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Project 6

I used two maps; one that stores an int for ID and Student for the student record and the other that stores a string for name and an int for the ID. I used this because I didn’t want to store the Student record again because it’s so large. So, I stored the ID twice, which is also probably not as efficient as maybe a pointer would’ve been but it’s not storing the large record. The way I used it was I could search by name and get the ID and then use that to search for the record in the ID map; otherwise if I was given the ID then I would just use the ID map.  
 Big O for each public method in the DB:

* Empty () – O(1) – since maps essentially use a binary search tree then empty would just need to check the root.
* Size() – O(N) – again because maps use a binary search tree, then the worst case is it would have to check every spot to increment a count and you would have to see if they had children and if so you would have to keep going done the list. This could be fixed by making a variable and incrementing/decrementing when you made insert and remove.
* Insert() – O(log N) – worst case scenario the tree would have to search the height of the tree once to see if it is there and then go the height of the tree for insert. This would be log N + log N but since it is still not close enough to N it would just be logN.
* searchByID() – O(logN) – worst case you would have to search the height of the tree.
* searchByName() – O(logN) – would be 2logN because I call the other search function in my method but since the multiples get dropped it would be just logN.
* removeByID() – O(logN) – worst case would be 3logN because I call a search function and I also erase from both maps. I would think that the erase would have to iterate through to find it an then erase but, again, because the multiples get dropped it would just be log N.
* removeByName() – O(logN) – worse case would be 3logN because of the same reason for removeByID().

The ID is stored more than once because we have a variable in Student that is for the ID then I also have ID stored in both of my maps in the DB. I also have name stored more than once because I have a name variable in Student and I also have name stored in one of my maps.