Lab Report

ECPE 170 – Computer Systems and Networks – Spring 2017

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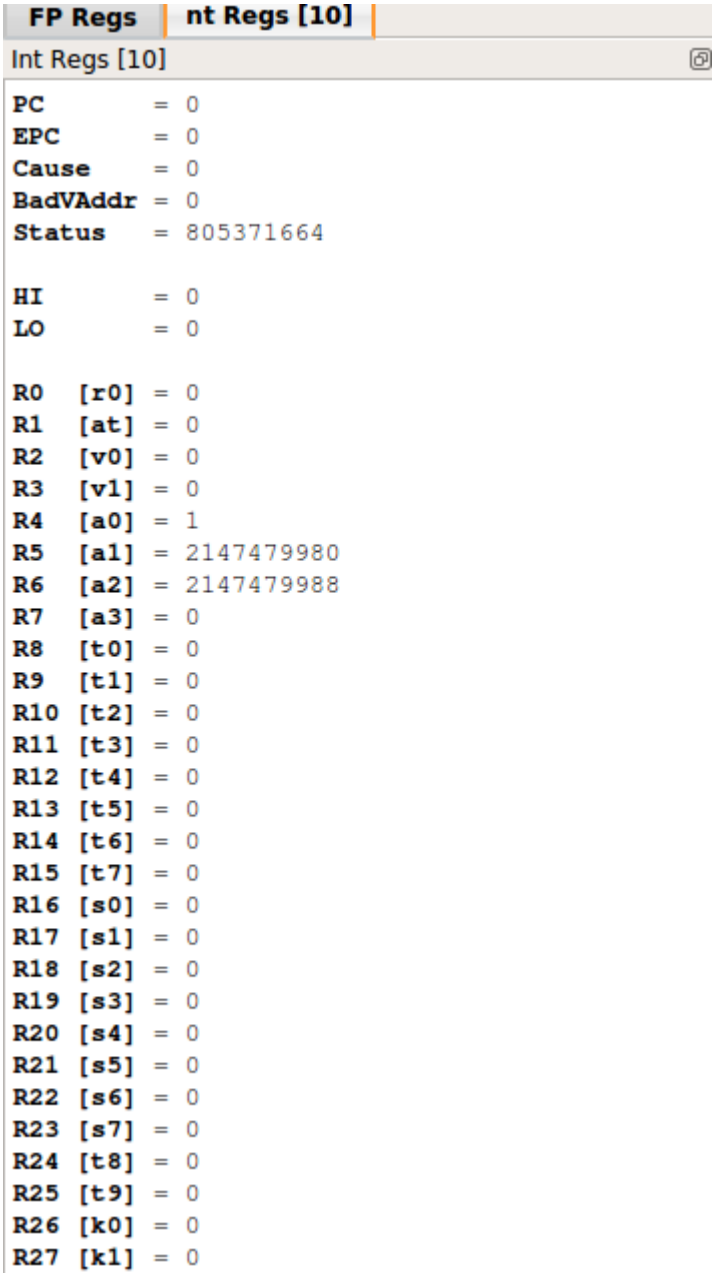
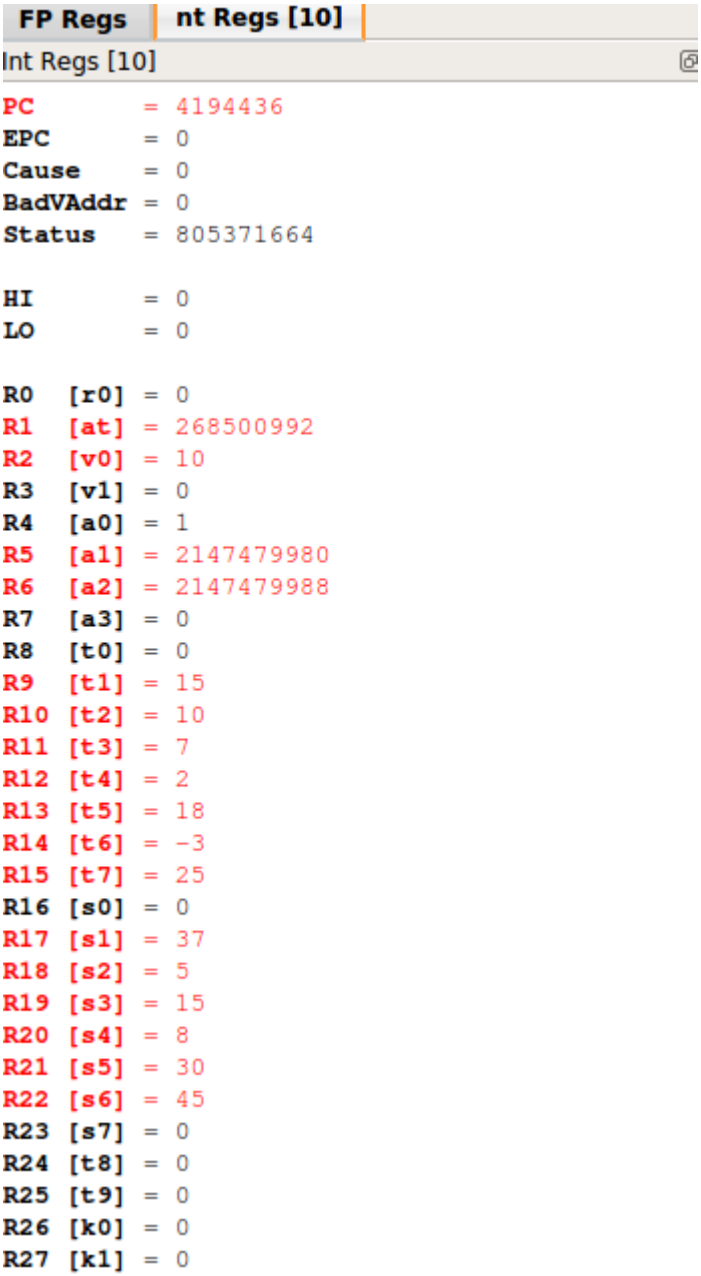
Lab Topic: MIPS Assembly Programming (Basic) (LAB #: 010)

(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.

Before: part1 Program



After: part1 Program



(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.

Before: part1 Program

```
User data segment [10000000]..[10040000]
[10000000]..[1003ffff]  00000000


User Stack [7ffff1a8]..[80000000]
[7ffff1a8]    0000000001  2147480239                                .  .  .  .  .  .  .  .
[7ffff1b0]    0000000000  2147483637  2147483619  2147483597    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
[7ffff1c0]    2147483544  2147483490  2147483474  2147483454    .  .  .  .  b  .  .  .  R  .  .  .  >  .  .  .
[7ffff1d0]    2147483437  2147483402  2147483384  2147483316    -  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
[7ffff1e0]    2147483293  2147483248  2147483233  2147481817    .  .  .  .  p  .  .  .  a  .  .  .  .  .  .  .
[7ffff1f0]    2147481798  2147481740  2147481688  2147481647    .  .  .  .  .  .  .  .  X  .  .  .  /  .  .  .
[7ffff200]    2147481596  2147481528  2147481377  2147481354    .  .  .  .  .  .  .  .  !  .  .  .  .  .  .  .
[7ffff210]    2147481336  2147481303  2147481282  2147481226    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
[7ffff220]    2147481208  2147481188  2147481169  2147481152    x  .  .  .  d  .  .  .  Q  .  .  .  @  .  .  .
[7ffff230]    2147481137  2147481083  2147481065  2147481036    1  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
[7ffff240]    2147481018  2147480992  2147480961  2147480940    .  .  .  .  .  .  .  .  .  .  .  .  l  .  .  .
[7ffff250]    2147480925  2147480917  2147480902  2147480858    ]  .  .  .  U  .  .  .  F  .  .  .  .  .  .  .
[7ffff260]    2147480840  2147480808  2147480781  2147480763    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
[7ffff270]    2147480745  2147480643  2147480583  2147480551    .  .  .  .  C  .  .  .  .  .  .  .  .  .  .  .
[7ffff280]    2147480536  2147480502  2147480471  2147480460    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
[7ffff290]    2147480434  2147480415  2147480381  2147480342    r  .  .  .  _  .  .  .  =  .  .  .  .  .  .  .
[7ffff2a0]    2147480319  2147480301  0000000000  0788529152    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  /
[7ffff2b0]    1701670760  1919513391  1986360435  1647275621    h  o  m  e  /  s  i  r  s  t  e  v  e  n  /  b
[7ffff2c0]    1969386601  1952803683  0825242159  1886609207    i  t  b  u  c  k  e  t  /  2  0  1  7  _  s  p
[7ffff2d0]    1735289202  1885562207  0808923493  1650551855    r  i  n  g  _  e  c  p  e  1  7  0  /  l  a  b
[7ffff2e0]    1882140721  0846492257  1836278062  0792551168    1  0  /  p  a  r  t  2  .  a  s  m  .  _  =  /
[7ffff2f0]    0796029813  0795765090  1886614641  1325428073    u  s  r  /  b  i  n  /  q  t  s  p  i  m  .  O
[7ffff300]    1464878156  1747926340  0795176303  1936877939    L  D  P  W  D  =  /  h  o  m  e  /  s  i  r  s
[7ffff310]    1702258036  1096286318  1330140245  1498696018    t  e  v  e  n  .  X  A  U  T  H  O  R  I  T  Y
[7ffff320]    1869098813  1932485997  1953722985  1852143205    =  /  h  o  m  e  /  s  i  r  s  t  e  v  e  n
[7ffff330]    1633168943  1869116533  2037672306  1397050368    /  .  X  a  u  t  h  o  r  i  t  y  .  L  E  S
[7ffff340]    1330398035  0792544595  0796029813  0795765090    S  C  L  O  S  E  =  /  u  s  r  /  b  i  n  /
[7ffff350]    1936942444  1701865840  0544417056  1191211813    l  e  s  s  p  i  p  e     %  s     %  s  .  G
[7ffff360]    1230981972  1330470733  1162630468  1969383741    T  K  _  I  M  _  M  O  D  U  L  E  =  i  b  u
[7ffff370]    1146617971  1430478663  1313165906  1162108756    s  .  X  D  G  _  C  U  R  R  E  N  T  _  D  E
[7ffff380]    1330924371  1851080016  0007959657  1347635524    S  K  T  O  P  =  U  n  i  t  y  .  D  I  S  P
```

After: part1 Program

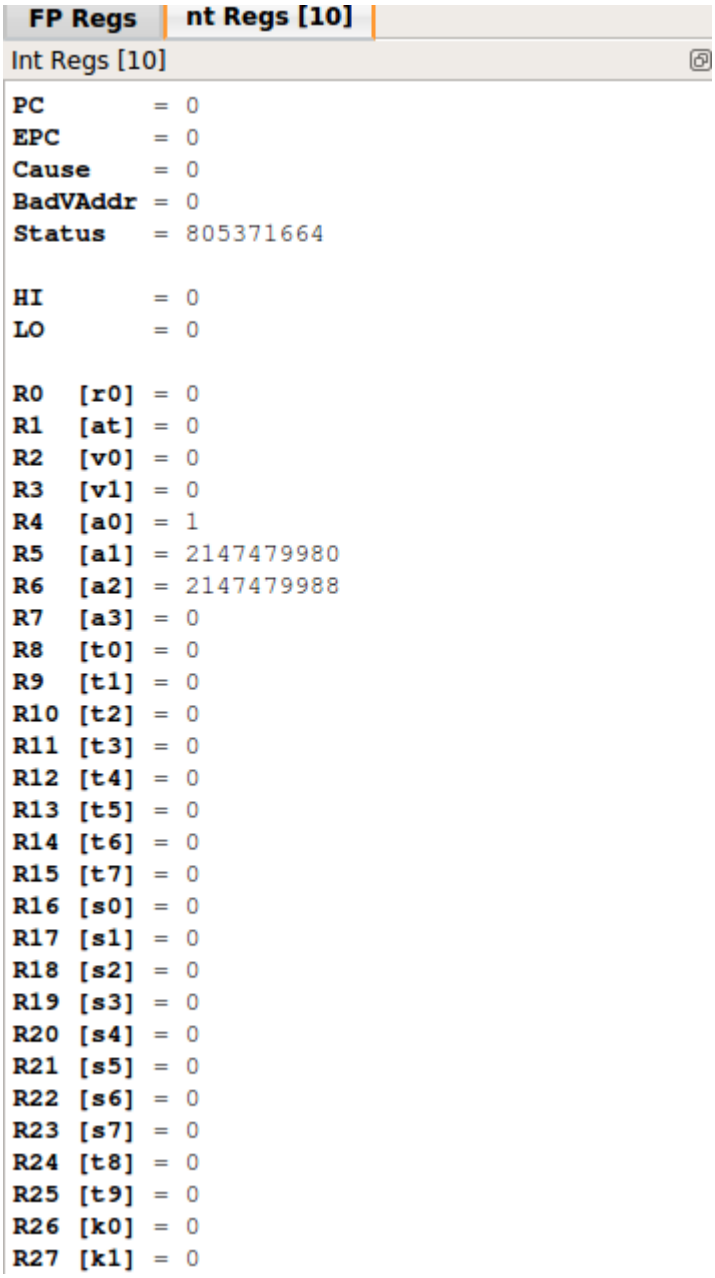
Data | Text

Data

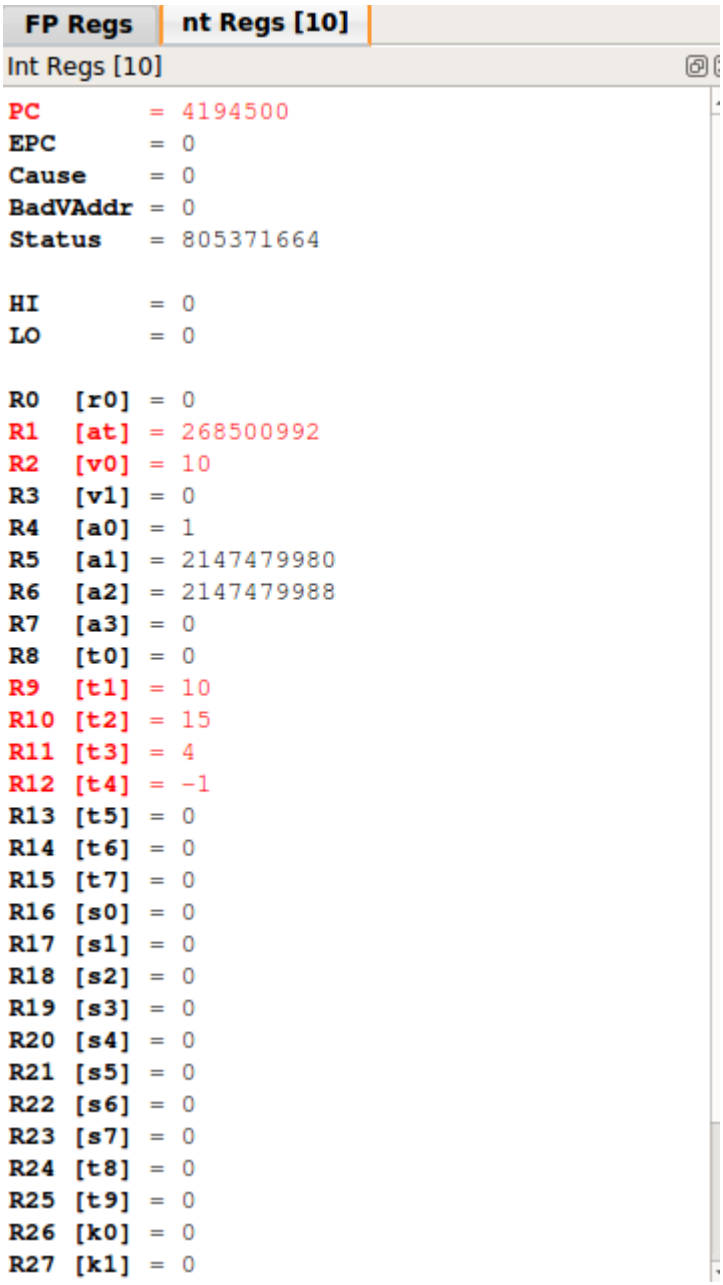
```
User data segment [10000000]..[10040000]
[10000000]..[1000ffff]  00000000
[10010000]    0000000015  0000000010  0000000007  0000000002    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
[10010010]    0000000018         -3  0000000037  0000000000    .  .  .  .  .  .  .  .  %  .  .  .  .  .  .  .
[10010020]..[1003ffff]  00000000


User Stack [7ffff1a8]..[80000000]
[7ffff1a8]    0000000001  2147480239                                .  .  .  .  .  .  .  .
[7ffff1b0]    0000000000  2147483637  2147483619  2147483597    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
[7ffff1c0]    2147483544  2147483490  2147483474  2147483454    .  .  .  .  b  .  .  .  R  .  .  .  >  .  .  .
[7ffff1d0]    2147483437  2147483402  2147483384  2147483316    -  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
[7ffff1e0]    2147483293  2147483248  2147483233  2147481817    .  .  .  .  p  .  .  .  a  .  .  .  .  .  .  .
[7ffff1f0]    2147481798  2147481740  2147481688  2147481647    .  .  .  .  .  .  .  .  X  .  .  .  /  .  .  .
[7ffff200]    2147481596  2147481528  2147481377  2147481354    .  .  .  .  .  .  .  .  !  .  .  .  .  .  .  .
[7ffff210]    2147481336  2147481303  2147481282  2147481226    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
[7ffff220]    2147481208  2147481188  2147481169  2147481152    x  .  .  .  d  .  .  .  Q  .  .  .  @  .  .  .
[7ffff230]    2147481137  2147481083  2147481065  2147481036    1  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
[7ffff240]    2147481018  2147480992  2147480961  2147480940    .  .  .  .  .  .  .  .  .  .  .  .  l  .  .  .
[7ffff250]    2147480925  2147480917  2147480902  2147480858    ]  .  .  .  U  .  .  .  F  .  .  .  .  .  .  .
[7ffff260]    2147480840  2147480808  2147480781  2147480763    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
[7ffff270]    2147480745  2147480643  2147480583  2147480551    .  .  .  .  C  .  .  .  .  .  .  .  .  .  .  .
[7ffff280]    2147480536  2147480502  2147480471  2147480460    .  .  .  .  .  .  .  .  .  .  .  .  .  .  .  .
[7ffff290]    2147480434  2147480415  2147480381  2147480342    r  .  .  .  _  .  .  .  =  .  .  .  .  .  .  .
[7ffff2a0]    2147480319  2147480301  0000000000  0795830319    .  .  .  .  .  .  .  .  .  .  .  .  /  h  o  /
[7ffff2b0]    1701670760  1919513391  1986360435  1647275621    h  o  m  e  /  s  i  r  s  t  e  v  e  n  /  b
[7ffff2c0]    1969386601  1952803683  0825242159  1886609207    i  t  b  u  c  k  e  t  /  2  0  1  7  _  s  p
[7ffff2d0]    1735289202  1885562207  0808923493  1650551855    r  i  n  g  _  e  c  p  e  1  7  0  /  l  a  b
[7ffff2e0]    1882140721  0829715041  1836278062  0792551168    1  0  /  p  a  r  t  1  .  a  s  m  .  _  =  /
[7ffff2f0]    0796029813  0795765090  1886614641  1325428073    u  s  r  /  b  i  n  /  q  t  s  p  i  m  .  O
[7ffff300]    1464878156  1747926340  0795176303  1936877939    L  D  P  W  D  =  /  h  o  m  e  /  s  i  r  s
[7ffff310]    1702258036  1096286318  1330140245  1498696018    t  e  v  e  n  .  X  A  U  T  H  O  R  I  T  Y
[7ffff320]    1869098813  1932485997  1953722985  1852143205    =  /  h  o  m  e  /  s  i  r  s  t  e  v  e  n
[7ffff330]    1633168943  1869116533  2037672306  1397050368    /  .  X  a  u  t  h  o  r  i  t  y  .  L  E  S
[7ffff340]    1330398035  0792544595  0796029813  0795765090    S  C  L  O  S  E  =  /  u  s  r  /  b  i  n  /
[7ffff350]    1936942444  1701865840  0544417056  1191211813    l  e  s  s  p  i  p  e     %  s     %  s  .  G
[7ffff360]    1230981972  1330470733  1162630468  1969383741    T  K  _  I  M  _  M  O  D  U  L  E  =  i  b  u
```

(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.

Before: part 2 program



After: part 2 program

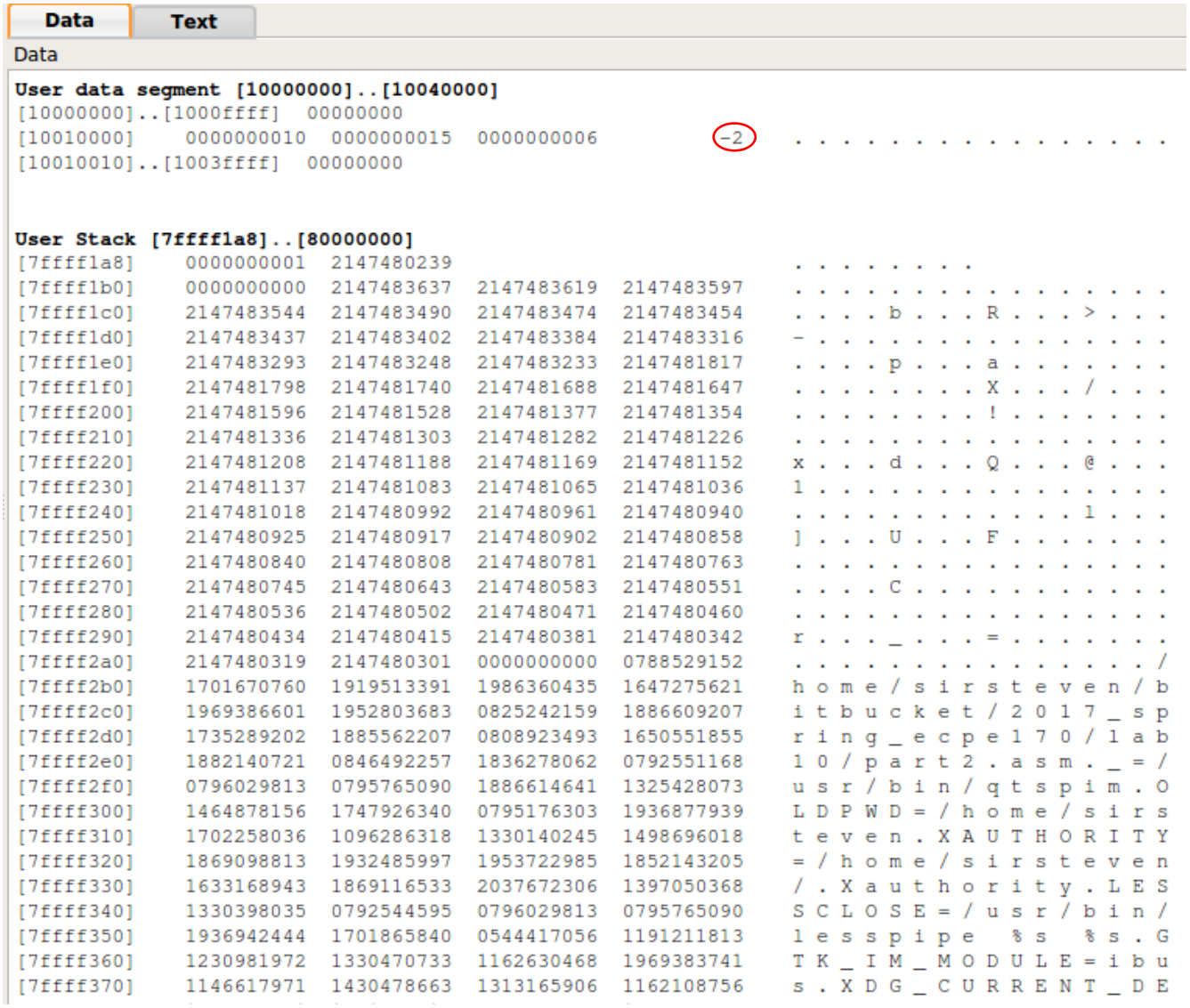


(4) Take two screenshots of the MIPS memory panel (data tab): one before your program runs, and one after your program finishes. Put the memory panel in Decimal mode (right-click), so it is easy to see memory values. In the after-execution capture, circle the memory location (not register) that contains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

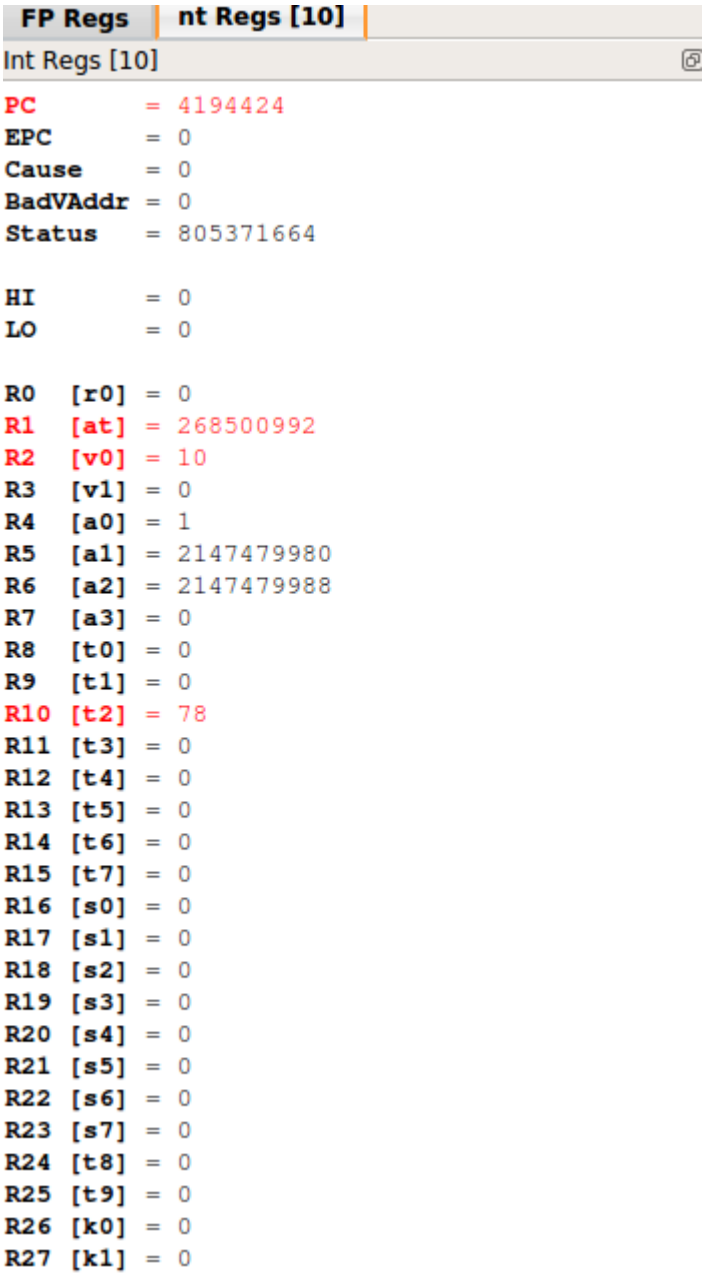
Before: part 2 program

```
User data segment [10000000]..[10040000]
[10000000]..[1003ffff]  00000000


User Stack [7fffe1a8]..[80000000]
[7fffe1a8]    0000000001  2147480239                                  . . . . . . . .
[7fffe1b0]    0000000000  2147483637  2147483619  2147483597          . . . . . . . . . . . . . . . .
[7fffe1c0]    2147483544  2147483490  2147483474  2147483454          . . . . b . . . R . . . > . . .
[7fffe1d0]    2147483437  2147483402  2147483384  2147483316          - . . . . . . . . . . . . . . . .
[7fffe1e0]    2147483293  2147483248  2147483233  2147481817          . . . . p . . . a . . . . . . . .
[7fffe1f0]    2147481798  2147481740  2147481688  2147481647          . . . . . . . . X . . . / . . .
[7fffe200]    2147481596  2147481528  2147481377  2147481354          . . . . . . . . ! . . . . . . . .
[7fffe210]    2147481336  2147481303  2147481282  2147481226          . . . . . . . . . . . . . . . . .
[7fffe220]    2147481208  2147481188  2147481169  2147481152          x . . . d . . . Q . . . @ . . .
[7fffe230]    2147481137  2147481083  2147481065  2147481036          l . . . . . . . . . . . . . . . .
[7fffe240]    2147481018  2147480992  2147480961  2147480940          . . . . . . . . . . . . l . . .
[7fffe250]    2147480925  2147480917  2147480902  2147480858          ] . . . U . . . F . . . . . . . .
[7fffe260]    2147480840  2147480808  2147480781  2147480763          . . . . . . . . . . . . . . . . .
[7fffe270]    2147480745  2147480643  2147480583  2147480551          . . . . C . . . . . . . . . . . .
[7fffe280]    2147480536  2147480502  2147480471  2147480460          . . . . . . . . . . . . . . . . .
[7fffe290]    2147480434  2147480415  2147480381  2147480342          r . . . _ . . . = . . . . . . . .
[7fffe2a0]    2147480319  2147480301  0000000000  0788529152          . . . . . . . . . . . . . . . . /
[7fffe2b0]    1701670760  1919513391  1986360435  1647275621          h o m e / s i r s t e v e n / b
[7fffe2c0]    1969386601  1952803683  0825242159  1886609207          i t b u c k e t / 2 0 1 7 _ s p
[7fffe2d0]    1735289202  1885562207  0808923493  1650551855          r i n g _ e c p e 1 7 0 / l a b
[7fffe2e0]    1882140721  0846492257  1836278062  0792551168          1 0 / p a r t 2 . a s m . _ = /
[7fffe2f0]    0796029813  0795765090  1886614641  1325428073          u s r / b i n / q t s p i m . O
[7fffe300]    1464878156  1747926340  0795176303  1936877939          L D P W D = / h o m e / s i r s
[7fffe310]    1702258036  1096286318  1330140245  1498696018          t e v e n . X A U T H O R I T Y
[7fffe320]    1869098813  1932485997  1953722985  1852143205          = / h o m e / s i r s t e v e n
[7fffe330]    1633168943  1869116533  2037672306  1397050368          / . X a u t h o r i t y . L E S
[7fffe340]    1330398035  0792544595  0796029813  0795765090          S C L O S E = / u s r / b i n /
[7fffe350]    1936942444  1701865840  0544417056  1191211813          l e s s p i p e   % s   % s . G
[7fffe360]    1230981972  1330470733  1162630468  1969383741          T K _ I M _ M O D U L E = i b u
[7fffe370]    1146617971  1430478663  1313165906  1162108756          s . X D G _ C U R R E N T _ D E
[7fffe380]    1330924371  1851080016  0007959657  1347635524          S K T O P = U n i t y . D I S P
[7fffe390]    1029259596  1476407354  1381975876  1230261845          I A Y _ . 0   Y D G   D U N T I
```

After: part 2 program



(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.



(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.

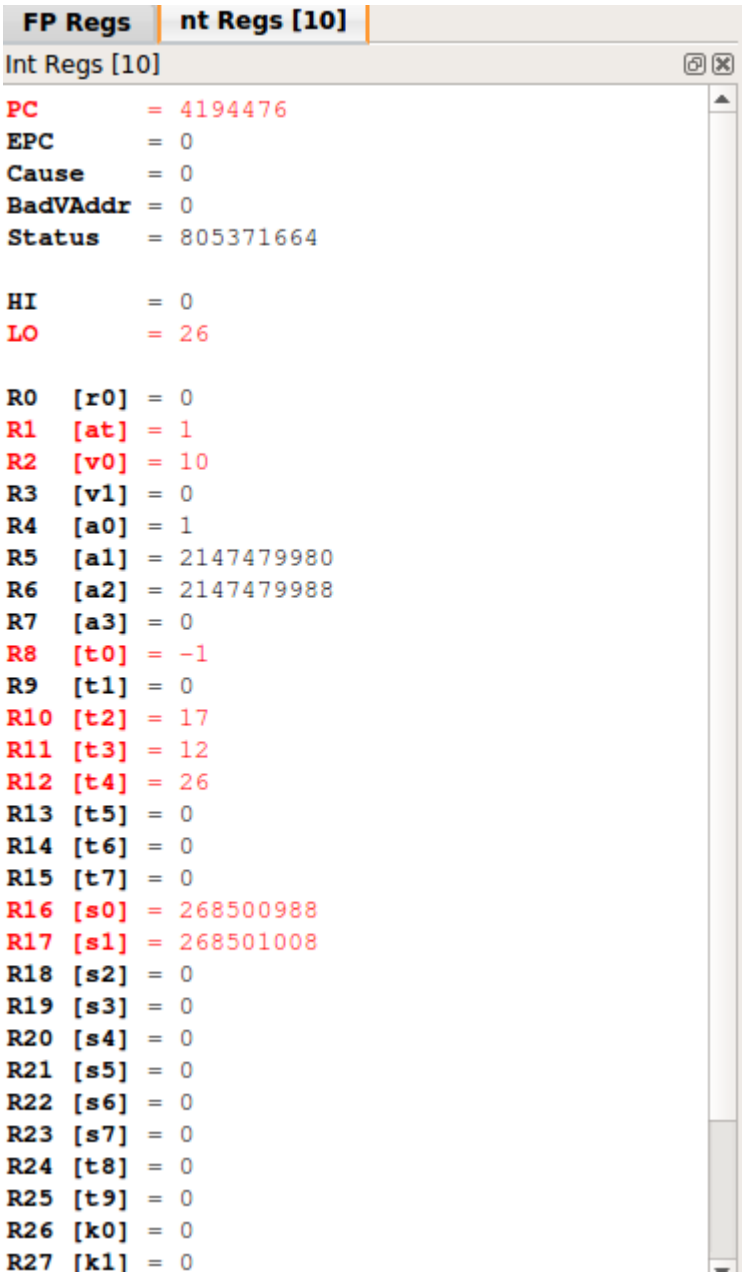
I is in Green; Z is in Red

Data | Text

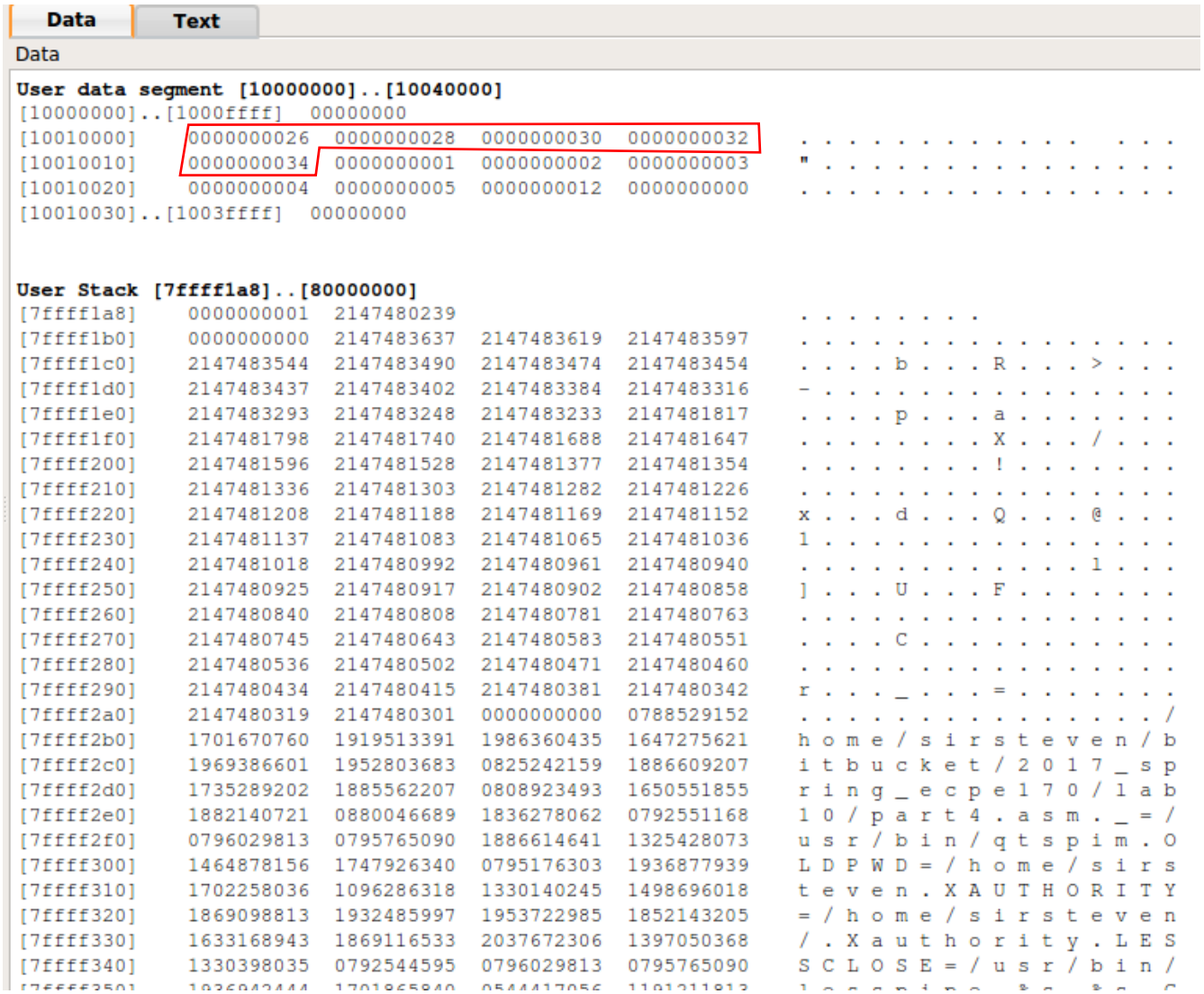
Data

```
User data segment [10000000]..[10040000]
[10000000]..[10010003]  00000000
[10010004]    0000000078  0000000000  0000000000              N . . . . . .
[10010010]..[1003ffff]  00000000


User Stack [7fffe1a8]..[80000000]
[7fffe1a8]    0000000001  2147480239                          . . . . . .
[7fffe1b0]    0000000000  2147483637  2147483619  2147483597  . . . . . .
[7fffe1c0]    2147483544  2147483490  2147483474  2147483454  . . . b . . . R . . . > . . .
[7fffe1d0]    2147483437  2147483402  2147483384  2147483316  - . . . . . .
[7fffe1e0]    2147483293  2147483248  2147483233  2147481817  . . . p . . . a . . . . . .
[7fffe1f0]    2147481798  2147481740  2147481688  2147481647  . . . . . X . . . / . . .
[7fffe200]    2147481596  2147481528  2147481377  2147481354  . . . . . ! . . . . . .
[7fffe210]    2147481336  2147481303  2147481282  2147481226  . . . . . .
[7fffe220]    2147481208  2147481188  2147481169  2147481152  x . . . d . . . Q . . . @ . . .
[7fffe230]    2147481137  2147481083  2147481065  2147481036  1 . . . . . .
[7fffe240]    2147481018  2147480992  2147480961  2147480940  . . . . . 1 . . .
[7fffe250]    2147480925  2147480917  2147480902  2147480858  ] . . . U . . . F . . . . . .
[7fffe260]    2147480840  2147480808  2147480781  2147480763  . . . . . .
[7fffe270]    2147480745  2147480643  2147480583  2147480551  . . . . C . . . . . .
[7fffe280]    2147480536  2147480502  2147480471  2147480460  . . . . . .
[7fffe290]    2147480434  2147480415  2147480381  2147480342  r . . . _ . . . = . . . . . .
[7fffe2a0]    2147480319  2147480301  0000000000  0788529152  . . . . . /
[7fffe2b0]    1701670760  1919513391  1986360435  1647275621  h o m e / s i r s t e v e n / b
[7fffe2c0]    1969386601  1952803683  0825242159  1886609207  i t b u c k e t / 2 0 1 7 _ s p
[7fffe2d0]    1735289202  1885562207  0808923493  1650551855  r i n g _ e c p e 1 7 0 / l a b
[7fffe2e0]    1882140721  0863269473  1836278062  0792551168  1 0 / p a r t 3 . a s m . _ = /
[7fffe2f0]    0796029813  0795765090  1886614641  1325428073  u s r / b i n / q t s p i m . O
[7fffe300]    1464878156  1747926340  0795176303  1936877939  L D P W D = / h o m e / s i r s
[7fffe310]    1702258036  1096286318  1330140245  1498696018  t e v e n . X A U T H O R I T Y
[7fffe320]    1869098813  1932485997  1953722985  1852143205  = / h o m e / s i r s t e v e n
[7fffe330]    1633168943  1869116533  2037672306  1397050368  / . X a u t h o r i t y . L E S
[7fffe340]    1330398035  0792544595  0796029813  0795765090  S C L O S E = / u s r / b i n /
[7fffe350]    1936942444  1701865840  0544417056  1191211813  l e s s p i p e   % s   % s . G
[7fffe360]    1230981972  1330470733  1162630468  1969383741  T K _ I M _ M O D U L E = i b u
[7fffe370]    1146617971  1430478663  1313165906  1162108756  s . X D G _ C U R R E N T _ D E
```

(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.



(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.



(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!)

ASCII code for ‘e’ in Hex = 65