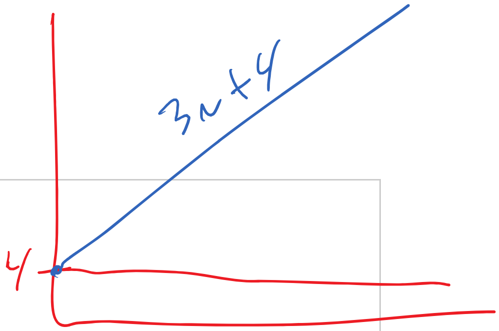
CSE12 - Lecture 9 - C00

Wednesday, October 12, 2022   11:00 AM

PA3 released today

PA2 hard-deadline is tonight



N → # of elements in the structure

Counting Steps

ArrayList Insert - ignore ExpandCapacity

```
public void insert(int index, String s) {
  //expandCapacity();   //ignore
  for (int i = size - 1; i >= index ; i--) {
    this.elements[i+1] = this.elements[i];
  }
  this.elements[index] = s;
  this.size += 1;
}
```

worst case

index = 0

N = 5

i = 4, 3, 2, 1, 0, -1

cond	update	body
~~||||~~	~~||||~~	~~||||~~
N+1	N	N

best case

index = 5

N = 5

i = 4

cond	upd	body
1	0	0
1	0	0

Best Case	Worst Case	Avg Case
0	0	0
1+1+0	1+(N+1)+N	$1 + (\frac{N}{2}+1) + \frac{N}{2}$
0	N	$\frac{N}{2}$
1	1	1
1	1	1
4	3N+4	$\frac{3N}{2} + 4$

ArrayList ExpandCapacity

```
private void expandCapacity() {
  int currentCapacity = this.elements.length;
  if(this.size < currentCapacity) { return; }
  String[] expanded = new String[currentCapacity * 2];
  for(int i = 0; i < this.size; i += 1) {
    expanded[i] = this.elements[i];
  }
  this.elements = expanded;
}
```

allocate room

init default

Best Case	Worst Case	~~Avg Case~~
1	1	
1+1	1+0	
0	2N+2N+1	
0	1+(N+1)+N	
0	N	
	1	
3	7N+6	

ArrayList Insert - with ExpandCapacity

```
public void insert(int index, String s) {
  expandCapacity();
  for (int i = size - 1; i >= index ; i--) {
    this.elements[i+1] = this.elements[i];
  }
  this.elements[index] = s;
  this.size += 1;
}
```

Best Case	Worst Case	~~Avg Case~~
		↳ week 6
3	7N+6	
1+1+0	1+(N+1)+N	
0	N	
1	1	
1	1	
7	10N+10	

add()

3+2	7N+6+2
5	7N+8

Counting Steps - where size of the contents is *n*

LinkedList Add

```
public void add(String s) {
  Node current = this.front;
  while(current.next != null) {
    current = current.next;
  }
  current.next = new Node(s, null);
  this.size += 1;
}
```

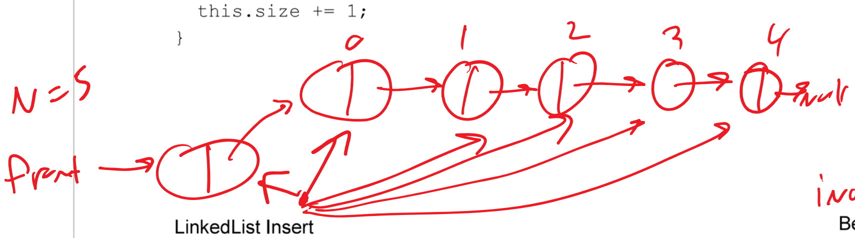
1

~~1111~~ 1 N+1

~~111~~ N

1

~~Best Case~~	Worst Case	~~Avg Case~~
	1	
	N+1	
	N	
	1	
	1	
	2N+4	



LinkedList Insert

```
public void insert(int index, String s) {
  Node current = this.front;
  for(int i = 0; i < index; i += 1) {
    current = current.next;
  }
  current.next = new Node(s, current.next);
  this.size += 1;
}
```

]1

index=0 Best Case	index=N Worst Case	~~Avg Case~~
1	1	
1+1+0	1+(N+1)+N	
0	N	
1	1	
1	1	
5	3N+5	

LinkedList Get

```
public String get(int index) {
  Node current = this.front.next;
  for(int i = 0; i < index; i += 1) {
    current = current.next;
  }
  return current.value;
}
```

index=0 Best Case	index=N-1 Worst Case	index = $\frac{N}{2}$ Avg Case
1	1	1
1+1+0	1+N+(N-1)	$1+(\frac{N}{2}+1)+\frac{N}{2}$
0	N-1	N/2
1	1	1
4	3N+1	$\frac{3N}{2}+4$

ArrayList Get

```
public String get(int index) {
  return this.elements[index];
}
```

Best Case	Worst Case	Avg Case
1	1	1