

Pairwise addition

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| 15 | <p>Title: Pairwise addition</p> <p>Problem Statement: 5 pairs of data bytes are stored in internal RAM locations starting at the address 25H. WAP to perform pairwise addition and save the result in same memory locations, i.e. sum replacing the first data byte and carry replacing the second one.</p> |
| | <p>[CO 1,2,3]</p> |

Before execution

The screenshot shows the Keil µVision IDE interface. The title bar reads "C:\Users\Admin\Documents\2024\Microcontrollers\sample program\Listings\PAIRWISE.ASM - µVision". The menu bar includes File, Edit, View, Project, Flash, Debug, Peripherals, Tools, SVCS, Window, and Help. The toolbar contains various icons for file operations like Open, Save, and Build. On the left, a "Registers" window displays a tree view of registers: "Regs" (r0, r1, r2, r3, r4, r5, r6, r7) and "Sys" (a, b, sp, sp_max, dptr, PC \$, states, sec, psw). The main window shows the assembly code for "PAIRWISE.ASM". The code starts at address 0000H, initializes R0 to 25H and R1 to 05H, then enters a loop at L1 where it increments R0, adds its value to A, decrements R0, adds R0 to A, and then checks if R1 is zero. If not, it loops back to L1. The code ends with an END instruction. The bottom part of the interface shows memory starting at address I:0x25.

```
ORG 0000H
MOV R0,#25H
MOV R1,#05H
L1: MOV A,@R0
    INC R0
    ADD A,@R0
    DEC R0
    MOV @R0,A
    INC R0
    MOV A,#00H
    ADDC A,#00H
    MOV @R0,A
    INC R0
DJNZ R1,L1
END
```

After execution

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| 16 | <p>Title: To count number of negative data bytes.</p> <p>Problem Statement: A series of 10 data bytes is stored in external RAM locations starting at 2501H. WAP to perform to count number of negative data bytes and save the result (count) in internal RAM location with address 25H. [CO 1,2,3]</p> |
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Before execution

The screenshot shows the µVision IDE interface with the following details:

- Title Bar:** C:\Users\Admin\Documents\2024\Microcontrollers\sample program\Listings\Neg.asm - µVision
- Menu Bar:** File, Edit, View, Project, Flash, Debug, Peripherals, Tools, SVCS, Window, Help
- Toolbar:** Includes icons for RST, Open, Save, Undo, Redo, and various project management tools.
- Registers Window:** Shows a tree view of registers under "Regs" and "Sys". The "r0" register is selected.
- Code Editor:** The file "Neg.asm" is open. The assembly code is as follows:

```
1 ORG 0000H
2     MOV DPTR,#2501H
3     MOV R0,#25H
4     MOV R1,#00H
5     MOV R2,#0AH
6 L1: MOVX A,@DPTR
7     RLC A
8     JNC AHEAD
9     INC R1
10    AHEAD: INC DPTR
11    DJNZ R2,L1
12    MOV A,R1
13    MOV @R0,A
14    END
```
- Memory Window:** Address X:0X2501 is selected, showing the memory dump starting at address 0x002501H.

After execution

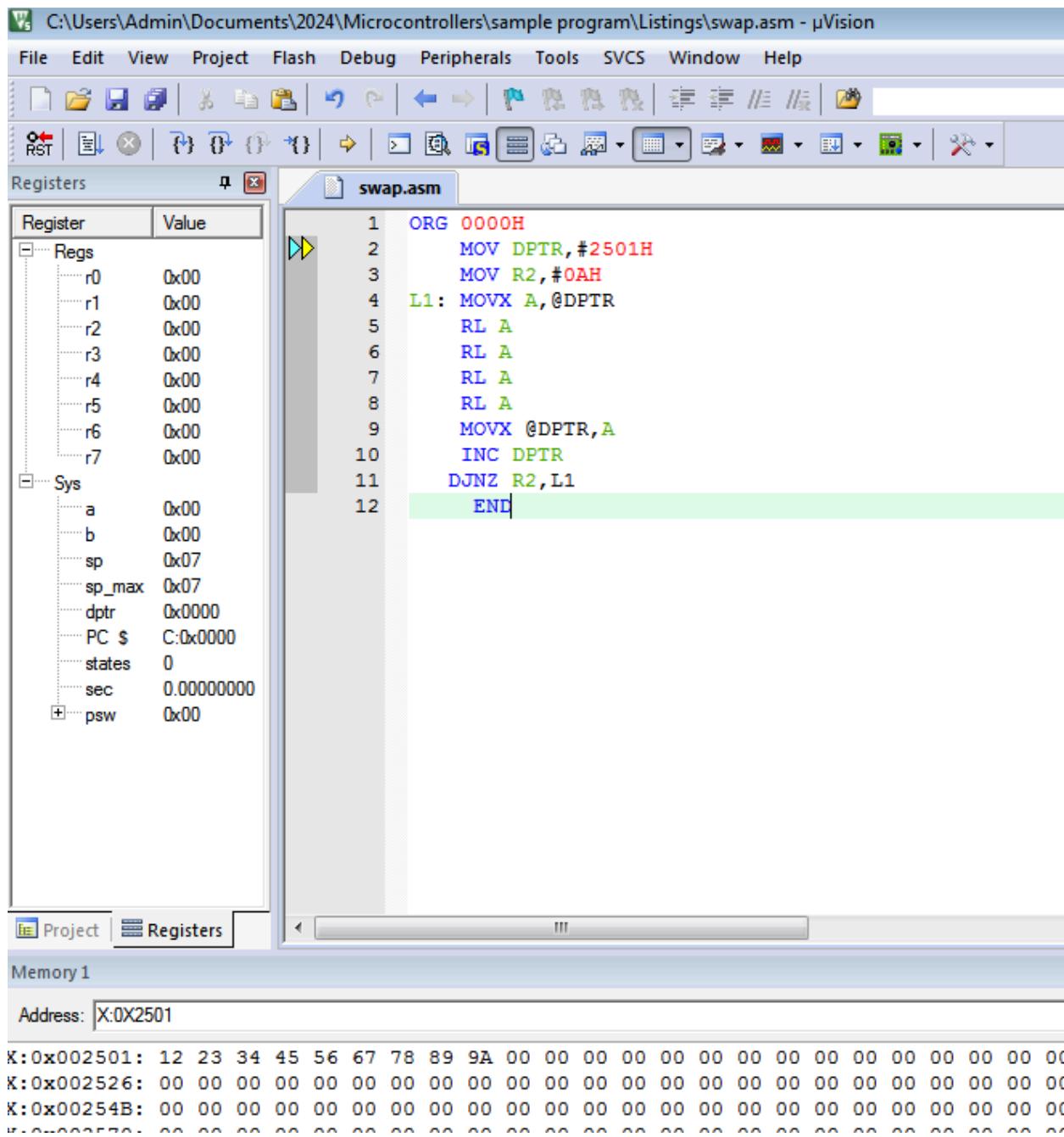
The screenshot shows the Keil µVision IDE interface with the following details:

- Title Bar:** C:\Users\Admin\Documents\2024\Microcontrollers\sample program\Listings\Neg.asm - µVision
- Menu Bar:** File, Edit, View, Project, Flash, Debug, Peripherals, Tools, SVCS, Window, Help
- Toolbar:** Includes icons for Project, Registers, Stack, Watch, Registers, Stack, Watch, and various debug and file operations.
- Registers Window:** Shows the state of registers. The **Regs** section contains r0 (0x25), r1 (0x04), r2 (0x00), r3 (0x00), r4 (0x00), r5 (0x00), r6 (0x00), and r7 (0x00). The **Sys** section contains a (0x04), b (0x00), sp (0x07), sp_max (0x07), dptr (0x250b), PC \$ (C:0x0013), states (101), sec (0.00010100), and psw (0x01). The register **r1** is currently selected.
- Neg.asm Assembly Window:** Displays the assembly code:

```
1 ORG 0000H
2     MOV DPTR, #2501H
3     MOV R0, #25H
4     MOV R1, #00H
5     MOV R2, #0AH
6 L1: MOVX A, @DPTR
7     RLC A
8     JNC AHEAD
9     INC R1
10    AHEAD: INC DPTR
11    DJNZ R2, L1
12    MOV A, R1
13    MOV @R0, A
14    END
```
- Bottom Navigation:** Project, Registers, Memory 2 tabs.
- Memory 2 Tab:** Address: I:0X25, showing memory dump from I:0x25 to I:0x4B.

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| 17 | <p>Title: To swap the nibbles</p> <p>Problem Statement: A series of 10 data bytes is stored in external RAM locations starting at 2501H. WAP to perform to swap the nibbles of the data bytes and save the result in same memory locations.</p> <p>[CO 2,3]</p> |
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Before



After

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| 18 | <p>Title: Data Transfer (even numbers only)</p> <p>Problem Statement: A series of 10 data bytes is stored in external RAM locations starting at 2501H. WAP to identify and transfer even data bytes in internal RAM locations starting at 25H, while rejecting odd numbers.</p> <p>[CO 2,3]</p> |
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Before

The screenshot shows the Keil µVision IDE interface with the following details:

- Title Bar:** C:\Users\Admin\Documents\2024\Microcontrollers\sample program\Listings\Even.asm - µVision
- Menu Bar:** File, Edit, View, Project, Flash, Debug, Peripherals, Tools, SVCS, Window, Help
- Toolbar:** Includes icons for project management, file operations, and various development tools.
- Registers Window:** Shows the current state of registers. The **Regs** section contains r0 to r7 all set to 0x00. The **Sys** section contains a, b, sp, sp_max, dptr, PC \$, states, sec, and psw, all set to 0x00.
- Code Editor:** The file Even.asm contains the following assembly code:

```
1 ORG 0000H
2 | MOV DPTR, #2501H
3 |
4 | MOV R0, #25H
5 | MOV R1, #0AH
6 L1: MOVX A, @DPTR
7 RRC A
8 JC REJECT
9 RLC A
10 MOV @R0,A
11 INC R0
12 REJECT: INC DPTR
13 DJNZ R1,L1
14 END
```
- Project Tab:** Shows the current project structure.
- Registers Tab:** Shows the current register values.
- Memory Tab:** Shows memory dump starting at address X:0X2501.

After

The screenshot shows the µVision IDE interface with the following details:

- Title Bar:** C:\Users\Admin\Documents\2024\Microcontrollers\sample program\Listings\Even.asm - µVision
- Menu Bar:** File, Edit, View, Project, Flash, Debug, Peripherals, Tools, SVCS, Window, Help
- Toolbar:** Includes icons for RST, Open, Save, Build, Run, Stop, and various simulation and analysis tools.
- Registers Window:** Shows the current state of registers. The **Regs** section includes r0 (0x2a), r1 (0x00), r2 (0x00), r3 (0x00), r4 (0x00), r5 (0x00), r6 (0x00), and r7 (0x00). The **Sys** section includes a (0xa), b (0x00), sp (0x07), sp_max (0x07), dptr (0x250b), PC \$ (C:0x0011), states (109), sec (0.000109...), and psw (0x80). The **a** register is currently selected.
- Code Editor:** The file Even.asm contains the following assembly code:

```
1 ORG 0000H
2     MOV DPTR, #2501H
3     MOV R0, #25H
4     MOV R1, #0AH
5 L1: MOVX A, @DPTR
6     RRC A
7     JC REJECT
8     RLC A
9     MOV @R0, A
10    INC R0
11    REJECT: INC DPTR
12    DJNZ R1, L1
13    END
```
- Status Bar:** Shows the address I:0X25 and memory dump data starting at I:0x25.