



Programming with C I

Fangtian Zhong
CSCI 112

Gianforte School of Computing
Norm Asbjornson College of Engineering
E-mail: fangtian.zhong@montana.edu

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

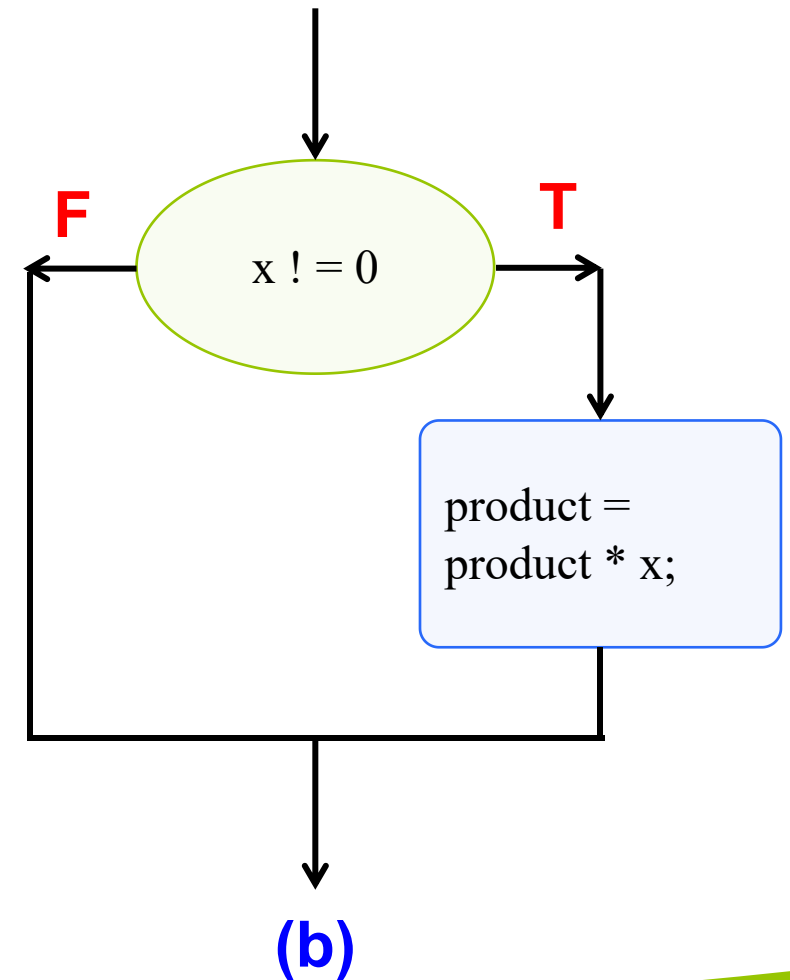
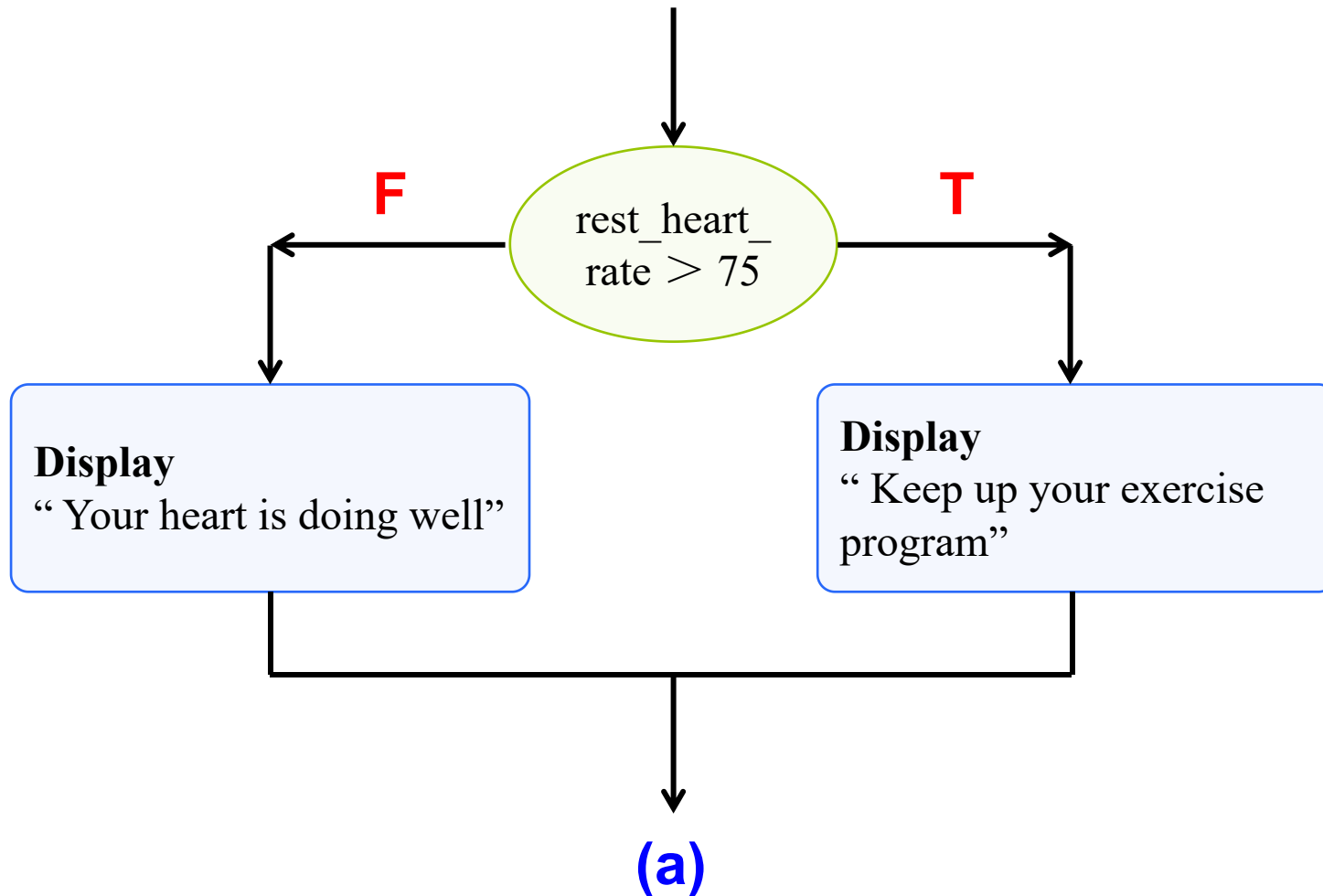


Figure if Statement to Order x and y

```
if (x > y) {                                /* Switch x and y */  
    temp = x;                               /* Store old x in temp */  
    x = y;                                  /* Store old y in x */  
    y = temp;                               /* Store old x in y */  
}
```

Nested if-statement



an if statement with another if statement as its true task or its false task

```
if (x > 0)
    num_pos = num_pos + 1
else
    if (x < 0)
        num_neg = num_neg + 1
    else /* x equals 0 */
        num_zero = num_zero + 1
```

Figure Function comp_tax

```
/*
 * Computes the tax due based on a tax table.
 * Pre : salary is defined.
 * Post : Returns the tax due for  $0.0 \leq \text{salary} \leq 150,000.00$ ;
 *        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)
}
```

Nested if-statements with more than one variable

```
if (road_status == 'S')
```

```
    if (temp > 0) {
```

```
        printf("Wet roads ahead\n");
```

```
        printf("Stopping time doubled\n");
```

```
    } else {
```

```
        printf("Icy roads ahead\n");
```

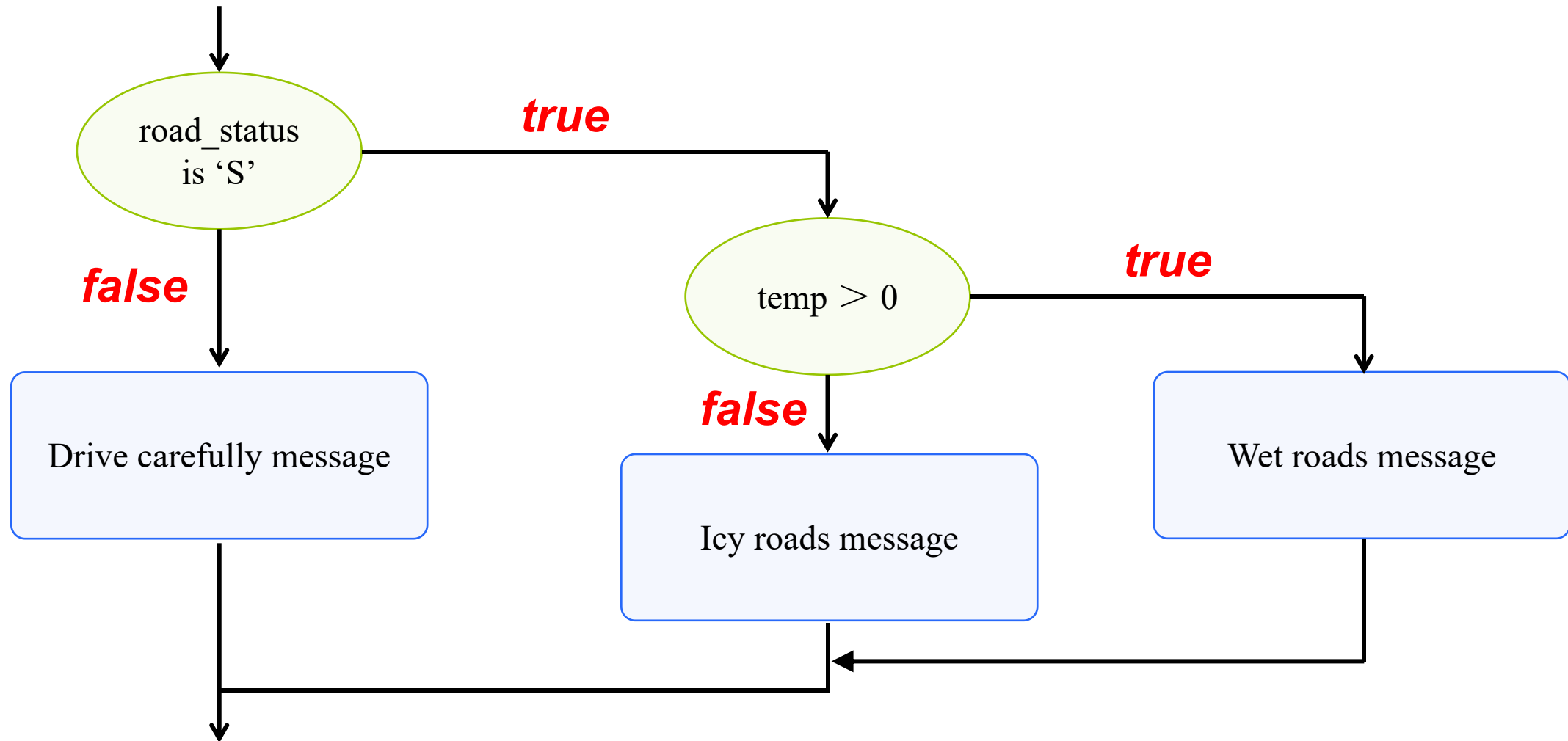
```
        printf("Stopping time quadrupled\n");
```

```
    }
```

```
else
```

```
    printf("Drive carefully!\n")
```


Flowchart of Road Sign Decision Process



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

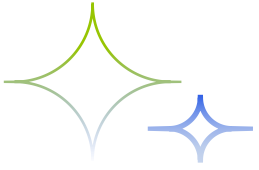
```
case 'C':  
case 'c':  
    printf("Cruiser\n");  
    break;  
case 'D':  
case 'd':  
    printf("Destroyer\n");  
    break;  
case 'F':  
case 'f':  
    printf("Frigate\n");  
    break;  
default:  
    printf("Unknown\n");  
}  
  
return (0);  
}
```

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

Fangtian Zhong
CSCI 112