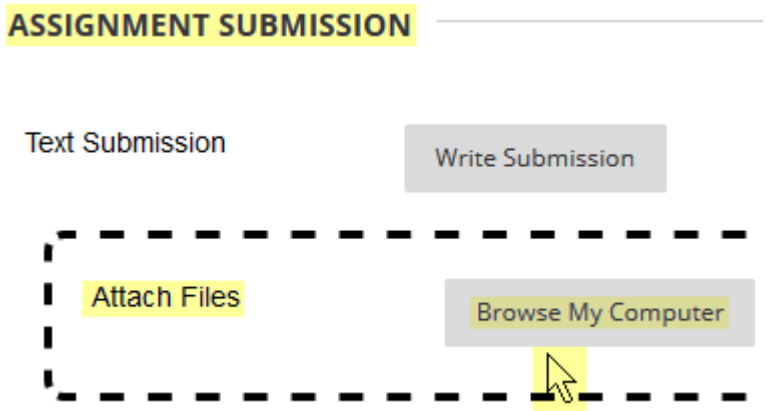
- ✓ There is too much any human being can remember during the first week so making notes, reviewing, and retracing steps is recommended. So is giving yourself a break.
- ✓ ICT is a discipline which often needs much explanation (ICT = Information and Communications Technology) and always requires attention to detail such as reading all the documentation *carefully*. There is no TL;DR in ICT. (TL;DR = Too Long; Didn't Read) **If ICT was simple, easy, and quick, no one would pay us to do it.** This course is no exception and you are being paid to do it, paid in marks, but paid nonetheless so you are now a professional ICT person.
- ✓ The School of ICT tries to be operating system agnostic. We believe in the existence of one true and eternal Turing Machine. When it comes to implementation, faith and beliefs may vary but all are respected.
- ✓ There are times when a particular operating system is necessary and when it is, this course uses Microsoft Windows. Hello, Apple macOS people, welcome…we mean you no harm. That goes for you Linux gurus, too. We admire Apple users for their good taste in hardware and Linux geeks for their virtue of nerdiness. Windows runs about 90% of the desktop/laptop market worldwide. Microsoft PCs dominate 95% of the *business* world's desktops. Why? Apple is a *consumer* product company; there is no server macOS (Apple tried once). Systems development organizations don't care that your iTunes stuff is nicely integrated across all your Apple devices.
- ✓ ***The Visual Studio Community IDE used for your C programming course runs only under a Windows operating system. VS Code can be a viable option for macOs and Linux users.*** *(There is a "Visual Studio for macOS" but it is similar in name only; VS for macOS does not support C/C++ programming.)* Visual Studio IDE is the most used integrated development environment among professional programmers.
- ✓ You do not need a personal Windows machine to be successful at Seneca. Our programs cover all major Operating Systems (IBM, *nix, Windows, with some Apple specific courses); Seneca labs give you access to all OS flavours. There will be times when it is necessary to work on the native OS platform or at least within a virtual Windows machine. Being adept with multiple platforms (hardware and OS) makes you a better ICT professional.
- ✓ For any .zip archive, ensure you work with the extracted files. Extract everything to a folder, then delete the .zip file to avoid confusion. (Yes, you can double click to open a file within a zip archive—the OS automatically extracts it to a deeply buried

temporary work folder—but you cannot easily work with those temp files for this, or any, activity.)

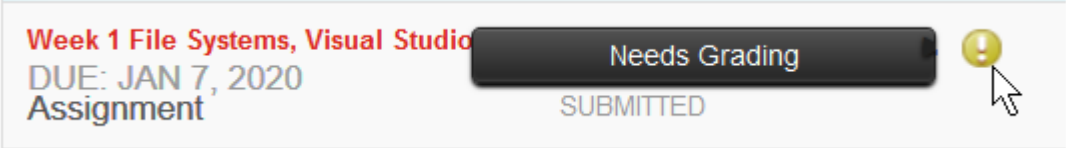
- ✓ For weekly activities, please feel free to talk about the activity with your colleagues but use only your own words in your answers. Share ideas, not files. Talk all you want, don't record anything or share files.
- ✓ A suggested format for file naming:
  *term*_course_W*nn*_*content*.docx
  where W*nn* is the week number and *content* describes what is in the file, e.g.
  *term*_CPR101_W*01*_*File systems-VisualStudio*.docx
  It's a good file name if, six months from now, you don't have to open the file to know what's in it.

✓ **Submit only the completed activity file in *MS Word .docx format* through Blackboard via the weekly topic link in Course Documents.** Your professor may charge you up to 50% for the effort of dealing with any other file format. No need to enter any "Submission Text" or add comments...they just slow down both our processes. No need to include your Visual Studio project or source code file.
Week 1 File Systems and Visual Studio ← from Course Documents, click this link and scroll down…

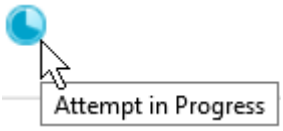


Drag and drop your .docx file here. Click [Submit] and **wait** for the success message near the top of the screen; review the contents of the submitted file when it is rendered. To correct a submission, click [Start New] and resubmit. Only the most recent submission will be marked.

A "Submission received" email is also sent. Go to **My Grades** to confirm. If you see an exclamation mark symbol, you are done; it ready to be marked by your professor.



If you see a blue clock icon in My Grades,



then it did not work usually because the tab / browser / computer was closed during the submission process. Resubmit.

✓ **Note for any course**: answers copied and pasted without citation and referencing will result in a minimum of zero marks **FOR THE ENTIRE SUBMITTED WORK**, may incur a penalty (a negative mark), and may be subject to Academic Integrity review. Please DO *discuss* aspects of the activity with your colleagues and professor but create the answer in your own words according to your own understanding. The rule is: you can **talk all you want but don't copy/paste** *anything* without attribution, citation, and references. Share ideas, not files.

✓ **What about the content and expression of your answers? How will your answers be evaluated?**

See the course marking rubric. Straightforward answers get straightforward marks. Answering with *why*, in addition to *what* or *how*, gets more marks. In the A and A+ grade range, your professor has found you provided responses beyond or below the surface of the questions. E.g. how to "delete a file from a PC permanently so it cannot be recovered"? There is more than one way. An A+ submission is easy to read and insightful. It communicates your answers clearly, correctly, completely, concisely, concretely, and with consideration for your reader; creativity is always welcomed. An A+ answer is similar to the quality of articles you might read on reputable news sites or in print.

Part 1 of 4: Visual Studio Community introduction (25%)

Complete the Visual Studio project creation and Hello World program using the Visual Studio IDE (Integrated Development Environment) or your own code editor if you must. See the CP4P_Week1_VS_demo within the zip file where you found this document, and **see the Getting Started page via the C programming course's home page. It contains guided videos and useful setup instructions for other utilities needed in C programming.** For diploma programs, see

https://ict.senecacollege.ca/~ipc144/pages/startup/index.html or for the degree program, see https://ict.senecacollege.ca/~btp105/pages/startup/index.html

Answer these ➔ questions in the …_Activity.docx

Explanations and approaches to these questions is offered here in the instructions document. Skipping the details in the instructions skips marks. (Perhaps only the people who pay attention to the details are reading this, so thanks.)

➔ What platform are you working on: Windows, macOS, Linux?
What code editor / IDE did you use to create the demonstration `helloWorld.c` source file?

➔ Where is your helloWorld.c source file? Find the file and paste its Full Patch:

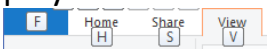
- Windows users: hints at using File Explorer to find your Visual Studio project's files are in the VS demo document.
- macOS users: this may be useful "Find the Absolute Path to a folder or directory in Mac OS X", also THIS – see Part 1: 1. 4. 5. and ignore the rest.

➔ What is in the helloWorld.c file? Source code, of course. Copy the text of your customized source statements from the Visual Studio editor and paste in the box below using the Paste Option to either Merge Formatting (M) or Keep Text Only (T).

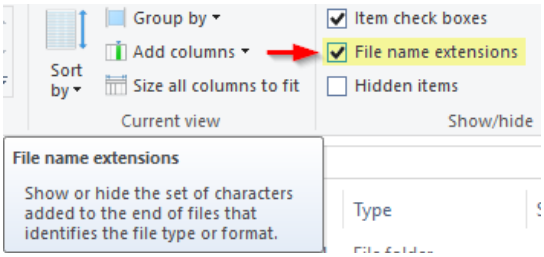
***N.B.** there is no need to submit the VS project or the .c source file itself with this week's activity…just your C code above.*

Part 2 of 4: File names and file extensions (25%)

Four files can be found in the "CP4P_Week1_Activity_WorkFiles" subfolder. Those files all have the wrong file extension. Your task is to correct the extension on those file names so the system can properly process those files.

- in File Explorer, if extensions are not being displayed:
  i. Press Alt-V to activate the View menu: 

  ii. Click to turn on the display of "File name extensions"



Normally, when you right-click a file, a number of options are available to process that file. E.g. Preview, Open, Open with > [optional applications]. These options are based on the file's extension which the system relates to an application. Double clicking a file name opens it using the default application.

file**.txt** ⇨ Notepad file**.jpg** ⇨ Windows Picture Viewer
file**.html** ⇨ Web Browser file**.bmp** ⇨ Paint graphics

If there is a problem with the data within the file, the default application may issue an error message or, as many manuals say, "results may be unpredictable".

Click and drag the file from File Explorer and drop it into a browser; any browser can render any of these file types but only if the file's data matches its file extension. Firefox gives the best feedback when there is a problem. If nothing happens when you click and drag, you are probably dragging a compressed file from the .zip. Software applications work only with uncompressed file data.

➔ What happens and what do you see when each lunamoth file is dropped into a browser? (Firefox preferred) It will not be as expected from the file extension.

To see the file's data which is causing problems, open those files with Notepad to inspect their content:
Start Notepad (⊞ + "Notepad"), Open the file (Ctrl+O or File / Open) or just click and drag the file from File Explorer and drop into Notepad. This will display the file's binary data as characters. Examine the raw data and determine what the file's extension should be.

- Text files (.txt) can contain any characters but usually contain human readable information formatted with little more than TAB and newline special characters.
- Web pages are text files with **HyperText Markup Language** (.html, .htm) that browsers use to display content. Visit https://en.wikipedia.org/wiki/HTML#Markup to see what HTML files look like.
- Find out what a **JPEG** (.jpg) photo file and a **bitmap** (.bmp) graphics file begin with. See https://en.wikipedia.org/wiki/List_of_file_signatures for data used to identify the content of a file.

➔ What should the proper extensions be for those files, and how did you know?

➔ What are the logical steps to rename the lunamoth files?

Our task is to issue Operating System instructions to rename each filename.extension so its data can be processed by the related application.

Rename from	**To** …*but* To *already exists*

`filename.abc`	`filename.def`
`filename.def`	`filename.ghi`
`filename.ghi`	`filename.jkl`
`filename.jkl`	`filename.abc`

The problem to solve is the OS will not allow us to rename `filename.abc` to `filename.def` when `filename.def` already exists.

You can rename the files in any order. Hint: an extra rename step is needed.

We must assume there are scripts or HTML pages on the server referencing the original file names. So, we cannot make up new names or expect anyone to see the Operating System's error messages. Interactive dialogs work for end-users but not for ICT professionals who write automated scripts for these tasks.

➔ What does this experience tell you about the importance of file names and their extensions?

Part 3: Working drives while doing common file/directory operations (25%)

- Open File Explorer and navigate to your folder containing the above Week 1 files.

In the left hand pane within the folder tree, use right-click…

- Create a new folder somewhere on the drive.

➔ What happens when you select the lunamoth files in your original folder, then drag and drop them to a **different folder** on the **same drive**? Do the files still exist in the original source location?

➔ While dragging a file anywhere within the **same drive** and continuing to hold the left mouse button, press the Ctrl key, then release the Ctrl key, then press the Ctrl key. How does the message displayed near the mouse pointer change?

Programmers almost always click, drag, and drop using the **right** mouse button.

➔ What happens when you drag and drop a file using **right** mouse button?

!!! Operating systems default for file copy versus move:
- a file dropped within the **same** file system is **moved**. E.g. from and to C: drive
- a file dropped in a **different** instance of file system is **copied**. E.g. from C: to D:

➔ What happens when you select the lunamoth files in your original folder, then drag and drop them to a **different drive** attached to your computer? E.g. a USB drive. Do the files still exist in the original source location?

➔ After deleting a file from the PC's internal drive, can you get it back? If so, how?

➔ How can a file on the PC's internal drive be deleted permanently?

There are two types of USB drives: Removable (small solid-state “thumb” drives) and External (“desktop” versions have their own power supply, “portable” versions are USB powered). To determine the type of a USB drive, Right-click on it under “This PC”. If the pop up menu shows an “Eject” option, the drive is Removable; otherwise, it is an External type drive. Deleting a file from one type of USB drive allows recovery of deleted files, but deleting a file from the other does not. Right-click Recycle Bin > Properties to see drives with deletion protection.

➔ If you have a USB drive, is it the Removable or External type?
If you have files in the "cloud", where are they?
After deleting a file from a USB or the cloud, can you get it back? If so, how?

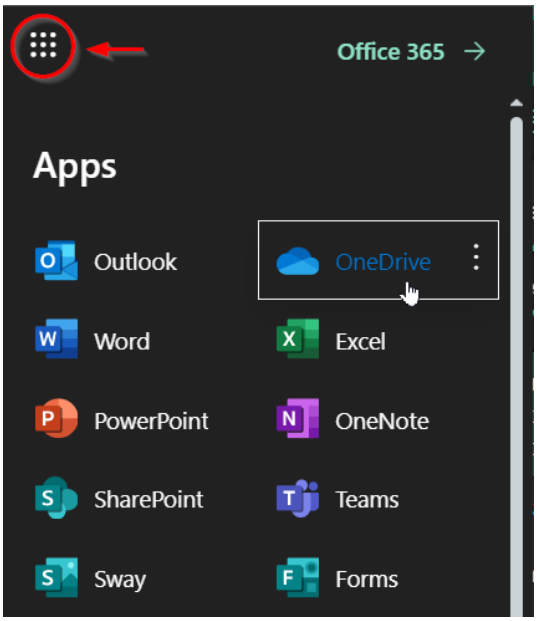
Part 4: Managing and Backing up your files (25%)

ICT professionals need their files to be readily accessible, even when their personal computer or a network connection to cloud storage is not.

You can store and work with your Visual Studio projects (in **`repos`** or **`Projects`** folder) directly on a USB drive or your Microsoft 365 OneDrive at Seneca in addition to your own computer.

If you haven't yet tried your Microsoft 365 OneDrive at Seneca, now is the time. You have 1TB of cloud storage there.

Sign on to mySeneca.ca, click on the grid in the top left which opens the Apps menu, click on OneDrive.



➔ Using the web app version of your Microsoft 365 OneDrive, try to edit a text file, a C source code file, and an MS Office file (Word or Excel or PowerPoint) stored there. How did it work? Have you installed the local OneDrive application? Whether yes or no, for what reasons?

➔ It takes effort to copy files and directories from a USB drive or OneDrive / cloud to the local drive, work with and save them locally, and then transfer back to the source location. Is it worth the effort? Why or Why not? What are the benefits and risks in having the same file on both your local system *and* on another drive or a remote system?

Be careful here. Synchronising your local drive with cloud storage means one file is in two places at the same time. *A backup file is a separate copy in a different non-synch'd place than the active file.*

All done? Time to backup.

A proper backup is TWO *COPIES*, at least one is in a geographically separate location on an independent system.

The active file on your computer does not count. It is the original, not a copy. A copy stored on the same computer does not count because it is in the same location on the same system.

- TWO copies
  - One copy is ideally on a nearby USB removable/external drive or a local network attached storage system – something you can put your hands on. This copy must be available if an Internet connection is not.
  - The second copy can be in the cloud or on a device in a different place from your computer.
- geographically separate location for storing a copy = a safe place nowhere near your computer.
  - If Godzilla or King Kong wrecks your building, your backup is available in an offsite location.
  - Cloud storage is a good option. Email works in a pinch.
  - Encrypt offsite backups. E.g. use 7zip archives with AES-256 encryption.
- an independent system = once the backup is done, the backup device is disconnected from your computer.
  - This means the external drive is unplugged. The cloud data storage location is *not* synchronized with your computer's file system.
  - If the copy is on the same drive, a plugged-in USB drive, or is in an available network location / mapped network drive, then it is on a *dependent* system and is subject to accidental deletion, ransomware encryption, and other misfortunes.
  - If two clouds are used for backup, they are likely in geographically different locations, but because they are unavailable without an Internet connection, there is a systems dependency. Thus the need for a locally available copy.

➔ What are the locations of your backup and how frequently do you do a backup?

<u>Notes</u>

You can work with your Visual Studio projects directly on your own laptop, a USB drive, a personal OneDrive, or your Office 365 OneDrive. Make one of those your standard practice as the active version. Make a copy of all your programming projects by storing the `/repos` or `/Projects` folder in a .zip archive, then copy/move the archive file to a geographically separate, independent system.

Synchronization of your PC's files with a cloud data service makes your system *interdependent* with the cloud; the synchronization is convenient but the systems are not independent. Although separated by geography, you have one file coexisting in two places. That is neither a copy nor a backup until you disconnect from the cloud service – only then are the two systems independent. As soon as you reconnect, files are sync'd and you once again have neither a copy nor a backup. If a file is deleted in one system, it will be deleted from all other sync'd systems.

Windows File History (macOS version is Time Machine) backs up and provides a generational version history of files and folders referenced in "Libraries". This is a good option for your second backup copy because its storage location can be independent of your computer's file system. Libraries, seen in File Explorer, are virtual containers of files and folders on the local computer. Windows, by default, has Libraries which reference your Documents and other commonly used folders. External drives and other folders or locations to be included in File History must be referenced in a new or existing library. Removable drives can be referenced in a library, but beware, they are not included in the File History.

USB file recovery: Web pages suggesting the use of CHKDSK and ATTRIB to recover USB file deletions always offer an option "if that doesn't work" to "buy our software". That is because CHKDSK and ATTRIB simply will not and *cannot* recover *deleted* files. That is *not* what those DOS/Windows operating system commands can do. This site is the only one we've seen that is honest about exactly what those commands do, but those are for rare cases, not simple file deletion.

Make sure you have a proper backup before restarting or shutting down a Seneca lab PC – when it starts, the PC is reset to its default state. That is, all files from the previous session are gone. At the start of term, it is worth confirming that that the PC is correctly configured: the D drive should indeed be temporary, and C:\Users\ should have retained none of your files.

USB flash drives are wonderfully portable which makes them easily losable. If you do lose your drive, usually by forgetting it in the lab PC, how will it ever get back to you?

> *Little Bo-Bleep*
> *has lost her USB-flash-drive-with-files-on-each-of-her sheep,*
> *And doesn't know where to find it;*
> *Without her name,*
> *Home ne'er it came,*
> *But would have if she had signed it.*
>
> (Sadly, she didn't have a backup.)

- Rename your USB drive's volume label to your name.
- Put a **`!!_PLEASE_RETURN_TO_!!.txt`** file in the root with your email address, contact information, and a nice message promising a reward coffee.
- Put your name on the outside of the USB drive.
- And it just might come home wagging its data behind it.