## Data Structures – Project Report 2

Assigned: **June 6, 2019**
Due Date: **June 20, 2019**

Group Letter _____

Please write the names of everyone who worked on this assignment.

Name _____        Student ID _____

Name _____        Student ID _____

Name _____        Student ID _____

Name _____        Student ID _____

Name _____        Student ID _____

Name _____        Student ID _____

This assignment should be completed together with your team. Each team should do this only once. Please print this and submit it in class.

1) Write down your data for the XTREE

Please write down the amount of time needed to run each Experiment:

| Value of n | 100 | 200 | 300 | 400 | 500 |
|---|---|---|---|---|---|
| **Experiment 1** | | | | | |
| **Experiment 2** | | | | | |
| **Experiment 3** | | | | | |
| **Experiment 4** | | | | | |
| **Experiment 5** | | | | | |
| **Experiment 6** | | | | | |
| **Experiment 7** | | | | | |
| **Experiment 8** | | | | | |
| **Experiment 9** | | | | | |
| **Experiment 10** | | | | | |
| **Experiment 11** | | | | | |
| **Experiment 12** | | | | | |

| Value of n | 100 | 200 | 300 | 400 | 500 |
|---|---|---|---|---|---|
| **Experiment 13** | | | | | |
| **Experiment 14** | | | | | |

2) Use the above timings to derive a formula for the amount of time each experiment requires

| | | |
|---|---|---|
| **Experiment 1** | T(n) = | T(n) = Θ(_____) |
| **Experiment 2** | T(n) = | T(n) = Θ(_____) |
| **Experiment 3** | T(n) = | T(n) = Θ(_____) |
| **Experiment 4** | T(n) = | T(n) = Θ(_____) |
| **Experiment 5** | T(n) = | T(n) = Θ(_____) |
| **Experiment 6** | T(n) = | T(n) = Θ(_____) |
| **Experiment 7** | T(n) = | T(n) = Θ(_____) |
| **Experiment 8** | T(n) = | T(n) = Θ(_____) |
| **Experiment 9** | T(n) = | T(n) = Θ(_____) |
| **Experiment 10** | T(n) = | T(n) = Θ(_____) |
| **Experiment 11** | T(n) = | T(n) = Θ(_____) |
| **Experiment 12** | T(n) = | T(n) = Θ(_____) |
| **Experiment 13** | T(n) = | T(n) = Θ(_____) |
| **Experiment 14** | T(n) = | T(n) = Θ(_____) |

3) Based on these Experiments, what do you think are the Running times of Insert and Search in the XTree? If you cannot determine the answer, then write "Unknown"

| Operation | Best | Average | Amortized | Worst |
|---|---|---|---|---|
| Insert | | | | |
| Search | | | | |

4) Based on these Running Times, do you think the XTree is a Binary Search Tree (BST), an AVL Tree, or a Splay Tree? Explain your decision.

5) Write down your data for the YTREE

Please write down the amount of time needed to run each Experiment:

| Value of n | 100 | 200 | 300 | 400 | 500 |
|---|---|---|---|---|---|
| Experiment 1 | | | | | |
| Experiment 2 | | | | | |
| Experiment 3 | | | | | |
| Experiment 4 | | | | | |
| Experiment 5 | | | | | |
| Experiment 6 | | | | | |
| Experiment 7 | | | | | |
| Experiment 8 | | | | | |
| Experiment 9 | | | | | |
| Experiment 10 | | | | | |
| Experiment 11 | | | | | |
| Experiment 12 | | | | | |
| Experiment 13 | | | | | |
| Experiment 14 | | | | | |

6) Use the above timings to derive a formula for the amount of time each experiment requires

| Experiment 1 | $T(n) =$ | $T(n) = \Theta(\underline{\hspace{2cm}})$ |
|---|---|---|
| Experiment 2 | $T(n) =$ | $T(n) = \Theta(\underline{\hspace{2cm}})$ |
| Experiment 3 | $T(n) =$ | $T(n) = \Theta(\underline{\hspace{2cm}})$ |
| Experiment 4 | $T(n) =$ | $T(n) = \Theta(\underline{\hspace{2cm}})$ |
| Experiment 5 | $T(n) =$ | $T(n) = \Theta(\underline{\hspace{2cm}})$ |
| Experiment 6 | $T(n) =$ | $T(n) = \Theta(\underline{\hspace{2cm}})$ |
| Experiment 7 | $T(n) =$ | $T(n) = \Theta(\underline{\hspace{2cm}})$ |
| Experiment 8 | $T(n) =$ | $T(n) = \Theta(\underline{\hspace{2cm}})$ |
| Experiment 9 | $T(n) =$ | $T(n) = \Theta(\underline{\hspace{2cm}})$ |
| Experiment 10 | $T(n) =$ | $T(n) = \Theta(\underline{\hspace{2cm}})$ |
| Experiment 11 | $T(n) =$ | $T(n) = \Theta(\underline{\hspace{2cm}})$ |
| Experiment 12 | $T(n) =$ | $T(n) = \Theta(\underline{\hspace{2cm}})$ |
| Experiment 13 | $T(n) =$ | $T(n) = \Theta(\underline{\hspace{2cm}})$ |
| Experiment 14 | $T(n) =$ | $T(n) = \Theta(\underline{\hspace{2cm}})$ |

7) Based on these Experiments, what do you think are the Running times of Insert and Search in the YTree?  If you cannot determine the answer, then write "Unknown"

| Operation | Best | Average | Amortized | Worst |
|-----------|------|---------|-----------|-------|
| Insert | | | | |
| Search | | | | |

8) Based on these Running Times, do you think the YTree is a Binary Search Tree (BST), an AVL Tree, or a Splay Tree?   Explain your decision.

9) Write down your data for the ZTREE

   Please write down the amount of time needed to run each Experiment:

| Value of n | 100 | 200 | 300 | 400 | 500 |
|------------|-----|-----|-----|-----|-----|
| Experiment 1 | | | | | |
| Experiment 2 | | | | | |
| Experiment 3 | | | | | |
| Experiment 4 | | | | | |
| Experiment 5 | | | | | |
| Experiment 6 | | | | | |
| Experiment 7 | | | | | |
| Experiment 8 | | | | | |
| Experiment 9 | | | | | |
| Experiment 10 | | | | | |
| Experiment 11 | | | | | |
| Experiment 12 | | | | | |
| Experiment 13 | | | | | |
| Experiment 14 | | | | | |

10) Use the above timings to derive a formula for the amount of time each experiment requires

| | | |
|---|---|---|
| **Experiment 1** | T(n) = | T(n) = Θ(_____) |
| **Experiment 2** | T(n) = | T(n) = Θ(_____) |
| **Experiment 3** | T(n) = | T(n) = Θ(_____) |
| **Experiment 4** | T(n) = | T(n) = Θ(_____) |
| **Experiment 5** | T(n) = | T(n) = Θ(_____) |
| **Experiment 6** | T(n) = | T(n) = Θ(_____) |
| **Experiment 7** | T(n) = | T(n) = Θ(_____) |
| **Experiment 8** | T(n) = | T(n) = Θ(_____) |
| **Experiment 9** | T(n) = | T(n) = Θ(_____) |
| **Experiment 10** | T(n) = | T(n) = Θ(_____) |
| **Experiment 11** | T(n) = | T(n) = Θ(_____) |
| **Experiment 12** | T(n) = | T(n) = Θ(_____) |
| **Experiment 13** | T(n) = | T(n) = Θ(_____) |
| **Experiment 14** | T(n) = | T(n) = Θ(_____) |

11) Based on these Experiments, what do you think are the Running times of Insert and Search in the ZTree?  If you cannot determine the answer, then write "Unknown"

| Operation | Best | Average | Amortized | Worst |
|---|---|---|---|---|
| Insert | | | | |
| Search | | | | |

12) Based on these Running Times, do you think the ZTree is a Binary Search Tree (BST), an AVL Tree, or a Splay Tree?   Explain your decision.