

## Question 1

assignment02 - IAR Embedded Workbench IDE - Arm 8.40.1

File Edit View Project Debug Disassembly Simulator Tools Window Help

Workspace

Debug

Files

- assignment02 - Debug
- main.c
- Output

main()

```
1 int main()
2 {
3     int counter = 0;
4     counter++;
5     counter++;
6     counter++;
7     counter++;
8     counter++;
9     counter++;
10    counter++;
11    return 0;
12 }
13
14
```

Disassembly

Go to Memory

Disassembly

main:

- 0x62: 0x2100 MOVS R1, #0
- counter++:
- 0x64: 0x1c49 ADDS R1, R1, #1
- counter++:
- 0x66: 0x1c49 ADDS R1, R1, #1
- counter++:
- 0x68: 0x1c49 ADDS R1, R1, #1
- counter++:
- 0x6a: 0x1c49 ADDS R1, R1, #1
- counter++:
- 0x6c: 0x1c49 ADDS R1, R1, #1
- counter++:
- 0x6e: 0x1c49 ADDS R1, R1, #1
- counter++:
- 0x70: 0x1c49 ADDS R1, R1, #1
- return 0:
- 0x72: 0x2000 MOVS R0, #0
- 0x74: 0x4770 BX LR
- exit:

Registers 1

Find Group: Current CPU Registers

Name	Value
R0	0x00000000
R1	0x80000000
R2	0x00000000
R3	0x00000000
R4	0x00000000
R5	0x00000000
R6	0x00000000
R7	0x00000000
R8	0x00000000
R9	0x00000000
R10	0x00000000
R11	0x00000000
R12	0x00000000
APSR	0x90000000
N	1
Z	0
C	0
V	1
Q	0
GE	0b0000

Memory 1

Go to 0x00000064 Memory

Address	Value
0x00000050	2000 f3af 8000 f000
0x00000058	f804 f000 f80c 2001
0x00000060	4770 2100 1c49 1c49
0x00000068	1c49 1c49 1c49 1c49
0x00000070	1c49 2000 4770 f000
0x00000078	b801 e7fe 4607 4638

Locals

Variable	Value	Location	Type
counter	-2147483648	R1	int

Watch 1

Expression	Value	Location	Type
counter	-2147483648	R1	int

## Question 2

assignment02 - IAR Embedded Workbench IDE - Arm 8.40.1

File Edit View Project Debug Disassembly Simulator Tools Window Help

Workspace

Debug

Files

- assignment02 - Debug
- main.c
- Output

main()

```
1 int main()
2 {
3     int counter = 0;
4     counter++;
5     counter++;
6     counter++;
7     counter++;
8     counter++;
9     counter++;
10    counter++;
11    return 0;
12 }
13
14
```

Disassembly

Go to Memory

Disassembly

main:

- 0x62: 0x2100 MOVS R1, #0
- counter++:
- 0x64: 0x1c49 ADDS R1, R1, #1
- counter++:
- 0x66: 0x1c49 ADDS R1, R1, #1
- counter++:
- 0x68: 0x1c49 ADDS R1, R1, #1
- counter++:
- 0x6a: 0x1c49 ADDS R1, R1, #1
- counter++:
- 0x6c: 0x1c49 ADDS R1, R1, #1
- counter++:
- 0x6e: 0x1c49 ADDS R1, R1, #1
- counter++:
- 0x70: 0x1c49 ADDS R1, R1, #1
- return 0:
- 0x72: 0x2000 MOVS R0, #0
- 0x74: 0x4770 BX LR
- exit:

Registers 1

Find Group: Current CPU Registers

Name	Value
R0	0x00000000
R1	0x00000000
R2	0x00000000
R3	0x00000000
R4	0x00000000
R5	0x00000000
R6	0x00000000
R7	0x00000000
R8	0x00000000
R9	0x00000000
R10	0x00000000
R11	0x00000000
R12	0x00000000
APSR	0x60000000
N	0
Z	1
C	1
V	0
Q	0
GE	0b0000

Memory 1

Go to 0x00000064 Memory

Address	Value
0x00000050	2000 f3af 8000 f000
0x00000058	f804 f000 f80c 2001
0x00000060	4770 2100 1c49 1c49
0x00000068	1c49 1c49 1c49 1c49
0x00000070	1c49 2000 4770 f000
0x00000078	b801 e7fe 4607 4638

Locals

Variable	Value	Location	Type
counter	0	R1	int

Watch 1

Expression	Value	Location	Type
counter	0	R1	int

### Question 3

assignment02 - IAR Embedded Workbench IDE - Arm 8.40.1

File Edit View Project Debug Disassembly Simulator Tools Window Help

Workspace: assignment02 - Debug

Files: assignment02 - Debug, main.c, Output

main.c

```
1 int main()
2 {
3     unsigned int counter = 0;
4     counter++;
5     counter++;
6     counter++;
7     counter++;
8     counter++;
9     counter++;
10    counter++;
11    counter++;
12    return 0;
13 }
14
```

Disassembly

Go to: Memory

Disassembly

```
_call_main:
0x4c: 0xf3af 0x8000 NOP W
0x50: 0x2000 MOVWS R0, #0
0x52: 0xf3af 0x8000 NOP W
0x56: 0xf000 0xf804 BL main
_main:
0x5a: 0xf000 0xf80c BL exit
__low_level_init:
0x5e: 0x2001 MOVWS R0, #1
0x60: 0x4770 BX LR
unsigned int counter = 0;
main:
0x62: 0x2100 MOVWS R1, #0
0x64: 0x1c49 ADDS R1, R1, #1
0x66: 0x1c49 ADDS R1, R1, #1
0x68: 0x1c49 ADDS R1, R1, #1
0x6a: 0x1c49 ADDS R1, R1, #1
```

Registers 1

Name	Value
R0	0x00000000
R1	0x00000000
R2	0x00000000
R3	0x00000000
R4	0x00000000
R5	0x00000000
R6	0x00000000
R7	0x00000000
R8	0x00000000
R9	0x00000000
R10	0x00000000
R11	0x00000000
R12	0x00000000
APSR	0x90000000
N	1
Z	0
C	0
V	1
Q	0
GE	0b0000

Memory 1

Go to	Memory
0x00000050	2000 f3af 8000 f000
0x00000058	f804 f000 f80c 2001
0x00000060	4770 2100 1c49 1c49
0x00000068	1c49 1c49 1c49 1c49
0x00000070	1c49 2000 4770 f000
0x00000078	b801 e7fe 4607 4638

Locals

Variable	Value	Location	Type
counter	2147483648	R1	unsigned int

Watch 1

Expression	Value	Location	Type
counter	2147483648	R1	unsigned int

### Question 4

assignment02 - IAR Embedded Workbench IDE - Arm 8.40.1

File Edit View Project Debug Disassembly Simulator Tools Window Help

Workspace: assignment02 - Debug

Files: assignment02 - Debug, main.c, Output

main.c

```
1 int main()
2 {
3     unsigned int counter = 0;
4     counter++;
5     counter++;
6     counter++;
7     counter++;
8     counter++;
9     counter++;
10    counter++;
11    counter++;
12    return 0;
13 }
14
```

Disassembly

Go to: Memory

Disassembly

```
_call_main:
0x4c: 0xf3af 0x8000 NOP W
0x50: 0x2000 MOVWS R0, #0
0x52: 0xf3af 0x8000 NOP W
0x56: 0xf000 0xf804 BL main
_main:
0x5a: 0xf000 0xf80c BL exit
__low_level_init:
0x5e: 0x2001 MOVWS R0, #1
0x60: 0x4770 BX LR
unsigned int counter = 0;
main:
0x62: 0x2100 MOVWS R1, #0
0x64: 0x1c49 ADDS R1, R1, #1
0x66: 0x1c49 ADDS R1, R1, #1
0x68: 0x1c49 ADDS R1, R1, #1
0x6a: 0x1c49 ADDS R1, R1, #1
```

Registers 1

Name	Value
R0	0x00000000
R1	0x00000000
R2	0x00000000
R3	0x00000000
R4	0x00000000
R5	0x00000000
R6	0x00000000
R7	0x00000000
R8	0x00000000
R9	0x00000000
R10	0x00000000
R11	0x00000000
R12	0x00000000
APSR	0x90000000
N	1
Z	0
C	0
V	1
Q	0
GE	0b0000

Memory 1

Go to	Memory
0x00000050	2000 f3af 8000 f000
0x00000058	f804 f000 f80c 2001
0x00000060	4770 2100 1c49 1c49
0x00000068	1c49 1c49 1c49 1c49
0x00000070	1c49 2000 4770 f000
0x00000078	b801 e7fe 4607 4638

Locals

Variable	Value	Location	Type
counter	2147483648	R1	unsigned int

Watch 1

Expression	Value	Location	Type
counter	2147483648	R1	unsigned int

## Question 5

assignment02 - IAR Embedded Workbench IDE - Arm 8.40.1

File Edit View Project Debug Disassembly Simulator Tools Window Help

Workspace

Debug

Files

assignment02 - Debug

main.c

Output

main()

```
1 unsigned int counter = 0;
2
3 int main() {
4     //int counter = 0;
5     counter++;
6     counter++;
7     counter++;
8     counter++;
9     counter++;
10    counter++;
11    counter++;
12    return 0;
13 }
14
15
```

Disassembly

Go to Memory

Disassembly

```
0x72: 0x2900    CMP    R1,
0x74: 0xd1e7    BNE    N, 0x4
0x76: 0xbc30    POP    {R4
0x78: 0x4770    BX     LR
BusFault_Handler:
DebugMon_Handler:
HardFault_Handler:
MemManage_Handler:
NMI_Handler... +5 symbols not displayed:
0x7a: 0xe7fe    B.N    Bus
counter++;
main:
0x7c: 0x480b    LDR    N, R0
0x7e: 0x6801    LDR    R1,
0x80: 0x1c49    ADDS    R1,
0x82: 0x6001    STR    R1,
counter++;
0x84: 0x6801    LDR    R1,
0x86: 0x1c49    ADDS    R1,
0x88: 0x6001    STR    R1,
```

Registers 1

Find: Group: Current CPU Registers

Name	Value
R0	0x00000000
R1	0x000000E8
R2	0x20000004
R3	0x20000004
R4	0x00000000
R5	0x00000000
R6	0x00000000
R7	0x00000000
R8	0x00000000
R9	0x00000000
R10	0x00000000
R11	0x00000000
R12	0x00000000
APSR	0x60000000
N	0
Z	1
C	1
V	0
Q	0
GE	0b0000

Memory 1

Go to 0x20000000 Memory

Address	Value
0x1fffffff0	0x1fffffff8
0x1fffffff8	0x20000000
0x20000000	0000 0000
0x20000008	cdcd cdcd cdcd cdcd
0x20000010	cdcd cdcd cdcd cdcd
0x20000018	cdcd cdcd cdcd cdcd

Locals

Variable	Value	Location	Type
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Watch 1

Expression	Value	Location	Type
counter	0	0x20000000	unsigned int

## Question 6

assignment02 - IAR Embedded Workbench IDE - Arm 8.40.1

File Edit View Project Debug Disassembly Simulator Tools Window Help

Workspace

Debug

Files

assignment02 - Debug

main.c

Output

main()

```
1 int counter = 0x0;
2 int main() {
3     int *p_int = (int *)0x20000000;
4     ++(*p_int);
5     ++(*p_int);
6     ++(*p_int);
7     counter++;
8     return 0;
9 }
10
11
```

Disassembly

Go to Memory

Disassembly

```
main:
0x7c: 0xf05f 0x5100    MOVS    W, R1,
++(*p_int);
0x80: 0x6808    LDR    R0,
0x82: 0x1c40    ADDS    R0,
0x84: 0x6008    STR    R0,
++(*p_int);
0x86: 0x6808    LDR    R0,
0x88: 0x1c40    ADDS    R0,
0x8a: 0x6008    STR    R0,
++(*p_int);
0x8c: 0x6808    LDR    R0,
0x8e: 0x1c40    ADDS    R0,
0x90: 0x6008    STR    R0,
counter++;
0x92: 0x4803    LDR    N, R0,
0x94: 0x6802    LDR    R2,
0x96: 0x1c52    ADDS    R2,
0x98: 0x6002    STR    R2,
return 0;
```

Registers 1

Find: Group: Current CPU Registers

Name	Value
R0	0x20000000
R1	0x20000000
R2	0x00000004
R3	0x20000004
R4	0x00000000
R5	0x00000000
R6	0x00000000
R7	0x00000000
R8	0x00000000
R9	0x00000000
R10	0x00000000
R11	0x00000000
R12	0x00000000
APSR	0x00000000
N	0
Z	0
C	0
V	0
Q	0
GE	0b0000

Memory 1

Go to 0x20000000 Memory

Address	Value
0x1fffffff0	0x1fffffff8
0x1fffffff8	0x20000000
0x20000000	0004 0000
0x20000008	cdcd cdcd cdcd cdcd
0x20000010	cdcd cdcd cdcd cdcd
0x20000018	cdcd cdcd cdcd cdcd

Locals

Variable	Value	Location	Type
p_int	counter	R1	int*

Watch 1

Expression	Value	Location	Type
counter	4	0x20000000	int

