

70-483 : Programming in C#



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Primitive Types



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Variables and Constants



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Variables / Constants

- Variable: a name given to a storage location in memory.
- Constant: an immutable value.



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$$\text{Pi} = 3.14$$



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Declaring Variables / Constants

```
int number;
```

```
int Number = 1;
```

```
const float Pi = 3.14f;
```



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Identifiers

- Cannot start with a number.

1route

oneRoute



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Identifiers

- Cannot include a whitespace.

`first name`

`firstName`



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Identifiers

- Cannot be a reserved keyword.

`int`

`@int`



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Identifiers

- Use meaningful names.

`fn`

`firstName`



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Naming Conventions

- Camel Case: `firstName`
- Pascal Case: `FirstName`
- Hungarian Notation: `strFirstName`



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Naming Conventions

- For local variables: Camel Case
- For constants: Pascal Case

```
int number;
```

```
const int MaxZoom = 5;
```



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Primitive Types

	C# Type	.NET Type	Bytes	Range
Integral Numbers	byte	Byte	1	0 to 255
	short	Int16	2	-32,768 to 32,767
	int	Int32	4	-2.1B to 2.1B
	long	Int64	8	...
Real Numbers	float	Single	4	-3.4×10^{38} to 3.4×10^{38}
	double	Double	8	...
	decimal	Decimal	16	-7.9×10^{28} to 7.9×10^{28}
Character	char	Char	2	Unicode Characters
Boolean	bool	Boolean	1	True / False

Primitive Types

- Google: C# built-in types
- [http://msdn.microsoft.com/en-us/library/cs7y5x0x\(v=vs.90\).aspx](http://msdn.microsoft.com/en-us/library/cs7y5x0x(v=vs.90).aspx)



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Real Numbers

Real Numbers	C# Type	.NET Type	Bytes	Range
	float	Single	4	-3.4×10^{38} to 3.4×10^{38}
	double	Double	8	...
	decimal	Decimal	16	-7.9×10^{28} to 7.9×10^{28}

```
float number = 1.2f;
```

```
decimal number = 1.2m;
```



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Non-Primitive Types

- String
- Array
- Enum
- Class



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Overflowing



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Overflowing

```
byte number = 255;
```

```
number = number + 1; // 0
```



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Overflowing

```
checked
{
    byte number = 255;

    number = number + 1;
}
```



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Scope



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Scope

- Where a variable / constant has meaning.



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Scope

```
{  
    byte a = 1;  
    {  
        byte b = 2;  
        {  
            byte c = 3;  
        }  
    }  
}
```



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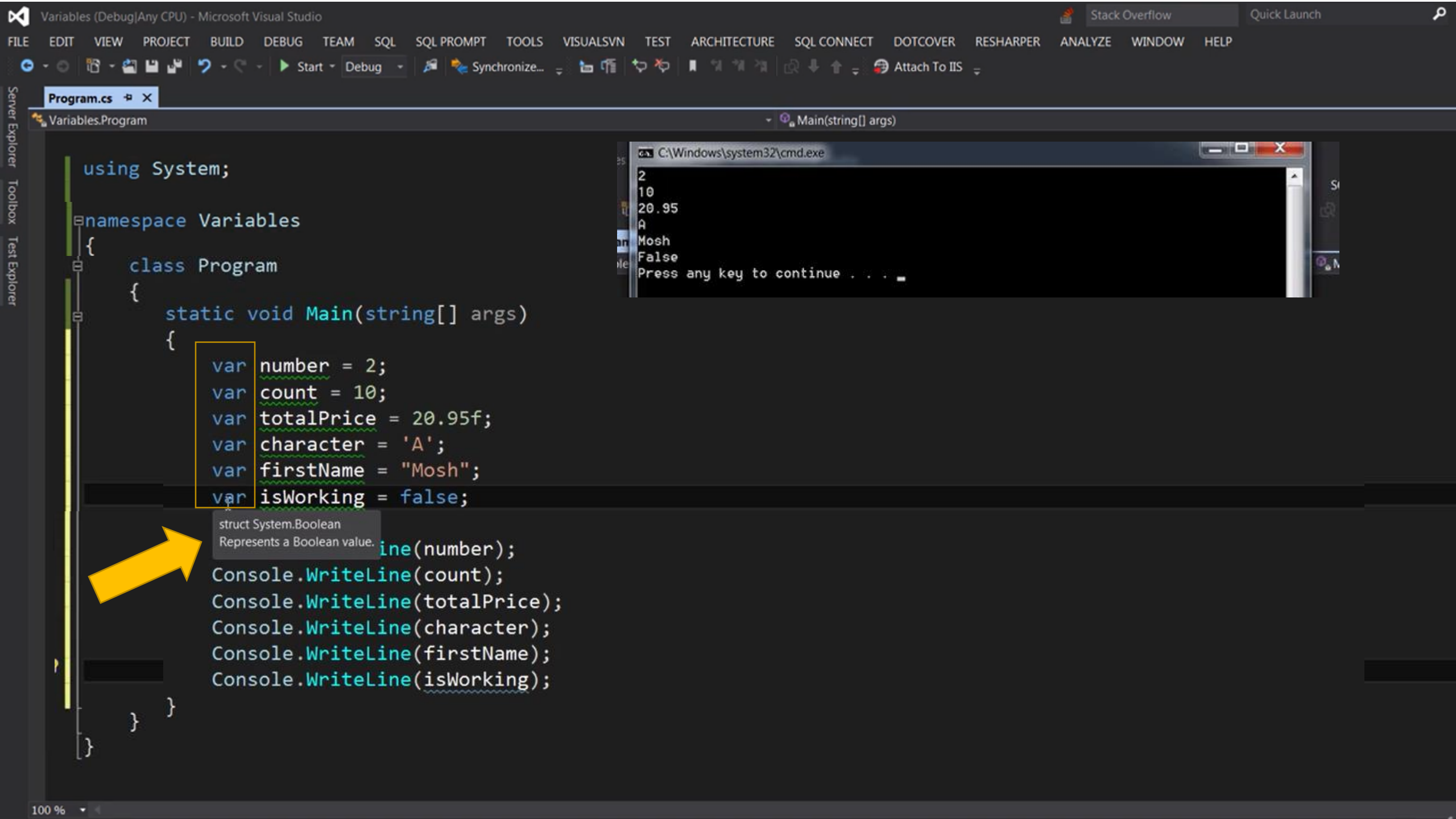
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Demo Variables and Constants



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Browse: My Solution

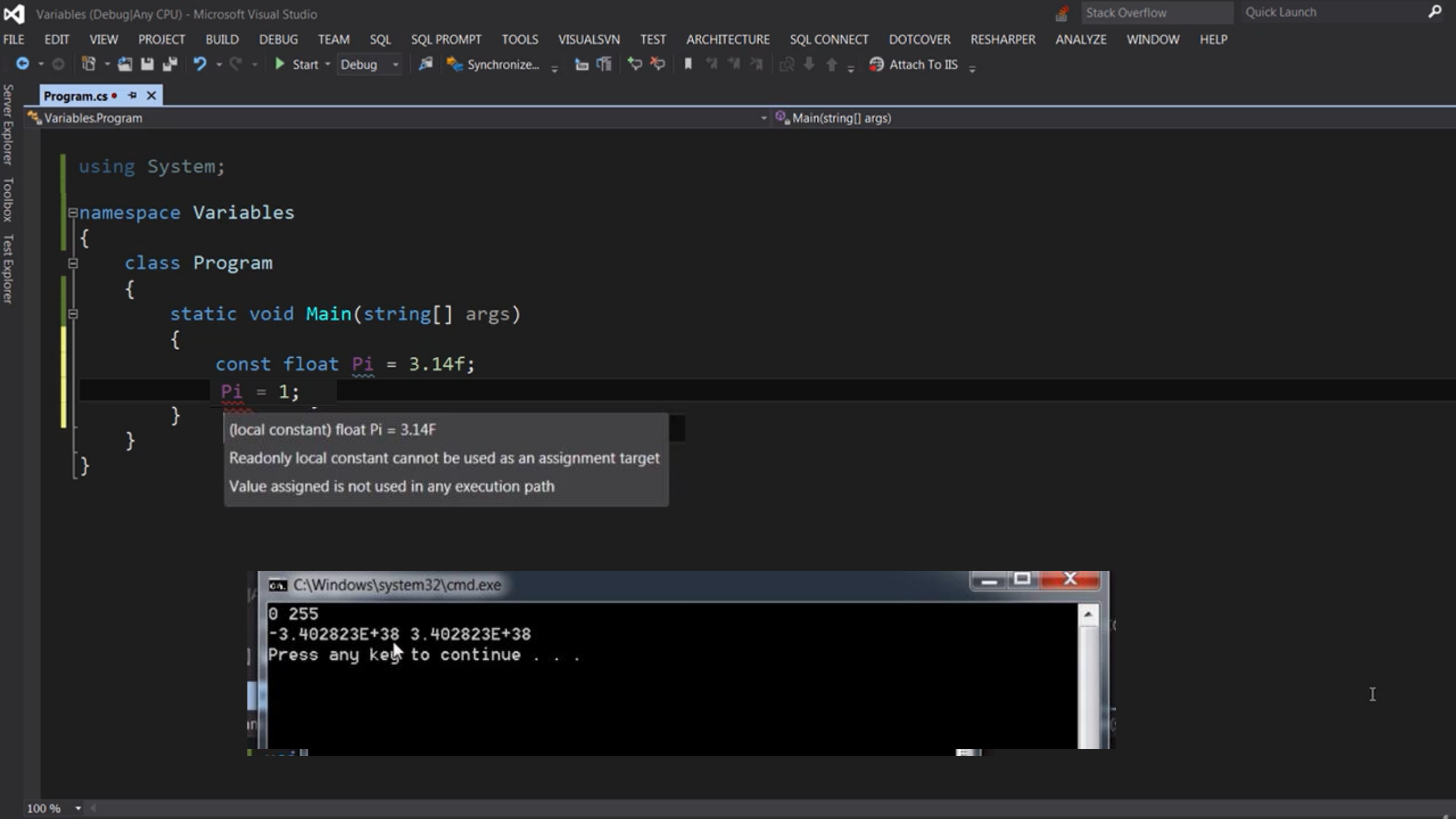
<Search>

- ▶ Char
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- ▶ Delegate
- ▶ DivideByZeroException
- ▶ DllNotFoundException
- ▶ Double
- ▶ DuplicateWaitObjectException
- ▶ EntryPointNotFoundException
- ▶ Enum

- GetNumericValue(char)
- GetTypeCode()
- GetUnicodeCategory(string, int)
- GetUnicodeCategory(char)
- IsControl(string, int)
- IsControl(char)
- IsDigit(string, int)
- IsDigit(char)
- IsHighSurrogate(string, int)
- IsHighSurrogate(char)
- IsLetter(string, int)
- IsLetter(char)
- IsLetterOrDigit(string, int)
- IsLetterOrDigit(char)
- IsLower(string, int)
- IsLower(char)
- IsLowSurrogate(string, int)
- IsLowSurrogate(char)
- IsNumber(string, int)
- IsNumber(char)
- IsPunctuation(string, int)
- IsPunctuation(char)
- IsSeparator(string, int)
- IsSeparator(char)
- IsSurrogate(string, int)
- IsSurrogate(char)
- IsSurrogatePair(char, char)
- IsSurrogatePair(string, int)

public struct **Char**Member of [System](#)

Summary:



Type Conversion



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Agenda

- Implicit type conversion
- Explicit type conversion (casting)
- Conversion between non-compatible types



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Implicit Type Conversion

```
byte b = 1;
```

00000001

```
int i = b;
```

00000000 00000000 00000000 00000001



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Implicit Type Conversion

```
int i = 1;
```

```
float f = i;
```



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Explicit Type Conversion

```
int i = 1;
```

```
byte b = (byte)i;
```



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Explicit Type Conversion

```
float f = 1.0f;
```

```
int i = (int)f;
```



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Non-compatible types

```
string s = "1";
```

```
int i = Convert.ToInt32(s);
```

```
int j = int.Parse(s);
```



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Convert

- ToByte()
- ToInt16()
- ToInt32()
- ToInt64()



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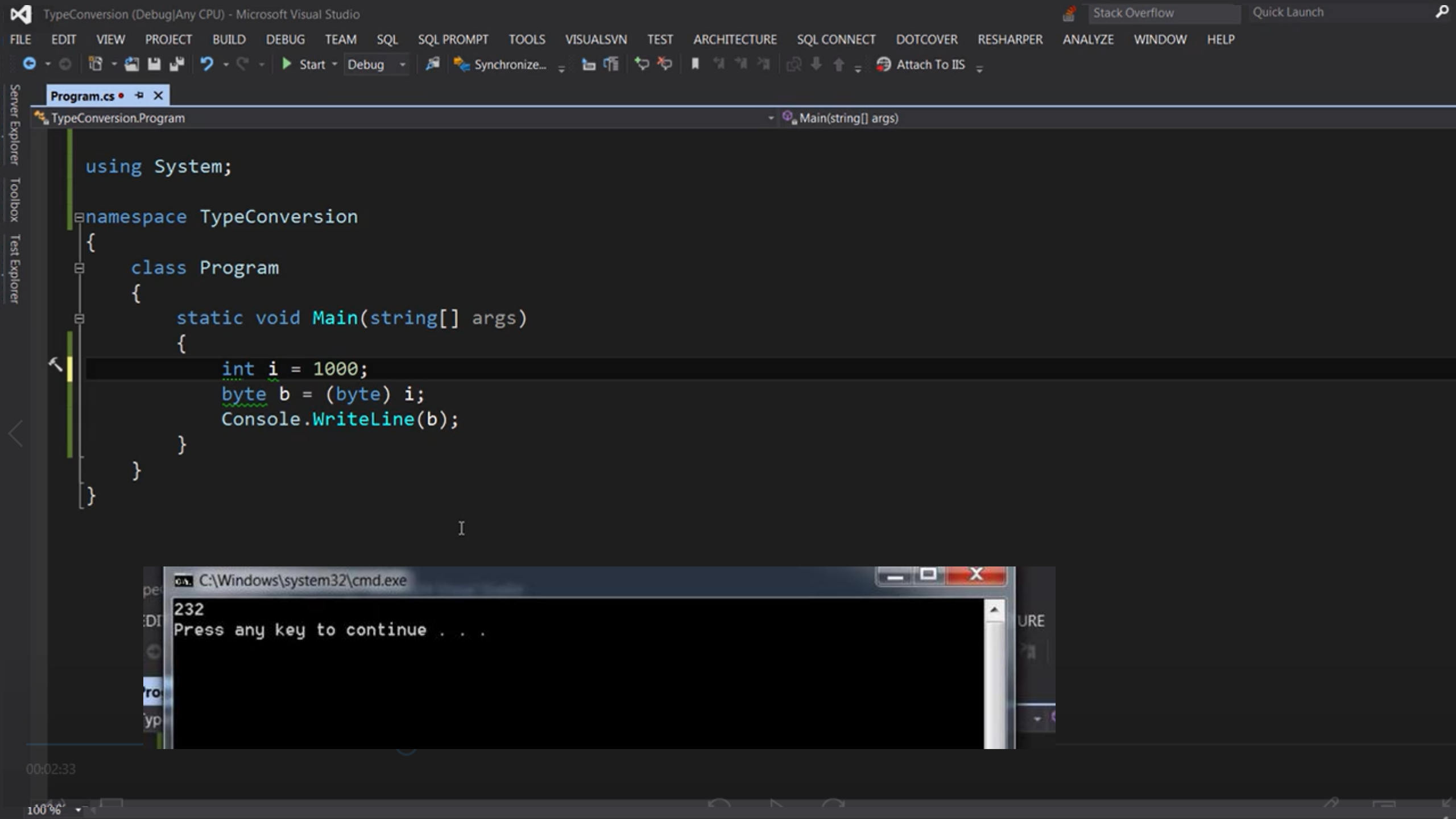
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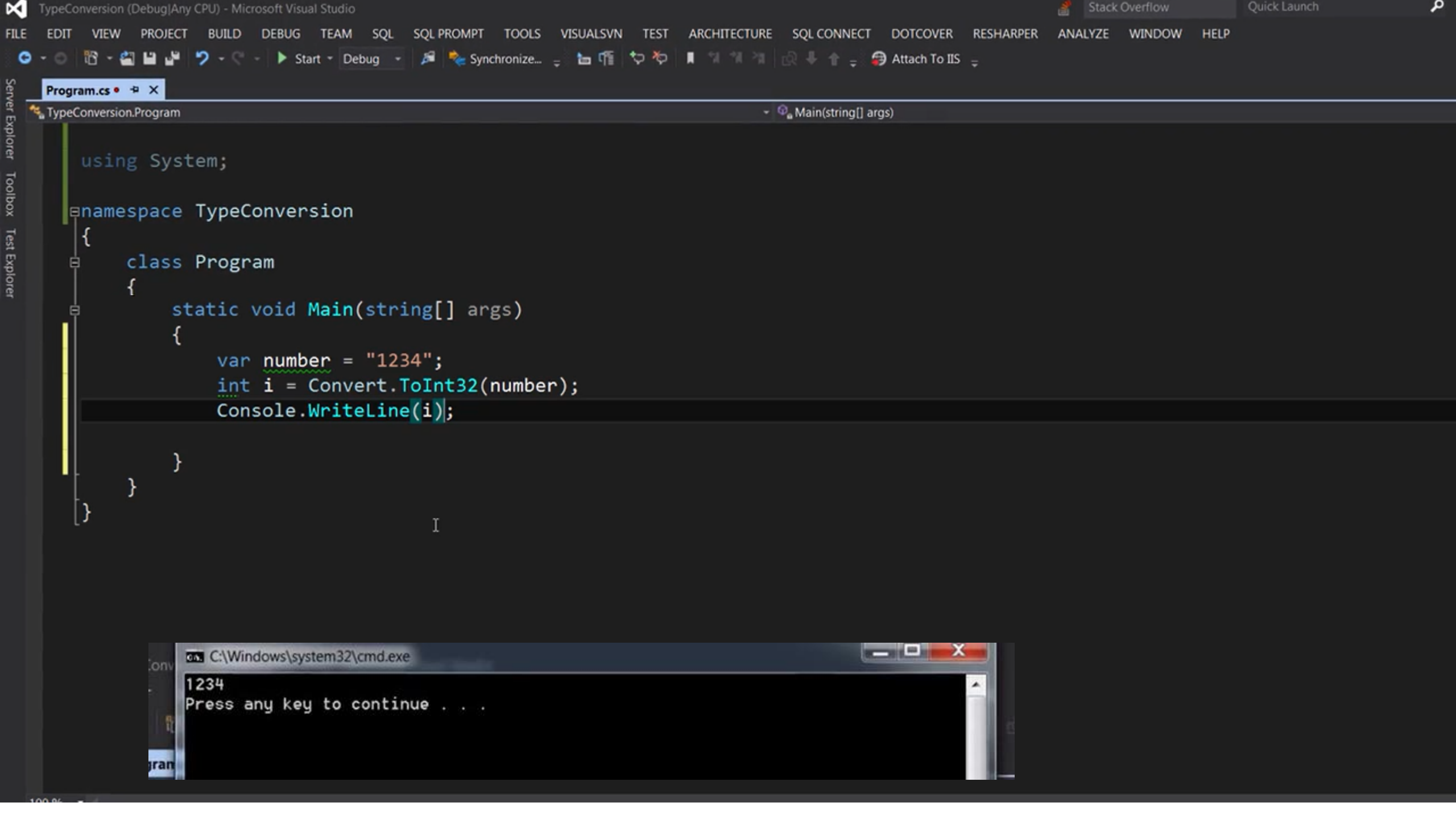
Demo Type Conversion

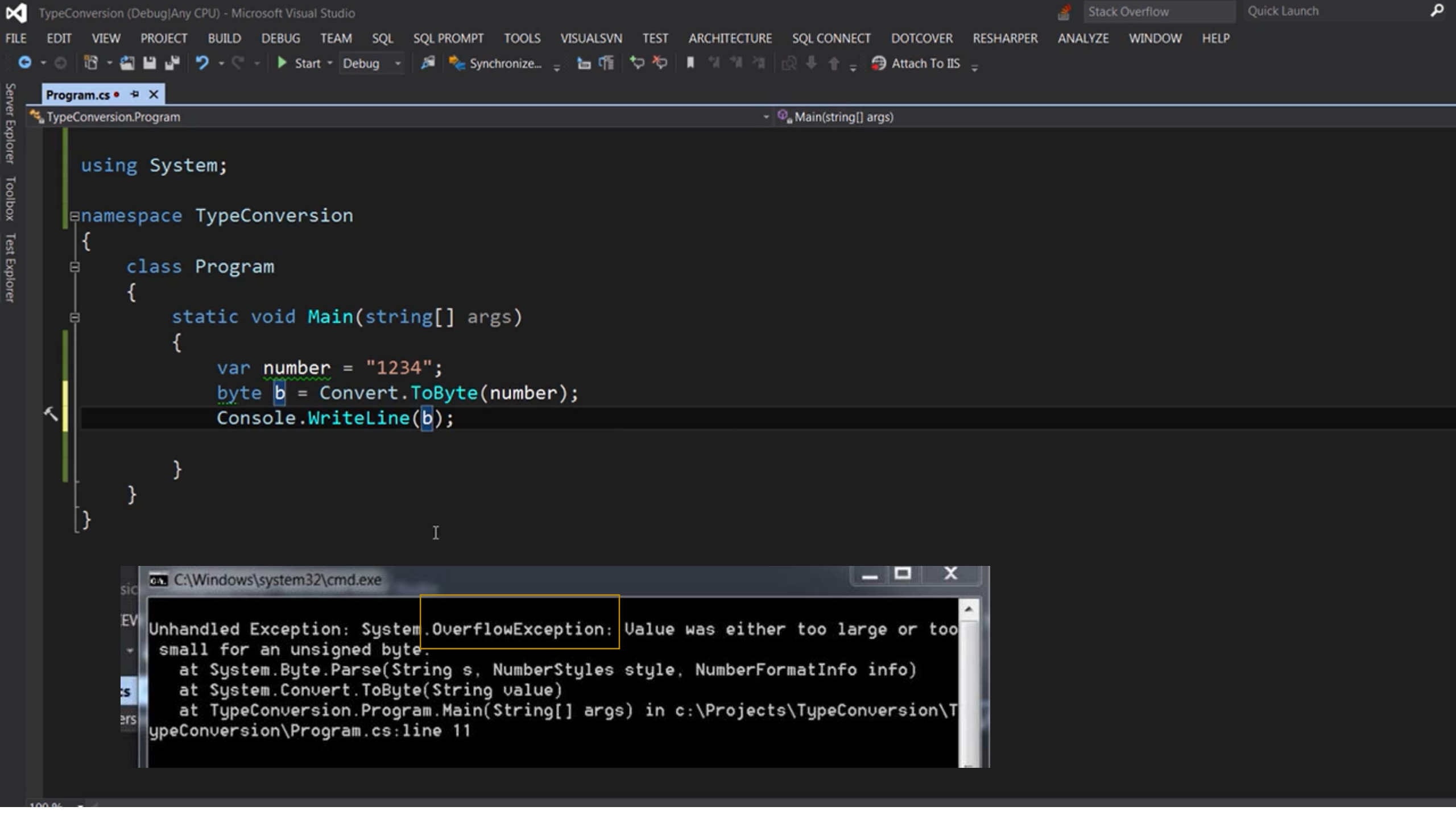


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```
using System;
```

```
namespace TypeConversion
```

```
{
```

```
    class Program
```

```
    {
```

```
        static void Main(string[] args)
```

```
        {
```

```
            try
```

```
            {
```

```
                var number = "1234";
```

```
                byte b = Convert.ToByte(number);
```

```
                Console.WriteLine(b);
```

```
            }
```

```
            catch (Exception)
```

```
            {
```

```
                Console.WriteLine("The number could not be converted to a byte.");
```

```
            }
```

```
        }
```

```
    }
```

```
}
```

C:\Windows\system32\cmd.exe

```
The number could not be converted to a byte.  
Press any key to continue . . .
```



```
using System;
```

```
namespace TypeConversion
```

```
{  
    class Program  
    {  
        static void Main(string[] args)  
        {  
            try  
            {  
                string str = "true";  
                bool b = Convert.ToBoolean(str);  
                Console.WriteLine(b);  
            }  
            catch (Exception)  
            {  
            }  
        }  
    }  
}
```

C:\Windows\system32\cmd.exe

True
Press any key to continue . . .

Operators



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C# Operators

- Arithmetic Operators
- Comparison Operators
- Assignment Operators
- Logical Operators
- Bitwise Operators



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Arithmetic Operators

	Operator	Example
Add	$+$	$a + b$
Subtract	$-$	$a - b$
Multiply	$*$	$a * b$
Divide	$/$	a / b
Remainder	$\%$	$a \% b$

Arithmetic Operators

	Operator	Example	Same as
Increment	<code>++</code>	<code>a++</code>	<code>a = a + 1</code>
Decrement	<code>--</code>	<code>a--</code>	<code>a = a - 1</code>



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Postfix Increment

```
int a = 1;  
int b = a++;
```

a = 2, b = 1



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Prefix Increment

```
int a = 1;  
int b = ++a;
```

a = 2, b = 2



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Comparison Operators

	Operator	Example
Equal	==	<code>a == b</code>
Not Equal	!=	<code>a != b</code>
Greater than	>	<code>a > b</code>
Greater than or equal to	>=	<code>a >= b</code>
Less than	<	<code>a < b</code>
Less than or equal to	<=	<code>a <= b</code>

Assignment Operators

	Operator	Example	Same as
Assignment	<code>=</code>	<code>a = 1</code>	
Addition assignment	<code>+=</code>	<code>a += 3</code>	<code>a = a + 3</code>
Subtraction assignment	<code>-=</code>	<code>a -= 3</code>	
Multiplication assignment	<code>*=</code>	<code>a *= 3</code>	
Division assignment	<code>/=</code>	<code>a /= 3</code>	

Logical Operators

	Operator	Example
And	&&	a && b
Or	 	a b
Not	!	!a

Bitwise Operators

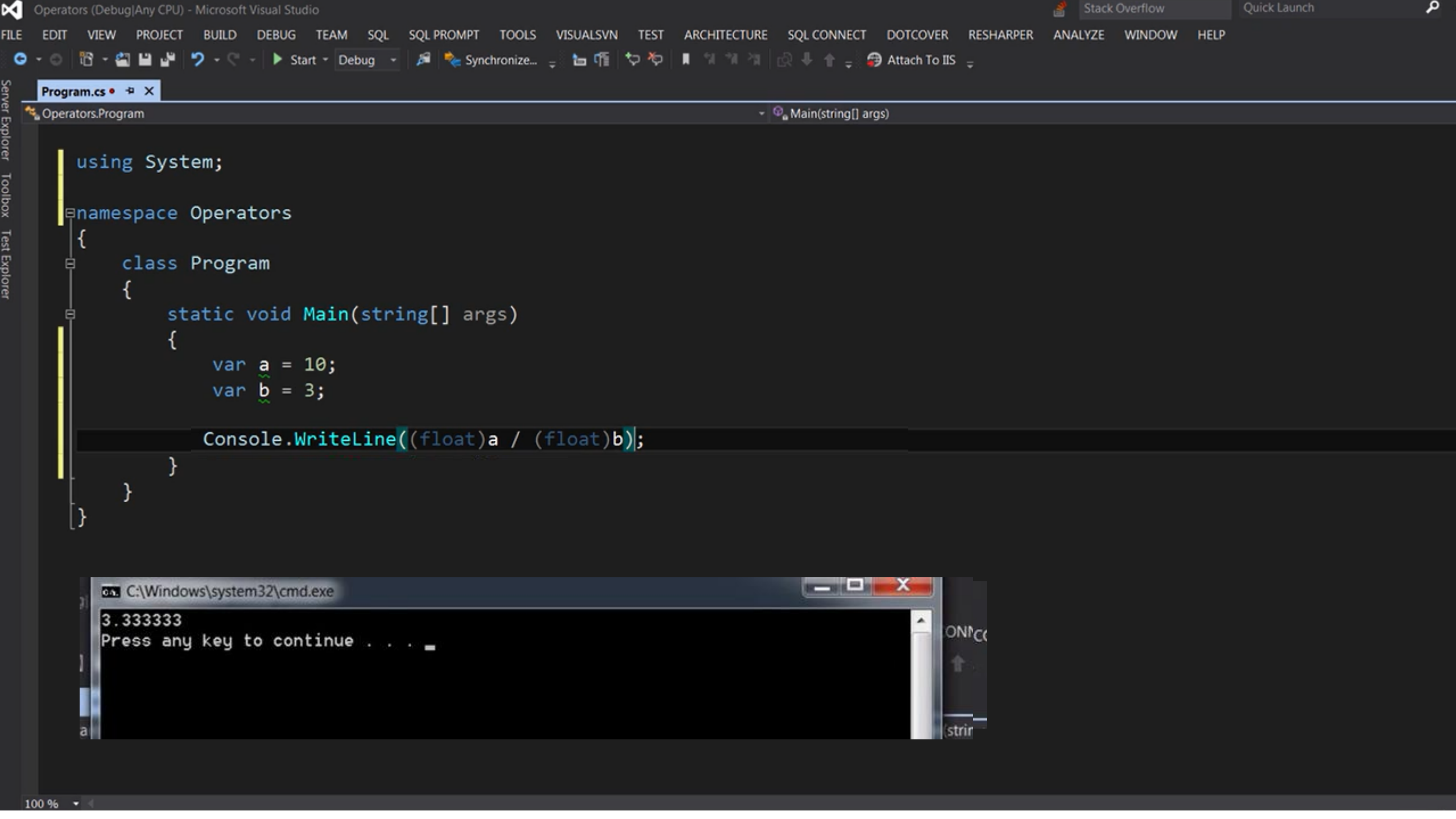
	Operator	Example
And	<code>&</code>	<code>a & b</code>
Or	<code> </code>	<code>a b</code>

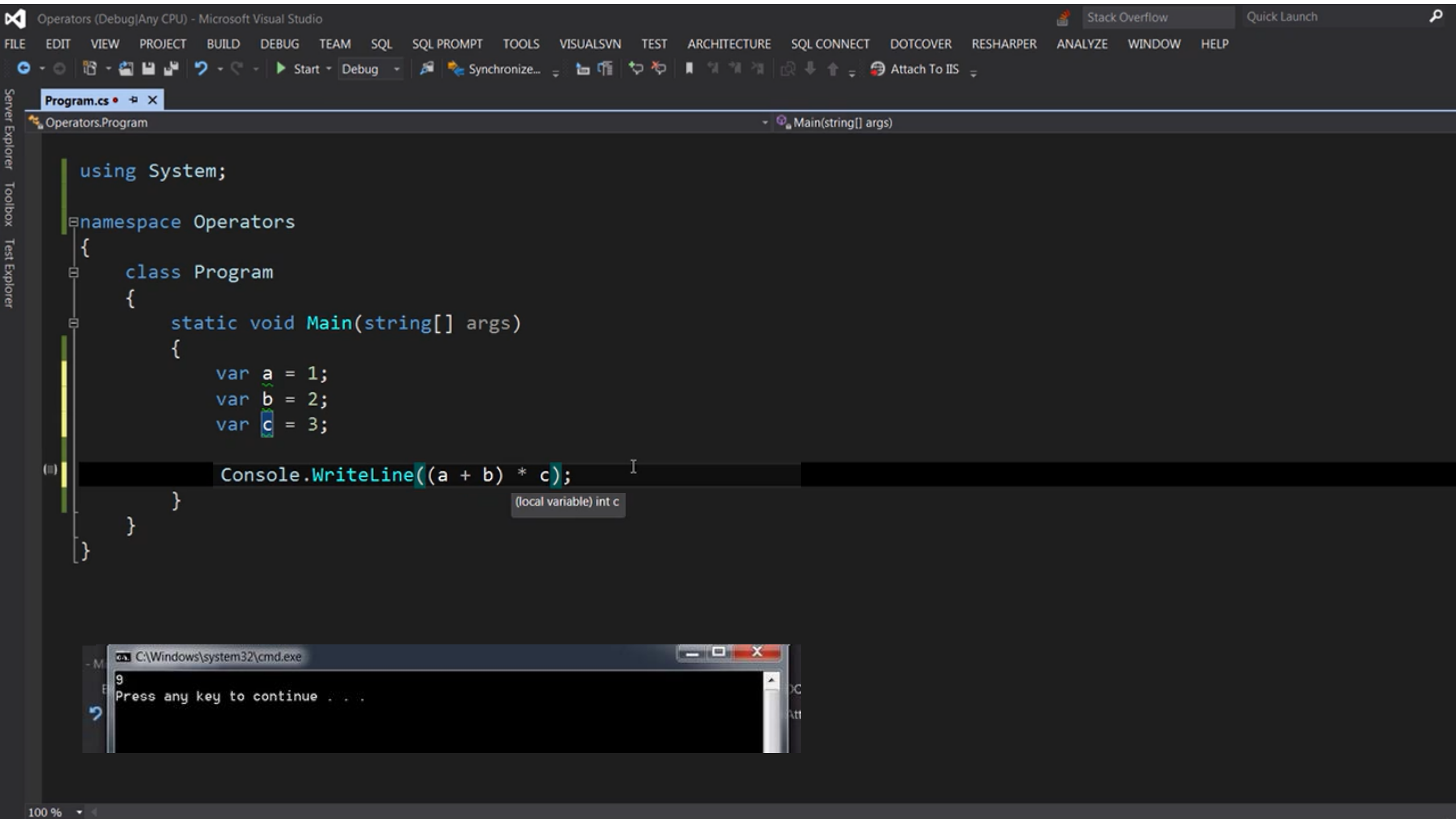
Demo Operators



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Program.cs

Operators.Program

Main(string[] args)

```
using System;
```

```
namespace Operators
```

```
{
```

```
    class Program
```

```
    {
```

```
        static void Main(string[] args)
```

```
        {
```

```
            var a = 1;
```

```
            var b = 2;
```

```
            Console.WriteLine(!(a != b));
```

```
        }
```

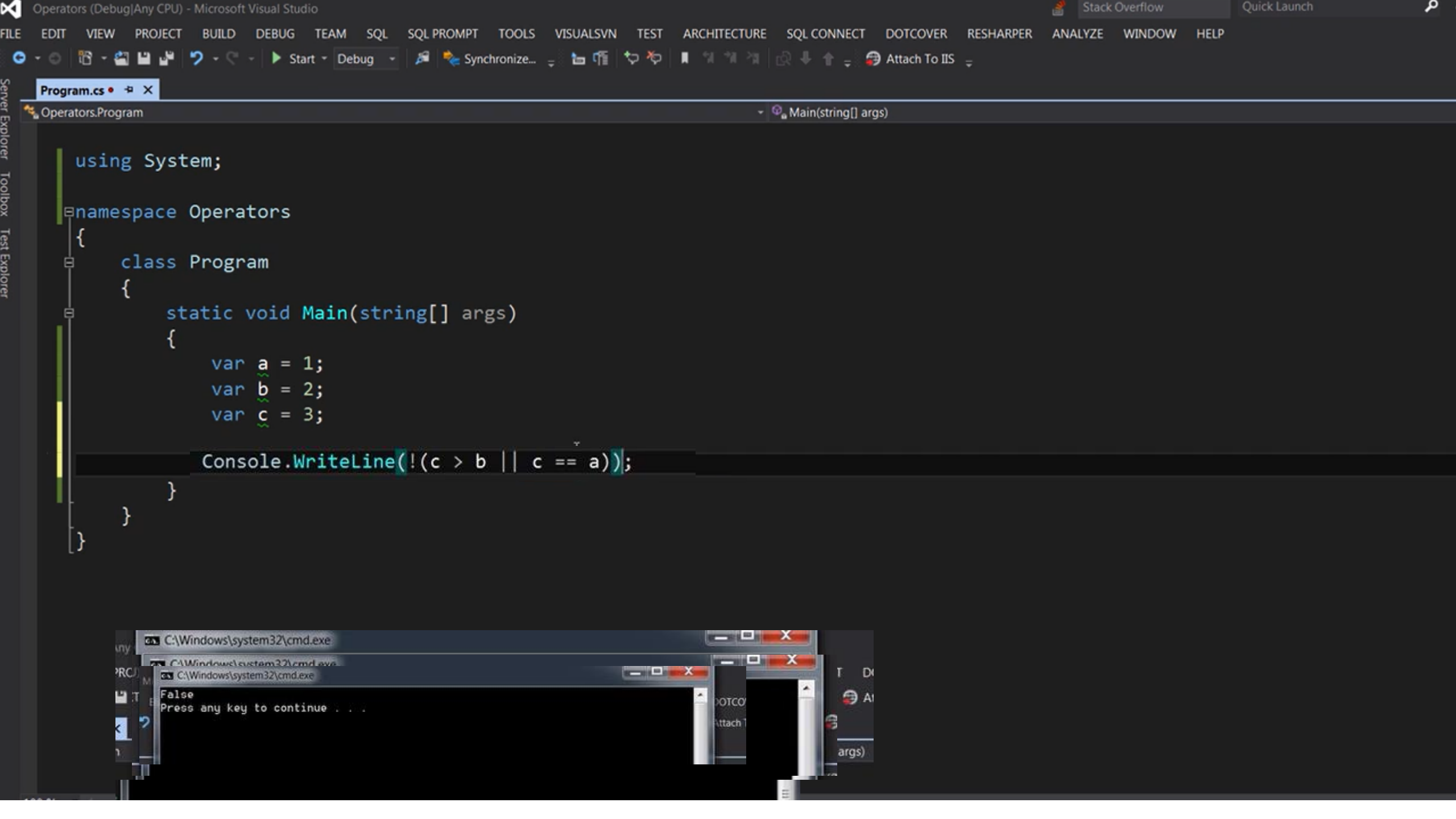
```
    }
```

```
}
```

C:\Windows\system32\cmd.exe

False

Press any key to continue . . .



Program.cs

Operators.Program

Main(string[] args)

```
using System;
```

```
namespace Operators
```

```
{
```

```
    class Program
```

```
    {
```

```
        static void Main(string[] args)
```

```
        {
```

```
            var a = 1;
```

```
            var b = 2;
```

```
            var c = 3;
```

```
            Console.WriteLine(!(c > b || c == a));
```

```
        }
```

```
    }
```

```
}
```

C:\Windows\system32\cmd.exe

C:\Windows\system32\cmd.exe

C:\Windows\system32\cmd.exe

False

Press any key to continue . . .

DOTCO

Attach1

args)

Comments



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Single-line Comment

```
// Here is a single-line comment  
int a = 1;
```

Multi-line Comments

```
/*  
    Here is a multi-line  
    comment  
*/  
int a = 1;
```



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When to Use

To explain whys, hows, constrains, etc.
not the whats.



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