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**ADT, hierarchy of classes, description and evaluation of the algorithms**

**Car Dealership**

**Class Hierarchy**

Diagram

Description automatically generated

**Evaluation of Algorithms**:

1. **Merge Sort:**

Merge Sort will be used for the sorting of the data collection. The user will be able to **choose** how the collections will be sorted – **by total price, by Insurance, or warranty.**

The algorithm has a **time complexity of O (n\*log n)** time in **all cases** (worst, average and best).

It divides the initial collection of items into smaller collections, sorts the smaller collections and combines them, thus getting the initial collection sorted.

1. **Boyer-Moore Pattern Matching Algorithm:**

I plan to implement a basic search function which will allow the users to search for a car model, and if it exists in the collection of vehicles, the attributes of the corresponding vehicle will be shown as console output.

The algorithm has a **best-case time complexity of O (n / m)**, and a **worst-case time Complexity of O(n\*m), where n is the length of the text, and m is the length of the pattern.**

The algorithm uses a position table, made up of an array, indexed by values of characters, and the position of the last occurrence of the given character. The matching is performed from the right side to left side of the pattern (backwards).

1. **Vector:**

All vehicle objects will be placed in a vector data structure. I will be utilizing primarily the **push\_back()** method, which has a **worst-case time complexity of O (n)** and a **best-case time complexity of O (1)**, which occurs more often.

**Abstract Data Types:**

Note: the following code is only the one stored in the header files. The code in the cpp files is at the end of this document.

**Vehicle (base class):**

A screenshot of a computer

Description automatically generated with medium confidence

**Car:**

Text

Description automatically generated

**SUV:**

Text

Description automatically generated

**Van:**

Text

Description automatically generated

**Truck:**

Text

Description automatically generated

**Pickup Truck:**

Text

Description automatically generated

**Motorcycle:**

Text

Description automatically generated

**Electric Scooter:**

A screenshot of a computer

Description automatically generated

**Code in the cpp files (probably needs to be changed a bit). I don’t think it was required but I still decided to include it:**

**Car:**

Text

Description automatically generated

Text

Description automatically generated

**SUV:**

Text

Description automatically generated

**Van:**

Text

Description automatically generated

**Truck:**

Text

Description automatically generated

Text

Description automatically generated

**Pickup Truck:**

Text

Description automatically generated

**Motorcycle:**

Text

Description automatically generated

Text

Description automatically generated

**Electric Scooter:**

Text

Description automatically generated