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Experience with Grapevine: the growth of a distributed system

**What are the critical tradeoffs that were explored by Grapevine in the 1980s, and what benefits (and drawbacks) might we be facing today given the scale of the Internet as we know it today?**

Grapevine is a distributed registry service and message queuing management system. Its primary service is mail delivery. This paper analyzes deployment problems, strategies for overcoming these issues, and the effects taken from experience with the system over the course of a few years after it was first introduced and developed. The paper was written in 1984 and there has been considerable developments in Computer Networking since that time and the article helps me to understand how distributed systems were first designed.  Grapevine operates in the Xerox research internet and is a collection of Ethernet local networks. It was implemented at Xerox PARC in 1978-80 and was deployed throughout the company

From my own understanding of the article, Grapevine is basically divided into two sub-components, which are, the message system and the registry system. One of the main advantages of Grapevine is that the user service and the registration service is divided. The registration data base is distributed, replicated and makes use of recursion in its implementation, The Message Delivery system transports, buffers and delivers, and it is also distributed and replicated and expands the distribution lists. The client –server relationship that we have been learning of in class is important in Grapevine, and server programs run on server computers dedicated to Grapevine whilst Client programs run on the usual workstations. According to A.D Birrel et al in the article, “Grapevine: An exercise in Distributed Computing”, Grapevine is an all-in-one distributed service that has a DNS service, a mail service, a resource locating service and an authentication and access control service. Workstations and servers are connected by Ethernet and long distance network which is mainly by use of telephone lines (Birrel et al).

Some of the disadvantages of the Grapevine system include the fact that the user service is closely intertwined with the registration service, The Networking programming that is involved includes adding a server or a service, which can be very complicated. The configuration of the network is also very reliant on how the registration of the database is configured. Grapevine is only suitable to services with the same properties as the mail delivery and it has too much indirection and lacks clarity. Several issues need to be addressed concerning Grapevine and most of these problems are still being experienced nowadays in the world of the internet, some of the issues concerning Distributed Systems include security and authentication, fault tolerance, consistency and replication and the order of operations. As well as using algorithms that result in the greatest efficiency, i.e. the big O notation. The remote maintenance model was quite advanced. A quote from the article was particularly interesting to me, it says, "We are slowly forgetting the details of the implementation and thus becoming less able to predict the consequences of changes." Which means that perhaps there was lack of original documentation or records of the design process (Schroeder et al).

Grapevine was designed in such a way that messages in the inbox could be stacked and read in order LIFO and then the contained messages then deleted. The design of Grapevine was done in such a way that they wanted to ensure great reliability that is, for example a failure of one server should not prevent the client from communicating or make any kind of service unavailable to them. The most common cause of a server failure is a corrupted disk. If a disk has incorrect bits or some bugs because of either hardware or software failures., this causes the server to crash and not be able to restart, however, repairing disks is something that can be done since the information that is contained on the disks is usually low-level and as such can be corrected easier. Grapevine is also accused of lacking adaptability and flexibility, this is evidenced by the fact that some of Grapevine’s registries are becoming quite large, as a register grows large, it requires to be split between two different name servers and so the registry is usually divided into two different registries. It is important to note that Grapevine had an overwhelming influence on later distributed systems that were introduced, especially the DNS, book which are Domain Name Servers and the internet’s equivalent of a phone. One of the most significant features of Grapevine is Scalability. Scalability is the ability to be changed in size or in scale and in Grapevine, it is provided by means of partitioning, which means that users are stored in different registries. The system can be scaled by adding more servers rather than by increasing power of the existing servers (Schroeder et al).

The main or primary design features of Grapevine were transparency to the user and reliability. My main take away from this article and what I have leant about Grapevine and Distributed systems is that I could see how basic email was developed and enabled us to get to the current email services that we are currently using. Many of the problem that I mentioned in the earlier paragraphs about the problems associated with Grape vine are still even being experienced today. The suggestion that was mentioned in the two sources that I read all are of the general consensus that the source of the information has to be distributed in order to increase the performance. Another big takeaway I got is that, what actually happens in the background that the email user cannot see is fascinating, for example, the fact that the email inboxes are replicated, this is done in order to enable a user to get their mail even if the primary server is not working. I had no prior knowledge of distributed system before reading this article and now I wish I had taken the class and explored this aspect of Networking. My knowledge is still raw on the topic but I gained valuable insight and information by having to research and read on this article.

Works Cited

Birrel, et al. "*An Exercise in Distributed Computing." Grapevine*. N.p., n.d. Web. 22 Feb. 2017. <http://pages.cs.wisc.edu/~sschang/OS-Qual/distOS/grapevine.htm>.

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