

CSE140 System Design Review

Instructor: Po-Ya Hsu

Implement the following algorithm:

Alg(X,Y,Z,start,U,done);

Input X[7:0], Y[7:0], start;

Output U[7:0], done;

Local-object A[7:0], B[7:0], C[7:0];

S1: If start' goto S1;

S2: A<= X || B<= Y || C<= (00001111) || done<= 0;

S3: C<=Inc(C) || If C'[7] then A<= Add(A, B) else A<= Add(A, -B);

S4: B<= Inc(B) || If B'[7] goto S3;

S5: U<= A || done<= 1 || goto S1;

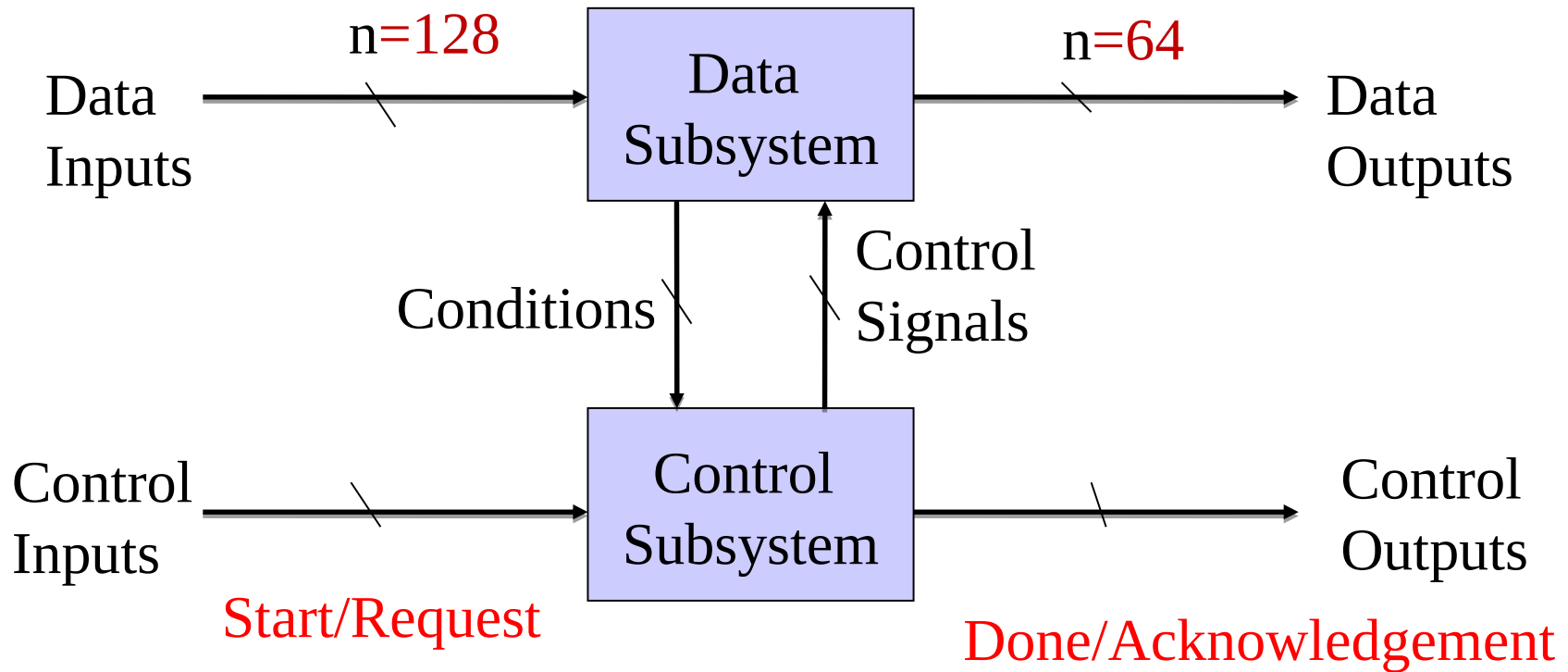
End Alg

First, think about how you're going
to do it

Methodology

Datapath Subsystem

Control Subsystem



Methodology

Datapath Subsystem

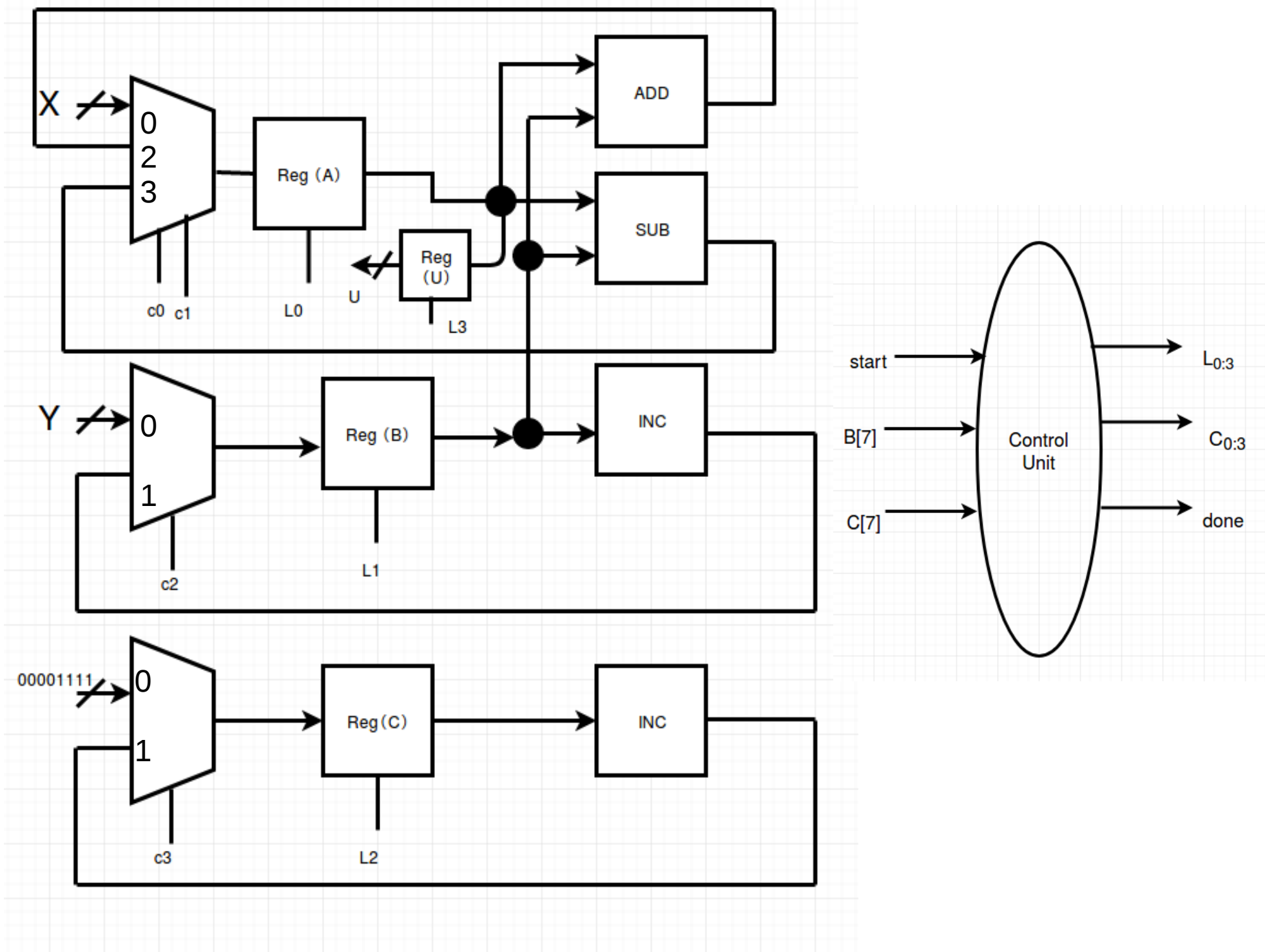
Control Subsystem

State	Instruction
S2	A <= Load(X)
S2	B <= Load(Y)
S2	C <= (00001111)
S3	C <= INC(C)
S3	A <= ADD(A,B)
S3	A <= SUB(A,B)
S4	B <= INC(B)
S5	U <= A

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Alg(X,Y,Z,start,U,done);
Input X[7:0], Y[7:0], start;
Output U[7:0], done;
Local-object A[7:0], B[7:0],
C[7:0];
S1: If start' goto S1;
S2: A<= X || B<= Y || C<=
(00001111) || done<= 0;
S3: C<=Inc(C) || If C'[7] then
A<= Add(A, B) else A<= Add(A,
-B);
S4: B<= Inc(B) || If B'[7] goto
S3;
S5: U<= A || done<= 1 || goto
S1;
End Alg

```



Methodology

Datapath Subsystem

Control Subsystem

Implement the following algorithm:

Alg(X,Y,Z,start,U,done);

Input X[7:0], Y[7:0], start;

Output U[7:0], done;

State	L0	L1	L2	L3	c0	c1	c2	c3	done
S1	0	0	0	0	-	-	-	-	1
S2	1	1	1	0	0	0	0	0	0
S3	1	0	1	0	1	C[7]	-	1	0
S4	0	1	0	0	-	-	1	-	0
S5	0	0	0	1	-	-	-	-	1

Local-object A[7:0], B[7:0], C[7:0];

S1: If start' goto S1;

S2: A<= X || B<= Y || C<= (00001111) || done<= 0;

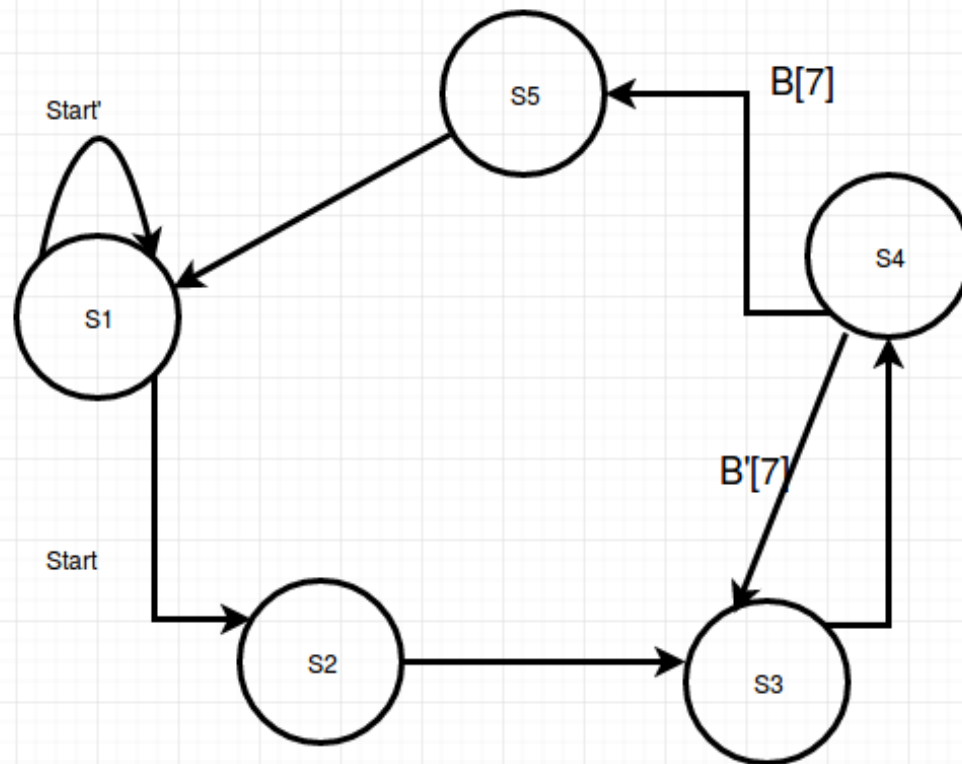
S3: C<=Inc(C) || If C'[7] then A<= Add(A, B) else A<= Add(A, -B);

S4: B<= Inc(B) || If B'[7] goto S3;

S5: U<= A || done<= 1 || goto S1;

End Alg

State Diagram



One Hot Encoding Design

