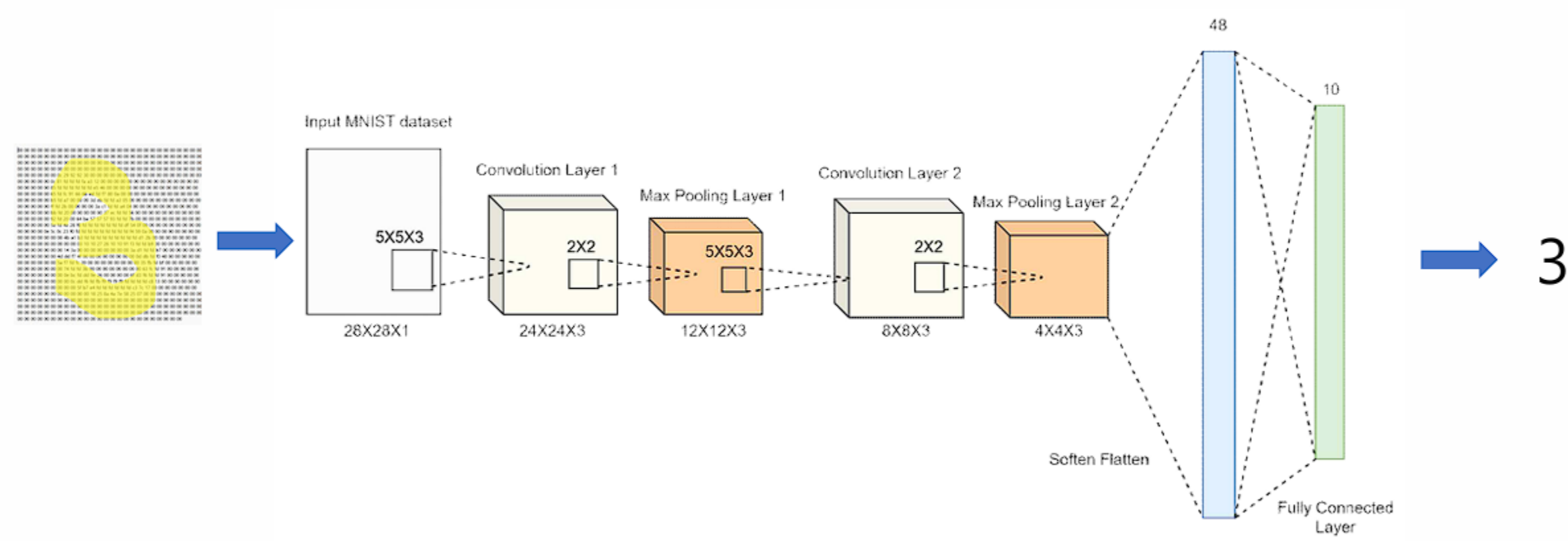
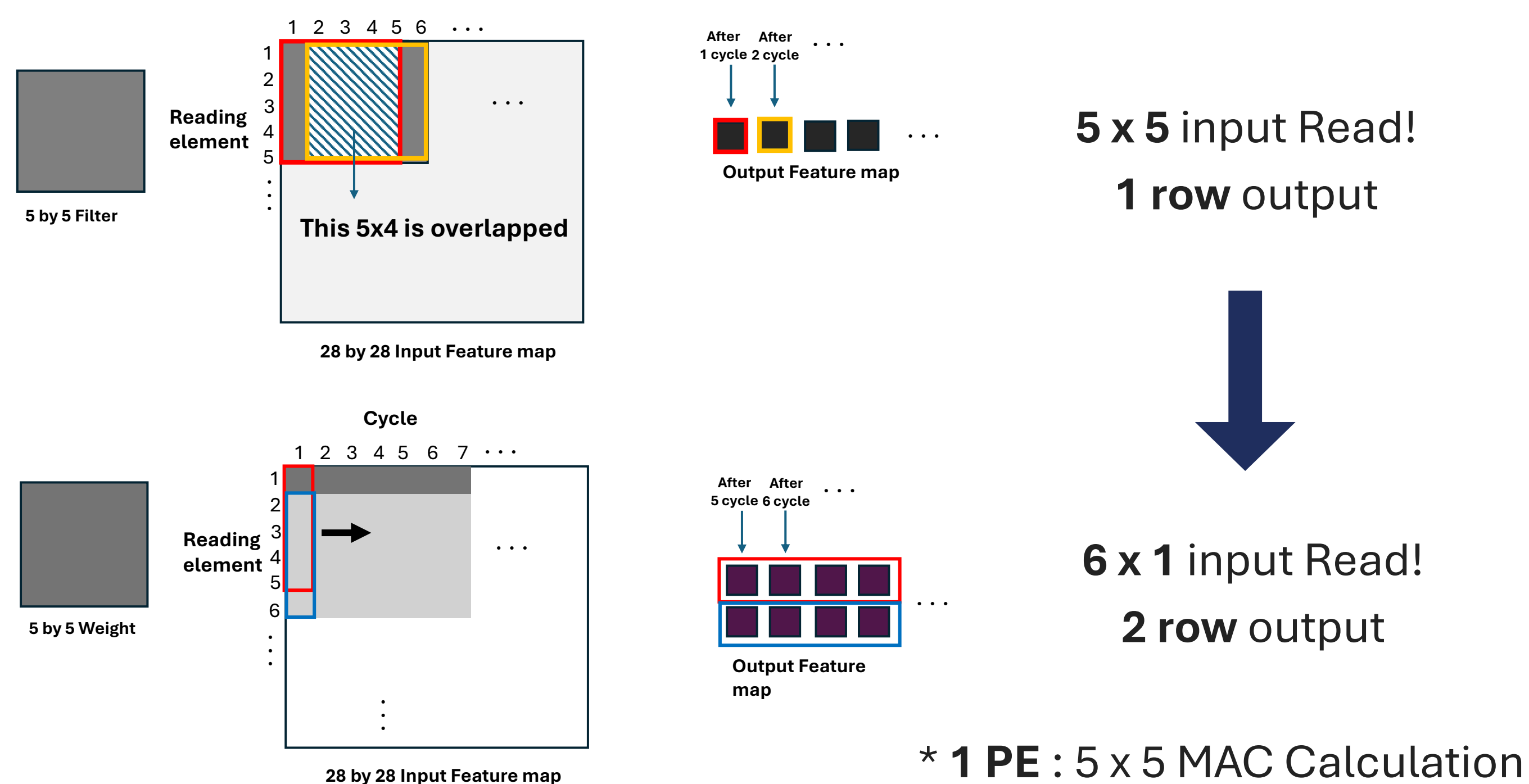


Reusable PE array CNN Accelerator

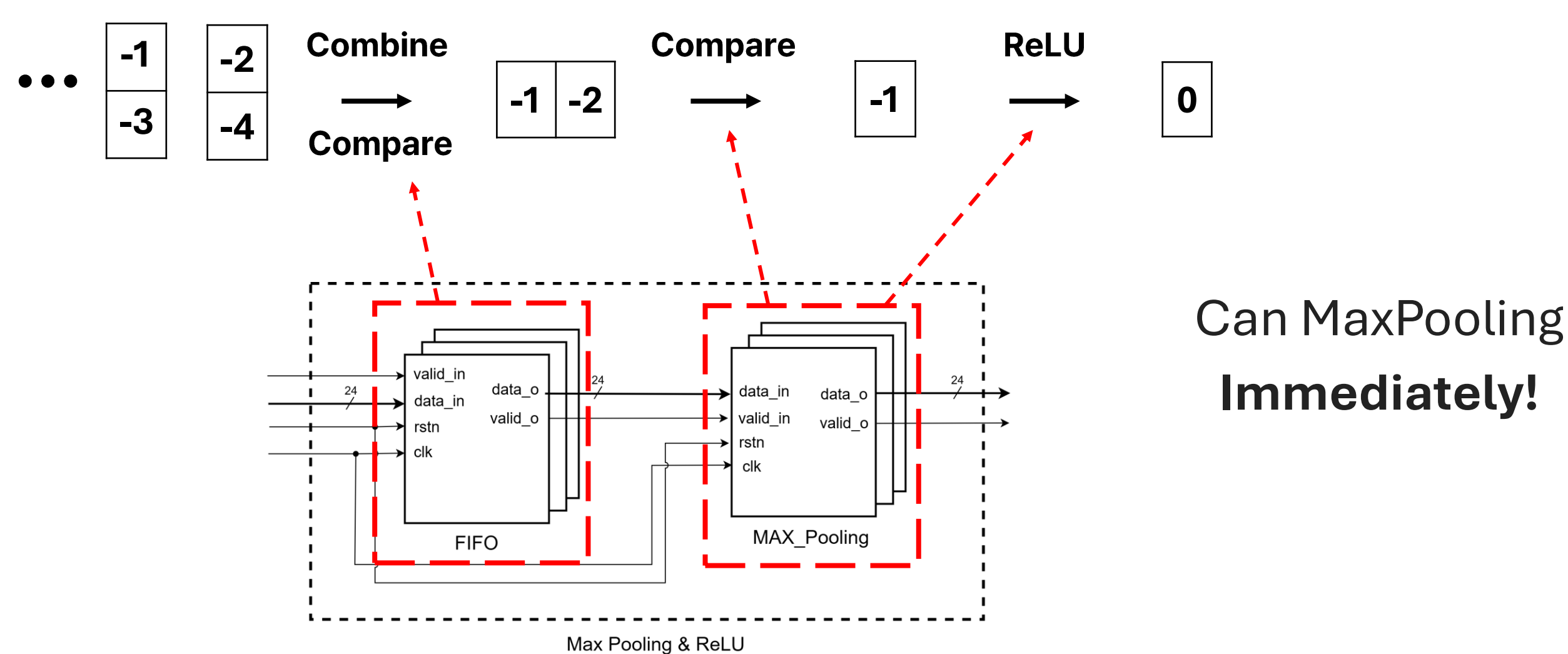
Target Model



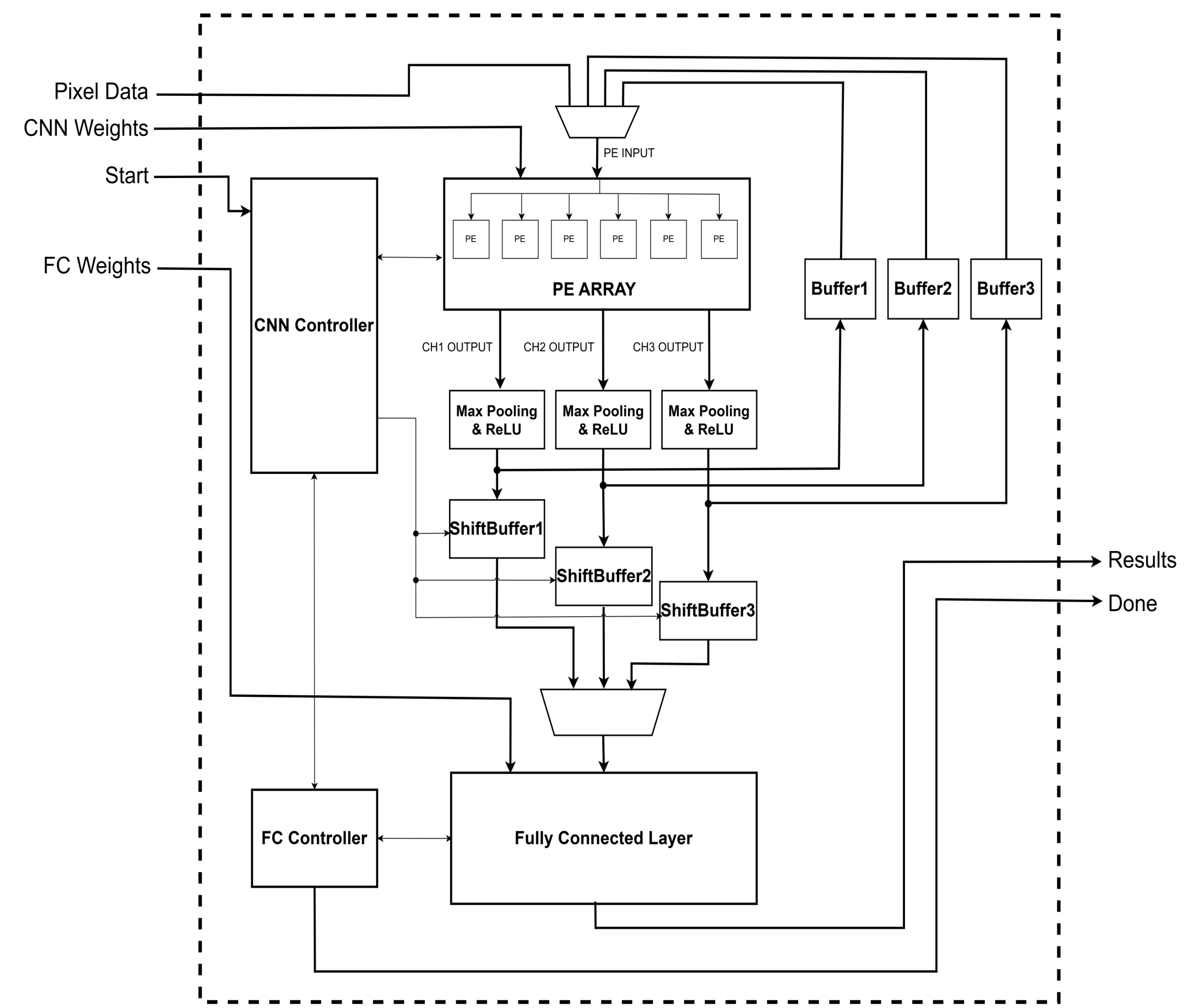
PE Array의 메모리 접근 최소화



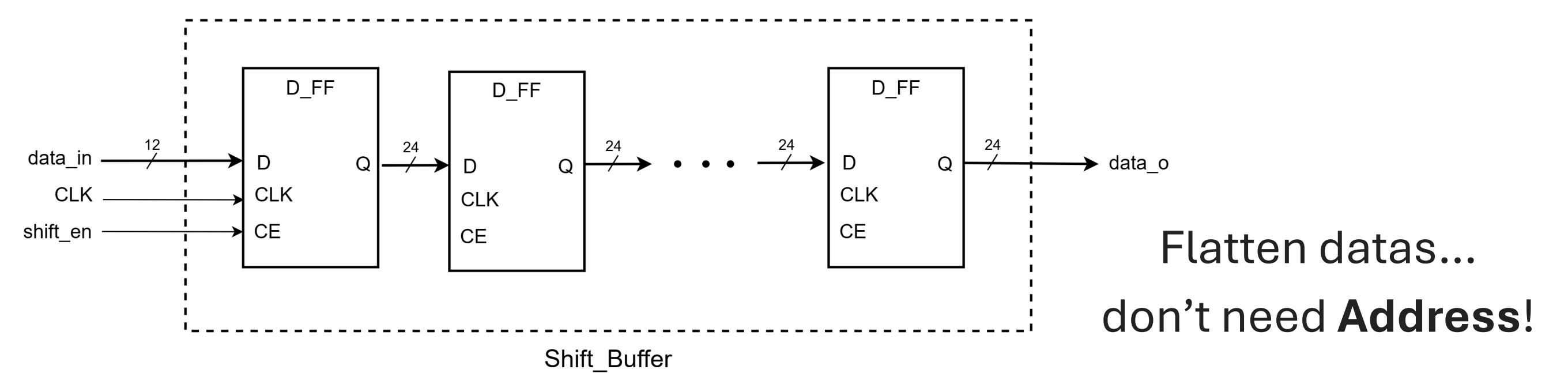
Pipelined FIFO & MaxPooling, ReLU



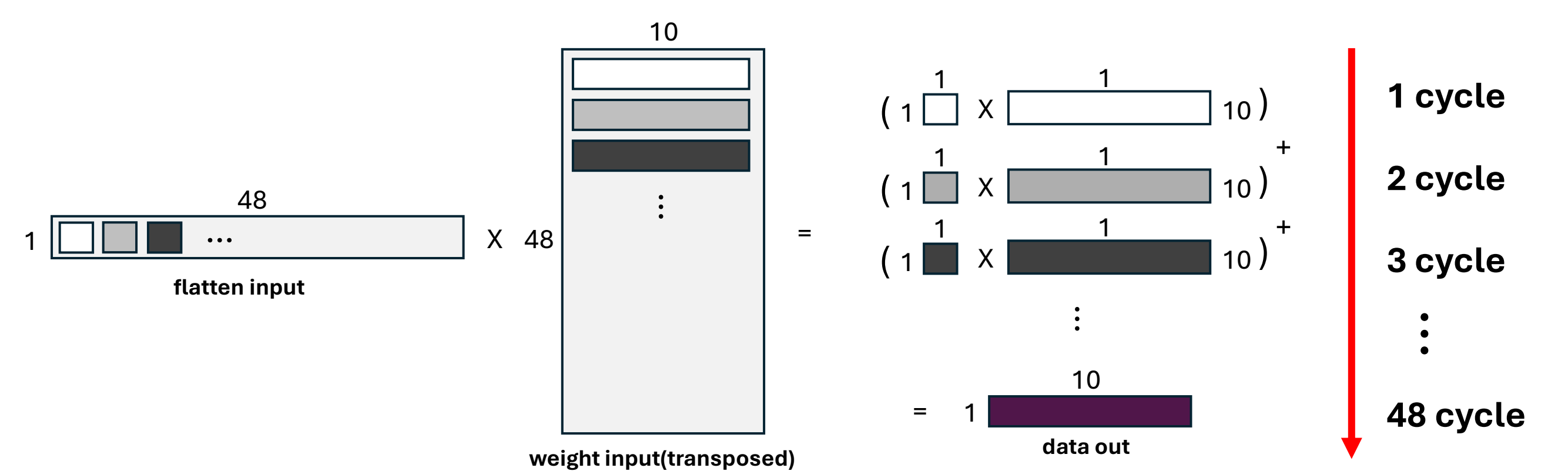
Architecture



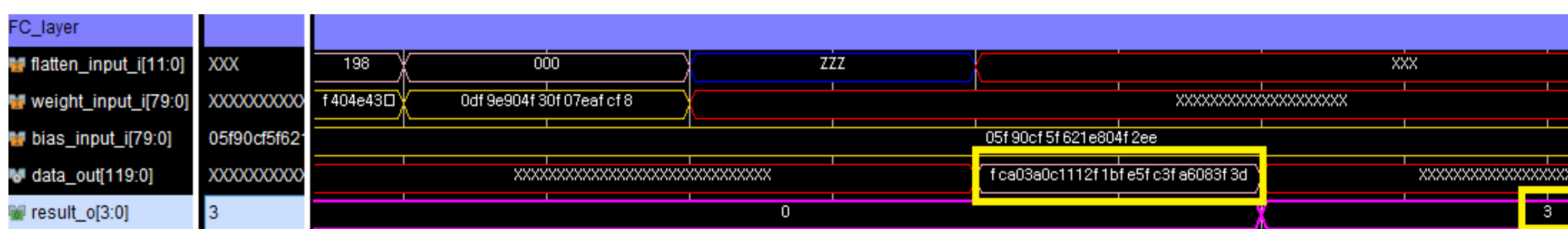
Shift Buffer



Fully Connected Layer



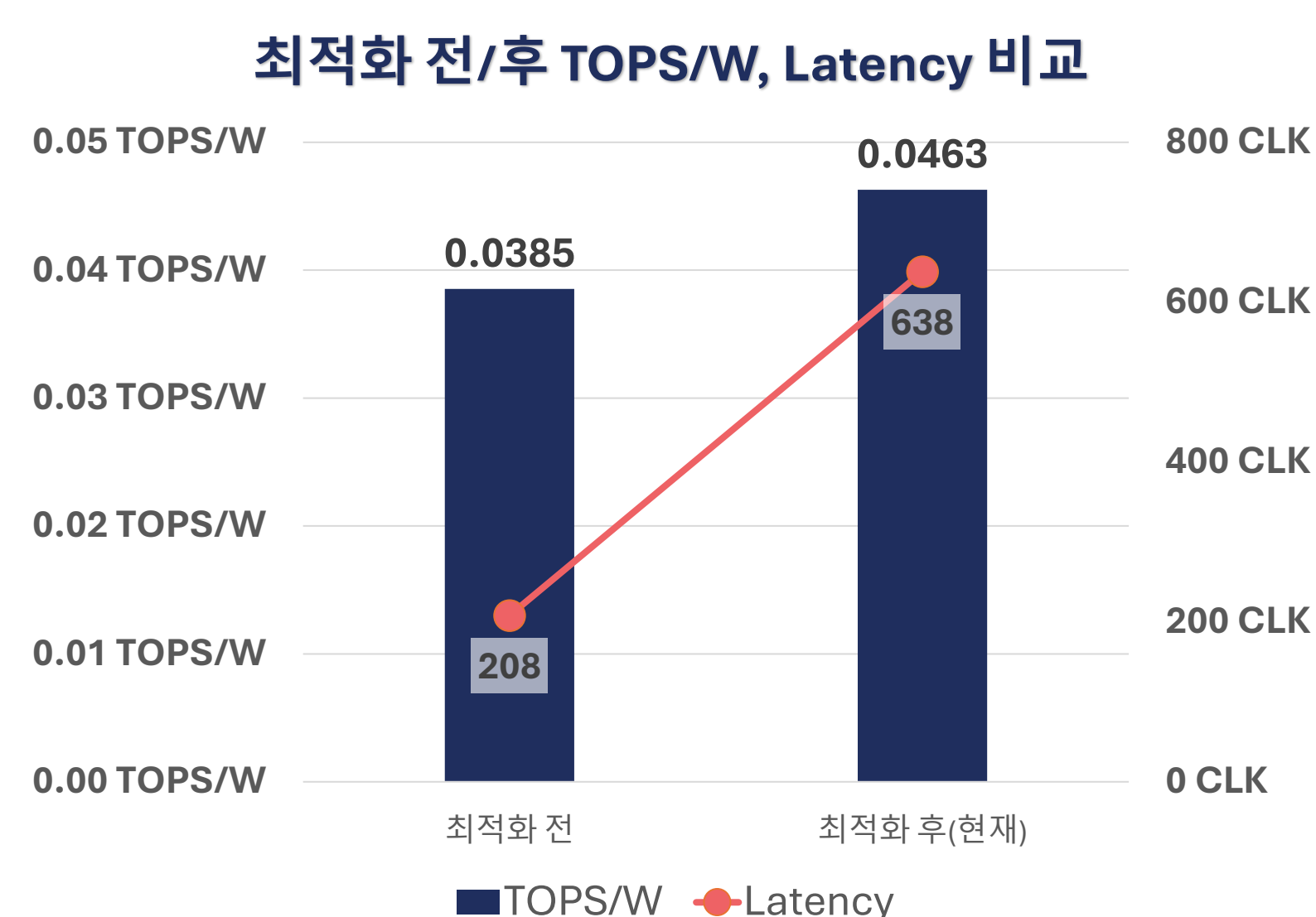
결과 분석



Result : 3

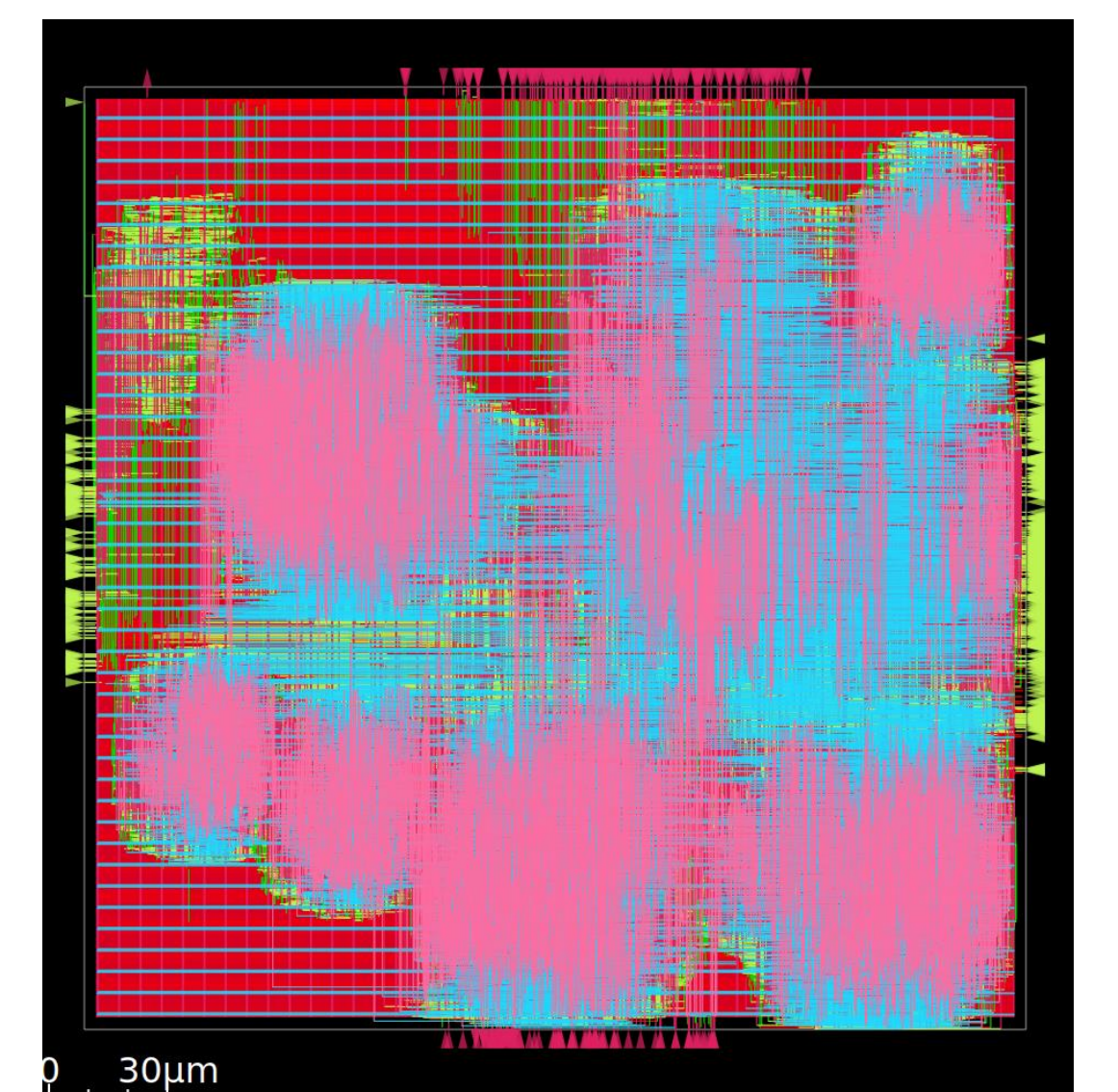
Image 1장 추론

Image 983: Success, Prediction = 3, True Label = 3
Image 984: Success, Prediction = 4, True Label = 4
Image 985: Success, Prediction = 5, True Label = 5
Image 986: Success, Prediction = 6, True Label = 6
Image 987: Success, Prediction = 7, True Label = 7
Image 988: Success, Prediction = 8, True Label = 8
Image 989: Success, Prediction = 9, True Label = 9
Image 990: Success, Prediction = 0, True Label = 0
Image 991: Success, Prediction = 1, True Label = 1
Image 992: Success, Prediction = 2, True Label = 2
Image 993: Success, Prediction = 3, True Label = 3
Image 994: Success, Prediction = 4, True Label = 4
Image 995: Success, Prediction = 5, True Label = 5
Image 996: Success, Prediction = 6, True Label = 6
Image 997: Success, Prediction = 7, True Label = 7
Image 998: Success, Prediction = 8, True Label = 8
Image 999: Success, Prediction = 9, True Label = 9



Energy efficiency

CLK에 따른 TOPS/W 비교



OpenROAD GUI Result

Total CLK	638	[CLK]
Frequency	0.2	[GHz]
Total Power	1.06	[Watts]
Accuracy	98	[%]
TOPS/W	0.0465	

----- Final Accuracy for 1000 Input Image -----
Accuracy : 98%

Image 1000장 추론

//before optimization.. 3500ps = 285.7MHz				
Post synthesis report_power				
Group	Internal Power	Switching Power	Leakage Power	Total Power (Watts)
Sequential	1.97e-02	1.18e-04	1.12e-06	1.98e-02 0.4%
Combinational	2.82e+00	2.76e+00	1.98e-05	5.58e+00 99.6%
Clock	0.00e+00	0.00e+00	0.00e+00	0.00e+00 0.0%
Macro	0.00e+00	0.00e+00	0.00e+00	0.00e+00 0.0%
Pad	0.00e+00	0.00e+00	0.00e+00	0.00e+00 0.0%
Total	2.84e+00	2.76e+00	2.09e-05	5.60e+00 100.0%
	50.7%	49.3%	0.0%	

//5000ps = 200MHz				
Post synthesis report_power				
Group	Internal Power	Switching Power	Leakage Power	Total Power (Watts)
Sequential	7.89e-03	3.46e-05	2.08e-06	7.93e-03 0.7%
Combinational	5.34e-01	5.20e-01	1.27e-05	1.05e+00 99.3%
Clock	0.00e+00	0.00e+00	0.00e+00	0.00e+00 0.0%
Macro	0.00e+00	0.00e+00	0.00e+00	0.00e+00 0.0%
Pad	0.00e+00	0.00e+00	0.00e+00	0.00e+00 0.0%
Total	5.42e-01	5.20e-01	1.48e-05	1.06e+00 100.0%
	51.0%	49.0%	0.0%	