SEER AKADEMI
Linux Networking Lecture3
File Transfer Protocol

Hi everyone again welcome to this lecture we will be continuing the Linux networking on the lecture number three today topic is going to be the File Transfer Protocol so we will be learning about the File Transfer Protocol in depth and going into like how we can make the file transfer protocol also known as FTP then we will go into more detail regarding how we can enable a server to do an FTP transfer so some of those topics will also be discussed.
So before we start talking about the FTP so I want to give the recap from last lecture as you know finished the last lecture on the IP addressing so let us look at what we learn.
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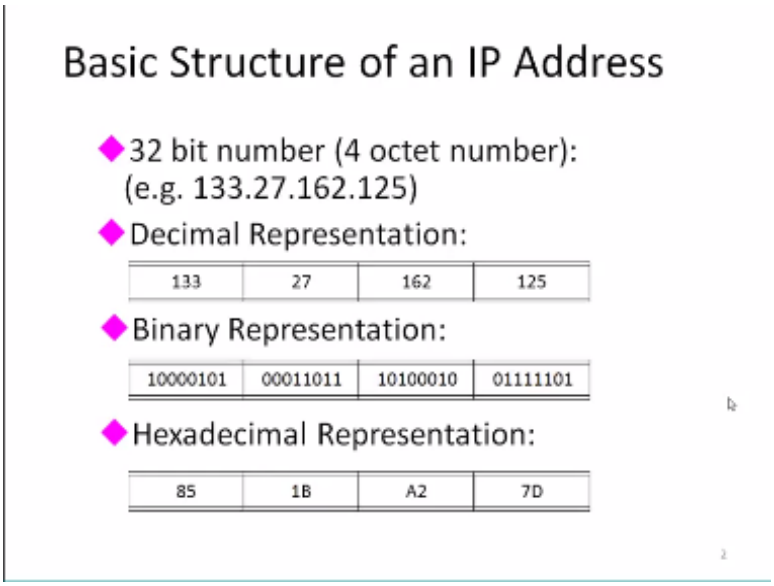

So we learnt the basic structure of an IP address if you go 32-bit number comprised of four octet numbers a simple example will be like 133.427.162 or 1.5 this is what is called decimal representation you can also represent it at the binary as shown here so each one will just get that its own binary equivalent sometimes it is also represented in the hexadecimal function which is Like 133 in hexadecimal is 85 and then the 27 becomes 1D in the 162 become A 2 and then 125 becomes 7D So if people simply say it as one number 85 one be a to 70 some of the licenses are all cut or the hexadecimal representation so you have a license for any software The software vendor may ask you the host name where you are hosting this license in the form of the six additional representations.
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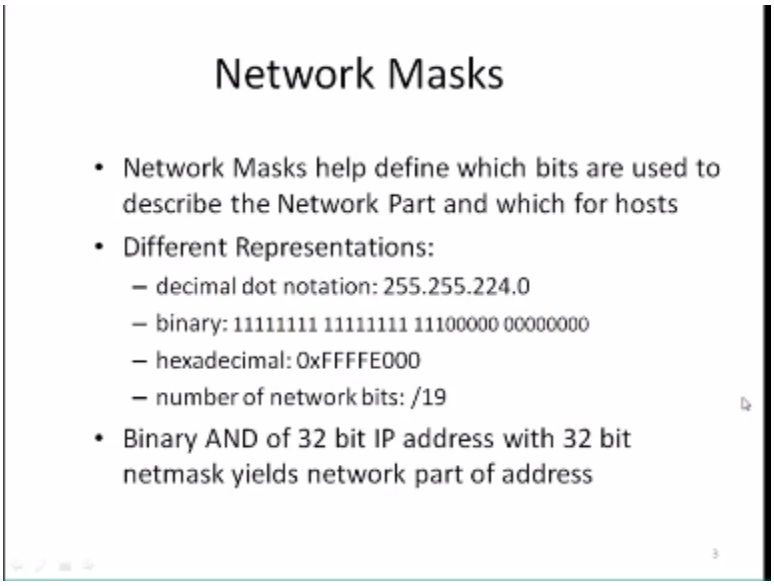

And we also saw the use of network mask around which it is used to define which bits are used to describe the network part and which are used for the hosts a simple notation will be like 255.255.224.0 in this case we know that actually the 224 is the first three bits of the third octet so hence the number of Network bits is 19 and the remaining is assigned to go the hosts so let us look at based on this let us look at some of the activity of they want you guys to do.

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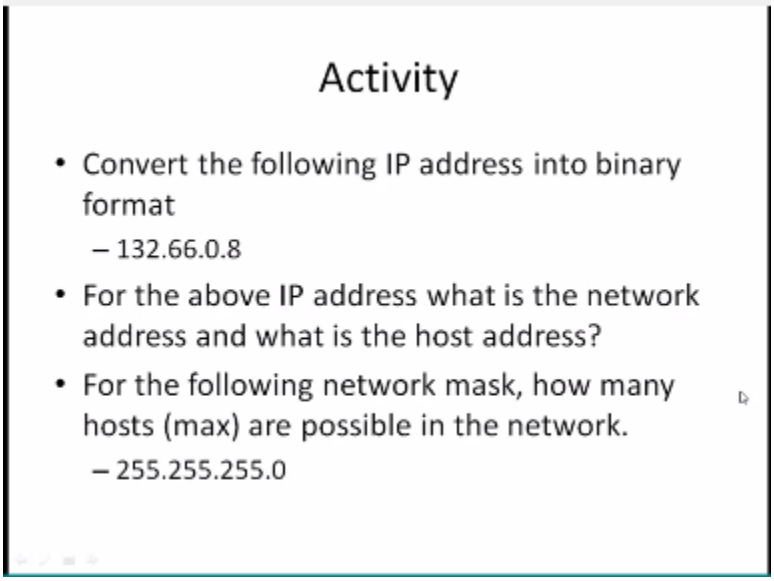

So here one of them is to convert the following IP address into a binary format fairly simple I think like with the knowledge from the above slide you should be able to do this fairly easily I think I given you also have the distinction between a local network and the public network or based on the IP addresses now the question is for the above IP address what is the network address what is a hosted or is the network quadrant most part again.

I think it is fairly simple you should be able to go what is the network address and the host address so I want you to just exercise the what we learn so want now the third one that I want you to do is the following which is I have given you this network mask very simple I want you to figure out how many hosts are possible in this network again I think a given it will be like a trivial exercise for you given that you are now master o IP addressing based on previous structure so with that I am going to go into the file transfer protocol which is the main topic of today.

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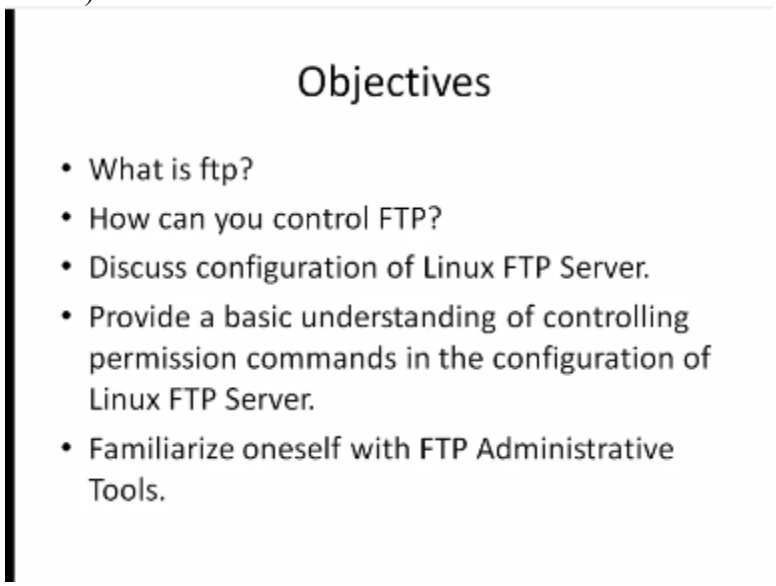

So in this lecture we will be learning about what is FTP why do we need a FTV then how do we how do we control the FTP essentially what are the commands that we can use in the FTP session order to initiate an FTP session how to end an FTP session things of that and then we will also discuss the configuration of a Linux or FTP server some basic understanding of controlling the permission commands in the configuration of the Linux FTP server.

And then some administrative tools again I do not want to emphasize too much on the backend the administrative aspect of it but I still want you to understand what are the stated challenges so that at least like I mean you are aware of what is going on if something is so let us look at what is FTP so in FTP the File Transfer Protocol is the way to copy large files I emphasize again large file through the network into another system.

These can be like connected in a LAN configuration land configuration these are the terms that we learned in lecture 1 so based on that we can transfer it is different from remote copy which is another way to actually copy a file because the remote copy actually explicitly opens a direct

communication link between the two computers and then tries to copy the file over or whatever duration that the copy needs to take.
An FTP is all done through the network rather than relying on the a direct connection between two computers which is very difficult to establish so let us see how we can actually control the FTP the first thing that we want to do is to initiate an FTP session.
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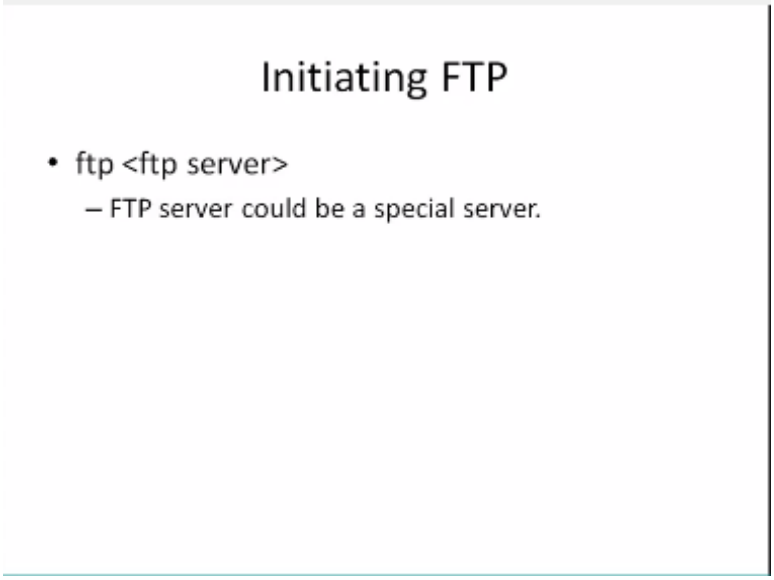

So the to initiate an FTP session be you simply type in FTP followed by the FTP servers IP at this the FTP server could be a special server on the network or it could be any other machine. Which is able to receive the FTP request again you see that actually the command and the command is of the same form that we learned in probably like lecture 1 when you started now when we learn the Linux basics.
Which is the command followed by an argument here the argument is actually the FTP server IP address you can also look for any kind of options available for the FTP there are new versions of FTP also available things like SFTP which is smaller the security which encrypts the data during the transmission and then we take a sample they learn so that is another topic essentially like I mean so you can actually look it up as a man FTP and then try to see like.
I mean what are these different possibilities that are available so now that you have initiated an FTP now we need to know how to resample because once the FTP is initiated usually the FTP server then ask you for an authentication the authentication is in the form of for the username and the password some FTP also allows you some FTP servers allows you to do login as a anonymous user.
So that it does not so think about this right I mean you are actually kind logging in to a different machine just for the purpose of transferring a file as long as the file is secure the remote machine

does not need to need you to have an established account because the whole point here is you are going to send this file and basically at that point you are going to cut off all your links between you and the remote server.
And then the remote server can go on doing whatever it is whatever it wants to do so in that sense like I mean you do not want to establish an identity in that remote server So that you know all the time like every six or whether that that person is there so FTP sites do allow anonymous form FTP so essentially like I mean so anybody who does not have an identity established in the remote server becomes an anonymous user so in most cases in some of the settings actually you can log in as an animal and password is nothing and then you can log in some cases they still want to log who is the user that is trying to FTP.
So they will require some form of identification usually the identification is your email address so the password that they require for anonymous access will be your email address so you can say like FTP HTTP server name and then it will ask you for a username usually it tastes like default is anonymous in that case like you can just click enter and that takes the anonymous as the user and then it will stay like okay.
Password now give a password and it they will typically say that put your email address as your password you want done so then you just type in the email address and then you click on it then immediately the prompt will change the prompt becomes FTP driven so now you know that you are in the middle of the FTP session so now let us see how once we started this session how do we proceed at the point so there are several commands.
That are available you can think of the FTP there is similar to your shell so in a shell you can just have the greater than symbol now with FTP you will say like FTP and then greater than symbol which gives you kind of command interpreter window so let us see like what commands that we can type in again this command interpreter will be very limited subset of the Linux shell so the number of commands that you can type is also limited.
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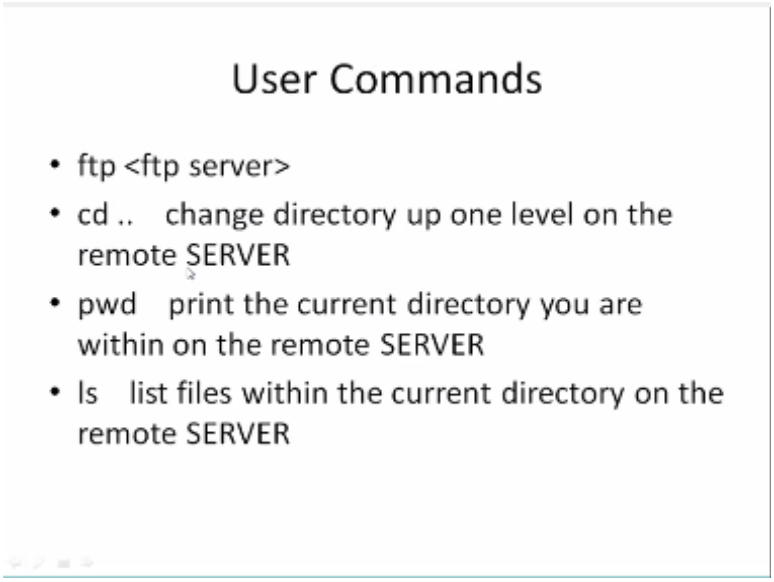

So let us see this command that you already know CD which is the change directory only difference between what you know what you knew earlier and this time is when you type CD it actually changes directory in the remote for it is no longer changing the directory from your site in fact typically like when you log in your identity site wherever you started with the current home directory it will still be preserved.

So say like I mean you are in your home directly with / home / XYZ and then you started the FTP server your local directory is still pointing to / home / it is Isis and I think the remote direct remote directory it goes into some space either just the slash which is the root directory from there you can then do a CD to move to any other directory and CD.. Will again go back up on level but now in the remote cell and more the current directory.

And PWD that other command that you are very familiar this person working directory that again it points to the present working directory of the remote server as opposed to yourself and then all these commands LS will work on the remote server but not on your side so even if you type LS you cannot see any of your files in the current directory but it will display the files from the FTP site or remote site.

So then what can we do like I mean with so now that you know like I mean okay you can change the directory from the root to the /a in the remote server assume that you are still okay with the / home / XYZ and you want to transfer a file called PQR into the remote directory / a so you did CD to / a and then you did a PWD and it prints like /a and then you do an LS and it leaves Nothing basically there are no files in that server now you need to copy your PQR into that directly so the way that we do it is using the following commands.

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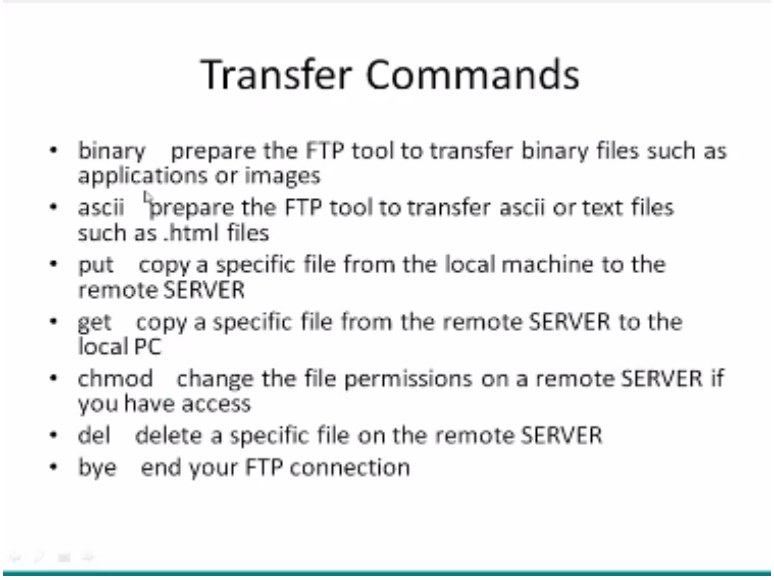

The transfer commands are shown here these typically start with specifying either one of these two options either binary or ask this tells the FTP to assume that the file whatever that we are going to transfer is going to be a binary format if you type in ASCII then it knows that we show transmitted as an ASCII format the difference here is essentially a mobile data may be like very similar like 1 and 0 the binary format will require.

Like some special handling in the sense that you cannot you have to make sure that the checksum is the same as ASCII there is some lenient people so the first thing that you do is based on what kind of fire file PQR is you set one of these we need to type in binary or ASCII let us assume that the PQR is a binary file so we typed binary and the short form you can just type BIN the BIN is the short form of binary.

So now that you indicated to the FTP server that the file that you want to transfer is going to be a binary now how do we transfer so if you just stay put and then followed by PQR then this PQR from the current directory within / whole expand check for V will be transferred over to /a which is the remote server so fairly easy you can also do get the get command will actually get the file from the remote server back to your local.

So again get is also the same thing get followed by file name and then the file name to your site now the next command is the CH mode not the man change one time and is very similar to determine that we saw earlier the previous logic changed over change mode command changes the file submission on the remote server as opposed to your machine DEL if this is used to delete a specific file on the remote server.

So again this is another command that is used to remove one of the files that you copy and finally the bye command will end your FTP session and they bring you back to the original form

so now we understood how the transfer works and it is a fairly easy to understand although actually the transfer happened but now there is a another question as to okay now we are originally in that / home / XYZ.
That is my home directory but you know the PQR instead of in my / home /XYZ it Is Now in a different directory it is a / home / XYZ now how do we go to that particular direction the local because we already started the FTP session let us look at some of those local access command.
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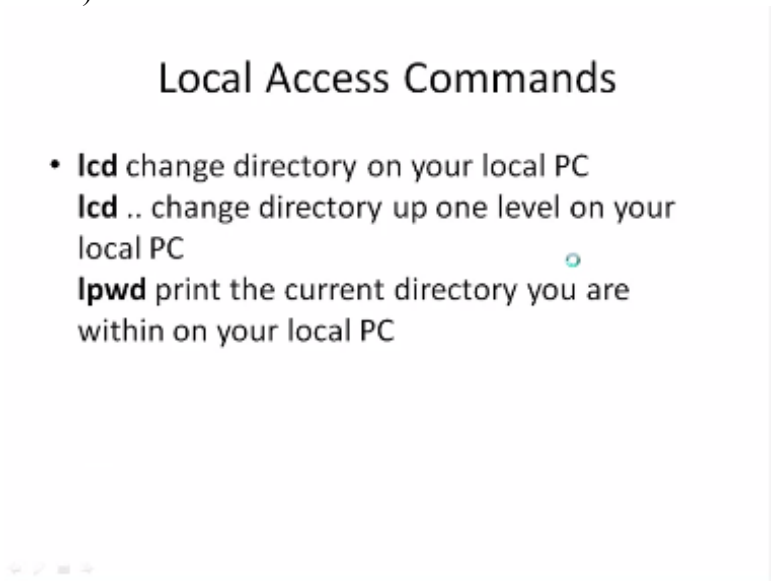

The one so LCD is an are command that can change the directory in the local PC so if you just type LCD although by say NA and then it will take from /home /XYZ or LCD and LCD... Will again go back to the one level u which is / home / XYZ and LPWD will now print out your current directory within your local.
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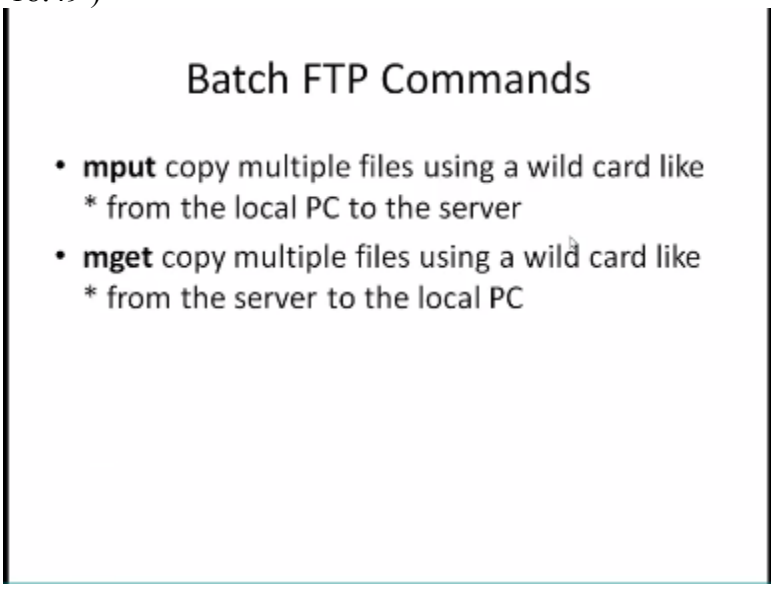

So we can now transfer now what if we have like multiple spy we need to copy that all the files to the server so if TV provides some shortcut commands for input its copies multiple files using y part so they here the Y card which is basically the asterisk which is stand for pretty much all the files in the local PD so all the files in the local PD will be taken and dropped into the server.
With M Put star and M get also copies multiple files from the server to the local PC the game the usage is fairly since it is in get star you so now that we understood the basics of and FTP protocol let us look at some of the challenges in terms of system administrator.
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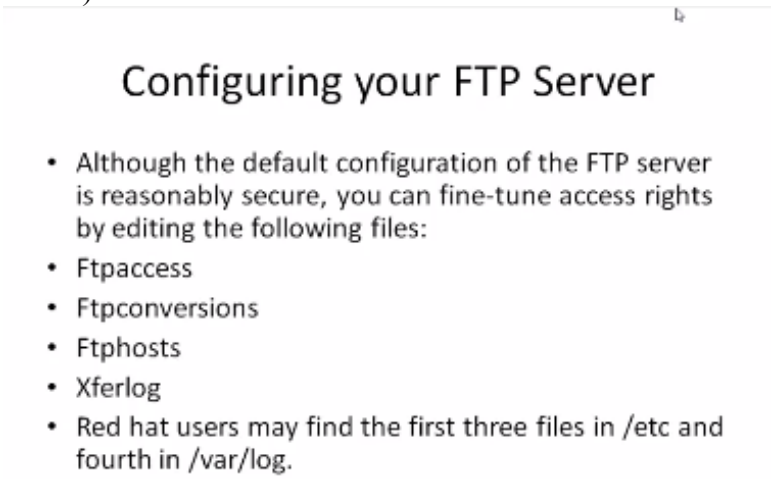

So the first thing is to configure the FTP server so here you can actually configure I mean this these commands actually lists here are how we can configure the FTP server so that we can fine tune some of the access rights available for the users so once that command is the FTP access you which will set the axis from the flashy TC file essentially so the this is actually in the FTP access the CPL file this is a simple point.
Which can actually use which you can use it to deny or accept certain posts from where like I mean you need to you can receive or send that is actually usually make receive the request this so essentially like I mean this the access lets you to allow or deny and also like specify most specific corporations like literally right only and then the users only group only and permissions that limit the FTP access form or a particular group or particular here this.
The that strives to an entity you this also like I mean you can use this command actually to control the access at the directory level essentially so you can you can actually use the FTP access to specify for a given directory or given file what should be the access rights what there,

in the other commands are the FTP conversion the FTP hosts the transfer log which is X log and then the essentially like I mean the in red hack initially installation.
The users can find these files in the /ETC and then the last one the transfer log in the / var / log as I mentioned like so basically the FTP access will be AEL file essentially.
Which tells the users which files are accessible which directed the rack to put say database files in to back down that those directories you so the FTP conversions and we used to change a particular file into the various things we City for example you can compress the file and digit the file things like that the again you can also like use the FTP host essentially like I mean use particular the type of hosts or that or which host and receive the FTP messages That is decided that is stored in this goes for fine.
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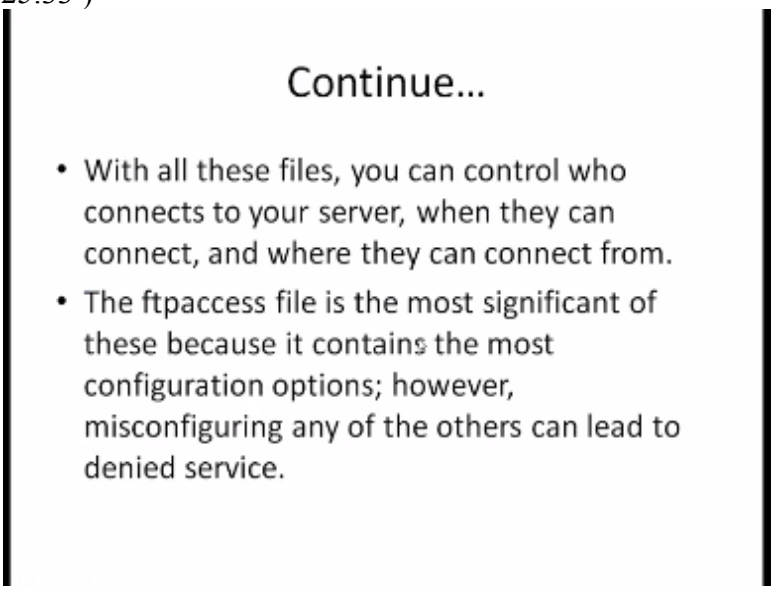

So with the D files you can actually control who is connecting to your machine then they can connect where they can connect and also the we saw that the FTP access is using the FTP access file you can also limit what can they access so in that way like I mean FTP File is the most significant because it contains the configuration options and if you miss configure those files that can also cause a denial of service And some of the viruses you can say think of it they can actually always like change the FTP access file so that it can parse a denial of service again.
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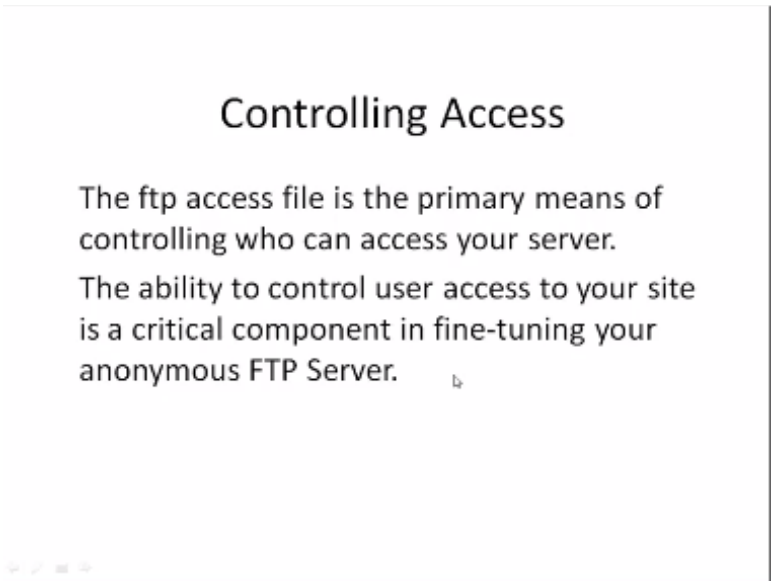

The FTP protocol is kind of used it is supposed to be very secure in this end box it is not that easy to get into these systems so even though that you may think that okay this can be easily affected number one is the FTP access is for use in this specific situation where you want a large file transfer and then the second thing is it is already like quite secure so you would not be able to do it kind of changes to go.

If to be access files so FTP access file is the primary means of controlling who can access the server this we saw already the ability to control the user access is the critical component in fine tuning the anonymous FTP server again the anonymous FTP server we talked about it in the previous section which is essentially this the FTP server where you can log in as an anonymous person and then control it that way Basically like do this do the transfer that way so now let us look at some more details regarding go how do we do this for FTP access.

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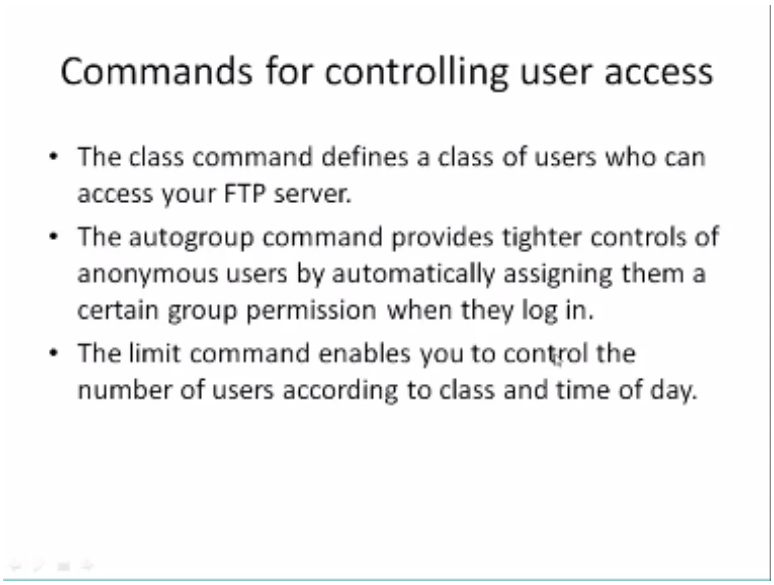

So again the we talked about the user access essentially like a minimum the way that we want to control the access is by defining that class essentially the class of users so one is the class command itself defined the class of users who can access the FTP server there is also the auto group command which provides title control of anonymous users it does this by automatically assigning them to certain a certain group permission.

So when they log in and say that okay hey they are treat them as same similar to my X group so that they inherit all the permissions that are available to the X group users and then the limit command essentially enables one to control the number of users according to the class and time.

Will be so if they belong to a certain class and then basically let them in that can also say that opening or this time of day.

I want only like ten users who can do it and this is usually like I mean this is a limited through the hardware availability so how many ports that the user can open up in a machine will limit the number of people who can access machine or directly like at the same time this essentially So let us look at some more commands for controlling this user access.

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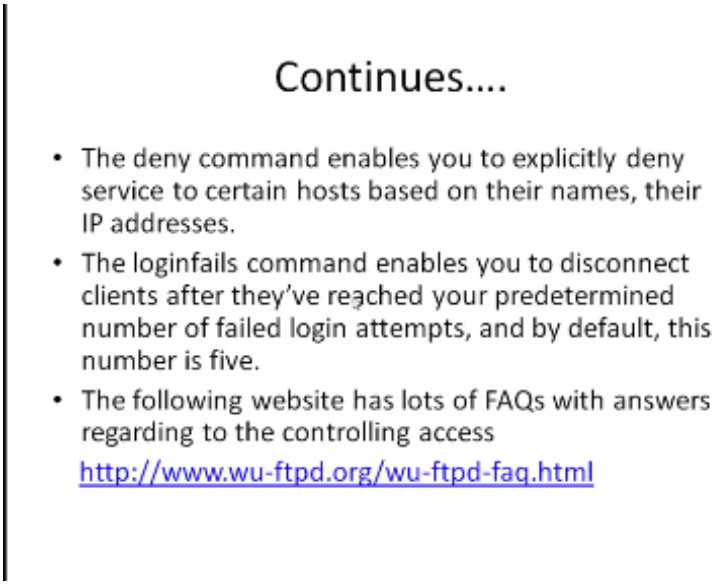

Now deny command essentially like I mean this one specifically tells like which users or which hosts to deny, so again this is basically like you can limit them by those IP addresses and then the login fails command enable or want to disconnect the clients after they have reached the predetermined number of failed login items typically by default in this number is four five there is this website which has a lot of FAQ.

I also find it that some of the IBM sites are interesting and has a lot of lot more information so again to recap the FTP access is limited through this FTP access control file Which usually we keep it under / ET c / FTP active CPL we may be able to actually access this and try to find out what are the increase in that file the entries are usually these commands we talked about in the Last three sections the slides the commands usually are allowed deny read only write only read write user only group only and then there are two other commands as well that we saw earlier.

So allow I mean they typically like them in the way that you will be the syntax for the FTP access command file is keyword followed by the value and keyword it is usually like it is one line the keyword :, value for more value , value so you can specify saying that allow and then you can all in post one post2 post three whereas those holes are the IP addresses of variables you can also say like I mean the read only and then you can view the directory name.

And so that those directories are kept as read-only and then you can also say like the user only and there are other commands Harold and MOTD or not be these things essentially like I mean you can specify and then the way that you can control like I mean with a particular user can be given a group permission it is essentially like I mean you can use the user only command and then again that that has the username all the usernames.

And then you can specifically say group only and then the group name the anonymous user essentially like I mean it is also like I mean you can specify the anonymous form in the user only and then that usually like I mean the username is form you can get it from both / equals false password I gave you an exercise so like last week to actually use this /et / password I hope you did their exercise and actually found out what is inside that / e TT / password.
Which could give you more insights as to how to what are the user names and then the group names similarly are stored in / people / group so you can see that actually like all these four different access level item are stored in / EDC which is under the root directory , so now let us move on let us look at how we can control the permissions.
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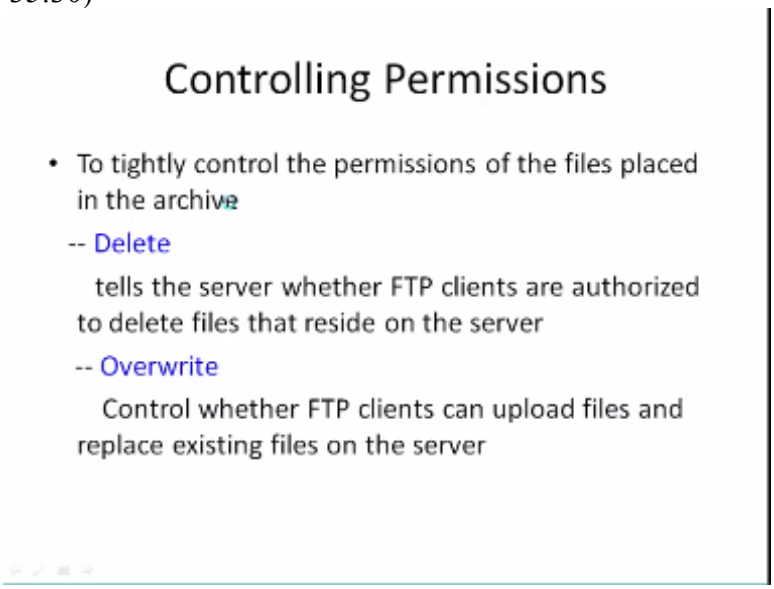

So we have the some more commands essentially which is delete which tells the server whether they FTP clients are authorized to delete files that we said on the server again continuing that these are other commands which we can code in so that that is explicitly tells whether the users can be able to delete some file format and then you can also have overwrite which controls the FTP clients whether they stick with lines and upload files and the replays What is already there in the system , then we have other command also.
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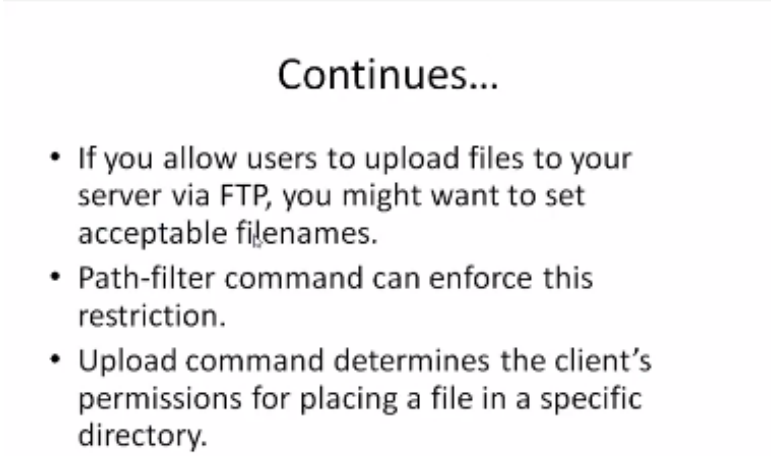

For example the fact filter command which essentially enforces or restrictions on the filenames that can be uploaded so if somebody names some file name as file name with extension they can focus on the other things that we can control using the context command um so we can Only allow certain more than okay virus file contains the extension yes then let us say again books than the file so that we can filter only I do not have that extension the upload command determines the clients permission for placing a file in a specific direction.

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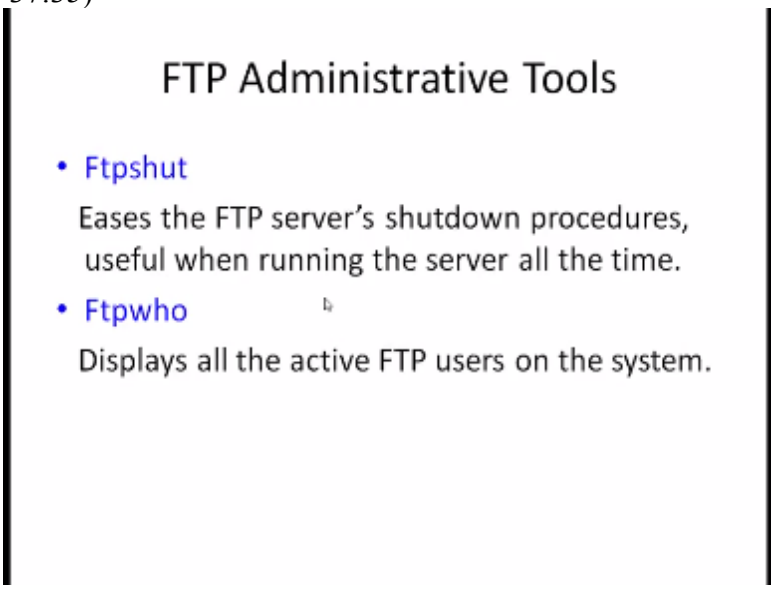

And let us see some more at the state of command one is the FTP shut this eases the FTP server shutdown procedures so essentially like I mean it is useful when running over a 50 server all the time FTP who displays the active FTP users in the system, so again the FTP shut FTP shut

actually displays the automated shut down so that quickly you can disconnect the FTP server take it offline.
It actually creates a control file in the same / etc area that is called the /etc screen slash shut MSD this is the shut message again this particular command has the various arguments as well as options so I will ask you to take a look at it in the sense, now there are a few more commands actually I will briefly talk about , one is the FTP , DCTL this is more like a control program or professional file transfer protocol .
And this control program is used to control the demon when it is running so essentially like I mean to so that is another way to another one that you can use, then FTP counts is another one.
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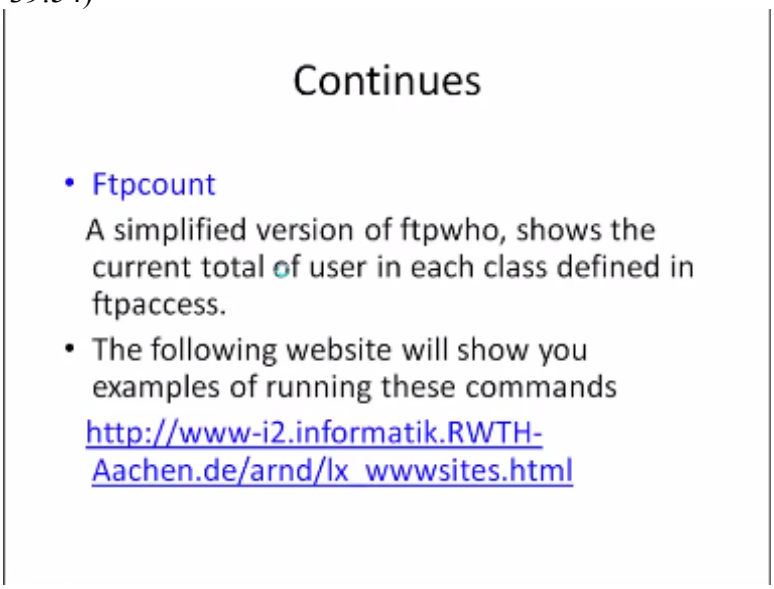

This actually gives just the current number of connections for each of the FTP sites essentially third this shows the number of connections per server and also the virtual host and anonymous configuration as defined in the confirmation part again please look at this website to get more information regarding more commands then the other one is the FTP top which displays the current status of the FTP session and it also again is very similar to the top command.
That we learnt the beginning lectures this also continuously updates and then you press Q to fit the system, then there are other commands attention FTP, FTP quota Manage much our user can pay FTP scrub is another one which removes the scoreboard file or the profit for FTP command, so as I mentioned the FTP program and have like multiple flavors for the SFTP that I mentioned more just the regular FTP and there is also like something called WUF STP.
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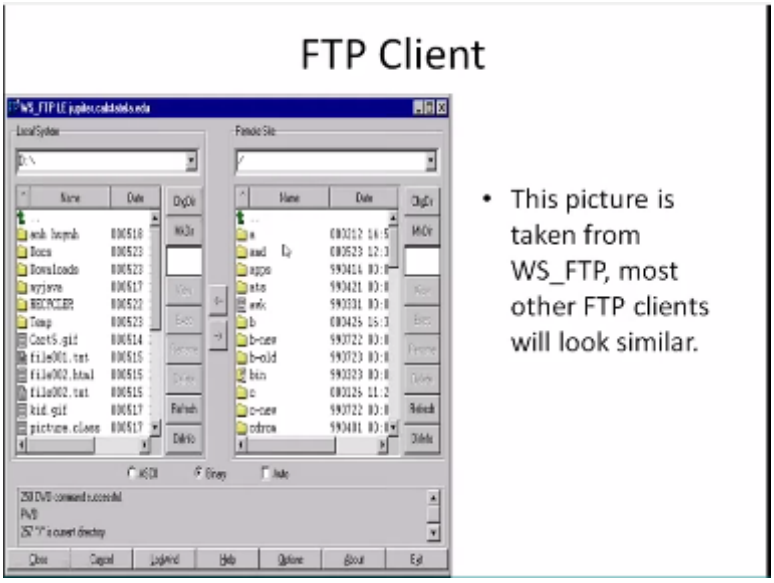

So here this is essentially the WSFTP is more UI based system where it shows both local system and the remote system and then you can actually use the GUI to navigate to various levels even though like I mean the it says that the other FTP client is very similar you can think of like just the FTP is the basic one which is not having a UI and then all these things are much more fancier and they have the you I saw and I shown.

So I think the we come to the end of this lecture so this should give you a good overview of FTP so we started by looking at ATP and looking at how we can actually do a file transfer mainly like we studied the how to initiate the transfer through FTP command then how do we use this amount like CDPWD to look at what are the things that are there in the remote side and then we also study how to transfer the files using the put and the gate commands.

And also we did that as a ASCII and binary then we did talk about how to navigate in local context of FTP if you are using this one of these or the newer we faced a FTP and WFTP you do not need to know those commands because you can easily move from one directly to the other using the be itself so then we went into like the administrative mainly we looked at the four files that are used for controlling their axis of FTP.

And we learn more details on our regarding FTP access file so how do we write how do we code in the things so that it can take in like a minute and give permission 7 users allow certain people deny certain one and then also like change the group permission or an allow for user so then we also like to learn about various FTP commands from the administrators perspective.

How they can use it one thing that we know this was all for these files are detailing in /etc area which is very common for Linux to usually find these files and work on them finally we look at this new rating clients like WSFTP which simplifies a lot of people in an both because

performance so I think that is pretty much it for today we will take it up from this point in the next lecture thank you very much for listening.