Hand in date: 10 March 2017

# ELD522/ELP052 Embedded Software Development

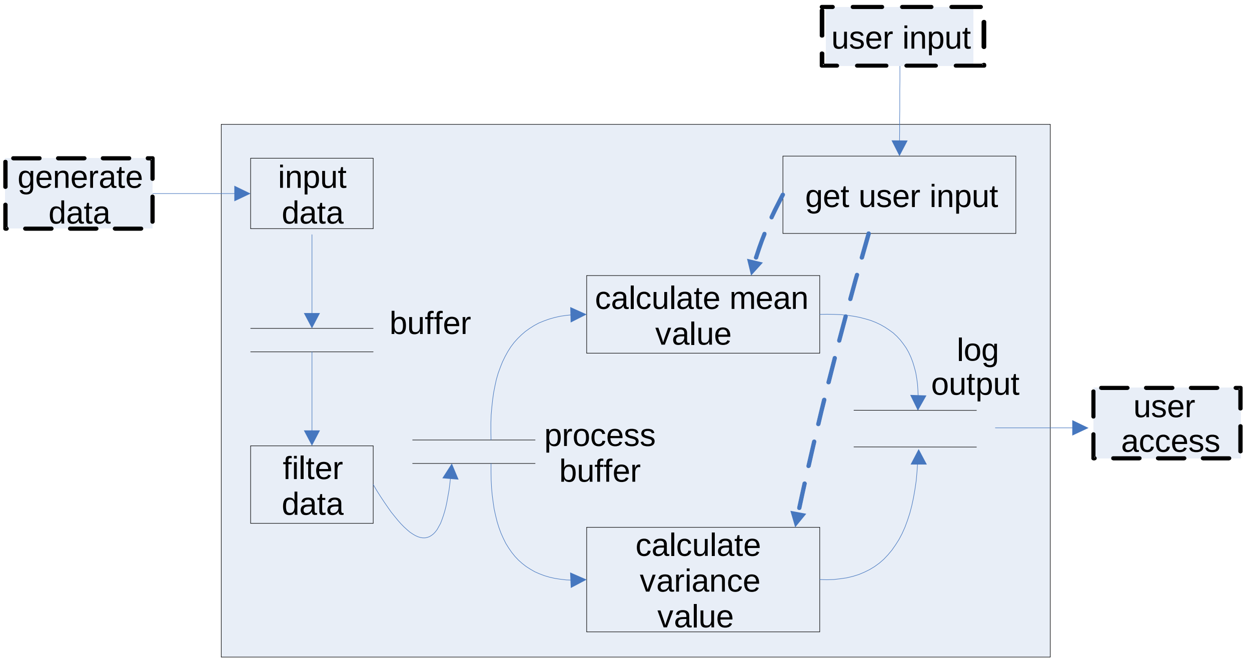
## Task 2 - RTX program implementation

The aim of the coursework is to write a program suitably divided into a number of RTX tasks that communicate to solve a real-time problem. This document outlines the requirements of the program and indicates how the coursework will be assessed. Initial code in an MDK-ARM project is provided on the Learn server for the coursework.

### Program to be implemented

The program needs to be able perform the following operations.

1. Receive input continuously from the `generate data` task (given in the initial code). The data generated should be altered only by changing the value of `NUM_SAMPLES` within the range 0 to 255.
2. Filter the data received in the manner now described. Each set of seven values from the `buffer` obtained need to be processed by the `filter data` task and used to produce a single output in the `process buffer`. The output is calculated as a weighted sum of seven inputs with the set of weight values being as follows `{-0.5,1.0,-2.0,3.0,-2.0,1.0,-0.5}`.
3. Continually calculate the mean of the most recent five data values in the `process buffer`. As new data values are arriving continuously, the calculations need to take place continuously. The mean values need to be stored in the `log output`.
4. Continually calculate the variance of the most recent five data values in the `process buffer`. Again, as new data values are arriving continuously, the calculations need to take place continuously. The variance values also need to be stored in the `log output`.
5. Keep the values obtained in points 3 and 4 above by storing them in memory. These values should be made easily accessible for testing purposes.
6. Obtain input from the user to permit their selection of whether only the mean values are needed, only the variance values are needed or whether both sets of values are needed. The user button should be used to select these options and the current option that is selected should be indicated by individual LEDs (you specify which LEDs are used).



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### Assessment

The task can be carried out individually or in groups of two. This piece of coursework is worth 20% of the module marks. The assessment will be based on the following criteria.

- The software meets the requirements given (6%)
- Suitable use of RTX and C features (6%)
- Appropriate structuring of the code (4%)
- Documentation of code (4%)

### Deliverables

The code will need to be submitted as a zipped file. A separate pdf file must be provided that documents how the user can interact with the code and access the values in the log output. The code and documentation must be submitted to the Learn server by the specified date.

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**February 2017**