Web infrastructure design

Task 1

For every additional element, why you 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 and improve the performance and security

What distribution algorithm your load balancer is configured with and how it works

Our load balancer uses the Round Robin algorithm, Round Robin passes each new connection request to the next server in line, eventually distributing connections evenly across the array of machines being load balanced. Round Robin works well in most configurations, but could be better if the equipment that you are load balancing is not roughly equal in processing speed, connection speed, and/or memory.

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.

How a database Primary-Replica (Master-Slave) cluster works

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.

What is the difference between the Primary node and the Replica node in regard to the application?

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

Issues

A. SPOF
The major single point of failure in this infrastructure is having only one load balancer.

B. Security issues (no firewall, no HTTPS)

Major security issues involve having the application communicate over HTTP protocol that is not secure and can allow an attacker (who may be in the middle) to view sensitive information (since HTTP transfers plain texts) like passwords. Also since the application doesn't have a firewall, this can allow an attacker to perform a denial of service attack that may cause a major downtime in the system, or allow a malicious attacker to breach the system exploiting unknown open ports and perform data exfiltration.

C. No monitoring
"You cannot fix or improve what you cannot measure" is a famous saying in the tech industry. Monitor in the server, website, or application in general, would allow the owner to identify any problems, downtime, or security threats and resolve them quickly before they turn into a serious problem. It will also improve productivity and possibly save some costs on IT support. As well as improve user experience in general.