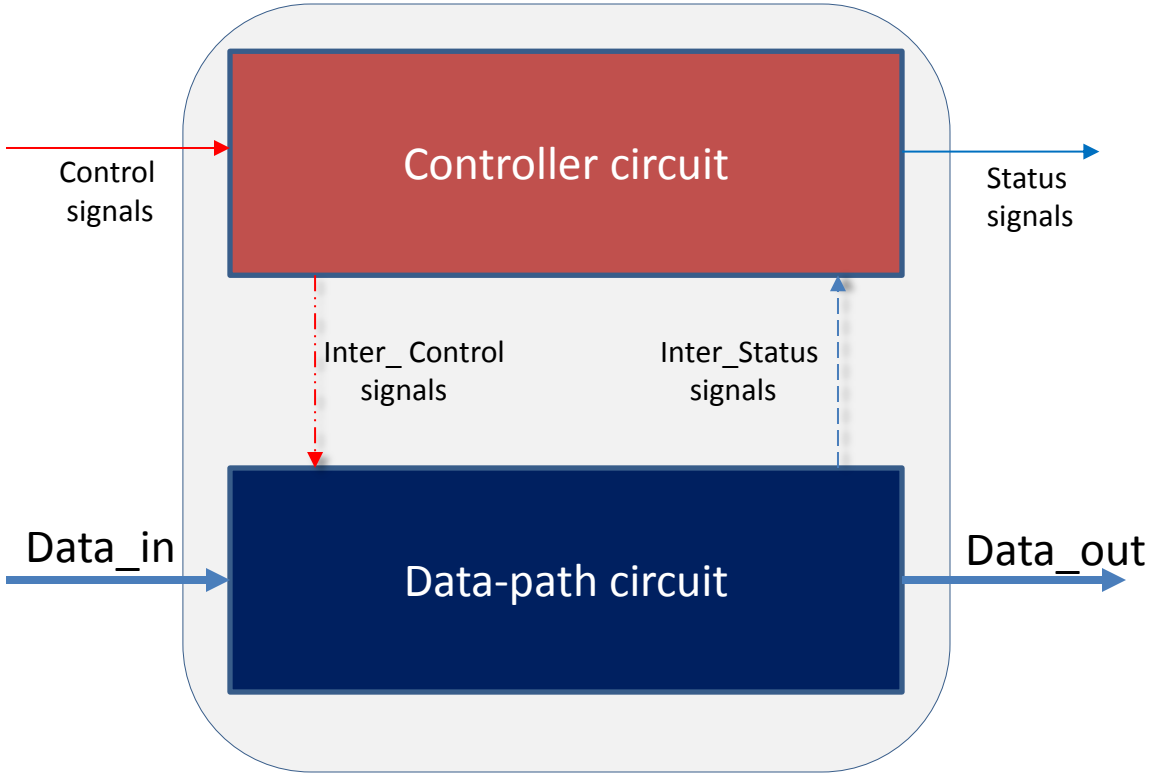
IC Design

Simplest systems have two parts

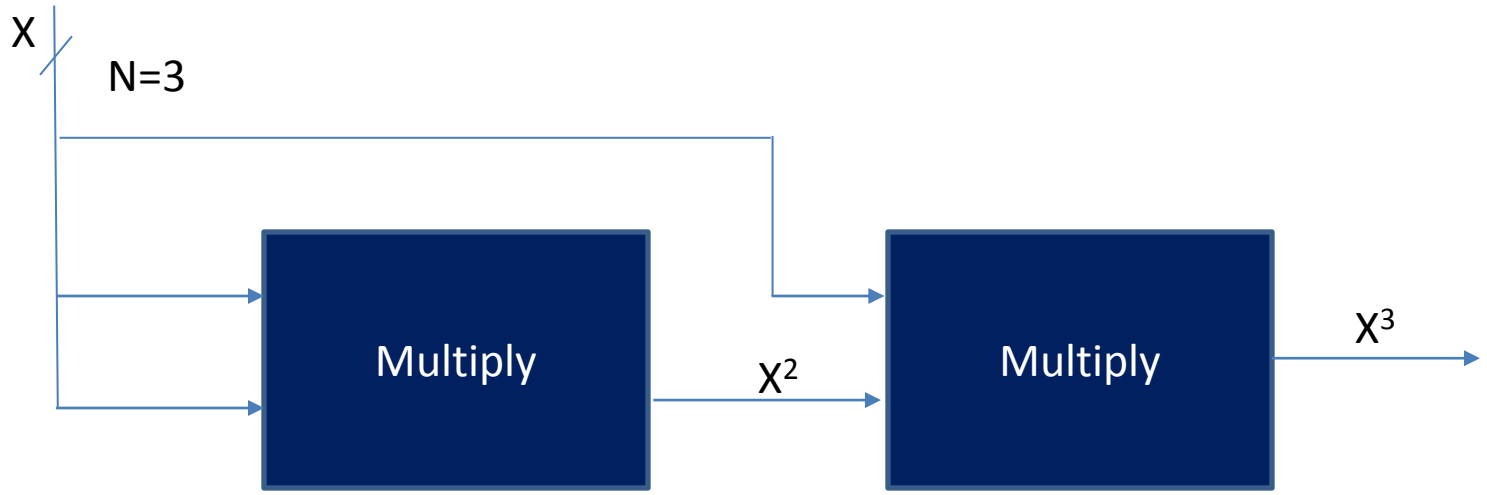


Start out simple

Suppose we want to build a circuit to calculate *X3*

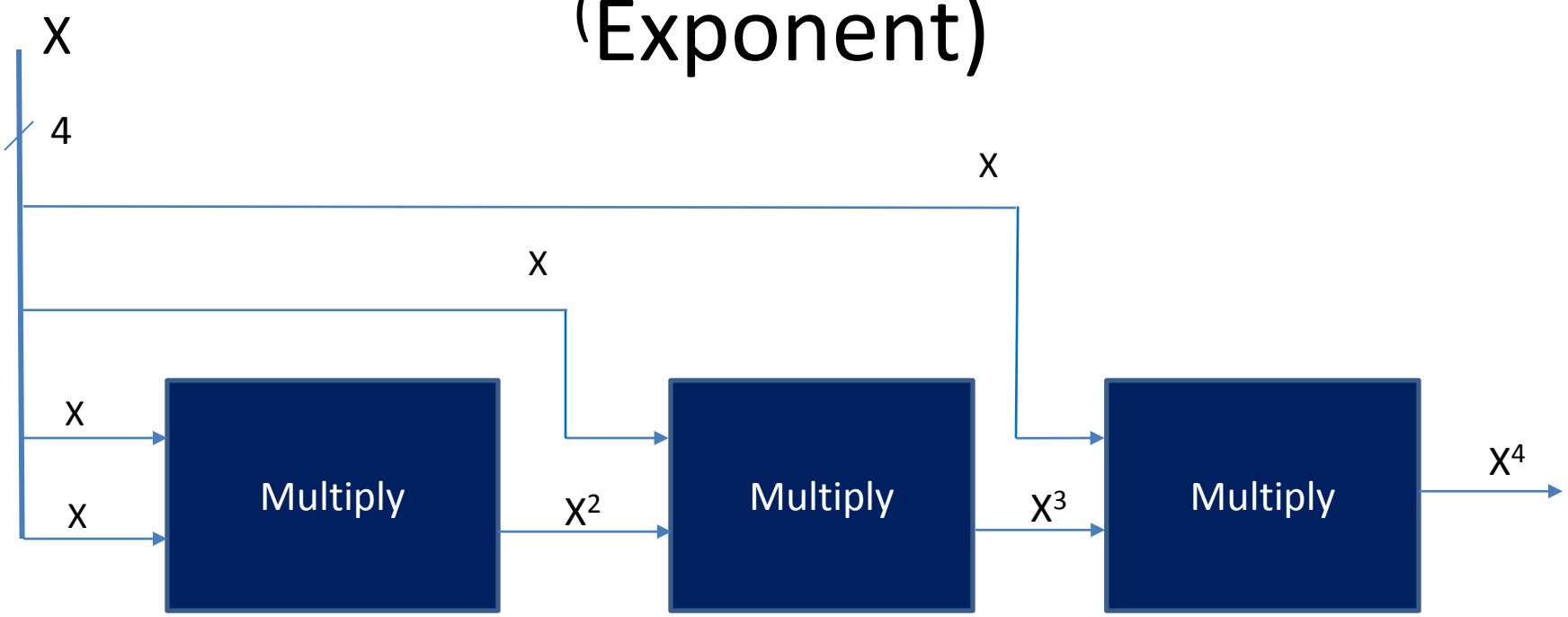
(Exponent)

Start out simple
Design the X^3
(Exponent)

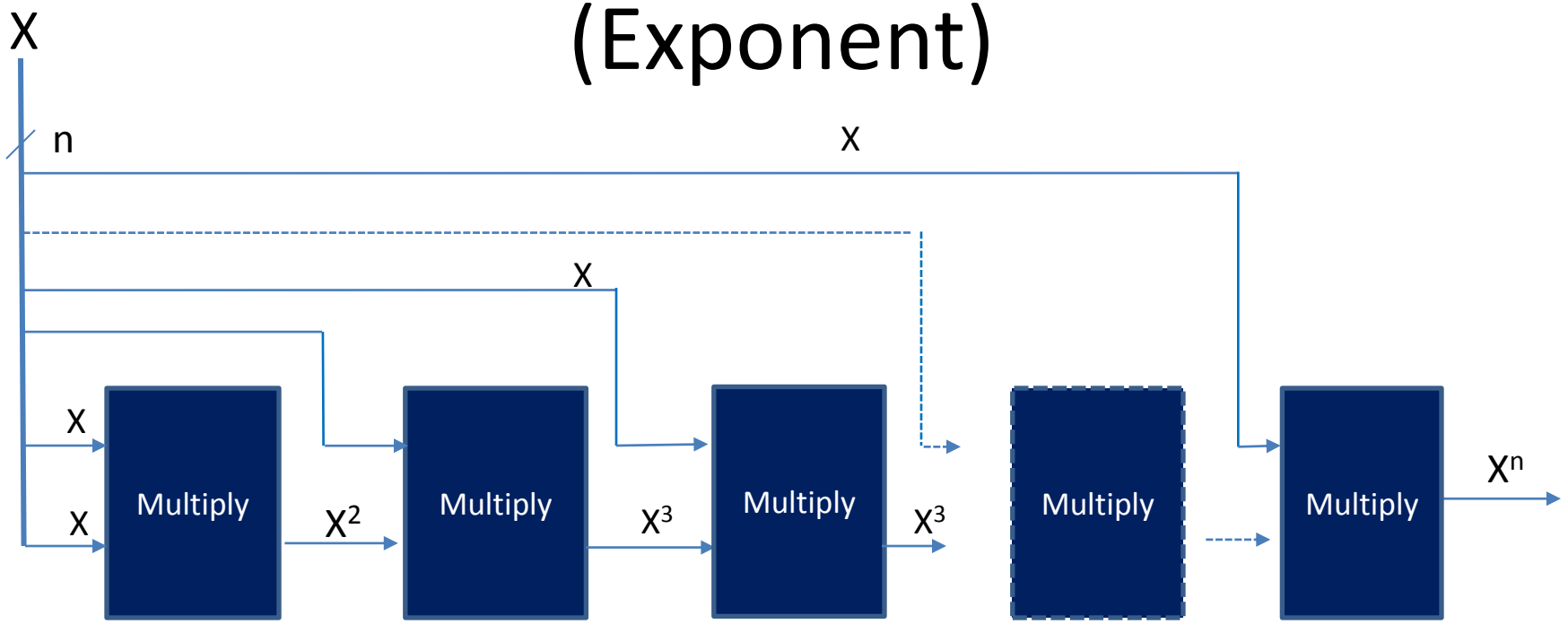


X^2

Start out simple
Design the X^4
(Exponent)

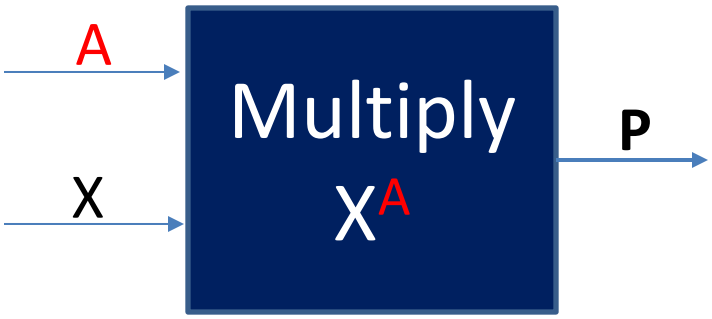


Start out simple
Design the X^n
(Exponent)



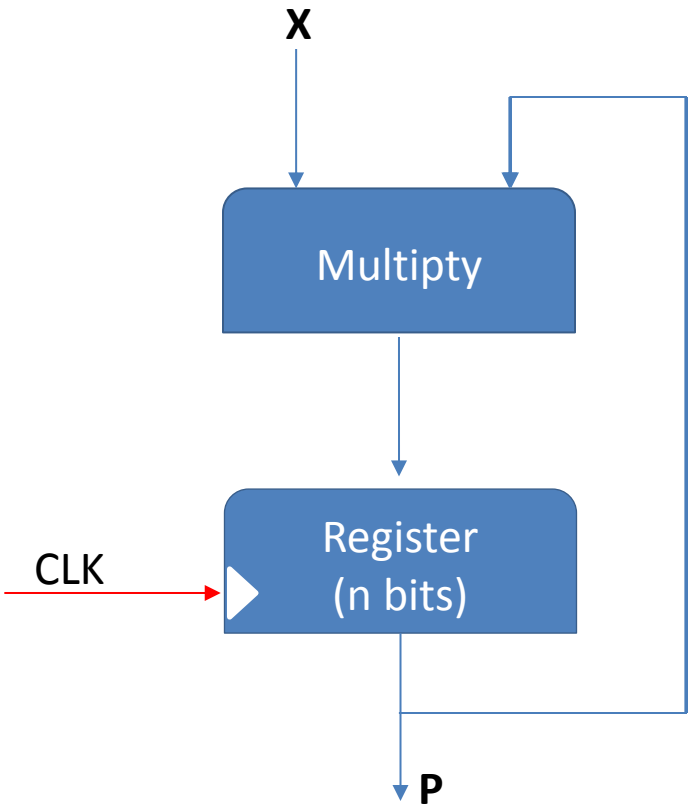
What if we want to compute X^A where *X* and *A* are both inputs

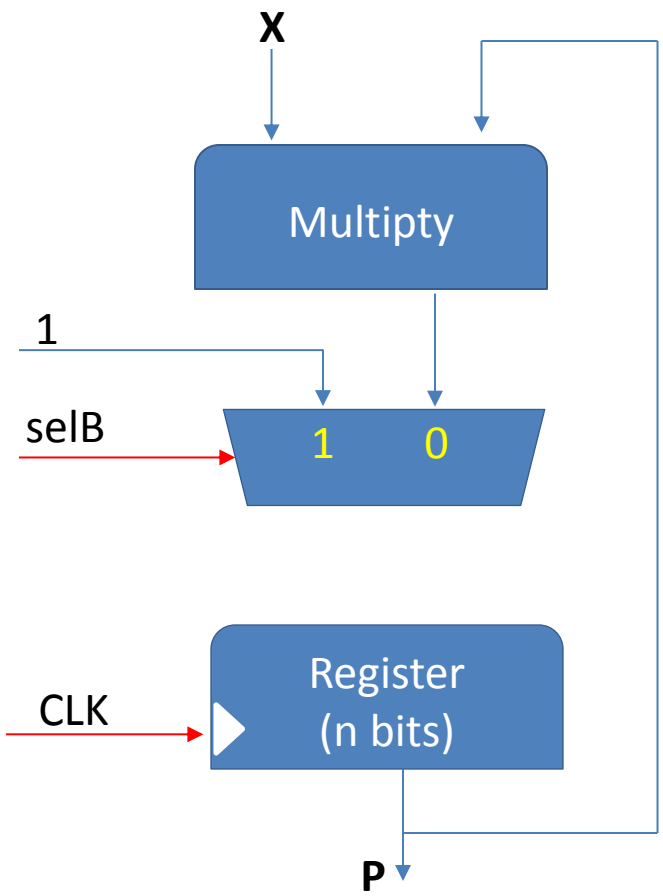
Start out simple
Design the X^A



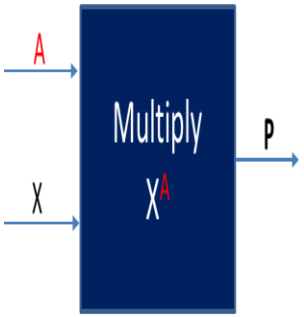

```
P = 1; CNT = A-1;
while (CNT >= 0) do
        P = P * X;
      CNT = CNT – 1;
end while;
```

Design the X^A





Design the X^A

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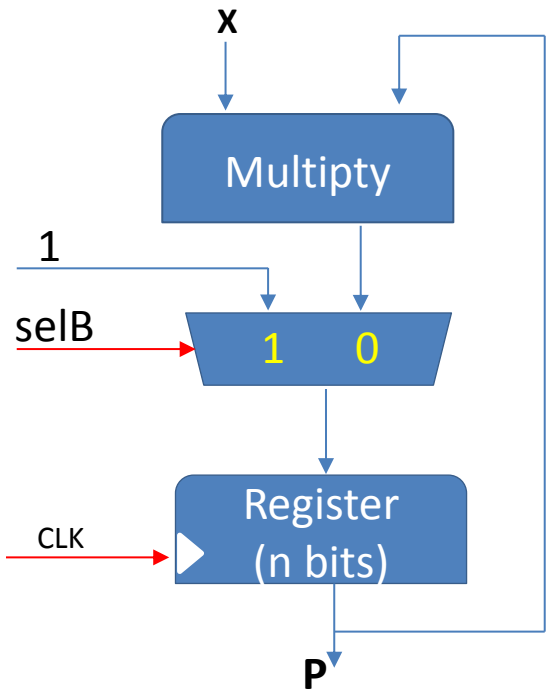
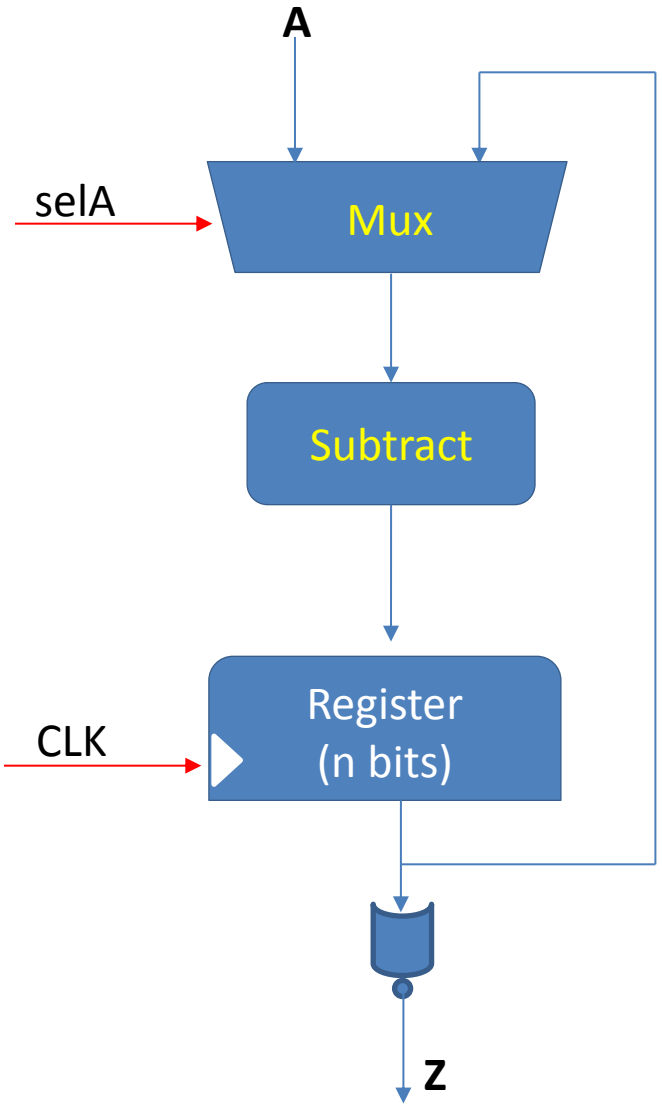
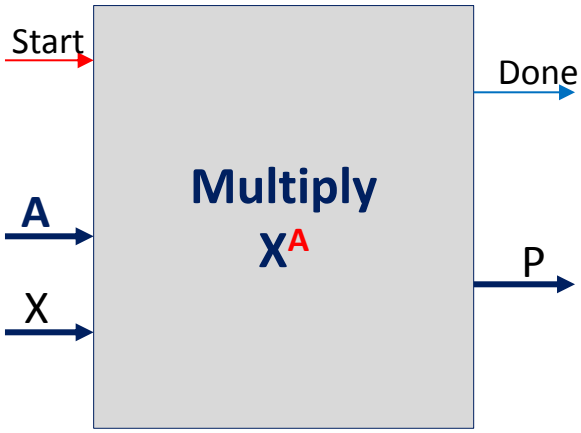
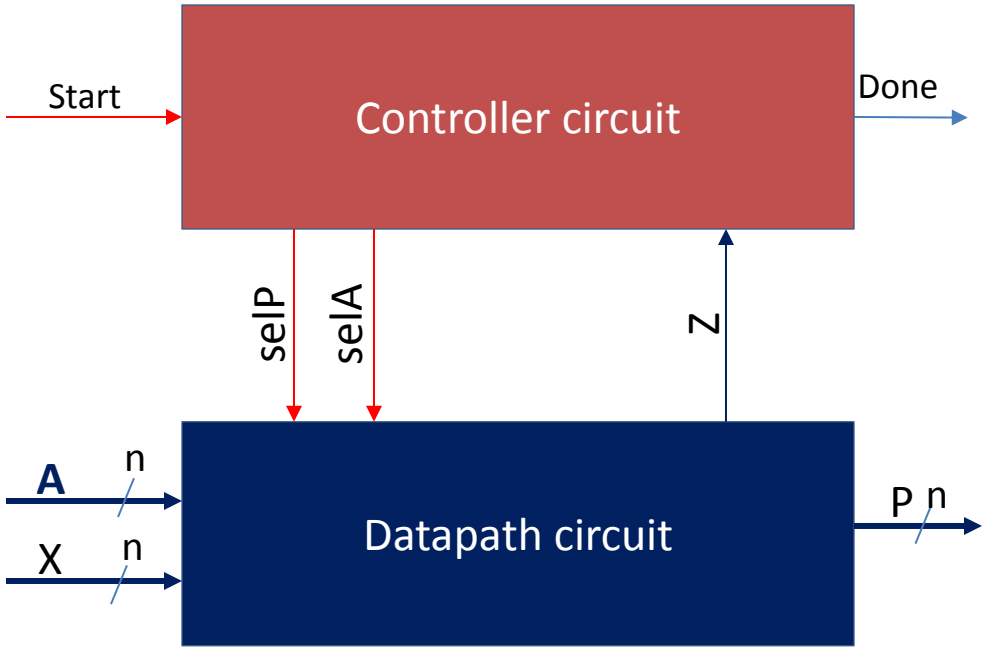




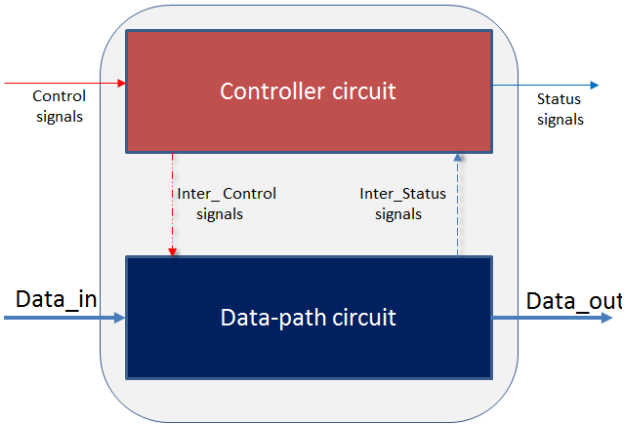
Design the X^A

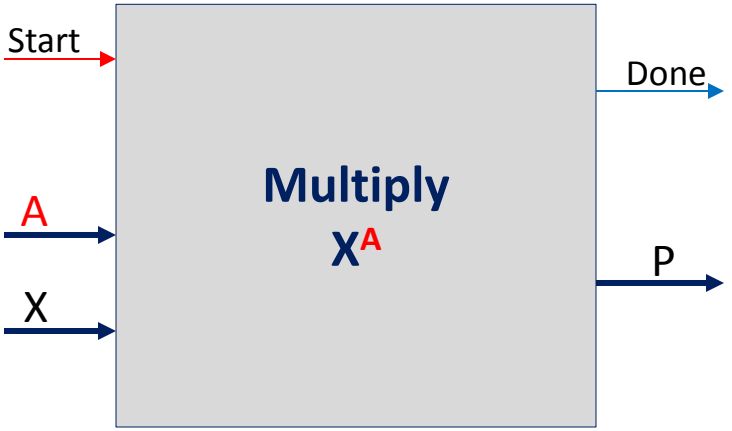




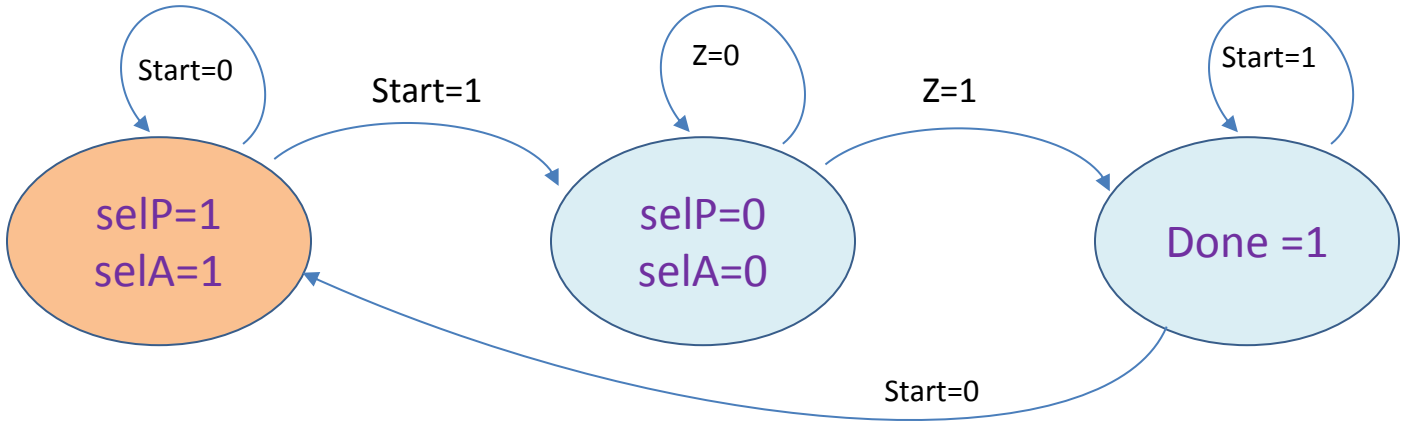
Model of Control Path & Data Path

Design the X^A





FMS



Control path

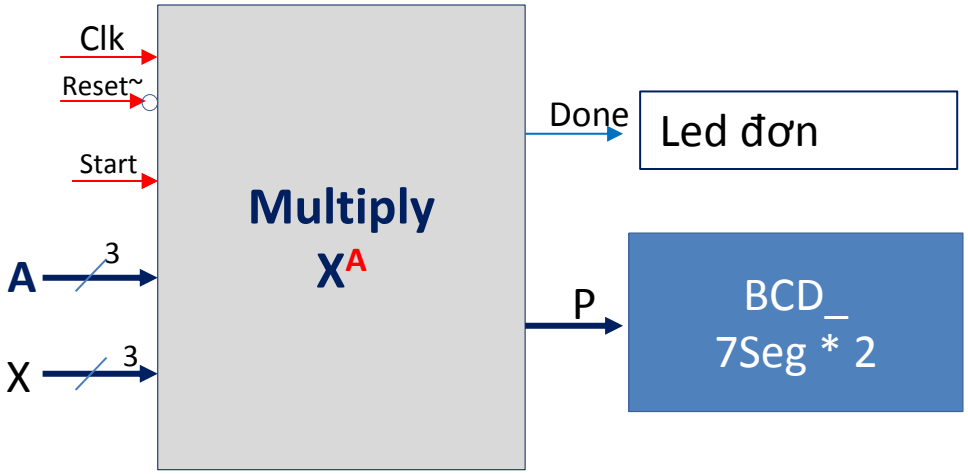
Data path

P= 1
Count = A

P= PxX
Count = Count-1

Count = 0
P out ra ngoài

Implementation on FPGA board



Giải thích thêm:

- Khi Start = 1 : Mạch thực hiện tính toán hàm mũ, giá trị được xuất ra 2 Led 7 đoạn
- Khi có Reset mức âm : đèn Done tắt và 2 Led- 7 đoạn về giá trị ‘0”
- A được gán từ 2 switch
- X được gán từ 2 switch

Chú ý :

2 switch thể hiện từ 0 – 3 giá trị, do đó hàm mũ này tính tối đa là 81 giá trị (3 mũ 3 = 81)

Do mạch chạy nhanh, có thể thêm Delay để thấy giá trị Led 7 đoạn tăng dần

Trong quá trình tính toán : Led Done tắt, khi tính xong Led Done sáng