# Hospital File Server Application for Data Management

*Department of Computer Science and Electronics, Universitas Gadjah Mada*
**2022**

Katarina Keishanti Joanne Kartakusuma - 21/472847/PA/20347
Santa Sisilia Filia Dulcis - 21/472864/PA/20349
Vania Clementine - 21/475023/PA/20509

***Abstract*— Computer network is an interconnection of several devices, also known as hosts, that are linked via various channels to send/receive data or media. A file server itself is a computer that stores and manages data files so that other computers on the same network may access them. It allows people to communicate information over a network without physically transferring data.**

## I. INTRODUCTION

### A. Problem Statement

Prior to the increase in the number of patients, the patient record system in every hospital was still done manually. Because of the rapid growth of hospitals, which is escalating patients, the record system must be done more promptly and effectively to avoid disordered data. In order to address this issue, hospitals may benefit from using a file server to simplify backups, secure data, prevent malware, and eliminate data buildup.

File server has numerous advantages that it is worth the consideration to migrate. It offers centrality which ensures each authorized network participant can access the stored files. This enables collaborative work on these files without version conflicts. File server is configured for remote access rather than the internet, quite like cloud storage, the files are accessible on the go. But unlike a cloud service, the business always maintains control over the files' security. This clearly has an advantage over alternatives from third parties as we control the files and security from our end. Disadvantages that one should know is file server is quite expensive, but that would not be an issue for a health institution.

Thus, our group believes utilizing file servers for hospital database systems would be a great choice as it would benefit and simplify the data system drastically.

### B. Related Work

There are some relevant studies on this topic, including Ahmad Fatoni (2010) who also held study on how to solve redundancy and inconsistency data in a school environment. In his work, he implemented his method using Windows 2000 Server, which is no longer eligible for regular support and security updates since July, 2010.

In this paper, we overcome the limitation of that previous study, as we apply our method to adjust the network design so that it suits a bigger environment.

## II. METHOD

### A. Network Infrastructure

A computer network is a system that links two or more computing devices in order to transfer and share data. Computing equipment ranges from a mobile phone to a server. Physical connections, such as fiber optics, are used to link these devices, although they can also be wireless. Computer networking is the field of computer science concerned with the design, maintenance, and security of computer networks. It combines computer science, computer engineering, and telecommunications.

Network infrastructure is a critical component of an organization's IT infrastructure since it is the broader collection of fundamental components that work together to run an IT network. Network infrastructure design can help you in planning the implementation, monitoring, and management of an IT network. After determining the operational requirements in terms of capacity, bandwidth, quality of service, security, and resilience, a design can be created. Network infrastructure can be a mix of hardware devices, software applications, and network services, including:

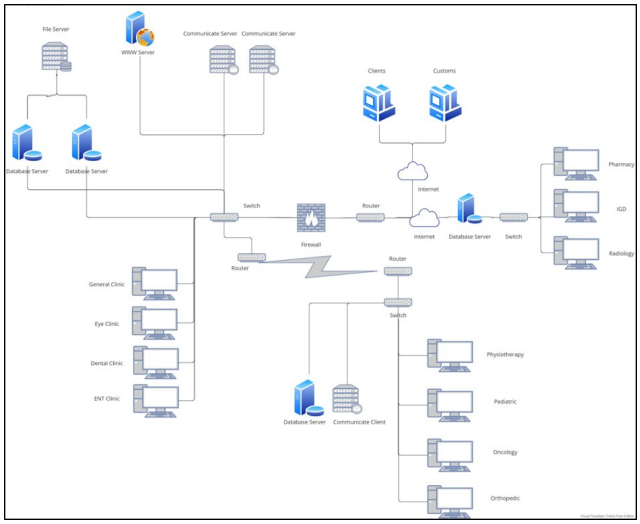
From the available infrastructure, our group used (but not limited to) these material, including :

- Hardware infrastructure
  - Routers
  - Switches
- Software infrastructure
  - Monitoring and management tools
  - Operating system
  - Firewall
  - Database server
- Network services
  - Network protocols
    - Transmission Control Protocol
    - User Datagram Protocol
    - Domain Name System
    - IP Addressing

We also ensure to make the infrastructure scalable. From all available topology, our group implemented star topology as it is very reliable; if one device fails, then the others won't be affected. Price wise, star topology is relatively cheaper since each device only needs one I/O port.

### *B. Analysis and Design*

According to the diagram, we connected the network with Wi-Fi (internet access) to each clinic as well as the servers via LAN cable to provide more security for the network. In this case, we used a file server to manage the data and a firewall to prevent data breaches. The desktop computers in the hospital were organized by floor and connected to switches. We also implemented extended star topology for scalability, making it sustainable if the hospital decided to add another clinic (adding more devices).

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## III. RESULTS

In this simulation, we use Cisco to build and simulate the topology. The main goal here in the result is to centralized all given data from any clusters to ease the data work.

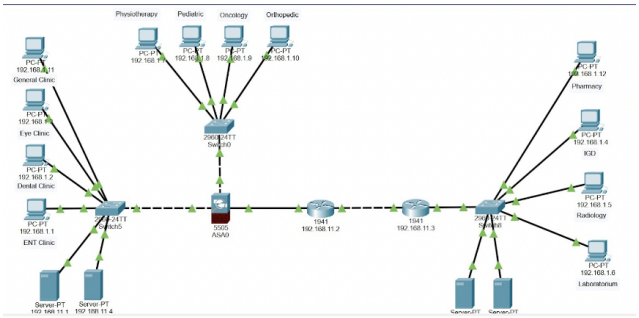
The new design we made is still stick to the concept we built as it still focuses on our main goal. The design mainly used the star topology because it suits the goal we want to achieve. The star topology has several advantages, some of which are:

- Highly efficient; each hospital will need an efficient system to manage a lot of data. The result here will have a high efficient flow because the star topology connects all the clinic into one system meaning the performance will be higher compared to other topology to ease the work of managing data.
- Centralized network; helps monitor the security of data network by using firewall.
- Safe to use; if it faces an obstacle, the system will only affect one node since the only way to take down the devices is by disabling the central core.
- Easy to manage; for a hospital that has a main goal to serve people, the data management should be easy to manage. In this system, the data is easy to manage because the link is easy to identify.

Using this topology helps us to make a more efficient system looking at the fact that hospitals have a lot of data to handle.

Although this design has a lot of advantages, this design also has a downside which is when there is a switch/hub that is broke down, the system will also be down -*exception for if the one that broke down is the cable or device, the system will still work like we have discussed above*- To prevent this downside, the management should pay more attention to the switches that they use.

Here in the design, we divided it into three clusters, which are :




- First cluster consisted of general clinic, eye clinic, dental clinic, and ENT clinic.
- Second cluster consisted of physiotherapy, pediatric, oncology, and orthopedic.
- Third cluster consisted of pharmacy, emergency unit, radiology, and laboratorium.

The result pictured how the communication between each cluster is bridged by the switches, routers, and a firewall. Each cluster's flow is they will pass the switch before reaching the server and for each cluster's flow will pass the firewall to improve the security. This simulation is concluded to be successful because the data have successfully been transferred and passed the firewall meaning the data have successfully been protected. Hospital will have a lot of data from various clinics that also have a lot of patients. They will need an efficient system to manage all the information. The system's simulation is also useful for the hospital because it will increase the efficiency of data management by using :

- Star topology; meaning it is a centralized system so the management does not have to go to each clinic for managing the data,
- computer network; meaning all the data is connected and using the star topology to centralized all the data.

Beside the efficiency, hospital will also need a high security for managing the data. Improving security is needed because health's information are confidential for each person. This system simulation also helped the management to improve the security by:

- Using a firewall; meaning it monitors and filters incoming and outgoing network traffic based on an organization's previously established security policies.
- Limitation of access; meaning the data's access is limited to improve the security.

Looking at those facts, we can conclude that this system is useful for a hospital to use because it will increase the efficiency and security.

Evaluating the accuracy of this simulation can be done by looking at the result. As we can see, the result is picturing a successful simulation as it sent the data successfully. Looking at this fact, we can conclude that this simulation is accurate according to the main goal.

## IV. Discussion

We differ the simulation design with the previous design that has been discussed on the Method's section because there are some limitations on the Cisco software to use that design. We have modified the design as shown below. The new design is made based on the thought that putting the world wide web server is unnecessary -*the same reason as we put away the internet* -

Based on our investigation, network design, and network simulation of a hospital's computer networking, we can draw the conclusion that the solution we propose will simplify file management at a hospital, enabling them to spend less money on this problem and improve patient care. Additionally, it gives convenience on giving the suitable data, reduces the possibility of data breaching. Due to the data being consolidated in the server, this approach also makes it simple for a hospital to back up their data. According to the application of this solution, we have discovered several suggestions for improved results, which are:

- Using the best quality hardware to store the data as it affects the stability of the system.
- Hardly suggested to make a migration strategy in case the data needs to be backed up.
- Script to do file filtering is highly recommended for any file that is potentially infected by virus.

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## References

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