CS 35L Software Construction Laboratory (Lab5-A)
Mon, Feb 6, 2012, Ver 1.0

C Language
  Father of C and Unix: Dennis Ritchie and Ken Thompson
  Invented in 1970's, still the second popular programming language

  More reading:
  http://en.wikipedia.org/wiki/Dennis_Ritchie
  http://en.wikipedia.org/wiki/Ken_Thompson
  http://www.cplusplus.com/

Top 5 Programming Language

Rank 2012	Rank 2011	Language	Rate	Delta
1	1	Java	17.050%	-1.43%
2	2	C	16.523%	+1.54%
3	6	C#	8.653%	+1.84%
4	3	C++	7.853%	-0.33%
5	8	Objective-C	7.062%	+4.49%

  More reading:
  http://www.tiobe.com/index.php/content/paperinfo/tpci/index.html

C Language Review

  Include head files:
  C libs: #include <xxx.h>
  Std C++ libs: #include <xxx>
  e.g. "#include <cstring>" vs "#include <string.c>" vs "#include <string>"

#include <stdio.h>
  http://www.cplusplus.com/reference/clibrary/cstdio
  -- printf   write to stdout
     int printf (const char * format, ...);
     %[flags][width][.precision][length]specifier
  -- scanf   read from stdin
     int scanf (const char * format, ...);
     %[*][width][modifiers]type
  -- getchar get character from stdin
     int getchar (void);
  -- putchar put character to stdout
     int int putchar (int character);

  Review for pipeline and redirection
    -- redirect output: echo '12345' > test
    -- redirect input: cat < test
    -- pipeline: echo '12345' | cat

#include <string.h>
  http://www.cplusplus.com/reference/clibrary/cstring/
  -- strlen   get string length
     size_t strlen (const char * str);
  -- strcmp   compare two strings
     int strcmp (const char * str1, const char * str2);
     return 0: both strings are equal

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    -- memcpy    copy block of memory
       void * memcpy ( void * destination, const void * source, size_t num );
    -- strcpy    copy string
       char * strcpy ( char * destination, const char * source );

#include <stdlib.h>
  http://www.cplusplus.com/reference/clibrary/cstdlib/
  -- malloc    allocate memory block (run time)
     void * malloc ( size_t size );    // size in bytes
            e.g. char* mem = malloc(memsize);
  -- free      deallocate space in memory
     void free ( void * ptr );
  -- atoi      convert string to integer
     int atoi ( const char * str );
  -- qsort     sort elements of array
     void qsort ( void * base, size_t num, size_t size,
                  int ( * comparator ) ( const void *, const void * ) );
     -- Function pointer
        int ( * comparator ) ( const void *, const void * )
        int compare (const void *a, const void *b)

A quick demo for next lecture
  http://irl.cs.ucla.edu/~jwcai/qsort.c

More reading for gdb
  http://www.unknownroad.com/rtfm/gdbtut/gdbtoc.html
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