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```
User@MSI MINGW64 ~/Desktop/OS/checkpoint3
$ ls
Makefile      preemptive.h    preemptive.rst  testpreempt.c  testpreempt.lst testpreempt.rel
preemptive.asm preemptive.lst  preemptive.sym  testpreempt.hex testpreempt.map testpreempt.rst
preemptive.c  preemptive.rel  testpreempt.asm testpreempt.lk  testpreempt.mem testpreempt.sym

User@MSI MINGW64 ~/Desktop/OS/checkpoint3
$ make clean
rm *.hex *.ihx *.lnk *.lst *.map *.mem *.rel *.rst *.sym *.asm *.lk
rm: cannot remove '*.ihx': No such file or directory
rm: cannot remove '*.lnk': No such file or directory
make: *** [Makefile:25: clean] Error 1

User@MSI MINGW64 ~/Desktop/OS/checkpoint3
$ ls
Makefile  preemptive.c  preemptive.h  testpreempt.c
$ make
sdcc -c testpreempt.c
testpreempt.c:82: warning 158: overflow in implicit constant conversion
sdcc -c preemptive.c
preemptive.c:210: warning 85: in function ThreadCreate unreferenced function argument : 'fp'
sdcc -o testpreempt.hex testpreempt.rel preemptive.rel

User@MSI MINGW64 ~/Desktop/OS/checkpoint3
$ ls
Makefile      preemptive.h    preemptive.rst  testpreempt.c  testpreempt.lst testpreempt.rel
preemptive.asm preemptive.lst  preemptive.sym  testpreempt.hex testpreempt.map testpreempt.rst
preemptive.c  preemptive.rel  testpreempt.asm testpreempt.lk  testpreempt.mem testpreempt.sym
```

Producer is running. Semaphore full (address 0x3A) gets increased from 0 to 1.

EdSim51DI - Version 2.1.32 | testpreempt.hex

System Clock (MHz): 11.0529 | 1000 | Update Freq.

SBUSF

| | | | | | | | |
|------|------|------|------|----|------|------|------|
| R/O | W/O | TH0 | TL0 | R7 | 0x01 | B | 0x00 |
| 0x00 | 0x00 | 0x05 | 0x00 | R6 | 0x00 | ACC | 0x00 |
| RZD | TYD | | | R5 | 0x01 | PSW | 0x88 |
| 1 | 1 | TMOD | 0x20 | R4 | 0x01 | IP | 0x00 |
| SOON | 0x50 | TCON | 0xD0 | R3 | 0x00 | IE | 0x82 |
| | | | | R2 | 0x00 | PCON | 0x00 |
| | | | | R1 | 0x31 | DPH | 0x00 |
| | | | | R0 | 0x3C | DPL | 0x00 |
| | | | | | | SP | 0x4F |

pins bits

| | | | |
|------|------|----|-----------|
| TH1 | TL1 | | |
| 0xFF | 0xFF | P3 | 0xFA 0xFC |
| 0xFF | 0xFF | P2 | |
| 0xFF | 0xFF | P1 | |
| 0xFF | 0xFF | P0 | |

PC: 8051

Modify RAM

| | | | |
|------|------|------|---|
| addr | 0x00 | 0x00 | value |
| 0 | 1 | 2 | 3 |
| 00 | 30 | 30 | 00 01 00 01 01 01 3C 31 00 00 01 01 00 01 |
| 10 | 00 | 00 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| 20 | 01 | 00 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| 30 | 46 | 56 | 00 00 03 01 41 01 01 01 02 41 00 00 42 |
| 40 | 86 | 00 | 00 00 01 00 08 30 01 00 00 00 00 00 00 00 |
| 50 | 14 | 00 | 00 00 00 00 05 00 00 00 00 00 00 00 00 00 |
| 60 | 00 | 00 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| 70 | 00 | 00 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |

Remove All Breakpo...

Time: 5ms 77us - Instructions: 5065

```

0065 | MOV R6,A
0066 | MOV 20H,R5
0068 | SETB 0AFH
006A | MOV A,R7
006B | RRC A
006C | MOV 0AFH,C
006E* | INC 39H
0070* | INC 3AH
0072 | SJMP 0A6H
0074 | ORL 89H,#20H
0077 | MOV 8DH,#0FAH
007A | MOV 98H,#50H
007D | SETB 8EH
007F | MOV 21H,#00H
0082 | SETB 0AFH
0084 | MOV A,3AH
0086 | JB 0E7H,0FBH
0089 | JZ 0F9H
008B | DEC 3AH
008D | MOV A,39H
  
```

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EdSim51DI - Version 2.1.32 | testpreempt.hex

System Clock (MHz): 11.0529 | 1000 | Update Freq.

SBUSF

| | | | | | | | |
|------|------|------|------|----|------|------|------|
| R/O | W/O | TH0 | TL0 | R7 | 0x01 | B | 0x00 |
| 0x00 | 0x00 | 0x05 | 0x02 | R6 | 0x00 | ACC | 0x00 |
| RZD | TYD | | | R5 | 0x01 | PSW | 0x88 |
| 1 | 1 | TMOD | 0x20 | R4 | 0x01 | IP | 0x00 |
| SOON | 0x50 | TCON | 0xD0 | R3 | 0x00 | IE | 0x82 |
| | | | | R2 | 0x00 | PCON | 0x00 |
| | | | | R1 | 0x31 | DPH | 0x00 |
| | | | | R0 | 0x3C | DPL | 0x00 |
| | | | | | | SP | 0x4F |

pins bits

| | | | |
|------|------|----|-----------|
| TH1 | TL1 | | |
| 0xFF | 0xFF | P3 | 0xFA 0xFE |
| 0xFF | 0xFF | P2 | |
| 0xFF | 0xFF | P1 | |
| 0xFF | 0xFF | P0 | |

PC: 8051

Modify RAM

| | | | |
|------|------|------|---|
| addr | 0x00 | 0x00 | value |
| 0 | 1 | 2 | 3 |
| 00 | 30 | 30 | 00 01 00 01 01 01 3C 31 00 00 01 01 00 01 |
| 10 | 00 | 00 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| 20 | 01 | 00 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| 30 | 46 | 56 | 00 00 03 01 41 01 01 01 02 41 00 00 42 |
| 40 | 86 | 00 | 00 00 01 00 08 30 01 00 00 00 00 00 00 00 |
| 50 | 14 | 00 | 00 00 00 00 05 00 00 00 00 00 00 00 00 00 |
| 60 | 00 | 00 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |
| 70 | 00 | 00 | 00 00 00 00 00 00 00 00 00 00 00 00 00 00 |

Remove All Breakpo...

Executed 0x0070: INC 3AH | Time: 5ms 80us

```

006E* | INC 39H
0070* | INC 3AH
0072 | SJMP 0A6H
0074 | ORL 89H,#20H
0077 | MOV 8DH,#0FAH
007A | MOV 98H,#50H
007D | SETB 8EH
007F | MOV 21H,#00H
0082 | SETB 0AFH
0084 | MOV A,3AH
0086 | JB 0E7H,0FBH
0089 | JZ 0F9H
008B | DEC 3AH
008D | MOV A,39H
008F | JB 0E7H,0FBH
0092 | JZ 0F9H
0094 | DEC 39H
0096 | MOV R7,#01H
0098 | JBC 0AFH,02H
009B | MOV R7,#00H
009D | CLR 0AFH
  
```

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Consumer is running. Semaphore empty (address 0x3B) gets increased from 0 to 1.

EdSim51Di - Version 2.1.32 | testpreempthex

System Clock (MHz) 11.0529 1000 Update Freq.

SBUP

| R/O | W/O | TH0 | TL0 | R7 | 0x01 | B | 0x00 |
|------|------|------|------|----|------|-----|------|
| 0x00 | 0x41 | 0x05 | 0x1B | R6 | 0x00 | ACC | 0x00 |
| RxD | TxD | | | R5 | 0x01 | PSW | 0x88 |
| 1 | 0 | TMOD | 0x20 | R4 | 0x01 | IP | 0x00 |
| SCON | 0x50 | TCON | 0x00 | R3 | 0x00 | IE | 0x82 |

pins bits

| TH1 | TL1 | R2 <td>0x00</td> <td>PCON</td> <td>0x00</td> | 0x00 | PCON | 0x00 | |
|------|------|--|------|------|------|------|
| 0x0D | 0x0D | P3 | 0x0A | 0x0A | DPH | 0x00 |
| 0xFF | 0xFF | P2 | 0x0A | 0x0A | DPL | 0x01 |
| 0xFF | 0xFF | P1 | 0x0A | 0x0A | SP | 0x3F |
| 0xFF | 0xFF | P0 | 0x0A | 0x0A | | |

8051

PC 0x00C2

PSW 1 0 0 0 1 0 0 0

Data Memory

| addr | 0x00 | 0x00 | value | | | | | | | | | | | | | |
|------|------|------|-------|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | |
| 00 | 30 | 30 | 00 | 01 | 00 | 01 | 01 | 01 | 31 | 3C | 00 | 00 | 01 | 01 | 00 | 01 |
| 10 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 20 | 00 | 01 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 30 | 46 | 56 | 00 | 00 | 03 | 00 | 41 | 01 | 01 | 00 | 02 | 00 | 41 | 42 | 43 | 44 |
| 40 | 86 | 00 | 00 | 00 | 01 | 00 | 08 | 30 | 01 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 50 | 1A | 00 | 00 | 00 | 00 | 00 | 88 | 31 | 31 | 00 | 00 | 44 | 00 | 00 | 01 | 00 |
| 60 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 70 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |

Modify RAM

addr 0x00 value

Remove All Breakpo...

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RST Step Run New Copy Paste

Time: 18ms 1us - Instructions: 10028

```
00000 KLC A
00007 SUBB A,0E0H
00009 MOV R6,A
0000A MOV 21H,R5
0000B SETB 0AFH
0000C MOV A,R7
0000D RRC A
0000E MOV 0AFH,C
0000F INC 39H
00010 INC 3BH
00011 JBC 99H,0BBH
00012 SJMP 0FBH
00013 MOV 3AH,00H
00014 MOV 39H,001H
00015 MOV 3BH,003H
00016 MOV DPTR, #0014H
00017 LCALL 0125H
00018 LJMP 0074H
00019 LJMP 00E8H
0001A RET
0001B RET
```

P0.7 Display-select Decoder CS(DAC WR
P0.6 Keypad Column 2
P0.5 Keypad Column 1
P0.4 Keypad Column 0
P0.3 Keypad Row 3
P0.2 Keypad Row 2
P0.1 Keypad Row 1
P0.0 Keypad Row 0
P1.7 LED 7(Seg. dp)(DAC DB7)LCD DB7
P1.6 LED 6(Seg. g)(DAC DB6)LCD DB6
P1.5 LED 5(Seg. f)(DAC DB5)LCD DB5
P1.4 LED 4(Seg. e)(DAC DB4)LCD DB4
P1.3 LED 3(... d)(DB3)...DB3... RS
P1.2 LED 2(... c)(DB2)...DB2)LCD E
P1.1 LED 1(Seg. b)(DAC DB1)LCD DB1
P1.0 LED 0(Seg. a)(DAC DB0)LCD DB0
P2.7 SW 7(ADC DB7
P2.6 SW 6(ADC DB6
P2.5 SW 5(ADC DB5
P2.4 SW 4(ADC DB4
P2.3 SW 3(ADC DB3
P2.2 SW 2(ADC DB2
P2.1 SW 1(ADC DB1
P2.0 SW 0(ADC DB0
P3.7 ADC RD(Comparator Output
P3.6 ADC WR
P3.5 Motor Sensor
P3.4 Display-select Input 1
P3.3 AND Gate Output(Display-se...t 0
P3.2 ADC INTR
P3.1 Motor Control Bit 1(Ext. GART Ra
P3.0 Motor Control Bit 0(Ext. GART Ta

EdSim51Di - Version 2.1.32 | testpreempthex

System Clock (MHz) 11.0529 1000 Update Freq.

SBUP

| R/O | W/O | TH0 | TL0 | R7 | 0x01 | B | 0x00 |
|------|------|------|------|----|------|-----|------|
| 0x00 | 0x42 | 0x3C | 0x12 | R6 | 0x00 | ACC | 0x00 |
| RxD | TxD | | | R5 | 0x02 | PSW | 0x88 |
| 1 | 1 | TMOD | 0x20 | R4 | 0x02 | IP | 0x00 |
| SCON | 0x50 | TCON | 0x00 | R3 | 0x00 | IE | 0x82 |

pins bits

| TH1 | TL1 | R2 <td>0x00</td> <td>PCON</td> <td>0x00</td> | 0x00 | PCON | 0x00 | |
|------|------|--|------|------|------|------|
| 0x0D | 0x0D | P3 | 0x0A | 0x0A | DPH | 0x00 |
| 0xFF | 0xFF | P2 | 0x0A | 0x0A | DPL | 0x01 |
| 0xFF | 0xFF | P1 | 0x0A | 0x0A | SP | 0x3F |
| 0xFF | 0xFF | P0 | 0x0A | 0x0A | | |

8051

PC 0x00C2

PSW 1 0 0 0 1 0 0 0

Data Memory

| addr | 0x00 | 0x00 | value | | | | | | | | | | | | | |
|------|------|------|-------|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | |
| 00 | 30 | 30 | 00 | 01 | 00 | 01 | 01 | 01 | 31 | 3D | 00 | 00 | 02 | 02 | 00 | 01 |
| 10 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 20 | 00 | 02 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 30 | 46 | 56 | 00 | 00 | 03 | 00 | 41 | 01 | 01 | 00 | 01 | 01 | 41 | 42 | 43 | 44 |
| 40 | 86 | 00 | 00 | 00 | 01 | 00 | 08 | 30 | 01 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 50 | 1A | 00 | 00 | 00 | 00 | 00 | 88 | 31 | 31 | 00 | 00 | 44 | 00 | 00 | 01 | 00 |
| 60 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 70 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |

Modify RAM

addr 0x00 value

Remove All Breakpo...

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RST Step Run New Copy Paste

Time: 18ms 902us - Instructions: 10914

```
00000 KLC A
00007 SUBB A,0E0H
00009 MOV R6,A
0000A MOV 21H,R5
0000B SETB 0AFH
0000C MOV A,R7
0000D RRC A
0000E MOV 0AFH,C
0000F INC 39H
00010 INC 3BH
00011 JBC 99H,0BBH
00012 SJMP 0FBH
00013 MOV 3AH,00H
00014 MOV 39H,001H
00015 MOV 3BH,003H
00016 MOV DPTR, #0014H
00017 LCALL 0125H
00018 LJMP 0074H
00019 LJMP 00E8H
0001A RET
0001B RET
```

P0.7 Display-select Decoder CS(DAC WR
P0.6 Keypad Column 2
P0.5 Keypad Column 1
P0.4 Keypad Column 0
P0.3 Keypad Row 3
P0.2 Keypad Row 2
P0.1 Keypad Row 1
P0.0 Keypad Row 0
P1.7 LED 7(Seg. dp)(DAC DB7)LCD DB7
P1.6 LED 6(Seg. g)(DAC DB6)LCD DB6
P1.5 LED 5(Seg. f)(DAC DB5)LCD DB5
P1.4 LED 4(Seg. e)(DAC DB4)LCD DB4
P1.3 LED 3(... d)(DB3)...DB3... RS
P1.2 LED 2(... c)(DB2)...DB2)LCD E
P1.1 LED 1(Seg. b)(DAC DB1)LCD DB1
P1.0 LED 0(Seg. a)(DAC DB0)LCD DB0
P2.7 SW 7(ADC DB7
P2.6 SW 6(ADC DB6
P2.5 SW 5(ADC DB5
P2.4 SW 4(ADC DB4
P2.3 SW 3(ADC DB3
P2.2 SW 2(ADC DB2
P2.1 SW 1(ADC DB1
P2.0 SW 0(ADC DB0
P3.7 ADC RD(Comparator Output
P3.6 ADC WR
P3.5 Motor Sensor
P3.4 Display-select Input 1
P3.3 AND Gate Output(Display-se...t 0
P3.2 ADC INTR
P3.1 Motor Control Bit 1(Ext. GART Ra
P3.0 Motor Control Bit 0(Ext. GART Ta