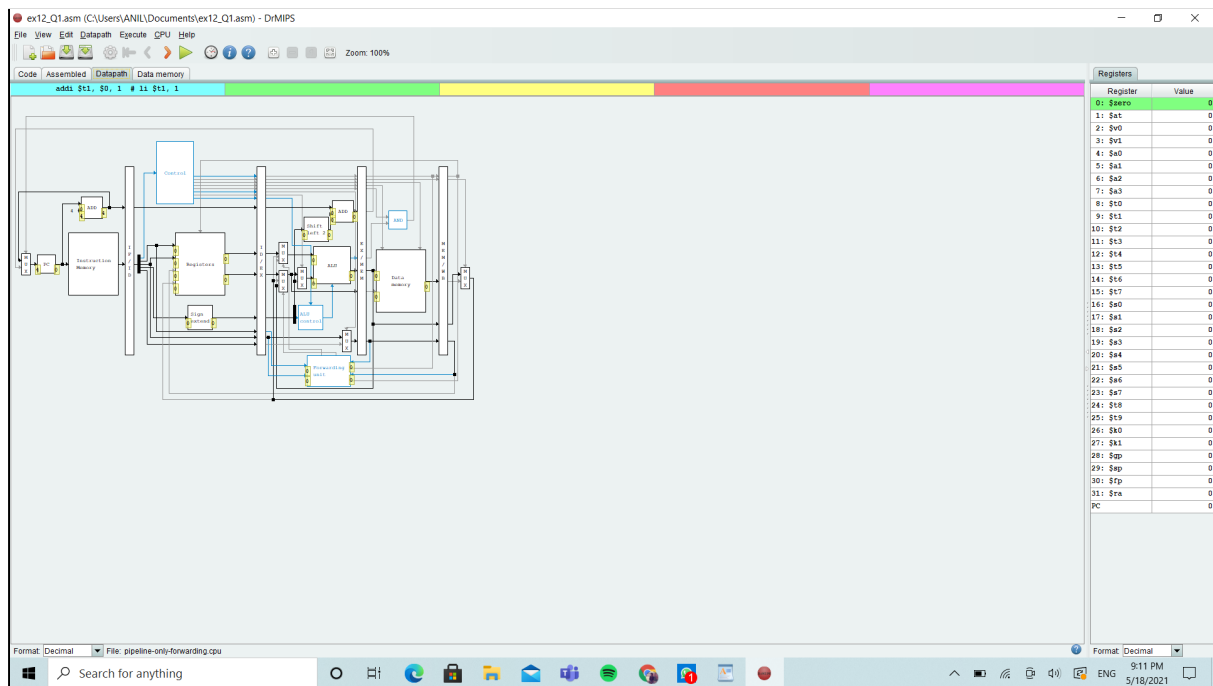


## EXERCISE 12

Date :18-05-2021  
2019103601

### 1.MODIFIED TO WORK IN DRMIPS SIMULATOR AS ORI IS NOT SUPPORTED

```
li $t1, 1
li $t3, 3
nop
nop
or $s1, $0, $t1
addi $s2, $0, 2
or $s3, $0, $t3
sub $s4, $s3, $s1
add $s5, $s4, $s2
or $s6, $s4, $s5
and $s7, $s3, $s4
sw $s7, 10($s4)
```





ex12\_Q1.asm (C:\Users\ANIL\Documents\ex12\_Q1.asm) - DrMIPS

File View Edit Datapath Execute CPU Help

Code Assembled Datapath Data memory

Format: Decimal File: pipeline-only-forwarding.cpu

Search for anything

Registers

Register	Value
0: \$zero	0
1: \$at	0
2: \$v0	0
3: \$v1	0
4: \$a0	0
5: \$a1	0
6: \$a2	0
7: \$a3	0
8: \$t0	0
9: \$t1	0
10: \$t2	0
11: \$t3	0
12: \$t4	0
13: \$t5	0
14: \$t6	0
15: \$t7	0
16: \$a0	0
17: \$a1	0
18: \$a2	0
19: \$a3	0
20: \$a4	0
21: \$a5	0
22: \$a6	0
23: \$a7	0
24: \$t8	0
25: \$t9	0
26: \$k0	0
27: \$k1	0
28: \$gp	0
29: \$ap	0
30: \$fp	0
31: \$ra	0
PC	12

Format: Decimal 9:11 PM 5/18/2021

ex12\_Q1.asm (C:\Users\ANIL\Documents\ex12\_Q1.asm) - DrMIPS

File View Edit Datapath Execute CPU Help

Code Assembled Datapath Data memory

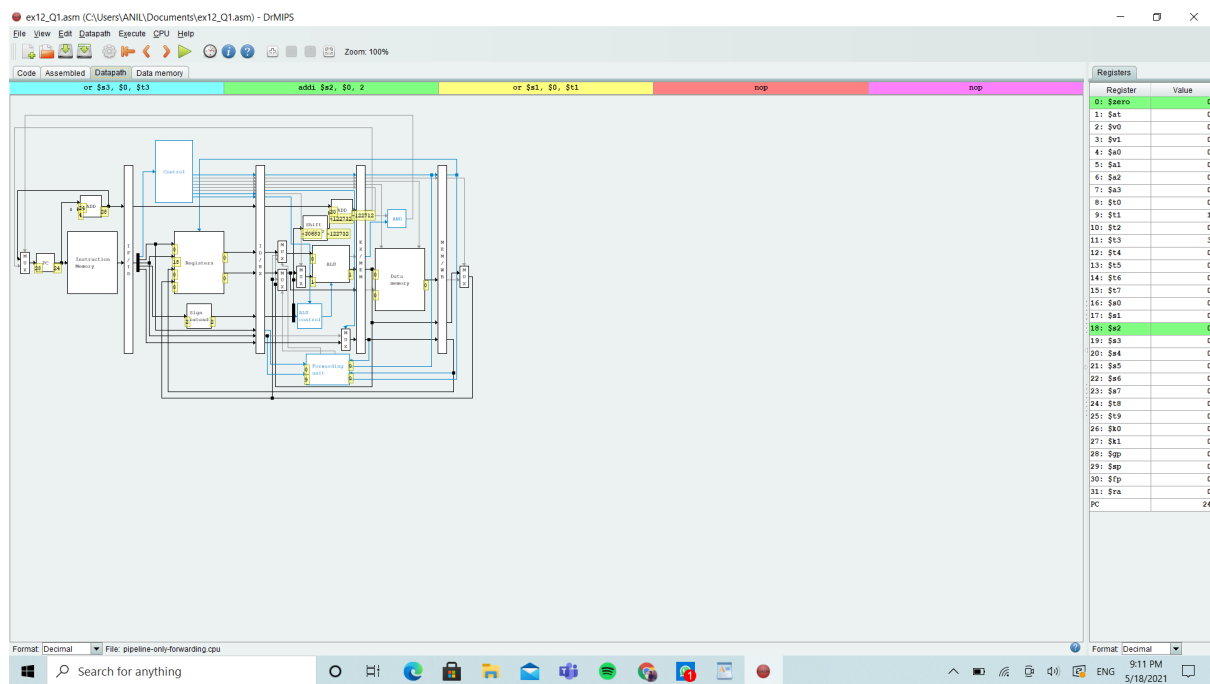
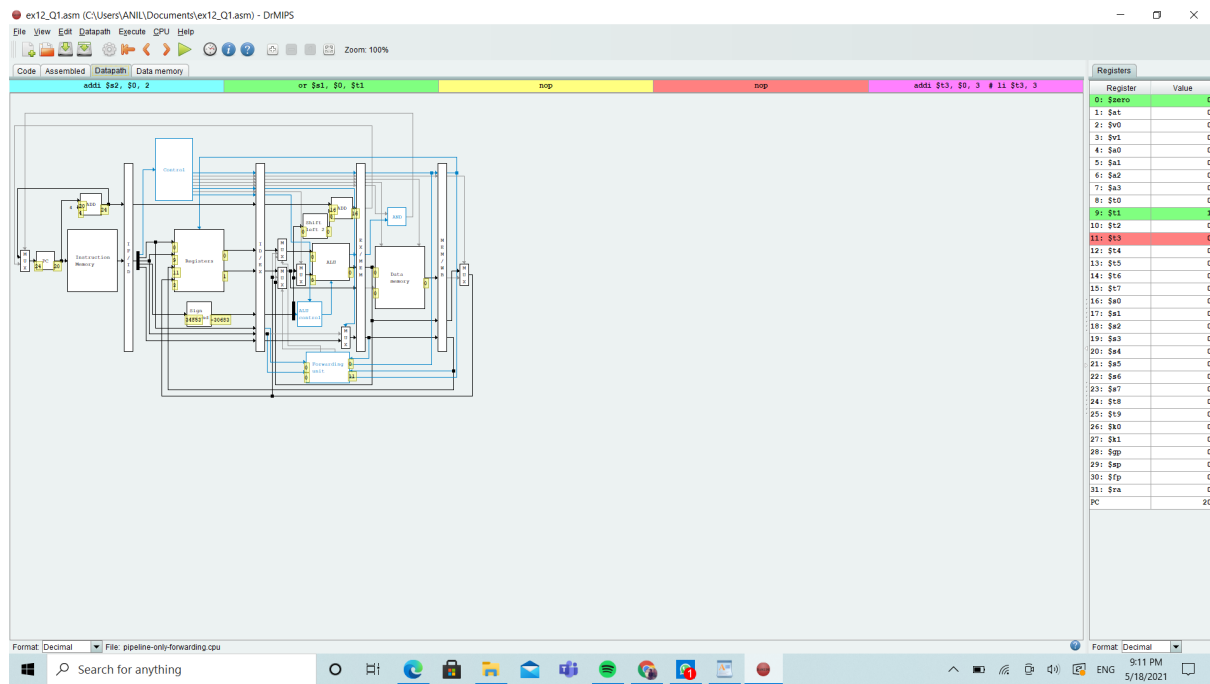
Format: Decimal File: pipeline-only-forwarding.cpu

Search for anything

Registers

Register	Value
0: \$zero	0
1: \$at	0
2: \$v0	0
3: \$v1	0
4: \$a0	0
5: \$a1	0
6: \$a2	0
7: \$a3	0
8: \$t0	0
9: \$t1	0
10: \$t2	0
11: \$t3	0
12: \$t4	0
13: \$t5	0
14: \$t6	0
15: \$t7	0
16: \$a0	0
17: \$a1	0
18: \$a2	0
19: \$a3	0
20: \$a4	0
21: \$a5	0
22: \$a6	0
23: \$a7	0
24: \$t8	0
25: \$t9	0
26: \$k0	0
27: \$k1	0
28: \$gp	0
29: \$ap	0
30: \$fp	0
31: \$ra	0
PC	16

Format: Decimal 9:11 PM 5/18/2021



Data forwarding unit is used

ex12\_Q1.asm (C:\Users\ANIL\Documents\ex12\_Q1.asm) - DrMIPS

File View Edit Datapath Execute CPU Help

Code Assembled Datapath Data memory

add \$a5, \$a4, \$a2    sub \$a4, \$a3, \$a1    or \$a3, \$0, \$t3    addi \$a2, \$0, 2    or \$a1, \$0, \$t1

Registers

Register	Value
0: \$zero	0
1: \$at	0
2: \$v0	0
3: \$v1	0
4: \$a0	0
5: \$a1	0
6: \$a2	0
7: \$a3	0
8: \$t0	0
9: \$t1	1
10: \$t2	0
11: \$t3	3
12: \$t4	0
13: \$t5	0
14: \$t6	0
15: \$t7	0
16: \$a0	0
17: \$a1	0
18: \$a2	0
19: \$a3	2
20: \$a4	0
21: \$a5	0
22: \$a6	0
23: \$a7	0
24: \$t8	0
25: \$t9	0
26: \$k0	0
27: \$k1	0
28: \$gp	0
29: \$sp	0
30: \$fp	0
31: \$ra	0
PC	32

Format: Decimal    File: pipeline-only-forwarding.cpu    Search for anything    ENG 5/18/2021

ex12\_Q1.asm (C:\Users\ANIL\Documents\ex12\_Q1.asm) - DrMIPS

File View Edit Datapath Execute CPU Help

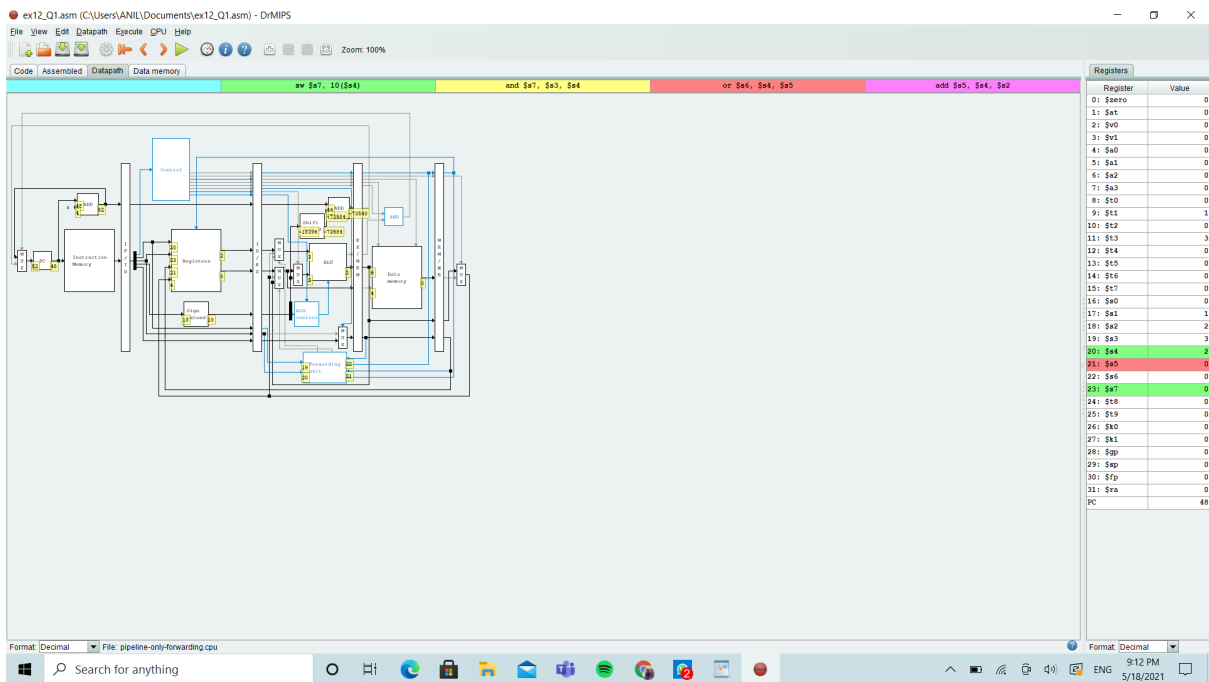
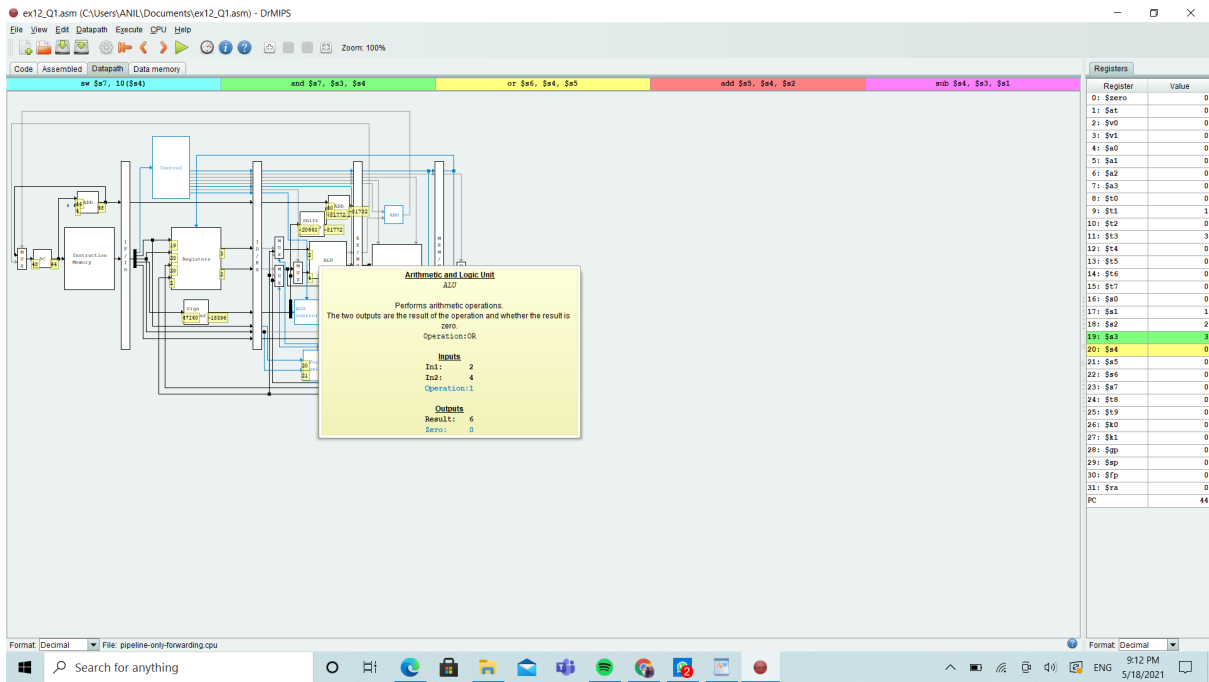
Code Assembled Datapath Data memory

and \$a7, \$a3, \$a4    or \$a6, \$a4, \$a5    add \$a5, \$a4, \$a2    sub \$a4, \$a3, \$a1    or \$a3, \$0, \$t3

Registers

Register	Value
0: \$zero	0
1: \$at	0
2: \$v0	0
3: \$v1	0
4: \$a0	0
5: \$a1	0
6: \$a2	0
7: \$a3	0
8: \$t0	0
9: \$t1	1
10: \$t2	0
11: \$t3	3
12: \$t4	0
13: \$t5	0
14: \$t6	0
15: \$t7	0
16: \$a0	0
17: \$a1	1
18: \$a2	2
19: \$a3	0
20: \$a4	0
21: \$a5	0
22: \$a6	0
23: \$a7	0
24: \$t8	0
25: \$t9	0
26: \$k0	0
27: \$k1	0
28: \$gp	0
29: \$sp	0
30: \$fp	0
31: \$ra	0
PC	40

Format: Decimal    File: pipeline-only-forwarding.cpu    Search for anything    ENG 5/18/2021



ex12\_Q1.asm (C:\Users\ANIL\Documents\ex12\_Q1.asm) - DrMIPS

File View Edit Datapath Execute CPU Help

Code Assembled Datapath Data memory

aw \$a7, 10(\$a4) and \$a7, \$a3, \$a4 or \$a6, \$a4, \$a5

Registers

Register	Value
0: \$zero	0
1: \$at	0
2: \$v0	0
3: \$v1	0
4: \$a0	0
5: \$a1	0
6: \$a2	0
7: \$a3	0
8: \$t0	0
9: \$t1	1
10: \$t2	0
11: \$t3	3
12: \$t4	0
13: \$t5	0
14: \$t6	0
15: \$t7	0
16: \$a0	0
17: \$a1	1
18: \$a2	2
19: \$a3	3
20: \$a4	2
21: \$a5	4
22: \$a6	0
23: \$a7	0
24: \$t8	0
25: \$t9	0
26: \$k0	0
27: \$k1	0
28: \$gp	0
29: \$sp	0
30: \$fp	0
31: \$ra	0
PC	56

Format: Decimal File: pipeline-only-forwarding.cpu

Search for anything

ENG 9:12 PM 5/18/2021

ex12\_Q1.asm (C:\Users\ANIL\Documents\ex12\_Q1.asm) - DrMIPS

File View Edit Datapath Execute CPU Help

Code Assembled Datapath Data memory

aw \$a7, 10(\$a4) and \$a7, \$a3, \$a4

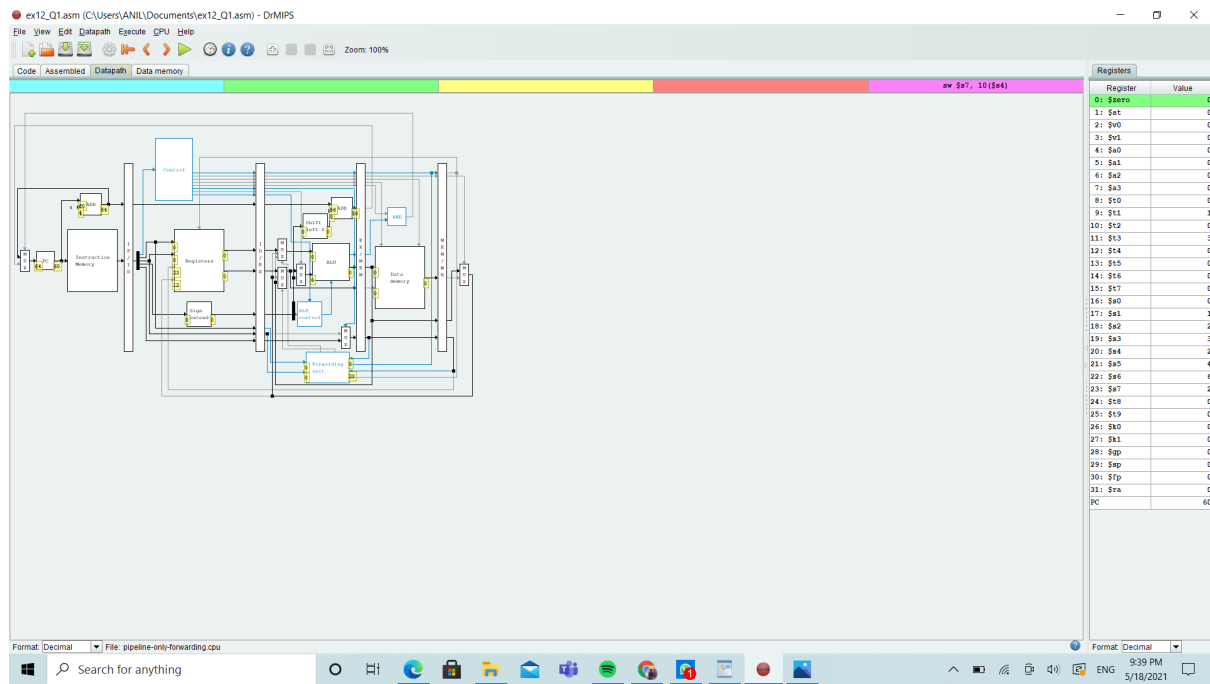
Registers

Register	Value
0: \$zero	0
1: \$at	0
2: \$v0	0
3: \$v1	0
4: \$a0	0
5: \$a1	0
6: \$a2	0
7: \$a3	0
8: \$t0	0
9: \$t1	1
10: \$t2	0
11: \$t3	3
12: \$t4	0
13: \$t5	0
14: \$t6	0
15: \$t7	0
16: \$a0	0
17: \$a1	1
18: \$a2	2
19: \$a3	3
20: \$a4	2
21: \$a5	4
22: \$a6	4
23: \$a7	0
24: \$t8	0
25: \$t9	0
26: \$k0	0
27: \$k1	0
28: \$gp	0
29: \$sp	0
30: \$fp	0
31: \$ra	0
PC	56

Format: Decimal File: pipeline-only-forwarding.cpu

Search for anything

ENG 9:12 PM 5/18/2021



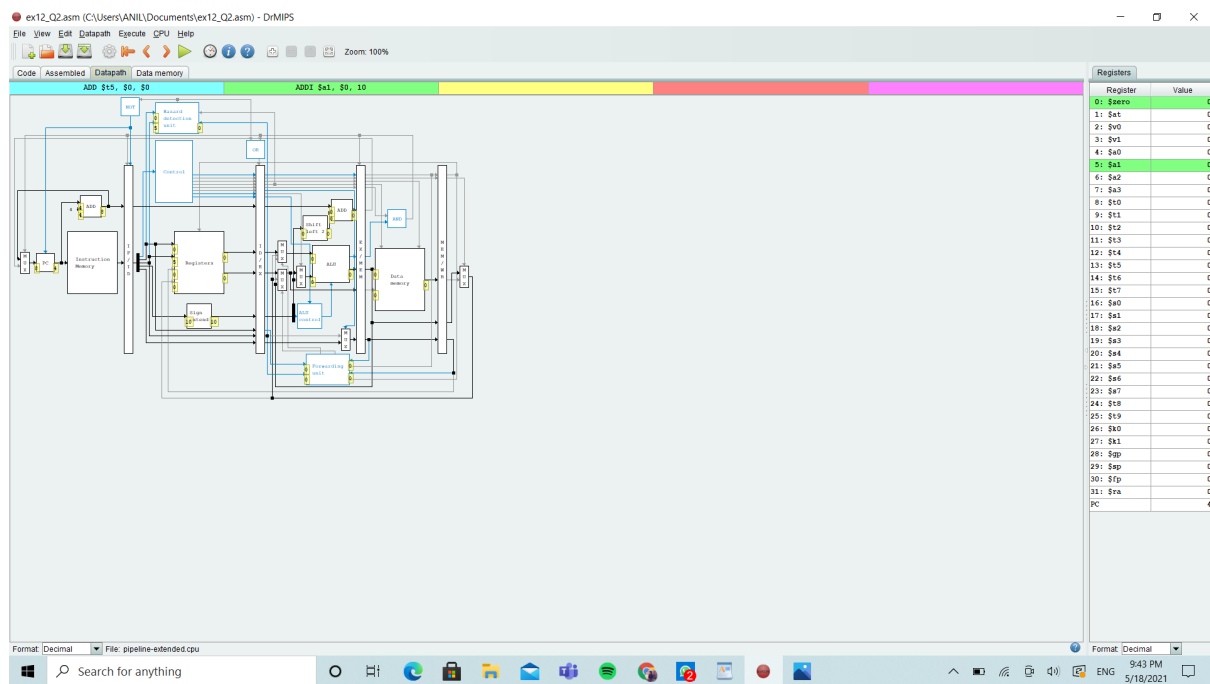
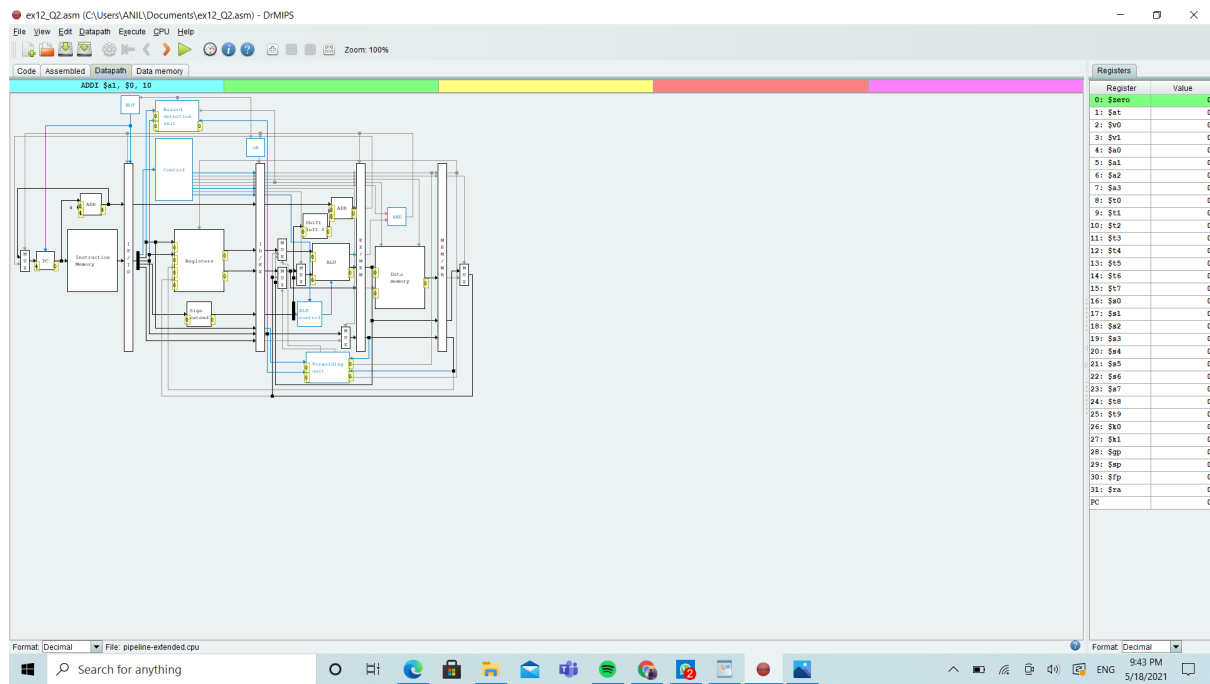
## 2. Modified to work in Dr Mips simulator as bne is not supported

```

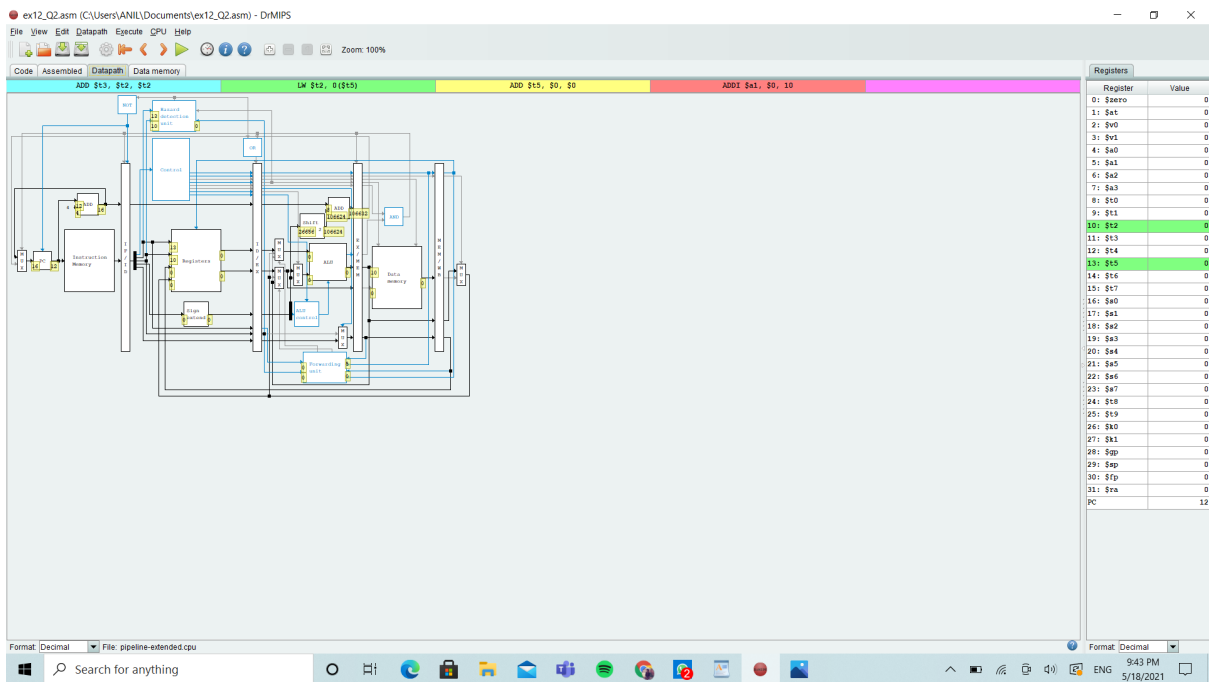
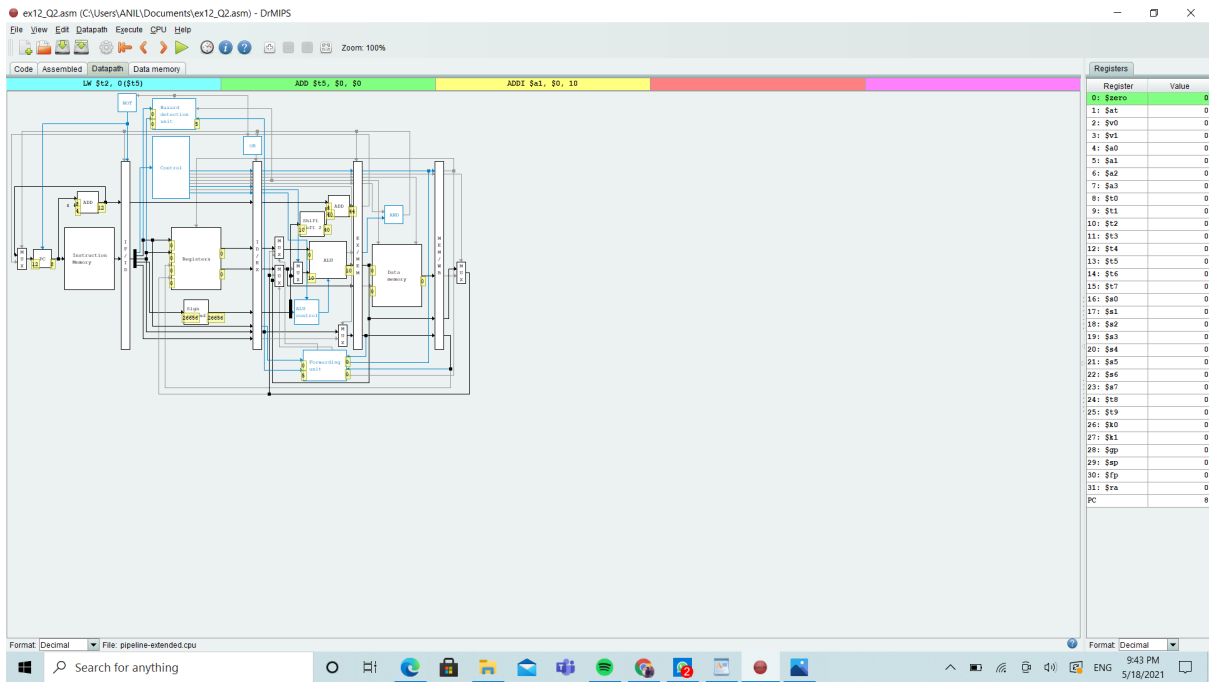
I1: ADDI $a1, $0, 10
I2: ADD $t5, $0, $0
I3: LW $t2, 0($t5)
I4: ADD $t3, $t2, $t2
I5: SW $t3, 0($t5)
I6: ADDI $a1, $a1, -1
I7: ADDI $t5, $t5, 4
I8: BEQ $a1, $0, I9
B I3
I9:

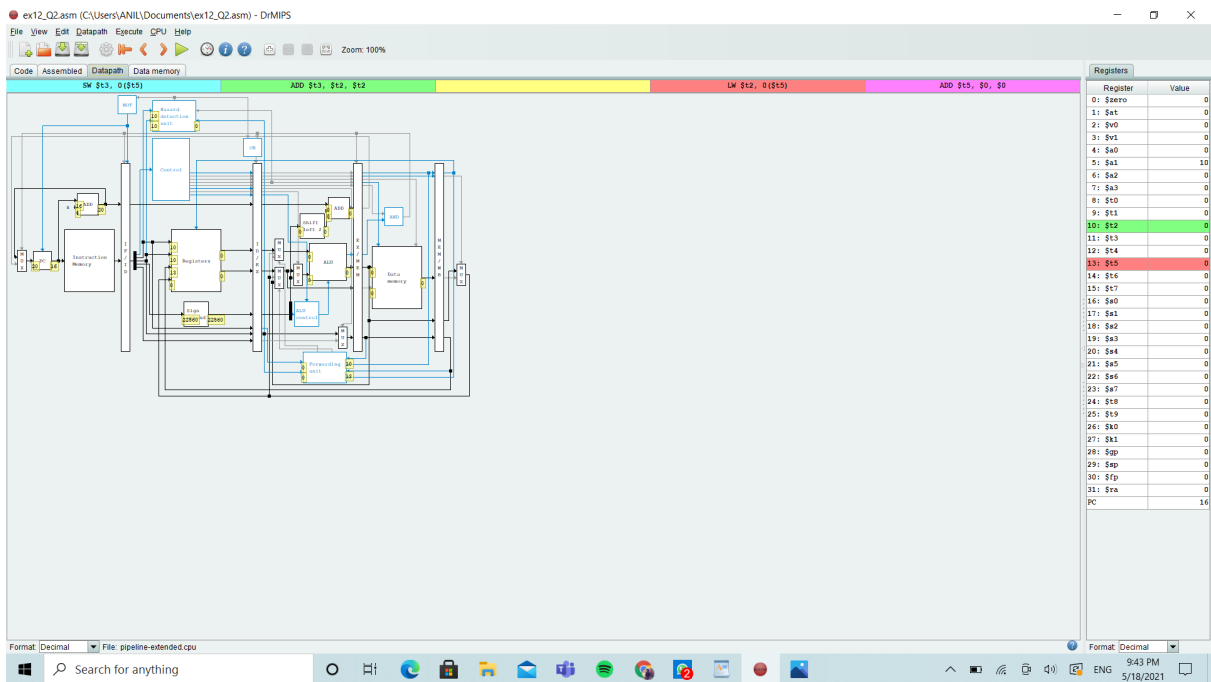
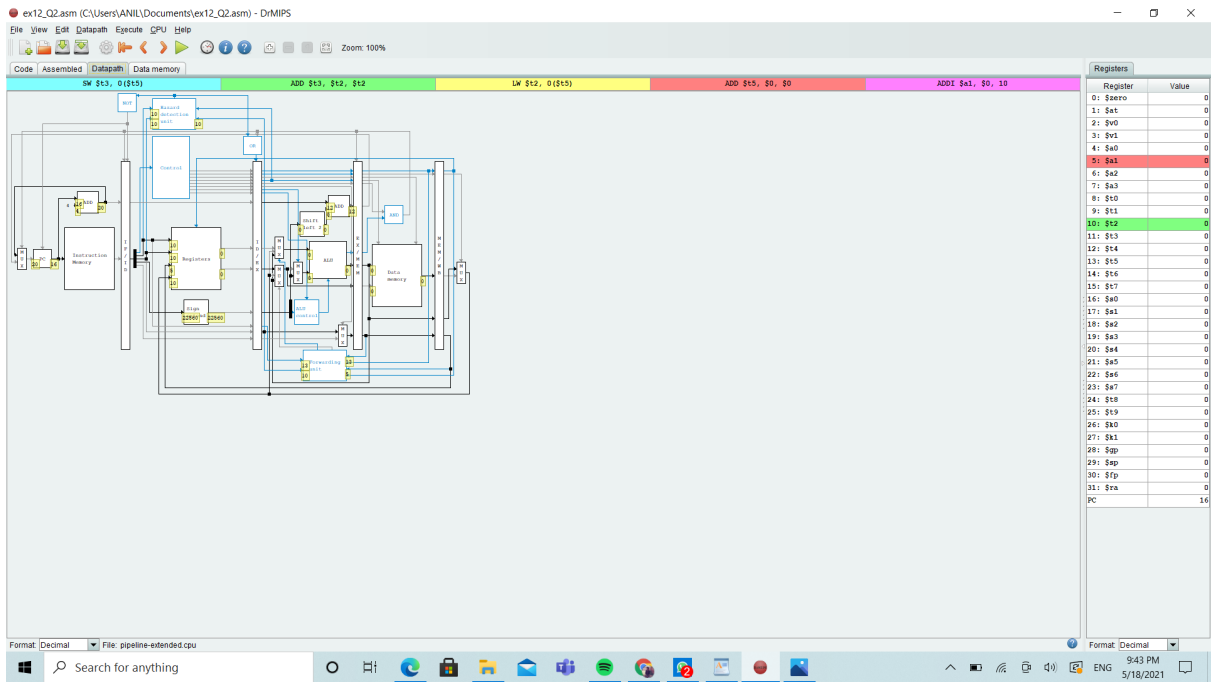
```

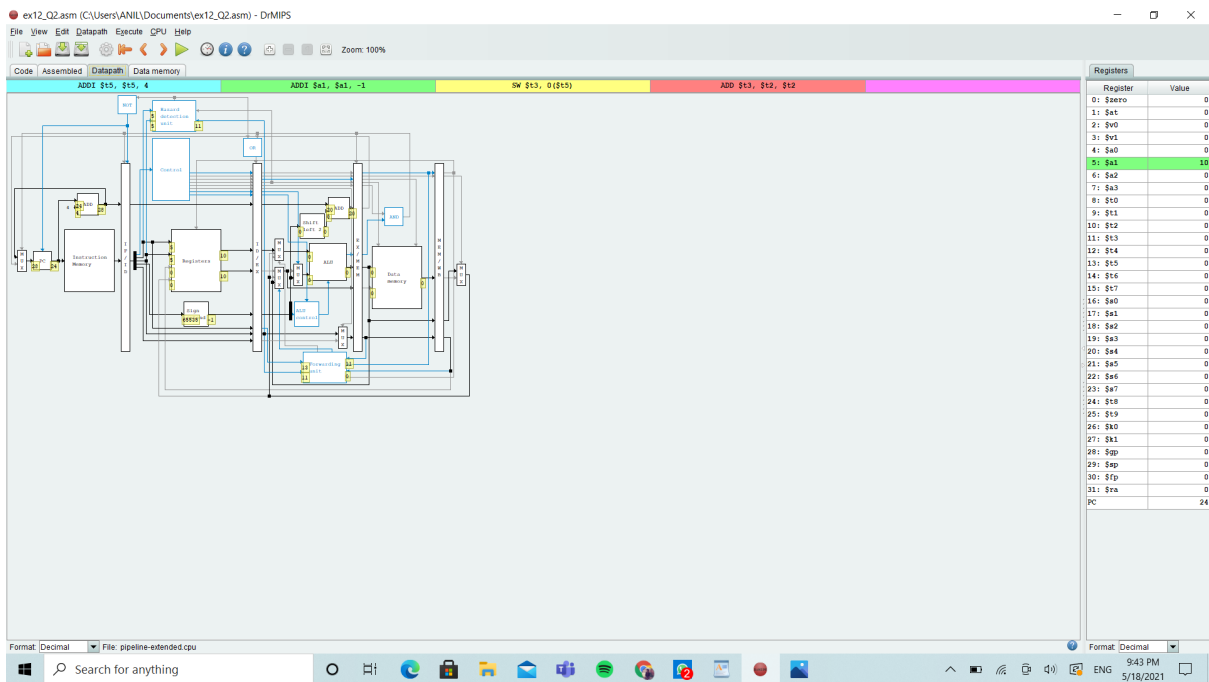
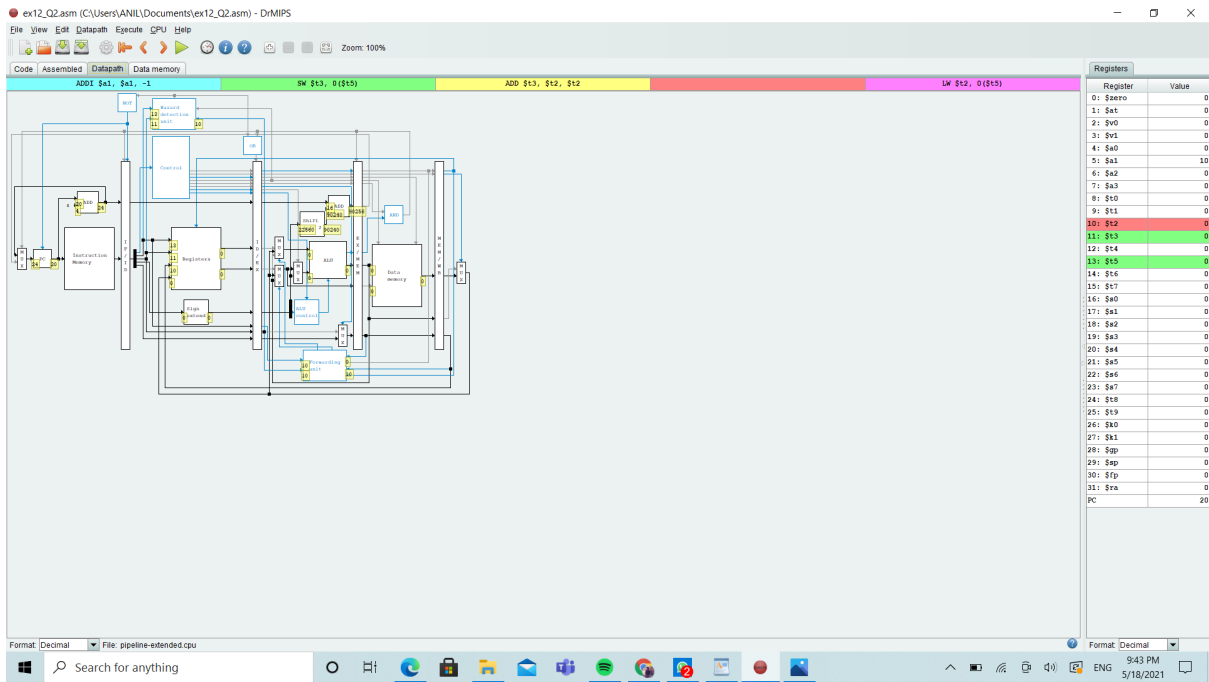


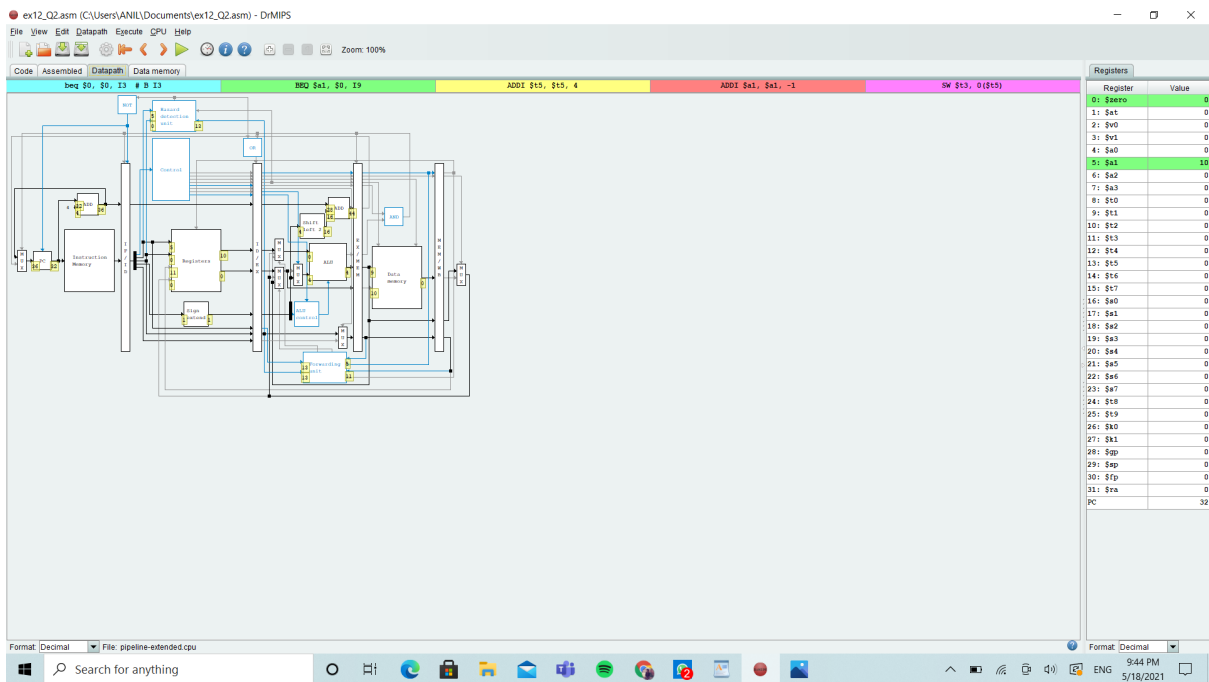
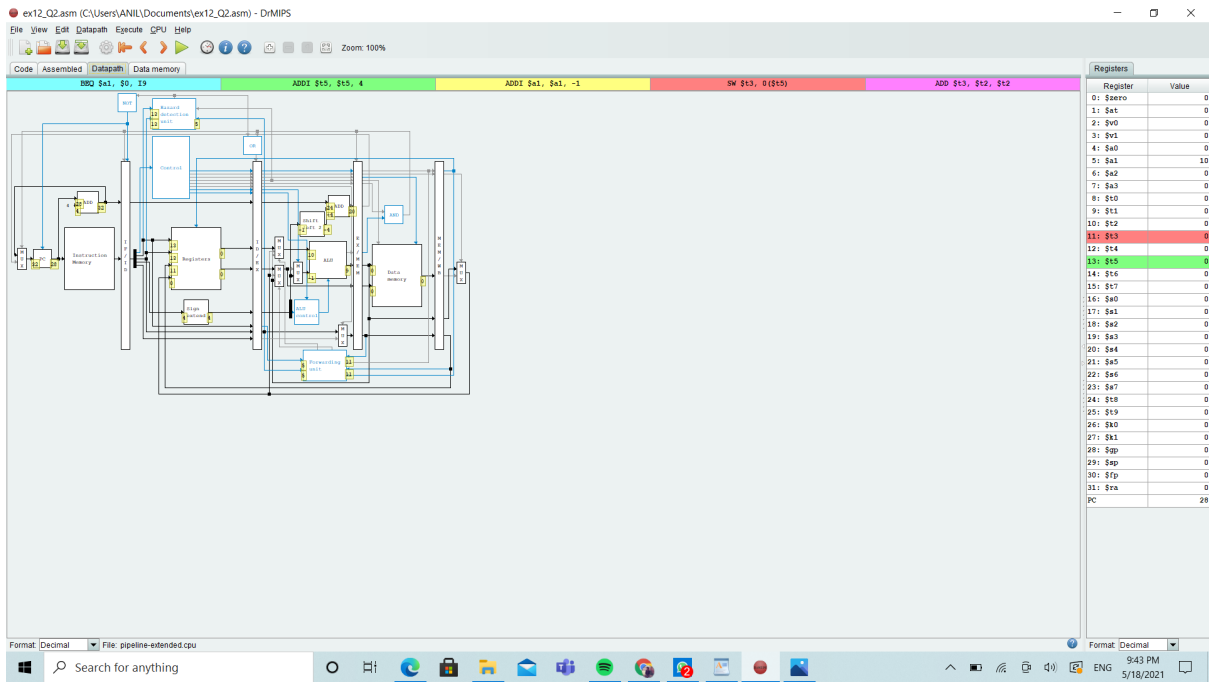


Loop: executes 10 times









ex12\_Q2.asm (C:\Users\ANIL\Documents\ex12\_Q2.asm) - DrMIPS

File View Edit Datapath Execute CPU Help

Code Assembled Datapath Data memory

beq \$0, \$0, 13 # B 13    mov \$a1, \$0, 19    addi \$t5, \$t5, 4    addi \$a1, \$a1, -1

Registers

Register	Value
0: \$zero	0
1: \$at	0
2: \$v0	0
3: \$v1	0
4: \$a0	0
5: \$a1	16
6: \$a2	0
7: \$a3	0
8: \$t0	0
9: \$t1	0
10: \$t2	0
11: \$t3	0
12: \$t4	0
13: \$t5	0
14: \$t6	0
15: \$t7	0
16: \$s0	0
17: \$s1	0
18: \$s2	0
19: \$s3	0
20: \$s4	0
21: \$s5	0
22: \$s6	0
23: \$s7	0
24: \$t8	0
25: \$t9	0
26: \$k0	0
27: \$k1	0
28: \$gp	0
29: \$ap	0
30: \$fp	0
31: \$ra	0
PC	36

Format: Decimal    File: pipeline-extended.cpu    Search for anything    ENG 5/18/2021

ex12\_Q2.asm (C:\Users\ANIL\Documents\ex12\_Q2.asm) - DrMIPS

File View Edit Datapath Execute CPU Help

Code Assembled Datapath Data memory

beq \$0, \$0, 13 # B 13    mov \$a1, \$0, 19    addi \$t5, \$t5, 4

Registers

Register	Value
0: \$zero	0
1: \$at	0
2: \$v0	0
3: \$v1	0
4: \$a0	0
5: \$a1	9
6: \$a2	0
7: \$a3	0
8: \$t0	0
9: \$t1	0
10: \$t2	0
11: \$t3	0
12: \$t4	0
13: \$t5	4
14: \$t6	0
15: \$t7	0
16: \$s0	0
17: \$s1	0
18: \$s2	0
19: \$s3	0
20: \$s4	0
21: \$s5	0
22: \$s6	0
23: \$s7	0
24: \$t8	0
25: \$t9	0
26: \$k0	0
27: \$k1	0
28: \$gp	0
29: \$ap	0
30: \$fp	0
31: \$ra	0
PC	40

Format: Decimal    File: pipeline-extended.cpu    Search for anything    ENG 9:44 PM 5/18/2021

This branch is taken only once, after the end of the loop.  
At the end of the loop

