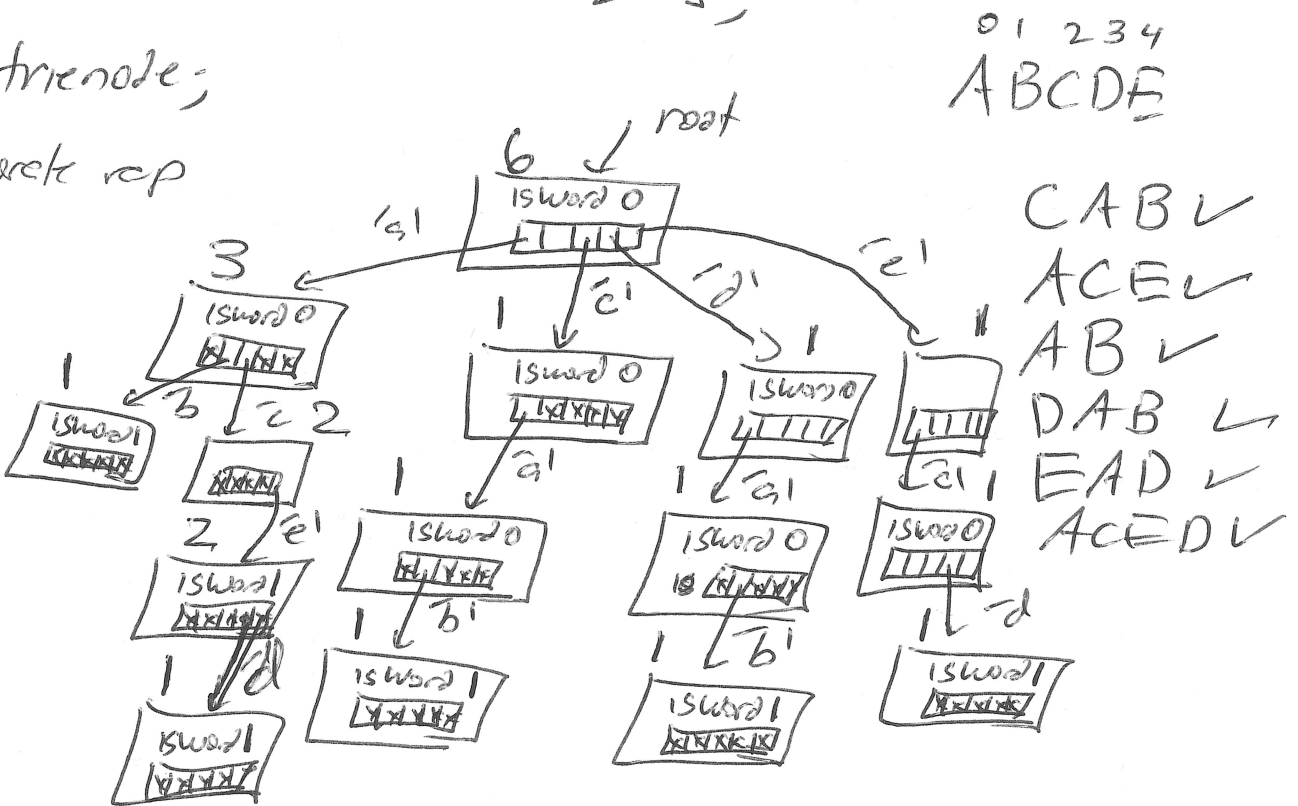# Tries (stores a dictionary)

- data structure
- insert
- Scrabble problem in notes
- wordle type program
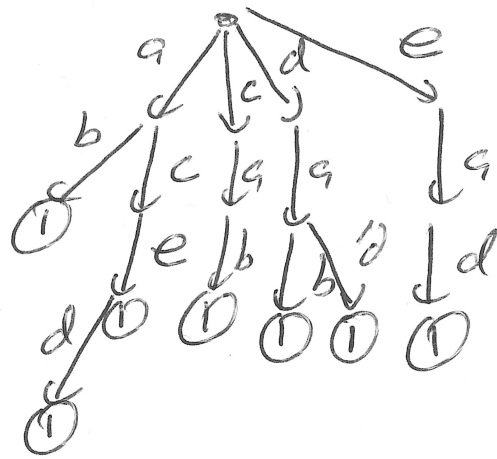
```
typedef struct trienode {
    int isWord; // 0 or 1
    int numWords; // total # words in this subtrie
    struct trienode* next[26];
} trienode;
```

accurate rep

```
0 1 2 3 4
A B C D E
```

CAB ✓
ACE ✓
AB ✓
DAB ✓
EAD ✓
ACED ✓

(trie diagram at top with branches labeled a, d, e, b, c, etc. and nodes marked ①)

Search for a word — just follow the path designated by the letters

Insert

follow down path, create node when necessary. Set last isWord = 1.

Scrabble

Given freq array of Scrabble tiles

2 Ts, 1 A, 1 H, 1 E, 1 R, 1 S
19   0   7   4   17   18

0	1	2	3	4	5	6	7		17	18	19	20
1	0	0	0	1	0	0	1	0 0 0	1	1	1	0 0 0

int CountAll

```
int CountAll (trienode* root, int freq[]) {
    if (root == NULL) return 0;
    int cnt = root->isWord;
    for (int i=0; i<26; i++) {
        if (root->next[i] == NULL) continue;
        if (freq[i] == 0) continue;
        freq[i]--;   // play tile
        cnt += CountAll (root->next[i], freq);
        freq[i]++;
    }
    return cnt;
}
```

```
print
countAll (trienode* root, int freq[], char* word, int k){
        int cnt=0;
        if (root->isWord) {
            word[k] = '\0';                // key
            printf("%s", word);            // change
            cnt = 1;
        }
    }
```

↓ In rec code

```
freq[i] --;
word[k] = (char)('a' + i);
```

Prefix question

How many words in a trie start with a given prefix?

```
int numStart (trienode* root, char* prefix) {
    int len = strlen(prefix);
    for (int i = 0; i < len; i++) {
        if (root->next[#] == NULL)
            return 0;        ↑ prefix[i] - 'a'
        root = root->next[prefix[i] - 'a'];
    }
    return root->numWords;
}
```

Secret 5 letter word

Monday's class

created trie
read file lots words
only took 5 letter words inserted into trie
function to print all out
prefix function count total # words w/a prefix
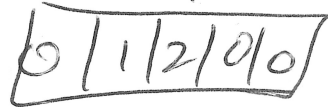
Today Add

check consistency

guess   feedback

newguess

not wrong place / right place / right letter

| 0 | 1 | 2 | 0 | 0 |

A N G L E
2 0 0 1 1

~~ALE~~ ALLOW
ALERT