VSCode Guide

1 What is VSCode

VSCode (Visual Studio Code) is a modern editor designed to write code quickly and efficiently. Beside standard syntax highlighting, it suggests auto-completions for variable and function names, it typechecks your code as you write it, and it lets you see the prototype and documentation of functions you are calling. It also allows you to write code on your own computer while saving it to your account on a `unix.andrew.cmu.edu` computer.

2 Setting up VSCode on `unix.andrew.cmu.edu` Computers

This will be done automatically as part of your very first 15-122 lab.

3 Setting up VSCode on your Own Computer

You can edit your 15-122 programming assignments (or any other 15-122 code) on your own computer and have them saved on `unix.andrew.cmu.edu`. Doing so requires a few steps outlined below:

- Download VSCode itself (see Downloading VSCode)
- Install the SFTP extension (see Setting Up the SFTP Extension)
- Install the C0 Extension (see Setting up the C0 Extension)

Once you have done that, you are ready to use VSCode!

3.1 Downloading VSCode

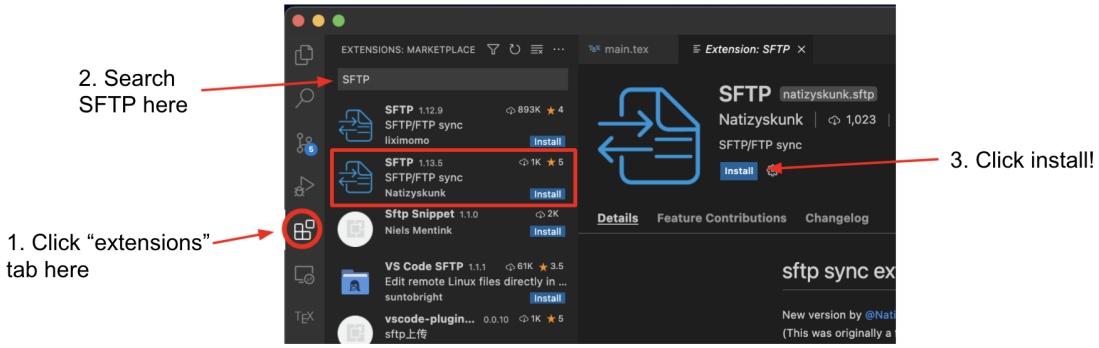
The first step to setting up VSCode locally for 15-122 is downloading VSCode. This is done from https://code.visualstudio.com/download.

3.2 Setting Up the SFTP Extension

SFTP stands for Secure File Transfer Protocol, allowing you to edit your files on your local computer, then sync them to AFS once you save. Instead of having to maintain a continuous connection to the CMU Unix servers, your computer will only connect to a `unix.andrew.cmu.edu` computer when you need to upload changes.

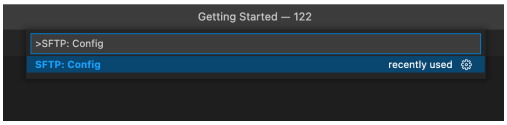
Note: There are other extensions provided by VSCode, such as the SSH and an older liximomo SFTP extension. As of writing this guide, the Natizyskunk SFTP extension is the most reliable extension when working with AFS, and will be the one we describe below.

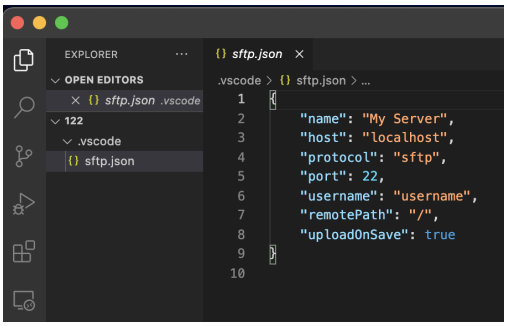
Start by installing the SFTP extension from the extensions manager. To do this, click on the "Extensions" tab on the left sidebar and then search for "SFTP". Look for the one provided by Natizyskunk. Install it by clicking on the blue install button.



Note: If you have the SFTP extension by liximomo installed, you will need to uninstall it for Natizyskunk's version to work.

Next, create a 15-122 folder somewhere on your computer, and open it in VSCode using "File → Open". You can then use `Ctrl + Shift + P` (Windows) or `Cmd + Shift + P` (Mac) to open the **Command Palette**. Type in "SFTP: Config" and press `Enter` - this should create a file called "sftp.json".





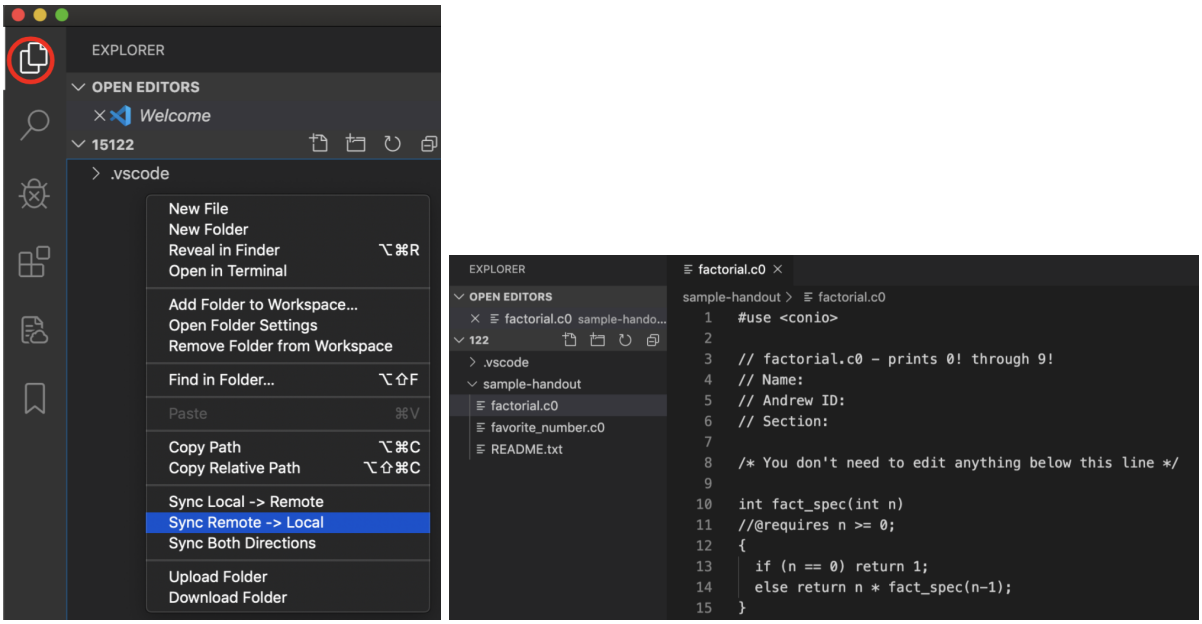
Replace the text in the config file with the following:

```
{
  "name": "15122",
  "host": "unix.andrew.cmu.edu",
  "protocol": "sftp",
  "port": 22,
  "username": "replace this with your andrew id in lower case",
  "remotePath": "private/15122",
  "uploadOnSave": true,
  "downloadOnOpen": true,
  "ignore": [
      ".vscode",
      ".git",
      ".DS_Store",
      "admin"
  ]
}
```

Don't forget to save this file.

Note: If you made your 15122 folder elsewhere in AFS, you'll need to replace "private/15122" with the path to your 15122 folder.

Now, we can do our first sync! To access your files, right-click in an empty space on the Explorer sidebar and click "Sync Remote → Local". You should get a prompt for your password; after entering that, you should see your 122 files!



You should do this every time you add new files to the AFS folder (i.e. copying over labs or downloading starter code from Autolab). If you add new files on your local machine, run "Sync Local → Remote" to add them to AFS. Saving edited files should automatically propagate the changes onto AFS.

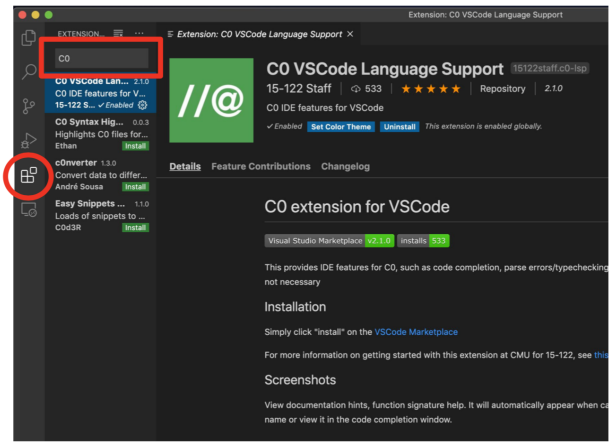
Note: If you get an error about authentication, double-check your username in `sftp.json` and your password.

3.3 Setting up the C0 Extension

Without syntax highlighting, the code you're working with looks pretty bare. Luckily, the 122 staff have prepared a C0 extension for you! Head back to the extensions tab and search up "C0 VSCode Language Support". Once again, install it by clicking on the blue install button.

Important: Do **NOT** install "C0 Syntax Highlighter"! This will interfere with our extension.

Note: Be careful that any extensions you install remotely while using the ssh extension will take up your AFS storage! If you're close to full on AFS, refer to the troubleshooting steps below for alternatives.



Once you click install, you will be prompted to choose a color theme. We currently have c0-light and c0-dark available for you (which are, respectively, a light and dark theme). We recommend choosing the one that matches your editor (e.g. if you have a dark theme editor, you should choose `c0-dark`, whereas if you have a light theme editor, you should choose `c0-light`). You are now done!

If you're following the setup lab, continue by editing the files `factorial.c0` and `favorite_number.c0` as described in the handout. You can save your changes with `Ctrl+S` or `Cmd+S`. Once you've finished the edits with both files, you can move on to the section "Running a C0 Program".

4 Troubleshooting

4.1 First Steps

If your SFTP extension is struggling to connect, try the following:

1. Restarting VSCode
2. Reinstalling the SFTP extension
3. Checking your Internet connection stability

4.2 Changing Unix Servers

If the above steps don't fix the issue, try ssh-ing through other means (Terminal, MobaXTerm). If the issue persists here, it likely means there's a larger problem with the unix servers. Often, this can be bypassed by ssh-ing in through a different unix server:

```
ssh [ANDREW_ID]@unix1.andrew.cmu.edu
ssh [ANDREW_ID]@unix2.andrew.cmu.edu
...
```

If one of these servers works out, you can change the SFTP host in the "sftp.json" file to the server that works out. If you are still encountering issues, please contact Computing Services.

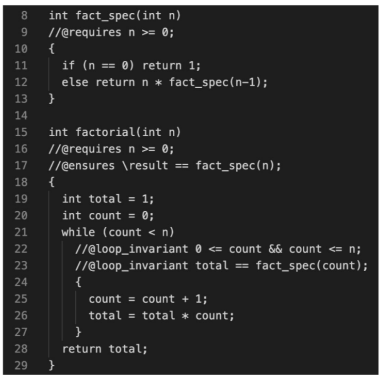
4.3 Syncing Errors

If your SFTP extension is showing syncing errors, first ssh into AFS through other means and check that your most recent progress is there. Try making a change on your local file, and see if the progress is reflected in AFS. If it seems to be working correctly, you can ignore the errors and keep working.

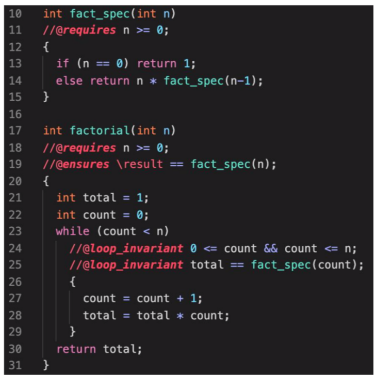
If your progress doesn't seem to be saved, you can try creating a new folder on your local computer and re-following the steps above.

5 Using VSCode to Edit C0 Programs

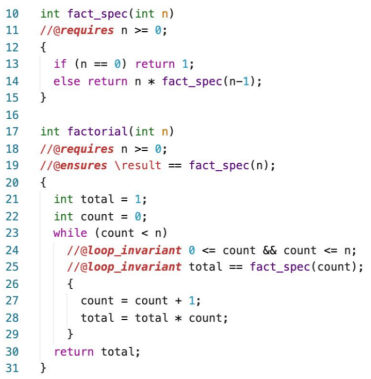
Syntax Highlighting and Color Themes. The easiest way to see change is the syntax highlighting. The color themes we provide are customized to fit C0-specific syntax, though you're free to use other colors themes to suit your preferences! You can also edit themes in the file `settings.json`.



Without extension



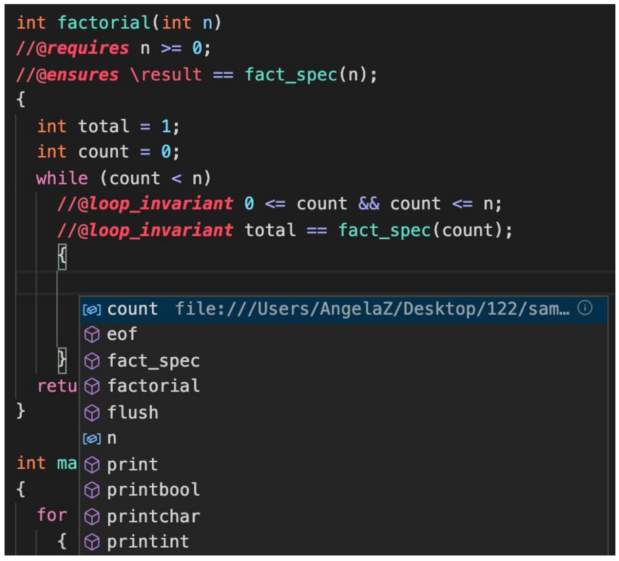
c0-dark theme



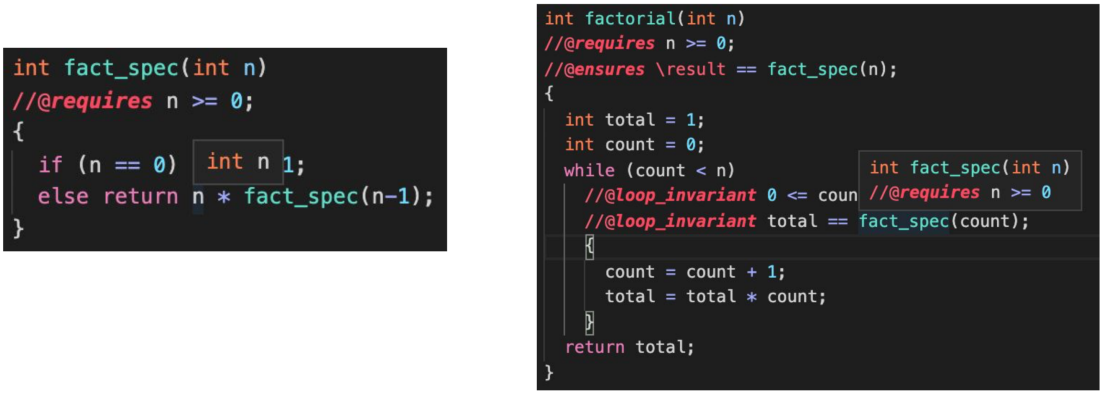
c0-light theme

Auto-Completion. When typing code, you'll get generated auto-completion suggestions. These have been customized with c0 library functions and user defined functions and variables!

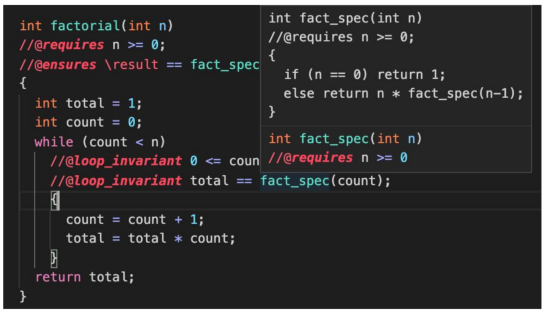
Pressing `Ctrl + Space` will give you a list of suggested variables and functions currently in scope



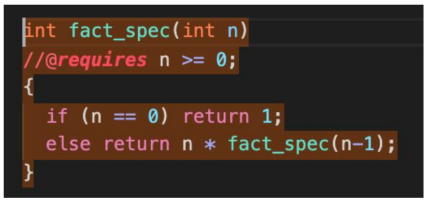
Hovering. Hovering over a function name gives you its function specification, and hovering over variables give you their type!



Go-To. You can also get more information on a function or variable by holding down `Ctrl` (Windows) or `Cmd` (Mac) as you hover. If you then click on it, you'll be taken to where that function/variable was declared!



Hovering with Cmd/Ctrl held down



Clicking takes you to fact_spec!

Signature Hints. Signature hints show you the names and types of a function, as well as the active parameter.