North South University

Department of Electrical and Computer Science

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Contribution Part	Member 1	Member 2	Member 3
Python	Yes	No	No
Shell Script	No	Yes	No
C++	No	No	Yes
Report	Yes	Yes	Yes

Abstract:

The goal of this assignment is to write three programs to read a data file using Shell Script, Python, and (C/C++/Java) (heart.csv). Then, without modifying the heart.csv file, we performed the search and sorting operation on it. For the heart.csv file, we used a column-by-column search and sorting operation. The CSV file contains fourteen columns and three hundred and four rows. Some are included in these columns. These columns contain some attributes, and for each of these attributes, we will perform a search and sort operation. From the heart.csv file, we can search for information such as people's age, gender, chest pain (cp), cholesterol (chol), fasting blood sugar (FBS), maximum heart rate achieved (thalachh), and resting electrocardiography results (restecg). By doing so, we will be able to gather some vital information. By searching the CSV file, we will be able to find some important information. We can also sort the data in the heart.csv file according to our needs. Then, we compared the three major programming languages (Shell Script, Python, and C++) from various points of view. Following the implementation of the searching and sorting operations, we used some criteria to make the comparison. Following the implementation of the searching and sorting operations, we used some criteria to make the comparison. We also compared readability, writability, reliability, and performance.

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Introduction:

A program is a set of instructions that let a computer do specified tasks in computer science. Typically, programming languages are used to create a program or a set of instructions. A programming language should be easy to pick up and use, with good readability and human recognition. High-level languages are more advanced than machine-understandable languages, often known as low-level languages, and are almost human-like. We will compare Python and shell scripts to other major programming languages such as C++ in this paper. A shell script is a text-based computer program for UNIX-based operating systems that provides a command sequence. . It's primarily utilized to break up monotonous tasks. Python, on the other hand, is a high-level, interpreted programming language with several applications. It boasts extensive, dependable, and effective libraries. Python is a very easy language to learn and use for newcomers. C++, on the other hand, is an object-oriented programming language that can be used to do a wide range of jobs. In comparison to the other programming languages, Python has fewer lines of code. The memory management system in C++ is extremely powerful. Python is dynamically typed, whereas C++ is statically typed. Bash shell programming is the default terminal in most Linux distributions; therefore it will always be faster. However, it does not have the same level of power. However, it lacks the power of Python. We'll talk about these three programming languages and how they've been used in the real world.

Features:

This Programs contain many features but we have shared few of them below, Such as

- Data is being read from the heart.csv file.
- Sorting data columns in (Ascending/Descending order) according to the user's preferences.
- The heart.csv file is being searched for specific data.
- Invoking an interpreter is made simple with Shell Scripting.

- Python and C++ both strongly support OOP concepts such as (encapsulation, inheritance, abstraction, polymorphism, and lists**.**

Technology:

Shell Script, Python, and C++ are examples of programming languages.

Linux-based operating systems include Ubuntu

Geaney, Codeblocks, Termina, Pycharm are examples of software**.**

Readability

One of the most significant factors for assessing a programming language is its readability. It assesses how simple a written program is to read and comprehend. Because of the minimal processors (low speed processors) used before 1970, the major focus was the efficiency of programming languages. But in the 1970s, software life-cycle concept emerged, and the main concern shifted to the maintenance of the software. And ease maintenance is determined mainly by readability. The characteristics of readability are simplicity, orthogonality, data types, syntax design.

SI No	Characteristics Name	Readability Criteria
1	Simplicity	The readability of a programming language is affected by its overall simplicity, which makes it more efficient. Python is most simple language then shell script. Shell script is less simple than C++. Because of its English analogies, Python and C++ is ideal for beginner programmers. But after learning the constructs of shell script it became for simple to read.
2	Orthogonality	By integrating a minimal collection of primitive components, orthogonality creates data structures to build up the control. It ensures that the contexts in which it appears in a program are independent. C++ can be helpful in data structure but shell script does not support this. Python also support orthogonality. In our python code to sort data we use user define function sort_by_column(data) in the sort() function as parameter.
3	Data Types	The presence of certain types of facilities for defining data structures is determined by data type. In shell script we don't have date types like integer, float, double but C++ have used integer , double, string, and so on. In Python, the support of essential primitive data type and data structure also has an important effect on readability. Python support of essential primitive data type. In Python there is no need to defining data. Data type defined dynamically.
4	Syntax Design	Readability is influenced by syntax design, which is an important aspect of readability. In terms of grammar design, Shel Script is rather unclear. In C++ we have used if else statement and also in python but we thought that shell script is obscure in terms of syntax design. In case of Python, because of its English analogies, syntax is ideal for programmers.

Writability

The writability of a language is a measure of how easy it is to write programs for a specific problem. The majority of the factors that influence readability also influence writability. This is due to the fact that developing a program necessitates the programmer constantly rereading the parts of the program that have already been written. The characteristics of readability are simplicity, orthogonality, data types, syntax design, support for abstraction and expressivity.

Si No	Characteristics Name	Writability Criteria
1	Simplicity & Orthogonality	Python programming is far more elegant than C++ programming. For example, detecting an error in python is easier than detecting an error in a shell script. Shell script, on the other hand, is simpler than C++.
2	Expressivity	Expressivity is all about doing more significant computation with a small program using powerful operators. In this case shell script is more expressible. Because is took only 192 line of code to do the task. On the other hand, Python code was 297 lines and C++ code were 3417 lines.
3	Abstraction	Abstraction is the process of designing complex data structures in such a way that we can ignore the intricacies. In C++, though, we require abstraction support. In C++, for example, trees are represented by the abstraction of a tree node. There are no abstraction features in shell scripts. Python support abstraction. In Python we use list.sort () function. We did not need to know how the function work; we only need to know how to use the function.

Reliability

When a program performs to its specifications under all conditions, then it is reliable. The measurement characteristics of Reliability are simplicity, orthogonality, data types, syntax design, type checking, exception handling, restricted aliasing.

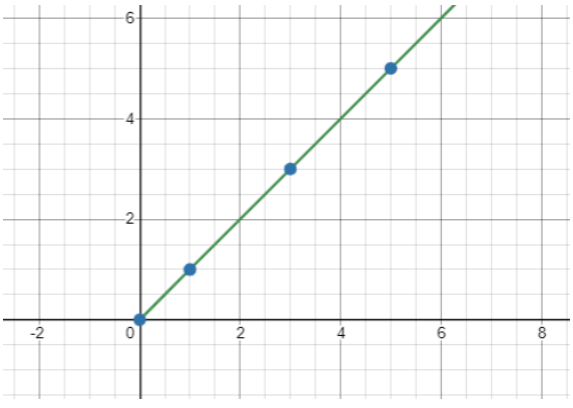
Si No	Characteristics Name	Reliability Criteria
1	Type Checking	It checks is there a type error in the program. It can be done either by the compiler or during program execution. Python is dynamically typed language. The type of the variable is determined at the runtime. In shell script, it checks whether the given data is a numerical value using a regular expression, or if it can be calculated by throwing to "expr" or "bc," for example. In C++ type checking done in compilation time. C++ is better in this case.
2	Exception Handling	Although there is no "try/catch" in shell script, you can achieve a similar result by using && or ||.In this example, if we want to execute “fallback_syntax “ if “a_syntax” fails (returns a non-zero value).a_syntax || fallback_syntax. Python support exception handling. In python we used exception in case user enter other input rather than the exepeced input (ValueError) it will handel that. In C++, exception is an event or object which is thrown at runtime. All exceptions are derived from std::exception class.
3	Aliasing	Using aliasing same memory cell can be accessed by two or more distinct names. It is a dangerous feature in a programming language. Python support alias. In shell scripts, aliases are disabled. C++ aliasing can be done by pointer.

Performance:

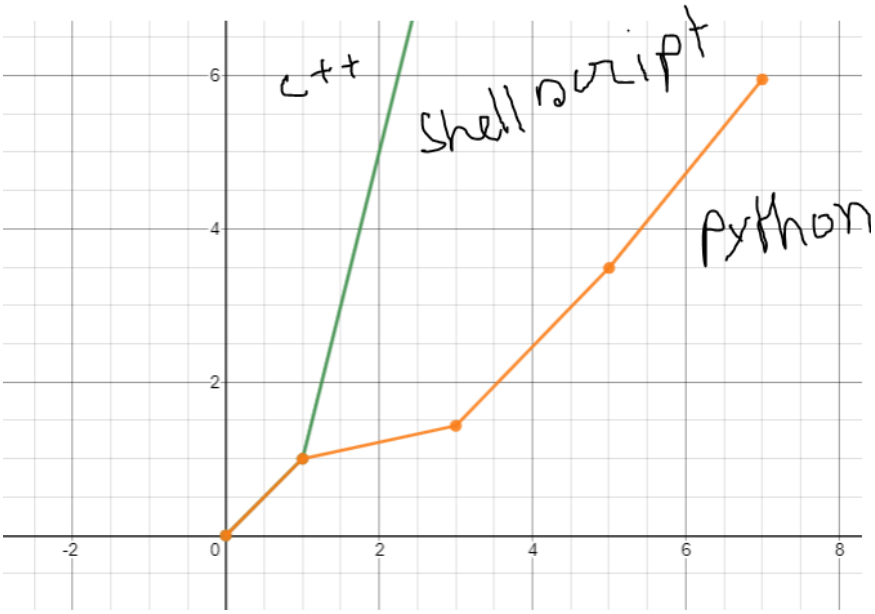
	Attribute	Time (Seconds)		
		Python	Shell Script	C++
Search	Age: 50	0.014946222305297852	0.5465041048	0.02004
	Gender: 1	0.031183242797851562	0.7864571565	0.596701
Sort	Age (Ascending)	0.015413761138916016	0.4300550573	0.921545
	Age (Descending)	0.015416145324707031	0.9058403143	0.921545
	Gender (Ascending)	0.03099822998046875	0.603619655	0.885181
	Gender (Descending)	0.031131505966186523	0.3311579536	0.900254
Time Complexity	Search	O(n)	O(n)	O(n)
	Sort	O(nlogn)	$O(n^2)$	$O(n^2)$
Code Size	Line	297	192	3417

In this table we compare the performance of all three languages. According to run time python took less time among all 3 languages. After that shell script took less time than C++.

In all three languages time complexity for search is O(n). In python time complexity for sort is O(nlogn) but in C++ and shell script it is $O(n^2)$.



Graph 1: For searching time complexity O(n) graph



Graph 2: For sorting time complexity $O(n^2)$ and O(nlogn) graph.

Design:

A shell script is a computer program that runs on the Unix shell, which is a command-line interpreter. Python is a dynamic and adaptable programming language. Python design patterns are a fantastic way to tap into the language's enormous potential. Good error-handling, exception management and correct memory management are the design issues of C++

Conclusion:

Finally, we can say that we conducted an in-depth and exhaustive comparison of our chosen programming languages based on the criteria we established. We discovered that a given language is appropriate for a particular field. They all have their own set of benefits and drawbacks. Python is a general-purpose programming language. C++ has more lines of code than Python, while Python has fewer. However, in comparison to C++, it is slower. C++ is a multi-purpose programming language. Shell Script is a command-line interpreter that can be found on Linux and

macOS distributions. With its advantages, it is much easier to write and begin. Interactive debugging is available. However, it is not well suited to large-scale and sophisticated programming. Furthermore, because Shell Script has a higher readability score than C++ or Python, it is more comfortable in some circumstances where it works well.

Code and Output Demo:

C++

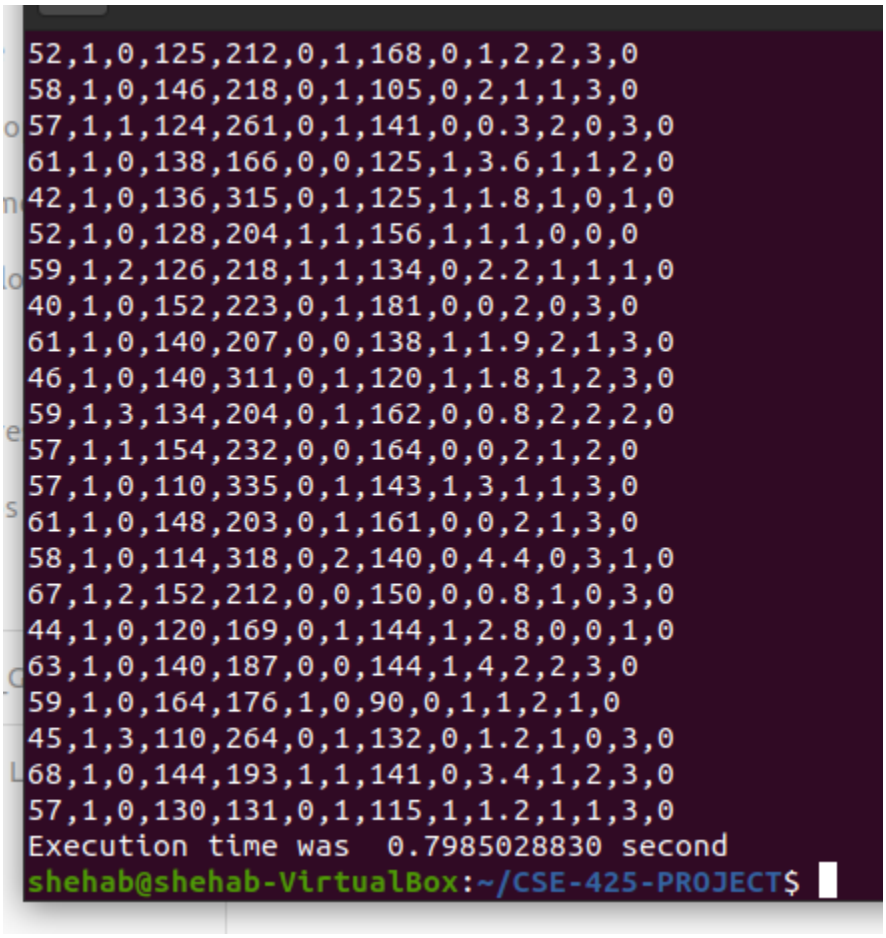
```
if(choice3=="1")
{
    long startTime21 = gettime();
    for(i=0;i<Cage.size()-1;i++)
    {
        for(j=0;j<Cage.size()-i-1;j++)
        {
            if(Cage[j]>Cage[j+1])
            {
                Tage=Cage[j];
                Cage[j]=Cage[j+1];
                Cage[j+1]=Tage;

                Tsex=Csex[j];
                Csex[j]=Csex[j+1];
                Csex[j+1]=Tsex;

                Tcp=Ccp[j];
                Ccp[j]=Ccp[j+1];
                Ccp[j+1]=Tcp;

                Ttrtbps=Ctrtbps[j];
                Ctrtbps[j]=Ctrtbps[j+1];
                Ctrtbps[j+1]=Ttrtbps;

                Tchol=Cchol[j];
                Cchol[j]=Cchol[j+1];
                Cchol[j+1]=Tchol;

                Tfbs=Cfbs[j];
                Cfbs[j]=Cfbs[j+1];
```

```
long startTime1 = gettime();

cout<<"Age  Sex  Cp Trtbps  Chol  Fbs  Restecg  Thalachh  Exng  Output  Slp  Caa  Thall  Oldpeak\n";
while(csv.good())
{
    getline(csv,age,',');
    getline(csv,sex,',');
    getline(csv,cp,',');
    getline(csv,trtbps,',');
    getline(csv,chol,',');
    getline(csv,fbs,',');
    getline(csv,restecg,',');
    getline(csv,thalachh,',');
    getline(csv,exng, ',');
    getline(csv,oldpeak,',');
    getline(csv,slp,',');
    getline(csv,caa,',');
    getline(csv,thall,',');
    getline(csv,output,'\n');

    if (ageinput == age)
    {
        std::cout<<age <<"    "<<sex<< "    " <<cp<<"   "<<trtbps<<"    " <<chol<<"   "<<fbs<<"    "<<restecg<< "        " << thalachh<<"
    }
}

long EndTime1 = gettime();
cout<<"For searching Time="<< EndTime1-startTime1<<"ms" <<'\n';

csv.close();
```

```
Press 1 to searching
Press 2 to sorting
Press 3 to exit
1
Press 1 to search age
Press 2 to search sex
Press 3 to search cp
Press 4 to search trtbps
Press 5 to search chol
Press 6 to search fbs
Press 7 to search restecg
Press 8 to search thalachh
Press 9 to search exng
Press 10 to search oldpeak
Press 11 to search slp
Press 12 to search caa
Press 13 to search thall
Press 14 to search output
1
Enter age
45
Age  Sex  Cp Trtbps  Chol  Fbs  Restecg  Thalachh  Exng  Output  Slp  Caa  Thall  Oldpeak
45    1    0   104    208   0    0        148       1     1       1    0    2      3
45    1    0   115    260   0    0        185       0     1       2    0    2      0
45    0    1   130    234   0    0        175       0     1       1    0    2      0.6
45    1    1   128    308   0    0        170       0     1       2    0    2      0
45    0    1   112    160   0    1        138       0     1       1    0    2      0
45    0    0   138    236   0    0        152       1     1       1    0    2      0.2
45    1    0   142    309   0    0        147       1     0       1    3    3      0
45    1    3   110    264   0    1        132       0     0       1    0    3      1.2
For searching Time=29644ms
```

```
64      1       0       120     246     0       0       96      1       2.2     0       1       2       0
64      1       0       145     212     0       0       132     0       2       1       2       1       0
65      0       2       140     417     1       0       157     0       0.8     2       1       2       1
65      1       0       120     177     0       1       140     0       0.4     2       0       3       1
65      0       2       155     269     0       1       148     0       0.8     2       0       2       1
65      0       2       160     360     0       0       151     0       0.8     2       0       2       1
65      0       0       150     225     0       0       114     0       1       1       3       3       0
65      1       0       110     248     0       0       158     0       0.6     2       2       1       0
65      1       0       135     254     0       0       127     0       2.8     1       1       3       0
65      1       3       138     282     1       0       174     0       1.4     1       1       2       0
66      0       3       150     226     0       1       114     0       2.6     0       0       2       1
66      1       0       120     302     0       0       151     0       0.4     1       0       2       1
66      1       0       160     228     0       0       138     0       2.3     2       0       1       1
66      0       2       146     278     0       0       152     0       0       1       1       2       1
66      1       1       160     246     0       1       120     1       0       1       3       1       0
66      0       0       178     228     1       1       165     1       1       1       2       3       0
66      1       0       112     212     0       0       132     1       0.1     2       1       2       0
67      0       2       115     564     0       0       160     0       1.6     1       0       3       1
67      0       2       152     277     0       1       172     0       0       2       1       2       1
67      0       0       106     223     0       1       142     0       0.3     2       2       2       1
67      1       0       160     286     0       0       108     1       1.5     1       3       2       0
67      1       0       120     229     0       0       129     1       2.6     1       2       3       0
67      1       0       125     254     1       1       163     0       0.2     1       2       3       0
67      1       0       100     299     0       0       125     1       0.9     1       2       2       0
67      1       0       120     237     0       1       71      0       1       1       0       2       0
67      1       2       152     212     0       0       150     0       0.8     1       0       3       0
68      1       2       118     277     0       1       151     0       1       2       1       3       1
68      0       2       120     211     0       0       115     0       1.5     1       0       2       1
68      1       2       180     274     1       0       150     1       1.6     1       0       3       0
68      1       0       144     193     1       1       141     0       3.4     1       2       3       0
69      0       3       140     239     0       1       151     0       1.8     2       2       2       1
69      1       3       160     234     1       0       131     0       0.1     1       1       2       1
69      1       2       140     254     0       0       146     0       2       1       3       3       0
70      1       1       156     245     0       0       143     0       0       2       0       2       1
70      1       0       145     174     0       1       125     1       2.6     0       0       3       0
70      1       0       130     322     0       0       109     0       2.4     1       3       2       0
70      1       2       160     269     0       1       112     1       2.9     1       1       3       0
71      0       1       160     302     0       1       162     0       0.4     2       2       2       1
71      0       2       110     265     1       0       130     0       0       2       1       2       1
71      0       0       112     149     0       1       125     0       1.6     1       0       2       1
74      0       1       120     269     0       0       121     1       0.2     2       1       2       1
76      0       2       140     197     0       2       116     0       1.1     1       0       2       1
77      1       0       125     304     0       0       162     1       0       2       3       2       0
For sorting Time=1035736ms
Press 1 to searching
```

SHELL SCRIPT:



```
52,1,0,125,212,0,1,168,0,1,2,2,3,0
58,1,0,146,218,0,1,105,0,2,1,1,3,0
57,1,1,124,261,0,1,141,0,0.3,2,0,3,0
61,1,0,138,166,0,0,125,1,3.6,1,1,2,0
42,1,0,136,315,0,1,125,1,1.8,1,0,1,0
52,1,0,128,204,1,1,156,1,1,1,0,0,0
59,1,2,126,218,1,1,134,0,2.2,1,1,1,0
40,1,0,152,223,0,1,181,0,0,2,0,3,0
61,1,0,140,207,0,0,138,1,1.9,2,1,3,0
46,1,0,140,311,0,1,120,1,1.8,1,2,3,0
59,1,3,134,204,0,1,162,0,0.8,2,2,2,0
57,1,1,154,232,0,0,164,0,0,2,1,2,0
57,1,0,110,335,0,1,143,1,3,1,1,3,0
61,1,0,148,203,0,1,161,0,0,2,1,3,0
58,1,0,114,318,0,2,140,0,4.4,0,3,1,0
67,1,2,152,212,0,0,150,0,0.8,1,0,3,0
44,1,0,120,169,0,1,144,1,2.8,0,0,1,0
63,1,0,140,187,0,0,144,1,4,2,2,3,0
59,1,0,164,176,1,0,90,0,1,1,2,1,0
45,1,3,110,264,0,1,132,0,1.2,1,0,3,0
68,1,0,144,193,1,1,141,0,3.4,1,2,3,0
57,1,0,130,131,0,1,115,1,1.2,1,1,3,0
Execution time was  0.7985028830 second
shehab@shehab-VirtualBox:~/CSE-425-PROJECT$
```

```
54
55  if (($choice  == 1))
56  then
57  echo "Enter the age: (e.g.50) number to search:";read pattern; awk -v patt="$pattern" -F ',' '$1 == patt' heart.csv
58
59  elif(($choice  == 2))
60  then
61  echo "Enter the sex: (e.g. 0 or 1) number to search:";read pattern; awk -v patt="$pattern" -F ',' '$2 == patt' heart.csv
62
63  elif(($choice  == 3))
64  then
65  echo "Enter the CP: (e.g. 0 or 1) number to search:";read pattern; awk -v patt="$pattern" -F ',' '$3 == patt' heart.csv
66
67  elif(($choice  == 4))
68  then
69  echo "Enter the trtbps: (e.g. 3) number to search:";read pattern; awk -v patt="$pattern" -F ',' '$4 == patt' heart.csv
70
71  elif(($choice  == 5))
72  then
73  echo "Enter the chol: (e.g. 0 or 1) number to search:";read pattern; awk -v patt="$pattern" -F ',' '$5 == patt' heart.csv
74
75  elif(($choice  == 6))
76  then
77  echo "Enter the fbs: (e.g. 0 or 1) number to search:";read pattern; awk -v patt="$pattern" -F ',' '$6 == patt' heart.csv
78
79  elif(($choice  == 7))
80  then
81  echo "Enter the restecg: (e.g. 0 or 1) number to search:";read pattern; awk -v patt="$pattern" -F ',' '$7 == patt' heart.csv
```

```
140     echo " you can the  sorted column 7 :";sort -t "," -k7 heart.csv
141
142     elif (($choice ==22))
143     then
144     echo " you can the  sorted column 8 :";sort -t "," -k8 heart.csv
145
146
147     elif (($choice ==23))
148     then
149     echo " you can the  sorted column 9 :";sort -t "," -k9 heart.csv
150
151
152     elif (($choice ==24))
153     then
154     echo " you can the  sorted column 10 :";sort -t "," -k10 heart.csv
155
156     elif (($choice ==25))
157     then
158     echo " you can the  sorted column 11 :";sort -t "," -k11 heart.csv
159
160     elif (($choice ==26))
161     then
162     echo " you can the  sorted column 12 :";sort -t "," -k12 heart.csv
163
164
165     elif (($choice ==27))
166     then
167     echo " you can the  sorted column 13 :";sort -t "," -k13 heart.csv
```

```
65,1,3,138,282,1,0,174,0,1.4,1,1,2,0
59,1,0,164,176,1,0,90,0,1,1,2,1,0
62,0,0,138,294,1,1,106,0,1.9,1,3,2,0
59,1,2,126,218,1,1,134,0,2.2,1,1,1,0
61,1,2,150,243,1,1,137,1,1,1,0,2,1
68,1,0,144,193,1,1,141,0,3.4,1,2,3,0
52,1,0,108,233,1,1,147,0,0.1,2,3,3,1
46,1,1,101,197,1,1,156,0,0,2,0,3,1
52,1,0,128,204,1,1,156,1,1,1,0,0,0
59,1,2,150,212,1,1,157,0,1.6,2,0,2,1
60,1,0,117,230,1,1,160,1,1.4,2,2,3,0
52,1,2,172,199,1,1,162,0,0.5,2,0,3,1
67,1,0,125,254,1,1,163,0,0.2,1,2,3,0
66,0,0,178,228,1,1,165,1,1,1,2,3,0
54,0,2,135,304,1,1,170,0,0,2,0,2,1
57,1,2,150,126,1,1,173,0,0.2,2,1,3,1
48,1,2,124,255,1,1,175,0,0,2,2,2,1
52,1,3,152,298,1,1,178,0,1.2,1,0,3,1
52,1,1,128,205,1,1,184,0,0,2,0,2,1
42,1,2,120,240,1,1,194,0,0.8,0,0,3,1
60,0,2,120,178,1,1,96,0,0,2,0,2,1
age,sex,cp,trtbps,chol,fbs,restecg,thalachh,exng,oldpeak,slp,caa,thall,output
Execution time was  0.9029998762 second
shehab@shehab-VirtualBox:~/CSE-425-PROJECT$
```

Python:

```
def search_by_age():
    age = input('Enter the Age: ')
    start_time = time.time()
    file = csv.reader(open('heart.csv'))

    for row in file:
        if age == row[0]:
            print(row)
    print("\n---Processing Time: %s seconds ---" % (time.time() - start_time))
    main()


def search_by_gender():
    sex = input('Enter the Gender(0/1): ')
    start_time = time.time()
    file = csv.reader(open('heart.csv'))

    for row in file:
        if sex == row[1]:
            print(row)
    print("\n---Processing Time: %s seconds ---" % (time.time() - start_time))
    main()
```

```
Enter you choice: 1
1. Search by Age
2. Search by Gender
3. Search by Constrictive pericarditis (CP)
4. Search by trtbps
5. Search by Cholestero (chol)
6. Search by fbs - fasting blood sugar
7. Search by restecg
8. Search by thalachh
9. Search by exng
10. Search by oldpeak
11. Search by slp
12. Search by caa
13. Search by thall
14. Search by output


Enter you choice: 1
Enter the Age: 45
['45', '1', '0', '104', '208', '0', '0', '148', '1', '3', '1', '0', '2', '1']
['45', '1', '0', '115', '260', '0', '0', '185', '0', '0', '2', '0', '2', '1']
['45', '0', '1', '130', '234', '0', '0', '175', '0', '0.6', '1', '0', '2', '1']
['45', '1', '1', '128', '308', '0', '0', '170', '0', '0', '2', '0', '2', '1']
['45', '0', '1', '112', '160', '0', '1', '138', '0', '0', '1', '0', '2', '1']
['45', '0', '0', '138', '236', '0', '0', '152', '1', '0.2', '1', '0', '2', '1']
['45', '1', '0', '142', '309', '0', '0', '147', '1', '0', '1', '3', '3', '0']
['45', '1', '3', '110', '264', '0', '1', '132', '0', '1.2', '1', '0', '3', '0']

---Processing Time: 0.0010030269622802734 seconds ---
```

```
13. Sort by thall
14. Sort by output
Enter you choice: 1

1. Sort in  Ascending Order
2. Sort in  Descending Order
Enter you choice: 2
['age', 'sex', 'cp', 'trtbps', 'chol', 'fbs', 'restecg', 'thalachh', 'exng', 'oldpea
['77', '1', '0', '125', '304', '0', '0', '162', '1', '0', '2', '3', '2', '0']
['76', '0', '2', '140', '197', '0', '2', '116', '0', '1.1', '1', '0', '2', '1']
['74', '0', '1', '120', '269', '0', '0', '121', '1', '0.2', '2', '1', '2', '1']
['71', '0', '1', '160', '302', '0', '1', '162', '0', '0.4', '2', '2', '2', '1']
['71', '0', '2', '110', '265', '1', '0', '130', '0', '0', '2', '1', '2', '1']
['71', '0', '0', '112', '149', '0', '1', '125', '0', '1.6', '1', '0', '2', '1']
['70', '1', '1', '156', '245', '0', '0', '143', '0', '0', '2', '0', '2', '1']
['70', '1', '0', '145', '174', '0', '1', '125', '1', '2.6', '0', '0', '3', '0']
['70', '1', '0', '130', '322', '0', '0', '109', '0', '2.4', '1', '3', '2', '0']
['70', '1', '2', '160', '269', '0', '1', '112', '1', '2.9', '1', '1', '3', '0']
['69', '0', '3', '140', '239', '0', '1', '151', '0', '1.8', '2', '2', '2', '1']
['69', '1', '3', '160', '234', '1', '0', '131', '0', '0.1', '1', '1', '2', '1']
['69', '1', '2', '140', '254', '0', '0', '146', '0', '2', '1', '3', '3', '0']
['68', '1', '2', '118', '277', '0', '1', '151', '0', '1', '2', '1', '3', '1']
['68', '0', '2', '120', '211', '0', '0', '115', '0', '1.5', '1', '0', '2', '1']
['68', '1', '2', '180', '274', '1', '0', '150', '1', '1.6', '1', '0', '3', '0']
['68', '1', '0', '144', '193', '1', '1', '141', '0', '3.4', '1', '2', '3', '0']
['67', '0', '2', '115', '564', '0', '0', '160', '0', '1.6', '1', '0', '3', '1']
['67', '0', '2', '152', '277', '0', '1', '172', '0', '0', '2', '1', '2', '1']
['67', '0', '0', '106', '223', '0', '1', '142', '0', '0.3', '2', '2', '2', '1']
['67', '1', '0', '160', '286', '0', '0', '108', '1', '1.5', '1', '3', '2', '0']
['67', '1', '0', '120', '229', '0', '0', '129', '1', '2.6', '1', '2', '3', '0']
['67', '1', '0', '125', '254', '1', '1', '163', '0', '0.2', '1', '2', '3', '0']
['67', '1', '0', '100', '299', '0', '0', '125', '1', '0.9', '1', '2', '2', '0']
```

```
        # sort operation
        global sort
        sort = int(input("Enter you choice: "))

        csv_file = open('heart.csv', 'r')
        file = csv.reader(csv_file)
        data = []
        for row in file:
            data.append(row)
        column_attribute = data.pop(0)

        print("\n1. Sort in  Ascending Order")
        print("2. Sort in  Descending Order")
        order = int(input("Enter you choice: "))
        start_time = time.time()

        if order == 1:
            data.sort(key=sort_by_column)
            print(column_attribute)
            for row in data:
                print(row)

            print("\n---Processing Time: %s seconds ---" % (time.time() - start_time))
        elif order == 2:
            data.sort(key=sort_by_column, reverse=True)
            print(column_attribute)
            for row in data:
                print(row)
            print("\n---Processing Time: %s seconds ---" % (time.time() - start_time))
        else:
            print("Wrong Input!!! Try Again")
        main()
    elif flag == 3:
main() › except ValueError
TODO  Problems  Terminal  Python Packages  Python Console
```