ALX Project

Web infrastructure design

Task 3.
Definitions and Explanations.

1. **For every additional element, why are adding it**; we have added one server and one load balancer. Adding the new server has allowed us to separate each component (web server; Nginx, Application server; code base and Database; MySQL) in there own server and yet having one extra server with all the components to serve as a backup if any of the components or server fails. Each server is being monitored and has a firewall. We have also added an extra load balancer that will assist in handling more traffic across the whole infrastructure.

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Task 2.

Definitions and Explanations.

1. **For every additional element, why are adding it**; we have added three new components; a firewall for each server to protect them from being attacked and exploited, 1 SSL certificate to server `www.foobar.com` over HTTPS and three monitoring clients that will collect logs and send them to our data collector Sumologic.
2. **What are firewalls for**; is a network security system that monitors and controls incoming and outgoing network traffic based on predetermined security rules. It basically establishes a barrier between a trusted network and an untrusted network.
3. **Why is the traffic served over HTTPS**; because previously the traffic was passed over Hypertext Transfer Protocol (**HTTP**) which transfers data in plain text while **HTTPS** is secure where the data is encrypted using Transfer Layer Security (**TLS**).
4. **What monitoring is used for**; it provides the capability to detect and diagnose any web application performance issues proactively.
5. **How the monitoring tool is collecting data**; it collects logs of the application server, MySQL Database and Nginx web server. A log in a computing context is the automatically produced and time-stamped documentation of events relevant to a particular system.
6. **Explain what to do if you want to monitor your web server QPS**; one web server handles 1K queries per second (**QPS**), I would basically monitor it from the network and application level.

Issues

A. **Why terminating SSL at the load balancer level is an issue**; it is an issue because decryption is resource and CPU intensive. Placing the decryption burden on the load balancer enables the server to spend processing power on application tasks but to be honest I don't know see the issue to be honest (I will update this).

B. **Why having only one MySQL server capable of accepting writes is an issue**; because once it is down it means do data can be added or updated meaning some features of the application won't work.

C. **Why having servers with all the same components (database, web server and application server) might be a problem**; this is because once you have a bug in one of the components in one of the servers then the bug will be valid in the other servers.

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Task 1.

Definitions and Explanations.

1. **For every additional element, why are adding it**; Adding a new server so that we can be able to add a load balancer to handle too much incoming traffic and also enable us to eliminate a single point of failure which could occur by having just one server.
2. **What distribution algorithm your load balancer is configured with and how it works**; Our load balancer uses the Round Robin algorithm which connects in order unless a server is down. Requests are served by the server sequentially one after another. After sending the request to the last server, it starts from the first server again. This algorithm is used when servers are of equal specification and there are not many persistent connections.
3. **Is your load-balancer enabling an Active-Active or Active-Passive setup, explain the difference between both**; The load balancer enables an **Active-Active** setup where both nodes (servers) are actively running the same kind of service simultaneously. While in an **Active-Passive** setup, not all nodes are going to be active. In the case of two nodes, if the first node is already active, the second node must be passive or on standby. The key difference between these two architectures is performance. Active-active clusters give you access to the resources of all your servers during normal operation. In an active-passive cluster, the backup server only sees action during failover.
4. **How a database Primary-Replica (Master-Slave) cluster works;** master-slave replication enables data from one database server (the master) to be replicated to one or more other database servers (the slaves). The master logs the updates, which then ripple through the slaves. If the changes are made to the master and slave at the same time, it is synchronous. If changes are queued up and written later, it is asynchronous. It is usually used to spread read access on multiple servers for scalability, although it can also be used for other purposes such as for failover, or analyzing data on the slave in order not to overload the master.
5. **What is the difference between the Primary node and the Replica node in regard to the application**; A replica node is a copy of the primary node, they provide redundant copies of the application codebase to protect against hardware failure and increase capacity to serve read requests like searching or retrieving a document.