Run-Time Analysis

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| --- | --- | --- | --- |
| **Vector Lines** | Line Cost | # Executions | Total Cost |
| Initialize string for course code | 1 | N | 1 |
| Initialize string for course name | 1 | N | N |
| Initialize int for course prerequisites | 1 | N | N |
| Create vector for courses | 1 | 1 | N |
| For loop to account for all inputs | 1 | N | N |
| Input for course code | 1 | N | N |
| Input for course name | 1 | N | N |
| Input for course prerequisites | 1 | N | N |
| Push all inputs to vector as a course | 1 | N | N |
|  |  | **Total cost** | 8N+1 |
|  |  | **Runtime** | O(N) |

|  |  |  |  |
| --- | --- | --- | --- |
| Hash Data Structure | Line Cost | # Executions | Total Cost |
| Create hash table | 1 | 1 | 1 |
| Initialize vector | 1 | 1 | 1 |
| Create insert function | 1 | 1 | 1 |
| Create course class | 1 | 1 | 1 |
| Create variables inside course | 1 | 1 | 1 |
| For loop to iterate over table | 1 | n | N |
| If course matches | 1 | n | N |
| Return course | 1 | n | N |
| else | **1** | n | N |
| Return error | **1** | n | N |
| Create course objects with name, id, prerequisites | **1** | n | N |
| Call insert function | **1** | n | N |
|  |  | **Total cost** | 7N + 5 |
|  |  | **Runtime** | O(N) |

|  |  |  |  |
| --- | --- | --- | --- |
| Tree Data Structure | Line Cost | # Executions | Total Cost |
| Create variable for course ID input | 1 | 1 | 1 |
| Create variable for course name input | 1 | 1 | 1 |
| Create variable for course prerequisite input | 1 | 1 | 1 |
| Loop through file | 1 | N | N |
| While not end of file | 1 | N | N |
| Input for course ID | 1 | N | N |
| Input course name | 1 | N | N |
| If there is a prerequisite | 1 | N | N |
| Input for prerequisite | **1** | N | N |
| Else | **1** | N | N |
| Close file | **1** | N | N |
| Break | **1** | n | N |
|  |  | **Total cost** | 9N + 3 |
|  |  | **Runtime** | O(N) |