Programming Principles (MT162)

Lecture 4

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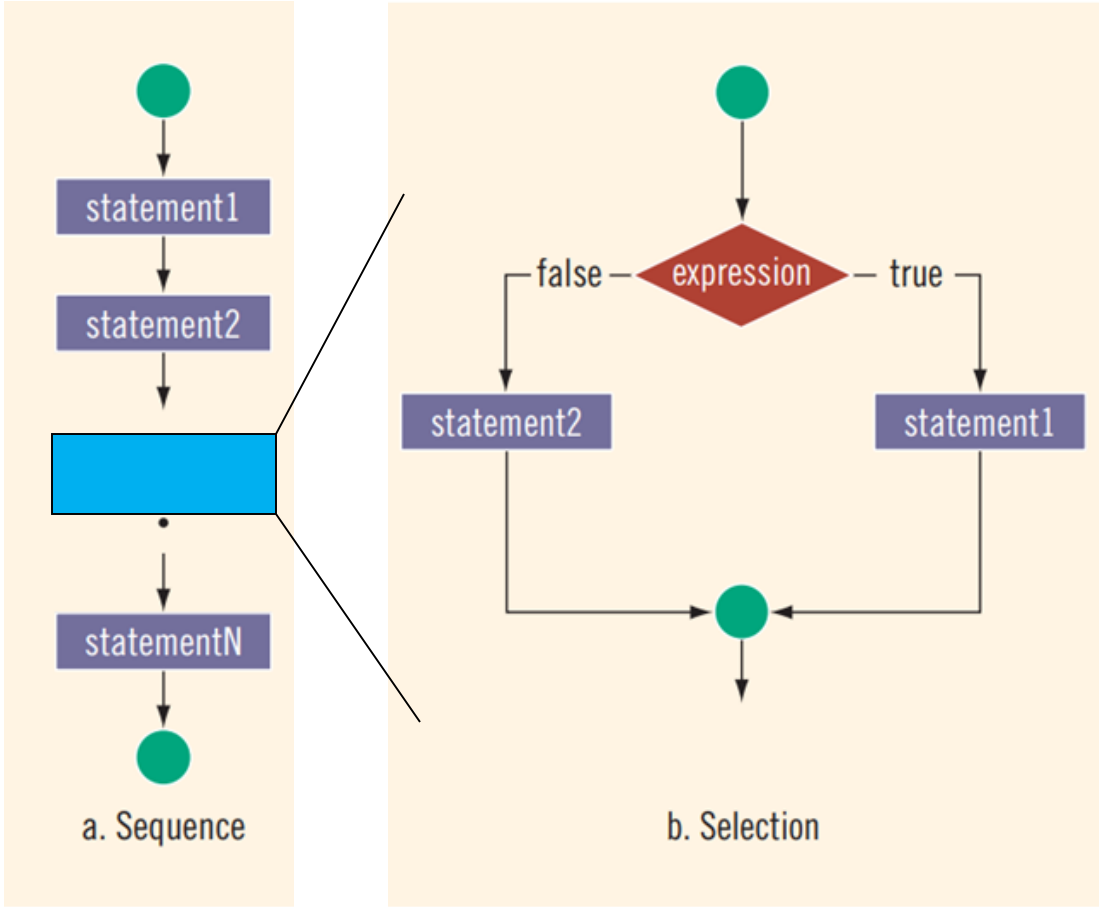
Control Structures



Control Structures

- A computer can proceed:
  - In sequence
  - Selectively (branch) - making a choice
  - Repetitively (iteratively) - looping
- Some statements are executed **Only If** certain **conditions** are met.
- A **condition** is met if it evaluates to `true.`

Relational Operators

- The following Table lists the C+ + relational operators.

- Relational operators:
  - Allow comparisons
  - Require two operands (binary)
  - Evaluate to `true` or `false`

Operator	Description
(==)	equal to
(!=)	not equal to
(<)	less than
(<=)	less than or equal to
(>)	greater than
(>=)	greater than or equal to

Logical Operators (two or more logical expressions)

Logical (Boolean) operators enable you to combine logical expressions.

Operator	Description
(!)	not
(&&)	and
(||)	or

INPUT	OUTPUT
0	1
1	0

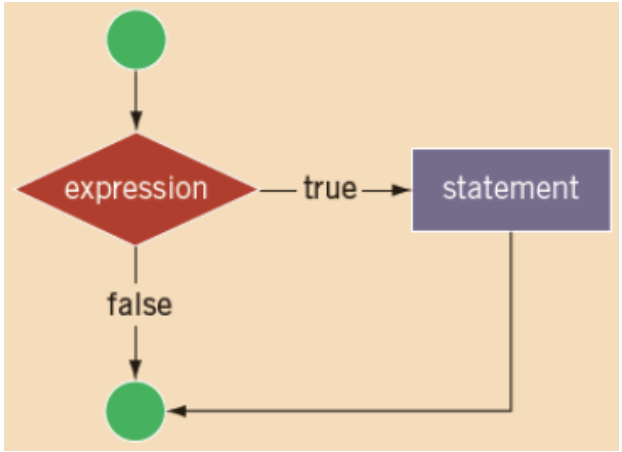
INPUT 1	INPUT 2	OUTPUT
0	0	0
0	1	1
1	0	1
1	1	1

INPUT 1	INPUT 2	OUTPUT
0	0	0
0	1	0
1	0	0
1	1	1

Control Structures
IF … else statement

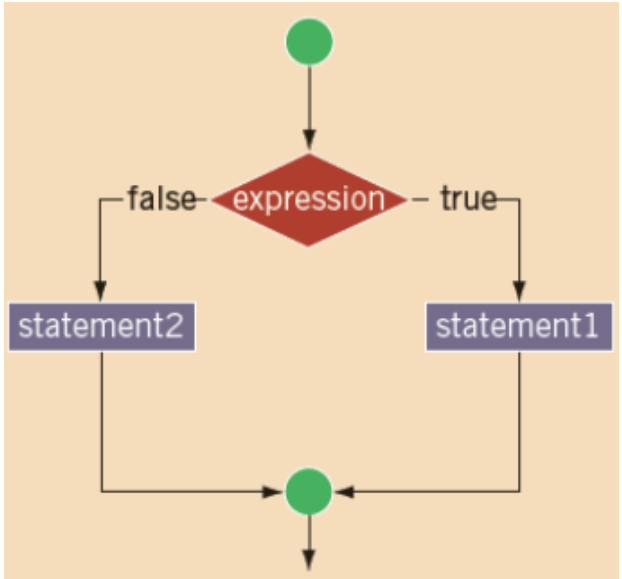
One way selection

```
if (expression)
    statement
```



Two way selection

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



Exercise_1: Write a program to check if a number enter by a user is positive.

```
#include <iostream>
using namespace std;
 int main() {
    int number;
    cout << "Enter an integer: ";
    cin >> number;
    // checks if the number is positive
    if (number > 0) {
       cout << "You entered a positive integer: " << number << endl;
    }
    cout << "This statement is always executed.";  // this line doesn't belong to the if statement
    return 0;
}
```

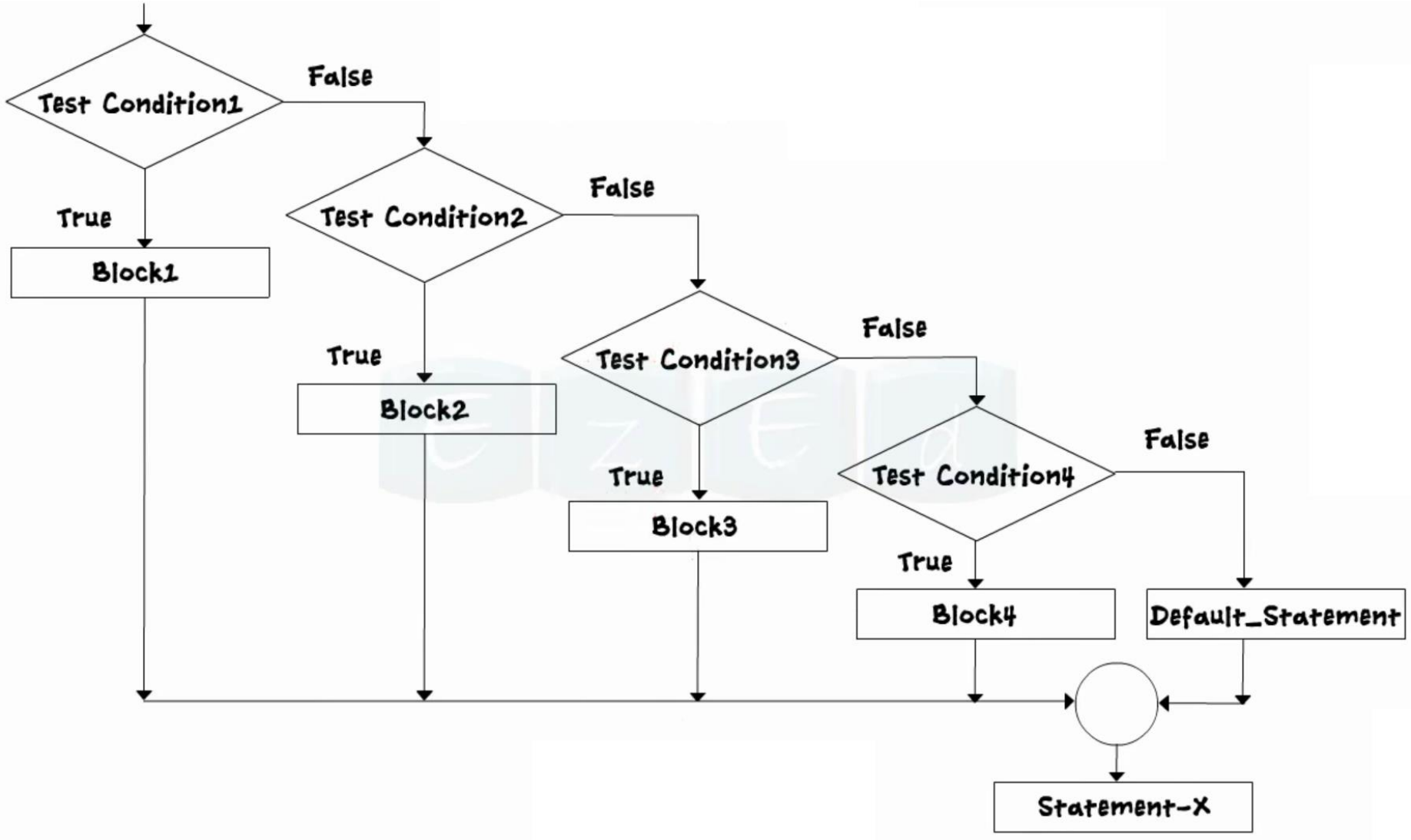
Exercise_2: Write a program to check whether an integer is positive or negative.

```
int main() {
    int number;
   cout << "Enter an integer: ";
   cin >> number;
   if (number >= 0) {
      cout << "You entered a positive integer: " << number << endl;
   }
   else {
      cout << "You entered a negative integer: " << number << endl;
   }
   cout << "This line is always printed.";
   return 0;
}
```

Exercise_3: Write a program to check whether an integer is even or odd.

```
int main() {
    int number;
   cout << "Enter an integer: ";
   cin >> number;
   if (number %2 == 0) {
      cout << number << “ is an even number " << endl;
   }
   else {
      cout << number << “ is an odd number << endl;
   }
   return 0;
}
```

Multiple Selections: If...else if...else statement




```
if (Test_Condition_1)
{
   Block_1;
}
else if (Test_Condition_2)
{
   Block_2;
}
else if (Test_Condition_3)
{
   Block_3;
}
else
{
   Block_4;
}
```

Exercise_4: Write a program to check whether an integer is positive, negative, or 0.

```
int main() {
    int number;
   cout << "Enter an integer: ";
   cin >> number;
   if (number > 0) {
      cout << "You entered a positive integer: " << number << endl;
   }
   else if (number < 0) {
      cout << "You entered a negative integer: " << number << endl;
   }
   else{
     cout << "You entered 0 " << endl;
  }
   cout << "This line is always printed.";
   return 0;
}
```



```
int main() {
    int number;
   cout << "Enter an integer: ";
   cin >> number;
   if (number > 0) {
      cout << "You entered a positive integer: " << number << endl;
   }
   else if (number < 0) {
      cout << "You entered a negative integer: " << number << endl;
   }
   else if(number==0) {
     cout << "You entered 0 " << endl;
  }
   cout << "This line is always printed.";
   return 0;
}
```

Exercise_5:

A. Write a program to find out the student's degree in any grade of the table will be set forth below

grades	Excellent	v.good	good	medium	pass	fail
degrees	100-90	89-80	79-70	69-60	59-50	49-0

```
int main() {
    float score;
    cout << "Enter total score (float, must be <= 100) : ";
    cin >> score;
    if (score>= 90){              cout<<‘Excellent’;}
    else if (score>= 80){       cout<<‘v.good’;}
    else if (score>= 70){       cout<<‘good’;}
    else if (score>= 60){       cout<<‘medium’;}
    else if (score>= 50){       cout<<‘pass’;}
    else {                           cout<<‘fail’;}
   return 0;
}
```

Exercise_6: write a Program to display month name according to the month number.

```
int main() {
    int month;
    cout<<" Enter a number from 1-12."<<endl;    cin>>month;
    if (month ==1)        cout<< "January";
    else if (month==2) cout<< "February";
    else if (month==3) cout<<"March";
    else if (month==4) cout<<"April";
    else if (month==5) cout<<"May";
    else if (month==6   cout<<"June";
    return 0;
}
```