ADS Assignment I - Project Report

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Project Objective:

This project sets up a smart system to handle orders for GatorGlide Delivery Co. It uses a special type of tree to organize orders efficiently. The system lets you do things like add orders, remove orders, change delivery times, and get details about orders.

Implementation:

To start off, I implemented the priority tree as well as the ETA tree using AVL Data Structure:

1. Priority Tree - this tree arranges orders according to their priority, determined by a blend of order value and the present time. It guarantees swift addition, removal, and access to orders while preserving a balanced setup.

2. ETA Order Tree: this tree organizes orders based on their estimated time of arrival (ETA). It's utilized for the timely delivery of orders when their ETA is reached and for adjusting the ETAs of related orders efficiently.

3. The gator delivery file will simply combine both the programs from 1 & 2 in order to implement the complete program.

Used these functions to implement the above 2 steps:

```
def createOrder
def retHeight(self, node):
def retBalance(self, node):
def ensureBalance(self, node):
def createNode(self, node, priority, orderID, currSysTime, orderValue, deliveryTime):
def rotateRight(self, data):
def rotateLeft(self, data):
def rotateLR(self, data):
def rotateRL(self, data):
def cancelOrder(self, priority, orderID, currSysTime):
def cancelNode(self, node, priority):
def getPredecessor(self, node):
def traverseInOrder(self, node):
```

How to Run the Program:
To utilize the GatorGlide Delivery Co. order management system:

Execute the Python script by providing the input file as a command-line argument:
python script_name.py input_file.txt

The program will handle the commands from the input file and produce an output file named after the input file, suffixed with "_output_file.txt".

Output of the Program:

When I used this input:

input.txt

```
createOrder(101, 2, 300, 4)
createOrder(102, 3, 600, 3)
print(101)
createOrder(103, 7, 200, 2)
createOrder(104, 8, 500, 3)
cancelOrder(102, 9)
createOrder(105, 10, 300, 4)
getRankOfOrder(105)
Quit()
```

I get the below output in the input_output_file:

input_output_file.txt

```
Order 101 has been created - ETA: 6
Order 102 has been created - ETA: 13
[101, 4, 6, 0.40000000000000013, 2]
Order 103 has been created - ETA: 18
Order 101 has been delivered at time 6
Order 104 has been created - ETA: 19
Updated ETAs: [103: 24]
Cannot cancel. Order 102 has already been delivered.
Order 105 has been created - ETA: 30
Order 105 will be delivered after 3 orders.
Order 102 has been delivered at time 13
Order 104 has been delivered at time 19
Order 103 has been delivered at time 24
Order 105 has been delivered at time 30
```