# Tracing Object-Oriented Programs

Tracing of Object-Oriented programs is different than for structured programs. These notes discuss key differences using Java code to illustrate.

1. All objects are created on the heap. The heap is a separate area in memory from where the locals and parameters of functions are stored. When a statement like:

```
Person p = new Person();
```

is executed, create a box for a Person on the heap and point p to it.

2. When an object is created, draw a box with a section for each data member.

3. After creating an object, call the constructor.

4. When a method is called, create boxes for all locals and parameters next to the code for the function. Don't forget about the implicit parameter 'this'.
Sample

```
public class Student {

   public String name;
   public boolean gradStudent;
   public int numUnits;
   public Student(String name,boolean gradStudent, int numUnits)
   {
      this.name=name;
      this.gradStudent=gradStudent;
      this.numUnits=numUnits;
   }
   public int fees()
   {
      if (this.gradStudent)
         return this.numUnits*1000;
      else
         return 18000;
   }
   public static void main(String args[])
   {
      Student jones = new Student("David Jones",true,12);
      int fees = jones.fees();
      System.out.println(fees);
   }
}
```

In-Class Problem: Trace the code at:
http://www.cs.usfca.edu/~wolber/courses/110/javaSamples/midterm/Student.java