Creating Projects using Microsoft Visual Studio 2019

CTEC1332

Software Engineering Practices

2021 Fall

Version **1.2**: Covers Windows 10 PCs
Last updated: **2021.09.08**

Niagara College Canada
APPLIED DREAMS.
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Starting Visual Studio 2019

- Visual Studio is installed on PCs in **L117**. Otherwise, you have two options:

  1. Download and install **Visual Studio 2019 Community** edition:

     https://visualstudio.microsoft.com/downloads/

     This is the preferred option, because it installs Visual Studio on **your PC** (or Mac).

Starting Visual Studio 2019

- Two options:

2. Use **Apps Anywhere**:

   https://its.niagaracollege.ca/apps-anywhere-instructions/

   "Apps Anywhere is available as the preferred software option for all students and faculty with a Windows based computer. "

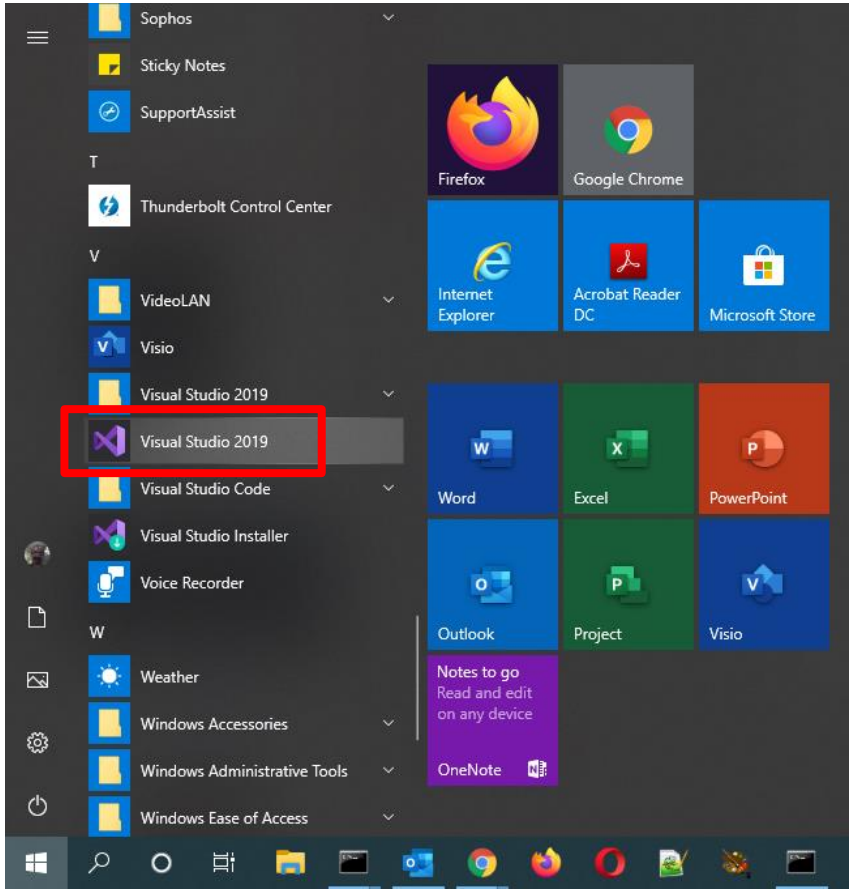
Starting Visual Studio 2019

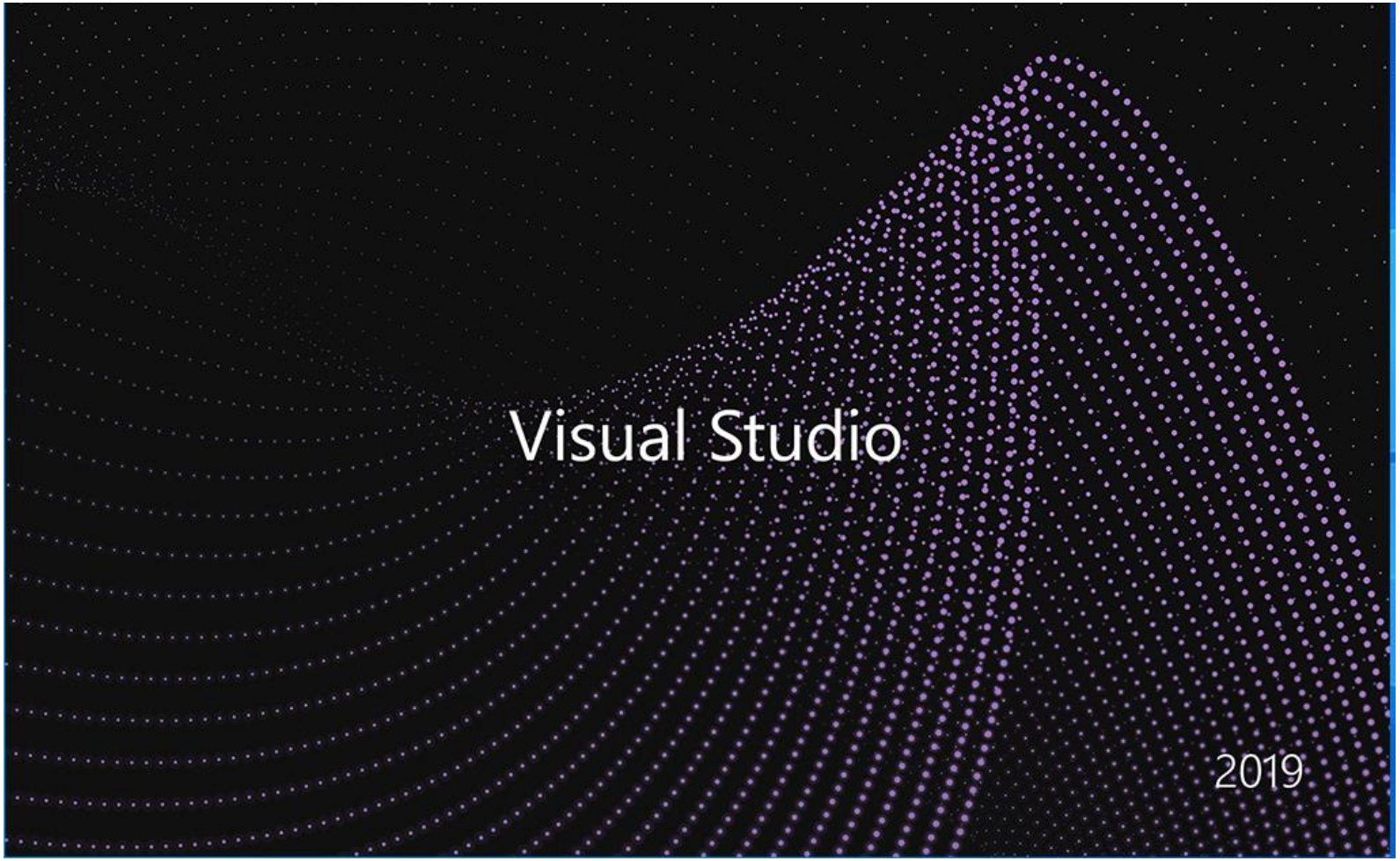
- The following slides refer to using a **native installation** of Visual Studio on a Windows 10 PC.

- See the Appendix for starting Visual Studio with Apps Anywhere.

Starting Visual Studio 2019

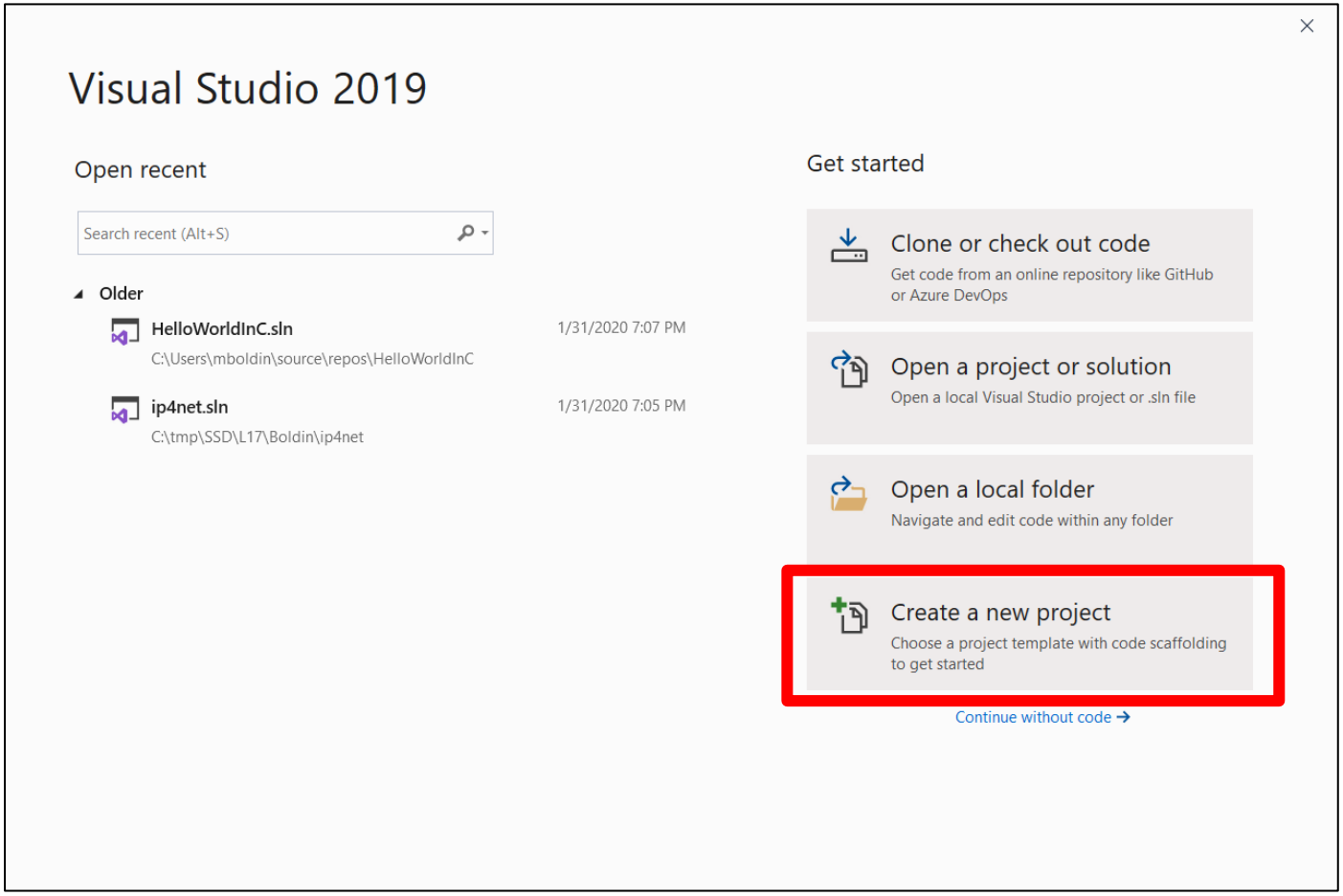
- From the Windows 10 Start Menu …





The “splash screen” is shown while Visual Studio loads … it may take several seconds.

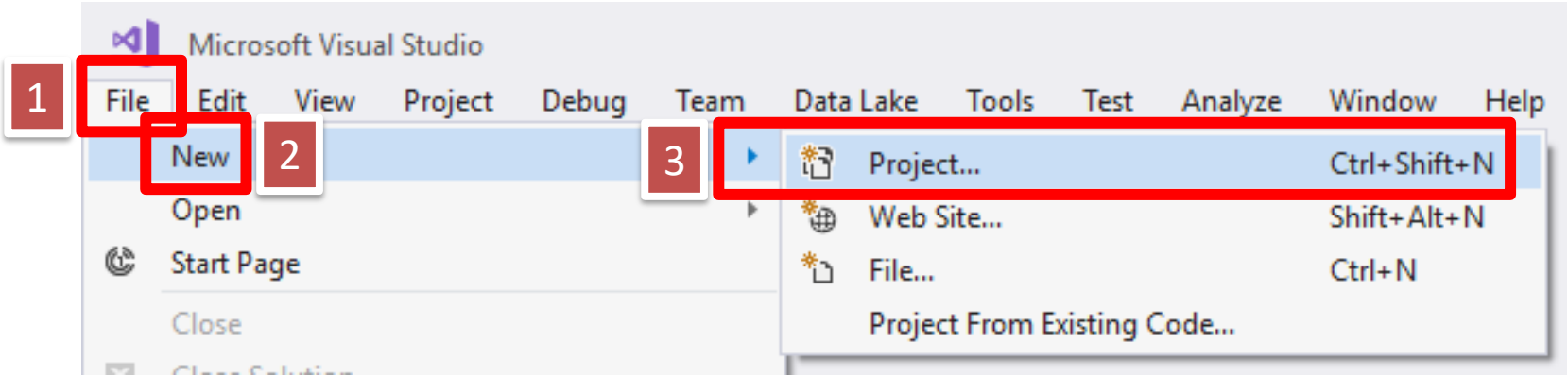
Visual Studio 2019



Note: You may see the “Dark” colour theme (the default.) It can be changed…

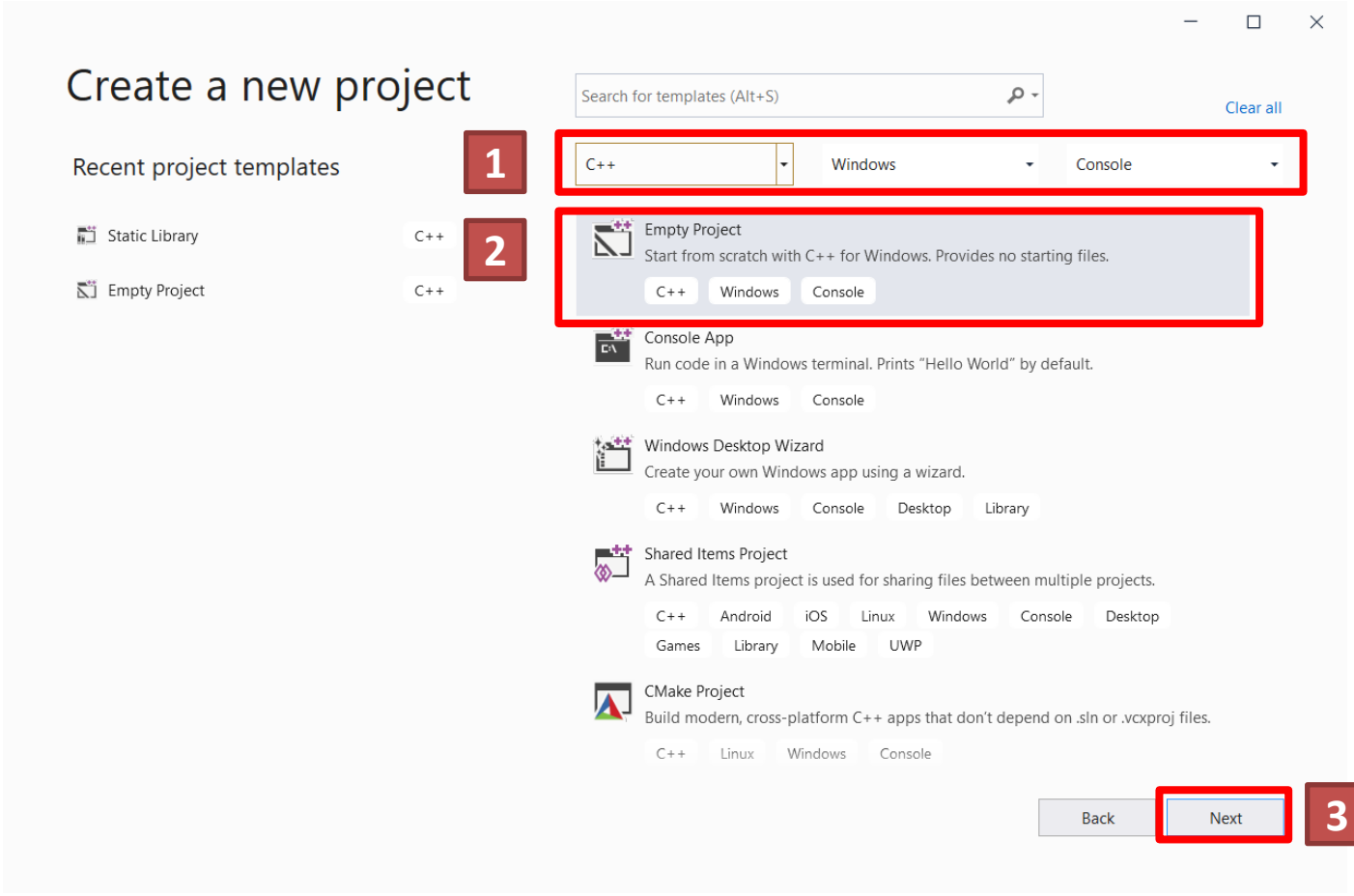
Create A New Project (Alternate Ways)

- From the **File** menu, select **New**, then **Project…**
- You can also press **Ctrl+Shift+N** instead



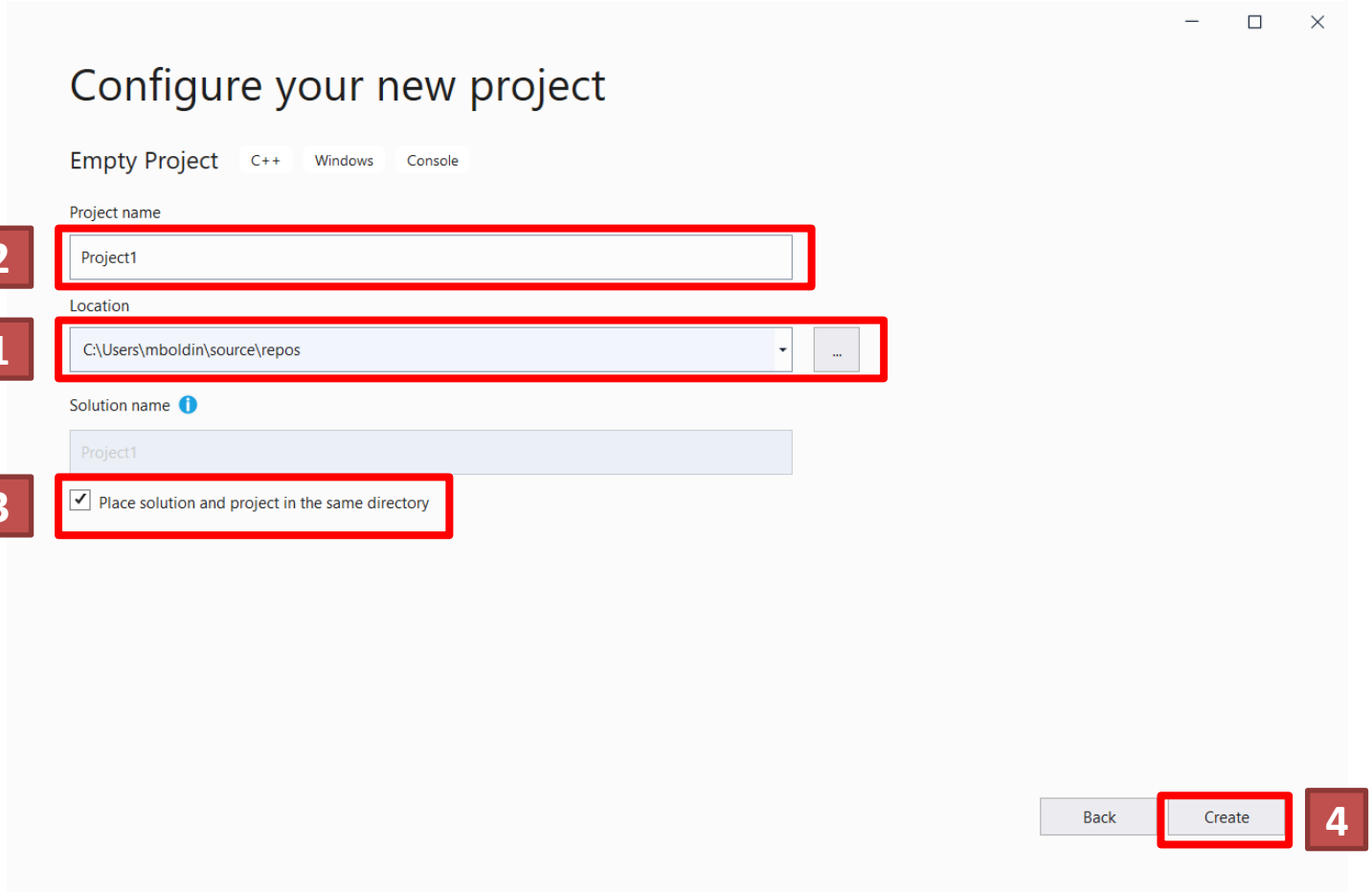
The “Create a new project” dialog box appears

For every program we do in this course, the Language is **C++**, the platform is **Windows**, the project type is **Console**, and the project template is **Empty**



The “Configure your new project” dialog box appears

Every program we do in this course will have **its own folder**. **You are responsible** for keeping track of your files!



Step 1. Choose the Project Location

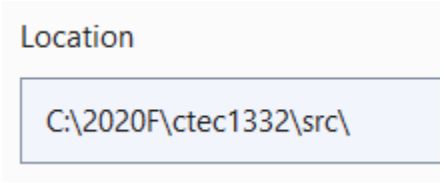
- Click on the “browse” button to pop up the “Project Location” dialog box. From here, choose or create a folder in which to store your project**s**.
- **Each project will have its own subfolder**.
- If you choose to save projects on drive **C:**, it will be faster, **BUT** you need to back up those folders!
- **I recommend the following** (in order of preference)**:**
  1. Your own USB hard drive or SSD (fast);
  2. Your “One Drive – NC” – if available (automatically copied to the Cloud);
  3. Your own USB flash drive (slowest option).

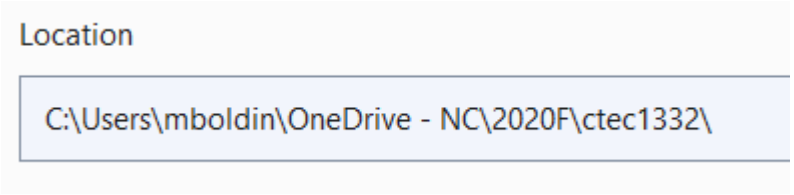
Step 1. Choose the Project Location

- If you are working in L117, choose the SSD (solid state drive) – **D:** or **E:**, depending on which Windows 10 installation you started.

- When you are finished, **make sure** that you:
  1. **Copy your files** to your own USB and/or your One Drive NC, so that you have a copy;
  2. **Delete your files** from the SSD, so that others cannot copy your work!

Step 1. Project Location Examples

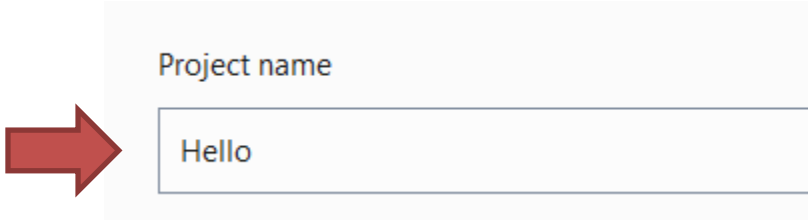




- In the example on the left, I have chosen **`C:\2020F\ctec1332\src`** as the main folder for all my Visual Studio projects.

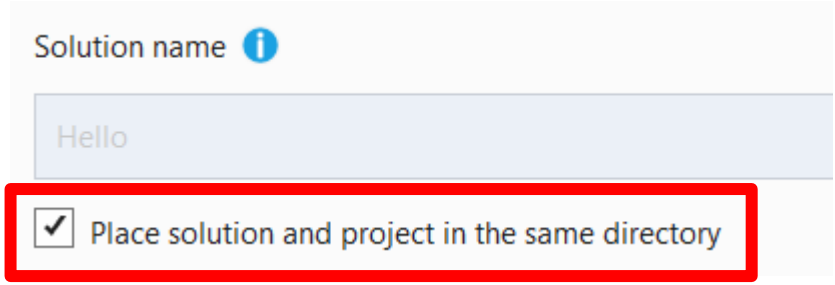
- In the example on the right, I have chosen my **OneDrive**, and created a "`2020F`" folder, then a "`ctec1332`" subfolder, which will be the main folder for projects.

Step 2. Give the Project a Name



- The name will be used for both the project folder and the executable.
  - For example, for the C++ Console app above, the project folder will be `Hello` and the executable will be written to `Hello\bin\Debug\Hello.exe`

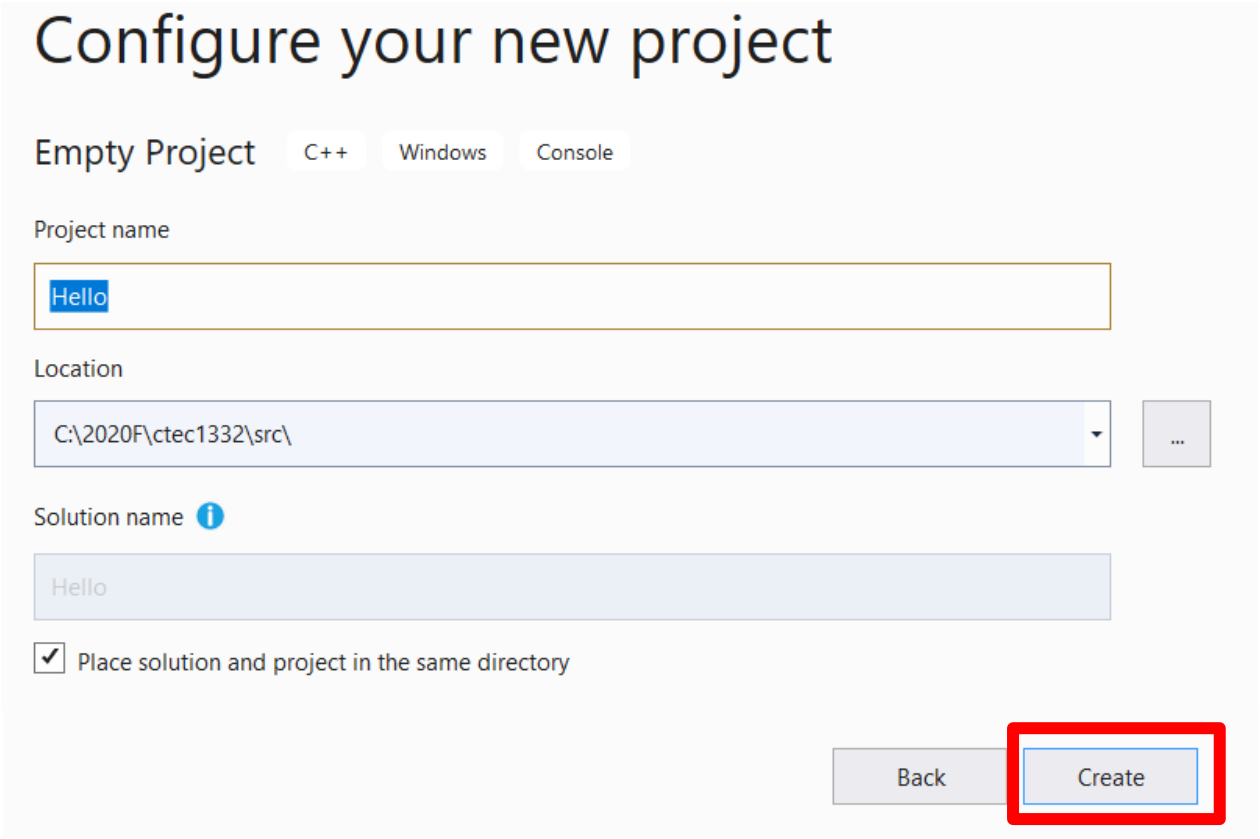
Step 3. One Directory Only



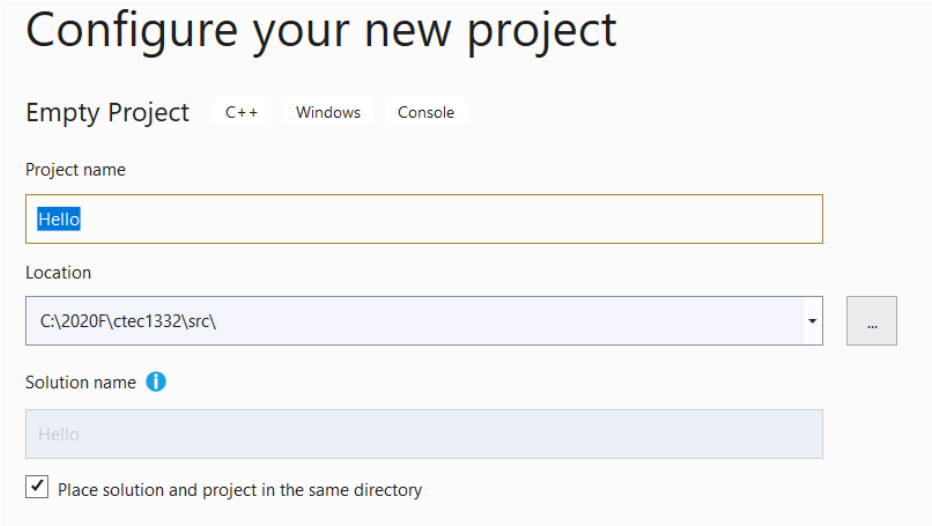
- Visual Studio allows you to create **multiple** Projects within a single Solution.

- In this course, we will have **exactly one** Project per Solution, so to simplify things, only one folder is needed.

Step 4. Create the Project

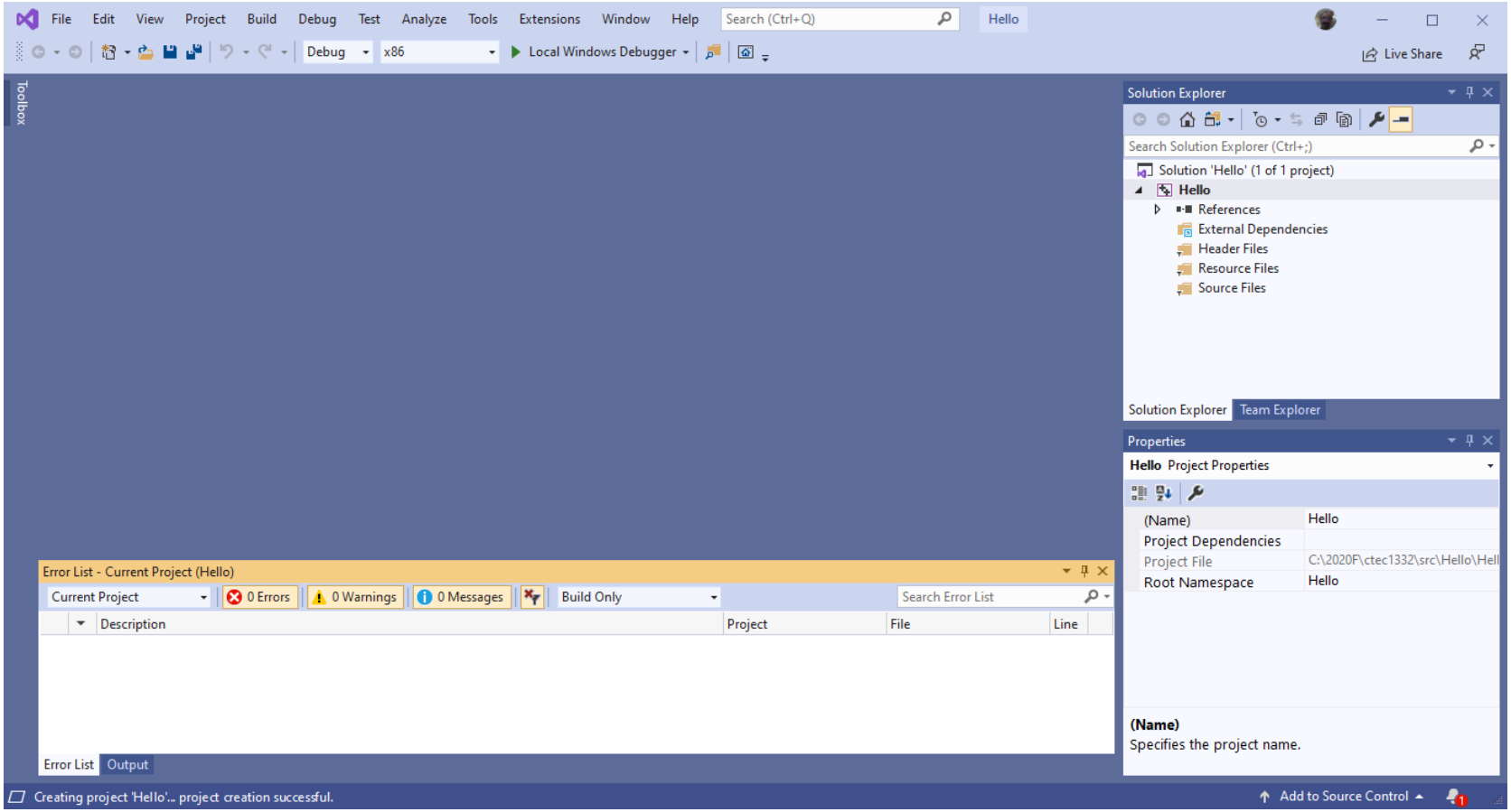


Step 4. Create the Project



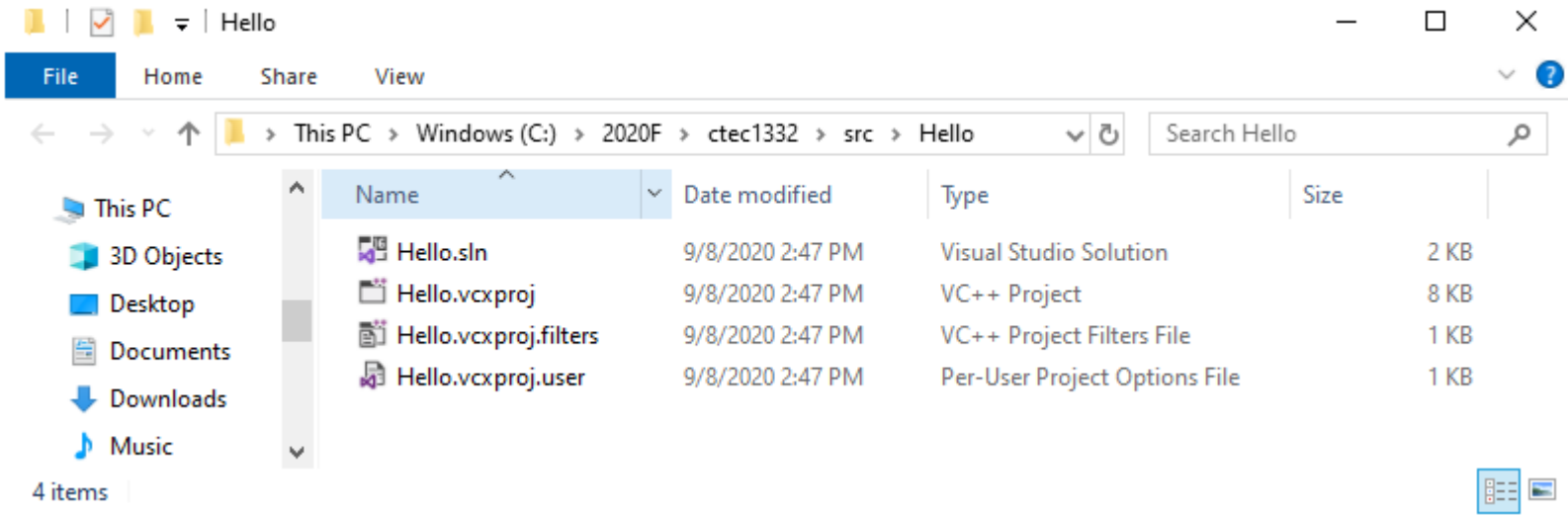
- For example, for the Empty C++ Windows Console app above, the project folder will be `C:\2020F\ctec1332\src\Hello` and the executable (Application) file will be `C:\2020F\ctec1332\src\Hello\Debug\Hello.exe`

New Project Created



Visual Studio creates an “Empty” project, meaning that you have to **add** a **source code** file.

Empty Project Folder



There are four files and one hidden directory.

Copy a source code (`.c`) file here, using either File Explorer or the Command Prompt.

A template `.c` file is always here:
http://technology.niagarac.on.ca/courses/ctec1332/template.c

Copy the Template File

I downloaded the `template.c` file to my **Project Location** folder (**`C:\2020F\ctec1332\src`**), so that it is always ready to be copied to a new project.

To **copy** the file, from a Command Prompt:

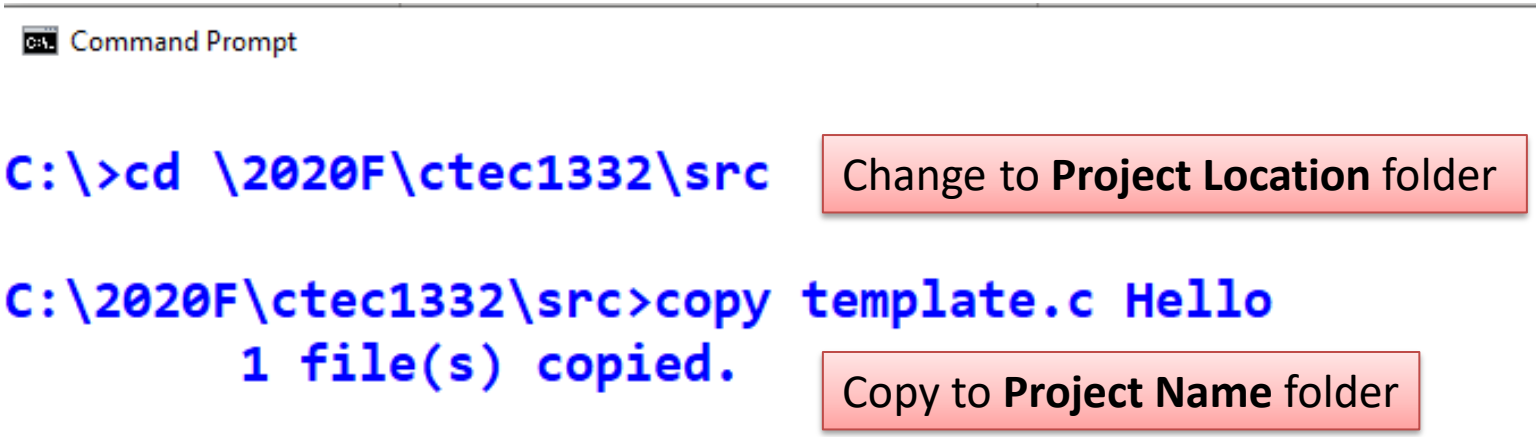
Command Prompt

```
C:\>cd \2020F\ctec1332\src

C:\2020F\ctec1332\src>copy template.c Hello
        1 file(s) copied.

C:\2020F\ctec1332\src>dir /a Hello
 Volume in drive C is Windows
 Volume Serial Number is C65F-C783

 Directory of C:\2020F\ctec1332\src\Hello

09/08/2020  03:02 PM    <DIR>          .
09/08/2020  03:02 PM    <DIR>          ..
09/08/2020  02:47 PM    <DIR>          .vs
09/08/2020  02:47 PM             1,430 Hello.sln
09/08/2020  02:47 PM             7,183 Hello.vcxproj
09/08/2020  02:47 PM               855 Hello.vcxproj.filters
09/08/2020  02:47 PM               168 Hello.vcxproj.user
09/08/2020  11:58 AM             1,610 template.c
               5 File(s)         11,246 bytes
               3 Dir(s)  697,810,239,488 bytes free
```

Copy the Template File

I downloaded the `template.c` file to my **Project Location** folder (**`C:\2020F\ctec1332\src`**), so that it is always ready to be copied to a new project.

To **copy** the file, from a Command Prompt:



After Copying

```
C:\2020F\ctec1332\src>dir /a Hello
 Volume in drive C is Windows
 Volume Serial Number is C65F-C783

 Directory of C:\2020F\ctec1332\src\Hello

09/08/2020  03:02 PM    <DIR>          .
09/08/2020  03:02 PM    <DIR>          ..
09/08/2020  02:47 PM    <DIR>          .vs
09/08/2020  02:47 PM             1,430 Hello.sln
09/08/2020  02:47 PM             7,183 Hello.vcxproj
09/08/2020  02:47 PM               855 Hello.vcxproj.filters
09/08/2020  02:47 PM               168 Hello.vcxproj.user
09/08/2020  11:58 AM             1,610 template.c
               5 File(s)         11,246 bytes
               3 Dir(s)  697,810,239,488 bytes free
```

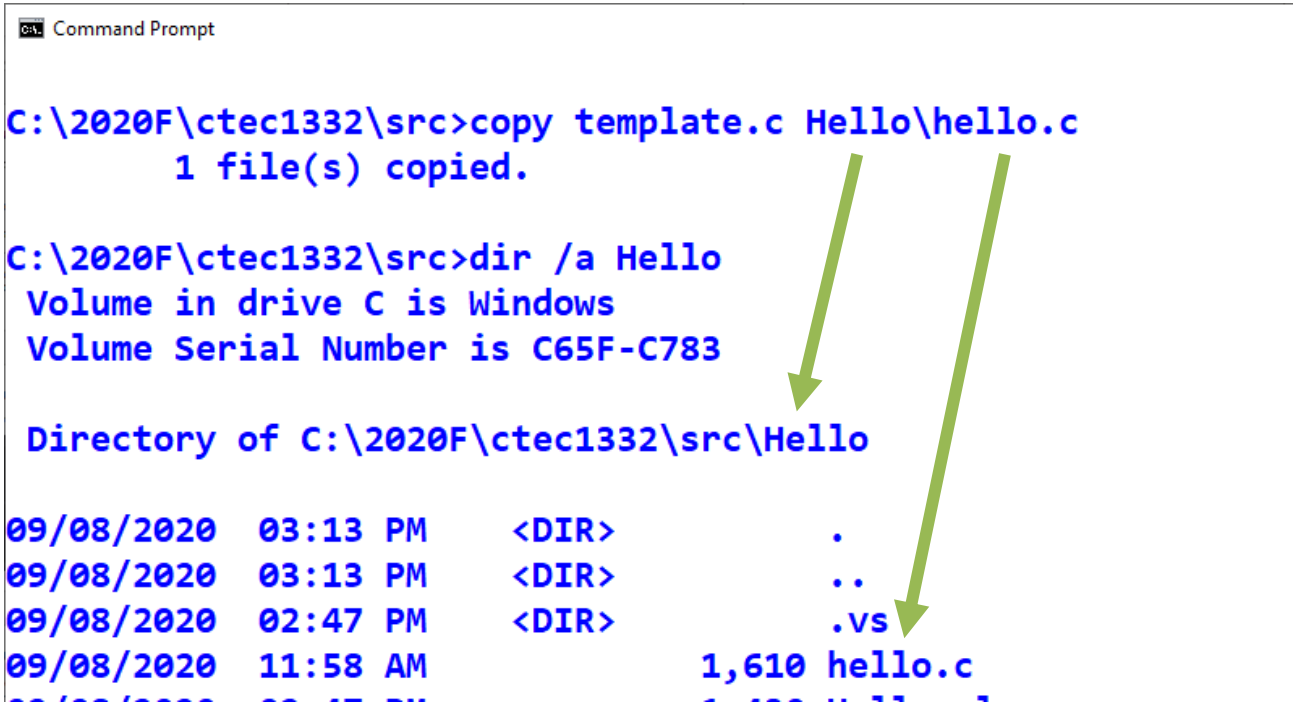
Hidden folder (DO NOT TOUCH)

VS2010 Project Files (D.N.T.)

Source file (CODE GOES HERE)

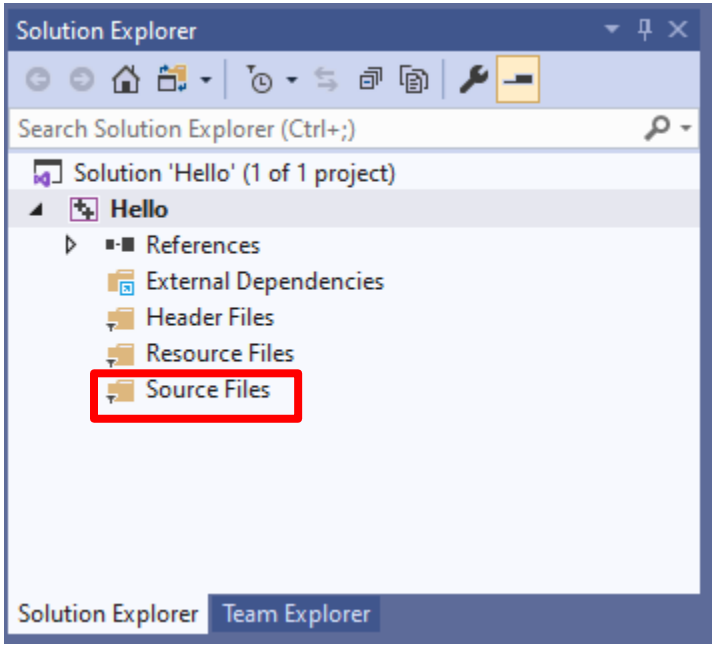
A Better Way:
Copy and Rename the Template File

To **copy and rename** the file (using a single command):

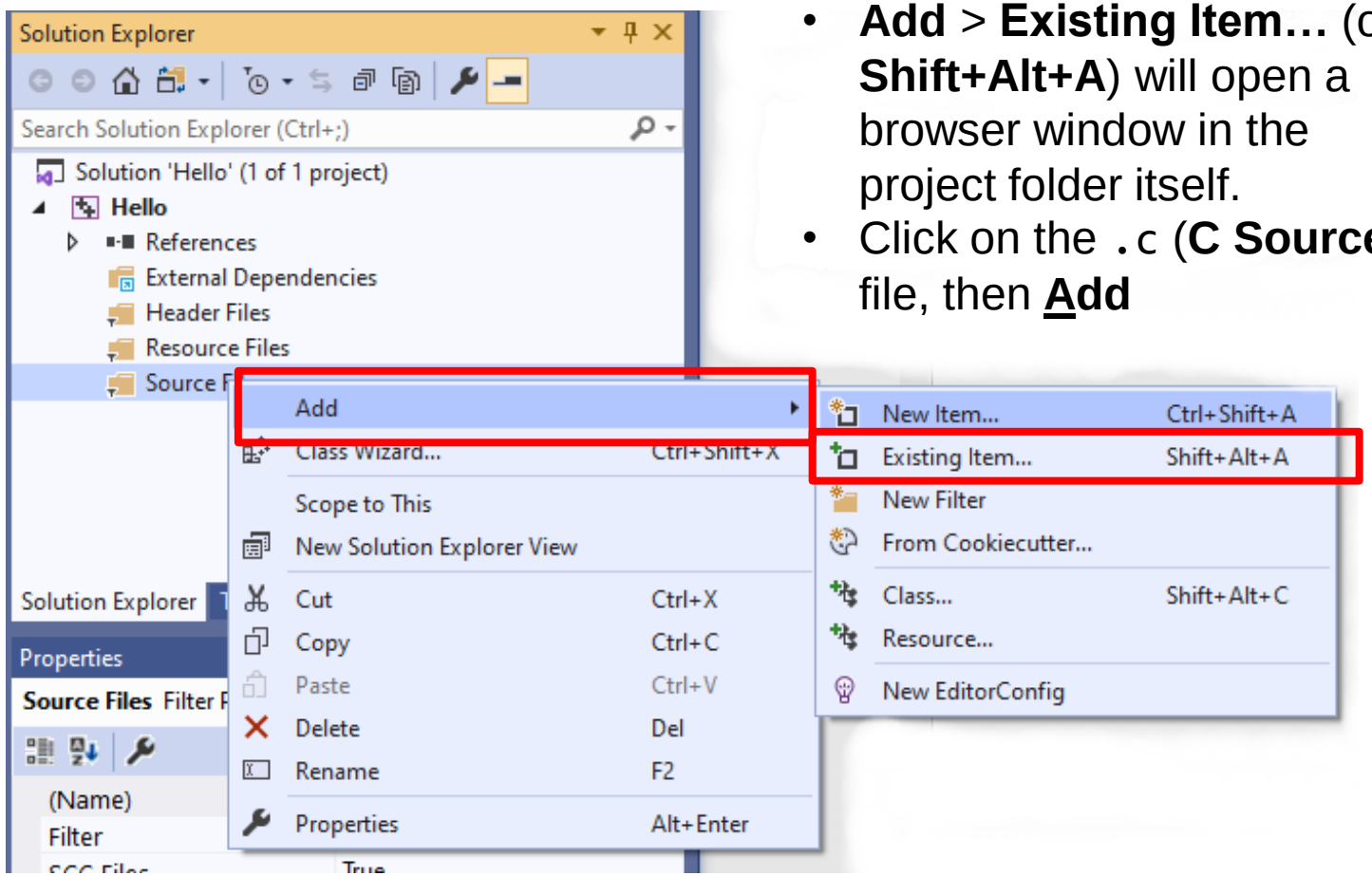


Add the Source Code file to the Project

- Visual Studio keeps track of your project contents in the **Solution Explorer** pane.
- In our Empty project, there are no Source Files.
- Right click on **Source files** to add your copied template file.



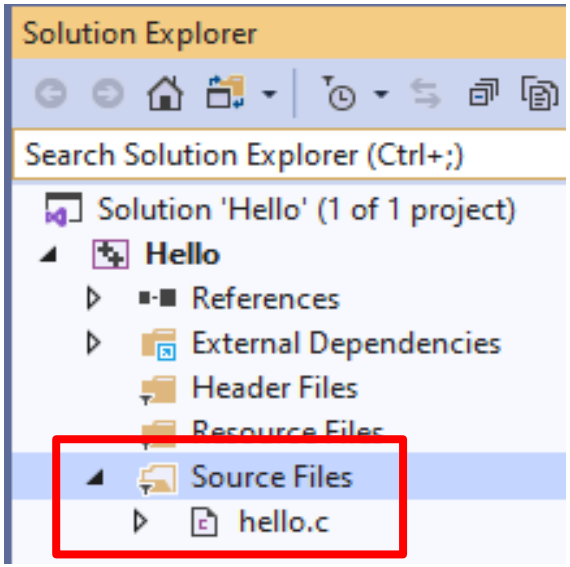
Add the Source Code file to the Project



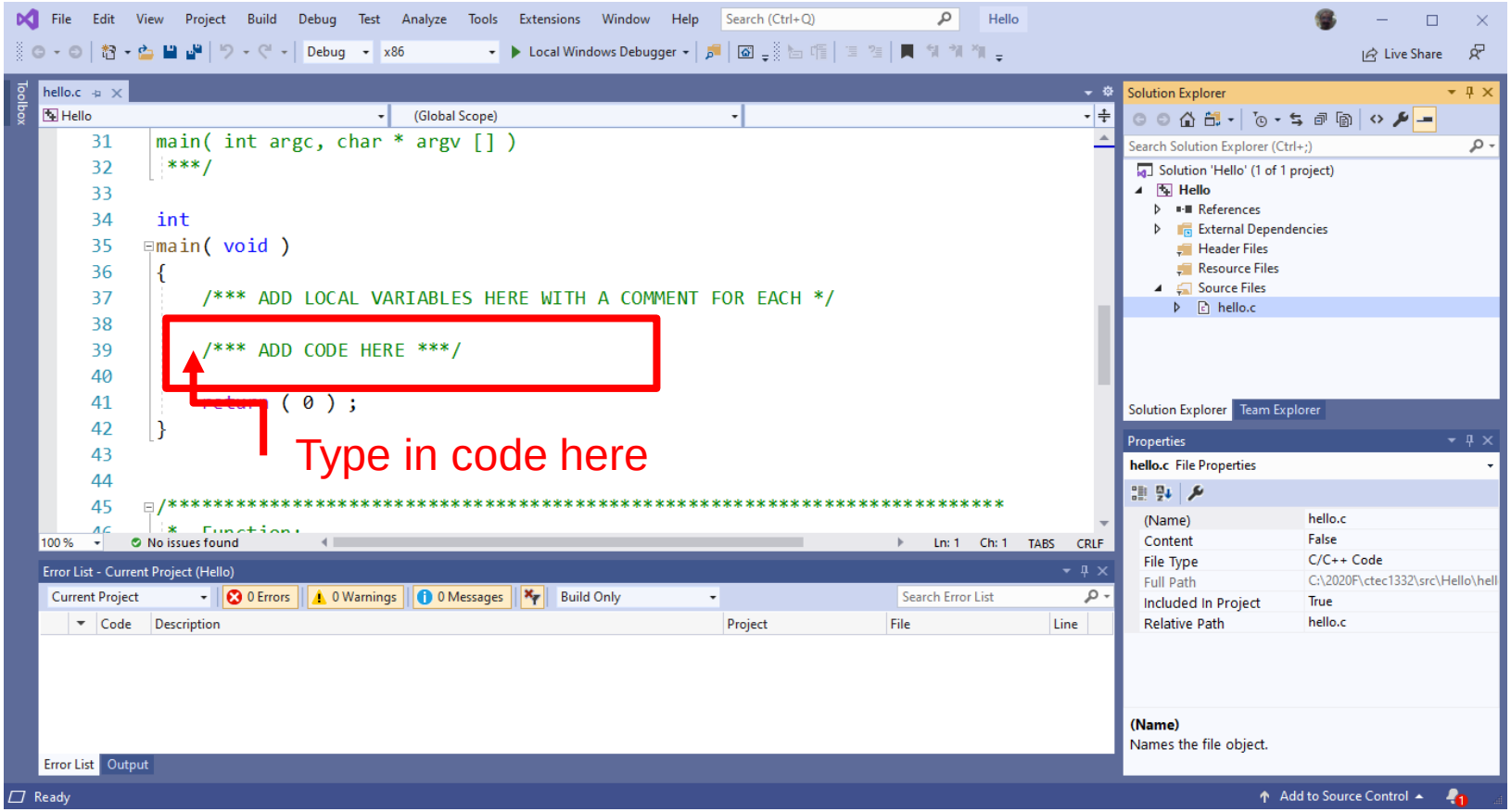
- **Add** > **Existing Item…** (or **Shift+Alt+A**) will open a browser window in the project folder itself.
- Click on the `.c` (**C Source**) file, then **Add**

C Source File Added

- Double click on the **.c** file (here it is called "`hello.c`") to open it in the **Editor** pane.
- This can be done if you re-open the project at a later date and want to edit the code.

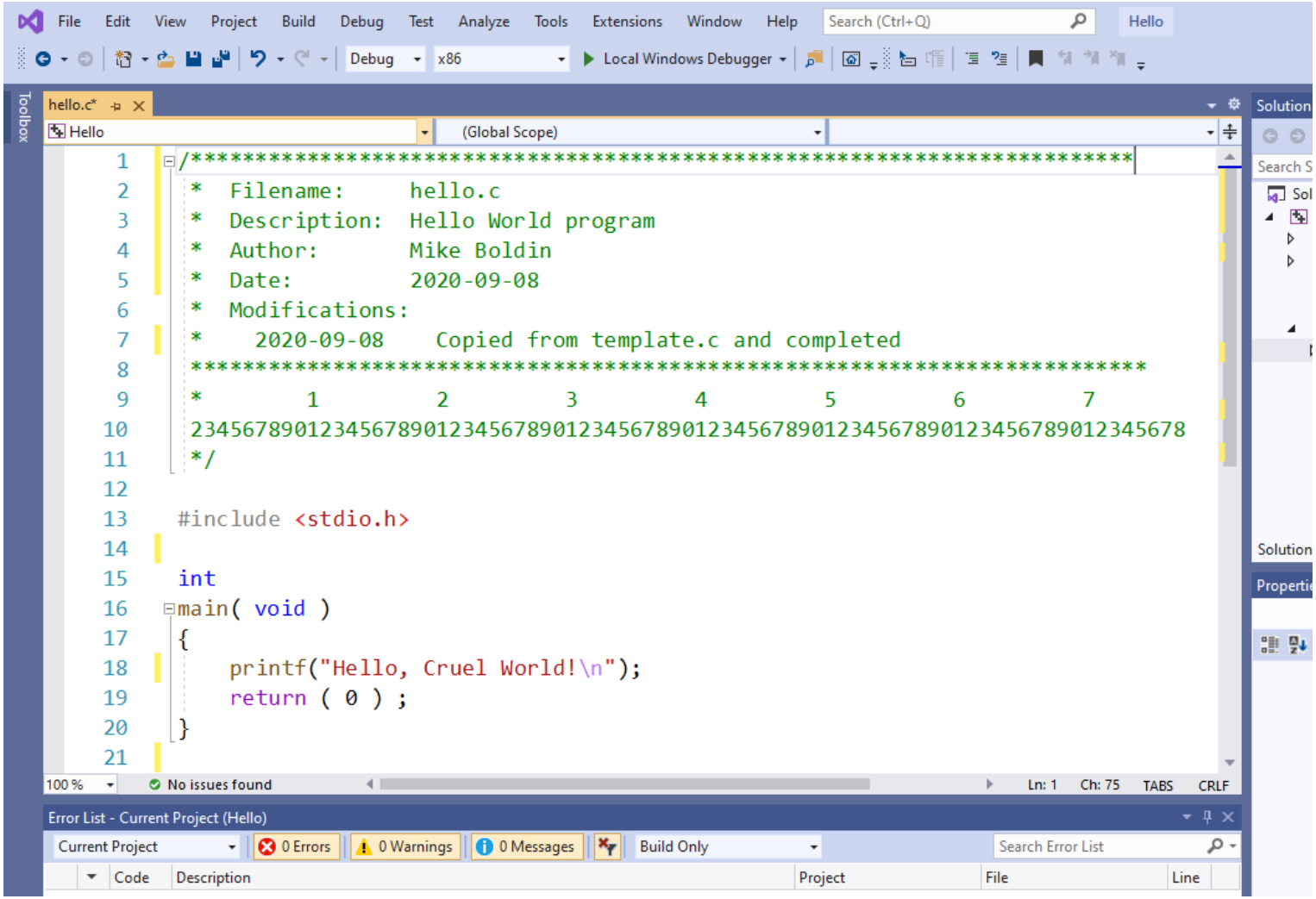


Start Coding!

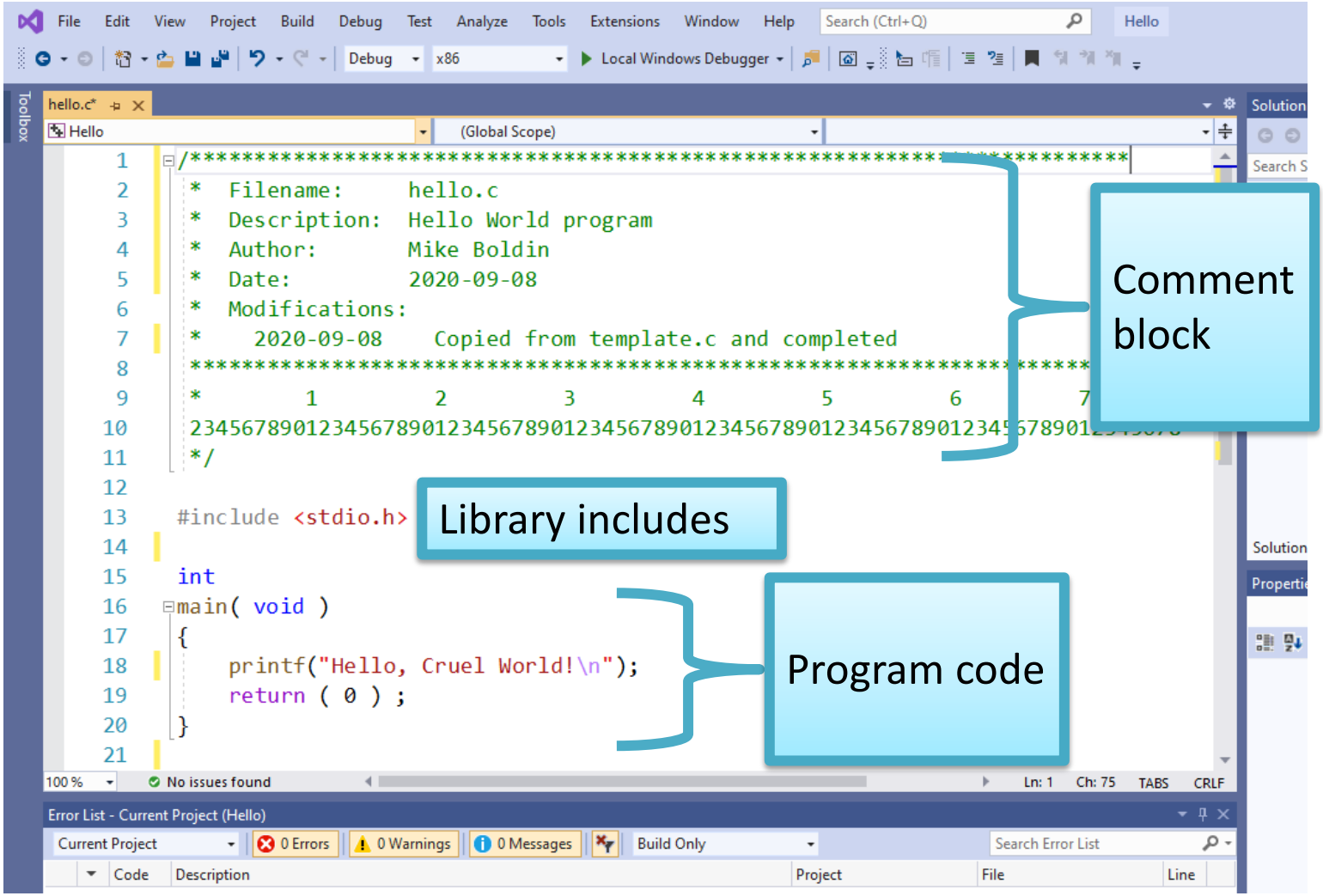


My template contains instructions in the form of C comments to guide you where to put various things to complete your program…

Hello, Cruel World



Hello, Cruel World



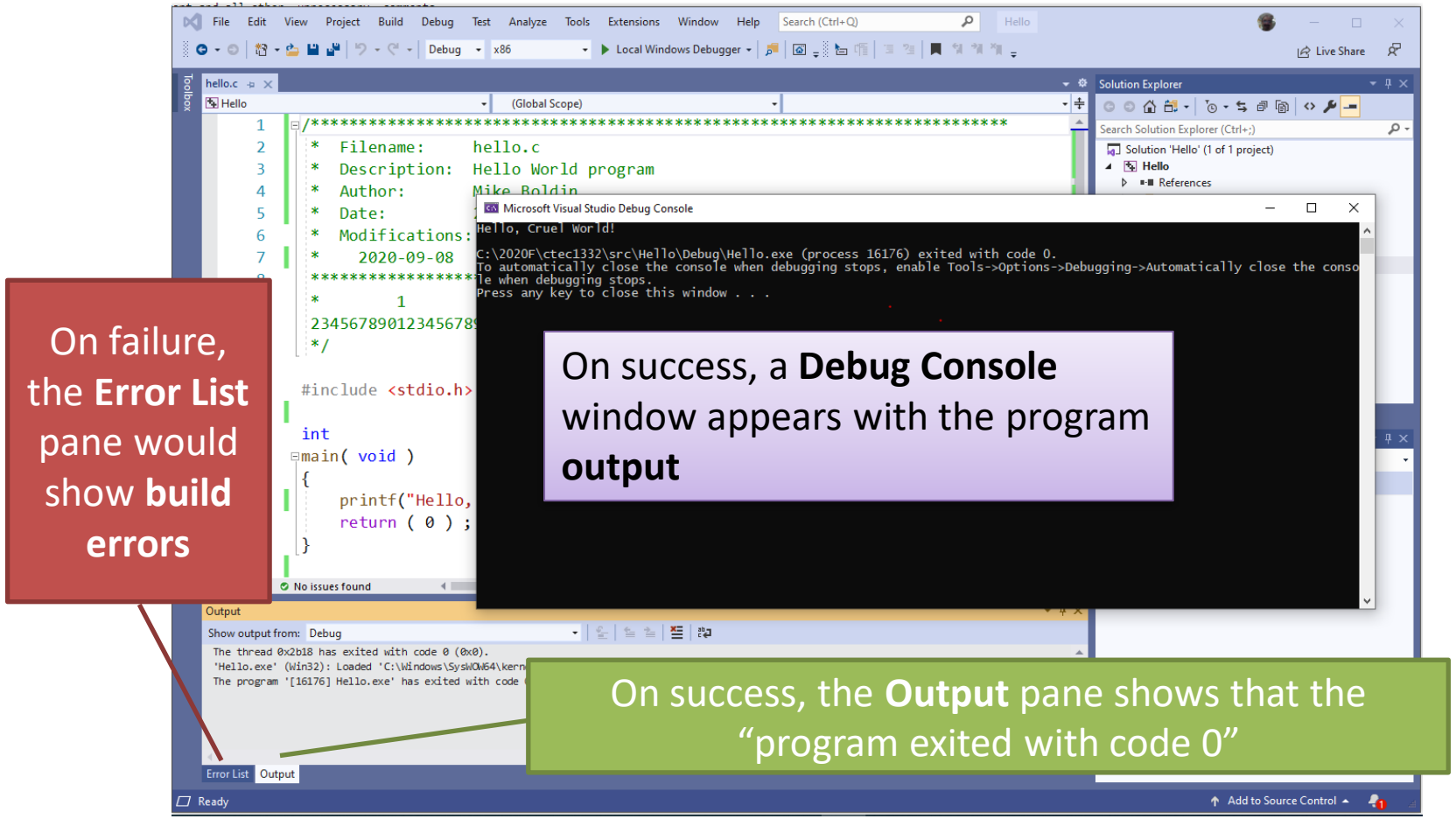
C Console App Code

- The C `#include` (pre-processor) directive allows the program to use various aspects of the **Standard C Library**.

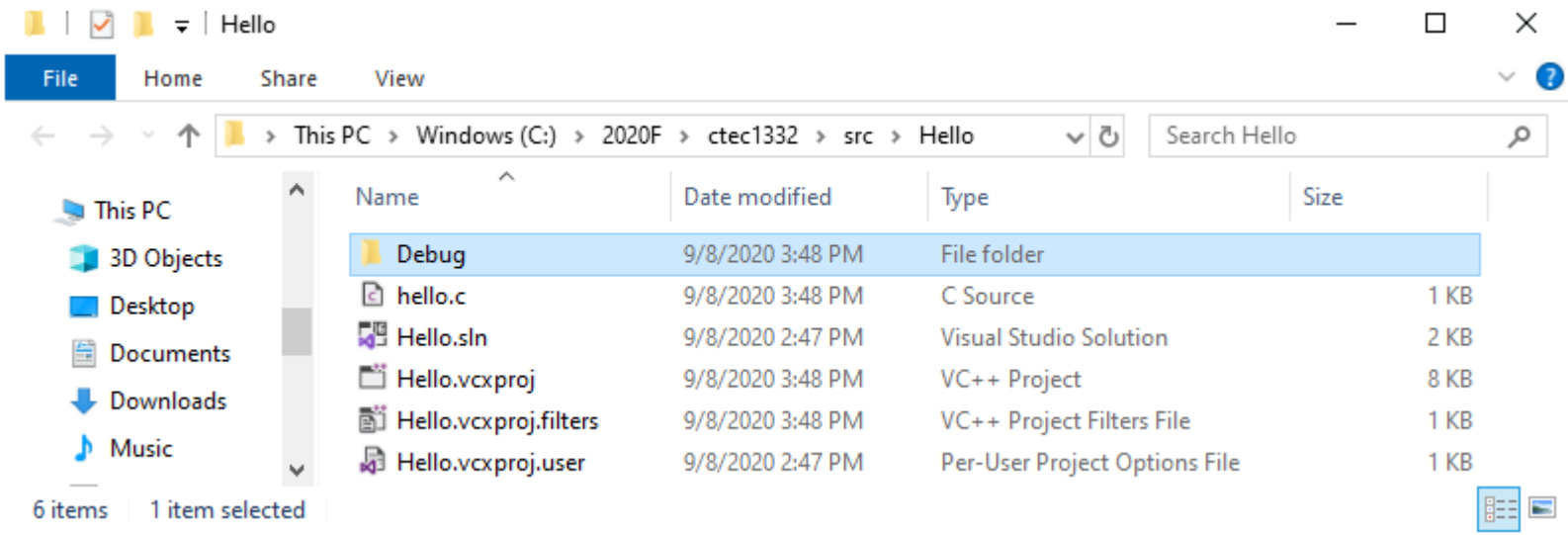
- The **program entry point** is "`main`".

- The main function contains C code between the braces, concluding with a `return` statement.

Build and Run: Press **F5**

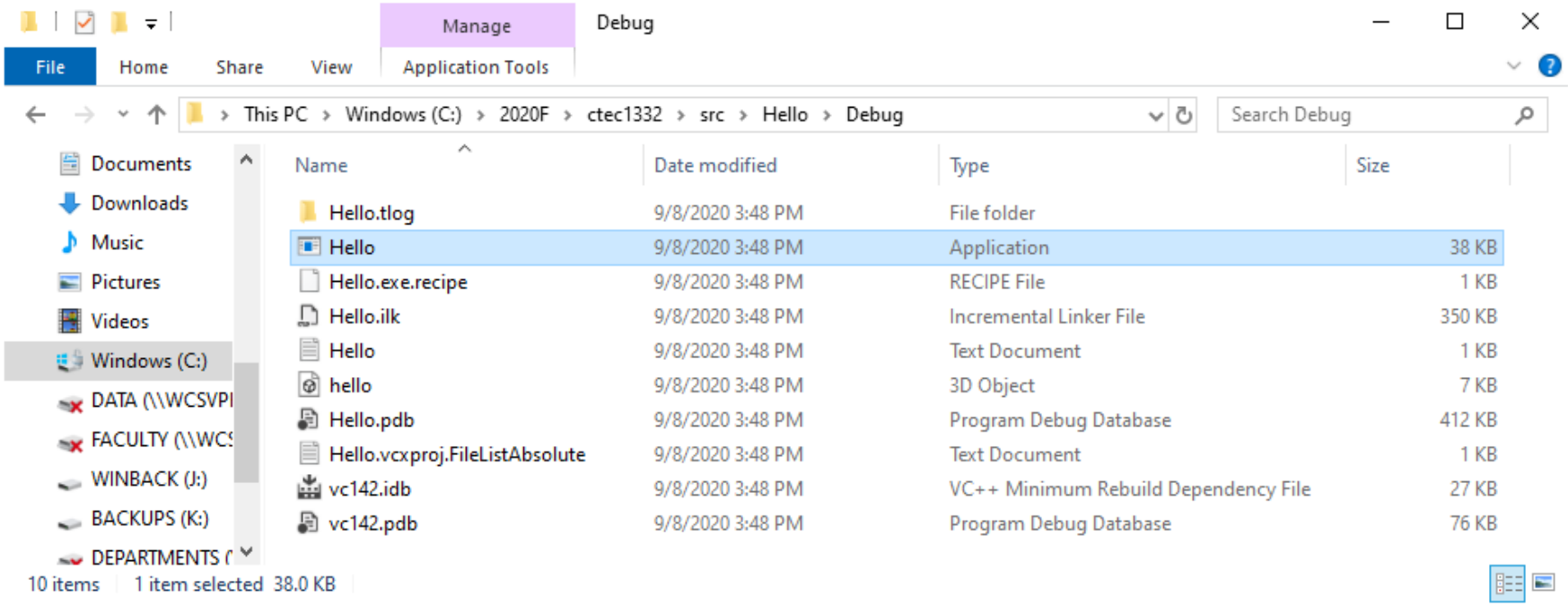


Project Files After Build



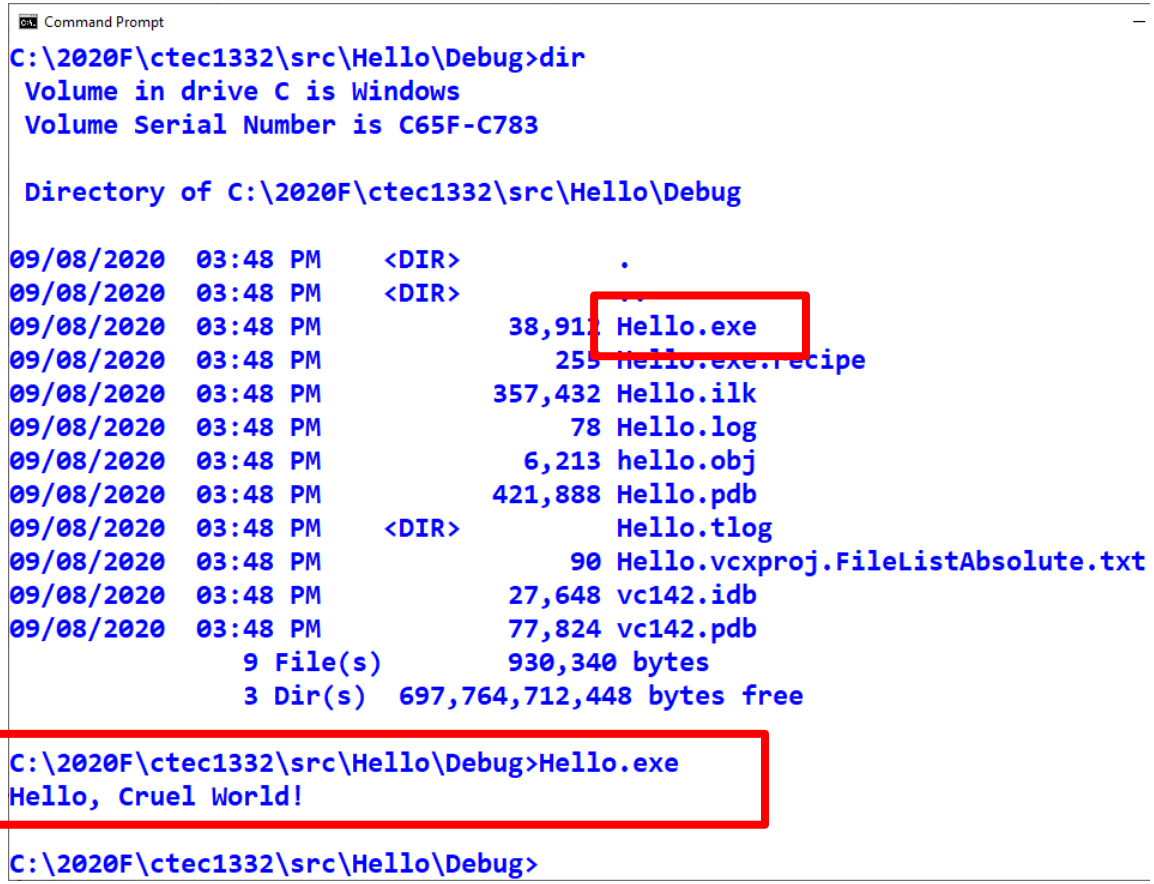
- *Don't* mess with the **.sln or .vcxproj** files!
- The **Debug** folder is used for building -- it contains the **executable**.
- Later, the Debug folder can be safely deleted.

Debug Files After Build



- The executable file (called **`Hello.exe`** here) is now a Windows **Application**, and can be copied elsewhere, including to other Windows computers.

C Console Executable



The executable is built (linked) in the **Debug** folder; it has an **.exe** extension.

You can run it directly from the command line.

This file can also be copied to *most* other Windows computers by itself.

Cleaning C Projects – Method 1

- From the **Build** menu, choose **Clean Solution**.
- From the **File** menu, choose **Close Solution**.

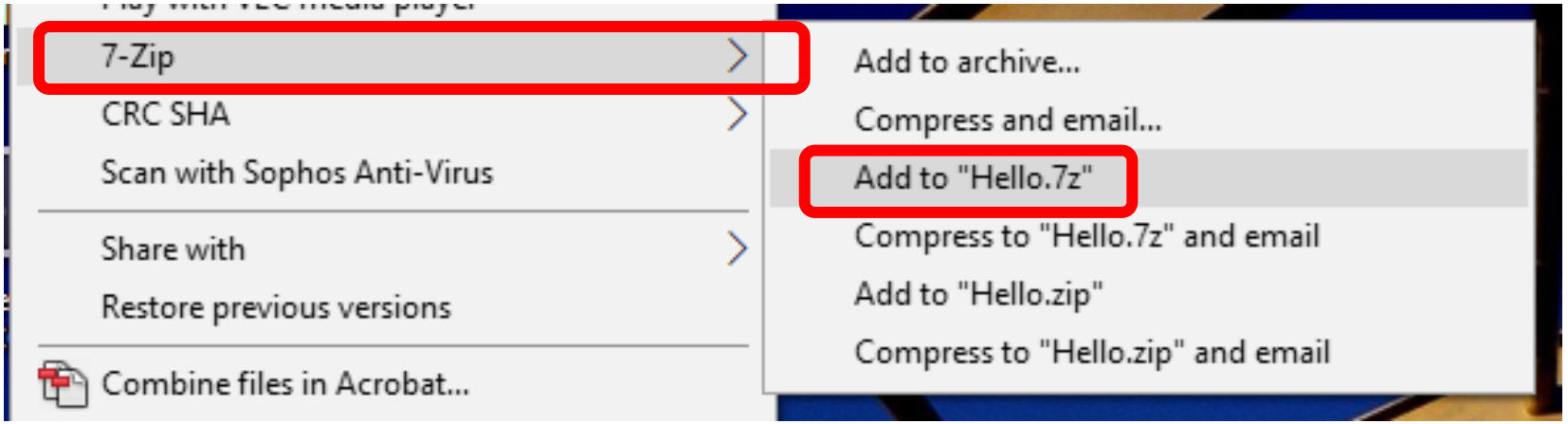
Cleaning C Projects – Method 2

- From the **File** menu, choose **Close Solution**.
- From a **Command Prompt**:
  - **`cd`** to the project folder (e.g., `cd Hello`)
  - **`rd /s /q Debug`**
  - **`cd .vs`**
  - **`cd`** `<project-name>` (e.g., `cd Hello` again)
  - **`cd v16`**
  - **`del Browse.VC.db`**
  - **`rd /s /q ipch`**
  - **`cd ..\..\..\..`** (or **`cd ..`** four times)

Cleaning C Projects – Method 2

```
C:\2020F\ctec1332\src>cd Hello

C:\2020F\ctec1332\src\Hello>rd /s /q Debug

C:\2020F\ctec1332\src\Hello>cd .vs\Hello\v16

C:\2020F\ctec1332\src\Hello\.vs\Hello\v16>del Browse.VC.db

C:\2020F\ctec1332\src\Hello\.vs\Hello\v16>rd /s /q ipch

C:\2020F\ctec1332\src\Hello\.vs\Hello\v16>cd ..\..\..\..

C:\2020F\ctec1332\src>
```

Archiving the Project



If **7-Zip** is installed, you can simply right-click on the project folder in Windows Explorer and create an archive (**.7z** or **.zip**) file. (This example was done under Windows 10 in L102.)

The project folder and resulting 7-Zip archive file (both on Desktop)

Archiving the Project - Summary

- Follow the cleaning procedure.
- Using Windows Explorer, go to the folder where your project folder is
- Right click on the project folder and select 7-Zip and then “Add to ____.7z” (where ____ is the name of your project/project folder)
- A **`.7z`** archive file will be created, which you can either copy to a USB device, to your OneDrive, safely email, and/or post on BB.

Archiving the Project - Summary

- If you use Cleaning Method 1, then the size of the .7z file will be around 500 kB.
- If you use Cleaning Method 2, the size will be around 5 kB!
- If you don't have 7-Zip, you can use Windows zip instead: right-click, **Send To > Compressed (zipped) Folder**
  - Around 900 kB using Method 1
  - Around 7 kB using Method 2

Archiving the Project - Summary

- You can also use File Explorer or a Command Prompt to make a backup of your project:
  - e.g.,
    `robocopy Hello c:\Backups\Hello /e`

- This creates an identical copy of the entire project folder:
  - about 5 MB uncleaned
  - about 4 MB cleaned using Method 1
  - about 50 kB cleaned using Method 2

Archiving the Project - Summary

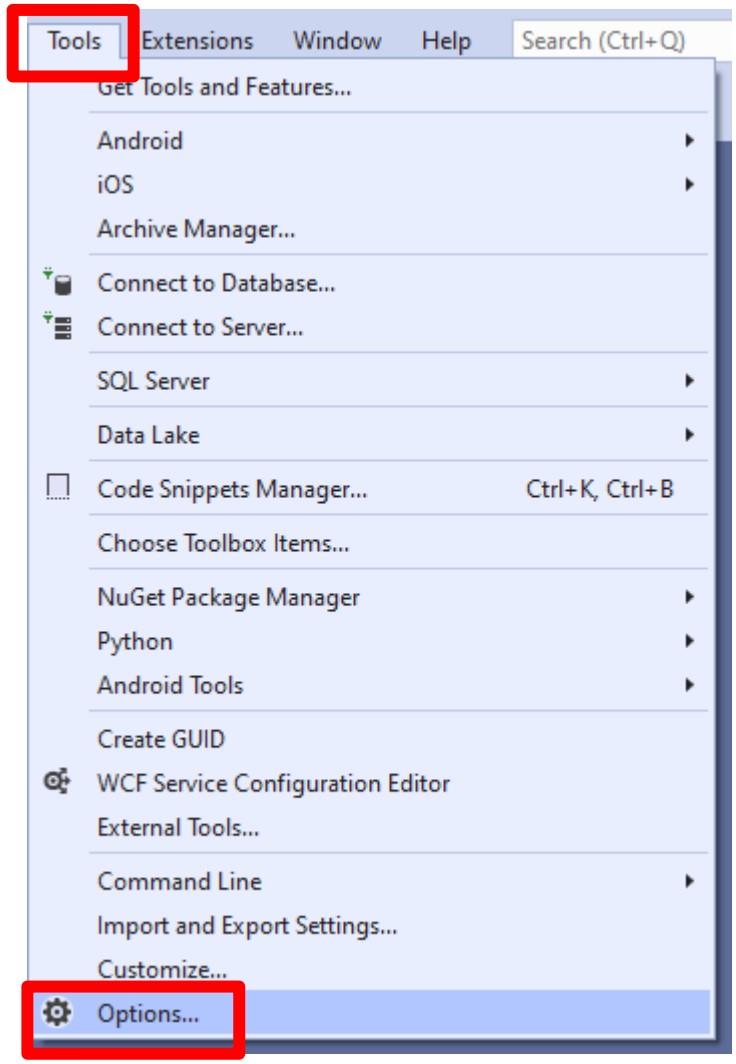
- Either way, **remember the 3-2-1 Backup Rule**:
  - **3 copies** (your C: drive, a USB, your OneDrive)
  - **2 different media** (HD, SSD, Flash, “The Cloud”)
  - **1 offsite copy** (OneDrive, email, BB)

APPENDIX

CUSTOMIZING VISUAL STUDIO

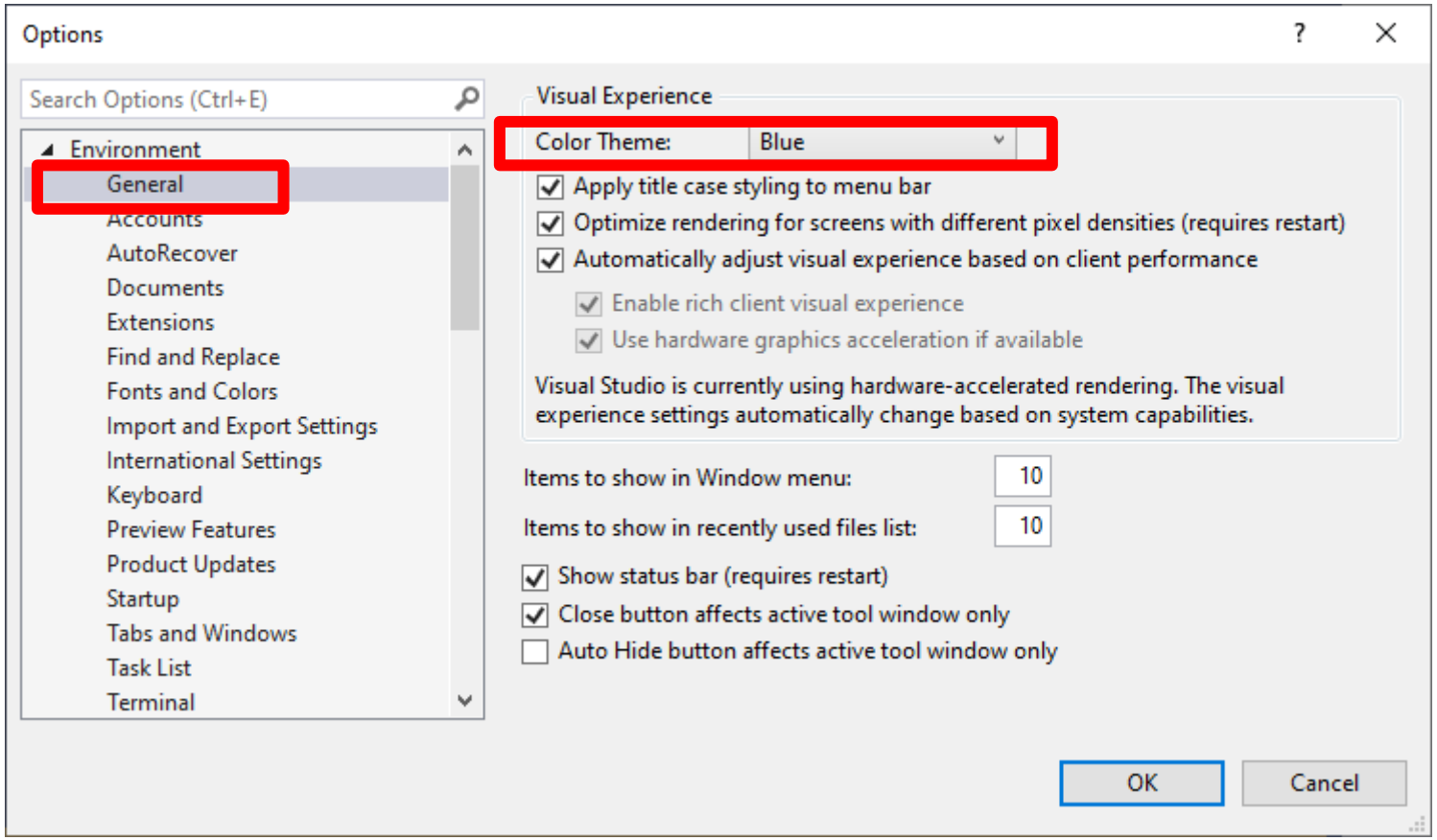
Customizing Visual Studio

- From the **Tools** menu, select **Options** (right at the bottom).
- You can then change the Color theme, and make the font larger…



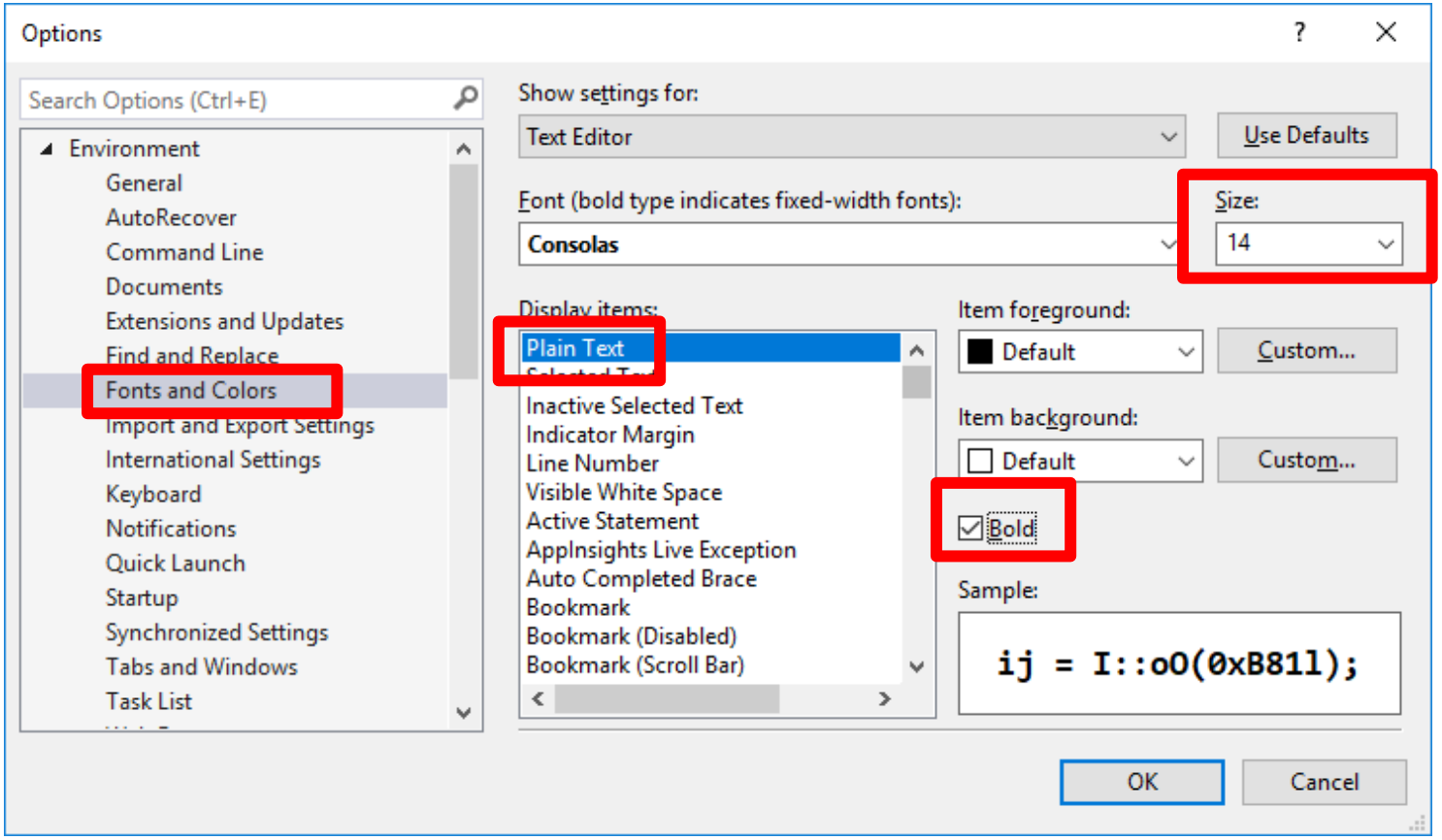
Customizing Visual Studio

Change the Color theme to **Light** (or **Blue**) for better contrast…



Customizing Visual Studio

From **Fonts and Colors**, the default font is already **Consolas**. You can make it larger for more detail on screen.



APPENDIX

USING APPS ANYWHERE

Apps Anywhere

- Read the **Guide** and follow the steps:

  https://its.niagaracollege.ca/wp-content/uploads/AppsAnywhere-Guide.pdf

- You need to download and install the **Cloudpaging Player** first:

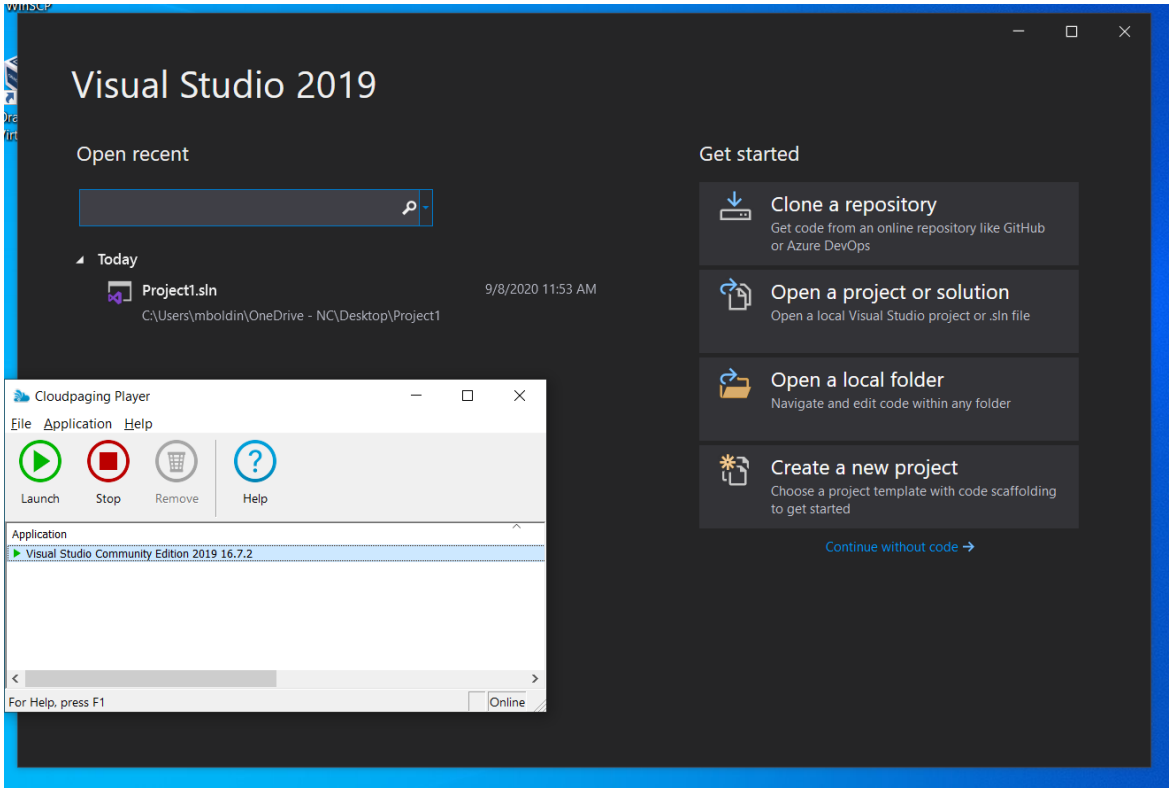
  https://appsnc.niagaracollege.ca/

- From the Niagara College Portal, go to **All Applications:**

  https://portalnc.niagaracollege.ca/MyApplications
  (**Apps Anywhere** is the first icon)

- In the Player, Visual Studio Community Edition 2019 near the bottom of the list…

Apps Anywhere



Important! Use your **One Drive – NC** folder to save projects.