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| CS 241 | #24 Errors. Write/Read Restarts.Networking intro |

#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.

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| enqueue(value)  mutex\_lock(m)  sem\_wait(s1)  sem\_post(s2)  buffer[(in++) & 255] = value  mutex\_unlock(m) | dequeue()  sem\_wait(s2)  sem\_post(s1)  mutex\_lock(m)  result=buffer[(out++) & 255]  mutex\_unlock(m)  return result |

#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 Handing EINTR

What is EINTR? What does it mean for sem\_wait? read? write? sleep?

#7 Restarting interrupted sleep calls

e.g. SIGCHILD interrupted the sleeping parent!

1. ssize\_t sleep\_restart(int seconds) {
2. //unsigned int remain = sleep(seconds)

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

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| 1. ssize\_t write\_all(int fd, void\*buffer, size\_t len) { 2. //Can't just call write(fd, buffer,len); |

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?