

INTERNSHIP ON NETWORK SYSTEM ADMINISTRATOR

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This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Computer Science and Engineering

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APPROVAL

This Project/internship titled “**Internship on Network System Administrator**”, submitted by MD. Abdul Aziz Mazumder, Id No: 191-15-12070 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfilment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on *28 February 2023*.

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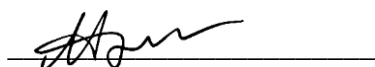


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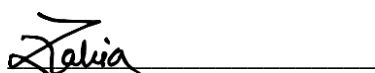


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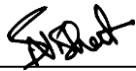
We hereby declare that, this project has been done by us under the supervision of **MD. Abdul Aziz Mazumder, Internship on Network System Administrator, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma. [Font-12]

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ABSTRACT

The main target and objective of this Internship on Network System Administrator was to develop my skills and thoughts and implement into any Multinational Company or Organization. In this new era of technology, skills are very important role in Career development. So, Network System Administrator is one of the very strong and useful source to implement our talents. There has various kinds of works in Network System Administrator, like: Routing, Windows Server, Linux Server, Mikrotik, Network Security and so on. In this new era Network System Administrator has a huge demand to develop any company. So, there has a lot of competition to build career and stay in this network field. Which is why I have chosen the title of my report “Network System Administrator”. Working with Islamic Development Bank-Bangladesh Islamic Solidarity and Educational Wakf (IsDB-BISEW) created a huge impact on my future career. In this report, I have described all the real life experiences and knowledge I have gained during this 4 months of internship period.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Computer networking is necessary for the charges of companies in industry crossing all types of recesses. To observe computer networks by well- predicated working setup, network directors come pivotal figures, exercising their specialist knowledge to inaugurate new tackle and software, bystander interpretation, save network security, and much further. This is the substantial explanation why networks cannot serve effectively without decent administration. A network director is a professional who can identify and develop the accurate networks that hold the capability to support the business pretensions of the targeted company. With correct administration, the accurate networks and systems will be installed in an attempt to catch the intended objects.

1.2 Motivations

I've always had an interest in computers. I've always been fascinated by computer tackle in particular. Because from the morning, I was allowing about how people are controlling the whole world through this electrical object! Due to which I got stimulant to take way in the world of computer networks. And this is where Islamic Development Bank- Bangladesh Islamic Solidarity and Educational Wakf(IsDB- BISEW) helped me. Where during the externship I got to know about the vast world of networking also know that this network world is as deep as the ocean.

1.3 Objective

In this internship period I make my chops on a new position. Which increased my interest in learning about network administration. I want to make my career as a system mastermind. So that I can find the problem of computer tackle and break them also upgrade them.

CHAPTER 2

ORGANIZATION

2.1 Introduction

The Islamic Development Bank- Bangladesh Islamic Solidarity Educational Wakf (IsDB- BISEW) was established in 1987 following an agreement between the Islamic Development Bank and the Government of Bangladesh. IsDB- BISEW is responsible for the backing, development and perpetration of programs in the areas of education, mortal resource development and institutional strengthening.

By fastening on pool development through specialized training and skilling in all its programs and systems accepted from 2003, it radically impacted the lives of about 50,000 depressed Muslim youths till now. Meanwhile, the programs have earned enormous character and success in original and overseas job requests. All the programs have been maintaining job placement of heirs. It's really perceptible and estimable donation towards the frugality of Bangladesh and explosively recommended for continuing the programs in broader and extended sphere.

2.2 Services

- IT Scholarship
- Vocational Training
- Madrasah Education
- 4-Year Diploma Scholarship
- Orphanage

2.3 Project Evaluation

The IsDB- BISEW IT Scholarship Project has been rated by a Third- Party Evaluation as " Really perceptible and estimable donation towards the frugality or Bangladesh and depressed Muslim Youths and explosively recommended for continuing the program In broader and extended sphere"

The IsDB- BISEW IT Scholarship Project, as stated in the BUET Evaluation report-" The IsDB- BISEW IT Scholarship Project has been producing largely competent for the job request. The evaluation of the design reveals that the qualifications and capabilities attained by completion of the training are officially authorized through the

IDB- B11SEW instrument and seller instruments both of which are non-academic in nature. Rather, a professional instrument/ parchment from an academic institution or delegation from an accredited educational institution adds value to both the externship and the design. But explosively recommends that you take the necessary way to gain blessing for your training program from an applicable educational institution authorized to award similar recognition on the following terms the shower of the Dakhil program (vocational training) is largely noteworthy, and its close monitoring system ensures quality training.”

2.4 Future Expansion Plan

A plot of land has been bought measuring two acres located in the Agargaon Administrative Area, Dhaka, Bangladesh for setting up an installation befitting with its purposes and objects of IsDB- BISEW with the enhanced capacity.

IsDB- BISEW meanwhile engaged a consulting establishment to carry out a feasibility study to review colorful possible options for exercising the land. The purpose of the study is to determine the stylish possible option reviewing the outgrowth of the study and the reasons & considerations for and against a proposition. The study is in progress now.

CHAPTER 3

INTERNSHIP TASK AND ACTIVITIES

3.1 Task and Activities

I have to build a new setup for this internship. Because my laptop configuration was not require for my work. I have summarized what I have learned from IsDB-BISEW.

3.2 Network Essentials

3.2.1 Open Systems Interconnection (OSI)

One of the biggest features of the OSI specification is to support data transfers between OSI specifications. A variety of hosts, whether UNIX, Windows, or Mac-based. Note, however, that the OSI model is not a physical model. It is a conceptual, comprehensive, and fluid set of guidelines for application developers to use to create and implement applications that run on networks. It also provides a framework for creating and implementing network standards, devices, and internetworking schemes (p. 30). The OSI model has seven layers:

- Application (Layer 7)
- Presentation (Layer 6)
- Session (Layer 5)
- Transport (Layer 4)
- Network (Layer 3)
- Data Link (Layer 2)
- Physical (Layer 1)

Application	• File, print, message, database, and application services
Presentation	• Data encryption, compression, and translation services
Session	• Dialog control
Transport	• End-to-end connection
Network	• Routing
Data Link	• Framing
Physical	• Physical topology

Figure 3.1: OSI Layer functions

3.2.2 DoD Model

The DoD model is essentially an abridged version of the OSI model. It consists of four, instead of seven, layers:

- Process/Application layer
- Host-to-Host layer
- Internet layer
- Network Access layer

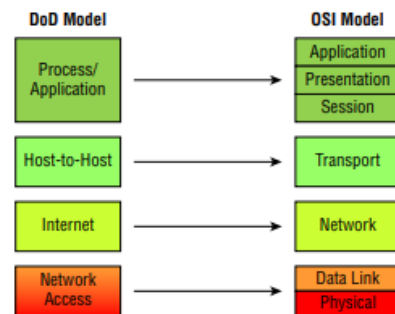


Figure 3.2: DoD and OSI models

3.2.3 TCP/IP

TCP/IP is so important to the operation of the Internet and intranets that a detailed understanding is essential. It begins with some background on TCP/IP and how it came about, and then discusses key technical goals defined by its original designers. Next, you'll learn how to compare TCP/IP to the theoretical Open Systems Interconnection (OSI) model (pp. 173-175).

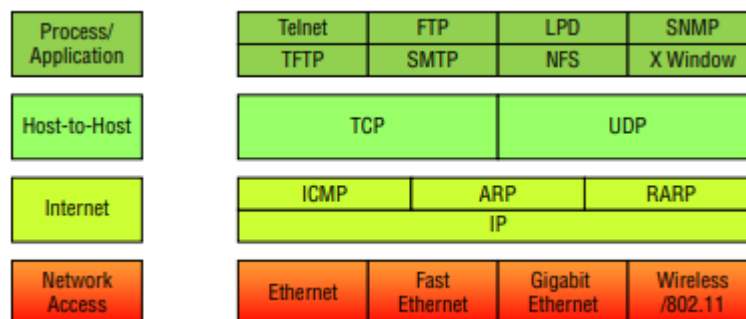


Figure 3.3: DoD and OSI models

3.2.4 Network Addressing

A network address (also called a network number) uniquely identifies each network. All computers on the same network share this network address as part of their IP address. For example, if the IP address is 172.16.30.56, 172.16 is the network address. A host address is assigned to each machine on a network to uniquely identify it. This part of the address must be unique as it identifies a specific machine (person) rather

than a network representing a group. In the example IP address 172.16.30.56, 30.56 is the host address. The designers of the Internet have chosen to create classes of networks based on their size. I created a Tier A network for a small number of networks with a very large number of hosts. At the other end of the spectrum are Class C networks. This is reserved for large networks with a small number of hosts. The class difference between very large and very small networks is, as expected, a class B network. The division of IP addresses into network and host addresses is determined by classes (p. 208).

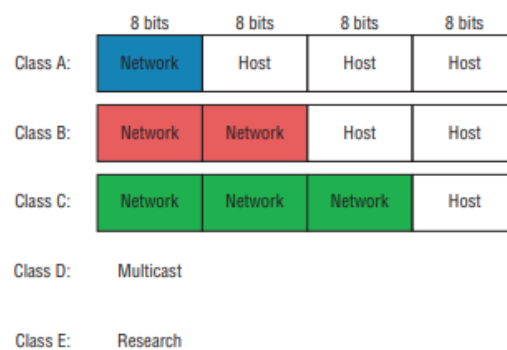


Figure 3.4: Summary of the network classes

3.2.5 Cisco Packet Tracer

The Cisco Networking Academy program is designed to keep up with the evolution of networking systems by providing innovative curriculum and materials that help students understand the complexities of information and communication technology (ICT). Within this framework, the Cisco Packet Tracer e-learning software was developed to help Networking Academy students gain practical skills in networking technology in a rapidly changing environment. Students pursuing ICT skills can benefit from the accessibility of an online curriculum and new opportunities for social learning, collaboration, and competition. Packet Tracer complements the physical equipment in the classroom by allowing students to create networks with an almost unlimited number of devices, facilitating practice, discovery, and troubleshooting. A simulation-based learning environment helps the student develop her 21st century skills such as decision-making, creative and critical thinking, and problem-solving.

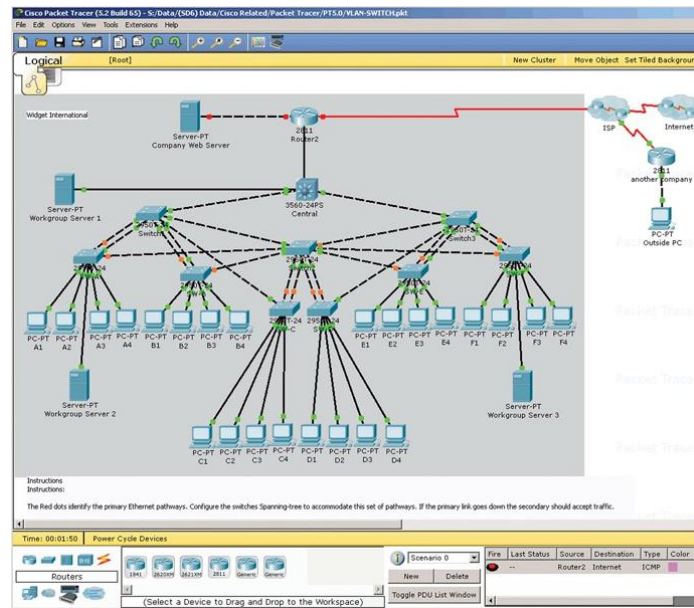


Figure 3.5: Packet Tracer's drag-and-drop interface

3.2.6 Routing

Routing is the simple process of choosing a route to deliver data to its destination. Any host that can generate a routing table can be routed. A routing process is required to deliver packets of data to networks that are not directly connected to the sender. We won't get into the theoretical details here, so let's open up Cisco Packet Tracer and run it. To simplify the configuration process, let's send data between two PCs through only his two routers (Ramdhani, 2020), like the following network topology:

1. The first thing we need to do is put a router in our workspace. You can choose one from Network Devices > Router > 4331 in the bottom panel. Any type of router will do. 4331 is closest to the cursor's current position. Repeat the same steps for another router or copy an existing router.
2. Select the PC under Devices > Devices > PC. Place them on the workplace.

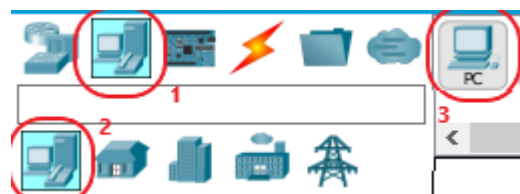


Figure 3.6: Bottom Panel: PC

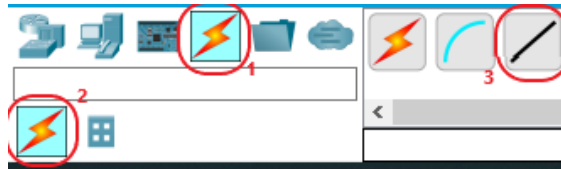


Figure 3.7: Bottom Panel: Copper Straight-Through

3. Select one of the physical media from Connections > Connections. Since we're using an Ethernet connection, choose a straight-through or crossover copper cable (if in doubt, choose straight-through).

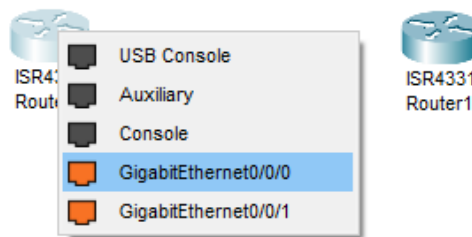


Figure 3.8: Physical port choosing

Then click on one of the hosts and select one of the available Ethernet ports. Then click on the other host, making sure the cable is pulled. Repeat the similar steps for connecting a PC and one of the routers.

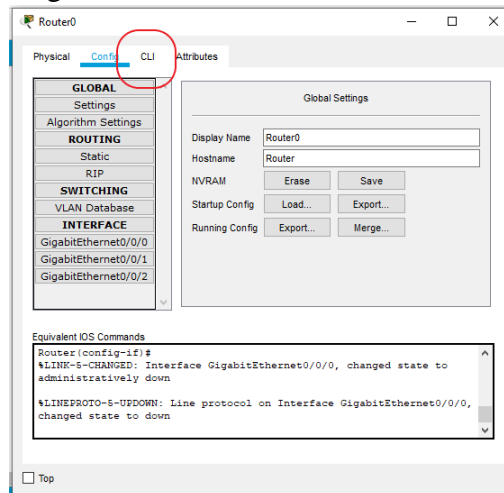


Figure 3.9: Pop-up window

4. Click on router to open a pop-up window. Then open the CLI tab.

In the Router0 CLI, paste the following script.

```
en
conf t
int gi0/0/0
ip address 10.10.10.1 255.255.255.248
no shutdown
exit
int gi0/0/1
ip address 192.168.1.1 255.255.255.0
no shutdown
exit
ip route 192.168.2.0 255.255.255.0 10.10.10.2
```

And below on Router1.

```
en
conf t
int gi0/0/0
ip address 10.10.10.2 255.255.255.248
no shutdown
exit
int gi0/0/1
ip address 192.168.2.1 255.255.255.0
no shutdown
exit
ip route 192.168.1.0 255.255.255.0 10.10.10.1
```

Enter No to pre-answer the next question when it appears.

Would you like to enter the initial configuration dialog? [yes/no]:

5. All PC pop-up windows have a Desktop tab. We will use the IP configuration and Command Prompt application here.

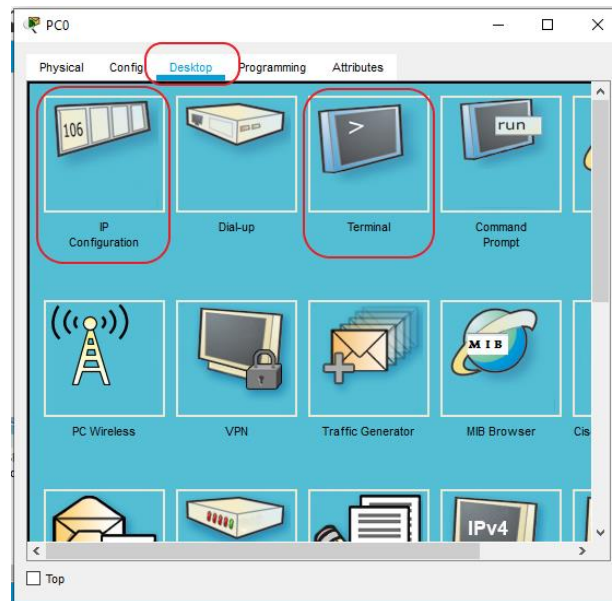


Figure 3.10: Desktop applications

Select IP Configuration to configure the IP and enter the following information.

For PC0.

IP Address: 192.168.1.2

Netmask: 255.255.255.0

Gateway: 192.168.1.1

For PC1.

IP Address: 192.168.2.2

Netmask: 255.255.255.0

Gateway: 192.168.2.1

6. Let's open command prompts on two PCs. The ping command has the following syntax:

ping <dst-address>

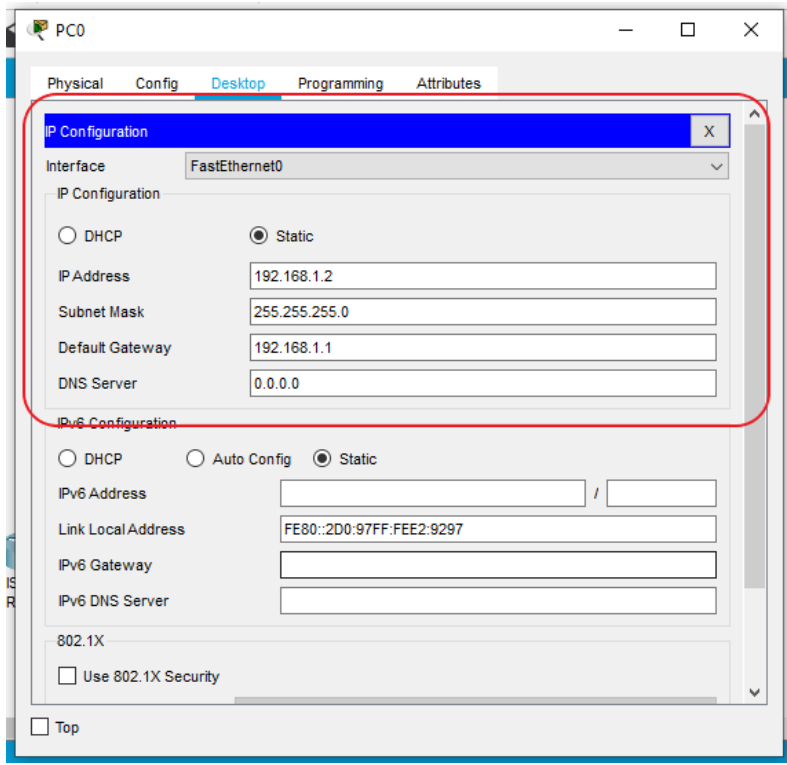


Figure 3.11: IP configuration

ping 192.168.1.2 from PC0, and ping 192.168.2.2 from PC1.

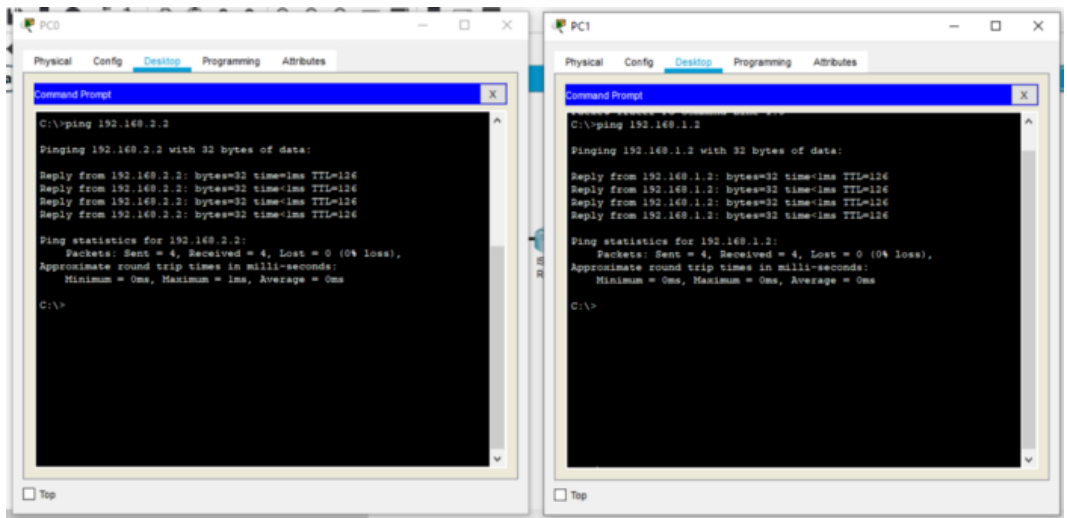


Figure 3.12: Ping test between two PCs

3.3 Windows Server 2016

Windows Server 2016 is a cloud-ready operating system that brings new security layers and Azure-inspired innovations to the applications and infrastructure. This is the eighth version of the Windows Server operating system developed by Microsoft as part of the Windows NT family of operating systems. Developed alongside Windows 10, it is the

successor to Windows Server 2012 R2, which is based on Windows 8.1. The first Early Preview Release (Technical Preview) was made available on October 1, 2014 along with the first System Center Technical Preview. Windows Server 2016 was released at Microsoft's Ignite conference on September 26th, 2016, with general availability on October 12th, 2016. It has been superseded by Windows Server 2019 and Windows Server Semi-Annual Channel (Microsoft, 2016).

3.3.1 Hardware Requirements

If computer does not meet the following minimum hardware requirements, Windows Server 2016 will not install correctly (or may not install at all):

- Processor: 1.4-GHz 64-bit
- RAM: for Server Core 512 MB ECC and Server with Desktop 2 GB ECC
- Experience
- Disk space: 32 GB minimum on a SATA or comparable drive
- Network adapter: Ethernet, with gigabit throughout
- Monitor: Super VGA or higher resolution
- Keyboard and mouse (or other compatible pointing device)
- Internet access

3.3.2 Maximum hardware for Virtualization limits

Virtualization complicates the issue of maximum supported hardware configurations for Windows Server 2016. It's no longer just about number of processors, amount of RAM, and maximum possible hard drive size. Processor max was measured in sockets, now refers to cores 19 and logical processors. Some resources have different maximum values for physical and virtual machines.

Windows Server 2016 maximum hardware configurations are:

- Processors a server host supports up to 512 logical processors (LPs) if Hyper-V is installed.
 - 24 terabytes Memory per host server and 12 terabytes per virtual machine.
 - VHDX size Up to 64 terabytes.
 - 1,024 per host server virtual machines.
- Virtual machine processors Up to 240 per virtual machine (Zacker, 2017).

3.3.3 Install Windows Server 2016

The installation process for Windows Server 2016 is relatively straightforward when performing a clean install on a single new computer. Automating mass deployments and migrating existing servers to new operating systems can also be very complex.

A clean install, also known as a bare metal install, is an installation on a computer that has not yet had an operating system installed. To do this, the operating system files must be present on bootable installation media. Windows Server 2016 is still available on a bootable DVD, but most administrators download the installation package as a disk image file with an ISO extension (Zacker, 2017).

- For Physical Computer: User need to burn the ISO to a removable disk. Like flash drives and DVDs. User can do this on other running computers Select the ISO in Windows Server 2016 or Windows 10 File Manager, then Select the Disc Image Tools\Manage menu and click the Burn button.
- For Virtual Machine (Hyper-V): User can use the ISO file directly. When user create a VM, he/she can specify the ISO as he/she configure the virtual DVD drive. When he/she start the VM, the ISO appears and functions as a bootable disk on the system.

After creating a bootable disc, user can perform a clean installation of Windows Server.

Install 2016 on a physical machine using the following steps:

1. Turn on your computer and insert the Windows Server 2016 installation flash drive or disk.
2. Press any key to boot from the installation media (if required). Progress a display screen appears while Windows loads the file.

3. Your computer loads the graphical user interface and the “*Windows Setup*” page is displayed.



Figure 3.13: Windows Setup page

4. Use the drop-down lists that appear to select the appropriate language to install, time and currency format, and keyboard or input method, then click Next. Another Windows setup page is displayed.
5. Click Install Now. The Windows Setup Wizard appears, displaying the Select Operating System to *Install* page.
6. Select the operating system edition and installation options you want to install, then click *Next*. The applicable notices and license terms page is displayed.

7. Select the “I accept the license terms check box and click Next”. The “What type of installation would you like to do?” page is displayed.

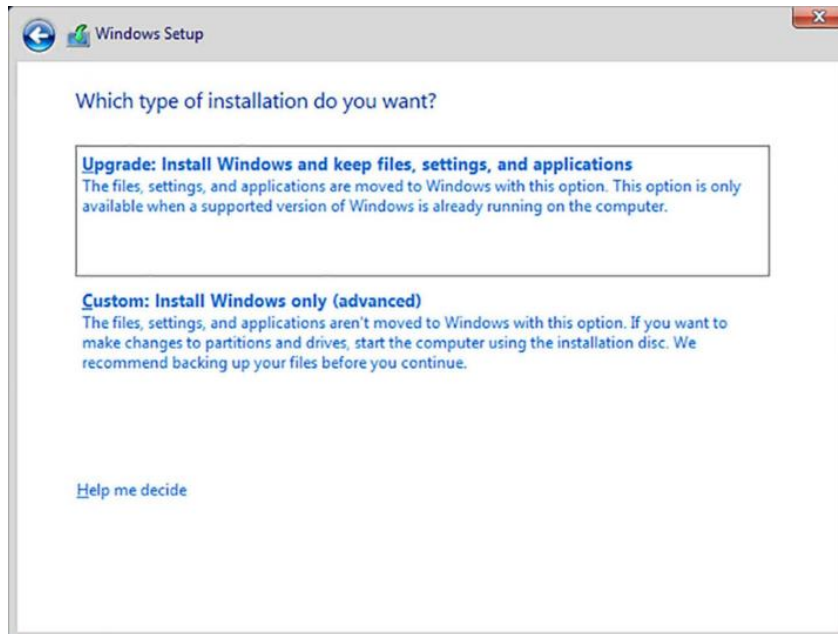


Figure 3.14: Which Type of Installation Do You Want page

8. Since we are doing a clean install and not an upgrade, click Custom. Install the Windows Only (Advanced) option. The “Where would you like to install Windows?” page appears.

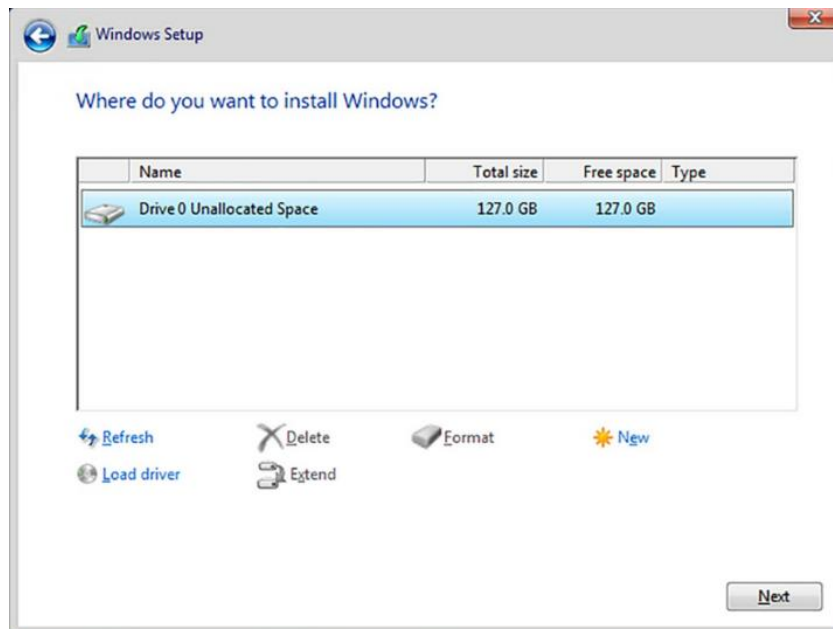


Figure 3.15: Where Do You Want To Install Windows page

9. From the displayed list, select the partition where you want to install Windows Server 2016 or select unallocated space for the setup program to create a new partition. Then click Next. The “Install Windows” page is displayed.

10. After a few minutes while the setup program installs Windows Server 2016, the computer restarts and displays the “*Customize Settings*” page.

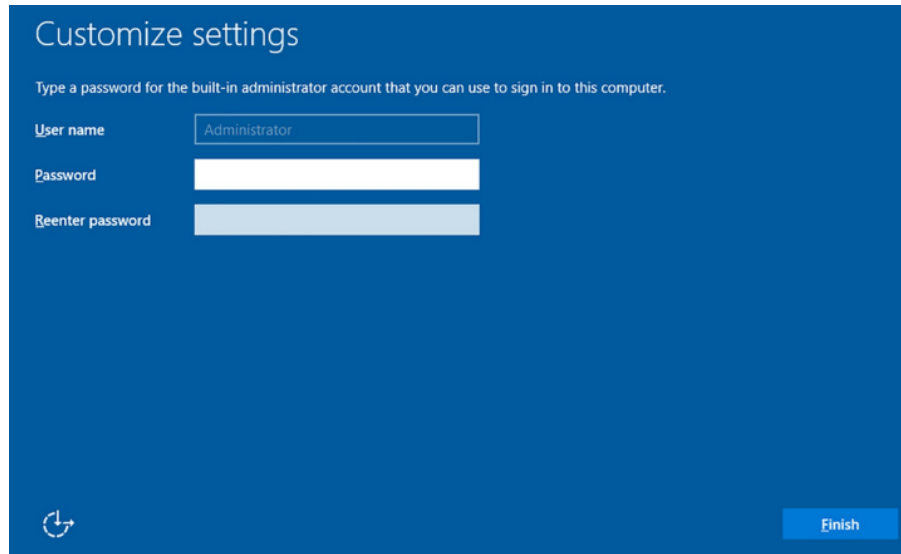


Figure 3.16: Customize Settings page

11. In the Password and Retype Password text boxes, type the password associated with the system's local administrator account and press Enter. The installation is complete and the “*Windows Lock Screen*” is displayed.

3.3.4 Working with partitions

In some cases, user may need to manipulate his/her hard drive and partitions to install Windows Server 2016. For this reason, the Setup program includes controls on the Where do he/she want to install Windows page that allow to create, manage, and delete partitions on the disk.

The buttons on the page have the following functions:

- **Refresh:** Shows the partitions available as a result of newly loaded drivers.
- **Loading Driver:** User can add hard disk drivers from external media such as CD-ROM, DVD, or USB drive.
- **Delete:** Removes an existing partition from the hard drive, permanently erasing all its data. It is recommended to delete the partition and consolidate the unallocated space so that a new larger partition can be created.
- **Extend:** User can extend an existing partition as long as there is unallocated space immediately after the selected partition on the hard drive.

- **Format:** User can format an existing partition on the hard drive and erase all its data. It is not necessary to format the new partition created for installation, but it is recommended to format the existing partition and remove unnecessary files before installing Windows Server 2012 R2.
- **New:** Creates a new partition with custom size in the selected area of unallocated space.

During installation, the *"Where do you like to install Windows?"* page may not show any partitions. This page lists all hard drive partitions on user's computer that the setup program can recognize with its default drivers. If no partitions appear, the computer's hard drive controller requires a device driver that is not included in the standard Windows driver set. Some high end controllers (Disk arrays) require their own drivers that can be installed during the setup process.

Find a driver that supports Windows Server 2016 or another newer version of Windows Server on the hard drive controller manufacturer's website and install it using the following steps:

1. On the *"Where do you like to install Windows?"* page, click the Load Driver button. A loading driver message box appears.



Figure 3.17: Load Driver message box

2. Insert a storage medium containing the driver into the computer so that this driver can be provided on a CD, DVD, USB stick, or floppy disk.
3. Click OK if the driver is located in the root directory of the storage medium. Click Browse if you need to search the directory structure of your hard drive for the driver. The Select Drivers to Install page displays a list of drivers on disk.
4. Four. Select one of the drivers in the list and click Next.
5. After the driver loads, the partition and unallocated space on the mapped disk will appear in the *"Do you want to install Windows?"* list.

6. Select the unallocated space partition or space to install Windows Server 2016 and continue the rest of the installation process as described earlier in this chapter.

3.3.5 Install Windows Server 2016 features and roles

Windows Server 2016 comes with a set of predefined services called roles that are used to configure the server to perform specific tasks. Operating systems also contain other small components called *features*. Windows Server 2016 can run as many roles as it supports hardware resources, but the current trend is towards more specialized servers that only run one or two roles.

To add roles and features to Windows Server 2016, install them using the graphical wizard in the Server Manager console or from the Windows PowerShell command line as described in the next section (Zacker, 2017).

3.3.6 Using Server Manager to install roles

Use the following procedure to install roles and services on a computer running Windows Server 2016 using Server Manager.

1. In Server Manager, open the Manage menu and select *Add Roles and Features*. The *Add Roles and Features* wizard will start.
2. Skip the *Before You Begin* page and select *Installation Type* page.

3. Click Next to accept the default selection of role-based or feature-based

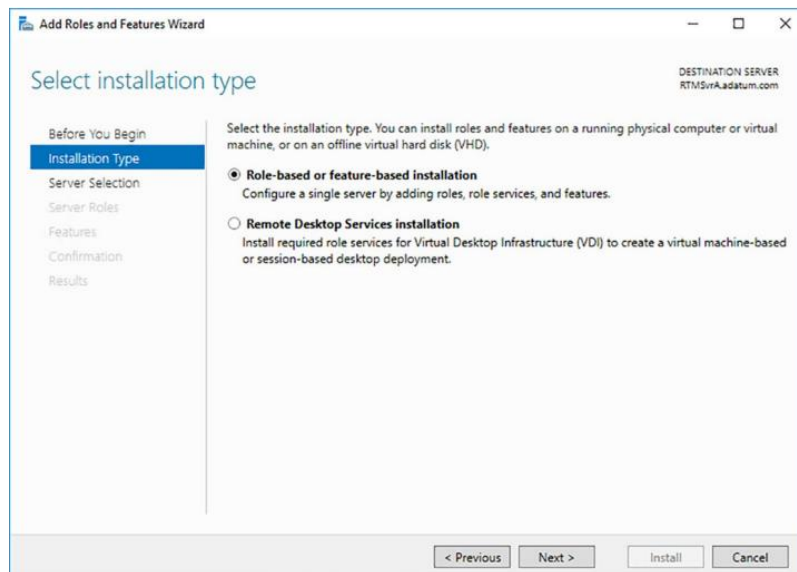


Figure 3.18: Select Installation Type page in the Add Roles and Features Wizard

installation. Select *Server Selection* page is displayed.

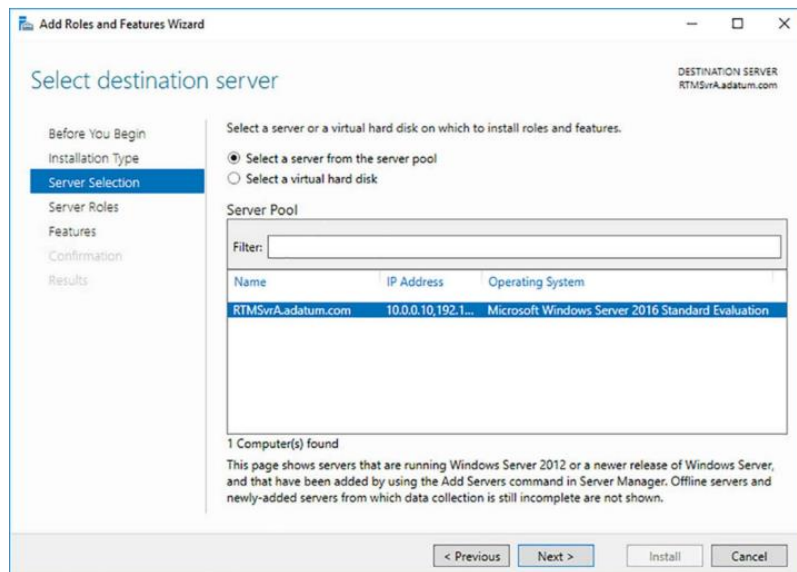


Figure 3.19: Select Destination Server page in the Add Roles and Features Wizard

4. Click Next to just accept the default server settings. Select *Server Roles* page opens.

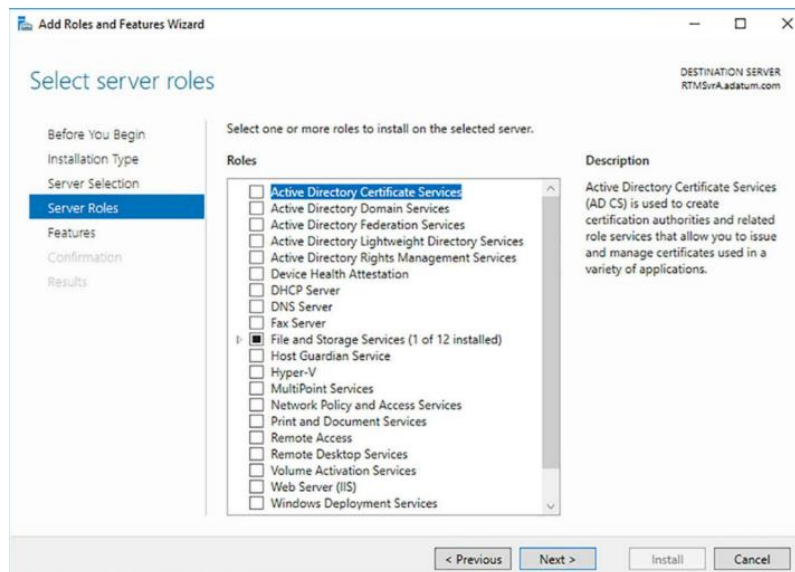


Figure 3.20: Select Server Roles page in the Add Roles and Features Wizard

5. Select the roles to install on the selected servers. If the selected role has other roles or features as dependencies, the *Add Required Features* dialog box appears.
6. Click Add Features to accept dependencies and click Next to open *Features* page.

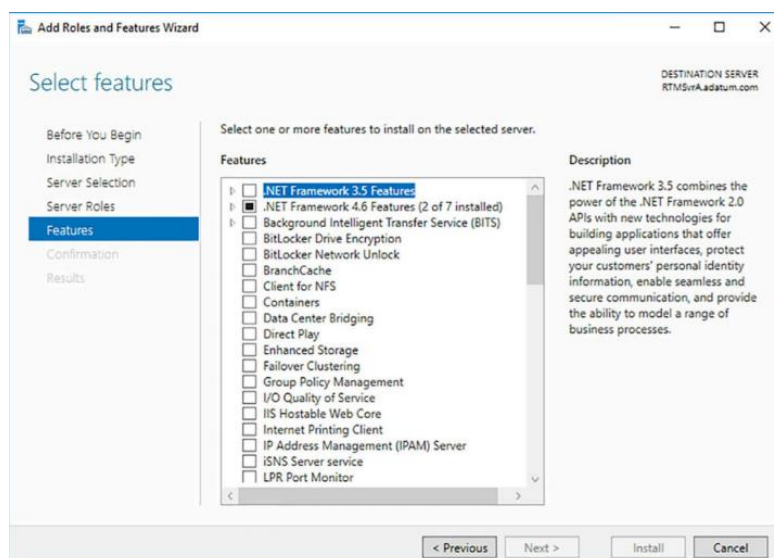


Figure 3.21: Select Features page in the Add Roles and Features Wizard

7. Select the features to install on the selected servers and click Next. Dependencies can also be viewed for feature selection.

8. The wizard may display additional pages specific to the selected role or feature. Most roles have a *Select Role Services* page that allow to select the elements of the role to install. Some pages also contain introductory information and configuration settings. Complete each role-specific or feature-specific page and click Next. The Confirm Installation Selections page appears.

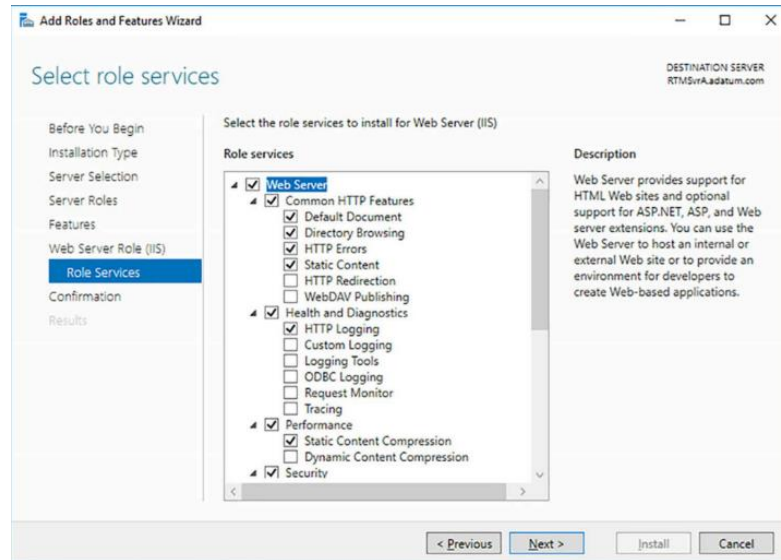


Figure 3.22: Select Role Services page in the Add Roles and Features Wizard

9. On the Confirm installation selections page perform the following optional tasks:
 - Automatically reboot target server if required Select this check box to automatically reboot the server after the installation is complete, if required by the selected roles and features.
 - Create an XML script that contains the steps performed by the Export Configuration Settings Wizard. With this script use *Windows PowerShell* to install the same configuration on another server.
 - Specify a different source path Specifies the location of the image file containing the software required to install the selected roles and features. This is not required for a standard installation of Windows Server 2016, but if user used Features on Demand to previously remove the source files from the system, so that will need the image files to install the roles and features.

10. Click Install to open the Installation Progress page. Depending on the selected roles and features, the wizard may provide hyperlinks to the tools or wizards required to perform the required post-installation tasks during installation.

3.4 MikroTik RouterOS

MikroTik RouterOS is an independent Linux-based operating system for PC-based and thin routers. No additional components required and no software requirements. With an easy-to-use and powerful interface, network administrators can deploy network structures and features that would otherwise require extensive training by simply following a reference manual (even if they don't have one).

MikroTik RouterOS turns a standard PC computer into a network router. Simply add a standard network PC interface to extend the capabilities of the router (MikroTik, 2002).

- Remote control with easy real-time Windows application (WinBox)
- Telnet/console/serial console control
- Advanced bandwidth control
- Network firewall with packet-filtering, masquerading, network address translation, logging and connection monitoring
- DHCP support
- HotSpot technology
- Ethernet 10/100/1000Mb/s
- Wireless client and AP 2.4GHz 11 Mb/s
- V.35 synchronous 5Mb/s with frame-relay
- Asynch PPP/RADIUS (up to 32 ports) for modem pools
- Cyclades and LMC DS3 with E1/T1 support
- IP Telephony Gateway
- Built-in Web-proxy
- And much more

3.4.1 Downloading and Installing the MikroTik RouterOS

The process of downloading and installing MikroTik RouterOS is illustrated in the diagram below.

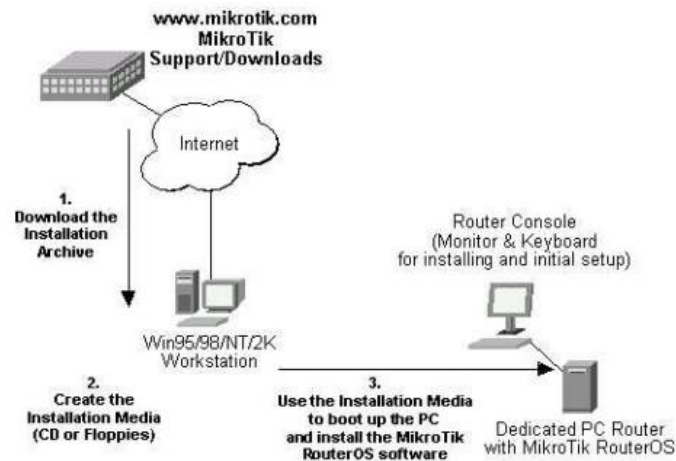


Figure 3.23: Downloading and Installing process of MikroTik RouterOS

3.4.2 Install the MikroTik RouterOS software

Dedicated PC router hardware must meet the following criteria:

- An upgraded 4th Gen (100MHz or higher core frequency), 5th Gen (Intel Pentium, Cyrix 6X86, AMD K5 or equivalent) or newer Intel IA-32 (i386) compatible motherboard and processor (dual processors are not supported)
- 32 MB to 1 GB of RAM (48 MB recommended)
- 30MB or larger PRIMARY MASTER IDE HDD or IDE flash drive. Note: The hard disk will be completely reformatted during installation and all data on it will be lost.
- Network adapter (NE2000 compatible PCI or ISA ethernet card or other supported NIC, see our website for supported interface specs)

Boot the dedicated PC router from the installation media that created and follow the instructions on the console screen while the hard drive is reformatted and MikroTik RouterOS is installed.

After a successful installation, remove the installation media from the CD or USB drive and press *Enter* to reboot router. When the router boots for the first time, it will be given a software ID for installation and asked to provide a valid software license key. Make a note of the Software ID. Required to obtain a software license from the MikroTik Account Server. If user need more time to retrieve software license key, user can turn off router. Type *shutdown* at the software key prompt to power off the router when it stops (MikroTik, 2002).

3.4.3 Logging into the MikroTik Router

After logging into the router using the terminal console, you will see the MikroTik RouterOS login prompt. To log in to the router for the first time, use "admin" and no password, For example:

MikroTik v2.6

Login: admin

Password:

The password can be changed with the /password command.

3.4.4 Adding Software Packages

A basic installation only contains the "system" package and a few other packages. This includes basic IP routing and router management. Additional features such as IP telephony, OSPF, and wireless require the download of additional software packages. Additional software packages must be of the same version as the system packages. Otherwise the package will not be installed. For more information on installing additional software packages, see MikroTik RouterOS Software Package Installation and Update Guide.

3.4.5 Navigating the Terminal Console

After logging into the router, it will be presented by the MikroTik RouterOS Welcome Screen and command prompt, for example:

```
MMM      MMM      KKK      TTTTTTTTTTT      KKK
MMMM     MMMM     KKK      TTTTTTTTTTT      KKK
MMM MMMM MMM III  KKK KKK RRRRRR  OOOOOO  TTT  III  KKK  KKK
MMM MM  MMM  III  KKKKK  RRR  RRR  OOO  OOO  TTT  III  KKKKK
MMM     MMM  III  KKK KKK  RRRRRR  OOO  OOO  TTT  III  KKK KKK
MMM     MMM  III  KKK KKK  RRR  RRR  OOOOOO  TTT  III  KKK  KKK

MikroTik RouterOS v2.6 (c) 1999-2002      http://www.mikrotik.com/

Terminal xterm detected, using multiline mode
[admin@MikroTik] >
```

Figure 3.24: MikroTik RouterOS Welcome Screen and command prompt

The prompt displays the router's ID name and the current menu level. For example:

```
[MikroTik] >      Base level menu
[MikroTik] interface>      Interface configuration
[MikroTik] ip address>      IP Address management
```

Figure 3.25: Identity name of the router and the current menu level

The list of available commands at any menu level can be obtained by entering the question mark '?', for example:

```
[admin@MikroTik] > ?
```

```
driver Driver management
file Local router file storage.
import Run exported configuration script
interface Interface configuration
log System logs
password Change password
ping Send ICMP Echo packets
port Serial ports
quit Quit console
redo Redo previously undone action
setup Do basic setup of system
undo Undo previous action
user User management

ppp
snmp snmp settings
isdn-channels ISDN channel status info
ip
queue Bandwidth management
system System information and utilities
tool
routing
export
```

```
[admin@MikroTik] > ip ?
```

```
accounting Traffic accounting
address Address management
arp ARP entries management
dns DNS settings
firewall Firewall management
neighbour neighbours
packing Packet packing settings
```

pool IP address pools
route Route management
service
policy-routing
dhcp-client DHCP client settings
dhcp-server DHCP server settings
dns-cache
ipsec
web-proxy HTTP proxy
telephony IP Telephony interface
export
[admin@MikroTik] > ip

3.4.6 Accessing the Router Remotely

MikroTik router can be accessed remotely using,

- Telnet protocol, such as using the Telnet client on a Windows or Unix workstation. Working with the telnet console is the same as working with a monitor and keyboard locally attached to the router.
- Use FTP to upload software upgrade packages or retrieve exported configuration files.
- HTTP and WinBox consoles (such as workstation web browsers).

3.4.7 Winbox Console

When connect to a MikroTik router via http (TCP port 80), the router's welcome page will be displayed in the web browser. For example:

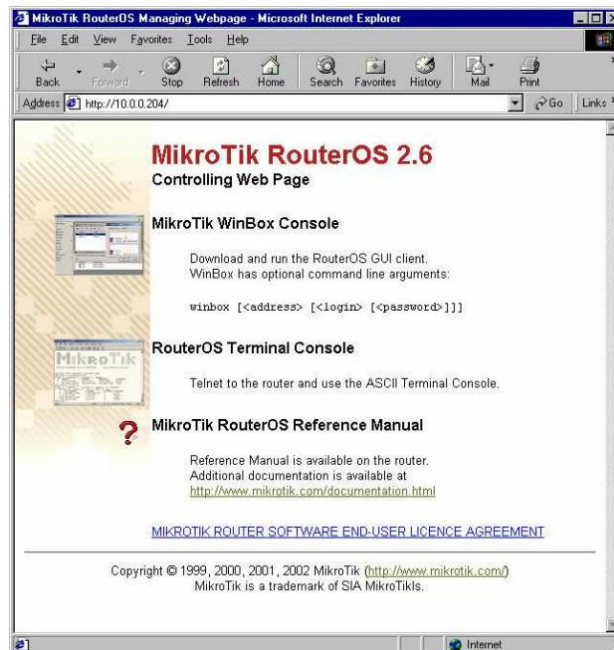


Figure 3.26: MikroTik RouterOS Welcome Page

Start downloading winbox.exe by clicking the Winbox Console link. Select the “*Run this program from its current location*” option and click OK,



Figure 3.27: Run this program from its current location Page

Alternatively, the winbox.exe program have to save to disk and run it from there, The winbox.exe program opens the Winbox login window. Log in to the router by entering IP address, username, and password, as in the following example,

Check the Winbox plugin download process.



Figure 3.28: WinBox Login Page

Once the plugin is downloaded, the Winbox Console will open. The Winbox console uses TCP port 3987. After logging into the router, user can manipulate the MikroTik router's configuration via the Winbox console and perform the same tasks as the regular console.

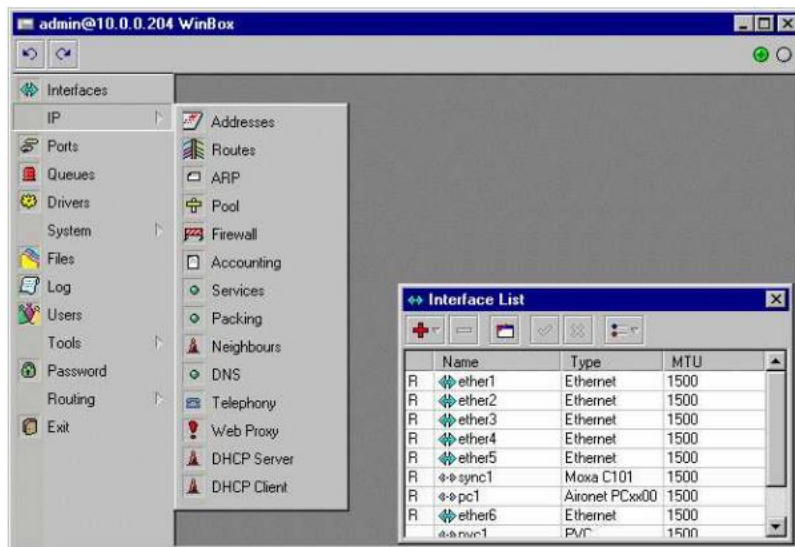


Figure 3.29: Winbox Console Page

3.5 Challenges

In this Internship I've learnt lots of stuffs about industrial life but I've faces lots of difficulties as well. It held meaningful time to adapt with new surroundings, new peoples with their expertise. At first, It was enough delicate to equalize with similar proficient co-workers. But I was really heated to learn from them. In this time every day I tried to set up a better interpretation of myself. Day by day I grew more self-confident. So, at last I would vocalize my struggle in internship was worth it.

CHAPTER 4

COMPETENCIES AND SMARTPLAN

4.1 Competencies Earned

Internship I've make a better interpretation of myself. As I leaned new stuff every day, my attachment grows much muscular to give the best. I've faced lot of challenges during this time but I was glad because I was learning from the best organization. They trained me numerous things about practical career life.

Like:

- How to deal with clients.
- How to stay calm in difficult situation.
- How to maintain when there has lots of task to do.
- How to build a great team.
- Balance between professional and personal life.

4.2 Smart Plan

I want to be a Network Administrator. So that I have to learn more and more about this path. I always like challenging life. In this smart generation we could not do anything if we don't have much skill to develop ourselves. That is why I choose Network Administration.

CHAPTER 5

CONCLUSION

Bangladesh is one of the fastest growing country. Our government has pledged to create a “Digital Bangladesh”. Since then, our government has been trying to build a strong foundation in the field of “Information Technology”. Today, there are many reputable companies and organizations that offer training in the IT field. One of them is “IsDB-BISEW”, where I trained in ISP field. Every day they provide many creative enthusiasts to further develop this country.

It is very important for computer science students to acquire practical knowledge. For this reason, this organization always takes the necessary steps to impart the best knowledge to its trainees. I have learned a lot in my field. I take great pride in creating better versions of myself to here.

APPENDIX

Organizations details

Name	IsDB-BISEW (Islamic Development Bank- Bangladesh Islamic Solidarity Educational Wakf)
Address	IDB Bhaban (4th Floor) E/8-A, Rokeya Sharani Sher-e-Bangla Nagar Dhaka-1207, Bangladesh
Phones	+880 2 9183006 -15
Fax	880 2 9183001 -2
Email	info@isdb-bisew.org, idbb@isdb-bisew.org
Website	http://isdb-bisew.org

REFERENCES

Books and Websites:

1. Lammle, T. (2015). *CompTIA Network+* (Third ed.). (K. Wimpsett, Ed.) Canada: John Wiley & Sons. Retrieved from https://books.google.com.bd/books?id=5e3GBwAAQBAJ&printsec=frontcover&redir_esc=y#v=onepage&q&f=false
2. Microsoft. (2016, September 26). *Wikipedia*. Retrieved 01 23, 2023, from wikipedia.org: https://en.wikipedia.org/wiki/Windows_Server_2016
3. MikroTik. (2002). *MikroTik RouterOS V2.6 Basic Setup Guide* (Vol. 2). MikroTik. Retrieved January 23, 2023
4. Ramdhani, A. (2020, April 13). *Cisco Packet Tracer | Static Routing*. Retrieved January 23, 2023, from medium.com: <https://medium.com/@41519120005/cisco-packet-tracer-static-routing-48c06824c8a4>
5. Zacker, C. (2017). *Exam Ref 70-740 Installation, Storage and Compute with Windows Server 2016*. United States of America: Pearson Education. Retrieved January 23, 2023

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