



### Part-3

#### - Program 13

The screenshot displays the Atmel Studio IDE with the following components:

- Disassembly Window (main.asm):**

```

.def var_a = r10
.def var_b = r17
.def var_c1 = r18
.def var_ch = r19
.def tmp = r20

.cseg
.org 0x00
rjmp main

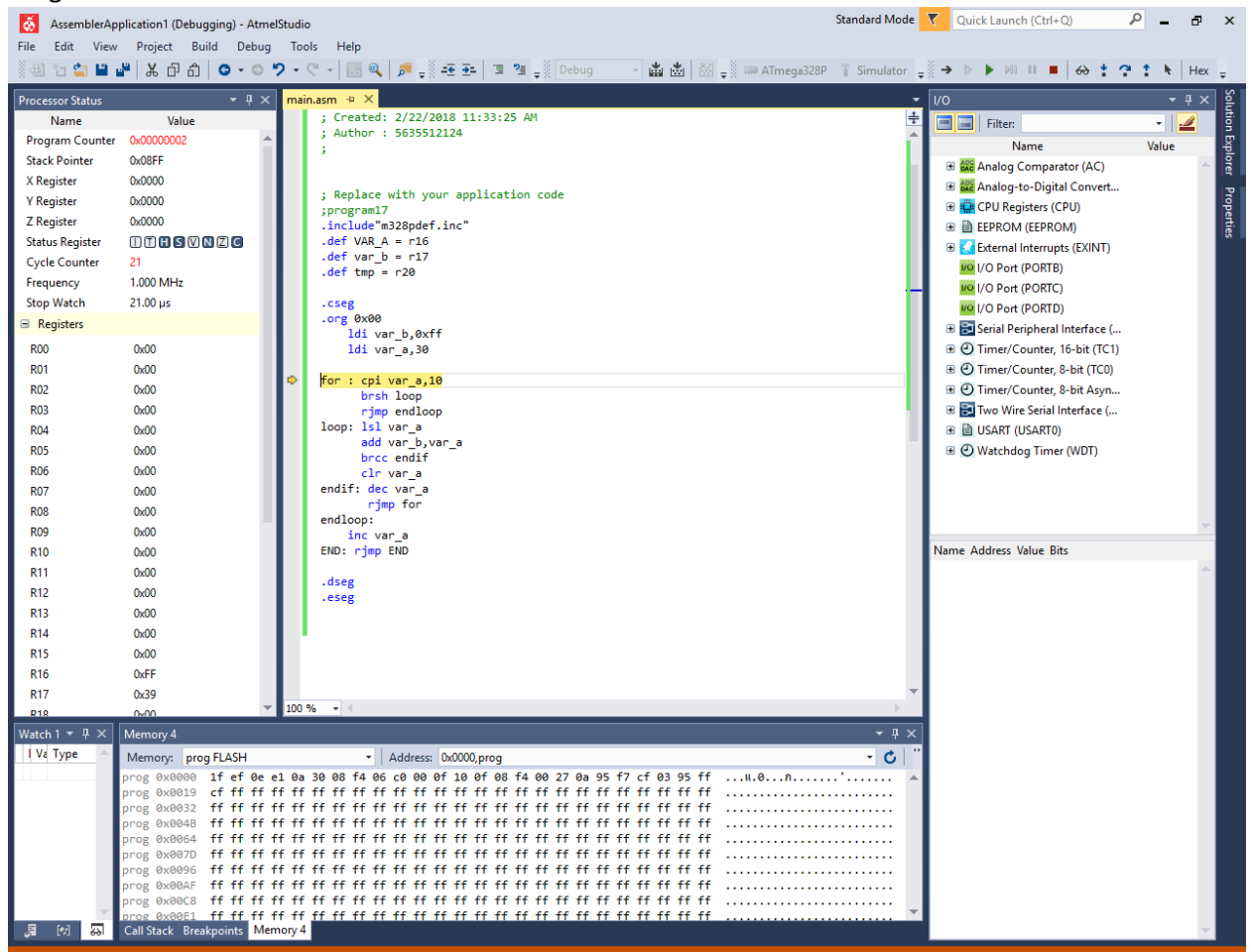
main: ldi x1, low(point_a)
      ldi xh, high(point_a)
      ld var_a, x+
      ld var_b, x+
      ld var_c1, x+
      ld var_ch, x+
      clr tmp
IFSTATE : cp var_b, var_a
          brsh True
          rjmp FALSE
True:   add var_c1, var_a
          adc var_ch, tmp
          rjmp STORE
FALSE:  add var_c1, var_b
          adc var_ch, tmp
STORE:  ldi z1, low(point_c)
          ldi zh, high(point_c)
          st z+, var_a
          st z+, var_b
          st z+, var_c1
          st z+, var_ch
      END : rjmp END

.dseg
.org 0x10A

```
- Processor Status Window:**

Name	Value
R03	0x00
R04	0x00
R05	0x00
R06	0x00
R07	0x00
R08	0x00
R09	0x00
R10	0x00
R11	0x00
R12	0x00
R13	0x00
R14	0x00
R15	0x00
R16	1
R17	16
R18	33
R19	32
R20	0
R21	0x00
R22	0x00
R23	0x00
R24	0x00
R25	0x00
R26	0x0E
R27	0x01
R28	0x00
R29	0x00
R30	0x10
R31	0x01
- Memory Window (Memory 4):**

Address	Value
0x010A	data
0x010B	data
0x010C	data
0x010D	data
0x010E	data
0x010F	data
0x0110	data
0x0111	data
0x0112	data
0x0113	data
0x0114	data
0x0115	data
0x0116	data
0x0117	data
0x0118	data
0x0119	data
0x011A	data
0x011B	data
0x011C	data
0x011D	data
0x011E	data
0x011F	data
0x0120	data
0x0121	data
0x0122	data
0x0123	data
0x0124	data
0x0125	data
0x0126	data
0x0127	data
0x0128	data
0x0129	data
0x012A	data
0x012B	data
0x012C	data
0x012D	data
0x012E	data
0x012F	data
0x0130	data
0x0131	data
0x0132	data
0x0133	data
0x0134	data
0x0135	data
0x0136	data
0x0137	data
0x0138	data
0x0139	data
0x013A	data
0x013B	data
0x013C	data
0x013D	data
0x013E	data
0x013F	data
0x0140	data
0x0141	data
0x0142	data
0x0143	data
0x0144	data
0x0145	data
0x0146	data
0x0147	data
0x0148	data
0x0149	data
0x014A	data
0x014B	data
0x014C	data
0x014D	data
0x014E	data
0x014F	data
0x0150	data
0x0151	data
0x0152	data
0x0153	data
0x0154	data
0x0155	data
0x0156	data
0x0157	data
0x0158	data
0x0159	data
0x015A	data
0x015B	data
0x015C	data
0x015D	data
0x015E	data
0x015F	data
0x0160	data
0x0161	data
0x0162	data
0x0163	data
0x0164	data
0x0165	data
0x0166	data
0x0167	data
0x0168	data
0x0169	data
0x016A	data
0x016B	data
0x016C	data
0x016D	data
0x016E	data
0x016F	data
0x0170	data
0x0171	data
0x0172	data
0x0173	data
0x0174	data
0x0175	data
0x0176	data
0x0177	data
0x0178	data
0x0179	data
0x017A	data
0x017B	data
0x017C	data
0x017D	data
0x017E	data
0x017F	data
0x0180	data
0x0181	data
0x0182	data
0x0183	data
0x0184	data
0x0185	data
0x0186	data
0x0187	data
0x0188	data
0x0189	data
0x018A	data
0x018B	data
0x018C	data
0x018D	data
0x018E	data
0x018F	data
0x0190	data
0x0191	data
0x0192	data
0x0193	data
0x0194	data
0x0195	data
0x0196	data
0x0197	data
0x0198	data
0x0199	data
0x019A	data
0x019B	data
0x019C	data
0x019D	data
0x019E	data
0x019F	data
0x01A0	data
0x01A1	data
0x01A2	data
0x01A3	data
0x01A4	data
0x01A5	data
0x01A6	data
0x01A7	data
0x01A8	data
0x01A9	data
0x01AA	data
0x01AB	data
0x01AC	data
0x01AD	data
0x01AE	data
0x01AF	data
0x01B0	data
0x01B1	data
0x01B2	data
0x01B3	data
0x01B4	data
0x01B5	data
0x01B6	data
0x01B7	data
0x01B8	data
0x01B9	data
0x01BA	data
0x01BB	data
0x01BC	data
0x01BD	data
0x01BE	data
0x01BF	data
0x01C0	data
0x01C1	data
0x01C2	data
0x01C3	data
0x01C4	data
0x01C5	data
0x01C6	data
0x01C7	data
0x01C8	data
0x01C9	data
0x01CA	data
0x01CB	data
0x01CC	data
0x01CD	data
0x01CE	data
0x01CF	data
0x01D0	data
0x01D1	data
0x01D2	data
0x01D3	data
0x01D4	data
0x01D5	data
0x01D6	data
0x01D7	data
0x01D8	data
0x01D9	data
0x01DA	data
0x01DB	data
0x01DC	data
0x01DD	data
0x01DE	data
0x01DF	data
0x01E0	data
0x01E1	data
0x01E2	data
0x01E3	data
0x01E4	data
0x01E5	data
0x01E6	data
0x01E7	data
0x01E8	data
0x01E9	data
0x01EA	data
0x01EB	data
0x01EC	data
0x01ED	data
0x01EE	data
0x01EF	data
0x01F0	data
0x01F1	data
0x01F2	data
0x01F3	data
0x01F4	data
0x01F5	data
0x01F6	data
0x01F7	data
0x01F8	data
0x01F9	data
0x01FA	data
0x01FB	data
0x01FC	data
0x01FD	data
0x01FE	data
0x01FF	data



- Program 18

The screenshot displays the Atmel Studio IDE with the following components:

- Top Bar:** Standard Mode, Quick Launch (Ctrl+Q), and a search icon.
- Menu Bar:** File, Edit, View, Project, Build, Debug, Tools, Help.
- Toolbox:** Contains various development tools like a debugger, simulator, and hex editor.
- Processor Status:** A window showing the status of the microcontroller, including Program Counter (0x00000008), Stack Pointer (0x08FF), X Register (0x0000), Y Register (0x0000), Z Register (0x0000), Status Register (0x0000), Cycle Counter (13), Frequency (1.000 MHz), and Stop Watch (13.00 µs).
- main.asm:** The assembly code editor showing the following code:
 

```

; Replace with your application code

;program18
.include "m328pdef.inc"
.def var_a = r16
.def var_b = r17
.def var_c1 = r18
.def var_ch = r19
.def var_d = r20
.def temp = r21
; loop เริ่มต้น ค่า a ไม่เท่ากับ b
.cseg
.org 0x00
    ldi var_c1, 1
    ldi var_ch, 0
    ldi var_a, 1
    ldi var_b, 2
    ldi var_d, 10

    ldi temp, 5

loop : mul var_a, temp
      movw var_c1, r0
      sub var_d, var_b
      cp var_a, var_b
      brsh loop

END : rjmp END

.dseg
.eseg
      
```
- I/O:** A window showing the I/O configuration, including Analog Comparator (AC), Analog-to-Digital Convert..., CPU Registers (CPU), EEPROM (EEPROM), External Interrupts (EXINT), I/O Port (PORTB), I/O Port (PORTC), I/O Port (PORTD), Serial Peripheral Interface (...), Timer/Counter, 16-bit (TC1), Timer/Counter, 8-bit (TC0), Timer/Counter, 8-bit Asyn..., Two Wire Serial Interface (...), USART (USART0), and Watchdog Timer (WDT).
- Watch 1:** A window showing the memory dump for Memory 4, starting at address 0x0000. The dump shows the first few bytes of memory, including the program counter and stack pointer.

- Program 19

The screenshot displays the Atmel Studio IDE interface. The main window shows the assembly file `main.asm` with the following content:

```

; Created: 2/22/2018 12:01:41 PM
; Author : 5635512124
;

; Replace with your application code
;program 19

.include "m328pdef.inc"
.def var_a = r16
.def var_b = r17
.def var_I = r18
.def temp = r21

.cseg
.org 0x00

    ldi var_a,15
    ldi var_b,1
    ldi var_I,0
    ldi temp,3

WHILE: cp var_b,var_a
      brlt loop
      rjmp endloop

loop: muls var_b,temp
     mov var_b,r0
     inc var_I
     rjmp WHILE

endloop: rjmp endloop
.dseg
.eseg

```

The Watch window (bottom left) shows the variable `var_a` with a value of `0x00`. The Memory window (bottom right) shows the memory address `0x0000` with the value `0x00`.