Cairo University

# Data Structures

## Assignment 1

### Sorting Algorithms & Time Complexity

Under supervision of: Dr Bashir

## Team Members

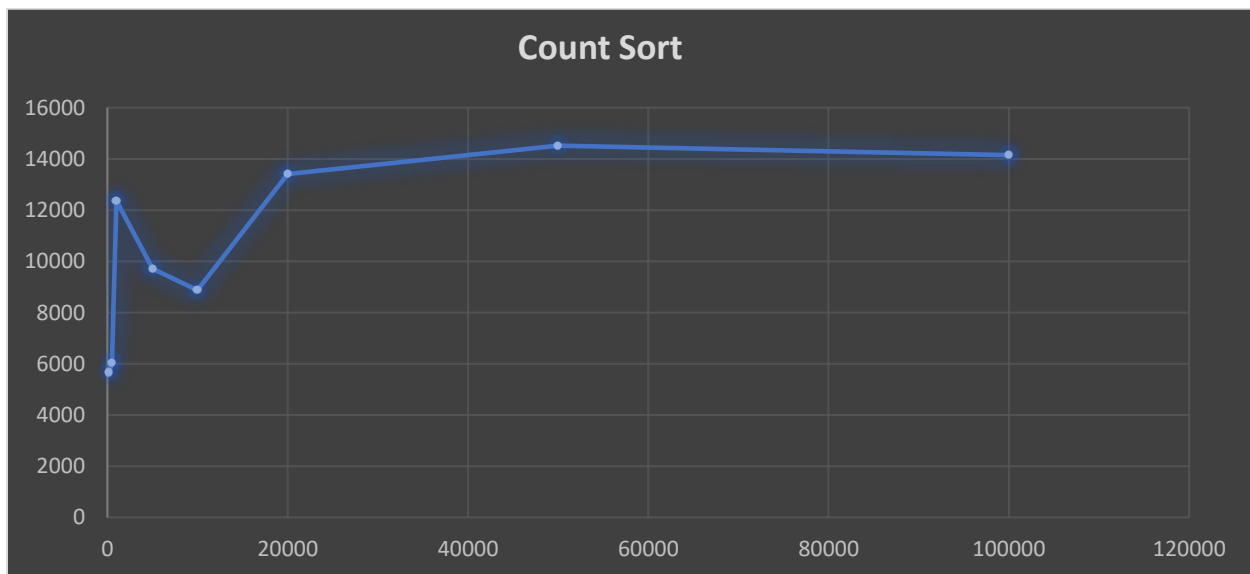| Name | ID |
|------|-----|
| Amal Mohamed Moawad | 20211016 |
| Rahma Khaled Kamal | 20190205 |
| Ziad Emad Elsayed | 20210151 |

# The Algorithms Times & Plots

## 1.Shell Sort

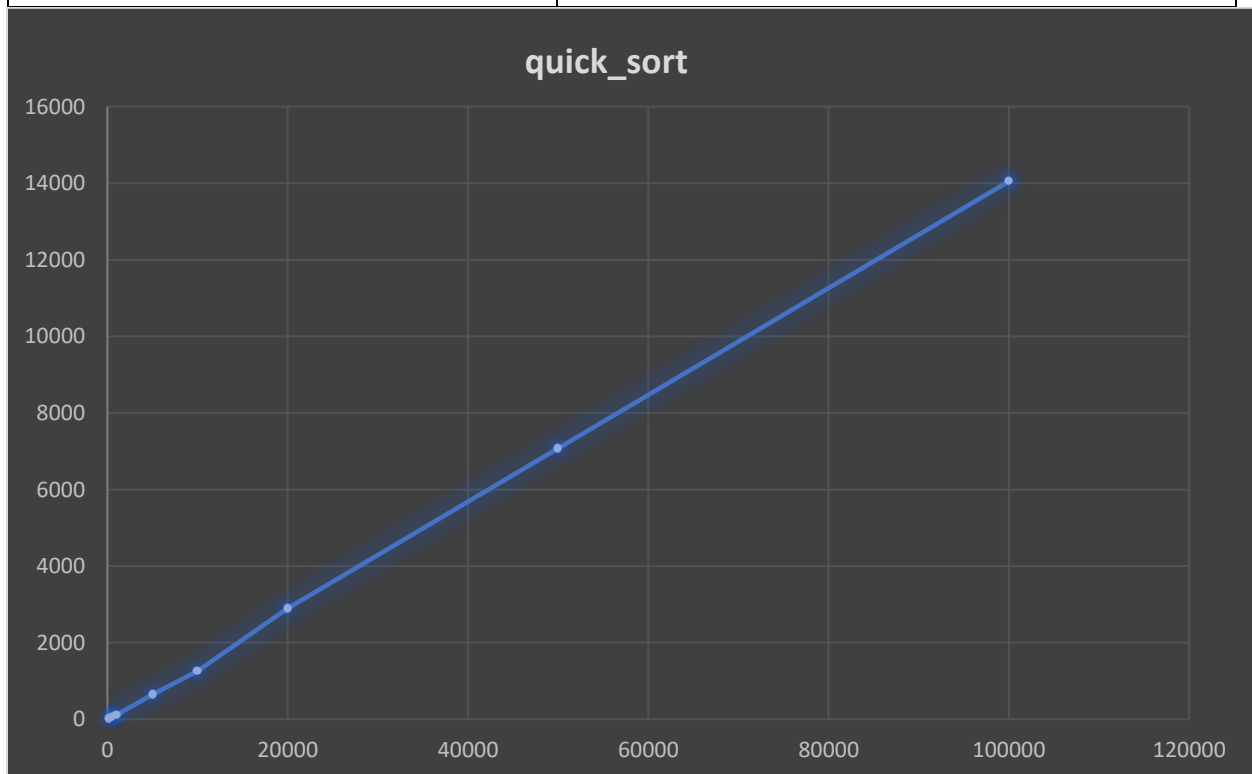| Size | Shell Sort |
|---|---|
| 200 | 19 |
| 500 | 64 |
| 1000 | 162 |
| 5000 | 1113 |
| 10000 | 2819 |
| 20000 | 3755 |
| 50000 | 12155 |
| 100000 | 27621 |

**Shell Sort**

## 2. Count Sort

| Size | Count Sort |
|---|---|
| 200 | 5659 |
| 500 | 6049 |
| 1000 | 12376 |
| 5000 | 9715 |
| 10000 | 8874 |
| 20000 | 13410 |
| 50000 | 14518 |
| 100000 | 14142 |



Count Sort

## 3. Quick Sort

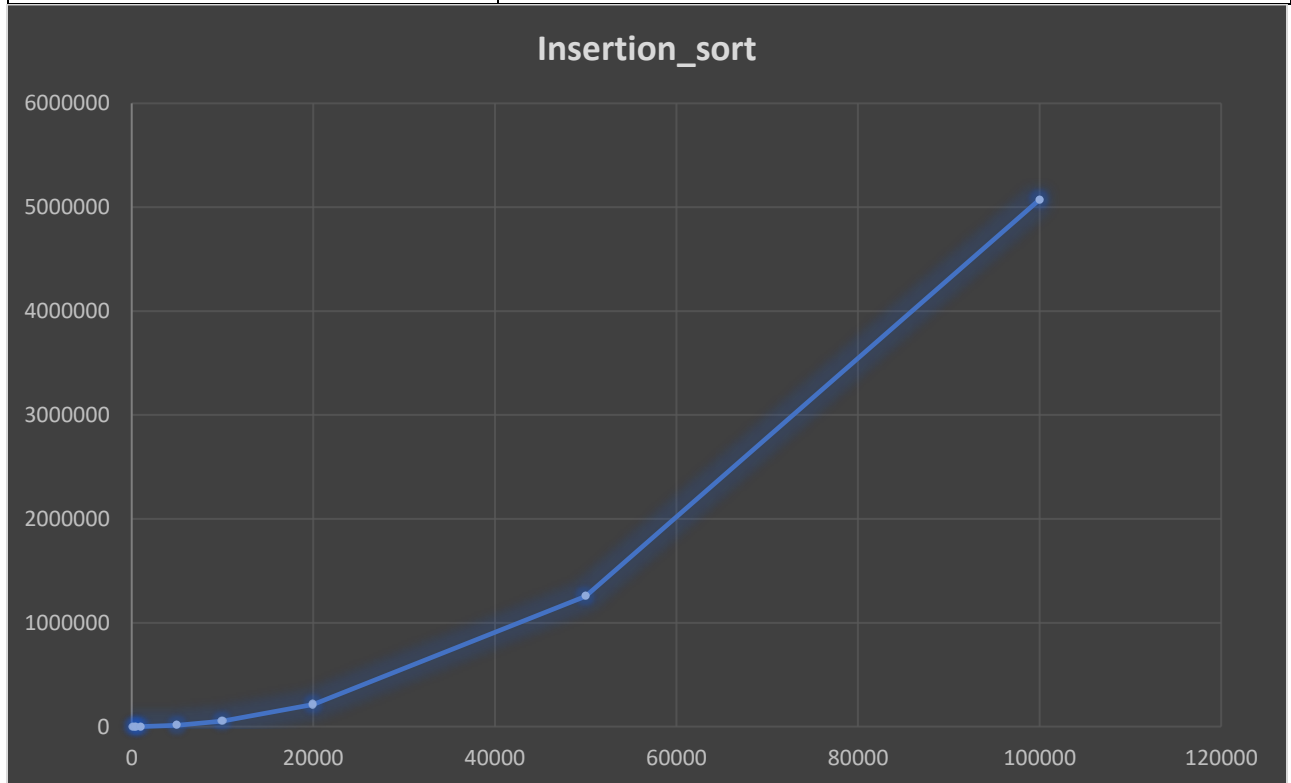| Size | quick_sort |
|---|---|
| 200 | 19 |
| 500 | 50 |
| 1000 | 111 |
| 5000 | 646 |
| 10000 | 1259 |
| 20000 | 2894 |
| 50000 | 7071 |
| 100000 | 14052 |



quick_sort

# 4.Selection Sort

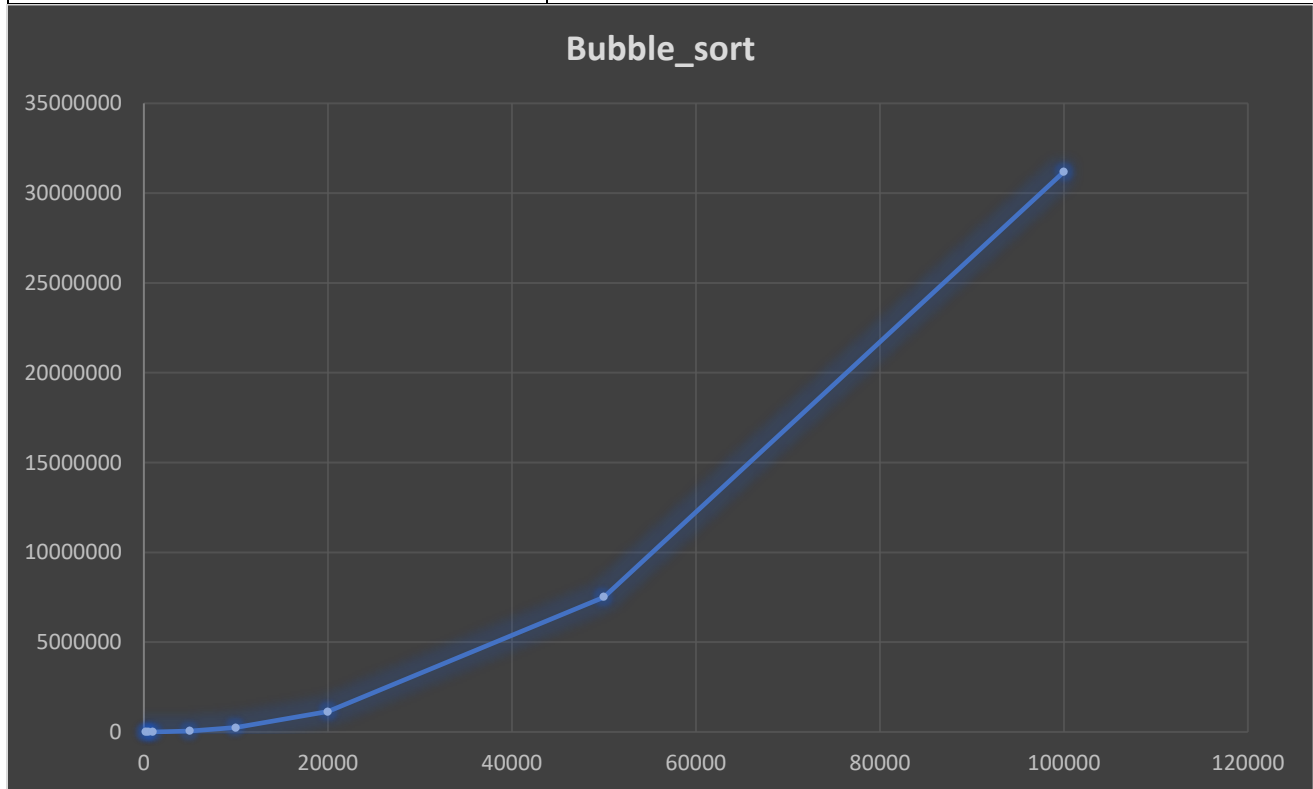| Size | Selection_sort |
|---|---|
| 200 | 55 |
| 500 | 394 |
| 1000 | 1122 |
| 5000 | 26659 |
| 10000 | 105966 |
| 20000 | 400164 |
| 50000 | 2.44E+06 |
| 100000 | 9.82E+06 |

## 5. Insertion Sort

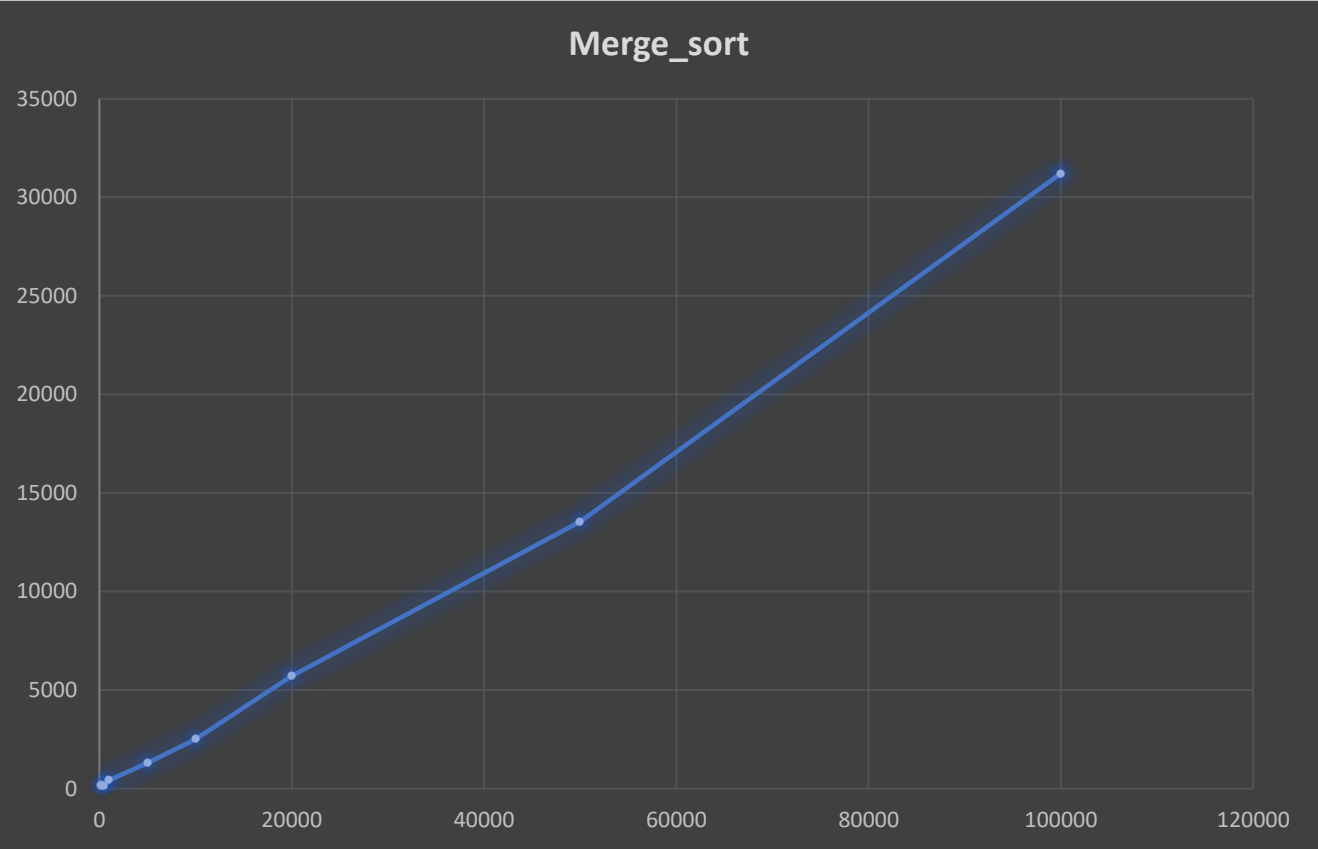| Size | Insertion_sort |
|------|---------------|
| 200 | 24 |
| 500 | 145 |
| 1000 | 599 |
| 5000 | 13258 |
| 10000 | 52009 |
| 20000 | 213415 |
| 50000 | 1.26E+06 |
| 100000 | 5.07E+06 |



Insertion_sort

# 6. Bubble Sort

| Size | Bubble_sort |
| --- | --- |
| 200 | 148 |
| 500 | 669 |
| 1000 | 2430 |
| 5000 | 53873 |
| 10000 | 248895 |
| 20000 | 1.13E+06 |
| 50000 | 7.51E+06 |
| 100000 | 3.12E+07 |



Bubble_sort

# 7. Merge Sort

| Size | Merge_sort |
| --- | --- |
| 200 | 160 |
| 500 | 149 |
| 1000 | 433 |
| 5000 | 1309 |
| 10000 | 2501 |
| 20000 | 5725 |
| 50000 | 13544 |
| 100000 | 31211 |

**Merge_sort**

# All Sortings