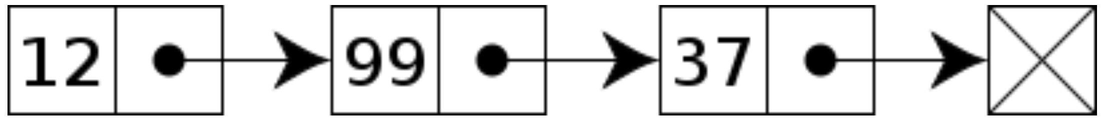
Week 4 Lecture 11

Theory

What's in this lecture?

- Linked Lists

List



- Look Familiar?
- A singly-linked list consists of list nodes with value and next pointers
- In this case, the head of the list is the node that has value 12

List in JavaScript

```
function make_listnode(value, next) {
  var node = new Object();
  node[“value”] = value;
  node[“next”] = next;

  return node;
}
```

List in JavaScript

```
var alist = make_listnode(12, null);
var blist = make_listnode(24, alist);
var clist = make_listnode(17, blist);
```

What do alist, blist, and clist “look like”?

List Find()

```
function find(value, alist) {
  if (alist == null) {
    return null;
  }
  if (alist[“value”] == value) {
    return alist;
  }
  return find(value, alist[“next”]);
}
```

List Contains()

```
function contains(value, alist) {
  return find(value, alist) != null;
}
```

List Insert()

```
function insert(value, alist) {
  return make_listnode(value, alist);
}
```

List Delete()

```
function delete(value, alist) {
  var last = null;

  for (var cur = alist; cur != null; cur = cur[“next”]) {
    if (cur[“value”] == value) {
      if (last == null) {
        alist = cur[“next”];
      } else {
        last[“next”] = cur[“next”];
      }
      break;
    }
    last = cur;
  }

  return alist;
}
```

List Length()

```
function length(alist) {
  var len = 0;
  for (var cur = alist; cur != null; cur = cur[“next”]) {
    len = len + 1;
  }

  return len;
}
```

Exercises

- Read Intro to Algorithms, 3rd Edition, Chapter 10
- Implement make_listnode, find, contains, insert, and delete, and length for a doubly-linked list in JavaScript