CS262 Lecture 02
Chapters 1&2

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- see makefile and word-count.c

standard c libarary

- assert.h //define macro **assert**
- ctype.h //classify and transform individual characters
- limits.h //defines the limits of **integral** types
- float.h //describes the characteristics of **floating** types
- math.h //trigonometric, exponential, logarithmic, ..
- string.h //string, array and memory manipulation
- stdio.h //file IO
- stdlib.h //string conversion, random number, memory management, searching, sorting, termination

Outline

- variables
  - types (int, char, float, double, enum, union, struct)
  - type conversion
  - array and char array (i.e. string)
  - scopes (automatic, static, extern)
- functions
  - parameters (caller), arguments (callee)
  - call by value vs. call by reference
- operators (almost identical with java)
  - arithmetic, bitwise, boolean,
  - order of evaluation

enumerate (enum)

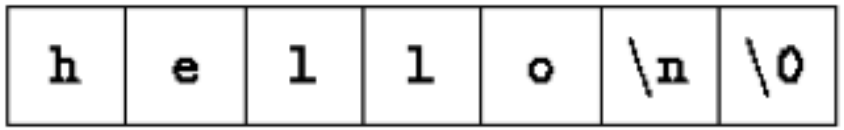
- **enum bool {false, true};**
  - bool flag=false;
- **enum error {no_error=1, io_error, mem_error};**
  - error msg=no_error;
- **union package { int id; char type; };**
  - package a;
  - usage: a.id=0; or
  - a.type='c';
  - but not both!

array

- very similar to java but there are some important differences
- **int tmp[3];**
- **int tmp[3]={0,0,0};**
- **const int tmp[]={0,0,0};**
- **tmp** is a pointer to the first element of the array
- cannot use variable to define the size of the array
  - ex: you cannot say: **int x=10; double tmp[x];**
  - this won't compile, but you can say:
  - **#define x 10**, then **double tmp[x];**

char array (string)

- c has no string (class)
- a string is simply a “char array” with the last element being null (‘\0’)
- ex:
  - char msg[]=”hello\n”;



  - char msg[7]=”hello\n”; //size 7 or larger

- see digit-count.c

function

- call-by-value
  - the arguments are local variables whose values are copied from the callers
  - each function call allocates all these local variables which are placed on the top of the **call stack**
  - **ex:** long ans=fib(n); //in ex4.c
    - variable n in main function and variable n in fib function are different variables even though they have the same value.
  - **ex:** void swap(int a, int b); //won;t work
  - void swap(int * a, int * b); //need to use pointers

function

- Since array variables are pointers so:
  - char A[]="GMU", B[]="UMD";
  - swap(A,B); //call by value
  - void swap(int X[], int Y[]){...}
    - X will have address A
    - Y will have address B

- java is also "call-by-value" and "references" (i.e. pointers) are passed when arguments are objects
  - so, java does have pointers (references), but you cannot manipulate them

- see longest-line-1.c

scopes

- scopes
  - life span (global, local)
  - visibility (static, extern)
- Life span
  - variables **outside** all functions are global variables (has life span of the program)
  - variables **inside** a function is local to a **function call** (does not span different calls) unless "static" is used
    - **int foo(){ static int x=0; printf("x=%d",x++); }**
    - call foo multiple times will output different values

scopes

- Visibility (for global variables)
  - similar to private, protected, public in java/c++
  - **static** means “only visible to the file contains that variable”
  - **extern** means “visible to the entire program”
    - this is default for all global variables
  -

- see longest-line-1.c