Criterion B: Design

Data Structures

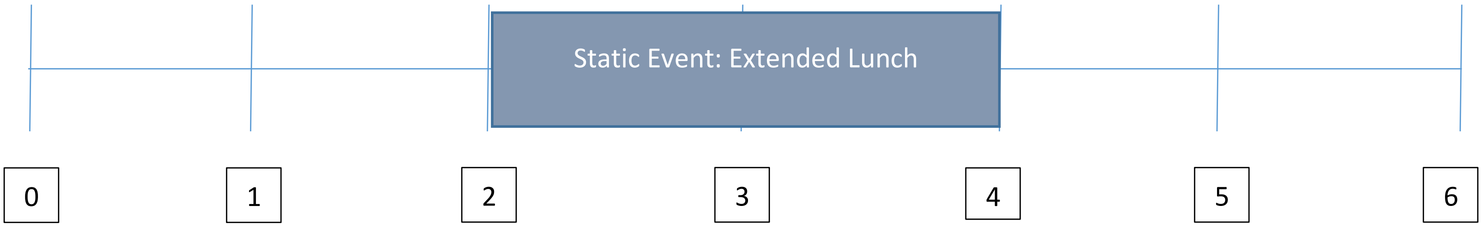
This program involves two main classes: events and tasks. Events are scheduled components of the agenda. An event includes a title, start time, and an end time. Tasks do not have any set times, but have a duration and priority, both of which can be updated by the user. Ultimately, the agenda will display only events; some of the events will be static while other will be instances of placed tasks. Since Java's "DateTime" data structures are too complex, simpler Time and Duration classes will be created and used.

Algorithms

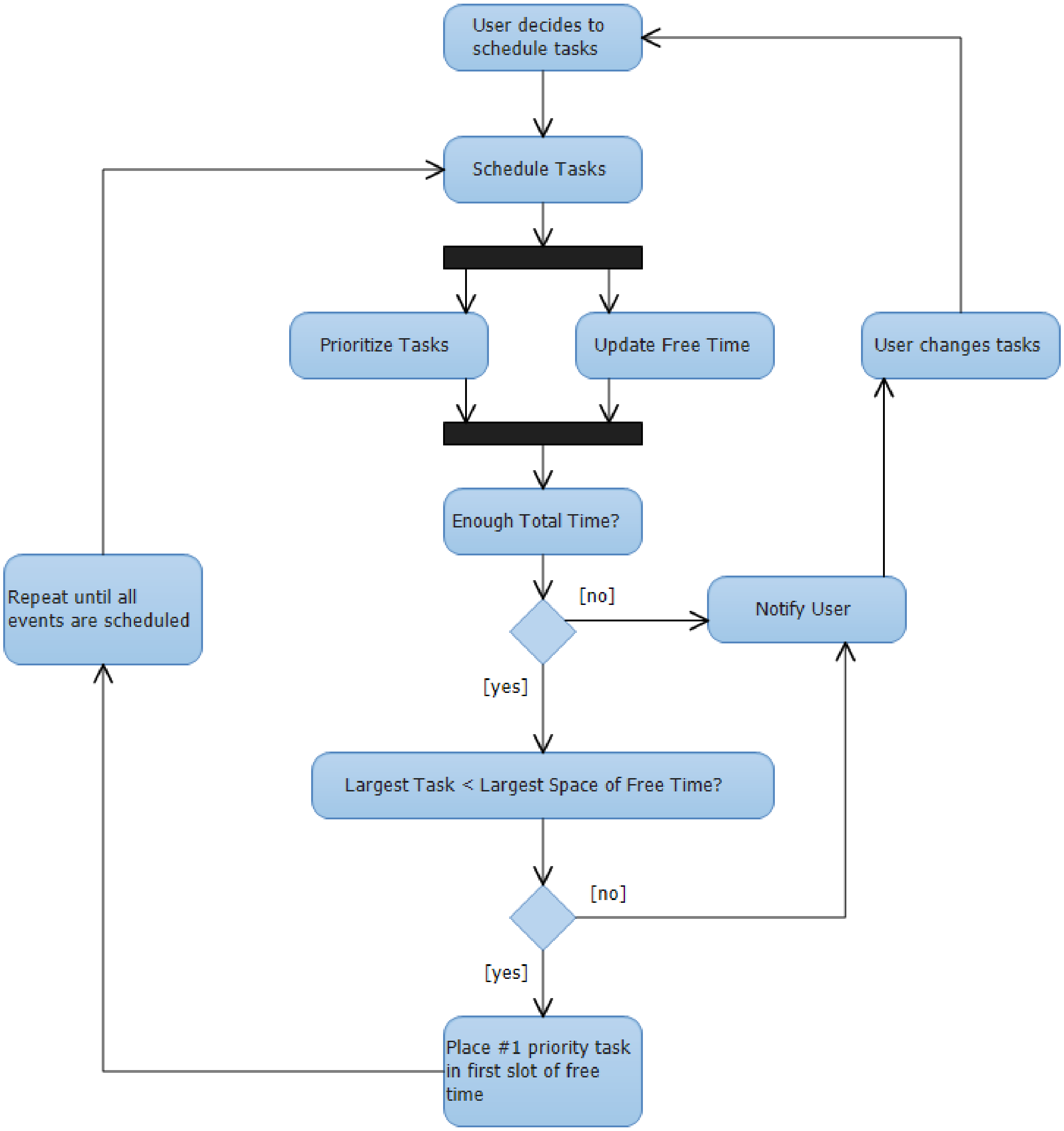
Although the data structures are fairly simple, the algorithms are quite complex. Apart from the myriad simpler algorithms that convert user input into data structures, the core algorithm of the program needs to take tasks given duration and priority, and time them into agenda events. In addition, another algorithm is to change the timing of the tasks when tasks are progressed or completed. Here is a shortened example:

Task Title	**Task Duration**	**Task Priority**
A	30 minutes (0:30)	1
B	25 minutes (0:25)	2
C	1 hour (1:00)	3
D	5 minutes (0:05)	4
E	2 hours (2:00)	5

Timeline:



In this situation, from 0'clock to 6'clock, tasks A-E need to be completed. Before diving into how the algorithm works, try to fit the tasks in intuitively. It's apparent that although task E has the lowest priority, it has the longest duration. This brings up a dilemma in prioritization, where duration of the task can override priority since the task needs to be completed. The following algorithm considers this dilemma and solves it.


User decides to schedule tasks
Schedule Tasks
Prioritize Tasks
Update Free Time
User changes tasks
Enough Total Time?
[no]
Notify User
Repeat until all events are scheduled
[yes]
Largest Task < Largest Space of Free Time?
[no]
[yes]
Place #1 priority task in first slot of free time

This is the central algorithm of the program, involving other complex processes such as getting free time, prioritizing tasks, and managing all the events in the agenda.