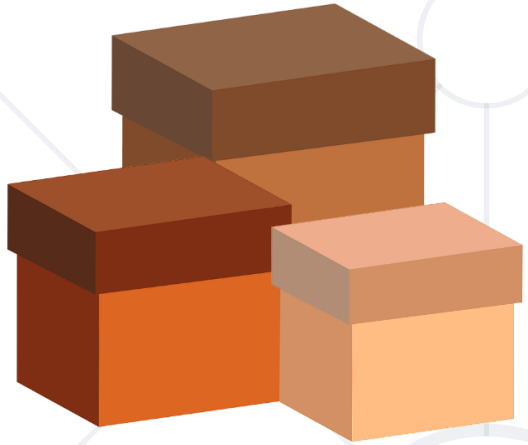
Data Types and Variables



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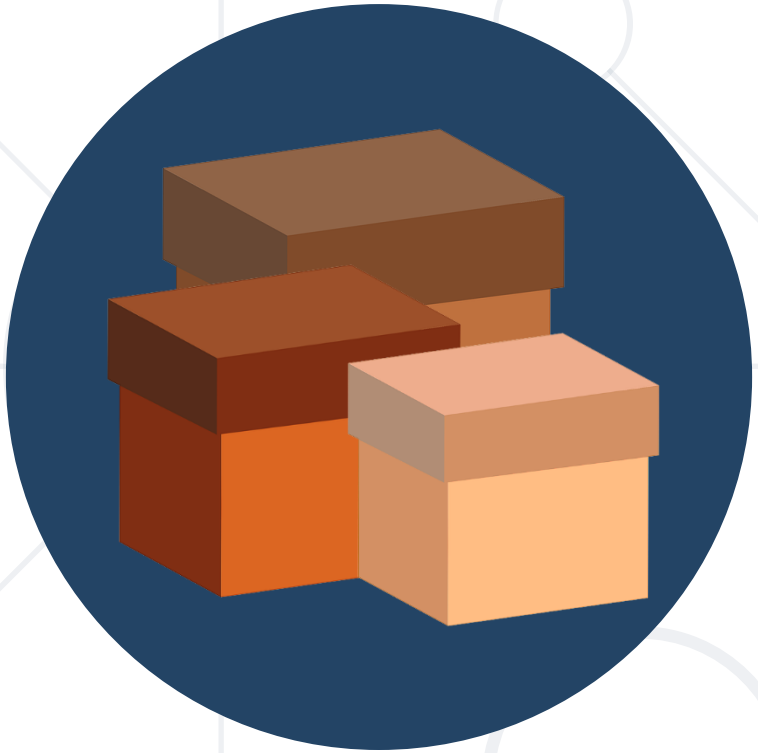
Data Types

Data Types

- Variables store value of a certain **type**
  - Number, letter, text (string), date, color, picture, list, …
- Data types:
  - **int** – an integer: **1**, **2**, **3**…
  - **double** – a floating-point number: **-0.5**, **3.14**, …
  - **char** – a symbol: '**a**', '**b**', '**#**', …
  - **string** – text: "**Hello**", "**World**", …

Data Types

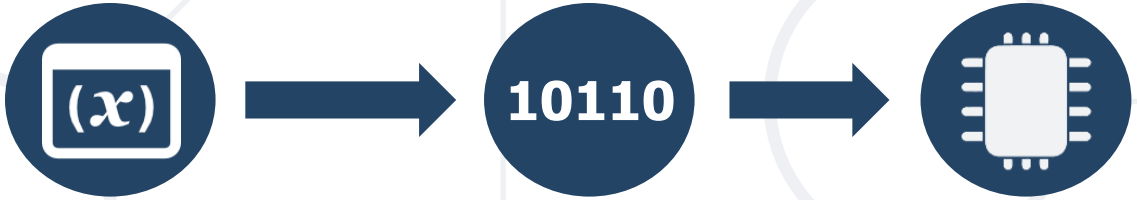
- Data types define **ranges of values** with similar characteristics
- Data types are characterized by:
  - **Name**
    - Example: **int**, **string, double**
  - **Size** (memory usage)
    - Example: **4 bytes**
  - **Default value**
    - Example: **0**



Variables

How Does Computing Work?

- Computers are machines that process data
  - Both program **instructions** and **data** are stored in the computer memory
  - **Data** is stored by using **variables**



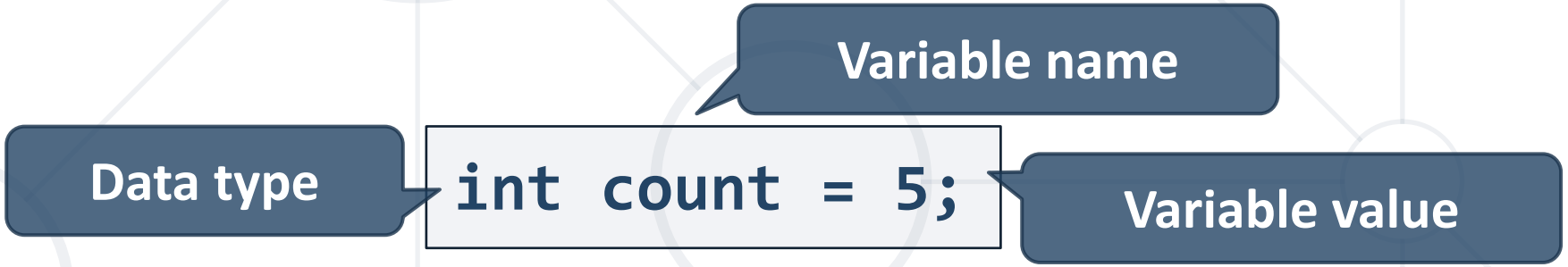
  - Like the lockers in the dressing room, variables have **names** and hold **something**

Variables

- A **variable** is a container for information
  - A **named area** of the computer memory
  - The data can be **read** and **changed** at any time
- **Variables** provide means for:
  - **Storing** data
  - **Retrieving** the stored data
  - **Modifying** the stored data

Variables

- Variables have **name**, **data type** and **value**
  - **Assignment** is done by the operator "="
  - Example of variable definition and assignment



- When processed, **data** is **stored** back **into variables**

Naming Variables

- Always refer to the naming **conventions** of a programming language – for C# use **camelCase**
- Preferred form: **[Noun]** or **[Adjective]** + **[Noun]**
- Should explain the purpose of the variable
- Always ask yourself "**What does this variable contain?**"

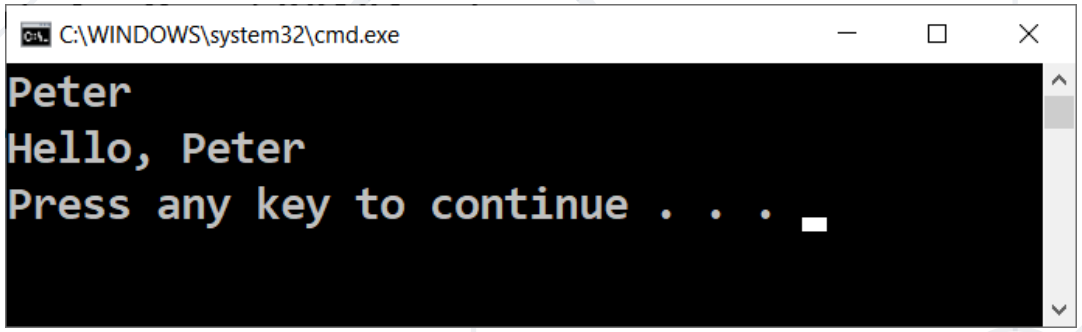

```
firstName, report, config, fontSize, maxSpeed
```

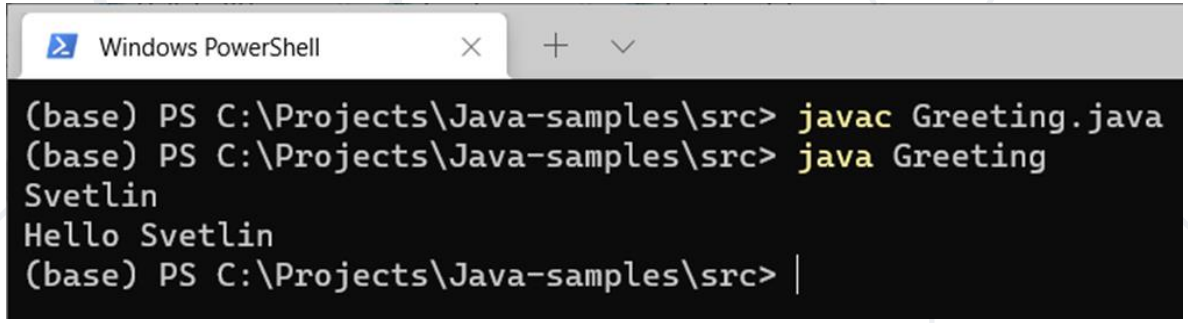
```
foo, bar, p, p1, LastName, last_name, LAST_NAME
```

Input / Output

What is the Console (Terminal)?

- The system **console** / **terminal** / **standard input and output**
  - A **special window**, used to communicate with the user
  - Uses a **text-based** input / output (command line interface)
  - Displays **text** data (text lines)
  - Reads user **input** (text lines)





Reading User Input and Printing Strings

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- Everything we **read** from the console comes as a **string**
- Reading user input:

```
string name = Console.ReadLine();
```

- Everything we **print** to the console is converted to a **string**

```
Console.WriteLine("Hello world!");
```

```
Console.WriteLine("Hello" + 123);
```

Formatting Output

- Formatting text and data

```
string firstName = "John";
int age = 19;
Console.WriteLine($"{firstName} is {age} years old");
// John Doe is 19 years old
```

```
double a = 5.123;
double b = 6.456;
double sum = a + b;
Console.WriteLine($"{sum:F2}"); // 11.58
```

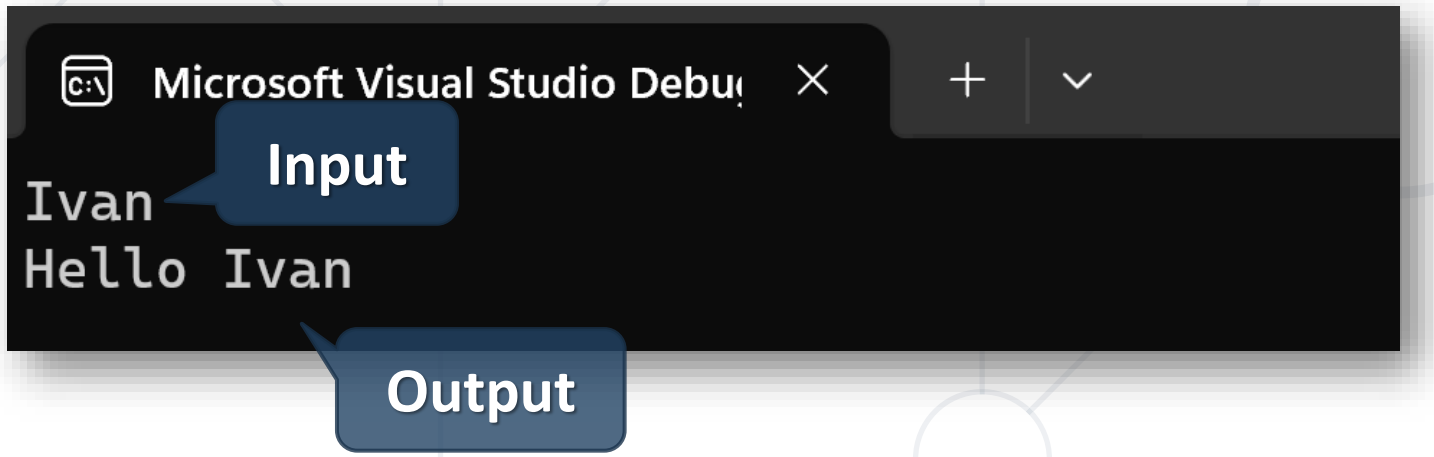
2 digits after the decimal point

Reading Text

- **Read** a name from the console and **prints** a greeting:

```
string name = Console.ReadLine();
Console.WriteLine("Hello " + name);
```

- The result from the execution would be:



Reading Integers

- Reading an **integer** number from the console:

```
int num = int.Parse(Console.ReadLine());
```

- Example: calculating a square area by given side **a**

```
int a = int.Parse(Console.ReadLine());
int area = a * a;
Console.WriteLine(area);
```

Reading Floating-Point Numbers

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- Reading a **floating-point number**:

```
double num = double.Parse(Console.ReadLine());
```

- Example: convert **inches** to **centimeters**

```
double inches = double.Parse(Console.ReadLine());
double centimeters = inches * 2.54;
Console.WriteLine(centimeters);
```

Concatenating Text and Numbers

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```
string firstName = "John";
string lastName = "Doe";
int age = 34;
string result = firstName + " " + lastName + " | " + age;
Console.WriteLine(result); // John Doe | 34
```

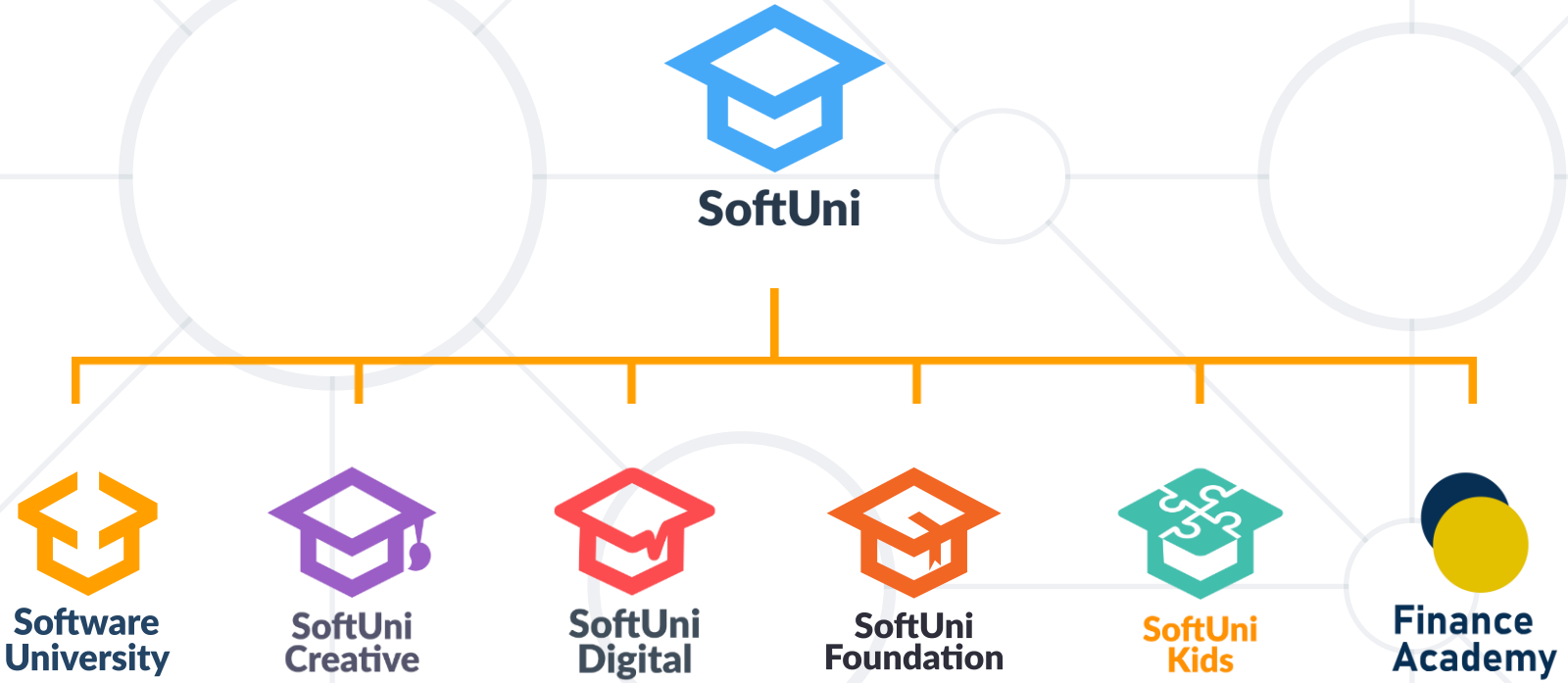
Concatenation

```
int a = 5;
int b = 11;
string result = "a + b = " + a + b;
Console.WriteLine(result); // a + b = 511
```

Summary

- Variables
- Data Types
  - int
  - double
  - string
  - char
- Input / Output

Questions?



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