12-1-2023

Kaleb Ward

CS-300-H2988

**Evaluation**

1. **Evaluate the run-time and memory of data structures that could be used to address the requirements:**

* **Vector:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Code** | **Line Cost** | **# Times Executes** | **Total Cost** |
| **INITIALIZE fstream and ifstream for file information** | **1** | **1** | **1** |
| **INITIALIZE temporary empty vector data tempData** | **1** | **1** | **1** |
| **IF file does not exist THEN** | **1** | **1** | **1** |
| **EXIT function** | **1** | **1** | **1** |
| **FOR each line in file ifstream DO** | **1** | **n** | **n** |
| **IF line is empty THEN** | **1** | **n** | **n** |
| **GOTO next line in order** | **1** | **n** | **n** |
| **INITIALIZE variables tempCourseNumber, tempCourseName, and tempCoursePreRequisites** | **1** | **1** | **1** |
| **SPLIT line into three variables created for temp use utilizing separation dividers “,”** | **1** | **1** | **1** |
| **IF split data does not contain tempCourseNumber and tempCourseName THEN** | **1** | **n** | **n** |
| **GOTO next line in order** | **1** | **n** | **n** |
| **ADD data to tempData (courseNumber, courseName, prerequisite)** | **1** | **1** | **1** |
| **FOR each course in tempData DO** | **1** | **n** | **n** |
| **IF prerequisite on line does not contain a courseNumber THEN** | **1** | **n** | **n** |
| **REMOVE prerequisite from data** | **1** | **n** | **n** |
| **CREATE new course object with corresponding information** | **1** | **1** | **1** |
| **ADD created course object to global vector data courses** | **1** | **1** | **1** |
| **GOTO next data in line** | **1** | **n** | **n** |
| **PRINT course data (courseNumber, courseName, prerequisite)** | **1** | **1** | **1** |
|  |  | **Total Cost** | **19n+10** |
|  |  | **Runtime** | **0(n)** |

* **Hash Table:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Code** | **Line cost** | **# Times Executes** | **Total Cost** |
| **INITIALIZE fstream and ifstream for file information** | **1** | **1** | **1** |
| **INITIALIZE temporary empty hash table tempData** | **1** | **1** | **1** |
| **IF file does not exist THEN** | **1** | **1** | **1** |
| **EXIT function** | **1** | **1** | **1** |
| **FOR each line in file ifstream DO** | **1** | **n** | **n** |
| **IF line is empty THEN** | **1** | **n** | **n** |
| **GOTO next line in order** | **1** | **n** | **n** |
| **INITIALIZE variables tempCourseNumber, tempCourseName, and tempCoursePreRequisites** | **1** | **1** | **1** |
| **SPLIT line into three variables created for temp use utilizing separation dividers “,”** | **1** | **1** | **1** |
| **IF split data does not contain tempCourseNumber and tempCourseName THEN** | **1** | **n** | **n** |
| **GOTO next line in order** | **1** | **n** | **n** |
| **ADD data to tempData with key (courseNumber, courseName, prerequisite)** | **1** | **1** | **1** |
| **FOR all data within tempData hash table DO** | **1** | **n** | **n** |
| **IF hash table key contains pre-requisites that does not have a valid course number THEN** | **1** | **n** | **n** |
| **DELETE key and data within** | **1** | **n** | **n** |
| **GOTO next key** | **1** | **n** | **n** |
| **CREATE new course object with corresponding information** | **1** | **1** | **1** |
| **ADD created course object to global HashTable courses** | **1** | **1** | **1** |
| **PRINT course data (courseNumber, courseName, prerequisite)** | **1** | **1** | **1** |
|  |  | **Total Cost** | **19n+10** |
|  |  | **Runtime** | **0(n)** |

* **Binary Search Tree:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Code** | **Line Cost** | **# Times Executes** | **Total Cost** |
| **INITIALIZE fstream and ifstream for file information** | **1** | **1** | **1** |
| **INITIALIZE temporary BinarySearchTree data tempData** | **1** | **1** | **1** |
| **IF file does not exist THEN** | **1** | **1** | **1** |
| **EXIT function** | **1** | **1** | **1** |
| **FOR each line in file ifstream DO** | **1** | **n** | **n** |
| **CALL checkLineFormat** | **8** | **8** | **8** |
| **IF check line format is false THEN** | **1** | **n** | **n** |
| **GOTO next line in order** | **1** | **n** | **n** |
| **INITIALIZE variables tempCourseNumber, tempCourseName, and tempCoursePreRequisites** | **1** | **1** | **1** |
| **SPLIT line into three variables created for temp use utilizing separation dividers “,”** | **1** | **1** | **1** |
| **ADD data to tempData (courseNumber, courseName, prerequisite)** | **1** | **1** | **1** |
| **FOR all nodes in temp binary search tree tempData DO** | **1** | **n** | **n** |
| **IF node prerequisite does not have a corresponding course number THEN** | **1** | **n** | **n** |
| **DELETE current nodes prerequisite** | **1** | **1** | **1** |
| **IF node exists to right THEN** | **1** | **n** | **n** |
| **TRAVERSE next node on right** | **1** | **n** | **n** |
| **IF node exists to left THEN** | **1** | **n** | **n** |
| **TRAVERSE next node on left** | **1** | **n** | **n** |
| **CREATE new course object** | **1** | **n** | **n** |
| **ADD created course object to global binary search tree courses** | **1** | **1** | **1** |
| **PRINT course data (courseNumber, courseName, prerequisite)** | **1** | **1** | **1** |
|  |  | **Total Cost** | **28n+17** |
|  |  | **RunTime** | **0(n)** |