|  |  |  |  |
| --- | --- | --- | --- |
| **Vector** | **Line Cost** | **# Times Executes** | **Total Cost** |
| vector<Course> loadCourses (string csvPath) { |  |  |  |
| Define a string vector named courseIds, |  |  |  |
| Display loading CSV file message. |  |  |  |
| Open the course catalog file using the given path. |  |  |  |
| If the file does not open. |  |  |  |
| Display error message. |  |  |  |
| Return empty vector. |  |  |  |
| End if. |  |  |  |
| While lines are in the CSV file. |  |  |  |
| Get each course number from file line. |  |  |  |
| Add each course number to the courseIds vector |  |  |  |
| End While. |  |  |  |
| Close CSV file. |  |  |  |
|  |  | **Total Cost** |  |
|  |  | **Runtime** |  |
| Open the course catalog file using the given path. |  |  |  |
| Define a Course vector of strings named courses. |  |  |  |
| While lines are in the CSV file. |  |  |  |
| Create a new Course struct named c |  |  |  |
| Get each course number from line. |  |  |  |
| Add each course number to c struct number. |  |  |  |
| Get each course title from line. |  |  |  |
| Add each course title to c struct title. |  |  |  |
| Define a string vector named validPrereqs. |  |  |  |
| While prerequisites are in line. |  |  |  |
| Get each prerequisite from line. |  |  |  |
| If prerequisite is in courseIds vector. |  |  |  |
| Add prerequisite to validPrereqs vector. |  |  |  |
| Else. |  |  |  |
| Break. // prerequisite is NOT in courseIds vector. |  |  |  |
| End If. |  |  |  |
| End While. |  |  |  |
| If ALL prerequisites are IN courseIds vector. |  |  |  |
| Set c struct coursePrerequisite vector to validPrereqs |  |  |  |
| Add c struct to courses vector |  |  |  |
| End If. |  |  |  |
| End While. |  |  |  |
| Close CSV file |  |  |  |
| Return courses vector. |  |  |  |
| } // End function. |  |  |  |
|  |  | **Total Cost** |  |
|  |  | **Runtime** |  |
|  |  |  |  |
| // Hash Table |  |  |  |
| **HashTable** | **Line Cost** | **# Times Executes** | **Total Cost** |
| Define a string vector named courseIds, |  |  |  |
| Display loading CSV file message. |  |  |  |
| Open the course catalog file using the given path. |  |  |  |
| If the file does not open. |  |  |  |
| Display error message. |  |  |  |
| Return empty vector. |  |  |  |
| While lines are in the CSV file. |  |  |  |
| Get each course number from file line. |  |  |  |
| Add each course number to the courseIds vector |  |  |  |
| Close CSV file. |  |  |  |
|  |  | **Total Cost** |  |
|  |  | **Runtime** |  |
| Open the course catalog file using the given path. |  |  |  |
| Define an empty Hash Table<string, Course) named courseTable. |  |  |  |
| While lines are in the CSV file. |  |  |  |
| Create a new Course struct named course |  |  |  |
| Get each course number from line. |  |  |  |
| Add each course number to course courseNumber. |  |  |  |
| Get each course title from line. |  |  |  |
| Add each course title to course courseTitle. |  |  |  |
| Define a string vector named validPrereqs. |  |  |  |
| Define and set boolean named allValidPrereqs and set to true. |  |  |  |
| While prerequisites are in line. |  |  |  |
| Get each prerequisite from line. |  |  |  |
| If prerequisite is in courseIds vector. |  |  |  |
| Add prerequisite to validPrereqs vector. |  |  |  |
| Else. |  |  |  |
| Set allValidPrereqs to false. |  |  |  |
| Break //(1/++) prerequisite is NOT in courseIds vector. |  |  |  |
| If allValidPrereqs are IN courseIds vector. |  |  |  |
| Set course preReg vector to validPrereqs |  |  |  |
| Insert course struct in courseTable with courseNumber as key. |  |  |  |
| Otherwise: |  |  |  |
| While a temp next pointer is not nullpointer. |  |  |  |
| Insert courseNumber with key at temp next pointer. |  |  |  |
| Close CSV file |  |  |  |
| Return courseTable. |  |  |  |
| } // End function. |  |  |  |
|  |  | **Total Cost** |  |
|  |  | **Runtime** |  |
| // BST |  |  |  |
| **Binary Search Tree** | **Line Cost** | **# Times Executes** | **Total Cost** |
| Define loadCourses(string csvPath) that returns a pointer to a BinarySearchTree named courseTree { |  |  |  |
| Define a string vector named courseIds, |  |  |  |
| Display loading CSV file message. |  |  |  |
| Open the course catalog file using the given path. |  |  |  |
| If the file does not open. |  |  |  |
| Display error message. |  |  |  |
| Return empty vector. |  |  |  |
| While lines are in the CSV file. |  |  |  |
| Get each course number from file line. |  |  |  |
| Add each course number to the courseIds vector |  |  |  |
| Close CSV file. |  |  |  |
|  |  | **Total Cost:** |  |
|  |  | **Runtime:** |  |
| Open the course catalog file using the given path. |  |  |  |
| Define an empty BinarySearchTree named courseTree. |  |  |  |
| While lines are in the CSV file. |  |  |  |
| Create a new Course struct named course |  |  |  |
| Get each course number from line. |  |  |  |
| Add each course number to course courseNumber. |  |  |  |
| Get each course title from line. |  |  |  |
| Add each course title to course courseTitle. |  |  |  |
| Define a string vector named validPrereqs. |  |  |  |
| Define and set boolean named allValidPrereqs and set to true. |  |  |  |
| While prerequisites are in line. |  |  |  |
| Get each prerequisite from line. |  |  |  |
| If prerequisite is in courseIds vector. |  |  |  |
| Add prerequisite to validPrereqs vector. |  |  |  |
| Set allValidPrereqs to false. |  |  |  |
| Break //(1/++) prerequisite is NOT in courseIds vector. |  |  |  |
| If allValidPrereqs are IN courseIds vector. |  |  |  |
| Set course preReg vector to validPrereqs |  |  |  |
| If courseTree root key is nullpointer. |  |  |  |
| Set courseNumber to new root key of courseTree. |  |  |  |
| Create a tempCourseNumber pointer, set equal to courseNumber root key. |  |  |  |
| If tempCourseNumber key is nullpointer. |  |  |  |
| Insert course in courseTree w/ courseNumber as key |  |  |  |
| Otherwise if: |  |  |  |
| Course courseNumber key is less than tempCourseNumber pointer key. |  |  |  |
| Set temp’s left pointer to the return recursive call on temp’s left pointer. |  |  |  |
| and pass courseNumber key to insert |  |  |  |
| Otherwise if: |  |  |  |
| Course courseNuber key is greater thantempCourseNumber key. |  |  |  |
| Set tempCourseNumber’s right pointer to the return recursive call on temp’s left pointer and |  |  |  |
| pass courseNumber key to insert. |  |  |  |
| Otherwise: |  |  |  |
| Return courseNumber. |  |  |  |
| Close CSV file |  |  |  |
| Return courseTree. |  |  |  |
| } // End function. |  |  |  |
|  |  | **Total Cost:** |  |
|  |  | **Runtime:** |  |