

Datatypes in C#

<https://csci-1301.github.io/about#authors>

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1 Value Types

1.1 Numeric

1.1.1 Signed Integer

| Type | Range | Size |
|--------------|---|-----------------------|
| sbyte | -128 to 127 | Signed 8-bit integer |
| short | -32,768 to 32,767 | Signed 16-bit integer |
| int | -2,147,483,648 to 2,147,483,647 | Signed 32-bit integer |
| long | -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807 | Signed 64-bit integer |

1.1.2 Unsigned Integer

| Type | Range | Size |
|---------------|--------------------|-------------------------|
| byte | 0 to 255 | Unsigned 8-bit integer |
| ushort | 0 to 65,535 | Unsigned 16-bit integer |
| uint | 0 to 4,294,967,295 | Unsigned 32-bit integer |

| Type | Range | Size |
|--------------------|---------------------------------|-------------------------|
| <code>ulong</code> | 0 to 18,446,744,073,709,551,615 | Unsigned 64-bit integer |

1.1.3 Floating-point Numbers

| Type | Approximate Range | Precision |
|----------------------|--|--------------------------|
| <code>float</code> | $\pm 1.5e-45$ to $\pm 3.4e38$ | 7 digits |
| <code>double</code> | $\pm 5.0e-324$ to $\pm 1.7e308$ | 15–16 digits |
| <code>decimal</code> | $(-7.9 \times 10^{28}$ to $7.9 \times 10^{28})/(100$ to $10^{28})$ | 28–29 significant digits |

1.2 Logical

| Type | Possible Values | Size |
|-------------------|--|-------|
| <code>bool</code> | <code>true</code> , <code>false</code> | 8-bit |

1.3 Character

| Type | Range | Size |
|-------------------|------------------|--------------------------|
| <code>char</code> | U+0000 to U+ffff | Unicode 16-bit character |

2 Literals

| Name | Corresponding datatype | Examples |
|-------------------|------------------------|--|
| Integer Literal | <code>int</code> | <code>40</code> , <code>-39</code> , <code>291838</code> , <code>0</code> , ... |
| Float Literal | <code>float</code> | <code>3.5F</code> , <code>-43.5f</code> , <code>309430.70006F</code> , ... |
| Double Literal | <code>double</code> | <code>28.98</code> , <code>239.0</code> , <code>-391.089</code> , <code>0.0</code> , ... |
| Decimal Literal | <code>decimal</code> | <code>8.95m</code> , <code>3283.9M</code> , <code>-30m</code> , ... |
| Boolean Literal | <code>bool</code> | <code>true</code> , <code>false</code> |
| Character Literal | <code>char</code> | <code>'Y'</code> , <code>'a'</code> , <code>'0'</code> , <code>'\n'</code> , <code>'\x0058'</code> , <code>'\u0058'</code> , ... |

3 Compatibility

| | Integer Literal | Float Literal | Double Literal | Decimal Literal |
|----------------------|-----------------|---------------|----------------|-----------------|
| <code>int</code> | ✓ | ✗ | ✗ | ✗ |
| <code>float</code> | ✓ | ✓ | ✗ | ✗ |
| <code>double</code> | ✓ | ✓ | ✓ | ✗ |
| <code>decimal</code> | ✓ | ✗ | ✗ | ✓ |

4 Result Type of Operations

| | <code>int</code> | <code>float</code> | <code>double</code> | <code>decimal</code> |
|----------------------|----------------------|---------------------|---------------------|----------------------|
| <code>int</code> | <code>int</code> | <code>float</code> | <code>double</code> | <code>decimal</code> |
| <code>float</code> | <code>float</code> | <code>float</code> | <code>double</code> | illegal |
| <code>double</code> | <code>double</code> | <code>double</code> | <code>double</code> | illegal |
| <code>decimal</code> | <code>decimal</code> | illegal | illegal | <code>decimal</code> |

References

- <https://docs.microsoft.com/en-us/dotnet/csharp/tour-of-csharp/types-and-variables>
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