

## Shokhzodbek Saidov

### Project 2

In this project, it was asked to implement a program that reads input files about degrees, departments, and students and stores the information in a combination of Array Lists, Linked Lists, and Binary Trees. It was a continuation of Project 1 with additional commands and functions.

#### **ArrayLists:**

- Department ArrayList consists of an array list of courses, where each course stores a name, title, and a linked-list of prerequisites.
- Degree ArrayList consists of a linked list of required courses. Each course is in a linked list of its own to take into account disjunct courses.

#### **Linked Lists:**

- I made respective LinkedList files for information coming from degrees. I used reqLinkedList once for generic purposes, which is utilized by degrees, students, and courses.

#### **Binary Trees:**

- I made the required changes to the courses and switched its data structure from an array list to a binary tree, which is sorted by the course name. Student information is also contained in a binary tree sorted by their respective name.

#### **Features:**

- All commands work properly according to the instructions.
- I was able to fix the errors noted in the comments for Project 1. Print of courses now does disambiguate between AND and OR prerequisites. I think I was also able to remove any cases that would give a segmentation fault. All were minor changes.
- Commands “n ” and “r ” were the most troublesome to make, because you need to keep track of courses that open up but have already been taken for the former, and due to the multiple layers of deletion needed for the latter. They all worked properly and correctly in my test cases, though there’s one point I’d like to make in the Bugs section

**Bugs:**

- There are no leaks and errors shown by valkyrie upon running all commands.
- NOTE: There is a case where I ran the “r” command multiple times, and it gave a few errors in valkyrie, due to some freeing/mallocing which I wasn’t able to get rid of. An example is shown below:

```
p c CS 202
p c CS 205
r Computer Science, CS 150
p c CS 202
p c CS 205
p c MATH 272
r Mathematics, MATH 263
p c MATH 272
p g BS Mathematics
p d Mathematics
```

```
Valgrind: FINISHED 'project' (wallclock runtime: 2.444s)
Errors: 5, Leaked Bytes: 0
+ Memcheck output for process id ==20984== (parent pid ==17968==)
+ Preamble
+ IVR [5]: Invalid read of size 8
+ Suppressed errors
```