



# Five-minute review

“FPGA Circuit Synthesis of Accelerator Data-Parallel Programs”

SINGH, Satnam et al. (Microsoft Research Cambridge)

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Field-Programmable Custom Computing Machines

# What means “Data-Parallel”?

```
//DOT PRODUCT                                // ADDER

prods =                                       main() {
[do                                           Target &tgt = CreateDX9Target();
  X * y                                       const int size = 5;
  for x in xs                                float f1[]={1.0,2.0,3.0,4.0,5.0};
  For y in ys                                float f2[]={0.1,0.2,0.3,0.4,0.5};

]                                             FPA x = FPA(f1, size);
                                             FPA y = FPA(f2, size);
                                             FPA z = x + y;

dotProduct =                                 float resultArray[size];
reduce(sum,prods)                            tgt.ToArray(z,resultArray,size);

                                             return 0;
                                             }
```

# How does it work?

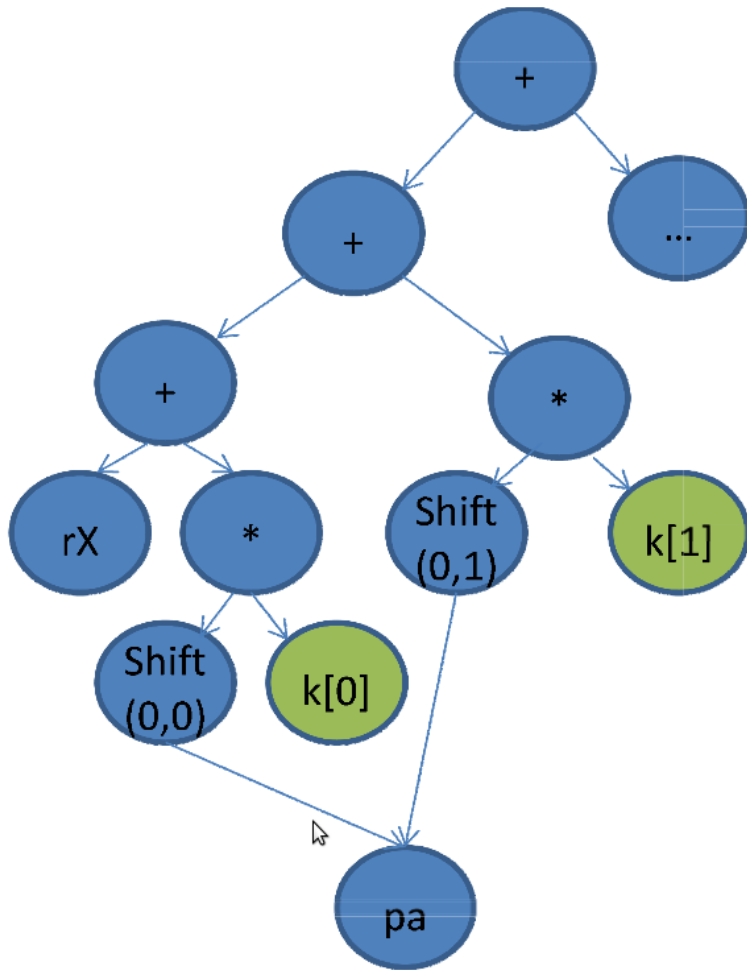


Figure 3. Expression trees using for JIT-ing

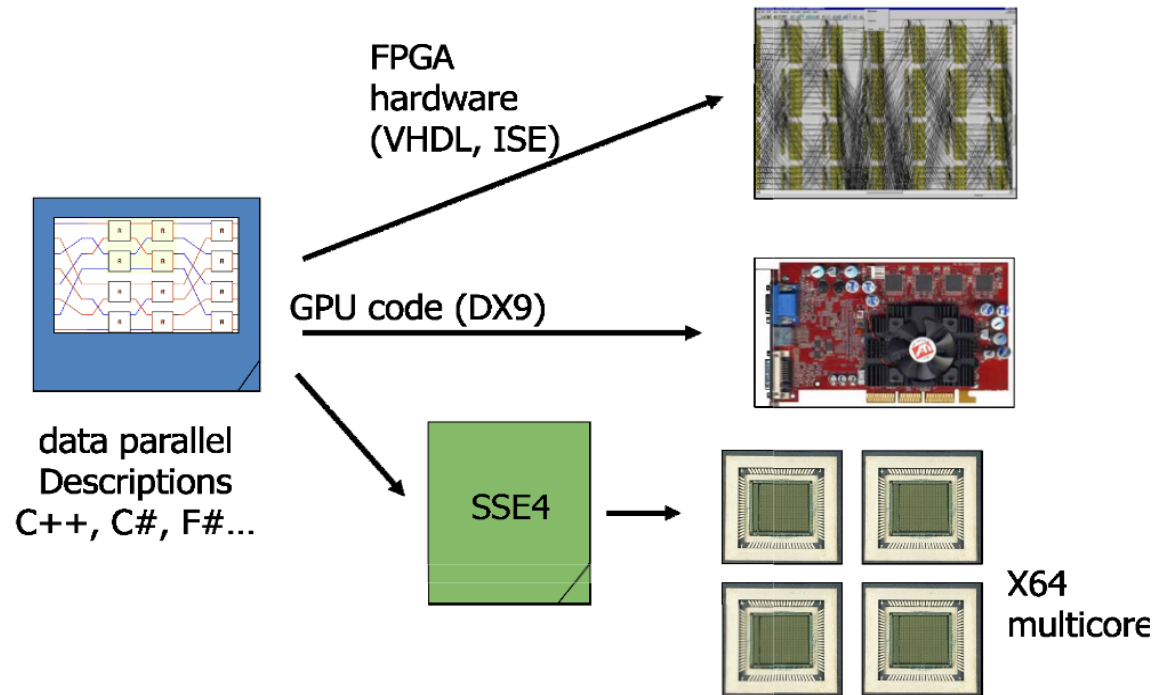


Figure 2. Single description, multiple targets

# Any questions?

- Full paper
  - Barry Bond, Kerry Hammil, Lubomir Litchev, Satnam Singh, "FPGA Circuit Synthesis of Accelerator Data-Parallel Programs," Field-Programmable Custom Computing Machines, Annual IEEE Symposium on, pp. 167-170, 2010 18th IEEE Annual International Symposium on Field-Programmable Custom Computing Machines, 2010
- Seminal work on data parallelism
  - Guy E. Blelloch. 1993. Nesl: a Nested Data-Parallel Language (Version 2.6). Technical Report. Carnegie Mellon Univ., Pittsburgh, PA, USA.