Final Producer Report B-tree Visualization Project

Director: Samuel Morrison

Producer: Brayden Peck

Other team members: Conley O'Neill, Thomas Wood

# Section 1 Postmortem

## Goals:

* Recode B Tree data structures in C++
* Convert GUI into Qt
* Clean up B Tree classes and nodes.
* Provide instructions as for what is happening with insertions, deletions, merging, and splitting.
* Include animations for tree operations

Gannt Chart detailing progress throughout the semester

A diagram of a tree

Description automatically generated

## Challenges:

* The major challenge that we faced with this project was the confusion of having multiple different structures for B trees provided as reference. The provided GUI did not structure the B tree correctly and would run into issues if too many nodes were inserted.
* The provided code was wrong and had enough bugs such that starting over was opted to be a better choice.
* Recoding in C++ and Qt made it so that the project could run on a variety of systems. However, that made the project more complex.
* Because of the way that Qt works and the way the data structures we made, the classes can’t interact directly with the GUI, so adding animations could have been easier with a different implementation of the data structures.
* With the way that we divided up work, the workload was split between Brayden and Sam coding the data structures while Conley, and Thomas researched Qt and created the GUI. With the way that this was completed it made adding in animations very challenging. Because of this, we prioritized having a completed GUI and instructions over having animations.

## Areas of Progress:

* Progress of the data structures, and GUI separately went well throughout the semester. However, there were complications when it came to combining them.
* The data structures were all working as intended for integers shortly before midterms.
* The GUI was also set up and creating/displaying nodes by midterms.
* Early integration of the data structure went well but drawing the nodes into the correct positions took a lot of effort.
* Spacing out the nodes correctly for each size of tree took a bit of work but we managed to come up with a good solution.

## Completed Goals:

* Recode B tree data structures in C++
* Convert GUI into Qt
* Clean up B Tree classes and nodes.
* Provide instructions as for what is happening with insertions, deletions, merging, and splitting.

## Future improvements

* The main future improvement is animations for the B-Tree data structures. We did not find an easy way to implement this over the course of the semester with the way that the data structures were coded.
* Making the data structures generic would be a good improvement as the data structures only hold integers.
* A setting to enable and disable duplicates in the data structures was requested.
* More detailed instructions with node numbers, and why keys ended up in the exact locations, relating to insertions.
* Adding unit tests to ensure that the data structures were working as intended even after new changes are introduced.