



12 Pages

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1	Student Number	P149885
2	Title of Examination Paper	Network Multiplayer Games
3	Module Code	M6X01105
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6	Seat Number	G056
7	Number of Answer Books handed in	1

[illegible]

- 2d) MAC is a layer 2 protocol which is used to connect two devices. A non-deterministic MAC is good because it's able to receive and send different forms of data. The drawbacks are that this method may be relatively slow and cause delays in the player's game, which could be the difference between the player's death and their living.

2b) 199.7.10.0 $N=9$ $M_h=12$

$$2^n - 2 \geq N$$

$$2^1 - 2 \geq 9$$

$$2^1 - 2 = 0 \geq 9 \text{ no good}$$

$$2^2 - 2 = 2 \geq 9 \text{ no good}$$

$$2^3 - 2 = 6 \geq 9 \text{ no good}$$

$$2^4 - 2 = 14 \geq 9 \text{ good}$$

Number of host bits is 8

$$h = 8 - 4 = 4$$

$$N_h = 2^h - 2$$

$$2^4 - 2 = 14$$

14 > 12 so continue

So 4 bits are reserved from the host.

$$11110000 = 240$$

255.255.255.240 Class C

Follow draw for step

$$N_h = 2^h - 2$$

sub Host

$$0001\ 0001 = 17, 199.7.10.17 \text{ first}$$

$$0001\ 0010 = 18, 199.7.10.18$$

$$0001\ 0011 = 19, 199.7.10.19$$

$$0001\ 0100 = 20, 199.7.10.20$$

... to ...

$$0001\ 1110 = 30, 199.7.10.30 \text{ last}$$

Continues on next page

2b) Continued from last page...

All 2's can't be used and neither can all 0's as they are both reserved.

The ranges for this subnet are:

199.7.10.17 to 199.7.10.30	} First 3 ranges.
199.7.10.33 to 199.7.10.46	
199.7.10.49 to 199.7.10.62	
199.7.10.65 to 199.7.10.78	

15.

(18)

4a) Consistency:

- Required as the data that each player receives must be the same and their systems must know what to expect.
- Everything in the game world should be the same for everyone.
- May require a lot of information to be sent.

~~Responsiveness~~

Responsiveness:

- A game such as a First-person shooter would require responsiveness due to any form of delay possibly causing the player's death, ruining the enjoyment of the player.
- Game may not be consistent.

4b) Interpolation and dead reckoning.

4c) Dead reckoning:

An instance of an entity is stored on the player's machine as an object.

Dead reckoning algorithms:

- Static ~~object~~ velocity
- Constant acceleration
- Constant velocity.

When an entity such as a car is made on the server, nodes will be made and sent to the player's machine, this contains the entity's kinematic information such as:

- Velocity
- Acceleration and orientation
- entity's damage
- Dead reckoning algorithm

Threshold may also be set on the objects, so if an object goes outside the threshold, the server will update the client.

Question continued →

4d) Interpolation is about determining the path something will move in, using its start position and end position. ✓

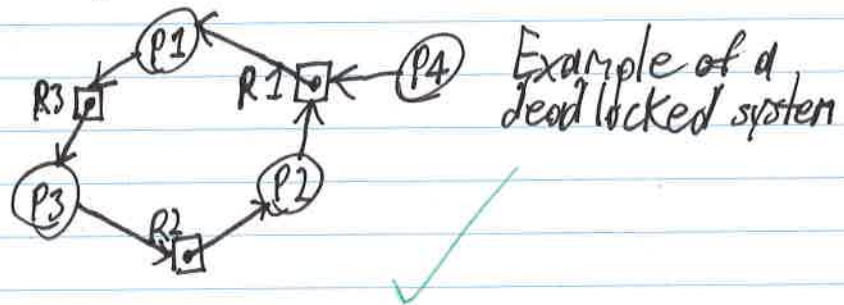
Extrapolation is about calculating the ~~ex~~ predicted position the object will be moving to, using its relevant details, such as start position and acceleration. ✓

4e) A threshold could be implemented, so if an object position is so different on the server compared to the client that the distance surpasses the threshold then the server will update the object in the client. This can however cause objects to jump around, a fix for this is to decrease the threshold size. 5.5

1a) ~~To increase the reliability, before sending any data they could first establish the connection through a 3-way handshake to make it connection oriented.~~

Please go to next page for next question

3d) Deadlock is when a chain of processes and resources are all ~~wait~~ waiting for each other.



To prevent deadlock a queue, could be implemented, so every new process gets the information it requires. A time based system could also be implemented so each process can only hold on ~~the~~ to their resource for a limited number of cycles. The processes may also be give priorities, so if a process with a higher priority needs a resource, it gets it. A wait function could also be used such as a mutex or semaphore to stop other processes from taking resources currently being used.

36.) Both mutexes and semaphores are used to stop multiple threads from trying to use the same resources, this stops data access violations from occurring.

2

Mutexes are generally used when it's one set of data that needs to be shared.

2

Semaphores are generally used when it's multiple sets of data that need to be shared, so you would have multiple instances of semaphores.

3

An example would be if the client slides object ~~has~~ is being moved, ~~on~~ but the server needs to update its location due thresholding. A Mutex or semaphore will stop an access violation from occurring and allow the object to be updating while it's still moving.

2

15

Next question on next page →

1a.) To increase the reliability, before sending any data they could first establish the connection ~~and~~ and use the 3-way handshake to make it connection-oriented. You could also use sequence numbers. Both the client and server will have the sequence numbers and it will tell the in what order the messages should arrive in, this method also allows any data ~~lost~~ due to the transfer to be easily recovered.

5

1b.) The Kernels will allow the use of multithreading, which will split the tasks up onto separate threads, improving its efficiency. The round-robin scheduling will ensure that each process can only hold onto a resource for a limited amount of time before giving it up. While the priority based scheduling is used so if a task of higher importance starts, it gets the resources it needs.

5