ISSN: 2663-5798 || Arab Journal for Scientific Publishing

الإصدار الثامن – العدد الخامس والسبعون
تاريخ الإصدار: 2 – كانون الثاني – 2025م
www.ajsp.net

“Customizing MAC Environment to be as a windows Environment”

Researchers:

Asmaa Altobaiqi

F00360683

Hanouf Alsharif

F00356983

Concordia University Wisconsin

Requirements Phase

Abstract of the problem:

The Computer Science department's labs at Concordia University Wisconsin have Mac devices with Windows operating system. Mac environment has many advantages that should be used at the university labs. The university requires customizing the Mac environment. The customization should be by implanted a server-based methods of customizing the user experience on the Mac side of the lab machines. As Windows side provides the services to the users, the Mac side should provide the same services such as server drives, printers, and WI-FI connection because it is missed in Mac side, which makes difficulties for the students to work in this environment. Documentation must be ready to review by the clients in the end of the project. The project must be completely implemented by the deadline in May 1st, 2015.

Detailed problem definition:

The problem is that the computers in the Department of Computer Science labs at the university run Windows or Mac operating systems, but the students using the Mac operating system do not have access to the same sorts of services as are available to those using the Windows operating system. The services are restricted to the Windows operating system. As a result, the students cannot work in different types of environments to enhance their work, and they do not have the ability to transfer their files between Windows and Mac environments. Therefore, a system solution is required to activate the Mac side's functions and to give students the option to choose the environment in which they prefer to work.

Requirements:

In order to solve the problem, we need to have a friendly user interface for the Mac side, a fast Internet connection, and easy access to the functions that are related to the Mac operating system. The users need to have a server-based method for importing the Windows services to the Mac computers. This method must be able to work in the Mac operating systems that are running on computers in the Department of Computer Science labs.

There are many user interface concerns and goals. First, the interface must be very clear and easy to use. Second, the interface must enable students in the computer labs to perform the relevant tasks in a reasonably short time. The speed of performance is important for efficiency. Third, the interface should function smoothly and reliably. The functions in both environments must be identical because familiarity of use improves client retention of using. In addition, the interface should be readable from various networks.

We must understand that the users need to have a helpful output. The icons in the interface must be understandable by the students and lead them to the appropriate output. For example, if the students want to open the Chrome browser, the Chrome icon has to be clear, and clicking it must open the browser, as expected by the users. On the other hand, the users do not have the authority to change, add, or delete any of the functions that we set up on the Mac side. In order to affect the output positively, we must provide information about how often we need to update the services.

We need to provide good services to have a perfect output that makes the users happy. One of the services is using all the printers that are available in the computer lab. The Mac computers must be connected to the printers correctly to provide the same service to Mac users that is provided to Windows users. The quality of printing, the number of pages, and the printing request must be the same in both the Windows and the Mac environments.

Another service is connecting to the university's Wi-Fi system. The Internet connection must work well without any interruptions. Once the computer administrator sets up the Internet connection's password, then the students do not have to write the password of the network again when they login to the Mac side.

In addition, document transfer is an important output in the project. The students should have the ability to transfer their documents from one environment to another. Also, the interface must not convert the extensions while transferring the documents.

Project Prototype

Use Case Number:	UC001
Use Case Name:	Open a service in Mac side
Actor(s):	User
Description:	When the user request a service from Mac environment, it will open correctly
Triggering Event:	User request a service from the computer labs has Mac operating system
Assumptions:	User has a login and password that allows him to log in to the Computer Science domain
Priority:	Critical

Steps Performed:
1. User open a computer on the lab at Computer Science Department
2. User request to have needed services from Mac environment
3. When the user order the service, it should be opened

Success Guarantee:	The service opened correctly
Minimum Guarantee:	User is informed as a result of their services requested

Use Case Number:	UC002
Use Case Name:	Run a service in Mac side
Actor(s):	User
Description:	When the user run a service in Mac side, the service must run correctly
Triggering Event:	User requests to run a service from the computer labs that has Mac operating system
Assumptions:	User select a specific service
Priority:	Critical

Steps Performed:
1. User open a computer on the lab at Computer Science Department
2. User run a specific service in Mac side
3. When the user run the service, it should be implemented

Success Guarantee:	The service runs correctly
Minimum Guarantee:	User is informed as a result of their services requested

Use Case Number:	UC003
Use Case Name:	Transfer files between Mac and Windows environment
Actor(s):	User
Description:	When the user request to transfer file from Windows environment to Mac environment, it will transferred correctly
Triggering Event:	User request to transfer files from the Windows OS to Mac OS
Assumptions:	User has to choose the file that he would to transfer to Mac OS
Priority:	High

Steps Performed:
1. User open the file on a computer on the lab at a Computer Science Department
2. User request to transfer the file from Windows to Mac environment
3. When the user order the file transfer, it should be transferred correctly

Success Guarantee:	The transfer implemented correctly
Minimum Guarantee:	User is informed that the file can not transfer

Use Case Number:	UC004
Use Case Name:	Check if the service has been work successfully in Mac side

Actor(s):	User
Description:	When the user receive the service on Mac side, it is implemented completely, and it should guarantee the same work's quality in both side
Triggering Event:	User open the service from the computer labs to check if it has the same proficiency as in Windows side
Assumptions:	User has to check the service that implemented to Mac OS
Priority:	High

Steps Performed:
1. User receives the service on a computer at a Computer Science Department
2. User check the service run in Mac environment to assure the right execution
3. When the user execute the service, it should be work correctly

Success Guarantee:	The services work correctly
Minimum Guarantee:	User is informed as a result of their services requested

Constraints of the Project

In general, any project will face some constraints. For example:

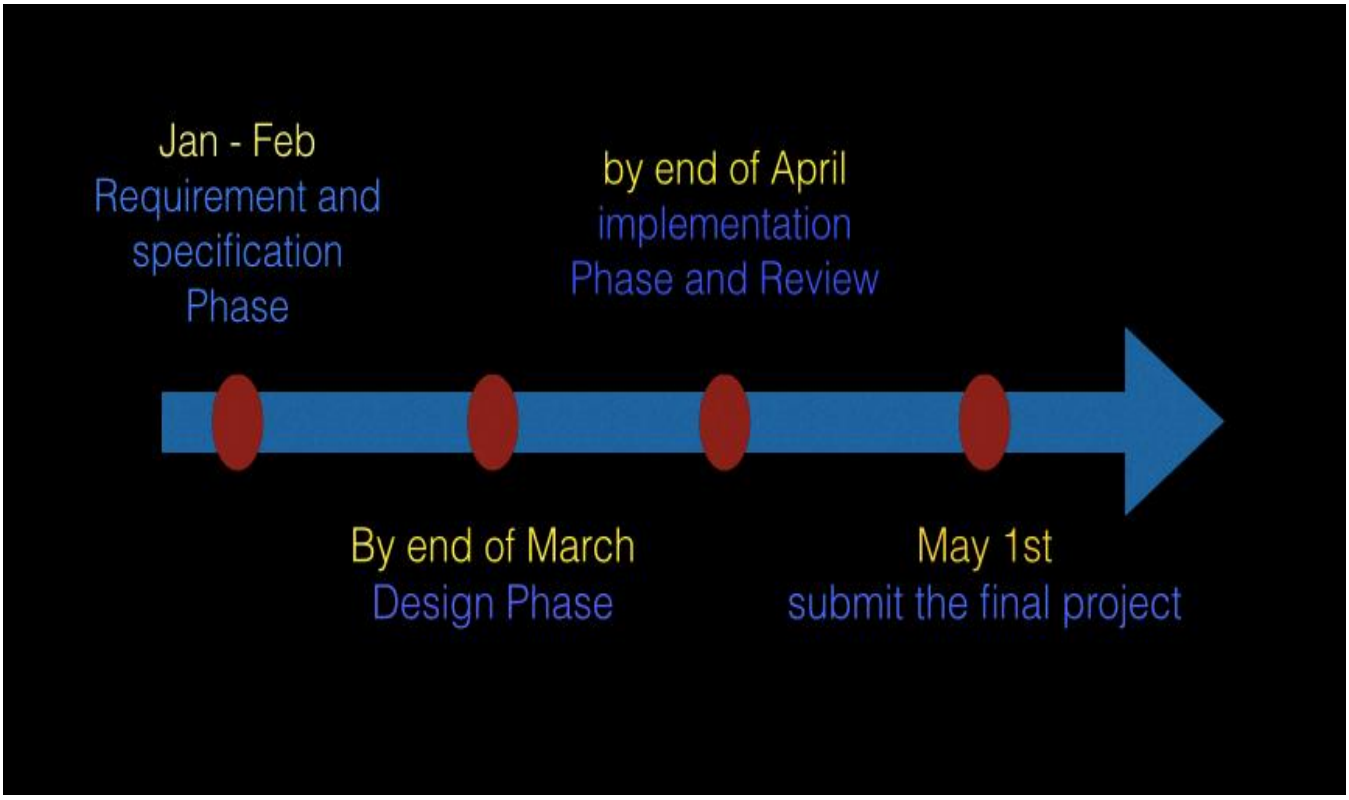
1- In this project, the time is the big issue. We have to finish the project before May 1st, which means less than 3 months.
2- Otherwise, the cost is the second concern. We have to find cheap resources to meet the university's budget.
3- In addition, we have to learn new skills to make a useful and helpful project that meet the user needs.
4- Moreover, we need to scale between the requirements to offer a good output.
5- All function must run in Mac side.
6- To understand the clients need very well is a constraint because of lack of information we have at this point.
7- The implementation of the function might be constraint because we have not do something similar before.

Constraints of the Product

1- We must provide a tool to transfer the users documents between both environments. We found a product that helps the users to send their files to the other environments, but the products does not match with Windows 7 version, which we have in the computer labs.
2- The Internet browser that we will install such as Chrome may not work correctly in the first time.

ISSN: 2663-5798 || Arab Journal for Scientific Publishing
الإصدار الثامن – العدد الخامس والسبعون
تاريخ الإصدار: 2 – كانون الثاني – 2025م
www.ajsp.net

Process TimeLine:



Transcript of questions/answers with a client:

To ensure good project quality and high performance of the project, we need to interview clients to identify their needs. The interviews could be unstructured or structured. In an unstructured interview, we would ask clients open-ended questions, such as, "What do you need in the computer labs?" In a structured interview, however, we would ask the clients closed-ended questions. Either of these interviews could be conducted over the phone, via Skype, or face-to-face. We use unstructured interview with the user.

We got the chance to interview the client face to face and asked him the following questions:

- Do we need to work on the server side?
  He said: "No, you don't need to work on the server, but if you need it, there is a Mac server and I can give you the permission to use it."
- What are the specific services you are hope to have installed in the Mac environment?
  He said: "You have to install the core services that work in the Windows side to make the user happy. The core services are the network drive, My Documents, set up the two printers, and set up the multiple web browsers."
- Can we guide the users about how they can use Sky-Drive in Google to transform their files using the cloud?
  He said: "No, because the computers in the lab have the Windows 7 environment. You can't install the Sky-Drive, but you should configure other tools for file transformation."
- Is the use case we did understandable?
  He said: "Yes, and you will change it over time."
- How can we login to the Mac side in the computer lab?
  We went to the computer lab and figured out the way to enter the Mac side.
- Could you please give us the permission to enter as administrators to the computers, so we can change and add the new features?
  He said: "I will email you the steps for login as the admin."

Tradeoffs and alternative requirements:

The idea of a tradeoff is a position that includes losing one quality of something in order to gain another

quality. The tradeoffs of our project would be:

- If we have more time, we will offer more services on the Mac side.
- If we have a large budget, we will offer many resources and tools that will help improve the Mac side.
- If the clients give us more authorization on the Mac side, we can access more areas to give more features for the Mac.
- The time, cost, and scope will affect the quality negatively or positively.
- If we have all the accurate information that we need, we will provide the services that the users request.

Rank requirements in order of importance:

All the requirements have the same priority; we cannot avoid one function in order to make other functions available. All the functions must work before May 1, 2015. We have to get the benefit from all the requirements to produce the desired output.

Research areas to investigate:

We need to investigate how we set up the services in a Mac environment. We have to research the steps involved in setting up printers and networks and transferring documents. For example, we will need to investigate the tools that are available to transfer documents between different environments, such as Dropbox. In addition, we have to know the names of the printers that are available in the computer labs to connect them on the Mac side. We also have to know the university Wi-Fi names and passwords, as they will allow us to login and connect the Mac computers. Also, we must understand the meaning of customizing the Mac environment to devise a good solution for Mac users.

Abstract idea of the required solution:

The abstract solution is to set up the services on the Mac side and find a good means to customize the interface. Also, we must find a way to transfer the users' documents between the Mac and the Windows environments.

Most difficult part of the project:

We expect that the most difficult part of the project will be to understand all the students' needs. Moreover, the implementation of the services might be challenging, and it will take a long time to complete. Choosing the appropriate way to run the services on the Mac side will be hard. Furthermore, we may need a budget for implementing a tool that offers capacity that is sufficient to hold each student's documents. For instance, if we download a Dropbox as a tool to share a user's files, this tool can hold a maximum of 1 GB for free. If the user needs to share more documents, he/she has to buy more capacity.

Specification Phase

Purpose of the project:

The purpose of the project is to Customize Mac Environment to be similar to how Windows side already implemented. This should include implement a server-based method of customizing the user experience on the Mac side of the lab machines. For example, My Document on server, server drives, printers, different types of browsers.

Abstract of the Problem:

The Computer Science Department's labs at Concordia University Wisconsin have Mac devices running the Windows operating system. The Mac environment has many advantages that should be used at the university's lab, but the university requires customizing the Mac environment. The customization should be implemented by server-based methods of customizing the user experience on the Mac side of the lab machines. We need to execute the core services running on the Windows side. As the Windows side provides the services to the users, the Mac side should provide the same services, such as server drives, and printers. Currently, these services are missing from the Mac side, which makes it difficult for students to work in this environment. Documentation must be ready to review by the clients at the end of the project. The project must be completely implemented by the deadline on May 1, 2015.

Definition of Terms:

The specification phase provides feedback to the customer to ensure the developers understand the issues or problems to be solved. The specification document should be unambiguously written in natural language and may also include charts, tables, and data flow diagrams. During specification, the project requirements are formally specified to focus the agreement on the functions required for the complete system. Also, this document will answer "What?" questions and focus on the project's input, output, and function.

In this document, the "client" is Prof. Jacob Hoppe, a professor in the Computer Science Department at Concordia University Wisconsin. The developers are students in MSIT at Concordia University Wisconsin who process this project. The system administrators are the Concordia University Wisconsin Computer Science Department system administrators. This project will solve the issue of customizing the Mac environment to be working as efficient as the Windows side in the Computer Science labs.

Abstract of the Specification:

The customized Mac environment must support the services that occur in Windows through setup services. It must allow users to share files between both environments. The solution must provide printers for the users to easily print their work. It must also allow users to use different types of browsers to browse the Internet via the Mac side. The solution must work correctly with network drives as well. After customization, users should be able to clearly identify the tools on the Mac side, so they can easily use the services. The solution must provide icons in the interface that are understandable by the users who see or read them. Overall, we need to provide good services that create the perfect output to satisfy the needs of users.

2. System Description

2.1 Environment

- The users of the project will be the students, faculty, and anyone who works in the computer labs at CUW.
- Some students are beginners in terms of working with the Mac side, so we must ensure that the solution is easy to use for all user types. However, we expect that some users have a high level of experience in the Mac environment because of computer science backgrounds, so they might prefer to work in the Mac environment.
- The project requires both the Mac and Windows operating systems. Also, it requires a software tool to transfer the user documents between the environments, as well as software that identifies the printers on the computers and uploads different types of browsers.
- In addition, the project needs some hardware tools to be successful: for example, computers to run the project, printers for use by the students, and networks drives to use the Internet connections.

2.2 User Interface

The solution must be presented to the students and other users in the computers' lab. The representative icons in the interface must be understandable by the users who see or read the icons. Thus, the appearance of the icons leads to the appropriate output. The users need to have a server-based method for importing Windows services to the Mac side. This method must work in the Mac operating systems installed on computers in the Computer Science Department lab. The solution must also provide a way for users to check files in both environments. The user interface must be as user-friendly as possible. The system's users are students working in both environments, so the solution must work efficiently.

There is some necessary information that must be inputted into the computers in the lab to have the required output. The input for our project is the devices that send instructions or data through the computers in the lab. First, the mouse is a required input to enable the users to access the Mac and Windows sides, to execute the commands needed in the tasks, and to control the pointer on the screen. The keyboard is one of the most required inputs that represent the keys on the screen. Users need to use the keyboard to insert the data into the computer. The input may include instructions, such as programs, commands, or user responses. A command is a direction given to a computer program. In our project, an example command might include something like "print this paper using the 'A' printer." A user response is a direction issued to the computer by replying to a question formed by a computer program. Hardware element that lets users enter data, programs, commands, and responses through a computer is an input device.

The necessary input data inserted by the user will interact with the computers in the lab to generate the required output. The users must choose which environment they would like to work on. For instance, when users choose to work with the Mac side, they must press an "option" button on the keyboard until all the environments appear on the screen. Then, they can use the "mouse" as input to choose the Mac operating system, which is the output. As another example, when users want to browse the Internet, they have to click on the browser icon for the respective browser, such as Chrome, Firefox, or Safari, to open an Internet page. Choosing the document to be transferred to the other environment is also considered an input. The document, upon transferring correctly, is also considered an output in the new environment. A user response in this scenario shows as a dialog box formed by a computer program, such as responding to a dialog box about printing an order.

ISSN: 2663-5798 || Arab Journal for Scientific Publishing

الإصدار الثامن – العدد الخامس والسبعون
تاريخ الإصدار: 2 – كانون الثاني – 2025م
www.ajsp.net

Screenshots:

This is the Mac Interface

Figure 1

This is the Firefox browser and it should be in the bottom bar, so the user can access it easily

This is the Chrome browser and it should be in the bottom bar so the user can access it easily

//We have to add picture for the drives in the dock and picture of the printers in the lists of printers when we need to print any paper ///////adjust all pictures write here

Figure 2

We have to add numbers for pictures to add them in the appendex

//if the work not done corecctly

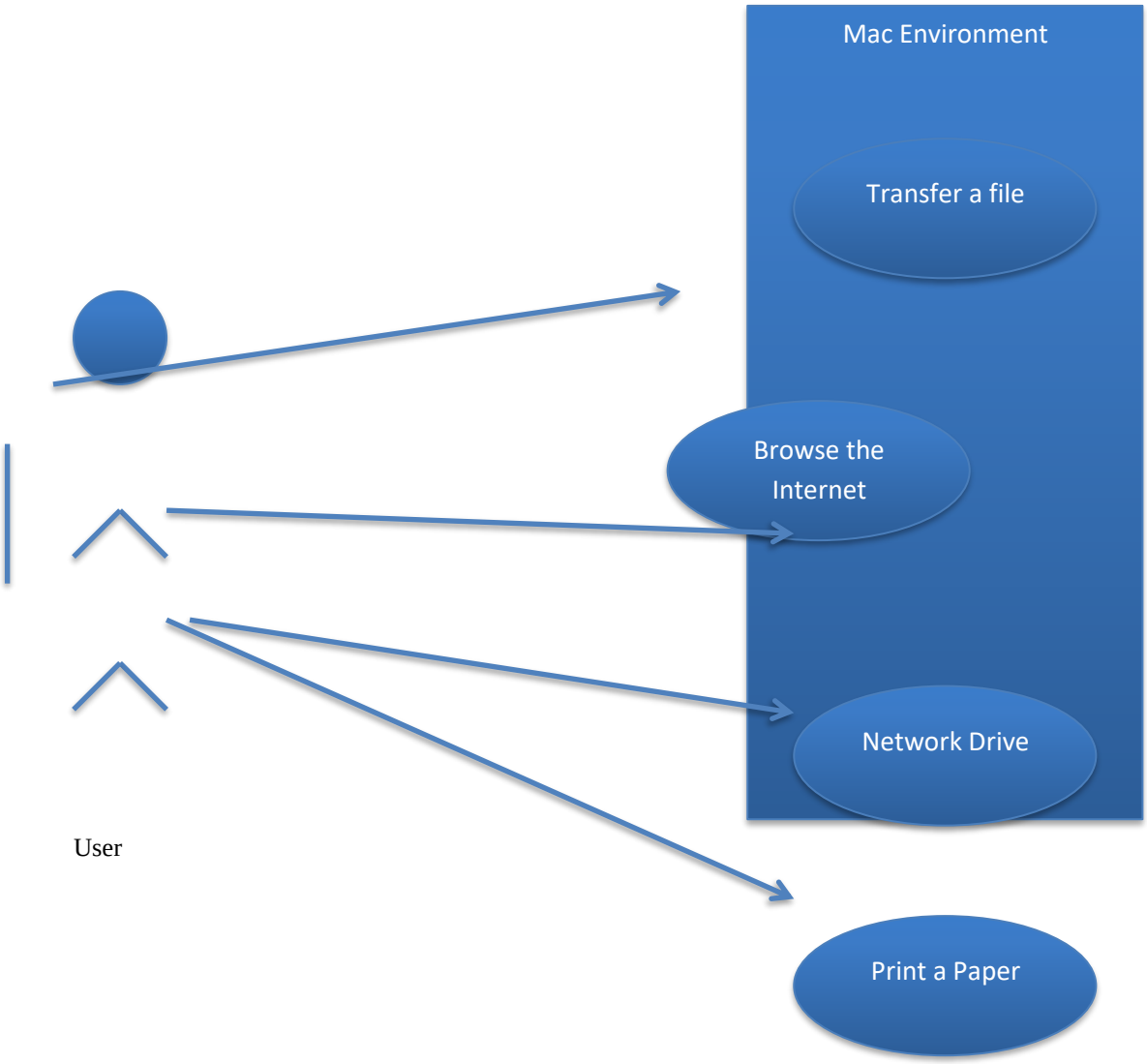
Note: when the user login to the computer's account on Mac, this box shows on the interface and display these contents.

ISSN: 2663-5798 || Arab Journal for Scientific Publishing
الإصدار الثامن – العدد الخامس والسبعون
تاريخ الإصدار: 2 – كانون الثاني – 2025م
www.ajsp.net

Wireless should be delete from the document

2.3 System Functions Defined

In this section, we will provide background information about the multiple services within the Mac environment. We must provide good services that create the perfect output to satisfy the needs of users. One of the services is using all the printers that are available in the computer lab. The Mac computers must use the printers correctly to provide the same service that works in the Windows side. The quality of printing, the number of pages, and the request for printing must be the same in both the Windows and Mac environments. In addition, the document transferring is an important output in the project. The students should have the ability to transfer documents from one environment to another.



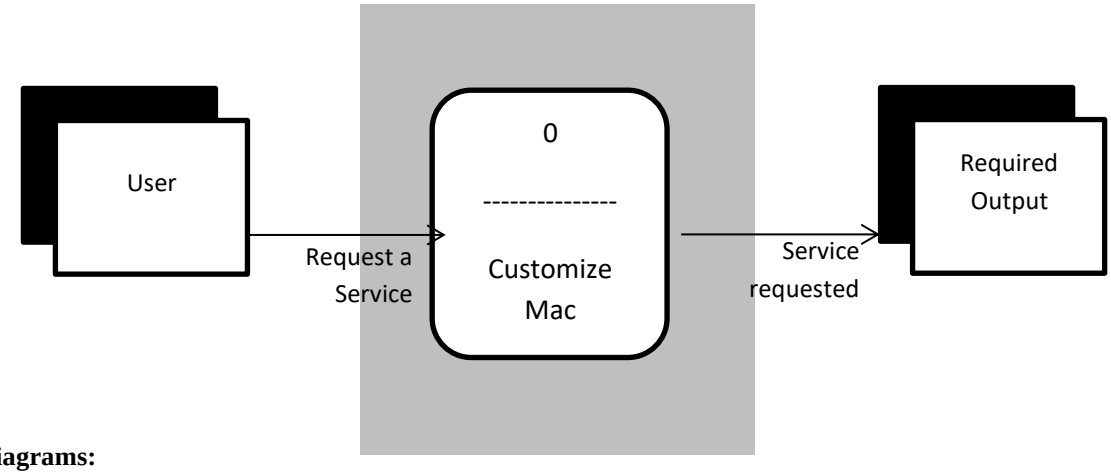
3. Requirements Specification

- The solution will automatically enable the users to use Mac environment functions, which will have the same functions in the Windows side.
- The solution will give the users the opportunity to transfer their documents between the two environments.
- The solution will enable users to print correctly and effectively in both printers located in the computer lab.
- **The solution will allow users to work with different web browsers in the Mac side, such as Internet Explorer**

ISSN: 2663-5798 || Arab Journal for Scientific Publishing
الإصدار الثامن – العدد الخامس والسبعون
تاريخ الإصدار: 2 – كانون الثاني – 2025م
www.ajsp.net

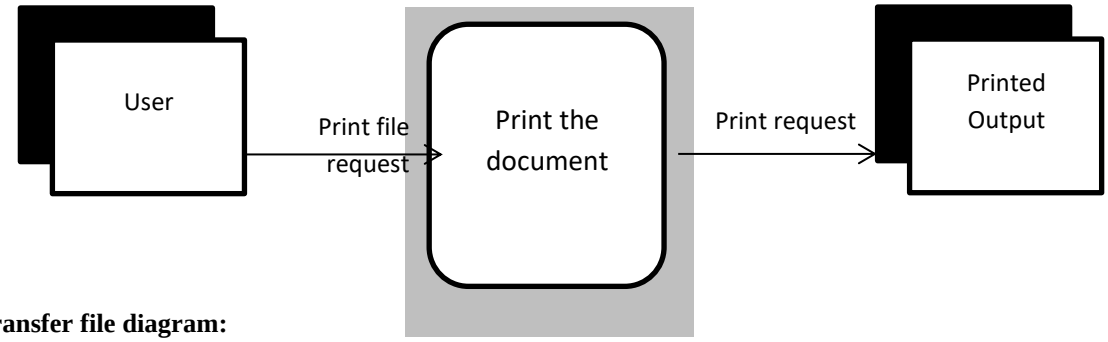
or Chrome browsers.

Context Diagram:



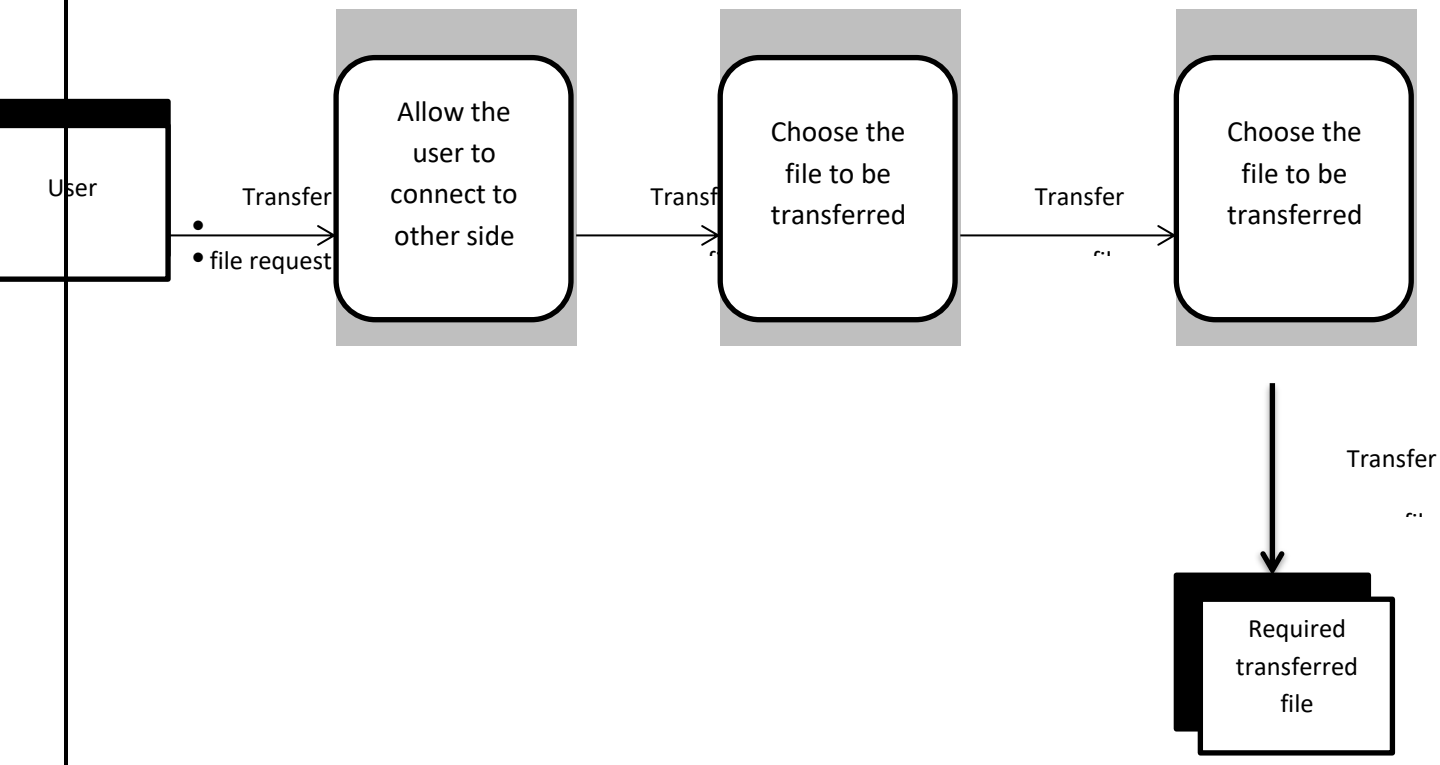
Diagrams:

Print file diagram:

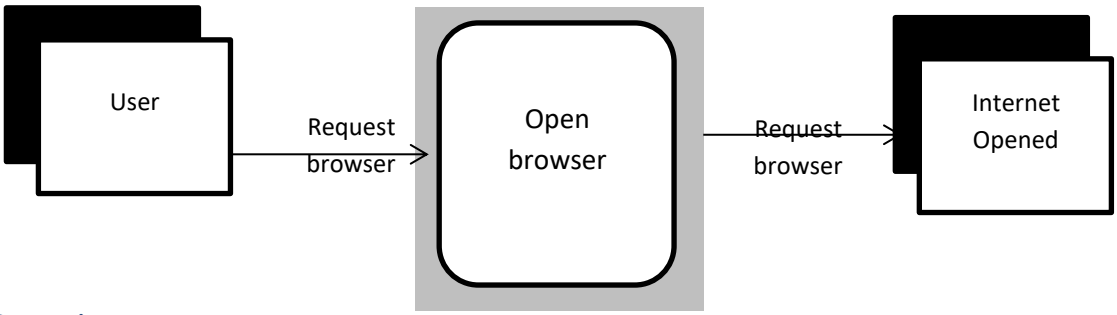


Transfer file diagram:

ISSN: 2663-5798 || Arab Journal for Scientific Publishing
الإصدار الثامن – العدد الخامس والسبعون
تاريخ الإصدار: 2 – كانون الثاني – 2025م
www.ajsp.net



Open browser diagram:



4. Constraints:

Constraints of the Project:

In general, any project will face some constraints, and the current project is no exception. We must work within the following constraints:

1- Time to completion: The time constraint is the biggest issue. We have to finish the project before May 1st, which means less than 3 months to complete the project.
2- Skill attainment: We must learn new skills to make a useful and helpful project that meets the needs of users.
3- Scale: We need to scale between the requirements to offer a good output.
4- Functionality: All functions must be able to run on the Mac side.
5- Understanding client needs: Understand the client's needs very well is a constraint because of the lack of information we have at this point.

6- Implementation: The implementation of the functions might be a constraint because we have not previously developed anything similar.

Constraints of the Product:

1- We must provide a tool to transfer the users documents between both environments. We found a product that helps the users send files to the other environments, but the product does not work within the Windows 7 version, which we have in the computer labs.
2- The Internet browsers that we will install, such as Chrome, may not work correctly the first time.
3- We may have difficulties setting up the Wi-Fi connection on the Mac side.

5. Acceptance Criteria

As IT professionals, we want to perfect the customization of the Mac environment so that we can grant users access to the environment. Also, we need to finish working on the project by May 1, 2015. The project will be considered complete when the product if verified and validated, which requires the following:

- The solution is installed correctly on the computers in the computer lab at CUW.
- The solution provides a method for users to share documents between the Mac environment and Windows 7.
- All the functions in the Mac environment will work correctly.
- The solution must allow users to use the printers located in the lab.
- The solution must allow the users to use different browsers.
- Completed user guidelines to help any users follow our steps and set up the solution on any computer in the lab.
- Finished documentation regarding setup and design.
- Product is delivered to the users.

Design Phase

Architecture Design

1. Introduction

Purpose

This document provides a comprehensive architectural overview of the customizing Mac environment project, using a number of different architectural views to represent different aspects of the system. It is proposed to capture and convey the significant architectural decisions, which have been made on the system.

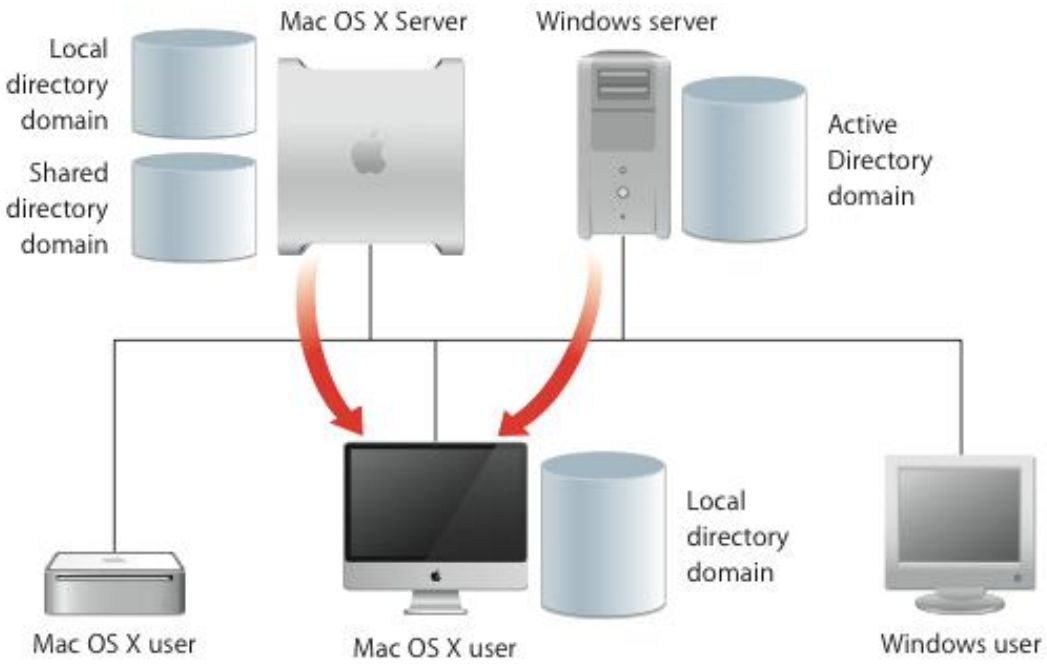
Scope

Based on the user requirements and the detailed analysis of a new system, the new system must be designed. This is the phase of system designing. It is the most important phase in the development of a system. In the design phase, the programming language and the hardware and software platform in which the new system will run are also decided. There are several tools and techniques used for describing the system design of the system.

2. System Overview

Concordia University Wisconsin maintains user information and other administrative data in directory domains on UNIX or Windows servers. Open Directory can share non-Apple domains, and the user can serve Windows-based workstations using SMB services, as shown in the illustration below.

ISSN: 2663-5798 || Arab Journal for Scientific Publishing
الإصدار الثامن – العدد الخامس والسبعون
تاريخ الإصدار: 2 – كانون الثاني – 2025م
www.ajsp.net



In order to customize Mac environment, the system should allow users to work in the Mac side in the computer lab and have the same features that users have in Windows side. The students and professors are the two levels of access. some of the main tasks that the system allow users to execute includes:

- Access the Application drives from the Mac side
- Access the User Data drives from the Mac side
- Ability to print using HP laser500 color printer
- Ability to print using HP 5200 LaserJet Printer
- Use different browsers

3. Architectural Goal and Constraints

The architectural goal for the customizing Mac environment project:

- The architecture should be flexible and expandable, ensure reusability for the next phase of the development.
- The architecture should have a description of how the product will solve the problem at hand.
- The architecture should be clear to allow any technologist to create, apply or manage the system.
- The architecture should be like a road map for the product.

Some key requirements and feature constraints that may have a significant impact on the current architecture:

- Interactions with the stakeholders of the project.
- Networks are not available for all users at all the time.
- Students and professors must be available on the campus to enter Mac computers in the lab and have their work from Windows side.
- The project must ensure complete protection of User Data and Applications from unauthorized access.

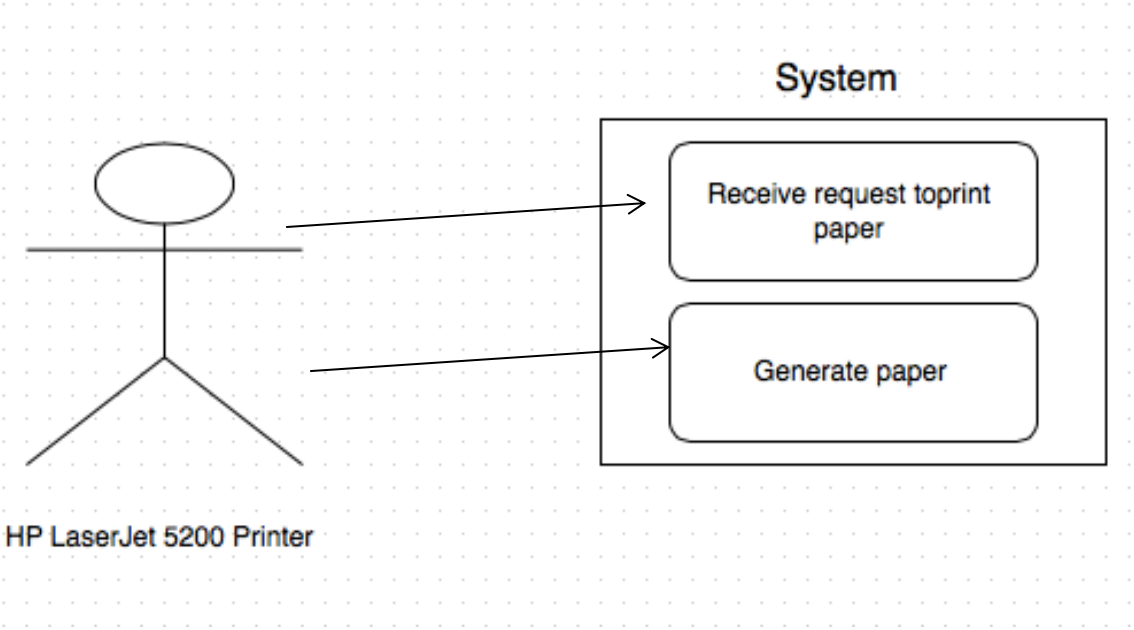
4. Use Case and Flowcharts View

This section explains the scenarios and/or use-cases that represent the important and central functionality, especially those use-cases that affect the architecture. The use case view is significant input to the selection of the set of scenarios and/or use cases that are the focus of a repetition.

The project use cases and flowcharts:

- HP LaserJet 5200TN printer use-case
- HP laser500 color printer use-case
- Map “Applications” network drive flowchart during the login for all the users
- Map “User Data” network drive flowchart during the login for all the users
- Flowchart for availability of application and the mounted network drives in the Dock or in the desktop after mounted.
- Using different Browses

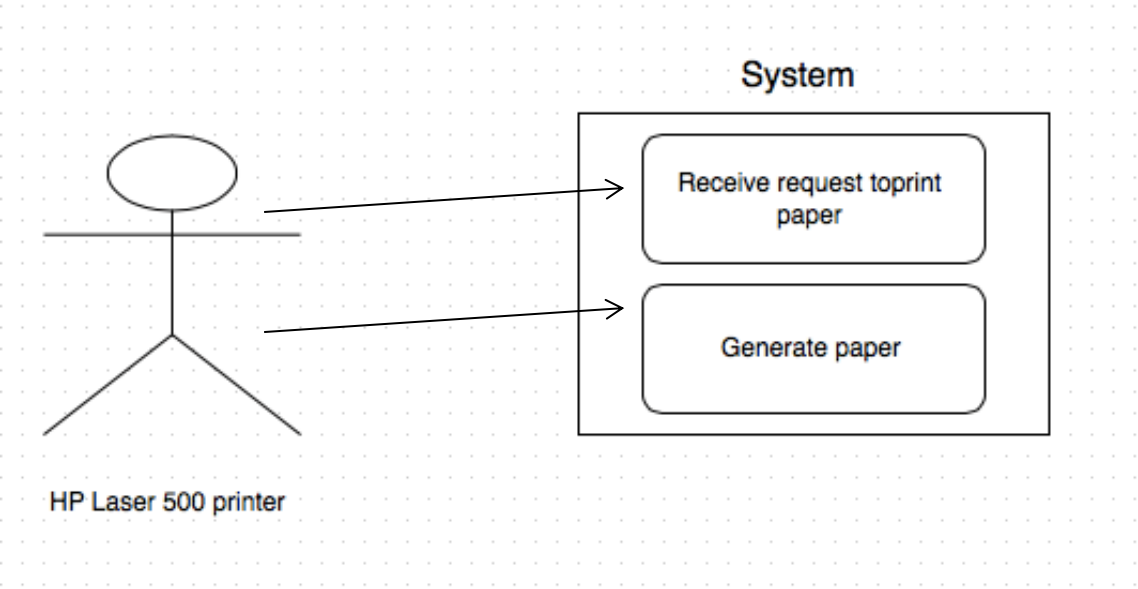
4.1 Print using HP LaserJet 5200TN printer use-case



- HP LaserJet 5200 printer, which existing in the computer lab, will receive request to print paper for a student or for a professor.
- The printer will generate the paper correctly.

4.2 Print using HP laser500 color printer use-case

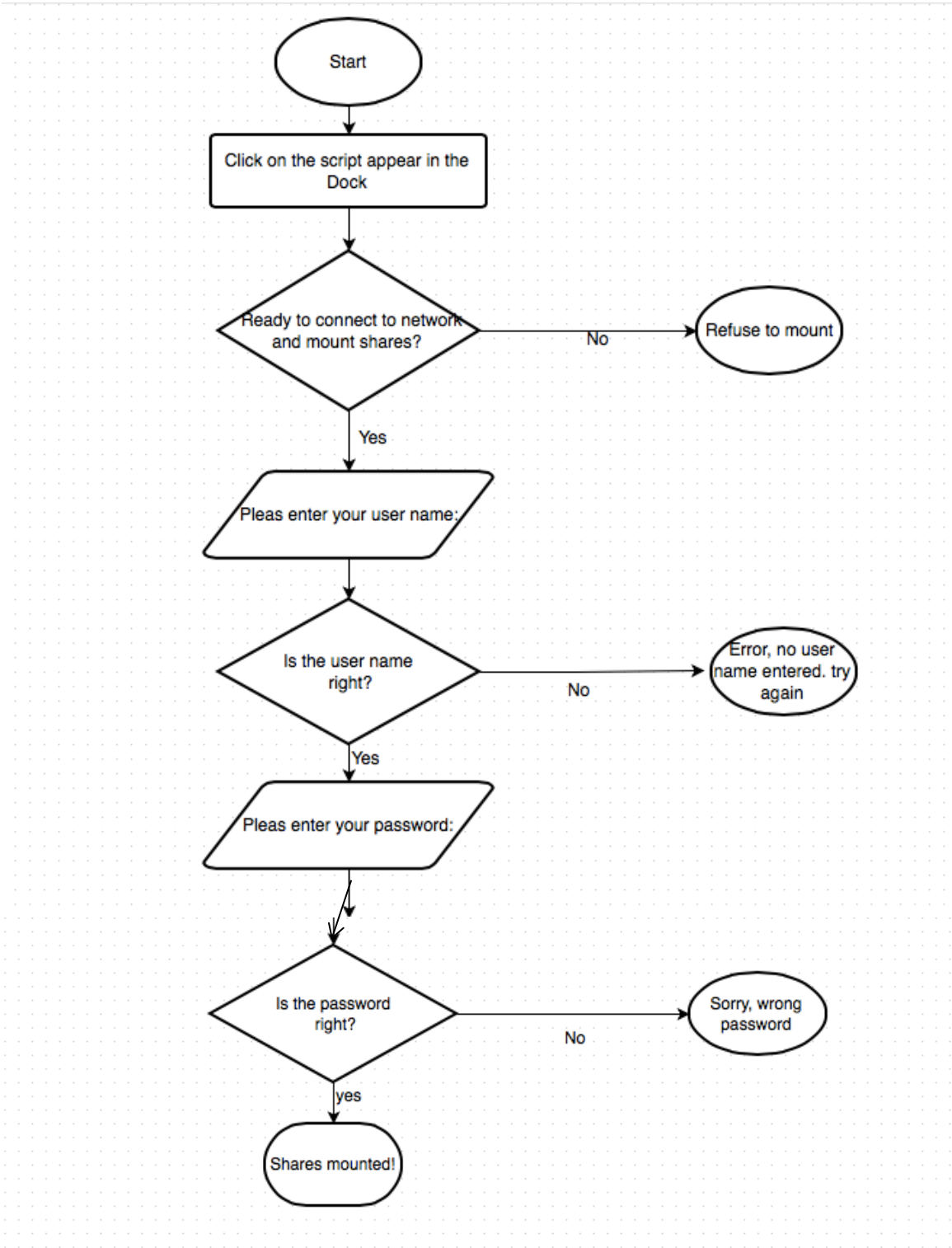
ISSN: 2663-5798 || Arab Journal for Scientific Publishing
الإصدار الثامن – العدد الخامس والسبعون
تاريخ الإصدار: 2 – كانون الثاني – 2025م
www.ajsp.net



- HP Laser 500 printer, which existing in the computer lab, will receive request to print paper for a student or for a professor.
- The printer will generate the paper correctly.

4.3 Map “Applications” and “User Data” network drive Flowchart

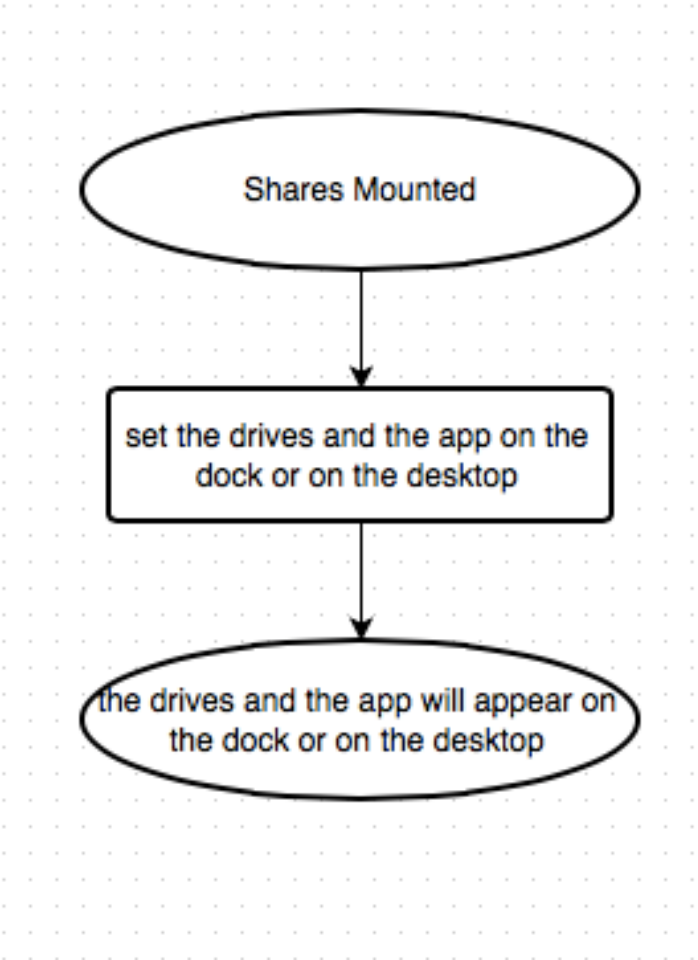
ISSN: 2663-5798 || Arab Journal for Scientific Publishing
الإصدار الثامن – العدد الخامس والسبعون
تاريخ الإصدار: 2 – كانون الثاني – 2025م
www.ajsp.net



Flowchart's Description

- After the user logging in the Mac side in the computer lab at CUW, the application will appear on the Dock of computer.
- Then, when the user click on the application, the dialog window will appear to ask the user if he is ready to connect to network and mount shares?
    - If the user click no, then refuse to mount and exit
    - If the user click yes, then go to next step
- A dialog window will ask the user to enter the user name.
    - If the user entered the user name wrong, then message will appear “Error, please try again”
    - If the user entered the user name right, then go to the next step
- A dialog window will ask the user to enter the user password.
    - If the user entered the password wrong, then message will appear “Sorry, wrong password”
    - If the user entered the password right, then go to the next step
- A dialog window will appear with a message “Shares Mounted!”

4.4 Availability of the Application and the Mounted Network Drives in the Dock or in the Desktop



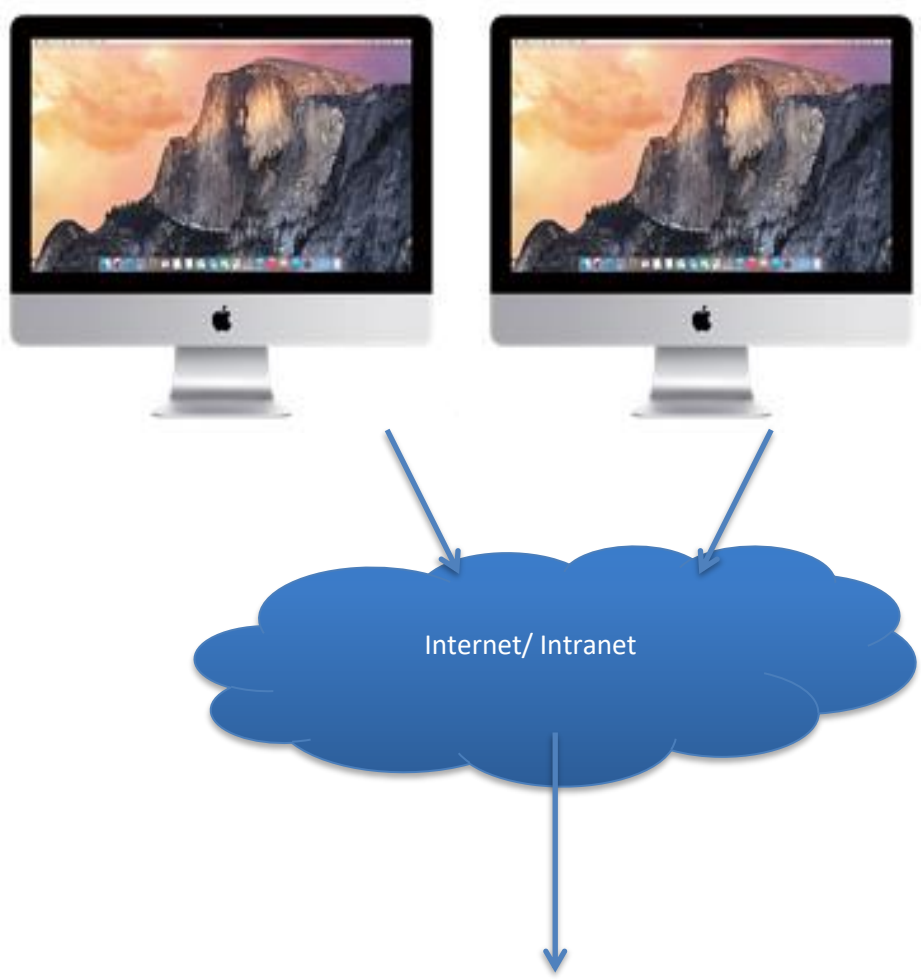
Flowchart's description

After the shares mounted the Applications drive, the User Data drive, and the Application, will appear in the dock or in the desktop, so the users can have easy access to the shared drives.

5. Logical View

To provide a basis for understanding the structure and the functional requirements of the design of the system, an architectural view called the Logical View is used in the Design workflow. There is only one logical view of the system, which illustrates the key use-case realizations, subsystems, packages and classes that encompass architecturally significant behavior. The design model is maintained in the logical view.

A logical architecture illustrates the software components needed to apply a solution, displaying the interrelationships between the components. The logical architecture and the quality of service requirements identified during the requirements phase form a implementation scenario. When developing a logical view you need to clarify not only the components that provide services to users, but also other components that provide necessary platform services. Please see the high availability diagram below.



Chemnitz Server

High Level Availability

Detailed Design

1. Introduction

Purpose

Detailed design of the system is the final design activity before implementation starts. The hardest design problems must be addressed by the detailed design or the design is not complete. The detailed design is still an abstraction as related to source code, but should be detailed enough to certify that translation to source is a precise mapping instead of a rough interpretation. In the details design, we list all the requirements that will be needed in order to provide the expected project outputs within the agreed costs and time.

Scope

The detailed design should present the system design in a variety of views where each view uses a different modeling technique. By using a variety of views, different parts of the system can be made clearer by different observations. Some views are better at developing systems states whereas other views are better at showing how data flows within the system.

2. Component of Detailed Design

Component Level Detailed Design is the build-to design of the hardware and software of the customizing Mac environment.

2.1 Hardware Component

Computer hardware is the group of physical parts of a computer system. Hardware used in this project are the following:

- HP LaserJet 5200 printer drivers:
  LaserJet 5200TN printer is designed to deliver efficiency and flexibility; this ultra-powerful, wide-format tabloid laser printer is flexible and easily manageable to meet the needs of university's work teams.

- HP laser500 color printer:

It is a professional color, and world-class extensible all for an outstanding value. Help the students in the university prints make. Count on HP for energy-saving features.

- Chemnitz server:

  A server is a computer program that offers services to the students and the faculty. You can connect student's computers using accounts preferences. You can use account preferences to connect to remote computers and change their setting, simplifying computer management. Also, we used Chemnitz to download the HP LaserJet 5200 printer to the Mac side.

- Mac Computer machine:

  We are working in Mac desktop to provide the services in our project.

2.2 Software components:

- Mac OS X software:
  We are using Mac OS X Yosemite, version 10.10 in the project.

- AppleScript:
  AppleScript is a scripting language that makes possible direct control of scriptable applications and of many parts of the Mac OS. We use AppleScript to write the code for mounting Application and User Data drives from Windows to Mac side.

AppleScript

- Printers' software:

We used the full software solution for the HP LaserJet Enterprise 500 color M551 Series printers including all necessary software and drivers to install the HP LaserJet 500 color printer.

3. Pseudo code

Pseudo code allows illustration of operations in an easily readable from without being constrained by the demands of the compiler. Pseudo code also allows the creator to code at the level of detail currently known. Code that must be compiled might not lend itself to high levels of abstraction and low levels of detail and yet that level of detail might be exactly what the design artifact needs to capture and convey to the user of the product.

3.1 Pseudo code for mount the Applications and the User Data network drives:

Begin by click on the application

Delay the application for two second to be sure network connections is solid

Display message for the user
"Ready to connect to network?"
if the user click yes
a. then, display dialog "please enter the user name:"
a. if the user name is right
i. then display dialog "please enter the password:"
- if the user enter the password right
  - then display dialog "Shares Mounted!"
- else if the user enter the password wrong
  - then display dialog "Error, please try again"

b. else if the user name is wrong
i. then display dialog "Error, No user name entered"

else if the user click no
then, refuse to mount and quit the application

3.2 Pseudo code to setup the HP LaserJet 5200 Printer

If the user request to print using the HP LaserJet 5200 printer

Then check if the printer is installed in the Mac side

- if the printer already installed
  - then, let the user choose the paper to print, and the printer should work correctly
- else if the printer was not installed
  - then, connect the computer to Chemnitz server
    - choose the printer from Windows
    - choose "cs"
    - choose Chemnitz
    - choose S114D-HP5200
    - then add the printer
      - then, let the user choose the paper to print, and the printer should work correctly

3.3 Pseudo code to setup the HP LaserJet 500 color Printer

If the user request to print using the HP LaserJet 500 color printer

Then check if the printer is installed in the Mac side

- if the printer already installed
  - then, let the user choose the paper to print, and the printer should work correctly
- else if the printer was not installed
  - then, go the website to download the printer http://h20564.www2.hp.com/hpsc/swd/public/readIndex?sp4ts.oid=4184891
  - Then select your product's operating system which is Mac OS * 10.10.
  - Then, click on the plus sign to dropdown the box that shows the description and the current version and the size (MB) then click on download.
  - Download software for the HP Printer for the Mac and install the printer driver.
    - then, let the user choose the paper to print, and the printer should work correctly.

Implementation Phase

1- Introduction:

The purpose of this phase is to list all tasks performed during the implementation of Customizing Mac Environment in the Computer Science lab at Concordia University Wisconsin. This document will allow a system administrator to reproduce the project "from scratch" when need to implement the project on different Mac computers in the lab. It will provide step-by-step instructions that describe the services administrator can set up services using server-based methods. It also explains how to configure Mac environment to provide services for the users.

2- Project overview:

The Computer Science Department's labs at Concordia University Wisconsin have Mac devices running the Windows operating system. The purpose of the project is to Customize Mac Environment to be similar to how Windows side already implemented. This should include implement a server-based method of customizing the user experience on the Mac side of the lab machines. The project main requirements were:

- Give the users the opportunity to share their documents from Windows side to Mac side.
- Give the users the opportunity to share the applications from Windows side to Mac side.
- Enable users to print correctly and effectively in both printers located in the computer lab.
- Allow the users to use different web browsers such as Google Chrome.

ISSN: 2663-5798 || Arab Journal for Scientific Publishing

الإصدار الثامن – العدد الخامس والسبعون
تاريخ الإصدار: 2 – كانون الثاني – 2025م
www.ajsp.net

3- Setup printers:

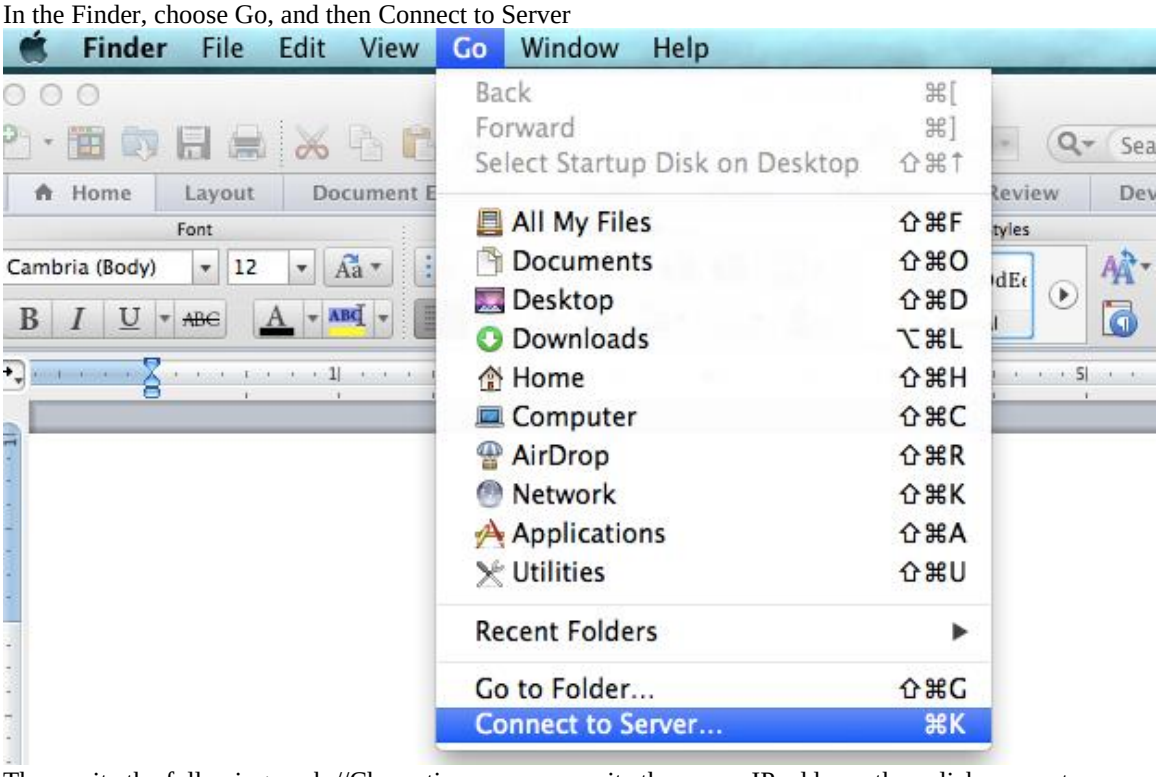
The project gives the users the ability to print correctly and effectively while working in Mac environment from "HP 5200 LaserJet Printer" and "HP Laser 500 Color Printer", which are located in the computer lab.

3.1 HP 5200 LaserJet Printer

LaserJet 5200TN printer is designed to deliver efficiency and flexibility; this ultra-powerful, wide-format tabloid laser printer is flexible and easily manageable to meet the needs of university's work teams. The HP LaserJet 5200dtn printer was installed in "Chemntiz" server, and to setup this printer in the Mac environment, you have to connect to the "Chemntiz" server, then install it from there.

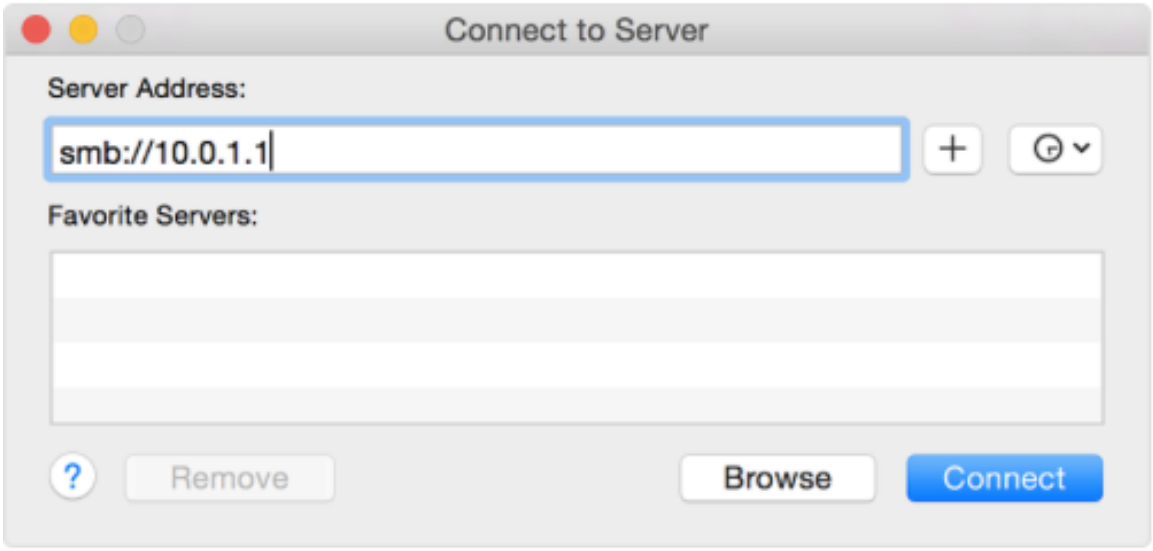
Follow the instructions below to install the printer correctly:

1- In the Finder, choose Go, and then Connect to Server

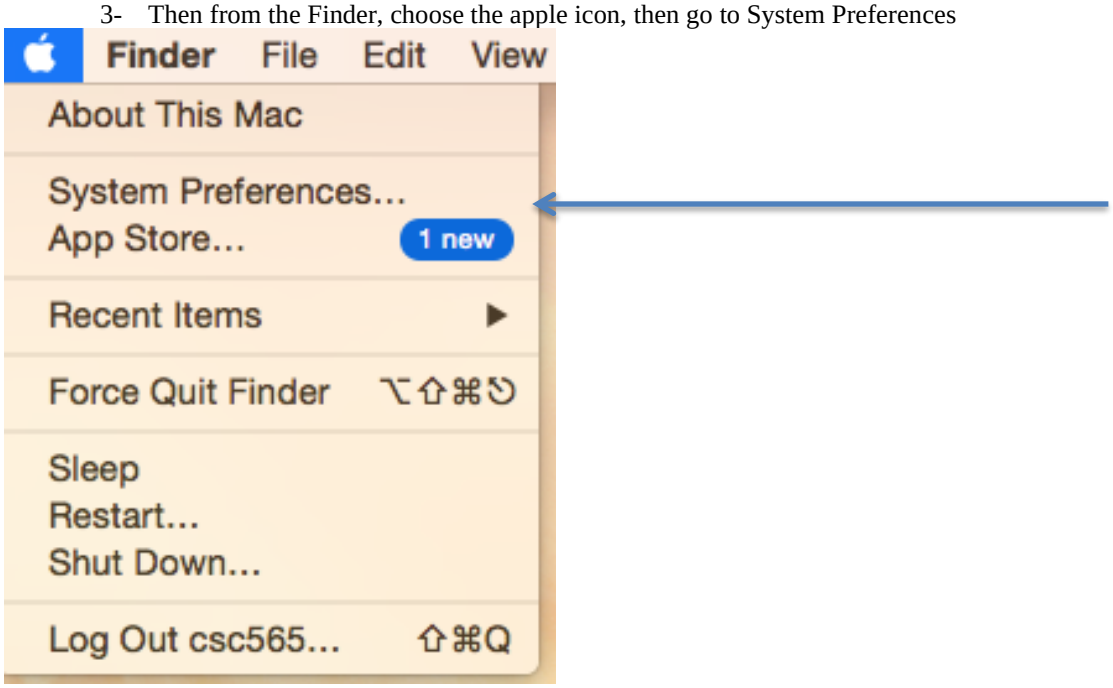


2- Then write the following: smb://Chemntiz or you can write the server IP address, then click connect.

ISSN: 2663-5798 || Arab Journal for Scientific Publishing
الإصدار الثامن – العدد الخامس والسبعون
تاريخ الإصدار: 2 – كانون الثاني – 2025م
www.ajsp.net



3- Then from the Finder, choose the apple icon, then go to System Preferences

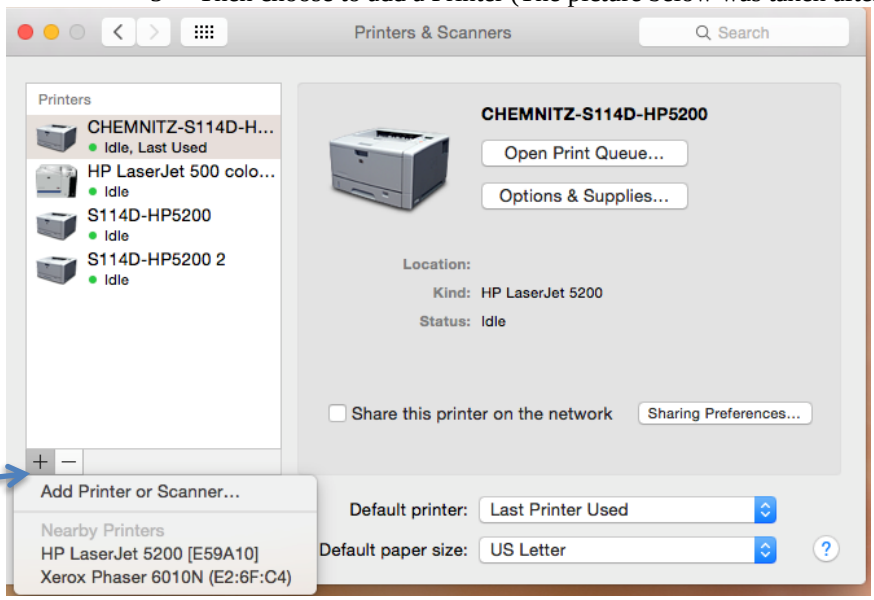


4- Choose the Printer and Scanners

ISSN: 2663-5798 || Arab Journal for Scientific Publishing

الإصدار الثامن – العدد الخامس والسبعون
تاريخ الإصدار: 2 – كانون الثاني – 2025م
www.ajsp.net

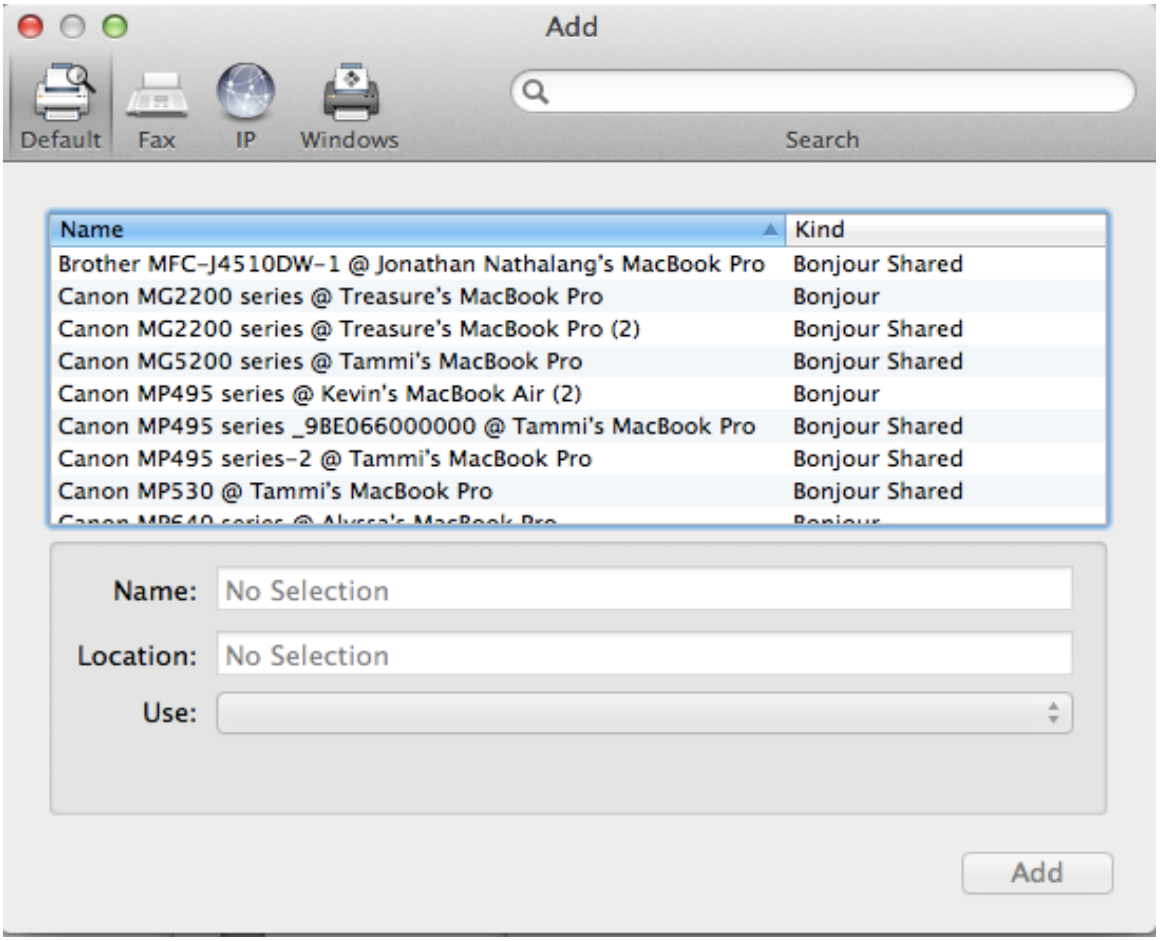
5- Then choose to add a Printer (The picture below was taken after adding the printers)



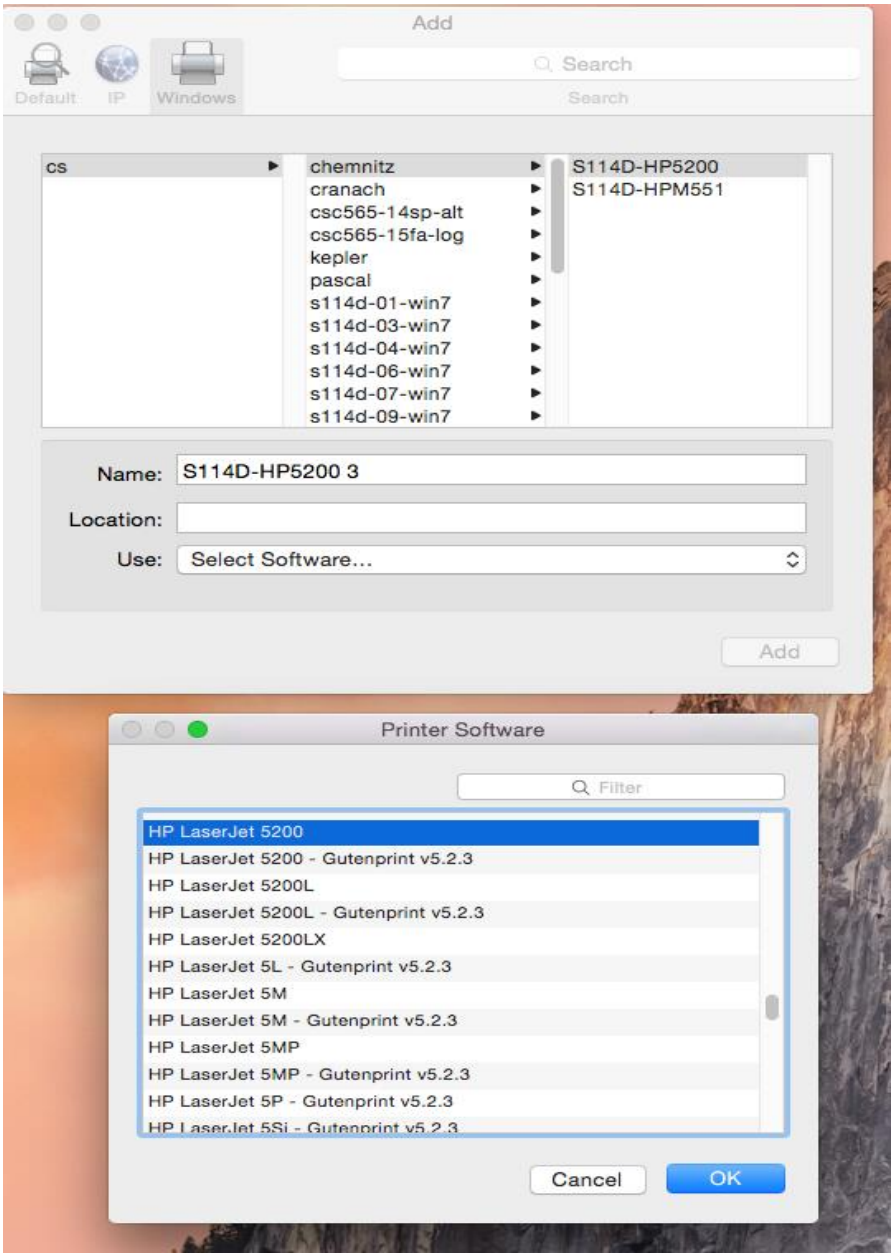
6- Type the name of the printer, or choose the printer from the Windows Network from the large list of printer name. For example, HP 5200 LaserJet.

ISSN: 2663-5798 || Arab Journal for Scientific Publishing

الإصدار الثامن – العدد الخامس والسبعون
تاريخ الإصدار: 2 – كانون الثاني – 2025م
www.ajsp.net



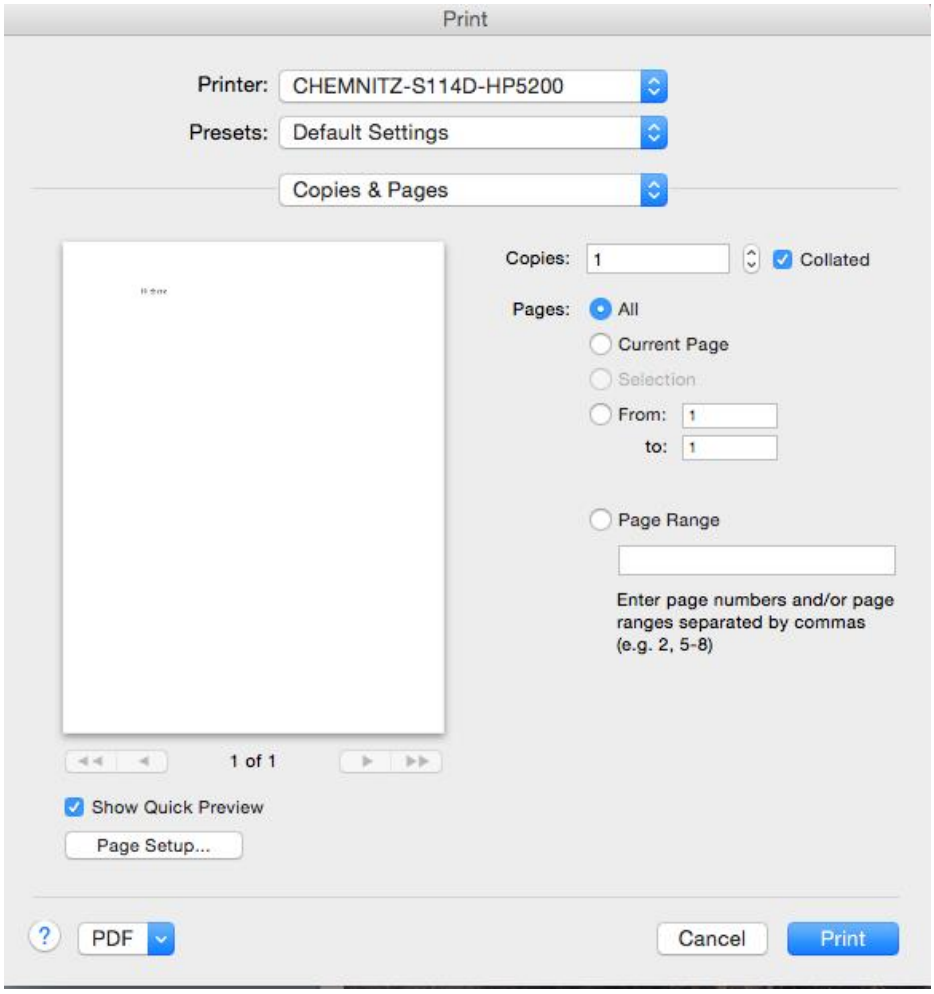
7- Then choose Windows from the up bar -> choose cs -> Chemnitz-> choose S114D-HP5200 -> add.



8- Then the printer will work effectively as in Mac side.

To test the printer:

- Choose the file you want to print
- Click file from the up bar -> print -> choose the printer
  CHEMNITZ-S114D-HP5200, the number of copy do you want, the pages , then click print.

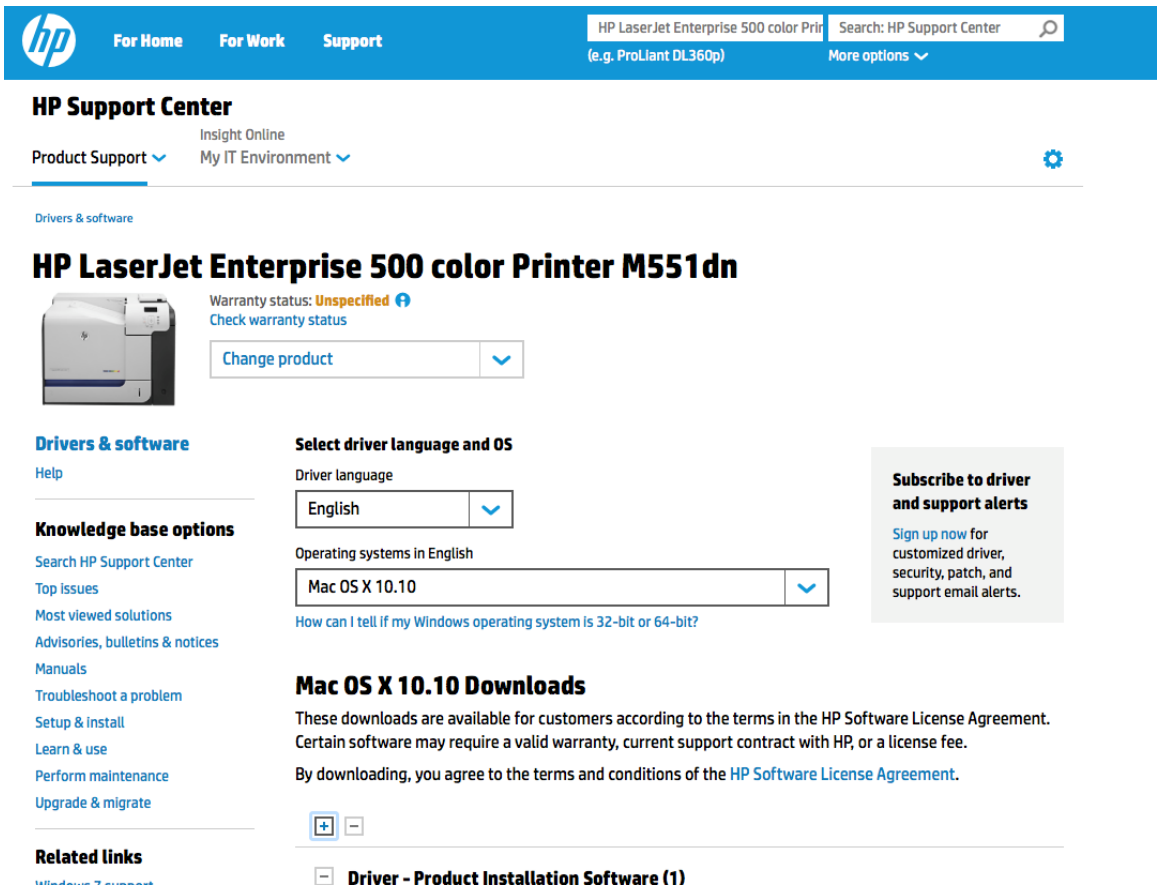


3.2 HP laser500 color printer:

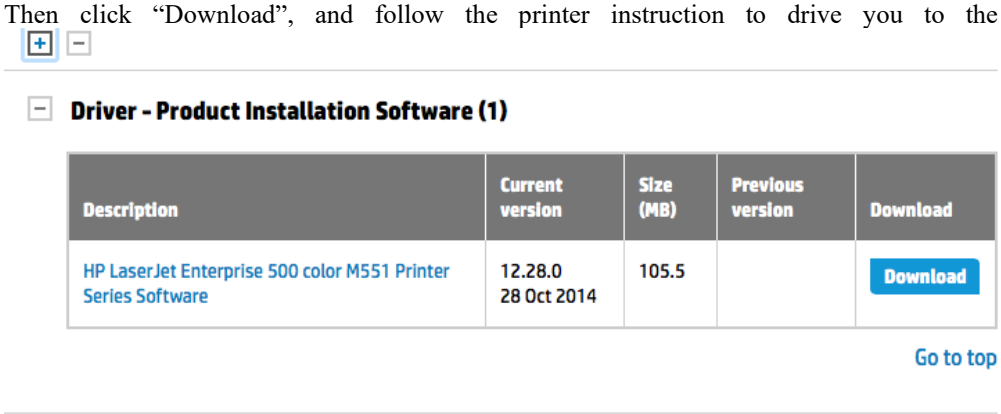
1. Go to this website, Download HP Laser Jet Enterprise 500 color Printer M551dn. http://h20564.www2.hp.com/hpsc/swd/public/readIndex?sp4ts.oid=4184891

2. Then select your product's operating system which is Mac OS * 10.10.

ISSN: 2663-5798 || Arab Journal for Scientific Publishing
الإصدار الثامن – العدد الخامس والسبعون
تاريخ الإصدار: 2 – كانون الثاني – 2025م
www.ajsp.net



3. Then, click on the plus sign to dropdown the box that shows the description and the current version and the size (MB) then click on download.
4. Then click "Download", and follow the printer instruction to drive you to the setup the printer.



4- Map Network Drives on Mac

Mapping a drive simply means to connect a local or network drive with a specially allocated shared directory or folder on another computer or on server. After a drive has been mapped, you can access the shared resource and treat it as if it's located locally on the Mac computer. The customization should be implemented by server-based methods of customizing the user experience on the Mac side of the lab machines. The customized Mac environment must support the services that occur in Windows. It must allow users to share files between both Mac and Windows environments. In this project, we automatically map "Applications" and "User Data" network drives because they have everything the user need from Windows side. As a result, the user can have everything he has in Windows by clicking on the network drives that are in Mac desktop such as his documents, pictures, or any other files or folders. This project will provide server-based method to transfer the user's document that reside in Windows to Mac, so user can access his documents from both environments.

4.1 Create a Script to Mount Network Drives

One of the things we struggled with was finding a method that has to work well for over 1000 users in Chemnitz server. We found over 3 methods that work fine for each user, but it is difficult and unofficial to copy the method for each user's Application folder and change the login property for each user. As a result, it is very important to find a good solution that applies for all users in Chemnitz server to mount their drives on Mac side.

The most effective and professional method we found is to mount network share for the Mac users via AppleScript Editor. We wrote a script using AppleScript Editor to add it to the Macintosh HD startup disk. The reason to add the script to the startup disk is to allow each user that login to Mac device to find his drives automatically. Therefore, we don't need to add the script manually one by one for each user. Then, we also keep a copy of the script in the Dock. We do this because the Mac cannot connected to the server until its appear in the network servers list, and if a user on our network logs in while Chemnitz still not connecting to the device, the user can manually launch the script from the Dock and the script will runs just fine. In addition, in our script we ask the user first if he want to share his volumes to give him an idea about the drives icon appearing on the Dock. The server-based method solution, which we did has four parts:

1. AppleScript App
2. Login Hook
3. Launchd
4. Test

AppleScript App

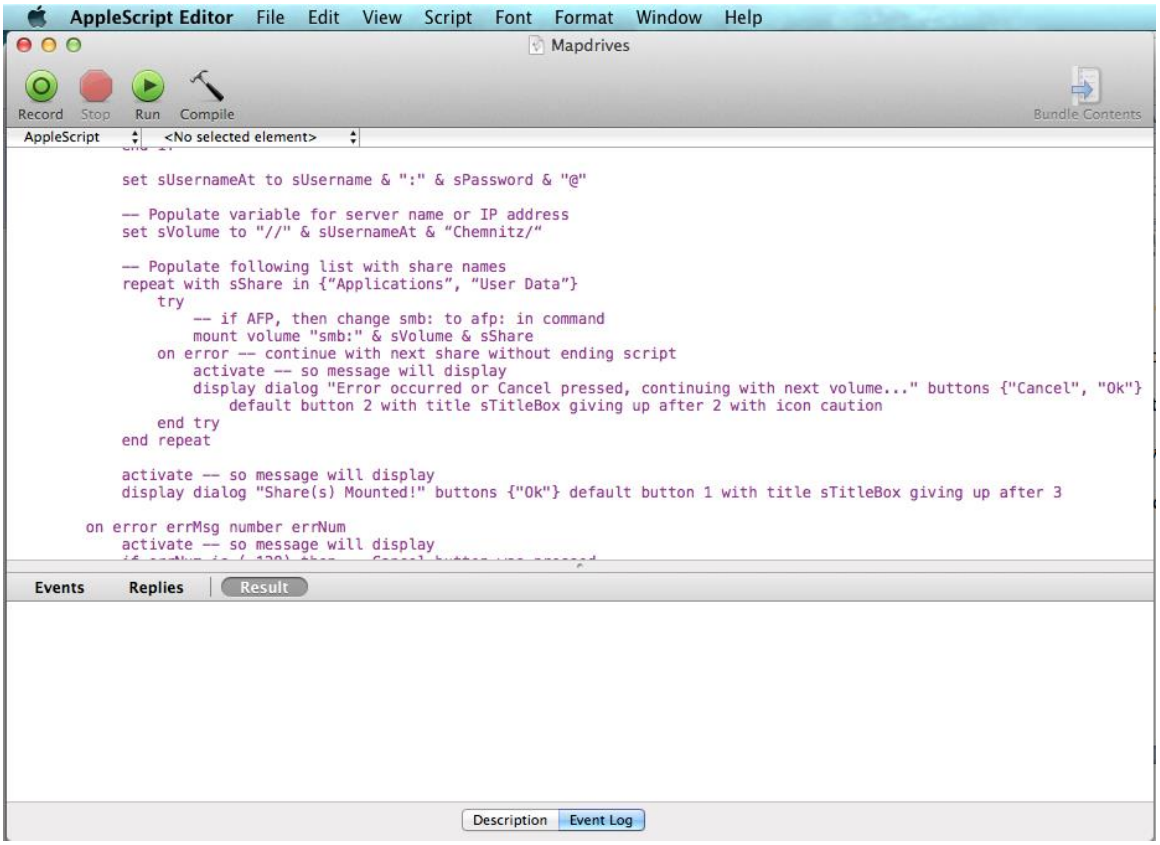
1. Write in the search field: AppleScript Editor. Open the AppleScript and start to write the code for mounting network share drives.
2. 1st thing we need is to ask the user if he is ready to connect to network and mount shares? Then, if he clicks yes, then go to the next step. If he clicks no, then exit the script without mounting the users drives.
3. We need to get the user name, and password.
    a. Check the user name, if it is "" then display dialog message: "Please enter the user name". By the way, the user name usually will be the current user name, and the user doesn't need to retype it, but just in case he is erase it for any reason.
    b. Check if the user write his password wrong, display dialog message: "Error"
4. Then we are ready to start grabbing information for this user to access his drives to share them.
    a. Populate variable for server name: set sVolume to "//" & sUsernameAt & "Chemnitz/"
    b. Populate the share drives name: Applications and User Data

```
repeat with sShare in {"Applications", "User Data"}
                try
                        -- if AFP, then change smb: to afp: in command
                        mount volume "smb:" & sVolume & sShare
                on error -- continue with next share without ending script
                        activate -- so message will display
                        display dialog "Error occurred or Cancel pressed, continuing with next volume..."
buttons {"Cancel", "Ok"} default button 2 with title sTitleBox giving up after 2 with icon caution
                end try
        end repeat
```

5. Now we are good to mapping drives:
   display dialog "Share(s) Mounted!"
6. Set the script, the Applications drive, the User Data drive to the Dock, so the user can access them easily.
   Write the code here

   Another way, is to set the Application drive and the User Data in windows appear in the desktop or in the Dock.
   Write the code here
7. Name the AppleScript such as (Mapdrives) as we did, and save the AppleScript code as Application in the /Application folder or in /Users/Shared folder or in any place that is easy to remember and you can access easily. In addition, root administrative privileges are required.

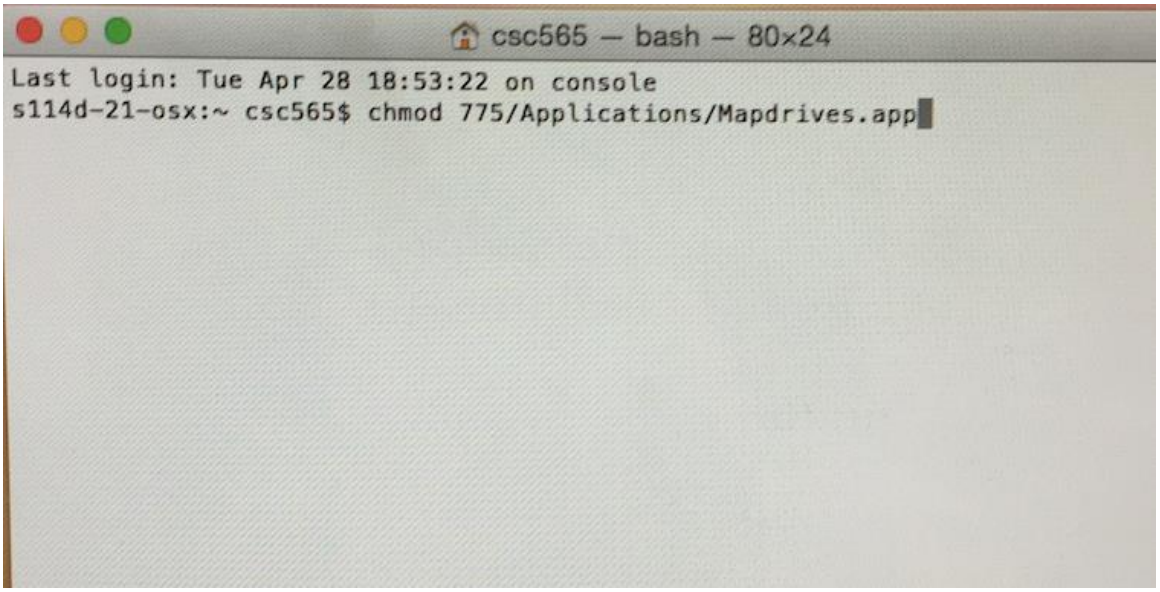
8. You can find the complete AppleScript code with clarify comments in the Appendix.



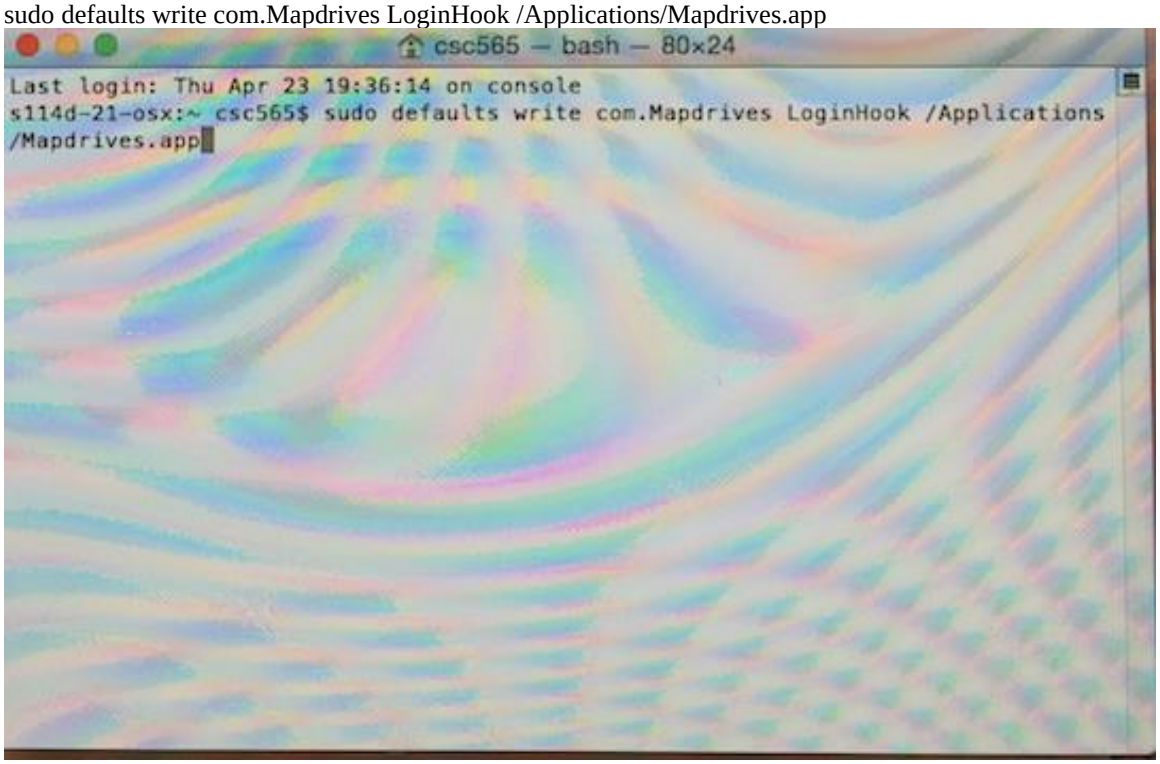
Login Hook

Using Login Hook to add the script for all the users is an effective method that works well because we have an admin privileges.

1. Place the script ex: Mapdrives.app in shared location as we said before.
2. Make sure the script is executable
    a. Open the terminal by navigate to /Applications/Utilities/ and double click on Terminal
    b. Write on terminal the command:
    chmod 775/path/of/ the file/
    For example: chmod 775/Applications/Mapdrives.app



3. Then from the terminal.app: run the following:
sudo defaults write com.Mapdrives LoginHook /Applications/Mapdrives.app



Note:

- There is only one system-wide login-hook, which provide run at login functionality.
- The login-hook script runs synchronously before other login actions, therefore, it should be kept short.
- The script runs in the context of the root user and his username of the user logging on is passed as the 1st argument to the script.

Launchd

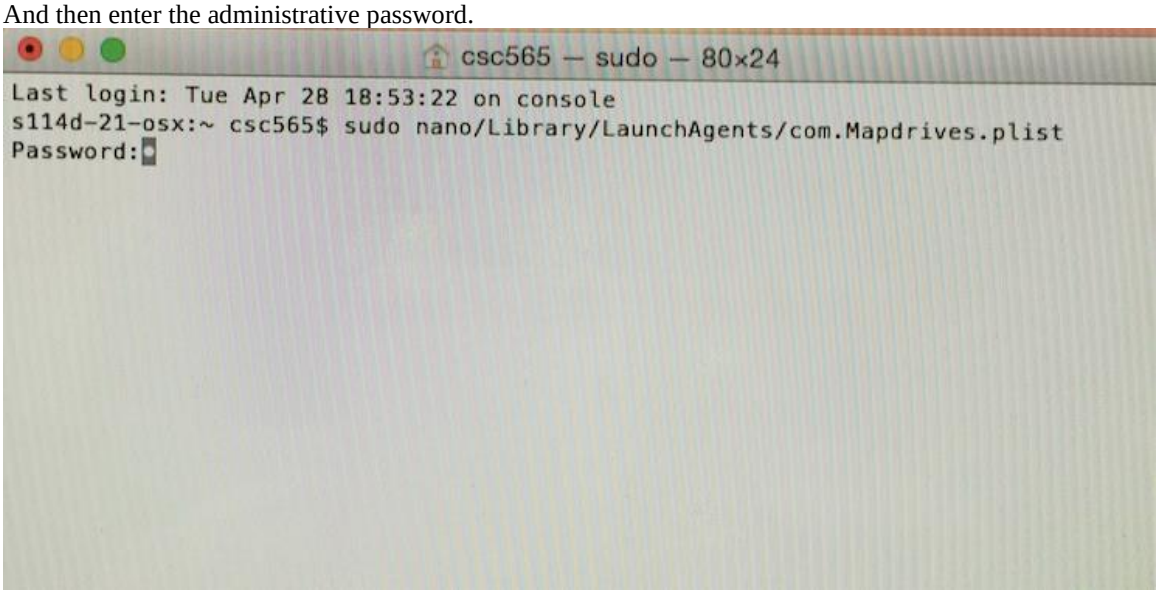
Launchd scripts can be installed for a specific user or for all the users as we need, and it requires administrative access. Launchd will allow the app to run at every login and as the user logging in While using launchd is Apple's preferred method, it also require creating a separate *.plist file. One of the benefits is that you can install multiple scripts independently.

Note:

- No specific sequencing or timing of launchd scripts is guaranteed; loosely speaking, and they run at the same time at login.

To launchd the script for all users, follow the steps below:

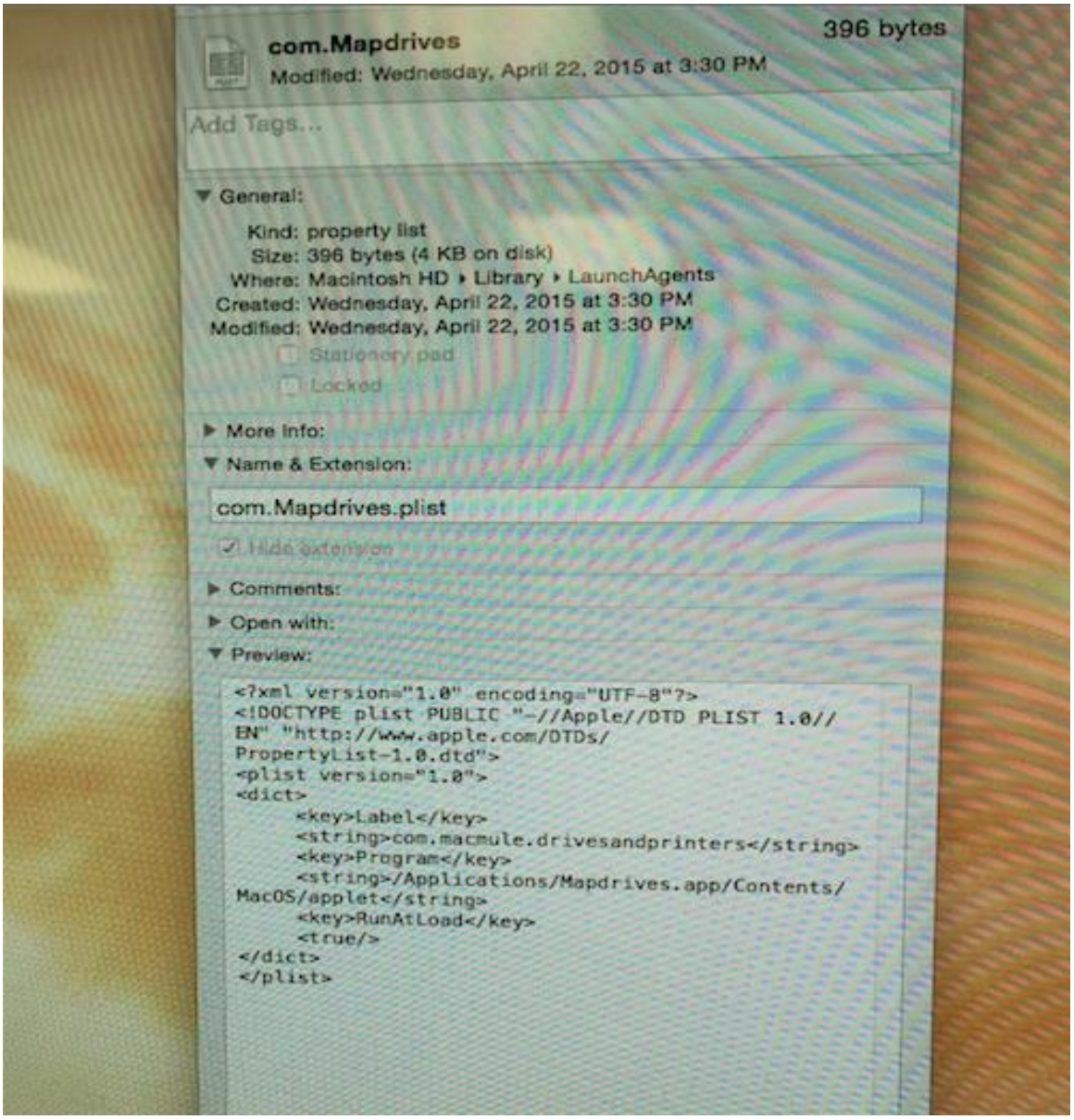
1. Create a file with extension **.plist** in /Library/LaunchAgents (requires admin privileges)
   E.x: /Library/LaunchAgents/com.Mapdrives.plist
   By running the following command in the Terminal.app:
   sudo touch /Library/LaunchAgens/com.Mapdrives.plist
2. Open the file and save it with the following content
   a. Make sure your text editor prompts for admin privileges on demand; alternatively, use:
   sudo nano/Library/LaunchAgents/com.Mapdrives.plist
   And then enter the administrative password.



   b. Write the following:

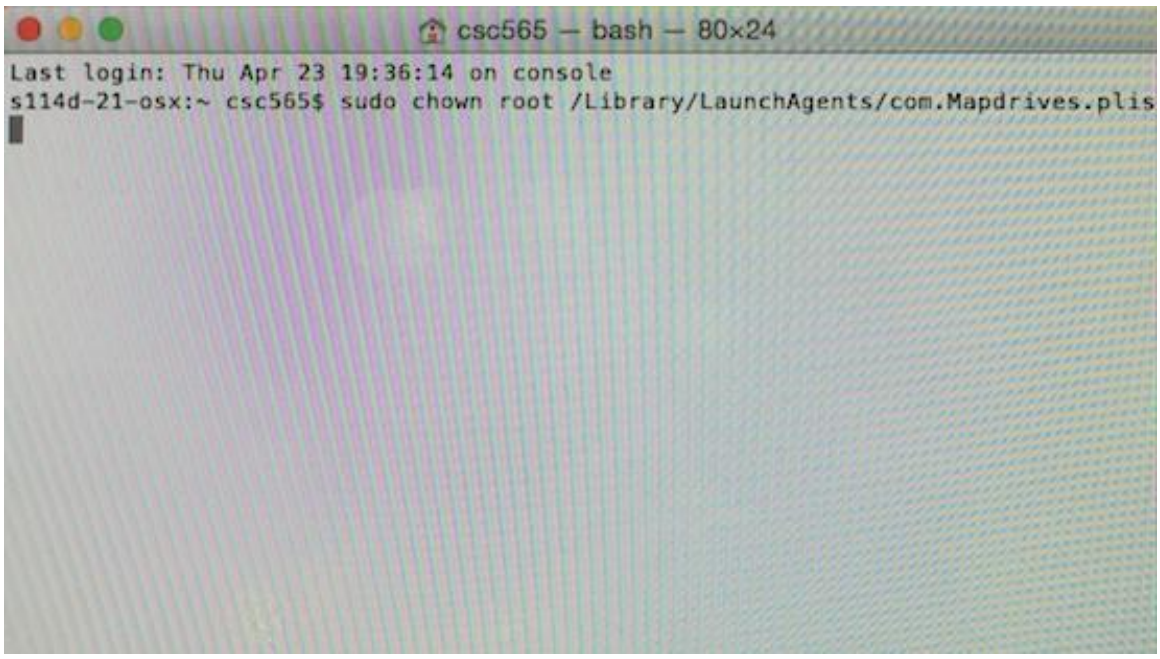
```
<?xml version="1.0" encoding="UTF-8"?>

<!DOCTYPE plist PUBLIC "-//Apple//DTD PLIST 1.0//EN" "http://www.apple.com/DTDs/PropertyList-1.0.dtd">

<plist version="1.0">

<dict>

    <key>Label</key>

    <string>com.macmule.drivesandprinters</string>

    <key>Program</key>

    <string>/Applications/Mapdrives.app/Contents/MacOS/applet</string>
```

```
    <key>RunAtLoad</key>
    <true/>
</dict>
</plist>
```

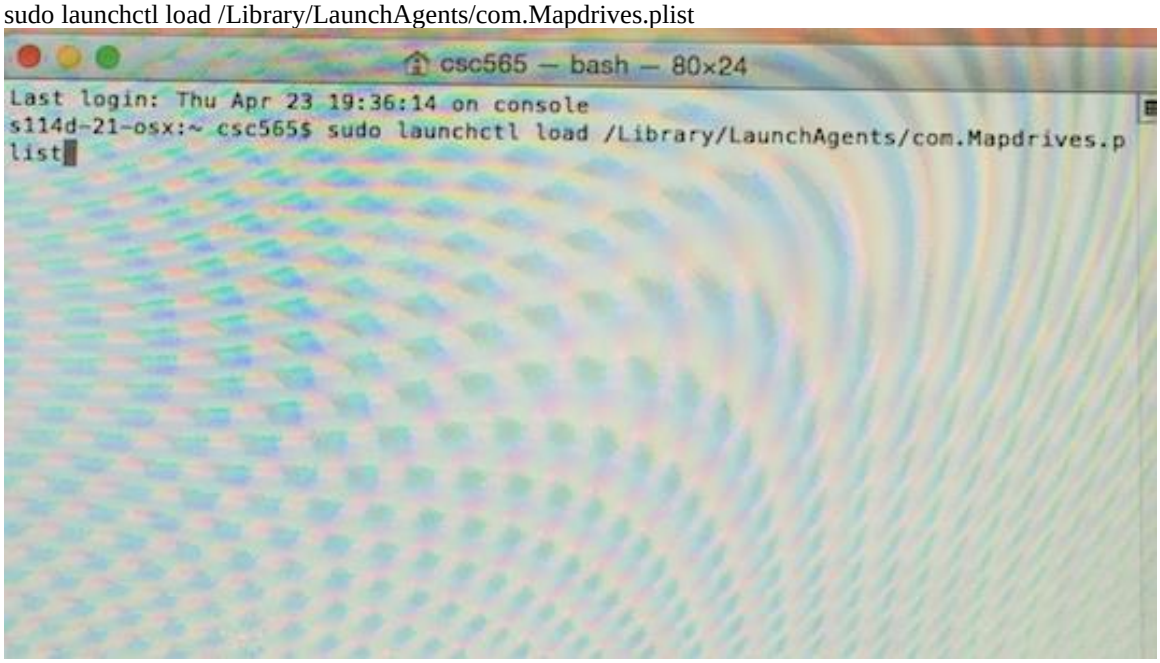


3. Now, from the Terminal.app, run the following command:
   sudo chown root /Library/LaunchAgents/com.Mapdrives.plist

ISSN: 2663-5798 || Arab Journal for Scientific Publishing
الإصدار الثامن – العدد الخامس والسبعون
تاريخ الإصدار: 2 – كانون الثاني – 2025م
www.ajsp.net

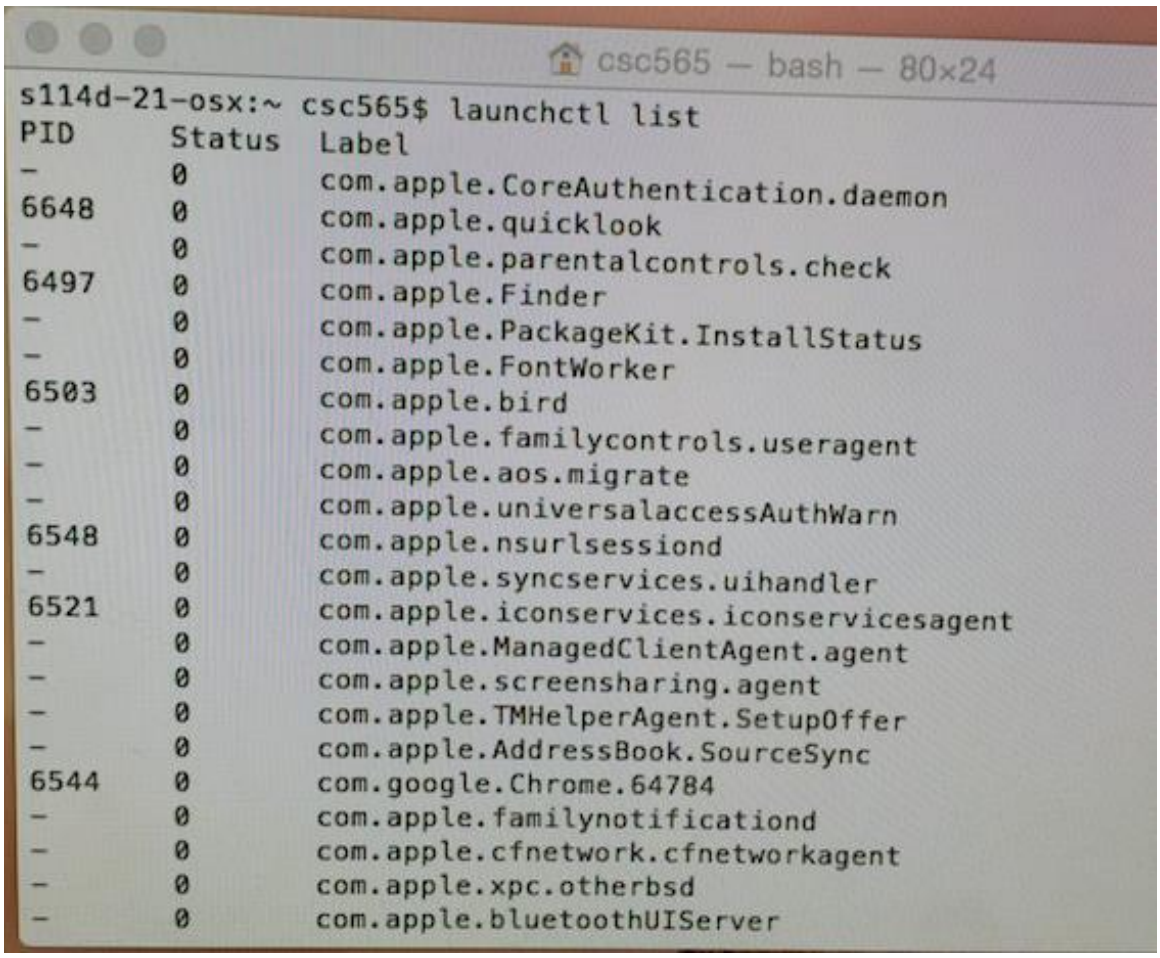


sudo launchctl load /Library/LaunchAgents/com.Mapdrives.plist



4. Now, you can write **launchctl list** in the Terminal.app to verify that the script executed correctly. If the script executed correctly you will got "0" in the status of the process, but if the script not executed correctly, you will for the error number.

ISSN: 2663-5798 || Arab Journal for Scientific Publishing
الإصدار الثامن – العدد الخامس والسبعون
تاريخ الإصدار: 2 – كانون الثاني – 2025م
www.ajsp.net



Test

You should be able to test this now, by logging out then logging in on a mac that has the app & this LaunchAgent. You should see the script in the Dock, and when the user clicks it, it will ask him about the user name, and password. Then if every thing goes good, you will see the display form said “Shared Mounted! ”. Then, the script, Application drive, and the User Data drive will appear in the Dock.

Suggestions for Future Improvement

Reference:

Network volume/Mac OS X. (n.d.). Retrieved April 20, 2015, from https://apps.education.ucsb.edu/wiki/Network_volume/Mac_OS_X

How To: Map Drives & Printers Based On AD Group Membership On OSX. (2011, September 8). Retrieved April 21, 2015, from https://macmule.com/2011/09/08/how-to-map-drives-printers-based-on-ad-group-membership-on-osx/

Mount network shares privately in OS X - CNET. (n.d.). Retrieved April 6, 2015, from http://www.cnet.com/news/mount-network-shares-privately-in-os-x/

(n.d.). Retrieved April 15, 2015, from http://images.apple.com/business/docs/Autofs.pdf

OS X Mavericks: Enable and disable the root user. (n.d.). Retrieved April 4, 2015, from https://support.apple.com/kb/PH14281?locale=en_US

SBS-0121151215: Create an AppleScript Script and App to Map Network Drives. (n.d.). Retrieved April 5, 2015, from http://community.spiceworks.com/how_to/105530-sbs-0121151215-create-an-applescript-script-and-app-to-map-network-drives

Share all Mac OS X Volumes on network - Straight Dope Message Board. (n.d.). Retrieved April 9, 2015, from http://boards.straightdope.com/sdmb/showthread.php?t=541714

Chapter 4 Logical Design. (2005, January 21). Retrieved April 23, 2015, from https://docs.oracle.com/cd/E19396-01/819-0058/log_architect.html

Mac Stuff. (n.d.). Retrieved April 19, 2015, from http://macstuff.beachdogs.org/blog/?p=14

(n.d.). Retrieved April 18, 2015, from https://manuals.info.apple.com/MANUALS/1000/MA1180/en_US/OpenDirAdmin_v10.6.pdf

Interact with Macs in a Windows and Active Directory Environment. (n.d.). Retrieved April 20, 2015, from https://technet.microsoft.com/en-us/magazine/2008.12.interacting.aspx

How to Join a Mac to a Windows Domain. (n.d.). Retrieved April 12, 2015, from http://blog.pluralsight.com/join-mac-to-windows-domain

Bind Yosemite OS X to Active Directory Windows Server 2012. (n.d.). Retrieved April 17, 2015, from https://www.youtube.com/watch?v=5qR8sjuLT_M

Apple. (n.d.). Retrieved April 16, 2015, from https://support.apple.com/en-us/HT2420

Episode #321: Mapping Network Drives in Windows. (n.d.). Retrieved April 15, 2015, from https://www.youtube.com/watch?v=tozfMBjwg2Q

ISSN: 2663-5798 || Arab Journal for Scientific Publishing

الإصدار الثامن – العدد الخامس والسبعون
تاريخ الإصدار: 2 – كانون الثاني – 2025م
www.ajsp.net

"تخصيص بيئة ماك لتكون كبيئة ويندوز"

إعداد الباحثتان:

أسماء الطبايقي

هنوف الشريف

مرحلة المتطلبات

ملخص المشكلة:

تحتوي مختبرات قسم علوم الحاسوب في جامعة كونكورديا ويسكونسن على أجهزة ماك تعمل بنظام تشغيل ويندوز. تتمتع بيئة ماك بالعديد من المزايا التي يجب الاستفادة منها في مختبرات الجامعة. تتطلب الجامعة تخصيص بيئة ماك. يجب أن يتم التخصيص من خلال تطبيق طرق مخصصة تعتمد على الخادم لتخصيص تجربة المستخدم على جانب ماك من أجهزة المختبر. بينما يوفر جانب ويندوز الخدمات للمستخدمين، يجب أن يوفر جانب ماك نفس الخدمات مثل محركات الخادم والطابعات واتصال الواي فاي، حيث أن هذه الخدمات مفقودة في جانب ماك، مما يجعل من الصعب على الطلاب العمل في هذه البيئة. يجب أن تكون الوثائق جاهزة للمراجعة من قبل العملاء في نهاية المشروع. يجب تنفيذ المشروع بالكامل بحلول الموعد النهائي في 1 مايو 2015.