Replication and redundancy

One replication technique is to have multiple (such as three) redundant instances/copies of a component, so up to two can be simultaneously down without affecting uptime. As discussed in chapter 4, update operations are usually assigned a particular host, so update performance is affected only if the other hosts are on different data centers geographically further away from the requester, but reads are often done on all replicas, so read performance decreases when components are down.

One instance is designated as the source of truth (often called the leader), while the other two components are designated as replicas (or followers). There are various possible arrangements of the replicas. One replica is on a different server rack within the same data center, and another replica is in a different data center. Another arrangement is to have all three instances on different data centers, which maximizes fault-tolerance with the tradeoff of lower performance.

An example is the Hadoop Distributed File System (HDFS), which has a configurable property called “replication factor” to set the number of copies of any block. The default value is three. Replication also helps to increase availability.