



**Faculty of Engineering and Applied Science**

**SOFE 3950 Operating Systems**

**Tutorial Activity 8**

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## Conceptual Questions

1. An abstract data type is a generalized way to express data allowing for abstract behaviours and members. An ADT (abstract data type) is not defined by the data itself, rather defined by a set of operations and values.
2. A queue is a FIFO data structure meaning that the first node added using the generalized function 'push' is the first node to be taken out by the generalized function 'pop'. This is contrasted with the stack data structure, where the first node added by generalized function 'push' is the last node taken out by the generalized function 'pop' (FILO).
3.
  - a. A linked list is a data structure that is defined by its lack of directly addressable nodes, rather each node only contains a pointer to the next node in the chain.
  - b. A tree is a data structure that represents some sort of hierarchy, represented with nodes that have parents and children. The root node is the 0th index and every child after adds to the root.
  - c. A heap is a data structure that is in essence a specialized tree, having the same parent child relationship that trees have but some additional rules. The rules for a general heap dictate that the node, if they have children must start from the left and go to the right for each layer.
4. A binary tree is an extension of what a tree is. A binary tree must only have nodes that are not leaves having only 2 children, no more no less. The rest of the rules are inherited from the regular tree data structure.
5. A hash table is a data structure that uses a hashing function to convert them into hashes. Each function is unique to the application and are used in a variety of places like storing passwords. Sometimes a hashing function can generate 2 separate hashes from different inputs, this is what is called a hashing collision.

## Application Questions

See attached code.