

#1 Review: Consumer-Producer practice question

Consumer-Producer uses a fixed size ring buffer. `s1` is initialized to 256 and `s2` is initialized to zero. There are 50 producer threads & 50 consumer threads.

- i) Can it deadlock, if so, under what conditions?
- ii) Is underflow possible? (underflow=Able to read/write before the start e.g. dequeue succeeds even though the data structure is empty)
- iii) Is overflow possible? (overflow=Able to read/write after the end e.g. enqueue succeeds even though data structure is full)

Consider the following attempt. Assume buffer has 256 entries.

<pre>enqueue(value) mutex_lock(m) sem_wait(s1) sem_post(s2) buffer[(in++) & 255] = value mutex_unlock(m)</pre>	<pre>dequeue() sem_wait(s2) sem_post(s1) mutex_lock(m) result=buffer[(out++) & 255] mutex_unlock(m) return result</pre>
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#2 Review: pthread practice question. What can the following code print? Assume `puts` is atomic.

```
void* funcA(void* ptr) { pthread_exit(((char*)ptr) + 1); }
void* funcB(void* ptr) { puts(ptr); }
```

```
int main() {
  pthread_create(&tidA,NULL,funcA,"ABC");
  pthread_create(&tidB,NULL,funcB,"XYZ");
  pthread_join(tidA, &result);
  puts(result);
  // pthread_exit(NULL)
}
```

#3 Would your answer change if main also called `pthread_exit(NULL)` ?#4 Working with errors: `errno`, `strerror`, `perror`

What is `errno` and when is it set?

What about multiple threads?

#5 Working with `errno` and `strerror`

When is `errno` set to zero?

What are the gotchas of using `errno`?

How can you print out the string message associated with a particular error number?

What are the gotchas of using `strerror`?

#6 Interrupted system calls. AKA Correctly Handling `EINTR`

What is `EINTR`? What does it mean for `sem_wait`? `read`? `write`? `sleep`?

#7 Restarting interrupted sleep calls

e.g. SIGCHLD interrupted the sleeping parent!

```
01  ssize_t sleep_restart(int seconds) {  
02  //unsigned int remain = sleep(seconds)  
03
```

```
04
```

8. Correctly using `write` (IMPORTANT FOR NETWORKING)

i) May not send all bytes for slow devices (=network)

ii) May return -1 and `errno` is `EINTR`

```
01  ssize_t write_all(int fd, void*buffer, size_t len) {  
02  //Can't just call write(fd, buffer,len);  
03
```

```
04
```

9. Network concepts

What is IP4?

What is 127.0.0.1?

What is a port?

Can my programs listen on any port?

What is UDP? When is it used?

What is TCP? When is it used?