

Data Structures and Algorithms

Project Phase 1 Report

Team Name: 1-4_T08

Number of members: 4

Team Email: hla.ahmed00@ eng-st.cu.edu.eg

Members Info:

Member Name	ID	Email
عمر عصام الدين احمد الأنصاري	1190332	omar.ansary01@eng-st.cu.edu.eg
عمر محمد فهمي مصطفى	1190477	omar.mostafa011@eng-st.cu.edu.eg
هلا هاني محمد حلمي أحمد	1190344	hla.ahmed00@eng-st.cu.edu.eg
ياسمين زكي بسيوني نصير	1190352	yasmeen.nossair01@eng-st.cu.edu.eg

Project Data Structures

List Name	Chosen DS	Justification
Event List	Queue	The list is sorted ascendingly according to the Event Day, so we will just add the event at the end of the queue. Enqueue: $O(1)$

Waiting Emergency Missions	Priority Queue	Emergency missions with a higher priority are the ones to be assigned first. Dequeue: $O(1)$ Enqueue: $O(n)$
Waiting Mountainous Missions	Linked List	They should be assigned according to first-come-first-served, BUT mountainous missions can be promoted, cancelled, or auto-promoted, so instead of using queues and pushing in a temp queue when searching for the ID, we will use linked lists to traverse the list easily. InsertEnd: $O(n)$ RemoveBeg: $O(1)$ Find: $O(n)$
Waiting Polar Missions	Queue	They should be assigned according to first-come-first-served. Enqueue: $O(1)$ Dequeue: $O(1)$
In-Execution Missions	Priority Queue	This list should be sorted by Completion Day in ascending order. The first mission with the earliest completion day will go out first. Enqueue: $O(n)$ Dequeue: $O(1)$

Completed Missions	Priority Queue	Completed missions must be sorted by CD in ascending order. If more than one mission is completed on the same day, they should be ordered by ED. Enqueue: $O(n)$
Available Emergency Rovers	Priority Queue	As mentioned in the bonus section, rovers of the same type may have different speeds. Higher speed rovers have the higher priority to be assigned to missions than lower speed rovers of the same type. Dequeue: $O(1)$ Enqueue: $O(n)$
Available Mountainous Rovers	Priority Queue	As mentioned in the bonus section, rovers of the same type may have different speeds. Higher speed rovers have the higher priority to be assigned to missions than lower speed rovers of the same type. Dequeue: $O(1)$ Enqueue: $O(n)$
Available Polar Rovers	Priority Queue	As mentioned in the bonus section, rovers of the same type may have different speeds. Higher speed rovers have the higher priority to be assigned to missions than lower speed rovers of the same type. Dequeue: $O(1)$ Enqueue: $O(n)$

In-Checkup Emergency Rovers	Queue	Checkup duration is the same for all rovers of the same type. Dequeue: $O(1)$ Enqueue: $O(1)$
In-Checkup Mountainous Rovers	Queue	Checkup duration is the same for all rovers of the same type. Dequeue: $O(1)$ Enqueue: $O(1)$
In-Checkup Polar Rovers	Queue	Checkup duration is the same for all rovers of the same type. Dequeue: $O(1)$ Enqueue: $O(1)$