

EGC442

Class Notes

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1) Given the following initial values, determine the resulting value for the given operation.

\$s1 = 0011 0000 0000 0000 0000 0000 1110 1001

0 - - - - - 0 0000 0000 0000 0000

nor 1101 1111 1111 1111 1111 1111 1111 1111 0110

a. For the following instruction:

nor \$t1, \$s1, 0x0000

Only put down the value of the register that changes

Assume \$s1 has 0x58 and \$s2 has 0x34. Given this code:


```
bne $s3, $s4, Else
add $s0, $s1, $s2
j    Exit
Else: sub $s0, $s1, $s2
Exit:
```

$(X \neq Y)$
 $C = A - B;$
else: $C = A + B;$



1) A main program will call a procedure Power for computing x^y .
Currently, x is in \$s0, y is in \$s1. How might the program pass the parameter values to Power?

```
add  $a0, $s0, $zero
add  $a1, $s1, $zero
add  $s0, $a0, $zero
add  $s1, $a1, $zero
add  $v0, $s0, $zero
add  $v1, $s1, $zero
```



2) A first part of a main program calls procedure Power to compute x^y , where x is in $\$s0$, y is in $\$s1$. Later, the program is to call Power again, but this time x is in $\$s3$ and y is in $\$s7$. How might the program pass the parameter values to Power?

Copy $\$s3$ to $\$a0$, and $\$s7$ to $\$a1$.

Not possible; x and y must be in $\$s0$ and $\$s1$.

3) A main program calls a Power procedure using the instruction: jal Power.

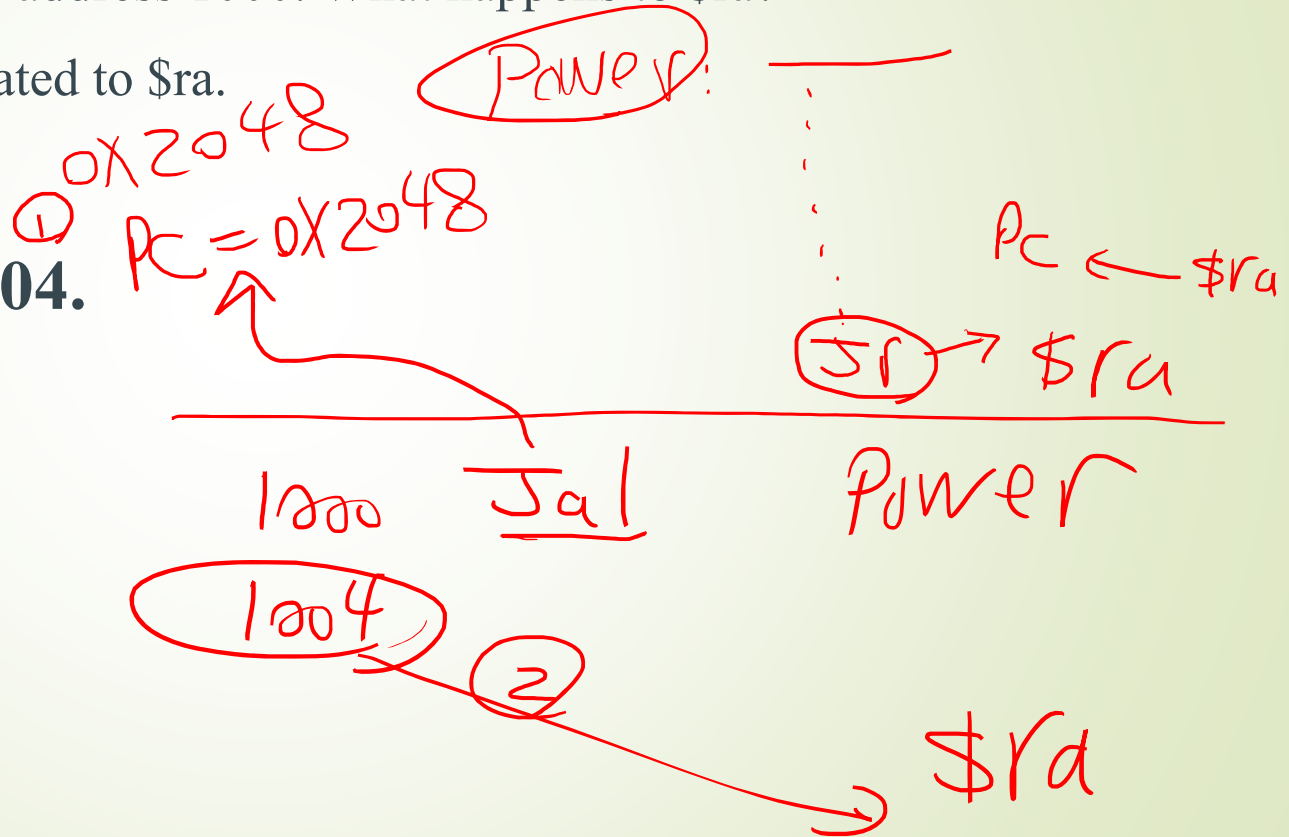
That instruction is at address 1000. What happens to \$ra?

Nothing; jal is unrelated to \$ra.

\$ra is set to 1000.

\$ra is set to 1004.

②



12)

~~exch (v[k], k)~~ \rightarrow $\$a2$

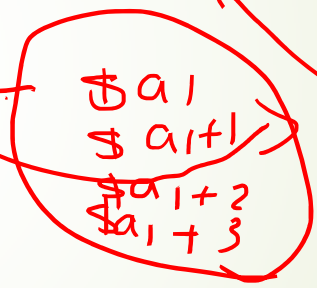
```
temp = v[k];
v[k] = v[k + 1];
v[k + 1] = temp;
```

Write a MIPS subroutine to carryout the following function.

Assume base address of v is register \$a1, k is in register \$a2, and temp is assigned to \$s1.

$\$a1 = \&v[0]$

v[0]



$v[k] @ a1 + 4k \rightarrow \$a2$

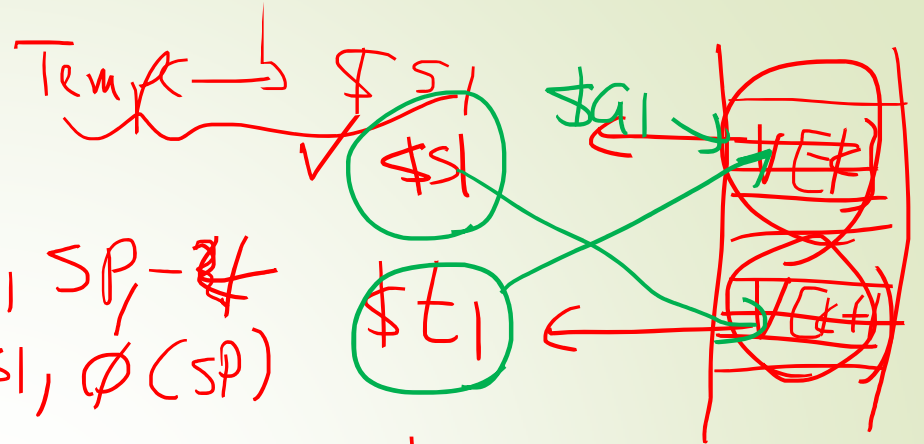
$\&v[k] \leftarrow \downarrow \text{sll } 2$

done by compiler \rightarrow $\left\{ \begin{array}{l} \$k \leftrightarrow \$a_1 \\ t \leftrightarrow \$a_2 \end{array} \right.$

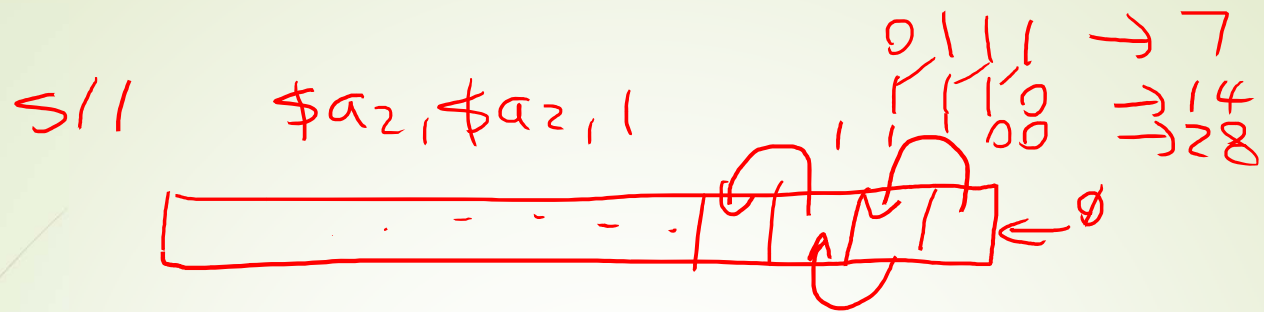
Exch:

push t_1 ? \rightarrow

$\left\{ \begin{array}{l} \text{addi} \\ \text{sw} \\ \text{sl} \\ \text{add} \\ \text{lw} \\ \text{lw} \\ \text{sw} \\ \text{sw} \\ \text{lw} \\ \text{addi} \\ \text{sr} \end{array} \right.$



$sp, sp - 4$
 $\$s1, 0(sp)$
 $\$a2, \$a2, 2 \# k * 4$
 $\$a1, \$a1, \$a2; \$a1 = \&v[k]$
 $\$s1, 0(\$a1) \# Temp = v[k]$
 $\$t1, 4(\$a1); t_1 = \&v[k+1]$
 $\$s1, 4(\$a1)$
 $\$t1, 0(\$a1)$
 $\$s1, 0(sp); \text{restore old } \$s1$
 $\$sp, sp + 4$



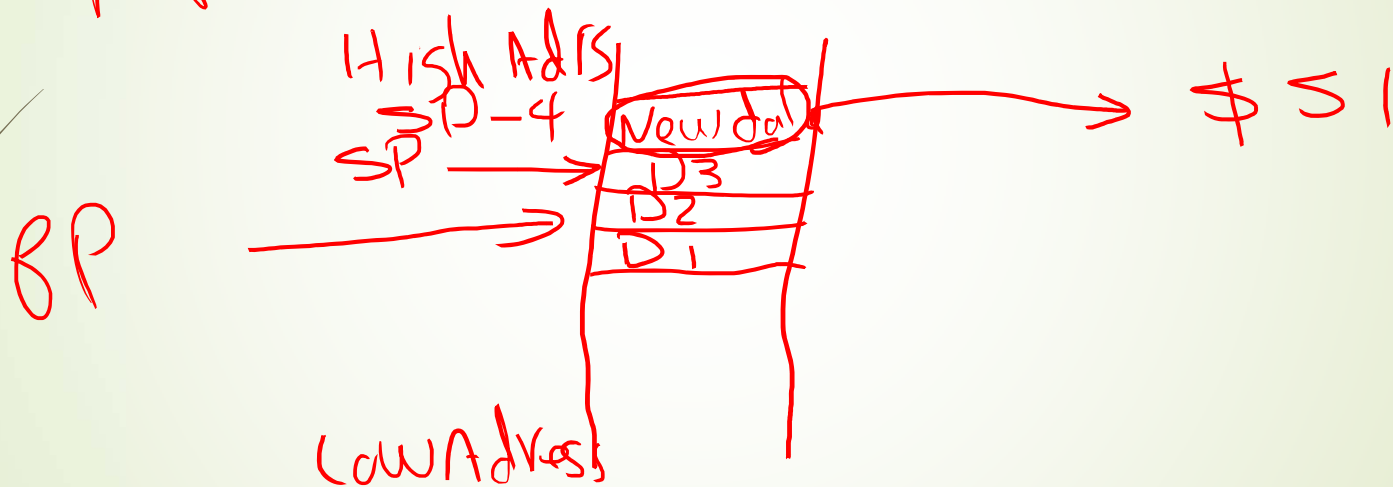
$sll \quad \$a2, \$a2, 2 \quad ; \quad \$a2 * 4$


$a[k]$
 \downarrow
 $*4$

stack

push → store a data

pop → retrieve data





5) A procedure Power computes a_0 to the power of a_1 . How should the procedure jump back to the next instruction in the caller?

jr Caller

jr \$ra

jal \$ra