C Programming #3

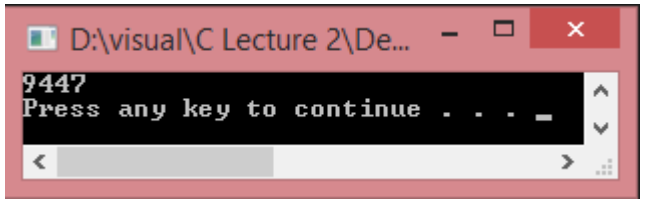
Selection

International College, KMITL

Random

- #include <time.h> is required
- Example of using random

```c
#include <stdio.h>
#include <time.h>

void main() {
    srand(time(NULL));
    int ran = rand();

    printf("%d\n", ran);

    system("pause");
}
```



Relational Expressions

- Simplest decision structure:

  if (condition)

  statement executed if condition is true

  - The condition is evaluated to determine its numerical value, which is interpreted as either true (non-zero) or false (0)
  - If condition is “true” the statement following the if is executed; otherwise, statement is not executed
- The condition used in all of C’s if statements can be any valid C expression
  - Most commonly, a relational expression (can yield only 0 or 1)

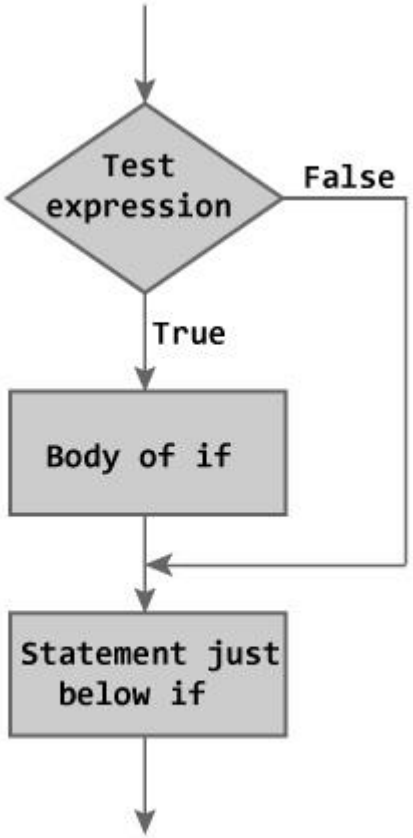


Figure: Flowchart of if Statement

Relational Expressions (continued)

Relational Operator	Meaning	Example
<	less than	`age < 30`
>	greater than	`height > 6.2`
<=	less than or equal to	`taxable <= 20000`
>=	greater than or equal to	`temp >= 98.6`
==	equal to	`grade == 100`
!=	not equal to	`number != 250`

Relational Operator in C

Relational Expressions (continued)

- Relational expressions are also known as conditions
- A relational expression evaluates to 1 (true) or 0 (false)
  - The expression 3 < 4 has a value of 1
  - The expression 2.0 > 3.3 has a value of 0
  - The value of hours > 0 depends on the value of hours
- Character data can also be compared using relational operators

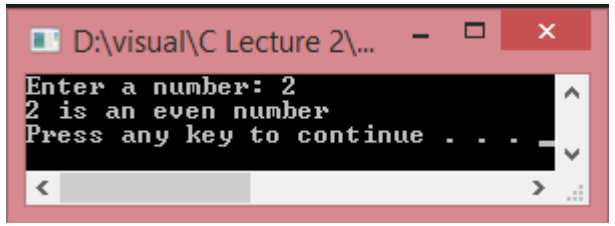
Relational Expressions (continued)

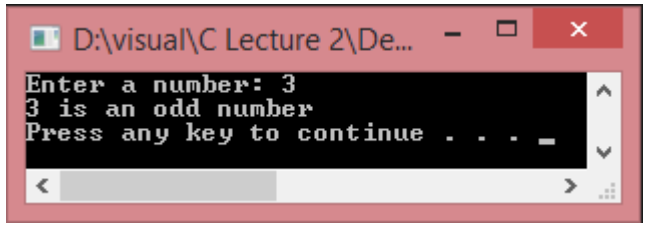
Expression	Value	Interpretation
'A' > 'C'	0	false
'D' <= 'Z'	1	true
'E' == 'F'	0	false
'g' >= 'm'	0	false
'b' != 'c'	1	true
'a' == 'A'	0	false
'B' < 'a'	1	true
'b' > 'Z'	1	true

Sample Comparison of ASCII Characters

Case Study

```c
#define _CRT_SECURE_NO_WARNINGS
#include <stdio.h>

void main() {
    int n;

    printf("Enter a number: ");
    scanf("%d", &n);
    if (n % 2 == 0)
    {
        printf("%d is an even number\n", n);
    }
    if (n % 2 == 1)
    {
        printf("%d is an odd number\n", n);
    }

    system("pause");
}
```





Common mistake

- “=” is used for assigning value, “==” use to compare value “{}” is needed when you have multiple statement in an “if”.

Logical Operators

- More complex conditions can be created using the logical operations AND (&&), OR (||), and NOT (!)
- When the && is used with two expressions, the condition is true only if both expressions are true by themselves

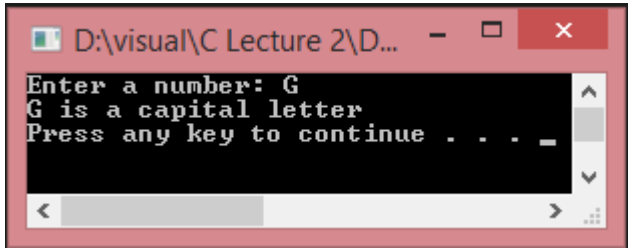
Logical Operators (Continued)

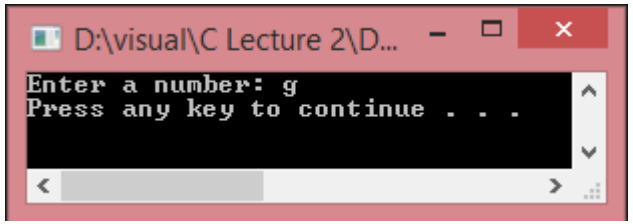
```
int i = 15, j = 30;
double a = 12.0, b = 2.0, complete = 0.0;
```

Expression	Value	Interpretation
`a > b`	1	true
`i == j || a < b || complete`	0	false
`a/b > 5 && i <= 20`	1	true

Case Study

```c
void main() {
    char c;

    printf("Enter a number: ");
    scanf("%c", &c);
    if ((c >= 65) && (c < 97))
    {
        printf("%c is a capital letter\n", c);
    }

    system("pause");
}
```





Check Point #1

The if-else Statement

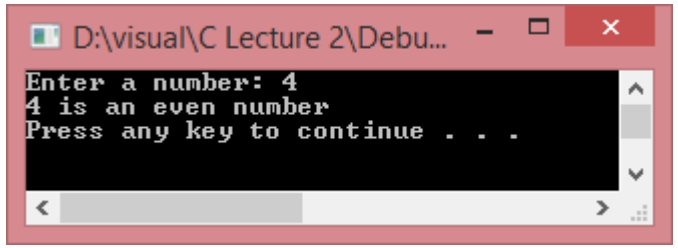
- The most commonly used if-else statement is

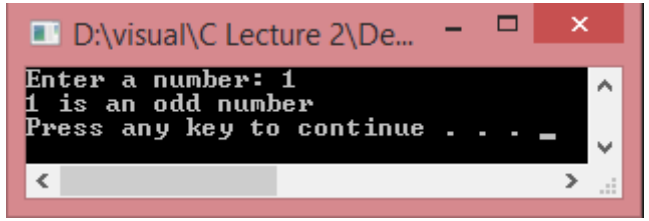
```
if (expression)
        statement1;
else
        statement2;
```

  - If the value of expression is 0 statement2, the statement after the reserved word else, is executed

Case Study

```c
#define _CRT_SECURE_NO_WARNINGS
#include <stdio.h>

void main() {
    int n;
    printf("Enter a number: ");
    scanf("%d", &n);

    if (n % 2 == 0)
    {
        printf("%d is an even number\n", n);
    }
    else
    {
        printf("%d is an odd number\n", n);
    }

    system("pause");
}
```





The if-else Chain

- Nested if statement:

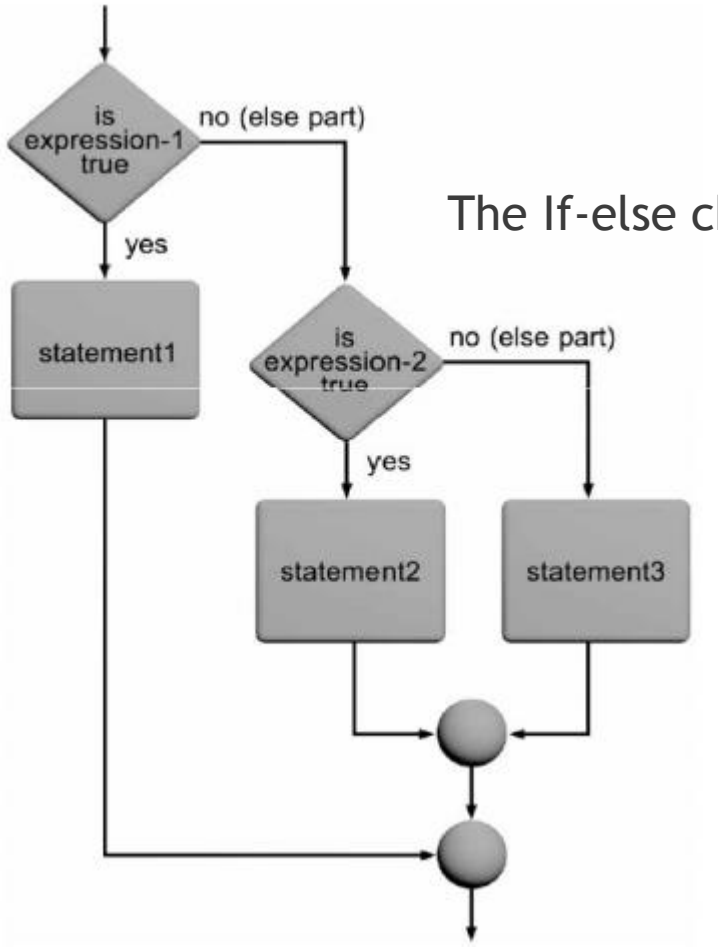
```
if (expression1)
        statement1;
else
        if (expression2)
                statement2;
        else
                statement3;
```

- Whether the indentation exists or not, the compiler will, by default, associate an else with the closest previous unpaired if, unless braces are used to alter this default pairing

The if-else Chain (continued)

- if-else chain:

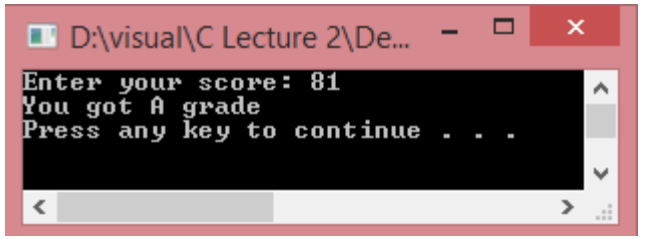
```
if (expression1)
        statement1;
else if (expression2)
        statement2;
else
        statement3;
```

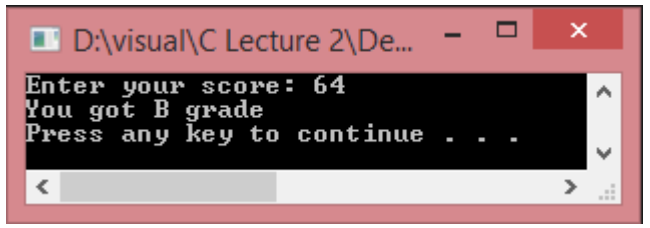


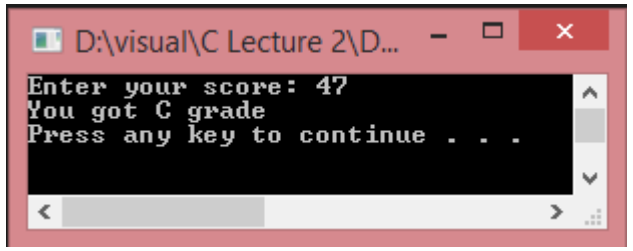
The If-else chain's flowchart

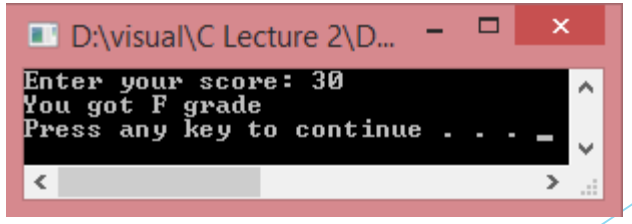
The if-else Chain (continued)

```c
#define _CRT_SECURE_NO_WARNINGS
#include <stdio.h>

void main() {
    int score;
    printf("Enter your score: ");
    scanf("%d", &score);

    if (score >= 80)
    {
        printf("You got A grade\n");
    }
    else
    {
        if (score >= 60)
        {
            printf("You got B grade\n");
        }
        else
        {
            if (score >= 40)
            {
                printf("You got C grade\n");
            }
            else
            {
                printf("You got F grade\n");
            }
        }
    }
    system("pause");
}
```



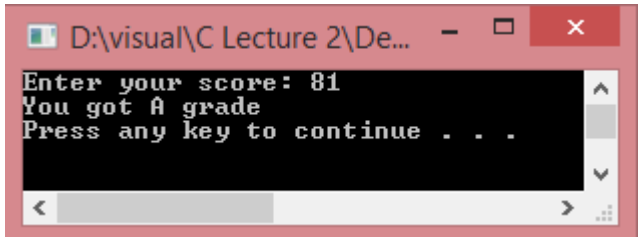


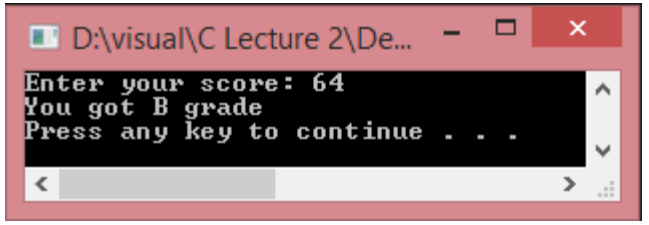


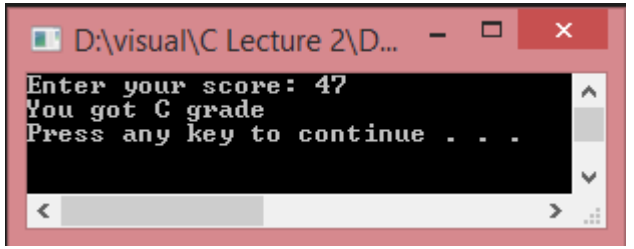


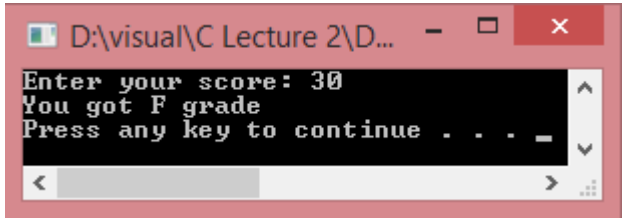
The if-else Chain (continued)

```c
#define _CRT_SECURE_NO_WARNINGS
#include <stdio.h>

void main() {
    int score;
    printf("Enter your score: ");
    scanf("%d", &score);

    if (score >= 80)
    {
        printf("You got A grade\n");
    }
    else if (score >= 60)
    {
        printf("You got B grade\n");
    }
    else if (score >= 40)
    {
        printf("You got C grade\n");
    }
    else
    {
        printf("You got F grade\n");
    }
    system("pause");
}
```









Check Point #2

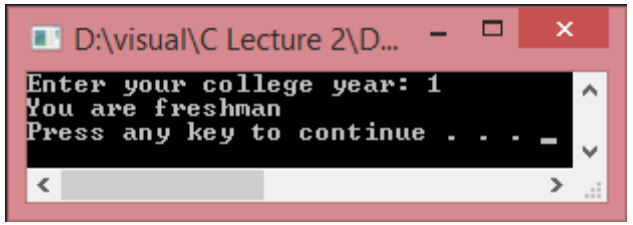
The switch Statement

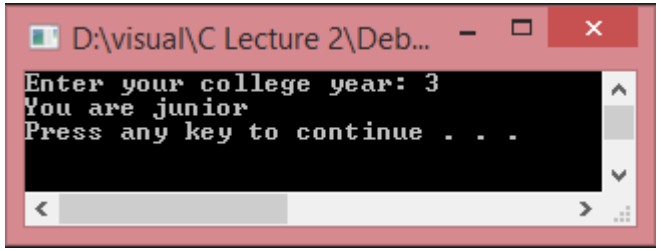
- Constant in “case” can only be char or int
- “default” is optional
- Syntax

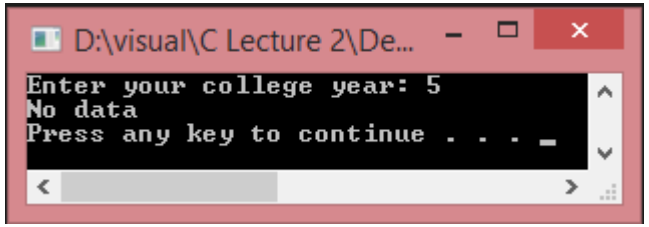
```
switch(//variable)
{
        case //constant_1: //statement;
                break;
        case //constant_2: //statement;
                break;
        case //constant_n: //statement;
                break;
        default: //statement;
}
```

Case Study

```c
#define _CRT_SECURE_NO_WARNINGS
#include <stdio.h>

void main() {
    int year;

    printf("Enter your college year: ");
    scanf("%d", &year);

    switch (year)
    {
        case 1: printf("You are freshman\n");
            break;
        case 2: printf("You are sophomore\n");
            break;
        case 3: printf("You are junior\n");
            break;
        case 4: printf("You are senior\n");
            break;
        default: printf("No data\n");
    }

    system("pause");
}
```







Check Point #3