

VSCode Configuration and Tips for Flang Development

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January 4, 2023

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Overview

VSCode Configuration

Stepping Through Code

Case Study

Preliminary Stuff

- You can find my slides [here](#)
- You can find my configuration files [here](#)

Current Topic

VSCode Configuration

VSCode Extensions

Configuration Files

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 VSCode Extensions

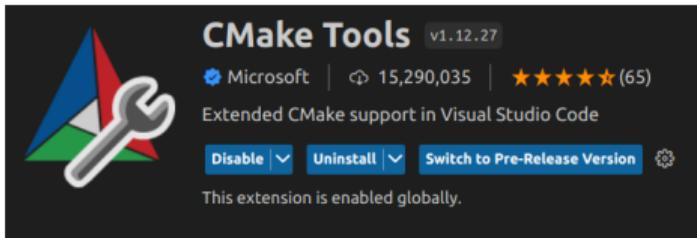
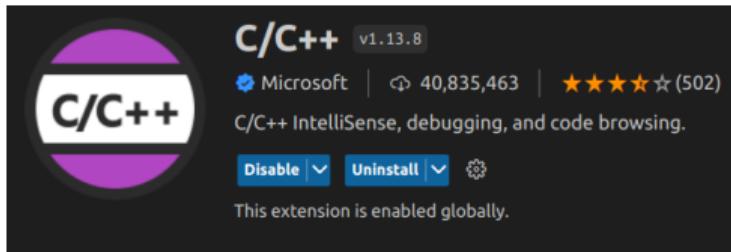
 Configuration Files

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Extensions to Download

- C/C++
- CMake



Current Topic

VSCode Configuration

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Configuration Files

CMakePresets.json and CMakeUserPresets.json

settings.json

launch.json

tasks.json

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CMakePresets.json and **CMakeUserPresets.json**

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 - Specifically, in the Flang project, the `CMakePresets.json` config can contain the [default build configuration from the Flang README.md](#), and the `CMakePresets.json` can contain your personal system-specific details for building on your machine

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 - Specifically, in the Flang project, the `CMakePresets.json` config can contain the `default build configuration from the Flang README.md`, and the `CMakePresets.json` can contain your personal system-specific details for building on your machine

Use these config files over `cmake-kits.json` and `cmake-variants.json`

It's cross-platform; you can share your `CMakePresets.json` and `CMakeUserPresets.json` files with someone who does not use VSCode as their IDE, since the presets files are a 'CMake' feature and not a VSCode feature. Also, `this is now the recommended method from Microsoft developers.`

CMakePresets.json Example

```
1  {
2      "version": 5,
3      "cmakeMinimumRequired": {
4          "major": 3,
5          "minor": 23,
6          "patch": 0
7      },
8      "include": [],
9      "configurePresets": [
10         {
11             "name": "Flang Default Configure",
12             "displayName": "Flang Default Configure",
13             "description": "Flang Default configure recipe given from Flang docs",
14             "generator": "Ninja",
15             "binaryDir": "${sourceDir}../build_flang_default",
16             "cacheVariables": [
17                 "CMAKE_INSTALL_PREFIX": "${sourceDir}../install_flang_default",
18                 "CMAKE_CXX_STANDARD": "17",
19                 "CMAKE_BUILD_TYPE": "Release",
20                 "CMAKE_EXPORT_COMPILE_COMMANDS": "ON",
21                 "CMAKE_CXX_LINK_FLAGS": "-Wl,-rpath,$LD_LIBRARY_PATH",
22                 "FLANG_ENABLE_WERROR": "ON",
23                 "LLVM_ENABLE_ASSERTIONS": "ON",
24                 "LLVM_TARGETS_TO_BUILD": "host",
25                 "LLVM_LIT_ARGS": "-v",
26                 "LLVM_ENABLE_PROJECTS": "clang;mlir;flang;openmp",
27                 "LLVM_ENABLE_RUNTIMES": "compiler-rt"
28             ]
29         }
30     ],
31     "buildPresets": [ ... ],
32     "testPresets": [ ... ],
33 }
34 }
```

CMakeUserPresets.json Example

```
lvm > {} CMakeUserPresets.json > [] testPresets
1  {
2    "version": 5,
3    "cmakeMinimumRequired": {
4      "major": 3,
5      "minor": 23,
6      "patch": 0
7    },
8    "include": [
9    ],
10   "configurePresets": [
11     {
12       "name": "default_local_relwithdebuginfo_with_gcc",
13       "inherits": [
14         "Flang Default Configure"
15       ],
16       "binaryDir": "${sourceDir}/../build_relwithdebuginfo_gcc",
17       "displayName": "local Default relwithdebuginfo Config with gcc",
18       "description": "local Default relwithdebuginfo build using Ninja generator",
19       "environment": [
20       ],
21       "cacheVariables": {
22         "CMAKE_C_COMPILER": "gcc",
23         "CMAKE_CXX_COMPILER": "g++",
24         "CMAKE_BUILD_TYPE": "RelWithDebInfo"
25       }
26     }
27   ],
28   "buildPresets": [
```

```
67   "buildPresets": [
68     {
69       "name": "build_from_user_presets_gcc_relwithdebuginfo",
70       "configurePreset": "default_local_relwithdebuginfo_with_gcc",
71       "displayName": "Build from user presets gcc relwithdebuginfo",
72       "description": "local Default build using Ninja generator",
73       "jobs": 128
74     }
75   ],
76   "testPresets": [
77   ]
78 ]
```

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- You can't step through auto-generated .inc files unless you make this association
- Example settings.json file:

```
.vscode > {} settings.json > ...
1  {
2    "files.associations": {
3      "*.inc": "cpp",
4      "*.tcc": "cpp",
5      "string": "cpp",
6      "regex": "cpp"
7    },
8    "cmake.sourceDirectory": "${workspaceFolder}/llvm",
9    "cmake.parallelJobs": 16,
10   "git.ignoreLimitWarning": true,
11 }
```

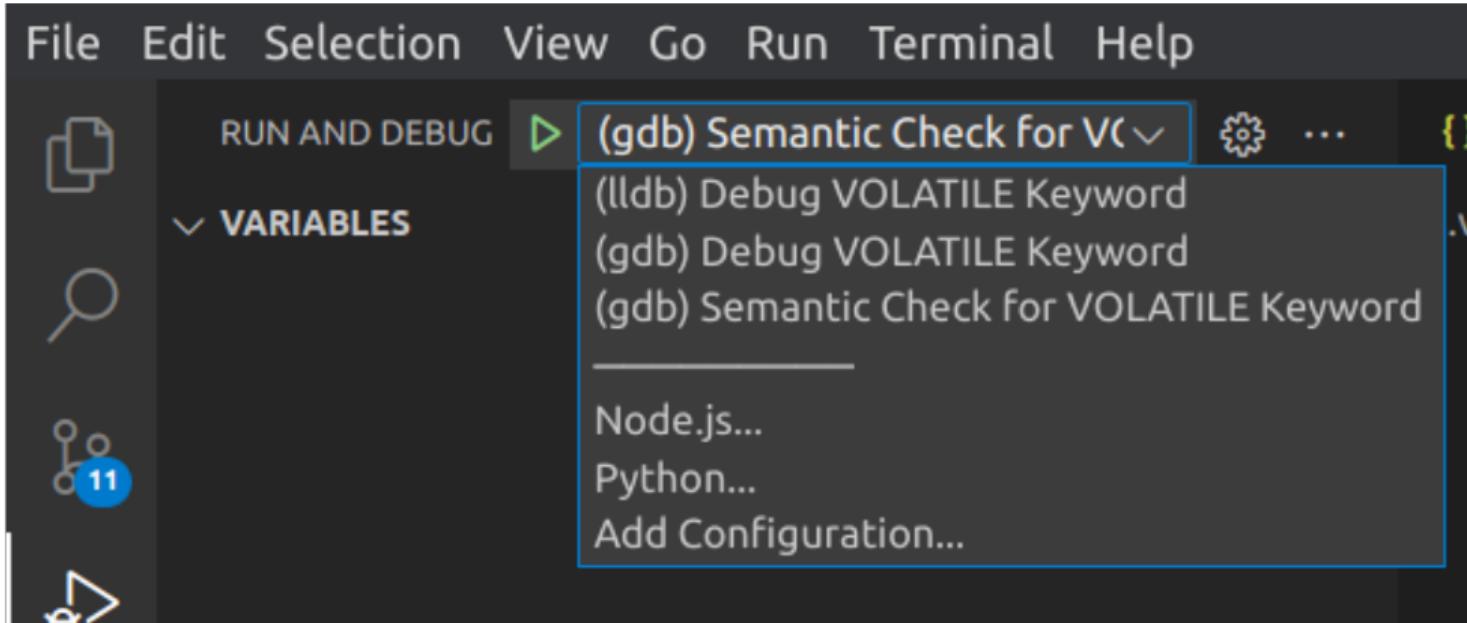
launch.json

A `launch.json` file is used to configure the `debugger` in VSCode

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- This is useful for quickly selecting between debugging tasks



launch.json

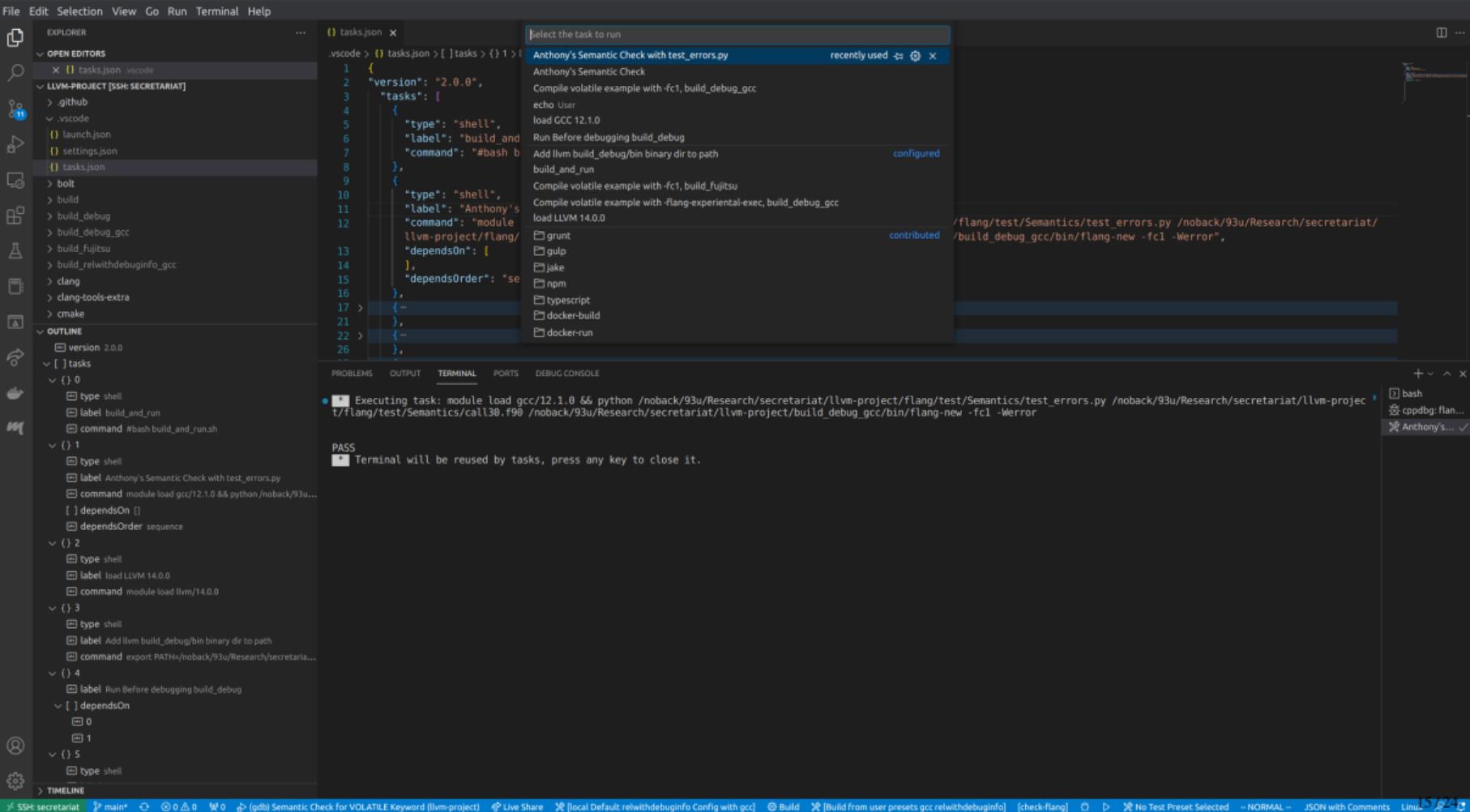
tasks.json

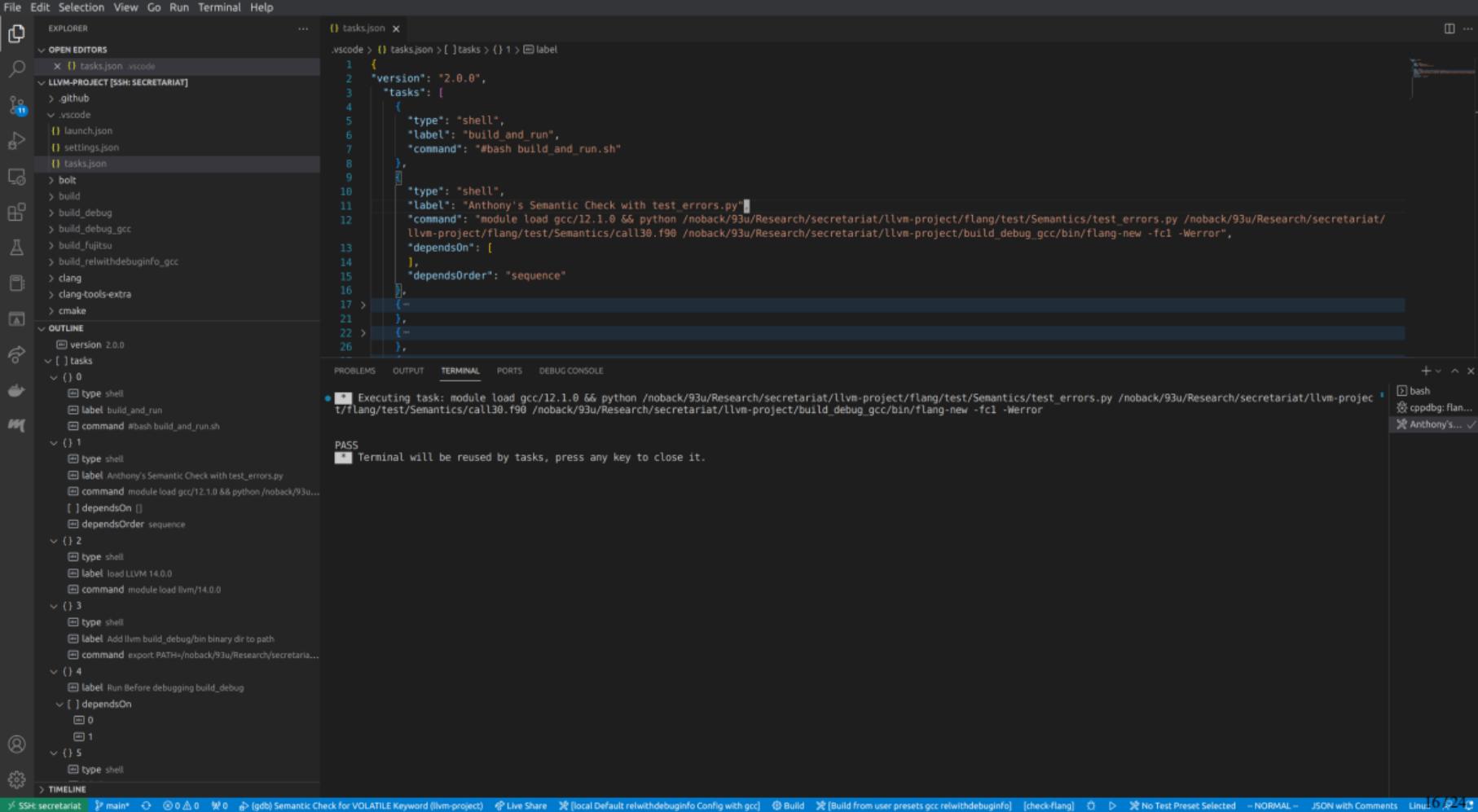
This config file allows you to create tasks with external tools, e.g., through shell commands, that are easily navigatable and can be executed within the VSCode environment

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- For example, this is helpful for *quickly* compiling a given test to check if LLVMFlang behaved as expected or not





Current Topic

VSCode Configuration

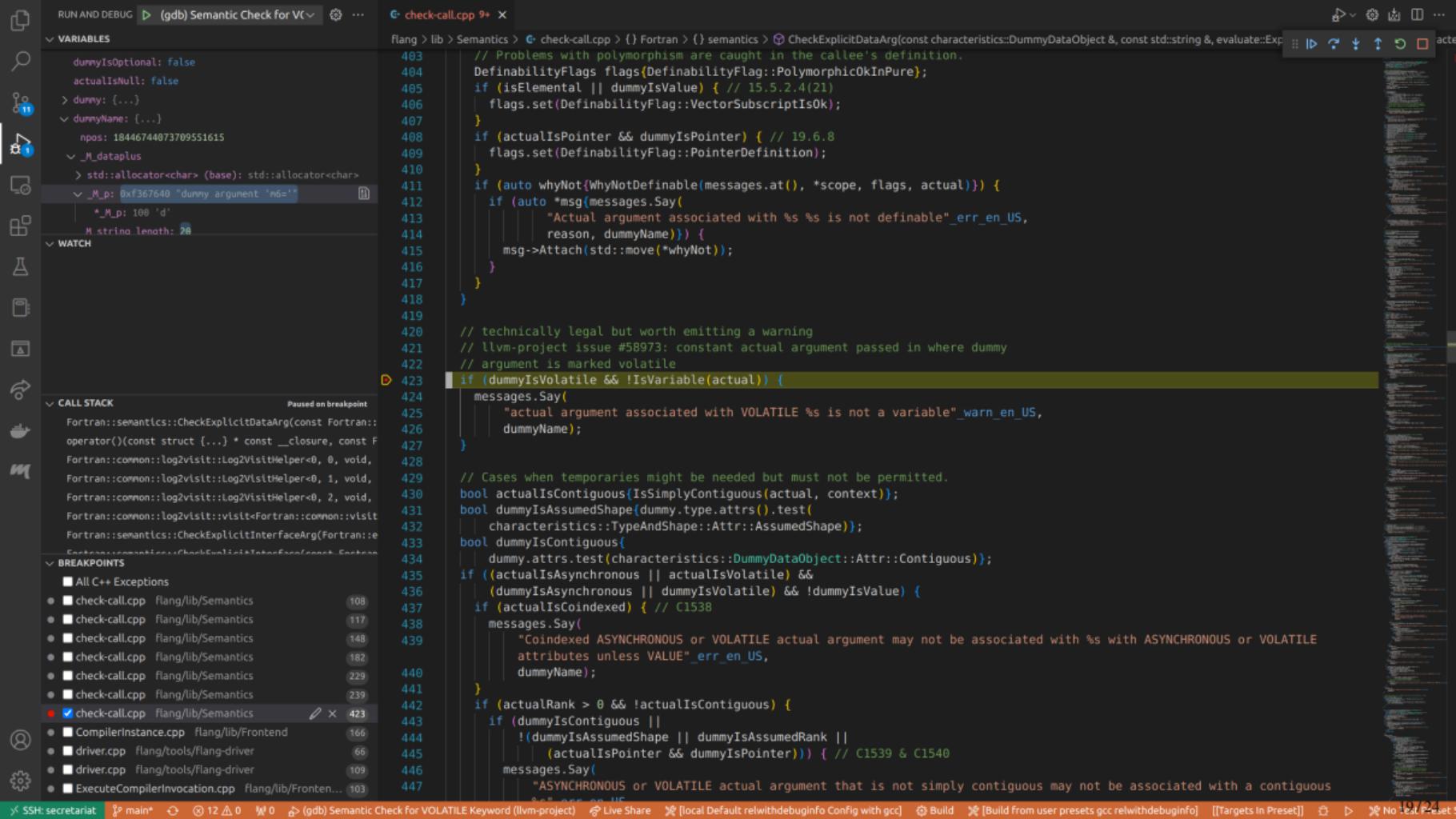
Stepping Through Code

Case Study

Using GDB to Step Through Code

Though it's somewhat slow to step through LLVM using a debugger, the tradeoff is that you can *interactively* see what the code is doing. This is particularly useful when you're still learning the codebase (like me!)

- You can examine the state of all variables
- You can jump through all currently active call stacks
- You can easily see where certain routines/variables are defined



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llvm-project issue 58973

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- Here is an issue that is raising an error when a warning is more appropriate
 - A little more specifically, an attribute of a dummy argument does not correspond to the actual argument being passed
- Besides knowing that I want to step through the code using gdb, I have no idea where to start, so I of course ask the Flang community for help
- After a tip, I find that `flang/lib/Semantics/check-call.cpp` might be where the fix should be applied
- Before going further, I start configuring VSCode + CMake
 - I set up `CMakeUserPresets.json` with the default Flang configuration, and set up `CMakeUserUserPresets.json` with details specific to my system as well as setting the `RelWithDebInfo` build option

llvm-project issue 58973 (cont.)

- I visually scan the `flang/lib/Semantics/check-call.cpp` and start setting breakpoints in places where I think might be useful
- I start implementing what I think the fix should be
- Once I have something I think works, it's time to build LLVM using the CMake extension integrated into our VSCode environment
- At this point, I can start editing the `launch.json` and `tasks.json` config files
 - The commands in `launch.json` and `tasks.json` will essentially be the same except `launch.json` contains config information for the debugger, and the `tasks.json` file will configure shell command that allows for a quick check for whether we see what we expect or not
- Once I'm happy with what I have so far, I start [soliciting reviews on Phabricator](#)
- After an iterative process, the fix was deemed acceptable but contingent on writing some tests in the `flang/test` directory

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