CMSC 204 Project 4 - Michael Bushman
Design & Algorithm

I first started with the CourseDBElement class and implemented comparable. I created my variables to hold all five pieces of course information. I created a basic constructor to initialize the variables and then another constructor with 5 parameters to assign to each variable. When I put implements comparable, a compareTo method popped up. I realized I need to created my own Comparable class in order to change the Object parameters in the compareTo method. Once I created a Comparable class with the compareTo parameters, I went back to the CourseDBElement class to work on the compareTo method. Since it need to return an int, I used the Integer compare method to compare the values of the current CRN vs the given CRN. I worked on the toString method next. I create a string with the five pieces of information with no spaces. Lastly, I went ahead and created all of my getter and setter methods needed to the Junit tests.

Next, I worked on the the CourseDBStructure class. I first created my variables to the hash table. I created two constructors, one that takes in an int and one that takes in an string and int. I then worked on the add method. I created my variable along with the hashcode. I used an if statement to check if the current element is not in the hash table. If it wasn't, I then added that element to the hash table. If the current element wasn't null, I then checked if the given element was already in our hash table. If it was, then it quit quietly. If it wasn't, then I added it to the hash table. For the get method, I first got the hashcode based on the given crn. I then checks if the hash table at that hashcode was null. If it was, I throw an IOException. If not, I returned the matching element from the hash table. I then worked on the ArrayList method. I created my variable to hold the ArrayList and then created a for loop to run through the hash table size. While the hashtable was not null, I grabbed each element from the hash table and added them to the array list. Once the hash table was finished, I ended the method. For getTableSize method, I return the hash table's size.

Lastly, I worked on the CourseDBManager class. I first created my variable to hold the CourseDBStructure. I then created the add method and created a new CourseDBElement object to hold all five pieces of information and added it to the CourseDBStructure variable. I then worked on the get method. I used a try to return the matching element based on the given crn. If that didn't work, I then threw an IOException error and returned null. Here is where I began to struggle a lot. For the readFile method, I started off creating my variables for the StringBuilder and scanner. I used a while loop to check if the file had a next line in it. While it did, I appended each line to the stringbuilder. I then closed the scanner. The reason I said that this is where I was having issues is because I never got this method to pass for the Junit test. I first began creating strings and string arrays to hold each line of the file. I used split to separate each of the information into the string array and made sure to assign each of the five pieces of information to the correct variables in the element class. However, I kept getting compilation errors when running the program. Once I tried reading input file, my code would crash and I started getting mismatch data errors along with out of bounds error. I then reverted back to the stringbuilder method above. Although this didn't crash my code and allowed me to compile it, when I went to input the file, nothing happens. I clicked on show DB but nothing was there. I believe my show all methods and everything else should be working so I think it's definitely the readFile method that's wrong. For the showAll method, I used the CourseDBStructure variable and used the showAll method from it. The problem that I believe I am having is when it comes to the teacher's name. I need to figure out a way to recognize that the teacher's name is in the additional array slots and that I need to figure out how to add the additional information to the instructor name.

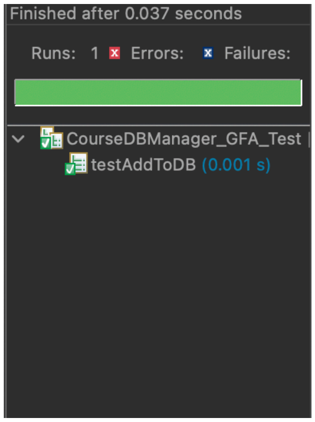
Challenges & Failed Junits

I was able to pass the GFA Junit test but I struggled quite a bit when it came to reading the file and making sure my program could handle different types on course information including missing course information. As mentioned before, I began writing the code to break each line up into their own part in a string array. I assigned each part of the array to the correct course variable. I still kept failing the readFile Junit test and honestly couldn't figure out why. I changed my code to at least stop the compilation errors and the sudden crashing. This way, I could still test out all of the other functions in the program. For the testHashtable Junit, I also failed that one as well. I kept getting an AssertionError and I believe it's because on my add method. I believe the add method is incorrectly adding the newly updated course information. Although to me, my add method seems to replace the given element the matches the same crn. The add method seems to add the updated course to the array list which would make the size 3 instead of the expected 2.

Assumptions

For the CourseDBStructureTest, I noticed that I kept failing the testGetTableSize Junit test. I looked at the test itself and noticed that both CDS in the setup() method are both 20 in size. But then when I looked at the actual testGetTableSize, the assertEquals said 19 for the first test. I'm assuming this was meant to be 20 as it was initialized in the beginning. I changed it to 20 which got my test working for this one. As mentioned above, I had to change the testShowAll method to have the correct order of elements in the list. For the testShowAll, I noticed that the order of the list was incorrect. I noticed that the CRN 30559 was listed first when it should be last. The CRN 30503 was listed second when it should be first and the CRN 30504 was listed third when it should be second.

Junits and Test Runs



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Finished after 0.037 seconds
Runs: 1 ☒ Errors: ☒ Failures:
CourseDBManager_GFA_Test
  testAddToDB (0.001 s)
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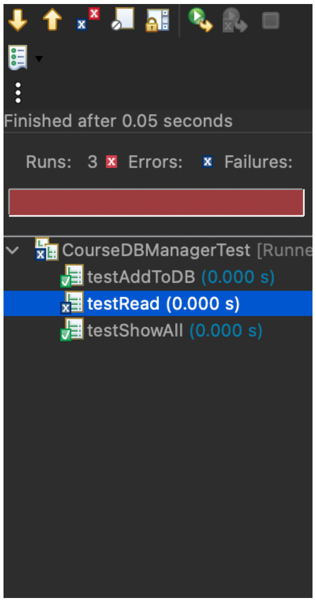

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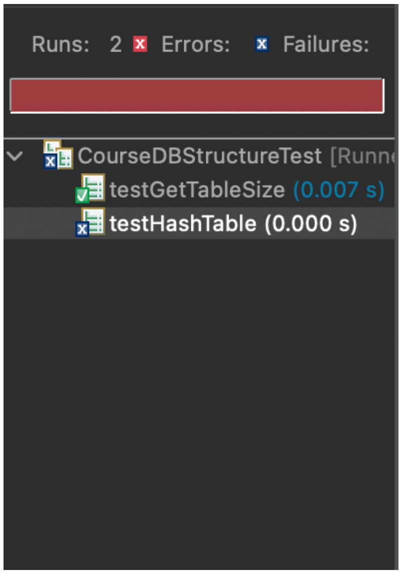
Runs: 3 ☒ Errors: ☒ Failures:
CourseDBManagerTest [Runne
  testAddToDB (0.000 s)
  testRead (0.000 s)
  testShowAll (0.000 s)
```



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Runs: 2 ☒ Errors: ☒ Failures:
CourseDBStructureTest [Runn
  testGetTableSize (0.007 s)
  testHashTable (0.000 s)
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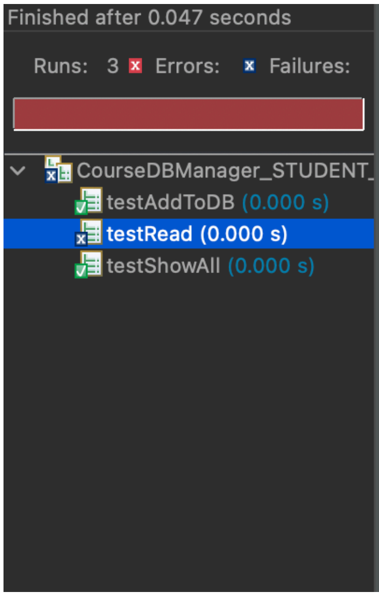

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Finished after 0.047 seconds
Runs: 3 ☒ Errors: ☒ Failures:
CourseDBManager_STUDENT_
  testAddToDB (0.000 s)
  testRead (0.000 s)
  testShowAll (0.000 s)
```
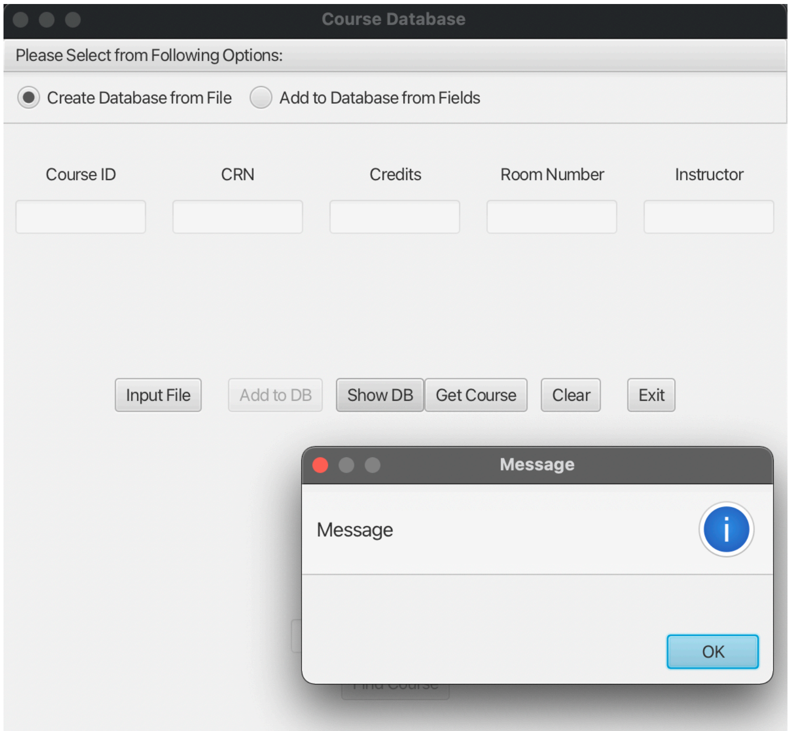
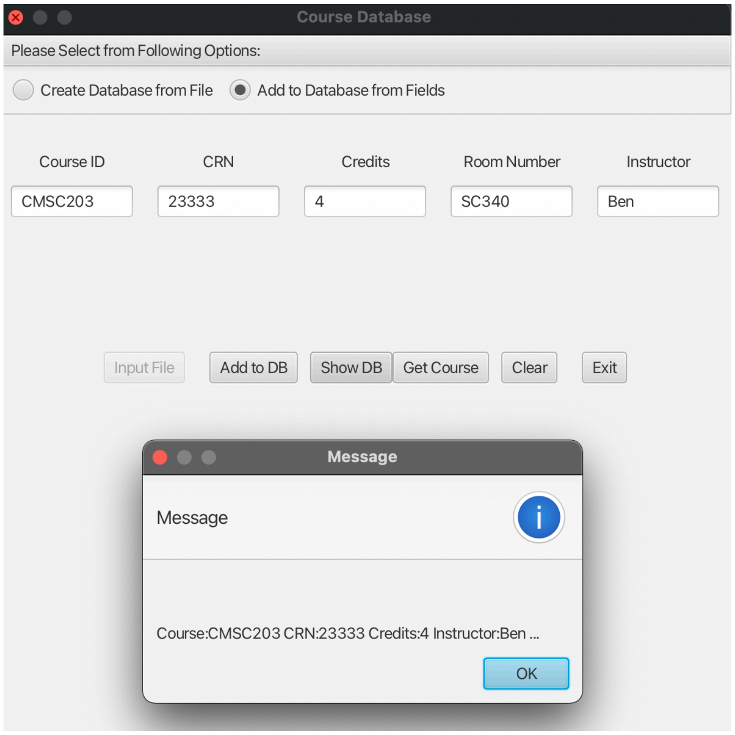


Course Database

Please Select from Following Options:

● Create Database from File ○ Add to Database from Fields

Message


Course Database

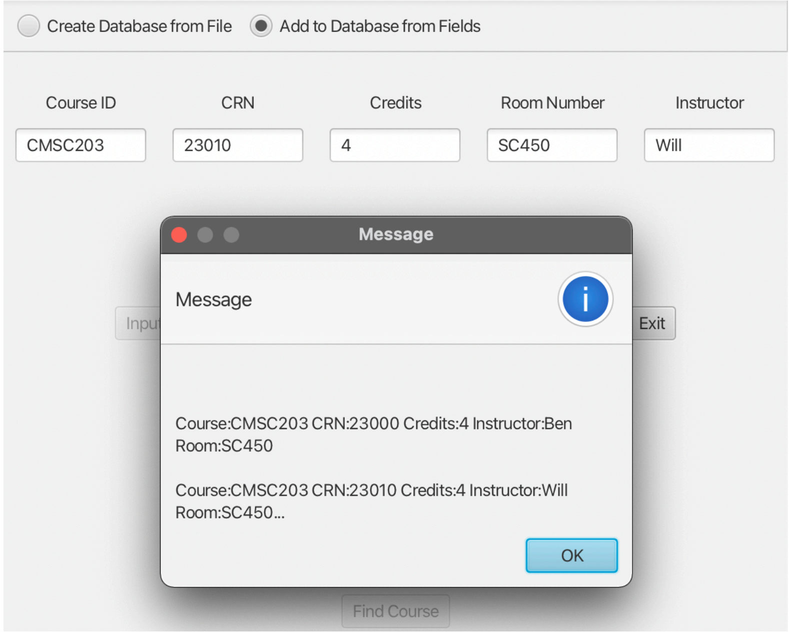
Please Select from Following Options:

○ Create Database from File ● Add to Database from Fields

Course ID: CMSC203
CRN: 23333
Credits: 4
Room Number: SC340
Instructor: Ben

Message

Course:CMSC203 CRN:23333 Credits:4 Instructor:Ben ...

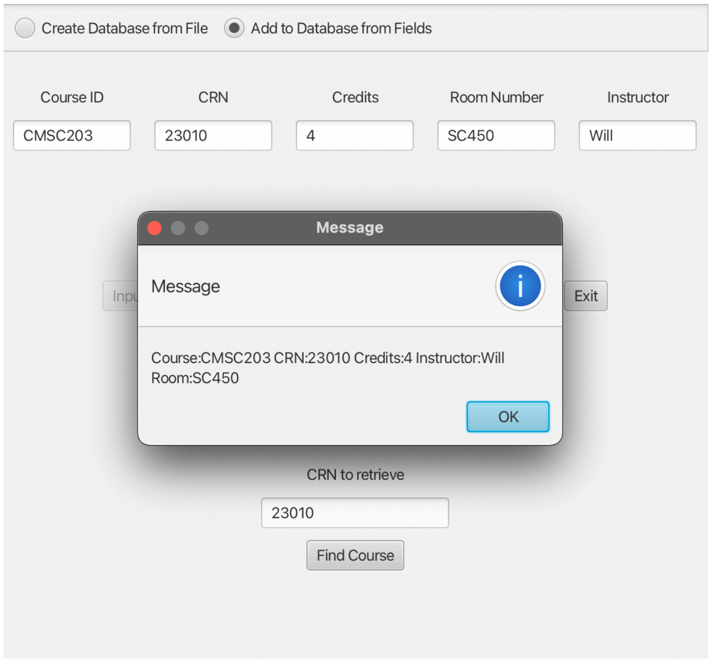

○ Create Database from File ● Add to Database from Fields

Course ID: CMSC203
CRN: 23010
Credits: 4
Room Number: SC450
Instructor: Will

Message

Course:CMSC203 CRN:23000 Credits:4 Instructor:Ben
Room:SC450

Course:CMSC203 CRN:23010 Credits:4 Instructor:Will
Room:SC450...


○ Create Database from File ● Add to Database from Fields

Course ID: CMSC203
CRN: 23010
Credits: 4
Room Number: SC450
Instructor: Will

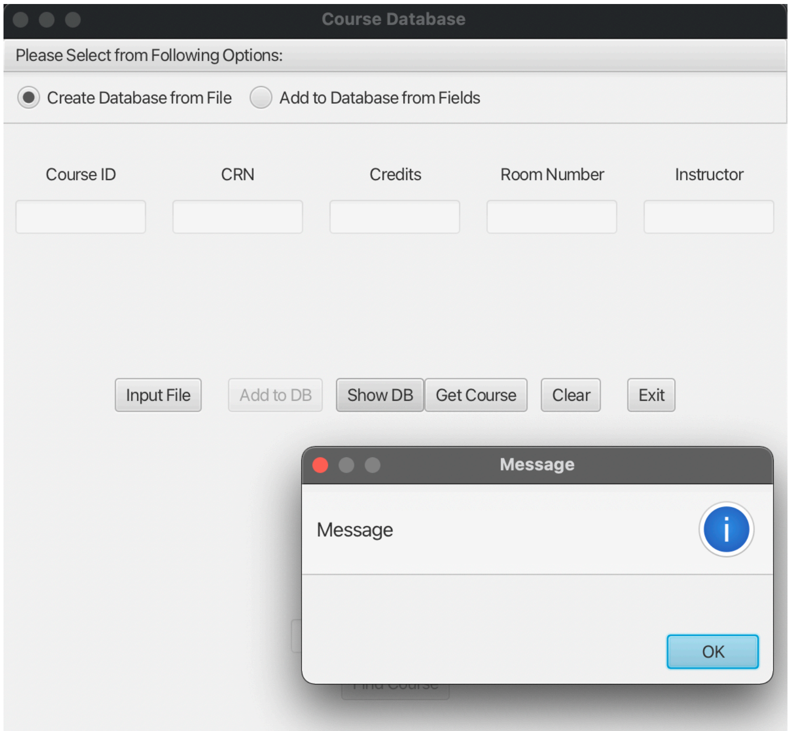
Message

Course:CMSC203 CRN:23010 Credits:4 Instructor:Will
Room:SC450

CRN to retrieve: 23010

Test Runs

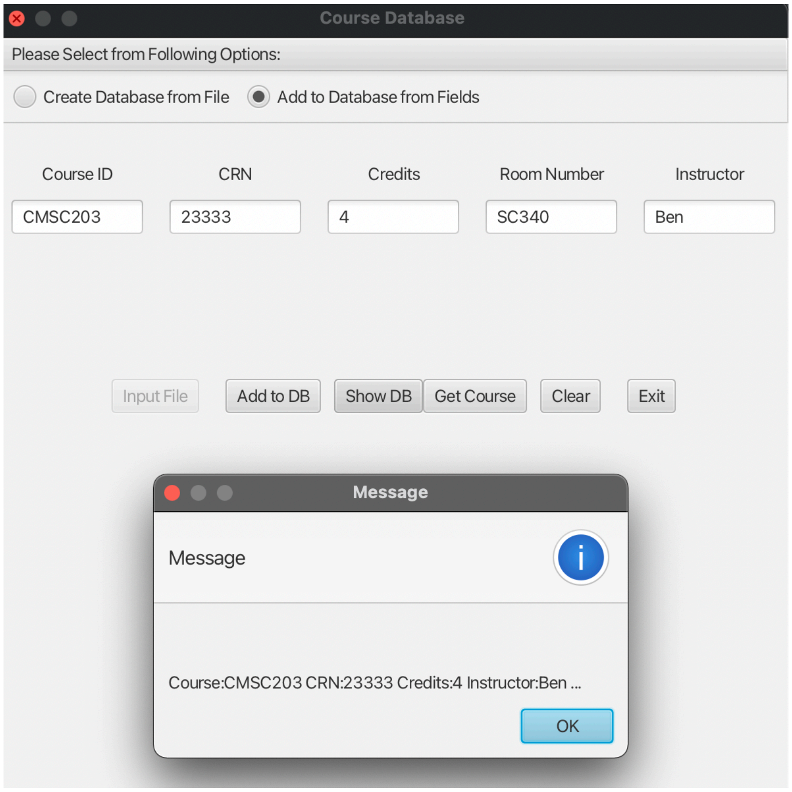
Expected: Select file and it uploads a message with all of the courses
Actual: Failed and doesn’t show any courses.



● Create Database from File ○ Add to Database from Fields

Message

Expected: Add to Database: CMSC203, 23333, 4, SC340, Ben
Actual: message with CMSC203, 23333, 4, SC340, Ben



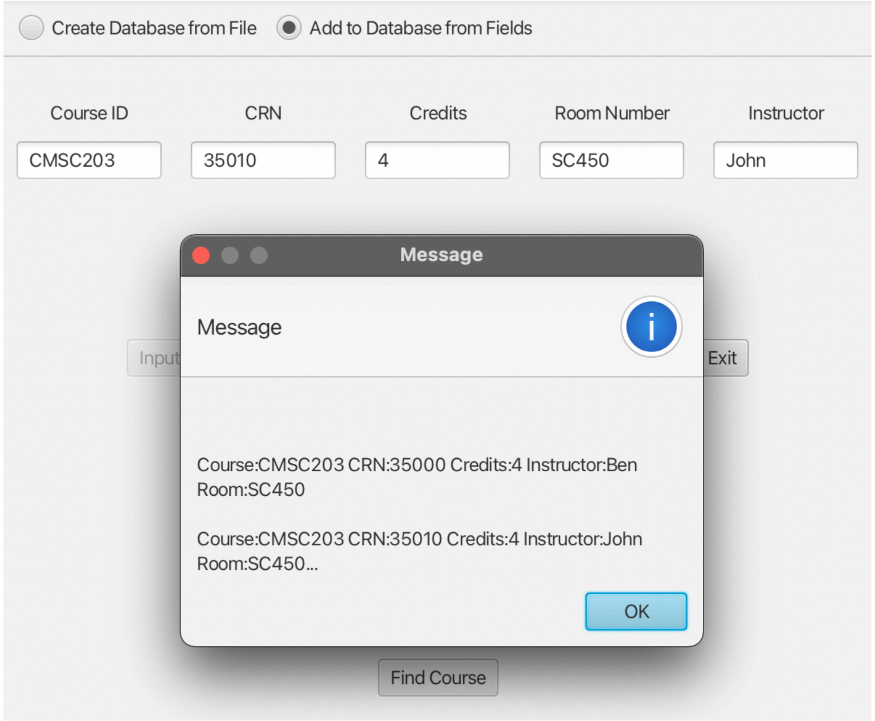
○ Create Database from File ● Add to Database from Fields

Course ID	CRN	Credits	Room Number	Instructor
CMSC203	23333	4	SC340	Ben

Message

Course:CMSC203 CRN:23333 Credits:4 Instructor:Ben ...

Expected: Add to Database: CMSC203, 35000, 4, SC450, Ben
Add to Database: CMSC203, 35010, 4, SC450, John
Actual: message with CMSC203, 35000, 4, SC450, Ben and CMSC203, 35010, 4, SC450, John



○ Create Database from File ● Add to Database from Fields

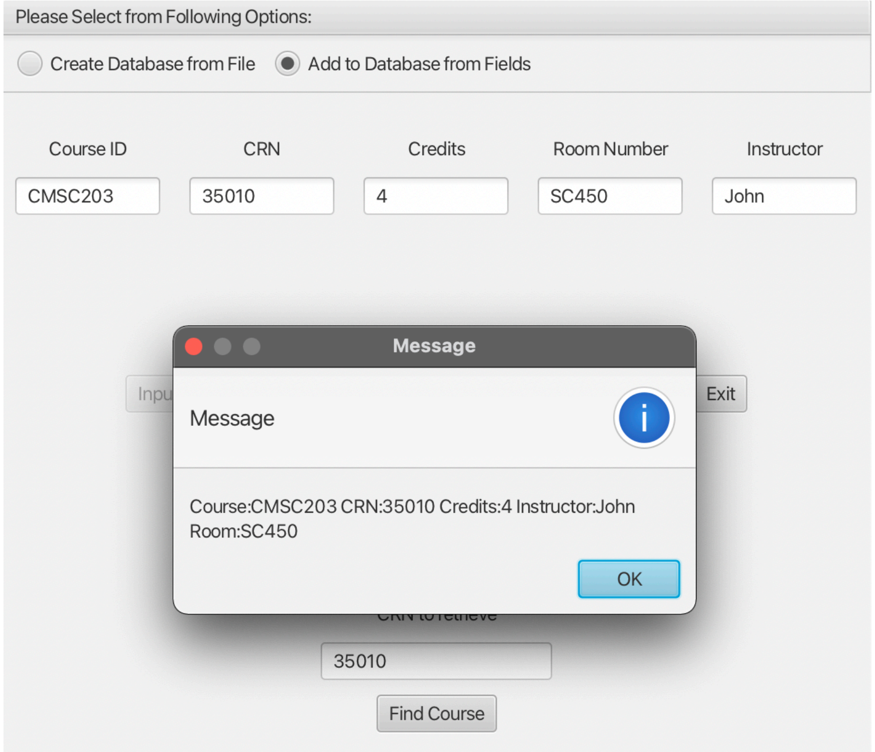
Course ID	CRN	Credits	Room Number	Instructor
CMSC203	35010	4	SC450	John

Message

Course:CMSC203 CRN:35000 Credits:4 Instructor:Ben
Room:SC450

Course:CMSC203 CRN:35010 Credits:4 Instructor:John
Room:SC450...

Expected: Retrieve CMSC203, 35010, 4, SC450, John
Actual: retrieved CMSC203, 35010, 4, SC450, John



Please Select from Following Options:

○ Create Database from File ● Add to Database from Fields

Course ID	CRN	Credits	Room Number	Instructor
CMSC203	35010	4	SC450	John

Message

Course:CMSC203 CRN:35010 Credits:4 Instructor:John
Room:SC450

CRN to retrieve: 35010

Learning Experience

I have learned a lot with this assignment as well as realizing where I am struggling and what I need to focus on. I was comfortable implementing the comparable interface and the element class. Both were pretty straight-forward. I learned a lot when working with the CourseDBStructure and CourseDBManager class. With the CourseDBStructure class, I got very comfortable with creating hash tables, linked lists and traversing those hashtable to add or get matching CRN. I learned a lot about showing all of the contents in an hash table and making sure to traverse it correctly. However, I did struggle quite a bit with this assignment. I was only able to pass the GFA, showAll, getTableSize and addtoDB Junit tests. I struggled with the readFile method because I couldn't figure out a way to deal with having more than just a last name as the instructor. I started implementing a way to split each course into a string array. Once I did that, I used an if statement to check if the array was larger than 5. If it was, I used a for loop to run through the rest of the array to add on the additional name details. This, however, still resulted in a crash and an index 1 out of bounds length 1 error. I reverted my code back to the previous code which doesn't show any DB message but doesn't crash my code every time I try and upload a file. The other issue I ran into was the testHashTable Junit test. I kept getting the AssertionError. The test fails once it compares the array list size to 2. The reason I believe this is failing is that my add method doesn't correctly update when a course needs to be replaced. The issue is that my code just adds the CMSC500-Updated without replacing the one it's supposed to be updating. So, instead of having an array list size of 2, it is 3 with my code. Although I thought my code accounted for this, I now know that I need to update that method to run the test properly. I have realized that my main area of weakness in coding is reading and writing files. For some reason, this is the hardest thing for my head to wrap around. I can't seem to find a way to implement read a file and have it correctly identify when someone has a longer last name than usual or if some information about the room number or credits is missing. I need to account for all of these scenarios which I can't seem to do. Overall, I gave this assignment my best attempt but I'm not happy. I'm not happy with the incorrect Junits because I know I could have done better.