MC140: lecture #17

today's topic:

string library

scope

string library.

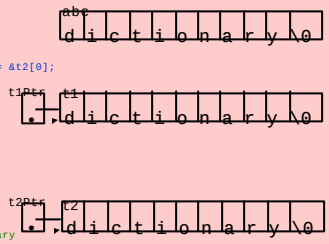
`char *` *is a pointer to a character array*

- string handling library
  `#include <string.h>`
- functions include:
  - string length
    `int strlen( char *s );`
  - string copy
  - string concatenate
  - string compare
  - string search

string library: string copy.

- `char *strcpy( char *s1, const char *s2 );`
- `char *strncpy( char *s1, const char *s, size_t n );`
- example:

```
#include <stdio.h>
#include <string.h>
int main( void ) {
  char *abc = "dictionary";
  char t1[100], t2[100];
  char *t1ptr = &t1[0], *t2ptr = &t2[0];
  t1ptr = strcpy(t1ptr, abc);
  t2ptr = strncpy(t2ptr,abc,7);
  t2[7] = '\0';
  printf( "abc=%s\n",abc);
  printf( "t1 =%s\n",t1);
  printf( "t2 =%s\n",t2);
  return( 0 );
} /* end of main() */
```



- output:

```
abc = dictionary
t1 = dictionary
t2 = diction
```

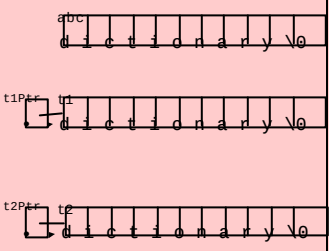

string library: string compare.

- `char *strcmp( char *s1, const char *s2 );`
- `char *strncmp( char *s1, const char *s2, size_t n );`
- example:

```
#include <stdio.h>
#include <string.h>
int main( void ) {
   . . .
   int i;
   i=strcmp(t1ptr,t2ptr);
   printf( "i=%d\n",i );
   i = strncmp(t1ptr,t2ptr,7);
   printf( "i=%d\n",i );
   . . .
} /* end of main() */
```

output:

```
i=0
i=1
```



scope.

- refers to the portion of the program that knows about a variable
- DD defines four types:
  (1) file scope
  (2) function scope
  (3) function prototype scope
  (4) block scope (we won't cover this)

scope:

file scope.

- also called *global variables*
- any variables that are declared outside any function (including main)
- these variables are allocated when the program executes and any functions inside the same file know about them

board is a global variable

```
#include <stdio.h>
int board[3][3];
int main( void ) {
  a();
} /* end of main() */
void a ( int i ) {
   int x = 35;
   return( i + x );
} /* end of a() */
```

scope:

function scope.

- also called *local variables*
- any variables that are declared in the header of a function
- any variables that are declared within the body of the function
- these variables are essentially discarded after the function exits -- they only exist in memory during execution of the function

i and ***x*** are local variables

```
void a ( int i ) {
  int x = 35;
  return( i + x );
} /* end of a() */
```


scope:

static.

- the *static* keyword can be used when declaring a variable inside a function
- the variable is a local variable, however, its value is retained even after the function exits
- example:

```
void b ( void ) {
      static int x = 50;
      printf( "in b, x=%d\n",x );
      ++x;
      printf( "in b, x=%d\n",x );
} /* end of b() */
```


scope:

function prototype scope.

- any variables that are declared within a function prototype

i is a function prototype variable

```
#include <stdio.h>
int board[3][3];
void a( int i );
int main( void ) {
  a();
} /* end of main() */
void a ( int i ) {
  int x = 35;
  return( i + x );
} /* end of a() */
```


scope:

example.

```
#include <stdio.h>
void a( void ); /* function prototype */
void b( void ); /* function prototype */
void c( void ); /* function prototype */
int x = 1;      /* global variable */

int main( void ) {
   int x = 5;    /* local variable */
   printf( "in main, x = %d\n",x );
   a();
   b();
   c();
   a();
   b();
   c();
   printf( "in main, x = %d\n",x );
   return( 0 );
} /* end of main() */
```

```
void a ( void ) {
   int x = 25;
   printf( "in a, x=%d\n",x );
   ++x;
   printf( "in a, x=%d\n",x );
} /* end of a() */

void b ( void ) {
   static int x = 50;
   printf( "in b, x=%d\n",x );
   ++x;
   printf( "in b, x=%d\n",x );
} /* end of b() */

void c ( void ) {
   printf( "in c, x=%d\n",x );
   x *= 10;
   printf( "in c, x=%d\n",x );
} /* end of c() */
```


scope:

example, output.

```
in main, x = 5
in a, x = 25
in a, x = 26
in b, x = 50
in b, x = 51
in c, x = 1
in c, x = 10
in a, x = 25
in a, x = 26
in b, x = 51
in b, x = 52
in c, x = 10
in c, x = 100
in main, x = 5
```


reading.

- material covered today:
  - DD: 8.6-8.8, 5.12
- EXAM #2 will be on MON 19 MARCH
- EXAM #3 will be on WED 11 APRIL