First of all, I created producer thread, system v semaphores and then consumer thread. Semaphores' initial values are zero. One of them holds (number of 1's)x2 and one of them holds number of (number of 2's)x2. I will explain why they hold doubles of them.

Producer thread starts reading the file and it prints the value read and values of semaphores. It increments the corresponding semaphore by 1 and then it takes updated values of semaphore and it prints the actual number of ones and twos. After that, it increases the number of read value's semaphore by 1. When we printing the numbers to the screen, we divided them by two. I did not want consumer to decrement values of semaphore before producer prints that it delivered the read number. So, actual numbers could be printed. When producer is done, it closes the file and exits. Because it is a detached thread, main function does not call pthread_join function for this thread.

Consumer function tries to decrement semaphores by two. Until it consumes N item, when sufficient number is encountered it continues to consume.

SIG_INT is handled carefully. Program clears everything and then exits. Program shows how many microseconds and seconds have passed since the program start. I achieved all requirements in this homework.

Partion of output (without SIG_INT):

```
seconds: 0 microseconds: 428140 Supplier: delivered a '2'. Post-delivery amounts: 2 x '1', 1 x '2'.
seconds: 0 microseconds: 428196 Supplier: read from input a '1'. Current amounts: 1 x '1', 0 x '2'.
seconds: 0 microseconds: 428234 Consumer-5 at iteration 4 (consumed). Post-consumption amounts: 1 x '1', 0 x '2'.
seconds: 0 microseconds: 428308 Consumer-5 has left.
seconds: 0 microseconds: 428409 Supplier: delivered a '1'. Post-delivery amounts: 2 x '1', 0 x '2'.
seconds: 0 microseconds: 428479 Supplier: read from input a '1'. Current amounts: 2 x '1', 0 x '2'.
seconds: 0 microseconds: 428521 Supplier: delivered a '1'. Post-delivery amounts: 3 x '1', 0 x '2'.
seconds: 0 microseconds: 428573 Supplier: read from input a '2'. Current amounts: 3 x '1', 0 x '2'.
seconds: 0 microseconds: 428612 Supplier: delivered a '2'. Post-delivery amounts: 3 x '1', 1 x '2'.
seconds: 0 microseconds: 428665 Supplier: read from input a '2'. Current amounts: 2 x '1', 0 x '2'.
seconds: 0 microseconds: 428696 Consumer-6 at iteration 4 (consumed). Post-consumption amounts: 2 x '1', 0 x '2'.
seconds: 0 microseconds: 428756 Consumer-6 has left.
seconds: 0 microseconds: 428822 Supplier: delivered a '2'. Post-delivery amounts: 2 x '1', 1 x '2'.
seconds: 0 microseconds: 428962 Supplier: read from input a '1'. Current amounts: 1 x '1', 0 x '2'.
seconds: 0 microseconds: 428917 Consumer-4 at iteration 4 (consumed). Post-consumption amounts: 1 x '1', 0 x '2'.
seconds: 0 microseconds: 429045 Supplier: delivered a '1'. Post-delivery amounts: 2 x '1', 0 x '2'.
seconds: 0 microseconds: 429070 Consumer-4 has left.
seconds: 0 microseconds: 429175 Supplier: read from input a '2'. Current amounts: 2 x '1', 0 x '2'.
seconds: 0 microseconds: 429215 Supplier: delivered a '2'. Post-delivery amounts: 2 x '1', 1 x '2'.
seconds: 0 microseconds: 429264 Consumer-8 at iteration 4 (consumed). Post-consumption amounts: 1 x '1', 0 x '2'.
seconds: 0 microseconds: 429318 Supplier: read from input a '2'. Current amounts: 1 x '1', 0 x '2'.
seconds: 0 microseconds: 429383 Consumer-8 has left.
seconds: 0 microseconds: 429413 Supplier: delivered a '2'. Post-delivery amounts: 1 x '1', 1 x '2'.
seconds: 0 microseconds: 429499 Consumer-9 at iteration 4 (consumed). Post-consumption amounts: 0 x '1', 0 x '2'.
seconds: 0 microseconds: 429620 Consumer-9 has left.
seconds: 0 microseconds: 429646 Supplier: read from input a '1'. Current amounts: 0 x '1', 0 x '2'.
seconds: 0 microseconds: 429725 Supplier: delivered a '1'. Post-delivery amounts: 1 x '1', 0 x '2'.
seconds: 0 microseconds: 429779 Supplier: read from input a '1'. Current amounts: 1 x '1', 0 x '2'.
seconds: 0 microseconds: 429818 Supplier: delivered a '1'. Post-delivery amounts: 2 x '1', 0 x '2'.
seconds: 0 microseconds: 429869 Supplier: read from input a '2'. Current amounts: 2 x '1', 0 x '2'.
seconds: 0 microseconds: 429907 Supplier: delivered a '2'. Post-delivery amounts: 2 x '1', 1 x '2'.
seconds: 0 microseconds: 429961 Consumer-10 at iteration 4 (consumed). Post-consumption amounts: 1 x '1', 0 x '2'.
seconds: 0 microseconds: 430028 Supplier: read from input a '1'. Current amounts: 1 x '1', 0 x '2'.
seconds: 0 microseconds: 430098 Consumer-10 has left.
seconds: 0 microseconds: 430126 Supplier: delivered a '1'. Post-delivery amounts: 2 x '1', 0 x '2'.
seconds: 0 microseconds: 430254 Supplier: read from input a '2'. Current amounts: 2 x '1', 0 x '2'.
seconds: 0 microseconds: 430298 Supplier: delivered a '2'. Post-delivery amounts: 2 x '1', 1 x '2'.
seconds: 0 microseconds: 430397 Supplier: read from input a '2'. Current amounts: 1 x '1', 0 x '2'.
seconds: 0 microseconds: 430350 Consumer-2 at iteration 4 (consumed). Post-consumption amounts: 1 x '1', 0 x '2'.
seconds: 0 microseconds: 430462 Consumer-2 has left.
seconds: 0 microseconds: 430493 Supplier: delivered a '2'. Post-delivery amounts: 1 x '1', 1 x '2'.
seconds: 0 microseconds: 430588 Consumer-7 at iteration 4 (consumed). Post-consumption amounts: 0 x '1', 0 x '2'.
seconds: 0 microseconds: 434027 The Supplier has left
seconds: 0 microseconds: 436314 Consumer-7 has left.
==26474==
==26474== HEAP SUMMARY:
==26474==     in use at exit: 0 bytes in 0 blocks
==26474==   total heap usage: 18 allocs, 18 frees, 4,822 bytes allocated
==26474==
==26474== All heap blocks were freed -- no leaks are possible
==26474==
==26474== Use --track-origins=yes to see where uninitialised values come from
==26474== For lists of detected and suppressed errors, rerun with: -s
==26474== ERROR SUMMARY: 250 errors from 3 contexts (suppressed: 0 from 0)
mustafa@mustafa-Aspire-A515-52G:/media/mustafa/Yerel Disk 2/3_Sinif_2_Donem/System Programming/hw4/1801042627$
```

Partion of output (with SIG_INT):

```
seconds: 4 microseconds: 428674 Supplier: read from input a ‘2’. Current amounts: 1 x ‘1’, 0 x ‘2’.
seconds: 4 microseconds: 429039 Supplier: delivered a ‘2’. Post-delivery amounts: 1 x ‘1’, 1 x ‘2’.
seconds: 4 microseconds: 430825 Consumer-2 at iteration 0 (consumed). Post-consumption amounts: 0 x ‘1’, 0 x ‘2’.
seconds: 6 microseconds: 429615 Supplier: read from input a ‘1’. Current amounts: 0 x ‘1’, 0 x ‘2’.
seconds: 6 microseconds: 429854 Supplier: delivered a ‘1’. Post-delivery amounts: 1 x ‘1’, 0 x ‘2’.
seconds: 7 microseconds: 435911 Consumer-2 at iteration 1 (waiting). Current amounts: 1 x ‘1’, 0 x ‘2’.
seconds: 8 microseconds: 430584 Supplier: read from input a ‘2’. Current amounts: 1 x ‘1’, 0 x ‘2’.
seconds: 8 microseconds: 430851 Supplier: delivered a ‘2’. Post-delivery amounts: 1 x ‘1’, 1 x ‘2’.
seconds: 8 microseconds: 431165 Consumer-7 at iteration 0 (consumed). Post-consumption amounts: 0 x ‘1’, 0 x ‘2’.
seconds: 10 microseconds: 431457 Supplier: read from input a ‘1’. Current amounts: 0 x ‘1’, 0 x ‘2’.
seconds: 10 microseconds: 431517 Supplier: delivered a ‘1’. Post-delivery amounts: 1 x ‘1’, 0 x ‘2’.
seconds: 11 microseconds: 431808 Consumer-7 at iteration 1 (waiting). Current amounts: 1 x ‘1’, 0 x ‘2’.
seconds: 12 microseconds: 432116 Supplier: read from input a ‘2’. Current amounts: 1 x ‘1’, 0 x ‘2’.
seconds: 12 microseconds: 432380 Supplier: delivered a ‘2’. Post-delivery amounts: 1 x ‘1’, 1 x ‘2’.
seconds: 12 microseconds: 432750 Consumer-4 at iteration 0 (consumed). Post-consumption amounts: 0 x ‘1’, 0 x ‘2’.
seconds: 14 microseconds: 432918 Supplier: read from input a ‘1’. Current amounts: 0 x ‘1’, 0 x ‘2’.
seconds: 14 microseconds: 433132 Supplier: delivered a ‘1’. Post-delivery amounts: 1 x ‘1’, 0 x ‘2’.
seconds: 15 microseconds: 433184 Consumer-4 at iteration 1 (waiting). Current amounts: 1 x ‘1’, 0 x ‘2’.
seconds: 16 microseconds: 433821 Supplier: read from input a ‘2’. Current amounts: 1 x ‘1’, 0 x ‘2’.
seconds: 16 microseconds: 434112 Supplier: delivered a ‘2’. Post-delivery amounts: 1 x ‘1’, 1 x ‘2’.
seconds: 16 microseconds: 434521 Consumer-9 at iteration 0 (consumed). Post-consumption amounts: 0 x ‘1’, 0 x ‘2’.
seconds: 18 microseconds: 435015 Supplier: read from input a ‘1’. Current amounts: 0 x ‘1’, 0 x ‘2’.
seconds: 18 microseconds: 435286 Supplier: delivered a ‘1’. Post-delivery amounts: 1 x ‘1’, 0 x ‘2’.
seconds: 19 microseconds: 435254 Consumer-9 at iteration 1 (waiting). Current amounts: 1 x ‘1’, 0 x ‘2’.
seconds: 20 microseconds: 436111 Supplier: read from input a ‘2’. Current amounts: 1 x ‘1’, 0 x ‘2’.
seconds: 20 microseconds: 436359 Supplier: delivered a ‘2’. Post-delivery amounts: 1 x ‘1’, 1 x ‘2’.
seconds: 20 microseconds: 436657 Consumer-6 at iteration 0 (consumed). Post-consumption amounts: 0 x ‘1’, 0 x ‘2’.
seconds: 22 microseconds: 436727 Supplier: read from input a ‘1’. Current amounts: 0 x ‘1’, 0 x ‘2’.
seconds: 22 microseconds: 436821 Supplier: delivered a ‘1’. Post-delivery amounts: 1 x ‘1’, 0 x ‘2’.
seconds: 23 microseconds: 436992 Consumer-6 at iteration 1 (waiting). Current amounts: 1 x ‘1’, 0 x ‘2’.
seconds: 24 microseconds: 437108 Supplier: read from input a ‘2’. Current amounts: 1 x ‘1’, 0 x ‘2’.
seconds: 24 microseconds: 437269 Supplier: delivered a ‘2’. Post-delivery amounts: 1 x ‘1’, 1 x ‘2’.
seconds: 24 microseconds: 437434 Consumer-5 at iteration 0 (consumed). Post-consumption amounts: 0 x ‘1’, 0 x ‘2’.
==29044==
==29044== HEAP SUMMARY:
==29044==     in use at exit: 0 bytes in 0 blocks
==29044==   total heap usage: 18 allocs, 18 frees, 4,822 bytes allocated
==29044==
==29044== All heap blocks were freed -- no leaks are possible
==29044==
==29044== Use --track-origins=yes to see where uninitialised values come from
==29044== For lists of detected and suppressed errors, rerun with: -s
==29044== ERROR SUMMARY: 39 errors from 3 contexts (suppressed: 0 from 0)
mustafa@mustafa-Aspire-A515-52G:/media/mustafa/Yerel Disk 2/3_Sınıf_2_Donem/System Programming/hw4/1801042627$
```