Lab 1

Reyna, Ricardo

Section 75C9

05/28/2015

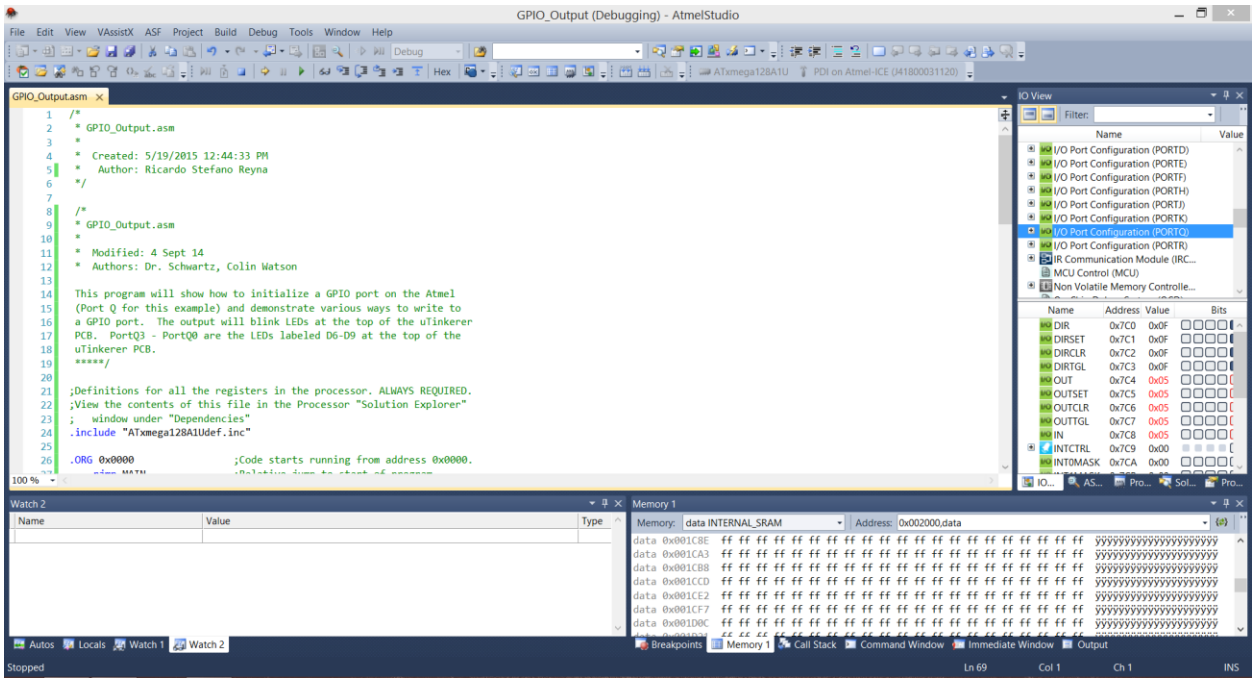
- Prelab Questions:
  1. What is the difference between program and data memory?
  Data memory is where we have the variables. Values are read and written into the data memory. Program memory, is where we store the program, we store constants.
  2. What memory location should the .DSEG section should start? Why?
  0x002000, because the data segment stores values in the SRAM and that's where it's located.
  3. What registers can we use to read from the program memory (flash)?
  Register Z.
- Problems Encountered:
  Instead of using lpm I used ld operation so the contents f the table wasn't loading since it's from the program memory that I have to load
- Future Work/Applications:
  This lab gave as an introduction to assembly which will be useful for later labs. Assembly is used today for special applications and it will be useful for our microprocessor.
- Pseudo code:
  Load Table1 with .db
  Table 1 starts at 0x6370->X
  Table 2 starts at 0x2C70->Y
  LOOP: Load content of table1 into a register
  Increase X
  If content equals 0x00 branch to NULL
  check if less than 0x30
  if true branch to LOOP
  check if greater or equal than 0x7A
  if true branch to LOOP
  store content into Y
  increase Y
  rjump to LOOP
  NULL: store content into Y
  increase Y
  DONE: Rjump to DONE

- Program Code:

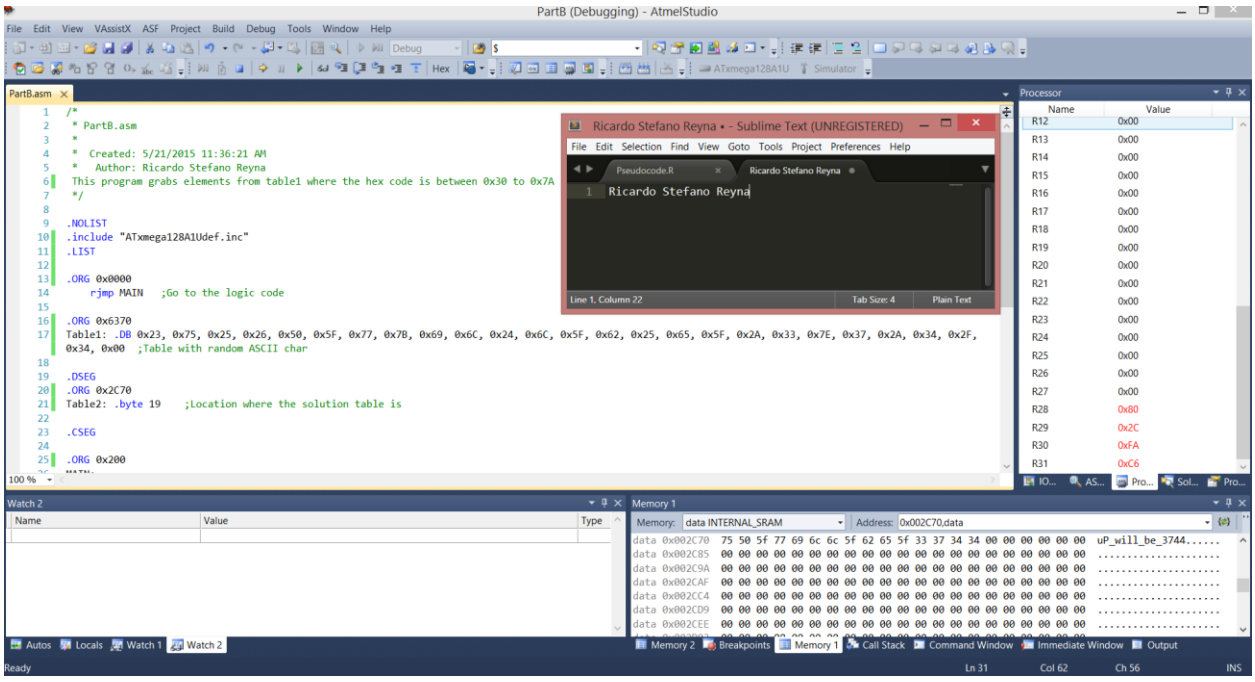
```
/*
 * Lab1_b_RSR.asm
 *
 *  Created: 5/21/2015 11:36:21 AM
 *   Author: Ricardo Stefano Reyna
 Lab 1 Part b
 Name: Ricardo Stefano Reyna
 Section#: 75C9
 TA: Khaled Hassan
 Description: This program grabs elements from table1 where the hex code is between
0x30 to 0x7A
 */

.NOLIST
.include "ATxmega128A1Udef.inc"
.LIST

.ORG 0x0000
   rjmp MAIN     ;Go to the logic code

.ORG 0x6370
Table1: .DB 0x23, 0x75, 0x25, 0x26, 0x50, 0x5F, 0x77, 0x7B, 0x69, 0x6C, 0x24, 0x6C,
0x5F, 0x62, 0x25, 0x65, 0x5F, 0x2A, 0x33, 0x7E, 0x37, 0x2A, 0x34, 0x2F, 0x34, 0x00
   ;Table with random ASCII char

.DSEG
.ORG 0x2C70
Table2:    .byte 19      ;Location where the solution table is

.CSEG

.ORG 0x200
MAIN:
   ldi ZL, low(Table1 << 1)    ;load low bits of the table in Z
   ldi ZH, high(Table1 << 1)   ;load high bits of the table in Z

   ldi YL, low(Table2)  ;load low bits of the table in Y
   ldi YH, high(Table2) ;load high bits of the table in Y

LOOP:
   lpm r16, Z+          ;Load content of table and increment pointer
   cpi r16, 0           ;Check if it equals 0
   breq NULL            ;If true go to NULL
   cpi r16, 0x30 ;Check if it's less than 0x30
   brlt LOOP            ;If true go to LOOP
   cpi r16, 0x7A ;Check if it's greater or qual than 0x7A
   brge LOOP            ;If true go to LOOP
   st Y+, r16           ;Store in Y and increment pointer
   rjmp LOOP            ;Go to LOOP
NULL:
   st Y+, r16           ;Store into Y and increment pointer
DONE:
   rjmp Done            ;Infinite loop
```

- Appendix:

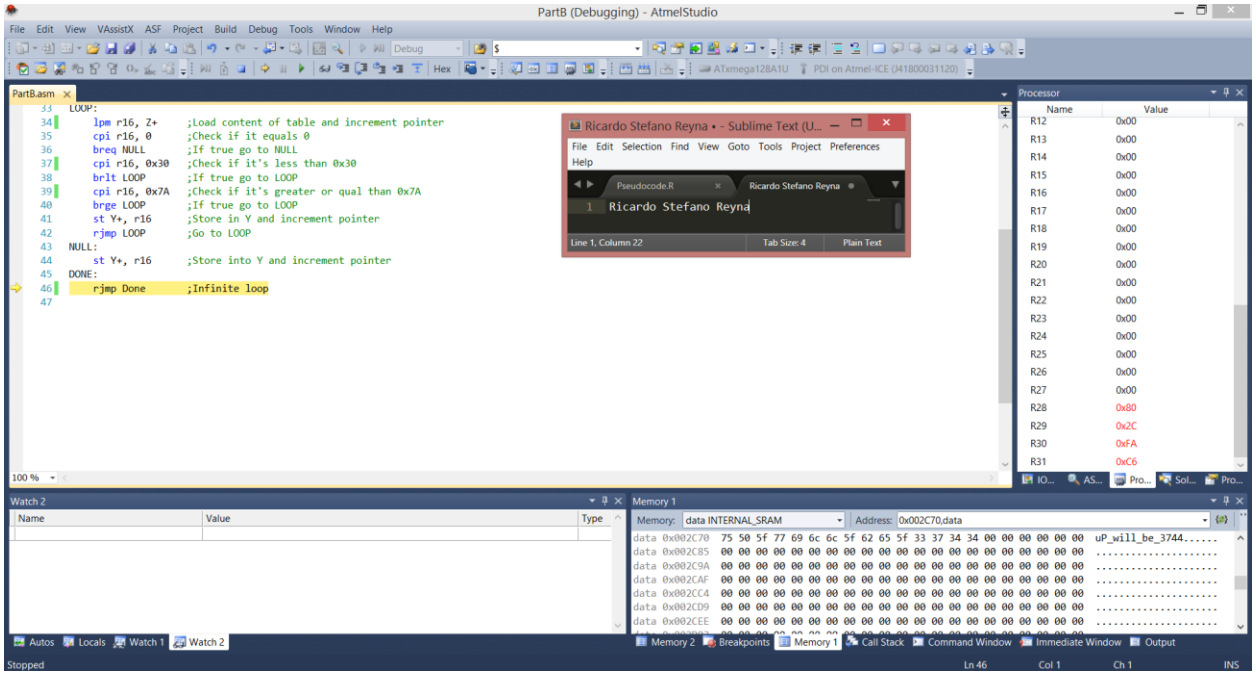
PartA



PartB:



PartC:


PartB (Debugging) - AtmelStudio
File Edit View VAssistX ASF Project Build Debug Tools Window Help
PartB.asm
LOOP:
lpm r16, Z+ ;Load content of table and increment pointer
cpi r16, 0 ;Check if it equals 0
breq NULL ;If true go to NULL
cpi r16, 0x30 ;Check if it's less than 0x30
brlt LOOP ;If true go to LOOP
cpi r16, 0x7A ;Check if it's greater or qual than 0x7A
brge LOOP ;If true go to LOOP
st Y+, r16 ;Store in Y and increment pointer
rjmp LOOP ;Go to LOOP
NULL:
st Y+, r16 ;Store into Y and increment pointer
DONE:
rjmp Done ;Infinite loop
Ricardo Stefano Reyna • - Sublime Text (U...
File Edit Selection Find View Goto Tools Project Preferences Help
Pseudocode.R
Ricardo Stefano Reyna
1 Ricardo Stefano Reyna
Line 1, Column 22
Tab Size: 4
Plain Text
Processor
Name
Value
R12 0x00
R13 0x00
R14 0x00
R15 0x00
R16 0x00
R17 0x00
R18 0x00
R19 0x00
R20 0x00
R21 0x00
R22 0x00
R23 0x00
R24 0x00
R25 0x00
R26 0x00
R27 0x00
R28 0x80
R29 0x2C
R30 0xFA
R31 0xC6
Watch 2
Name
Value
Type
Memory 1
Memory: data INTERNAL_SRAM
Address: 0x002C70,data
data 0x002C70 75 50 5f 77 69 6c 6c 5f 62 65 5f 33 37 34 00 00 00 00 00 00 uP_will_be_3744.....
data 0x002C85 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
data 0x002C9A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
data 0x002CAF 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
data 0x002CC4 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
data 0x002CD9 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
data 0x002CEE 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
Autos Locals Watch 1 Watch 2
Memory 2 Breakpoints Memory 1 Call Stack Command Window Immediate Window Output
Stopped
Ln 46 Col 1 Ch 1 INS