

# Paradigms Introduction

*CS 23I*



# Imperative Paradigm (Oldest)

- ✿ *Memory is a collection of boxes*
- ✿ *Program statements are commands to change contents of boxes*
- ✿ *Statements are commands to change state of machine*
- ✿ *Based on Turing Machine*



# Logical Paradigm

- ✦ *Database of logical assertions*
- ✦ *Program is database plus formulated queries*



# Functional

- ✿ *Mathematical functions*
- ✿ *Program is a composition of functions*
- ✿ *Based on work by Church, recursive function theory*



# Imperative subtypes

- ✦ *Calling these subtypes is my way of organizing how to think about them*
- ✦ *spaghetti bowl - uses goto*
- ✦ *structured - each structure has a single entry and exit point*
  - ✦ *introduced ADT (abstract data type)*
- ✦ *Object-oriented - formal handling of ADTs*
- ✦ *Procedural - program broken into subroutines*



# C Language

- ✿ *Imperative*
- ✿ *Structured - but still has goto*
- ✿ *mid-level - closer to machine code than other high-level languages*



# C Syntax

- ✦ *Java syntax is based on C, so if you know Java, you know the C syntax of*
  - ✦ *declaration statements*
  - ✦ *assignment statements*
  - ✦ *if, if/else statements*
  - ✦ *switch statements*
  - ✦ *for, while, do while statements*



# C Language

- ✿ *Each program needs a main function as an entry point, place where code begins execution*
- ✿ *All functions are at the top level, no nesting of functions*



# C Language

- ✿ *C has no objects*
  - ✿ *create structures instead*
- ✿ *C uses macro pre-processing*
- ✿ *#include to include other file code in program*
- ✿ *#define to make definitions*



# C Language

- ✿ *boolean type does not exist*
- ✿ *instead, use int with a value of 0 for false, not zero is true*
- ✿ *string is not a type in C*
- ✿ *storage for strings is an array of char*
- ✿ *a string is a sequence of char values followed by '\0'*



# String Functions

- ✿ *#include <string.h>*
- ✿ *char str[60]; (59 byte string)*
- ✿ *char str2 [100][20]; (100 strings, each of 19 bytes)*
- ✿ *strcat, strncat for concatenation*
- ✿ *strcmp, strncmp for comparison*
- ✿ *strcpy, strncpy for copy*
- ✿ *strlen to get length*



# Character Processing

- ✧ *#include <ctype.h>*
- ✧ *Representative functions:*
  - ✧ *is alpha*
  - ✧ *isdigit*
  - ✧ *islower*
  - ✧ *isupper*
  - ✧ *isspace*
  - ✧ *tolower, toupper,*