Instituto Tecnológico y de Estudios Superiores de Monterrey
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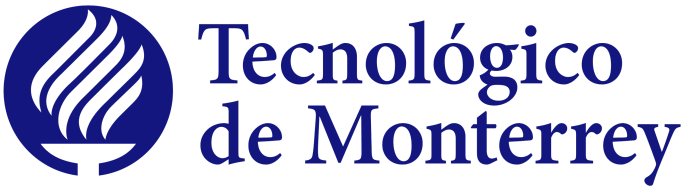

Programming of Data Structures and Fundamental Algorithms

Act 3.4 - Comprehensive BST activity

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Importance of BST's in this project

The use of a BST in this project is very important so we can optimize the search algorithm, BST's have a very fast execution process of approximately Ω(log(n)). This are function complexities and descriptions according to "GeeksforGeeks" (2022):

- Searching: For searching element 2, we have to traverse all elements (assuming we do breadth first traversal). Therefore, searching in binary trees has the worst case complexity of O(n).
- Insertion: For inserting element as left child of 2, we have to traverse all elements. Therefore, insertion in binary trees has the worst case complexity of O(n).
- Deletion: For deletion of element 2, we have to traverse all elements to find 2 (assuming we do breadth first traversal). Therefore, deletion in binary trees has the worst case complexity of O(n).

Network infection

The way of discovering if a network is infected or not is by searching for most requests from the same IP's. This gives good arguments for thinking that the network is infected because the access requests are very frequent and they could be being done by a bot or an automated process.

Filtering IP addresses in this manner allows you to monitor the conversations taking place between particular machines, so if you suspect that a computer is infected, you can take a closer look at its traffic. It's a good idea to regularly inspect hosts generating the greatest traffic volume, as this can indicate the host is infected with malware and is attempting to spread it to other machines. (Comparitech, 2022)

Algorithm description

- extractIP() - Complexity O(1):

Extracts the ip from the line of text found by inFileMain().

It receives a line of text and counts the spaces to extract the section of the line that includes its respective IP.

- IP2Int() - Complexity O(1):

Función para obtener el valor int dado una IP.

Retorna la IP vuelta un número agregándole sus respectivos ceros faltantes, ya que cada punto divide la prioridad de dicho espacio, creando un IP de notación decimal científica que representa la prioridad de forma implícita.

- MaxHeapQueue::push() - Complexity O(n):

Itera el heap hasta encontrar el último nodo, inserta uno nuevo e intercambia valores con el superior hasta que cumpla con la condición de ser menor.

- MaxHeapQueue::pop() = Complexity O(n):

Itera el heap hasta encontrar el último nodo, lo intercambia con la cabeza, borra el último nodo y baja la cabeza hasta que cumpla con la condición de ser menor.

- MaxHeapQueue::top() = Complexity O(1):

Regresa el vector superior del heap.

Referencias

Comparitech. (2022, August 22). *How to Perform a Network Virus Scan*. Comparitech. Retrieved October 26, 2022, from https://www.comparitech.com/net-admin/network-virus-scan/

GeeksforGeeks. (2022, August 1). *Complexity of different operations in Binary tree, Binary Search Tree and AVL tree*. GeeksforGeeks. Retrieved October 26, 2022, from https://www.geeksforgeeks.org/complexity-different-operations-binary-tree-binary-search-tree-avl-tree/