

MC140: lecture #6

today's topic:

assignment operators
arithmetic operators
relational operators
combination operators
increment and decrement operators
for loops
while loops
do loops

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assignment operators.

`=` is the primary assignment operator!

- example:

```
int x;  
x = 7;
```

stores the value 7 in the memory location indicated by the integer variable x

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arithmetic operators.

- are just like in algebra ... almost

		<u>algebra</u>	<u>C</u>
addition	+	$f + 7$	$f + 7$
subtraction	-	$p - c$	$p - c$
multiplication	*	bm	$b * m$
division	/	x/y or x,y	x/y
modulus	%	$r \text{ mod } s$	$r \% s$

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relational operators.

- are also just like in algebra ... almost

		<u>algebra</u>	<u>C</u>
equality	==	$f = 7$	$f == 7$
inequality	!=	$p \neq c$	$p != c$
greater than	>	$b > m$	$b > m$
less than	<	$x < y$	$x < y$
greater than or equal	>=	$d \geq n$	$d >= n$
less than or equal	<=	$w \leq z$	$w <= z$

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warning!

don't mix up assignment and equality

`=` is assignment

`==` is equality

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combination operators: arithmetic and assignment.

addition	+=	$f += 7;$	$f = f + 7;$
subtraction	-=	$p -= c;$	$p = p - c;$
multiplication	*=	$b *= m;$	$b = b * m;$
division	/=	$x /= y;$	$x = x / y;$
modulus	%=	$r \% = s;$	$r = r \% s;$

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increment and decrement operators.

- increment: **++**
these are all equivalent:
`x = x + 1; x += 1; x++;`
- decrement: **--**
these are all equivalent:
`y = y - 1; y -= 1; y--;`

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loops.

- used when you want to do something more than once
- two forms:
 - counter controlled \Rightarrow *definite*
 - sentinel controlled \Rightarrow *indefinite*
- three statements:
 - **for**
 - **while**
 - **do**

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what is a sentinel?

- sentinel (*noun*): SENTRY; GUARD; WATCH; especially: a soldier standing guard at a point of passage (as a gate)
- watches for the looping condition to become FALSE

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counter controlled loops.

for:

```
for ( i=1 ; i<=3 ; i++ ) {
    printf( "hello world\n" );
} /* end of for */
```

while:

```
i = 1;
while ( i<=3 ) {
    printf( "hello world\n" );
    i++;
} /* end of while */
```

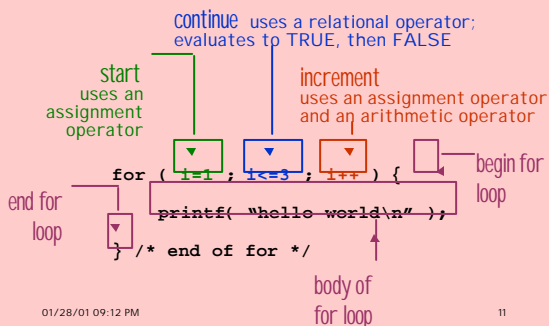
do:

```
i = 1;
do {
    printf( "hello world\n" );
    i++;
} while ( i<=3 );
```

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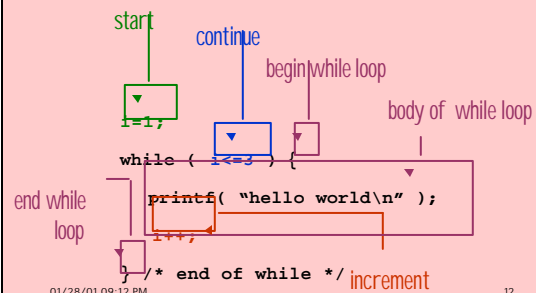
dissecting the counter controlled for loop.



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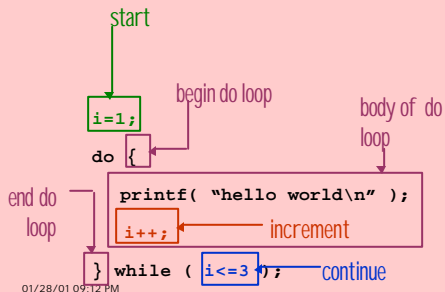
dissecting the counter controlled while loop.



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dissecting the counter controlled do loop.



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counter controlled loop syntax.

```

for ( <start> ; <continue> ; <increment> ) {
  statement1;
  statement2;
  ...
} /* end of for */

<start>;
while ( <continue> ) {
  statement1;
  statement2;
  ...;
  <increment>;
} /* end of while */

<start>;
do {
  statement1;
  statement2;
  ...;
  <increment>;
} while ( <continue> );
  
```

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sentinel controlled loops.

while:

```

more = 1;
while ( more == 1 ) {
  printf( "hello world\n" );
  printf( "do you want more (1=yes,2=no)? " );
  scanf( "%d",&more );
} /* end of while */
  
```

do:

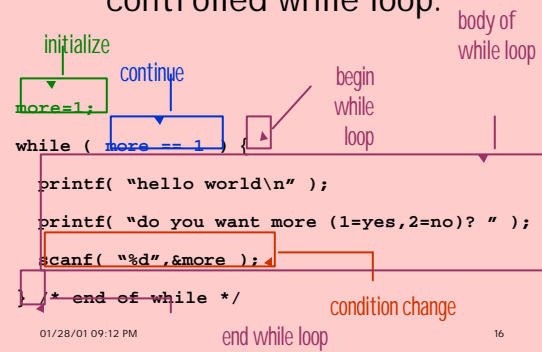
```

more = 1;
do {
  printf( "hello world\n" );
  printf( "do you want more (1=yes,2=no)? " );
  scanf( "%d",&more );
} while ( more == 1 );
  
```

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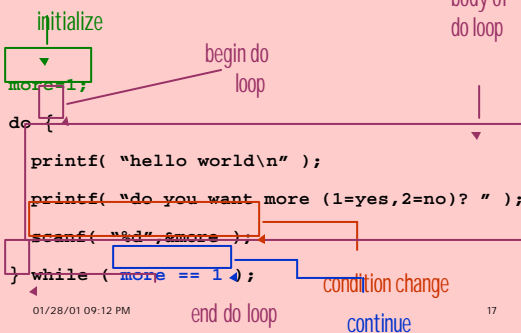
dissecting the sentinel controlled while loop.



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dissecting the sentinel controlled do loop.



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sentinel controlled loop syntax.

```

<initialize>;
while ( <continue> ) {
  statement1;
  statement2;
  ...;
  <change condition>;
} /* end of while */

<initialize>;
do {
  statement1;
  statement2;
  ...;
  <change condition>;
} while ( <continue> );
  
```

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warning!

beware the infinite loop!

- infinite = runs forever
- make sure <increment> is doing something!
- make sure <change condition> is doing something!
- make sure <continue> becomes FALSE eventually

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reading.

- material covered last time:
 - DD: ch 2.5 - 2.6, 4.4 - 4.6
- material covered today:
 - DD: ch 2.5 - 2.6, 3.11 - 3.12, 4.1 - 4.6
- *assignment #3 will be out wednesday*

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