Computational Expression

Repetition: While Loop

Janyl Jumadinova

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Repetition Statements

Loops

- A portion of a program that repeats a statement or a group of statements is called a loop.
- The statement or group of statements to be repeated is called the body of the loop.
- There must be a means of exiting the loop.
A while statement repeats while a controlling boolean expression remains true.

The loop body typically contains an action that ultimately causes the controlling boolean expression to become false.
While Loop

Syntax:

while (Boolean_Expression)
  Body_Statement

or

while (Boolean_Expression) {
  First_Statement
  Second_Statement
  ...
}

Enter a number:
2
1, 2,
Buckle my shoe.

Enter a number:
3
1, 2, 3,
Buckle my shoe.

Enter a number:
0
Buckle my shoe.

Sample screen output

The loop body is iterated zero times.
while (count <= number) {
    System.out.print(count + "", "");
    count++;
}

Start

Evaluate
count <= number

True

Execute
{}
    System.out.print(count + ", ");
    count++;

False

End loop
**while** *(Boolean Expression)*

*Body*

- **Evaluate** *(Boolean Expression)*
  - **True**
    - **Execute Body**
  - **False**
    - **End loop**

**Start**
Break Statement

- A `break` statement can be used to end a loop immediately.
- The `break` statement ends only the innermost loop or if statement that contains the break statement.
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The break statement ends only the innermost loop or if statement that contains the break statement.
break statements make loops more difficult to understand.
Use break statements sparingly (if ever).
while (itemNumber <= MAX_ITEMS) {
    ...
    if (itemCost <= leftToSpend) {
        ...
        if (leftToSpend > 0)
            itemNumber++;
        else
            {
                System.out.println("You are out of money.");
                break;
            }
    }
    else
        ...
}
A `continue` statement:

- Ends current loop iteration
- Begins the next one
- Do not use unless necessary
  - Introduce unneeded complications
Loop Bugs

Common loop bugs:

- Unintended infinite loops
- Off-by-one errors
- Testing equality of floating-point numbers
- The loop may terminate for some input values, but not for others.