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ESP Homework (2)

Question 1

Part A) Concept Explanation

- 1) A **field** refers to a set of values in a table that holds a specific type of data. In relational databases a common field could be used to link two files together.
- 2) **Bus topology** is a type of network setup where all devices are connected to a single central cable called bus. This setup has some benefits like being cost-effective but also some disadvantages as network congestion.
- 3) **Lossy compression** is a technique to reduce file size by permanently removing some data which is considered to be less important. It helps in saving storage and bandwidth. It also makes video streaming and sharing more efficient.
- 4) An **input device** is an equipment that allows users to enter data, commands, or signals into a computer or other information processing system, such as interactive whiteboards and biometric authentication systems.

Part B) Database Improvement Recommendation

This approach does not follow basic database normalization principles, specifically First Normal Form or 1NF, which requires **atomic data**. It may also cause other problems, such as difficulty in searching and sorting, as well as integrity issues, since different attributes of students are stored in a single database field.

To correctly redesign this database, we should separate these key attributes and keep each of them in a unique field with an appropriate data type. Correctly implemented database may look like this:

Student ID (Number)	First Name (Text)	Last Name (Text)	Email (Text)
403105793	Arvin	Baghal Asl	asliarvin@gmail.com
...

This implementation also enhances query capabilities, making extracting specific information (e.g. filtering students by ID or their email address) easier.

Part C) Multimedia Management Proposal

I'd recommend the academy to use MP4 as the preferred video file format. Because it offers high compression efficiency which means the file size will reduce while maintaining good quality. MP4 is optimized for streaming and It's also widely compatible (works on most devices and browsers).

By using MP4 format, file size would be reduced due to redundant data deletion during compression and streaming performance will be improved. Modern codecs of MP4 like H.265 also maintain high quality in lower sizes.

Part D) Network Topology Decision

In bus topology, devices are connected directly to a single cable, while in star topology, devices are connected to a central hub or switch. Although Bus topology is suitable for small and low-cost networks, it will suffer from performance and reliability issues in larger scales, so switching to star topology would surely be beneficial to company. Some advantages of star topology over bus topology are higher performance and greater reliability. Star topology is faster and more efficient because each device has a dedicated connection while bus topology is slower due to data collisions. In a bus topology if the main cable fails the whole network goes down whereas in a star topology if one of the devices fail the system remains functional. The star topology is also more scalable and easier to troubleshoot.

Question 2

Part A) Fill in the blanks

- 1) Reinforcement learning (RL)
- 2) Procedural content generation (PCG)
- 3) Behavior trees
- 4) Generative AI models (based on LLMs and CNNs)

Part B) Match the Term to Its Definition

1. Reinforcement Learning: Training AI to improve performance through feedback
2. Procedural Content Generation: Creation of assets, worlds, or levels using algorithms

3. Behavior trees: Systems for structured decision-making in NPC behavior
4. Generative AI: Producing new dialogues, images, or stories based on learning models

Part C) Best Interpretation

1. Why are behavior trees preferred over static scripting for modern NPCs?

B) They allow characters to make flexible, situational decisions

Part D) True or False? (Explain briefly)

1. **False**

Explain: Procedural content generation (PCG) creates levels dynamically using algorithms. Which means each player may experience different environments based on randomization.

2. **True**

Explain: Generative AI models are used to create realistic dialogues and procedural storylines. So they could personalize story arcs based on interactions with player.

Question 3

1. (2) human intelligence
2. (1) To name one of the disciplines among others that are used in building machines with artificial intelligence
3. (3) used to be considered as a yardstick for defining artificial intelligence
4. (4) Fundamental
5. (4) Chess-playing computer