In this assignment you will write an OpenSPL application with a custom manager that includes a fanout and three kernels.

- Kernel 1 will calculate the sum of a stream of uint32_t values. The sum will be accumulated in a uint64_t and returned as a scalar value.
- Kernel 2 will calculate the average of a stream of uint32_t values. The sum for your average will be accumulated in a uint64_t independently of the sum calculated in kernel 1. The average will be returned as a uint64_t scalar value.
- Kernel 3 will calculate the squares of a stream of uint32_t values. The squares will be returned as a stream of uint32_t values and average

You must include a C implementation of each of your kernels to verify that the output of each kernel matches the expected values.

To implement this assignment you will have to create a manager that handles three kernels at the same time. The input to each of the three kernels will be identical and arrive via one single stream from the CPU code and then fed into a fanout routing block in the manager so that it can be connected to each of the three kernels at the same time.

To sum the elements in your stream you may use a Reduction:

```c
Reductions.accumulator.makeAccumulatorConfig(dfeUInt(64));
```

See listing 3 in section 3.2 of the Networking Tutorial for hints on how to use the Reductions class and example 3 from the Manager Tutorial for a discussion of routing blocks and a possible starting point for this assignment.

Note that to use a reduction you may have to add import statements to your kernel .maxj files such as these:

```c
import com.maxeler.maxcompiler.v2.kernelcompilerstdlib.Accumulator.Params;
import com.maxeler.maxcompiler.v2.kernelcompilerstdlib.Reductions;
```

## 1 Compiling and Testing Your Programs

Build and test your program using the VM as discussed in class. Name your project as discussed in class: z88888-a07.

## 2 How to Hand in Your Program

Hand in your program using the SVN repo as discussed in class and in the appendix of the lecture notes. Don't forget to create the repo and commit your files!!!