**Runtime Analysis**

|  |  |  |  |
| --- | --- | --- | --- |
| **Vector** | **Line Cost** | **# Times Executes** | **Total Cost** |
| **Create vector** | 1 | 1 | 1 |
| **For each data entry in file** | 1 | n | n |
| **Create new course item** | 1 | n | n |
| **While prerequisite exists** | 1 | n | n |
| **Append prerequisite** | 1 | n | n |
| **Append new course item to vector** | 1 | n | n |
| **Total Cost** | | | 5n + 1 |
| **Runtime** | | | O(n) |

|  |  |  |  |
| --- | --- | --- | --- |
| **Hash Table** | **Line Cost** | **# Times Executes** | **Total Cost** |
| **Create Hash Table** | 1 | 1 | 1 |
| **Create course key** | 1 | n | n |
| **If no node found with key** | 1 | n | n |
| **Assign node with key** | 1 | n | n |
| **Else find next open node** | 1 | n | n |
| **Append new node to end** | 1 | n | n |
| **For each data point in file** | 1 | n | n |
| **Create new course item** | 1 | n | n |
| **While prerequisite exists** | 1 | n | n |
| **Append prerequisite** | 1 | n | n |
| **Append new course item** | 1 | n | n |
|  |  |  |  |
| **Total Cost** | | | 10n + 1 |
| **Runtime** | | | O(n) |

|  |  |  |  |
| --- | --- | --- | --- |
| **Tree** | **Line Cost** | **# Times Executes** | **Total Cost** |
| **Create tree** | 1 | 1 | 1 |
| **Make method to add node** | 1 | 1 | 1 |
| **If all node null, make root** | 1 | 1 | 1 |
| **While less than node, check left pointer** | 1 | n | n |
| **If node is null, add current node** | 1 | n | n |
| **While greater than node, check right pointer** | 1 | n | n |
| **If node is null, add current node** | 1 | n | n |
| **For each data entry in file** | 1 | n | n |
| **Create course item** | 1 | n | n |
| **While prerequisite exists** | 1 | n | n |
| **Append prerequisite** | 1 | n | n |
| **Append new course item** | 1 | n | n |
| **Total Cost** | | | 9n + 3 |
| **Runtime** | | | O(n) |