DATA STRUCTURES

ASSIGNMENT 2

Submitted by

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Task 2:

- Pivot: First Element - I tried to use a median pivot but I was unsure of my program and decided to use a simpler approach. I successfully implemented Quick Sort using the first and last element as pivot separately.
- Partition Scheme: Hoarse Partition: This was discussed in class and I quickly caught on to it so I successfully implemented it for this assignment.

Task 3:

- The number of comparisons and swaps were maximum for selection sort, proving it has a similar run time for all cases.
- The number of swaps for correctly sorted / uniform array for insertion sort were 0, as I expected them to be.
- For random arrays it did not work well and thus resulted in very high number of comparisons and swaps as was expected.
- For quick sort I used the first element as pivot. For sorted arrays it would give a better run time if I chose the median as the pivot. Worked similar for first and last element as pivot. Performed better when sorting the two random arrays

Task 4:

- I successfully wrote and executed the program although the output slightly differed in values and a difference in spacing of the output
- To print the top 5 games of each year
  - Load all values from the CSV file
  - Sort the data by release date.
  - Now all elements of that year will be grouped (ascending / descending).
  - Find groups and keep account of the first and last element of each group
  - Sort each group individually by score received (descending).
  - The first 5 elements of each group will be the highest rated.
  - Again look for groups, print first 5 elements of each group

TASK 1

2 / 2 C Testing part 1

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Visualize whitespace characters

Student STDOUT.txt

```
*** Running array filling tests with 10 elements. ***

Ascending array is ascending: true
Descending array is descending: true
Uniform array is uniform: true

Random array is random: true
Random array is random no duplicates: false
Second random array is random: true
Second random array is random no duplicates: false
The two random arrays are different:true

The two random arrays no duplicates are different:true
Random array no duplicates is random and has no duplicates: true
Second random array no duplicates is random and has no duplicates: true

```

Expected STDOUT.txt

```
*** Running array filling tests with 10 elements. ***

Ascending array is ascending: true
Descending array is descending: true
Uniform array is uniform: true

Random array is random: true
Random array is random no duplicates: false
Second random array is random: true
Second random array is random no duplicates: false
The two random arrays are different:true

The two random arrays no duplicates are different:true
Random array no duplicates is random and has no duplicates: true
Second random array no duplicates is random and has no duplicates: true

```

TASK 2

C Compilation part 2

2 / 2 **C Testing part 2 - sorting algos with size 10**

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Visualize whitespace characters

Student STDOUT.txt

```
Arrays of size 10:
  Selection sort
                      TEST |      SORTED |
                 Ascending |         YES |
                Descending |         YES |
                   Uniform |         YES |
       Random w duplicates |         YES |
    Random w/o  duplicates |         YES |


  Insertion sort
                      TEST |      SORTED |
                 Ascending |         YES |
                Descending |         YES |
                   Uniform |         YES |
       Random w duplicates |         YES |
    Random w/o  duplicates |         YES |


  Quick sort
                      TEST |      SORTED |
                 Ascending |         YES |
                Descending |         YES |
                   Uniform |         YES |
       Random w duplicates |         YES |
    Random w/o  duplicates |         YES |
```

Expected STDOUT.txt

```
Arrays of size 10:
  Selection sort
                      TEST |      SORTED |
                 Ascending |         YES |
                Descending |         YES |
                   Uniform |         YES |
       Random w duplicates |         YES |
    Random w/o  duplicates |         YES |


  Insertion sort
                      TEST |      SORTED |
                 Ascending |         YES |
                Descending |         YES |
                   Uniform |         YES |
       Random w duplicates |         YES |
    Random w/o  duplicates |         YES |


  Quick sort
                      TEST |      SORTED |
                 Ascending |         YES |
                Descending |         YES |
                   Uniform |         YES |
       Random w duplicates |         YES |
    Random w/o  duplicates |         YES |
```

3 / 3 **C Testing part 2 - sorting algos with size 10 000**

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Visualize whitespace characters

Student STDOUT.txt

```
Arrays of size 10000:
  Selection sort
                      TEST |      SORTED |
                 Ascending |         YES |
                Descending |         YES |
                   Uniform |         YES |
       Random w duplicates |         YES |
    Random w/o  duplicates |         YES |


  Insertion sort
                      TEST |      SORTED |
                 Ascending |         YES |
                Descending |         YES |
                   Uniform |         YES |
       Random w duplicates |         YES |
    Random w/o  duplicates |         YES |


  Quick sort
                      TEST |      SORTED |
                 Ascending |         YES |
                Descending |         YES |
                   Uniform |         YES |
       Random w duplicates |         YES |
    Random w/o  duplicates |         YES |
```

Expected STDOUT.txt

```
Arrays of size 10000:
  Selection sort
                      TEST |      SORTED |
                 Ascending |         YES |
                Descending |         YES |
                   Uniform |         YES |
       Random w duplicates |         YES |
    Random w/o  duplicates |         YES |


  Insertion sort
                      TEST |      SORTED |
                 Ascending |         YES |
                Descending |         YES |
                   Uniform |         YES |
       Random w duplicates |         YES |
    Random w/o  duplicates |         YES |


  Quick sort
                      TEST |      SORTED |
                 Ascending |         YES |
                Descending |         YES |
                   Uniform |         YES |
       Random w duplicates |         YES |
    Random w/o  duplicates |         YES |
```

TASK 3

C Compilation part 3

C Testing part 3 - you might have different numbers

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Visualize whitespace characters

Student STDOUT.txt

```
Arrays of size 10000:
  Selection sort
                    TEST |     SORTED |      SWAPS |      COMPS |
               Ascending |        YES |       9999 |   49995000 |
              Descending |        YES |       9999 |   49995000 |
                 Uniform |        YES |       9999 |   49995000 |
     Random w duplicates |        YES |       9999 |   49995000 |
   Random w/o  duplicates |        YES |       9999 |   49995000 |


  Insertion sort
                    TEST |     SORTED |      SWAPS |      COMPS |
               Ascending |        YES |          0 |       9999 |
              Descending |        YES |   49995000 |   50004999 |
                 Uniform |        YES |          0 |       9999 |
     Random w duplicates |        YES |   25096072 |   25106071 |
   Random w/o  duplicates |        YES |   23993371 |   24003370 |


  Quick sort
                    TEST |     SORTED |      SWAPS |      COMPS |
               Ascending |        YES |       9999 |   49995000 |
              Descending |        YES |   25009999 |   49995000 |
                 Uniform |        YES |       9999 |   49995000 |
     Random w duplicates |        YES |      74968 |     161056 |
   Random w/o  duplicates |        YES |     103814 |     165543 |
```

Expected STDOUT.txt

```
Arrays of size 10000:
  Selection sort
                    TEST |     SORTED |      SWAPS |      COMPS |
               Ascending |        YES |       9999 |   49995000 |
              Descending |        YES |       9999 |   49995000 |
                 Uniform |        YES |       9999 |   49995000 |
     Random w duplicates |        YES |       9999 |   49995000 |
   Random w/o  duplicates |        YES |       9999 |   49995000 |


  Insertion sort
                    TEST |     SORTED |      SWAPS |      COMPS |
               Ascending |        YES |          0 |       9999 |
              Descending |        YES |   49995000 |   50004999 |
                 Uniform |        YES |          0 |       9999 |
     Random w duplicates |        YES |   25096072 |   25106071 |
   Random w/o  duplicates |        YES |   23993371 |   24003370 |


  Quick sort
                    TEST |     SORTED |      SWAPS |      COMPS |
               Ascending |        YES |       9999 |   50014998 |
              Descending |        YES |       9999 |   50014998 |
                 Uniform |        YES |      60517 |     121034 |
     Random w duplicates |        YES |      32174 |     163052 |
   Random w/o  duplicates |        YES |      31597 |     162690 |
```

TASK 4

C Compilation part 4

C Testing part 4 - outputs don't need to match!

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Visualize whitespace characters

Student STDOUT.txt

```
 Zero Escape: Virtue's Last Reward     PlayStation Vita 10 2012
 Zero Escape: Virtue's Last Reward         Nintendo 3DS 10 2012
                         Zen Bound              iPhone 10 2009
                         Xenogears          PlayStation 10 1998
                     World of Goo               iPhone 10 2011
                     World of Goo                 iPad 10 2010
                     World of Goo                  Wii 10 2008
                     Wave Race 64          Nintendo 64 10 1996
                Wario Ware Twisted!     Game Boy Advance 10 2005
        Virtua Fighter 4: Evolution        PlayStation 2 10 2003

```

Expected STDOUT.txt

```
Zero Escape: Virtue's Last Reward          PlayStation Vita    10 2012
Zero Escape: Virtue's Last Reward              Nintendo 3DS    10 2012
Zen Bound                                          iPhone      10 2009
Xenogears                                      PlayStation     10 1998
Advance Wars                                Game Boy Advance   10 2001
World of Goo                                       iPhone      10 2011
World of Goo                                        iPad       10 2010
World of Goo                                        Wii        10 2008
Animal Crossing: New Leaf                      Nintendo 3DS    10 2013
Wave Race 64                                   Nintendo 64     10 1996

```