



**Lab#2**  
**TRANSLATING ASSEMBLY LANGUAGE TO MACHINE**  
**LANGUAGE**  
MIPS architecture.

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Translate the next instructions to machine code and show which type it is.

lw \$t9,-16(\$0)

I-type			
lw \$t9,-16(\$0)			
op	rs	rt	imm
35	0	25	-16
100011	00 000	11001	1111111111110000.00
1000-1100-0001-1001-1111-1111-1111-0000			
0x8C19FFF0			

sw \$t5,-15(\$t3)

I-Type			
sw \$t5,-15(\$t3)			
op	rs	rt	imm
43	11	13	-15
1010 11	01 011	0 1101	1111 1111 1111 0001
1010-1101-0110-1101 -1111 1111 1111 0001			
AD6DFFF1			

nor \$s4,\$s2,\$s1

R-type					
nor \$s4,\$s2,\$s1					
op	rs	rt	rd	shamt	funct
0	18	17	20	0	39
0 000 00	10 010	1 0001	1010 0	000 00	10 0111
0000-0010-0101-0001-1010-0000-0010-0111					
0x0251A027					

or \$s1,\$s5,\$s7

R-type					
or \$s1,\$s5,\$s7					
op	rs	rt	rd	shamt	funct
0	21	23	17	0	37
0000 00	10 101	1 0111	1000 1	000 00	10 0101
0000-0010-1011-0111-1000-1000-0010-0101					
0x02B78825					

and \$s4,\$s5,\$s3

R-type					
and \$s4,\$s5,\$s3					
op	rs	rt	rd	shamt	funct
0	21	19	20	0	36
0000 00	10 101	1 0011	1010 0	000 00	10 0100
0000-0010-1011-0011-1010-0000-0010-0100					
0x02B3A024					

addi \$t0,\$s1,10

I-type			
addi \$s1,-10(\$s0)			
op	rs	rt	imm
8	17	8	10
1000	10001	1000	0000000000001010
0010-0010-0010-1000-0000-0000-0000-1010			
0x2228000A			

slt \$t8,\$s4,\$s6

R-type					
slt \$t8,\$s4,\$s6					
op	rs	rt	rd	shamt	funct
0	20	22	24	0	42
000000	10100	10110	11000	00000	101010
0000-10100-10110-11000-0000-0010-1010					
0x0296C02A					

```
0x00400204 loop: ...
.
.
.
0x004004e8 j loop
```

J-type	
jta	0000 0000 0100 0000 0000 0010 0000 0100
op	addr
000010	0000 0100 0000 0000 0010 0000 01
0000-1000-0001-0000-0000-0000-1000-0001	
0x08100081	

```

0x00400004 loop: ...
.
.
.
0x00400038 bne $t9,
$t3,loop
...

```

I-Type				rs=25
bne \$t9,\$t3,loop				rt=11
op	rs	rt	imm	
0001 01	11 001	0 1011	1111 1111 1111 0010	
0001 0111 0010 1011 1111 1111 1111 0010				
0x172BFFF2				

```

0x004004e8 loop: ...
.
.
.
0x00400540 beq $t6,
$s6,loop
...

```

				rs t6=14
I-Type				rt s6=22
beq \$t6,\$s6,loop				
op	rs	rt	imm	
0001 00	01 110	1 0110	1111 1111 1110 1001	
0001-0001-1101-0110-1111-1111-1110-1001				
0x11D6FFE9				