



CS684: Embedded System Course

Assignment 1: Reactive Kernel

AIM

- Download [ReacK.zip](#). Unzip it.
- The extracted folder ReacK contains reactive kernel code written in C by hand (by-hand folder) and synthesized to C from a high-level language (Heptagon, by-hept folder).
- by-hand has C code implemented for Minimum (min) and Minimum of Average (min_avg) which follows the structure of a reactive kernel. That is, it consists of a C file with step and reset functions forming the compute part and the main file (the entry point) that reads inputs from the console (sense), calls functions from the compute part and prints on the console (or actuate).
- by-hept implements Heptagon code for the same problems, which synthesizes to C code.
- Minimum takes an input x and finds minimum of the x's seen so far.
- Minimum of Average takes inputs x and y and finds minimum of the average at each instance $(x+y)/2$ seen so far.

Compiling and Running:

- For min

```
cd </path/to/Reack>/by-hand/min
gcc -c min.c
gcc -c main.c
gcc -o min main.o min.o
```

./min

- After running enter an integer value for x. The output should be the minimum of x entered since the start of the program.
- Repeat steps 1 and 2 for minimum of average.

Exercise:

- Inspect and analyze the C codes, both written by hand and synthesized.
- Follow the same structure of C code to write a reactive kernel for finding:
 - Mean
 - Variance
- At each step, input is a single integer x. [Mean and Variance](#) has to be found for a sequence of x's seen so far.

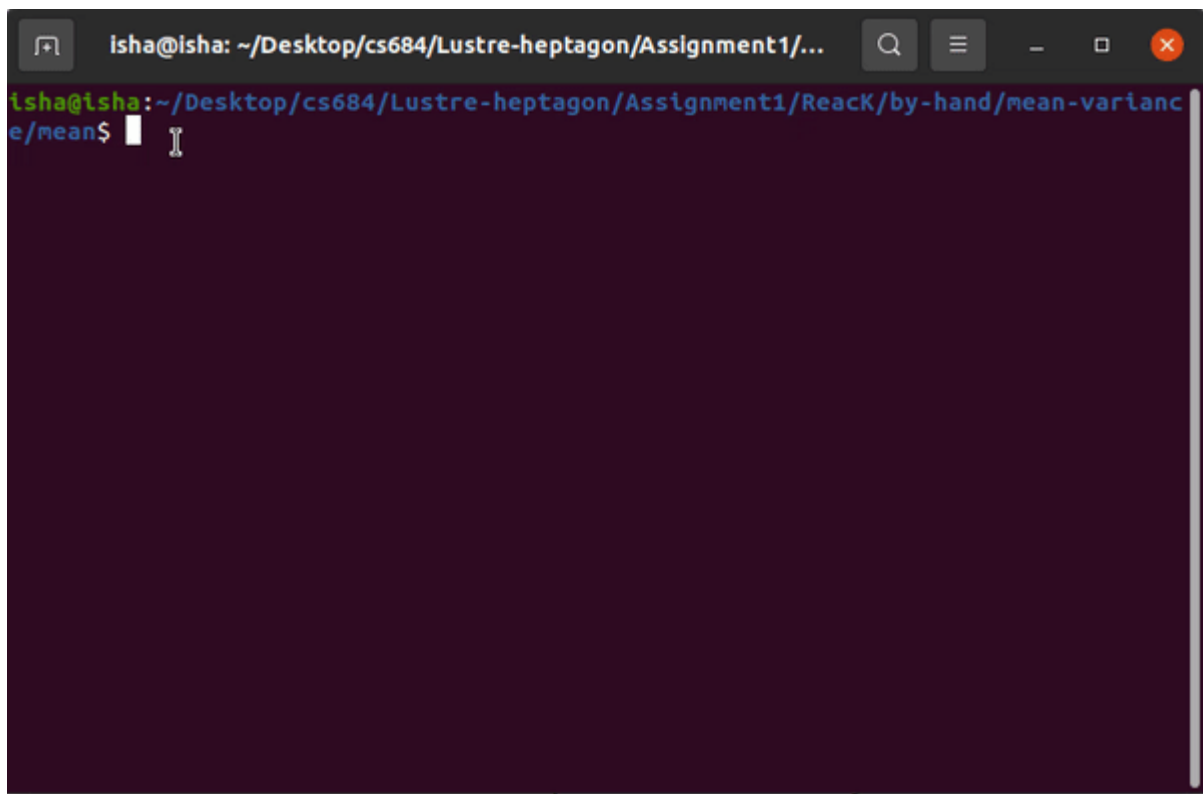


Hint: You need to remember the number of steps, mean and mean of x^2 , and update it at each step.



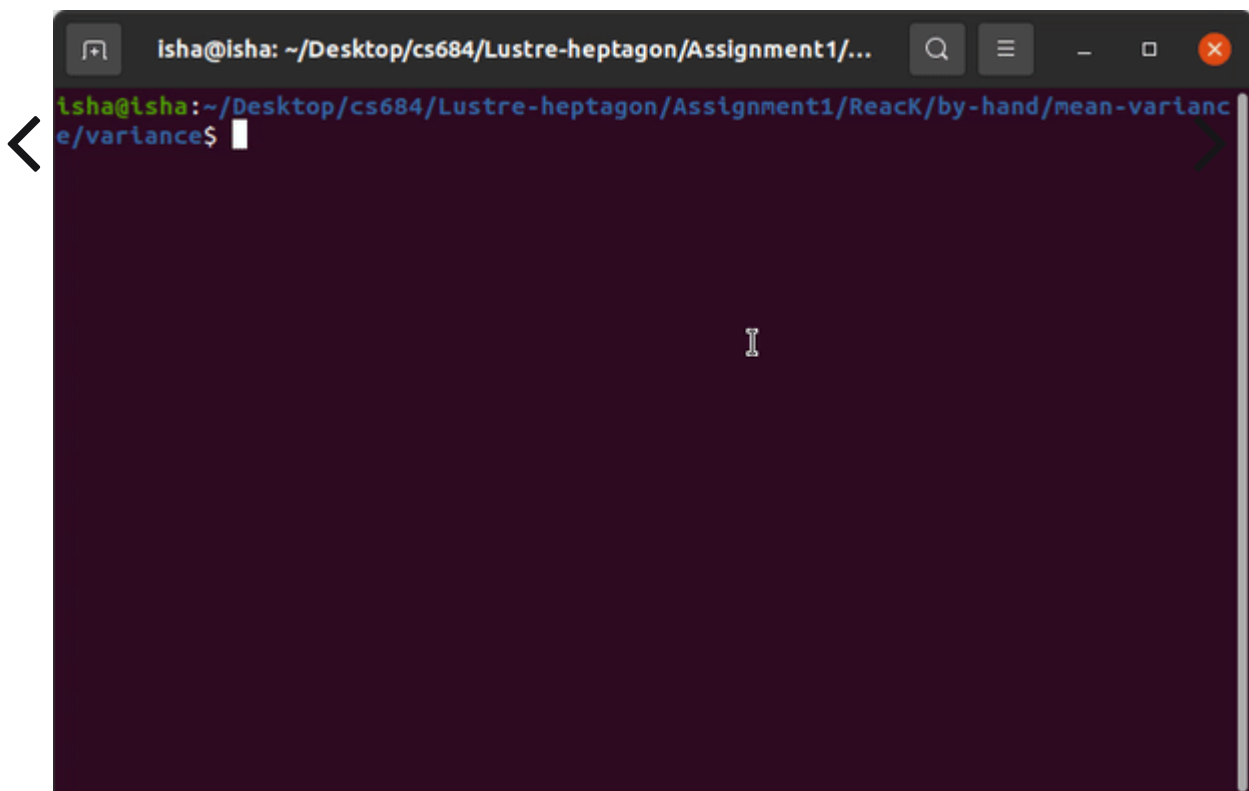
Expected Output:

- **Mean**



```
isha@isha: ~/Desktop/cs684/Lustre-heptagon/Assignment1/...
isha@isha:~/Desktop/cs684/Lustre-heptagon/Assignment1/ReactK/by-hand/mean-variance/mean$
```

- Variance



```
< isha@isha:~/Desktop/cs684/Lustre-heptagon/Assignment1/ReactK/by-hand/mean-variance/variance$ >
```

Note: Your output should be exactly same as expected output including variables name as it will be autoevaluated.

Submission Instructions:

- Create a folder named `<RollNo>_Assignment_1`.
- Copy and paste **mean** & **variance** folder inside the newly created folder.
- **mean** folder should contain 3 files : `mean.c` , `mean.h` & `main.c`.
- **variance** folder should contain 3 files : `var.c` , `var.h` & `main.c`.
- Compress the folder in a `.tar.gz` file and submit it on moodle.

Note: Make sure you have removed all the print statements from the file except the lines which prints mean and variance. Else your submission will not be evaluated.

