
Lab
01
CST8152
Compilers

Algonquin College

Computer Engineering Technology

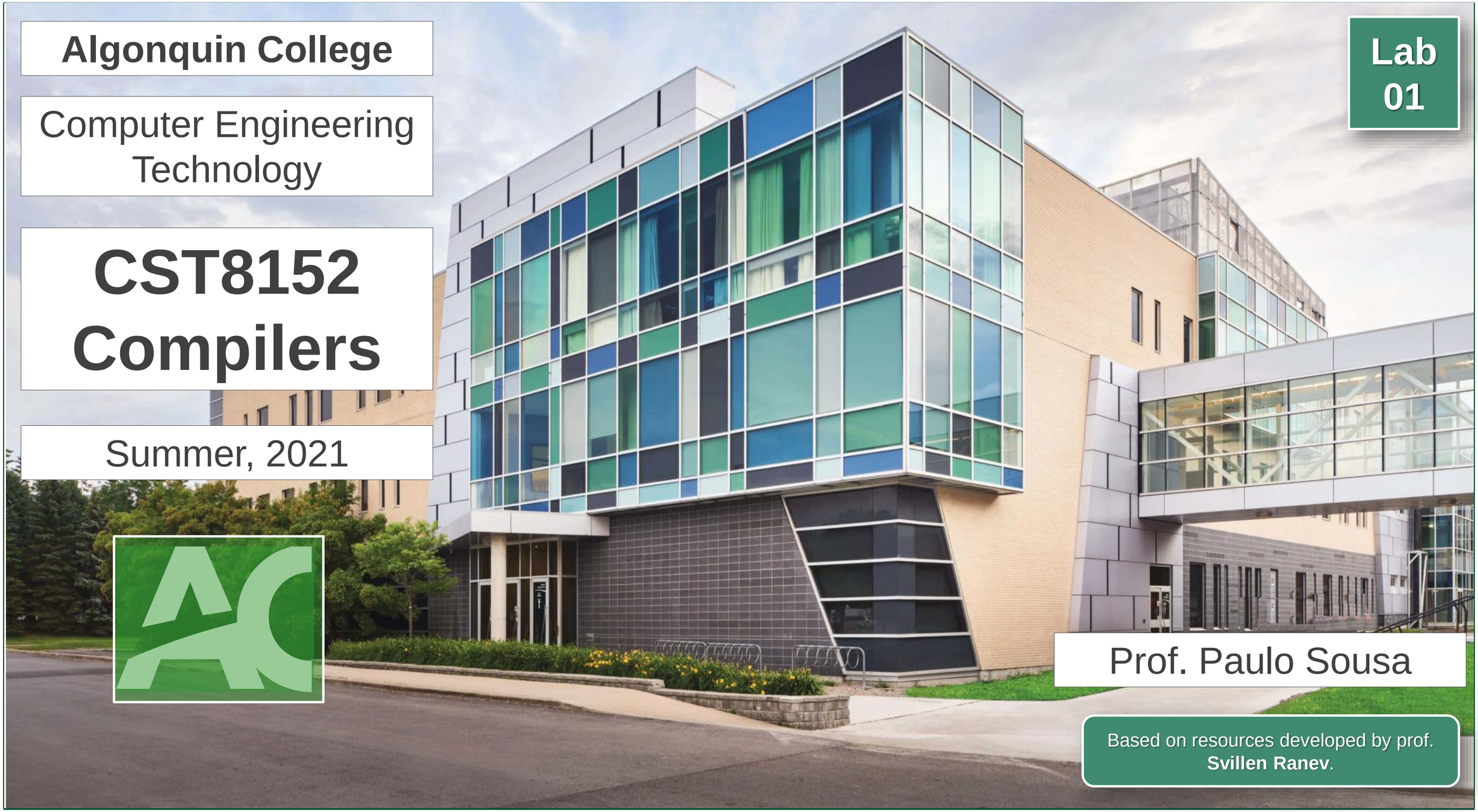
CST8152 Compilers

Summer, 2021

Lab 01

Prof. Paulo Sousa

Based on resources developed by prof. **Svillen Ranev**.



Algonquin College

Computer Engineering Technology

CST8152 Compilers

Summer, 2021

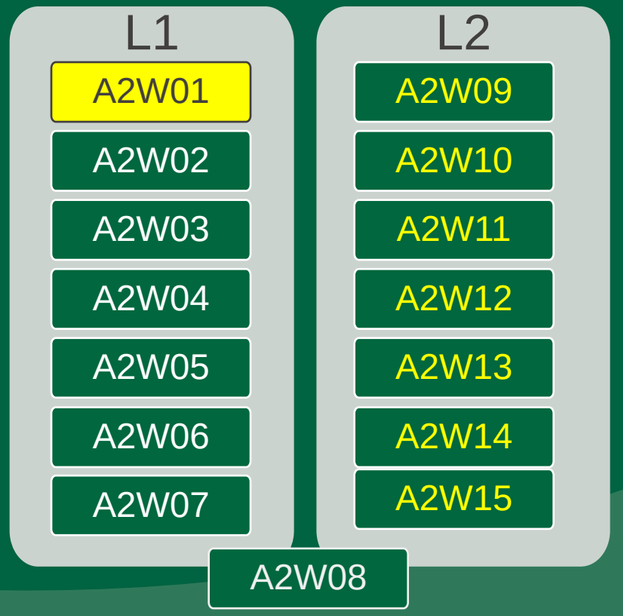
Lab 01

Prof. Paulo Sousa

Based on resources developed by prof. **Svillen Ranev**.

Lab 1: Hello Lab

First Week Lab – Environment preparation



Welcome

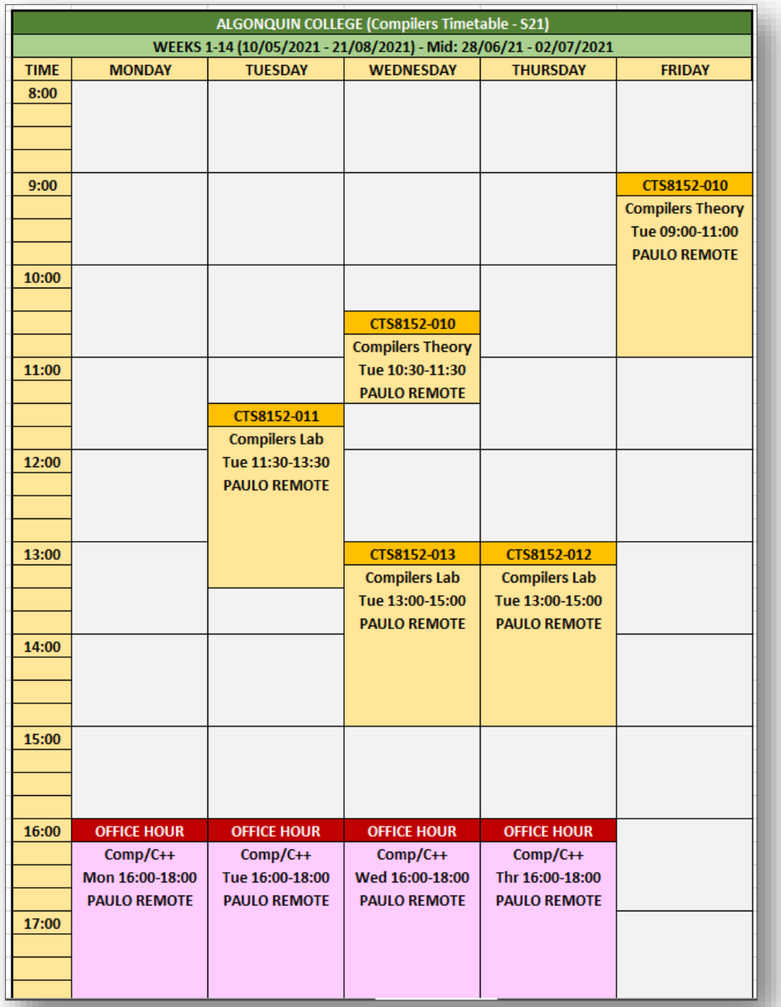
- Remember dates:

Assignments:

- **A11** - Compiler Specification - May 22nd (Week 2)
- **A12** - Buffer Modification - Jun 5th (Week 4)
- **A21** - Language Models - Jun 19th (Week 6)
- **A22** - Scanner Implementation - Jul 10th (Week 9)
- **A31** - Grammar Definition - Jul 31st (Week 12)
- **A32** - Parser Implementation - Aug 14th (Week 14)

Exams:

- **MidTerm1** - Week 5
- **MidTerm2** - Week 10
- **Final Exam** - Week 15



ALGONQUIN COLLEGE (Compilers Timetable - S21)					
WEEKS 1-14 (10/05/2021 - 21/08/2021) - Mid: 28/06/21 - 02/07/2021					
TIME	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
8:00					
9:00					CTS8152-010 Compilers Theory Tue 09:00-11:00 PAULO REMOTE
10:00			CTS8152-010 Compilers Theory Tue 10:30-11:30 PAULO REMOTE		
11:00		CTS8152-011 Compilers Lab Tue 11:30-13:30 PAULO REMOTE			
12:00					
13:00			CTS8152-013 Compilers Lab Tue 13:00-15:00 PAULO REMOTE	CTS8152-012 Compilers Lab Tue 13:00-15:00 PAULO REMOTE	
14:00					
15:00					
16:00	OFFICE HOUR Comp/C++ Mon 16:00-18:00 PAULO REMOTE	OFFICE HOUR Comp/C++ Tue 16:00-18:00 PAULO REMOTE	OFFICE HOUR Comp/C++ Wed 16:00-18:00 PAULO REMOTE	OFFICE HOUR Comp/C++ Thr 16:00-18:00 PAULO REMOTE	
17:00					

Compilers Lab Dynamics (1)

- **Step-by-step:**

1. Each lab activity is related to a specific Assignment (or extra activity demanded by Lab prof.);
2. The time in the Lab should be used in order to progress towards the final solution;
3. During this time, doubts and suggestions can be discussed with the assistant professor;
4. It is important to follow the script defined to each Assessment and respect the deadlines.

Source: https://www.algonquincollege.com/pembroke/program/computer-systems-technician/gallery/

Compilers Lab Dynamics (2)

- **The Assignments**

1. There are 6 assignments (programming project) with increasing complexity:
    1. **Two related to Compilers and structures (buffer);**
    2. **Two related to Language recognition (scanner)**
    3. **Two related to Language structure (parser)**;
2. The assignments must be done individually or by a recognized team work (only two students);

Source: https://techcrunch.com/2016/05/10/please-dont-learn-to-code/

Compilers Lab Dynamics (3)

- **Standards and Requirements**

1. All assignments must use a standard;
2. The project includes rules for comments, syntaxes, interface definitions and other observed rules;
3. The assignments must be delivered electronically and also printed.

Source: https://regtechassociation.org/wp-content/uploads/2018/10/Standards-stock-image-1400x650.jpg

Code of Conduct

- **Beyond the Code…**

1. No Harassment / Discrimination / Violence;
2. No infringement of Copyright Act;
3. No permission to Software Piracy
4. Respect to Algonquin College Policies AA32, SA07 and IT01.

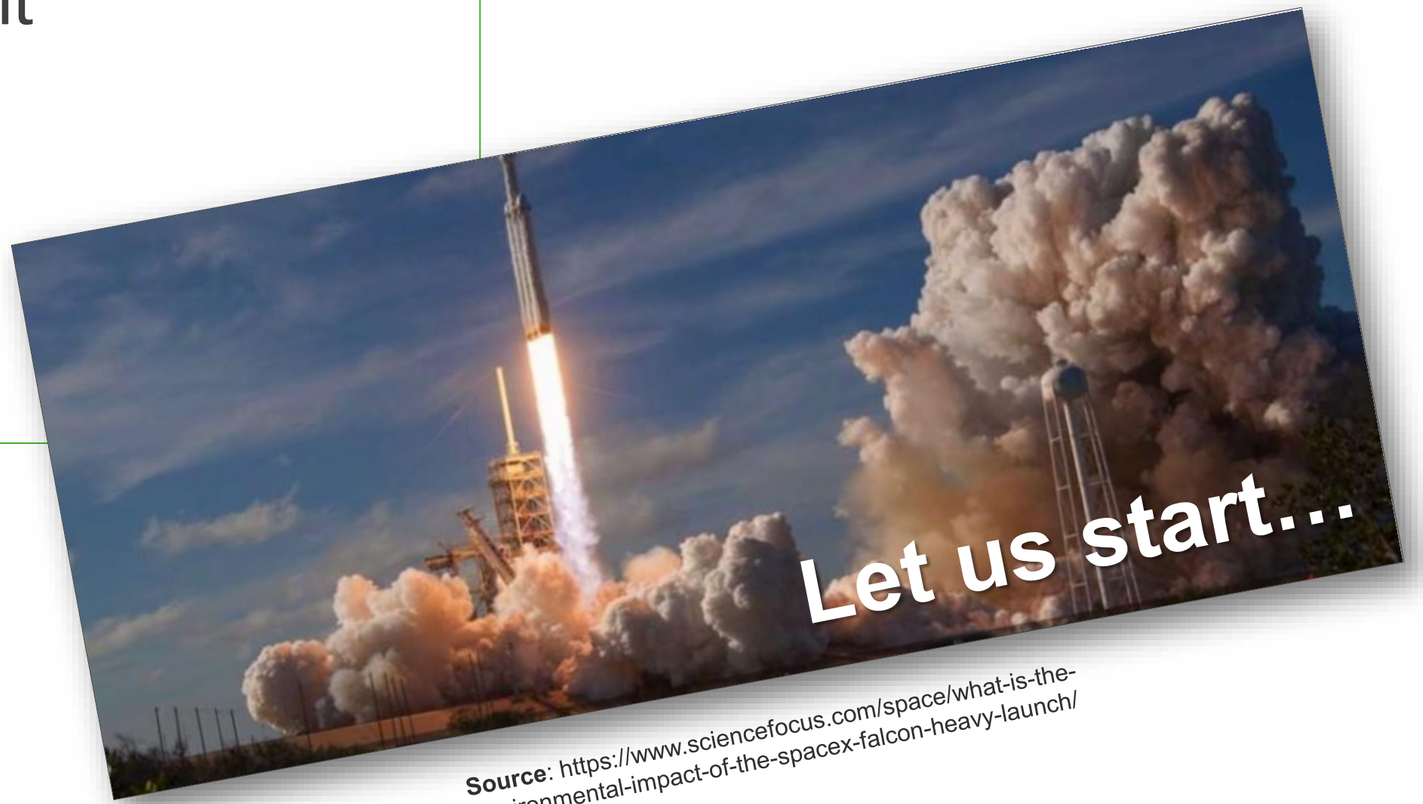
- **Important:**

No copies are allowed between the individuals / teams

Source:https://www.cdc.gov/ethics/images/Ethics.png

Weekly Outcomes

1. Preparing Environment
2. Lab 1 – C Practice



Source: https://www.sciencefocus.com/space/what-is-the-environmental-impact-of-the-spacex-falcon-heavy-launch/

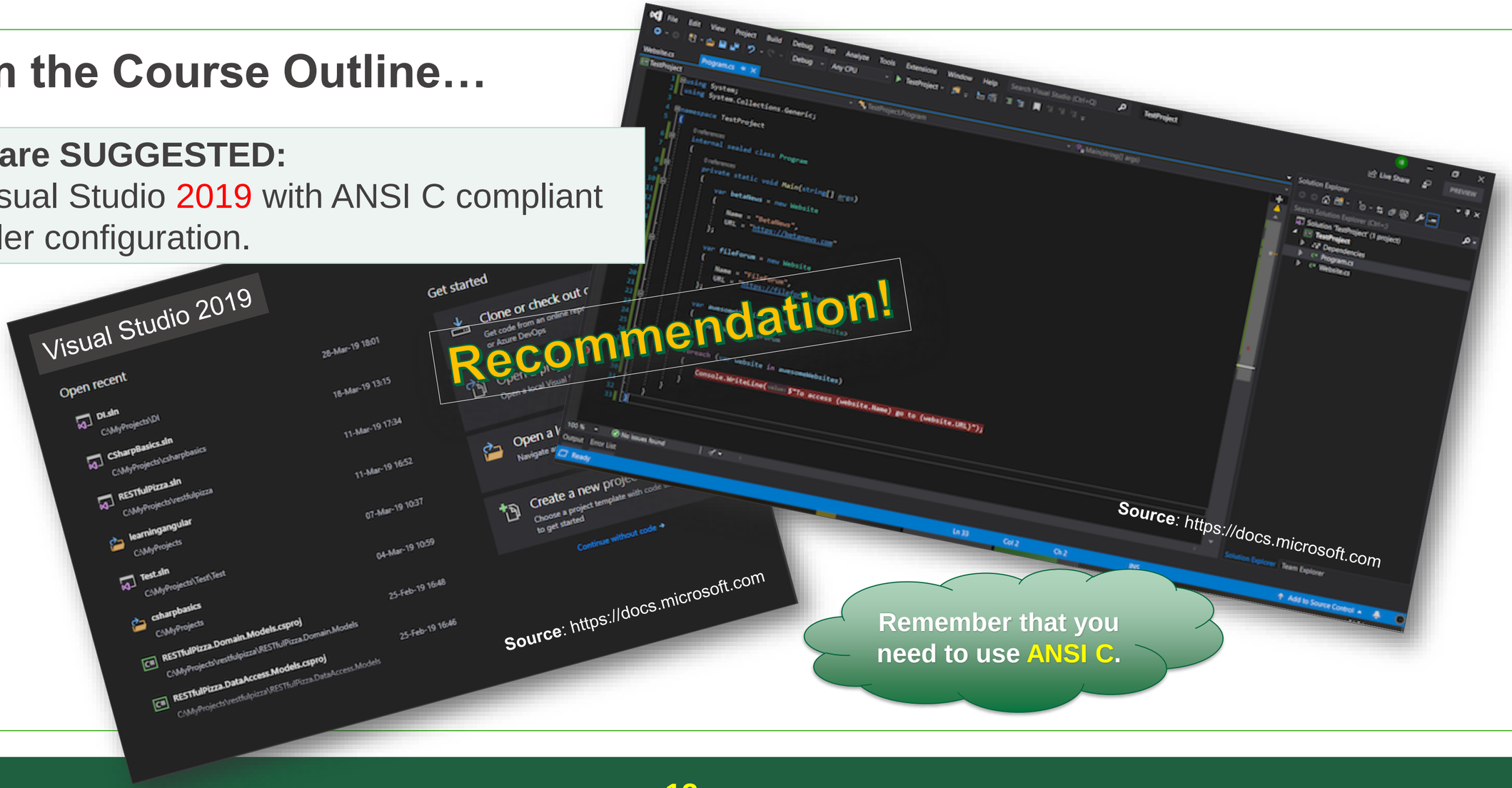
Compilers – Week 1

Preparing the Environment

Compilers Lab Preview – Environment

- **From the Course Outline…**

Software SUGGESTED:
MS Visual Studio 2019 with ANSI C compliant compiler configuration.



Remember that you need to use ANSI C.

12

Instructions

- Read the following documents (in this sequence):
  - ProjectVisualStudio_v2019
  - ProgrammingTask_Lab1

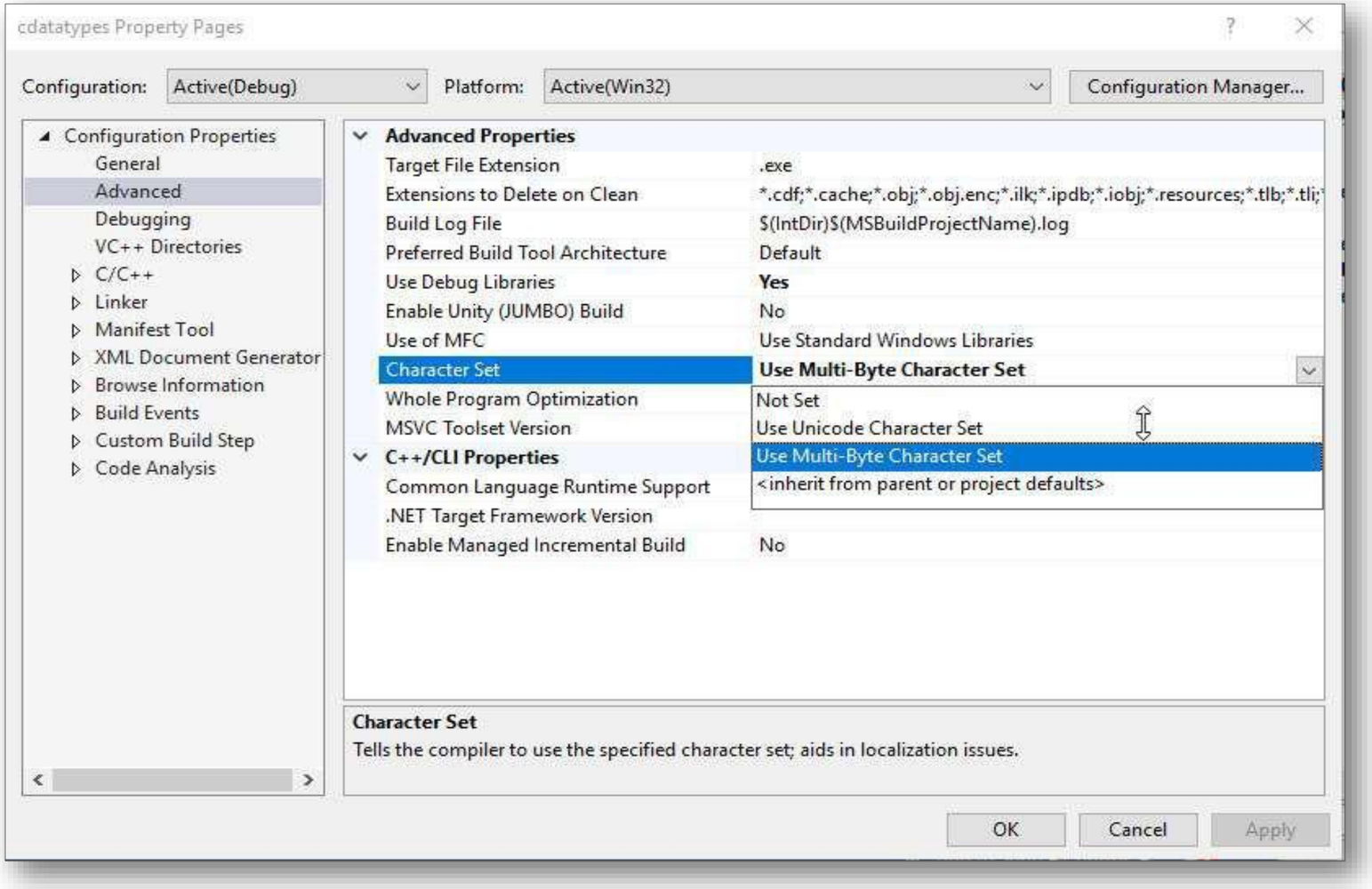
MS Visual Studio 2019 is the standard for Lab Evaluation.

VSCode is also a allowed, but you need to use ANSI C.

- See documentation

Source: https://www.algonquincollege.com/pembroke/program/computer-systems-technician/gallery/

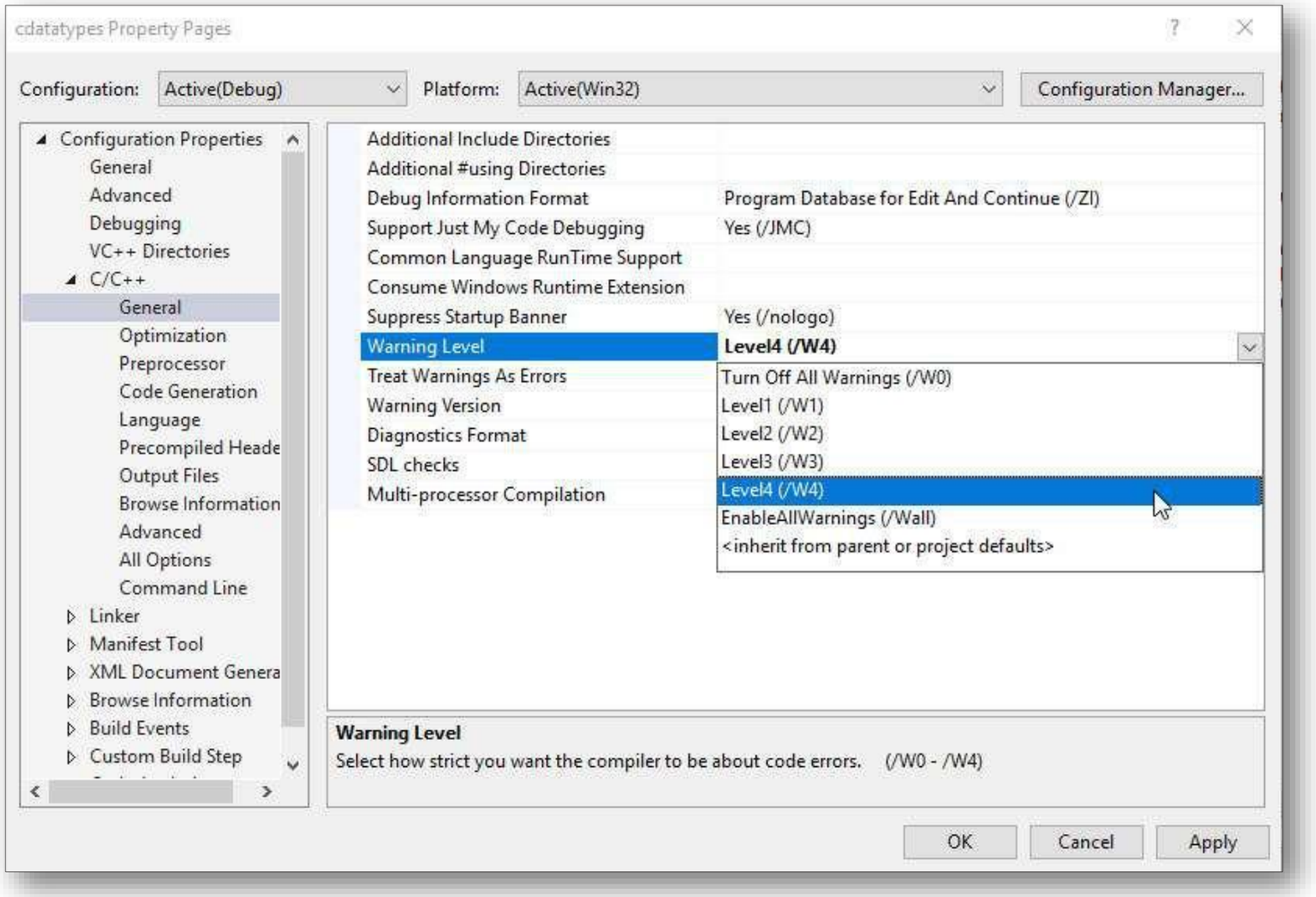
Compilers Lab Preview – Environment



Character set: Not Set.

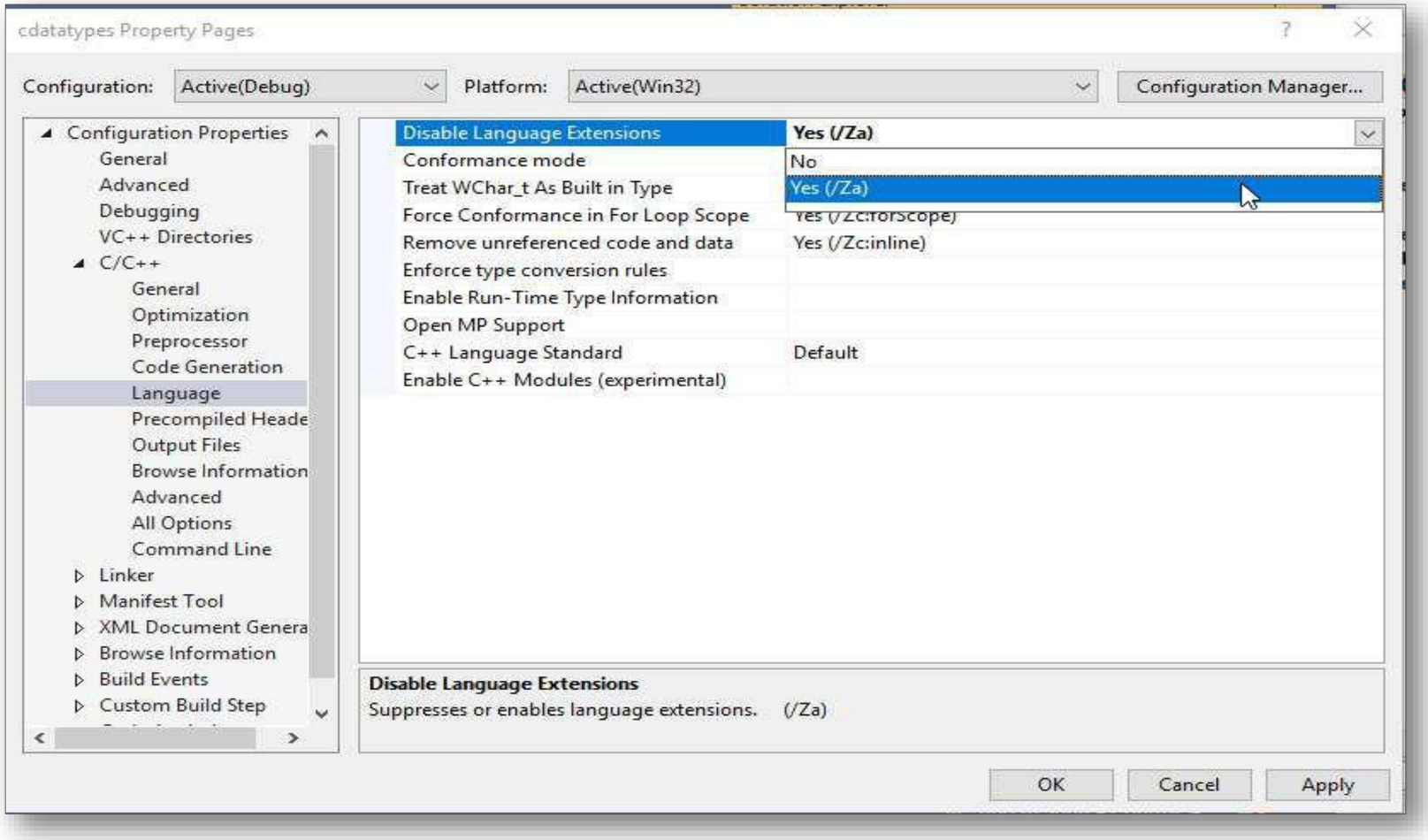
14

Compilers Lab Preview – Environment



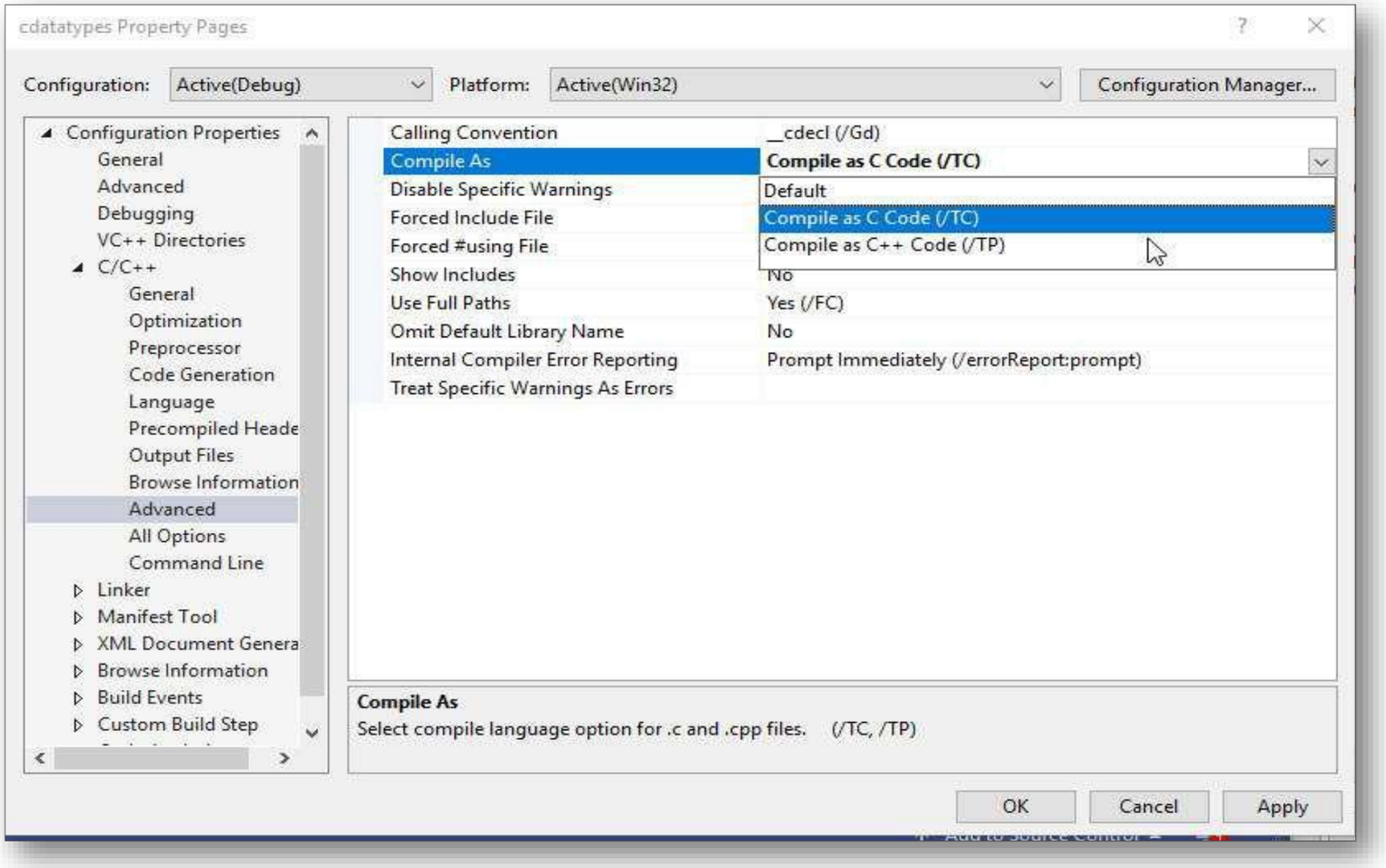
Warning Level: W4.

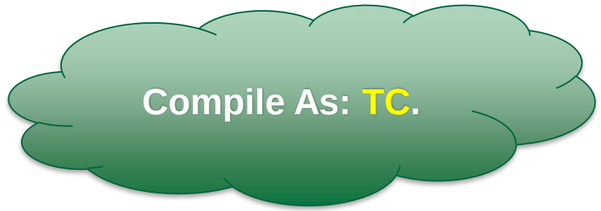
Compilers Lab Preview – Environment



Disable Language Extension: Yes.

Compilers Lab Preview – Environment





Compilers – Week 1

Demo

Task 1

- Write an ANSI C program that prints the sizes in bytes of the memory space allocated for the different built-in C data types i.e. ***char, short int*** or simply ***short, int, long int*** or simply ***long , float, double, long double*** as well as for all ***unsigned*** integral data types (for example ***unsigned int***).
- Additionally, the program prints the size of to derived data types: ***size_t*** and ***wchar_t***.
- The amount of space that is reserved for each type depends on the machine and the application platform.
- The C language provides a very useful and convenient operator ***sizeof,*** which allows the programmer to find the sizes of different data types (built-in and user defined) at run time. You should use ***printf()*** function to display the results.

Source: https://www.algonquincollege.com/pembroke/program/computer-systems-technician/gallery/

Task 1

Example:

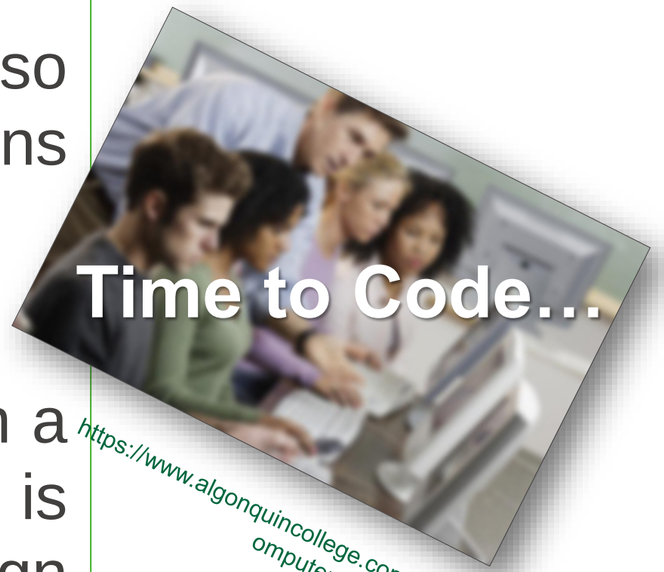
```
#include <stdio.h>

int main (void) {
  printf("The size of type int is: %u\n", sizeof(int));
  /*a statement is missing here – what is it? */
}
```

- The C language provides a very useful and convenient operator sizeof, which allows the programmer to find the sizes of different data types (built-in and user defined) at run time. You should use printf() function to display the results.

Source: https://www.algonquincollege.com/pembroke/program/computer-systems-technician/gallery/

Task 2

- Modify the cdtypes.c program by adding following functionality. Declare a variable named **max_value**.
    - Choose an appropriate integer type of the variable so that it can hold the result from de calculations described below.
- Calculate the maximum positive value that can be stored in a variable of type short int using the formula $2^{n-1}-1$, where n is the number of bits allocated for the variable storage. Assign the result to **max_value**.



Source: https://www.algonquincollege.com/pembroke/program/computer-systems-technician/gallery/

Task 2

- Print the result using the following function call

```
printf("The last positive value is: %d\n",max_value);
```

- Calculate the maximum positive value that can be stored in a variable of type ***unsigned short int*** using the formula $2^n–1$**.** Assign the result to a variable named ***max_value***.
- Print the result with

```
printf("The last positive unsigned value is: %u\n",max_value);
```

Source: https://www.algonquincollege.com/pembroke/program/computer-systems-technician/gallery/

Task 3

- Define one integer variable **iov** of type **short**.
- The initial value of the variable is 0.
- Write an endless loop that increments the variable by 10000.
- When the variable value turns negative, print the last positive value and terminate the loop.
- Compile and build the project.
- Run the program.

⇒ **QUESTION:** *Can you explain why the variable iov turns negative?*

Source: https://www.algonquincollege.com/pembroke/program/computer-systems-technician/gallery/

Task 4

- Open a Command Window (or any *shell*) and run the program.
- You will find the executable (**cdtypes.exe**) in your project Debug folder.
- Using the standard output redirection operation (>) save the output into a file. Example:

```
cdtypes > cdtypes.txt
```

- **TIP:** Keep this file for further reference.

https://www.algonquincollege.com/pembroke/program/computer-systems-technician/gallery/

Source:

Conclusion

In this lesson, you viewed…

- How to configure the Lab;
- Create small project;
- Test some standard datatypes.

In the next lesson, you will continue to…

- Developing **buffer** using Microsoft ® Visual Studio Code.

Source: https://www.sciencefocus.com/space/what-is-the-environmental-impact-of-the-spacex-falcon-heavy-launch/

Compilers – Week 1

Thank you for your attention!