Noah Parker
Chapter 16 Study Sheet

Implementing a Linked List Like arrays, Linked List is a linear data structure. Unlike arrays, linked list elements are not stored at the contiguous location, the elements are linked using pointers.

```
class LinkedList {
   Node head; // head of list
   /* Linked list Node*/
   class Node {
      int data;
      Node next;
      // Constructor to create a new node
      // Next is by default initialized
      // as null
      Node(int d) { data = d; }
   }}
```

The node class:, is a class which is used to create the individual data holding blocks for various data structure, which organise data in a non-sequential fashion.

```
public void addFirst(Object element)
{
Node newNode = new Node();
newNode.data = element;
newNode.next = first;
first = newNode;
}
```

Java ArrayList Implementation The Java Collection framework has a class called ArrayList. The objects are stored in a dynamic array. It's similar to Array, however it doesn't have a size restriction. We have complete control over the elements and can add or remove them at any time. The ArrayList can be used to store the duplicate element; it maintains the insertion order internally.

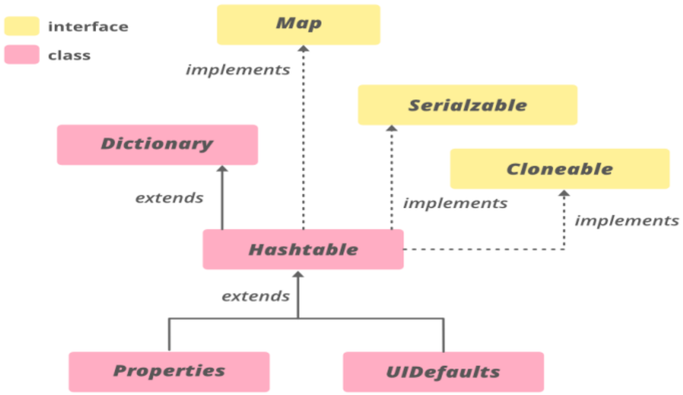
```
public class ALExample {
      public static void main(String[] args) {
         List<String> l = new ArrayList<>(); //List Implementation
         l.add("Sam");  //adding objects to list
         l.add("Sandy");
         l.add("Joe");
         l.add("Arya");
         l.add("Nik");
         System.out.println("List objects are:  " +l); // printing the list
         l.remove("Nik"); //removing objects from list
         System.out.println("After Removing Nik, List Objects are" +l);
      } }
```

This table above creates a new array list that we store names in

A queue can be implemented using two stacks. Let queue to be implemented be q and stacks used to implement q be stack1 and stack2. q can be implemented in two ways:

```
static class Queue{
   static Stack<Integer> s1 = new Stack<Integer>();
   static Stack<Integer> s2 = new Stack<Integer>();
   static void enQueue(int x) {
      // Move all elements from s1 to s2
      while (!s1.isEmpty()){
         s2.push(s1.pop());
         //s1.pop();}
      // Push item into s1
      s1.push(x);
      // Push everything back to s1
      while (!s2.isEmpty()){
         s1.push(s2.pop());
         //s2.pop(); }  }
   // Dequeue an item from the queue
   static int deQueue()  {
      // if first stack is empty
      if (s1.isEmpty()) {
         System.out.println("Q is Empty");
         System.exit(0);}
      // Return top of s1
      int x = s1.peek();
      s1.pop();
      return x;}};
```

Hash table is implemention using the Hashtable class, which maps keys to values. As a key or a value, any non-null object can be used. The objects used as keys must implement the hashCode and equals methods in order to successfully store and retrieve objects from a hashtable.
public class Hashtable<K,V> extends Dictionary<K,V> implements Map<K,V>, Cloneable, Serializable The table below is how a hash table is laid out


interface
class
Map
implements
Serialzable
Dictionary
Cloneable
extends
implements
implements
Hashtable
extends
Properties
UIDefaults