C# 6.0 UND VORSCHAU AUF C# 7

HINTERGRÜNDE, FEATURES, BEISPIELE

Vortrag am 18.07.2016 von Robert Walter
bei INdotNET – Ingolstädter .NET User Group

INHALT

- C# 6.0 – Seit wann und wo?
- C# 6.0 – Was genau?
- C# 6.0 – Das Beste!
- Und was ist mit VB14?
- C# 7 – Ein Blick in die Zukunft!

C# 6.0 – SEIT WANN UND WO?

ALLGEMEINE VERFÜGBARKEIT VON C# 6.0

C# 6.0 ist schon bereits seit dem 20.07.2015 final verfügbar.

(Bzw. seit 2014 als Preview verfügbar.)

Wenn da nicht der Tail Call Bug gewesen wäre…

! !

TAIL CALL BUG IN RYUJIT (.NET 4.6) (PROBLEM)

Blog-Post from Nick Craver: Why you should wait on upgrading to .Net 4.6

GitHub Issue on dotnet/coreclr: Tail Call bug in RyuJIT - Incorrect parameters passed

"The methods you call can get different parameter values than you passed in“

“Recommendations: Do not install .Net 4.6 in production.”

Nick Craver
software developer and system administrator
Stack Exchange (home of the popular programming support site Stack Overflow)
Aussage vom 27.07.2015

TAIL CALL BUG IN RYUJIT (.NET 4.6) (LÖSUNG)

LÖSUNG UNTER .NET 4.6

Update (August 11th): A patch for this bug has been released by Microsoft:

We released an updated version of RyuJIT today, which resolves this advisory. The update was released as Microsoft Security Bulletin MS15-092 and is available on Windows Update or via direct download as KB3086251. The update resolves: CoreCLR #1296, CoreCLR #1299, and VisualFSharp #536. Major thanks to the developers who reported these issues. Thanks to everyone for their patience.

Quelle: *http://nickcraver.com/blog/2015/07/27/why-you-should-wait-on-dotnet-46/*

LÖSUNG UNTER .NET 4.6.1

Bug auf alle Fälle mit .NET 4.6.1 gefixt.

Quelle:
https://github.com/Microsoft/dotnet/blob/master/releases/net461/dotnet461-changes.md

.NET 4.6.1 ist ebenfalls in Visual Studio 2015 integriert.

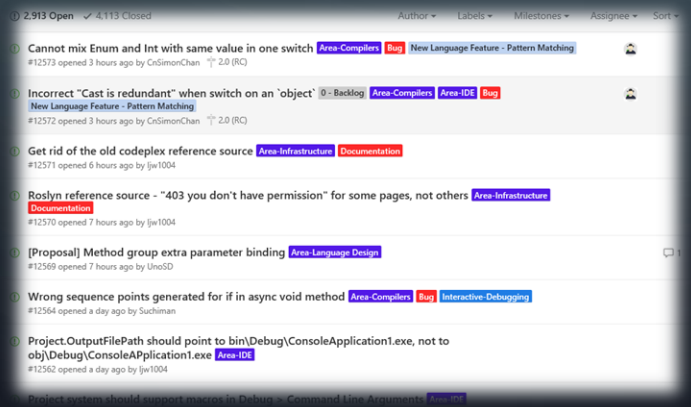
OFFENE DISKUSSION UM C# FEATURES

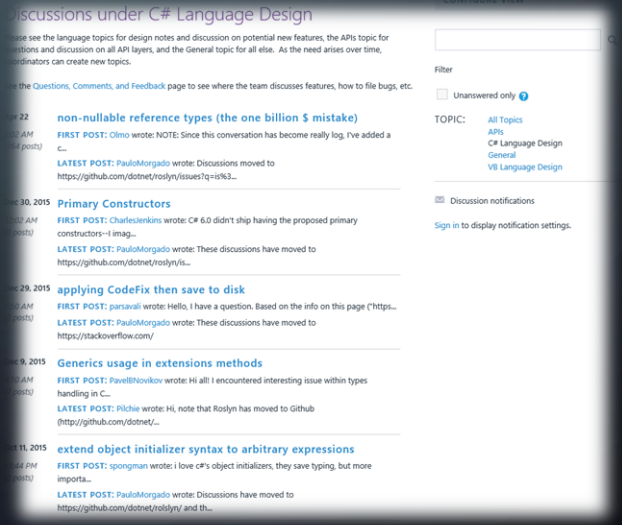
Beispiel: Öffentliche Diskussion um Verzicht von `null` ist 70 DIN A4 Seiten lang!

C# Language Design Discussions:

alt: http://roslyn.codeplex.com/discussions

neu: https://github.com/dotnet/roslyn/issues





C# 6.0 – WAS GENAU?

C# 6.0 FEATURES

- Null-conditional operators
- Auto-Property Initializers
- Getter-only Auto-Properties
- Nameof Expressions
- Expression-bodied Functions and Properties
- String Interpolation
- Using static
- Index Initializers
- Exception filters
- await in catch and finally Blocks

NULL-CONDITIONAL OPERATORS

Ziel:

```
Console.WriteLine(
    UserGroups.All[0].Events.First().Title
    );
```

Vorher:

```
if (UserGroups.All != null)
{
    if (UserGroups.All[0] != null && UserGroups.All[0].Events != null)
    {
        if (UserGroups.All[0].Events.FirstOrDefault() != null)
        {
            Console.WriteLine(UserGroups.All[0].Events.First().Title);
        }
    }
}
```

C# 6.0:

```
Console.WriteLine(
    UserGroups.All?[0].Events?.FirstOrDefault()?.Title
    );
```

?.

AUTO-PROPERTY INITIALIZERS

Vorher:

```
public class UserGroup
{
    public string Name { get; set; }
    public List<Event> Events { get; set; }

    public UserGroup()
    {
        Events = new List<Event>();
    }
}
```

C# 6.0:

```
public class UserGroup
{
    public string Name { get; set; }
    public List<Event> Events { get; set; } = new List<Event>();
}
```

{ get; set; } = …

GETTER-ONLY AUTO-PROPERTIES

Vorher:

```
public class UserGroup
{
    public string Name { get; set; }
    public List<Event> Events { get; set; } = new List<Event>();
    public string BestProgrammingLanguage { get; }

    public UserGroup()
    {
        BestProgrammingLanguage = "C#";
    }
}
```

C# 6.0:

```
public class UserGroup
{
    public string Name { get; set; }
    public List<Event> Events { get; set; } = new List<Event>();
    public string BestProgrammingLanguage { get; } = "C#";
}
```

```
{ get; } = …
```

NAMEOF EXPRESSIONS

Vorher:

```
public void Invite(List<Attendee> attendees)
{
    if (attendees == null)
    {
        throw new ArgumentNullException("attendees");
    }
    // ...
}
```

C# 6.0:

```
public void Invite(List<Attendee> attendees)
{
    if (attendees == null)
    {
        throw new ArgumentNullException(nameof(attendees));
    }
    // ...
}
```

nameof(…)

EXPRESSION-BODIED FUNCTIONS AND PROPERTIES

Vorher:

```
public DateTime CalculateBestTimeForUsingCSharp6()
{
    return DateTime.Now;
}
```

C# 6.0:

```
public DateTime CalculateBestTimeForUsingCSharp6() => DateTime.Now;
```

() => ...

STRING INTERPOLATION

Vorher:

```
int cSharpVersion = 6;
string strAlt = string.Format("Hier geht es um C# {0}", cSharpVersion);
```

Änderungen gegenüber der Preview:

Syntaxänderung: Anstatt „\{…}“ jetzt $“{…}“

C# 6.0:

```
int cSharpVersion = 6;
string strNeu = $"Hier geht es um C# {cSharpVersion}";
```

```
string strFormatted = $"Hier geht es um C# {cSharpVersion:0.0}";
```

$“Text {i}“

USING STATIC

Vorher:

```
Console.WriteLine("Ohne using static System.Console");
```

C# 6.0:

```
using static System.Console;

WriteLine("Mit using static System.Console");
```

Änderungen gegenüber der Preview:

*Schlüsselwort **static** zwingend notwendig!*

```
using static Namespace.Type;
```

INDEX INITIALIZERS

Vorher:

```
var dictAlt = new SortedDictionary<int, string>()
{
    { 2, "dot" },
    { 3, "NET" },
    { 1, "IN" },
};
```

C# 6.0:

```
var dictNeu = new SortedDictionary<int, string>()
{
    [2] = "dot",
    [3] = "NET",
    [1] = "IN",
};
```

```
{ [key] = value, … }
```

EXCEPTION FILTERS

Vorher:

```
try
{
    var userGroupEvent = new Event() { Title = "C# 6.0" };
    userGroupEvent.Invite(null);
}
catch (ArgumentNullException ex)
{
    if (ex.ParamName == "attendees")
    {
        Console.Error.WriteLine("Ein null Parameter bedeutet natürlich ALLE .NET-Entwickler!");
        return;
    }
    Console.Error.WriteLine("Welche Argumente denn noch?");
}
```

C# 6.0:

```
try
{
    var userGroupEvent = new Event() { Title = "C# 6.0" };
    userGroupEvent.Invite(null);
}
catch (ArgumentNullException ex) when (ex.ParamName == "attendees")
{
    Console.Error.WriteLine("Ein null Parameter bedeutet natürlich ALLE .NET-Entwickler!");
}
catch (ArgumentNullException ex)
{
    Console.Error.WriteLine("Welche Argumente denn noch?");
}
```

Änderungen gegenüber der Preview:

*Vorher Schlüsselwort **if** statt **when***

`catch(…) when (…)`

AWAIT IN CATCH AND FINALLY BLOCKS

Vorher:

(nicht möglich)

C# 6.0:

```
try
{
    //System.IO.File.ReadAllText(@"C:\Datei_existiert_nicht.txt"); // Achtung: Statische File-Methoden nicht asynchron!
    using (var streamReader = new System.IO.StreamReader(@"C:\Datei_existiert_nicht.txt"))
    {
        string text = await streamReader.ReadToEndAsync();
        Console.WriteLine(text);
    }
}
catch (Exception ex)
{
    await Console.Error.WriteLineAsync("Async Error:");
    await Console.Error.WriteLineAsync(ex.ToString());
}
finally
{
    await Task.Delay(TimeSpan.FromSeconds(1));
    await Console.Error.WriteLineAsync("1 Sekunde lang aufgeräumt!");
}
```

```
catch(…) { await … }
```

VERSCHOBENE ODER ENTFERNTE C# 6.0 FEATURES

- **Primary constructor**

```
public class Customer(string firstName, string lastName) {..}
```

- **Binary literals**

```
int nineteen = 0b10011;
```

- **Digit separators**

```
int dec = 33_554_432; int bin = 0b1001_1010_0001_0100;
```

- **Params IEnumerable**

```
void Method(params Arguments<int> args) { ... }
```

- **Inline declaration for out params**

```
int.TryParse(input, out var result)
```

C# 6.0 – DAS BESTE!

C# 6.0 – TOP 3

1. **Null-conditional operators** `?.`
2. **String Interpolation** `$“Text {i}“`
3. **Auto-Property Initializers** `{ get; set; } = …`

UND WAS IST MIT VB 14?

VB 14 – EINE VOLLSTÄNDIGE LISTE

https://github.com/dotnet/roslyn/wiki/New-Language-Features-in-VB-14

Null-conditional operators

This new operator is a convenient shorthand for the many occasions when you have to check for null:

```
Dim x = customer.Address?.Country

' is shorthand for
Dim _temp = customer.Address
Dim x = If(_temp IsNot Nothing, _temp.Address.Country, Nothing)
```

You can also use it in a sequence and you can mix with the regular `.` operator, e.g. `a?.b.c?.d`. It reads left-to-right. Any null value before a `?.` will just stop the sequence short, and any null value before a `.` will raise a `NullReferenceException` as usual.

For a string value like `customer.Address?.Name`, if it stops short then the result is a null value typed

VERGLEICH ZWISCHEN C# 6.0 UND VB14 (1/2)

Feature	Example	C# 6.0	VB 14
Auto-property initializers	public int X { get; set; } = x;	Added	Exists
Getter-only auto-properties	public int Y { get; } = y;	Added	Added
Ctor assignment to getter-only autoprops	Y = 15	Added	Added
Parameterless struct ctors	Structure S : Sub New() : End Sub : End Structure	Added	Added
Using static members	using System.Console; … Write(4);	Added	Exists
Dictionary initializer	new JObject { ["x"] = 3, ["y"] = 7 }	Added	No
Await in catch/finally	try … catch { await … } finally { await … }	Added	No
Exception filters	catch(E e) if (e.Count > 5) { … }	Added	Exists
Partial modules	Partial Module M1	N/A	Added
Partial interfaces	Partial Interface I1	Exists	Added
Multiline string literals	"Hello<newline>World"	Exists	Added
Year-first date literals	Dim d = #2014-04-03#	N/A	Added
Line continuation comments	Dim addrs = From c in Customers ' comment	N/A	Added
…	…	…	…

VERGLEICH ZWISCHEN C# 6.0 UND VB14 (2/2)

Feature	Example	C# 6.0	VB 14
…	…	…	…
TypeOf IsNot	If TypeOf x IsNot Customer Then …	N/A	Added
Expression-bodied members	public double Dist => Sqrt(X * X + Y * Y);	Added	No
Null propagation	customer?.Orders?[5]?.$price	Added	Added
String interpolation	$"{p.First} {p.Last} is {p.Age} years old."	Added*	Planned
nameof operator	string s = nameof(Console.Write);	Added*	Planned
#pragma	#Disable Warning BC40008	Added	Added
Smart name resolution		N/A	Added
ReadWrite props can implement ReadOnly		Exists	Added
#region inside methods		Exists	Added
Overloads inferred from Overrides		N/A	Added
CObj in attributes		Exists	Added
CRef and parameter name		Exists	Added
Extension Add in collection initializers		Added	Exists
Improved overload resolution		Added	N/A

C# 7 – EIN BLICK IN DIE ZUKUNFT!

VORSCHAU AUF C# 7

- **Local Functions**

```
void Method() { int localFunction(int a, int b) => a + b; }
```

- **Tuples**

```
(int x, int y) t1 = (23, 45); (int a, int b) t2 = t1;
```

- **Pattern Matching**

```
var c = new Customer(Name: "Mayer");
SpecialCustomer sc = c with { Discount = 0.2 };

if(x is SpecialCustomer && x.Discount > 0.15) { … }
```

- **ref locals and ref returns**

```
public static ref int Max(ref int first, ref int second, ref int third)
{
  ref int max = first > second ? ref first : ref second;
  return max > third ? ref max : ref third;
}
```

- **…**

VORSCHAU AUF C# 7

- …
- **Binary Literals**

```
int nineteen = 0b10011;
```

- **Digit Separators**

```
int dec = 33_554_432; int bin = 0b1001_1010_0001_0100;
```

- **async Main**

```
async Task Main();
async Task<int> Main();
async Task Main(string[]);
async Task<int> Main(string[]);
```

- **out var**

```
int.TryParse(input, out var result)
```