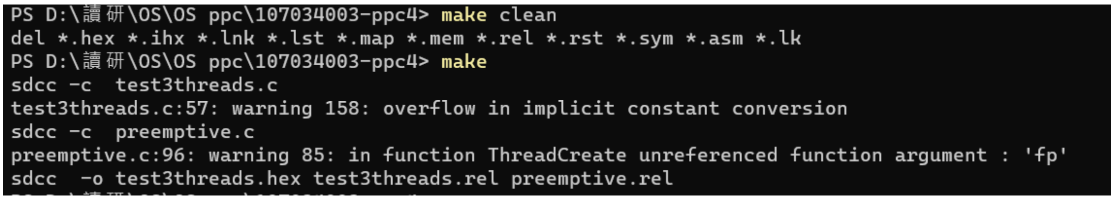
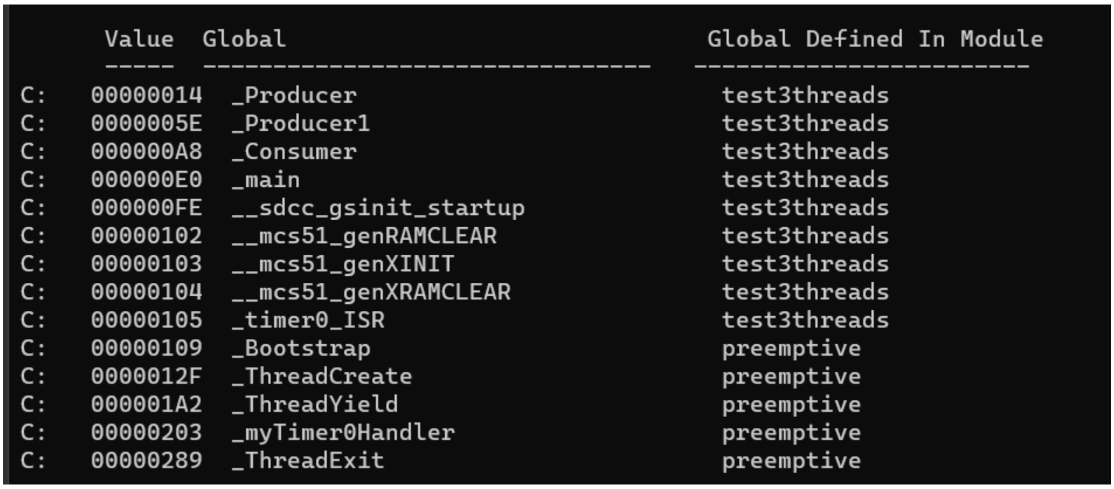
107034003 游鈞皓



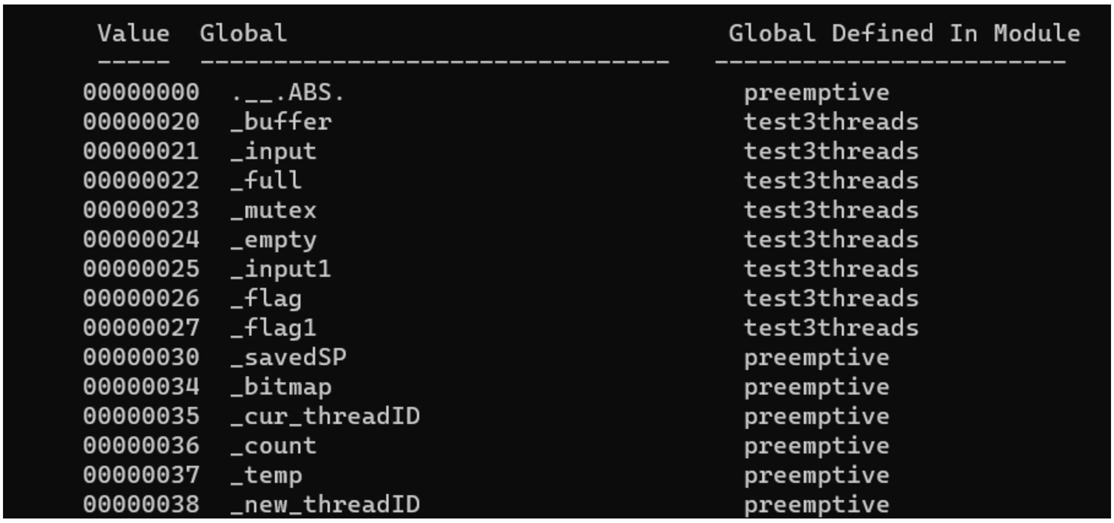
```
PS D:\讀研\OS\OS ppc\107034003-ppc4> make clean
del *.hex *.ihx *.lnk *.lst *.map *.mem *.rel *.rst *.sym *.asm *.lk
PS D:\讀研\OS\OS ppc\107034003-ppc4> make
sdcc -c  test3threads.c
test3threads.c:57: warning 158: overflow in implicit constant conversion
sdcc -c  preemptive.c
preemptive.c:96: warning 85: in function ThreadCreate unreferenced function argument : 'fp'
sdcc  -o test3threads.hex test3threads.rel preemptive.rel
```

the address of functions

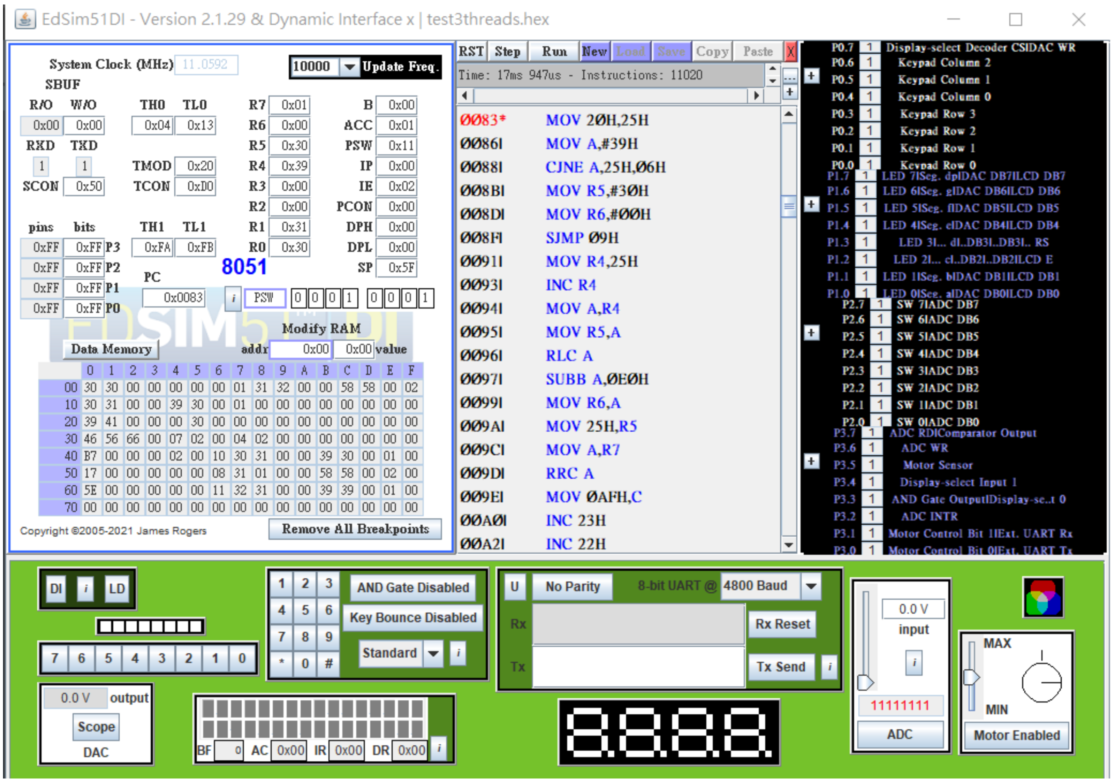


```
      Value  Global                              Global Defined In Module
      -----  --------------------------------   ------------------------
 C:   00000014  _Producer                         test3threads
 C:   0000005E  _Producer1                        test3threads
 C:   000000A8  _Consumer                         test3threads
 C:   000000E0  _main                             test3threads
 C:   000000FE  __sdcc_gsinit_startup             test3threads
 C:   00000102  __mcs51_genRAMCLEAR               test3threads
 C:   00000103  __mcs51_genXINIT                  test3threads
 C:   00000104  __mcs51_genXRAMCLEAR              test3threads
 C:   00000105  _timer0_ISR                       test3threads
 C:   00000109  _Bootstrap                        preemptive
 C:   0000012F  _ThreadCreate                     preemptive
 C:   000001A2  _ThreadYield                      preemptive
 C:   00000203  _myTimer0Handler                  preemptive
 C:   00000289  _ThreadExit                       preemptive
```

the address of variables



```
      Value  Global                              Global Defined In Module
      -----  --------------------------------   ------------------------
     00000000  .__.ABS.                           preemptive
     00000020  _buffer                            test3threads
     00000021  _input                             test3threads
     00000022  _full                              test3threads
     00000023  _mutex                             test3threads
     00000024  _empty                             test3threads
     00000025  _input1                            test3threads
     00000026  _flag                              test3threads
     00000027  _flag1                             test3threads
     00000030  _savedSP                           preemptive
     00000034  _bitmap                            preemptive
     00000035  _cur_threadID                      preemptive
     00000036  _count                             preemptive
     00000037  _temp                              preemptive
     00000038  _new_threadID                      preemptive
```



EdSim51DI - Version 2.1.29 & Dynamic Interface x | test3threads.hex

System Clock (MHz) 11.0592 — 10000 Update Freq.

```
SBUF
R/O   W/O      TH0   TL0       R7 0x01      B    0x00
0x00  0x00     0x04  0x13      R6 0x00      ACC  0x01
RXD   TXD                      R5 0x30      PSW  0x11
1     1        TMOD  0x20      R4 0x39      IP   0x00
SCON  0x50     TCON  0xD0      R3 0x00      IE   0x02
                               R2 0x00      PCON 0x00
pins  bits     TH1   TL1       R1 0x31      DPH  0x00
0xFF  0xFF P3  0xFA  0xFB      R0 0x30      DPL  0x00
0xFF  0xFF P2                  8051         SP   0x5F
0xFF  0xFF P1  PC 0x0083       PSW 0 0 0 1  0 0 0 1
0xFF  0xFF P0
Modify RAM  addr 0x00  0x00 value
```

Data Memory

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	30	30	00	00	00	00	00	01	31	32	00	00	58	58	00	02
10	30	31	00	00	39	30	00	01	00	00	00	00	00	00	00	00
20	39	41	00	00	00	30	00	00	00	00	00	00	00	00	00	00
30	46	56	66	00	07	02	00	04	02	00	00	00	00	00	00	00
40	B7	00	00	00	02	00	10	30	31	00	00	39	30	00	01	00
50	17	00	00	00	00	00	08	31	01	00	00	58	58	00	02	00
60	5E	00	00	00	00	00	11	32	31	00	00	39	39	00	01	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

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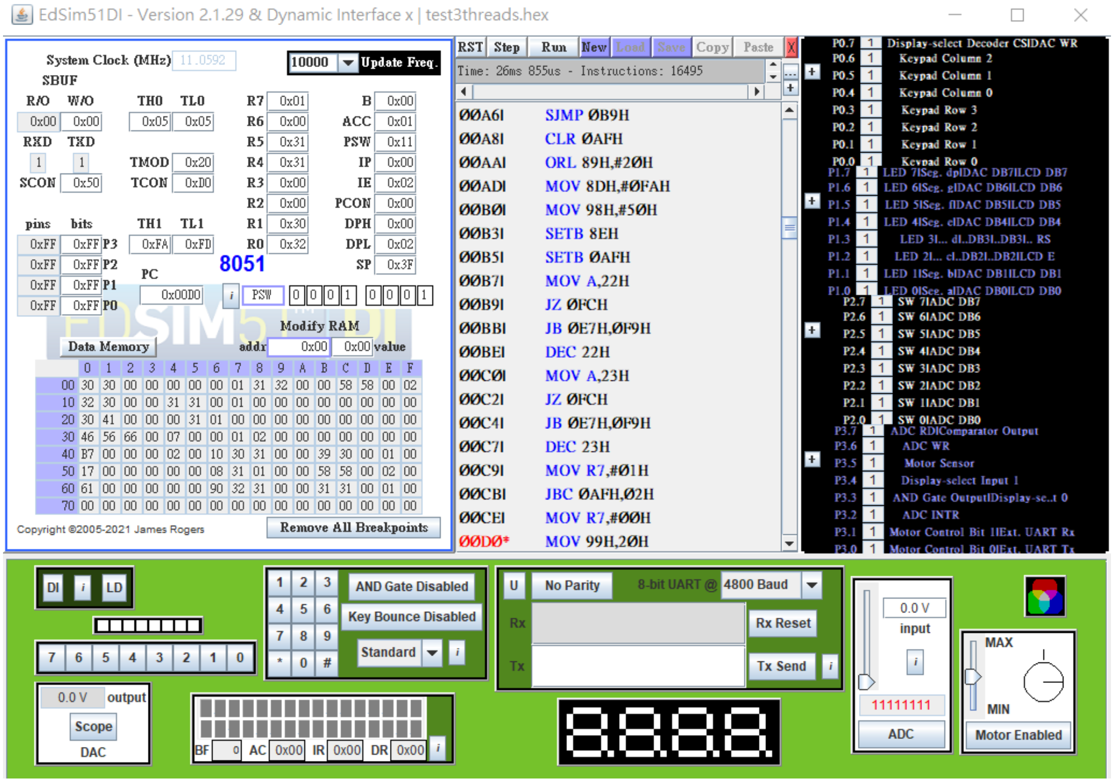
Time: 17ms 947us - Instructions: 11020

```
ØØ83*   MOV 2ØH,25H
ØØ86|   MOV A,#39H
ØØ88|   CJNE A,25H,Ø6H
ØØ8B|   MOV R5,#3ØH
ØØ8D|   MOV R6,#ØØH
ØØ8F|   SJMP Ø9H
ØØ91|   MOV R4,25H
ØØ93|   INC R4
ØØ94|   MOV A,R4
ØØ95|   MOV R5,A
ØØ96|   RLC A
ØØ97|   SUBB A,ØEØH
ØØ99|   MOV R6,A
ØØ9A|   MOV 25H,R5
ØØ9C|   MOV A,R7
ØØ9D|   RRC A
ØØ9E|   MOV ØAFH,C
ØØAØ|   INC 23H
ØØA2|   INC 22H
```

P0.7 1 Display-select Decoder CSIDAC WR
P0.6 1 Keypad Column 2
P0.5 1 Keypad Column 1
P0.4 1 Keypad Column 0
P0.3 1 Keypad Row 3
P0.2 1 Keypad Row 2
P0.1 1 Keypad Row 1
P0.0 1 Keypad Row 0
P1.7 1 LED 7lSeg. dplDAC DB7lLCD DB7
P1.6 1 LED 6lSeg. glDAC DB6lLCD DB6
P1.5 1 LED 5lSeg. flDAC DB5lLCD DB5
P1.4 1 LED 4lSeg. elDAC DB4lLCD DB4
P1.3 1 LED 3l... dl..DB3l..DB3l.. RS
P1.2 1 LED 2l... cl..DB2l..DB2lLCD E
P1.1 1 LED 1lSeg. blDAC DB1lLCD DB1
P1.0 1 LED 0lSeg. alDAC DB0lLCD DB0
P2.7 1 SW 7lADC DB7
P2.6 1 SW 6lADC DB6
P2.5 1 SW 5lADC DB5
P2.4 1 SW 4lADC DB4
P2.3 1 SW 3lADC DB3
P2.2 1 SW 2lADC DB2
P2.1 1 SW 1lADC DB1
P2.0 1 SW 0lADC DB0
P3.7 1 ADC RDlComparator Output
P3.6 1 ADC WR
P3.5 1 Motor Sensor
P3.4 1 Display-select Input 1
P3.3 1 AND Gate OutputlDisplay-se..t 0
P3.2 1 ADC INTR
P3.1 1 Motor Control Bit 1lExt. UART Rx
P3.0 1 Motor Control Bit 0lExt. UART Tx
DI i LD
7 6 5 4 3 2 1 0
0.0 V output
Scope
DAC
1 2 3 4 5 6 7 8 9 * 0 #
AND Gate Disabled
Key Bounce Disabled
Standard
BF 0 AC 0x00 IR 0x00 DR 0x00
U No Parity 8-bit UART @ 4800 Baud
Rx Rx Reset
Tx Tx Send
0.0 V input
11111111
ADC
MAX MIN
Motor Enabled

When executing buffer=input(MOV 20H,25H) in the producer, the values of semaphores(full,empty,mutex) become (0,0,0). Because the producer is in the critical section,and hasn’ t produced an input. Also, it hasn’ t finished producing ,so the flags(26H or 27H) are all 0. After it finish, it will set flag1(27H)to 1.



EdSim51DI - Version 2.1.29 & Dynamic Interface x | test3threads.hex

System Clock (MHz) 11.0592 — 10000 Update Freq.

```
SBUF
R/O   W/O      TH0   TL0       R7 0x01      B    0x00
0x00  0x00     0x05  0x05      R6 0x00      ACC  0x01
RXD   TXD                      R5 0x31      PSW  0x11
1     1        TMOD  0x20      R4 0x31      IP   0x00
SCON  0x50     TCON  0xD0      R3 0x00      IE   0x02
                               R2 0x00      PCON 0x00
pins  bits     TH1   TL1       R1 0x30      DPH  0x00
0xFF  0xFF P3  0xFA  0xFD      R0 0x32      DPL  0x02
0xFF  0xFF P2                  8051         SP   0x3F
0xFF  0xFF P1  PC 0x00D0       PSW 0 0 0 1  0 0 0 1
0xFF  0xFF P0
Modify RAM  addr 0x00  0x00 value
```

Data Memory

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	30	30	00	00	00	00	00	01	31	32	00	00	58	58	00	02
10	32	30	00	00	31	31	00	01	00	00	00	00	00	00	00	00
20	30	41	00	00	00	31	01	00	00	00	00	00	00	00	00	00
30	46	56	66	00	07	00	00	01	02	00	00	00	00	00	00	00
40	B7	00	00	00	02	00	10	30	31	00	00	39	30	00	01	00
50	17	00	00	00	00	00	08	31	01	00	00	58	58	00	02	00
60	61	00	00	00	00	00	90	32	31	00	00	31	31	00	01	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

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Remove All Breakpoints

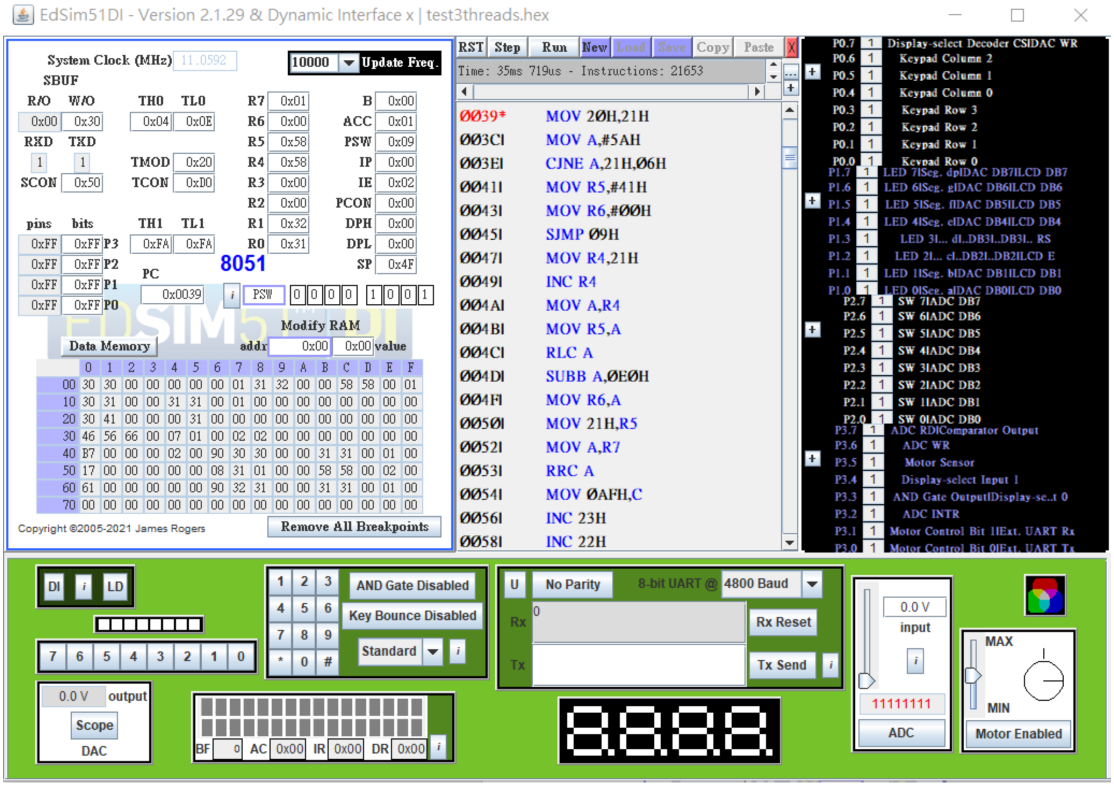
RST Step Run New Load Save Copy Paste X

Time: 26ms 855us - Instructions: 16495

```
ØØA6|   SJMP ØB9H
ØØA8|   CLR ØAFH
ØØAA|   ORL 89H,#2ØH
ØØAD|   MOV 8DH,#ØFAH
ØØBØ|   MOV 98H,#5ØH
ØØB3|   SETB 8EH
ØØB5|   SETB ØAFH
ØØB7|   MOV A,22H
ØØB9|   JZ ØFCH
ØØBB|   JB ØE7H,ØF9H
ØØBE|   DEC 22H
ØØCØ|   MOV A,23H
ØØC2|   JZ ØFCH
ØØC4|   JB ØE7H,ØF9H
ØØC7|   DEC 23H
ØØC9|   MOV R7,#Ø1H
ØØCB|   JBC ØAFH,Ø2H
ØØCE|   MOV R7,#ØØH
ØØDØ*   MOV 99H,2ØH
```

P0.7 1 Display-select Decoder CSIDAC WR
P0.6 1 Keypad Column 2
P0.5 1 Keypad Column 1
P0.4 1 Keypad Column 0
P0.3 1 Keypad Row 3
P0.2 1 Keypad Row 2
P0.1 1 Keypad Row 1
P0.0 1 Keypad Row 0
P1.7 1 LED 7lSeg. dplDAC DB7lLCD DB7
P1.6 1 LED 6lSeg. glDAC DB6lLCD DB6
P1.5 1 LED 5lSeg. flDAC DB5lLCD DB5
P1.4 1 LED 4lSeg. elDAC DB4lLCD DB4
P1.3 1 LED 3l... dl..DB3l..DB3l.. RS
P1.2 1 LED 2l... cl..DB2l..DB2lLCD E
P1.1 1 LED 1lSeg. blDAC DB1lLCD DB1
P1.0 1 LED 0lSeg. alDAC DB0lLCD DB0
P2.7 1 SW 7lADC DB7
P2.6 1 SW 6lADC DB6
P2.5 1 SW 5lADC DB5
P2.4 1 SW 4lADC DB4
P2.3 1 SW 3lADC DB3
P2.2 1 SW 2lADC DB2
P2.1 1 SW 1lADC DB1
P2.0 1 SW 0lADC DB0
P3.7 1 ADC RDlComparator Output
P3.6 1 ADC WR
P3.5 1 Motor Sensor
P3.4 1 Display-select Input 1
P3.3 1 AND Gate OutputlDisplay-se..t 0
P3.2 1 ADC INTR
P3.1 1 Motor Control Bit 1lExt. UART Rx
P3.0 1 Motor Control Bit 0lExt. UART Tx
DI i LD
7 6 5 4 3 2 1 0
0.0 V output
Scope
DAC
1 2 3 4 5 6 7 8 9 * 0 #
AND Gate Disabled
Key Bounce Disabled
Standard
BF 0 AC 0x00 IR 0x00 DR 0x00
U No Parity 8-bit UART @ 4800 Baud
Rx Rx Reset
Tx Tx Send
0.0 V input
11111111
ADC
MAX MIN
Motor Enabled

When executing SBUF = buffer(MOV 99H, 20H) in the consumer, the values of semaphores(full,empty,mutex) become (0,0,0). Because the consumer is in the critical section,and hasn’ t consumed an input. Besides, one of the semaphore flag(26H or 27H) becomes 1 and the other remains 0. The one whose flag becomes 1 will be the next producer to produce.



EdSim51DI - Version 2.1.29 & Dynamic Interface x | test3threads.hex

System Clock (MHz) 11.0592 — 10000 Update Freq.

SBUF R/O 0x00 W/O 0x30; RXD 1 TXD 1; SCON 0x50

TH0 0x04 TL0 0x0E; TMOD 0x20; TCON 0xD0; TH1 0xFA TL1 0xFA

R7 0x01, R6 0x00, R5 0x58, R4 0x58, R3 0x00, R2 0x00, R1 0x32, R0 0x31

B 0x00, ACC 0x01, PSW 0x09, IP 0x00, IE 0x02, PCON 0x00, DPH 0x00, DPL 0x00, SP 0x4F

pins / bits: P3 0xFF 0xFF; P2 0xFF 0xFF; P1 0xFF 0xFF; P0 0xFF 0xFF

PC 0x0039 — PSW 0 0 0 0 1 0 0 1

Modify RAM addr 0x00 value 0x00

Data Memory

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	30	30	00	00	00	00	00	01	31	32	00	00	58	58	00	01
10	30	31	00	00	31	31	00	01	00	00	00	00	00	00	00	00
20	30	41	00	00	00	31	00	00	00	00	00	00	00	00	00	00
30	46	56	66	00	07	01	00	02	02	00	00	00	00	00	00	00
40	B7	00	00	00	02	00	90	30	30	00	00	31	31	00	01	00
50	17	00	00	00	00	00	08	31	01	00	00	58	58	00	02	00
60	61	00	00	00	00	00	90	32	31	00	00	31	31	00	01	00
70	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

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Time: 35ms 719us - Instructions: 21653

```
ØØ39*    MOV 2ØH,21H
ØØ3C|    MOV A,#5AH
ØØ3E|    CJNE A,21H,Ø6H
ØØ41|    MOV R5,#41H
ØØ43|    MOV R6,#ØØH
ØØ45|    SJMP Ø9H
ØØ47|    MOV R4,21H
ØØ49|    INC R4
ØØ4A|    MOV A,R4
ØØ4B|    MOV R5,A
ØØ4C|    RLC A
ØØ4D|    SUBB A,ØEØH
ØØ4F|    MOV R6,A
ØØ5Ø|    MOV 21H,R5
ØØ52|    MOV A,R7
ØØ53|    RRC A
ØØ54|    MOV ØAFH,C
ØØ56|    INC 23H
ØØ58|    INC 22H
```

When executing buffer=input1(MOV 20H,21H) in the producer1, the values of semaphores(full,empty,mutex) become (0,0,0). Because the producer1 is in the critical section,and hasn’ t produced an input. Also, it hasn’ t finished producing ,so the flags(26H or 27H) are all 0. After it finish, it will set flag(26H) to 1.

If using RR scheduling policy , the producer executing after the consumer will always fill in the buffer. Therefore, the other producer will never get the chance to produce.

Adding a semaphore flag to each producer, and making them wait for their own flag and signal the other one after they finished will be a fair version.