

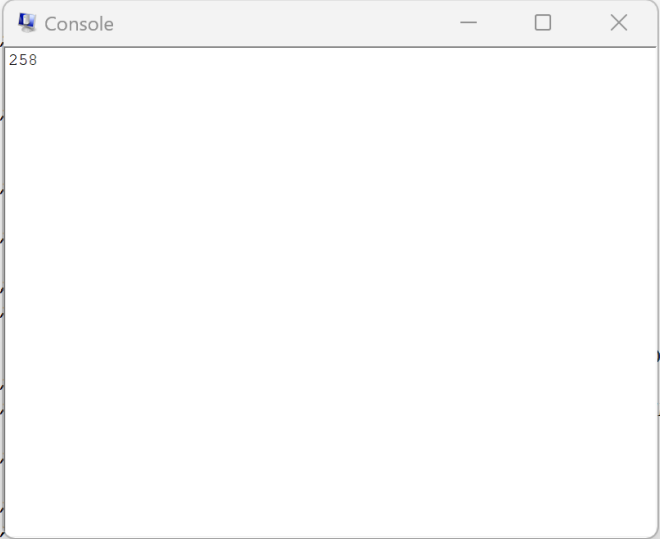
\$\$lab 5\$\$ \$Manav Bilakhia\$

5) 258

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; 18: lw $t0, num1 # temp = num1

; 97: andi $a0 $a0 0x1f
; 101: li $v0 4 # syscall 4 (print_str)
; 102: la $a0 __m1_
; 103: syscall

m1_]
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0000]..[80010000]
p
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6)

		User Text Segment [00400000]..[00440000]
PC = 4194348	[00400000] 81a40000 lw \$4, 0(\$29)	; 183: lw \$a0 0(\$29) # argc
EPC = 4194344	[00400004] 27a50004 addiu \$5, \$29, 4	; 184: addiu \$a1 \$29 4 # argv
Cause = 36	[00400008] 24a60004 addiu \$6, \$5, 4	; 185: addiu \$a2 \$a1 4 # envp
BadVAddr = 0	[0040000c] 00041080 sll \$2, \$4, 2	; 186: sll \$v0 \$a0 2
Status = 805371664	[00400010] 00c23021 addu \$6, \$6, \$2	; 187: addu \$a2 \$a2 \$v0
	[00400014] 0c100009 jal 0x00400024 [main]	; 188: jal main
H1 = 0	[00400018] 00000000 nop	; 189: nop
LO = 0	[0040001c] 3402000a ori \$2, \$0, 10	; 191: li \$v0 10
	[00400020] 0000000c syscall	; 192: syscall # syscall 10 (exit)
R0 [r0] = 0	[00400024] 3c011001 lui \$1, 4097	; 18: lw \$t0, num1 # temp = num1
R1 [a0] = 268500992	N [x0040002] x8c28000 lw \$8, 0(\$1)	; 19: add \$t1, \$0, \$t0 # accum = temp
R2 [v0] = 4	[00400030] 3c011001 lui \$1, 4097	; 20: lw \$t0, num2 # temp = num2
R3 [v1] = 0	N [x0040003] x8c28000 lw \$8, 4(\$1)	; 21: add \$t1, \$t1, \$t0 # accum = accum + temp
R4 [a0] = 1	[0040003c] 3c011001 lui \$1, 4097	; 22: lw \$t0, num3 # temp = num3
R5 [a1] = 2147481104	N [x0040004] x8c28000 lw \$8, 8(\$1)	; 23: add \$t1, \$t1, \$t0 # accum = accum + temp
R6 [a2] = 2147491112	[00400048] 3c011001 lui \$1, 4097	; 24: sw \$t1, sum # sum = accum
R7 [a3] = 0	[0040004c] ac29000c sw \$9, 12(\$1)	; 25: addi \$v0, \$0, 1 # \$v0 = code for 'print-int'
R8 [t0] = 17	N [x0040005] 20020001 addi \$2, \$0, 1	; 26: add \$a0, \$0, \$t1 # \$a0 = accum
R9 [t1] = 0	[00400058] 0000000c syscall	; 27: syscall # syscall(\$v0-1) prints \$a0
R10 [t2] = 0	[0040005c] 03a00008 jr \$31	; 28: jr \$ra # return control to the simulator
R11 [t3] = 0		
R12 [t4] = 0		
R13 [t5] = 0		
R14 [t6] = 0		
R15 [t7] = 0		
R16 [a0] = 0		
R17 [a1] = 0		
R18 [a2] = 0		
R19 [a3] = 0		
R20 [a4] = 0	[80000180] 0001d821 addu \$27, \$0, \$1	; 90: move \$k1 \$a0 # Save \$a0
R21 [a5] = 0	[80000184] 3c019000 lui \$1, -28672	; 92: sw \$v0 \$1 # Not re-entrant and we can't trust \$sp
R22 [a6] = 0	[80000188] ac220200 sw \$2, 512(\$1)	; 93: sw \$a0 \$2 # But we need to use these registers
R23 [a7] = 0	[8000018c] 3c019000 lui \$1, -28672	; 95: mfc0 \$k0 \$13 # Cause register
R24 [a8] = 0	[80000190] ac240204 sw \$4, 516(\$1)	; 96: srl \$a0 \$k0 2 # Extract ExCoDe Field
R25 [a9] = 0	[80000194] 401a6800 mfc0 \$26, \$13	; 97: andi \$a0 \$a0 0x1f
R26 [k0] = 0	[80000198] 001a2082 srl \$4, \$26, 2	; 101: li \$v0 4 # syscall 4 (print_str)
R27 [k1] = 0	[8000019c] 3084001f andi \$4, \$4, 31	; 102: la \$a0 __m1_
R28 [gp] = 268468224	[800001a0] 34020004 ori \$2, \$0, 4	; 103: syscall
R29 [sp] = 2147491100	[800001a4] 3c049000 lui \$4, -28672 [__m1_]	; 105: li \$v0 1 # syscall 1 (print_int)
R30 [a8] = 0	[800001a8] 0000000c syscall	; 106: srl \$a0 \$k0 2 # Extract ExCoDe Field
R31 [ra] = 4194328	[800001ac] 34020001 ori \$2, \$0, 1	; 107: andi \$a0 \$a0 0x1f
	[800001b0] 001a2082 srl \$4, \$26, 2	; 108: syscall
	[800001b4] 3084001f andi \$4, \$4, 31	; 110: li \$v0 4 # syscall 4 (print_str)
	[800001b8] 0000000c syscall	; 111: andi \$a0 \$k0 0x3c
	[800001bc] 34020004 ori \$2, \$0, 4	; 112: lw \$a0 __excp(\$a0)
	[800001c0] 3344003c andi \$4, \$26, 60	
	[800001c4] 3c019000 lui \$1, -28672	
	[800001c8] 00240821 addu \$1, \$1, \$4	

7) new values:

num1: .word 10

num2: .word -100

num3: .word 1000

Before:

		User Text Segment [00400000]..[00440000]	
PC	= 0	[00400000] 8fa40000	lw \$4, 0(\$29)
EPC	= 0	[00400004] 27a50004	addiu \$5, \$29, 4
Cause	= 0	[00400008] 24a60004	addiu \$6, \$5, 4
BadVAddr	= 0	[0040000c] 00041080	sll \$2, \$4, 2
Status	= 005371664	[00400010] 00c23021	addu \$6, \$6, \$2
		[00400014] 0c100009	jal 0x00400024 [main]
HI	= 0	[00400018] 00000000	nop
LO	= 0	[0040001c] 3402000a	ori \$2, \$0, 10
R0 [r0]	= 0	[00400020] 0000000c	syscall
R1 [a1]	= 0	[00400024] 3c011001	lui \$1, 4097
R2 [v0]	= 0	[00400028] 8c280000	lw \$8, 0(\$1)
R3 [v1]	= 0	[0040002c] 00004820	add \$9, \$0, \$8
R4 [a0]	= 1	[00400030] 3c011001	lui \$1, 4097
R5 [a1]	= 2147481104	[00400034] 8c280004	lw \$8, 4(\$1)
R6 [a2]	= 2147481112	[00400038] 01284820	add \$9, \$9, \$8
R7 [a3]	= 0	[0040003c] 3c011001	lui \$1, 4097
R8 [t0]	= 0	[00400040] 8c280008	lw \$8, 8(\$1)
R9 [t1]	= 0	[00400044] 01284820	add \$9, \$9, \$8
R10 [t2]	= 0	[00400048] 3c011001	lui \$1, 4097
R11 [t3]	= 0	[0040004c] ac29000c	sw \$9, 12(\$1)
R12 [t4]	= 0	[00400050] 20020001	addi \$2, \$0, 1
R13 [t5]	= 0	[00400054] 00092020	add \$4, \$0, \$9
R14 [t6]	= 0	[00400058] 0000000c	syscall
R15 [t7]	= 0	[0040005c] 03e00008	jr \$31
R16 [s0]	= 0		
R17 [s1]	= 0		
R18 [s2]	= 0		
R19 [s3]	= 0	[80000180] 0001d821	addu \$27, \$0, \$1
R20 [s4]	= 0	[80000184] 3c019000	lui \$1, -28672
R21 [s5]	= 0	[80000188] ac220200	sw \$2, 512(\$1)
R22 [s6]	= 0	[8000018c] 3c019000	lui \$1, -28672
R23 [s7]	= 0	[80000190] ac240204	sw \$4, 516(\$1)
R24 [t8]	= 0	[80000194] 401a6800	mfc0 \$26, \$13
R25 [t9]	= 0	[80000198] 001a2082	srl \$4, \$26, 2
R26 [k0]	= 0	[8000019c] 3084001f	andi \$4, \$4, 31
R27 [k1]	= 0	[800001a0] 34020004	ori \$2, \$0, 4
R28 [gp]	= 268468224	[800001a4] 3c049000	lui \$4, -28672 [__m1_]
R29 [sp]	= 2147481100	[800001a8] 0000000c	syscall
R30 [s8]	= 0	[800001ac] 34020001	ori \$2, \$0, 1
R31 [ra]	= 0	[800001b0] 001a2082	srl \$4, \$26, 2
		[800001b4] 3084001f	andi \$4, \$4, 31
		[800001b8] 0000000c	syscall
		[800001bc] 34020004	ori \$2, \$0, 4
		[800001c0] 3344003c	andi \$4, \$26, 60
		[800001c4] 3c019000	lui \$1, -28672
		[800001c8] 00240821	addu \$1, \$1, \$4

During:

		User Text Segment [00400000]..[00440000]	
PC	= 4194348	[00400000] 8fa40000	lw \$4, 0(\$29)
EPC	= 4194344	[00400004] 27a50004	addiu \$5, \$29, 4
Cause	= 36	[00400008] 24a60004	addiu \$6, \$5, 4
BadVAddr	= 0	[0040000c] 00041080	sll \$2, \$4, 2
Status	= 805371664	[00400010] 00c23021	addu \$6, \$6, \$2
		[00400014] 0c100009	jal 0x00400024 [main]
HI	= 0	[00400018] 00000000	nop
LO	= 0	[0040001c] 3402000a	ori \$2, \$0, 10
R0 [r0]	= 0	[00400020] 0000000c	syscall
R1 [a1]	= 268500992	[00400024] 3c011001	lui \$1, 4097
R2 [v0]	= 4	[00400028] 8c280000	lw \$8, 0(\$1)
R3 [v1]	= 0	N [x0040002c] x0008482	add \$9, \$0, \$8
R4 [a0]	= 1	N [x00400030] 3c011001	lui \$1, 4097
R5 [a1]	= 2147481104	N [x00400034] x8c280000	lw \$8, 4(\$1)
R6 [a2]	= 2147481112	N [x00400038] x0128482	add \$9, \$9, \$8
R7 [a3]	= 0	[0040003c] 3c011001	lui \$1, 4097
R8 [t0]	= 10	N [x00400040] x8c280000	lw \$8, 8(\$1)
R9 [t1]	= 0	N [x00400044] x0128482	add \$9, \$9, \$8
R10 [t2]	= 0	[00400048] 3c011001	lui \$1, 4097
R11 [t3]	= 0	[0040004c] ac29000c	sw \$9, 12(\$1)
R12 [t4]	= 0	[00400050] 20020001	addi \$2, \$0, 1
R13 [t5]	= 0	[00400054] 00092020	add \$4, \$0, \$9
R14 [t6]	= 0	[00400058] 0000000c	syscall
R15 [t7]	= 0	[0040005c] 03e00008	jr \$31
R16 [s0]	= 0		
R17 [s1]	= 0		
R18 [s2]	= 0		
R19 [s3]	= 0	[80000180] 0001d821	addu \$27, \$0, \$1
R20 [s4]	= 0	[80000184] 3c019000	lui \$1, -28672
R21 [s5]	= 0	[80000188] ac220200	sw \$2, 512(\$1)
R22 [s6]	= 0	[8000018c] 3c019000	lui \$1, -28672
R23 [s7]	= 0	[80000190] ac240204	sw \$4, 516(\$1)
R24 [t8]	= 0	[80000194] 401a6800	mfc0 \$26, \$13
R25 [t9]	= 0	[80000198] 001a2082	srl \$4, \$26, 2
R26 [k0]	= 0	[8000019c] 3084001f	andi \$4, \$4, 31
R27 [k1]	= 0	[800001a0] 34020004	ori \$2, \$0, 4
R28 [gp]	= 268468224	[800001a4] 3c049000	lui \$4, -28672 [__m1_]
R29 [sp]	= 2147481100	[800001a8] 0000000c	syscall
R30 [s8]	= 0	[800001ac] 34020001	ori \$2, \$0, 1
R31 [ra]	= 4194328	[800001b0] 001a2082	srl \$4, \$26, 2
		[800001b4] 3084001f	andi \$4, \$4, 31
		[800001b8] 0000000c	syscall
		[800001bc] 34020004	ori \$2, \$0, 4
		[800001c0] 3344003c	andi \$4, \$26, 60
		[800001c4] 3c019000	lui \$1, -28672
		[800001c8] 00240821	addu \$1, \$1, \$4

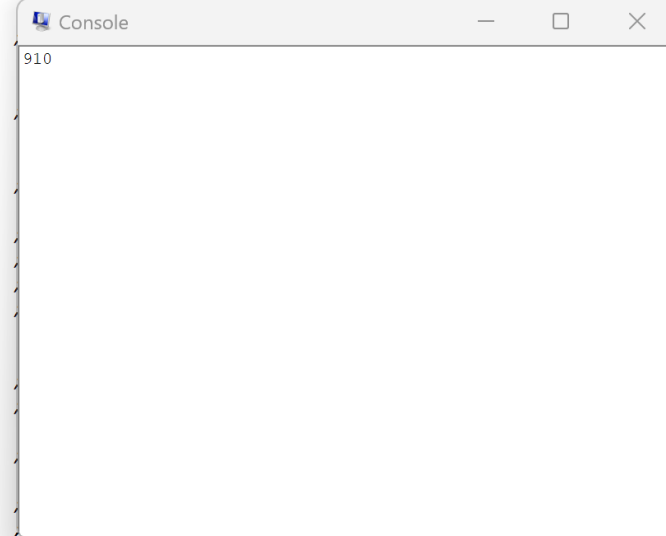
PC = 4194352 EPC = 4194340 Cause = 36 BadVAddr = 0 Status = 805371664		<div>User Text Segment [00400000]..[00440000]</div> <pre> [00400000] 8fa40000 lw \$4, 0(\$29) ; 183: lw \$a0 0(\$sp) # argc [00400004] 27a50004 addiu \$5, \$29, 4 ; 184: addiu \$a1 \$p 4 # argv [00400008] 24a60004 addiu \$6, \$5, 4 ; 185: addiu \$a2 \$a1 4 # envp [0040000c] 00041080 sll \$2, \$4, 2 ; 186: sll \$v0 \$a0 2 [00400010] 00c23021 addu \$6, \$6, \$2 ; 187: addu \$a2 \$a2 \$v0 [00400014] 0c100009 jal 0x00400024 [main] ; 188: jal main [00400018] 00000000 nop ; 189: nop [0040001c] 3402000a ori \$2, \$0, 10 ; 191: li \$v0 10 [00400020] 0000000c syscall ; 192: syscall # syscall 10 (exit) [00400024] 3c011001 lui \$1, 4097 ; 18: lw \$t0, num1 # temp - num1 N [x0040002] x8c28000 lw \$8, 4(\$1) ; 19: add \$t1, \$0, \$t0 # accum = temp [00400030] 3c011001 lui \$1, 4097 ; 20: lw \$t0, num2 # temp = num2 N [x0040003] x8c28000 lw \$8, 4(\$1) N [x0040003] x0128482 add \$9, \$9, \$8 ; 21: add \$t1, \$t1, \$t0 # accum = accum + temp [0040003c] 3c011001 lui \$1, 4097 ; 22: lw \$t0, num3 # temp = num3 N [x0040004] x8c28000 lw \$8, 8(\$1) N [x0040004] x0128482 add \$9, \$9, \$8 ; 23: add \$t1, \$t1, \$t0 # accum = accum + temp [00400048] 3c011001 lui \$1, 4097 ; 24: sw \$t1, sum # sum = accum [0040004c] ac29000c sw \$9, 12(\$1) ; 25: addi \$v0, \$0, 1 # \$v0 = code for 'print-int' [00400050] 20020001 addi \$2, \$0, 1 ; 26: add \$a0, \$0, \$t1 # \$a0 = accum [00400054] 00092020 add \$4, \$0, \$9 ; 27: syscall # syscall(\$v0-1) prints \$a0 [00400058] 0000000c syscall ; 28: jr \$ra # return control to the simulator [0040005c] 03e00008 jr \$31</pre> <div>Kernel Text Segment [80000000]..[80010000]</div> <pre> [80000180] 0001d821 addu \$27, \$0, \$1 ; 90: move \$k1 \$at # Save \$at [80000184] 3c019000 lui \$1, -,28672 ; 92: sw \$v0 \$1 # Not re-entrant and we can't trust \$sp [80000188] ac220200 sw \$2, 512(\$1) ; 93: sw \$a0 \$2 # But we need to use these registers [8000018c] 3c019000 lui \$1, -,28672 [80000190] ac240204 sw \$4, 516(\$1) ; 95: mfc0 \$k0 \$13 # Cause register [80000194] 401a6800 mfc0 \$26, \$13 ; 96: srl \$a0 \$k0 2 # Extract ExCoDe Field [80000198] 001a2082 srl \$4, \$26, 2 ; 97: andi \$a0 \$a0 0x1f [8000019c] 3084001f andi \$4, \$4, \$1 ; 101: li \$v0 4 # syscall 4 (print_str) [800001a0] 34020004 ori \$2, \$0, 4 ; 102: la \$a0 __ml_ [800001a4] 3c049000 lui \$4, -,28672 [__ml_] ; 103: syscall [800001a8] 0000000c syscall ; 105: li \$v0 1 # syscall 1 (print_int) [800001ac] 34020001 ori \$2, \$0, 1 ; 106: srl \$a0 \$k0 2 # Extract ExCoDe Field [800001b0] 001a2082 srl \$4, \$26, 2 ; 107: andi \$a0 \$a0 0x1f [800001b4] 3084001f andi \$4, \$4, \$1 ; 108: syscall [800001b8] 0000000c syscall ; 110: li \$v0 4 # syscall 4 (print_str) [800001bc] 34020004 ori \$2, \$0, 4 ; 111: andi \$a0 \$k0 0x3c [800001c0] 3344003c andi \$4, \$26, 60 ; 112: lw \$a0 __excp(\$a0) [800001c4] 3c019000 lui \$1, -,28672 [800001c8] 00240821 addu \$1, \$1, \$4</pre>	
PC = 4194360 EPC = 4194356 Cause = 36 BadVAddr = 0 Status = 805371664		<div>User Text Segment [00400000]..[00440000]</div> <pre> [00400000] 8fa40000 lw \$4, 0(\$29) ; 183: lw \$a0 0(\$sp) # argc [00400004] 27a50004 addiu \$5, \$29, 4 ; 184: addiu \$a1 \$p 4 # argv [00400008] 24a60004 addiu \$6, \$5, 4 ; 185: addiu \$a2 \$a1 4 # envp [0040000c] 00041080 sll \$2, \$4, 2 ; 186: sll \$v0 \$a0 2 [00400010] 00c23021 addu \$6, \$6, \$2 ; 187: addu \$a2 \$a2 \$v0 [00400014] 0c100009 jal 0x00400024 [main] ; 188: jal main [00400018] 00000000 nop ; 189: nop [0040001c] 3402000a ori \$2, \$0, 10 ; 191: li \$v0 10 [00400020] 0000000c syscall ; 192: syscall # syscall 10 (exit) [00400024] 3c011001 lui \$1, 4097 ; 18: lw \$t0, num1 # temp - num1 N [x0040002] x8c28000 lw \$8, 0(\$1) ; 19: add \$t1, \$0, \$t0 # accum = temp [00400030] 3c011001 lui \$1, 4097 ; 20: lw \$t0, num2 # temp = num2 N [x0040003] x8c28000 lw \$8, 4(\$1) N [x0040003] x0128482 add \$9, \$9, \$8 ; 21: add \$t1, \$t1, \$t0 # accum = accum + temp [0040003c] 3c011001 lui \$1, 4097 ; 22: lw \$t0, num3 # temp = num3 N [x0040004] x8c28000 lw \$8, 8(\$1) N [x0040004] x0128482 add \$9, \$9, \$8 ; 23: add \$t1, \$t1, \$t0 # accum = accum + temp [00400048] 3c011001 lui \$1, 4097 ; 24: sw \$t1, sum # sum = accum [0040004c] ac29000c sw \$9, 12(\$1) ; 25: addi \$v0, \$0, 1 # \$v0 = code for 'print-int' [00400050] 20020001 addi \$2, \$0, 1 ; 26: add \$a0, \$0, \$t1 # \$a0 = accum [00400054] 00092020 add \$4, \$0, \$9 ; 27: syscall # syscall(\$v0-1) prints \$a0 [00400058] 0000000c syscall ; 28: jr \$ra # return control to the simulator [0040005c] 03e00008 jr \$31</pre> <div>Kernel Text Segment [80000000]..[80010000]</div> <pre> [80000180] 0001d821 addu \$27, \$0, \$1 ; 90: move \$k1 \$at # Save \$at [80000184] 3c019000 lui \$1, -,28672 ; 92: sw \$v0 \$1 # Not re-entrant and we can't trust \$sp [80000188] ac220200 sw \$2, 512(\$1) ; 93: sw \$a0 \$2 # But we need to use these registers [8000018c] 3c019000 lui \$1, -,28672 [80000190] ac240204 sw \$4, 516(\$1) ; 95: mfc0 \$k0 \$13 # Cause register [80000194] 401a6800 mfc0 \$26, \$13 ; 96: srl \$a0 \$k0 2 # Extract ExCoDe Field [80000198] 001a2082 srl \$4, \$26, 2 ; 97: andi \$a0 \$a0 0x1f [8000019c] 3084001f andi \$4, \$4, \$1 ; 101: li \$v0 4 # syscall 4 (print_str) [800001a0] 34020004 ori \$2, \$0, 4 ; 102: la \$a0 __ml_ [800001a4] 3c049000 lui \$4, -,28672 [__ml_] ; 103: syscall [800001a8] 0000000c syscall ; 105: li \$v0 1 # syscall 1 (print_int) [800001ac] 34020001 ori \$2, \$0, 1 ; 106: srl \$a0 \$k0 2 # Extract ExCoDe Field [800001b0] 001a2082 srl \$4, \$26, 2 ; 107: andi \$a0 \$a0 0x1f [800001b4] 3084001f andi \$4, \$4, \$1 ; 108: syscall [800001b8] 0000000c syscall ; 110: li \$v0 4 # syscall 4 (print_str) [800001bc] 34020004 ori \$2, \$0, 4 ; 111: andi \$a0 \$k0 0x3c [800001c0] 3344003c andi \$4, \$26, 60 ; 112: lw \$a0 __excp(\$a0) [800001c4] 3c019000 lui \$1, -,28672 [800001c8] 00240821 addu \$1, \$1, \$4</pre>	
PC = 4194364 EPC = 4194360 Cause = 36 BadVAddr = 0 Status = 805371664		<div>User Text Segment [00400000]..[00440000]</div> <pre> [00400000] 8fa40000 lw \$4, 0(\$29) ; 183: lw \$a0 0(\$sp) # argc [00400004] 27a50004 addiu \$5, \$29, 4 ; 184: addiu \$a1 \$p 4 # argv [00400008] 24a60004 addiu \$6, \$5, 4 ; 185: addiu \$a2 \$a1 4 # envp [0040000c] 00041080 sll \$2, \$4, 2 ; 186: sll \$v0 \$a0 2 [00400010] 00c23021 addu \$6, \$6, \$2 ; 187: addu \$a2 \$a2 \$v0 [00400014] 0c100009 jal 0x00400024 [main] ; 188: jal main [00400018] 00000000 nop ; 189: nop [0040001c] 3402000a ori \$2, \$0, 10 ; 191: li \$v0 10 [00400020] 0000000c syscall ; 192: syscall # syscall 10 (exit) [00400024] 3c011001 lui \$1, 4097 ; 18: lw \$t0, num1 # temp - num1 N [x0040002] x8c28000 lw \$8, 0(\$1) ; 19: add \$t1, \$0, \$t0 # accum = temp [00400030] 3c011001 lui \$1, 4097 ; 20: lw \$t0, num2 # temp = num2 N [x0040003] x8c28000 lw \$8, 4(\$1) N [x0040003] x0128482 add \$9, \$9, \$8 ; 21: add \$t1, \$t1, \$t0 # accum = accum + temp [0040003c] 3c011001 lui \$1, 4097 ; 22: lw \$t0, num3 # temp = num3 N [x0040004] x8c28000 lw \$8, 8(\$1) N [x0040004] x0128482 add \$9, \$9, \$8 ; 23: add \$t1, \$t1, \$t0 # accum = accum + temp [00400048] 3c011001 lui \$1, 4097 ; 24: sw \$t1, sum # sum = accum [0040004c] ac29000c sw \$9, 12(\$1) ; 25: addi \$v0, \$0, 1 # \$v0 = code for 'print-int' [00400050] 20020001 addi \$2, \$0, 1 ; 26: add \$a0, \$0, \$t1 # \$a0 = accum [00400054] 00092020 add \$4, \$0, \$9 ; 27: syscall # syscall(\$v0-1) prints \$a0 [00400058] 0000000c syscall ; 28: jr \$ra # return control to the simulator [0040005c] 03e00008 jr \$31</pre> <div>Kernel Text Segment [80000000]..[80010000]</div> <pre> [80000180] 0001d821 addu \$27, \$0, \$1 ; 90: move \$k1 \$at # Save \$at [80000184] 3c019000 lui \$1, -,28672 ; 92: sw \$v0 \$1 # Not re-entrant and we can't trust \$sp [80000188] ac220200 sw \$2, 512(\$1) ; 93: sw \$a0 \$2 # But we need to use these registers [8000018c] 3c019000 lui \$1, -,28672 [80000190] ac240204 sw \$4, 516(\$1) ; 95: mfc0 \$k0 \$13 # Cause register [80000194] 401a6800 mfc0 \$26, \$13 ; 96: srl \$a0 \$k0 2 # Extract ExCoDe Field [80000198] 001a2082 srl \$4, \$26, 2 ; 97: andi \$a0 \$a0 0x1f [8000019c] 3084001f andi \$4, \$4, \$1 ; 101: li \$v0 4 # syscall 4 (print_str) [800001a0] 34020004 ori \$2, \$0, 4 ; 102: la \$a0 __ml_ [800001a4] 3c049000 lui \$4, -,28672 [__ml_] ; 103: syscall [800001a8] 0000000c syscall ; 105: li \$v0 1 # syscall 1 (print_int) [800001ac] 34020001 ori \$2, \$0, 1 ; 106: srl \$a0 \$k0 2 # Extract ExCoDe Field [800001b0] 001a2082 srl \$4, \$26, 2 ; 107: andi \$a0 \$a0 0x1f [800001b4] 3084001f andi \$4, \$4, \$1 ; 108: syscall [800001b8] 0000000c syscall ; 110: li \$v0 4 # syscall 4 (print_str) [800001bc] 34020004 ori \$2, \$0, 4 ; 111: andi \$a0 \$k0 0x3c [800001c0] 3344003c andi \$4, \$26, 60 ; 112: lw \$a0 __excp(\$a0) [800001c4] 3c019000 lui \$1, -,28672 [800001c8] 00240821 addu \$1, \$1, \$4</pre>	

After:

```

; 18: lw $t0, num1 # temp = num1
; 19: syscall # syscall 10 (exit)

```



```

; 97: andi $a0 $a0 0x1f
; 101: li $v0 4 # syscall 4 (print_str)
; 102: la $a0 ml

```

8) Swap:

Before

PC	=	0	
EPC	=	0	
Cause	=	0	
BadVAddr	=	0	
Status	=	805371664	
HI	=	0	
LO	=	0	
R0 [r0]	=	0	
R1 [at]	=	0	
R2 [v0]	=	0	
R3 [v1]	=	0	
R4 [a0]	=	1	
R5 [a1]	=	2147481104	
R6 [a2]	=	2147481112	
R7 [a3]	=	0	
R8 [t0]	=	0	
R9 [t1]	=	0	
R10 [t2]	=	0	
R11 [t3]	=	0	
R12 [t4]	=	0	
R13 [t5]	=	0	
R14 [t6]	=	0	
R15 [t7]	=	0	
R16 [s0]	=	0	
R17 [s1]	=	0	
R18 [s2]	=	0	
R19 [s3]	=	0	
R20 [s4]	=	0	
R21 [s5]	=	0	
R22 [s6]	=	0	
R23 [s7]	=	0	
R24 [t8]	=	0	
R25 [t9]	=	0	
R26 [k0]	=	0	
R27 [k1]	=	0	

User data segment [10000000]..[10040000]			
[10000000]..[1000ffff]	00000000		
[10010000]	0000000005	0000000017	-3 0000000022
[10010010]	0000000120	-1 0000000002	0000000003
[10010020]..[1003ffff]	00000000		
User Stack [7ffff60c]..[80000000]			
[7ffff60c]	0000000001		
[7ffff610]	2147481288	0000000000	2147483617 2147483578
[7ffff620]	2147483529	2147483469	2147483420 2147483394
[7ffff630]	2147483358	2147483308	2147483259 2147483219
[7ffff640]	2147483206	2147483184	2147483142 2147483115
[7ffff650]	2147483091	2147483058	2147483044 2147482162
[7ffff660]	2147482100	2147482071	2147481998 2147481980
[7ffff670]	2147481956	2147481929	2147481899 2147481858
[7ffff680]	2147481828	2147481721	2147481698 2147481641
[7ffff690]	2147481621	2147481606	2147481584 2147481545
[7ffff6a0]	2147481507	2147481483	2147481444 2147481429
[7ffff6b0]	2147481402	2147481384	2147481364 2147481343
[7ffff6c0]	0000000000	0000000000	1294940739 1986096737
[7ffff6d0]	1635017028	1819239215	1701274988 1970225967
[7ffff6e0]	1936028530	1129530159	0791689010 1935827308
[7ffff6f0]	1650551855	2004037429	1630433377 1593863539
[7ffff700]	1280528479	1147888495	1349416815 1667853423
[7ffff710]	0003161465	1599292762	1111576133 1398752588
[7ffff720]	1095586649	0003226958	1684957559 1128100457
[7ffff730]	1230462010	1464812622	1398079571 1380995653
[7ffff740]	1279870543	0977485125	1702057308 1834775410
[7ffff750]	1986096737	1163089152	1296125522 1634549061
[7ffff760]	0007758190	1380275029	1095585604 1381977673
[7ffff770]	1229799759	1380992846	1279870543 1095580997
[7ffff780]	1398161742	1414545740	1426083919 1146242387
[7ffff790]	1229016399	1095581006	1398161742 1414545740
[7ffff7a0]	1409306703	1128091725	1934974010 1551069797
[7ffff7b0]	1634623853	1883331702	1952531568 1867275361
[7ffff7c0]	1550606691	1886217556	1296389120 0977485136

After

Int Regs [10]		Data	
PC	= 4194336	User data segment [10000000]..[10040000]	
EPC	= 0	[10000000]..[1000ffff] 00000000	
Cause	= 0	[10010000] 0000000005 0000000017 0000000022 -3	
BadVAddr	= 0	[10010010] 0000000120 -1 0000000002 0000000003 x	
Status	= 805371664	[10010020]..[1003ffff] 00000000	
HI	= 0	User Stack [7ffff60c]..[80000000]	
LO	= 0	[7ffff60c] 0000000001	
R0 [r0]	= 0	[7ffff610] 2147481288 0000000000 2147483617 2147483578	
R1 [at]	= 268500992	[7ffff620] 2147483529 2147483469 2147483420 2147483394	
R2 [v0]	= 10	[7ffff630] 2147483358 2147483308 2147483259 2147483219	
R3 [v1]	= 0	[7ffff640] 2147483206 2147483184 2147483142 2147483115	
R4 [a0]	= 1	[7ffff650] 2147483091 2147483058 2147483044 2147482162	
R5 [a1]	= 2147481104	[7ffff660] 2147482100 2147482071 2147481998 2147481980	
R6 [a2]	= 2147481112	[7ffff670] 2147481956 2147481929 2147481899 2147481858	
R7 [a3]	= 0	[7ffff680] 2147481828 2147481721 2147481698 2147481641	
R8 [t0]	= 268500992	[7ffff690] 2147481621 2147481606 2147481584 2147481545	
R9 [t1]	= 268501000	[7ffff6a0] 2147481507 2147481483 2147481444 2147481429	
R10 [t2]	= 268501004	[7ffff6b0] 2147481402 2147481384 2147481364 2147481343	
R11 [t3]	= 268501004	[7ffff6c0] 0000000000 0000000000 1294940739 1986096737	
R12 [t4]	= 26	[7ffff6d0] 1635017028 1819239215 1701274988 1970225967	
R13 [t5]	= 0	[7ffff6e0] 1936028530 1129530159 0791689010 1935827308	
R14 [t6]	= 0	[7ffff6f0] 1650551855 2004037429 1630433377 1593863539	
R15 [t7]	= 0	[7ffff700] 1280528479 1147888495 1349416815 1667853423	
R16 [s0]	= 0	[7ffff710] 0003161465 1599292762 1111576133 1398752588	
R17 [s1]	= 0	[7ffff720] 1095586649 0003226958 1684957559 1128100457	
R18 [s2]	= 0	[7ffff730] 1230462010 1464812622 1398079571 1380995653	
R19 [s3]	= 0	[7ffff740] 1279870543 0977485125 1702057308 1834775410	
R20 [s4]	= 0	[7ffff750] 1986096737 1163089152 1296125522 1634549061	
R21 [s5]	= 0	[7ffff760] 0007758190 1380275029 1095585604 1381977673	
R22 [s6]	= 0	[7ffff770] 1229799759 1380992846 1279870543 1095580997	
R23 [s7]	= 0	[7ffff780] 1398161742 1414545740 1426063919 1146242387	
R24 [t8]	= 0	[7ffff790] 1229016399 1095581006 1398161742 1414545740	
R25 [t9]	= 0	[7ffff7a0] 1408306703 1128091725 1934974010 1551069797	
R26 [k0]	= 0	[7ffff7b0] 1634623953 1883331702 1952531568 1867275361	
R27 [k1]	= 0	[7ffff7c0] 1550606691 1886217556 1296389120 0977485136	