0x09-web_infrastructure_design

Task1 explanations:

I. **Infrastructure Components:**
    1. **Server 1 (Primary Web Server):**
        Hosts website's static content (HTML, CSS, JavaScript).
    2. **Server 2 (Replica Web Server):**
        A replica of the primary web server, hosting identical static content.
    3. **Web Server (Nginx):**
        Handles user requests and serves web pages.
    4. **Application Server:**
        Manages dynamic content, interacts with the database.
    5. **Load Balancer (HAproxy):**
        Distributes user requests evenly between primary and replica web servers for performance and redundancy.
    6. **Application Files (Code Base):**
        Instructions/code for building the website, used by the application server.
    7. **Database (MySQL):**
        Stores and retrieves data like user profiles, posts, and comments.

II. **Additional Elements Explained:**
    - **Primary and Replica Web Servers:** Added for redundancy; if one fails, the other can still serve the website.
    - **Load Balancer:** Balances user requests between servers for better performance and fault tolerance.
    - **Database Cluster:** Improves database performance and data availability in case one node fails.

III. **Load Balancer Configuration:**
    - HAproxy uses a Round Robin distribution algorithm, sending requests to each server in turn, ensuring even traffic distribution.

IV. **Active-Active vs. Active-Passive Setup:**
    - This infrastructure uses an Active-Active setup, where both primary and replica web servers are active and serve traffic simultaneously. In Active-Passive, only one server is active while the other remains on standby as a backup.

V. **Database Primary-Replica (Master-Slave) Cluster:**
    - Primary handles write operations, replicating data to the replica. The replica serves read requests and ensures data redundancy.

VI. **Difference Between Primary and Replica for the Application:**
    - Primary handles write operations, like adding new data to the database.
    - The replica is used for read operations, such as displaying existing data. It reduces the load on the primary and improves performance.

VII. **Issues with this Infrastructure:**
    1. **Single Points of Failure (SPOF):**
        - The load balancer could become a single point of failure if it fails.
        - There's a lack of redundancy for the load balancer itself.
    2. **Security Issues:**
        - No mention of a firewall, which is essential for securing the infrastructure.
        - No mention of HTTPS, leaving data transmission unencrypted.
    3. **Monitoring Missing:**
        - There's no monitoring system in place to detect and address issues proactively, which is crucial for maintaining uptime and performance.