Programming with C I

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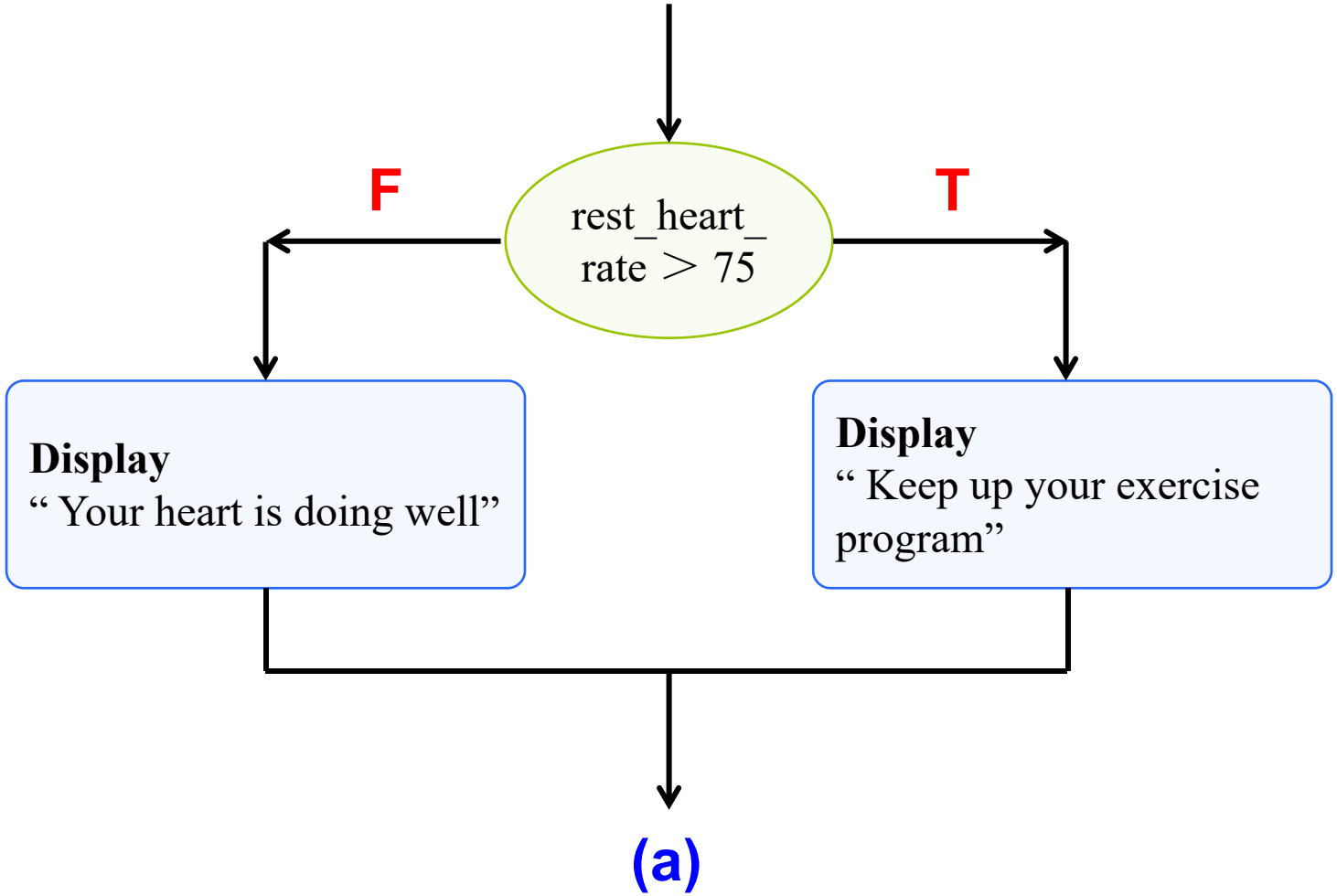
Comparing Characters

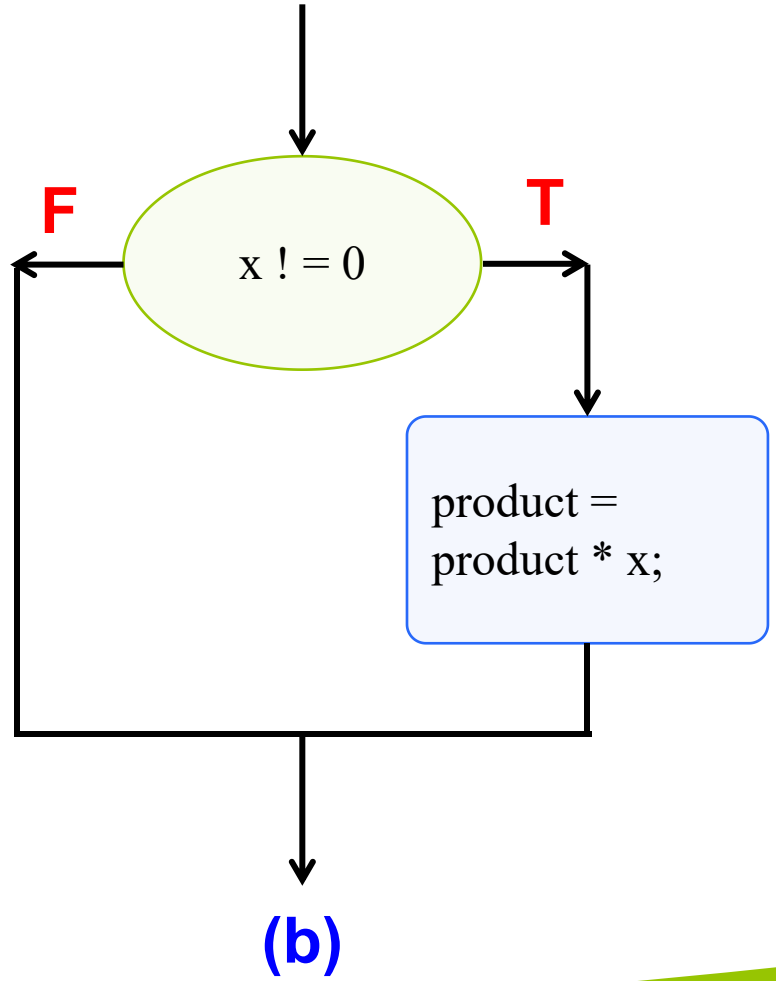
Expression	Value
'9' >= '0'	1 (true)
'a' < 'e'	1 (true)
'B' <= 'A'	0 (false)
'Z' == 'z'	0 (false)
'a' <= 'A'	System dependent
'a' <= ch && ch <= 'z'	1 (true) if ch is a lowercase letter

The if-statement

making decisions

Figure Flowcharts of if Statements with (a) Two Alternatives and (b) One Alternative





if-statement with two alternatives

```
if (rest_heart_rate > 75)
        printf( “Keep up your exercise program!\n” );
else
        printf( “Your heart is doing well!\n” );
```

if-statement with one alternative

```
if (x != 0)
        product = product * x;
```

Figure Program Using an if statement for selection

```
/*
 * Displays message about heart rate.
 */
#include <stdio.h>

int main(void)
{
        int pulse;                  /* resting pulse rate for 10 secs */
        int rest_heart_rate;        /*  resting heart rate for 1 minute */

        /* Enter your resting pulse rate */
        printf("Take your resting pulse for 10 seconds. \n");
        printf("Enter your pulse rate and press return>");
        scanf("%d", &pulse);

        /* Calculate resting heart rate for minute */
        rest_heart_rate = pulse * 6
        printf("Your resting heart rate is %d.\n", rest_heart_rate);
        /* Display message based on resting heart rate */
       if (rest_heart_rate > 56)
          printf("Keep up your exercise program!\n");
       else
          printf("Your heart is in excellent health!\n");

        return (0);
}
```

(continued)

Figure Program Using an if statement for selection

Sample Run 1

```
Take your resting pulse for 10 seconds.
Enter your pulse rate and press return> 12
Your resting heart rate is 72.
Keep up your exercise program!
```

Sample Run 2

```
Take your resting pulse for 10 seconds.
Enter your pulse rate and press return> 9
Your resting heart rate is 54.
Your heart is in excellent health!
```

Figure Function comp_tax

```
/*
 * Computes the tax due based on a tax table.
 * Pre : salary is defined.
 * Post : Returns the tax due for 0.0 <= salary <= 150,000.00;
 *          returns -1.0 if salary is outside the table range.
 */
double
comp_tax(double salary)
{
      double tax;

      if (salary < 0.0)
            tax = -1.0;
      else if (salary < 15000.00)                    /* first range          */
            tax = 0.15 *salary;
      else if (salary < 30000.00)                    /* second range         */
            tax = (salary -15000.00) * 0.18 + 2250.00;
      else if (salary < 50000.00)                    /* third range          */
            tax = (salary - 30000.00) * 0.22 + 5400.00;
      else if (salary < 80000.00)                    /* fourth range         */
            tax = (salary - 50000.00) * 0.27 +11000.00;
       else if (salary <= 150000.00)                 /* fifth range          */
            tax = (salary -80000.00) * 0.33 + 21600.00;
        else
            tax = -1.0;

         return (tax)
}
```

The switch statement

- also used to select one of several alternatives
- useful when the selection is based on the value of
  - a single variable
  - or a simple expression ← **controlling expression**
- values may of type int or char
  - not double

Syntax

```
switch (controlling expression) {
        label set1
                statements1
                break;
        label set2
                statements2
                break;
                .
                .
                .
        label setn
                statementsn
                break;
```

Figure Program Using a *switch* Statement for Selection

```
/*
 * Reads serial number and displays class of ship
 */

#include <stdio.h>

int
main(void)
{
        char class;                                     /* input - character indicating class of ship */

        /* Read first character of serial number */
        printf("Enter ship serial number>");
        scanf("%c", &class);                            /* scan first letter */

        /* Display first character followed by ship class */
        printf("Ship class is %c: ", class);
        switch (class) {
        case 'B':
        case 'b':
                printf("Battleship\n");
                break;
```

(continued)

Figure Program Using a *switch* Statement for Selection

```
        case 'C':
        case 'c':
                printf("Cruiser\n");
                break;
        case 'D':
        case 'd':
                printf("Destroyer\n");
                break;
        case 'F':
        case 'f':
                printf("Frigate\n");
                break;
        default:
                printf("Unknown\n");
        }

        return (0);
}
```

Sample Run 1

Enter ship serial number> f

ship class is f: Frigate

Sample Run 2

Enter ship serial number> P

ship class is P: Unknown

THE END

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