# Assignment 2 for CPTN278

**Name:** Stack Implementation with an Array

**References:**

* Chapter 2 in the text book
* In class notes
* Any other resource you can find other than people

### Assignment Description:

You are to create an application in C++ that uses a Stack Data Structure. You will document the system and procedure used to compile, link and run the program. You will also be required to provide a detailed description of the program along with conclusions.

The application you create for Assignment 2 must contain the following features.

* A separate stack class
* The application will implement two separate stacks
* The application will prompt for and accept a list of five simple and different integers and store them on the first stack
* The application will then copy the first stack to the second stack reversing the order of the integers
* The application will display the integers from the second stack
* Do not use any global variables or objects
* You do not need to use any application support functions

Details on program format and construction are provided in class.

As a software developer, we are often required to “create” and “document” an application we have never seen before. The information must be formally documented using an organization’s documentation procedures. This assignment will require you to accomplish this type of task using NCC resources and CPTN278 methods. This skill is essential to the timely development and maintenance of software applications. The term “Software Development” equally applies to “Web Development” and “System/Network Administrator.” Only the development language and document contents differ.

The requirements for this assignment are exact and no deviation from the requirements or substitution of requirements is allowed. They would not be allowed in a software development organization so we will not allow them here.

The open hidden agenda items for this assignment are:

* Demonstrate the ability to use a C++ software development environment
* Demonstrate the ability to write a C++ application using data structure(s)
* Demonstrate the ability to use Blackboard
* Demonstrate the ability to use Microsoft Office Word 2010
* Demonstrate the ability to professionally document a C++ application
* Demonstrate the ability to manage your time
* Demonstrate the ability to follow an organizations procedures and policies

### Assignment Deliverables:

1. A C++ class header file containing your class data members and member function definitions. The base name of this file must be **CPTN278\_A2\_Stack\_*lastname*.h** where *lastname* is your actual last name.
2. A C++ class body source file containing your class source code. The base name of this file must be **CPTN278\_A2\_Stack\_*lastname*.cpp** where *lastname* is your actual last name.
3. A C++ application program source file containing your application source code. The base name of this file must be **CPTN278\_A2\_Application\_*lastname*.cpp** where *lastname* is your actual last name.
4. A Microsoft Word 2010 document with the following contents and sections. Each major bullet needs to be a new section. The name of this file must be **CPTN278\_A2\_Description\_*lastname*.docx** where *lastname* is your actual last name.

* Title page
  + Document Name
  + Author
  + Creation Date
  + Course Number
* Table of Contents
* Introduction
* System Information
  + Hardware Model
  + Operating System
  + Name and version of C++ Development Environment
* How to use your C++software development environment including
  + Starting the C++ software development application
  + Entering code from scratch
  + Compiling the application source modules
  + Linking the application object modules
  + Running the application executable program
  + Saving your work and exiting the C++ software development application
* A one paragraph description of what the application does
* A description of the class and application source code including
* A description of the source code including
  + The list and correct sequence of steps used to accomplish the task
  + A description of what occurs in a section of code
  + A description of how the variables and objects “change” as a result of executing each section of code
* Captured Program Output
* Conclusions about the application
* Conclusion
* References documented using APA style
* Appendix (if needed)

### Strenuously Recommended Approach:

Even though the word “recommended” is in this section header, consider it as mandatory. The approach below includes requirements and “how to” suggestions that should be used to complete the assignment. Hopefully by following the steps in order and using the suggestions, completing the assignment won’t be a difficult task.

1. Understand the problem.

Before you begin any software development task you must fully understand what is required to complete the task. How else can you know when you are done? Here are some important things to do to complete this step.

Completely read this document from beginning to end before doing anything else. The various sections of this document interrelate. Questions raised in one section are often answered in another section. This will give you the big picture of what is going on.

Ask me questions for clarity but they should be specific questions as they relate to the assignment requirements or procedures. A question like, “How do I do this?” is not a specific question. Asking questions like “Can I do the assignment another way?”, “Can I use a different documentation application or submission process?”, or “Can I turn it in late?” also won’t work. The answer to these questions will be “No.” Part of this assignment is to follow an organization’s formal procedures and policies, use the required tools and manage your time just as you would have to in industry.

Now to be realistic. I know you and I cannot think of or cover every issue or question that may come up. Please feel free to post questions to the FAQ. I check Blackboard every day. I would even check the FAQ forum first in case your question has already been asked and answered.

1. Identify and gather resources.

Under the “References” section, I listed some of the references you might use for this and future assignments. In reality, you may use any resource or reference you want except other people’s work. I am the person you should come to for help. Our textbook actually contains all the information on everything I am asking you to do but use other technical resources as desired.

You should already know how to use Blackboard, Microsoft Word and a software development environment. If not, learn quick! We are not using any advanced features from any of these tools. You may if you wish, but don’t waste time learning and trying things you don’t need for this course.

1. Start your documentation.

“Is he serious? I haven’t done anything yet to document.” Yes, I am serious about doing this step now.

I suggest you start your Word document with the headings already in place, even thought there is no content yet. So how do I get started? Well here is an idea.

Since you should already have this document down loaded to your system from the previous step, why not make a copy of it with the correct file name. Then remove all content except the section headings and rename the headings to match the required outline. When you have the new headings only file, make a second copy under a generic name for future use. A quick, easy approach to get you started and have something you will be able to use over again for future assignments.

It should have the Title page, Section Headings, Auto TOC and a References page. Save it away (remember where you saved it) because you will need it for all of our assignments.

1. Add the document introduction.

One paragraph should be enough. You can use this document as a source for this purpose. But just don’t copy and paste.

1. Start the application source program.

Don’t forget to use the correct name for this source code file.

This should be an “empty” but functional application source file. By empty I mean it does not need to do anything other than announce itself when it executes.

Since the source file is also a document created by you, it must also have at the top (as comments) code author, creation date, purpose and informal references to any other code source you used. I check for this.

You may use the C++ software development environment and system of choice but I suggest you use the NCC provided systems. They have all required applications needed for all course requirements. I will only provide help on NCC systems.

Take detailed notes on how you are doing this step. In fact, I even suggest writing the information directly into your description document in the correct section.

1. Document the procedures used to create and run the application.

If not already done, document the procedure you used in the previous step. I hope you took my suggestion and did it as you went. If not, you get to repeat previous sequence to ensure you did not miss any steps in your documentation.

The actual procedure should tell me how to start the development environment, what items to select, click or check in the correct order and finally how to save files and close the environment. It should include exactly, what window, sub window, panel, pane or frame I should be using at any given step. Use the correct terms and don’t miss any steps no matter how trivial. Add notes of explanations or observations as you see fit.

You should assume your audience (me) has no clue as to what I am doing but could still follow your procedure. I have access to many different software development environments on many different types of systems and am quite likely to have my wife try to use your procedure.

1. Write an overview of what the application does.

This should be a paragraph or so and added to your document in the correct section.

1. Add the description of the applications variables and objects.

Each object should be listed by name and include any properties it contains. This includes their names, type and starting (initialized) values.

Do the same for any variables used in the methods of the object(s).

This will be covered in class.

1. Add the source code design for the stack class body.

Critical note here. This is not code and it better not look like code. It is a description of code. This can be done via pseudo code or flow charts. I suggest pseudo code because it makes it easier to create comments in your real code later. Using flow charts requires the use of another application or shapes in Word.

Pseudo code is just a step by step description of the algorithm. For this assignment, this will be a simple. We will cover this in class as the course progresses.

1. Add the source code design for the application.

Use the same procedure as the previous step.

1. In a repetitive process add one small feature to the application and test it.

Now going through the pseudo code from your document add one “feature” to the actual code. Recompile and run the application to verify the new feature “works.”

A feature can be but limited to the following.

* Declaration of a class property
* Declaration of a variable
* Creation of an empty method
* Creation of an empty programming structure (loop, decisions, etc)
* Adding a line of functional code to a method or structure

A working feature is simply one that does not break anything that already works and accomplishes what it is required to do.

Always add the minimal amount of code needed between compilation events. Compile and test often.

Continue this process until all application features have been implemented.

You will likely have to make some minor updates to the design document as you create the real code and possibly adjust related program code.

Resist the urge to go back and fix thing that are not broken.

A final note. Ensure all code includes comments based on the design.

1. Run the final application and capture the screen output.

This should be self-explanatory. Add it to the appropriate section of your document.

1. Document your application conclusions.

This information is often what you would be expected to present at a code design review meeting using your design to back up your conclusions. For this assignment there is no presentation required but your written conclusions are a requirement.

The issues to address are

* What went well
* Where did you encounter problems and how did you fix them
* What does not work
* If there was time where could you have used a better technique to implement a similar feature
* If there was to be a Version 2 of this application what features would you add

Add these conclusions to your document in the appropriate section.

1. Add the document conclusion.

The main idea here is to summarize (maybe a simple table) the main points of the sections covered.

1. Build the references page from the in-line citations.

I can think of at least three references you will be using. There may be more…

* The text book
* Blackboard
* Possibly Internet FAQ sites

1. Proof read your document.

I am not kidding. This document represents you, your skills and your professionalism in communications. In industry, people (especially the non-technical) notice the smallest details. Here are things to check.

* Information presented must be accurate and as complete as possible
* Spelling – I better not see any red squiggles when I turn on the spell checker other than for technical terminology
* Grammar – I should see a minimum of green and blue squiggles when I turn on the grammar checker
* Document formatting
  + Bulleted list items normally don’t end with periods
  + Numbered list items do end with periods
  + Consistent use of heading types
  + Consistent use of fonts, font sizes and styles for text
  + Consistent use of indenting of all text and lists

Yes, I will be checking and points deducted if there are too many issues.

And yes, we are not perfect. Things do slip by. You might even find some of these issues in this document, but hopefully not too many. If you do please feel free to let me know. I like my documents to be accurate and professional as well.

1. Rebuild the TOC.

This is essential as things may have moved around in the document or you may have added or deleted section headings.

1. Post the Word document to Blackboard via the “View/Complete Assignment” link.

You will be submitting four files. They are:

* CPTN278\_A2\_Stack\_lastname.h – The stack class header file
* CPTN278\_A2\_Stack\_lastname.cpp – The stack class body file
* CPTN278\_A2\_Application\_lastname.cpp – The application source file
* CPTN278\_A2\_Description\_lastname.docx – Your design document

Use the above link for assignment submissions. For those not familiar with this Blackboard method of assignment submission, it will be demonstrated in class. Do not submit assignments via the Blackboard Digital Drop Box or forums. Do not use e-mail attachments. Do not hand in hard copies of documents. Do not compress them, zip them or alter their format in any way. This is the only acceptable submission method.

Remember time management is also an assignment requirement. Even if you have not completed the assignment you must submit what you have on the day the assignment is due. The due date will be announced in class. Partial credit is given for partially completed assignments as long as the completed parts are correct. No late submissions will be accepted. In industry when your manager assigns a task and wants something to be done, they expect it on time. It is part of the “salary continuation plan.”

1. Down load and test the deliverables.

It is your responsibility to make sure the files were uploaded and can be read. The only way I know to test this is to down load a temporary copy and make sure you can read it. Submission of unreadable files is not a valid reason for missing an assignment.

### A few Last Thoughts:

I know this assignment write up has been rather lengthy. Future assignments won’t be quite as verbose as this one. With this write up I tried to accomplish several goals. These include but are not limited to:

* Provide explicit, detailed and clear directions and requirements for the assignment
* Provide useful hints and techniques that you can use and reuse in future assignments
* Provide a rational for why we are doing things the way we are
* Share some of my observations about why and how I do things when it comes to software development
* Address issues and answer questions before they cause work blockage
* Set the expectations for future software development assignments and projects with methods that can save you development time

I also want to remind you that the primary purpose of this course is to write C++ code, use data structures and create good applications. We will be exploring many features and techniques of C++ to accomplish this goal. All the other stuff will take care of itself after you get used to doing it as part of software development.

The requirements for this assignment my seem heavy handed and totally inflexible. If you think this then you are correct. But…

These requirements are still less rigid than those you are likely to encounter in industry. One of the goals of this course and the entire NCC program is to get you ready to work professionally in a professional environment. Remember your work represents you to your managers, fellow software developers and eventual employees. Professionalism gets you a long way. Anything else gets you ignored and left behind.