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Web infrastructure design

Task 1: 1-distributed_web_infrastructure

Explanations

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.

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.

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. The passive(failover) server serves as a backup that's ready to take over as soon as the active(primary) server gets disconnected or is unable to serve, an active-passive failover for when a node fails.

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. Master-slave replication can be either synchronous or asynchronous. The differences is simply the timing of propagation of changes. 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: 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. The primary accepts all write operations. The secondary replica node replicate the operations log to apply to their data sets

Issues

SPOF (Single Point Of Failure); The major SPOF in this infrastructure is having only one load balancer or an arrays of servers is networked through a single network switch.

Security issues (no firewall, no HTTPS): Major security issues involve having the application communicate over HTTP protocol that is not secure. Since the application doesn't have a firewall, This can allow an attacker to perform a denial of service attack (DOS or DDOS) 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.

No monitoring: Monitoring the server, website, or application in general, would allow the owner to identify any problems, requests, downtime, API, 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.