Pogram 3: Timetest Write-up

*Table 1: Run Times*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ADT** | **Load Factor** | **File1.dat**  **(s)** | **File2.dat**  **(s)** | **File3.dat**  **(s)** | **File4.dat**  **(s)** |
| **Skip List** | **-** | 0.88327 | 0.708791 | 0.823769 | 3.49076 |
| **BST** | **-** | Took too long | Took too long | Took too long | 1.59646 |
| **AVL Tree** | **-** | 1.4162 | 1.10932 | 1.15171 | 2.92356 |
| **Splay Tree** | **-** | 0.371428 | 0.284251 | 0.245177 | 2.49319 |
| **BTree (M = 3, L = 1)**  **BTree (M = 3, L = 200)**  **BTree (M = 1000, L = 2)**  **BTree (M = 1000, L = 200)** | **-** | 0.989853 | 1.79552 | 0.893921 | 3.40123 |
| **-** | 0.966159 | 1.84869 | 1.39996 | 2.42322 |
| **-** | 4.82017 | 7.21537 | 4.68899 | 7.94411 |
| **-** | 2.70741 | 3.66484 | 3.46024 | 3.9091 |
| **Separate Chaining Hash** | **0.5** | 0.433503 | 0.298315 | 0.335475 | 0.75584 |
| **1** | 0.408991 | 0.288406 | 0.299942 | 0.917358 |
| **10** | 0.448214 | 0.362169 | 0.31433 | 1.32112 |
| **100** | 5.17677 | 3.42191 | 2.2699 | 6.24236 |
| **1000** | 51.3271 | 29.6849 | 24.7077 | 54.1449 |
| **Quadratic Probing Hash** | **2** | 0.376825 | 0.299984 | 0.300473 | 0.410093 |
| **1** | 0.330781 | 0.277322 | 0.276052 | 0.365987 |
| **0.5** | 0.232117 | 0.226905 | 0.226241 | 0.322401 |
| **0.25** | 0.232254 | 0.226699 | 0.226567 | 0.317087 |
| **0.1** | 0.23249 | 0.227198 | 0.226774 | 0.307201 |
| **Binary Heap** | **-** | 0.194331 | 0.576582 | 0.579239 | 0.699572 |
| **Quadratic Probing Pointer Hash** | **2** | 0.479339 | 0.366885 | 0.362834 | 0.635673 |
| **1** | 0.428244 | 0.340664 | 0.341142 | 0.733337 |
| **0.5** | 0.341297 | 0.289451 | 0.288914 | 0.634712 |
| **0.25** | 0.365563 | 0.302063 | 0.311337 | 0.522823 |
| **0.1** | 0.450452 | 0.341602 | 0.348059 | 0.565704 |

*Table 2: Big-O for File1.dat:*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ADT** | **Individual Insertion** | **Individual Deletion** | **Series of Insertions** | **Series of Deletions** | **Entire File1.dat** |
| **Skip List** | log(n) | - | nlog(n) | - | nlog(n) |
| **BST** | n | - | n2 | - | n2 |
| **AVL Tree** | log(n) | - | nlog(n) | - | nlog(n) |
| **Splay Tree** | 1 | - | n | - | n |
| **BTree** | mlogm(n/l) | - | nmlogm(n/l) | - | nmlogm(n/l) |
| **Separate Chaining Hash** | 1 | - | n | - | n |
| **Quadratic Probing Hash** | 1 | - | n | - | n |
| **Binary Heap** | 1 | - | n | - | n |
| **Quadratic Probing Pointer Hash** | 1 | - | n | - | n |

*Table 3: Big-O for File2.dat:*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ADT** | **Individual Insertion** | **Individual Deletion** | **Series of Insertions** | **Series of Deletions** | **Entire File2.dat** |
| **Skip List** | log(n) | log(n) | nlog(n) | nlog(n) | nlog(n) |
| **BST** | n | 1 | n2 | n | n2 |
| **AVL Tree** | log(n) | log(n) | nlog(n) | nlog(n) | nlog(n) |
| **Splay Tree** | 1 | n (1 for ave. case) | n | n | n |
| **BTree** | mlogm(n/l) | mlogm(n/l) + l | nmlogm(n/l) | n(mlogm(n/l) + l) | n(mlogm(n/l) + l) |
| **Separate Chaining Hash** | 1 | 1 | n | n | n |
| **Quadratic Probing Hash** | 1 | 1 | n | n | n |
| **Binary Heap** | 1 | log(n) | n | nlog(n) | nlog(n) |
| **Quadratic Probing Pointer Hash** | 1 | 1 | n | n | n |

*Table 4: Big-O for File3.dat:*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ADT** | **Individual Insertion** | **Individual Deletion** | **Series of Insertions** | **Series of Deletions** | **Entire File3.dat** |
| **Skip List** | log(n) | log(n) | nlog(n) | nlog(n) | nlog(n) |
| **BST** | n | n | n2 | n2 | n2 |
| **AVL Tree** | log(n) | log(n) | nlog(n) | nlog(n) | nlog(n) |
| **Splay Tree** | 1 | n | n | n | n |
| **BTree** | mlogm(n/l) | mlogm(n/l) + l | nmlogm(n/l) | n(mlogm(n/l) + l) | n(mlogm(n/l) + l) |
| **Separate Chaining Hash** | 1 | 1 | n | n | n |
| **Quadratic Probing Hash** | 1 | 1 | n | n | n |
| **Binary Heap** | 1 | log(n) | n | nlog(n) | nlog(n) |
| **Quadratic Probing Pointer Hash** | 1 | 1 | n | n | n |

*Table 5: Big-O for File4.dat:*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ADT** | **Individual Insertion** | **Individual Deletion** | **Series of Insertions** | **Series of Deletions** | **Entire File4.dat** |
| **Skip List** | log(n) | log(n) | nlog(n) | nlog(n) | nlog(n) |
| **BST** | log(n) | log(n) | nlog(n) | nlog(n) | nlog(n) |
| **AVL Tree** | log(n) | log(n) | nlog(n) | nlog(n) | nlog(n) |
| **Splay Tree** | log(n) | log(n) | nlog(n) | nlog(n) | nlog(n) |
| **BTree** | mlogm(n/l) + l | mlogm(n/l) + l | n(mlogm(n/l) + l) | n(mlogm(n/l) + l) | n(mlogm(n/l) + l) |
| **Separate Chaining Hash** | 1 | 1 | n | n | n |
| **Quadratic Probing Hash** | 1 | 1 | n | n | n |
| **Binary Heap** | log(n) (1 for average case) | log(n) | nlog(n) (n for average case) | nlog(n) | nlog(n) |
| **Quadratic Probing Pointer Hash** | 1 | 1 | n | n | n |