

+ 23

# From Your First Line of Code to Your Largest Repo:

How Visual Studio Code Can Help You  
Develop More Efficiently in C++

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& SINEM AKINCI



20  
23



October 01 - 06

# Meet the Speakers



Alexandra Kemper

PM for the C++ Extension for VS Code



Sinem Akinci

C++ Cross-platform and CMake Product Manager for Visual Studio and VS Code

# Before we get started...

Join #visual\_studio channel on CppCon Discord

<https://aka.ms/cppcon/discord>

- Meet the Microsoft C++ team
- Ask any questions
- Discuss the latest announcements



Take our survey:

<https://aka.ms/cppcon/vscode>

# Agenda

- 1 Let's talk VS Code – ***Built on open source to run anywhere you are***
- 2 Hello Again, World – ***Getting Started with C++ & CMake***
- 3 Advanced Debugging & Testing - ***Using VS Code to build the Endless Sky Github Repo***
- 4 What else is new in VS Code? – ***Dev Containers, Makefiles & More***

# Let's Talk VS Code

Built on open source

Runs anywhere you are





# Why should I use VS Code?

- 1 Its **free!**
- 2 Extensions allow for **rich multi-language support** – Python, C++, C#, Typescript...
- 3 **Works on many OS** – develop on Mac, Linux, Windows,...
- 4 **Light-weight** and **highly customizable**
- 5 **Remote Development solutions** – WSL, tunneling, SSH, ...
- 6 **Code completion** through IntelliSense

↓ **Download** at [aka.ms/vscode](https://aka.ms/vscode)

***But I want a fully integrated build system & debugging suite!***


Visual Studio has interesting features for you. Check out the recording of: "What's New in Visual Studio" – David Li & Mryam Girmay




# What extensions do you need as a C++ Developer?

VS Code extensions allow you to dynamically and independently **add language support, debuggers, and tools** to your developer environment and **customize your environment to your needs**.

## Recommended Extensions for C++:




**CMake Tools** v1.16.7  
Microsoft [microsoft.com](https://microsoft.com) | 23,979,327 | ★★★★★ (67)  
Extended CMake support in Visual Studio Code  
[Install](#) ⚙️




**C/C++** v1.17.5  
Microsoft [microsoft.com](https://microsoft.com) | 52,526,819 | ★★★★★ (530)  
C/C++ IntelliSense, debugging, and code browsing.  
[Install](#) ⚙️


## Other Extensions we'll talk about:




**GitHub Copilot** v1.117.443  
GitHub [github.com](https://github.com) | 9,273,152 | ★★★★★ (940)  
Your AI pair programmer  
[Install](#) ⚙️



**Python** v2023.16.0  
Microsoft [microsoft.com](https://microsoft.com) | 98,218,235 | ★★★★★ (558)  
IntelliSense (Pylance), Linting, Debugging (multi-threaded, remote), code formatting, refactoring, unit tests, and more.  
[Install](#) ⚙️



**Makefile Tools** v0.7.0  
Microsoft [microsoft.com](https://microsoft.com) | 3,020,950 | ★★★★★ (31)  
Provide makefile support in VS Code: C/C++ IntelliSense, build, debug/run.  
[Install](#) ⚙️

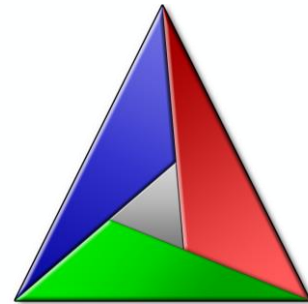


**Remote Development** v0.24.0  
Microsoft [microsoft.com](https://microsoft.com) | 4,480,193 | ★★★★★ (108)  
An extension pack that lets you open any folder in a container, on a remote machine, or in WSL ...  
[Install](#) ⚙️



# Hello again, World

Getting Started with C++ & CMake





# What you'll need to develop in C++

**Compiler (Ex.  
MSVC, GCC,  
Clang)**

**Debugger  
(Ex.  
GDB, LLDB)**

**Build System  
(Ex. CMake,  
Make)**

**IDE or Code Editor (VS Code, Visual Studio)**

## ***Want to learn more?***

Check out the "Back to the Basics" session:

"Getting Started with C++" – Michael Price On Friday @ 13:30



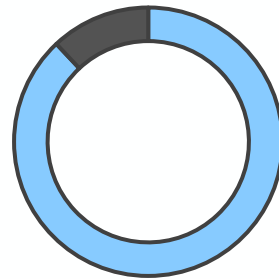
# GitHub Copilot

Your AI pair programmer

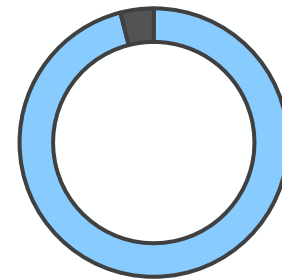
- 1 Convert comments to code
- 2 Create unit tests
- 3 Get inline text suggestions
- 4 Use chat to understand the context of code, workspace, settings, and more



**74%** of developers are able to focus on more satisfying work

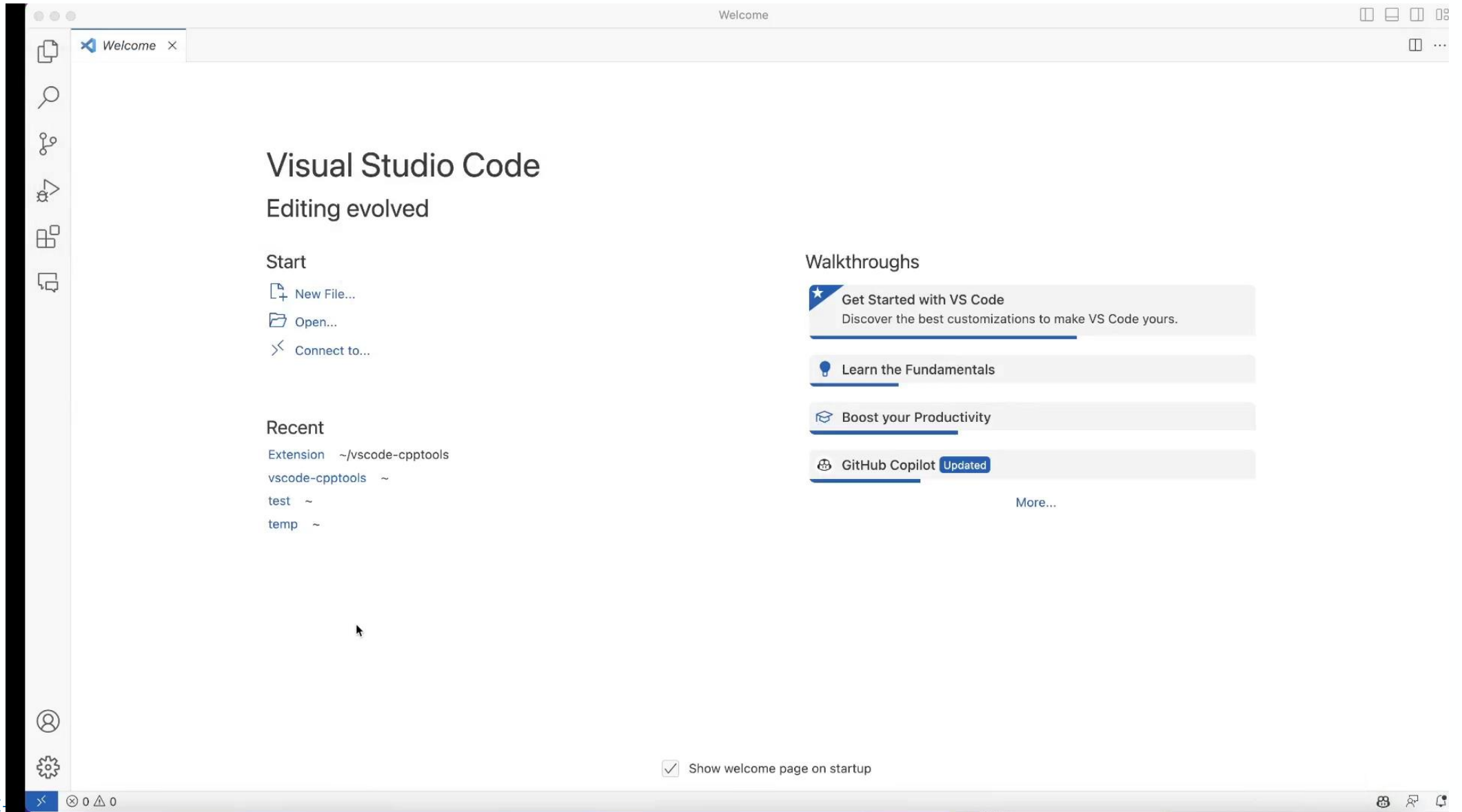


**88%** feel more productive



**96%** of developers are faster with repetitive tasks

# Before we start, let's install a compiler (Preview)



# Demo: Let's get started with C++ in VS Code

Getting Started Walkthrough

Configuration Quickpick

GitHub Copilot & Copilot Chat

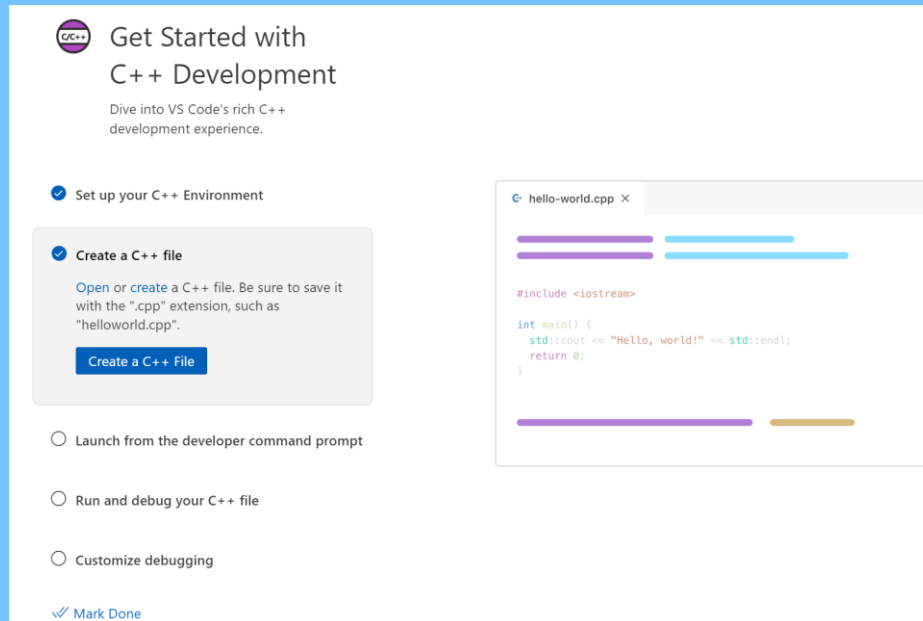
Create Declaration & Definition

# New features in the C++ Extension

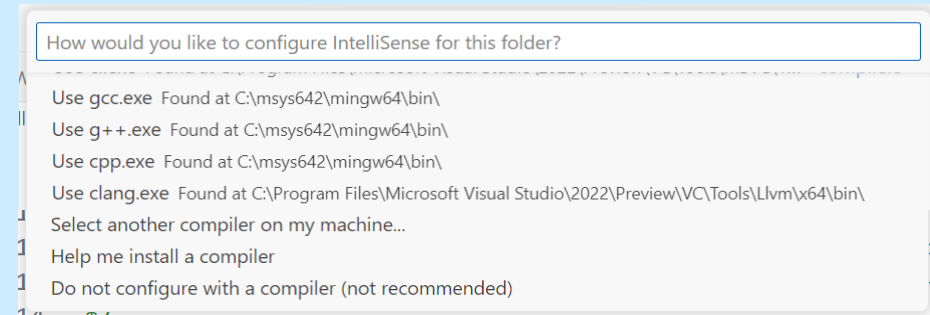
## Getting Started & Configuration

### Getting Started Walkthrough

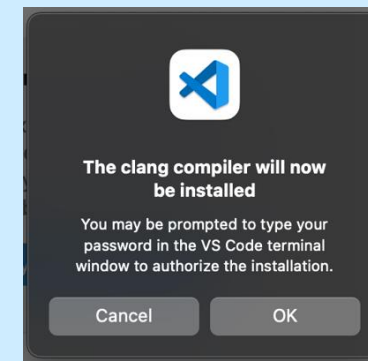
Configure IntelliSense, Run & Debug



### IntelliSense configuration options



### One-click Compiler Installation



Preview:

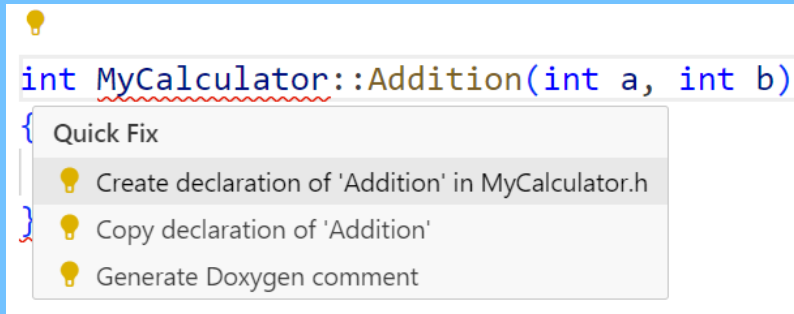
Command line install of  
GCC/Clang on  
Linux/Mac Machines

# More New features in C++ Extension

## Easier Refactoring & Code Analysis

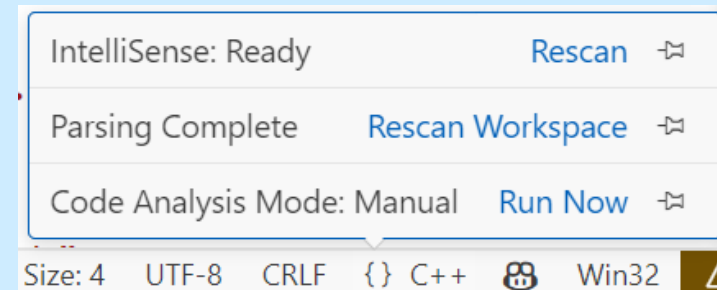
### Create Declarations & Definitions

- Create new header/source files as needed
- Inserts declaration/definition relative to existing code

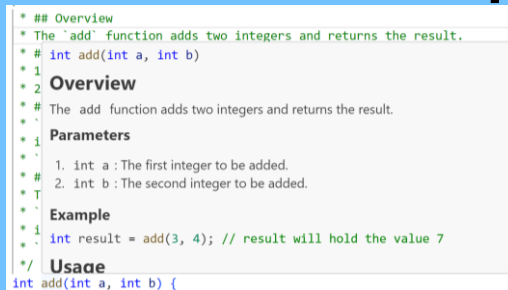


### Language Status Bar

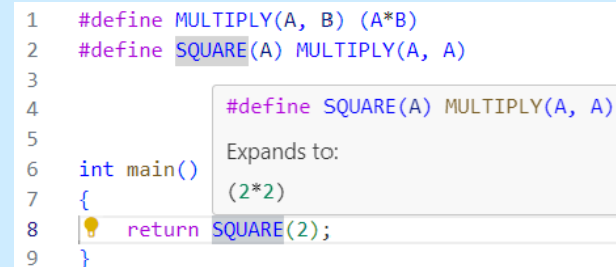
- Check on the IntelliSense or parsing status
  - One Click to run Code Analysis



### Markdown Comment Support



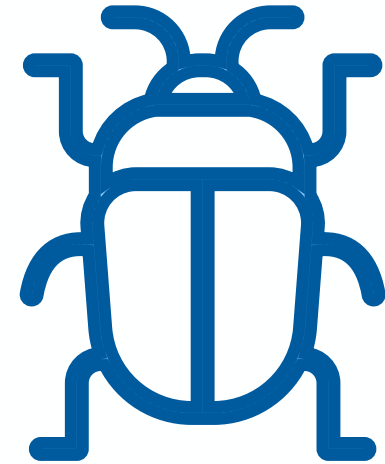
### Recursive Macro Expansion





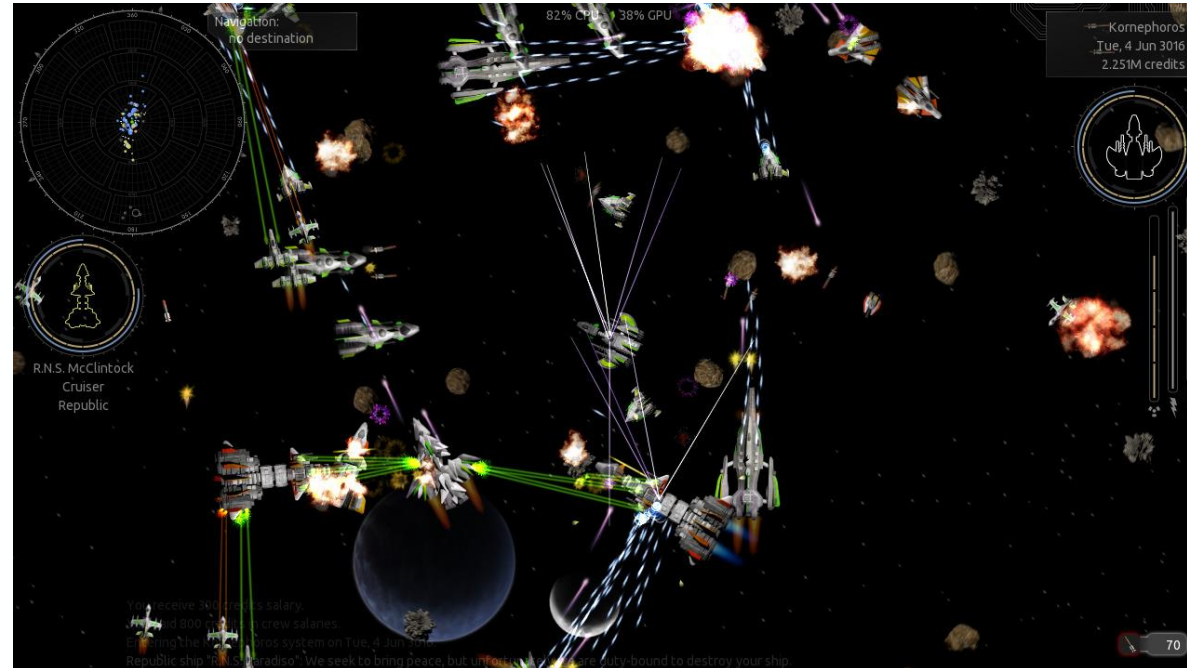
# Advanced Testing & Debugging

Using VS Code to build the Endless Sky  
GitHub Repo

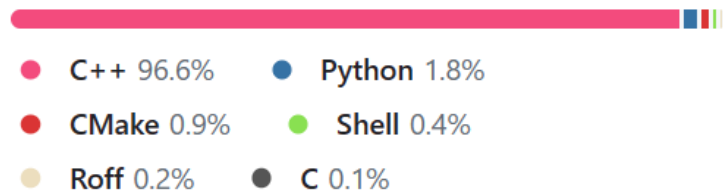


# Now that we've got the basics, It's time to reach for the skies

[www.github.com/endless-sky](https://www.github.com/endless-sky)



## Languages





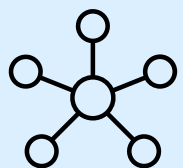
Free, open-source C++ package manager  
For all platforms, build systems, and workflows

**Install dependencies** without having to spend time figuring out how to build them and manually integrate them with your project individually

**Integrates with native CMake features** so you don't have to do anything special in your CMakeLists.txt file

**Largest catalog of open-source libraries** of any C++ package manager -  
Bring your own libraries or use these!

# GitHub Codespaces



Shared easily so everyone on the team has an **identical developer environment**



Compilers, debuggers & extensions are **already installed** and ready to go



Created with a **few simple clicks** from your GitHub repo

The screenshot displays the GitHub Codespaces interface for a repository named 'erwincoumans'. The top banner features the GitHub logo, a penguin mascot, and the text 'GitHub Codespaces' with a 'Preview' badge. Below the banner, the repository's file tree is visible on the left, and a list of commits is shown on the right. A sidebar on the right highlights the 'Codespaces' section, showing a 'my codespace' entry that is 'Active'.

File	Description	Commit	Time
.ci	try to fix travis builds		
.github/workflows	Create cmake.yml		
Extras	rename tiny_obj_loader.h namespace to bt_tiny		
build3	fix premake4 build		
data	Revert "Revert "Reduced Deformable Model""		
docs	update pybullet quickstart guide pdf		
examples	Merge pull request #4413 from aprilprojecteu/master		2 months ago
src	Add deformable contact forces info		4 months ago
test	Merge pull request #3287 from glebm/heightfield-accel		2 years ago
.gitignore	Revert "Revert "Reduced Deformable Model""		last year
.style.yapf	add yapf style and apply yapf to format all Python files		4 years ago
AUTHORS.txt	add a few more contributors (the list is far from complete though)		6 years ago
BulletConfig.cmake.in	Revert "Export targets in CMake and add include directories to target..."		6 years ago
CMakeLists.txt	Merge remote-tracking branch 'bp/master'		2 years ago

# Let's take a look at all of this in practice with VS Code...

vcpkg

CMake Debugger

CMake Tasks

GitHub Codespaces

Call Hierarchy

Test Explorer

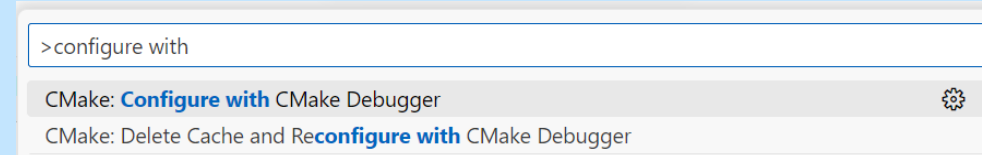
Multi-language Support

# New Debugging and Testing Features for CMake

## CMake Debugger

Debug your CMake scripts using VS Code debugging interface

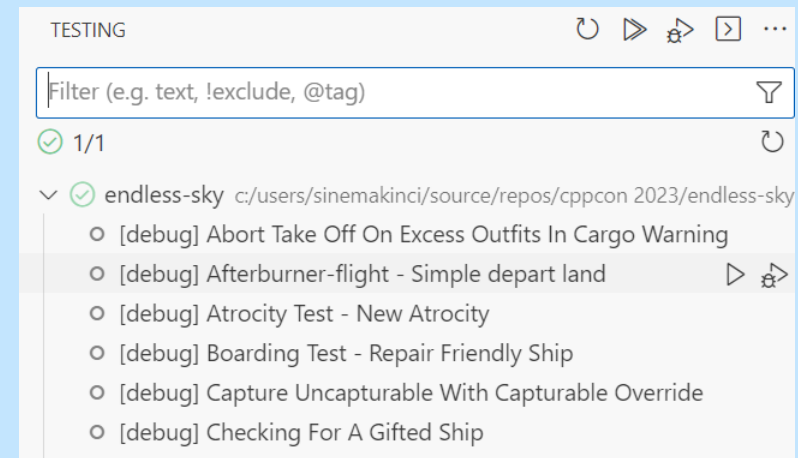
- View variables, call stacks, cache variables
- Set breakpoints



## Test Explorer

Interactive view of CMake tests configured by test presets

- View detailed state of tests and last run results
- Run or debug one or more tests from a simple view

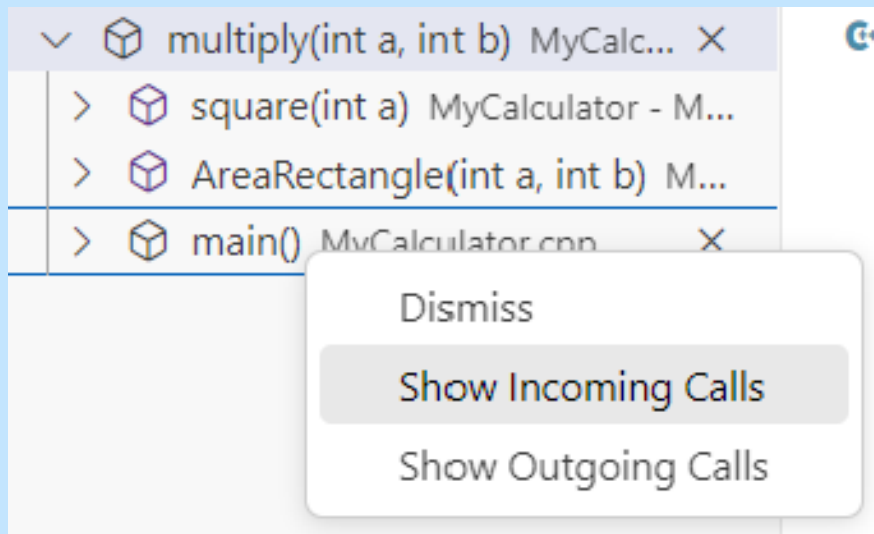




# Improve your Day-to-Day C++ Productivity

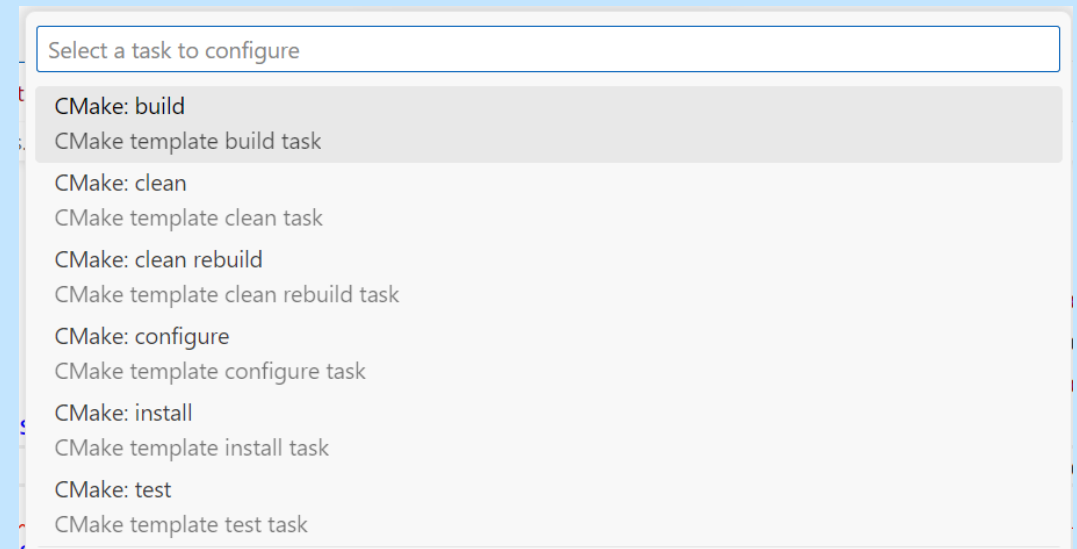
## Call Hierarchy

View incoming/outgoing calls  
**Easily see calls** of node functions



## CMake Tasks

Define tasks to **automate your workflow**  
instead of manually typing shell tasks

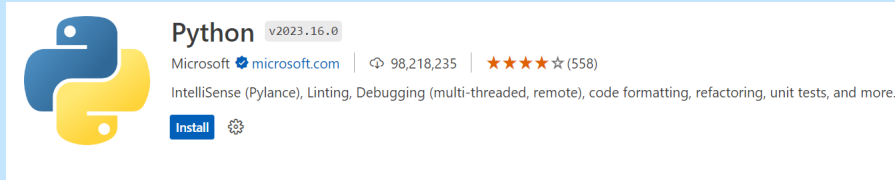


# What if I'm working with multiple languages?

All the same features in one place:

- Language-specific IntelliSense across your files

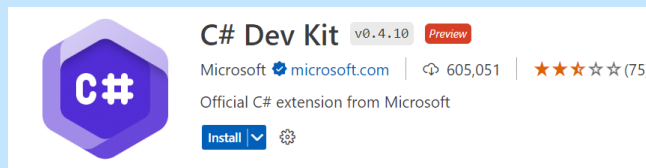
Download the Extension of Your Choice:



**Python** v2023.16.0  
Microsoft [microsoft.com](#) | 98,218,235 | ★★★★★ (558)  
IntelliSense (Pylance), Linting, Debugging (multi-threaded, remote), code formatting, refactoring, unit tests, and more.  
[Install](#) ⚙️



**Extension Pack for Java** v0.25.14  
Microsoft [microsoft.com](#) | 22,039,750 | ★★★★★ (64)  
Popular extensions for Java development that provides Java IntelliSense, debugging, testing, Maven/Gradle s...  
[Install](#) ▼ ⚙️

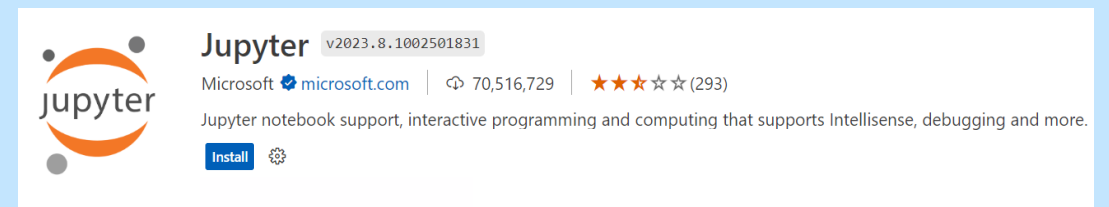


**C# Dev Kit** v0.4.10 Preview  
Microsoft [microsoft.com](#) | 605,051 | ★★★★★ (75)  
Official C# extension from Microsoft  
[Install](#) ▼ ⚙️

Microsoft C++

Jupyter Notebooks

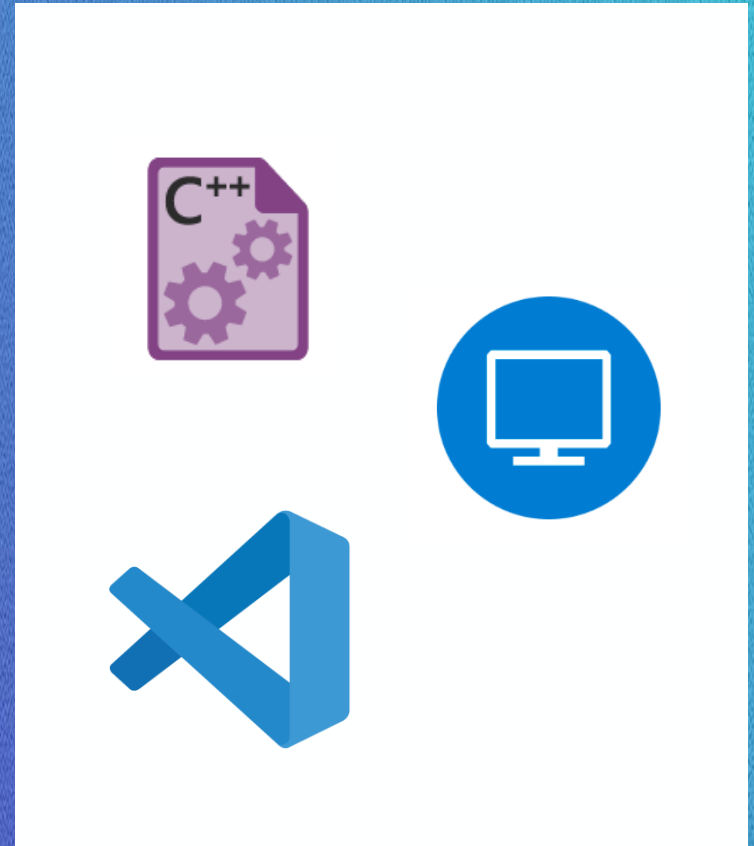
- Use C#, Python, SQL, PowerShell, and more in one notebook
- Invoke executable scripts



**Jupyter** v2023.8.1002501831  
Microsoft [microsoft.com](#) | 70,516,729 | ★★★★★ (293)  
Jupyter notebook support, interactive programming and computing that supports Intellisense, debugging and more.  
[Install](#) ⚙️

# What else is new in VS Code?

Dev Containers, VS Code Profiles, and More



# What's New for Codespaces

## Create a codespace from a template

### Choose a template

Start a codespace from a template and get to developing with the power of a virtual machine in the cloud.

#### Blank

By github

Start with a blank canvas or import any packages you need.

Use this template

#### Ruby on Rails

By github

A full-stack web framework for building dynamic websites that deliver a rich user experience.

Use this template

#### React

By github

A popular JavaScript library for building user interfaces based on UI components.

Use this template

## Accounts:

- Increased usage limits: 60 hours/month per free user, 180 hours/month per paid user
- Performance improvements: Machines now have 2x the RAM and 1.3x the CPU Performance
- Widened access: Can access from individual accounts

**Check out Michael Price's talk from last year to learn more!**

*Reproducible Developer Environments in C++: [aka.ms/cppcon/codespaces](https://aka.ms/cppcon/codespaces)*



# Remote - Tunnels

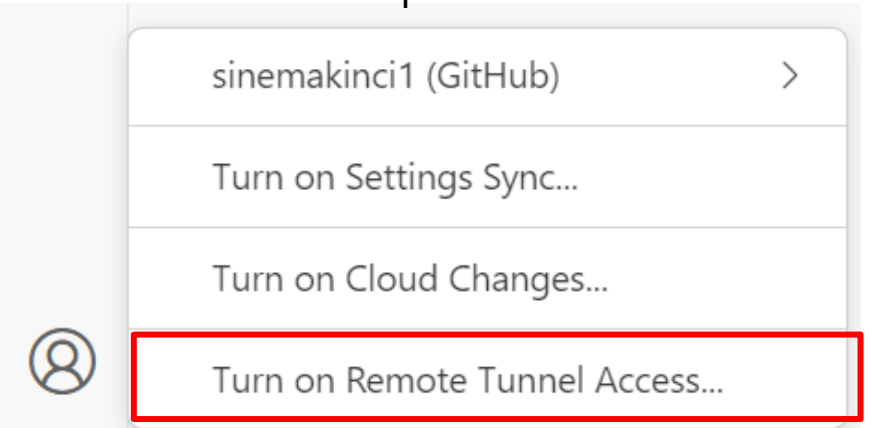
Connect to a Remote Machine via a secure tunnel from a VS Code client anywhere, without the requirement of SSH.

- **Develop anywhere:** connect to a tunnel from VS Code Desktop or [vscode.dev](https://vscode.dev)
- **Like using a CLI more?** Create a Tunnel through the VS Code CLI which is included in VS Code Desktop

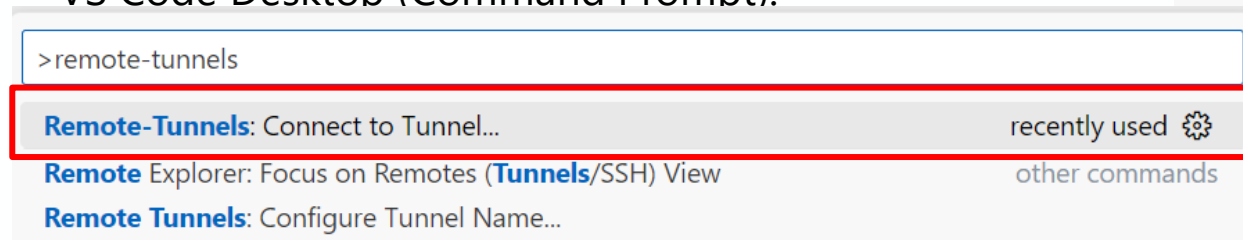
VS Code CLI:

```
PS C:\Users\sinemakinci> code tunnel
*
* Visual Studio Code Server
*
* By using the software, you agree to
* the Visual Studio Code Server License Terms (https://aka.ms/vscode-server-license) and
* the Microsoft Privacy Statement (https://privacy.microsoft.com/en-US/privacystatement).
*
Open this link in your browser https://vscode.dev/tunnel/sinemsurface
```

VS Code Desktop:



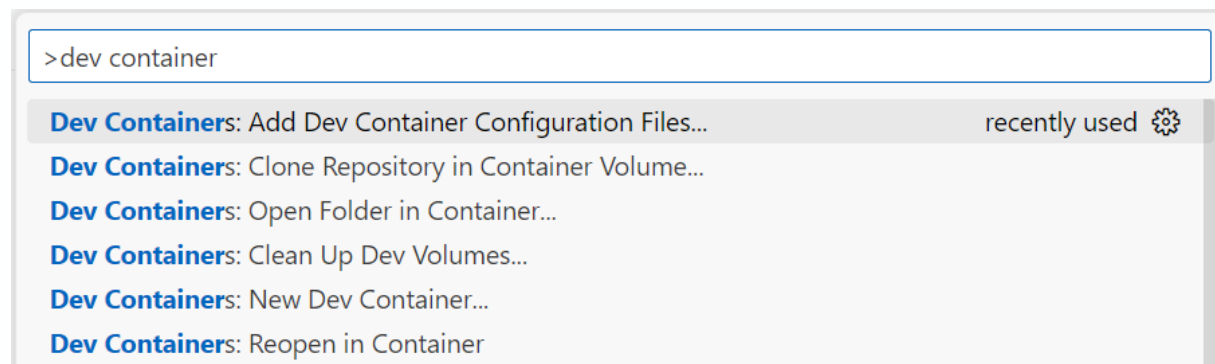
VS Code Desktop (Command Prompt):





Open any folder or repo with a Docker container to **use it as a as a full-featured development environment** from anywhere (Local Machine, GitHub Codespaces, CLI).

- **Quickly switch** between different, separate dev environments
- **Make updates** without impacting your local machine
- Get new team members **up and running quickly**



 Starting Dev Container (show log)



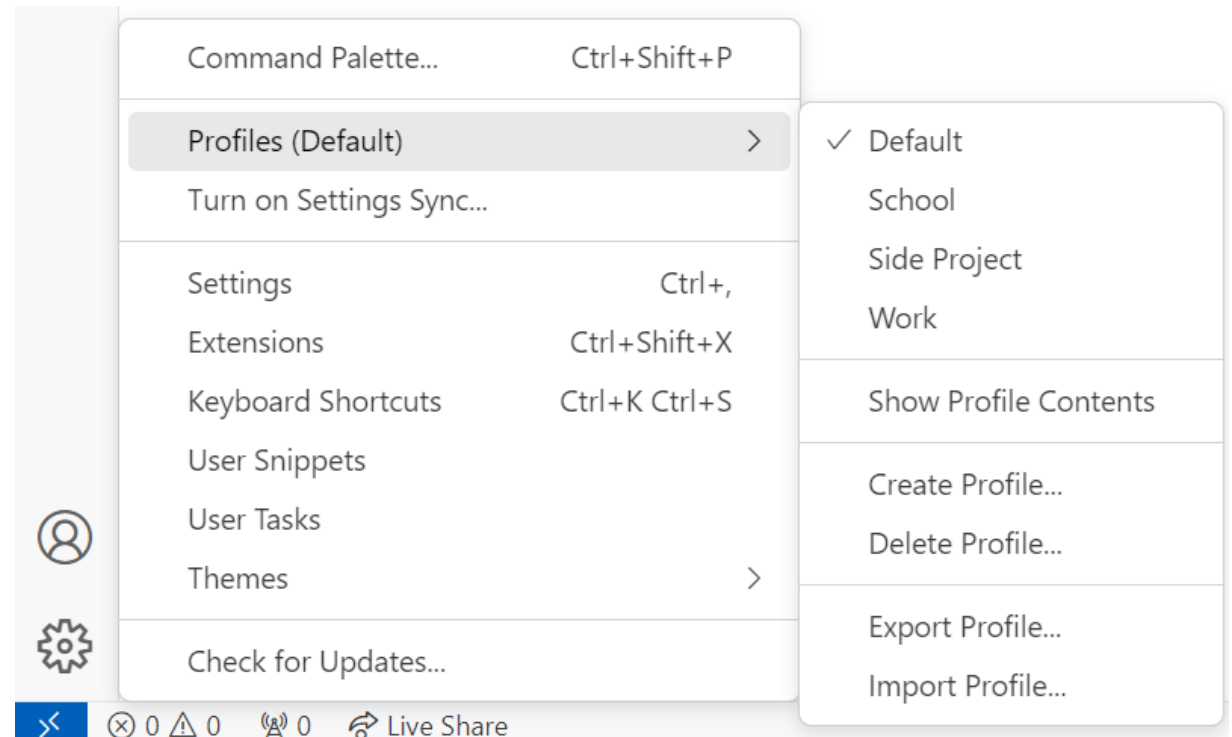
# VS Code Profiles

Customize different configurations of your VS Code IDE based on what development you are doing – between different school, work, or leisure projects. **Quickly switch between profiles** and **share** them **with others**.

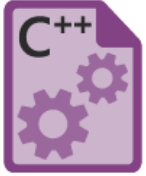
100s of Settings

1000s of Extensions

Innumerable UI Configs



# What's New for Makefile Tools in VS Code



- Provide commands to build, debug, and run your make targets
- Provide IntelliSense configurations to C++ Extension for Makefile projects
- NEW: Support for C++23

## Variable Expansion

New macros that are supported to work from any settings.json entry point.

- `${workspaceFolder}` and `${workspaceRoot}`
- `${workspaceFolderBasename}`
- `${userHome}`
- `${env:ENVIRONMENT_VARIABLE}`
- `${config:ANY_EXTENSION_SCOPE.ANY_SETTING_ID}`
- `${command:ANY_EXTENSION_SCOPE.ANY_COMMAND_ID}`
- `${configuration}` and `${command:makefile.getConfiguration}`
- `${buildTarget}` and `${command:makefile.getBuildTarget}`

## User improvements to Extension Activation

More transparent information into critical components in your Makefile extension

MAKEFILE: PROJECT OUTLINE

Configuration: [Unset]

Build target: [Unset]

Launch target: [Unset]

Makefile (not found): [makefile]

Make (not found): [make.exe]

Build Log: [Unset]

# Coming up

## C++

**Refactoring** experience:

- **Extract function**/Member function
- Signature Editing
- Generating overrides for virtual functions
- Add Missing Includes to File

**Performance** Improvements

- (IntelliSense generation, etc.)

[aka.ms/cpptools](https://aka.ms/cpptools)

## CMake Tools

- **New fully customizable side bar** with CMake Tasks and Presets integration
- CMake Presets support for **Workflow and Package Presets**
- **Automated CMake Installation**
- **Language Services** for CMake

[aka.ms/cmaketools](https://aka.ms/cmaketools)

**Create & upvote GitHub issues and feature requests**  
**Come chat with us about future ideas and what you'd like to see!**

# Our sessions

Monday 2nd

- Lifetime Safety in C++ – Gabor Horvath
- Informal Birds of a Feather for Cpp2/cppfront – Herb Sutter

Tuesday 3rd

- What's New in Visual Studio – David Li & Mryam Girmay

Thursday 5th

- Cooperative C++ Evolution: Towards a Typescript for C++ – Herb Sutter (Keynote)
- How Visual Studio Code Can Help You Develop More Efficiently in C++ – Alexandra Kemper & Sinem Akinci
- Regular, Revisited – Victor Ciura

Friday 6th

- Getting Started with C++ – Michael Price

# Questions?

Join the #visual\_studio channel on CppCon Discord <https://aka.ms/cppcon/discord>

- Meet the Microsoft C++ Team
- Ask Questions
- Discuss latest announcements

Take our survey: <https://aka.ms/cppcon/vscode>



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@AlexandraKemperMS  
@Sinem\_\_Akinci



[visualcpp@microsoft.com](mailto:visualcpp@microsoft.com)

