Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

TVET LEVEL IV



SOFTWARE DEVELOPMENT

WEBSITE DEPLOYMENT

TRAINEE MANUAL

RTB | RWANDA TVET BOARD

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Module
WEBSITE DEPLOYMENT

Unit 1: Plan website Deployment

Unit 2: Deploy website on a local network

Unit 3: Deploy website online

Unit 1:
Plan website deployment

Illustration of Learning Unit



- Draw a grid of computers, Tablets and smart phones that are together with to a global world wide web (Like a Globe) connected to the central server.
- Make a blue-sky background to illustrate the cloud (Igicu). All these devices appear to be placed somewhere in the cloud.

Topics

1. Determine client and server systems to meet the requirements for deployment
2. Determine server deployment requirements
3. Configure server accessibility requirements.

Unit Summary:

This unit describes the skills, knowledge and attitudes required to determineclient and server systems, determine deployment requirements and configure server accessibility.

Self-Assessment: Unit 1

1. Look at the illustration. What is happening? What do you think this unit will be about? What topics might be covered?

2. Fill in the self assessment below.

There is no right or wrong way to answer this survey. It is for your own use during this course. Think about yourself: do you think you can do this? How well? Read the statements across the top. Put a check in column that best represents your situation. At the end of this unit, we'll take this survey again.

My experience Knowledge, skills and attitudes	I don't have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Analyze compatibility between created website and hosting server.					
Identify strategies for the deployment plan.					
Select server for deployment.					
Evaluate hosting platforms available					
Analyze requirements of a hosting platform					
Follow configuration steps of chosen server					
Identify domain name requirements					
Verify DNS Settings					
Follow domain email configuration steps					

Topic 1.1: Determination of client and server systems to meet the requirements for deployment

Key Competencies:

Knowledge	Skills	Attitudes
1. Describe compatibility between created website and hosting server.	**1.** Analyze compatibility between created website and hosting server.	**1.** Detail-oriented
2. Describe strategies for thedeployment plan.	**2.** Identifystrategies for the deployment plan.	**2.** Skilful
3. Explain deployment server selection criteria.	**3.** Select server for deployment.	**3.** Decisive

Getting Started: What do we know and where are we going?

Task:



Observe this pictureand discuss the following:

a. What is represented by this picture?
b. Explain the relationship between the picture and the topic.

Activity 1: Problem Solving

Task: The website developer of the school has developed a PHP website for the school and wants to deploy it so it becomes visible online. Ask trainees to form small groups and discuss the following:

1. Determine client's requirements to hosting a website?
2. Determine the server requirements to hosting a website?
3. Enumerate the key strategies for website deployment.

Key Facts 1.1

Compatibility betweenwebsite and hosting server.

1.1. Description of website hosting

Websitedeployment or website hosting is a service that allows organizations and individuals to post a website or web page onto the Internet. Hosting services providethe technologies and services needed for the website or webpage to be viewed on the Internet by storing/hostingsite files on special computers,known as servers.

- Purpose of hosting a website

When Internet users want to view your website, all they need to do is type your website address or domain into their browser. Their computer will then connect to your server and your web pages will be delivered to them through their browsers.

- Client'sRequirements

I.Domain name

A domain name is a website name. A domain name is the address that Internet users use to access your website. Whenpreparing website deployment,three general scenarios may be considered:

- The client has no domain (i.e. this is their first website)
- The client already has hosting and you will be deploying the site on their server
- The client already has hosting but you will be moving to a new server

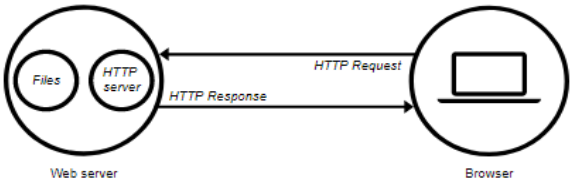
The first scenario is the most simple and fast deployment. You start with a blank slate and all you need is register their domain name and purchase (or provide) web hosting.

Scenarios 2 and 3 are a bit trickier and involve a more thoughtful deployment process.You will need domain management credentials for the existing host so that you can manage the DNS records. Visit whois.domaintools.com to check existing domains.

II.SiteFiles

These are the web pages your potential customers actually see when visiting your site. It includes the index file, source folders and other useful files such as media files, graphics, scripts, and other .html data. This data tells web hosting servers how pages should look and relate to one another. Web servers translate these files and then obey their flow.

1.2. Web Server Specifications



Website deployment requires web servers to host files and process requests. The main popular and open source web servers are:

- Apache web server, provided and managed by Apache Foundation
- IIS (Internet Information Services, provided by Microsoft)
- NGINX (pronounced like “Engine X”, provided by NGINX, Inc.)
- GWS (provided by Google and short for Google Web Server)

Apart from these Web Servers, there are other Web Servers also available in the market. Some are not open source and some others very expensive.Such ones include AWS (Amazon Web Server provided by Google), IBM's WebSphere and many more others.

I. Apache HTTP Server

Apache is the most popular web server in the world developed by the Apache Software Foundation. Apache web server is open source software and can be installed on almost all operating systems including Linux, Unix, Windows, FreeBSD, Mac OS X and more. About 60% of the web server machines run the Apache Web Server.

II. Internet Information Services

The Internet Information Server (IIS) is a high performance Web Server from Microsoft. This web server runs on Windows NT/2000 and 2003 platforms (and may be on upcoming new Windows version also). IIS comes bundled with Windows NT/2000 and 2003; Because IIS is tightly integrated with the operating system so it is relatively easy to administer it. You can have detailed information about this server at http://www.iis.net/.

III. Lighttpd

The Lighttpd pronounced “Lighty” is also a free web server that is distributed with the FreeBSD operating system. This open source web server is fast, secure and consumes

much less CPU power. Lighttpd can also run on Windows, Mac OS X, Linux and Solaris operating systems.Find information about this server at http://www.lighttpd.net/.

2. Key strategies for website deployment plans.

Choosing a web host provider is not a difficult thing to conquer. You just have to know the right strategies to follow. There are plenty key strategies to finding the perfect web hosting. Let us discuss five main of them:

2.1. Determine Your Website Requirements

Before considering a website hosting provider or check out the different deployment solutions, there is a need to determine the exact purpose: Is it a blog, so we can use WordPress? Or are we setting up online business, hence we look for an e-commerce hosting? These requirements can differ from one person to another. That is why we need to determine the requirements of our website, so we can decide which hosting needed.

2.2. Enough Space and Bandwidth

When it comes to ensuring the functionality of your website, there are two elements that you need to consider: the server and the bandwidth. These two come hand in hand, especially when guaranteeing the uptime of your site. Basically, you have to allocate adequate server disk space and, if required, a database in order to host your data and files. At the same time, you need to ensure enough bandwidth for quick accessibility.

2.3. Good Hosting Price

Considering that there are many hosting solutions out there, it only makes sense for different prices and rates to surface. But when you say good price, it does not mean cheaper is a better choice. Features included in the hosting plan are the ones that determine what price is a good choice to go according to your specific requirements.

2.4. Uptimeand Great Server Reliability

Believe it or not, many website owners fail to realize the importance of server reliability. They neglect the significance it brings later on; hence, they fail to achieve success over time. Think about putting a website that is meant to cater to a huge number of visitors. Let’s say your website goes down for a very long time. Visitors would go and look for similar sites andthis suggests that your sales conversions are down.

2.5. Professional Customer Support

There are different qualities that make up professional customer support. It could be that he is exceptional in handling complaints and delivering solutions. It could also mean that he is available 24/7. No matter what circumstances, the right web hosting provider to choose should be able to provide you with a team of experts who can help you whenever you are experiencing hosting-related problems.

3. Decision making and selection of the deployment server.

3.1. Decide on Web Server Platforms - Linux or Windows

The truth of the matter is these two web server platforms are functionally equivalent, it all depends on what are your hosting needs, and what are you most comfortable with.Both platforms differ in cost, ease of use, versatility and stability. Windows costs more than Linux.

Linux is mainly centered on the Linux kernel. It is initially developed by Linus Torvalds in the year 1991. While Windows Server is basically a Microsoft product and is a brand name for a group of server operating systems.

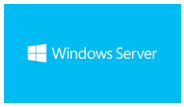
- Linux Server Vs. Windows Server

Linux Server



- Linux servers are mainly based on command line mode of operation. It has lots of community support but less than that of windows.
- It allows running scripts written in PHP, Perl, Python and other Unix-originated languages. It usually supports MySQL and PostgreSQL databases. Users normally don't have access to the core system settings; hence the violations and security gaps are minimal.

Windows Server



- Windows servers use Graphic user interface to implement the operations. It is based on Microsoft packages. Although Windows server is costly, they provide a larger community and paid support.
- Allows for running ASP scripts and utilizing .NET and other Microsoft technologies. It supports Microsoft SQL Server and Access database.

If youare familiar with Linux commands, you should choose Linux hosting because they are more economical. However, you should choose the platform that supports the technologies you use.

3.2. Decide on Type of Hosting

Various types of web hosting services are available to host your website. Before signing up for any hosting provider, it is important to understand what kind of service,server, budget, and what type of services the web host offers, in contrast to your website needs.

Popular Hosting options available areWebsite Builders, Shared Hosting, Dedicated Hosting, Collocated Hosting, Reseller Hosting, VPS Hosting;Self service Hosting and many more.

I. Website Builders

A website builder service is a type of hosting service that caters to beginners who need to host a website, but lack the technical skills and knowledge to build one. They typically provide you with an online browser-based drag-and-drop interface to build and host any website.

II. Shared Hosting

In a shared hosting, your website and other website owners share one server.This includes sharing the physical server and the software applications within the server. Shared hosting services are affordable because the cost to operate the server is shared.

III. Dedicated Hosting

In a dedicated hosting, you have the entire web server to yourself. This allows for faster performance, as you have all the server's resources entirely, without sharing with other website owners. However, this also means that you will be responsible for the cost of server operation.

IV. Collocated Hosting

In this type of hosting, you will purchase your own server and have it housed at a web host's facilities. You will be responsible for the server itself. An advantage of this type of hosting service is you have full control of the web server. You can install any scripts or applications you need.

3.3. Decide the right Plan

You can reduce your hosting cost to a great extent by choosing the right plan. Evaluate your needs carefully and opt for a plan that closely meets your needs. Remember that most hosts have quick upgrade options and you can always upgrade to the next higher plan the moment your resource requirements increase, as your website gains traffic with time.


Activity 2: Guided Practice


Task: Based on the previous activity, perform the following:

3.1. Explain the client's website requirements with the deployment server.
3.2. Interpret key strategies for web hosting requirements.
3.3. Explain server selection criteria.

Activity 3: Application

Task:A website developer wants to deploy the school website but the school does not have their own server. Ask trainees to work individually on the following:

1. Compare the client's website with the deployment server.
2. Interpret key strategies for web hosting requirements.
3. Select server

Points to Remember

- Always consider server security issues.
- Free hosting are not always free.
- Follow Technology change.

Formative Assessment

1. Among the following list of items, write down the ones that a client bringing a website to host should be having.
   a. Domain name
   b. Name Servers
   c. Site Files
   d. Disk space
   e. Bandwidth

2. Write a short note on the following web servers:
   a. Apache
   b. IIS
   c. Lighttpd
   d. NGINX

3. The list below contains key strategies for selecting a deployment plan. Write down the ones that are correct.
   a. Website requirements
   b. Bandwidth
   c. Driving permit
   d. Disk space
   e. Internet

4. What are the deployment server selection criteria?
5. Explain the following terms in regards of types of hosting providers and say when to use each of them:
    a. Website builders
    b. Shared hosting
    c. Dedicated hosting
    d. Collocated hosting



Self Reflection

Areas of strength	Areas for improvement	Actions to be taken to improve
1. **2.**	**1.** **2.**	**1.** **2.**

Topic 1.2: Determination of server deployment requirements.

Key Competencies:

Knowledge	Skills	Attitudes
List hosting platforms	Evaluate hosting platforms	Detail-oriented
Explain requirements of a hosting platform.	Analyze requirements of a hosting platform	Being Creative
Describe configuration steps of chosen server	Follow configuration steps of chosen server.	Proactive

Getting Started: What do we know and where are we going?

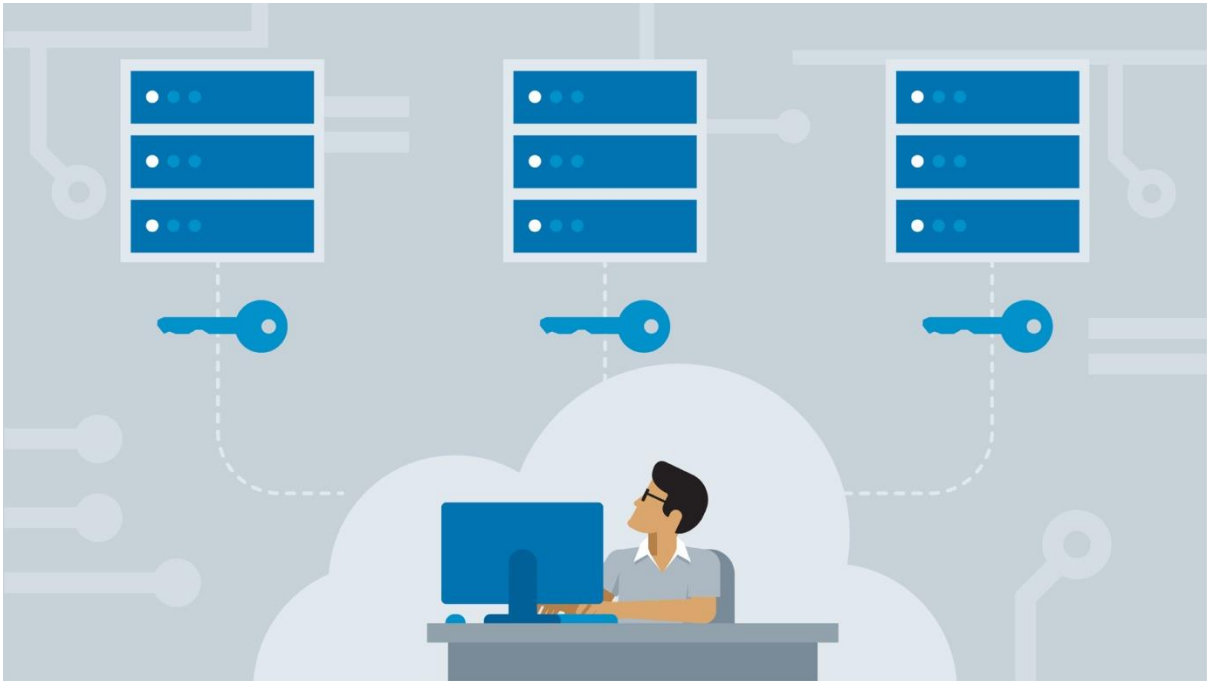


Figure 1.2.a

Task: Observe the picture and answer the following questions:

1. What does the picture represent?
2. What is the relationship between the picture and the topic?

Activity 1: Problem Solving

Task:Scenario: ICT is a good profession

During the internship program of Last year's TVET Trainees of Level 4 Software Development, they were being trained about website deployment. The In-company trainer gave them a list of available website deployment platforms as follows:

WEB HOSTS	FREE	PAID

1. HostGator
2. BlueHost
3. 000WebHost
4. Hostinger
5. Wix
6. GoDaddy
7. Interserver
8. Weebly
9. SiteGround
10. WordPress

Refer to the above table do yhe following

a) Choose among the list of web hosts, and write Free hosting and Paid hosting in their respective columns;
b) Explain the requirements of both free and paid platforms.
c) Enumerate steps of configuration of a hosting platform.

Key Facts 1.2

1. Hosting Platforms

▸ Free Hosting

Free hosting platforms are not completely free. Most of them are website builders, they require ending your chosen domain name by their names (example: mywebsite.wixsite.com, mywebsite.weebly.com, mywebsite.comli.com …etc) others, they offer free domain and require a small amount to host your website; some others restrict your domain to contain their sub domains for free and offers a trial period hosting your website, and thereafter you can upgrade to premium hosting to access premium features such as Sub-domains, Email accounts, SSL Certificate and many more.

Below is a list of examples of host providers that offers free hosting.

a. 000webhost.com.
b. Wix.com
c. Weebly.com
d. Wordpress.com
e. X10Hosting.com
f. Bravenet.com
g. 5GBFree.com
h. Freehostia.com
i. FreeWebHostingArea.com

▸ Paid Hosting

There are hundreds of hosting providers available to us. Out of all them, some are more popular than others and have amassed quite a following. Based on uptime

A lot of times, free web hosting and paid hosting offers the same security, network bandwidth and port speed. The only difference is the hosting features included. These features include additional disk storage, bandwidth, SSL Certificate (for securing your HTTP Protocol), data transfer, more scripting support, more email accounts, more sub domains …etc and most importantly, your custom domain.

For a business opening a new website, or for any regular website, the disk storage and data transfer offered by a free web hosting service would be sufficient. It takes time to grow a

website and accumulate enough visitors to max out the storage and/or data transfer limits of a free web hosting package.

You can buy among best selling hosting service providers of your choice or if you bought free hosting, you can always upgrade your service from the free web hosting to paid hosting when the time comes. The following is a list of examples of popular web hosting providers on the market:

a. BlueHost
b. HostGator
c. Namecheap
d. InMotion
e. GoDaddy
f. Hostinger
g. SiteGround
h. Digital Ocean

2. Requirements of Hosting Platforms

Requirements of hosting platforms variesaccording to the website to host; the technologies used to develop the website, the amount of data to be processed, the script support required and many more other factors that defines the compatibility between your created website and your hosting server. If your website possesses a database, then you will need a host whose server supports backend functionalities otherwise, database server will not be required.

▸ Hosting with backend server

The backend consists of three parts: a server, an application, and a database. If you book a flight or buy concert tickets, you usually open a website and interact with the frontend. Once you've entered that information, the application stores it in a database that was created on a server. For sake of ease, just think about a database as a giant Excel spreadsheet on your computer, but your computer (server) is stored somewhere in America.All of that information stays on the server so when you log back into the application to print your tickets, all of the information is still there in your account.

Depending on the platform selected, The following is a list of popular database clients as requirements according to your chosen platform.

- MySQL
- Microsoft SQL Server
- PostgreSQL
- MONGO DB
- Oracle
- SQLite
- PL/SQL

- Hosting without backend server

A website which only requires displaying pre-defined data essentially does not require any back-end logic.These websites are usually called static websites and does not require backend servers during their hosting processes. Therefore the requirements are minimal: No database server required, disk space is minimal and load time may increase.

A few examples for such websites could be:

- A website about a company.
- A personal portfolio.
- An events page.
- An online journal/newspaper.

3. Web ServerConfiguration Steps

Depending on the server you have chosen, you should apply the following steps to successfully configure your web server.

Step 1: Install your chosen web server (Example: Apache)

Step 2: Install and configure PHP

Step 3: Install and configure MySQL Server

Step 4: Install and configure PhpMyAdmin


Activity 2: Guided Practice


Task: Scenario: Hi Five To Web designers!!

IPRC Kigali has encountered problems in its hosting provider and wishes to move to anew hosting server. They called youto help them to do the following:

1. Compare free hosting features to paid hosting options
2. Examineweb host and server location for the deployment
3. Explain configuration steps of chosen server


Activity 3: Application


Task: Scenario: ICT Entrepreneurship

Kamugisha is an entrepreneur. He started a business that sells cooking gas and he delivers his products to his clients. Kamugisha has recently bought a domain name for his website to be deployed online and he is looking for you to help him the following:

1. List available hosting platform for Mr. Kamugisha.
2. Select web host and server location for the deployment
3. Followconfiguration steps of chosen server.


Points to Remember.

- Follow guidelines on creating strong passwords.
- Verify copyrights infringements before registering any domain name


Formative Assessment

1. Among the following web hosting providers, write the one which is correct.
   - HotGhost
   - HostGot
   - HostGator

- HostGet
- HostGate

2. Among the following web hosting providers, write the ones that are free.
- 000Webhost
- BlueHost
- Wix
- 0001Webhost
- Weebly

3. Link the elements from column A of Hosting Providers and elements of column B which represents Hosting features.

A	B
• 000Webhost • HostGator	• Free domain registration • SSL Certificate • Unlimited sub-domains • Unlimited bandwidth • Domain extension ends in 000webhost.com • Free hosting

4. The following is the list of deployment requirements. Write down the correct ones:
a. Domain name registration
b. Domain name restriction
c. DNS Configurations
d. DNS Confrontation
e. Domain mapping
f. Files Upload
g. Fire Download



Self Reflection

Areas of strength	Areas for improvement	Actions to be taken to improve
1. **2.**	**1.** **2.**	**1.** **2.**

Topic 1.3: Configuration of server accessibility requirements.

Key Competencies:

Knowledge	Skills	Attitudes
1. Describe domain name requirements	**1.** Identify domain name requirements	**1.** Innovative
2. List DNS Settings	**2.** Verify DNS Settings	**2.** Attentive, Coachable
3. Explain domain email configuration steps.	**3.** Follow domain email configuration steps.	**3.** Detail-oriented

Getting Started: What do we know and where are we going?



Figure 1.3.a

Task: Observe the picture "Figure 1.3.a" above and answer the following questions:

i. What does this picture represents?
ii. What is the relationship between the picture and the topic?

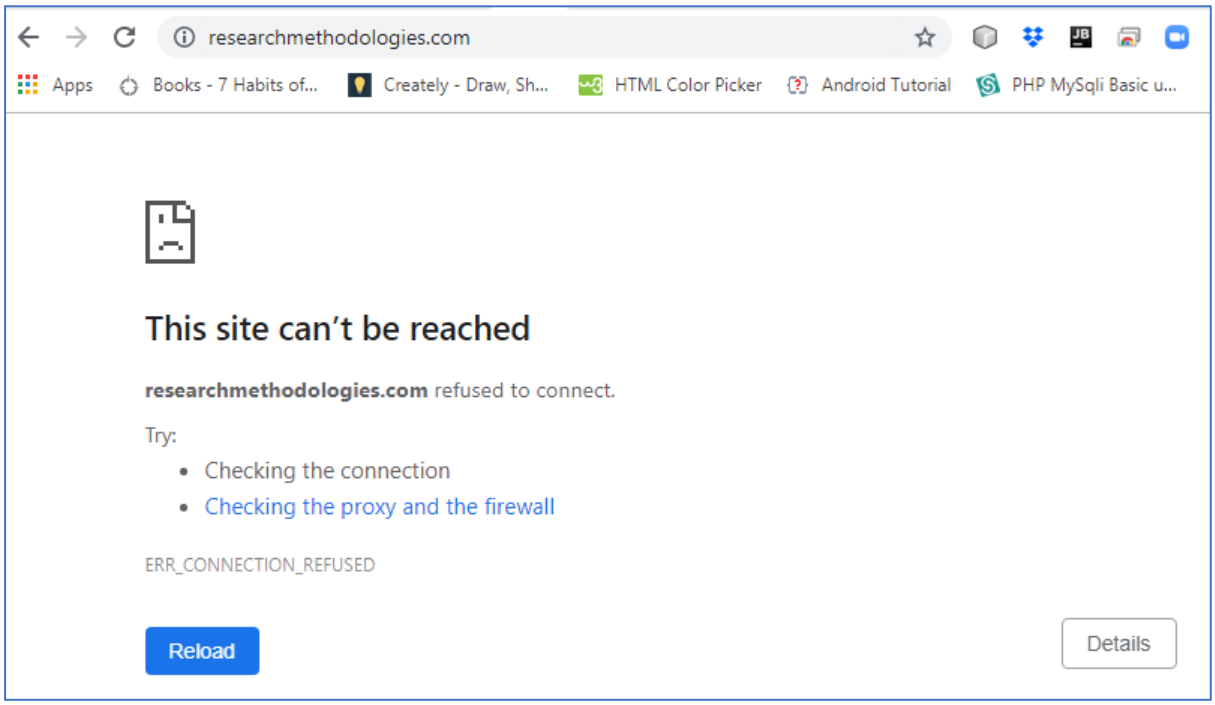
1. Form small groups and discuss these above questions in groups.

2. After group discussions, each group will present their findings to the class.
3. Together with your trainer, link the picture with the Learning outcome.

Activity 1: Problem Solving

Task: Scenario: Experience Is a good teacher

Mukahirwa is student in TVET school, in the field of ICT. The trainer gave the class a homework about reaserach methologies which required to use internet for research. When Mukahirwa tried to access researchmethodologies.com, the page appeared as follows:



Tasks related to the above scenario:

i. Identify causes for this issue
ii. Suggest possible solutions to handle the problem, so that Mukashema could access the page.

i. Form groups of two to four (2-4) and read the scenario above named: "**Experience Is a good teacher**".
ii. Your Trainer will randomly, pick one group to present their answers to the class, and other groups will make/provide input/feedback.
iii. Your trainer will give the expert view to enhance your answers.

Key Facts 1.3

4. Domain Name Requirements

Follow the steps below to help you pick the perfect domain name:

Step 1: Make it easy to type

Finding a domain name that is easy to type is critical to online success. If you use slang (u instead of you) or words with multiple spellings (express vs. xpress), it might be harder for customers to find your site.

Step 2: Keep it short

If your domain name is long and complex, you risk customers mistyping or misspelling it. Short and simple is the way to go.

Step 3: Use keywords

Try using keywords that describe your business and the services you offer. For example, if you're a glass replacement business, you may want to register GlassRepair.com or GlassReplacement.com. if your are an IT consultant, try something that includes itconsultant.rw or itconsult.com.

N.B: Include the keywords that people enter when searching for your products or services.It helps improve your rank on search engines (which increases traffic) and just makes more sense to your customers.

Step 4: Target your area

If your business is local, consider including your city or state in your domain name to make it easy for local customers to find and remember. Example: NyamataGlassRepair.com or KigaliITConsult.com

Step 5: Avoid numbers and hyphens

Numbers and hyphens are often misunderstood — people who hear your website address don't know if you're using a numeral (5) or it's spelled out (five) or they misplace or forget the dash. If you need these in your domain, register the different variations to be safe.

Step 6: Be memorable

There are millions of registered domain names, so having a domain that's catchy and memorable is essential. Once you've come up with a name, share it with close friends to make sure it sounds appealing and makes sense to others.

Step 7: Research it

Make sure the name you've selected isn't trademarked, copyrighted or being used by another company. It could result in a legal mess that could cost you a fortune!.

Step 8: Use appropriate domain extension

Extensions are suffixes, such as .com or .net, at the end of web addresses. These can have specific uses, so make sure to choose one that works for your business. The .com domain extension is far and away the most popular, but it can be tough to get a short and memorable .com domain name because it's been around for so long.

A bevy of new generic top-level domains — like .app, .photography, .tech and many moreoffer a great opportunity to register short and highly relevant names. And here are some other top extensions and how they're often used:

- .rw: Rwandan domain names
- .co : an abbreviation for company, commerce, and community.
- .info : informational sites.
- .net : technical, Internet infrastructure sites.
- .org : non-commercial organizations and nonprofits.
- .biz : business or commercial use, like e-commerce sites.
- .me : blogs, resumes or personal sites.

Step 9: Protect and build your brand

To protect your brand, consider purchasing various domain extensions, as well as misspelled versions of your domain name. This prevents competitors from registering other versions and ensures your customers are directed to your website, even if they mistype it.

5. Domain Name System (DNS) Settings

- Description of DNS

DNS or Domain Name System is a system that points a domain name to physical IP address. The purpose of DNS is to use easy to remember domain names for websites instead of their

numeric IP addresses. It also enables website owners to change their web hosts without changing domain names.

A component called a DNS Resolver is responsible for checking if the hostname is available in local cache, and if not, contacts a series of DNS Name Servers, until eventually it receives the IP of the service the user is trying to reach, and returns it to the browser or application. This usually takes less than a second.

▸ Name Servers

A name server is simply a host address of your primary server that is responsible to translate domain names into IP addresses. This makes it possible for a user to access a website by typing in the domain name instead of the website's actual IP address. For example, when you type in "www.microsoft.com," the request gets sent to Microsoft's name server which returns the IP address of the Microsoft website.

Each domain name must have at least two name servers listed when the domain is registered. These name servers are commonly named ns1.servername.com and ns2.servername.com, where "servername" is the name of the server. The first server listed is the primary server, while the second is used as a backup server if the first server is not responding.

▸ Changing Name Servers

Domain registrars usually provide domain owners easy tools to manage their name servers. Ideally it would be best if you register domain with hosting provider, this way you will not have to deal with transferring domain name or changing name servers. But sometimes you may come across situation where your domain name is registered elsewhere while your website is hosted with another service. In that case you can simply change DNS name servers and point to your web host’s name servers.

✓ Steps followed to change your Name Servers

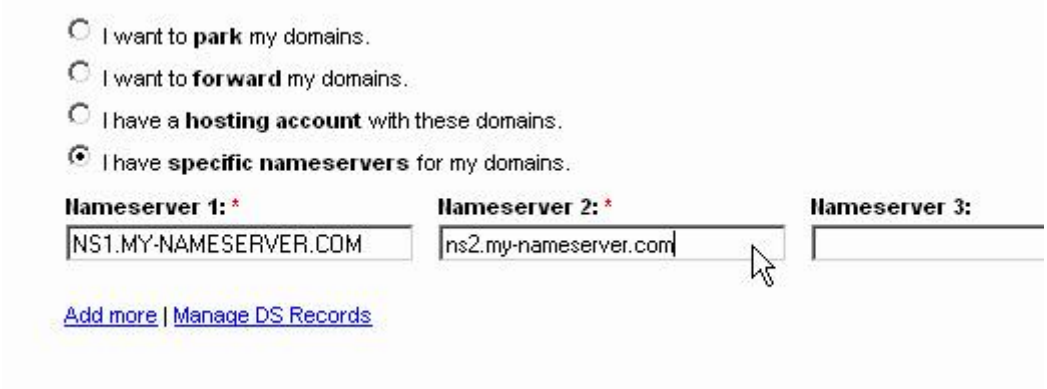
→ Go to your hosting provider and sign in to your control panel.

→ Browse toyour domains options and find Domain Management.

→ Choose the domain name you want to edit and then click on Nameservers.



→ Click on "I have specific nameservers for my domain", and enter HostGator'snameservers.



→ Click OK, and you are done.

If you have registered your domain and you do not find a way to change name servers, check your domain registrar's support pages or email them.

DNS Servers

A DNS Server is a server computer that provides DNS services. For example, if a request is sent to a DNS Server to translate www.comentum.com, the server returns the IP address of 208.66.56.33. A DNS Server does not require much processing power since it is just a simple database server for translating domain host names to their corresponsing IP addresses.

DNS Services is a monthly service for hosting your domain and host names for your domain on a DNS Server. This service will identify and serve IP information about where your website, email, FTP and other services are hosted.DNS service is usually combined with website hosting and email serviceswith website hosting.

There are three common DNS Server types that are used to resolve hostnames into IP addresses.

- DNS Resolver
- DNS Root server
- Authoritative DNS Server

DNS Queries

A DNS Query is appliedagainst a DNS server, supplying the hostname. The DNS server takes the hostname and resolves it into a numeric IP address, which the web browser can connect to. There are three types of DNS Queries:

- Recursive query
- Iterative query
- Non-recursive query

DNS Records

DNS servers create a DNS record to provide important information about a domain or hostname, particularly its current IP address. The most common DNS record types are:

Address Mapping record (A Record)

It is also known as a DNS host record and it stores a hostname and its corresponding IPv4 address.

IP Version 6 Address record (AAAA Record)

It stores a hostname and its corresponding IPv6 address.

Canonical Name record (CNAME Record)

It can be used to alias a hostname to another hostname. When a DNS client requests a record that contains a CNAME, which points to another hostname, the DNS resolution process is repeated with the new hostname.

Mail exchanger record (MX Record)

It specifies an SMTP email server for the domain, used to route outgoing emails to an email server.

Name Server records (NS Record)

It specifies that a DNS Zone, such as “example.com” is delegated to a specific Authoritative Name Server, and provides the address of the name server.

Reverse-lookup Pointer records (PTR Record)

It allows a DNS resolver to provide an IP address and receive a hostname (reverse DNS lookup).

Certificate record (CERT Record)

It stores encryption certificates—PKIX, SPKI, PGP, and so on.

Service Location (SRV Record)

A service location record, like MX but for other communication protocols.

Text Record (TXT Record)

Typically carries machine-readable data such as opportunistic encryption, sender policy framework, DKIM, DMARC, etc.

Start of Authority (SOA Record)

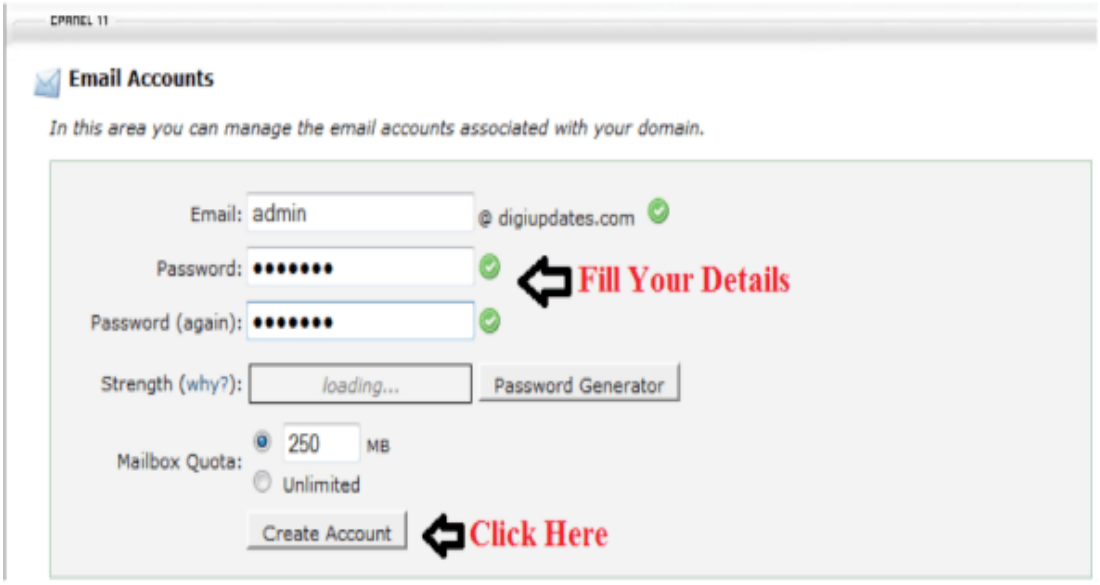
This record appears at the beginning of a DNS zone file, and indicates the Authoritative Name Server for the current DNS zone, contact details for the domain administrator, domain serial number, and information on how frequently DNS information for this zone should be refreshed.

6. Domain Email Configurations

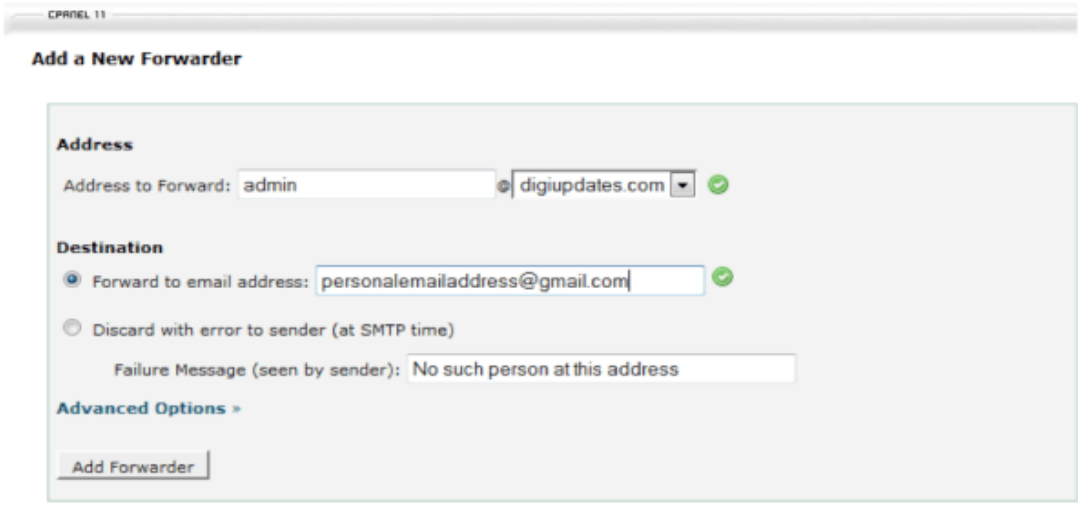
Creating a domain email account instills trust in your customers and enhances the credibility of your brand.

Steps to create the domain name email address

1. Log into your blog hosting control panel, or cPanel.
2. Click on Email Accounts in the Email section.
3. Enter the details for your new account, and click Create Account, as shown here.



4. You will see a notification that reads something like this: “Success! Account Created.” The account will be shown on the same page.
5. Now go back to your cpanel and click on Forwarders in the Mail section. Then click Add Forwarder.
6. Fill all the details as shown below. Then, click Add Forwarder and you’re done.



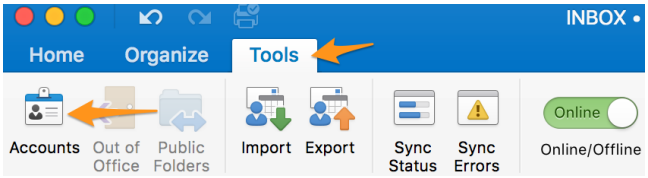
Now all the emails sent to username@yourdomainname.com will be sent to your personal email address.

Integrate your new domain email with Gmail

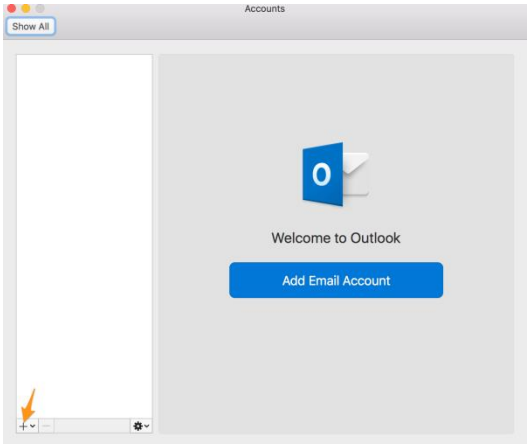
1. Sign in to your Gmail account.
2. Go to Options, then to Mail Settings, then click Accounts and Imports.
3. Check Send Mail As, and click on Add Another Email Address You Own.
4. In the popup that appears, fill in your details, add the new domain email address you just created, then click Next.
5. Click on Send Verification, and a verification email will be delivered to your inbox. Simply click on the link to verify it, and you are done.
6. Now, click on Compose Email, and see the changes you've made in action.

Integrate your new domain email with Outlook

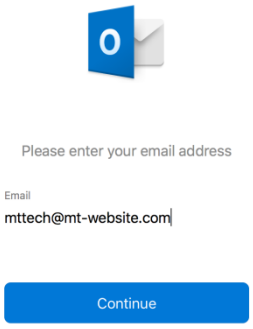
1. Open Outlook 2018 and select **Tools**. Then click **Account**



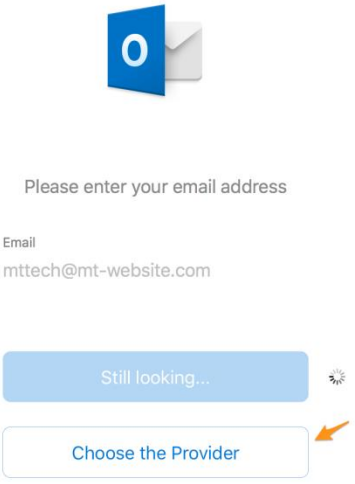
2. Select the **+** icon in the lower left corner.



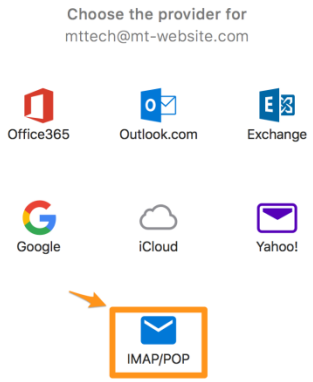
3. Input your username. Then click **Continue**.



4. You can wait for Outlook to detect your provider type. Or you can click **Choose the Provider.**



5. Ensure your provider type is **IMAP/POP.**



6. Enter your information to the email form. Then click **Add Account.**
    - **Type:** IMAP or POP (we recommend IMAP).
    - **Email Address:** Your full user@example.com email address.
    - **Username:** Your full user@example.com email address.
    - **Password:** Your password.
    - **Incoming Server:** Use mail.yourdomain.com
        - Using SSL and the appropriate SSL Port is recommended.
    - **Outgoing Server:** This will also be mail.yourdomain.com.
        - Using SSL and the appropriate SSL Port is recommended.

7. You may receive a notification asking you to trust your certificate. This is normal if your domain is using a self-signed certificate. Simply select **Always trust "certificate name" when connecting to "mail.example.com".** Then click **Continue, your email will be added. Keep in mind that the process may take longer if you have many emails on your server.**

Activity 2: Guided Practice

Task: Scenario: Challenges bring experience A

The numbers 41.74.167.85 represents the public IP address of Rwanda social security board (RSSB). However, the institution has bought its domain name www.rssb.rw and wants to map it so that employees, visitors and other stakeholders will be using it to access its website instead of using numbers. Help RSSB to perform the following:

1. Verify DNS Settings for RSSB Website
2. Map/Point RSSB Website to its public address of their hosting server
3. Configure Administrator email address as admin@rssb.rw
4. Integrate admin@rssb.rw to their administrator's personal Gmail account
5. Integrate admin@rssb.rw to their administrator's personal Outlook account


Activity 3: Application


Task

Scenario: Challenges brings experience B

Given the following numbers 102.132.96.35as a representation of one of the popular social media site do the following:

1. Identify the domain name associated with this public ip
2. Follow the steps to Verify DNS Settings for the above address.
3. Identify steps to create admin email for that domain name.


Points to Remember

- Your domain name is your key to online presence.
- Every domain is unique and is registered before its use.


Formative Assessment

1. List criteria to setting up appropriate domain name

2. Thefollowing are the list of domain names, write down the one that is not a correct domain name and state why.
   - www.mywebsite.rw
   - www.mywebsite.kgl
   - www.mywebsite.tech

- www.mywebsite.xyz
- www.mywebsite.online

3. List the steps for domain transfer process.

4. Information about registered domain namesis found viathe online domain lookup tools.Among the listed information, write down the ones that are not provided.

- Website owner
- Where it was registered
- When it will expire
- Web server types
- SSL Certificate.

5. You are given a list of numbers that represent public IPaddresses; write down the numbers that corresponds to numbers that are valid IP addresses.

- 123.21.49.341
- 41.185.213.11
- 234.1819.1.21
- 234.111.1121
- 192.168.2.124

6. List at least four DNS Settings/Configurations

7. Explain all steps required to map your domain name to a website's IP address

8. If you have registered your domain name or have recently made changes in your DNS settings, a period called DNS Propagation is required for your changes to take effects. According to your experience, The DNS Propagation period can take:

- Up to 24 hours
- Up to 24 Minutes
- Up to 24 days
- Up to 24 seconds
- Up to 2 hours 15 minutes

9. Domain Name Services (DNS) settings include name servers that resolve domain names or website names to their server's IP addresses. Among the following name servers, write down the correct ones.

h. ns21.websitewelcome.com
i. websitewelcome.ns21.com
j. com.ns21.websitewelcome
k. ns21.com.websitewelcome
l. ns21.com

10. How many name servers are provided for every registered domain name?

m. At least 1
n. At least 2
o. At least 100
p. At least 254
q. At least 1.5



Self Reflection

Areas of strength	Areas for improvement	Actions to be taken to improve
1. **2.**	**1.** **2.**	**1.** **2.**

Unit 2:
Deploy website on a local network

Illustration of Learning Unit



Draw two hands, local computer and a cup of hot coffee, where the right hand is holding/scrolling a mouse and in the computer screen write the word Local Environment.

Topics

1. Selection of hosting package/folder locally in line with website technical requirements.
2. Testing of local hosting package/folder.
3. Deployment of website to local environment.

Unit Summary:

This unit describes the skills, knowledge and attitudes required to select a hosting package/folder locally; test the local hosting package/folder and deploy a website on a local environment.

Self-Assessment: Unit 1

3. Look at the illustration. What is happening? What do you think this unit will be about? What topics might be covered?

4. Fill in the self assessment below.

There is no right or wrong way to answer this survey. It is for your own use during this course. Think about yourself: do you think you can do this? How well? Read the statements across the top. Put a check in column that best represents your situation. At the end of this unit, we'll take this survey again.

My experience Knowledge, skills and attitudes	I don't have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Verify local files to be uploaded to local server.					
Verify local server					
Apply file uploading methods					
Evaluate the local server					
Verify local URL Accessibility					
Examine browser compatibility					
Verify uploading process					
Check security configurations					
Deploy and test local website accessibility					

Topic 2.1: Selection of a hosting package/folder locally**.**

Key Competencies:

Knowledge	Skills	Attitudes
Explain elements to be verified.	Verify local files to be uploaded to local server.	Skillful, Attentive
List types of local servers.	Verify local server	Detail-Oriented
Explain file uploading methods	Apply file uploading methods	Patient, Proactive

Getting Started: What do we know and where are we going?

Task: Observation

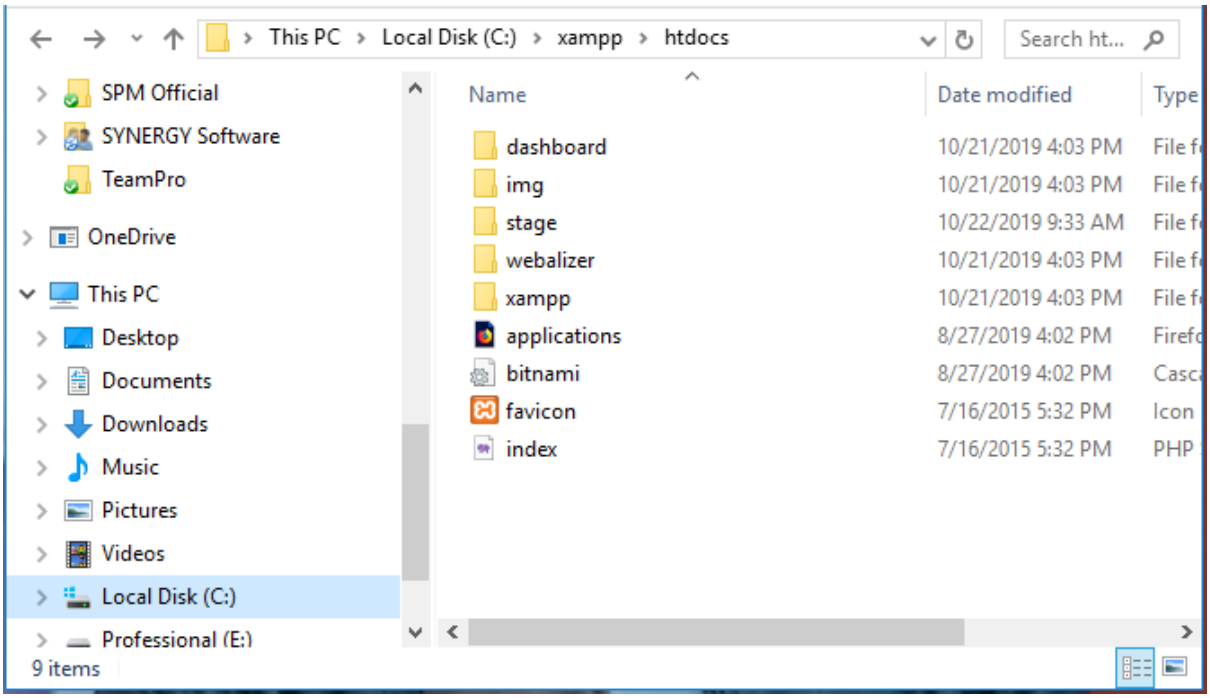


Fig 2.1.a

The picture above represents the path towards the htdocs folder.

i. What does the htdocs folder represent? Explain.
ii. Where does the htdocs come from?
iii. How do we upload our website into htdocs?

1. Observe the picture and discuss about it by answering all related questions.
2. After discussion in small groups, brainstorm ideas as a whole class to relate the above picture to the topic.

 Activity 1: Problem Solving

 **Task:**

Agripine has developed a website for her customer and is ready for deployment, she wants to verify if all the files are ready for deployment.

1. As trained website designers, you are requested to form small groups and perform the following tasks:
   i. Identify files and folders to be verified for local hosting
   ii. Verify the local server and configure any conflicting ports if any
   iii. Upload all the files to the local document root

2. After performing all the tasks assigned, each group will present their work to the rest of the class.

Key Facts 2.1

1. Verification of Local Website files

1.1. The Local Root directory

Every file that you use for your website should be in one, single, main folder on your hard drive. This is the local root folder, where local means on your computer. You can name it mywebsite, www, webwork, etc. as long as it is meaningful to you. The root folder should contain sub-folders for graphics, media files, html documents, scripts, PDF files, etc.

1.2. The Local Site Files/Folders

You will always have not to ignore important files to be present right after creating your website; the “index” page is mandatory and is required into your directory structure. The local copy of the website is where all original copies of your files are created, modified and stored. Think of this as the development site. You can edit, test and view your pages on the local site without affecting your live pages on the server.

✓ The Index File

The index file is the default site file that is necessary to display the index page. The index page, also known as the front page, main page or directory index, is the URL or local file that automatically loads when a web browser starts the website root and/or when the browser's 'home' button is pressed.

If any server gets a request (url) that doesn't specify a particular web page, it looks for that default web page; If the server doesn't find an index file, two things can happen. The browser may display an error message or a listing of all the files inside the folder (not for all servers). Neither result is desirable, so it's a good idea to give the main web page in each folder in your site the proper default page name.

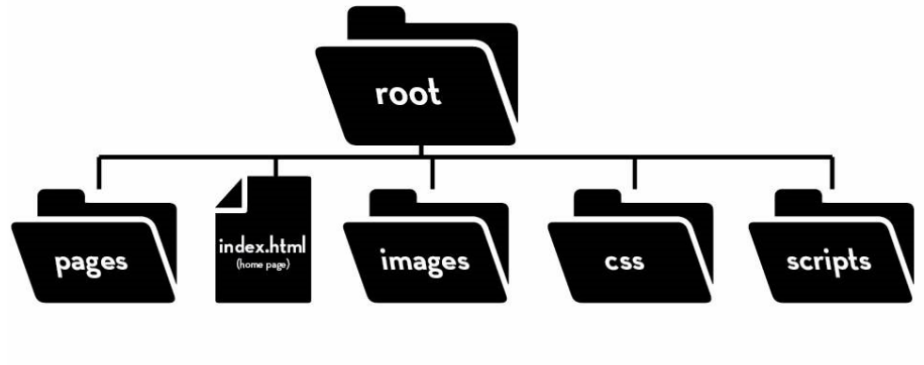
✓ The Config /Connection file

When building static websites, there is no need for databases since information displayed remains static as entered into through codes or from files; In contrast, for any dynamic website, due to the need of dynamic information, the Configuration or connection file is required to store or configure server information and initiating the connection to databases.

This is what any websites uses to communicate with your web server. For each and every web page that needs dynamic information, this file should provide the server and database information for the required connection (s) to communicate and/or manipulate information to/from the sserver.

✓ Resources, Categories and Sub-directories

Resources required by the website such as images, videos, styles, scripts, documents …etc are normally categorized into sub-directories regarding to the specifications of the programmer-code. All files to be included in other files, such as headers, footers, etc. can be stored into a “includes” sub-directory, all pictures and images can as well be stored in its sub-directory.



2. Verification of Local Server

A local server is one that provides a service by running an application which is on the same machine as the client application. Locally deployed websites can be accessed over the LAN.

2.1. Importance

A local server provides the same environment as your web host’s server, it allows you to install/test/run your website on local computer or local network without the need of neither internet nor hosting service provider, and is an essential tool for local deployment.

2.2. Components

For Local deployment environment to be verified, local web server/HTTP server software and database server software should be installed. Popular HTTP server is Apache and the widely used database server for web development is MariaDB for MySQL database.

Software packages such as XAMPP, MAMP, WAMP, and LAMP are installed to create local deployment environment through which dynamic websites can be tested and deployed. The term AMP found in their names, stands for Apache, MySQL (or MariaDB), and PHP. They are the same programs that are installed on webhost’s server to run hosted/online website.

2.3. Selection criteria of a local server software package

Your choice of a local server program will primarily depend on which operating system you run on your computer. There are couples of local server’s software like XAMPP, that work on multiple operating systems, and all will give you a solid local development environment.

I. XAMPP – For cross platforms: Windows, Mac and Linux

II. MAMP – For Mac Macintosh (or just Mac or Apple computers)

III. WAMP – For Windows

IV. LAMP – For Linux.

2.4. Setting up a local server

To configure access to local server, you need to specify the server configuration root folder and the URL address to access it. The best way to get used to working on a server is to set up a web server on your computer. Below are the steps to Install and configure Xampp.

- Step 1: Download

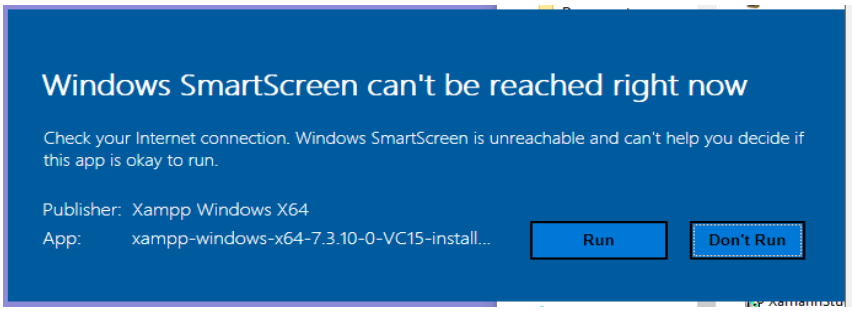
XAMPP is a release made available by the non-profit project Apache Friends. Versions with PHP 5.5, 5.6, or 7 are available for download on the Apache Friends' website.

- Step 2: Deactivate any antivirus software

Since an active antivirus program can negatively affect the installation process, it's recommended to temporarily disable any antivirus software until all XAMPP components have successfully been installed. Before installing XAMPP, it is advisable to disable the anti-virus program temporarily.

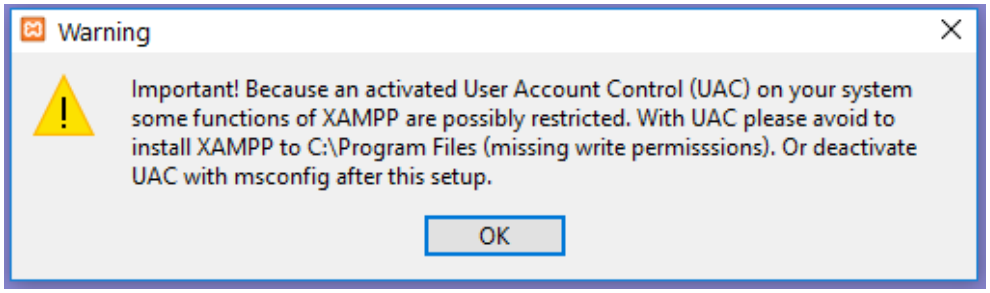
- Step 3: Run .exe file

Once the software bundle has been downloaded, you can start the installation by double clicking on the file that ends in .exe. If the Smart Screen prompts as in the picture below, Click Run to continue the setup process.



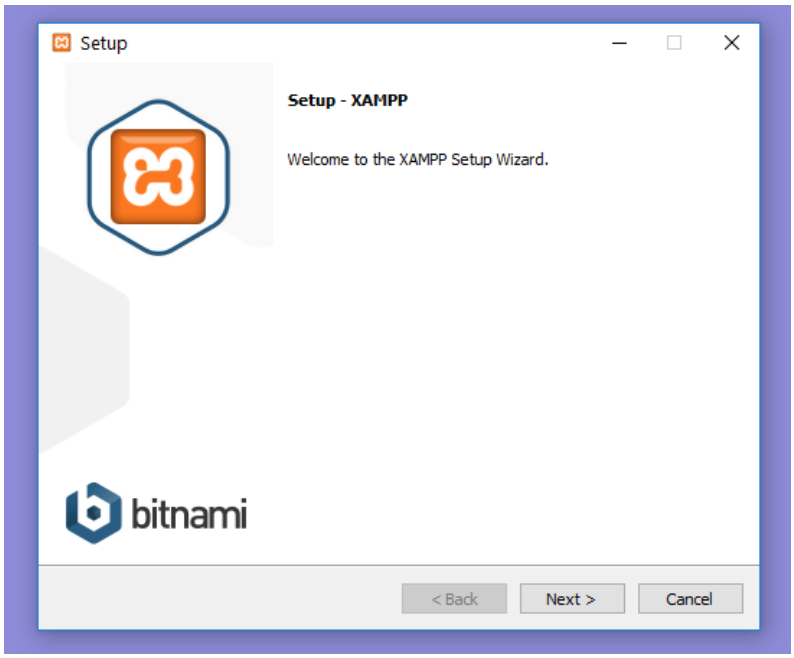
- Step 4: Deactivate UAC

User Account Control (UAC) can interfere with the XAMPP installation because it limits writing access to the C: drive, so we recommend you deactivate this too for the duration of the installation process.



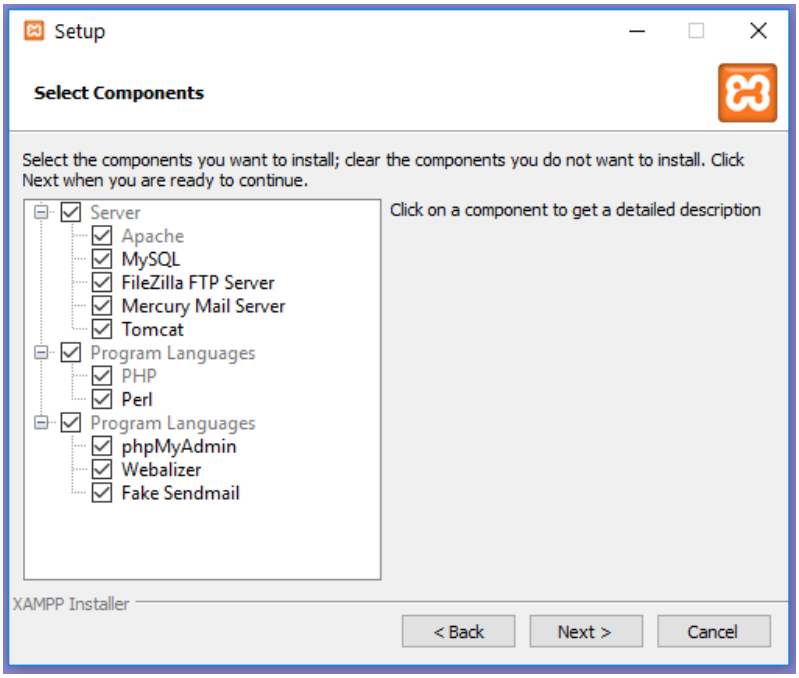
- Step 5: Start the setup wizard

After you've opened the .exe file (after deactivating your antivirus program(s) and taken note of the User Account Control, the start screen of the XAMPP setup wizard should appear automatically. Click on 'Next' to configure the installation settings.



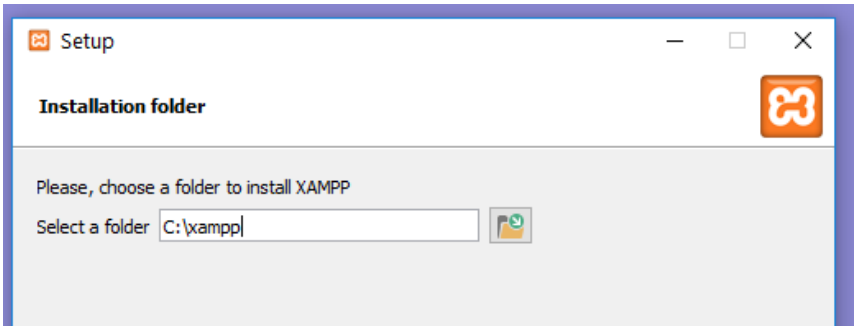
- Step 6: Choose software components

Under 'Select Components', you have the option to exclude individual components of the XAMPP software bundle from the installation. But for a full local test server, we recommend you install using the standard setup and all available components.



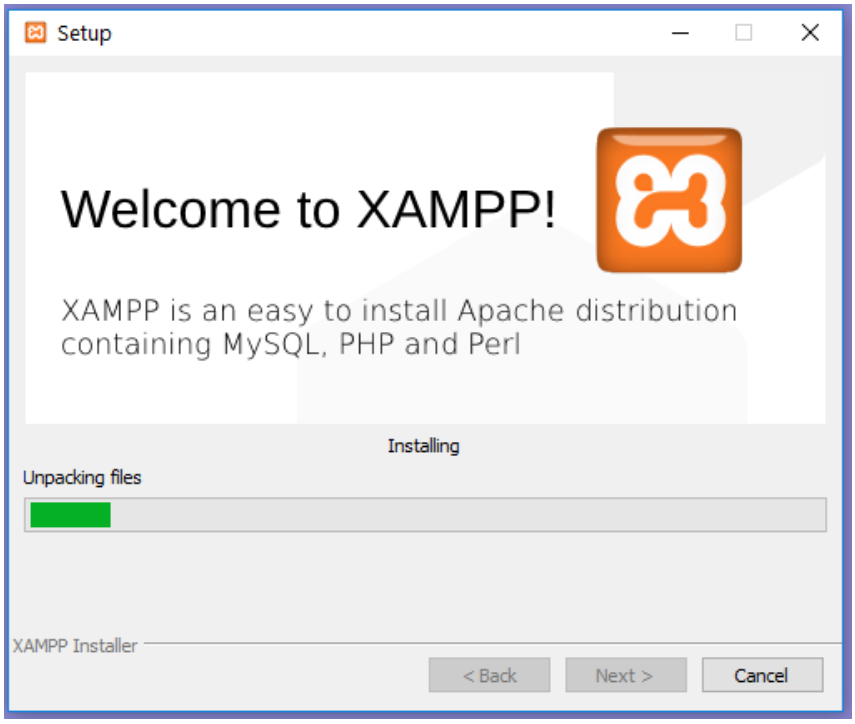
- Step 7: Choose the installation directory

In this next step, you have the chance to choose where you'd like the XAMPP software packet to be installed. If you opt for the standard setup, then a folder with the name XAMPP will be created under C:\ for you. After you've chosen a location, click 'Next'.



- Step 8: Start the installation process

Once all the aforementioned preferences have been decided, click to start the installation. The setup wizard will unpack and install the selected components and save them to the designated directory. This process can take several minutes in total. According to the default settings, the selected software components are unpacked and installed in the target folder.



- Step 9: Windows Firewall blocking

Your Firewall may interrupt the installation process to block some components of the XAMPP. Use the corresponding check box to enable communication between the Apache server and your private network or work network. Remember that making your XAMPP server available for public networks is not recommended.

- Step 10: Complete installation

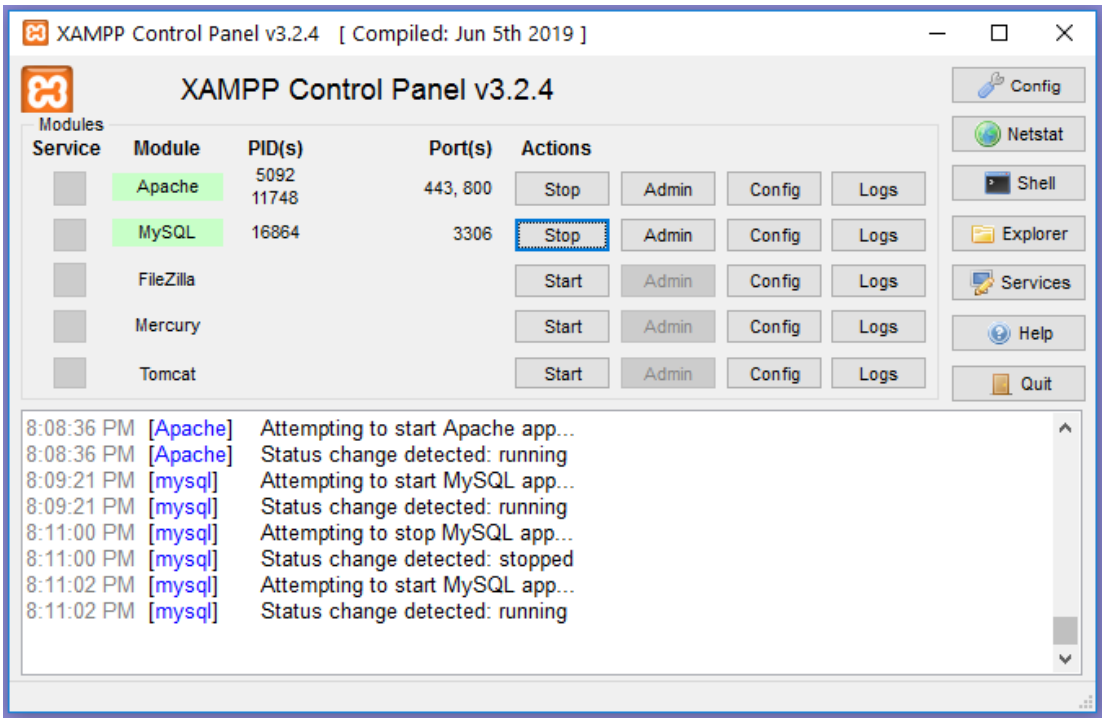
Once all the components are unpacked and installed, you can close the setup wizard by clicking on 'Finish'. Click to tick the corresponding check box and open the XAMPP Control Panel once the installation process is finished.

2.5. The XAMPP Control Panel Configuration

Controls for the individual components of your test server can be reached through the XAMPP Control Panel. **The clear user interface** logs all actions and allows you to start or stop individual modules with a single. The XAMPP Control Panel also offers you various other control buttons such as Config, Netstat, Shell, Explorer, Services, Help and Quit.

- **Config:** Allows you to configure the XAMPP as well as the individual components
- Netstat: Shows all running processes on the local computer
- **Shell:** Opens a UNIX shell
- **Explorer:** Opens the XAMPP folder in Windows Explorer
- **Services:** Shows all services currently running in the background
- **Help: O**ffers links to user forums

- **Quit:** Closes the XAMPP Control Panel

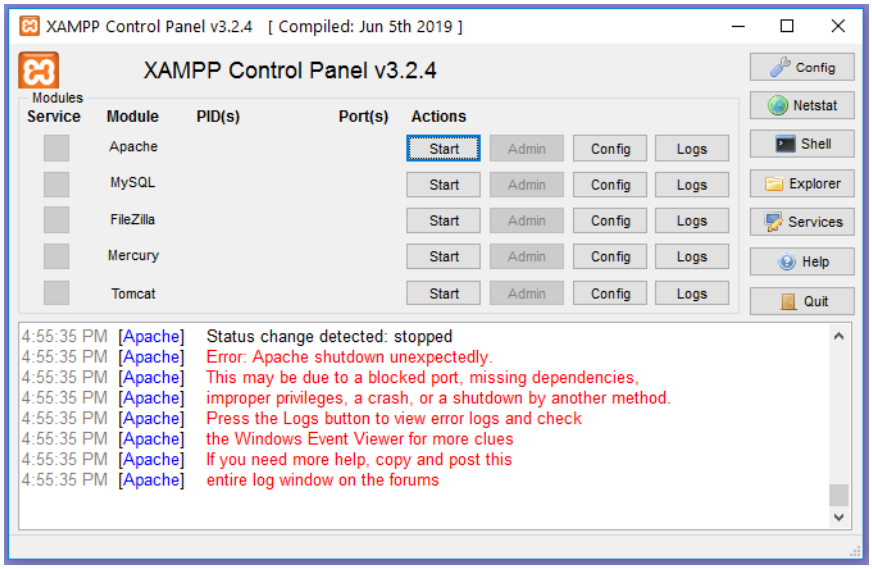


Individual modules can be started or stopped on the XAMPP Control Panel through the corresponding buttons under 'Actions'. You can see which modules have been started because their names are highlighted green under the 'Module' title.

An active module is marked in green in the Control Panel. If a module can't be started as a result of an error, you'll be informed of this straight away in red font. A **detailed error report** can help you identify the cause of the issue.

2.6. The XAMPP Common Errors

A common source of local server errors associated with Apache is **blocked ports**. If you're using the standard setup, then XAMPP will assign the web server to main/default port 80 and the SSL port 443. The latter of these particularly is often blocked by other programs, meaning the web server won't be started on default ports if they are occupied.



There are three ways to solve common Xampp issue:

- **Change the conflicting port:** Let's assume for the sake of example that the instant messenger program Skype is blocking SSL port 443 (this is a common problem), this issue can be resolved by disallowing Skype from accessing ports 80 and 443.

- **Change the XAMPP module port settings**: Click the Config button for the module in question and open the files *httpd.conf* and *httpd-ssl.conf*. Replace these default port numbers 80 or 443(If you are using SSL setup) with any free ports.

- **End the conflicting program:** The simplest way to avoid port conflicts in the short term is to end the conflicting program restart your server modules, ports will be free.

3. Uploading Website files to a local deployment

In a local deployment environment, if Xampp was used as your local server, a folder named "htdocs" will be inside your Xampp's installation folder. To upload your website in there, you just COPY and PASTE your whole website in there, alongside other files present.

N.B: Do not name your website as any of the similar folders inside htdocs.


Activity 2: Guided Practice


Task: Scenario: Practice makes perfect

Kamugisha is a web developer at SYNERTECH Ltd, he wanted to deploy his website on local server and as he was trying to turn on Modules in his XAMPP server, Apache refused to start and displayed red erroneous messages and thereafter, he could not verify his local hosting:

Together with your trainer, follow the steps to do the following:

3.4. Verify this website developed by Kamugisha to confirm its readiness.
3.5. Install and configure the local server for deployment
3.6. Upload your files to your local environment and test the website


Activity 3: Application


Task:

and displayed red erroneous messages and thereafter, he could not verify his local hosting:

4. Together with your trainer, follow the steps to do the following:
4.1. Verify this website developed by Kamugisha to confirm its readiness.
4.2. Install and configure the local server for deployment
4.3. Upload your files to your local environment and test the website


Points to Remember

- It is not recommended to make your local server available to public networks
- Always upload the index file first for initial test of your local server

Formative Assessment

6. List any mandatory files while verifying website files for local deployment
7. Among the following local server modules, one of them is a database server, write it down:
    a. Apache
    b. Merrcury
    c. MySQL
    d. FileZilla
    e. Tomcat

8. Among the following local server modules, one of them is a File transfer protocol software, write it down:
    a. Apache
    b. Mercury
    c. MySQL
    d. FileZilla
    e. Tomcat

9. You are given the following local website links. Which of them are false urls?
    a. http://localhost:200
    b. http//localhost/phpmyadmin
    c. http//:localhost:200/mysite
    d. http://localhost:800
    e. http://localhost:8080

10. How do we upload our website files in a local deployment?
    a. By the use of HTTP Software
    b. By the use of STP Software
    c. By the use of Copy and Paste
    d. By the use of FTP Software

Self Reflection

Areas of strength	Areas for improvement	Actions to be taken to improve
1. **2.**	**1.** **2.**	**1.** **2.**

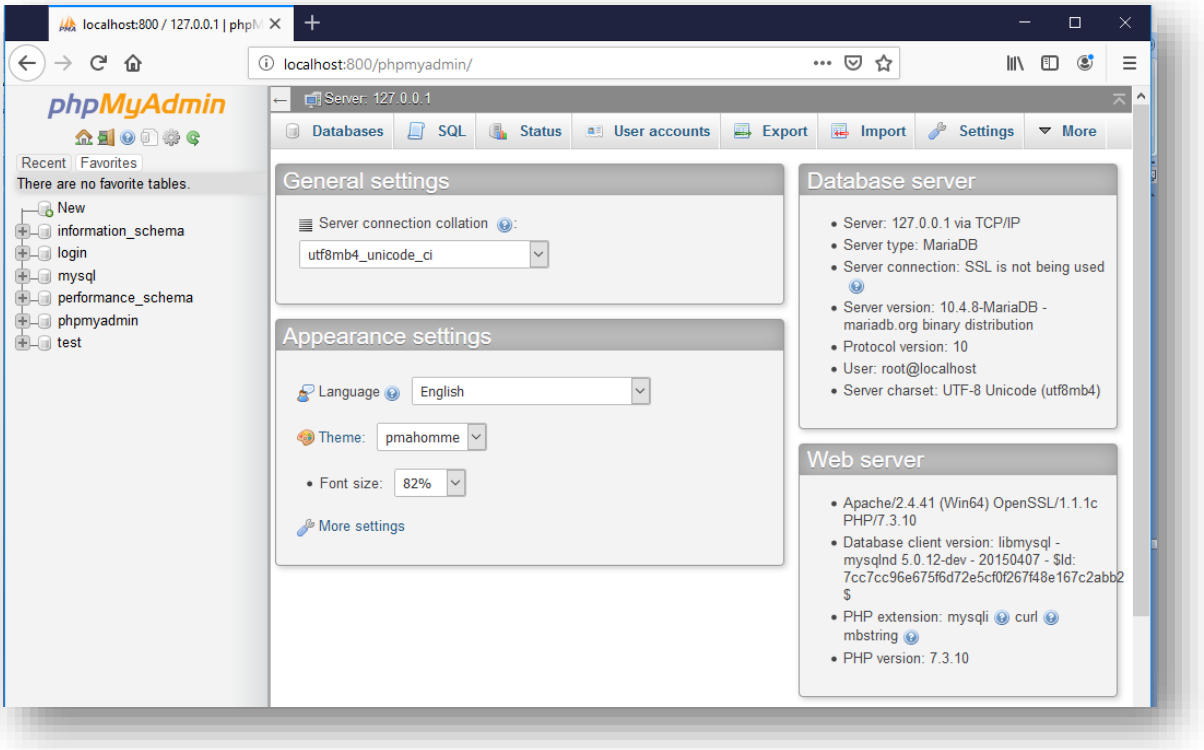
Topic 2.2: Testing of local hosting package/folder.

Key Competencies:

Knowledge	Skills	Attitudes
Describe the local server	Evaluate the local server	Attentive
Identify host and port number	Verify local URL Accessibility	Skillful
Identify features of browsers	Examine browser compatibility	Detail-oriented

Getting Started: What do we know and where are we going?

Task:

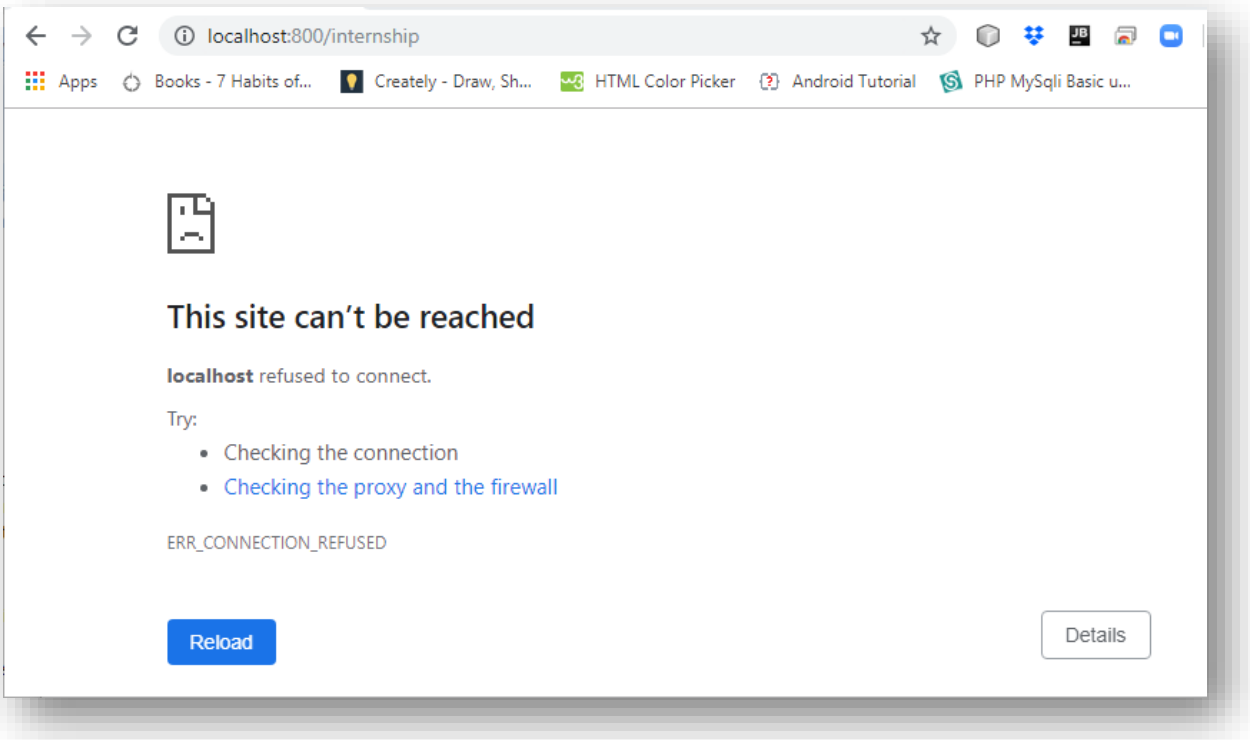


1. Observe the picture above and discuss related questions:
    - **a.** What do you see in the picture above?
    - **b.** Interpret the URL and explain its components?
    - **c.** Examine the link in different browsers to check the compatibility.

2. After discussion in small groups, brainstorm ideas as a whole class to relate the above picture to the topic.

Activity 1: Problem Solving

Task: Observation



1. The picture above illustrates the locally accessed URL during trainees' internship at the workplace learning program.
    - **a.** What do you see in the picture above?
    - **b.** Interpret the URL and explain its components?
    - **c.** Examine the link in different browsers to check the compatibility.

2. After discussion in small groups, brainstorm ideas as a whole class to relate the above picture to the topic.

Key Facts 2.2

1. Evaluation of the Local server

1.1. Local network testing

After Successfully pinging remote hosts, the local host, the router and the remote host are configured correctly; Pinging each host one by one on the LAN can carry out this test.

If a host responds with Destination Unreachable, note which address was not successful and continue to ping the other hosts on the LAN. Another failure message is Request Timed Out. This indicates that no response was made to the ping attempt in the default time period indicating that network latency may be an issue. Note that entering "y" to the "Extended commands" prompt provides more options that are useful in troubleshooting.

A Successfully ping shows that the local and other hosts IP address in the network are configured properly. The following Local Network testing are recommended:

→ Testing a host on the local LAN

→ Testing Gateway and Remote Connectivity

→ Testing Route Next Hop

→ Testing Remote Hosts connectivity

→ Ping a remote host from a local host

→ Test Router Remote Connectivity

1.2. Local Files Testing and visibility

1.2.1. Accessibility and visibility

If your local testing server is turned on with active web server and active database server, your website will be locally available for testing. Therefore providing your IP address and your Apache's communication port to your network peers will provide them accessibility and visibility of your entire website's content to their browsers.

1.2.2. Local File Inclusion (LFI) Vulnerability

Local File Inclusion (LFI) allows an attacker to include files on a server through the web browser. This vulnerability exists when a web application includes a file without correctly

sanitizing the input, allowing and attacker to manipulate the input and inject path traversal characters and include other files from the web server.

The following is an example of PHP code vulnerable to local file inclusion.

```
<?php
   $file = $_GET['file'];
   if(isset($file))
   {
       include("pages/$file");
   }
   else
   {
       include("index.php");
   }
?>
```

1.2.3. Log Files

An Apache log is a record of the events that have occurred on your Apache web server. Apache stores two kinds of logs:

- Access Log

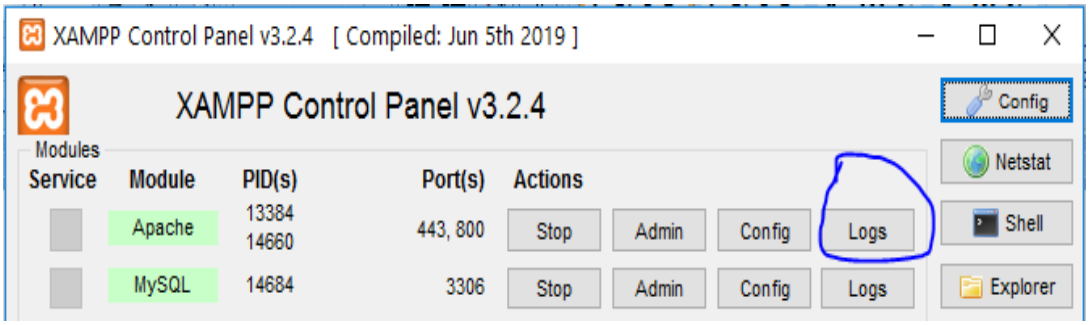
Contains information about requests coming in to the web server. This information can include what pages people are viewing, the success status of requests, and how long the request took to respond.

- Error Log

Contains information about errors that the web server encountered when processing requests, such as when files are missing.

- Log Files Location

Access and error log files are stored on individual web servers. The exact location of your Apache logs depends on your operating system. A typical location for all log files is …/logs/ folder or via Logs button on the GUI of Xampp near apache modules.



- Log File Contamination

Log file contamination is the process of injecting source code into log files on the target system. This is achieved by introducing source code via other exposed services on the target system which the target operating system / service will store in log files. For example, injecting PHP reverse shell code into a URL, causing syslog to create an entry in the apache access log for a 404 page not found entry. The apache log file would then be parsed using previously discovered file inclusion vulnerability, executing the injected PHP reverse shell.

2. Verification of Local URL Accessibility

1.3. Document Root Vs Project Root

The document root is a directory (a folder) that is stored on your host's servers and that is designated for holding web pages. When someone else looks at your web site, this is the location they will be accessing.

While the project root or web root is the topmost (or “highest”) directory on that web server where the files are served from. So, the web root is always a specific directory on a web server. For locally webs

3. Browser Compatibility

Web Browsers are software installed on your PC. To access the Web, you need a web browser, such as Google Chrome, Microsoft Internet Explorer or Mozilla Firefox.

On the Web, when you navigate through pages of information, this is commonly known as web browsing or web surfing. There are four leading web browsers – Google Chrome, Firefox, Opera, and Safari, but there are many others browsers available on the internet.

While developing a site, we should try to make it compatible to as many browsers as possible. Especially sites should be compatible to major browsers like Firefox, Chrome, Netscape, Opera, Safari and many more others.



Internet Explorer

Internet Explorer (IE) is a product from Microsoft which they later turned into Microsoft Edge. This is the most commonly used browser in the windows operating system because it comes build with latest windows versions. It was introduced in 1995 along with Windows 95 launch and it has passed Netscape popularity in 1998.



Google Chrome

This web browser is developed by Google and its beta version was first released on September 2, 2008 for Microsoft Windows. Today, chrome is known to be one of the most popular web browsers with its global share of more than 50%. It is the most preferred by developers due to its interoperability and plug-in integrations.



Mozilla Firefox

Firefox is a new browser derived from Mozilla. It was released in 2004 and has grown to be the second most popular browser on the Internet.



Safari

Safari is a web browser developed by Apple Inc. and included in Mac OS X. It was first released as a public beta in January 2003. Safari has very good support for latest technologies.



Opera

Opera is smaller and faster than most other browsers, yet it is full- featured. Fast, user-friendly, with keyboard interface, multiple window zoom functions, and more. Java and

non Java-enabled versions available. Ideal for newcomers to the Internet, school children, handicap and as a front-end for CD-Rom and kiosks.

1.4. Browser Features and compatibility

The Web browser should be able to look at the Web pages throughout Internet or to connect to various sites to access information, explore resources and have fun. It must enable you to follow the hyperlinks on a Web and type in a URL for it to follow. Another feature of browser is to have a number of other commands readily available through menus, icons, and buttons.

Few of many browser features are hereby discussed one by one:

- Ease of use

The most important feature of any browser is ease of use. While all Web browsers are fundamentally simple to use, the one you settle on should be very easy to work with; it should function as a transparent window onto the Web.

- Search Engine

One of the main features of a browser is to search the information on the current page as well as search the WWW itself. Most featured browsers possess a search engine that helps internet users to search for desired information over the internet.

- Pages/File processing

Browser give you the facility to save a Web page in a file or print it on your computer, and send the contents of a Web page e-Mail to others on the Internet. Web browser should be able to handle text, images of the World Wide Web, as well as the hyperlinks to digital video, or other types of information.

- Caching

Another important feature to insist on in your browser is caching. A browser that caches keeps of the pages you visit so that it does not have to download them again if you want to return to them. Reloading a page from the cache is much quicker that downloading it again from the original source.

- Bookmarking

You will definitely want a way to save links to the sites you have visited on the WWW so that you can get back to them during other sessions. Web browsers take care of those in two ways, through

a come across in the current in the session, and a bookmark list, which you use to keep a list of WWW pages you want to access any time you use your browser. The name of the site and its URL are kept in these lists. The bookmark list is particularly important and the browser contains tools to manage and arrange it.

- Plug-in support (Java or JavaScript enabled)

To take advantage of some of the most exciting things on the World Wide Web, your browser needs to properly display and handle Web pages that contain animated or interactive items. These features include ability to interpret programs written in Java and Java Script. Few Web browsers are complete Internet package, means they come with components like e-Mail client, newsgroup client an HTML composer, telnet, ftp, etc.

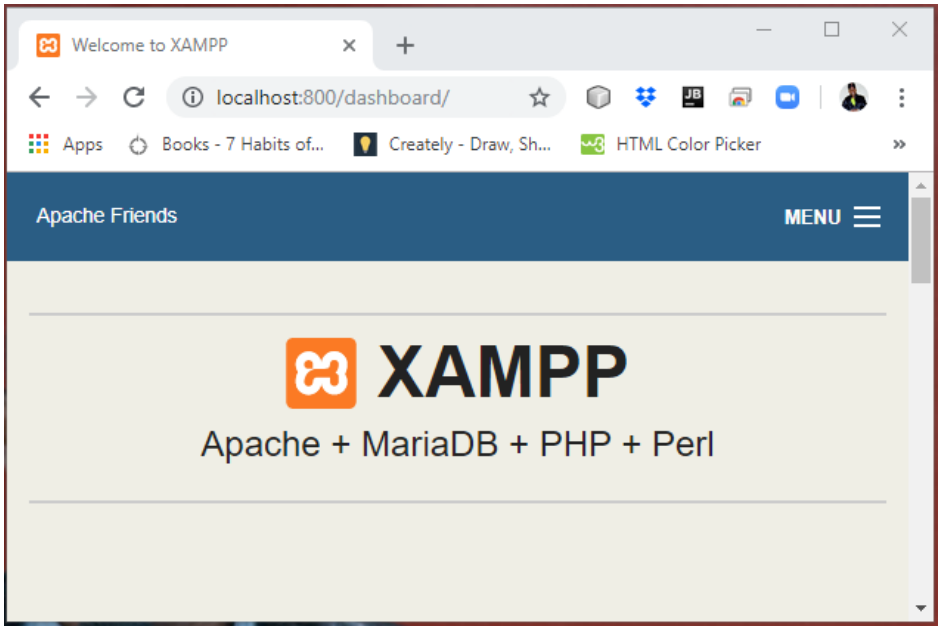
- Featured menu items

Web browsers interact not just with the Web, but also with your computer's operating system and with other programs, called plug-ins, that gives the browser enhanced features. Find an outline of advanced menu items useful while browsing the internet:

- ✓ Navigation buttons
- ✓ Refresh button
- ✓ Stop button
- ✓ Home button
- ✓ Web browser's address bar
- ✓ Integrated search
- ✓ Tabbed browsing
- ✓ Bookmark buttons

 Activity 2: Guided Practice

 **Task: Local server configuration**



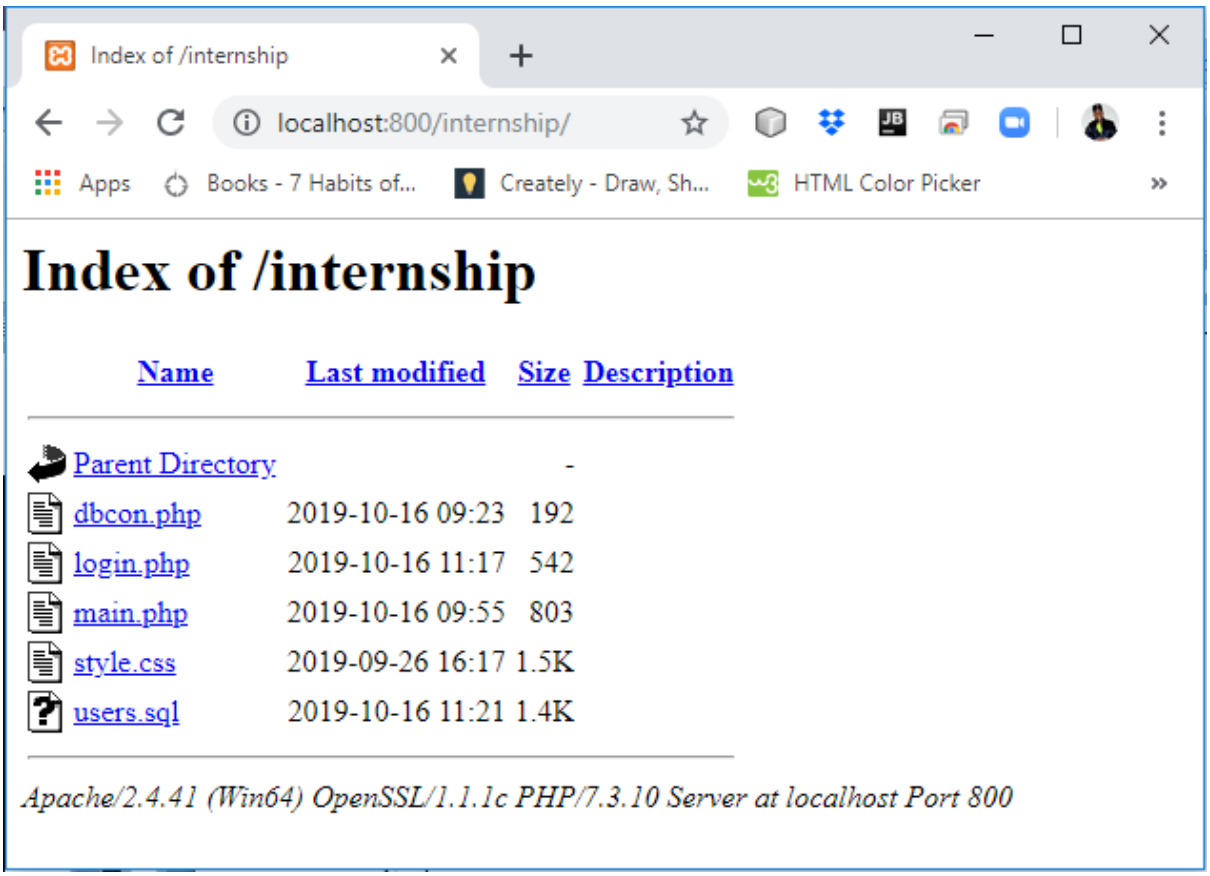
The picture above represents a successfully tested local hosting server on port 800.

1. You are requested to change back the communication port to the Local server's default port so that the link http://localhost/dashboard/ will display the same page as above.

2. You will accomplish the task together with your trainer, ask for clarifications and guidance where necessary.

Activity 3: Application

Task: Local website deployment



1. After the communication ports on the local server have been configured successfully, the students during the internship had access to the link but the page appeared as in the above picture. Given that main.php is the default page:
   i. What did you notice in the picture above?
   ii. Verify the local URL accessibility.
   iii. Examine the link in different browsers to check the compatibility.

2. Submit your work to your trainer for verification.

Points to Remember

- The default page should always be named “index….”
- For other devices to access your local hosted website, give them your public IP address.

Formative Assessment

5. The list below describes typical hints to evaluating the local server. Write down the ones that are not correct hints.
    a. Port configuration
    b. Enable JavaScript
    c. End conflicting program
    d. Use https://localhost/
    e. Ping 127.0.0.1

6. Given the link http://localhost:8080/internship explain the following parts:
    a. http://
    b. localhost
    c. 8080
    d. Internship

7. Among the following list. Write down each element that is not a browser
    a. Chrome
    b. Brave
    c. Xampp
    d. Firefox

8. What is SSL? Explain its benefits.

9. What is the file that we open for editing the communication port for Apache in Xampp?
    a. Http.conf
    b. Httpd.conf
    c. Http-ssl.conf
    d. Httpd-ssl.conf
    e. Httpdssl.conf

Self Reflection

Areas of strength	Areas for improvement	Actions to be taken to improve
1. **2.**	**1.** **2.**	**1.** **2.**

Topic 2.3: Deployment of a website to local environment.

Key Competencies:

Knowledge	Skills	Attitudes
Explain local website uploading process	Verify uploading process	Detail-oriented
Identify steps of local server security configuration	Check security configurations	Skilful
Explain steps for local website deployment.	Deploy and test local website accessibility	Technical

- Getting Started: What do we know and where are we going?
- **Task: Observe the following picture and discuss the questions related to it:**



d. What do you see in this picture? –State at least 5 items
e. How would you explain the interconnection of these items
f. How would you relate the above picture to the topic


Activity 1: Problem Solving


Task: Critical thinking

2. Discuss on how to verify uploading process of local deployment
3. Explain the steps to overcome security issues in local deployment
4. What are the useful steps in deploying and testing local website accessibility

Key Facts 2.3

1. File Uploading to Local platform

1.5. Criteria of a Successful upload

In any local deployment environment, website files are copied from their storages, or external drives or can be extracted from the zip files to destined document root of your web project.

A successful upload of the website is guaranteed if and only if:

- ✓ The default access is successful: access to the document root of the web project without specifying any page, i.e. access of the index page.
- ✓ A successful access to each and every page
- ✓ A successful access to sub-directories if applicable

1.6. File Errors and Error handling

Copying and pasting or ZIP File extraction are most useful capabilities of your computer; this helps you avoid the monotonous re-typing or re-creating of large sections of text, files or folders. However, various errors do occur while processing the task. Such Errors include or are related to the following scenarios:

- ✓ Access Denied: when the destination has write protection permission.
- ✓ Process Failure: when the process was interrupted or was incomplete.
- ✓ Corrupted Files: When the source file/folder elements are incomplete or corrupted. This might arise from virus infection, incomplete files or unsupported format or file extensions.

2. Basic Security configurations of local platform

4.1. Network Configuration

A Local Area Network (LAN) allows connected computers and devices to talk to each other and access the internet (if the serving router or modem has internet access). Necessary steps have to be taken towards a successful network configuration:

- ✓ Count the number of computers you need to hardwire.

When setting up a LAN, you'll need to know how many computers will be connecting to the network via Ethernet. This will determine the number of ports you'll need. If you have four or less computers that you need to hardwire, you'll just need a router. If you have more

than four, you'll likely need to get a switch to extend the number of ports available on your router.

- ✓ Decide if you want to create a wireless network.

If you want to allow devices to connect wirelessly, you'll need a router that can broadcast a wireless network. Most routers you'll find at the store or online have wireless capabilities. Network switches do not allow wireless devices to connect, and can only be used for hardwired LANs or to extend the number of ports available to the router.

- ✓ Determine if you want all network devices to have internet access.

If you want all of the connected devices to have access to the internet, you'll need a router to handle the connections. If you don't need the devices to have a network connection, you can just use a network switch.

- ✓ Consider your future needs.

If you're filling all of the ports on your hardware, consider future-proofing to allow for more devices in the future.

- ✓ Setup your network and verify connectivity and accessibility.

Connect your network hardware, cabling system and verify if all computers are connected and can talk to each another. If you're only using a switch as your network hub, setting up one computer as a DHCP server will allow all of the connected computers to easily obtain IP addresses. Use `ipconfig` command to check the local server's IP address.

- ✓ Set up file and printer sharing.

Once your network is up, you won't see anything on other computers unless that computer has shared files. You can designate files, folders, drives, printers, and other devices as shared so that anyone on the network, or just specific users, can access them.

4.2. Firewall Configuration

Outgoing connections can be affected by the presence of firewall or antivirus software on the local computer or network connection. Windows comes with a built-in Internet Firewall that is active by default and blocks all FTP traffic. You can turn off this firewall (not recommended by Microsoft) or configure it to allow connections via HTTP Connection.

Users can configure the Firewall settings as per their need to block or open port in Windows and other operating systems. However, at times the Firewall may block ports or programs

accidentally by user's or administrator's miss-configuration. Go to your firewall settings and allow HTTP Server connection ports (80 and 443) to be open.

3. Deployment and accessibility of local website

4.3. Full Deployment and Testing

If all necessary steps and configurations are all set; and all necessary files are uploaded to the local server, make note of your server's IP address. The full deployment is all set. The next step is to enable access from all connected client computers.

Assuming that the server's IP address is 192.168.43.185, and then the full deployment link will be formulated as the URL destined to access your local application. The link should be of this form: protocol://your-ip(server-ip):port-number/website-name Below are examples of valid links assumed the server's IP Address to be 192.168.43.185:

→ http://192.168.43.185website-name (If the port remained default)
→ http://192.168.43.185:800/website-name (If the port was set to 800)

Note that if you are on the local server, the localhost link http://localhost/website-name or http://localhost:800/website-name will also be successful. Make use of IP addresses for client computers.

4.4. Shortcut creation

4.4.1. Introduction to shortcuts

In Microsoft Windows, a shortcut is a link that points to a program on the computer or on the web. Shortcuts allow you to create links to programs in any folder, Start bar, Taskbar, desktop or web page, or other locations on the computer or on the internet. A shortcut in Windows has a small arrow in the bottom left corner of the icon and are files that end with a file extension of .lnk.

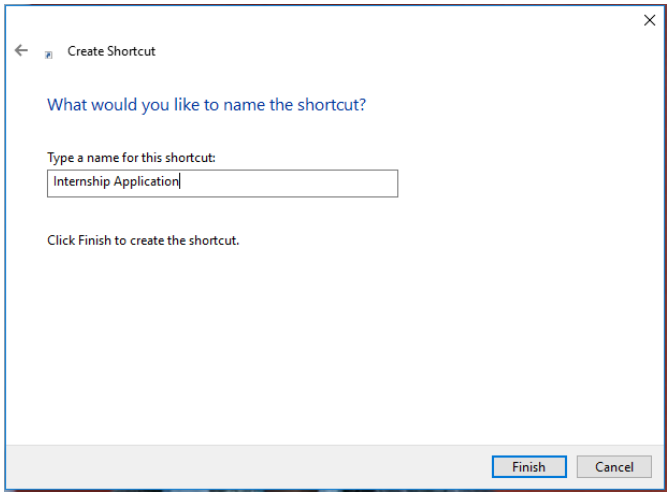
Having a web shortcut on the Windows desktop eliminates the need for users to dig through the browser typing the numbers (IP addresses and port numbers) and the application/website name. A shortcut also makes it much quicker to open a webpage without even opening the browser; the file explorer will open the browser and automatically go to your desired URL.

4.4.2. Steps of creating shortcuts for local website

✓ Browse your full deployment link and copy the URL
✓ Right click on the desktop and click New → Shortcut → Paste the URL

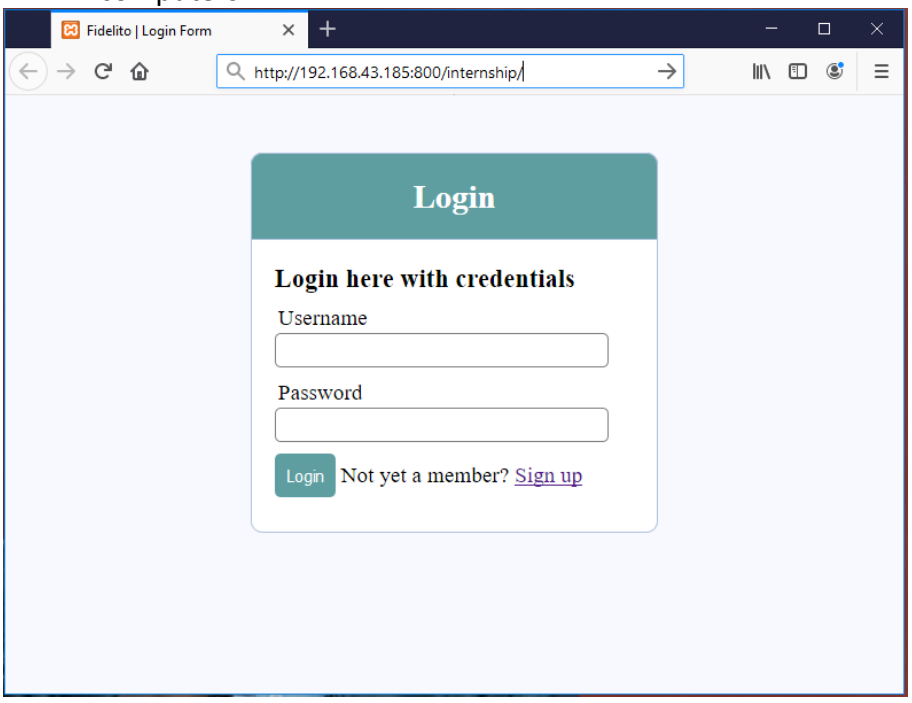


✓ Type a name for the Name of the shortcut (It should be a name of your website or any other description related to your application). Click Finish, and Voila!





✓ Double click the shortcut on all clients and the application will be accessed on all computers.



Activity 2: Guided Practice

Task: Local website uploading process



You are given a zip file that contains a complete developed website. You are required

i. Extract and upload the website to your local deployment environment
ii. Check security configurations.
iii. Deploy and test local website accessibility

Activity 3: Application

Task: New Website KIAC College

Mr. Iradukunda is a fresh graduate in Kigali Integrated art college is a technical and vocational education and training school, located in Remera, Kigali Rwanda. He was recruited to host their newly designed website onto their local network and configure each computer to access the website without the need of internet.

As a trained website designer, you are required to perform Mr. Iradukunda's tasks by following these steps:

i. Verify uploading process
ii. Check security configurations
iii. Deploy and test local website accessibility

Points to Remember

- Set your favorite modules always to start automatically
- Remember to note your Public IP for your local website accessibility on local network
- Be aware of security constraints in client machines

Formative Assessment

11. Write down the steps to configure Apache HHTP server in windows firewall.

12. Write correct answers on the following questions from A to D:

- What to do if the uploading process of local websites files was interrupted?
    - Delete the unfinished files and re-upload again
    - Re-copy and override unfinished files
    - Copy and paste again
    - Use FTP Client
    - Use HTTP Client

- How do you verify local website accessibility, if my website root folder is "synergyweb" and communication ports are default ports and are all free?
    - localhost/synergyweb
    - http://localhost:443/synergyweb
    - http://localhost/synergyweb
    - localhost:80/synergyweb
    - https://localhost/synergyweb

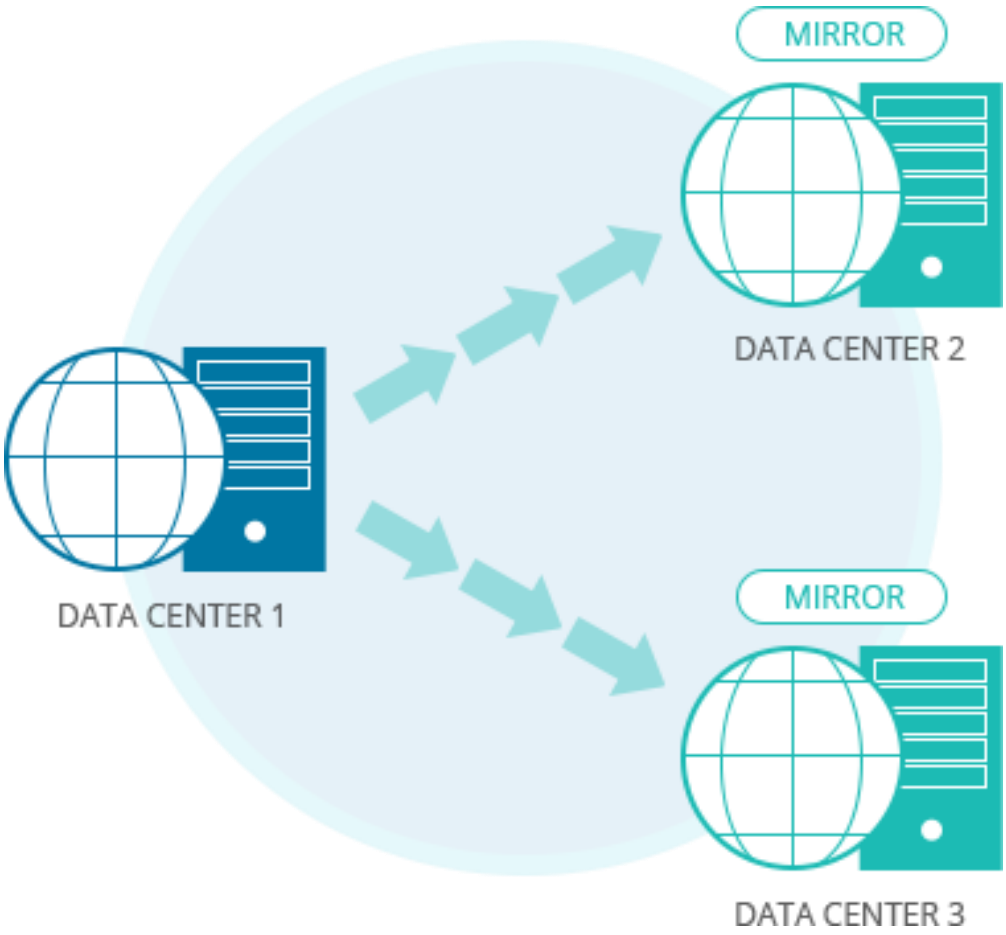
- What to do you do if your local server cannot reach your locally deployed website?
    - Run the local server and stop apache
    - Run the local server and start apache
    - Start both MySQL and Apache
    - Stop MariaDB and start apache
    - Start both MySQL and FileZilla
- What to do if the uploading process of local websites files was interrupted?
    - Delete the unfinished files and re-upload again
    - Re-copy and override unfinished files
    - Copy and paste again
    - Use FTP Client
    - Use HTTP Client

Self Reflection

Areas of strength	Areas for improvement	Actions to be taken to improve
1. **2.**	**1.** **2.**	**1.** **2.**

Deploy website online

Illustration of Learning Unit





Draw a person/programmer who is sitting on a computer. The computer should contain PHP code and should have a wire/fiber/cable that seems to be transferring data from the computer to Data Center 1.

Topics

4. Selection of hosting package/server online.
5. Deployment and Testing to an online environment.

Unit Summary:

This unit describes the skills, knowledge and attitudes required to select a hosting provider; test online hosting package and deploy a website on an online/production environment.

Self-Assessment: Unit 1

5. Look at the illustration. What is happening? What do you think this unit will be about? What topics might be covered?

6. Fill in the self assessment below.

There is no right or wrong way to answer this survey. It is for your own use during this course. Think about yourself: do you think you can do this? How well? Read the statements across the top. Put a check in column that best represents your situation. At the end of this unit, we'll take this survey again.

My experience Knowledge, skills and attitudes	I don't have any experience doing this.	I know a little about this.	I have some experience doing this.	I have a lot of experience with this.	I am confident in my ability to do this.
Select online server					
Subscribe to a hosting account					
Choose uploading methods					
Migrate files to hosting server.					
Perform basic security configuration.					
Test speed and accessibility.					

Topic 3.1: Select a hosting package/server online.

Key Competencies:

Knowledge	Skills	Attitudes
Explain Selection criteria of online server	Select online server	Detail-oriented
Identify requirements of online server	Subscribe to a hosting account	Skilful
Describe uploading methods	Choose uploading methods	Technical, Patient

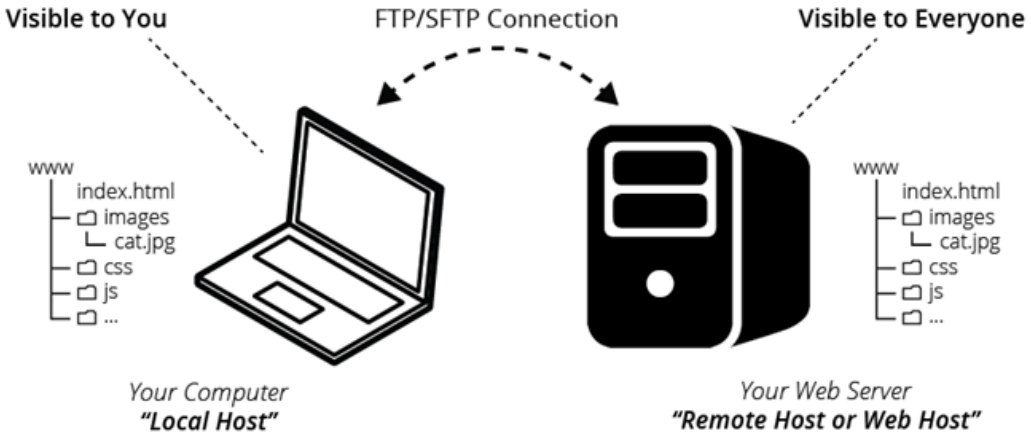
Getting Started: What do we know and where are we going?



Task: Discuss available hosting servers and hosting providers.

Activity 1: Problem Solving

Task: The website developer of the school has developed a PHP website for the school and wants to deploy it so it becomes visible online. He Illustrated the task as follows:



1. Form small groups and discuss the following:
   i. What are the server selection criteria for hosting a PHP website?
   ii. Explain the steps followed to subscribe to a hosting account.
   iii. Describe uploading techniques.

2. Make notes of your work and be ready to present to the class what are your findings.

Key Facts 3.1

1. Selection Criteria for hosting providers

When you get into the process of choosing a web hosting service a lot of questions would haunt your mind. Such questions include the following:

a. Do I get control panel and FTP/SFTP access?
b. Do I get email accounts?
c. How many email accounts do I get?
d. How much disk space is allocated to me?
e. What is my bandwidth limit?
f. Do I get to run my scripts?

g. What free software I get with my account?

These are just few of the questions. There are most important criteria that you must consider while selecting the right hosting plan and the right hosting service provider. Such criteria includes:

- Bandwidth

If you expect a high volume of traffic and you have a large number of web pages that use excessive graphics, you will need substantial bandwidth allocation for your website. The amount of bandwidth you would require depend broadly on the following 3 factors:

- The number of pages your website has.
- The size of each web page. This will vary considerably depending primarily upon the number of images and other multimedia objects that the page contains.
- The number of hits you expect at your website in the initial couple of years. This would depend largely on what promotion plans you have envisaged.

- Speed

The speed at which a website downloads is very important. When potential customers have to wait for content and images to download, it irritates them and they tend to move away. Also, your search engine rank is negatively affected as search engines penalize websites that are slow to download.

- Server Uptime & Reliability

Quality hosts ensure good uptime and availability and you can rely on their servers. Server uptime is measured as a percentage. Typically, an uptime of 99.9% is decent and acceptable. What does this mean? This means that the server will be down only 0.1% of the time in 1 year.

- Backup Policy

Servers go down and websites crash. Your web site hosting service has to provide some guarantee of reliability. If you lose all your files and customer data, your business will suffer. Selecting a hosting service that has a weekly backup policy and provides backup restoration service would be advisable. Web hosts also provide facility in their control panel to enable you to carry out backups yourself as well. It is wise to take periodic backups in your own computer as well.

- Price & Reputation

It is common sense that You get what you pay for. If you are paying too less, do not expect a good service. Stay away from free hosting services. While there are several free hosting providers on the internet, a free service is not indeed free due to various reasons:

- You have little control over your hosting space.
- There is no assurance of quality and reliability. Free hosts may often crash and create error situations and you may not get quick response to support issues.
- Free hosts usually embed their own Ads in your website pages to meet their costs. This can be disastrous for your reputation. Don't be surprised if you find your competitor's ads on your web pages.

- Security

Hosting your website on a secure server is very important. Check what security systems and anti-virus software are installed by your web host. Web servers are frequently subjected to attack by hackers. Good web hosts implement policies and closely monitor their servers to prevent such attacks. Also, emails often carry viruses that may harm the server. Hence it is imperative that good anti-virus software is installed on the web host's server that can protect it from virus attacks.

- Support

Good and quick technical support is very important to keep your website up and running with minimal issues. Check that the web host that you choose are technically sound and respond to emails quickly. Also, check that they provide 24x7 supports. Watch out for various ways of contacting them such as email, phone no. and live chat.

2. Subscription to a hosting account

A web hosting account give you access to large computers, called servers, where you can store the files and information required to make a website or application. The servers connect to the internet to share and deliver that content to users.

The Following are key steps to follow for a full web hosting subscription:

6.1. Purchase a Web Hosting Plan

Now that you know the types of plans available and have chosen a web hosting provider, assess their plan tiers to determine the best one for you. While shared hosting tiers vary primarily by storage offered, cloud hosting tiers vary based on the memory and storage offered, and VPS tiers offer different amounts of memory, storage, and processing power. After you've chosen your tier, click on the relevant button to begin the purchase process.

6.2. Register a Domain Name

The next step in setting up most web hosting accounts is choosing a domain name. Before you do so, however, consider what you want your domain name to be, then check the availability of that domain name. Finally, purchase the domain that you want for your hosting plan. If you already have a domain, you can add it at this stage of the sign-up process.

6.3. Set Up DNS Settings

6.3.1. About DNS Settings

DNS stands for *Domain Name System*. This system is essentially the phone book of the Web that organizes and identifies domains. While a phone book translates a name like "Acme Pizza" into the correct phone number to call, the DNS translates a web address like "www.google.com" into the physical IP address—such as"74.125.19.147"—of the computer hosting that site (in this case, the Google homepage).

For successful DNS Settings, there is need to configure all the DNS parameters required for the website and domain name mapping. Such settings include:

→ Name servers
→ DNS Zone
→ DNS Host
→ DNS Records
→ Time To Live (TTL)

6.3.2. Importance of Learning DNS System

- Learning DNS basics will enable you to have more freedom to use your domain name to achieve your objectives.
- If you want to migrate your website to another web hosting service for whatever reason, understanding DNS will enable you to move your website, email, and other services without interruptions in service.
- Even if you hire a technical consultant to help you with your web hosting, understanding DNS will help you to communicate your goals to the consultant and understand your options.

- Pointing domain name to a hosting server.

6.4. Verify your control panel

After a successful registration and purchase of required fees for the hosting and domain. You are required to verify a hosting panel by verifying if credentials are correct (confirmed by a successful login) before providing usernames and password to the customer.

3. Uploading process to a hosting panel

3.1. Introduction to Control panel –cPanel

cPanel is essentially a web hosting control panel that is Linux based and which, owing to its graphic user interface and handy automation tools, makes for a very simplified process of web hosting. cPanel aims at creating an environment where the various faucets of the administration of a website and server administration can be effectively and easily carried out by using a standard web browser. To achieve this, cPanel uses a system that is 3 – tier in nature, enabling the administrators, resellers as well as the end – user website owners to manage the website properly.

Uploading an existing website to cPanel is necessary for the proper administration and management of websites since cPanel is essentially an online web hosting control panel.

3.2. Uploading Process

The Procedure for uploading an already existing Website to cPanel involves the use of File Manager, which is one of the web interfaces that is commonly used with cPanel. The steps enumerated below need to be followed while uploading an existing website to the cPanel server.

- ✓ Step 1: Login to cPanel

The first step to uploading a website to cPanel is to log in to the customer portal at cPanel. To do this, the user needs to go to the link – https://[[IP Address]]:2083

N.B: Replace [[IP Address]] with the IP Address for you server provided in welcome mail.

- ✓ Step 2: Explore File Manager

Completing the above mentioned step will have you logged in to the customer portal, from which you need to upload the website. On being logged in, look for Files under the File Manager option at the top of the screen.

- ✓ Step 3: Navigate to Web Root

Under Directory Selection select the Web Root (public_html/www) option and then click on Go. This will bring up the File Manager Menu.

- ✓ Step 4: Upload your files under web root

Look for the Upload button at the top of the interface and click on it. Once you do that, another menu will pop up, where you need to click on Browse. This will bring up a list of the files on the device from which you can upload to cPanel. Select the file to be uploaded from the list and then click Open. A bar showing the progress of the file upload will appear.

- ✓ Step 6: Verify and Test your website files

As soon as the file is uploaded click the link Back to home/customer/public_html. The files of your website will now be visible on the File Manager screen. Go to your live preview to test your entire website.


Activity 2: Guided Practice


Task: Scenario: Online Business

Mr. Sixte is a businessman who does multiple service delivery, he signs contracts with his customers and delivers requested services to the customer's place, when the service is needed again, Sixte is always called for a next delivery. In order to deliver better and manage his commercial services, Mr. Sixte hired a website developer called TheoDatus to design an ecommerce website that provides a request management so that customer's requests will be managed online.

TheoDatus have developed a website and he used HTML5, CSS3 and JavaScript on the front-end; He used PHP and MySQL on the backend. Now, he would like to deploy the website on a good online hosting provider.

1. Form small groups and discuss about this scenario
2. Together with your trainer, you are required to help TheoDatus to perform the following tasks:
    a. Identify and select an online hosting server
    b. Create an account and pay a yearly subscription on the selected host
    c. Among the following method, choose an appropriate method to use while uploading your website.
        i. cPanel File Manager

ii. FTP Client Software

3. Each group will present their work to the class.


Activity 3: Application


Task: Scenario: Website production

NYINAWABASINGA Esther is an In-Company Trainer at SYNERTECH Ltd and she is in charge of helping students/internees from different TVET Schools to enhance their learned skills and put them into a real life application at SYNERTECH Ltd.'s workplace.

During the last training session, the students were helped to enhance their website deployment skills and Miss Esther gave them a zip file containing a fully developed and tested company website with an exported SQL queries file for the website's MyQSL database. She asked them to perform the following:

i. Select an online hosting server
ii. Explain the steps to buy a hosting server
iii. Discuss website uploading process to online deployment


Points to Remember

- Be aware when selecting an online host
- It is recommended to buy both domain name and a hosting to the one host to avoid time spent during domain transfer.


Formative Assessment

11. List available online hosting providers
12. Enumerate the steps followed to buy an online hosting
13. Explain online website uploading methods
14. What is FTP Client software? –Give two examples


Self Reflection

Areas of strength	Areas for improvement	Actions to be taken to improve
1. **2.**	**1.** **2.**	**1.** **2.**

Topic 3.2: Deploy on online environment

Key Competencies:

Knowledge	Skills	Attitudes
1. Explain the procedures to migrate web files to hosting server.	1. Upload files to hosting server.	1. Be detail-oriented
2. Describe basic security configuration.	2. Perform basic security configuration.	2. Being Pragmatic
3. Describe web accessibility in regards with speed, file size and location.	3. Test speed and accessibility.	2. Being Accurate

Getting Started: What do we know and where are we going?

**Task:**

1. Form groups and perform the following tasks.



a. Observe the image above and explain what you see.
1. Demonstrate the relationship of this situation with our topic.

Activity 1: Problem Solving

1. Form small groups to work on the following tasks.

Munyakazi Franck is a trainee who did an e-commerce website. He have finished the development of the website, everything is working fine on his local server installed on his laptop. He needs now his website to be accessible online by everyone, as for the moment is the only one who accesses it locally. He is looking for help among his classmates.

To help him, perform the following tasks:

Task:

a) What are the steps that Munyakazi will go through to see his ecommerce website online.
b) What are the basics security configurations Franck should observes.
c) He expect to have big audience, with slow internet connection. To please his visitors, what should Munyakazi emphasize on while deploying his website online?

Key Facts 3.2

1. Web Hosting Tools

- Hosting control panels

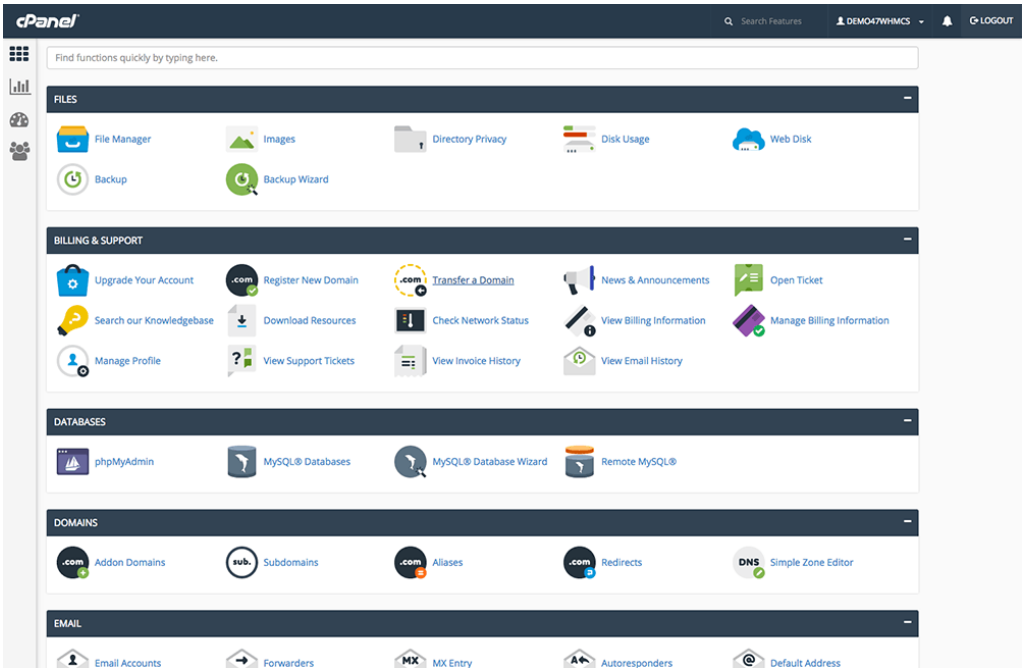
A hosting control panel is a tool that allows you to manage all aspects of a hosting service. It allows you to do most of the complex system admin processes in just a few clicks from the admin interface. You can even do advanced tasks such as server migrations, web server switching etc. in just a few clicks.

All of the panels mentioned bellow have their own peculiarities, pros, and cons. It is quite hard to determine which one is the best. This is a matter of choice. However, these web panels have one common feature: they make managing servers and hosting easier and quicker. That's why they are a good solution for both beginners and developers.

Here below, the list is not exhaustive, are the most popular hosting control panels on the market:

1. cPanel

This panel is available only for Linux OS. It's one of the most popular control panels. It has both a graphical interface and server management interface through WHM (Web Host Manager). As these environments work together, it is possible to manage your website in either of them. So, it is perfectly suitable for both beginners and developers that prefer console rather than pretty design.

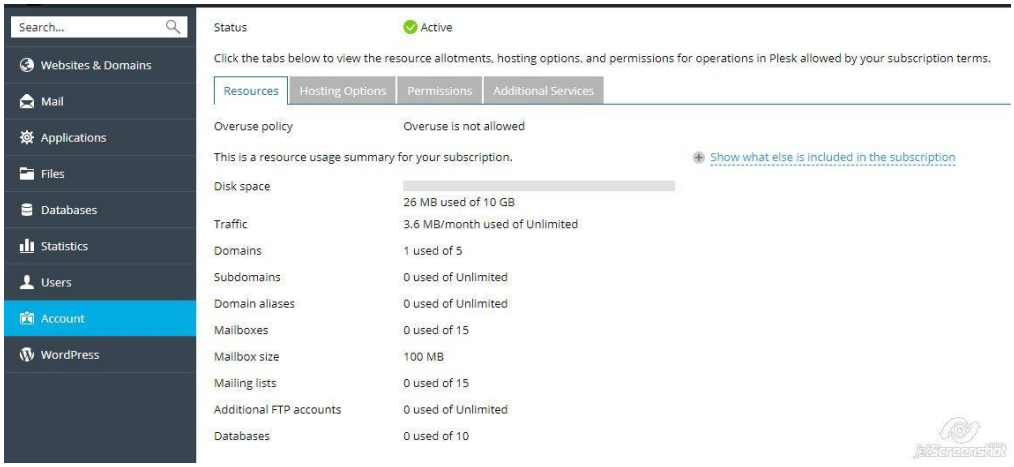


cPanel has lots of different features. All of them are located on one page which is quite comfortable as you will not need to click on various menus to get where you need. In addition, all of the features have short descriptions where it's indicated what they can do. Moreover, almost in each option, you can create anything in a few clicks. Here are the main features offered:

- Domain name settings, registration, and transfer;
- Email creation and management, spam filters management, autoresponders, and email forwarders set up;
- Visitor and error logs;
- Database creation and management;
- Security features, such as IP blocker, leech protection, and password-protected directories;
- Server performance monitoring;
- Backup creation and automation;
- File manager and FTP users creation;
- Lots of third-party apps and tools to extend functionality.

2. Plesk

Available for Windows and Linux. It's also quite popular, especially amongst European hosting providers. Basically, there are not many control panels offered for Windows. That's why Plesk can be considered as one of the most comfortable and easy panel for this particular OS.



All of the options are divided into different categories. They are displayed in the form of a list on the left side. Multiple servers can be managed in one panel.

The interface is quite simple and intuitive, everything can be created in a few clicks. One of its distinctive features is the variety of automation tools. They will spare your time and resources, so you can focus on your website development and don't worry about server maintaining.

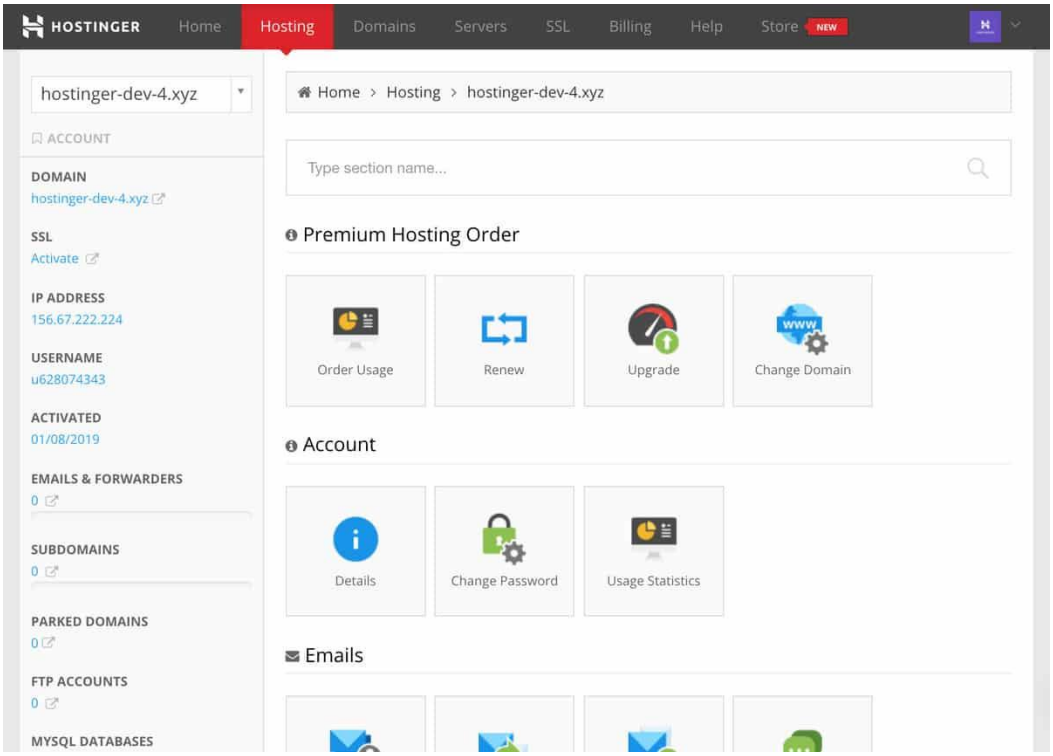
Another peculiarity of Pleskare the login levels. There are 4 levels. All of them have different permissions and responsibilities:

- Administrator – the highest level, possible to manage and set up system items as well as manage multiple servers (if applicable);
- Client/Reseller – possible to create and manage groups of domain names, permissions are given by system administrator;
- Domain Owner – possible to manage only one domain name, management options are predetermined;
- Mail User – the lowest level, possible to log in to webmail interface and manage passwords, spam filters etc.

cPanel and Plesk panels are the most popular and commonly used panels worldwide. However, there are still dozens of them. Some companies create their own control panels for their customers. For example, Hostinger has designed hPanel. You can find it's description below.

3. hPanel

This is a control panel designed by Hostinger team for their clients. It is available for Linux distributives. Also, hPanel can be used only for shared hosting at the moment.

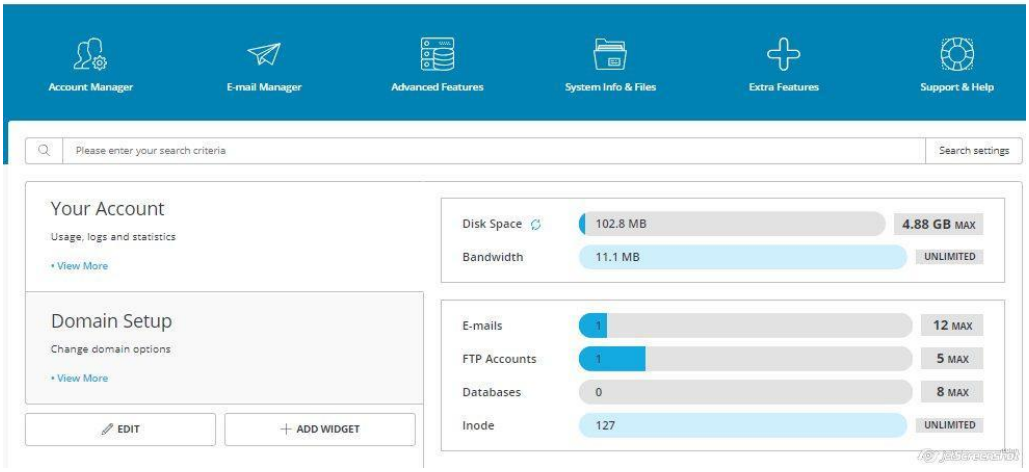


hPanel looks a bit like cPanel, however, a more comfortable version. For instance, although all of the options are located on the front page, when you select one of them, a side menu appears on the left. So it'll be easier to navigate between different sections.

This web panel has all of the basic functions that you need, such as domain and email management, DNS zone editor, file and database manager etc. You can also manage your account security: set up passwords for directories, block IPs and configure hotlink protection. Apart from all of these options, it's the main peculiarity is the possibility to manage all of your products in one panel. For example, it's possible to view your payment history, buy new hosting packages and upgrade them.

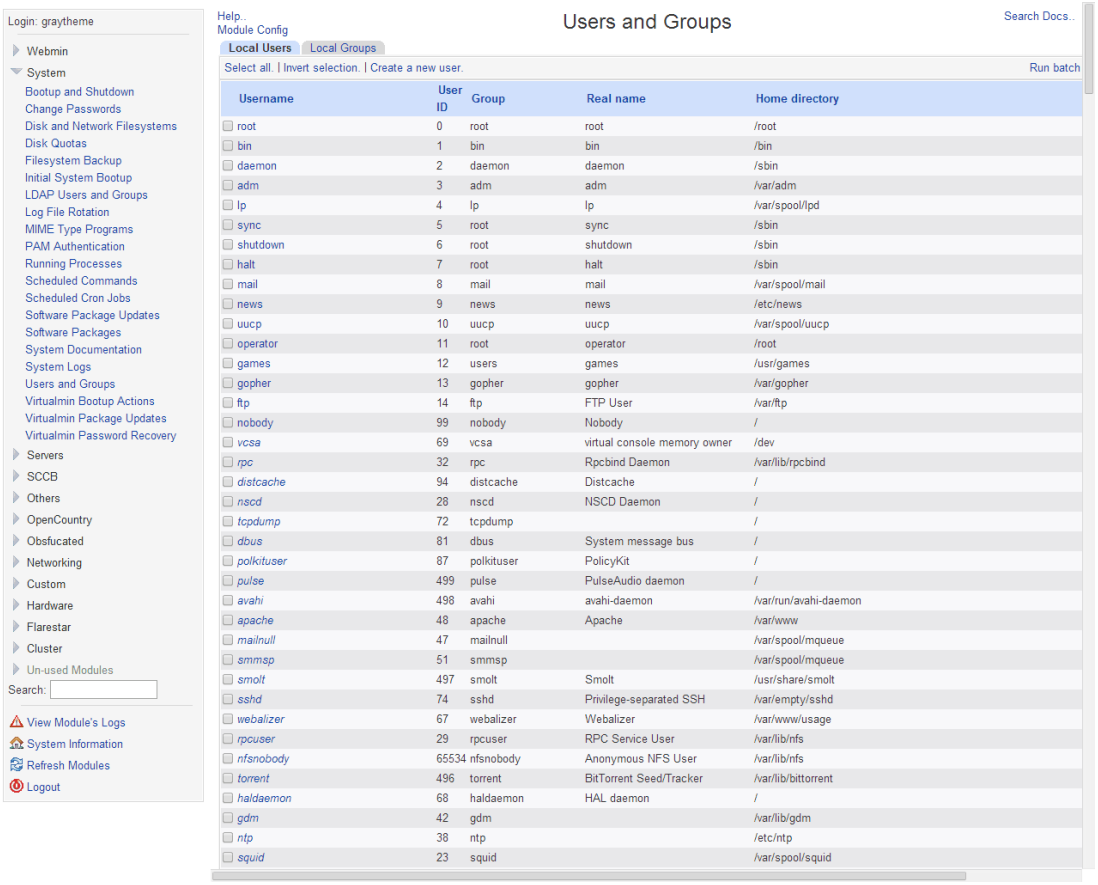
4. Direct Admin

It's available for Linux and BSD systems. It is one of the easiest, fastest and most stable panels. Its interface is very user-friendly. Plus, it's one of the cheapest as well.



5. Webmin

This web panel is available for all Unix systems, including but not limited to BSD systems, all Linux and Solaris systems. Moreover, it is partially available for Windows OS. This means that it is possible to install Webmin on Windows, however, not all of the functions will be displayed.



It's obvious that Webmin's design cannot be called extremely user-friendly and simple, though, it is highly customizable. For example, it has an Apache web server to configure

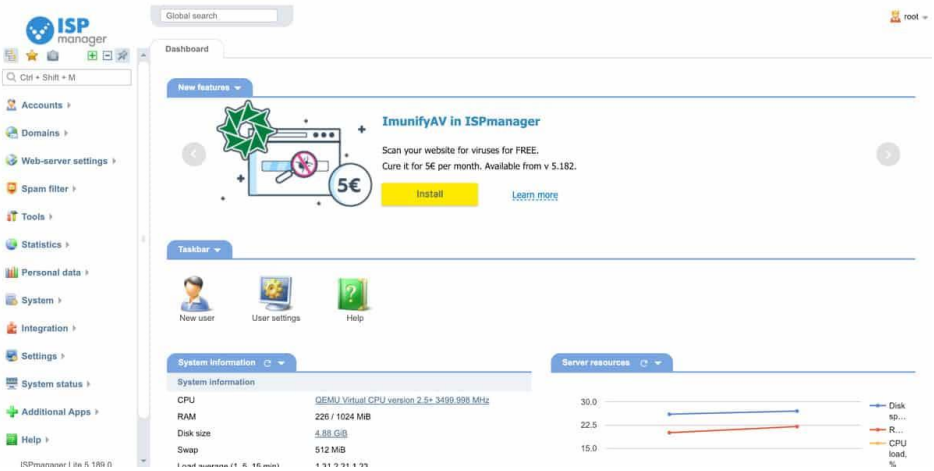
Apache directives and features. Furthermore, Webmin developers created several panels based on WebmincPanel to match different purposes and hosting types:

1. Usermin – web interface for managing emails, setting up mail filters and password etc;
2. Cloudmin – user interface for managing virtual servers;
3. Virtualmin – used to manage multiple virtual hosts (like Plesk).

Webmin may not be as comfortable as other panels described in this article but it is absolutely free and can be installed on the majority of operating systems.

6. ISPmanager

It is a Linux-based control panel widely used among Eastern European hosting companies. Has a very simple and basic design but that does not make it less comfortable.



There are two versions of this web panel: Lite and Business. The first one, Lite, apart from other features that are more or less common for each panel, can be used for web-server management, creating users with different access levels, importing data from remote servers etc. Due to this, the Lite panel is mostly used for Dedicated and VPS servers. As for Business ISPmanager version, it's better for shared or reseller hosting as it allows to manage multiple servers (clusters) and easily create and manage user accounts.

- FTP Client

A File Transfer Protocol client (FTP client) is a software utility that establishes a connection between a host computer and a remote server, typically an FTP server. An FTP client provides the dual-direction transfer of data and files between two computers over a TCP network or an Internet connection.

Deploying a website online using cPanel/WHM

To deploy a website using cPanel/WHMand make it available online, just follow the steps bellow:

Step 1: Pick a reliable website hosting company

Step 2: Create CPanel account with WHM

Step 3: Upload website files to the server online using cPanel.

Step 4: Import the MySQL database using phpMyAdmin from cPanel.

Step 5: Check if the website works

- Pick a reliable website hosting company

You learned this topic earlier of how to pic a reliable hosting company, there are reputable international companies and local ones.

If you need hosting for only one domain, you will choose package with only one cPanel. But if you need hosting for more than one domain, you will choose package with WHM which will allow you to create multiple accounts with separated cPanel.

The choice is yours.

- **CreateNewcPanel in WHM - cPanel Setup**

If you would like to have more than one cPanel in you account or to host more than one website and want to keep them separate, then this tutorial will help you to be able to do that.

To be able to do this you will need to make sure that you have a package WHM to create new cPanel.

Creating a cPanel, go through these steps:

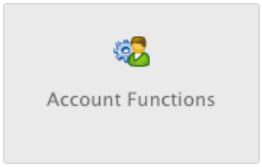
1) Access WHM

The WHM portal is mainly accessible through http://IP-address:2086 or https://IP-address:2087

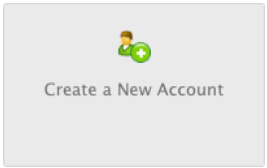
2) Login to the WHM



3) Click **Account Functions**



4) Click the icon **Create a New Account**.



5) Under **Domain Information** enter the domain, username, password (twice) and the contact email address.



6) In the **Package** section select the package your have already created.

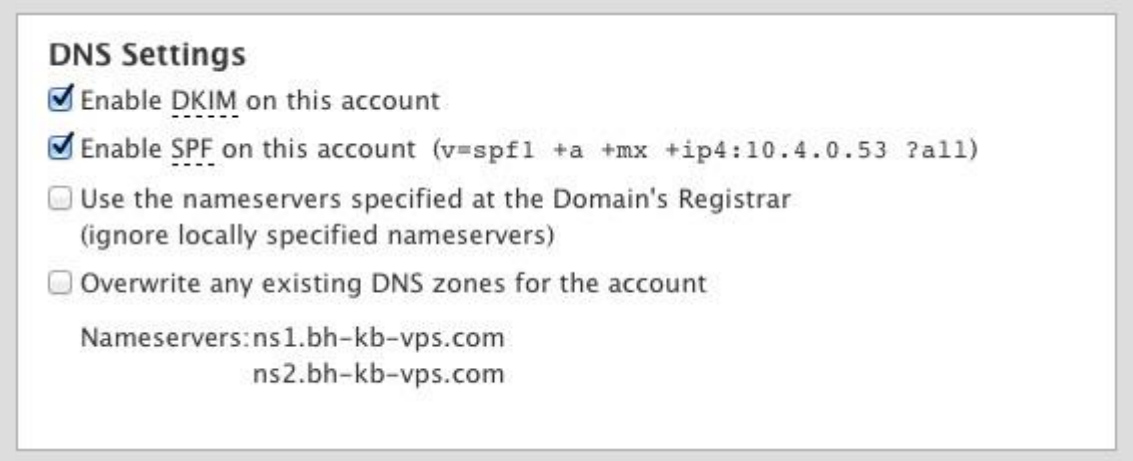


7) Settings is where the theme and language of the cPanel can be set.

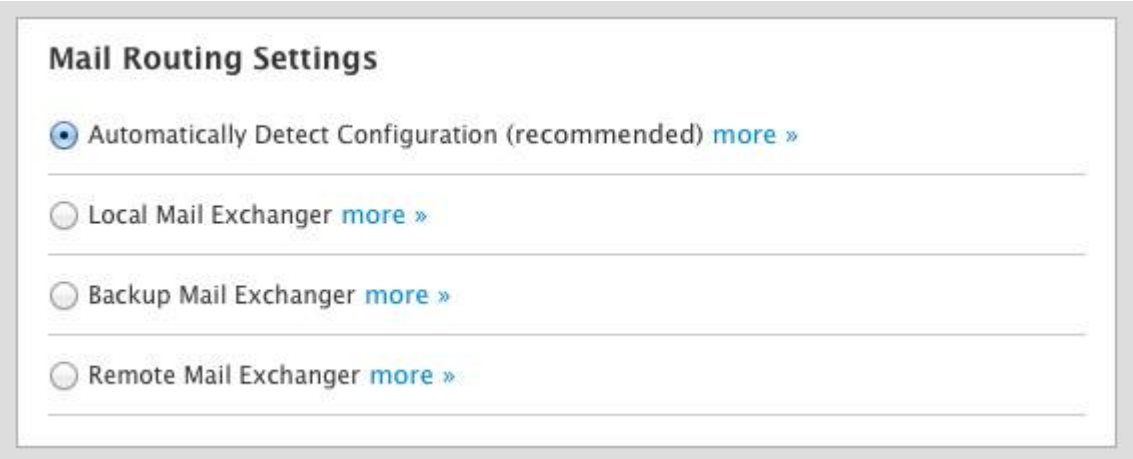


8) Under **DNS Settings** choose which nameservers will be set in the records and the SPF and DKIM records that will be held in the local DNS nameserver tables. Keep the nameservers

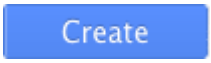
because they will be added to the domain name later.



9) Select how the mail is to be handled under **Mail Routing Settings**.



10) Click **Create**.



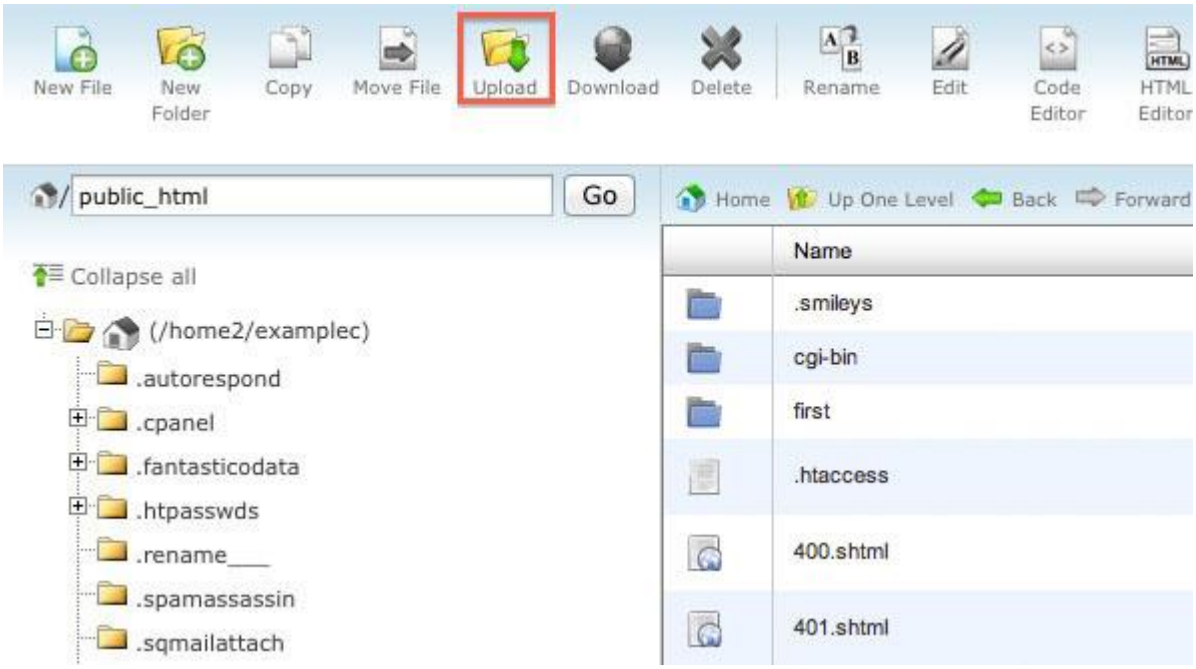
If it is a successful create it will say *Account Creation Complete!!!...Account Creation Ok...Done.* Then you would be able to login to the new account through the new cPanel's

domain example.com/cpanel or through the server's IP address with the cPanel port http://IP-address:2082 or https://IP-address:2083.

- Upload website files to the server using cPanel

To upload a files and folders through cPanel's File Manager, please do the following:

1. Login to cPanel and open the File Manager.
2. Choose to open Web Root and Show hidden files.



3. Navigate to the folder where you want the upload to be located.
4. Click on the **Upload icon** from the top toolbar



Click the **Browse box** (Some web browsers will have a **Choose File box** instead).

Locate the file on your computer that you wish to upload.

Once the file has been selected, it will automatically upload. You may select additional files while uploads are in progress.

- Import the MySQL database using phpMyAdmin from cPanel.

Moving databases is one the things you must know how to do when hosting sites. Luckily you have cPanel to help you make this seemingly complicated task simple.

To import a MySQL database using cPanel simply:

1. Login to cPanel.
2. Go to phpMyAdmin.
3. Click to create new database name in the top left, or choose an existing database.
4. Click Import in the main area of phpMyAdmin.
5. Browse for the .sql file on your computer and click Open.

Here you will be presented several options like defining the format of the file and the compatibility type to use. Everything is usually set to the default settings.

1. Click Go to proceed.
2. You should get a message saying the import has been successful.

Common issues with importing databases

Import file is too large

Importing files should never take too long. If after 30 seconds of attempting to import phpMyAdmin will time out, the problem is that your file is just too big. When this happens you usually have to get the help of your webhost service provider. Some providers will ask you to send them your database using your account.

Access denied for user 'username1'@'localhost' to database 'user2_database'

This problem arises when your import file contains an SQL query that tries to create a database for the wrong username. Notice the usernames don't match.

The import file must be edited to match your new username. You can do this yourself or again ask the help of your webhost service provider.

Access denied for user 'username1'@'localhost' to database 'database name'

Just like the previous issue, the correct username is missing. On a shared sever, your database names must always look like something_something.

Unknown database 'username1_database name'

The problem here is that your import file does not have a query to create the database before importing the data. To solve this:

1. Log into cPanel.
2. Go to MySQL Databases.
3. Create a database with that name (database name).
4. Try the import again.

Can't create database 'username1_wrdp9'; database exists

The problem happens when your import file contains an SQL query that attempts to create a database that already exists. If this happens:

1. Login to cPanel.
2. Go to MySQL Databases.
3. Remove that empty database.
4. Try the import again.

If the database is not empty, you must edit the import file and remove the CREATE DATABASE query. It should look like this:

â–¡CREATE DATABASE `username1_database name` DEFAULT CHARACTER SET latin1 COLLATE latin1_swedish_ci;

You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near…

This happens when your file does not contain backup data for a database, or if the file has been somehow changed or corrupted. Ask the help of your webhost service provider.

Access denied for user 'username1'@'localhost' to database 'username1_database name'

If you get this error, this means you do not have privileges to use Create. What's wrong here is that your import file contains at least one SQL query that is trying to create a database, and you do not have the privilege to do so.

Again you can always ask the help of your webhost service provider. Or edit the file yourself. The import file must be edited to remove the CREATE DATABASE query. It should something like this.

â–¡CREATE DATABASE `username1_dtabase name` DEFAULT CHARACTER SET latin1 COLLATE latin1_swedish_ci;

After you have removed the code:

1. Login to cPanel.
2. Go to MySQL Databases icon.
3. Create your database.

The name of this database must be the same with the one that was removed from the import file (in this example, database name). You can now import the modified import file.

Basic website security configuration

Having a website has become easier than ever due to the proliferation of great tools and services in the web development space. Content management systems (CMS) like WordPress, Joomla!, Drupal, Magento, and others allow business owners to build an online presence rapidly. The CMS's highly extensible architectures, rich plugins, and effective modules have reduced the need to spend years learning web development before starting to build a website.

The ease of launching an online business or personal website is great. However, there are some negative side effects. We see many webmasters who do not understand how to make sure their website is secure. There is a misunderstanding when it comes to the importance of securing their website, and whose responsibility it is.

Today, let's see what 10 best practices all website owners should take to keep their website secure.

1 – Update, Update, Update!

This is something we cannot stress enough here at Sucuri. Countless websites are compromised every day due to outdated and insecure software.

It is incredibly important to update your site as soon as a new plugin or CMS version is available. Those updates might just contain security enhancements or patch a vulnerability.

Most website attacks are automated. Bots are constantly scanning every site they can for any exploitation opportunities. It is no longer good enough to update once a month or even once a week because bots are very likely to find vulnerability before you patch it.

This is why we recommend using a website firewall, which will virtually patch the security hole as soon as updates are released.

If you have a WordPress website, I personally recommend the plugin 'WP Updates Notifier'. It emails you to let you know when a plugin or WordPress core update is available.

2 – Passwords

Having a secure website depends a lot on your security posture. Have you ever thought of how the passwords you use can threaten your website security?

In order to clean up infected websites, we often need to log into a clients' site or server using their admin user details. It is shocking how insecure root passwords can be. With logins like admin/admin you might as well not have any password at all.

There are many lists of breached passwords online. Hackers will combine these with dictionary word lists to generate even larger lists of potential passwords. If the passwords you use are on one of those lists, it is just a matter of time before your site is compromised.

Our best practices for you to have a strong password are:

Do not reuse your passwords

Every single password you have should be unique. A password manager can make this easier.

Have long passwords

Try longer than 12 characters. The longer the password is, the longer it will take a computer program to crack it.

Use random passwords

Password-cracking programs can guess millions of passwords in minutes if they contain words found online or in dictionaries. If you have real words in your password, it isn't random. If you can easily speak your password, it means that it is not strong enough. Even using character replacement (i.e. replacing letter O with number 0) is not enough.

There are several helpful password managers out there such as, "LastPass" (online) and "KeePass 2" (offline).

These brilliant tools store all your passwords in an encrypted format and can easily generate random passwords at the click of a button. Password managers make it possible to use strong passwords by taking away the work of memorizing weaker ones or jotting them down.

3 – One Site = One Container

We understand that hosting many websites on a single server can seem ideal, especially if you have an 'unlimited' web hosting plan. Unfortunately, this is one of the worst security practices we commonly see. Hosting many sites in the same location creates a very large attack surface.

You need to be aware that cross-site-contamination is very common. It's when a site is negatively affected by neighboring sites within the same server due to poor isolation on the server or account configuration.

For example, a server containing one site might have a single WordPress install with a theme and 10 plugins that can be potentially targeted by an attacker. If you host 5 sites on a single server now an attacker might have three WordPress installs, two Joomlainstalls, five themes and 50 plugins that can be potential targets. To make matters worse, once an attacker has found an exploit on one site, **the infection can spread easily to other sites on the same server.**

Not only can this result in all your sites being hacked at the same time, it also makes the cleanup process much more time consuming and difficult. The infected sites can continue to reinfect one another, causing an endless loop.

After the cleanup is successful, you now have a much larger task when it comes to resetting your passwords. Instead of just one site, you have a number of them. **Every single password** associated with **every website on the server** must be changed after the infection is gone. This includes all of your CMS databases and File Transfer Protocol (FTP) users for every single one of those websites. If you skip this step, the websites could all be reinfected again and you are back to square one.

4 – Sensible User Access

This tip only applies to sites that have **multiple users or logins**. It's important that every user has the appropriate permission they require to do their job. If escalated permissions are needed momentarily, grant it. Then reduce it once the job is complete. This is a concept known as Least Privileged.

For example, if someone wants to write a guest blog post for you, make sure their account does not have full administrator privileges. Your friend's account should only be able to create new posts and edit their own posts because there is no need for them to be able to change website settings.

Having carefully defined user roles and access rules will limit any mistakes that can be made. It also reduces the fallout of compromised accounts and can protect against the damage done by 'rogue' users. This is a frequently overlooked part of user management: **accountability** and monitoring. If multiple people share a single user account and an unwanted change is made by that user, how do you find out which person on your team was responsible?

Once you have separate accounts for every user, you can keep an eye on their behavior by reviewing logs and knowing their usual tendencies, like when and where they normally access the website. This way, if a user logs in at an odd hour, or from a suspicious location, you can investigate.

Keeping audit logs are vital to keeping on top of any suspicious change to your website. An audit log is a document that records the events in a website so you can spot anomalies and confirm with the person in charge that the account hasn't been compromised.

We know that it may be hard for some users to perform audit logs manually. If you have a WordPress website, you can use our free Security Plugin that can be downloaded from the official WordPress repository.

5 – Change the Default CMS Settings!

Today's CMS applications (although easy to use) can be tricky from a security perspective for the end users. By far the most common attacks against websites are entirely automated. Many of these attacks rely on users to have only default settings.

This means that you can avoid a large number of attacks simply by **changing the default settings** when installing your CMS of choice.

For example, some CMS applications are writeable by the user – allowing a user to install whatever extensions they want.

There are settings you may want to adjust to control comments, users, and the visibility of your user information. The file permissions, (which we will discuss later) are another example of a default setting that can be hardened.

You can either change these default details when installing your CMS or later, but don't forget to do it.

6 – Extension Selection

The CMS applications extensibility is something webmasters usually love, but it can also pose one of the biggest weakness. There are plugins, add-ons, and extensions that provide virtually any functionality you can imagine. But how do you know which one is safe to install?

Here are the things I always look for when deciding which extensions to use:

- **When the extension was last updated**: If the last update was more than a year ago, I get concerned that the author has stopped work on it. I much prefer to use extensions that are actively being developed because it indicates that the author would at least be willing to implement a fix if security issues are discovered. Furthermore, if an extension is not supported by the author, then it may stop working if core updates cause conflicts.
- **The age of the extension and the number of installs**: An extension developed by an established author that has numerous installs is more trustworthy than one with a few number of installs released by a first-time developer. Not only do experienced developers have a better idea about best security practices, but they are also far less likely to damage their reputation by inserting malicious code into their extension.
- **Legitimate and trusted sources**: Download your plugins, extensions, and themes from legitimate sources. Watch out for free versions pirated and infected with

malware. There are some extensions whose only objective is to infect as many websites as possible with malware.

7 – Backups

Having a hacked website is not something you would like to experience, but you don't want to be caught off guard in case the worst happens.

Having website backups is crucial to recovering your website from a major security incident. Though it shouldn't be considered a replacement for having a website security solution, a backup can help recover damaged files.

A good backup solution should fulfill the following requirements:

- First, they have to be **off-site**. If your backups are stored in your website's server, they are as vulnerable to attacks as anything else in there. You should keep your backups off-site because you want your stored data to be protected from hackers and from hardware failure. Storing backups on your web server is also a major security risk. These backups invariably contain unpatched versions of your CMS and extensions, giving hackers easy access to your server.
- Second, your backups should be **automatic**. You do so many things every day that having to remember to backup your website might be unthinkable. Use a backup solution that can be scheduled to meet your website needs.
- To finish, have **reliable recovery**. This means having backups of your backups and testing them to make sure they actually work. You will want multiple backups for redundancy. By doing this, you can recover files from a point before the hack occurred.

8 – Server Configuration Files

Get to know your web server configuration files:

- Apache web servers use the **.htaccess** file,
- Nginx servers use **nginx.conf**,
- Microsoft IIS servers use **web.config**.

Most often found in the root web directory, server configuration files are very powerful. They allow you to execute server rules, including directives that improve your website security.

If you aren't sure which web server you use, run your website through Site check and click the Website Details tab.

Here are a few best practices that I recommend you research and add for your particular web server:

- **Prevent directory browsing**: This prevents malicious users from viewing the contents of every directory on the website. Limiting the information available to attackers is always a useful security precaution.
- **Prevent image hot linking**: While this isn't strictly a security improvement, it does prevent other websites from displaying the images hosted on your web server. If people start hot linking images from your server, the bandwidth allowance of your hosting plan might quickly get eaten up displaying images for someone else's site.
- **Protect sensitive files**: You can set rules to protect certain files and folders. CMS configuration files are one of the most sensitive files stored on the web server as they contain the database login details in plain text. Other locations, like admin areas, can be locked down. You can also restrict PHP execution in directories that hold images or allow uploads.

9 – Install SSL

SSL is the acronym for **Secure Sockets Layer**. It is the standard security technology for establishing an encrypted link between a web server and a browser.

I was hesitant to include SSL as a tip to improve your website security because there is a lot of misleading information suggesting that installing SSL will solve all your security issues.

Let's be clear: SSL does nothing to protect your site against malicious attacks and does not stop it from distributing malware. There is always a difference between SSL and website security.

SSL encrypts communications between Point A and Point B – aka the website server and visitor's browser. This encryption is important for one specific reason. It prevents anyone from being able to intercept that traffic, known as a Man in the Middle (MITM) attack. SSL is a great way to protect passwords and credit card info (as well as other sensitive data) and initiatives like Let's Encrypt have made it freely accessible.

With the push from Google to label HTTP website as "Not Secure", SSL is crucial for all websites. Forcing HTTPS is unavoidable for e-commerce websites and for any website that accepts form submissions with sensitive user data or Personally Identifiable Information (PII).

The SSL certificate protects your visitors' information in transit, which in turn protects you from the fines and legal issues that come along with being found noncompliant with PCI DSS.

If you are thinking about installing SSL on your site, you can follow our guide to learn more.

10 – File Permissions

File permissions define who can do what to a file.

Each file has 3 permissions available and each permission is represented by a number:

- '**Read**' (4): View the file contents.
- '**Write**' (2): Change the file contents.
- '**Execute**' (1): Run the program file or script.

If you want to allow multiple permissions, simply **add the numbers together**, e.g. to allow read (4) and write (2) you set the user permission to 6. If you want to allow a user to read (4), write (2) and execute (1) then you set the user permission to 7.

There are also 3 user types:

- **Owner** – Usually the creator of the file, but this can be changed. Only one user can be the owner.
- **Group** – Each file is assigned a group, and any user who is part of that group will get these permissions.
- **Public** – Everyone else.

So, if you want the owner to have read & write access, the group to have only-read access, and the public to have no access, the file permission settings should be:

	Write	Read	Execute
Owner	2	4	0
Group	0	4	0
Public	0	0	0

When you view the file permissions **this will be shown as 640**.

Folders also have the same permissions structure. The only difference is that the 'execute' flag allows you to make the directory your working directory. You will usually want this on.

Most CMS installs have all the permissions correctly configured by default. So why did I just spend so much time explaining how permissions work? When searching for solutions to permissions errors, all over the web you will find misinformed people advising you to change file permissions to 666 or folder permissions to 777.

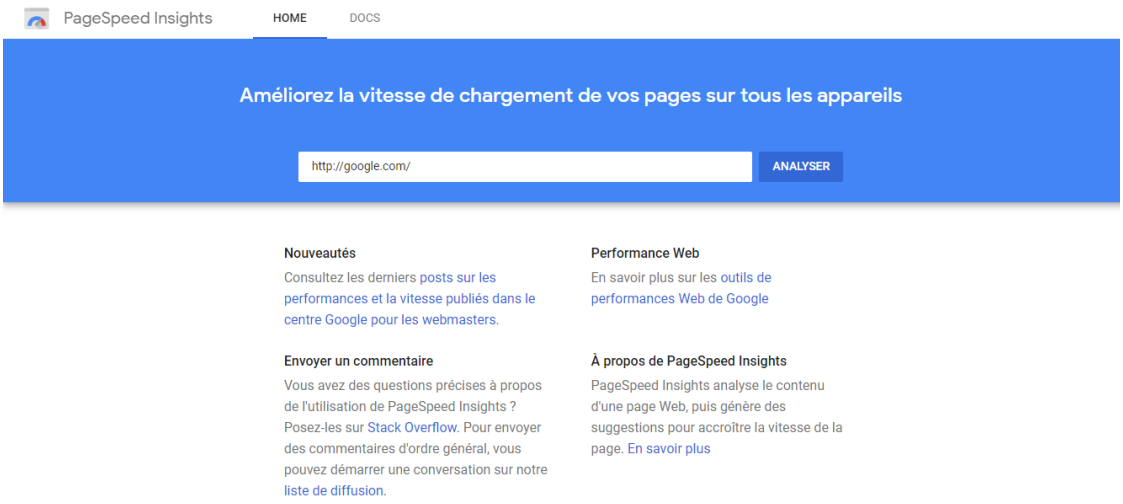
This advice will usually fix any permissions errors, but it is terrible advice from a security perspective.

If you set a file permission to 666 or folder permission to 777 you have just allowed *anyone* to insert malicious code or delete your files!

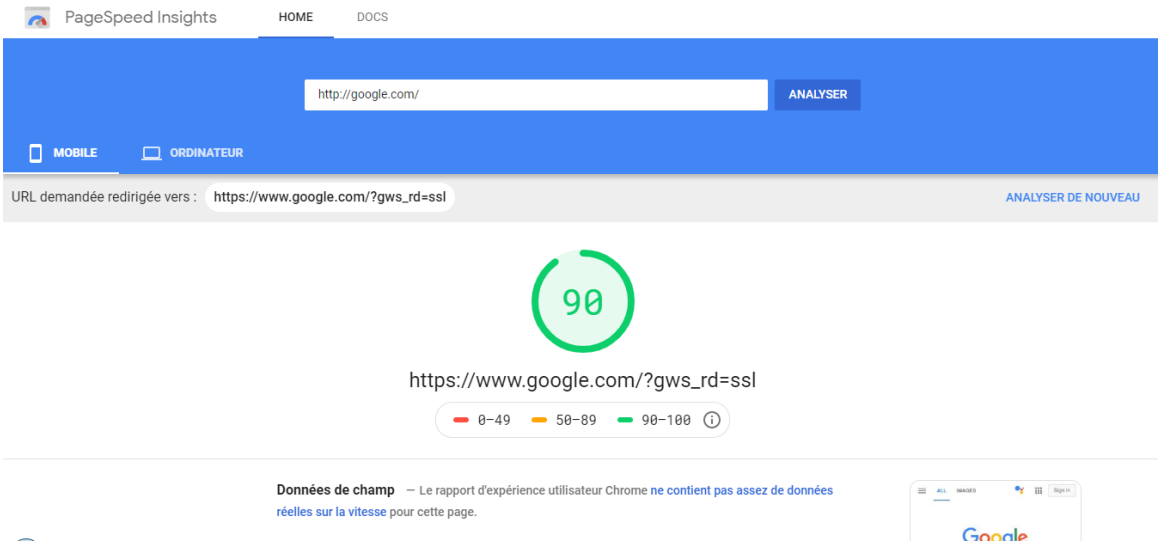
- Test website speed and accessibility

There are lot of tools that help to test website speed and accessibility and give hints to improve it. As a reference use the Google's tool dedicated to that matter on this link: https://developers.google.com/speed/pagespeed/insights

You will be required to enter the domain name of the website you need to test the speed and click on Analyze.



You will get the page result with all the errors that makes your website run slower. To improve the speed of your website just correct the errors one by one, your website's speed will improve significantly.



Activity 2: Guided Practice

Form small groups to work on the following tasks.

The management of a very popular website, Tohoza.com needs to change his hosting server as it is no longer supporting its fast growing audience. They have decided to migrate the website to a VPS (Virtual Private Server) with more dedicated resources. The VPS has WHM and cPanel installed on it.

The management of Tohoza will give the assignment to a group of expert, selected after passing an exam. Your group needs to postulate for the job, but before the exam you need to exercise yourself by performing the following tasks:

Task:

a) Create cPanel account for your website using WHM on the new server.
b) Backup your website' files from the old location and download the backup to your computer.
c) Upload your backup online to the new server.
d) Backup your website's database from the old location.
e) Import your website's database backup to the new location.

Test if the migration has been done successfully, all the website's functionalities are working smoothly.


Activity 3: Application

You will do the following tasks individually.

You have created a beautiful website during your courses. But this is not enough as it is accessed by yourself on your computer. You need it to be accessible by everyone in the world, by deploying it to an online server. Do it by performing the following tasks:


Task:

a) Create cPanel account for your website using WHM on the new server.
b) Backup your website' files from the old location and download the backup to your computer.
c) Upload your backup online to the new server.
d) Backup your website's database from the old location.
e) Import your website's database backup to the new location.
f) Test if the migration has been done successfully, all the website's functionalities are working smoothly.


Points to Remember

- Always update yourself on web hosting technology
- Discuss with colleagues about the trends in ICT


Formative Assessment

A. Answer by True or False
    1. WHM works with Webmin?
    2. Plesk is a web hosting control panel?
    3. cPanel is available for Linux OS and Windows OS?
    4. Filezilla is a web hosting control panel?
B. List steps to deploy website online.
C. Describe the steps you go through while uploading files to online using cPanel.
D. Describe at least 5 basic website security configurations.

Self Reflection

Areas of strength	Areas for improvement	Actions to be taken to improve
1. **2.**	**1.** **2.**	**1.** **2.**

Summative Assessment

GS Kampanga Primary School in Musanze district has a developed website which was created by a web front end developer. They have requested that the website will be available online.

There is information on the website which must go online in order that the parents have to be aware about their children schedule all year long. It's very important to keep the parents informed. For this reason, the school requests that the website, be deployed online.

The main tasks will be to deploy it online so that it becomes accessible from a URL.

- Plan a website deployment/hosting
- Deploy website online - for free of costs

The time required to accomplish this is task is 3 hours.