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# ***MediaMaestro***

## **Project Proposal for CSE 3111: Computer Networking Lab**

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## CHAPTER 1 INTRODUCTION AND OVERVIEW

### 1.1 Introduction

THE project for CSE 3111: Computer Networking Lab is to set a capstone to the learning that we did throughout the semester in this lab. It should ideally contain various networking concepts taught throughout. We also believe it should be a project that is personally useful to us. Thus in keeping with this goal we propose the following project for your consideration as the culmination of our work in this lab. We hope you find this proposal and the project itself satisfactory and in line with your expectations.

### 1.2 The Pitch: Home Media Server (*MediaMaestro*)

We plan to implement a media server running off the localhost of any capable device. We call it MediaMaestro. A part of its filesystem shall be exposed as a network access storage or a file transfer server. We plan to add a usable and coherent UI, metadata, authentication of some sort and streaming capabilities so that any internet enabled device on the local network can enjoy the saved media without having to download it or having to stream it from the WAN.

### 1.3 Objectives and Motivation

The objectives and motivation of the project is suited to our personal needs. As avid media consumers we believe that running a media server from our local computer can give us fast and easy access to our favourite media wherever we are in our house. Again we can run it off some old hardware as sort of a simplified NAS. Some objectives and motivation for the project is given below.

1. **Centralized media storage:** One objective of building a media server is to have a centralized location for storing media files such as music, videos, and photos. This can help eliminate the need for multiple storage devices and make it easier to access and manage media files.
2. **Remote access:** Another objective of building a media server is to provide remote access to media files from any device with an internet connection within our home network. This is useful to view, consume, share and collaborate on media without duplication and extra storage space.
3. **Media streaming:** A common motivation for building a media server is to enable media streaming to multiple devices simultaneously. This can provide a convenient way to share media files with friends and family, or to stream media content to different rooms in a home. This would particularly be useful in streaming high bitrate content such as Blue-Ray movies and FLAC audio files a functionality that internet based streaming simply cannot provide in a poor internet infrastructure having country like ours.
4. **Customization:** Building a media server from scratch can provide greater flexibility and customization options than using pre-built media server software. Users can tailor the server to their specific needs and preferences, such as organizing media files in a certain way or implementing custom security measures
5. **Backup and disaster recovery:** A home server can be used to backup critical data and files, ensuring that they are safe in the event of a disaster or hardware failure.
6. **Learning and skill development:** Building a media server project can also provide an opportunity for learning and skill development. It can help users gain a deeper understanding of networking concepts, programming, and server administration, among other skills.

In short the goal here is to have a convenient and customizable solution for storing, accessing, and streaming media files.



## CHAPTER 2 IMPLEMENTATION

**H**ERE we shall discuss our preliminary idea about implementing our vision. Please note that implementation details are subject to change.

### 2.1 Technology to be used

We can use a variety of technologies to build a Home media server. Some key technologies that we hope to use are listed below.

1. **Python:** We shall use Python as the primary programming language to build the server application.
2. **FTP library:** We might use the built-in `ftplib` library in Python to implement the FTP protocol and handle file transfers between the server and client devices.
3. **Web server:** We may use a web server such as Apache or Nginx to serve our media files and provide web-based access to them.
4. **Authentication and Authorization libraries:** We plan to add authentication to our server, be it via a rudimentary method or using libraries such as Flask-Login or Django-Auth, depending on the web framework.
5. **Media library management:** We may use libraries like mutagen, TinyTag, or eyeD3 to extract metadata from media files and organize them into a searchable database.
6. **Database:** To store metadata about your media files, we may use a lightweight database such as SQLite, which can be easily integrated with Python.

Specifics about this implementation is subject to change.

### 2.2 Features to be built

We have aimed for a minimum viable number of features those being file sharing and streaming. The others are some extra nice to haves that we aim to implement if time permits. The features planned initially are

1. **File transfer:** Our media server should be able to transfer media files to and from client devices. This can be accomplished by implementing the FTP protocol in Python code.
2. **Media organization:** To make it easier for users to find and access media files, We shall organize the media files into folders and provide a way for users to navigate through them.
3. **Media streaming:** It should be able to stream media to multiple devices in the local network simultaneously.
4. **Authentication and Authorization:** We may include a simple authentication mechanism to allow users to access the server, and to ensure that only authorized users can access specific media files.
5. **Media metadata:** We may include metadata for each media file, such as title, artist, album, and genre. This can be helpful for users to easily identify and search for specific media files.
6. **Search functionality:** To help users find media files quickly, We may include a search feature that allows them to search for media files based on keywords or metadata.
7. **User management:** To allow for multiple users to access the server, we may include a user management system that allows you to create, modify, and delete user accounts.



## CHAPTER 3 CONCEPTS AND APPLICATION

**W**E believe this project is a perfect display of the various networking concepts learnt throughout our course the concepts and application of such a project is detailed below

### 3.1 Networking concepts to be used

We primarily believe these networking concepts may come of use when we will implement said server. Please note all of these are subject to change as we learn while we implement.

Building a home media server involves various networking concepts. Here are some of the key networking concepts that may be reflected in the project:

1. **IP addressing:** The home server will require an IP address to communicate with other devices on the network. We may need to configure static IP addresses or use DHCP to dynamically assign IP addresses to devices on the network.
2. **Ports and protocols:** The File Transfer Protocol (FTP) typically uses ports 20 and 21 for data transfer and control communication, respectively. Understanding these ports and protocols is important when configuring firewalls and network devices to allow traffic to and from the server.
3. **Network topology:** The media server will be connected to other devices on the network, and understanding the network topology can help us identify potential bottlenecks or performance issues. We may need to consider factors such as wired vs. wireless connectivity, distance between devices, and the number of devices on the network.
4. **Network security:** The home server may contain sensitive information, so it's important to implement security measures such as user authentication, encryption, and firewalls to protect it from unauthorized access or attack.
5. **Bandwidth management:** When multiple devices are accessing the media server simultaneously, network bandwidth can become a bottleneck. We may need to implement bandwidth management techniques such as Quality of Service (QoS) to prioritize traffic and ensure that media streaming is not affected by other network traffic.

Understanding these concepts is essential for designing and implementing a robust and secure home server that can meet our needs.

### 3.2 Prospective Application of the Project

There are various applications of a media server, depending on the needs and requirements of the user. Some of the common applications of a media server include:

1. **Home media center:** A media server can be used to create a home media center, where users can store and access their music, videos, and photos from any device in the home.
2. **Entertainment hub:** A media server can be used as an entertainment hub, allowing users to stream media content to their TVs, computers, and mobile devices.
3. **Media sharing:** A media server can be used to share media files with friends and family, making it easy to share photos and videos from vacations, parties, and other events.
4. **Remote access:** A media server can be used to provide remote access to media files, making it easy to access and stream media files from anywhere in our household.
5. **Business applications:** A media server can be used in business applications, such as for storing and sharing training videos, marketing materials, and other multimedia content.

Overall, a media server can be a versatile tool with many applications, and its usefulness will depend on the specific needs and requirements of the user.



## CHAPTER 4 CONCLUSION

**I**N conclusion, building a media server project can provide a convenient and customizable solution for storing, accessing, and streaming media files. The objectives and motivations for building such a server may vary depending on individual needs, but the common thread is to have a centralized location for managing and sharing media files. The functionalities of a media server can also vary, but should include features such as file management, streaming, user authentication, metadata management, media playback, and remote access.

Building a media server project can also provide an opportunity for learning and skill development, as it involves various networking concepts, programming, and server administration skills. We believe we can build a robust media server that can meet their needs and provide a convenient way to manage and share media files.