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C# - What's new and cool?

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Topics

- C# Language Enhancements
- What's new?
- What's coming?
- How does it help?

Auto Default Struct

C# 10 added

- struct records
- *with* expressions with structs
- custom parameterless constructors

C# 11 enhanced

- auto default struct

Required Modifier

- Nullable reference types solves problems
- Constructors adds complexity
- required: Initialize with *constructor* or *object initializer*

- Modifier for properties and fields
- *SetsRequiredMembers* Attribute on constructor

Interface Enhancements

C# 8 added implementation in interfaces

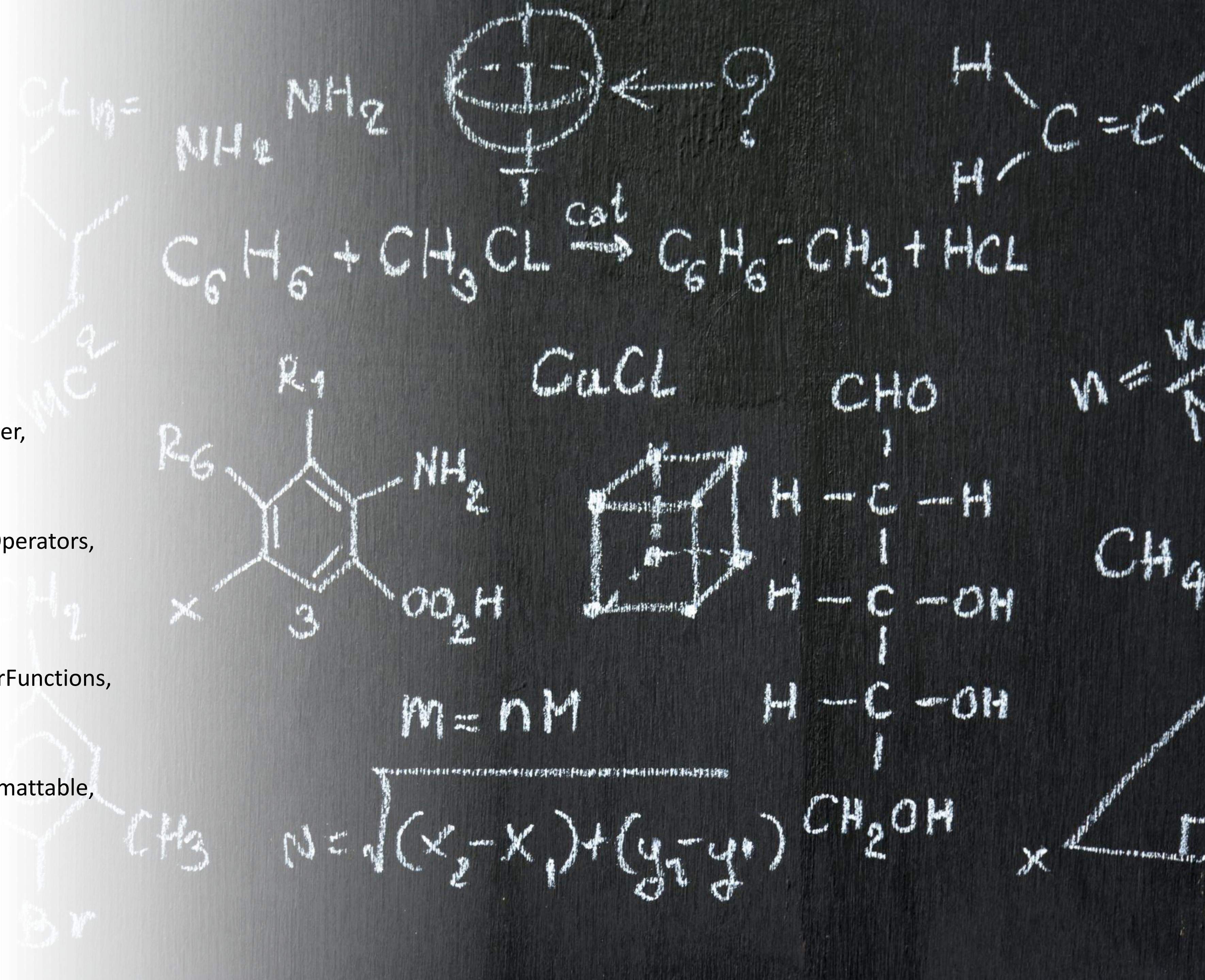
- Versioning
- Mixin functionality

C# 11 adds static members

- Constraints with generic types

Generic Math

- Numeric interfaces
  - INumber, IMinMaxNumber, IAdditiveIdentity, IBinaryInteger, IFloatingPoint…
- Operator interfaces
  - IAdditionOperators, IBitwiseOperators, IIncrementOperators…
- Function interfaces
  - IExponentialFuncations, ILogarithmicFunctions, IPowerFunctions, ITrigonometricFunctions…
- Parsing and formatting interfaces
  - IParsable, ISpanParsable, IFormattable, ISpanFormattable



Pattern Matching Enhancements

- List Patterns
  - Apply a pattern on any element in the sequence
  - Discard pattern to match any element
  - Slice pattern to match zero or more elements
- Matching on Span<T>

Strings – UTF8

- The .NET string type is *UTF-16*
- Internet uses *UTF-8*
- **u8** suffix to define UTF-8 Strings

```
ReadOnlySpan<byte> s1 = "hello"u8;
```

```
ReadOnlySpan<byte> bytesStatus404 =
  new byte[] { (byte)'4', (byte)'0', (byte)'4' };
```

```
var bytesStatus404 = "404"u8;
```

Strings – Raw String Literals

- Three or more quotes
- span multiple lines
- Indentation based on end quotes
- Combine with interpolated strings

.NET 7 Source Generators

- Logging
- Regex
- JSON Serialization
- Platform Invoke
- JavaScript Interop
- …

Native AOT Deployment

- Self-contained
- AOT compiled to native code
- Quick startup, less memory
- Can run where JIT is not allowed

- No dynamic loading
- No reflection emit
- No C++/CLI
- Requires trimming
- Compilation into a single file
- Includes runtime-libraries

What's next with C#?

- Alias for any type
- Semi-auto properties (field keyword)
- **Primary constructors**
- params Span<T>
- lambda default parameters
- Collection literals
- Roles / Extensions
- Interceptors

C# 12 – Primary Constructors

- Productivity enhancements

- C# 9 – Primary constructors with class records
  - get/init accessors
- C# 10 – Primary constructors with struct records
  - get/set accessors
  - get/init accessors (readonly record struct)
- C# 12 – Primary constructors with classes and structs

Summary

- What's new with C#?
- Required…interfaces…pattern matching…strings…AOT…

- Directions going forward
- Source code: https://github.com/cnilearn/bastaspring2023
- Blog: https://csharp.christiannagel.com

References

- My Blog
  - https://csharp.christiannagel.com
- .NET Blogs
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- Microsoft Learn
  - https://learn.microsoft.com/dotnet
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  - https://github.com/dotnet

Thank you

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