

CS 218 – Assignment #2

Purpose: Become familiar with the assembler, linker, and debugger.
Display values in memory for integers, reals, and characters.
Due: Thursday (1/31)
Points: 20 (Part A - 10pts, Part B - 10pts)

Assignment:

Part A:

Write a simple assembly language program to compute the following formulas:

```
bAns1 = bVar1 + bVar2
bAns2 = bVar1 - bVar2
wAns1 = wVar1 + wVar2
wAns2 = wVar1 - wVar2
dAns1 = dVar1 + dVar2
dAns2 = dVar1 - dVar2
```

Declare the following variables in the data segment (after the “.data”).

```
NULL      equ    0

bVar1      db      45
bVar2      db      16
bAns1      db      0
bAns2      db      0
wVar1      dw      5436
wVar2      dw      3816
wAns1      dw      0
wAns2      dw      0
dVar1      dd      249521376
dVar2      dd      102727691
dVar3      dd      -532456
dAns1      dd      0
dAns2      dd      0
flt1       dd      8.25
flt2       dd      -15.625
pi         dd      3.14159
qVar1      dq      214578927150
myClass    db      "CS 218", NULL
edName     db      "Ed Jorgensen", NULL
myName     db      "your name goes here", NULL
```

Part B:

On the attached worksheet, write the binary, decimal, and hex representation of each integer variable. For the reals (*flt1*, *flt2*, and *pi*), in addition, show the sign, exponent, and mantissa parts of the representation. For the character strings, show the ASCII codes (for each letter) in hex for only the first six (6) characters for each. See the worksheet for examples.

Submission

Submit a hard copy of:

- 1) Assemble the program, *print and submit the assembler list file* (i.e., ast2.lst).
- 2) Using the debugger, execute the program. Use the provided debugger display commands (“a2in.txt”). *Print and submit a copy of the values after execution* (i.e., a2out.txt).
- 3) Completed data representation worksheet.

Note, the assignment is due at the beginning of class.

Debugger Commands:

Execute the program in the debugger (in the same manner as assignment #1). You should review the DDD/GDB debugger information handout to understand the debugger commands examine memory variables.

You should use the provided “a2in.txt” to display the variables with the debugger.

- Each byte, word, double-word sized, and quadword variable is displayed twice (once in decimal and again in hex).
- The floating point values are display twice (once as a real value and again in hex).
- The strings are displayed twice, once showing both the decimal and ASCII values and then just the hex values for the first six characters

A brief summary of the command to examine memory is as follows:

x/<n><f><u> &<variable>	Examine memory location <variable>
<n>	number of locations to display, 1 is default.
<f>	format:
	d – decimal
	x – hex
	u – unsigned
	c – character
	s – string
	f – floating point
<u>	unit size:
	b – byte (8-bits)
	h – halfword (16-bits)
	w – word (32-bits)
	g – giant (64-bits)

For example, to display the 16-bit variable **wVar2** and the 32-bit variable **dVar1**, the commands would be as follows:

```
x/dh &wVar2
x/dw &dVar1
x/dg &qVar1
```

For future assignments you will need to select the correct command to display the data based on the defined size and any guidance from the assignment.

Data Representation Worksheet

[illegible]

Data Representation Worksheet

flt1	b	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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
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	ltr 1	ltr 2	ltr 3	ltr 4	ltr 5	ltr 6
class =	C	S		2	1	8
hex	43	53	20	32	31	38
edName =						
hex						
myName =						
hex						