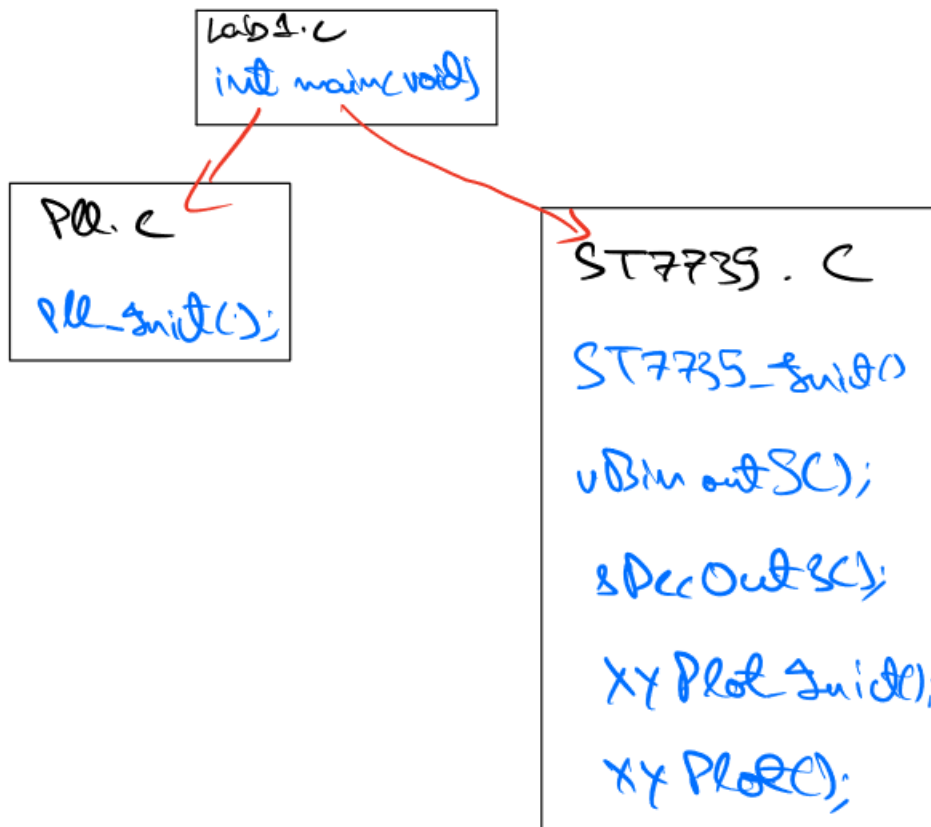


Objective

To develop and test Graphic Routines that can be used in subsequent labs. In particular, we develop routines that help output numbers and plot to the LCD screen.

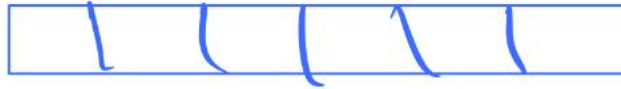
B) Software Design (upload one file with your header, code, and test components to Canvas as instructed by your TA)

Call Graph



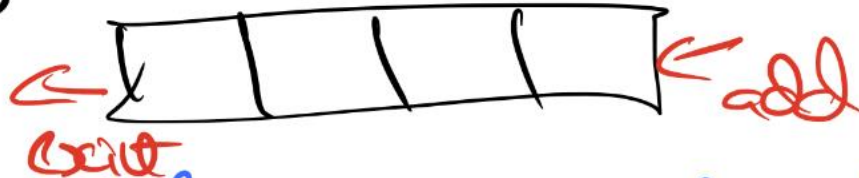
Data Structure

Array



used to store x, y
co-ordinates of plot

FIFO



used to print characters to
LCD.

C) Analysis and Discussion (1 page maximum). In particular, answer these questions

1) When should you use fixed-point over floating point? When should you use floating-point over fixed-point?

Fixed Point should be used for fractional numbers when the number of digits after the decimal point is already known or insignificant. Floating point should be used when the number of digits after the decimal point is variable.

2) Give an example application (not mentioned in the book) for fixed-point. Describe the problem and choose an appropriate fixed-point format. (no software implementation required).

Fixed Point is used in Digital Signal Processing to convert signals to cosine waves or vice versa. Speed plays a big factor in DSP therefore fixed point representation is preferred.

3) Can we use floating point on the ARM Cortex M4? If so, what is the cost?

We can use floating point on ARM Cortex M4, it is disabled by default. The cost is that it consumes extra power.

4) Compare your **ElapsedTime** and **ElapsedTime2** measurements with mine. Were your times approximately the same, or significantly different from mine? Do you think execution is *I/O bound* (speed

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limited by the output rate to the LCD) or *CPU bound* (speed limited by software algorithm and CortexM running at 80 MHz)? Why?

The ElapsedTime and ElapsedTime2 measurements were similar to Dr. Valvano's measurements. The execution is I/O bound as outputting to the LCD takes significantly longer compared to the calculations with fixed point.