Repetitions and Complex Repetitions

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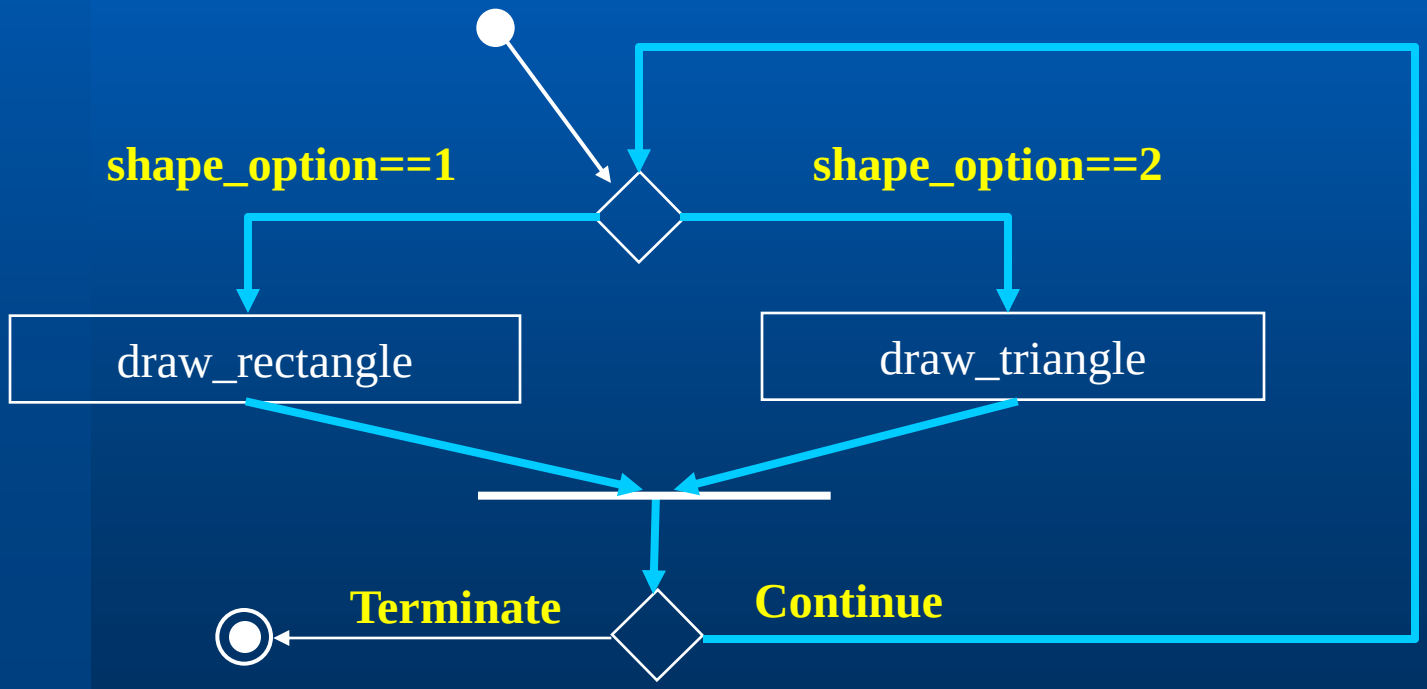
Introduction

- **Sequence, selection, repetition control structures**
- **Latter on complex repetitions**
- **Repetition**
  - **Execute portions of the code repeatedly**

Simple Repetition Structure (1/3)

- **Swim lane diagram**



Simple Repetition Structure (2/3)

- **Repetition statements**
  - **Pre-test: while**
  - **Post-test : Do-while**
  - **Pre-test: for**

Simple Repetition Structure (3/3)

- **Pre-test: while**

```
while (Expression)
{
    Statement;
}
/*end while*/
```

1. Evaluate loop control statement
2. If the evaluation is nonzero, loop body is executed. It goes back to loop control.
3. If the evaluation is zero, droops down to the while statement.

Example 1

- General C
- Enter 1 to draw a rectangle, otherwise draw a triangle.
  - Continue while users enter y.
- 07_c01.c

Example 2

- **Robot Go!**
  - **Robotic C**
- **If table is white, go forward; if table is black, rotate clockwise**
  - **Continue above selections.**
- **07_NXC01.nxc**

Simple Repetition Structure

- **Post-test : do-while**

```
do
{
    Statement;
}
while (Expression)
/*end while*/
```

1. Evaluate loop control statement
2. If the evaluation is nonzero, loop body is executed. It goes back to loop control.
3. If the evaluation is zero, droops down to the while statement.

Example 3

- General C
- Enter 1 to draw a rectangle, otherwise draw a triangle.
  - Continue while users enter y.
- 09_c02.c

Example 4

- **Robot Go!**
  - **Robotic C**
- **If table is white, go forward; if table is black and touch something, rotate clockwise**
  - **Continue above selections.**
- **07_NXC02.nxc**

Simple Repetition Structure

- **Pre-test: for loop**

```
for (InitialExp; ControlExp; UpdateExp)
{
    Statement;
}
/*end while*/
```

1. **Execute InitialExp**
2. **Execute loop if** *ControlExp* **is nonzero**
3. **Update expression until** *ControlExp* **is zero**

Example 5

- General C
- Enter 1 to draw a rectangle, otherwise draw a triangle.
  - Continue while users enter y.
- 07_c03.c

Example 6

- **Robot Go!**
  - **Robotic C**
- **If table is white, go forward; if table is black and touch something, rotate clockwise**
  - **Continue above selections.**
- **07_NXC03.nxc**

Complex Repetition Structure (1/2)

- **Nested loops**
  - **A repetitive structure contains 1 or more loops**
  - **Double, triple,…loops**
  - **Execute from inner loops to outer loops**

Complex Repetition Structure (2/2)

- **Nested loops**

```
while (...){
    while (...){
        while (...){
        }
    }
}
```

```
do{
    do{
        do{
        } while (…)
    } while (…)
}while (…)
```

```
for (...){
    for (...){
        for (...){
        }
    }
}
```

Example 7

- General C
- Enter 1 to draw a rectangle, otherwise draw a triangle.
  - Continue while users enter y.
- 07_c04.c

Example 8

- **Robot Go!**
  - **Robotic C**
- **If table is white, go forward; if table is black and touch something, rotate clockwise**
  - **Continue above selections.**
- **07_NXC04.nxc**

Example 9

- **Robot Go!**
  - **Robotic C**
- **Demonstrate encoder, ultrasonic sensor, and sound sensor**
  - **Continue above controls.**
- **07_NXC05.nxc**