Lab Exercise 5 - CT213 Computer Systems & Organizaton

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1   Part 1

I do not have the ability to connect the raspberry pi to the internet due to issues on my side so I was not able to get the package to run this section of the lab exercise

2   Part 2

2.1   Code

```
.data

.balign 4

varA : .float
↪  25.92053345170039,90.05413446659519,94.1085674045136,49.94587749791683,13.244169782031111,52.433423
varB : .float
↪  95.55624520621527,21.129651229628056,85.24766152184556,76.87109970897774,24.346313299890767,34.0674
varC : .float
↪  0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0

.text
.global main
main:
  MOV r3, #50 /*Count value*/
  LDR r0, address_of_varA /*Load varA address in at r0*/
  LDR r1, address_of_varB /*Load varB address in at r1*/
  LDR r2, address_of_varC /*Load varC address in at r3*/

loop:
  VLDR s0, [r0] /*Load varA[50-r3] at s0*/
  VLDR s1, [r1] /*Load varB[50-r3] at s1*/
  VADD.f32 s2, s1, s0 /*Add s1 + s0, store in s2*/
  VSTR s2, [r2] /*Insert s2 at varC[50-r3]*/
  ADD r0, #4 /*Move Array A position to next Float*/
  ADD r1, #4 /*Move Array B position to next Float*/
  ADD r2, #4 /*Move Array C position to next Float*/
  SUB r3, #1 /*Take one away from Array Counter*/
  CMP r3, #0 /*Check if zero, if not zero loop again*/
  BGT loop
  BEQ exit
exit:
  BX lr

address_of_varA : .word varA
address_of_varB : .word varB
address_of_varC : .word varC
```

2.2   GDB Outputs

```
12              MOV r3, #50 /*Count value*/
(gdb) s
13              LDR r0, address_of_varA /*Load varA address in at r0*/
(gdb) s
14              LDR r1, address_of_varB /*Load varB address in at r1*/
(gdb) s
15              LDR r2, address_of_varC /*Load varC address in at r3*/
(gdb) x/50f &varA
0x21024:        25.9205341      90.0541382      94.1085663      49.9458771
0x21034:        13.2441702      52.4334221      27.2505207      25.334486
0x21044:        6.75010252      58.2694435      79.5448837      5.7594924
0x21054:        62.7400818      68.8948288      24.4274693      74.5064697
0x21064:        12.0912628      60.9887314      17.8582516      5.1952467
0x21074:        29.1445923      92.4769592      38.4327011      58.6868668
0x21084:        36.8309822      25.1132965      92.0819931      36.7812309
0x21094:        9.91857719      8.19772911      48.456543       59.9478111
0x210a4:        37.0640717      45.1112671      75.4407043      84.8773346
0x210b4:        41.6538429      42.7749901      43.3295708      49.3400612
0x210c4:        35.2812843      12.1123133      58.97332        23.7946129
0x210d4:        23.8646107      7.38606834      94.4003296      99.4392395
0x210e4:        28.0968895      38.7269058
(gdb) x/50f &varB
0x210ec:        95.5562439      21.129652       85.2476578      76.8711014
0x210fc:        24.3463135      34.0674667      47.4802437      53.4014282
0x2110c:        18.6631603      41.3176537      47.5594902      0.456041902
0x2111c:        99.2470703      36.7572441      24.4946442      19.3672714
0x2112c:        31.8525543      58.9810371      75.2891083      62.3357239
0x2113c:        71.9576187      5.68597221      98.7639236      78.6046982
0x2114c:        27.6804161      55.7645874      39.9271355      22.9990177
0x2115c:        65.6788177      92.6926041      99.7574158      62.2323418
0x2116c:        98.2216492      40.1293602      11.7346077      16.8923721
0x2117c:        14.5545645      72.6715317      87.6881866      1.99496555
0x2118c:        71.6582413      48.2243004      8.76789284      59.2074394
0x2119c:        83.8115692      46.0291634      88.1902847      16.9932728
0x211ac:        88.6330872      14.1348925
(gdb)
```

Figure 1: VarA/B contents

```
                                    ⊡ Terminal

0x211b4:          0          0          0          0
0x211c4:          0          0          0          0
0x211d4:          0          0          0          0
0x211e4:          0          0          0          0
0x211f4:          0          0          0          0
0x21204:          0          0          0          0
0x21214:          0          0          0          0
0x21224:          0          0          0          0
0x21234:          0          0          0          0
0x21244:          0          0          0          0
0x21254:          0          0          0          0
0x21264:          0          0          0          0
0x21274:          0          0
(gdb) break exit
Breakpoint 2 at 0x76e85780: file exit.c, line 139.
(gdb) run
The program being debugged has been started already.
Start it from the beginning? (y or n) y
Starting program: /home/pi/assignment5/addfloats

Breakpoint 2, __GI_exit (status=135404) at exit.c:139
139     exit.c: No such file or directory.
(gdb) x/50f &varC
0x211b4:        121.476776      111.183792      179.356232      126.816978
0x211c4:        37.5904846      86.500885       74.7307663      78.7359161
0x211d4:        25.4132633      99.5870972      127.10437       6.21553421
0x211e4:        161.987152      105.652069      48.9221115      93.8737411
0x211f4:        43.9438171      119.969772      93.1473618      67.5309677
0x21204:        101.102211      98.1629333      137.196625      137.291565
0x21214:        64.5113983      80.8778839      132.009125      59.7802505
0x21224:        75.5973969      100.890335      148.213959      122.180153
0x21234:        135.285721      85.2406311      87.1753082      101.769707
0x21244:        56.2084084      115.446518      131.017761      51.3350258
0x21254:        106.939529      60.3366127      67.7412109      83.0020523
0x21264:        107.676178      53.4152298      182.590607      116.43251
0x21274:        116.72998       52.8617973
```

Figure 2: VarC before/after running