ALX PROJECT: Web Infrastructure Design

Task 1. Distributed web infrastructure
Definitions and Explanations.
1. For every additional element, why you are adding it:
Incorporating an additional server is essential to introduce a load balancer, ensuring effective management of excessive incoming traffic. This step not only addresses the challenge of potential traffic overload but also eliminates the risk associated with a single point of failure, which may arise when relying on a solitary server.
2. What distribution algorithm your load balancer is configured with and how it works:
The Round Robin algorithm employed by our load balancer establishes connections in a sequential order, unless a server is offline. Requests are systematically distributed, one after another, to the servers. Once a request reaches the last server, the sequence recommences from the first server. This algorithm is particularly effective when servers share similar specifications and when there are limited persistent connections.
3. Is your load-balancer enabling an Active-Active or Active-Passive setup, explain the difference between both:
The utilization of a load balancer facilitates an Active-Active configuration, where both nodes (servers) concurrently operate the same service. Conversely, in an Active-Passive arrangement, not all nodes remain active. For instance, in a two-node setup, if the first node is active, the second node assumes a passive or standby role. The primary distinction between these architectures lies in performance. Active-Active clusters grant continuous access to the resources of all servers during regular operations, whereas an Active-Passive cluster only activates the backup server during failover events
4. In Master-Slave replication, data originating from a single database server (the master) undergoes replication to one or more additional database servers (the slaves). The master server records updates, and these changes subsequently propagate to the slave servers. If modifications occur simultaneously on both the master and slave, the process is synchronous. Conversely, if changes are queued and written later, it is considered asynchronous. This replication method is commonly employed to distribute read access across multiple servers to enhance scalability. However, it can also serve other purposes, such as facilitating failover or conducting data analysis on the slave server to prevent overloading the master
5. What is the difference between the Primary node and the Replica node in regard to the application:
 A replica node functions as a duplicate of the primary node, serving as a backup by offering redundant copies of the application codebase. This redundancy is essential to safeguard against hardware failures and enhance the system's capacity to handle read requests, such as searching or retrieving documents

Issues
A. SPOF, denoting Single Point Of Failure, is a notable vulnerability in this infrastructure, primarily arising from the reliance on a singular load balancer
B. Security concerns (absence of firewall and lack of HTTPS) are substantial. Notably, the application's reliance on the insecure HTTP protocol exposes sensitive information, including

passwords, to potential interception by an attacker positioned in the middle. Furthermore, the absence of a firewall creates vulnerabilities, making the system susceptible to denial-of-service (DoS or DDoS) attacks. Such attacks have the potential to cause significant downtime or enable malicious actors to breach the system, exploiting undisclosed open ports and facilitating data exfiltration.

C. Absence of monitoring: In the tech industry, a well-known saying emphasizes the importance of measuring what you aim to fix or enhance. Establishing monitoring for the server, website, or application is crucial, as it enables the owner to promptly identify issues, downtimes, or security threats, addressing them proactively before they escalate. This proactive approach not only enhances productivity but also has the potential to reduce IT support costs. Additionally, it contributes to an overall improvement in user experience.

References

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