

Lab Report

ECPE 170 – Computer Systems and Networks – Spring 2022

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Lab Topic: MIPS Assembly Programming (Basic) (Lab #: 0009)

Question #1:

Take two screenshots of the MIPS register panel: one before your program runs, and one after your program finishes. Put the register panel in Decimal mode (right-click) so it is easy to see register values.

Answer:

FP Regs	Int Regs [10]	FP Regs	Int Regs [10]
×	☐	×	☐
PC = 0		PC = 4194412	
EPC = 0		EPC = 0	
Cause = 0		Cause = 0	
BadVAddr = 0		BadVAddr = 0	
Status = 805371664		Status = 805371664	
HI = 0		HI = 0	
LO = 0		LO = 0	
R0 [r0] = 0		R0 [r0] = 0	
R1 [at] = 0		R1 [at] = 268500992	
R2 [v0] = 0		R2 [v0] = 10	
R3 [v1] = 0		R3 [v1] = 0	
R4 [a0] = 1		R4 [a0] = 1	
R5 [a1] = 2147483136		R5 [a1] = 2147483136	
R6 [a2] = 2147483144		R6 [a2] = 2147483144	
R7 [a3] = 0		R7 [a3] = 0	
R8 [t0] = 0		R8 [t0] = 37	
R9 [t1] = 0		R9 [t1] = 268500992	
R10 [t2] = 0		R10 [t2] = 7	
R11 [t3] = 0		R11 [t3] = 2	
R12 [t4] = 0		R12 [t4] = 18	
R13 [t5] = 0		R13 [t5] = -3	
R14 [t6] = 0		R14 [t6] = 25	
R15 [t7] = 0		R15 [t7] = 5	
R16 [s0] = 0		R16 [s0] = 0	
R17 [s1] = 0		R17 [s1] = 0	
R18 [s2] = 0		R18 [s2] = 0	
R19 [s3] = 0		R19 [s3] = 0	
R20 [s4] = 0		R20 [s4] = 0	
R21 [s5] = 0		R21 [s5] = 0	
R22 [s6] = 0		R22 [s6] = 0	
R23 [s7] = 0		R23 [s7] = 0	
R24 [t8] = 0		R24 [t8] = 15	
R25 [t9] = 0		R25 [t9] = 8	
R26 [k0] = 0		R26 [k0] = 0	
R27 [k1] = 0		R27 [k1] = 0	
R28 [gp] = 268468224		R28 [gp] = 268468224	
R29 [sp] = 2147483132		R29 [sp] = 2147483132	
R30 [s8] = 0		R30 [s8] = 0	
R31 [ra] = 0		R31 [ra] = 4194328	

Question #2:

Take two screenshots of the MIPS memory panel (data tab): one before your program runs, and one after your program finishes. Put the memory panel in Decimal mode (right-click), so it is easy to see memory values. **In the after-execution capture, circle the memory location (not register) that contains the final calculated value of Z.**

Answer:

```

[10000000]..[10031fff] 00000000
[7ffffdfc] 0000000001
[7fffffe0] 2147483197 0000000000 2147483634 2147483596
[7fffffe1] 2147483574 2147483557 2147483522 2147483456
[7fffffe2] 2147483461 2147483426 2147483382 2147483325
[7fffffe3] 2147483253 2147483249 0000000000 1934962632
[7fffffe4] 0796095077 1851876788 1852401779 1986348879
[7fffffe5] 1863594037 1953391391 1344684949 0000000000
[7fffffe6] 1659543665 1882143824 8829711541 1836278862
[7fffffe7] 1129338880 1095517791 0809325383 1476407416
[7fffffe8] 1396752088 1236393925 3144664949 1627951357
[7fffffe9] 1915306179 1952339407 9778989417 6778923875
[7fffffea] 1970438135 1953254515 1835625661 0808998766
[7fffffeb] 8075967825 0808998766 6940758916 2147245956
[7fffffec] 1868023987 1812398877 1812398877 1936876098

```

```

[10000000]..[10031fff] 00000000
[7ffffdfc] 0000000001
[7fffffe0] 2147483197 0000000000 2147483634 2147483596
[7fffffe1] 2147483574 2147483557 2147483522 2147483456
[7fffffe2] 2147483461 2147483426 2147483382 2147483325
[7fffffe3] 2147483253 2147483249 0000000000 1934962632
[7fffffe4] 0796095077 1851876788 1852401779 1986348879
[7fffffe5] 1863594037 1953391391 1344684949 0000000000
[7fffffe6] 1659543665 1882143824 8829711541 1836278862
[7fffffe7] 1129338880 1095517791 0809325383 1476407416
[7fffffe8] 1396752088 1236393925 3144664949 1627951357
[7fffffe9] 1915306179 1952339407 9778989417 6778923875
[7fffffea] 1970438135 1953254515 1835625661 0808998766
[7fffffeb] 8075967825 0808998766 6940758916 2147245956
[7fffffec] 1868023987 1812398877 1812398877 1936876098

```

Question #3:

Take two screenshots of the MIPS register panel: one before your program runs, and one after your program finishes. Put the register panel in Decimal mode (right-click) so it is easy to see register values.

Answer:

FP Regs	Int Regs [10]	FP Regs	Int Regs [10]
×	☐	×	☐
PC	= 0	PC	= 4194544
EPC	= 0	EPC	= 0
Cause	= 0	Cause	= 0
BadVAddr	= 0	BadVAddr	= 0
Status	= 805371664	Status	= 805371664
HI	= 0	HI	= 0
LO	= 0	LO	= 0
R0 [r0]	= 0	R0 [r0]	= 0
R1 [at]	= 0	R1 [at]	= 268500992
R2 [v0]	= 0	R2 [v0]	= 10
R3 [v1]	= 0	R3 [v1]	= 0
R4 [a0]	= 1	R4 [a0]	= 1
R5 [a1]	= 2147483136	R5 [a1]	= 2147483136
R6 [a2]	= 2147483144	R6 [a2]	= 2147483144
R7 [a3]	= 0	R7 [a3]	= 0
R8 [t0]	= 0	R8 [t0]	= 268501004
R9 [t1]	= 0	R9 [t1]	= 0
R10 [t2]	= 0	R10 [t2]	= 0
R11 [t3]	= 0	R11 [t3]	= 0
R12 [t4]	= 0	R12 [t4]	= 0
R13 [t5]	= 0	R13 [t5]	= 0
R14 [t6]	= 0	R14 [t6]	= 0
R15 [t7]	= 0	R15 [t7]	= 0
R16 [s0]	= 0	R16 [s0]	= 10
R17 [s1]	= 0	R17 [s1]	= 15
R18 [s2]	= 0	R18 [s2]	= 6
R19 [s3]	= 0	R19 [s3]	= 0
R20 [s4]	= 0	R20 [s4]	= 0
R21 [s5]	= 0	R21 [s5]	= 0
R22 [s6]	= 0	R22 [s6]	= 0
R23 [s7]	= 0	R23 [s7]	= 0
R24 [t8]	= 0	R24 [t8]	= 0
R25 [t9]	= 0	R25 [t9]	= 0
R26 [k0]	= 0	R26 [k0]	= 0
R27 [k1]	= 0	R27 [k1]	= 0
R28 [gp]	= 268468224	R28 [gp]	= 268468224
R29 [sp]	= 2147483132	R29 [sp]	= 2147483132
R30 [s8]	= 0	R30 [s8]	= 0
R31 [ra]	= 0	R31 [ra]	= 4194328

Question #4:

Take two screenshots of the MIPS memory panel (data tab): one before your program runs, and one after your program finishes. Put the memory panel in Decimal mode (right-click), so it is easy to see memory values. **In the after-execution capture, circle the memory location (not register) that contains the final calculated value of Z.**

Answer:

The image displays two side-by-side screenshots of a Windows command prompt window. Both windows have a title bar that reads 'Text' and a menu bar with 'File' and 'Edit'. The command prompt shows the execution of the 'type' command on a file named 'Data'.

The left screenshot shows the first 100 lines of the file. The output is mostly zeros, with some lines containing the string '00000000'. The line numbers are visible on the left side of the prompt.

The right screenshot shows the same file, but with a red circle highlighting a line that contains the string '00000000'. This line is the 100th line of the file. The line numbers are visible on the left side of the prompt.

Question #5:

Take a screenshot of the MIPS register panel after your program finishes. Put the register panel in Decimal mode (right-click) so it is easy to see register values.

Answer:

FP Regs	Int Regs [10]	FP Regs	Int Regs [10]
PC = 0		PC = 4194452	
EPC = 0		EPC = 0	
Cause = 0		Cause = 0	
BadVAddr = 0		BadVAddr = 0	
Status = 805371664		Status = 805371664	
HI = 0		HI = 0	
LO = 0		LO = 0	
R0 [r0] = 0		R0 [r0] = 0	
R1 [at] = 0		R1 [at] = 268500992	
R2 [v0] = 0		R2 [v0] = 10	
R3 [v1] = 0		R3 [v1] = 0	
R4 [a0] = 1		R4 [a0] = 1	
R5 [a1] = 2147483136		R5 [a1] = 2147483136	
R6 [a2] = 2147483144		R6 [a2] = 2147483144	
R7 [a3] = 0		R7 [a3] = 0	
R8 [t0] = 0		R8 [t0] = 268500996	
R9 [t1] = 0		R9 [t1] = 0	
R10 [t2] = 0		R10 [t2] = 0	
R11 [t3] = 0		R11 [t3] = 0	
R12 [t4] = 0		R12 [t4] = 0	
R13 [t5] = 0		R13 [t5] = 0	
R14 [t6] = 0		R14 [t6] = 0	
R15 [t7] = 0		R15 [t7] = 0	
R16 [s0] = 0		R16 [s0] = 78	
R17 [s1] = 0		R17 [s1] = 0	
R18 [s2] = 0		R18 [s2] = 0	
R19 [s3] = 0		R19 [s3] = 0	
R20 [s4] = 0		R20 [s4] = 0	
R21 [s5] = 0		R21 [s5] = 0	
R22 [s6] = 0		R22 [s6] = 0	
R23 [s7] = 0		R23 [s7] = 0	
R24 [t8] = 0		R24 [t8] = 0	
R25 [t9] = 0		R25 [t9] = 0	
R26 [k0] = 0		R26 [k0] = 0	
R27 [k1] = 0		R27 [k1] = 0	
R28 [gp] = 268468224		R28 [gp] = 268468224	
R29 [sp] = 2147483132		R29 [sp] = 2147483132	
R30 [s8] = 0		R30 [s8] = 0	
R31 [ra] = 0		R31 [ra] = 4194328	

Question #6:

Take a screenshot of the MIPS memory panel (data tab) after your program finishes. Put the memory panel in Decimal mode (right-click), so it is easy to see memory values. **Circle the memory location (not register) that contains the final calculated values of I and Z.**

Answer:

[illegible]

Question #7:

Take a screenshot of the MIPS register panel after your program finishes. Put the register panel in Decimal mode (right-click) so it is easy to see register values.

Answer:

FP Regs	Int Regs [10]	FP Regs	Int Regs [10]
PC = 0		PC = 4194464	
EPC = 0		EPC = 0	
Cause = 0		Cause = 0	
BadVAddr = 0		BadVAddr = 0	
Status = 805371664		Status = 805371664	
HI = 0		HI = 0	
LO = 0		LO = 0	
R0 [r0] = 0		R0 [r0] = 0	
R1 [at] = 0		R1 [at] = 1	
R2 [v0] = 0		R2 [v0] = 10	
R3 [v1] = 0		R3 [v1] = 0	
R4 [a0] = 1		R4 [a0] = 1	
R5 [a1] = 2147483136		R5 [a1] = 2147483136	
R6 [a2] = 2147483144		R6 [a2] = 2147483144	
R7 [a3] = 0		R7 [a3] = 0	
R8 [t0] = 0		R8 [t0] = 0	
R9 [t1] = 0		R9 [t1] = 4	
R10 [t2] = 0		R10 [t2] = 268500992	
R11 [t3] = 0		R11 [t3] = 26	
R12 [t4] = 0		R12 [t4] = 268501008	
R13 [t5] = 0		R13 [t5] = 0	
R14 [t6] = 0		R14 [t6] = 0	
R15 [t7] = 0		R15 [t7] = 0	
R16 [s0] = 0		R16 [s0] = 268500992	
R17 [s1] = 0		R17 [s1] = 268501012	
R18 [s2] = 0		R18 [s2] = 12	
R19 [s3] = 0		R19 [s3] = -1	
R20 [s4] = 0		R20 [s4] = 0	
R21 [s5] = 0		R21 [s5] = 0	
R22 [s6] = 0		R22 [s6] = 0	
R23 [s7] = 0		R23 [s7] = 0	
R24 [t8] = 0		R24 [t8] = 0	
R25 [t9] = 0		R25 [t9] = 0	
R26 [k0] = 0		R26 [k0] = 0	
R27 [k1] = 0		R27 [k1] = 0	
R28 [gp] = 268468224		R28 [gp] = 268468224	
R29 [sp] = 2147483132		R29 [sp] = 2147483132	
R30 [s8] = 0		R30 [s8] = 0	
R31 [ra] = 0		R31 [ra] = 4194328	

Question #8:

Take a screenshot of the MIPS memory panel (data tab) after your program finishes. Put the memory panel in Decimal mode (right-click), so it is easy to see memory values. Circle the final values of array A.

Answer:

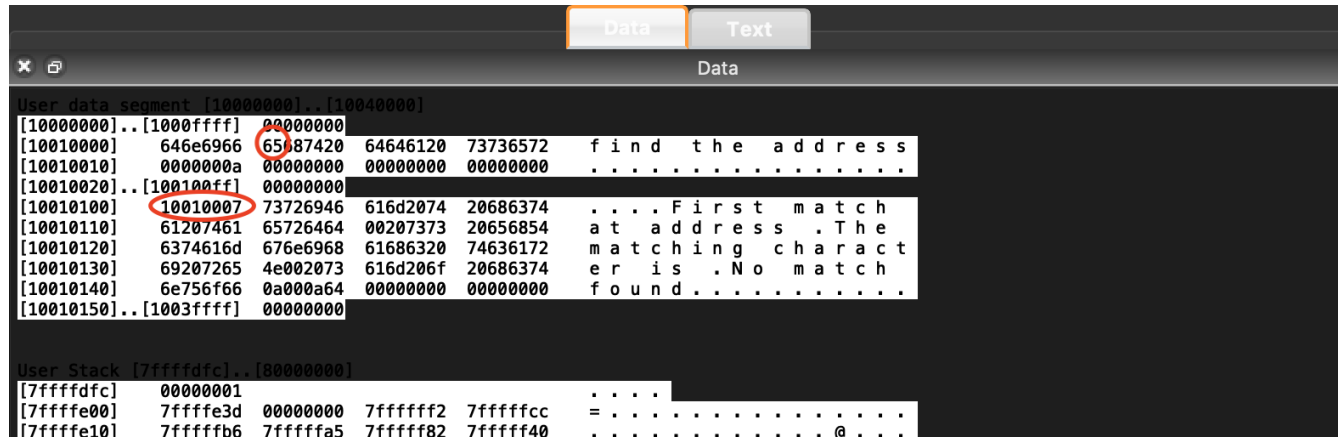
Data	Text	Data	Text
[10000000]...[10010013] 00000000		[10000000]...[10010013] 00000000	
[10010014] 0000000001 0000000002 0000000003		[10010014] 0000000026 0000000028 0000000030 0000000032	
[10010020] 0000000004 0000000005 0000000006 0000000007		[10010020] 0000000034 0000000036 0000000038 0000000040	
[10010030]...[1003ffff] 00000000		[10010030]...[1003ffff] 00000000	
[7ffffdc] 0000000001		[7ffffdc] 0000000001	
[7ffffe0] 2147483197 0000000000 2147483634 2147483596		[7ffffe0] 2147483197 0000000000 2147483634 2147483596	
[7ffffe4] 2147483574 2147483557 2147483522 2147483456		[7ffffe4] 2147483574 2147483557 2147483522 2147483456	
[7ffffe8] 2147483441 2147483420 2147483382 2147483325		[7ffffe8] 2147483441 2147483420 2147483382 2147483325	
[7ffffec] 2147483263 2147483240 0000000000 153462432		[7ffffec] 2147483263 2147483240 0000000000 153462432	
[7fffff0] 0796095077 1851876708 1852401779 1986348079		[7fffff0] 0796095077 1851876708 1852401779 1986348079	
[7fffff4] 1806350437 1953391981 1346585983 0000923461		[7fffff4] 1806350437 1953391981 1346585983 0000923461	
[7fffff8] 1658543663 1882143024 0863269473 1836278062		[7fffff8] 1658543663 1882143024 0863269473 1836278062	
[7fffffc] 1129338880 1095517791 0809325383 1476487416		[7fffffc] 1129338880 1095517791 0809325383 1476487416	
[7ffff00] 1398752000 1230393925 1314866499 1827951937		[7ffff00] 1398752000 1230393925 1314866499 1827951937	
[7ffff04] 1819308129 1952539497 0778989417 0778923875		[7ffff04] 1819308129 1952539497 0778989417 0778923875	
[7ffff08] 1978430316 1953574515 1835626611 0008990766		[7ffff08] 1978430316 1953574515 1835626611 0008990766	

Question #9:

Take a screenshot of the MIPS memory panel (data tab) after your program finishes. Put the memory panel in Hex mode (right-click), since Decimal mode will not allow us to distinguish between bytes.

Circle two things: the final value of the pointer 'result' in memory, and the corresponding location that result points to. Does that location in memory contain the ASCII code for the character 'e'? (If not, you had better check your work!)

Answer:



```

User data segment [10000000]..[10040000]
[10000000]..[1000ffff] 00000000
[10010000] 646e6966 65087420 64646120 73736572 f i n d   t h e   a d d r e s s
[10010010] 0000000a 00000000 00000000 00000000 . . . . .
[10010020]..[100100ff] 00000000
[10010100] 10010007 73726946 616d2074 20686374 . . . . F i r s t   m a t c h
[10010110] 61207461 65726464 00207373 20656854 a t   a d d r e s s .   T h e
[10010120] 6374616d 676e6968 61686320 74636172 m a t c h i n g   c h a r a c t
[10010130] 69207265 4e002073 616d206f 20686374 e r   i s   .   N o   m a t c h
[10010140] 6e756f66 0a000a64 00000000 00000000 f o u n d . . . . .
[10010150]..[1003ffff] 00000000

User Stack [7ffffdfc]..[80000000]
[7ffffdfc] 00000001
[7ffffe00] 7ffffe3d 00000000 7fffff2 7fffffcc = . . . . .
[7ffffe10] 7fffffb6 7fffffa5 7fffff82 7fffff40 . . . . . @ . . .

```