

PA5 due Tuesday

PA7 Late/Resubmit → due Tuesday

## Map and HashTable

## Hash Function

```
int getIndex(String k) {
    return k.length();
}
```

# of buckets – 6  
(i.e. the size of the array)

```
set("Smith", 1);
set("Johnson", 2);
set("Williams", 3);
set("Brown", 4);
set("Jones", 5);
set("Garcia", 6);
set("Miller", 7);
set("Davis", 8);
set("Rodriguez", 9);
set("Martinez", 10);
```

hash	index
1	1
2	2
3	3
4	4
5	5
6	6
7	0
8	0
9	3
10	2

Draw the picture of the HashTable using Separate Chaining (no expandCapacity)

0	→ {Garcia, 6}, {Miller, 7}
1	→ {Johnson, 2}
2	→ {Williams, 3}, {Martinez, 10}
3	→ {Rodriguez, 9}
4	→ {Brown, 4}
5	→ {Smith, 1}, {Davis, 8}

N=10

Set → add more 5 letter names

→ LL add  $\Theta(n)$ → AL add  $\Theta(1) \rightarrow [\Theta(n) \text{ expand capacity}]$ → LL prepend  $\Theta(1)$ 

get("Davis")

4 comparisons

get("Gregs")

4 comparisons

get("Greg")

0 comparisons

## Mapping keys to values

```
class KeyValuePair<K, V> {
    K key;
    V value;
}
```

What is the run-time for this HashTable (do picture first):

set()

Worst Case:  $\Theta(1)$  or  $\Theta(n)$  w/ no expand capacityBest Case:  $\Theta(1)$ What conditions make up the best case for set()?  
empty list for a bucket (no collisions)  
even distribution

get()

Worst Case:  $\Theta(n)$ Best Case:  $\Theta(1)$ What conditions make up the best case for get()?  
Empty bucket  
1 element in a bucket  
1st element in the bucket  
even distribution →  $\log(n)$ key value  
Map < String, Integer >

ArrayList &lt; KeyValuePair &lt; String, Integer &gt; &gt; contents;

AL < KeyValuePair < String, Integer > > [ ] contents  
= new [6];