1. Tools, Setup & .NET

AGENDA

- Introduction to C# & the .NET runtime
- Git & why version management is crucial
- Visual Studio & the role of the IDE
- MSBuild & how to build softwares
- Task: Hello World!

Motivation

- Nenne drei Unterschiede zwischen einen Programm und einen Betriebssystem
- Wo ist überall Informatik drin? Nennt ein paar Beispiele
- Welche Programmiersprachen kennt ihr?

1. INTRODUCTION TO C# AND THE .NET RUNTIME

.Net

- Free == free available
- Open source == you can get source code and participate on development
- Cross-platform == works on Linux, MacOS, Windows
- Development platform
  - runtime for programming languages **C#** and F#
  - libraries and development tools for application development

1. INTRODUCTION TO C# AND THE .NET RUNTIME

.Net != .Net Framework

.Net	.Net Framework
runs on Linux, MacOS, Windows	only runs on Windows
has to be installed	included in Windows
recommanded for new development	

> https://learn.microsoft.com/de-de/shows/dotnet-for-beginners/what-is-dotnet-dotnet-for-beginners

1. INTRODUCTION TO C# AND THE .NET RUNTIME

What can you do with .Net?

- you can run and develop:
  - Web applications
  - Mobile and desktop applications
  - Cloud-native apps
- includes a compiler for C# and F#. A compiler translates the program to something the computer (operating system) can understand

1. INTRODUCTION TO C# AND THE .NET RUNTIME

C#

- Developed in 2002 by Anders Hejlsberg on behalf of Microsoft as part of the .NET strategy
- platform-independent
- object-oriented
- type-safe

1. INTRODUCTION TO C# AND THE .NET RUNTIME

Tools

- Visual Studio
- Visual Studio Code

Links

- Introduction videos
- Wikipedia
- Microsoft Training
- Knowledge Check

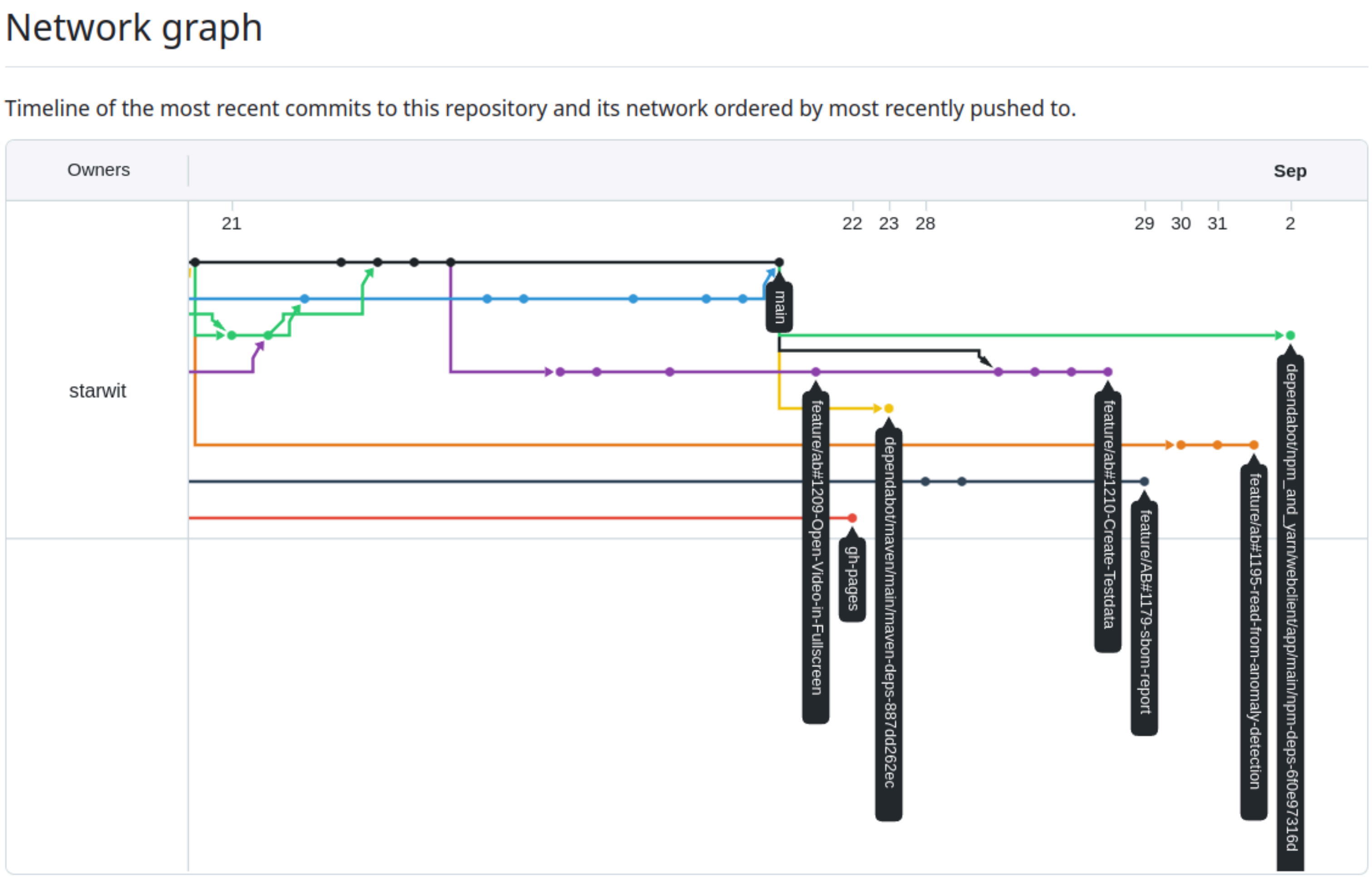
2. GIT AND WHY VERSION MANAGEMENT IS CRUCIAL

Git Overview

- in order to work together, you need to handle parallel changes of your team
- Git is a version control system designed to do this
- you work with branches e.g. to separate different features from each other
- important commands:
  - `git clone https://...` clones a project from a git repository to your lokal file system
  - `git add .` adds your changes to a stage
  - `git commit .` commits your changes in your local branch
  - `git push` pushes your changes to remote branch
  - `git pull` get the latest changes from your repository

2. GIT AND WHY VERSION MANAGEMENT IS CRUCIAL

Git Branches and Workflow



Network graph

Timeline of the most recent commits to this repository and its network ordered by most recently pushed to.

Owners
Sep
21
22
23
28
29
30
31
2
starwit
main
feature/ab#1209-Open-Video-in-Fullscreen
gh-pages
dependabot/maven/main/maven-deps-887dd262ec
feature/ab#1210-Create-Testdata
feature/AB#1179-sbom-report
feature/ab#1195-read-from-anomaly-detection
dependabot/npm_and_yarn/webclient/app/main/npm-deps-6f0e97316d

2. GIT AND WHY VERSION MANAGEMENT IS CRUCIAL

Pull Requests / Merge Requests

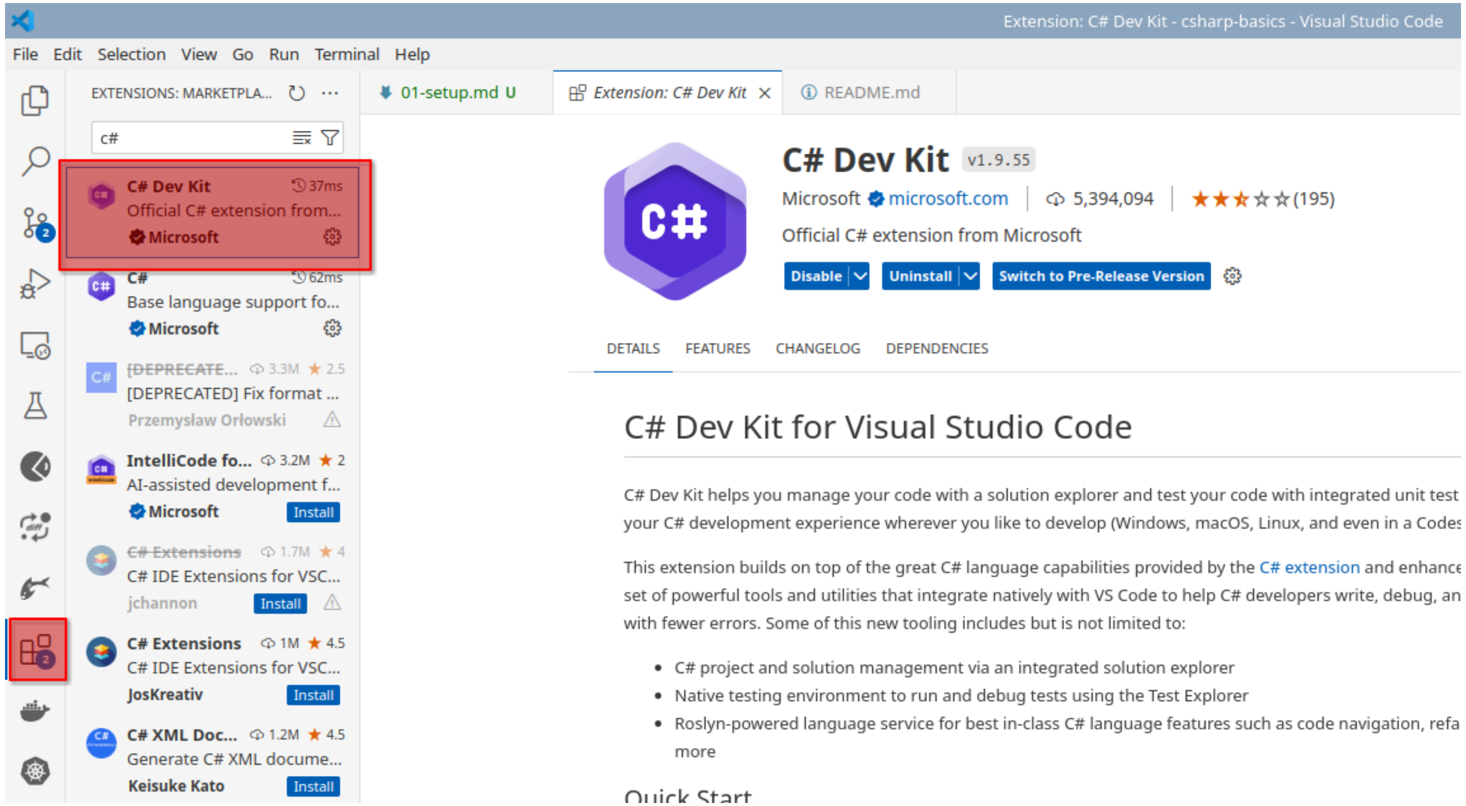
- to merge feature branches in the main branch, pull request or merge requests can be created
- a pull request can be reviewed and approved before merging

Advantages

- you can work in a separated version of code (branch) without disturbing anyone
- contolled way to do reviews before code is going live
- building and maintaining more than one release is possible
- versioned code history

3. VISUAL STUDIO AND THE ROLE OF THE IDE

Visual Studio Code


Extension: C# Dev Kit - csharp-basics - Visual Studio Code
File Edit Selection View Go Run Terminal Help
EXTENSIONS: MARKETPLA...
c#
C# Dev Kit 37ms
Official C# extension from...
Microsoft
C# 62ms
Base language support fo...
Microsoft
~~[DEPRECATE...~~ 3.3M ★ 2.5
[DEPRECATED] Fix format ...
Przemysław Orłowski
IntelliCode fo... 3.2M ★ 2
AI-assisted development f...
Microsoft Install
~~C# Extensions~~ 1.7M ★ 4
C# IDE Extensions for VSC...
jchannon Install
C# Extensions 1M ★ 4.5
C# IDE Extensions for VSC...
JosKreativ Install
C# XML Doc... 1.2M ★ 4.5
Generate C# XML docume...
Keisuke Kato Install
01-setup.md U
Extension: C# Dev Kit
README.md
C# Dev Kit v1.9.55
Microsoft microsoft.com | 5,394,094 | ★★★☆☆ (195)
Official C# extension from Microsoft
Disable
Uninstall
Switch to Pre-Release Version
DETAILS
FEATURES
CHANGELOG
DEPENDENCIES

C# Dev Kit for Visual Studio Code

C# Dev Kit helps you manage your code with a solution explorer and test your code with integrated unit test your C# development experience wherever you like to develop (Windows, macOS, Linux, and even in a Codes

This extension builds on top of the great C# language capabilities provided by the C# extension and enhance set of powerful tools and utilities that integrate natively with VS Code to help C# developers write, debug, an with fewer errors. Some of this new tooling includes but is not limited to:

- C# project and solution management via an integrated solution explorer
- Native testing environment to run and debug tests using the Test Explorer
- Roslyn-powered language service for best in-class C# language features such as code navigation, refa more

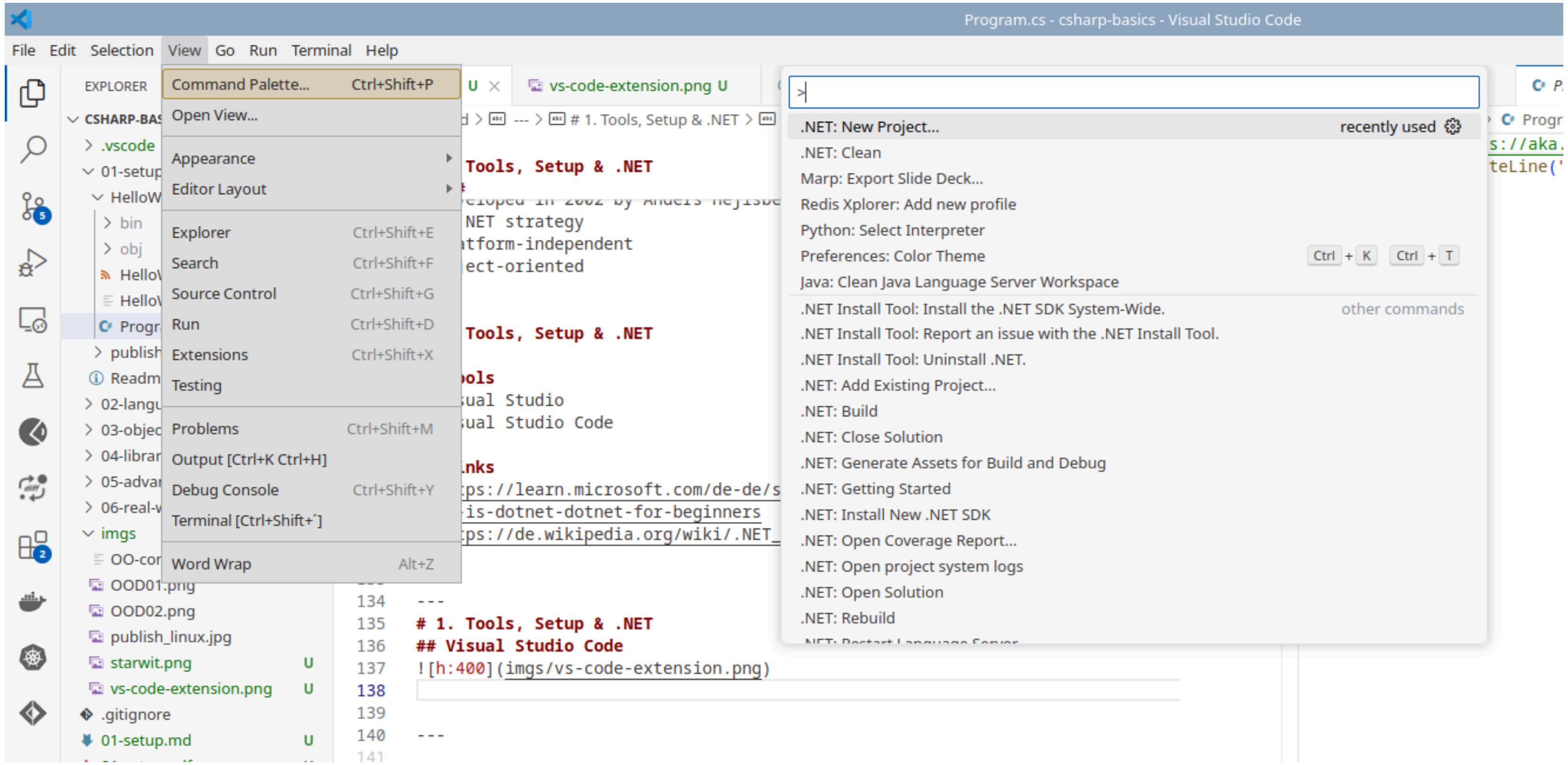
Quick Start

add extension

3. VISUAL STUDIO AND THE ROLE OF THE IDE

Visual Studio Code - Create new Project

- Option 1 via console: `dotnet new console -o ./CsharpProjects/TestProject`
- Otpion 2 via IDE (Integrated Development Environment):



Program.cs - csharp-basics - Visual Studio Code
File Edit Selection View Go Run Terminal Help
EXPLORER
CSHARP-BAS
.vscode
01-setup
HelloW
bin
obj
imgs
OOD01.png
OOD02.png
publish_linux.jpg
starwit.png U
vs-code-extension.png U
.gitignore
01-setup.md U
Command Palette... Ctrl+Shift+P
Open View...
Appearance
Editor Layout
Explorer Ctrl+Shift+E
Search Ctrl+Shift+F
Source Control Ctrl+Shift+G
Run Ctrl+Shift+D
Extensions Ctrl+Shift+X
Testing
Problems Ctrl+Shift+M
Output [Ctrl+K Ctrl+H]
Debug Console Ctrl+Shift+Y
Terminal [Ctrl+Shift+`]
Word Wrap Alt+Z
vs-code-extension.png U
# 1. Tools, Setup & .NET
>
.NET: New Project... recently used
.NET: Clean
Marp: Export Slide Deck...
Redis Xplorer: Add new profile
Python: Select Interpreter
Preferences: Color Theme Ctrl + K Ctrl + T
Java: Clean Java Language Server Workspace
.NET Install Tool: Install the .NET SDK System-Wide. other commands
.NET Install Tool: Report an issue with the .NET Install Tool.
.NET Install Tool: Uninstall .NET.
.NET: Add Existing Project...
.NET: Build
.NET: Close Solution
.NET: Generate Assets for Build and Debug
.NET: Getting Started
.NET: Install New .NET SDK
.NET: Open Coverage Report...
.NET: Open project system logs
.NET: Open Solution
.NET: Rebuild

```
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# 1. Tools, Setup & .NET
## Visual Studio Code
![h:400](imgs/vs-code-extension.png)


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```
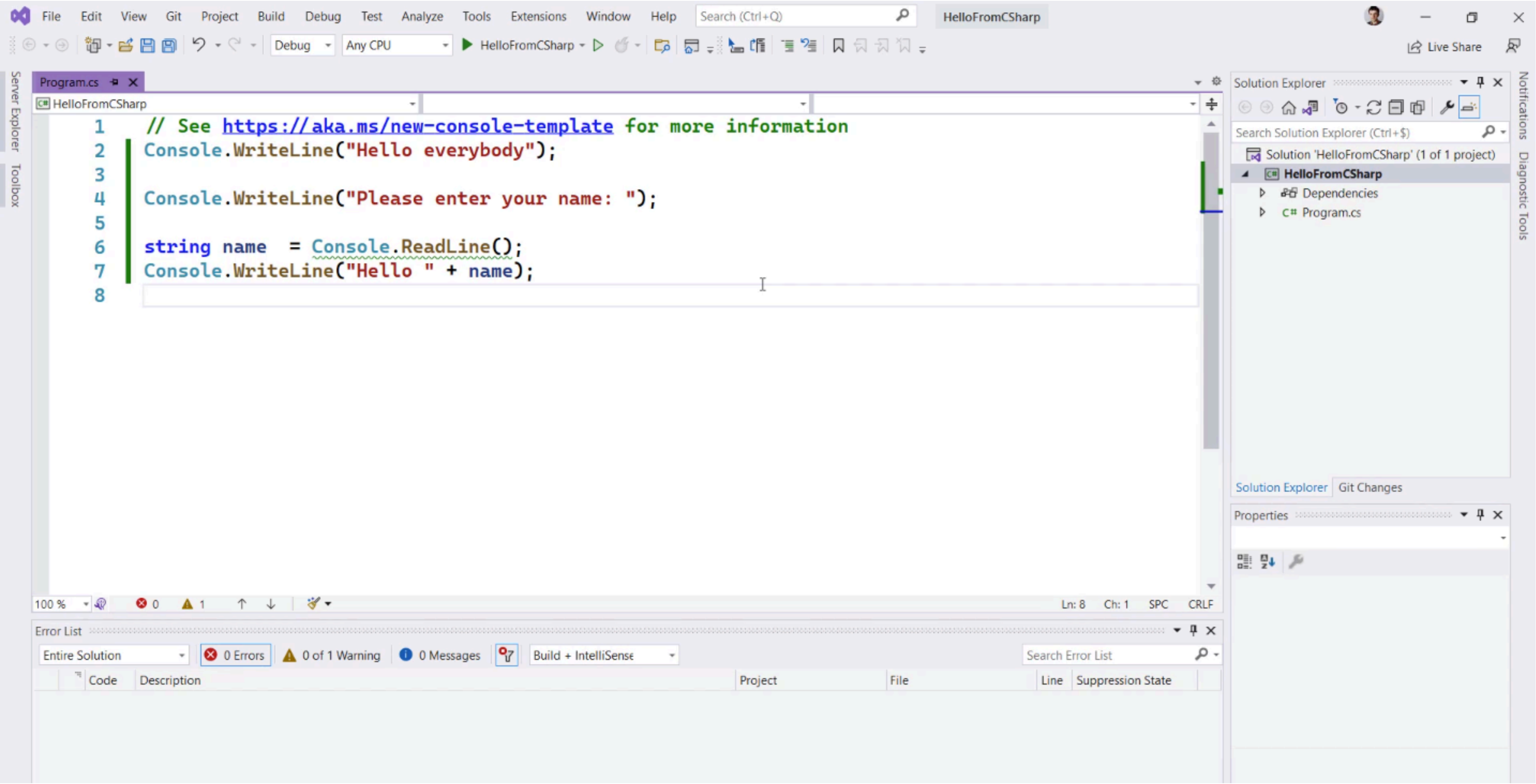

3. VISUAL STUDIO AND THE ROLE OF THE IDE

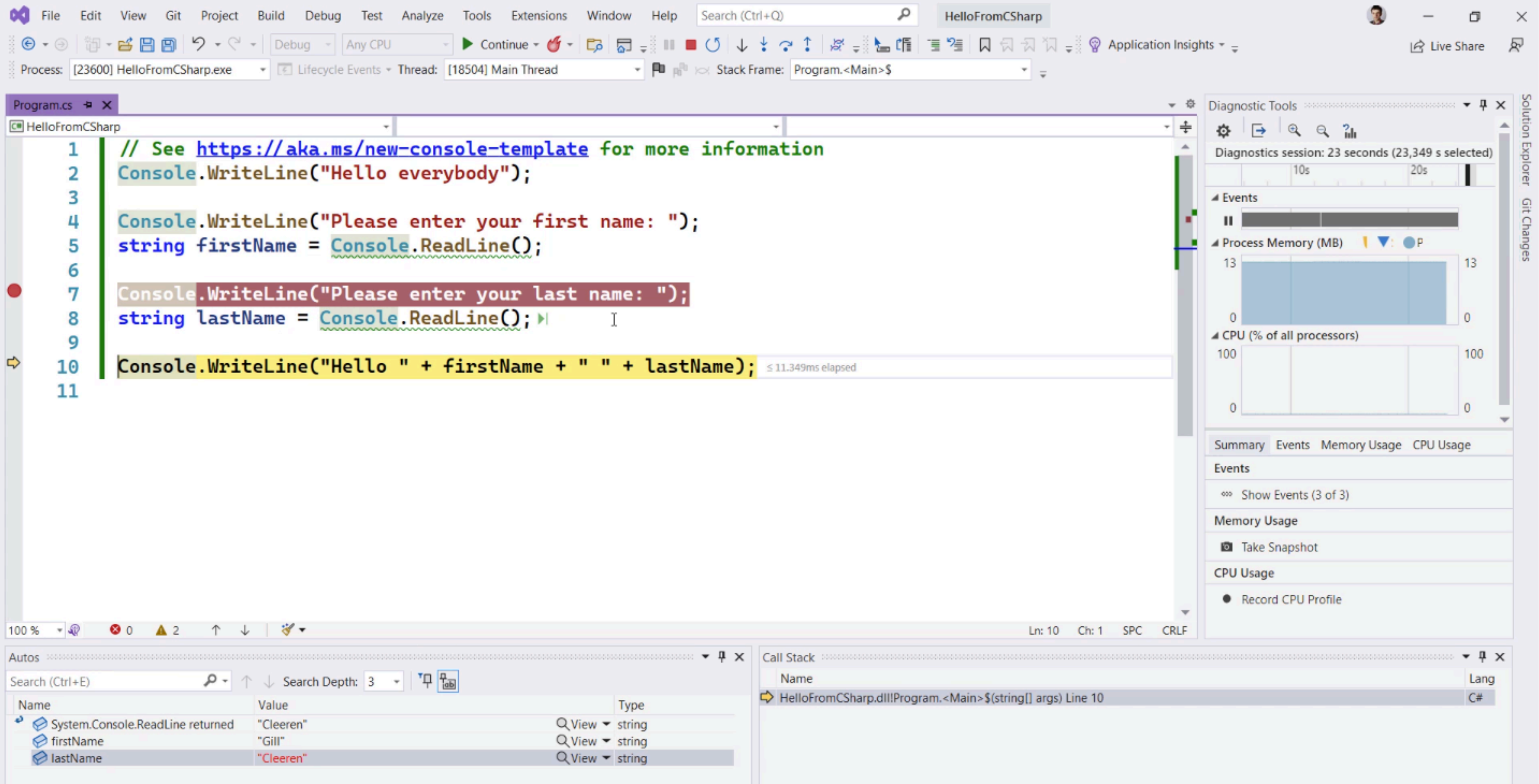
Visual Studio



```
// See https://aka.ms/new-console-template for more information
Console.WriteLine("Hello everybody");

Console.WriteLine("Please enter your name: ");

string name  = Console.ReadLine();
Console.WriteLine("Hello " + name);
```

3. VISUAL STUDIO AND THE ROLE OF THE IDE

Visual Studio Debugging



Process: [23600] HelloFromCSharp.exe Thread: [18504] Main Thread Stack Frame: Program.<Main>$

```
// See https://aka.ms/new-console-template for more information
Console.WriteLine("Hello everybody");

Console.WriteLine("Please enter your first name: ");
string firstName = Console.ReadLine();

Console.WriteLine("Please enter your last name: ");
string lastName = Console.ReadLine();

Console.WriteLine("Hello " + firstName + " " + lastName); ≤ 11.349ms elapsed
```

100 % 0 2 Ln: 10 Ch: 1 SPC CRLF

Diagnostics session: 23 seconds (23,349 s selected)

Search Depth: 3

Name	Value		Type
System.Console.ReadLine returned	"Cleeren"	View	string
firstName	"Gill"	View	string
lastName	"Cleeren"	View	string

Name	Lang
HelloFromCSharp.dll!Program.<Main>$(string[] args) Line 10	C#

4. MSBUILD AND HOW TO BUILD SOFTWARES

MSBuild Overview

- build platform for Microsoft and Visual Studio
- uses project file to manage the build
- manage dependencies
- declares framework version
- run, build an publish projects
- detailed information can be found here

4. MSBUILD AND HOW TO BUILD SOFTWARES

Files in a project

- ***.sln**: solution - organisation of projects
- ***.csproj**: project declaration, MSBuild commands, dependencies
- ***.cs**: source code files

4. MSBUILD AND HOW TO BUILD SOFTWARES

Building an application

CLI_Commands_	Description	Hints
`dotnet new`	create a new application	e.g. `dotnet new console -n myApp`
`dotnet build`	compile application	
`dotnet run`	execute application	
`dotnet publish`	creates a compiled version of an application	**self-contained:** runnable without .Net **framework-dependent:** needs .Net

4. MSBUILD AND HOW TO BUILD SOFTWARES

Installing packages with Nuget

- Why: Using other peoples code via packages
- Why a package manager:
  - tool for adding, deleting packages for your entire project independent of local machine
- go to nuget.org and search e.g. for PasswordGenerator

WISSENSCHECK

- Wofür dient die .Net-Plattform?
- Was ist ein Compiler bzw. was bedeutet kompilieren?
- Aus welchen Dateien besteht ein C#-Projekt?
- Wofür benötigt man einen Package Manager?
- Was bedeutet es, wenn eine Programmiersprache als *managed* bezeichnet wird?
- Warum lässt sich mit C#/.Net geschriebener Code einfacher auf andere Systeme (Mikroprozessoren/Betriebssysteme) übertragen?
- Was ist der Unterschied zwischen Debuggen und Ausführen?