

3.1 [2 points] Typescript for compilation

```
project3 — -zsh — 80x24
[zhangjunteng@zhangjuntengdeMacBook-Air project3 % ls
Makefile      preemptive.c  preemptive.h  testpreempt.c
[zhangjunteng@zhangjuntengdeMacBook-Air project3 % make
sdcc -c testpreempt.c
testpreempt.c:34: warning 158: overflow in implicit constant conversion
sdcc -c preemptive.c
preemptive.c:180: warning 85: in function ThreadCreate unreferenced function arg
ument : 'fp'
preemptive.c:222: warning 158: overflow in implicit constant conversion
sdcc -o testpreempt.hex testpreempt.rel preemptive.rel
[zhangjunteng@zhangjuntengdeMacBook-Air project3 % ls
Makefile      preemptive.lst  testpreempt.asm  testpreempt.lst  testpreempt.rst
preemptive.asm  preemptive.rel  testpreempt.c    testpreempt.map  testpreempt.sym
preemptive.c    preemptive.rst  testpreempt.hex  testpreempt.mem
preemptive.h    preemptive.sym  testpreempt.lk   testpreempt.rel
[zhangjunteng@zhangjuntengdeMacBook-Air project3 % make clean
rm *.hex *.ihx *.lnk *.lst *.map *.mem *.rel *.rst *.sym *.asm *.lk
rm: *.ihx: No such file or directory
rm: *.lnk: No such file or directory
make: *** [clean] Error 1
[zhangjunteng@zhangjuntengdeMacBook-Air project3 % ls
Makefile      preemptive.c  preemptive.h  testpreempt.c
[zhangjunteng@zhangjuntengdeMacBook-Air project3 %
```

3.2 [18 points] Screenshots and explanation

Look up the addresses for your symbols (i.e., functions, variables, etc) in the file testpreempt.map. Set one or more breakpoints in EdSim51's assembly code window after you have assembled it.

Value	Global	Global Defined In Module
C: 00000014	_Producer	testpreempt
C: 00000053	_Consumer	testpreempt
C: 0000008B	_main	testpreempt
C: 0000009D	_sdcc_gsinit_startup	testpreempt
C: 000000A1	_mcs51_genRAMCLEAR	testpreempt
C: 000000A2	_mcs51_genXINIT	testpreempt
C: 000000A3	_mcs51_genXRAMCLEAR	testpreempt
C: 000000A4	_timer0_ISR	testpreempt
C: 000000A8	_Bootstrap	preemptive
C: 000000CE	_myTimer0Handler	preemptive
C: 00000168	_ThreadCreate	preemptive
C: 000001FA	_ThreadYield	preemptive
C: 00000262	_ThreadExit	preemptive

- Take screenshots when the Producer is running and show semaphore changes.

EdSim51DI - Version 2.1.29 | testpreempt.hex

System Clock (MHz) 11.0592 100 Update Freq.

SBUF

R/O W/O TH0 TL0 R7 0x00 B 0x00

0x00 0x41 0x03 0x19 R6 0x42 ACC 0x01

RXD TXD TMOD 0x20 R5 0x42 PSW 0x89

1 1 TCON 0xD0 R4 0x00 IP 0x00

SCON 0x50 TH1 TL1 R3 0x00 IE 0x82

pins bits TH1 TL1 R2 0x00 PCON 0x00

0xFF 0xFF P3 0xFA 0xFC R1 0x31 DPH 0x00

0xFF 0xFF P2 PC 8051 R0 0x30 DPL 0x00

0xFF 0xFF P1 PSW 1 0 0 0 1 0 0 1

0xFF 0xFF P0

Data Memory

addr	0x00	0x30	value
0	30	30	00 00 01 00 00 01 30 31 00 00 00 42 42 00
10	00	00	00 00 00 00 00 00 00 00 00 00 00 00 00 00
20	07	00	00 00 00 00 00 00 00 00 00 00 00 00 00 00
30	46	56	00 00 03 01 01 41 01 02 41 42 00 01 01 00
40	62	00	00 00 01 00 88 30 30 00 00 00 42 42 00 00
50	17	00	00 00 00 00 88 31 31 00 00 00 42 42 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 Breakpoints

Time: 26ms 810us - Instructions: 16186

```

ORG 0000H
0000| LJMP 009DH
0003| RETI
ORG 000BH
000B| LJMP 00A4H
000E| LJMP 008BH
0011| LJMP 000EH
0014* MOV 3BH, #41H
0017| MOV A, 3EH
0019| JZ 0FCH
001B| JB 0E7H, 0F9H
001E* DEC 3EH
0020| MOV A, 3DH
0022| JZ 0FCH
0024| JB 0E7H, 0F9H
0027* DEC 3DH
0029| SETB 00H
002B| JBC 0AFH, 02H
002E| CLR 00H
0030| MOV 3AH, 3BH
0033| MOV A, #5AH
0035| CJNE A, 3BH, 06H
0038| MOV R6, #41H
003A| MOV R7, #00H

```

While producer running, the DEC 3EH and DEC 3DH do the wait operation!

- Take screenshots when the Consumer is running and show semaphore changes.

EdSim51DI - Version 2.1.29 | testpreempt.hex

System Clock (MHz) 11.0592 100 Update Freq.

SBUF

R/O W/O TH0 TL0 R7 0x00 B 0x00

0x00 0x42 0x06 0x01 R6 0x43 ACC 0x01

RXD TXD TMOD 0x20 R5 0x43 PSW 0x89

1 0 TCON 0xD0 R4 0x00 IP 0x00

SCON 0x50 TH1 TL1 R3 0x00 IE 0x82

pins bits TH1 TL1 R2 0x00 PCON 0x00

0xFD 0xFD P3 0xFA 0xFE R1 0x30 DPH 0x00

0xFF 0xFF P2 PC 8051 R0 0x31 DPL 0x01

0xFF 0xFF P1 PSW 1 0 0 0 1 0 0 1

0xFF 0xFF P0

Data Memory

addr	0x00	0x30	value
0	30	30	00 00 01 00 00 01 31 30 00 00 00 43 43 00
10	00	00	00 00 00 00 00 00 00 00 00 00 00 00 00 00
20	07	00	00 00 00 00 00 00 00 00 00 00 00 00 00 00
30	46	56	00 00 03 00 01 41 01 01 42 43 00 00 00 00
40	62	00	00 00 01 00 88 30 30 00 00 00 42 42 00 00
50	17	00	00 00 00 00 88 31 31 00 00 00 43 43 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 Breakpoints

Time: 35ms 777us - Instructions: 21697

```

0051| SJMP 0C4H
0053* CLR 0AFH
0055| ORL 89H, #20H
0058| MOV 8DH, #0FAH
005B| MOV 98H, #50H
005E| SETB 8EH
0060| SETB 0AFH
0062| MOV A, 3CH
0064| JZ 0FCH
0066| JB 0E7H, 0F9H
0069| DEC 3CH
006B| MOV A, 3DH
006D| JZ 0FCH
006F| JB 0E7H, 0F9H
0072| DEC 3DH
0074| SETB 01H
0076| JBC 0AFH, 02H
0079| CLR 01H
007B| MOV 99H, 3AH
007E| MOV C, 01H
0080| MOV 0AFH, C
0082* INC 3DH
0084* INC 3EH
0086| JBC 99H, 0D9H

```

While operation is over, we signal the semaphore by INC 3DH and INC 3EH!