Programming with C I

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while Statement Syntax

```
while (loop repetition condition)
        statement;

/* display N asterisks. */
count_star = 0;
while (count_star < N) {
        printf(“*”);
        count_star = count_star + 1;
}
```

Increment and Decrement Operators

- counter = counter + 1

  count += 1

  counter++

  ++counter

- counter = counter - 1

  count -= 1

  counter--

  --counter

while Statement Syntax

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```

Compound assignment

Operator	Definition
+	addition
-	subtraction
*	multiplication
/	division
%	remainder

- **Can do these too:**

  +=

  -=

  *=

  /=

  %=

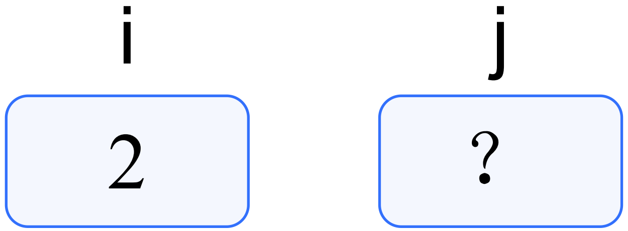
Increment and Decrement Operators

side effect

- – a change in the value of a variable as a result of carrying out an operation

Increment and Decrement Operators

Before..


i j

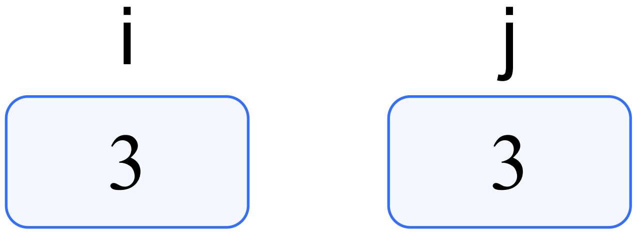
2 ?

Increments...

j = ++i;

prefix:
Increment i and then use it.

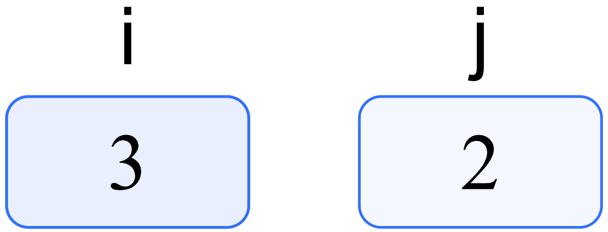
After...


i j

3 3

j = i++;

postfix:
Use i and then increment it..


i j

3 2

The for Statement Syntax

```
for (initialization expression;
          loop repetition condition;
          update expression)
      statement;

/* Display N asterisks. */
for (count_star = 0;
       count_star < N;
       count_star += 1)
    printf("*");
```

do-while Statement

- For conditions where we know that a loop must execute at least one time.

1. Get a *data value*
2. If *data value* isn't in the acceptable range, go back to step 1.

do-while Syntax

```
do
        statement;
while (loop repetition condition);

/* Find first even number input */
do
        status = scanf(“%d”, &num);
while (status > 0 && (num % 2) !=
0);
```

We will talk more about the output of scanf next time.

Computing a Sum or Product in a Loop

accumulator

- a variable used to store a value being computed in increments during the execution of a loop

Computing Factorial

logical complement (negation)

- loop body executes for decreasing value of **i** from **n** through 2
- each value of **i** is incorporated in the accumulating product
- loop exit occurs when **i** is 1

Nested Loops

- Loops may be nested just like other control structures
- Nested loops consist of an outer loop with one or more inner loops
- Each time the outer loop is repeated, the inner loops are reentered, their loop control expressions are eevaluated, and all required iterations are performed

Table Compound Assignment Operators

Statement with Simple Assignment Operator	Equivalent Statement with Compound Assignment Operator
count_emp = count_emp +1;	count_emp += 1;
time = time - 1;	time -= 1;
total_time = total_time + times;	total time += time;
product = product * item;	prouct *= item;
n = n* (x + 1);	n *= x + 1;

Loop Control Components

- initialization of the loop control variable
- test of the loop repetition condition
- change (update) of the loop control variable

- the for loop supplies a designated place for each of these three components

Figure Function to Compute Factorial

```
/*
 * Computes n!
 * Pre: n is greater than or equal to zero
 */
int
factorial(int n)
{
      int i,                /* local variables */
          product;          /* accumulator for product computation */

      product = 1;
      / * Computes the product n x (n-1) x (n-2) x . . . x 2 x 1 */
      for (i = n; i > 1; --i) {
            product = product * i;
      }

      /* Returns function result */
      return (product);
}
```

Endfile-Controlled Loop Design

- Get the first ***data value*** and save ***input status***
- while ***input status*** does not indicate that end of file has been reached
- Process data value
- Get next data value and save ***input status***

Figure Batch Version of Sum of Exam Scores Program

```
/*
 * Compute the sum of the list of exam scores stored in the file scores. txt
 */
 #include <stdio.h>

int
main(void)
{
        int sum = 0,            /* sum of scores input so far */
            score,              /* current score */
            input_status;       /* status value returned by scanf */

        printf("Scores\n");

        input_status = scanf("%d", &score);
        while (input_status != EOF) {
                printf("%5d\n", score);
                sum += score;
                input_status = scanf("%d", &score);
        }

        printf("\nSum of exam scores is %d\n", sum);

        return (0);
}

Scores
     55
     33
     77
sum of exam scores is 165
```

THE END

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