

3. Typescript and screenshots

3.1 Typescript for compilation

```
PS C:\Users\peggy\OS Checkpoint\OS-checkpoint-3> make clean
del *.hex *.ihx *.lnk *.lst *.map *.mem *.rel *.rst *.sym *.asm *.lk
PS C:\Users\peggy\OS Checkpoint\OS-checkpoint-3> make
sdcc -c testpreempt.c
testpreempt.c:68: warning 158: overflow in implicit constant conversion
sdcc -c preemptive.c
sdcc -o testpreempt.hex testpreempt.rel preemptive.rel
```

3.2 Screenshots and explanation

- **Screenshot when the Producer is running and show semaphore changes.**
Current thread ID (stored at 0x35) is 1, which is the thread ID of Producer. The semaphore `empty` (stored at 0x25) changes into 0, which indicates there's no empty buffer. The semaphore `full` (stored at 0x24) changes into 1, which indicates there is 1 full buffer.

The screenshot displays the SIM505 IDE interface. The main window shows the assembly code for the Producer thread, with the current instruction being `MOV 0E0H, 25H` at address 0019. The left pane shows the system clock at 11.0592 MHz and the update frequency at 1000. The right pane shows the hardware configuration, including the Display-select Decoder CS/DAC WR, Keypad Column 2, Keypad Column 1, Keypad Column 0, Keypad Row 3, Keypad Row 2, Keypad Row 1, Keypad Row 0, LED 7 (Seq. dp|DAC DB7|LCD DB7), LED 6 (Seq. g|DAC DB6|LCD DB6), LED 5 (Seq. f|DAC DB5|LCD DB5), LED 4 (Seq. e|DAC DB4|LCD DB4), LED 3 (... d|.DB3|.DB3|... RS), LED 2 (... c|.DB2|.DB2|LCD E), LED 1 (Seq. b|DAC DB1|LCD DB1), LED 0 (Seq. a|DAC DB0|LCD DB0), SW 7|ADC DB7, SW 6|ADC DB6, SW 5|ADC DB5, SW 4|ADC DB4, SW 3|ADC DB3, SW 2|ADC DB2, SW 1|ADC DB1, SW 0|ADC DB0, ADC RD|Comparator Output, ADC WR, Motor Sensor, Display-select Input 1, AND Gate Output|Display-se... 0, ADC INTR, Motor Control Bit 1|Ext. UART Rx, and Motor Control Bit 0|Ext. UART Tx.

The bottom pane shows the hardware simulation interface, including the DI, LD, and LD registers, the AND Gate Disabled and Key Bounce Disabled settings, the Standard dropdown menu, the 0.0 V output, the Scope DAC, the BF, AC, IR, and DR registers, the 8-bit UART @ 4800 Baud, the Rx Reset and Tx Send buttons, the 0.0 V Input, the 11111111 ADC, and the Motor Enabled button.

- **Screenshot when the Consumer is running and show semaphore changes.**

Current thread ID (stored at 0x35) is 0, which is the thread of Consumer. The semaphore `full` (stored at 0x25) changes into 0, which indicates there's no full buffer. The semaphore `empty` (stored at 0x24) changes into 1, which indicates there is 1 empty buffer.

The screenshot displays the Proteus 8.09 SP3 environment during a simulation of an 8051 microcontroller. The central window shows the assembly code for the Consumer thread, which is currently running. The code includes instructions for decrementing a counter, popping the stack, moving data, and jumping. The status bar at the bottom shows the current thread ID as 0. The right-hand pane shows the I/O map, listing various hardware components like the Display-select Decoder, Keypad, and ADC. The bottom-most pane shows a graphical representation of the hardware, including a keypad, a display, and various control buttons.