CCT College Dublin

CA-2

Module Title:	Operating Systems & Architecture
Assessment Title:	Virtual Windows Active Directory / Network Server Virtualization – Part 1
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Date of Submission:	15-04-2023

Declaration

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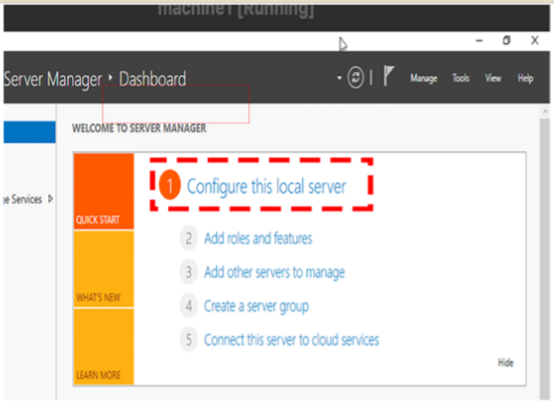
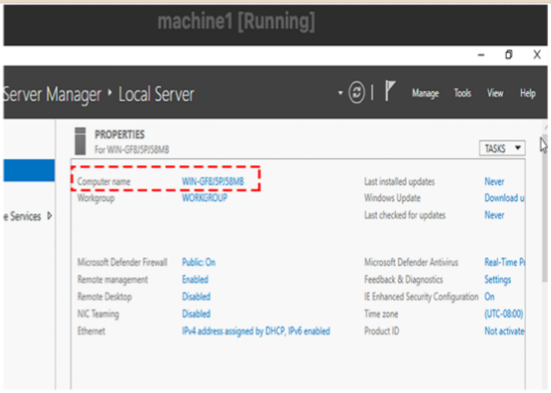
Renaming Machine-1 computer name using Windows System Properties.

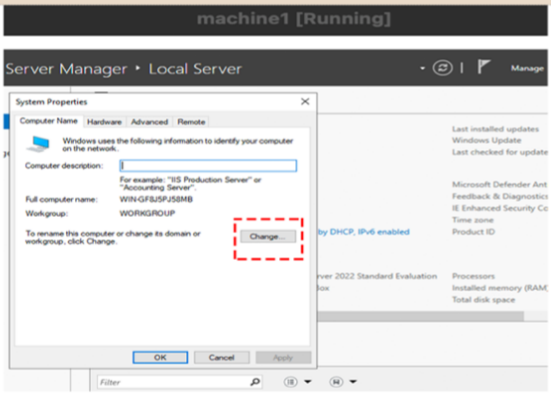
Step-01 Renaming the computer name on server manager.

Step-02

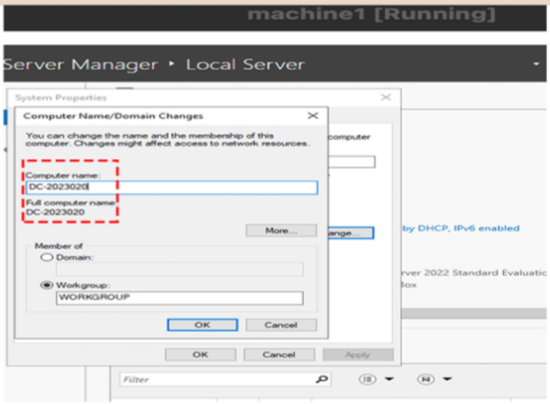




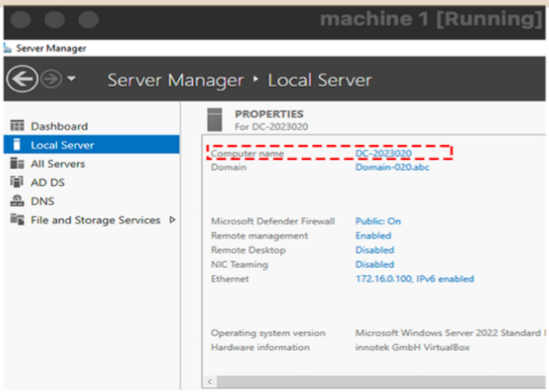
Step-03



4. Rebooting the system after entering the computer name.



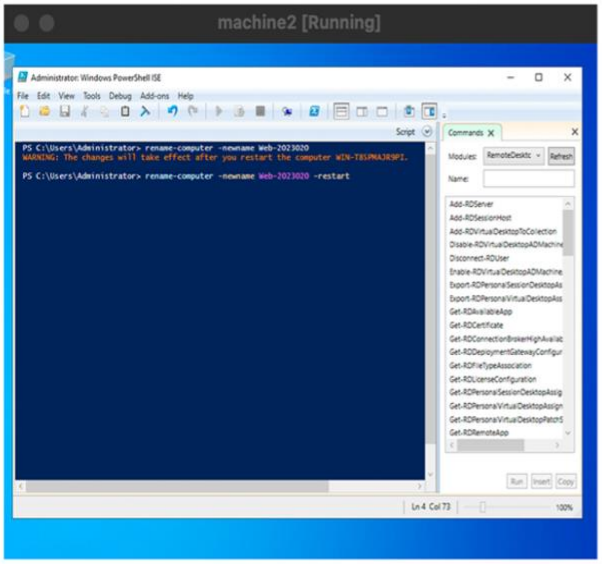
5. Computer name is renamed.



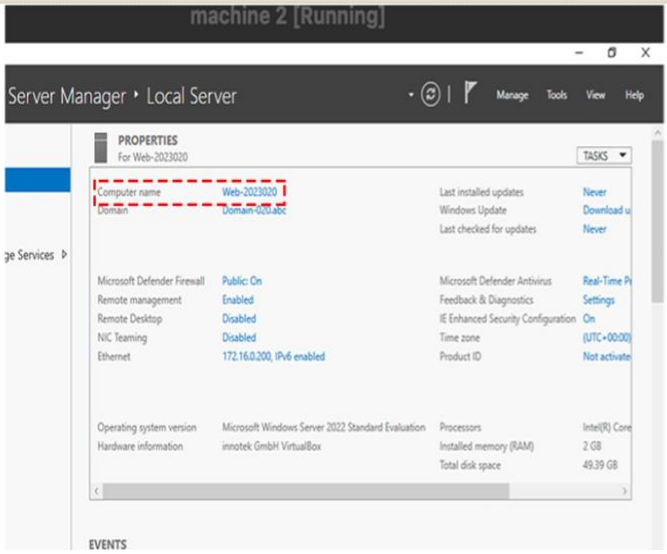
RENAMING MACHINE 2 TO WEB SERVER

Renaming Machine-2 computer name using Powershell.

Step-01 Renaming computer name using powershell by entering a command - (rename-computer -newname Web-2023020 -restart)



3.Computer name is renamed.



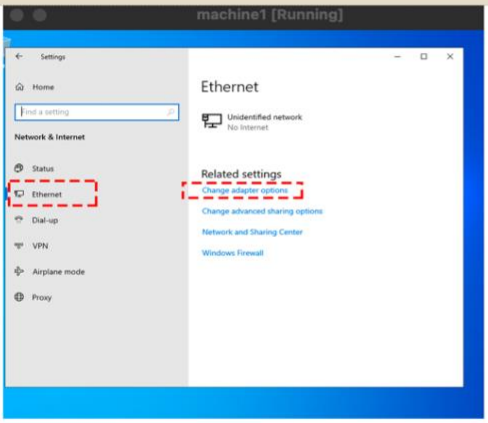
Why use PowerShell instead of CMD?

Cmd is used primarily to execute batch commands and do some primary troubleshooting, whereas PowerShell can be used for executing batch commands as well as administrative purposes. Scripts can also be written in PowerShell to automate the tasks.

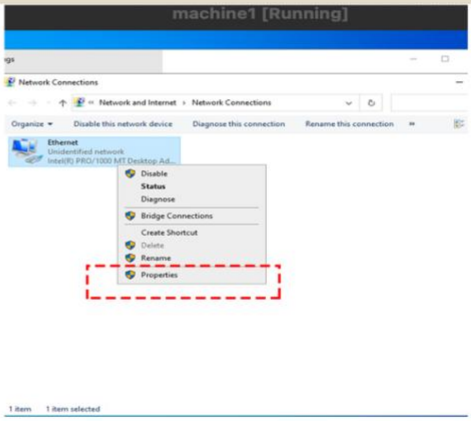
ASSINGING IP ADDRESS FOR MACHINE 1

Assigning the server static IP addressing for DC-2023020 machine.

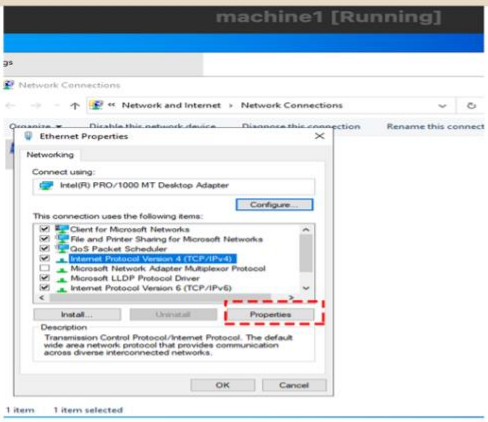
1. Step-01



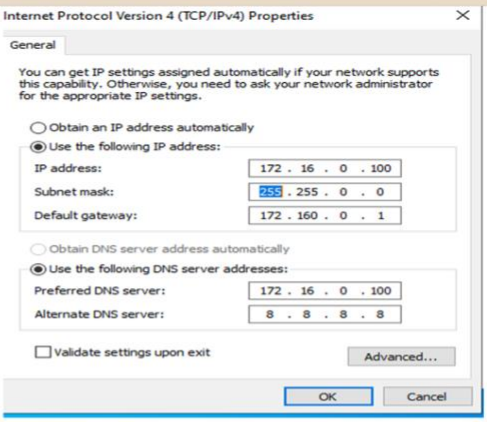
2.Step-02



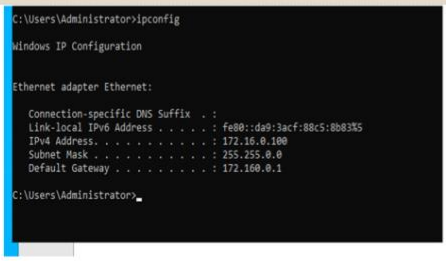
3.Step-03



4.Assigned IP address manually.



5. Verifying IP address via Command promt.



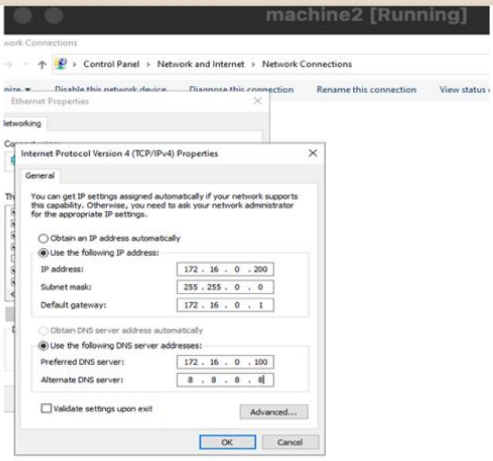
Necessity of IP address

A static IP address for devices on your network that will need to be accessed very reliably by other systems or devices on the network. A device set with a static IP address makes sure that the device is easily found on the network, since the IP address will not change.

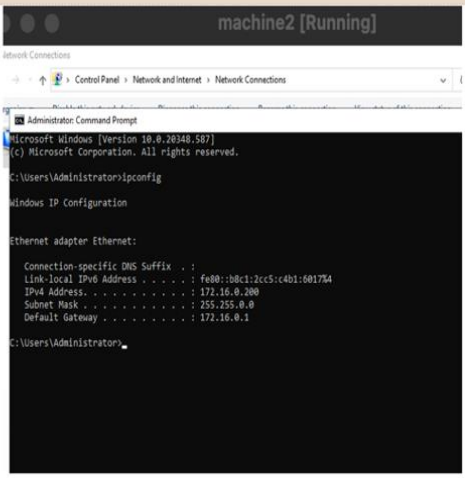
ASSINGNING IP ADDRESS FOR WEB SERVER

Assigning the server static IP addressing for Web-2023020 machine.

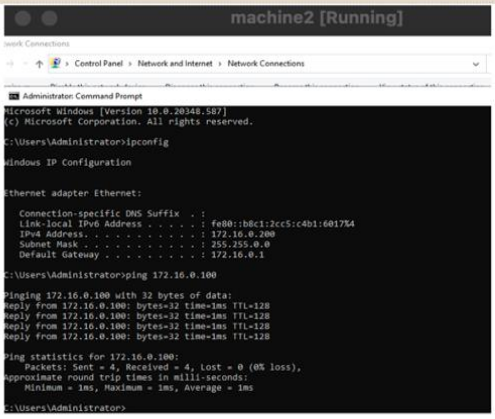
1. Assigning IP address to Web server.



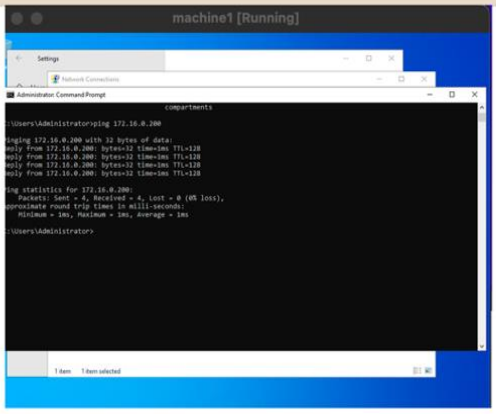
2 Verifying IP address via Command promt.



Contacting DC-2023020 from Web Server.



Contacting Web Server from DC-2023020.



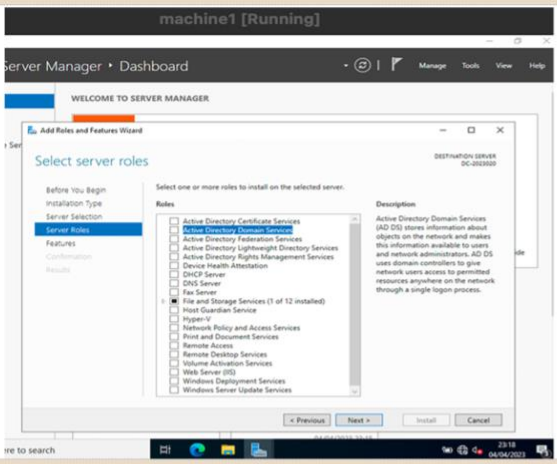
Reason to ping other server ;-

Ping is a computer network administration utility used to test the reachability of a host on an Internet Protocol (IP) network and to measure the round-trip time for messages sent from the originating host to a destination computer.

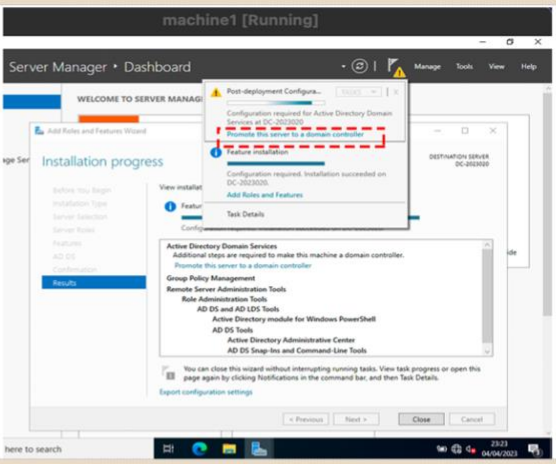
CONVERTING MACHINE 1 SERVER TO DOMAIN CONTROLLER

Converting server to domain:-

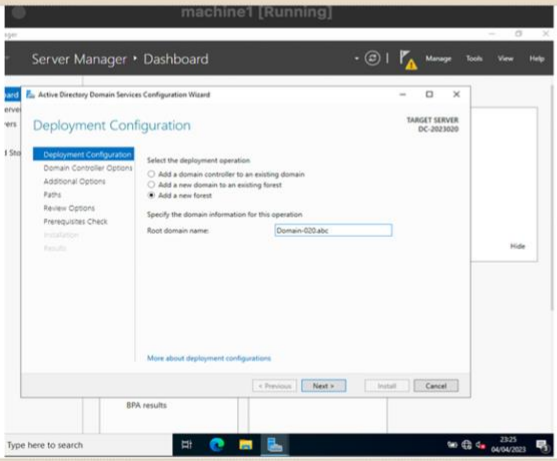
1. Adding Domain feature from Add roles and features wizard on server manager.



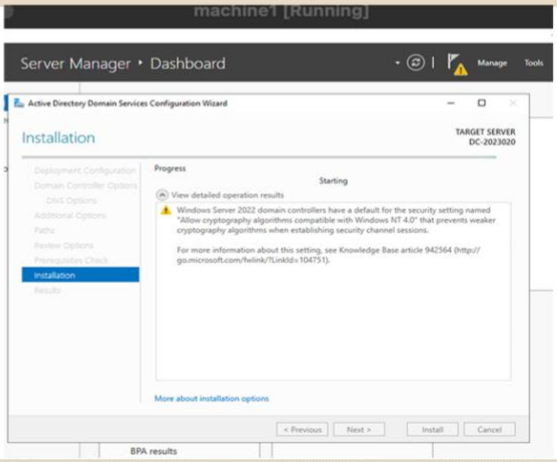
2. After installation, Configuring Active Directory Domain Service.



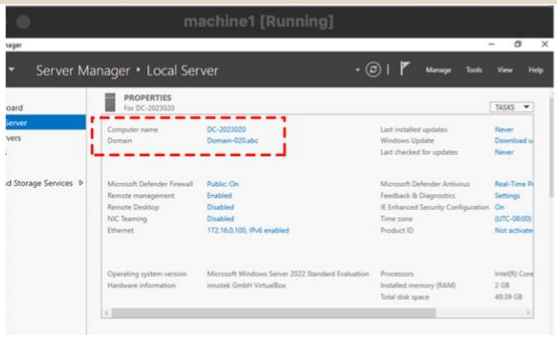
3.Configuring domain service(Naming and setting up new password for the domain service)



4. After prerequisites check and installation, The domain service will be added.



5. Converted to domain from server.



Benefits of domain controller

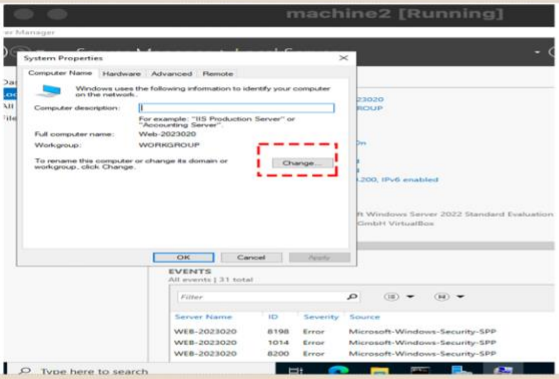
The principal benefit of joining a workstation to a domain is central authentication. With a single login, you can access different services and resources without logging into each one.

JOINING WEB COMPUTER SERVER TO DOMAIN CONTROLLER SERVER

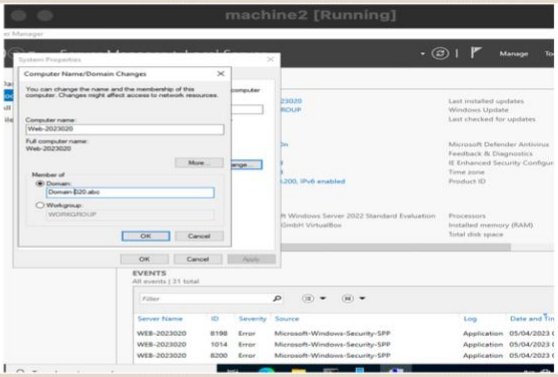
1. INSTALLING IIS USING POWERSHELL ON WEB COMPUTER

Joining the Web computer to the Domain.

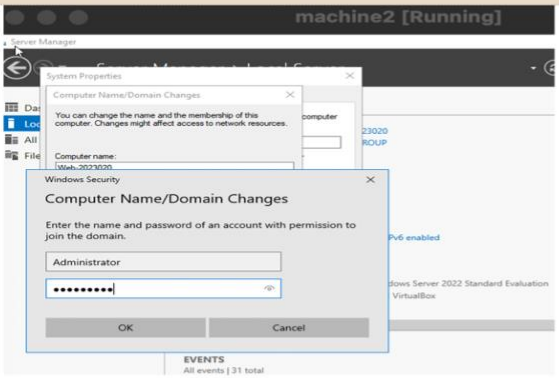
1. Joining web server to domain controller on server manager.



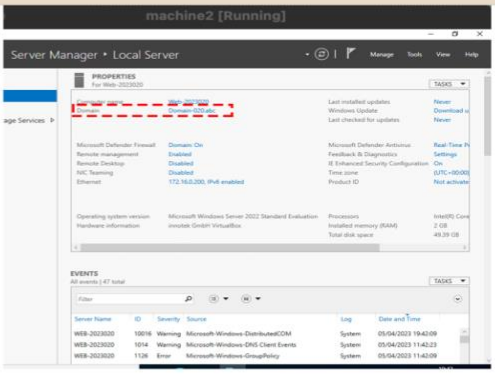
2. Setting up Domain name from domain server.



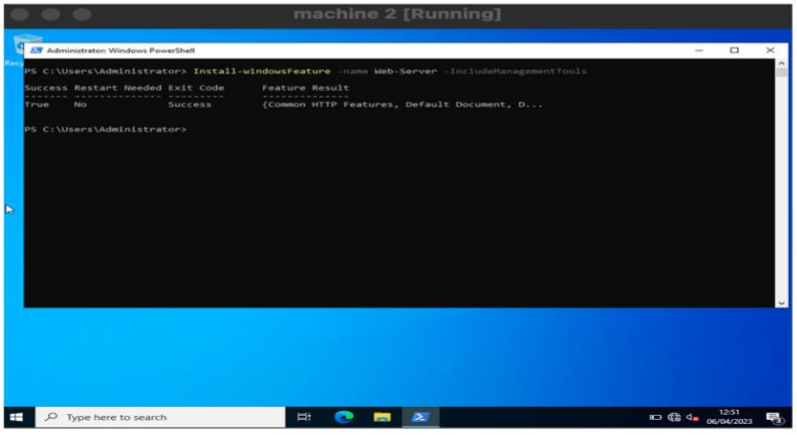
3.Naming and setting up new password to join domain service .



4. Entered domain name as created.



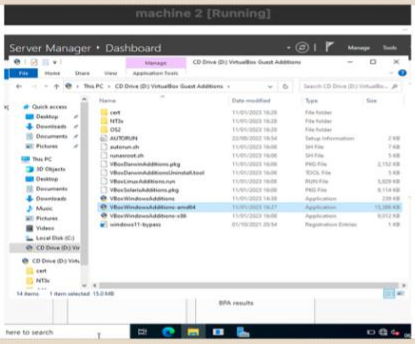
Part -2 Installing IIS using Powershell by entering Install-windowsFeature -name Web-Server -IncludeManagementTools



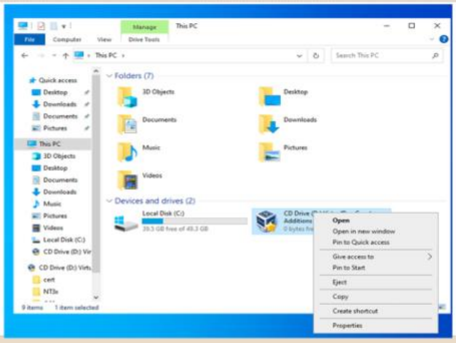
TRANSFERING CREATED DIGITECH WEBSITE FILES FROM HOST TO VIRTUAL MACHINE

Transfering files from Host to Virtual Machine

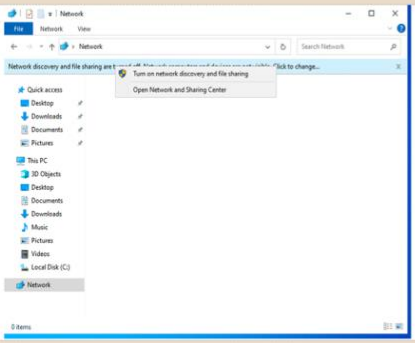
1.Installing windowsadditions-amd64 from CD drive.



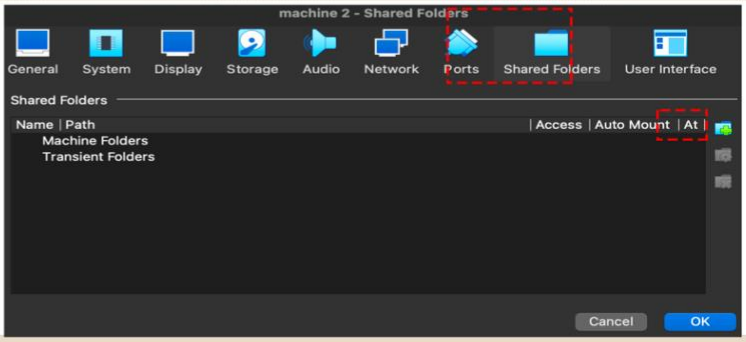
2.Ejecting CD drive guest addition after installation.



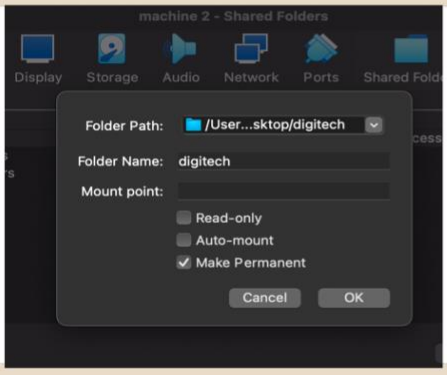
3.Turning on network discovery and file sharing to share files from host.



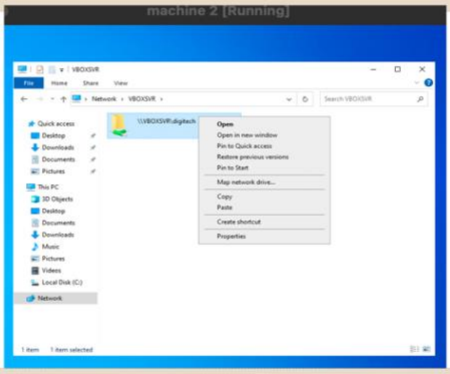
4. Adding files from host using shared folders.



5. Transfering files from host.



6.Transferred files from host.



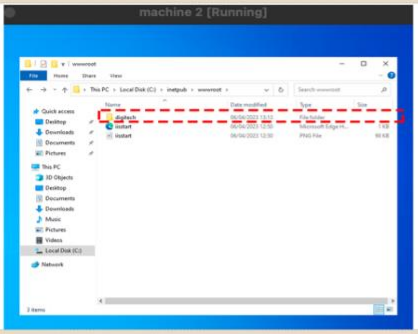
Purpose of tranfering files from host

1. Created a website for digitech company on the host machine.
2. Transferred a file from host machine to add the website on IIS Server.

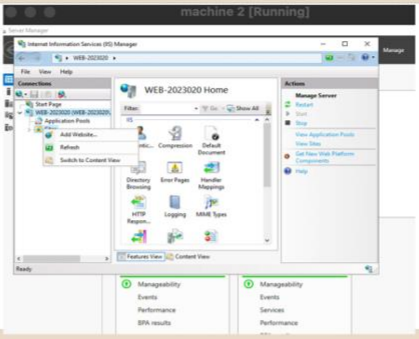
ADDING DIGITECH WEBSITE ON IIS MANAGER

Adding website on IIS Server

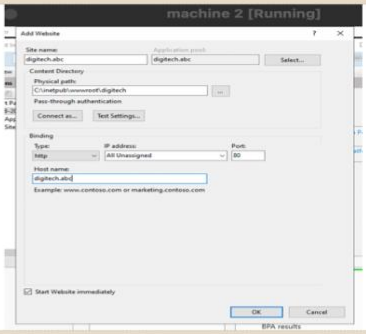
1.Copying the transfered file from host to c:/intepub/wwwroot



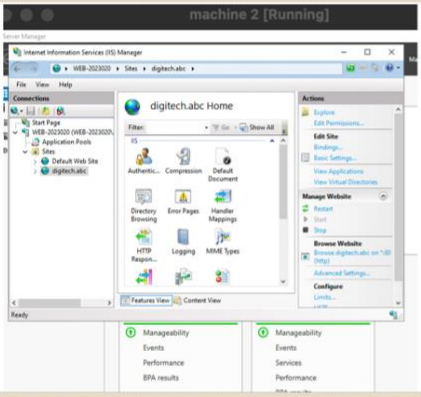
2.Adding Digitech website on the IIS manager.



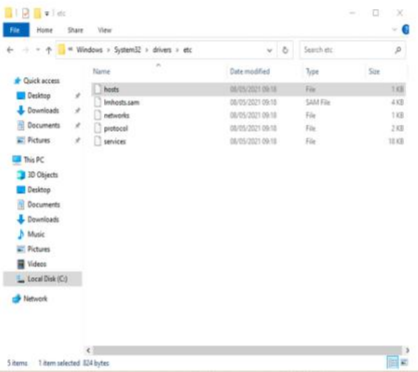
3. Setting up sitename and host name.

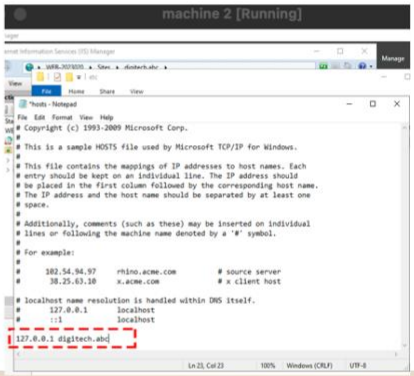


4. Website has been added.

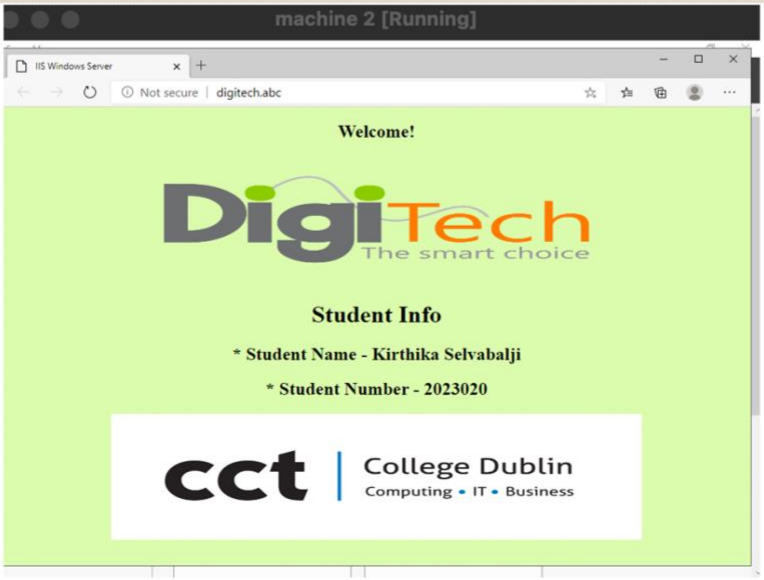


5. Adding website name on the host file from c:/windows/system32/drivers/etc/.





6. DIGITECH WERBSITE IS WORKING.



RESEARCH TOPICS

1.Raspberry Pi and Arduino.

ABOUT RASPBERRY PI

- → Raspberry Pi is the name of a series of single-board computers made by the Raspberry Pi Foundation.
- → A credit-card size computer that plugs into tv (monitor) and a keyboard.
- → It's a capable little Pc which can be used for many of the things that our desktop does.

Raspberry Pi Foundation-

- → Charity organization founded in 2009 in UK.
- → Responsible for developing The Raspberry PiFoundation. It does this by providing low-cost, high-performance computers that people use to learn, solve problems, and have fun. It provides outreach and education to help more people access computing and digital making-it develops free resources to help people learn about computing and making things with computers and trains educators who can guide other people to learn.

Why was Raspberry Pi made?

- → Originally designed for education.
- → Create a low-cost device that would improve programming skills and hardware understanding at the pre-university level.
- → Thanks to its small size and accessible price, now it is used in thousands of different ways.

Storage, Pricing and Availability: -

The original Pi had a single-core 700MHz CPU and just 256MB RAM, and the latest model has a quad-core CPU clocking in at over 1.5GHz, and 4GB RAM.

The price point for Raspberry Pi has always been under $100 (usually around $35 USD), most notably the Pi Zero, which costs just $5.

All over the world, people use the Raspberry Pi to learn programming skills, build hardware projects, do home automation, implement Kubernetes clusters and Edge computing, and even use them in industrial applications.

The Raspberry Pi is a very cheap computer that runs Linux, but it also provides a set of GPIO (general purpose input/output)

pins, allowing you to control electronic components for physical computing and explore the Internet of Things (loT).

What can we do with a Raspberry Pi?

Some people buy a Raspberry Pi to learn to code, and people who can already code use the Pi to learn to code electronics for physical projects. The Raspberry Pi can open opportunities for you to create your own home automation projects, which is popular among people in the open-source community because it puts you in control, rather than using a proprietary closed system.

Is the Raspberry Pi open source?

The Raspberry Pi operates in the open-source ecosystem: it runs Linux (a variety of distributions), and its main supported operating system, Pi OS, is open source and runs a suite of open-source software.

The Raspberry Pi Foundation contributes to the Linux kernel and various other open-source projects as well as releasing much of its own software as open source.

1. Desktop PC

Using Raspberry Pi, the microSD card, and a power supply, a simple desktop can be made. We would also need an HDMI cable and a suitable display, maybe an old monitor. A USB keyboard and mouse are also needed.

The new version, which is Raspberry Pi 3, has built-in Wi-Fi and Bluetooth too. If a different model is used, compatible USB dongles would be required.

Once everything is set up, and preferred operating system installed (the latest version of Raspbian), your desktop computer is ready to be used.

2. Wireless print server

This requires installing Samba file-sharing software and CUPS (Common Unix Printing System). CUPS provide drivers for the printer and administration console.

After this, Pi configuration is needed to ensure a Windows or Mac computers can access the printer via a network. The printer must have a USB cable.

3. Media usage

Many estimates suggest one of the main uses of Raspberry Pi is a Kodi media center. Several Kodi builds have been released as disk images. OSMC and OpenElec are among the most popular.

Installing Kodi comes with some caveats. It is recommended that we install only safe and legal add-ons from the official Kodi repositories. Also, a Raspberry Pi running Kodi is vulnerable to a few security issues. Hence, setting up a VPN to encrypt data is recommended.

4. Game servers

Raspbian, the default OS of pi comes with a special version of Minecraft game pre-installed. But, the applications of Raspberry Pi can be used as a game server as well. It is an excellent game server for Minecraft. If multiple Raspberry Pis are used, making one as a dedicated server, a great gaming experience can be achieved.

Other multiplayer network games can be set up on the Raspberry Pi.

5. Retro gaming machine

Raspberry Pi is ideal as a retro gaming machine. it fits as one of the lightest components of a machine. Particularly, it's a version, The Raspberry Pi Zero, that can fit into small spaces for gaming projects. There are two main options, Recalbox and RetroPie. Other platforms can be emulated too. Classic MS-DOS PC gaming and Commodore 64 can also be set-up and also many other popular 16-bit games consoles.6. Robot controller

There are many robot-controller Raspberry Pi projects. There is a dedicated robotics package for Pi, duly powered with the device battery and used to communicate and control robots.

for robots, Pi Zero W can only be used. Zero, a slim line version of the Raspberry Pi, has features of onboard wireless connectivity suitable for lightweight robots.

It's quite lighter than the Model B+ boards of version 2 and 3 of pi and the low profile ensures it can be placed in an efficient position without having a concern about USB ports.

7. Stop motion camera

Using Python and a suitable mount (standard tripod for clay- or toy-based) and the availability of a well-lit area Stop motion camera can be built. But this is a time-consuming process. One needs a good amount of practice to get good results.

8. Time-lapse cameraccombingge

The Raspberry Pi camera model and script creates another use that captures movies. This can be achieved by taking single frames with a time delay. Also needed is, perhaps, a portable battery solution, and a tripod can be used. A smartphone tripod is most preferred to ensure the device remains

9. FM radio station

Raspberry Pi can also be used to broadcast on FM radio. Pi can broadcast only over a short-range. A portable battery and soldering skills may be required here. Any audio which needs to broadcast will need to be loaded beforehand to the microSD card.

10. Web servers

Another great application of Raspberry Pi are to create a web server out of it. What this means is that it can be configured to host a website much like any other server. It can host blogs too. First of all, the right software needs to be installed and that is Apache and its dependent libraries. A full LAMP stack can also be installed with PHP, MySQL, and Apache too. Setting up FTP is also helpful.

Once all these steps as mentioned are completed, HTML files can be saved into the /www/ directory, and the webserver is ready to be used. Specific web software like WordPress can also be used once the server setup is complete.

Conclusion

Raspberry Pi is versatile and very useful. The above use-cases depict it. Students of computer science, electronics, and similar discipline must spend time learning this cool skill; they would enjoy and also become very good at the fundamentals of computer programming and hardware technologies. A lot of fun projects, activities, college-level competitions can be won by having sound knowledge of raspberry pi.

Other examples of uses of raspberry pi could be a Twitter bot, security cameras, digital photo frames, smart tv, network monitoring tool, home automation systems etc.

Arduino

Introduction: -

- → It is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices
- → Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output(I/O) pins that maybe interface to various expansion boards or breadboards (for prototyping) and other circuits.
- → An Italian prototyping tool project
- → Ready-made electronic products at low costs
- → Open Source
- → Boards with different performances

The three key concepts of Arduino Project

- → **Hardware**

Can sense the environment by sensors, and affects it by controlling lights, motors, and other actuators.

- → **Environment**

Allows to write code in the Arduino programming language and using the Arduino development environment.

- → **Community** It is made up of everyone from and to hobbyists, students, designers and engineers across the world.

Why should we use Arduino?

- → Simple, academic purposes
- → Open source
- → Hardware & Software: permits to manufacture the boards and software distribution by anyone
- → Arduino compatible: Canaduino, Freeduino, Linduino, SainSmart, ... ○ GNU Lesser General Public License (LGPL)
- → Opportunistic prototyping
- → Community
- → Wiki, Forum,Tutorials
- → Could be used as an IoT starting point
- → Physical computing objects

Some Current Arduino Boards

UNO

- → Current official reference of Arduino Board

→ Most used and documented board

Mega

→ Designed for more complex projects
→ 54 digital I/O pins, 16 analog inputs
→ ATmega2560

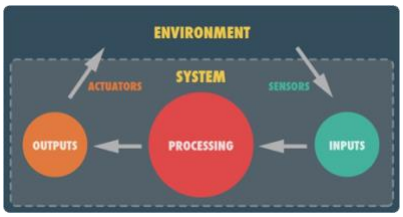
Lilypad

→ Designed for e-textiles and wearables projects
→ Can be sewn to fabric and to power supplies
→

Nano

→ Compact board like the UNO

Arduino as Physical Computing Platform



→ Physical Computing involves the design of interactive objects that can communicate with humans using sensors and actuators controlled by a behavior implemented as software running inside a microcontroller.

Arduino Cloud

→ A new platform to make building IoT
→ Creation of tools that allow connection and control of device on/by the Internet
→ MQTT broker makes connection between each object

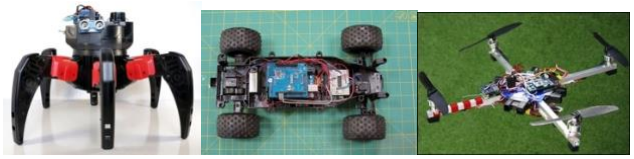
Home Control and Automation

Arduino Usage Examples

Beat bearing

TeleBall (Breakout game)

Other Examples



Arduino Architecture and Components

General Architecture

Main components

- → AVR Microcontroller
- → Analog and digital I/O pins
- → Flash memory
- → Integrated in the microcontroller
- → USB port for serial communication

Arduino Sensors

Some of the commonly used sensors in projects.

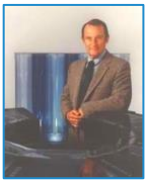
Distance Ranging Sensor	Light Sensor	Humidity and Temperature Sensor	RGB and Gesture Sensor	Acceleration Sensor
Pressure Sensor	Proximity Sensor	Sound Detecting Sensor	PIR SENSOR	

Difference between Arduino and Raspberry Pi :-

S No.	Arduino	Raspberry Pi
1.	In the year 2005, the classrooms of the Interactive Design Institute in Ivrea, Italy, first introduced the Arduino board.	In the year 2012, Eben Upton first introduced the Raspberry Pi device in February.
2.	Control unit of the Arduino is from the Atmega family.	The control unit of Raspberry Pi is from the ARM family.
3.	Arduino is based on a microcontroller.	While Raspberry Pi is based on a microprocessor.
4.	Arduino boards have a simple hardware and software structure.	While Raspberry Pi boards have a complex architecture of hardware and software.
6.	CPU architecture: 8 bit.	CPU architecture: 64 bit.
7.	It uses very little RAM, 2 kB.	While Raspberry Pi requires more RAM, 1 GB.
8.	It clocks a processing speed of 16 MHz.	While Raspberry Pi clocks a processing speed of 1.4 GHz.
9.	It is cheaper in cost.	While Raspberry Pi is expensive.
10.	It has a higher I/O current drive strength.	While Raspberry Pi has a lower I/O current drive strength.

11.	It consumes about 200 MW of power.	While it consumes about 700 MW of power.
12.	Its logic level is 5V.	Its logic level is 3V.
13.	It does not have internet support.	It has inbuilt Ethernet port and WiFi support.
14.	It has higher current drive strength.	It has lower current drive strength.

2.Research Seymore Cray's contribution to computer science.:



"Anyone can build a fast CPU. The trick is to build a fast system."
– Seymour Cray

Seymour Cray was an American computer engineer who made significant contributions to the development of computer science. His innovations in the design of high-performance computers, and their associated software and cooling systems, helped to transform the field of computing and laid the foundation for modern supercomputers.


Big, big iron: the UNIVAC 1103, Cray's first design. Source: Wikipedia, public domain.

Cray's early work was in designing large-scale digital computers for Control Data Corporation (CDC), where he was involved in the development of several early machines. In 1960, Cray designed the CDC 1604, which was the first computer to use integrated circuits, and he subsequently designed the CDC 6600, which was the world's first commercially successful supercomputer. The CDC 6600 was notable for its use of parallel processing and vector processing, which were key innovations in the field of high-performance computing.

CRAY-1


Beauty and brains: the Cray-1 on display at Living Computers: Museum + Labs in Seattle.

In 1972, Cray left CDC to found his own company, Cray Research, which focused on the development of high-performance computers. One of his most famous designs was the Cray-1, which was introduced in 1976 and was one of the fastest computers in the world at the time. The Cray-1 was notable for its unique cylindrical design and its use of a liquid cooling system, which allowed it to operate at high speeds without overheating.

CRAY-2

Offering advanced architecture, advanced technology and advanced software, the CRAY-2 clearly leads the industry in large-scale computing. The CRAY-2 leads in technology by offering the fastest processor clock cycle (4.1 nanoseconds~, the largest memory (256 million words) and four vector and scalar multiprocessing Background Processors. The CRAY-2 leads the industry in computer architecture by applying the fastest or most dense components available and packaging them in three-dimensional modules immersed in liquid coolant. The CRAY-2 leads the industry in software by converting an industry recognized and accepted operating system and tailoring the needs of large-scale computers, by providing a FORTRAN conifer that automatically takes advantage of the system architecture and offering extensions available to the operating systems that promote efficient use of the system.

CRAY-3

Cray continued to develop new supercomputers throughout his career, including the Cray-2 and the Cray-3, which were even faster and more powerful than the Cray-1. These machines were used for a wide range of applications, including weather modeling, nuclear simulation, and computational fluid dynamics.

Cray was also a pioneer in the field of vector processing, which involves performing computations on large arrays of data. He developed vector processing units that could perform these operations more quickly and efficiently than earlier machines, which made his computers especially well-suited for scientific and engineering applications that required complex mathematical computations.

In addition to his work on supercomputers and vector processing, Cray also made significant contributions to the development of parallel processing, which involves dividing a computation into smaller pieces that can be performed simultaneously by multiple processors. This technique is used to speed up complex computations and is a key component of modern supercomputers.

Cray was also involved in the development of several operating systems for his supercomputers, including the Cray Operating System (COS) and the UNICOS operating system. These operating systems were designed to take advantage of the unique features of his computers and to provide a high level of performance for scientific and engineering applications. Overall, Seymour Cray's contributions to computer science have had a lasting impact on the field of computing. His work in developing supercomputers, vector and parallel processing, and operating systems helped to pave the way for modern high-performance computing, while his innovations in liquid cooling and other areas helped to ensure that these computers could operate reliably and efficiently.

3.The architectures and uses of Mainframe computers

A single-frame IBM z15 mainframe. Larger capacity models can have up to four total frames. This model has blue accents, as compared with the Linux ONE III model with orange highlights.

ABOUT MAINFRAME

Mainframe computers have a unique architecture that sets them apart from other types of computers. They are designed to handle large volumes of data and run critical applications for businesses and organizations.

key aspects of mainframe computer architecture and their uses:

Centralized Processing: Mainframe computers use a centralized processing architecture, which means that the processing power and resources are concentrated in a single location. This allows them to handle large volumes of data and perform complex tasks quickly and efficiently.

Redundancy: Mainframes are designed with redundant components to ensure that the system remains operational even if a component fails. For example, mainframes typically have multiple processors, power supplies, and storage devices that can be switched on and off as needed to maintain system availability.

Virtualization: Mainframes have the ability to virtualize resources, which allows multiple operating systems and applications to run on the same hardware platform. This makes it easier to manage resources and optimize performance, as well as reduce the need for additional hardware.

Scalability: Mainframe computers are highly scalable and can handle large amounts of data and users. They can be expanded by adding additional processors, memory, or storage devices, making them ideal for organizations that need to accommodate changing workloads and demands.

Three examples of different applications and uses of these very powerful computers.

The use of mainframe computers varies widely depending on the industry and organization. Some common uses of mainframes include:

Financial Transactions: Mainframes are commonly used in financial institutions to process transactions such as banking, insurance, and stock trading. Examples of mainframe operating systems used in financial services include IBM's z/OS and z/VM, and Unisys' OS 2200.

Scientific Research: Supercomputers are used in scientific research to perform complex calculations and simulations in fields such as climate modeling, particle physics, and drug discovery. They can process and analyze large amounts of data, helping researchers to gain new insights and develop new technologies.

Examples of supercomputer operating systems used in scientific research include Linux, AIX, and Cray Operating System (COS).

Healthcare: Mainframes are used in the healthcare industry to manage patient records and process medical claims. Examples of mainframe operating systems used in healthcare include IBM's z/OS and Unisys' MCP (Master Control Program).

In addition to the above examples, mainframes and supercomputers are also used in other industries such as transportation, energy, and government, to manage critical systems and data. They are also used for high-performance computing (HPC) applications such as weather forecasting, oil exploration, and aerospace engineering.

Overall, modern mainframes and supercomputers continue to play a vital role in our society by providing the processing power and reliability needed to handle large amounts of data and critical applications.

4.Patch management:

Patch management is the process of regularly applying software updates, or "patches," to computer systems and applications to address known vulnerabilities and prevent security breaches. These updates are designed to fix bugs, improve system performance, and close security loopholes that can be exploited by attackers.

Patch management is a critical aspect of cybersecurity as it helps to ensure that systems are secure and protected from potential threats. Without proper patch management, systems may be left vulnerable to attacks that exploit known vulnerabilities, which can result in data breaches, system downtime, and other negative consequences.

Effective patch management requires organizations to stay up-to-date with the latest security threats and software updates, and to implement a systematic approach to deploying patches across all relevant systems and applications. This includes developing a testing and deployment strategy, ensuring that patches are properly tested before they are deployed, and maintaining comprehensive records of all patches applied to the system.

Role of patch management

The role of patch management is to ensure that computer systems and applications are up-to-date with the latest security updates and patches to prevent security breaches and cyber-attacks. The main goal of patch management is to address known vulnerabilities and reduce the risk of exploitation by attackers.

Patch management involves a number of key activities, including:

Identifying vulnerabilities: The first step in patch management is to identify known vulnerabilities in the system or application. This may involve conducting regular vulnerability assessments or relying on vendor notifications.

Prioritizing patches: Once vulnerabilities are identified, the next step is to prioritize which patches should be deployed first based on their severity and the level of risk they pose.

Testing patches: Before deploying patches, they must be thoroughly tested to ensure that they do not have any unintended consequences or cause system errors.

Deploying patches: Once patches have been tested and approved, they can be deployed across the system or application. This may involve scheduling updates during off-hours to minimize disruption to users.

Verifying patches: After patches have been deployed, it is important to verify that they have been installed correctly and are working as intended.

Monitoring: Finally, patch management requires ongoing monitoring to ensure that new vulnerabilities are identified and patches are deployed in a timely manner.

Effective patch management can help organizations prevent security breaches, reduce downtime, and ensure compliance with industry regulations and standards. It is an essential aspect of cybersecurity and should be a priority for all organizations.

Advantages and disadvantages of patch management

Advantages of patch management:

Improved Security: One of the main advantages of patch management is that it helps improve the security of computer systems by fixing vulnerabilities and weaknesses that can be exploited by hackers.

Increased Stability: By regularly updating software and applications, patch management helps ensure that systems are stable and less likely to crash or experience errors.

Compliance: Many industries have regulatory requirements that mandate regular security updates and patching, making patch management a necessary component of compliance.

Cost savings: Proactive patch management can help organizations avoid costly security breaches and downtime, which can result in significant financial losses.

Disadvantages of patch management:

Time-consuming: Patch management requires time and resources to identify, prioritize, and deploy patches, which can be a time-consuming process.

Interruptions: Installing patches can sometimes interrupt the normal operation of computer systems, leading to temporary downtime or reduced productivity.

Compatibility issues: Sometimes patches may not be compatible with other software and applications installed on the system, causing compatibility issues and system errors.

Human error: In some cases, patch management errors may occur due to human error, such as installing the wrong patch or forgetting to install a critical update.

Overall, while there are some potential disadvantages to patch management, the benefits of maintaining secure and stable systems outweigh the drawbacks. With careful planning and attention to detail, organizations can successfully implement patch management to improve their overall security posture.

CASE-STUDY

In May 2021, the Health Service Executive (HSE) in Ireland suffered a major cyber-attack that impacted their information technology (IT) systems, causing significant disruptions to their operations. The attack was caused by a ransomware group called Conti, who gained access to the HSE's systems through a vulnerability in their IT software.

The vulnerability was a result of the HSE not properly patching their systems, leaving them open to exploitation by attackers. According to the HSE, they had been aware of the vulnerability but had not yet patched it due to concerns about the impact on critical healthcare systems. This highlights the importance of a well-managed patch management system, which would have ensured that the systems were kept up to date with the latest security patches and updates.

The attack on the HSE resulted in the shutdown of many of their IT systems, including their email and internal systems, causing significant disruption to their operations. Patients were unable to access their medical records, and healthcare providers were unable to access important patient information, leading to delays in treatment and care.

The HSE worked with law enforcement and cybersecurity experts to investigate the attack and to try to restore their systems as quickly as possible. They also implemented a range of cybersecurity measures to prevent future attacks, including strengthening their patch management processes to ensure that vulnerabilities were addressed in a timely manner.

Overall, the attack on the HSE highlights the critical importance of patch management for ensuring the security of IT systems. Failure to properly manage patches can leave systems vulnerable to exploitation by attackers, potentially resulting in significant disruptions and damage. Proper patch management, on the other hand, can help prevent attacks by ensuring that systems are kept up to date with the latest security patches and updates.

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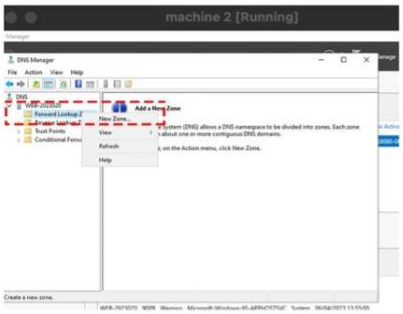
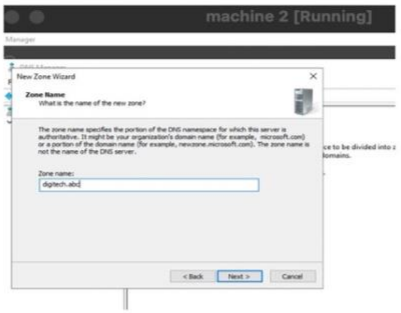
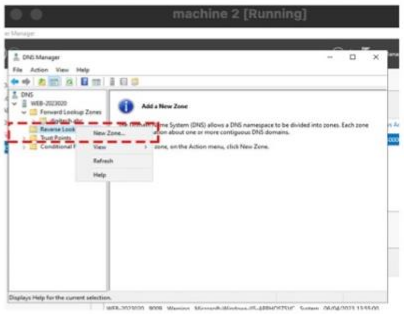
Challenge Task-1 - Setting up a DNS entry for the DigiTech web site.

Using the DNS console to setting up a DNS entry for the DigiTech web site

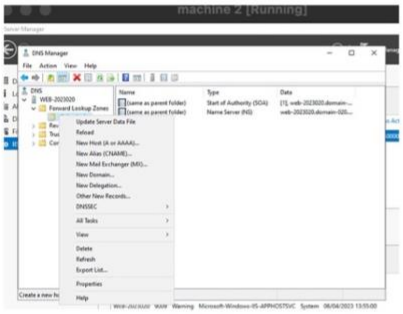
1.After installing DNS server feature, Creating a new zone in the name of digitech.abc in forward lookup zone and reverse lookup zone.

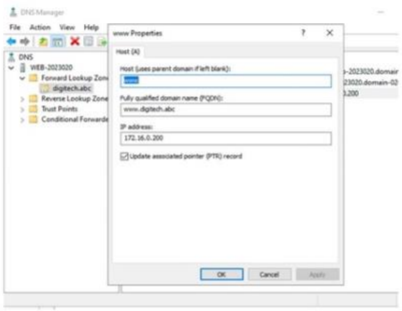




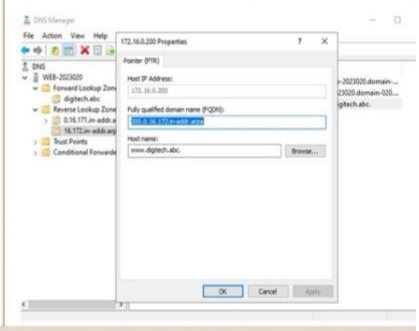


2. Setting up an IP address and setting up a website name for digitech company in forward lookup zone

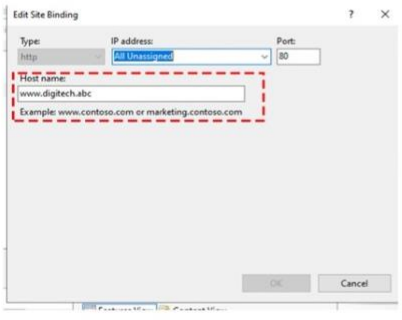




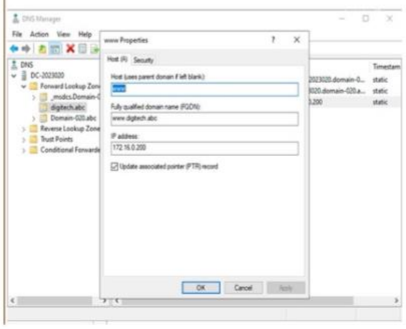
3. Creating a new host name for the website in reverse lookup zone.



4. Editing site bindings on IIS manager and setting up a host name created on DNS manager.



5. On domain server machine 1,Setting up a new host for digitech website in forward lookup zone and adding a Web server IP address. Verifying the website www.digitech.abc on browser and its working.



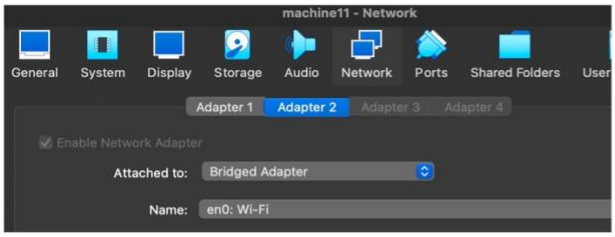
The benefits of DNS are that domain names:

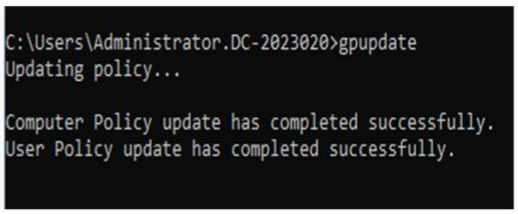
1.Can map to a new IP address if the host's IP address changes.
2. Are easier to remember than an IP address.
3. Allow organizations to use a domain name hierarchy that is independent of any IP address assignment.

Challenge Task-2 - Windows Software Update Server (WSUS)

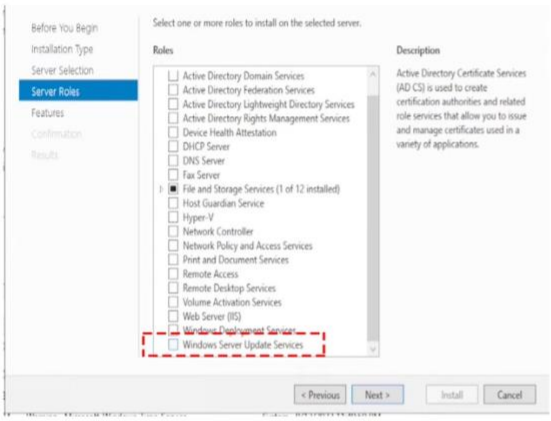
Setting up wsus

1.Adding Second adapter for internet connections

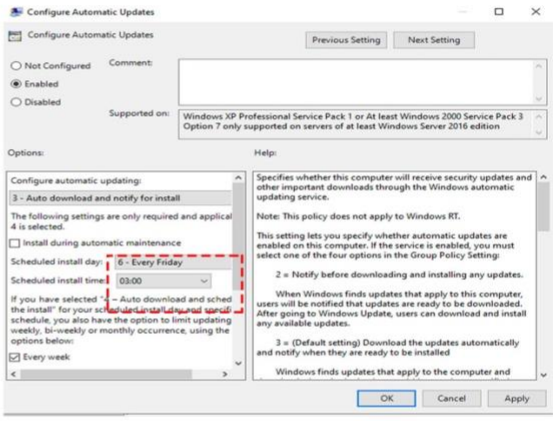




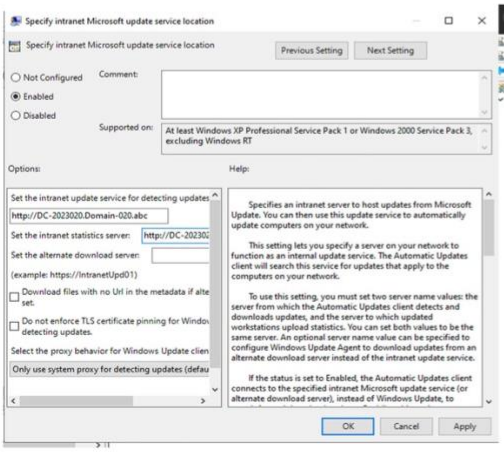
2.Adding wsus features



3. Configuring automatic updates in GPO



4.Specific intranet microsoft update service location



5. Configuration settings as been added