A06 Maps: HashMap and TreeMap

Map as an ADT
A Map interface
A hash-table-based Map implementation
A tree-based Map implementation

ADT Recap

First-principles implementation of three Java container types:

- List
  - **`ArrayList`**, **`LinkedList`** implementations (A1, A2)
- Set
  - **`HashSet`**, **`TreeSet`** implementations (A3, A4, A5)
- Map
  - **HashMap**, **TreeMap** implementations (A6)

Introduced **hash tables**, **trees** (A4, A5)

The Map ADT (also known as Associative Array)

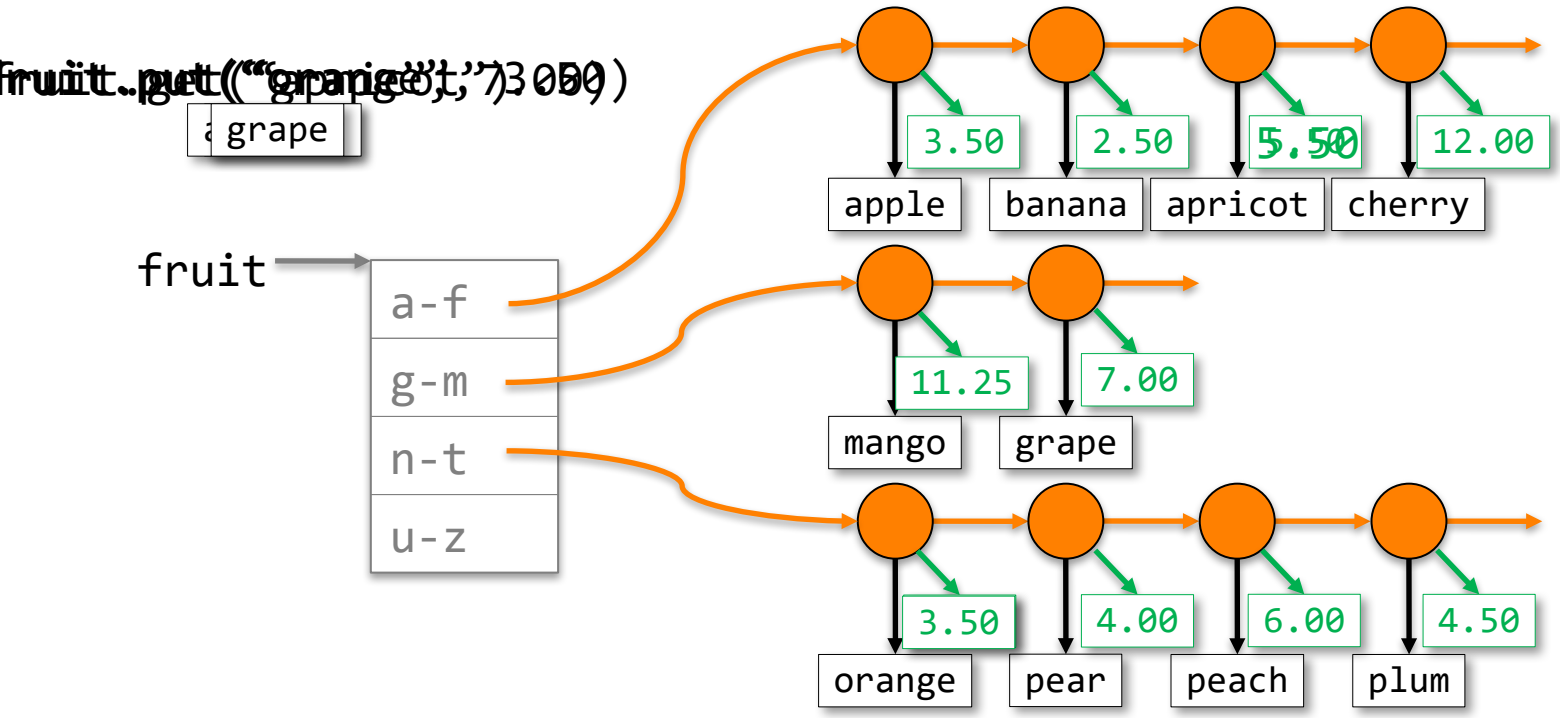
A map consists of **(key, value)** pairs

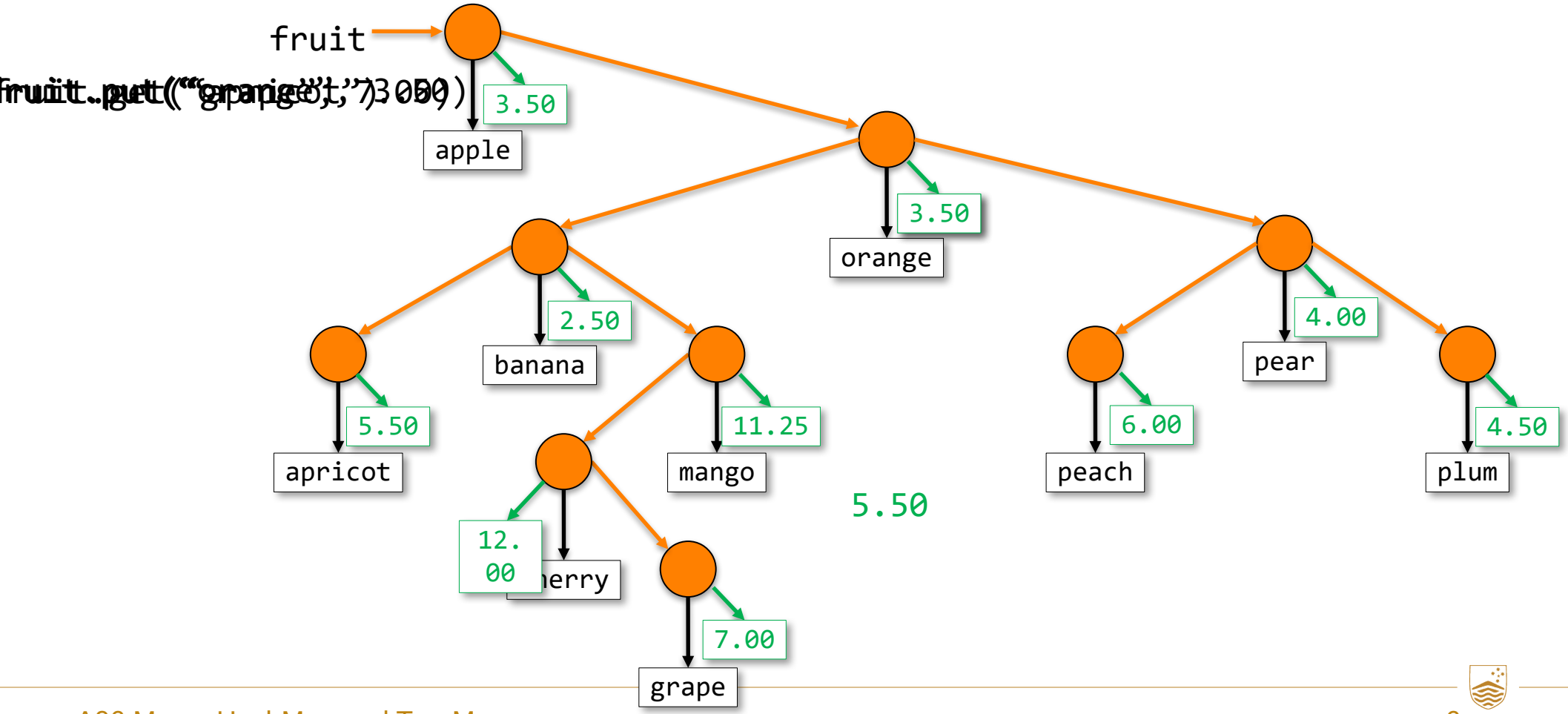
- Each key may occur only once in the map
- Values are retrieved from the map via the key
- Values may be modified
- Key, value pairs may be removed

Our Map Interface

We will explore maps using a simple interface:

```
public interface Map<K,V> {
   V put(K key, V value);
   V get(K key);
   V remove (K key);
   int size();
}
```


fruit.put("grape", 7.00)
grape
fruit
a-f
g-m
n-t
u-z
3.50
2.50
5.50
12.00
apple
banana
apricot
cherry
11.25
7.00
mango
grape
3.50
4.00
6.00
4.50
orange
pear
peach
plum


fruit
fruit.put("grape", 7.00)
3.50
apple
3.50
orange
2.50
banana
4.00
pear
5.50
apricot
11.25
mango
6.00
peach
4.50
plum
12.
00
7.00
grape
5.50