

Matrix Multiplication

Negin Safari

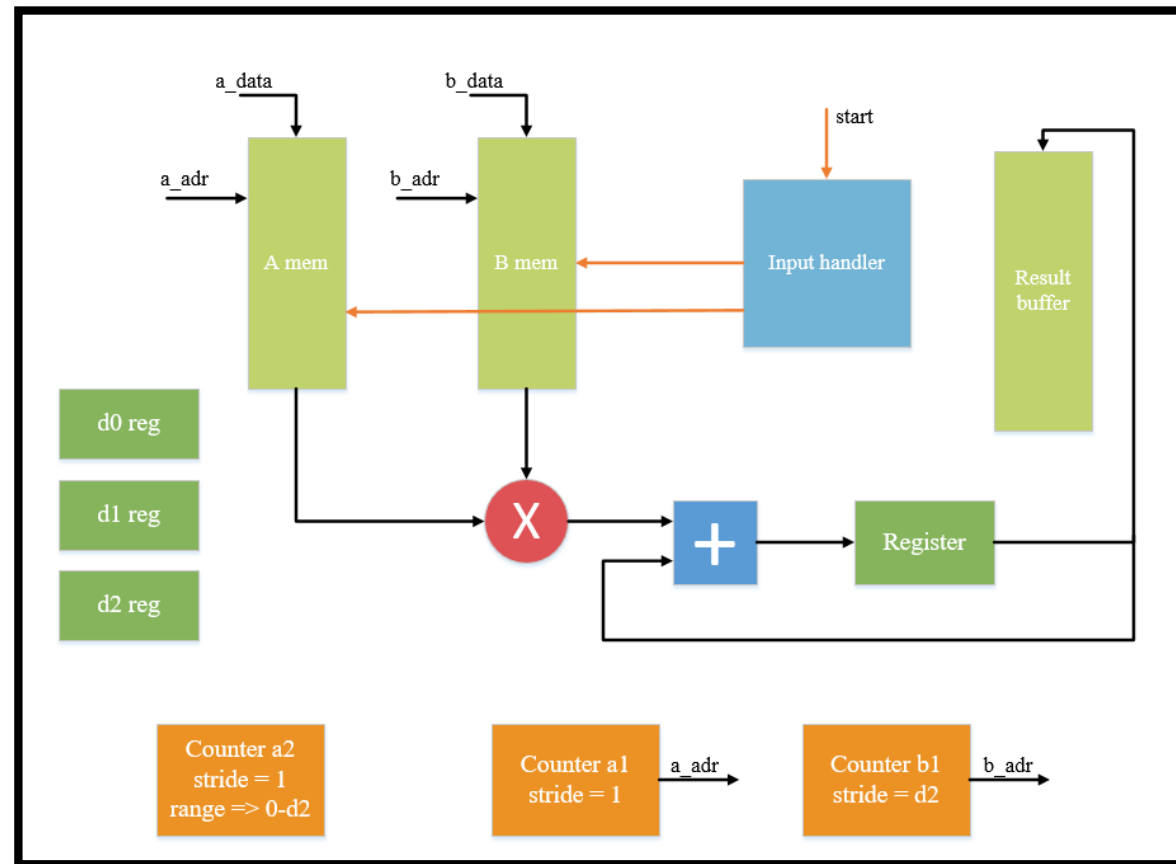
Matrix Multiplication View

Matrix multiplication is among the most fundamental and compute-intensive operations in machine learning.

$$\begin{bmatrix} a_1 & a_2 & a_3 \\ a_4 & a_5 & a_6 \\ a_7 & a_8 & a_9 \end{bmatrix} \begin{bmatrix} b_1 & b_2 & b_3 \\ b_4 & b_5 & b_6 \\ b_7 & b_8 & b_9 \end{bmatrix} = \begin{bmatrix} c_1 & c_2 & c_3 \\ c_4 & c_5 & c_6 \\ c_7 & c_8 & c_9 \end{bmatrix}$$

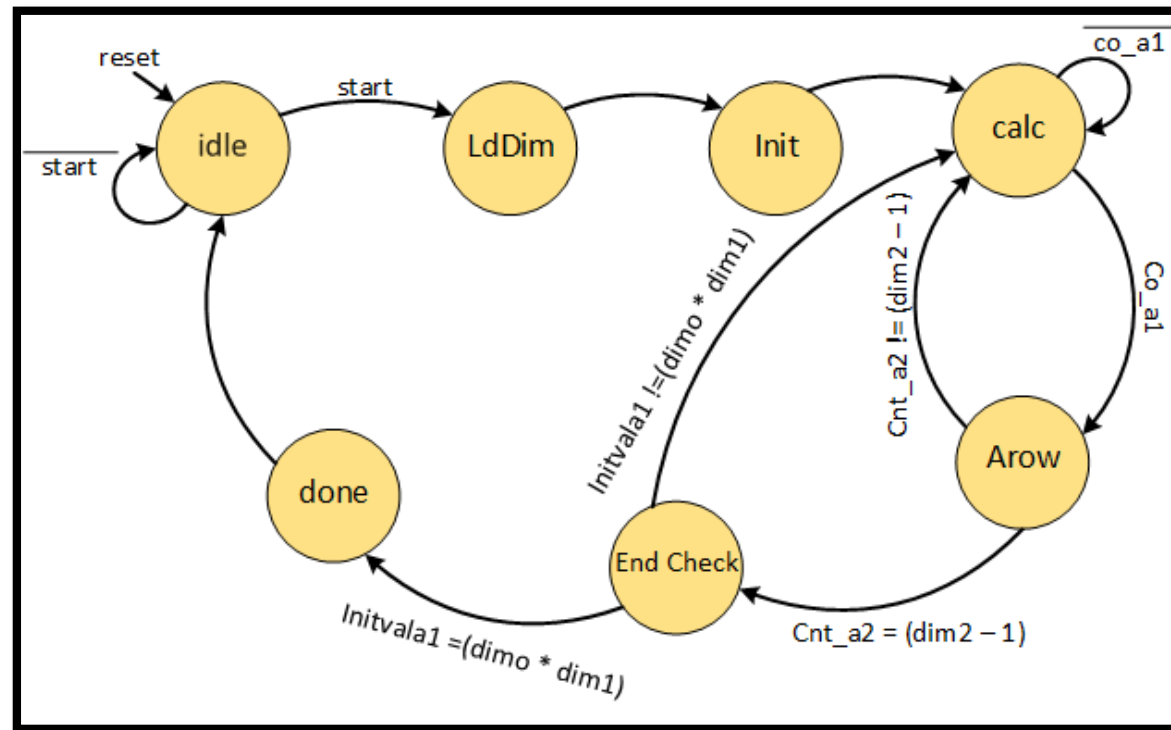
Data path

- Memory
- Register
- Counter
- Input handler
- Multiplier
- Adder

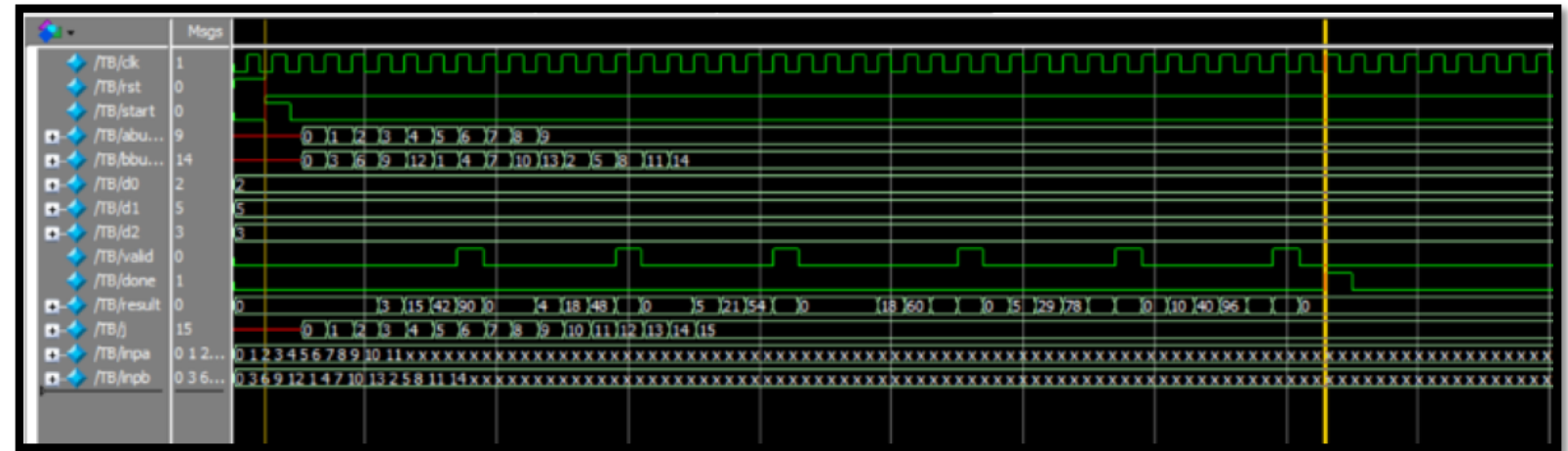


Control Unit

A circuitry that directs operations within the accelerator by using 7 states.



Wave Form



40 cycles

0	1	2	3	4
5	6	7	8	9

X

0	1	2
3	4	5
6	7	8
9	10	11
12	13	14

=

90	100	110
240	275	310

In Progress Tasks

- HW/SW co-design for design space exploration purposes
- Software simulation on CPU by using ISS

Thanks for your attention