CS261 Data Structures

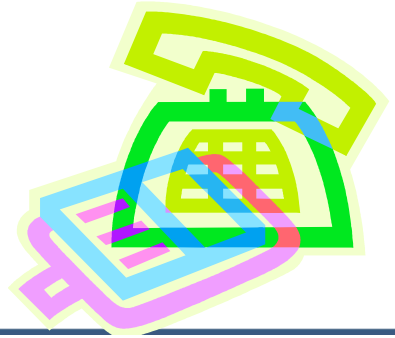
Maps (or Dictionaries)

Goals

- Introduce the Map(or Dictionary) ADT
- Introduce an implementation of the map with a Dynamic Array

So Far….

- Emphasis on ***values*** themselves
  - e.g. store names in an AVL tree to quickly lookup club members
  - e.g. store numbers in an AVL tree for a tree sort
- Often, however, we want to associate something else (ie. a value) with the lookup value (ie. a key)
  - e.g. phonebook, dictionary, student roster, etc.



Map or Dictionary ADT

- A Map stores not just values, but ***Key-Value pairs***

```
void put (KT key , VT value)
VT get (KT key)
int containsKey(KT key)
void removeKey (KT key)
```

```
Struct Association {
  KT    key;
  VT value;
};
```

All comparisons done on the key
All returned values are VT
Can implement with AVLTree, HashTable, DynArr, etc.

Dynamic Array Map: Contains

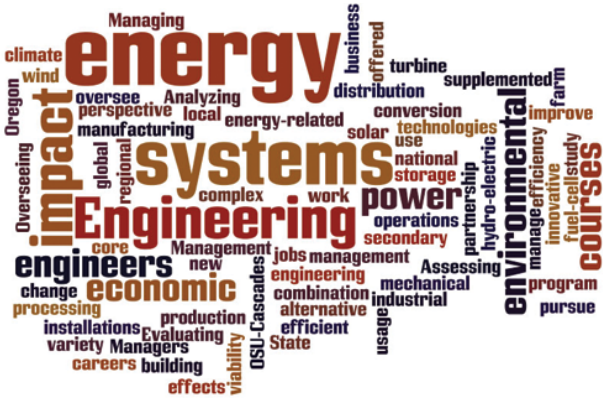
```
int containsMap (DynArr *v, KT key, comparator compare){
        int i = 0;
        for (i = 0; i < v->size; i++) {
        if ((*compare)(((struct association *)(v->data[i]))->key,
                key) == 0 )  /* found it */
            return 1;
         }
        return 0;
}
```

cast to struct association

compare key from array with passed in key

Map or Dictionary

- A Map stores not just values, but ***Key-Value pairs***
- Example Application: Concordance
  - Count the number of times each word appears in a selection of text (ie. a concordance)
    - Keys: unique words form the text
    - Value: count of each word



Your Turn – Worksheet 36: Dynamic Array Implementation of the Map

- Internally, store Struct Associations

dynamic array stores struct associations

- Put
  - Ensure that each element in the dictionary has a ***unique key***
- ContainsKey
  - Loop until you find the 'key' and then return true, else false
- Get
  - Loop until you find the 'key' then return the value
- RemoveKey
  - Loop until you find the 'key', then remove the entire association