While Loop

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Review

For Loops, Loops with a Step

Prefix and Postfix

- Prefix decrement

```
int a = 1;
Console.WriteLine(--a); // 0
Console.WriteLine(a);   // 0
```

Decrease the value, then print it

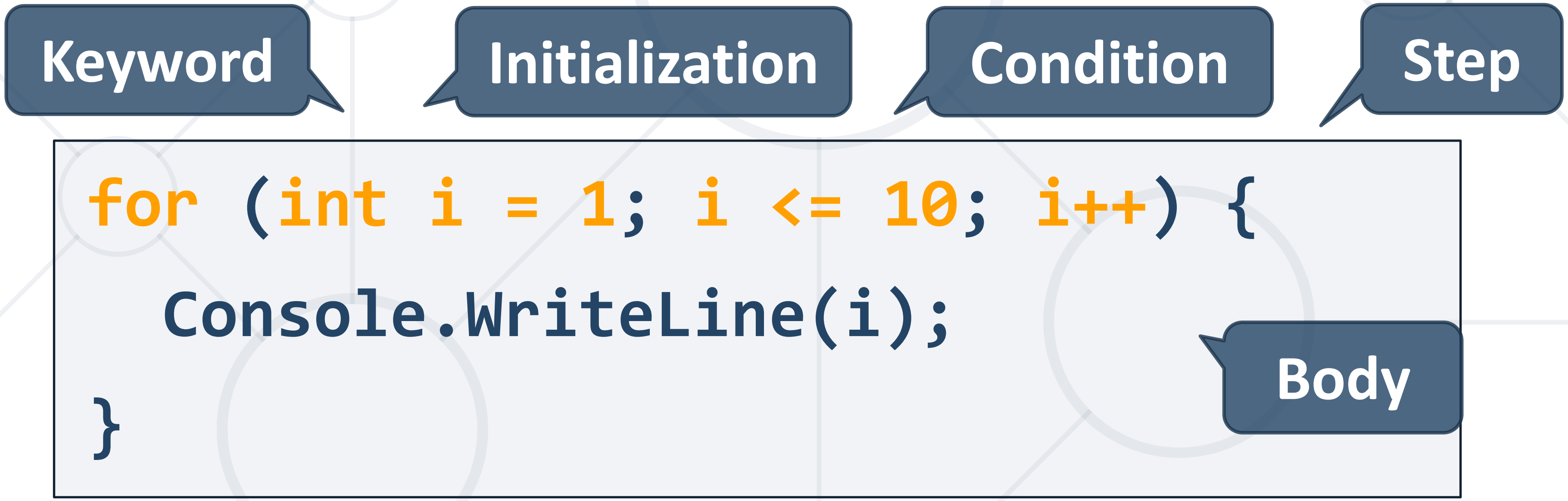
- Postfix decrement

```
int a = 1;
Console.WriteLine(a--); // 1
Console.WriteLine(a);   // 0
```

First print the value, then decrease it

Simple For-Loop

- **For loops** repeat a certain code block a known number of times
- Printing the numbers **from 1 to 10**



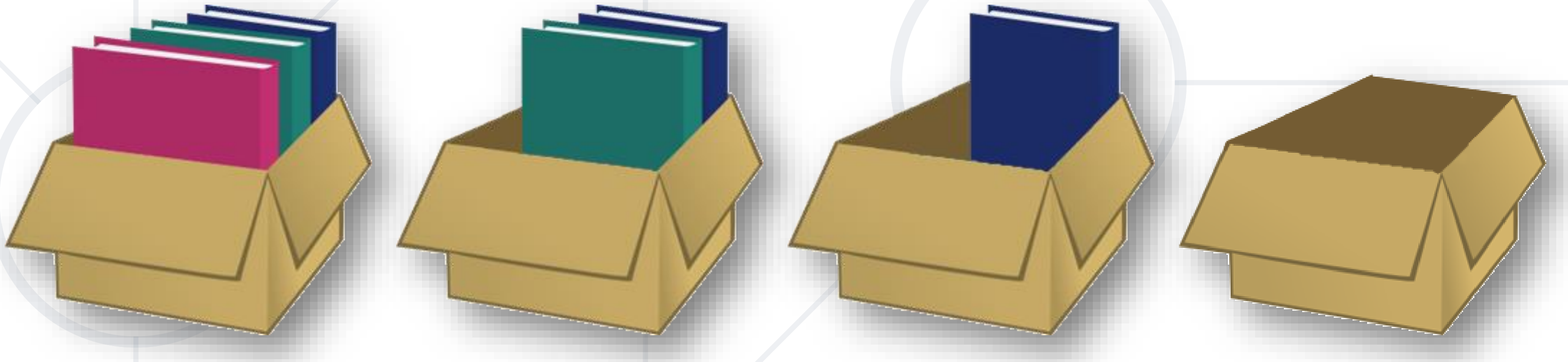
```
for (int i = 1; i <= 10; i++) {
  Console.WriteLine(i);
}
```

Introduction

The Need of While Loops

Real-Life Example: Box of Books

- Unpack a box of books
  - Remove the first book from the box
  - Keep removing books **until** the box is emptied

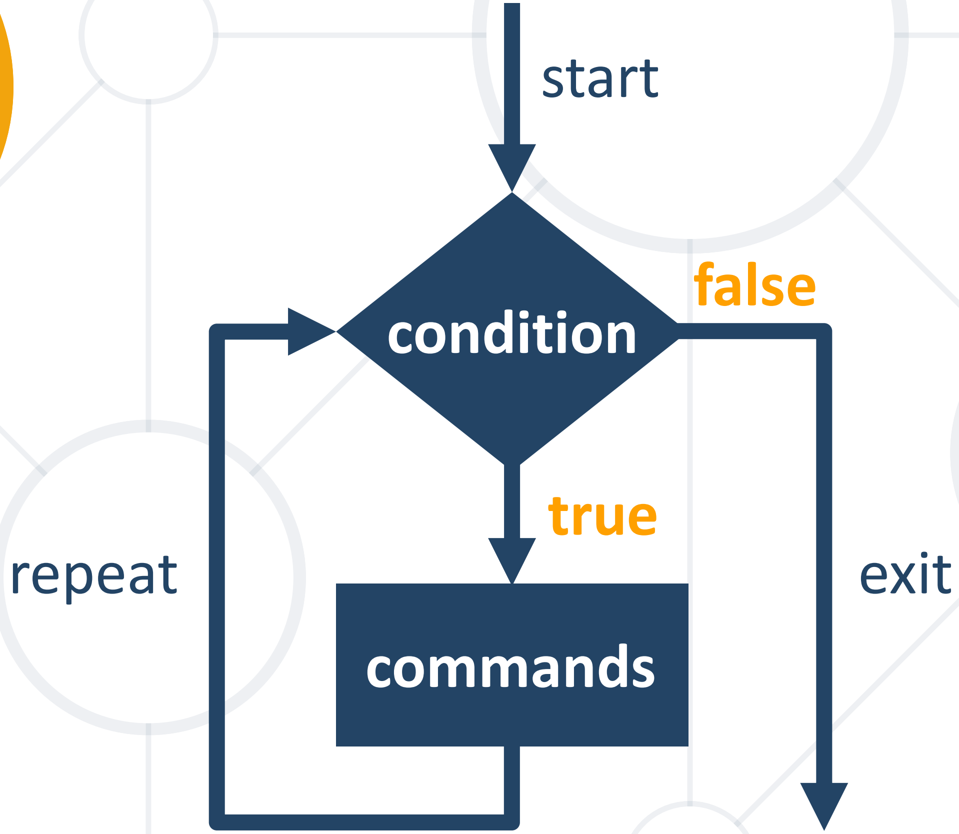


While Loop

Control Flow Statement

While Loop

- Used to **repeat a code** block until an **exit condition** is met



```
while (condition)
{
    // commands
}
```

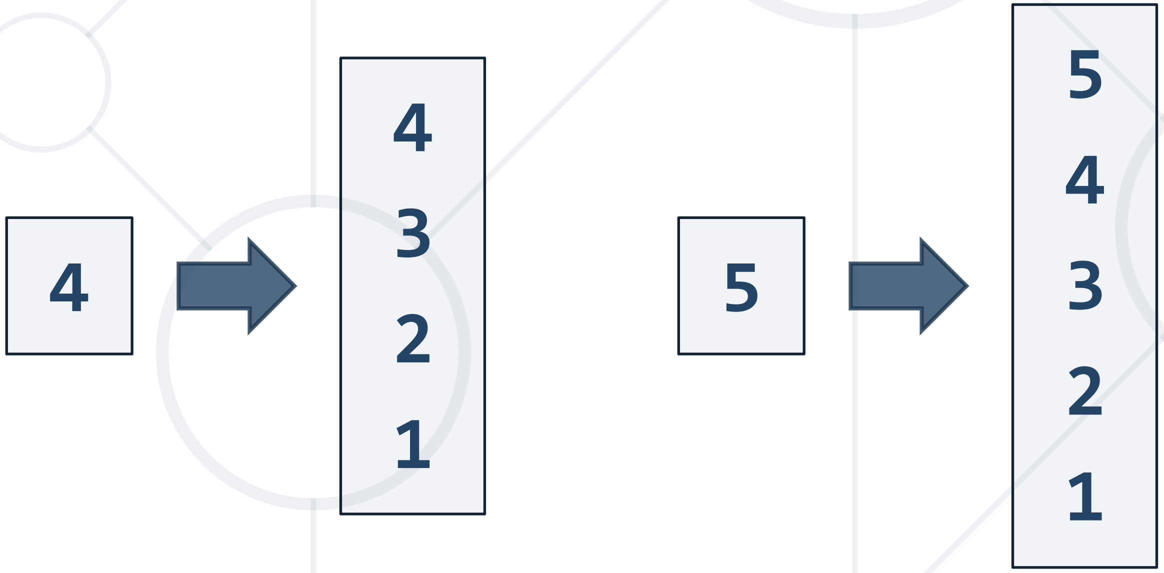
Example: While Loop

- Print the numbers from 1 to 5

```
int i = 1;
while (i <= 5)
{
    Console.WriteLine(i);
    i++;
}
```

Problem: Decreasing Numbers

- Print the **numbers from N down to 1**, using a **while** loop
  - Write a program which receives number: **n**
  - Print the numbers **n … 1**



4 → 4 3 2 1

5 → 5 4 3 2 1

Solution: Decreasing Numbers

```
int number =
int.Parse(Console.ReadLine());
while (number >= 1)
{
    Console.WriteLine(number);
    number--;
}
```

While or For Loop?

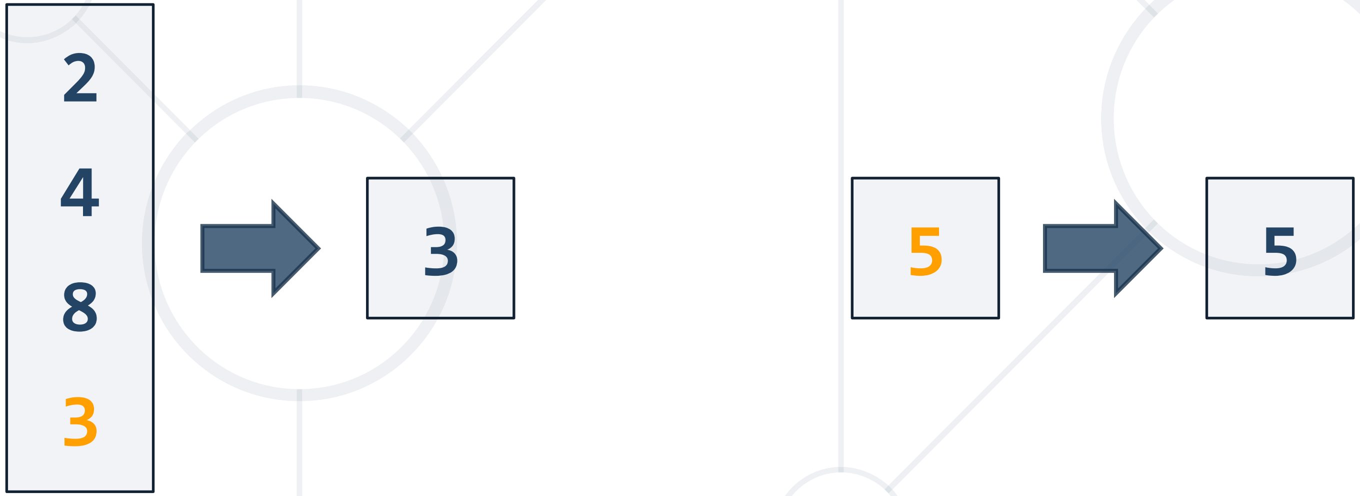
Choosing the Right Loop Type

While or For Loop?

- The `while` and `for` loops both **repeat a block of code**
- Use `for`-loop when you preliminary know the **number of iterations**
  - E.g. repeat exactly **n** times
- Use `while` if you don't know when the exit condition will be met
  - E.g. repeat until stopped

Problem: Odd Number

- Write a program to **enter an odd number**
  - Read numbers from the console until an **odd number** is entered
  - Print the **odd** number as output



```
2
4
8
3
```

→

```
3
```

```
5
```

→

```
5
```

Solution: Odd Number

```
int num = int.Parse(Console.ReadLine());
while (num % 2 == 0)
{
  // The number is not odd → read a new one
  num = int.Parse(Console.ReadLine());
}
Console.WriteLine(num);
```

Infinite While Loop

Using `while (true) { … }`

Infinite While Loop

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- **Infinite loop** = repeating a block of code **an infinite number** of times
- Infinite **while** loops: use **true** as loop condition

```
while (true)
{
   // Commands
}
```

Example: Infinite While Loop (Bug)

```
string command = Console.ReadLine();
while (command != "End")
{
  Console.WriteLine("Executing: " + command);
}
```

always **true**

Example: Finite While Loop (Bug Fixed)

```
string command = Console.ReadLine();
while (command != "End")
{
    Console.WriteLine("Executing: " + command);
    command = Console.ReadLine();
}
```

The "break" Operator

Exiting from a Loop

The "break" Operator

- Used for prematurely **exiting** the loop
- Can only be executed from the loop's **body**
- When break is executed, the code inside the loop's body after it **is skipped** (does not execute)

```
while (true)
{
  // Some code …
  if (…) break;
  // More code …
}
```

Example: Break Operator

```
int sum = 0;
while (true)
{
  int nextNum = int.Parse(Console.ReadLine());
  if (nextNum == 0)
  {
    // The last number was reached
    break;
  }
  sum += nextNum;
  Console.WriteLine("Sum: " + sum);
}
```

- Sum numbers until **0 is entered**

Example: Infinite Loop with Break

```
while (true)
{
  string command = Console.ReadLine();
  if (command == "End")
  {
     break;
  }
  Console.WriteLine("Executing: " + command);
}
```

Summary

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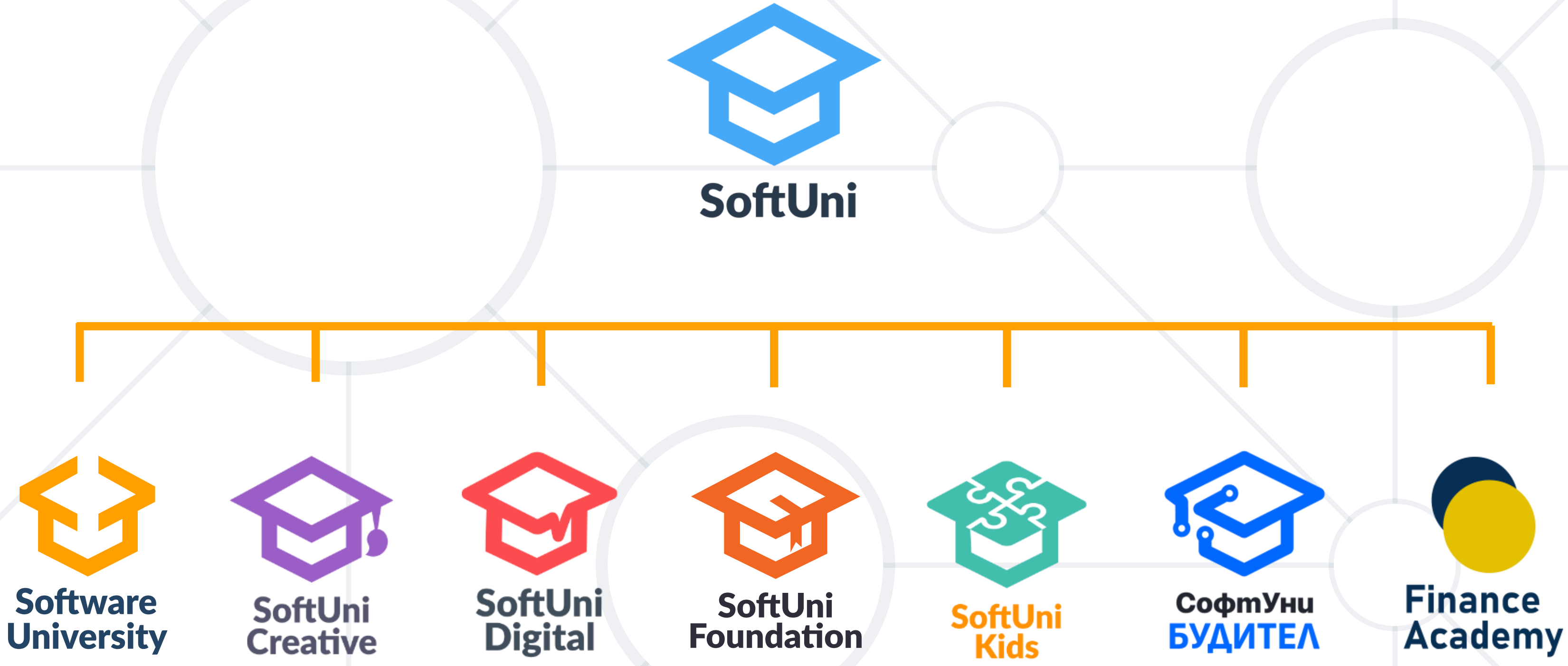
- The `while` loop executes a block of code multiple times
  - While the loop condition is true
- Use `for` when you initially know the number of repetitions, `while` otherwise
- `while` loops can be infinite
  - Use the `break` operator to exit from the loop on certain condition

Questions?



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