Aparna Kagini & Zeenat Anjum

# SEG2105 Assignment 1

Textbook Questions

**E26**

| | **Advantages** | **Disadvantages** |
|---|---|---|
| **Design 1** | ● Simplifies data storage<br>● Reduces memory usage | ● Requires an additional flag to indicate which type is stored. |
| **Design 2** | ● A simple implementation for polar computations | ● More room for errors during computations |
| **Design 3** | ● Efficient for storing and retrieving cartesian coordinates | ● Complicated to compute polar coordinates |
| **Design 4** | ● Provides access to both types, making them easier to retrieve | ● Higher memory usage |
| **Design 5** | ● Both modules are incorporated into the program, which is more efficient | ● Increased memory and complexity of code |

**E30**

For Part 2a below, we created an array of size 10,000,000, and below are the construction run times in milliseconds for ArrayList, Vector, and Array

| | **Trial 1** | **Trial 2** | **Trial 3** | **Trial 4** | **Trial 5** | **Trial 6** | **Trial 7** |
|---|---|---|---|---|---|---|---|
| **ArrayList** | 1536 | 1519 | 3896 | 3123 | 2967 | 3661 | 2947 |
| **Vector** | 977 | 1028 | 2104 | 2477 | 1691 | 2103 | 1347 |
| **Array** | 250 | 322 | 566 | 806 | 416 | 611 | 347 |

Average Runtime for each Array (ArrayList, Vector & Array):

ArrayList = 2807 ms
Vector = 1675 ms
Array = 474 ms

Part 2b: Below are the iteration run times in milliseconds for ArrayList, Vector, and Array

| | **Trial 1** | **Trial 2** | **Trial 3** | **Trial 4** | **Trial 5** | **Trial 6** | **Trial 7** |
|---|---|---|---|---|---|---|---|
| **ArrayList** | 46 | 39 | 68 | 56 | 89 | 41 | 136 |
| **Vector** | 373 | 400 | 842 | 596 | 706 | 566 | 1447 |
| **Array** | 13 | 26 | 46 | 23 | 24 | 17 | 32 |

Average Runtime for each Array (ArrayList, Vector & Array):

ArrayList = 68 ms
Vector = 704 ms
Array = 26 ms

**Conclusion**

In conclusion, the array with the fastest run time is the Array for both parts (construction and iteration times). Arrays are efficient for cases where the size is known and fixed. Additionally, it's important to consider the specific requirements of your application when choosing between ArrayList, Vector, and Array.