# FINAL MSC CAPSTONE PROPOSAL

Title: A final semester capstone project done in full fulfilment of my master's degree in Computer Science.

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Course: Computer Science.

## Introduction

This project tells a story of students in the developing and underdeveloped country that has little or no access to internet connectivity in their schools to carry out daily academic activities like obtaining course materials from their professors, online submission of homework and student forum. This project proves valuable to places, particularly institutions that cannot afford the cost of internet bandwidth and its efficiency. The project provides solution to the above-mentioned problem of connectivity and digital transformation without the need for internet.

## Objective

The goal of this project is to cover and enhance the scope of routing networking, application of content management system software, database file system and client-server intranet communication in a Local Area Network (LAN) using the Wireless Local Area Networking Protocol (WLAN). This project aims to achieve the goal of connecting an application device (client) over a router to a server that in turn retrieves information from a file system and back to the client. The clients that are connected to each other on this network would be able to communicate and share files without internet connectivity.

## Background

The valuable experience during my four years bachelor's degree gave birth to this capstone project idea. Internet connectivity was not accessible to students in the best private universities in Africa, and not only that - in other schools in African countries at the time. This situation typically speaks for every other low to moderate funded schools in under-developed and developing countries. Although, Internet is in no doubt available in these countries but the cost of access is often too high for institutions and individuals to adopt. Furthermore, shall the internet be adopted, it runs slow and it's not efficient to serve its need. Teachers are not able to transfer course materials to students electronically except through the traditional way of distributing printed papers. Even when these handouts are distributed, some few students who are not in the classrooms at the time of distribution miss out on them. The problem does not only arise in distribution of course notes, the problem also occurs in students and teachers connecting to each other to send information and have online forums.

Here I propose a solution to this long-term problem of low internet efficiency in schools and institution by creating a local area network that allows everyone to connect and have access to each other so they can send email, share files and send chat messages without internet connection. Teachers are would be able to drop course notes and contents in a repository that can be retrieved by authorized students on their device. The device – mobile or desktop will host a content management system software that model blackboard. The use cases would be described in the specific aims section below.

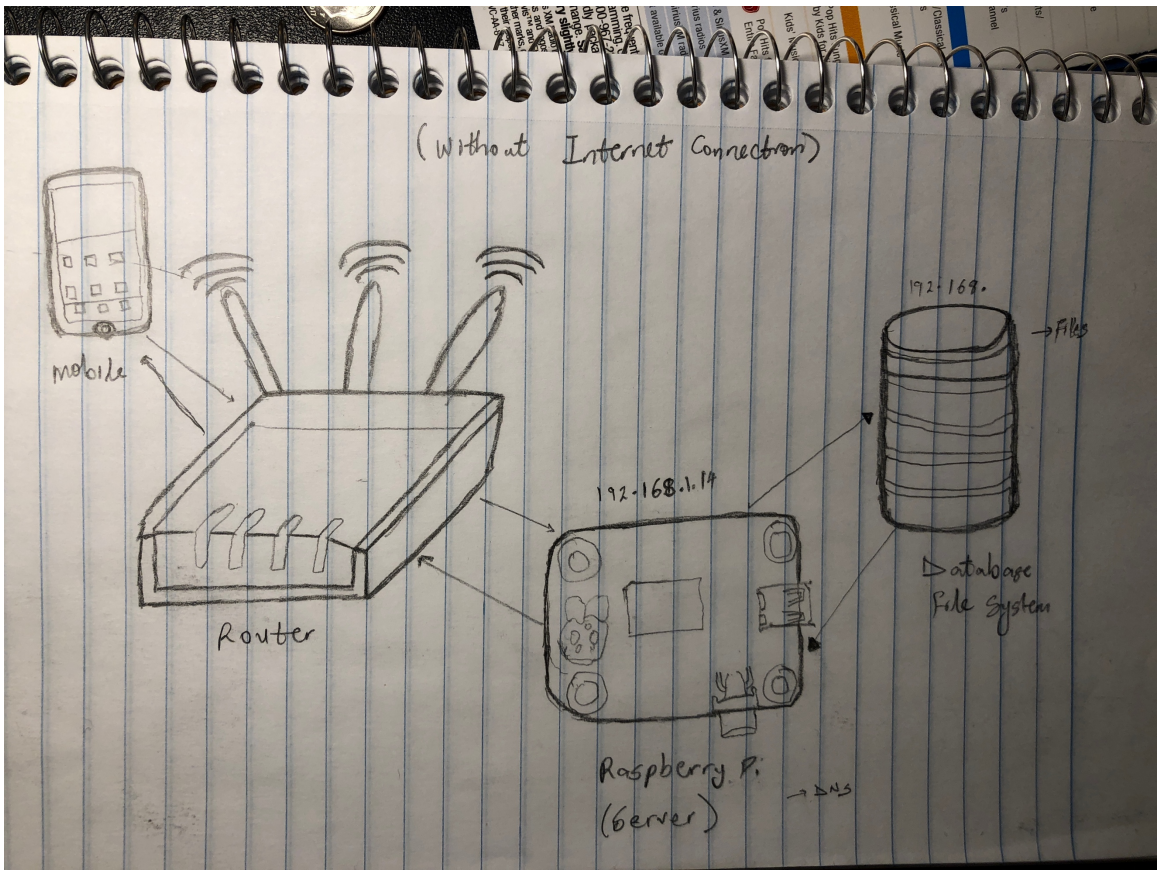
## Specific Aims

For the system design, the aim of this capstone project is to produce intermediary steps towards the final deliverable of this project by limiting the scope to what can be done in the time span. At the end of this capstone, I hope to have built a model that simulates what the deliverable is.

**Aim 1 - Setup**

Build a model system that comprises of

1. *Mobile Phone - A mobile application developed in Xamarin.forms that allows for cross-platform mobile applications. For this capstone, focus on iOS and Android.*
2. *Raspberry Pi – This acts as a server that'll be developed using Node.js which fetches files from a database file system and return to the application.*
3. *SQL – A database file system for storage using SQL technology.*
4. *Access Point Router – DNS configuration to assign IP Address to devices.*




**Aim 2 – Use cases**

Below is a description of the use cases.

Students can:

1. *Connect to the network once he/she is in the LAN.*
2. *Sign up / sign in.*
3. *View contents related to his/her classes on the mobile application.*
4. *Download contents into device.*
5. *Upload homework for submission.*
6. *Send emails to other Professors connected on the network*
7. *Send chats and multimedia to other students connected on the network*

Teachers can:

1. *Connect to the network in the LAN.*
2. *Sign up / sign in.*
3. *Upload contents into the mobile application.*
4. *Download student's homework.*
5. *Grade student's homework.*
6. *Send emails to other Professors or students.*
7. *Send chats and multimedia.*

**Project Approach**

Once students connect to the network and sign up, they would be automatically added into a repository which represents their course of study. For example, first year Engineering repository. Each repository would have restricted privileges. The reason for this is to avoid redundancy – so that course materials associated to a first year Engineering course would not get into Drama major groups. When an Art Teacher drops a course material into a first year Art student's repository, the material would only be viewed by first year Art students in that repository.

At sign up, every student obtains a unique ID for the purpose of direct communication and sending individual emails.

When a student leaves the LAN, he or she does not have access to the network and hence, cannot access the material until such student connect to the network.

**Timeline**

| Stage | Activity | Deadline |
|---|---|---|
| Conceptual | Literature Review | February 16, 2018 |
| | Project Planning | February 23, 2018 |
| | Design Analysis | February 26, 2018 |
| Research and Review Technologies | C# | February 27, 2018 |
| | Xamarin.forms | March 13, 2018 |
| | Node.js | March 6, 2018 |
| | Raspberry Pi | March 6, 2018 |
| | Linksys Access point | March 30, 2018 |
| Design | Establish Server Connection from Raspberry pi to Database File system. | March 6, 2018 |
| | Create Database with user restriction | March 20, 2018 |
| | Create CMS mobile application | April 10, 2018 |
| | Establish Router | April 23, 2018 |
| | Review Steps | April 30, 2018 |
| Analytical Phase | Data Analysis | May 10, 2018 |
| | Result Analysis | May 15, 2018 |
| Dissemination Phase | Project document write up | May 18, 2018 |
| | Presentation and Reports | On final deadline |