2) Search for employee name      = 'Henry' (i.e. EXACT MATCH)
3) Search for employee name containing 'Henry' (i.e. PARTIAL MATCH)
4) Back to main menu ...
-----
Please enter your choice (1 - 4) : 2
-----
Records with name EXACTLY matching 'Henry' :

No matching records found !!!
-----
1) Enter a name          (current value = 'Henry')
2) Search for employee name      = 'Henry' (i.e. EXACT MATCH)
3) Search for employee name containing 'Henry' (i.e. PARTIAL MATCH)
4) Back to main menu ...
-----
Please enter your choice (1 - 4) : 3
-----
Records with name PARTIALLY matching 'Henry' :
=====
  IC          Name          Phone          Birth Date      Hired Date      Email
=====
S6190344B  Henry Adams      (76)-18837574  15/12/1985      13/11/1986      sjvit@innovatech.io
S3994947V  Henry White      (79)-23900913  14/07/1984      11/11/1986      ojipx@techcorp.com
S9085419T  Henry Johnson    (30)-60760992  15/08/1970      11/06/1974      nwtrj@softwaredev.com
S9804148G  Henry Black      (82)-89358624  14/01/1995      08/06/1983      ksukh@logistics.co
S6501036I  Henry Smith      (15)-71453449  09/03/1970      11/11/1986      mybkc@logistics.co
S5027066P  Henry Smith      (49)-85419571  12/05/1987      09/10/1980      ydtxm@consultingfirm.net
=====
6 records found, with name PARTIALLY matching henry !!
-----
1) Enter a name          (current value = 'Henry')
2) Search for employee name      = 'Henry' (i.e. EXACT MATCH)
3) Search for employee name containing 'Henry' (i.e. PARTIAL MATCH)
4) Back to main menu ...
-----
Please enter your choice (1 - 4) :
```


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(con't) From main menu, if the user chooses '5', please analyze / implement similar interaction sequence(s) below :

```
-----
1) Enter a name          (current value = 'SAMPLE_NAME')
2) Search for employee name      = 'SAMPLE_NAME' (i.e. EXACT MATCH)
3) Search for employee name containing 'SAMPLE_NAME' (i.e. PARTIAL MATCH)
4) Back to main menu ...
-----
Please enter your choice (1 - 4) : 1

Please type in name value to search for (< 35 chars) : hEnRy JoHnSoN

-----
1) Enter a name          (current value = 'hEnRy JoHnSoN')
2) Search for employee name      = 'hEnRy JoHnSoN' (i.e. EXACT MATCH)
3) Search for employee name containing 'hEnRy JoHnSoN' (i.e. PARTIAL MATCH)
4) Back to main menu ...
-----
Please enter your choice (1 - 4) : 2

Records with name EXACTLY matching 'hEnRy JoHnSoN' :
=====
IC          Name          Phone          Birth Date      Hired Date      Email
=====
S9085419T   Henry Johnson      (30)-60760992   15/08/1970      11/06/1974      nwtrj@softwaredev.com
S8588200S   Henry Johnson      (31)-59468047   12/12/1970      05/08/1982      ljxkp@innovatech.io
S3984710L   Henry Johnson      (13)-84235900   21/07/1971      08/06/1977      znmcb@healthcareplus.org
S1076541P   Henry Johnson      (14)-44053543   26/11/1986      16/08/1973      uvkzq@marketplace.biz
=====
4 records found, with name EXACTLY matching hEnRy JoHnSoN !!

-----
1) Enter a name          (current value = 'hEnRy JoHnSoN')
2) Search for employee name      = 'hEnRy JoHnSoN' (i.e. EXACT MATCH)
3) Search for employee name containing 'hEnRy JoHnSoN' (i.e. PARTIAL MATCH)
4) Back to main menu ...
-----
Please enter your choice (1 - 4) : 3

Records with name PARTIALLY matching 'hEnRy JoHnSoN' :
=====
IC          Name          Phone          Birth Date      Hired Date      Email
=====
S8588200S   Henry Johnson      (31)-59468047   12/12/1970      05/08/1982      ljxkp@innovatech.io
S3984710L   Henry Johnson      (13)-84235900   21/07/1971      08/06/1977      znmcb@healthcareplus.org
S1076541P   Henry Johnson      (14)-44053543   26/11/1986      16/08/1973      uvkzq@marketplace.biz
=====
3 records found, with name PARTIALLY matching hEnRy JoHnSoN !!

-----
1) Enter a name          (current value = 'hEnRy JoHnSoN')
2) Search for employee name      = 'hEnRy JoHnSoN' (i.e. EXACT MATCH)
3) Search for employee name containing 'hEnRy JoHnSoN' (i.e. PARTIAL MATCH)
4) Back to main menu ...
-----
Please enter your choice (1 - 4) :
```

Note : Similar sub-menu options & interactions apply as well, to Main Menu options :

6) Search for records by Email

7) Search for records by Phone Number

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From main menu, if the user chooses '8', please analyze / implement similar interaction sequence(s) below :

```
-----
1) Get current no. of records in Employee Database
2) Read Data From File and Populate Employee DB
3) Display All Records
4) Search for records by IC
5) Search for records by Name
6) Search for records by Email
7) Search for records by Phone Number
8) INSERT New Employee Record
9) Search (by ic) & UPDATE Existing Employee Record
10) Search (by ic) & DELETE Existing Employee Record
11) Write Data From Employee DB To File
12) Quit
-----

Please enter your choice (1 - 12) : 8
Employee Records DB is FULL! Unable to add new record!
```

Cater to the possible scenario where the EmployeeRecordsDB [] array is fully filled with valid data!

Edit MAX_NO_OF_RECORDS in "StuAssnSampleMain.cpp" file to 51, re-compile and run program again ...

```
-----
1) Get current no. of records in Employee Database
2) Read Data From File and Populate Employee DB
3) Display All Records
4) Search for records by IC
5) Search for records by Name
6) Search for records by Email
7) Search for records by Phone Number
8) INSERT New Employee Record
9) Search (by ic) & UPDATE Existing Employee Record
10) Search (by ic) & DELETE Existing Employee Record
11) Write Data From Employee DB To File
12) Quit
-----
```

```
Please enter your choice (1 - 12) : 2
```

```
-----
Reading data from file to populate Employee DB ...
-----
```

(continue on next page => ...)

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(<= continue from previous page ...)

Please enter your choice (1 - 12) : 2

Reading data from file to populate Employee DB ...

Please enter the input (CSV) file's name : sample-50-recs.csv

Done! Total no. of records read in and stored in DB : 50

DUE TO LACK OF SPACE, ASSUME MAIN MENU IS DISPLAYED HERE ...

Please enter your choice (1 - 12) : 3

Show array index? (y/n) : y

All Employee Records (total = 50) ...

Idx	IC	Name	Phone	Birth Date	Hired Date	Email
0	S1754299L	Frank Johnson	(79)-32118966	09/12/1998	09/03/1987	qkwtv@consultingfirm.net
1	S2495281Y	Grace Lee	(75)-60536119	29/12/1994	14/01/1993	voabp@softwaredev.com
2	S6190344B	Henry Adams	(76)-18837574	15/12/1985	13/11/1986	sjvit@innovatech.io
3	S6714771C	Eve Brown	(11)-43795543	23/06/1984	03/09/1996	dkhzy@healthcareplus.org
4	S6351711Y	Eve Brown	(75)-72256520	08/04/1974	31/01/1978	yzdqi@marketplace.biz
5	S3818194F	Carol White	(70)-82266698	12/05/1987	08/08/1993	bodey@innovatech.io
6	S8566435T	Jane White	(31)-37007071	30/12/1989	02/07/1977	cnmam@innovatech.io
7	S3994947V	Henry White	(79)-23900913	14/07/1984	11/11/1986	ojipx@techcorp.com
8	S9085419T	Henry Johnson	(30)-60760992	15/08/1970	11/06/1974	nwtrj@softwaredev.com
9	S4335497O	Carol Brown	(73)-07636602	09/03/1970	20/01/1977	jztxi@techcorp.com
10	S2874438W	Alice Smith	(32)-99535281	07/08/1972	26/12/1985	oxtdt@businessinc.net

DUE TO LACK OF SPACE, ASSUME RECORDS FROM ARRAY INDEX 11 - 39 IS DISPLAYED HERE ...

40	S5027066P	Henry Smith	(49)-85419571	12/05/1987	09/10/1980	ydtxm@consultingfirm.net
41	S6434318J	Jane Doe	(47)-14783997	29/09/1979	24/01/1997	ywhba@techcorp.com
42	S2132744L	Frank Doe	(71)-40568010	28/09/1975	15/08/1993	uachn@consultingfirm.net
43	S5552115O	John Smith	(63)-41595843	08/07/1983	03/09/1996	dfigc@marketplace.biz
44	S5045003A	Grace Smith	(72)-29206305	30/10/1971	03/09/1996	ecwsx@webservices.org
45	S3097344K	Eve Brown	(15)-01487223	15/08/1970	07/01/1972	opdsj@techcorp.com
46	S9722129A	John Adams	(47)-25002142	27/09/1974	08/07/1977	dahai@techcorp.com
47	S5696062F	John Johnson	(36)-79717904	22/02/1987	04/06/1977	upbdj@softwaredev.com
48	S3036938M	Grace Green	(42)-66154117	14/05/2000	08/06/1983	bcklm@logistics.co
49	S8874289Q	Bob Smith	(92)-54539512	29/12/1994	19/06/1985	wgsiv@healthcareplus.org

Note that the last array index is 49, storing "Bob Smith" ! So far, a total of 50 records has been read in from the input file.

(continue on next page => ...)

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(<= continue from previous page ...)

```
-----  
DUE TO LACK OF SPACE, ASSUME MAIN MENU IS DISPLAYED HERE ...  
-----  
  
Please enter your choice (1 - 12) : 8  
Please type in employee's name      (< 35 chars)      : Bob Smith  
Error! Name 'Bob Smith' already exists in employee records DB, do you INSIST this is correct? (y/n) :  
y  
Alright, you insisted! Storing (duplicate) Name 'Bob Smith' under this Employee Record in DB ...  
Please type in employee's ic        (< 10 chars)      : S8874289Q  
Error! IC No. 'S8874289Q' already exists in employee records DB, please try again!  
Please type in employee's ic        (< 10 chars)      : S0000001A  
Please type in employee's email     (< 35 chars)      : wgsiv@healthcareplus.org  
Error! Email 'wgsiv@healthcareplus.org' already exists in employee records DB, please try again!  
Please type in employee's email     (< 35 chars)      : wgsiv@healthcareplus.com  
Please type in employee's phone num (< 15 chars)      : (92)-54539512  
Error! Phone Num '(92)-54539512' already exists in employee records DB, do you INSIST this is correct?  
(y/n) : n  
  
Please type in employee's phone num (< 15 chars)      : (42)-66154117  
Error! Phone Num '(42)-66154117' already exists in employee records DB, do you INSIST this is correct?  
(y/n) : n  
  
Please type in employee's phone num (< 15 chars)      : (00)-00000000  
To enter employee's date of birth, please adhere to the format shown in prompt below ...  
Enter a date (dd-mm-yyyy) : 01-01-2024  
  
To enter employee's date of hire, please adhere to the format shown in prompt below ...  
Enter a date (dd-mm-yyyy) : 01-01-2024  
  
Done! Going back to main menu ...  
  
-----  
DUE TO LACK OF SPACE, ASSUME MAIN MENU IS DISPLAYED HERE ...  
-----  
  
Please enter your choice (1 - 12) : 3  
Show array index? (y/n) : 1
```

(continue on next page => ...)

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(<= continue from previous page ...)

DUE TO LACK OF SPACE, ASSUME MAIN MENU IS DISPLAYED HERE ...

Please enter your choice (1 - 12) : **3**
Show array index? (y/n) : **1**

All Employee Records (total = 51) ...

Idx	IC	Name	Phone	Birth Date	Hired Date	Email
0	S1754299L	Frank Johnson	(79)-32118966	09/12/1998	09/01/1987	qkwtv@consultingfirm.net
1	S2495281Y	Grace Lee	(75)-60536119	29/12/1994	14/01/1993	voabp@softwaredev.com
2	S6190344B	Henry Adams	(76)-18837574	15/12/1985	13/11/1986	sjvit@innovatech.io
3	S6714771C	Eve Brown	(11)-43795543	23/06/1984	07/09/1996	dkhzy@healthcareplus.org
4	S6351711Y	Eve Brown	(75)-72256520	08/04/1974	11/01/1978	yzdqi@marketplace.biz
5	S3818194F	Carol White	(70)-82266698	12/05/1987	08/08/1993	bodey@innovatech.io
6	S8566435T	Jane White	(31)-37007071	30/12/1989	02/07/1977	cnmam@innovatech.io
7	S3994947V	Henry White	(79)-23900913	14/07/1984	11/11/1986	ojipx@techcorp.com
8	S9085419T	Henry Johnson	(30)-60760992	15/08/1970	11/06/1974	nwtrj@softwaredev.com
9	S4335497O	Carol Brown	(73)-07636602	09/03/1970	20/01/1977	jztxi@techcorp.com
10	S2874438W	Alice Smith	(32)-99535281	07/08/1972	26/12/1985	oxtdt@businessinc.net

DUE TO LACK OF SPACE, ASSUME RECORDS FROM ARRAY INDEX 11 - 39 IS DISPLAYED HERE ...

40	S5027066P	Henry Smith	(49)-85419571	12/05/1987	09/10/1980	ydtxm@consultingfirm.net
41	S6434318J	Jane Doe	(47)-14783997	29/09/1979	24/01/1997	ywhba@techcorp.com
42	S2132744L	Frank Doe	(71)-40568010	28/09/1975	15/08/1993	uachn@consultingfirm.net
43	S5552115O	John Smith	(63)-41595843	08/07/1983	03/09/1996	dficg@marketplace.biz
44	S5045003A	Grace Smith	(72)-29206305	30/10/1971	03/09/1996	ecwsx@webservices.org
45	S3097344K	Eve Brown	(15)-01487223	15/08/1970	07/01/1972	opdsj@techcorp.com
46	S9722129A	John Adams	(47)-25002142	27/09/1974	08/07/1977	dahai@techcorp.com
47	S5696062F	John Johnson	(36)-79717904	22/02/1987	04/06/1977	upbdj@softwaredev.com
48	S3036938M	Grace Green	(42)-66154117	14/05/2000	08/06/1983	bcklm@logistics.co
49	S8874289Q	Bob Smith	(92)-54539512	29/12/1994	19/06/1985	wgsiv@healthcareplus.org
50	S0000001A	Bob Smith	(00)-00000000	01/01/2024	01/01/2024	wgsiv@healthcareplus.org

Note that the employee record **you just added**, appears “at the end” (i.e. the last array index 50) in your employee records database!

The same treatment applies whenever user selects option 8 : Insert New Employee Record. Just insert it “at the end” of your array (as long as there is space ...)

Also, total no. of records should be 51 now ...

RSE1202 – C++ Programming

From main menu, if the user chooses '9', please analyze / implement similar interaction sequence(s) below :

Invalid IC entered ...

```
-----  
DUE TO LACK OF SPACE, ASSUME MAIN MENU IS DISPLAYED HERE ...  
-----  
Please enter your choice (1 - 12) : 9  
Please type in existing employee's IC (< 10 chars) : abc123abc123  
Input too long. Please enter data again ( < 10 chars ) : abcdef  
Error! IC No. 'abcdef' DOES NOT exist in employee records DB!  
  
-----  
1) Get current no. of records in Employee Database  
2) Read Data From File and Populate Employee DB  
3) Display All Records  
4) Search for records by IC  
5) Search for records by Name  
6) Search for records by Email  
7) Search for records by Phone Number  
8) INSERT New Employee Record  
9) Search (by ic) & UPDATE Existing Employee Record  
10) Search (by ic) & DELETE Existing Employee Record  
11) Write Data From Employee DB To File  
12) Quit  
  
-----  
Please enter your choice (1 - 12) :
```

Non-Existent IC entered ...

```
-----  
DUE TO LACK OF SPACE, ASSUME MAIN MENU IS DISPLAYED HERE ...  
-----  
Please enter your choice (1 - 12) : 9  
Please type in existing employee's IC (< 10 chars) : 999999999  
Error! IC No. '999999999' DOES NOT exist in employee records DB!  
  
-----  
DUE TO LACK OF SPACE, ASSUME MAIN MENU IS DISPLAYED HERE ...  
-----  
Please enter your choice (1 - 12) :
```

RSE1202 – C++ Programming

(con't) From main menu, if the user chooses '9', please analyze / implement similar interaction sequence(s) below :

Refer to earlier sample output (around pg. 11), take note of the:

- 1st employee record Frank Johnson's particulars
- 2nd employee record Grace Lee's particulars

We are using some of the (above) employee's data to test our "update existing employee record" function ...

```
-----
DUE TO LACK OF SPACE, ASSUME MAIN MENU IS DISPLAYED HERE ...
-----

Please enter your choice (1 - 12) : 9

Please type in existing employee's IC (< 10 chars) : S1754299L

Records with IC EXACTLY matching 'S1754299L' :

=====
IC           Name           Phone           Birth Date      Hired Date      Email
=====
S1754299L    Frank Johnson      (79)-32118966   09/12/1998      09/03/1987      qkwtv@consultingfirm.net
=====

1 records found, with IC EXACTLY matching S1754299L !!

+++++
+++ Item to be updated ... +++
+++++
1) Update IC           (curr. value = 'S1754299L')
2) Update Email        (curr. value = 'qkwtv@consultingfirm.net')
3) Update Name         (curr. value = 'Frank Johnson')
4) Update Phone Number (curr. value = '(79)-32118966')
5) Update Birth Date   (curr. value = '09/12/1998')
6) Update Hired Date   (curr. value = '09/03/1987')
7) Done with updates
+++++
Please enter your choice (1 - 7) : 1

Please type in employee's ic           (< 10 chars)      : S1754299L

Error! IC No. 'S1754299L' already exists in employee records DB, please try again!

Please type in employee's ic           (< 10 chars)      : S2495281Y

Error! IC No. 'S2495281Y' already exists in employee records DB, please try again!

Please type in employee's ic           (< 10 chars)      : S8888888Z

+++++
+++ Item to be updated ... +++
+++++
1) Update IC           (curr. value = 'S8888888Z')
2) Update Email        (curr. value = 'qkwtv@consultingfirm.net')
3) Update Name         (curr. value = 'Frank Johnson')
4) Update Phone Number (curr. value = '(79)-32118966')
5) Update Birth Date   (curr. value = '09/12/1998')
6) Update Hired Date   (curr. value = '09/03/1987')
7) Done with updates
+++++
Please enter your choice (1 - 7) : 2
```

This sub-menu will be displayed, processing choices 1) to 6), until user chooses 7), to return to main menu !

(continue on next page => ...)

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(<= continue from previous page ...)

```
+++++
Please enter your choice (1 - 7) : 2

Please type in employee's email      (< 35 chars)      : qkwtv@consultingfirm.net

Error! Email 'qkwtv@consultingfirm.net' already exists in employee records DB, please try again!

Please type in employee's email      (< 35 chars)      : voabp@softwaredev.com

Error! Email 'voabp@softwaredev.com' already exists in employee records DB, please try again!

Please type in employee's email      (< 35 chars)      : testEMAIL@test.com

+++++
+++ Item to be updated ... +++
+++++
1) Update IC          (curr. value = 'S8888888Z')
2) Update Email       (curr. value = 'testEMAIL@test.com')
3) Update Name        (curr. value = 'Frank Johnson')
4) Update Phone Number (curr. value = '(79)-32118966')
5) Update Birth Date   (curr. value = '09/12/1998')
6) Update Hired Date   (curr. value = '09/03/1987')
7) Done with updates
+++++
Please enter your choice (1 - 7) : 3

Please type in employee's name        (< 35 chars)      : Frank Johnson

Error! Name 'Frank Johnson' already exists in employee records DB, do you INSIST this is correct?
(y/n) : n

Please type in employee's name        (< 35 chars)      : Grace Lee

Error! Name 'Grace Lee' already exists in employee records DB, do you INSIST this is correct? (y/n) :
n

Please type in employee's name        (< 35 chars)      : Frank Johnson II

+++++
+++ Item to be updated ... +++
+++++
1) Update IC          (curr. value = 'S8888888Z')
2) Update Email       (curr. value = 'testEMAIL@test.com')
3) Update Name        (curr. value = 'Frank Johnson II')
4) Update Phone Number (curr. value = '(79)-32118966')
5) Update Birth Date   (curr. value = '09/12/1998')
6) Update Hired Date   (curr. value = '09/03/1987')
7) Done with updates
+++++
Please enter your choice (1 - 7) : 4

Please type in employee's phone num (< 15 chars)      : (79)-32118966

Error! Phone Num '(79)-32118966' already exists in employee records DB, do you INSIST this is correct?
(y/n) : n

Please type in employee's phone num (< 15 chars)      : (75)-60536119

Error! Phone Num '(75)-60536119' already exists in employee records DB, do you INSIST this is correct?
(y/n) : n

Please type in employee's phone num (< 15 chars)      : (65)-11111111

+++++
+++ Item to be updated ... +++
```

(continue on next page => ...)

RSE1202 – C++ Programming

(<= continue from previous page ...)

```
+++++
+++ Item to be updated ... +++
+++++
1) Update IC          (curr. value = 'S8888888Z')
2) Update Email       (curr. value = 'testEMAIL@test.com')
3) Update Name        (curr. value = 'Frank Johnson II')
4) Update Phone Number (curr. value = '(65)-11111111')
5) Update Birth Date   (curr. value = '09/12/1998')
6) Update Hired Date   (curr. value = '09/03/1987')
7) Done with updates
+++++
Please enter your choice (1 - 7) : 5

To enter employee's date of birth, please adhere to the format shown in prompt below ...

Enter a date (dd-mm-yyyy) : 31/12/2024

Invalid date format or values. Please try again.
Enter a date (dd-mm-yyyy) : 31-12-2024

+++++
+++ Item to be updated ... +++
+++++
1) Update IC          (curr. value = 'S8888888Z')
2) Update Email       (curr. value = 'testEMAIL@test.com')
3) Update Name        (curr. value = 'Frank Johnson II')
4) Update Phone Number (curr. value = '(65)-11111111')
5) Update Birth Date   (curr. value = '31/12/2024')
6) Update Hired Date   (curr. value = '09/03/1987')
7) Done with updates
+++++
Please enter your choice (1 - 7) : 6

To enter employee's date of hire, please adhere to the format shown in prompt below ...

Enter a date (dd-mm-yyyy) : 31/02/2024

Invalid date format or values. Please try again.
Enter a date (dd-mm-yyyy) : 31-02-2024
Day value > 29 for month = 2 in leap year! (Expected range is 1-29)

Invalid date format or values. Please try again.
Enter a date (dd-mm-yyyy) : 01-01-2025

+++++
+++ Item to be updated ... +++
+++++
1) Update IC          (curr. value = 'S8888888Z')
2) Update Email       (curr. value = 'testEMAIL@test.com')
3) Update Name        (curr. value = 'Frank Johnson II')
4) Update Phone Number (curr. value = '(65)-11111111')
5) Update Birth Date   (curr. value = '31/12/2024')
6) Update Hired Date   (curr. value = '01/01/2025')
7) Done with updates
+++++
Please enter your choice (1 - 7) : 7

Done! Going back to main menu ...
```

(continue on next page => ...)

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(<= continue from previous page ...)

Done! Going back to main menu ...

-
- 1) Get current no. of records in Employee Database
 - 2) Read Data From File and Populate Employee DB
 - 3) Display All Records
 - 4) Search for records by IC
 - 5) Search for records by Name
 - 6) Search for records by Email
 - 7) Search for records by Phone Number
 - 8) INSERT New Employee Record
 - 9) Search (by ic) & UPDATE Existing Employee Record
 - 10) Search (by ic) & DELETE Existing Employee Record
 - 11) Write Data From Employee DB To File
 - 12) Quit
-

Please enter your choice (1 - 12) : **3**
Show array index? (y/n) : y

All Employee Records (total = 50) ...

Idx	IC	Name	Phone	Birth Date	Hired Date	Email
0	S8888888Z	Frank Johnson II	(65)-11111111	31/12/2024	01/01/2025	testEMAIL@test.com
1	S2495281Y	Grace Lee	(75)-60536119	29/12/1994	14/01/1993	voabp@softwaredev.com
2	S6190344B	Henry Adams	(76)-18837574	15/12/1985	13/11/1986	sjvit@innovatech.io
3	S6714771C	Eve Brown	(11)-43795543	23/06/1984	03/09/1996	dkhzy@healthcareplus.org
4	S6351711Y	Eve Brown	(75)-72256520	08/04/1974	31/01/1978	yzdqi@marketplace.biz
5	S3818194F	Carol White	(70)-82266698	12/05/1987	08/08/1993	bodey@innovatech.io

DUE TO LACK OF SPACE, ASSUME RECORDS FROM ARRAY INDEX 6 - 49 IS DISPLAYED HERE ...

Note that the above employee record at array index = 1, has been updated to their respective new values as highlighted from previous interactions !

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From main menu, if the user chooses '10', please analyze / implement similar interaction sequence(s) below :

Invalid IC entered ...

```
-----  
DUE TO LACK OF SPACE, ASSUME MAIN MENU IS DISPLAYED HERE ...  
-----  
Please enter your choice (1 - 12) : 10  
Please type in existing employee's IC (< 10 chars) : ZZzzZZzzZZzz  
Input too long. Please enter data again ( < 10 chars ) : a1b2c3d4  
Error! IC No. 'a1b2c3d4' DOES NOT exist in employee records DB!  
-----  
1) Get current no. of records in Employee Database  
2) Read Data From File and Populate Employee DB  
3) Display All Records  
4) Search for records by IC  
5) Search for records by Name  
6) Search for records by Email  
7) Search for records by Phone Number  
8) INSERT New Employee Record  
9) Search (by ic) & UPDATE Existing Employee Record  
10) Search (by ic) & DELETE Existing Employee Record  
11) Write Data From Employee DB To File  
12) Quit  
-----  
Please enter your choice (1 - 12) :
```

Non-Existent IC entered ...

```
-----  
DUE TO LACK OF SPACE, ASSUME MAIN MENU IS DISPLAYED HERE ...  
-----  
Please enter your choice (1 - 12) : 10  
Please type in existing employee's IC (< 10 chars) : 87654321  
Error! IC No. '87654321' DOES NOT exist in employee records DB!  
-----  
DUE TO LACK OF SPACE, ASSUME MAIN MENU IS DISPLAYED HERE ...  
-----  
Please enter your choice (1 - 12) :
```

RSE1202 – C++ Programming

(con't) From main menu, if the user chooses '10', please analyze / implement similar interaction sequence(s) below :

Below figure is with reference to earlier sample output (around pg. 11), take note of the LAST FIVE RECORDS (i.e. array index from 45 – 49)

All Employee Records (total = 51) ...						
Idx	IC	Name	Phone	Birth Date	Hired Date	Email
=====						
DUE TO LACK OF SPACE, ASSUME RECORDS FROM ARRAY INDEX 0 - 39 IS DISPLAYED HERE ...						
40	S5027066P	Henry Smith	(49)-85419571	12/05/1987	09/10/1980	ydtxm@consultingfirm.net
41	S6434318J	Jane Doe	(47)-14783997	29/09/1979	24/01/1997	ywhba@techcorp.com
42	S2132744L	Frank Doe	(71)-40568010	28/09/1975	15/08/1993	uachn@consultingfirm.net
43	S5552115O	John Smith	(63)-41595843	08/07/1983	03/09/1996	dfgc@marketplace.biz
44	S5045003A	Grace Smith	(72)-29206305	30/10/1971	03/09/1996	ecwsz@webservices.org
45	S3097344K	Eve Brown	(15)-01487223	15/08/1970	07/01/1972	opdsj@techcorp.com
46	S9722129A	John Adams	(47)-25002142	27/09/1974	08/07/1977	dahai@techcorp.com
47	S5696062F	John Johnson	(36)-79717904	22/02/1987	04/06/1977	upbdj@softwaredev.com
48	S3036938M	Grace Green	(42)-66154117	14/05/2000	08/06/1983	bcklm@logistics.co
49	S8874289Q	Bob Smith	(92)-54539512	29/12/1994	19/06/1985	wgsiv@healthcareplus.org

We are using some of the (above) employee's data to test our "delete existing employee record" function, to delete the employee at array index = 46

```
-----
1) Get current no. of records in Employee Database
2) Read Data From File and Populate Employee DB
3) Display All Records
4) Search for records by IC
5) Search for records by Name
6) Search for records by Email
7) Search for records by Phone Number
8) INSERT New Employee Record
9) Search (by ic) & UPDATE Existing Employee Record
10) Search (by ic) & DELETE Existing Employee Record
11) Write Data From Employee DB To File
12) Quit
-----

Please enter your choice (1 - 12) : 10

Please type in existing employee's IC (< 10 chars) : S9722129A

Records with IC EXACTLY matching 'S9722129A' :
=====
IC          Name          Phone          Birth Date      Hired Date      Email
=====
S9722129A   John Adams      (47)-25002142   27/09/1974      08/07/1977      dahai@techcorp.com

1 records found, with IC EXACTLY matching S9722129A !!

Confirm deletion of the record? (y/n) : y

Done! Going back to main menu ...
```

(continue on next page => ...)

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(<= continue from previous page ...)

```
-----
1) Get current no. of records in Employee Database
2) Read Data From File and Populate Employee DB
3) Display All Records
4) Search for records by IC
5) Search for records by Name
6) Search for records by Email
7) Search for records by Phone Number
8) INSERT New Employee Record
9) Search (by ic) & UPDATE Existing Employee Record
10) Search (by ic) & DELETE Existing Employee Record
11) Write Data From Employee DB To File
12) Quit
-----
```

```
Please enter your choice (1 - 12) : 3
Show array index? (y/n) : y
```

All Employee Records (total = 49) ...

Idx	IC	Name	Phone	Birth Date	Hired Date	Email
DUE TO LACK OF SPACE, ASSUME RECORDS FROM ARRAY INDEX 0 - 39 IS DISPLAYED HERE ...						
40	S5027066P	Henry Smith	(49)-85419571	12/05/1987	09/10/1980	ydtxm@consultingfirm.net
41	S6434318J	Jane Doe	(47)-14783997	29/09/1979	24/01/1997	ywhba@techcorp.com
42	S2132744L	Frank Doe	(71)-40568010	28/09/1975	15/08/1993	uachn@consultingfirm.net
43	S5552115O	John Smith	(63)-41595843	08/07/1983	03/09/1996	dfgic@marketplace.biz
44	S5045003A	Grace Smith	(72)-29206305	30/10/1977	03/09/1996	ecwsx@webservices.org
45	S3097344K	Eve Brown	(15)-01487223	15/08/1970	07/01/1972	opdsj@techcorp.com
46	S5696062F	John Johnson	(36)-79717904	22/02/1987	04/06/1977	upbdj@softwaredev.com
47	S3036938M	Grace Green	(42)-66154117	14/05/2000	08/06/1983	bcklm@logistics.co
48	S8874289Q	Bob Smith	(92)-54539512	29/12/1994	19/06/1985	wgsiv@healthcareplus.org

Note #1 => After the record “John Adams” at array index = 46 is deleted, observe that Records from index = 45, “Eve Brown”, all the way down to index = 0, are still stored at their previous positions. However :

- Record “John Johnson” (previous index = 47) is now shifted to index = 46, previously occupied by the (now deleted) “John Adams” employee
- Record “Grace Green” (previous index = 48) is now shifted to index = 47, previously occupied by the (now shifted) “John Johnson” employee
- Record “Bob Smith” (previous index = 49) is now shifted to index = 48, previously occupied by the (now shifted) “Grace Green” employee
- Array index = 49, previously occupied by the (now shifted) “Bob Smith” employee, is now TOTALLY EMPTY (i.e. not even displayed!)

Note #2 => Observe the total no. of employee records has been reduced, from (previous value) 50 to 49

Note #3 => Above sample output is just for illustration purposes. Employee records could be deleted at ANY array index! You should follow the implicit algorithm (i.e. shifting records “downwards”, to a “lower index position”, to cover the deleted record) for any array index. The only “special case” occurs when it is the last record that is to be deleted, in which case, no need to perform “shifting”!

RSE1202 – C++ Programming

From main menu, if the user chooses '11', please analyze / implement similar interaction sequence(s) below

For the purpose of testing using smaller data set, the MAX_NO_OF_RECORDS in "StuAssnSampleMain.cpp" file was edited to 10, resulting in the size of the EmployeeRecordsDB [] array initialized to 10 only

```
-----
DUE TO LACK OF SPACE, ASSUME MAIN MENU IS DISPLAYED HERE ...
-----

Please enter your choice (1 - 12) : 3
Show array index? (y/n) : y

All Employee Records (total = 10) ...

=====
Idx      IC      Name      Phone      Birth Date      Hired Date      Email
=====
0        S1754299L    Frank Johnson    (79)-32118966    09/12/1998      09/03/1987      qkwtv@consultingfirm.net
1        S2495281Y    Grace Lee       (75)-60536119    29/12/1994      14/01/1993      voabp@softwaredev.com
2        S6190344B    Henry Adams     (76)-18837574    15/12/1985      13/11/1986      sjvit@innovatech.io
3        S6714771C    Eve Brown       (11)-43795543    23/06/1984      03/09/1996      dkhzy@healthcareplus.org
4        S6351711Y    Eve Brown       (75)-72256520    08/04/1974      31/01/1978      yzdqi@marketplace.biz
5        S3818194F    Carol White     (70)-82266698    12/05/1987      08/08/1993      bodey@innovatech.io
6        S8566435T    Jane White      (31)-37007071    30/12/1989      02/07/1977      cnmam@innovatech.io
7        S3994947V    Henry White     (79)-23900913    14/07/1984      11/11/1986      ojipx@techcorp.com
8        S9085419T    Henry Johnson   (30)-60760992    15/08/1970      11/06/1974      nwtrj@softwaredev.com
9        S4335497O    Carol Brown     (73)-07636602    09/03/1970      20/01/1977      jztxi@techcorp.com
=====

1) Get current no. of records in Employee Database
2) Read Data From File and Populate Employee DB
3) Display All Records
4) Search for records by IC
5) Search for records by Name
6) Search for records by Email
7) Search for records by Phone Number
8) INSERT New Employee Record
9) Search (by ic) & UPDATE Existing Employee Record
10) Search (by ic) & DELETE Existing Employee Record
11) Write Data From Employee DB To File
12) Quit

-----

Please enter your choice (1 - 12) : 11

-----
Writing data from Employee DB to an output file ...
-----

Please enter the output (CSV) file's name : test-option11.csv

Done! Total no. of records written to output file 'test-option11.csv' = 10 records
```

(continue on next page => ...)

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(<= continue from previous page ...)

After the program ends, using any text editor (in Ubuntu, you can use 'gedit'), open up the previously saved 'test-option11.csv'. The contents should be similar to the earlier display from option 3 in your program.

Below shows the sample contents, after the file is transferred from Ubuntu OS to a Windows OS. Check the Idx column, ensure the employee data remains consistent for each employee at each index value, similar to the earlier display from option 3 in your program

```
Idx,Name,Email,IC,PhoneNum,HireDate,BirthDate
1,Frank Johnson,qkwtv@consultingfirm.net,S1754299L,(79)-32118966,09/03/1987,09/12/1998
2,Grace Lee,voabp@softwaredev.com,S2495281Y,(75)-60536119,14/01/1993,29/12/1994
3,Henry Adams,sjvit@innovatech.io,S6190344B,(76)-18837574,13/11/1986,15/12/1985
4,Eve Brown,dkhzy@healthcareplus.org,S6714771C,(11)-43795543,03/09/1996,23/06/1984
5,Eve Brown,yzdqi@marketplace.biz,S6351711Y,(75)-72256520,31/01/1978,08/04/1974
6,Carol White,bodey@innovatech.io,S3818194F,(70)-82266698,08/08/1993,12/05/1987
7,Jane White,cnmam@innovatech.io,S8566435T,(31)-37007071,02/07/1977,30/12/1989
8,Henry White,ojipx@techcorp.com,S3994947V,(79)-23900913,11/11/1986,14/07/1984
9,Henry Johnson,nwtrj@softwaredev.com,S9085419T,(30)-60760992,11/06/1974,15/08/1970
10,Carol Brown,jztxi@techcorp.com,S4335497O,(73)-07636602,20/01/1977,09/03/1970
```

Resources

Within your "... Pkg.zip" file, please locate and review the contents from the following files :

- Date.h, Date.cpp
- Employee.h, Employee.cpp
- StuAssnSampleMain.cpp
- sample-50-recs.csv

The file "StuAssnSampleMain.c" contains the `main()` function, which represents the main instructions that will be executed by the (Ubuntu) OS when the binary executable is being run.

It contains a "wealth" of information like :

- 1) recommended C++ header libraries to include
- 2) `#include "Employee.h"`, (your very first header, which is ALREADY POPULATED with the exact function prototypes that you MUST IMPLEMENT, along with detailed comments on the additional considerations your algorithms should take into account)
- 3) Examples of pre-processor macro `#define`, and how to declare constants
- 4) Examples of global variables, "in-house" function prototypes
- 5) Sample code in `main()`, and it is already working (i.e. can compile and run already!). Of course, majority of the functionalities still requires you to implement, but the "skeletal framework" is already implemented as an example for you!

Hint #1 : you will notice that the so called "Employee DB", is actually implemented as a global variable array of `Employee` class (a class already declared for you in `Employee.h`!)

Hint #2 : global var '`empDBSize`' represents the ACTUAL no. of records currently stored in your DB! Its value will fluctuate, depending on user operations (e.g. insertion of new records, deletion of existing records, reading in records from an external file, etc.)

Hint #3 : in '`StuAssnSampleMain.cpp`', `MAX_NO_OF_RECORDS` represents "capacity" / size of your `Employee` DB (array). You should cater to the possible "exception scenarios" where you set `MAX_NO_OF_RECORDS` to a fixed value of 100, but a user entered filename contains 150 lines of records (e.g. store up to first 100 records, and report to user that 50 records cannot be imported due to lack of space ...)

The file "`Employee.h`" contains the "framework" as an example for all other additional *.h header files that you may be implementing for this, or any other assessments in future.

The file "`Employee.cpp`" contains a "simple framework" as an example of how, the source code for all C++ classes (declared in the *.cpp source files) can be implemented in future, for all other assessments as well!

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Hint #4 : analyze the design, and the “flow” of function calls based on the code from the files you are given.

E.g. [in file : StuAssnSampleMain.cpp]

```
main(),          =>      printMainMenuOptions();          =>      main()          =>
queryCurrentNoOfEmpRecs() ...
```

The above function call “work-flow” implements the very first functionality listed in your program’s menu => 1) Get current no. of records in Employee Database! With the above mentioned example workflow, determine how you should adapt / “customize” the above design framework for all your other functionalities listed in your program’s menu (options 2-11) ?

Also, could all other database-related menu functionalities be “distributed” and “implemented” in other files (e.g. “EmpDB.h”, “EmpDB.cpp”) ? How would their functionalities be accessed and invoked from `main()` ?

Finally, you are free to design additional “helper functions”, place them in appropriate header (*.h) and source (*.cpp) files, and invoke them from your `main()`.

It is also ok for you to add other C++ “helper” classes, provided you separate each class into its header (*.h) and implementation (*.cpp) files respectively! For example, you may design a group of `static` helper functions that specifically deals with reading / writing data to/from files, and place them in a “FileIO.h” and “FileIO.cpp” files!

Additional Tip

In real life, users will not simply give you their sample test data, because, ... well, they are TEST DATA, meant to TEST YOUR SYSTEM during the very important UAT (User Acceptance Test). However, in this part of the assignment package, you are provided with the following file :

- `sample-50-recs.csv`

Please analyze closely the “structure” of this file, its headers, columns, sample rows/lines of records. For each row, determine how would you extract each item of data (e.g. Name, Email, IC, etc.), store it in your `Employee` class’s object variable within your `EmployeeDB []` array ...

Note #1 : If the **1st column** in your sample employee data file is the “**Idx**” **column**, ignore it! (i.e. **DO NOT STORE** them in your database.)

Note #2 : During your Assignment Test Case Evaluation, your program may be required to read in / import different sets of input files with different content, to verify that it can work under all user scenarios.

Deliverables

In terms of how to organized your deliverable files, please refer to the main Assignment document “RSE1202_Assignment ..”, APPENDIX E-2

Below describes the “typical files” that should be included in your submission.

Place within “inc” sub-folder ...

- Date.h, Employee.h
- ... any other header (*.h) files you implement

Place within “src” sub-folder ...

- Assn.cpp // file that contains your main() function
- Date.cpp, Employee.cpp
- ... any other source (*.cpp) files you implement

Place within “obj” sub-folder ...

- Employee.o // hint : generated using “ g++ -c Employee.cpp ... ” – research this!
- ... any other object (*.o) files where relevant

Place within the “root” folder ...

- Assn.run // your generated program executable!
- [acknowledgement.txt](#) /* declare the LEGITIMATE sources in which part of your work (< 30%) is derived from */
- readme.txt // compilation command to type, to generate your *.run executable
OR
makefile /* exploit make programming instructions to conveniently compile your program! */

Additional Considerations ...

- 1) If you analyzed all the requirements and information from the above sections, you will quickly realize that it is **impossible**, to specify all possible usage scenarios, permutations of interactions, covering a wide variety of situations from invalid input, invalid values, to “subtler” issues :
 - (i) Should I detect invalid email format (e.g. missing '@') or date format (e.g. day not within 1-31, missing date delimiter, etc.) in input file or user input?
 - (ii) What if my array size constant 'MAX_NO_OF_RECORDS' is < the total no. of (lines of) records in user's input filename?
 - (iii) In real life, is it possible for 2 or more employees to have :
 - Exact same name?
 - Exact same office email address, phone number?In any organization, what attribute(s) can help uniquely identify an individual?
 - (iv) How can we help our user to avoid situations where data becomes corrupted by “duplicate fields”, “missing / incomplete data” (due to user error or insufficient storage), inconsistencies, ... ?
 - (v) Etc.
- 2) These are “real life” issues that you may encounter as you develop your programs in future, and you will find that there are no easy / quick answers. Of course, this being an Academic Assessment, there has to be some guidelines to address some of the issues mentioned above.
 - (a) From the above points A) (i) to (v), consolidate a detailed list of what YOU THINK could go wrong, that affects the smooth running of your program.
 - (b) For issues related to invalid input data from user, suggested approaches include :
 - Go in an “infinite loop”, display error message (& “educate” user on the required input), then prompt user to enter the desired data (in “correct” format / range), exit loop **only when** the “correct” input has been enteredOR
 - Go in an “infinite loop”, display error message (& “educate” user on the required input), **give user the choice to “cancel” current operation**, OR let user enter the desired data (in “correct” format / range), and exit loop **only when** the “correct” input has been entered

- (c) For issues related to inconsistent / invalid data from input file, or insufficient “memory storage” for records, or individual data fields (e.g. name, ic, etc.), suggested approaches could include :

- Output error message informing user on the exact nature of the error, **give user the choice to rectify the error in your program (without shutting down!)**, OR inform user the program will “shut down”, user should rectify the error in the input file, then re-run the program again

OR

- Output error message informing user on the exact nature of the error, inform user the program will “shut down”, user should rectify the error in the input file, then re-run the program again