**PERFORMANCE ANALYSIS OF VECTORS**

|  |  |  |  |
| --- | --- | --- | --- |
| # of Strings | Load Time (sec) | Operation Time (sec) | Output Time (sec) |
| 1,000,000 | 0.15625 | 0.71875 | 6.09375 |
| 2,000,000 | 0.3125 | 1.40625 | 11.9375 |
| 3,000,000 | 0.484375 | 2.26562 | 17.4844 |
| 4,000,000 | 0.609375 | 3.09375 | 23.6875 |
| 5,000,000 | 0.765725 | 4.1875 | 29.5321 |
| 6,000,000 | 0.921875 | 4.82812 | 36.0781 |

Sorting Random 5 Letter Strings Using **STL Vector**:

Removing Duplicates (Preserving Order) of Random 5 Letter Strings Using **STL Vector**:

|  |  |  |  |
| --- | --- | --- | --- |
| # of Strings | Load Time (sec) | Operation Time (sec) | Output Time (sec) |
| 5,000 | 0 | 0.21875 | 0.046875 |
| 10,000 | 0 | 0.859375 | 0.0625 |
| 15,000 | 0.015625 | 2 | 0.125 |
| 20,000 | 0 | 3.46875 | 0.140625 |
| 25,000 | 0 | 5.53125 | 0.171875 |

Removing Duplicates (Any Order) of Random 5 Letter Strings Using **STL Vector**:

|  |  |  |  |
| --- | --- | --- | --- |
| # of Strings | Load Time (sec) | Operation Time (sec) | Output Time (sec) |
| 1,000,000 | 0.140625 | 0.734375 | 5.95312 |
| 2,000,000 | 0.3125 | 1.5 | 10.7812 |
| 3,000,000 | 0.453125 | 2.35938 | 15.9688 |
| 4,000,000 | 0.625 | 3.23438 | 20.2031 |
| 5,000,000 | 0.75 | 4.23438 | 24.3906 |
| 6,000,000 | 0.9375 | 5.04688 | 27.7812 |

Finding the Mode of Random 5 Letter Strings Using **STL Vector**:

|  |  |  |  |
| --- | --- | --- | --- |
| # of Strings | Load Time (sec) | Operation Time (sec) | Output Time (sec) |
| 1,000,000 | 0.140625 | 0.734375 | 0.015625 |
| 2,000,000 | 0.3125 | 1.54688 | 0.03125 |
| 3,000,000 | 0.46875 | 2.45312 | 0.046875 |
| 4,000,000 | 0.625 | 3.17188 | 0.0625 |
| 5,000,000 | 0.78125 | 4.21875 | 0.078125 |
| 6,000,000 | 0.921875 | 4.96875 | 0.109375 |

**PERFORMANCE ANALYSIS OF LISTS**

|  |  |  |  |
| --- | --- | --- | --- |
| # of Strings | Load Time (sec) | Operation Time (sec) | Output Time (sec) |
| 500,000 | 0.078125 | 0.890625 | 2.95312 |
| 1,000,000 | 0.15625 | 1.90625 | 5.79688 |
| 1,500,000 | 0.234375 | 3.09375 | 8.8125 |
| 2,000,000 | 0.3125 | 4.21875 | 11.8438 |
| 2,500,000 | 0.375 | 5.32812 | 15.2031 |

Sorting Random 5 Letter Strings Using **STL List**:

Removing Duplicates (Preserving Order) of Random 5 Letter Strings Using **STL List**:

|  |  |  |  |
| --- | --- | --- | --- |
| # of Strings | Load Time (sec) | Operation Time (sec) | Output Time (sec) |
| 5,000 | 0 | 0.265625 | 0.046875 |
| 10,000 | 0.015625 | 1.10938 | 0.0625 |
| 15,000 | 0 | 2.51562 | 0.09375 |
| 20,000 | 0 | 4.46875 | 0.125 |

Removing Duplicates (Any Order) of Random 5 Letter Strings Using **STL List**:

|  |  |  |  |
| --- | --- | --- | --- |
| # of Strings | Load Time (sec) | Operation Time (sec) | Output Time (sec) |
| 100,000 | 0.015625 | 0.15625 | 0.625 |
| 250,000 | 0.03125 | 0.421875 | 1.48438 |
| 500,000 | 0.078125 | 0.921875 | 2.875 |
| 1,000,000 | 0.15625 | 2.0625 | 5.54688 |
| 2,000,000 | 0.3125 | 4.48438 | 11.3281 |

Finding the Mode of Random 5 Letter Strings Using **STL List**:

|  |  |  |  |
| --- | --- | --- | --- |
| # of Strings | Load Time (sec) | Operation Time (sec) | Output Time (sec) |
| 250,000 | 0.046875 | 0.40625 | 0.046875 |
| 500,000 | 0.078125 | 0.90625 | 0.078125 |
| 1,000,000 | 0.15625 | 1.90625 | 0.1875 |
| 1,500,000 | 0.234375 | 3.15625 | 0. 296875 |
| 2,000,000 | 0.3125 | 4.26562 | 0.421875 |
| 2,500,000 | 0.375 | 5.4375 | 0.515625 |

**PERFORMANCE ANALYSIS OF HASH TABLES**

Removing Duplicates (Preserving Order) of Random 5 Letter Strings Using **STL unordered\_map**:

|  |  |  |  |
| --- | --- | --- | --- |
| # of Strings | Load Time (sec) | Operation Time (sec) | Output Time (sec) |
| 5,000 | 0 | 0.421875 | 0.03125 |
| 7,500 | 0 | 0.953125 | 0.0625 |
| 10,000 | 0 | 1.71875 | 0.09375 |
| 12,500 | 0.015625 | 2.78125 | 0.09375 |
| 15,000 | 0 | 3.85938 | 0.109375 |
| 17,500 | 0 | 5.59375 | 0.125 |

Removing Duplicates (Any Order) of Random 5 Letter Strings Using **STL unordered\_set**:

|  |  |  |  |
| --- | --- | --- | --- |
| # of Strings | Load Time (sec) | Operation Time (sec) | Output Time (sec) |
| 1,000,000 | 0.15625 | 0.671875 | 5.39062 |
| 2,000,000 | 0.3125 | 1.32812 | 10.9351 |
| 3,000,000 | 0.46875 | 2.04688 | 15.6719 |
| 4,000,000 | 0.625 | 2.6875 | 20.25 |
| 5,000,000 | 0.765625 | 3.40625 | 24.0938 |
| 6,000,000 | 0.9375 | 4.07812 | 27.5938 |
| 7,000,000 | 1.0625 | 4.59375 | 31.4844 |

Finding the Mode of Random 5 Letter Strings Using **STL unordered\_map**:

|  |  |  |  |
| --- | --- | --- | --- |
| # of Strings | Load Time (sec) | Operation Time (sec) | Output Time (sec) |
| 1,000,000 | 0.15625 | 0.765625 | 0.078125 |
| 2,000,000 | 0.3125 | 1.59275 | 0.140625 |
| 3,000,000 | 0.453125 | 2.32812 | 0.203125 |
| 4,000,000 | 0.6875 | 3.17188 | 0.28125 |
| 5,000,000 | 0.78125 | 3.84375 | 0.328125 |
| 6,000,000 | 0.90625 | 4.5 | 0.359375 |
| 7,000,000 | 1.10938 | 5.14062 | 0.40625 |

**PERFORMANCE ANALYSIS OF BINARY SEARCH TREES**

|  |  |  |  |
| --- | --- | --- | --- |
| # of Strings | Load Time (sec) | Operation Time (sec) | Output Time (sec) |
| 500,000 | 0.078125 | 1.3125 | 2.96875 |
| 1,000,000 | 0.15625 | 2.76562 | 5.73438 |
| 1,250,000 | 0.1875 | 3.71875 | 7.42188 |
| 1,500,000 | 0.234375 | 4.29688 | 8.9375 |
| 2,000,000 | 0.3125 | 6.1875 | 12.7344 |

Sorting Random 5 Letter Strings Using **STL map**:

Removing Duplicates (Preserving Order) of Random 5 Letter Strings Using **STL map**:

|  |  |  |  |
| --- | --- | --- | --- |
| # of Strings | Load Time (sec) | Operation Time (sec) | Output Time (sec) |
| 2,500 | 0 | 0.15625 | 0.0625 |
| 5,000 | 0 | 0.890625 | 0.078125 |
| 7,500 | 0 | 1.89062 | 0.046875 |
| 10,000 | 0 | 3.01562 | 0.078125 |
| 12,500 | 0 | 4.78125 | 0.078125 |

Removing Duplicates (Any Order) of Random 5 Letter Strings Using **STL set**:

|  |  |  |  |
| --- | --- | --- | --- |
| # of Strings | Load Time (sec) | Operation Time (sec) | Output Time (sec) |
| 500,000 | 0.09375 | 1.35938 | 4.625 |
| 750,000 | 0.15625 | 2.26562 | 6.92188 |
| 1,000,000 | 0.203125 | 2.67188 | 8.5625 |
| 1,250,000 | 0.265625 | 3.51562 | 9.54688 |
| 1,500,000 | 0.421875 | 5.25 | 10.9844 |

Finding the Mode of Random 5 Letter Strings Using **STL map**:

|  |  |  |  |
| --- | --- | --- | --- |
| # of Strings | Load Time (sec) | Operation Time (sec) | Output Time (sec) |
| 250,000 | 0.046875 | 1.25 | 0.03125 |
| 500,000 | 0.109375 | 1.71875 | 0.09375 |
| 750,000 | 0.125 | 3.04688 | 0.15625 |
| 1,000,000 | 0.234375 | 3.89062 | 0.203125 |
| 1,250,000 | 0.40625 | 5.25 | 0.34375 |

**PERFORMANCE ANALYSIS OF PRIORITY QUEUES**

|  |  |  |  |
| --- | --- | --- | --- |
| # of Strings | Load Time (sec) | Operation Time (sec) | Output Time (sec) |
| 500,000 | 0.09375 | 1.26562 | 3.6875 |
| 1,000,000 | 0.171875 | 2.51562 | 7.1875 |
| 1,250,000 | 0.25 | 4.01562 | 8.9375 |
| 1,500,000 | 0.34375 | 4.75 | 10.4219 |

Sorting Random 5 Letter Strings Using **STL priority\_queue**:

Removing Duplicates (Any Order) of Random 5 Letter Strings Using **STL priority\_queue**:

|  |  |  |  |
| --- | --- | --- | --- |
| # of Strings | Load Time (sec) | Operation Time (sec) | Output Time (sec) |
| 500,000 | 0.09375 | 1.3125 | 3.375 |
| 750,000 | 0.15625 | 2.26562 | 5.1875 |
| 1,000,000 | 0.359375 | 3.03125 | 6.65625 |
| 1,250,000 | 0.265625 | 3.45312 | 8.46875 |
| 1,500,000 | 0.34375 | 4.46875 | 9.92188 |

Finding the Mode of Random 5 Letter Strings Using **STL priority\_queue**:

|  |  |  |  |
| --- | --- | --- | --- |
| # of Strings | Load Time (sec) | Operation Time (sec) | Output Time (sec) |
| 500,000 | 0.09375 | 1.09375 | 0.015625 |
| 750,000 | 0.15625 | 1.73438 | 0.015625 |
| 1,000,000 | 0.1875 | 2.46875 | 0.015625 |
| 1,250,000 | 0.25 | 3.14062 | 0.015625 |
| 1,500,000 | 0.359375 | 4.46875 | 0.03125 |
| 1,750,000 | 0.328125 | 4.6875 | 0.03125 |