# Chapter 1

## CS488/688 F14 A0: Introduction

*"I want to work on Assignment 0. I want to do some Tcl programming—there's no thinking involved!"*

– The TA who developed the Tcl version of this assignment

This assignment is due **Tuesday, September 16th [Week 2]**.

### 1.1 Topics

- Familiarise you with the course computing environment.
- Ensure that your account(s) are set up properly.
- Provide exposure to gtkmm and a refresher of C++.
- Provide practice in building/modifying a user interface.
- Give you a trial run at submitting an assignment.

### 1.2 Summary

This assignment is optional.

If you do not hand it in, you will not lose marks. If you do hand it in, it will be marked in the normal way, but the mark will not be recorded. Therefore, if you have any theologically unsound habits that will cost you marks or if your account is not set up correctly, you will have a chance to correct things before Assignment 1.

In past terms, over half the students who did not submit Assignment 0 lost marks on Assignment 1 for setting up their account incorrectly or for submitting inadequate documentation. These mistakes could have been avoided had these students completed Assignment 0.

It is in your best interest to do this assignment. You will gain some information and experience which will be useful for later assignments. Thus, even if you do not choose to hand in Assignment 0, you will still eventually need to learn what it covers before you can finish later assignments.

Note also that the directions in this assignment are more explicit than in the remaining assignments. In the future, the steps to follow will not be written as explicitly.

## 1.3 Statement

Do the following:

1. Set up your account. To do this, login to a Linux or Unix machine in the undergrad environment and type "`/u/gr/cs488/bin/setup`". Observe that you now have the following directory subtree in your home directory:

```
cs488/
     handin/
          A0/
               src/
               data/
          A1/
               src/
               data/
          A2/
               src/
               data/
          A3/
               src/
               data/
          A4/
               src/
               data/
          A5/
               src/
               data/
```

2. The next steps assume the that `qmake` and `qt libraries` are installed. These should already be installed on the machines in the graphics lab. If you are working on your own machine, and you don't have `qmake` and `qt` libraries installed, run the following script:

```
sudo apt-get install qt5-qmake qt5-default libqt5opengl5-dev
```

3. You will find several `.cpp` and `.hpp` files in the `A0` subdirectory, as well as a `paint488.pro` file. Enter the subdirectory and type `qmake paint488.pro`. This generates a `Makefile`. Then, type `make`. The program should compile and you should be left with an executable called `paint488`.

   The program is a simple painting program that allows you to draw rectangles, ovals and lines.

4. To run the program type `./paint488` at the command line. To exit you must select the "Quit" entry under the `Application` menu.

Modify `paintwindow.hpp` and `paintwindow.cpp` so that a "Quit" button is placed at the bottom of the window. When this button is pressed, the program terminates.

5. Add a Clear entry to the `Application` menu. This entry should clear the screen.

6. Add a new menu for selecting a colour. This menu should be labeled `Colour`, and should appear between the `Tools` and `Help` menus on the menu bar. You should be able to select the following colours: Black, Red, Green, Blue. Any subsequent draw of a rectangle or oval should fill the object with the selected colour.

   The default fill colour should be Black and the default shape should be Line.

   If you like, you can add additional fill colours, such as Cyan, Magenta, Yellow, Purple, Orange, White, but you will only be graded on Black, Red, Green, and Blue.

7. Change the Tools menu to use radiobuttons to select between the drawing primitives.

8. Add Help entries to Help menu for Rectangles and Ovals.

9. Add the following keyboard shortcuts:

   **C:** Clear

   **L:** Line

   **R:** Rectangle

   **O:** Ovals

   Note that lower case letters should trigger the shortcuts. We have already implemented a keyboard shortcut for Quit; you should add your keyboard shortcuts to the same handler.

10. Write a Manual and a `README` for `paint488` explaining how to run and use it. The Manual should be submitted in hardcopy. The `README` should be in the `cs488/handin/A0` directory but does not have to be handed in as a hardcopy.

11. Remove all unnecessary files (eg., `*.bak, *~, core`, etc.).

12. From your `cs488/handin` directory run "`grsubmit A0`" to create a checksum for your assignment. Note that `/u/gr/cs488/bin` should already be in your search path. You are to print out this checksum and hand it in with your assignment.

13. Hand in all the things mentioned in the **Assignment Format** documentation that are applicable to this assignment. Double check the objectives to ensure that your assignment meets all of them. Make sure you sign the objective sheet and fill in the requested information!

## 1.4 Extras

If you wish to add some extras (sorry, no bonus points) to the paint program, consider adding the following:

- Rubberbanding. When drawing an oval or a rectangle, it is useful to draw the outline of the shape (or even the shape itself) as you move the mouse after the mouse button down.
- Additional shapes. Some additional shapes can be drawn if you allow multiple mouse presses. For example, you could draw a polyline (a sequence of line segments), an arbitrary polygon, or Bézier curves.
- Updating/deleting elements. You might want to change the colour of one of the elements you've drawn. Or you might want to delete one of the elements. This would require find the element and either removing it from the m_shape list or modifying its colour.
- Save/print. You could add additional functionality to either save the primitives to a file (to be read in later) or to print the screen.

Note that except for the first one, each of these will likely require a significant amount of coding.

## 1.5 Donated Code

In `/u/gr/cs488/data/A0` you will find

- `main.cpp` - The initial startup function `main`.
- `paintcanvas.hpp`, `paintcanvas.cpp` - The canvas onto which the user can draw
- `paintwindow.hpp`, `paintwindow.cpp` - The main window of the application.
- `Makefile` - used to compile your program.

These files have been copied to your `handin/A0` directory.

## 1.6 Deliverables

**Executables:**

`paint488`. Be sure to place this in the correct directory (under `A0`).

**Source code:**

All source code should be placed in `A0/src`. You should not have to add any new files, but can if you wish. You should not have to change the Makefile. If you wish to add a file to the project, add your files in the `.pro` file in the `A0/src` folder.

**Documentation:**

`README`. Be sure to place this in the correct directory (under `A0`).

## 1.7 Objectives: Assignment 0

**Due: Tuesday, September 16th [Week 2].**

**Name:** _____

**UserID:** _____

**Student ID:** _____

___ **1:** The account is set up correctly.

___ **2:** The checksum program was run, and its output was printed and included in the submitted documentation.

___ **3:** The correct information was handed in as hardcopy, a `README` file exists in `handin/A0`, and the executable is in `handin/A0`.

___ **4:** There is a "Quit" button at the bottom of the window that terminates the program.

___ **5:** A Clear entry has been added to the Application menu, which clears the screen.

___ **6:** A Colour menu with radiobuttons has been added with the listed colours. After a colour is selected, any subsequent draws of a rectangle or oval are filled with that colour, and that colour's radiobutton is turned on.

___ **7:** The tools menu has been modified to use radiobuttons to select between the graphics primitives.

___ **8:** Keyboard shortcuts have been added for Clear (C), Lines (L), Rectangles (R), and Ovals (O). Both upper and lower case letters should trigger the shortcut.

___ **9:** Help entries for Rectangles and Ovals have been added.

___ **10:** A screenshot of your program is provided in `handin/A0/screenshot01.png`.

**Declaration:**

I have read the statements regarding cheating in the CS488/688 course handouts. I affirm with my signature that I have worked out my own solution to this assignment, and the code I am handing in is my own.

**Signature:**

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□ I do NOT grant permission to use images of my Assignment 0 in the course webpage or t-shirt.

Name (printed):

Student id:

User id:

Signature:

Date: