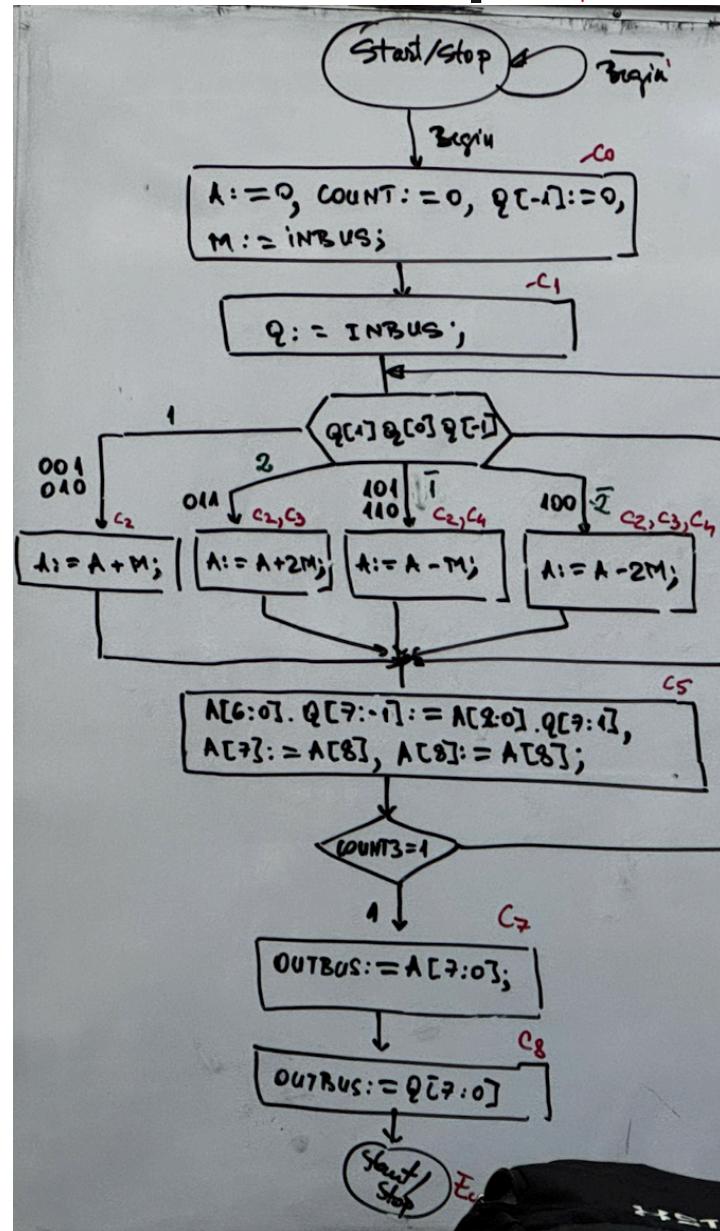


CNT	A	Q	Q-1	M
000	0000 0000 +0011 0111	1001 0011 0011 0111	0 1	1100 1001 1001 0011
001	0000 0110 +1100 1001	11100100 11101011	1 0	11 11
011	1111 0010 +0011 0111	01110010 00101100	0 1	01 +
100	0001 0110 +0011 0111	01001100 00101100	1 0	-
101	+1100 1001	11011111 11101111	0 0	
110	1111 0111 +0011 0111	11010111 00101110	0 1	
111	+0011 0111	00010111 00010111	1 1	
		00010111 01101011	1	END



X _{i+1}	X _i	X _{i-1}	operator
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	2
1	0	0	2
1	0	1	1
1	1	0	1
1	1	1	1

CNT	A	Q	Q-1
00	0000 0000 +1101 0110	1000 1011 1101 0110	0 1
01	+1101 0110	11001100 11110011	0 1
10	+0010 1001 0001 1100	01001100 00000111	0 1
11	+1010 1101 1011 0100	00010100 11010110	1

-117 * 83 = -9711

x_{i+2}	x_{i+1}	x_i	x_{i-1}	Out
0	0	0	1	0
0	0	1	0	1
0	0	1	1	2
0	1	0	0	2
0	1	0	1	3
0	1	1	0	3
0	1	1	1	4
1	0	0	0	0
1	0	0	1	1
1	0	1	0	0
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	1

Radix θ

1, 2, 3, 4 bits
3 shift

Radix 8	$x = -104$	$x = -128 + 24 = -128 + 16 + 8$
	$y = -93$	$y_{C_2} = 10011000$
$2M = 1100111010$	$y = -128 + 29 = -128 + 16 + 8 + 4 + 1$	
$-2M = 0011000110$	$y = 1110011101$	
$\leftarrow 3M = 01000101001$	$-y = 0001100011$	
$\uparrow 3M = 1011010111$		
	$x \times y$	$\frac{1110011101 + 0001100011 + 0001100011}{1011010111}$
CNT	A	Q
00	$00\ 0000$ $00\ 0000$	$110011\ 000$ $0011\ 0011$
01	$\begin{array}{r} 10110101 \\ 101101 \\ 11110101 \end{array}$	$\begin{array}{r} 0111000110 \\ 111000110 \end{array}$
10	$\begin{array}{r} 0011000110 \\ 0010100000 \\ 00010010100 \end{array}$	$\begin{array}{r} 000111000 \\ 1 \end{array}$
	$-104 - 93 = 10296$	\checkmark

Restoring

COUNT	A	Q	M
000	0010 1101	0001 011 <u>1</u> 0	1000 0111
-	1000 0111		
(1)	0101 0110	0001 011 <u>1</u> 0	
+	1000 0111		
	<u>0010 1101</u>		
	0101 1010	0010 1 <u>1</u> 00	
001	1000 0111		
+	(1) 0100 0111	0010 11 <u>0</u> 0	
	1000 0111		
	0101 1010		
	1011 0100 0101 1 <u>0</u> 00		
010	- 1000 0111		
(1)	0101 1010	0101 1 <u>0</u> 01	
	01		
011	- 1000 0111	101 <u>1</u> 0010	
(1)	0101 0011		
+	1000 0111	101 <u>1</u> @ 010	
	0101 1010		
	1011 0101 011 <u>1</u> @ 0100		
100	- 1000 0111		
(1)	0101 1110	011 <u>1</u> @ 0101	
	0101 1100		
101	- 1000 0111	11 <u>0</u> 0 1010	
(1)	0101 0101		
+	1000 0111	11 <u>0</u> 0 1010	
	0101 1100		
	1011 1001 1@01 0100		
110	- 1000 0111		
(1)	0111 0010	1@01 0101	
	0110 0101	@0101010	

Non Reformation

COUNT	S	A	<u>Q</u>	M
000	0	0010 1101	0001 0110	1000 0111
	-10	1000 0111		
	(1)	1010 0110	0001 0110	
	1	0100 1100	0010 1100	
001+	0	1000 0111		
	(1)	1101 0011	0010 1100	
	1	1010 0110	0101 1000	
010	+0	1000 0111		
	(0)	0010 1101	0101 1001	
	0	0101 1010	1011 0010	
011-	0	1000 0111		
	(1)	1101 0011	1011 0010	
	1	1010 0111	0110 0100	
100+	0	1000 0111		
	(0)	0010 1110	0110 0101	
	0	0101 1100	1100 1010	
101-	0	1000 0111		
	(1)	1101 0101	1100 1010	
	1	1010 1011	1001 0100	
110+	0	1000 0111		
	0	0011 0010	1001 0101	
	0	0110 0101	0010 1010	
111-	0	1000 0111		
	(1)	1101 1110	0010 1010	
00+	0	1000 0111		
	0	0110 0101		

NPD shift and - unit
1 → + 9-, add e =
0 → - 0 add a 1

gbf

1.4.3 Radix-2 SRT

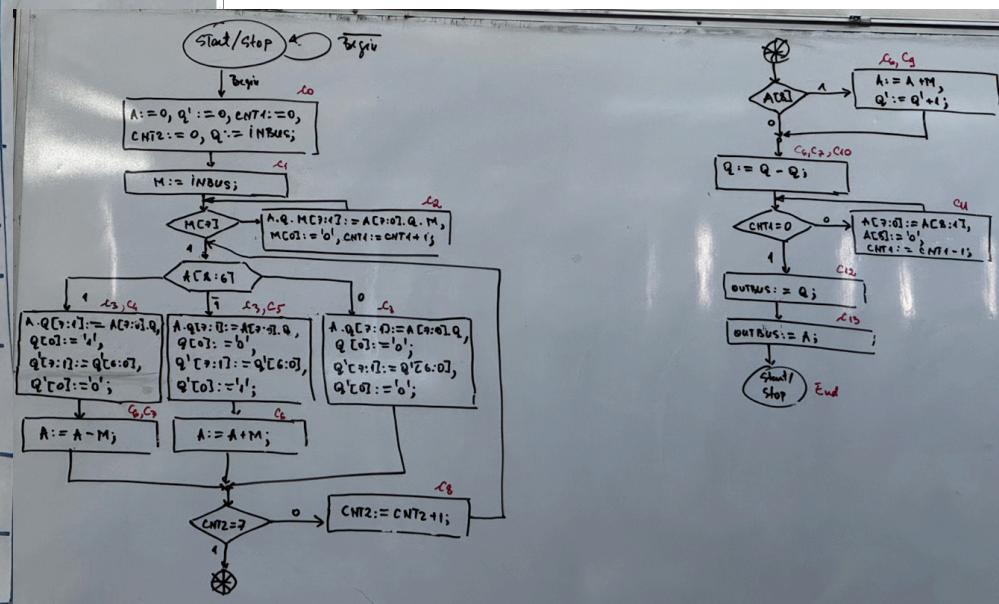
COUNT	P	A	M
000	00000 0000 00001 1010	1001 0000 0000 0000	0000 0101 1010 0000
000	$q_0 = 0$	$00010 0100$	$0000 0000$
001	$q_1 = 1$	$00100 1000$	$0000 0000$
010	$q_2 = 1$	$01001 0000$	$0000 0000$
011	$q_3 = 0$	$11110 0000$	$0000 0000$
100	$q_4 = 0$	$11100 0000$	$0000 0000$
101	$q_5 = 0$	$11000 0000$	$0000 0000$
110	$q_6 = 1$	$10000 0000$	$0000 0000$
111	$q_7 = 1$	$10100 0000$	$0000 0000$
	$+ 01010 0000$	$0001 0000$	$11010 0000$
	$(11100 0000)$	$0000 0001$	$11010 0000$
	$(00010 0000)$	$0010 0000$	$0000 0100$
	$\text{Shift} + 00000 00100$	00011100	$(28)_{10}$
	conv	$(41)_{10}$	$(28)_{10}$

$$\begin{array}{r} 128 \\ 21 \\ \hline 144 \\ 15 \\ \hline 10 \\ 128 \\ \hline 64 \\ 65 \\ \hline 32 \\ 16 \\ \hline 144 \end{array}$$

$\text{CPU time} = (\text{IC} \times \text{CPI}) \times \text{clk cycle time}$

$\text{CCF} = \frac{1}{\text{CR}}$

$\text{MIPS} = \frac{\text{IC}}{\text{CPU time} \times 10^6} = \frac{\text{IC}}{\text{FC} \times \text{CPS} \times \text{CCF}} = \frac{\text{IC}}{\text{Clock Rate} \times 10^6}$



1 SRT-4

b	Range of P	q	b	Range of P	q
8	-12	-7	-2	12	-18
8	-6	-3	-1	12	-10
8	-2	1	0	12	-4
8	2	5	1	12	3
8	6	11	2	12	9
9	-14	-8	-2	13	-19
9	-7	-3	-1	13	-10
9	-3	2	0	13	-4
9	2	6	1	13	3
9	7	13	2	13	10
10	-15	-9	-2	14	-20
10	-8	-3	-1	14	-11
10	-3	2	0	14	-4
10	2	7	1	14	3
10	8	14	2	14	10
11	-16	-9	-2	15	-22
11	-9	-3	-1	15	-12
11	-3	2	0	15	-5
11	2	8	1	15	3
11	8	15	2	15	11

COUNT	P	A	B
00	00000 0000 00001 1010	1101 0011 0110 0000	0000 0101 1100 0000
00	$q_0 = 1$	$00110 1001$	$0000 0000$
-	$00110 1010$	$1000 0001$	$00 00$
-	$01010 0000$	$00 00$	$00 00$
	$11100 1010$		
01	$q_1 = 1$	$00000 0100$	$00 00$
+	$10010 1010$	$00000 0100$	$00 00$
+	$01010 0000$	$00 00$	$00 00$
	$11100 1010$		
10	$q_2 = 1$	$00000 0000$	$00 00$
+	$10010 1000$	$00000 0000$	$00 00$
+	$01010 0000$	$00 00$	$00 00$
	$11100 1000$		
11	$q_3 = 1$	$00000 0000$	$00 00$
+	$10010 0000$	$0100 0000$	$00 00$
+	$01010 0000$	$00 00$	$00 00$
	$11100 0000$		
	$(11100 0000)$	$0000 0001$	$00 10 00$
	$(00010 0000)$	$0100 1010$	$00 01 01 10$
	$\text{Shift} + 00000 0001$	$00010 1010$	$00 10 00 11$
	conv	$00000 0001$	$\text{quotient} = 35_{10}$
		$\text{remainder} = 1_{10}$	

COUNT	P	A	B
00	00000 0000 00001 1010	1101 0011 0110 0000	0000 0101 1100 0000
00	$q_0 = 0$	$00110 1001$	$0000 0000$
	$11100 1001$	$1000 0000$	$00 00$
01	$q_1 = 1$	$00000 0000$	$00 00$
-	$11010 0110$	$00000 0000$	$00 00$
	$00010 0110$		
10	$q_2 = 1$	$00000 0000$	$00 00$
+	$01001 1000$	$00000 0000$	$00 00$
	$11100 1000$		
11	$q_3 = 1$	$00000 0000$	$00 00$
+	$10010 0000$	$0100 0000$	$00 00$
	$11100 0000$		
	$(11100 0000)$	$0000 0001$	$00 10 00 11$
	$(00010 0000)$	$0100 1010$	$00 01 01 10$
	$\text{Shift} + 00000 0001$	$00010 1010$	$00 10 00 11$
	conv	$00000 0001$	$\text{quotient} = 35_{10}$
		$\text{remainder} = 1_{10}$	