

Taking together: control structures

Computer Programming 143 – Lecture 8

Program Control III

Faculty of Engineering



Logic summary

0 $\rightarrow$ False

1 $\rightarrow$ True
(non-zero)

Expressions:

- And $\&\&$
- Or $\|\|$
- Not $!$
- Equality $==$

We can combine all of these, e.g.



```
if ( ((x > 4) && (x <= 6)) || (x == 2) )  
{  
    // true: this happens  
}
```

1 7 2

4.6 The **switch** Multiple-Selection Statement I

Unelegant **if** statement

```
if ( condition ) {  
    statement(s);  
}  
else if ( condition ) {  
    statement(s);  
}  
else if ( condition ) {  
    statement(s);  
}  
else if ( condition ) {  
    statement(s);  
}  
...
```

The switch statement

switch (value) *normally variable*

{

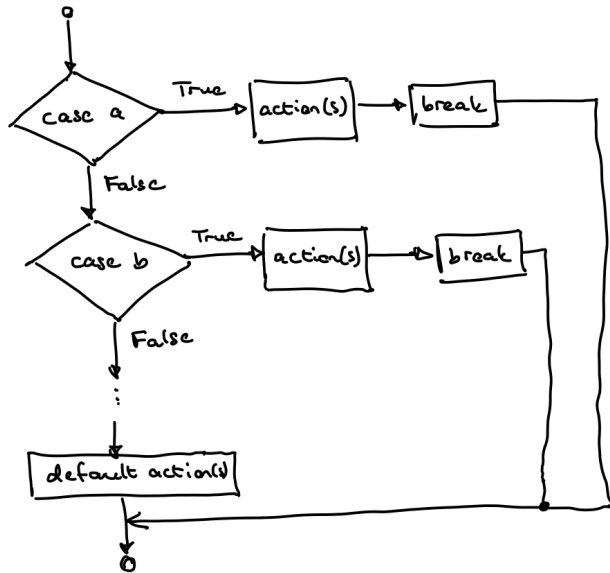
case a:
action(s);
break;

case b:
action(s);
break;

⋮

default:
action(s);

}



4.8 The **break** Statement I

break

- Causes immediate exit from a **while**, **for**, **do...while** or **switch** statement
- Program execution continues with the first statement after the structure
- Common uses of the **break** statement
 - Escape early from a loop
 - Skip the remainder of a **switch** statement

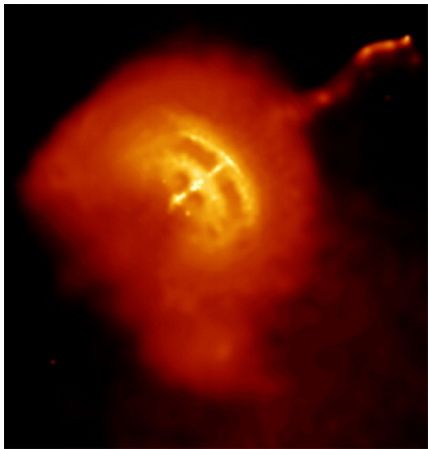
Remarks

- Violates rules of structured programming when used with **while**, **for** or **do...while** statement
- For more information refer to the textbook



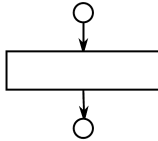
10^{18} bytes

$4.35 \cdot 10^{17}$



4.11 Summary of Structured Programming I

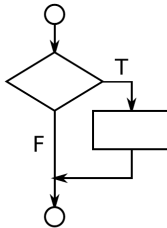
Sequence structure



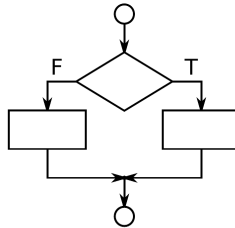
4.11 Summary of Structured Programming II

Selection structures

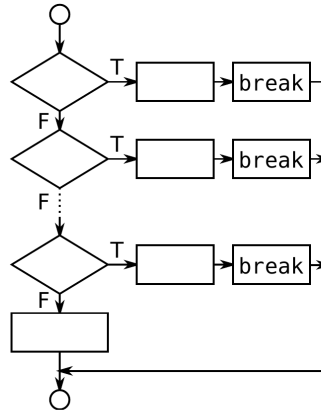
if statement



if...else statement



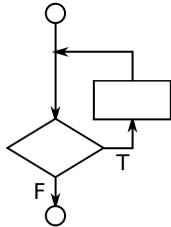
switch statement



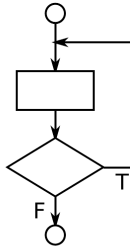
4.11 Summary of Structured Programming III

Repetition structures

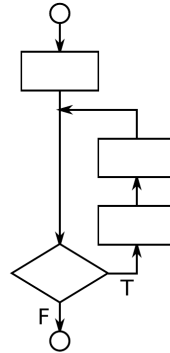
while statement



do...while statement

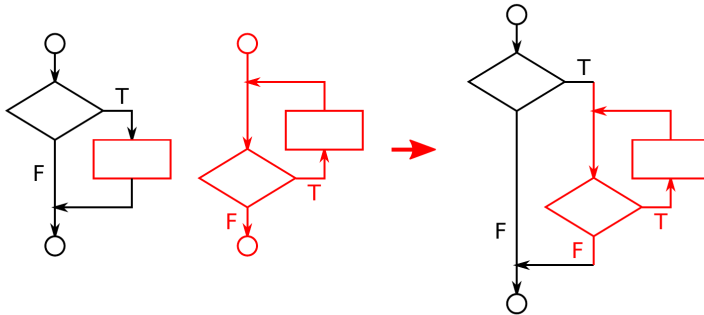


for statement



4.11 Summary of Structured Programming V

Connecting control structures: method 2



4.6 switch Bigger Example I

Example C code

```
/* Counting Grades (based on Fig. 4.5 in Deitel & Deitel) */
#include <stdio.h>
#include <stdlib.h>
// function main begins program execution
int main( void )
{
    int numStudents; //total number of students
    char grade; // grade input variable
    int passCount = 0; // number of passes
    int failCount = 0; // number of failures

    printf("Enter the total number of students.\n");
    scanf("%d",&numStudents); //read the total number of students
    printf( "Enter results (P for pass; F for failure).\n");
    do {
        scanf(" %c", &grade); //scanf reads one character from keyboard
```

4.6 switch Bigger Example II

Example C code (cont'd...)

```
switch ( grade ) { // switch nested in while
  case 'F':        // grade input was uppercase F
  case 'f':        // or lowercase f
    failCount++; // increment number of failures
    break;       // exit switch

  case 'P':        // grade input was uppercase P
  case 'p':        // or lowercase p
    passCount++; // increment number of passes
    break;       // exit switch

  case '\n':       // ignore newlines
  case '\t':       // tabs,
  case ' ':        // and spaces in input
    break;       // exit switch
```

4.6 switch Bigger Example III

Example C code (cont'd...)

```
    default:           // catch all other characters
        printf( "Invalid character entered. " );
        printf( "Enter a new result (P or F).\n" );
        break;
    } // end switch
} while ((passCount+failCount) < numStudents); // end do....while

// output summary of results
printf( "\nTest results:\n" );
printf( "Passed: %d\n", passCount ); // display number of passes
printf( "Failed: %d\n", failCount ); // display number of failures

return 0; // indicate program ended successfully
} // end function main
```

4.6 switch Bigger Example IV

Example output

Enter the total number of students.

5

Enter results (P for pass; F for failure).

p

P

f

F

k

Invalid character entered. Enter a new result (P or F).

P

Test results:

Passed: 3

Failed: 2

Homework

- Go through the bigger example: Slides 10-13
- Study Sections 4.6, 4.8, 4.11 in Deitel & Deitel
- Do Self Review Exercises 4.1, 4.2(a)&(b), 4.4(c) in Deitel & Deitel
- Do Exercises 4.5(b)&(c), 4.19, 4.24 in Deitel & Deitel