CS 261 – Data Structures

C Programming Basics Review

Oregon State
UNIVERSITY

Why C ?

C is a straightforward procedural language that makes it easier to focus on important concepts

Avoid OOP Baggage

- Classes
- Inheritance
- Polymorphism
- Function overloading

However….

- No garbage collection
- No reference types

Memory Management

Pointers

Oregon State UNIVERSITY

Main

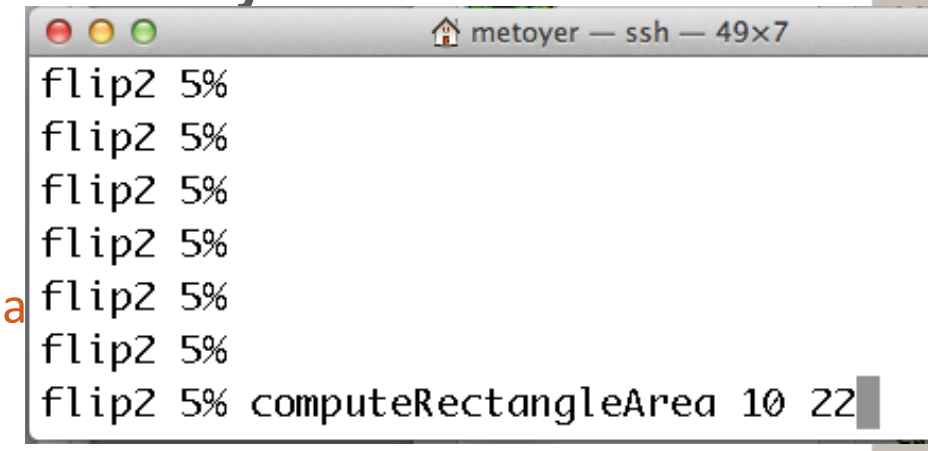
Every C Program has a main

```
int main (int argc, char **argv)  {
   …
}
```

Main kicks off execution and can call other ***functions***

Command Line Arguments:

argc = 3
argv[0] = computeRectangleArea
argv[1] = 10
argv[2] = 22



Oregon State UNIVERSITY

Function Definitions

Functions look a lot like methods you are used to in Java, but are not part of a class:

```
return-type function-name(parameters)   {
  variable-declarations;

  function-body;
}
```

Example — return sum of elements of an integer array:

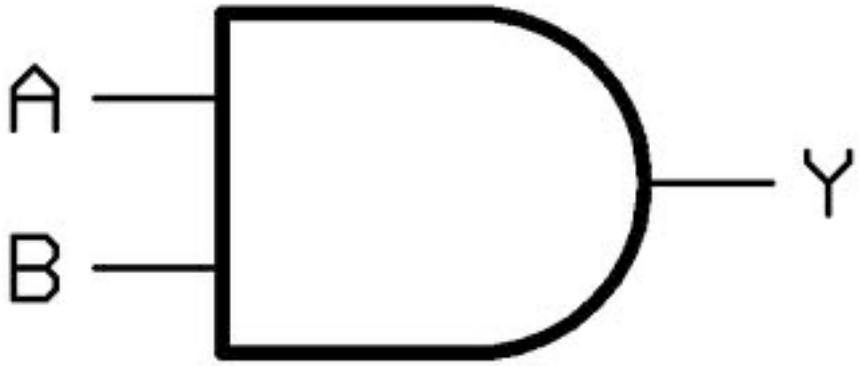
```
long arrSum(int arr[], unsigned int n)   {
  unsigned int i;          /* Loop variable. */
  long sum = 0;            /* Sum (initialized to zero). */

  for (i = 0; i < n; i++) {
    sum += arr[i];
  }
  return sum;
}
```

Need to pass size of array (not included in **arr**).

Structures (user defined types)

Structures are like classes that have only public data fields and no methods:

```
struct Gate {
  int           type;      /* Type of gate. */
  struct Gate *left;       /* Left  input.  */
  struct Gate *rght;       /* Right input.  */
};
```



Accessing Struct Fields

Access to struct fields uses the same dot notation you are used to:

```
struct Gate gate;

gate.type = 3;
```

(but often combined with pointers …more on this later!)

Object Oriented vs. Procedural

In OOP (e.g. Java), we define classes with methods and call methods 'on' class instances

```
student s = new Student();
s.print();
```

In C, we define functions and in order to use a structure with that function, we must pass the structure into the function

```
void printStudent(struct Student myStudent)
{… /* Code to print a single student  struct*/
}
…
struct Student s;
… /*fill s */
printStudent(s)
```

Scope (simplified)

Global

- variables declared outside of any function (use sparingly)

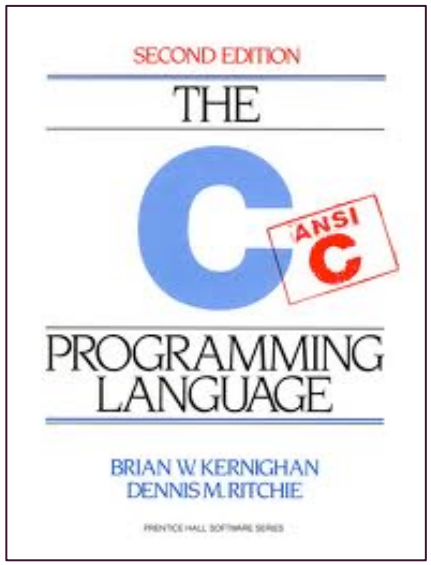
Local

- variables declared inside of function

```
double avg;          /* Global variable: can access in any function. */

void arrAvg(int arr[], unsigned int n)  {
  unsigned int i;  /* Local variables: access only within
                      function. */
  long sum = 0;

  for (i = 0; i < n; i++) sum += arr[i];
  avg = (double)sum / n;
}
```

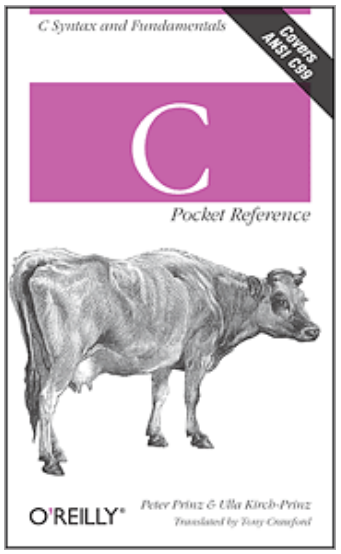
And much, much more…

Get a good reference



Types

- char
- int
- float
- double



Comments

/* Ansi C (C89) */

// Post C89

Control

if-else statements

if-else if statements (for multiway decisions)

switch statements

while loops

for loops

do-while loops

Oregon State UNIVERSITY