**CS607P Assignment #1 Spring 2024**

Name: Abdul Rehman

VU-ID: BC220424444

**Question #1:**

Breath First Search (BFS) is a memory hungry search strategy that means it requires a lot of memory whiling processing a problem even having a reasonable and moderate complexity. It is primarily due to the branching factor that increase the number of ways to search for the solution (goal/target).

Now, consider that we have a tree with the branching factor of 9 and depth (or height) 11, while each node of requires 20 bytes storage. If the Breath First Search (BFS) is applied on this tree, calculate the memory required for this search.

**Note:** You should provide the storage in Bytes (B), Kilo Bytes (KB), Mega Bytes (MB) and Giga Bytes (GB).

**Solution:**

According to the given scenario, first we need to determine the maximum number of nodes that will be in the queue at any given time during the search.

**Given Data:**

Branching factor (b) = 9.

Depth of the tree (d) = 11.

Storage required for each node = 20 bytes.

Now, calculate the maximum number of nodes in the queue at any given time during BFS.

Max nodes in queue = 𝑏𝑑

Max nodes in queue = 911

**Max nodes in queue = 313,810,596.**

Now, calculating the memory required.

Memory required = Max nodes in queue x Storage per node.

Memory required = 313,810,596 x 20.

**Memory required = 6,276,211,920 bytes.**

Now, I’m going to convert this byte’s storage in Kilo Bytes (KB), Mega Bytes (MB) and Giga Bytes (GB).

Memory required = 6,276,211,920 / 1024.

**Memory required = 6,120,346.25 KB.**

Memory required = 6,120,346.25 / 1024.

**Memory required = 5,984.42 MB.**

Memory required = 5,984.42 / 1024.

**Memory required = 5.83 GB.**

**Conclusion:**

So, we calculated the maximum number of nodes in the queue at any given time during BFS, and then we solved the second part of the question which is to convert this byte’s storage in Kilo Bytes (KB), Mega Bytes (MB) and Giga Bytes (GB).