Word Count: 404

One of the weaknesses associated with software is that software's are especially likely to fail. If we are running services like AWS, for an hour average, one in a thousand server will fail. This kind of failure rate is high when it comes to businesses that are vulnerable to failures, such as banking system, where one failure that even last a very short amount of time of security system could lead to millions or billions of dollars loss. So, engineers need ways to mitigate this problem.

One of the most prevalent ways to mitigate hardware failure is through backup servers. Even though running backup servers may cost multiple times the money for maintenance of the servers, it could very effectively solve the problem. Every time a system fails, the backups take over. Since backups get constantly updated with the newest change in the original system, it would continue without losing a single step. If we are really worried about the failure of some infrastructure such as Google file system, we may create multiple backup servers which are all updated with the original ones. For example, GFS has on average five backup servers. [1] So, we seldom see Google's services go down even though Google's customer number is really high.

One of the errors the book discuss is the incorrect phone bill in Qwest's billing software. 1.4 percent of the clients of the phone company received incorrect bills, charging up to $600 per minute for the use of their cell phones. I believe that my recommendations of backup servers could effectively prevent this problem from happening. Since sending out phone bills only happen once per month, we could double check the bills before sending without worrying about the cost of doing so. So, with the help of an up-to-date backup server, we could compare to see if all bills in the backup servers are rated the same. If they are, that means the bills are correct and vice versa, since the rate all backup servers gone wrong at the same time is quite low, especially when more backup servers are involved. If one or more of the numbers does not add up, we need to do a re-calculate on all servers until all of the numbers line up. This double-checking procedure, I believe, could mitigate the problem's happening chance to a minimum.

REF:

[1] Sanjay Ghemawat, ‘The Google File System’, online, accessible, https://static.googleusercontent.com/media/research.google.com/zh-CN//archive/gfs-sosp2003.pdf