C
Computer Science

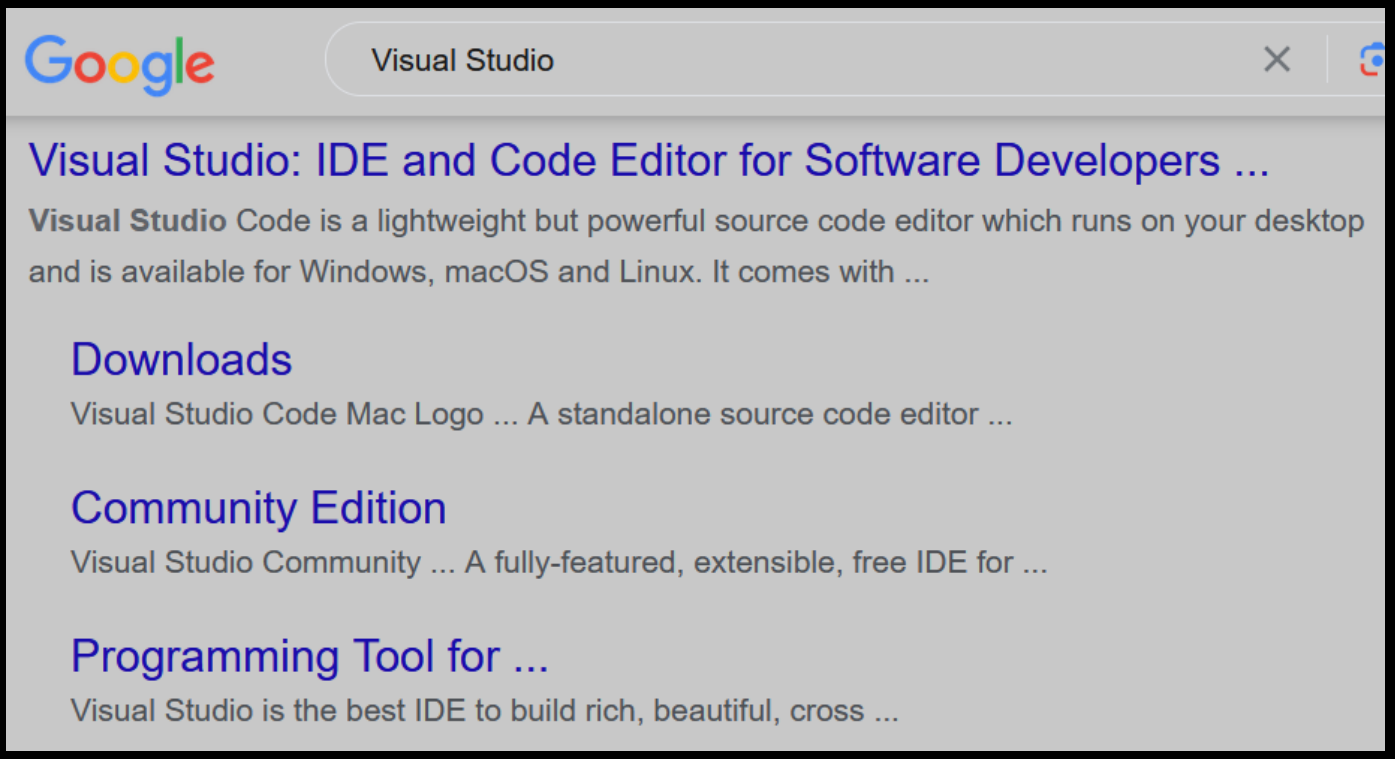
by

Christopher Andrew Topalian

Christopher Topalian

Dedicated to God the Father

Download Visual Studio - Search Google



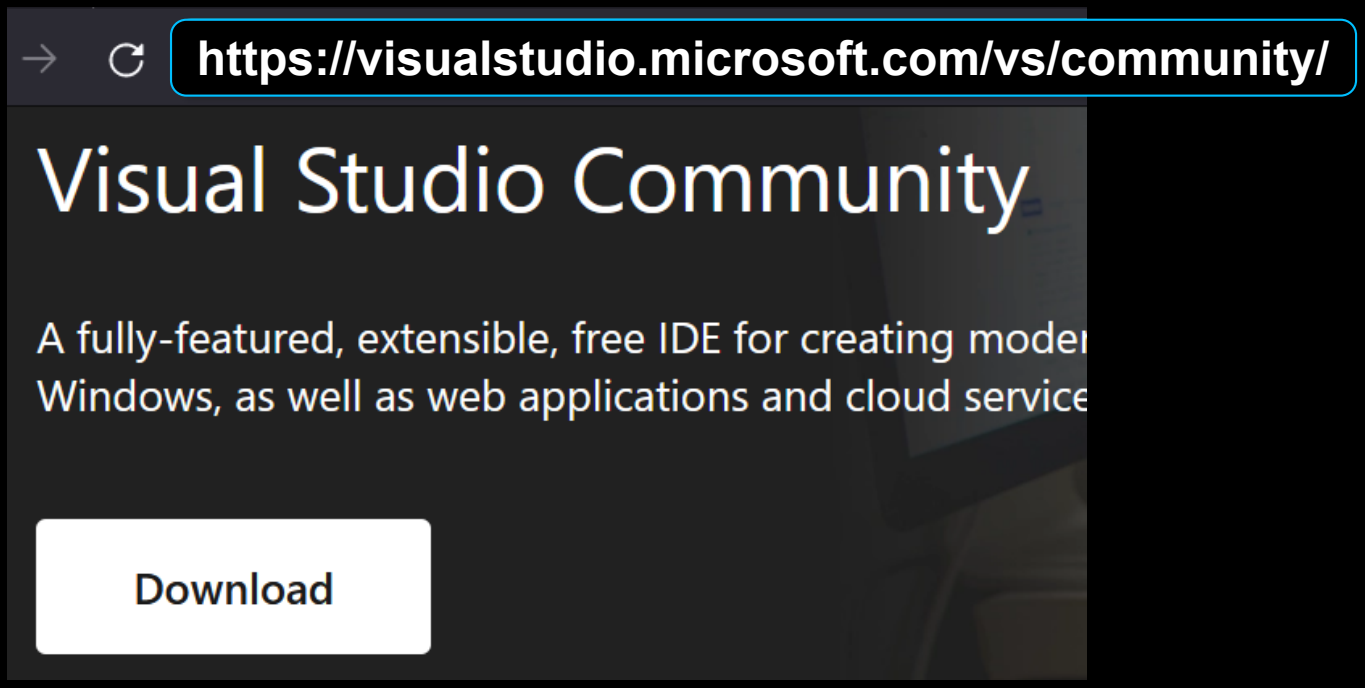
We Go To: google.com

We Search for: Visual Studio

We Left Click on: Downloads

Or, we can go directly
to the Visual Studio website
as shown on the next page.

Download Visual Studio - Directly from Website



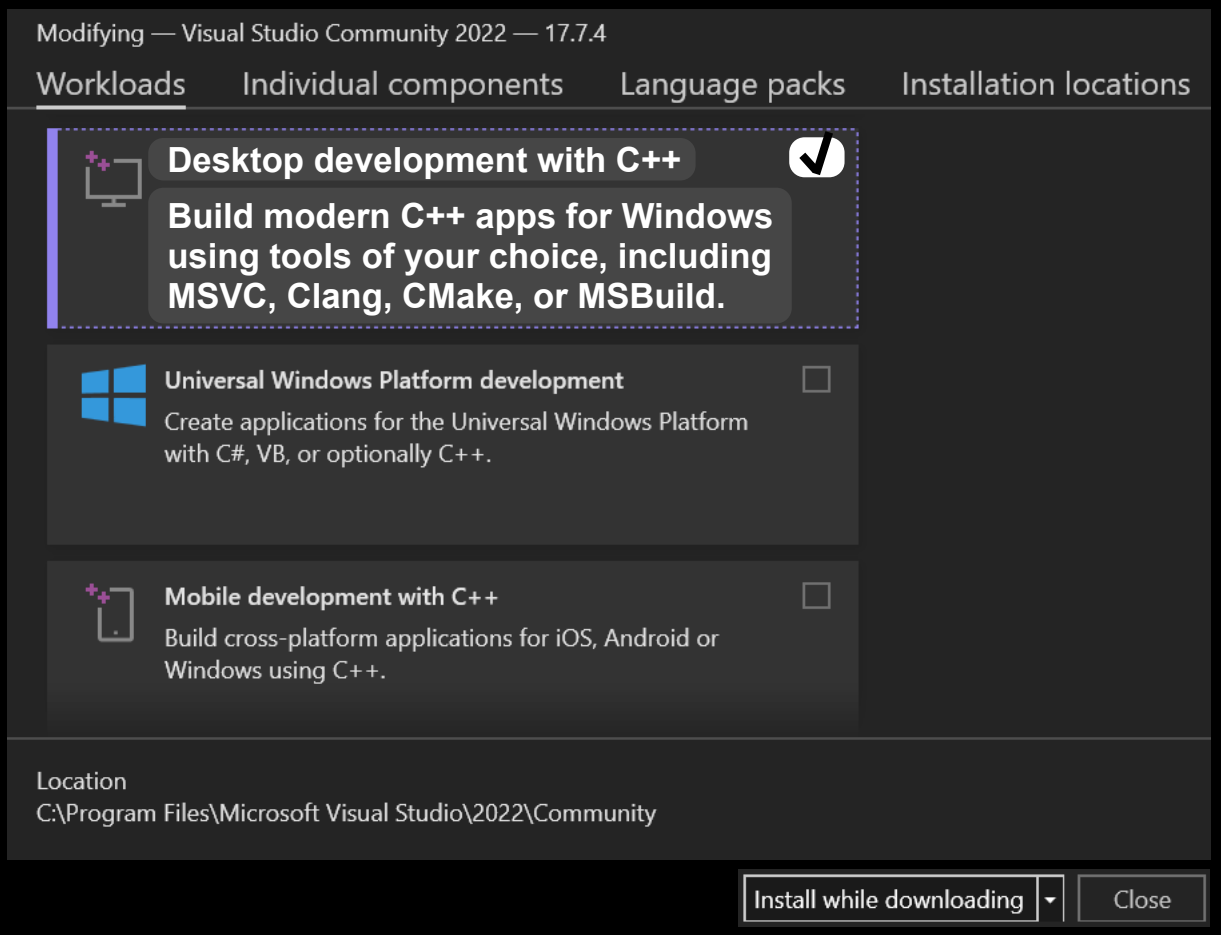
We Go To:
https://visualstudio.microsoft.com/vs/community

We Download: **Visual Studio Installer**

We Go To our Downloads Folder and:
Double Left Click the Install file to Install it.

After it is installed, we can open VS Studio.
Once open, we can then install the C++ package, which has in it, the ability to create C apps too.

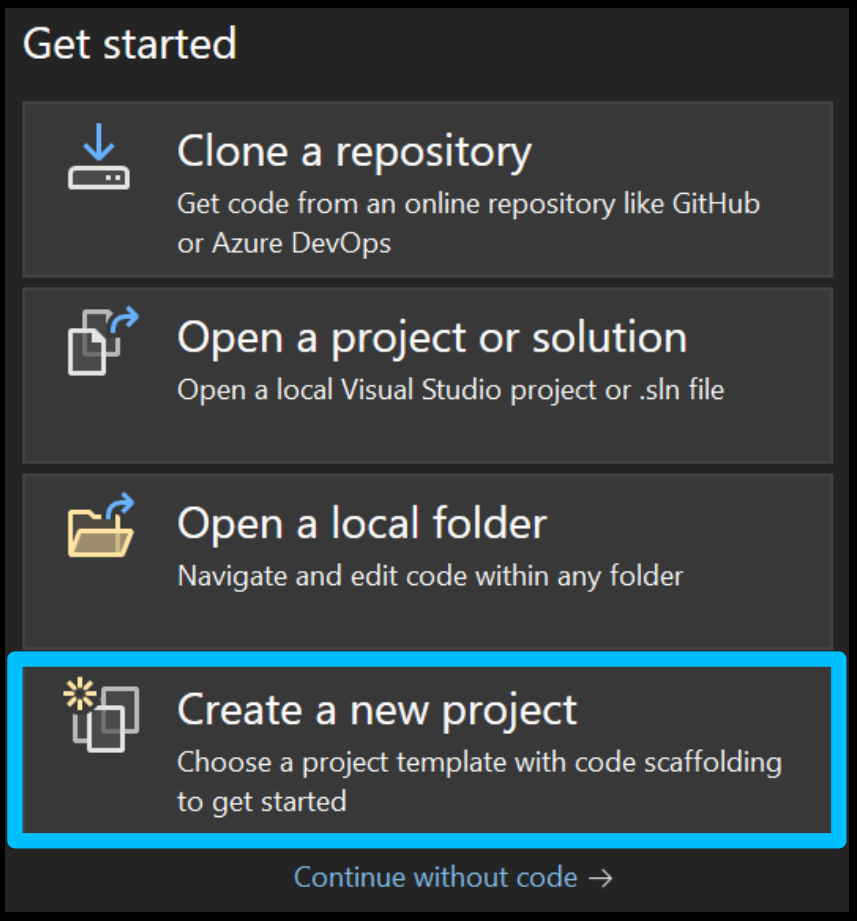
We Download and Install:
Desktop development with C++



We Put a Checkmark in the box
and then Left Click the
Install while downloading button

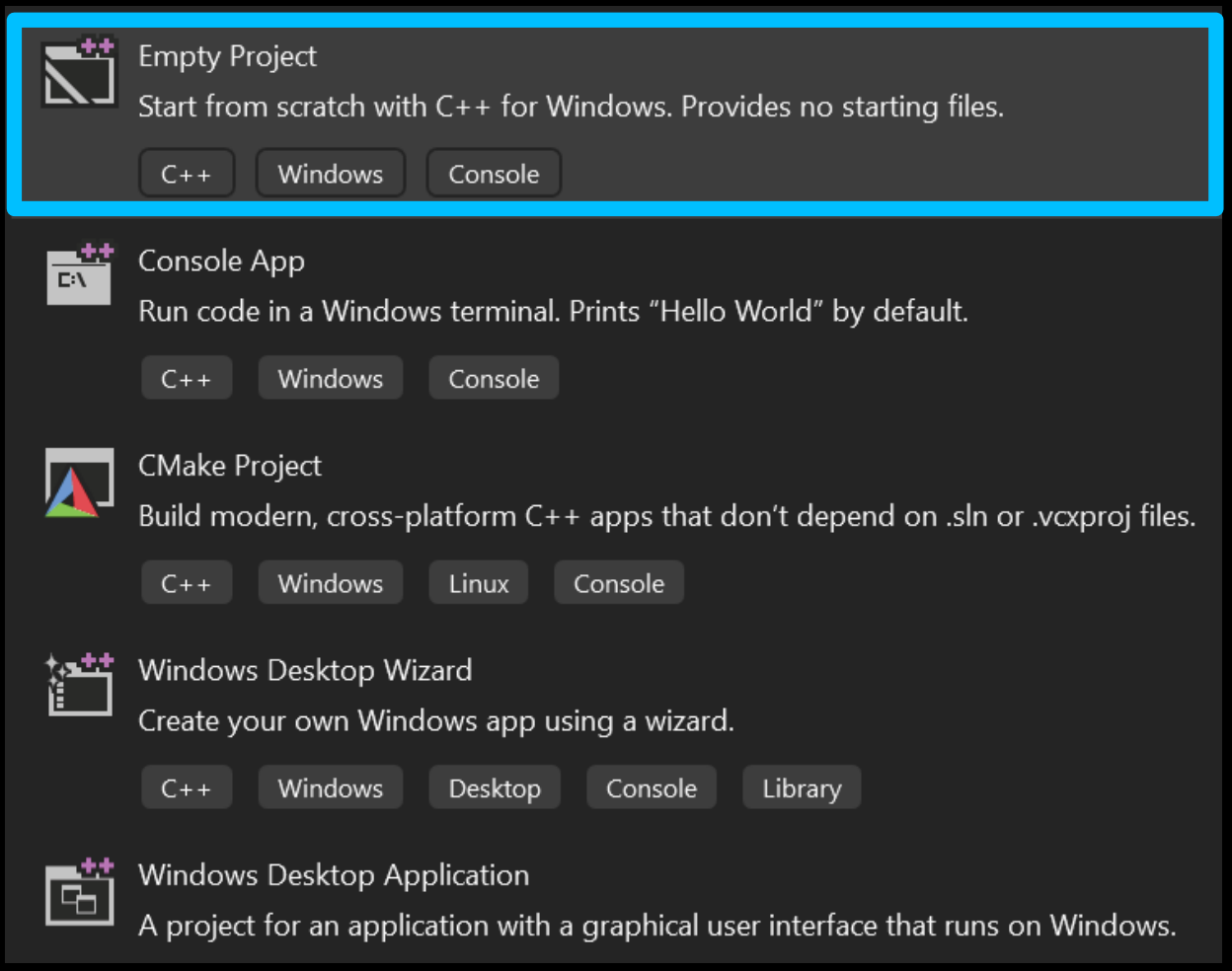
This will download and install the ability to use Visual Studio to create C++ Desktop Applications, but also, C applications too.

Create a New Project

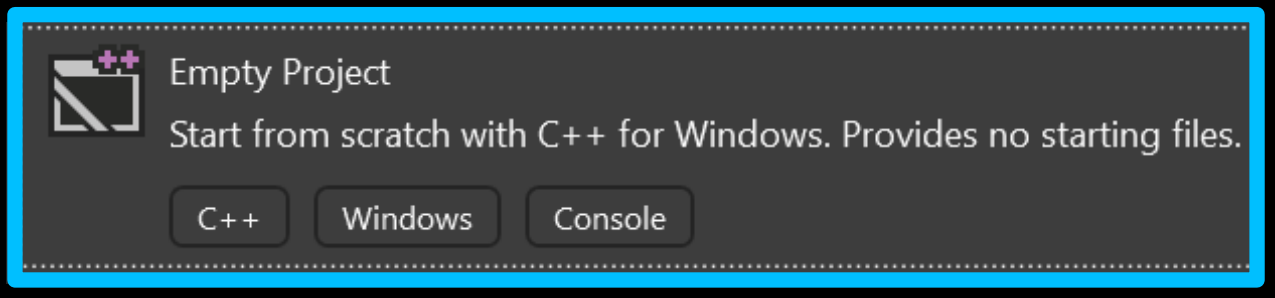


We Choose: Create a new project

Choices for a New Project

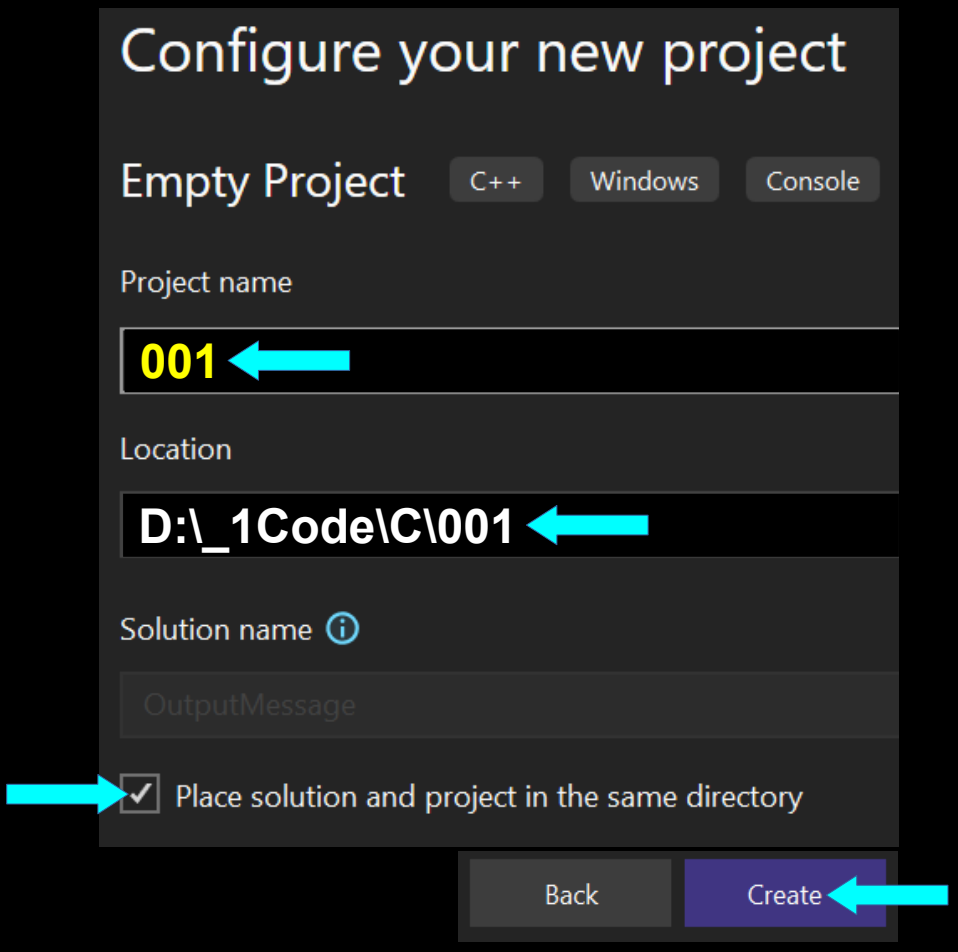


We Left Click: Empty Project



We Left Click: Next Button

Project Name - 001



We name our first project as: 001

We put a Checkmark in: Place solution and project in the same directory

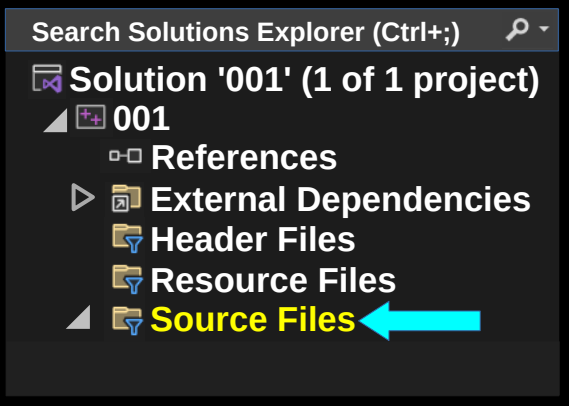
We Left Click: Create Button

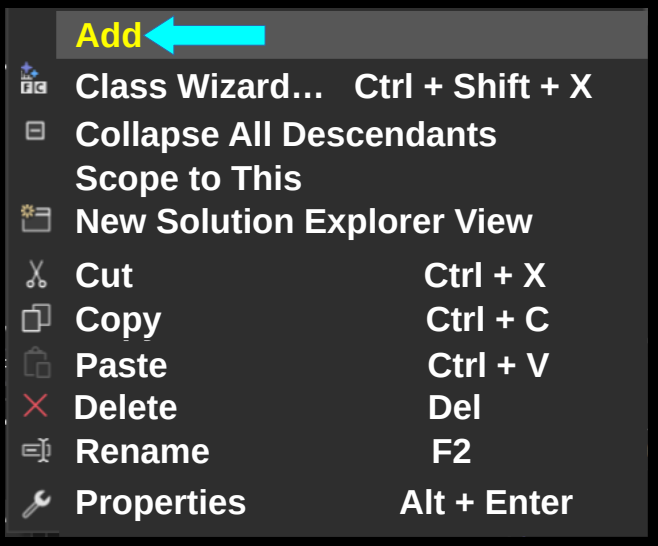
Creating our main.c file in Source Files Folder

We Right click on: Source Files Folder

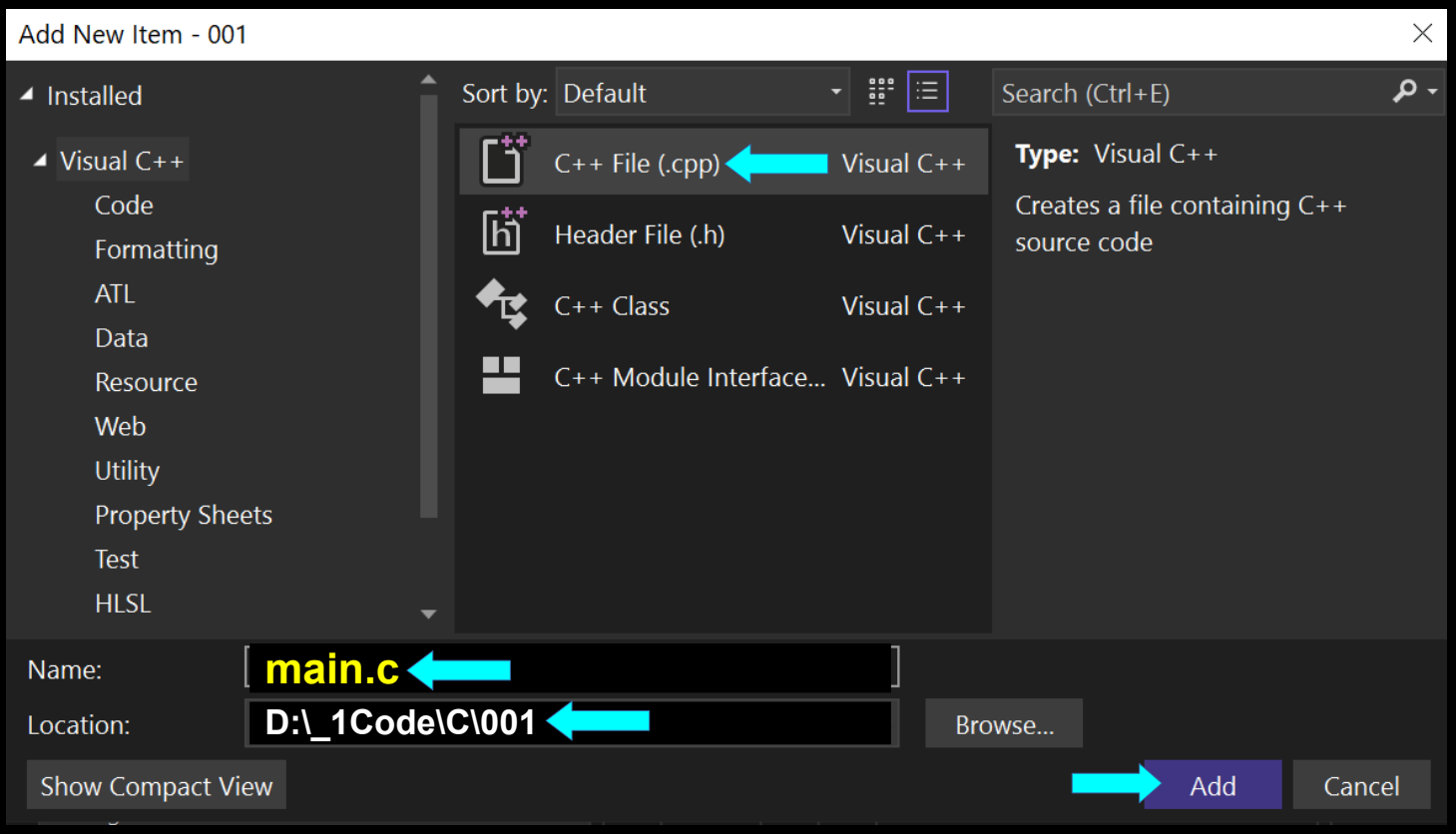
We Choose: Add

We Choose: New Item...





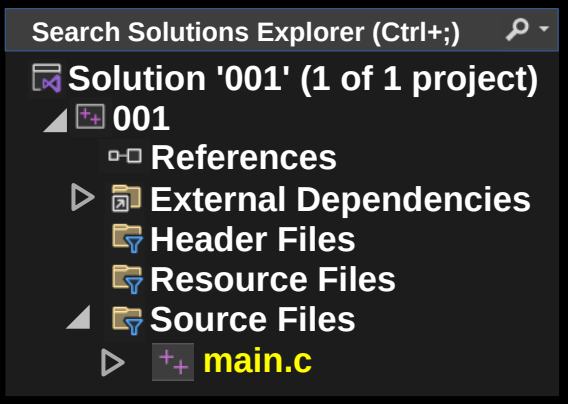
We Choose: C++ File (.cpp)



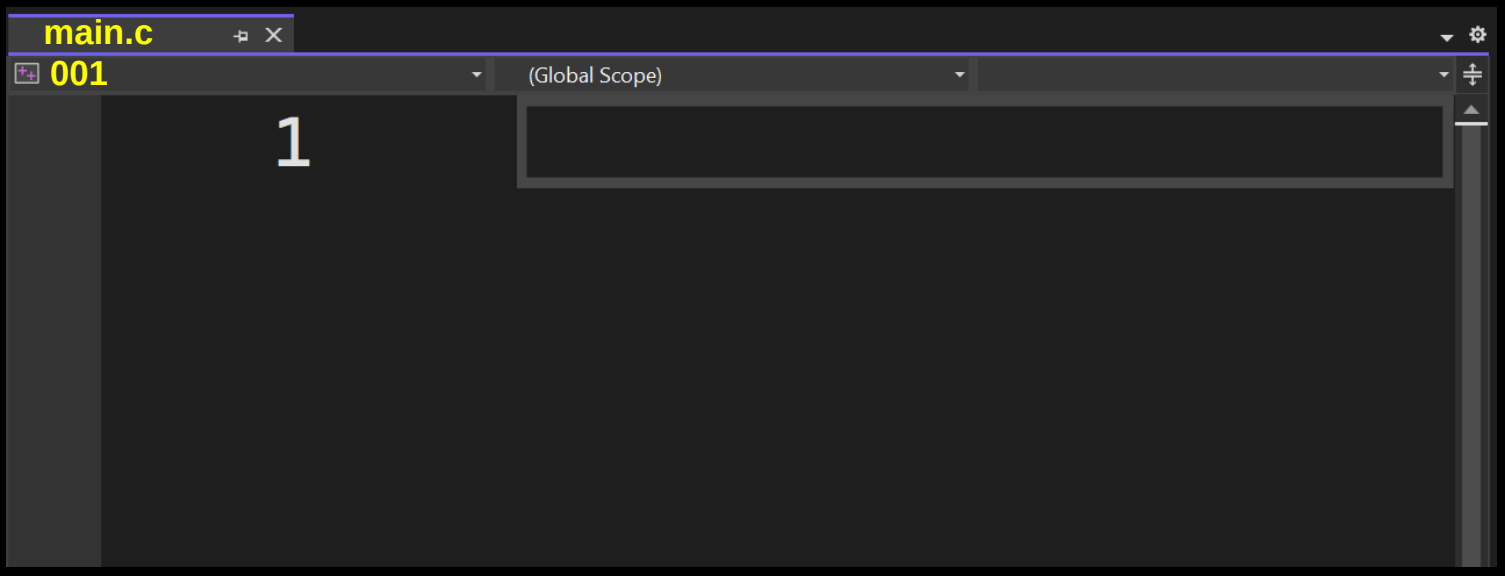
We Name our File: main.c

We Left Click: Add button

We see our created file: main.c



main.c is now open



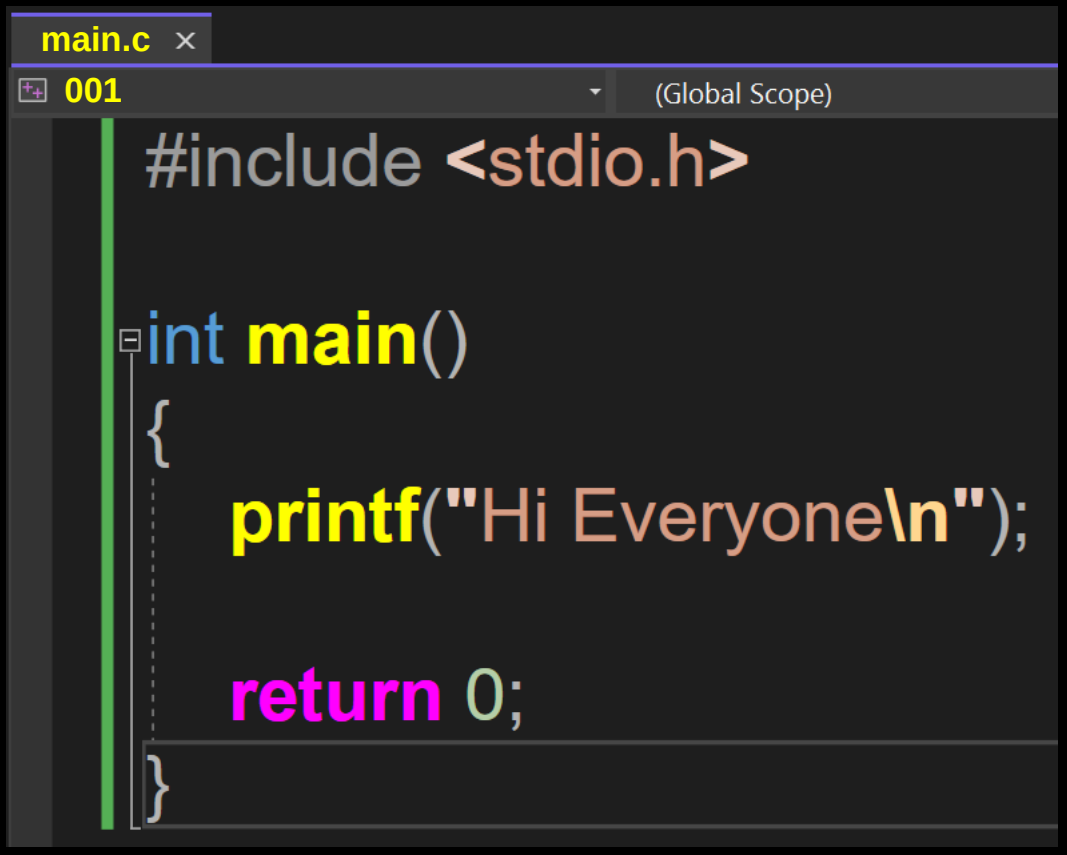
We can now: Type our Code :-)

We make Bigger Font by:
Control + Scroll Wheel Forward

We make Smaller Font by:
Control + Scroll Wheel Backward

main.c Code - Screenshot

Here is a screenshot of: Our C Code

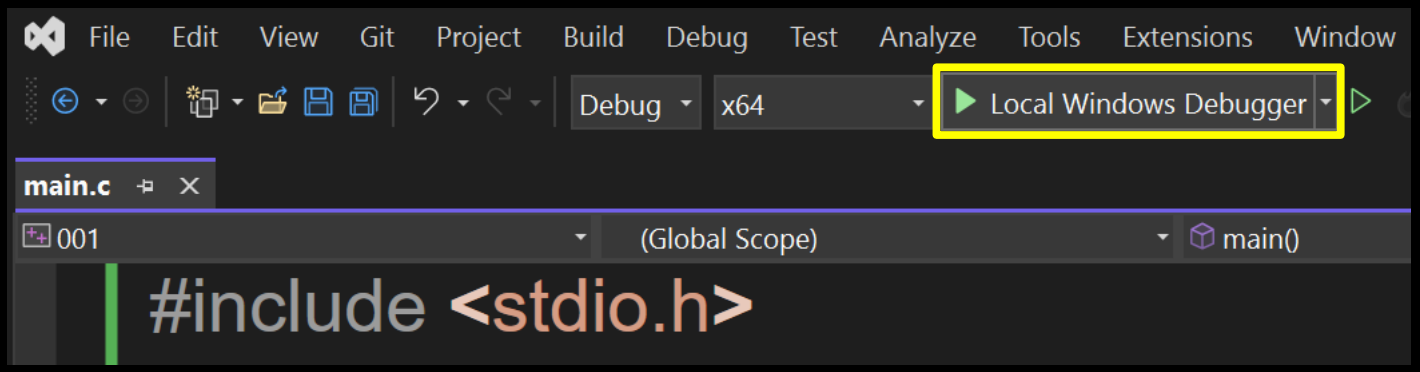


On the next page
we show the same code,
but with better font.

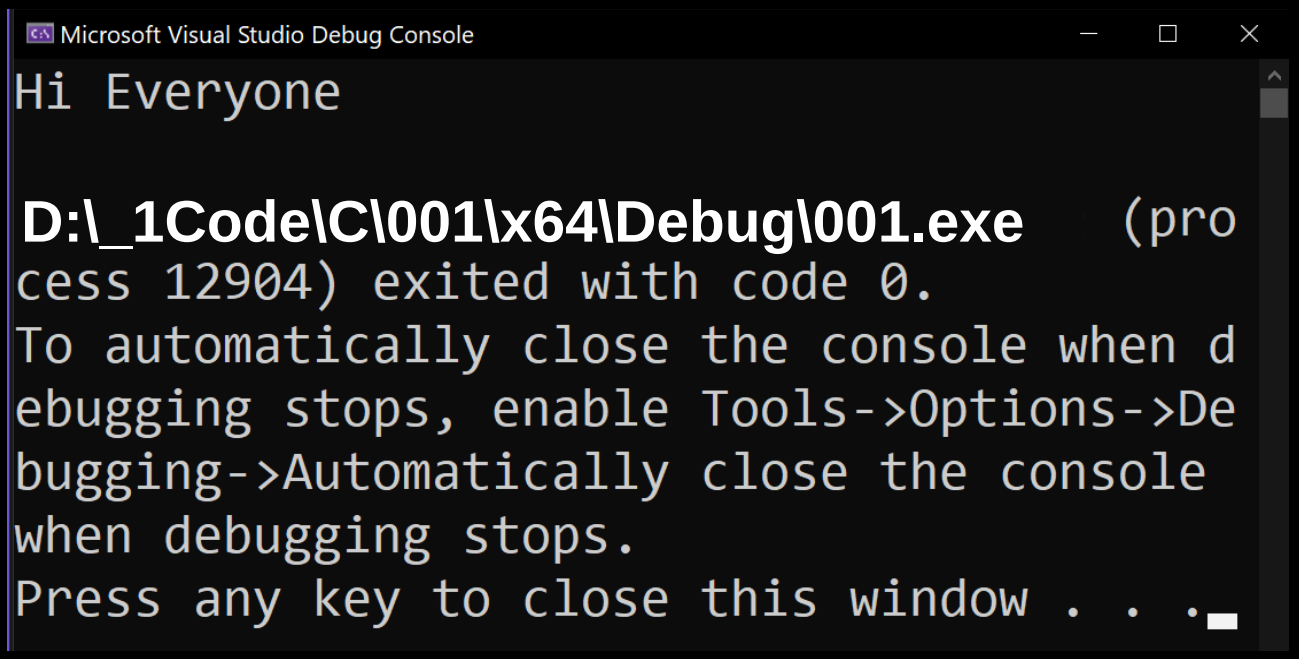
```c
// Outputting Text
// main.c

#include <stdio.h>

int main()
{
    printf("Hi Everyone\n");

    return 0;
}
```

// Building and Running our App

We Left Click on: Local Windows Debugger



Our app opens in the Debug Console Window, with the message of: Hi Everyone



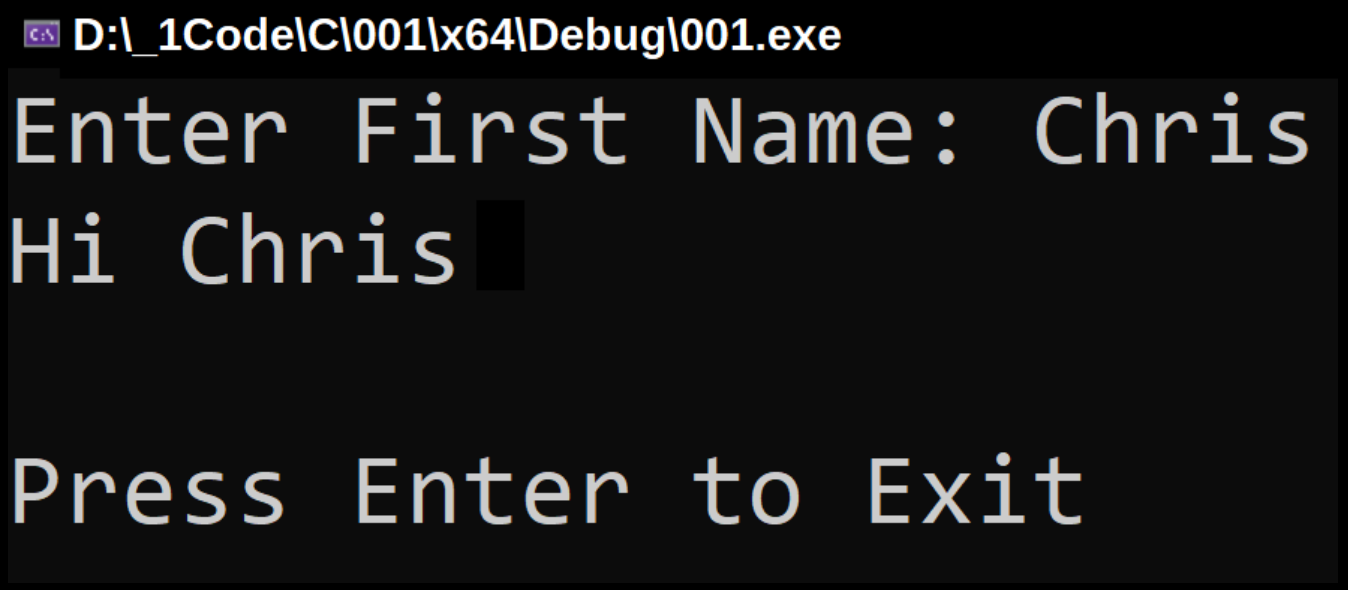
We make Bigger Console Font by:
Control + Scroll Wheel Forward

We make Smaller Console Font by:
Control + Scroll Wheel Backward

```c
// Outputting Text, Exit by Pressing Enter
// main.c

#include <stdio.h>

int main()
{
    printf("Hi Everyone\n");

    printf("Press Enter to Exit\n");

    // wait for user to press Enter
    getchar();

    return 0;
}
```

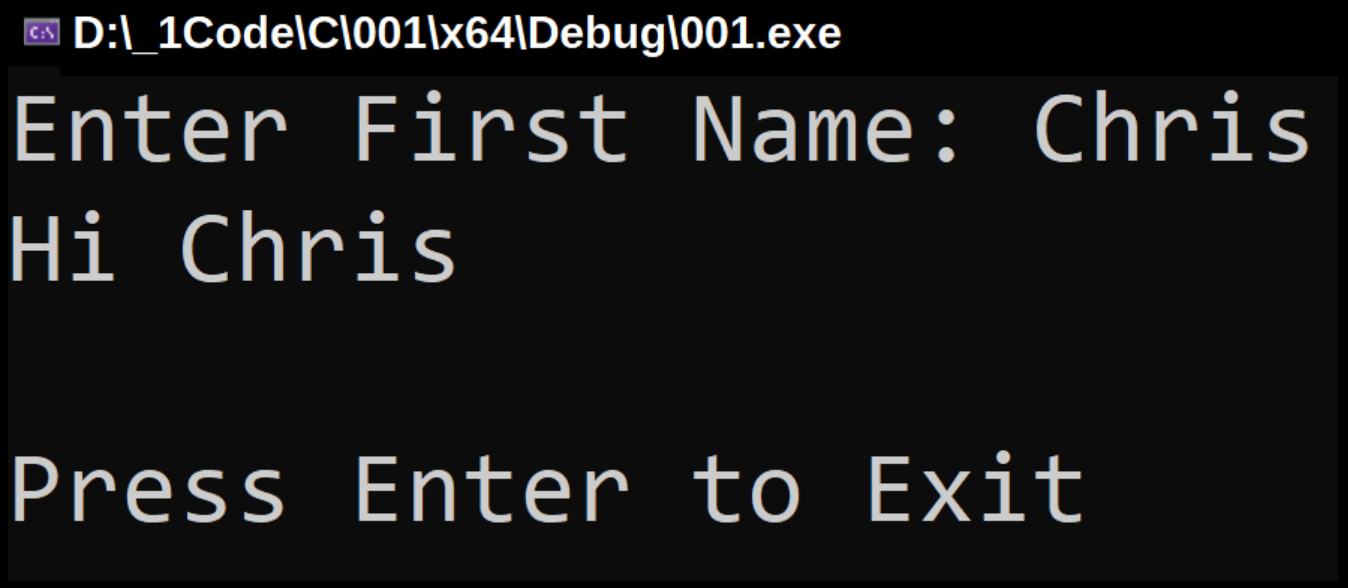
```c
// Input from user
// main.c

#include <stdio.h>

int main()
{
    // max name is 100 chars + null terminator
    char name[101];

    printf("Enter First Name: ");

    // read input from user and prevent buffer overflow
    scanf_s("%s", name, (unsigned int)sizeof(name));

    printf("Hi %s\n", name);

    printf("\nPress Enter to Exit\n");

    // remove newline char left in input buffer
    getchar();

    // wait for user to press Enter
```

```
    getchar();

    return 0;
}
```



```
// Custom Function - askName
// main.c

#include <stdio.h>

void askName(char* name)
{
    printf("Enter First Name: ");

    // read input from user and prevent buffer
overflow
    scanf_s("%s", name, (unsigned
int)sizeof(name));
}

int main()
{
    // max name is 100 chars + null terminator
    char userName[101];

    askName(userName);
    printf("Hi %s\n", userName);

    printf("\nPress Enter to Exit\n");
```

```
    // remove newline char left in input buffer by scanf_s
    getchar();

    // wait for user to press Enter
    getchar();

    return 0;
}
```



```c
// Custom Function - consoleLog
// main.c

#include <stdio.h>

void consoleLog(const char *message)
{
    printf("%s\n", message);
}

int main()
{
    consoleLog("Hi Everyone");

    printf("Press Enter to Exit\n");

    // wait for user to press Enter
    getchar();

    return 0;
}
```

Header File - We define our function in a header file for easy use

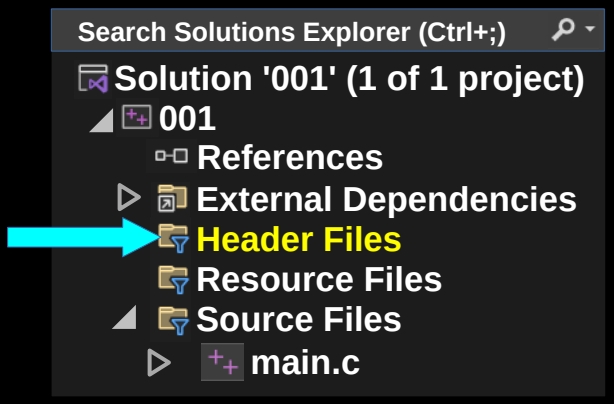
Instead of pasting this useful function in every script in our application, we will instead type it once in a header file and put it in the Header Files Folder.

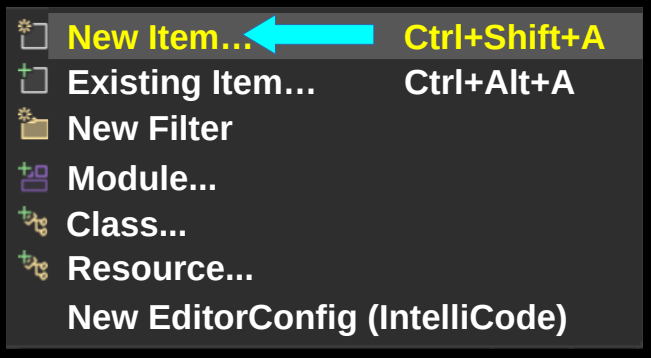
Using a header file is easier, because we place the header files in the Header Files folder and then include that header file with a reference in our main.c and other files.

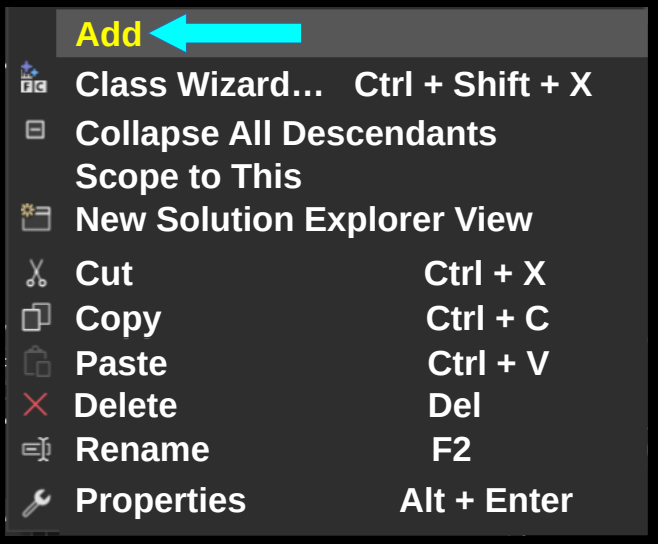
In our header file, we type the terms
#ifndef
and
#define
to designate that it will be used in other files.

Header File - Add - New Item

We right click on: Header Files folder



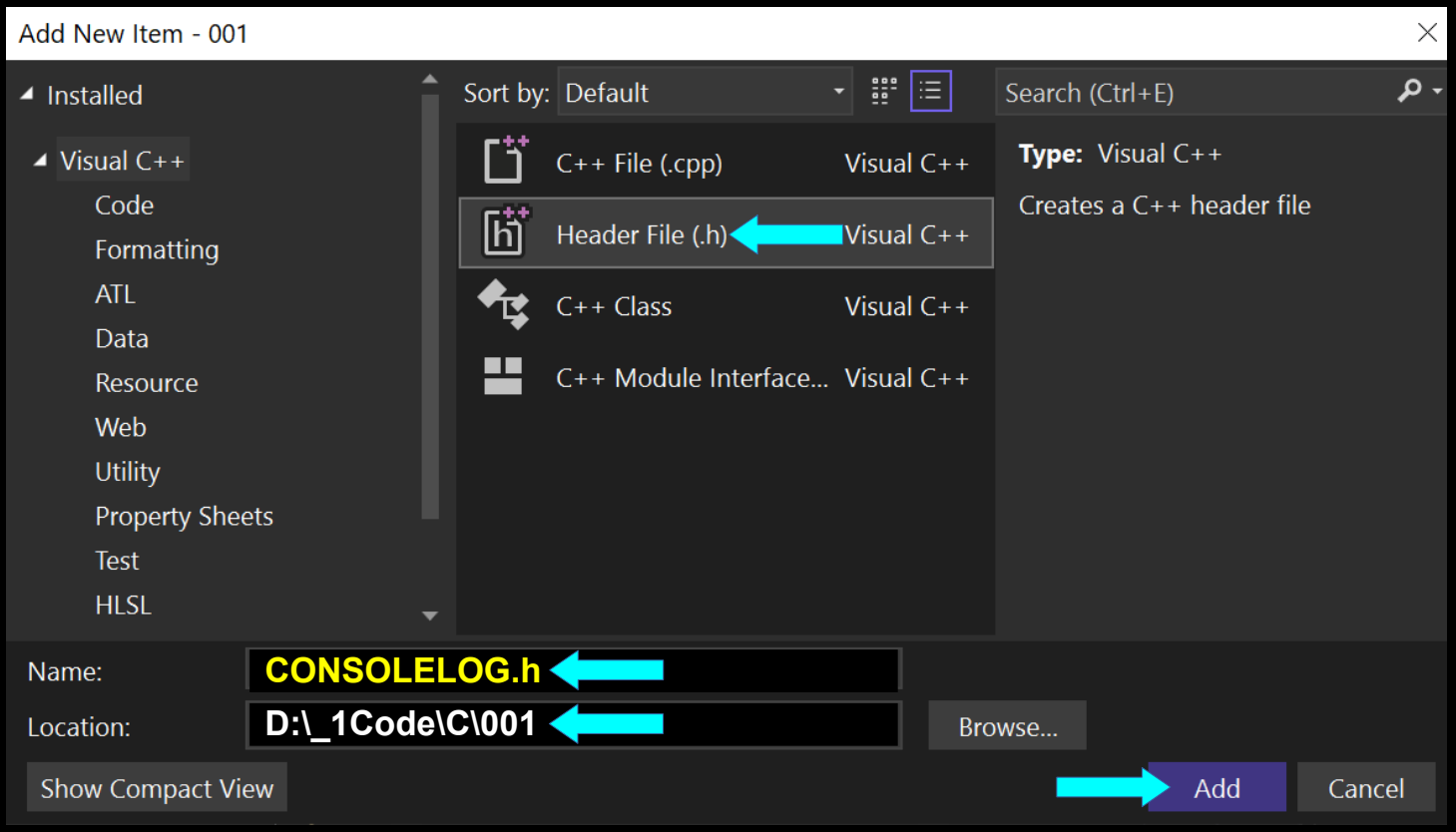




We choose: Add

We choose: New Item

We choose: Header File .h



We name it: CONSOLELOG.h

We Left Click: Add button

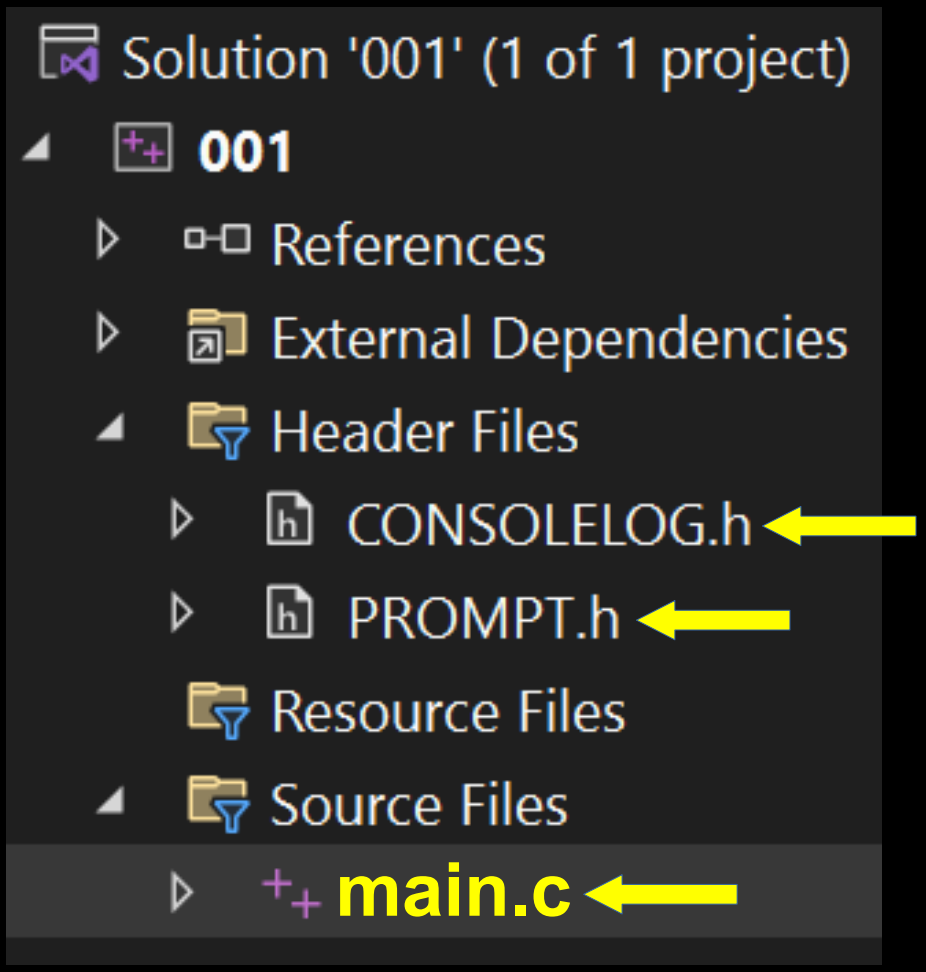
```
// CONSOLELOG.h header file
// CONSOLELOG.h

#ifndef CONSOLELOG
#define CONSOLELOG
#include <stdio.h> // printf

void consoleLog(const char *message)
{
    printf("%s\n", message);
}

#endif
```

```
// Our main.c uses CONSOLELOG.h header file
// main.c

#include "CONSOLELOG.h"
#include <stdio.h> // printf

int main()
{
    consoleLog("Hi Everyone");

    printf("Press Enter to Exit\n");

    // wait for user to press Enter
    getchar();

    return 0;
}
```

```
// PROMPT.h header file
// PROMPT.h

#ifndef PROMPT
#define PROMPT
#include <stdio.h> // scanf_s
#include <string.h> // strlen

void prompt(char* userInput)
{
    // read input from user and prevent buffer overflow
    scanf_s("%s", userInput, 101);

    // wait for user to press Enter
    getchar();
}

#endif
```

```
// main.c uses CONSOLELOG.h and PROMPT.h
// main.c

#include "PROMPT.h"
#include "CONSOLELOG.h"
#include <stdio.h> // printf, scanf

int main()
{
    // max input is 100 chars + null terminator
    char input[101];

    consoleLog("Enter First Name");
    prompt(input);

    printf("Hi %s\n", input);

    consoleLog("Press Enter to Exit\n");

    // wait for user to press Enter
    getchar();

    return 0;
}
```

File Structure of the previous Examples

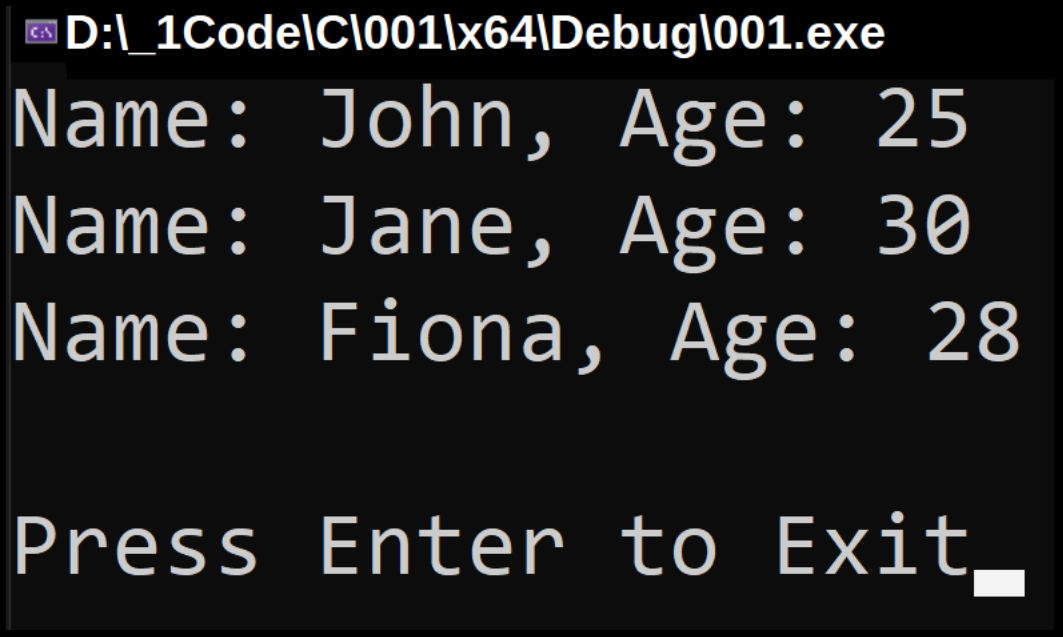


We have 2 Header Files:
CONSOLELOG.h
and
PROMPT.h

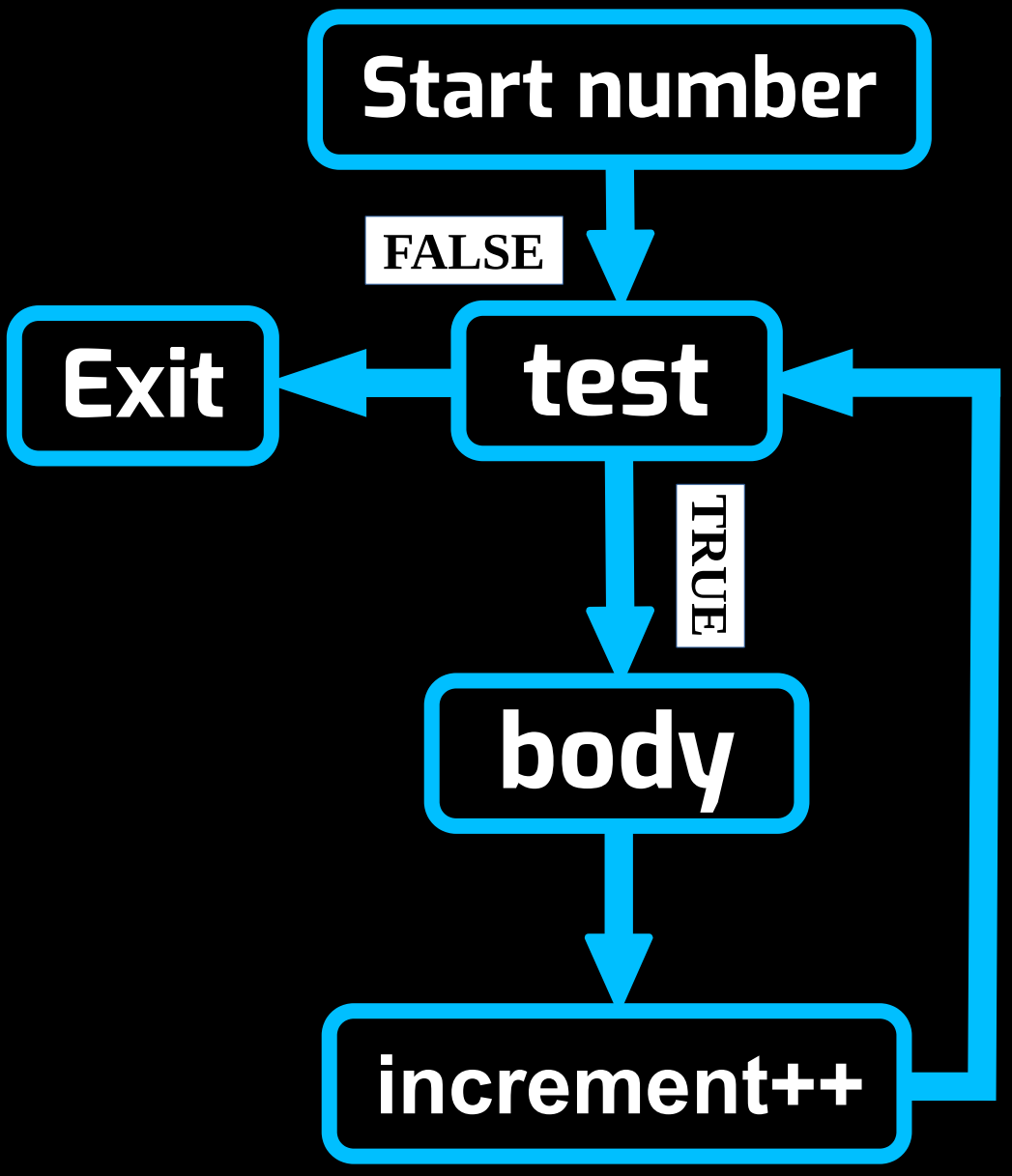
We have 1 main.c file:
main.c uses CONSOLELOG.h and PROMPT.h header files

```c
// Array of Objects
// main.c

#include <stdio.h> // printf

// define a structure to represent a person
struct Person
{
    char name[50];
    int age;
};

int main()
{
    // create an array of Person structs
    struct Person people[] =
    {
        { "John", 25 },
        { "Jane", 30 },
        { "Fiona", 28 }
    };

    // calculate number of elements in array
    int numPeople = sizeof(people) /
sizeof(people[0]);
```

```
    // iterate over each person in the array
    for (int i = 0; i < numPeople; i++)
    {
        printf("Name: %s, Age: %d\n",
people[i].name, people[i].age);
    }

    printf("\nPress Enter to Exit");

    // wait for user to press Enter
    getchar();

    return 0;
}
```



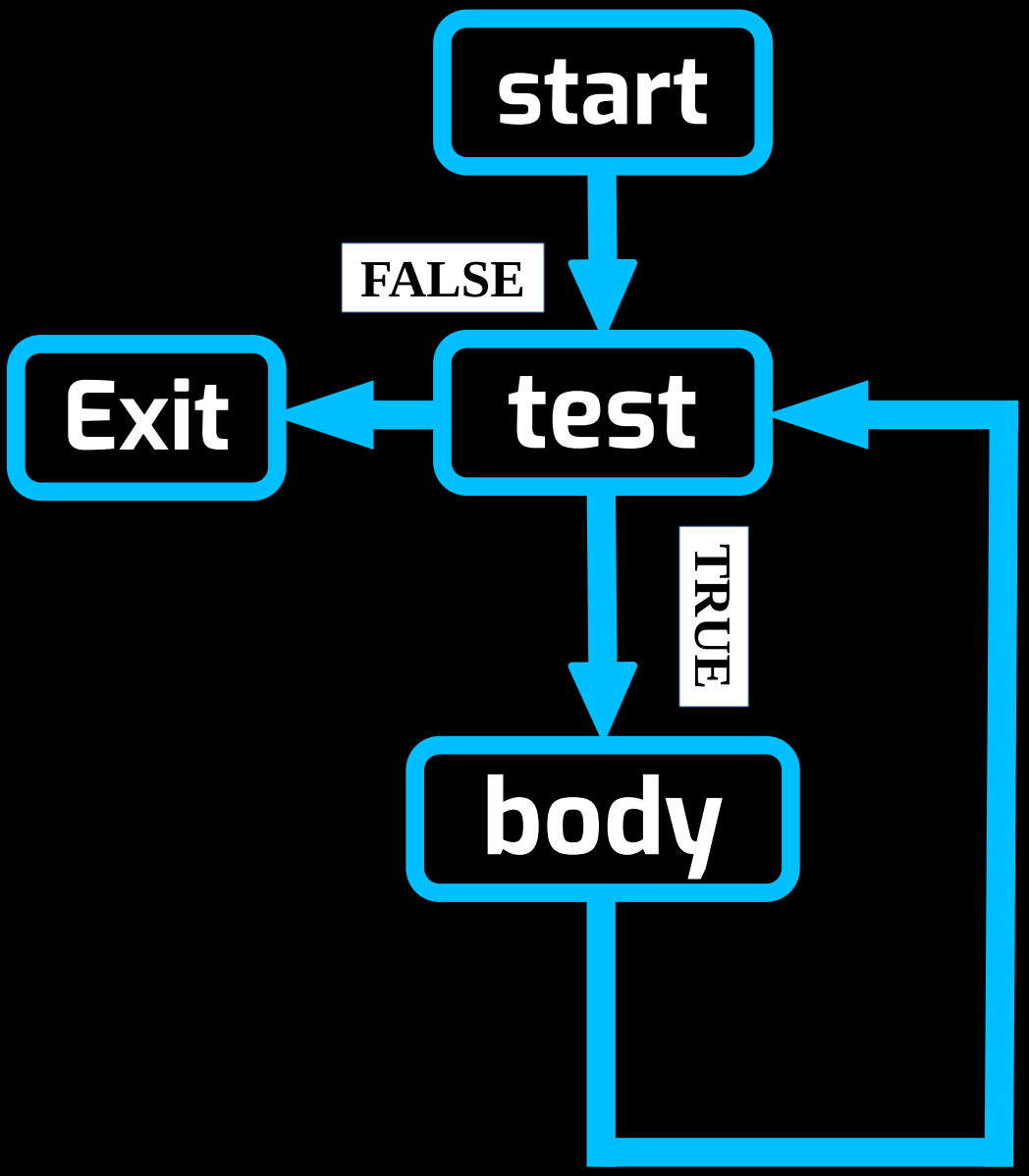
// for loop diagram



```c
// for loop
// main.c

#include <stdio.h> // printf

int main()
{
    for (int i = 1; i <= 100; i++)
    {
        printf("%d ", i);
        printf("\n");
    }

    printf("\nPress Enter to Exit");

    // wait for user to press Enter
    getchar();

    return 0;
}
```

Christopher Topalian

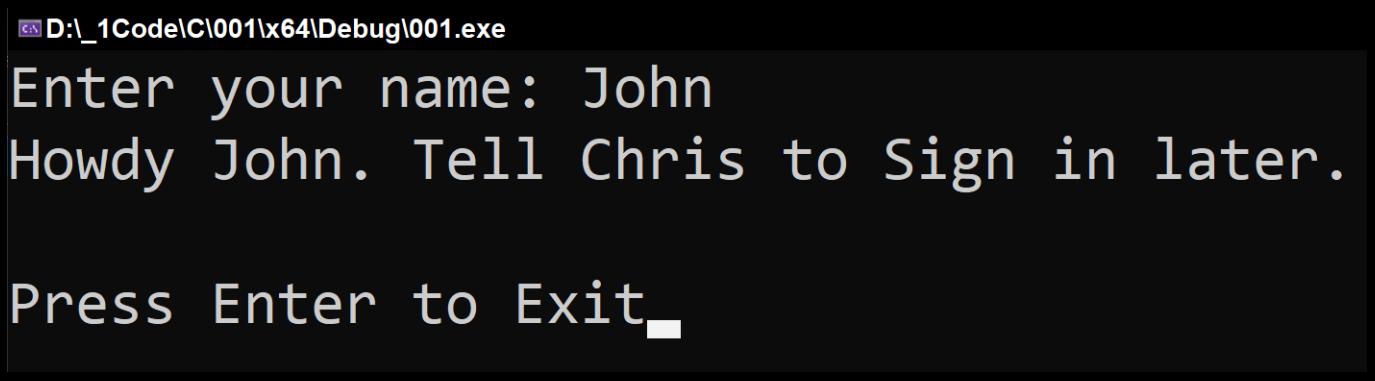
// while loop diagram



```c
// while loop
// main.c

#include <stdio.h> // printf

int main()
{
    for (int i = 1; i <= 100; i++)
    {
        printf("%d ", i);
        printf("\n");
    }

    printf("\nPress Enter to Exit");

    // wait for user to press Enter
    getchar();

    return 0;
}
```

```
// if else - strcmp, without null terminating the string
// main.c

#include <stdio.h>  // printf, scanf_s
#include <string.h> // strcmp

int main()
{
    char name[101]; // buffer to store the name

    printf("Enter your name: ");

    // read input from user and prevent buffer overflow
    scanf_s("%s", name, (unsigned int)sizeof(name));

    // remove newline char left in input buffer
    getchar();

    if (strcmp(name, "Chris") == 0)
    {
        printf("Hi Chris.\nIt is good that you are visiting Earth.\n");
```

```
    }
    else
    {
        printf("Howdy %s. Tell Chris to Sign in later.\n", name);
    }

    printf("\nPress Enter to Exit");

    // wait for user to press Enter
    getchar();

    return 0;
}
```



```c
// if else - strcmp, null terminating the string
// main.c

#include <stdio.h>
#include <string.h>

int main()
{
    char name[101]; // buffer to store the name

    printf("Enter your name: ");

    // read input from user and prevent buffer
overflow
    scanf_s("%100s", name, (unsigned
int)sizeof(name) - 1);

    // explicitly null terminate the string
    name[sizeof(name) - 1] = '\0';

    // remove newline char left in input buffer
    getchar();

    if (strcmp(name, "Chris") == 0)
    {
```

```
        printf("Hi Chris.\nIt is good that you are visiting Earth.\n");
    }
    else
    {
        printf("Howdy %s. Tell Chris to Sign in later.\n", name);
    }

    printf("\nPress Enter to Exit");

    // wait for user to press Enter
    getchar();

    return 0;
}

// This version makes sure that we first null terminate the string before comparison.
```

```
// Open Browser to a URL
// main.c

#include <windows.h>

int main()
{
    ShellExecuteA(NULL, "open",
"https://www.google.com", NULL, NULL,
SW_SHOWNORMAL);

    return 0;
}
```

```
// Open Browser to a URL using char url
// main.c

#include <windows.h>

int main()
{
    // URL to open
    const char* url = "https://www.google.com";

    // open web browser to specified URL
    ShellExecuteA(NULL, "open", url, NULL, NULL, SW_SHOWNORMAL);

    return 0;
}
```

```
// Custom Function - Open Browser to a URL
// main.c

#include <windows.h>

void openURL(const char *url)
{
    ShellExecuteA(NULL, "open", url, NULL,
NULL, SW_SHOWNORMAL);
}

int main()
{
    const char *url = "https://www.google.com";

    openURL(url);

    return 0;
}
```

```
// Create Text File with Data
// main.c

#include <stdio.h>

int main()
{
    // declare FILE pointer
    FILE* outputFile;

    // open file for writing
    if (fopen_s(&outputFile, "ourTextFile.txt",
"w") == 0)
    {
        // write data to file using fprintf_s
        if (fprintf_s(outputFile, "Hi Everyone\n") >
0)
        {
            // close file
            fclose(outputFile);

            printf("Data written successfully.\n");
        }
        else
        {
```

```
            printf("Error writing data to file.\n");
            // close file if an error occurs
            fclose(outputFile);
        }
    }
    else
    {
        printf("Failed to open file.\n");
    }

    return 0;
}
```

```
// Custom Function - Create Text File with Data
// main.c

#include <stdio.h>

void writeToFile(const char* fileName, const
char* content)
{
    // declare FILE pointer
    FILE* outputFile;

    // open file for writing
    if (fopen_s(&outputFile, fileName, "w") == 0)
    {
        // check if file opened successfully
        if (outputFile != NULL)
        {
            // write data to file
            fprintf(outputFile, "%s\n", content);

            // close file
            fclose(outputFile);

            printf("Data written to %s successfully.\
n", fileName);
```

```
        }
        else
        {
            printf("Failed to open file %s.\n",
fileName);
        }
    }
    else
    {
        printf("Failed to open file %s.\n",
fileName);
    }
}

int main()
{
    const char* fileName = "ourTextFile.txt";
    const char* content = "Hi Everyone";

    writeToFile(fileName, content);

    return 0;
}
```

```
// Read a Text File
// main.c

#include <stdio.h>

void displayFileContents(const char* fileName)
{
    // declare FILE pointer
    FILE* inputFile;

    // open file for reading
    if (fopen_s(&inputFile, fileName, "r") == 0)
    {
        // check if file opened successfully
        if (inputFile != NULL)
        {
            // max line length is 255 chars + 1 null
terminator
            char line[256];

            printf("Contents of %s:\n", fileName);

            // read, display file contents line by line
            while (fgets(line, sizeof(line), inputFile) !
= NULL)
```

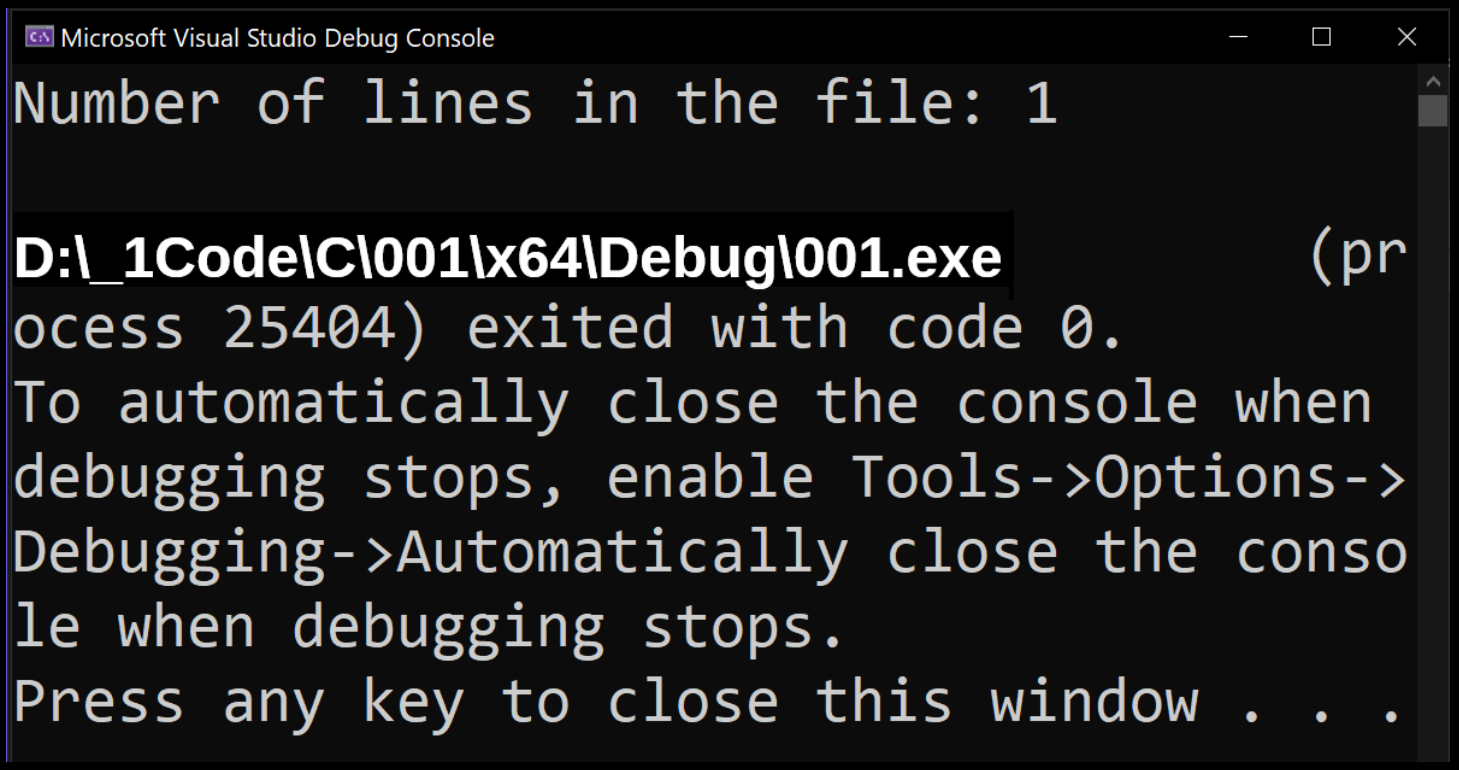
```
            {
                printf("%s", line);
            }

            // close the file
            fclose(inputFile);
        }
        else
        {
            printf("Error opening file: %s\n",
fileName);
        }
    }
    else
    {
        printf("Error opening file: %s\n",
fileName);
    }
}

int main()
{
    const char* fileName = "ourTextFile.txt";

    displayFileContents(fileName);
```

```
    printf("\nPress Enter to Exit");

    // wait for user to press Enter
    getchar();

    return 0;
}
```

```c
// Count Number of Lines in a Text File
// main.c

#include <stdio.h>

int main()
{
    // declare FILE pointer
    FILE* inputFile;

    // open text file for reading
    if (fopen_s(&inputFile, "ourTextFile.txt", "r")
== 0)
    {
        // check if the file opened successfully
        if (inputFile == NULL)
        {
            fprintf(stderr, "File won't open.\n");
            return 1; // return an error code
        }

        // variable to store the count of lines
        int lineCount = 0;
```

```
        // temporary buffer to store each line read
from file
        // max line length is 255 chars + 1 null
terminator
        char line[256];

        // read file line by line and count lines
        while (fgets(line, sizeof(line), inputFile) !=
NULL)
        {
            lineCount++;
        }

        // close the file
        fclose(inputFile);

        // display the total number of lines
        printf("Number of lines in the file: %d\n",
lineCount);
    }
    else
    {
        fprintf(stderr, "File won't open.\n");
        return 1; // return an error code
    }
```

```
    return 0;
}
```

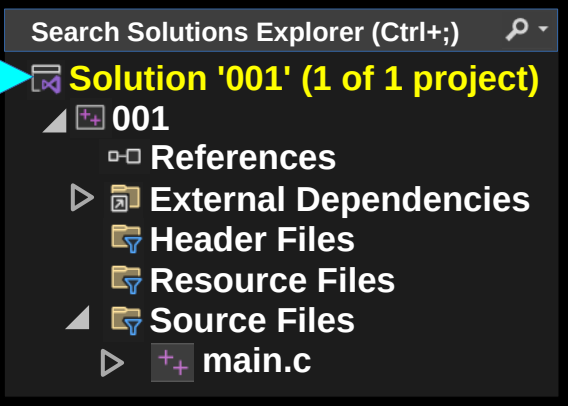

Microsoft Visual Studio Debug Console
Number of lines in the file: 1
D:_1Code\C\001\x64\Debug\001.exe (process 25404) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.
Press any key to close this window . . .

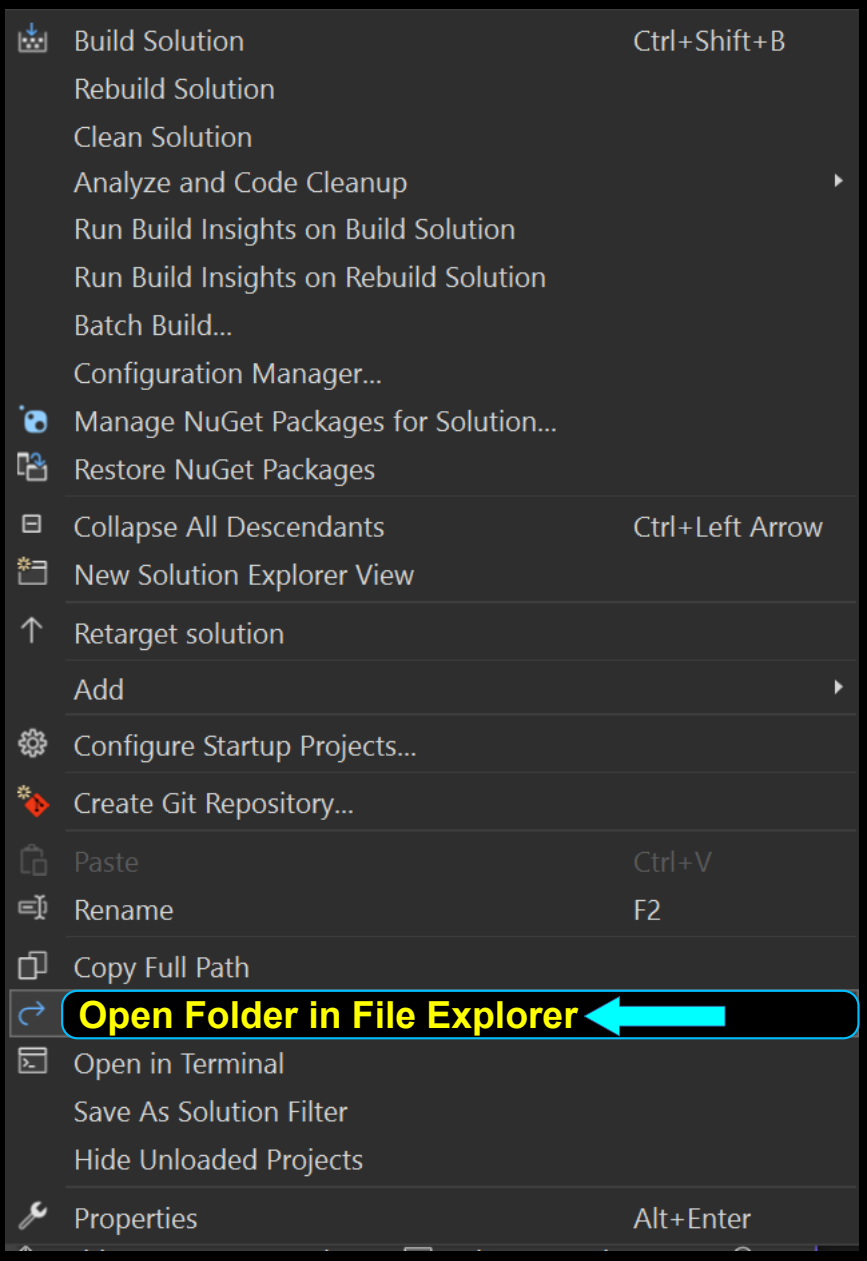
```
// Calculate Hard Drive Memory Statistics

#include <stdio.h>
#include <windows.h>

int main()
{
    ULARGE_INTEGER freeBytesAvailable;
    ULARGE_INTEGER totalBytes;
    ULARGE_INTEGER totalFreeBytes;

    if (GetDiskFreeSpaceEx(NULL,
&freeBytesAvailable, &totalBytes,
&totalFreeBytes))
    {
        printf("Total space: %llu bytes\n",
totalBytes.QuadPart);

        printf("Free space: %llu bytes\n",
totalFreeBytes.QuadPart);

        printf("Available space: %llu bytes\n",
freeBytesAvailable.QuadPart);
    }
    else
    {
```

```
        perror("Error getting disk space
information");
        return 1; // return an error code
    }

    printf("\nPress Enter to Exit");

    // wait for user to press Enter
    getchar();

    return 0;
}
```

// How to Find Our Application .exe File

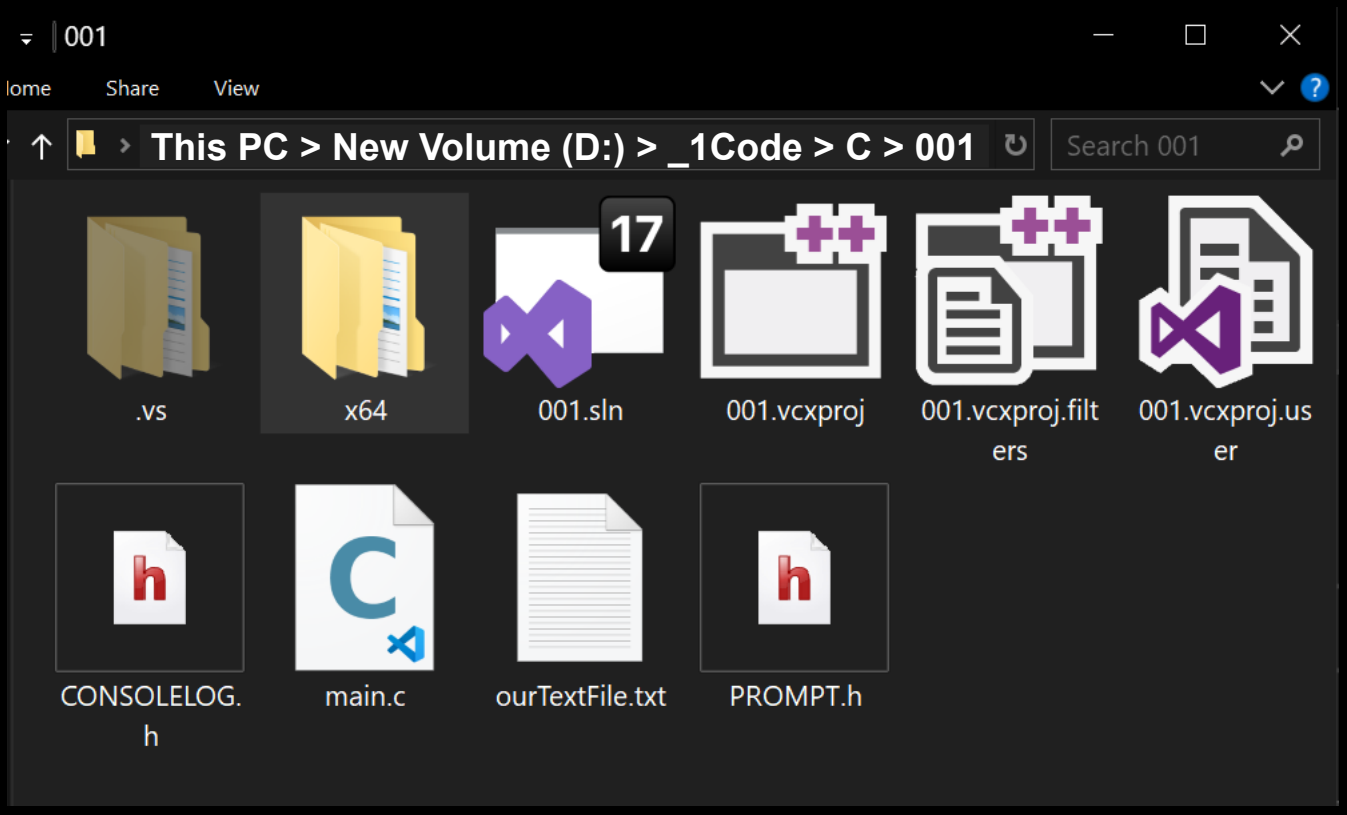
We put mouse arrow on: Solution '001' (1 of 1 project)



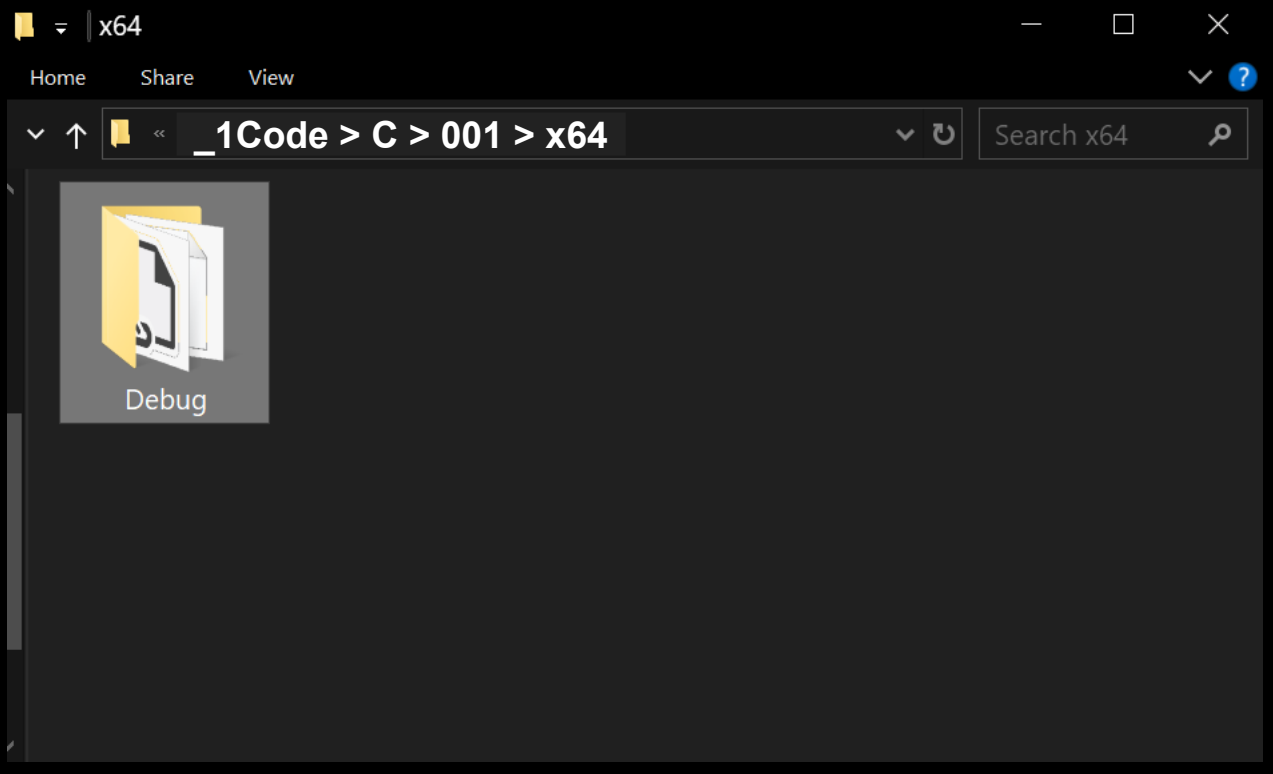


We Choose: Open Folder in File Explorer

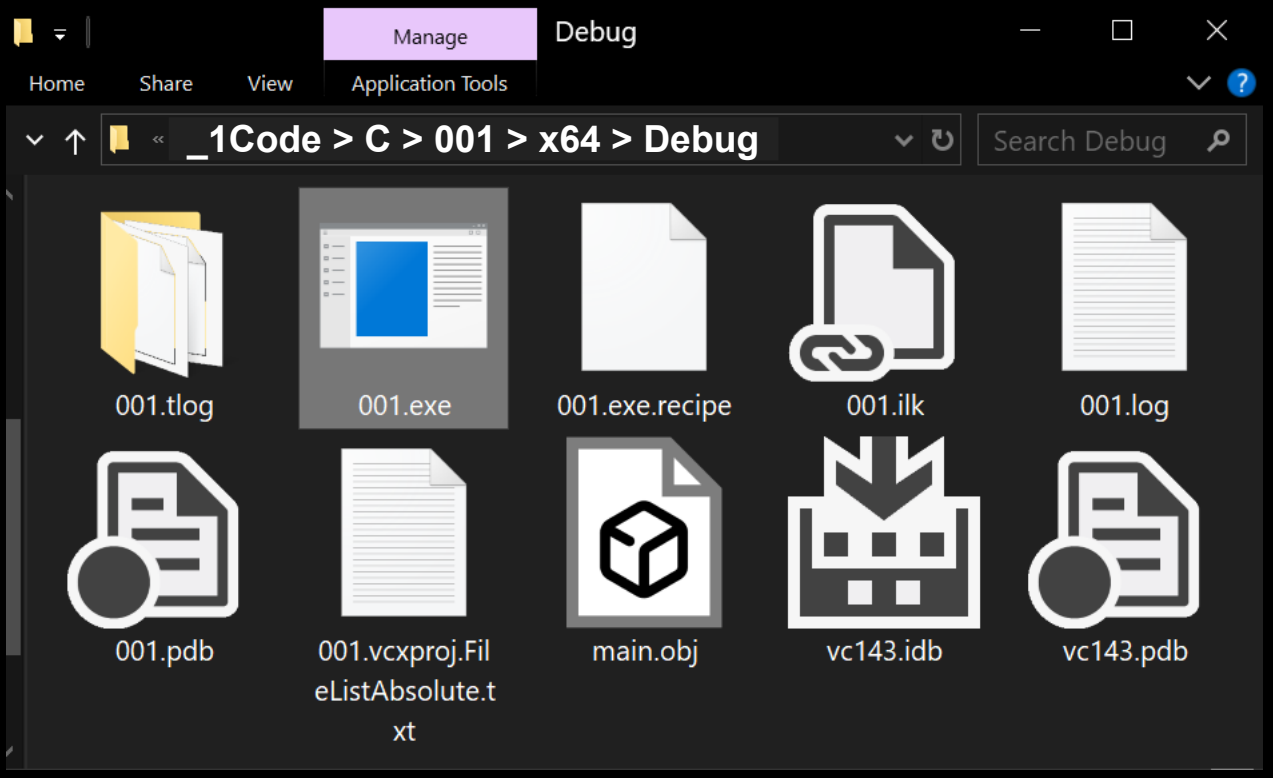
We see that our Project Folder has opened:



We Open: x64 Folder to find the Debug Folder



We Open: Debug Folder to find 001.exe



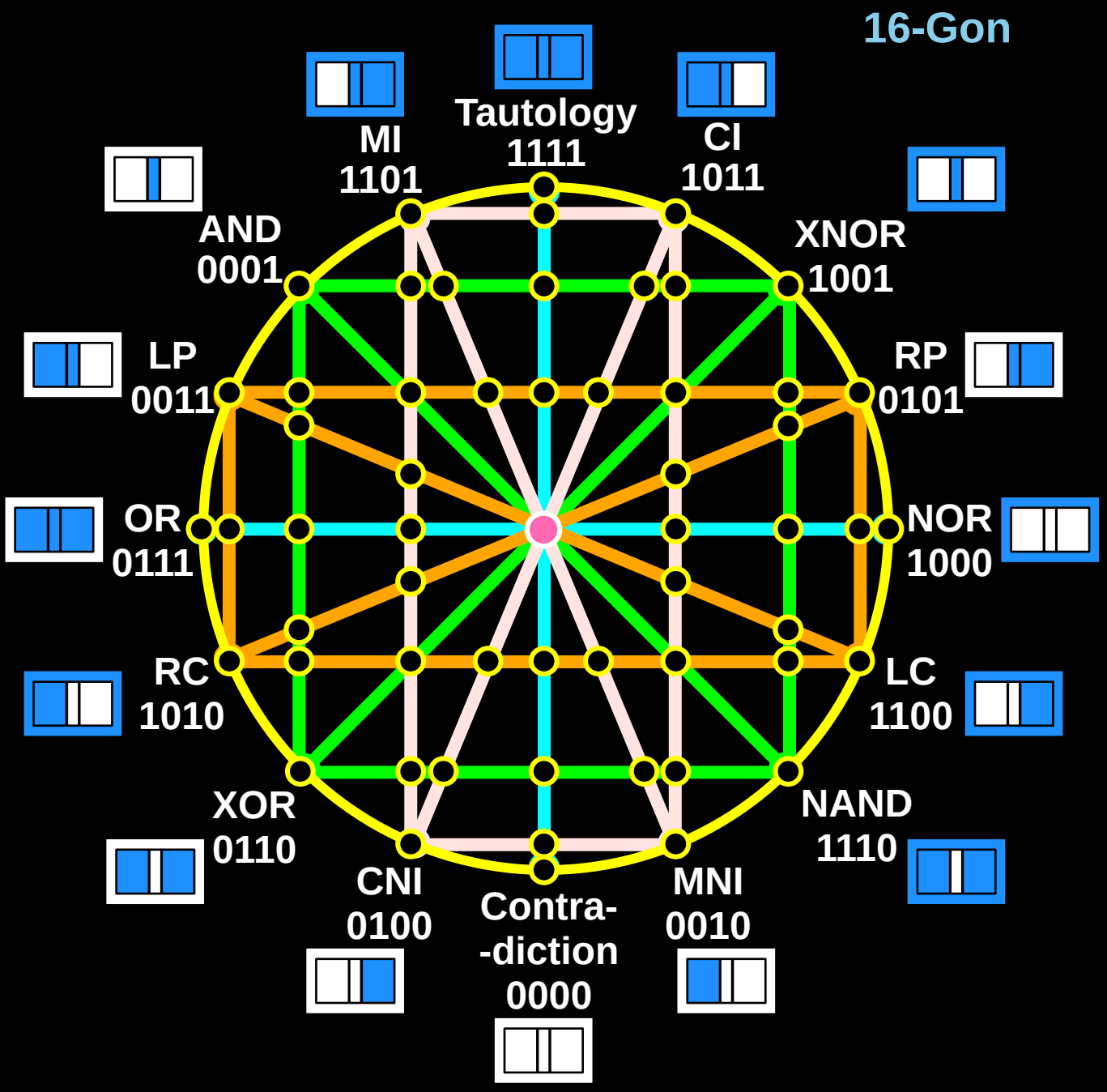
We Double Left Click: 001.exe

Our application should activate.

Happy Programming :-)

Christopher Topalian

True Artificial Intelligence System



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Dedicated to God the Father

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