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Pattern Matching with C#

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#ThriveITConf

3rd - 4th June 2025

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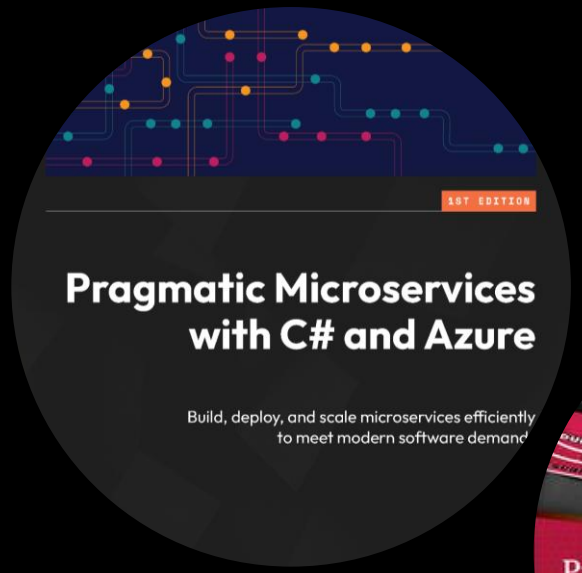

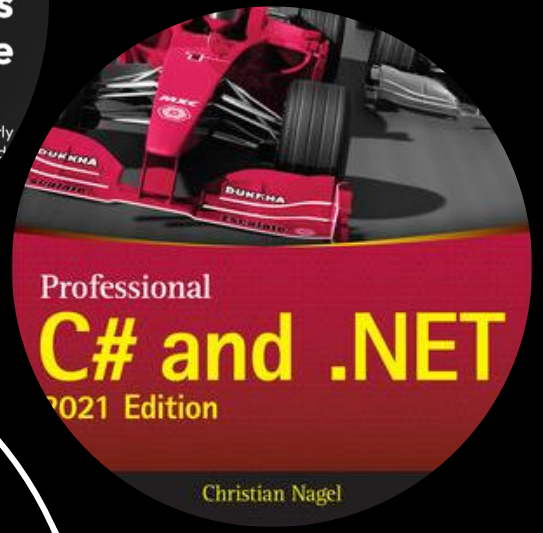

About me...

- Training
- Coaching
- Consulting
- Development

- Microsoft MVP
- www.cninnovation.com
- blogs.cninnovation.com

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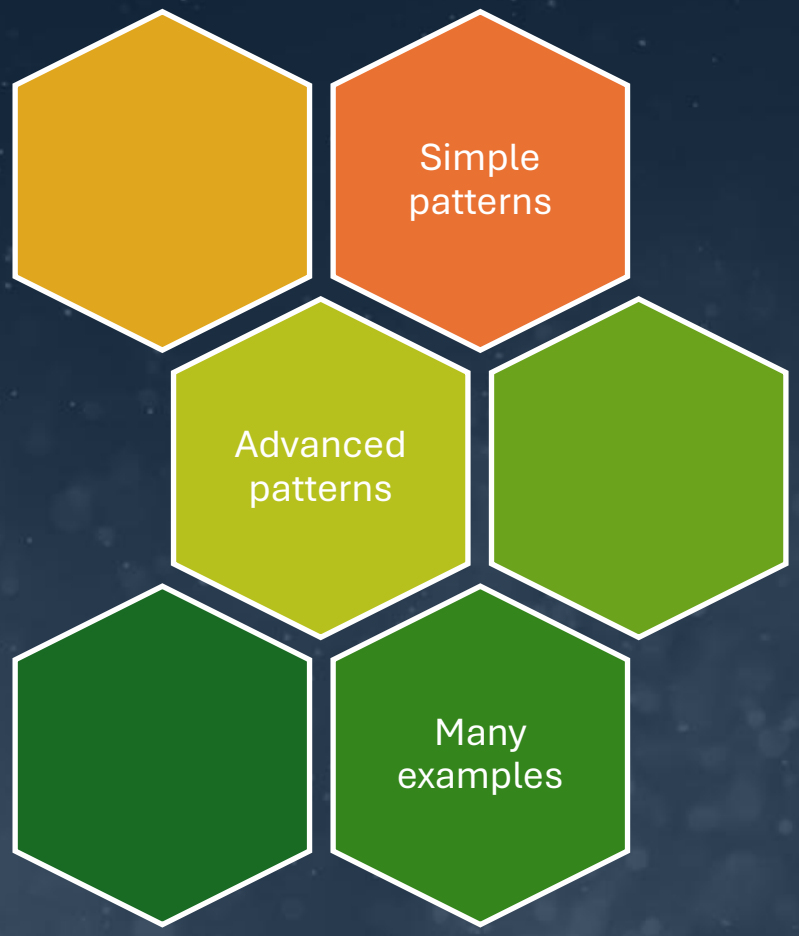
Topics



C# is not just an object-oriented programming language

Component

Declarative

Functional

Why pattern matching?

Readable code

Simplified control flow

Reduced type checks

Code sample – C# patterns

- Type and declaration
- Constant
- Relational
- Var
- Property
- Positional
- Discard

Type and declaration pattern

```
if (value is int intValue1)
    Console.WriteLine($"1. Type pattern: {intValue1} is an int");
```

Type pattern with generic types

```
object genericObj = new List<int>[1, 2, 3];
if (genericObj is List<int> intList)
    Console.WriteLine($"2. Generic type pattern: List<int> with count {intList.Count}");
else if (genericObj is List<string> stringList)
    Console.WriteLine($"2. Generic type pattern: List<string> with count {stringList.Count}");
```

Constant pattern

```
if (value is 42)
    Console.WriteLine("3. Constant pattern: Value is 42");
```

Relational pattern

```
if (value is int intValue2 && intValue2 > 40)
    Console.WriteLine("4. Relational pattern: Value is greater than 40");
```

Var pattern

```
if (value is var v)
    Console.WriteLine($"5. var pattern: {v}");
```

Property pattern

```
if (person is { FirstName: "Clark"})
    Console.WriteLine($"6. Property pattern: {person} is a Clark");
if (person is { Address: { City: "Smallville"} })
    Console.WriteLine($"6. Recursive property pattern: {person} lives in Smallville");
if (person is { Address.City: "Gotham City" })
    Console.WriteLine($"6. Dot-separated recursive property pattern: {person} lives in Gotham City");
```

Positional pattern

```
if (point is (3, 4))
    Console.WriteLine("7. Positional pattern: Point is (3, 4)");
```

Discard pattern

```
var tuple = (42, "hello", true);
if (tuple is (42, _, _))
    Console.WriteLine("8. Discard pattern: First item is 42, others are ignored");
```

Sample application

Traffic light

List patterns

```
int[] numbers = [1, 2, 3, 4];
if (numbers is [1, 2, .. var rest])
    Console.WriteLine($"9. List pattern: Starts with 1, 2. Rest: {string.Join(",", rest)}");
```

List patterns with Spans

```
Span<int> spanNumbers = stackalloc[] { 10, 20, 30, 40, 50 };
if (spanNumbers is [10, .. var middle, 50])
  Console.WriteLine($"10. List pattern with Span: Starts with 10, ends with 50. " +
    $"Middle: {string.Join(",", [.. middle ])}");
```

Logical Patterns

```
int test = 15;
if (test is > 10 and < 20)
    Console.WriteLine($"10. Logical pattern: {test} is between 10 and 20");
if (test is < 10 or > 20)
    Console.WriteLine($"10. Logical pattern: {test} is less than 10 or greater than 20");
if (test is not 0)
    Console.WriteLine($"10. Logical pattern: {test} is not zero");
```

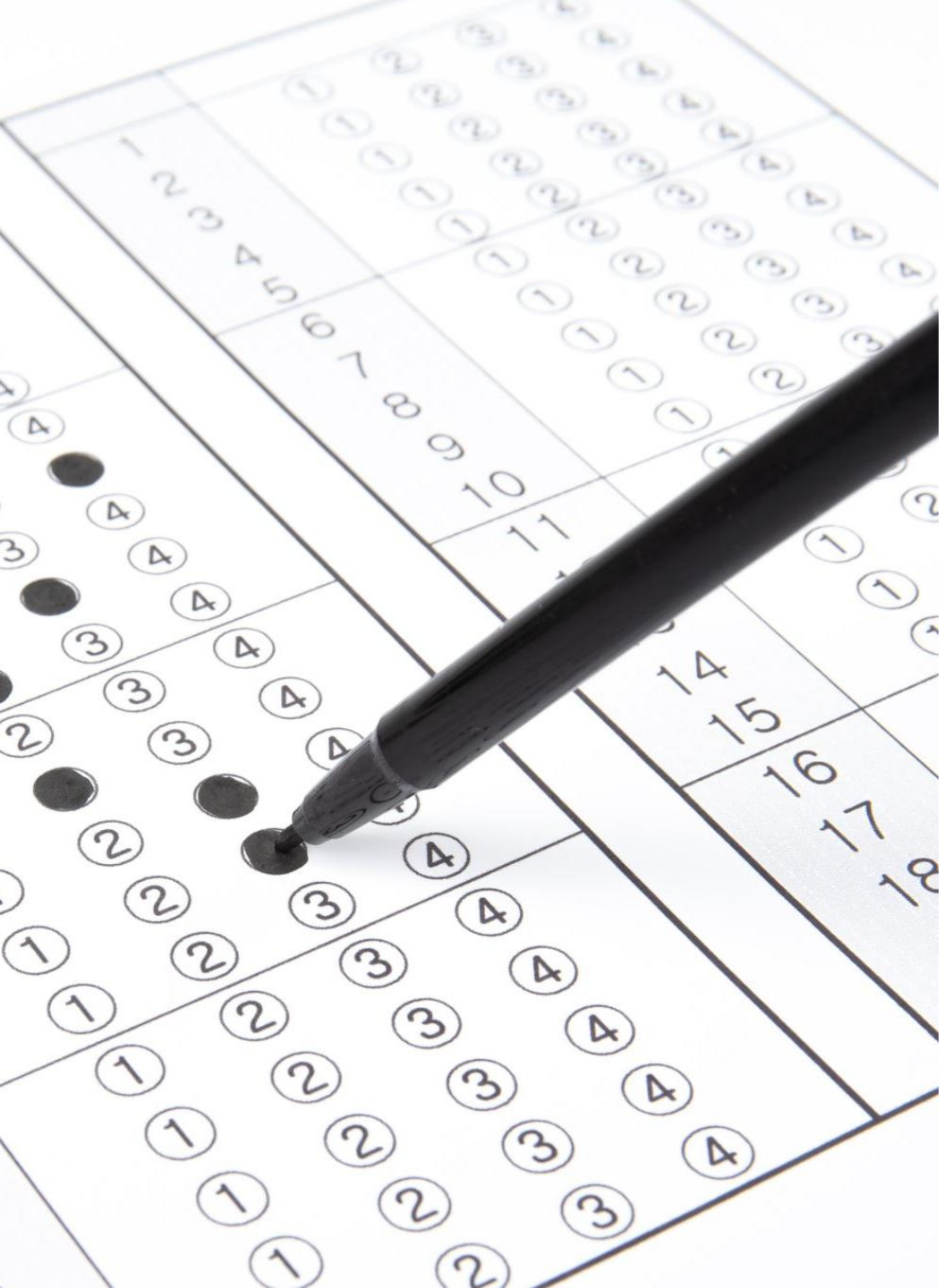
Parenthesized Pattern

```
if (parenthesizedTest is (< 0 or > 10) and not 100)
    Console.WriteLine($"11. Parenthesized pattern: {parenthesizedTest} is less than 0 or greater than 10,
and not 100");
```

Benchmark List Recursive (.NET 9 - .NET 10)

Method – Value 300, .NET 9	Mean
|| == (no pattern)	1.3541 ns
is or	0.6286 ns
switch or	0.2376 ns

Method – Value 300, .NET 10	Mean
|| == (no pattern)	0.4124 ns
is or	0.0007 ns
switch or	0.0189 ns



Sample

Calculate numbers

Benchmark List Recursive (.NET 9)

Method	Mean	Ratio	Allocated
AccumulateFor	27.52 ns	1.0	-
AccumulateForeach	27.57 ns	1.0	-
AccumulateGeneric	27.36 ns	0.99	-
AccumulateRecursive	1,625.50 ns	59.07	22376 B
AccumulateRecursiveSpan	200.66 ns	7.29	-

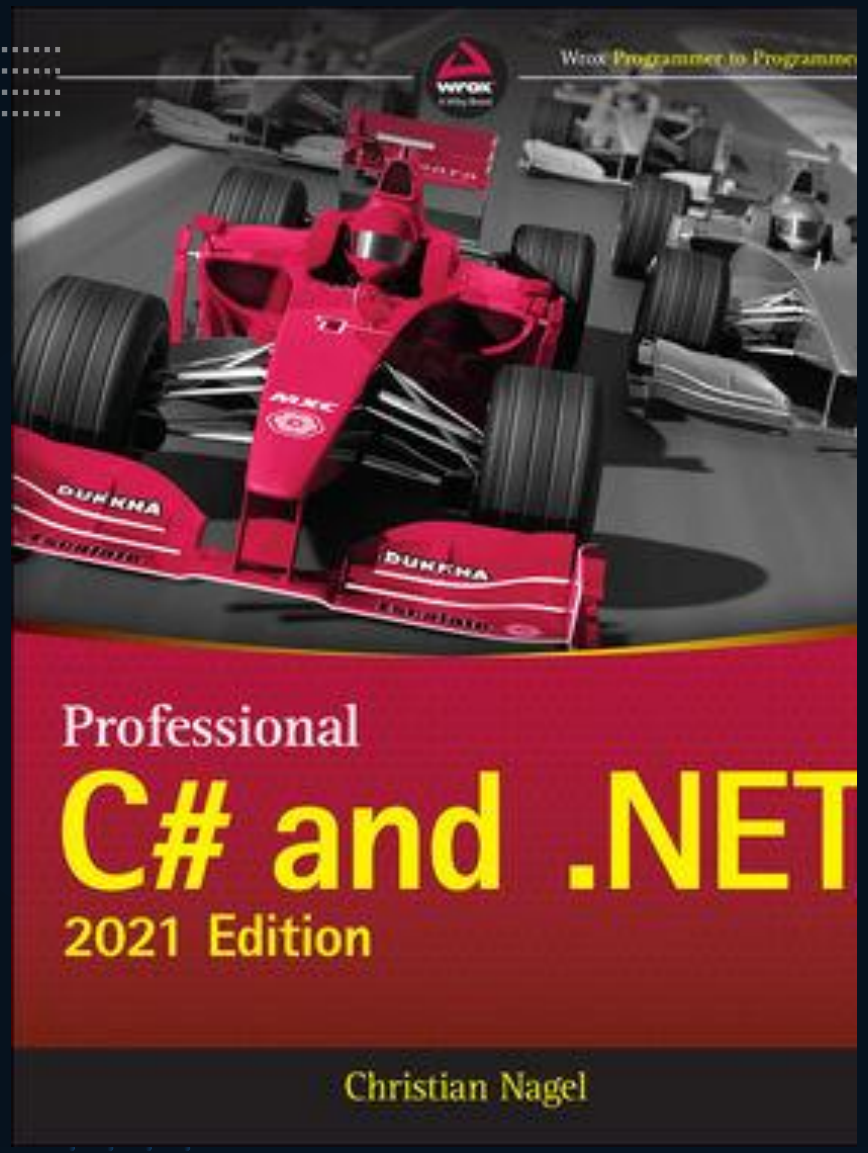
Sample application

Calculate balance from CSV file

Summary Pattern Matching

- Code readability
- Safer and more efficient data handling
- Powerful control flow
- Easy deconstruction of data types
- Improves performance

Questions?



More information

- https://github.com/cnilearn/thrive2025
- https://csharp.christiannagel.com
- https://www.cninnovation.com

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Thank you

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https://bit.ly/Thrive25Survey

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