Computer Networks and Internet Protocol
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Lecture - 09
Application Layer – IV (HTTP, HTML, TELNET) (Contd.)

Hello. So, we will continue our discussion on HTTP, HTML and TELNET. So, as you have as we have seen that that HTTP clients are it works on a clients server mode. So, HTTP client typically browsers will request to the HTTP server which are web server. And it will reflect it will basically respond the web document to the things right. So, this documents are typically in a formatted in a in a hypertext markup language right. So, this is a structured language which allows a parser or HTTP which is there in the HTTP browser to look at the document and appropriately display the document on the screen right.

So, what we will do as these days HTML are taught a from the school days itself. So, I believe that most of you have some knowledge on the HTML, but what will we do, we will do we will look at a quickly at that different aspects of this HTML document right. So, before that one thing I thought of mentioning which might have missed in the previous lecture that is this a concept of HTTP proxy right. So, this is interesting we will revisit some time at the latter of the thing we will look at the things.

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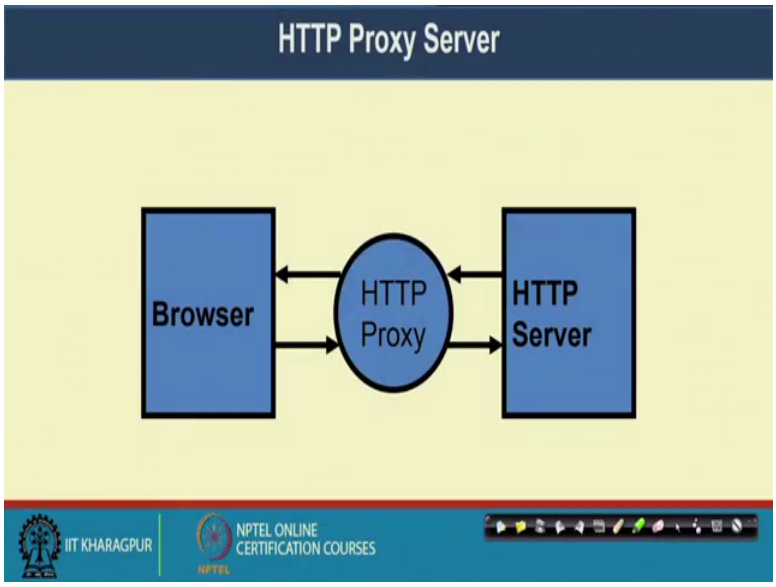

Just to have before going to the HTML, so there is a concept of HTTP proxy server or proxy. So, what it does it proxies for the HTTP server right. So, there are different aspect of it right. So, it can catch something, it can even do some sort of a filtering operations that who will be allowed, which type of data it can log data and type of thing. So, there is an intermediate server which access a proxy server. So, there are different set of proxy server just to mention that there is a this thing called HTTP proxy right. So, we will come to that in a later stage when we will discussed on a on proxy severs.

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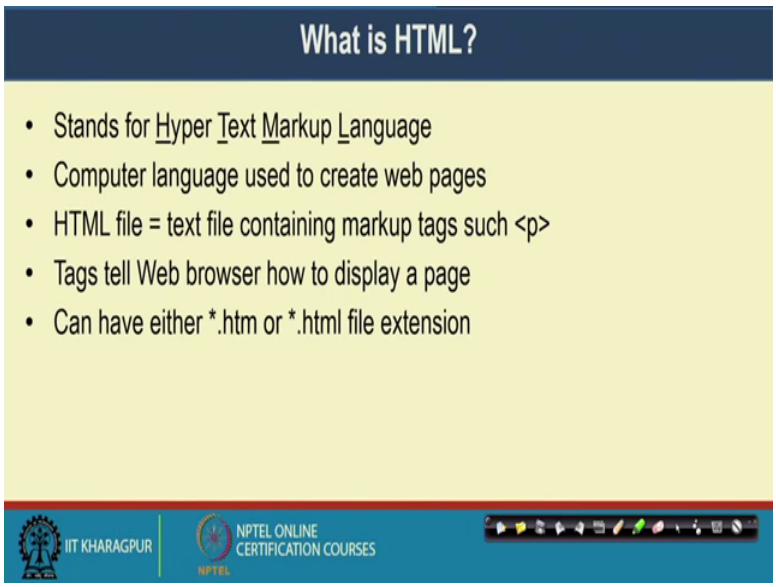

Now, the HTML stands for hypertext markup language, it is a computer language used to create web pages right. And many of us have tried our hand, but these days lot of tools are available. So, mostly we are not doing directly HTML coding, but using some tools to code that. Tags tell the web browser how to display a page right the tag tells a web browser how to display a page. Can have either htm or star html extension. So, the page can be dot html or htm. So, this there are it is a tag language right. Tag means it I will see that there will be an opening tag and closing tag. And the content the tag dictates or tells the web browser that how the page need to be displayed, and in which colour, which format and how it need to be displayed which location and so on and so forth.

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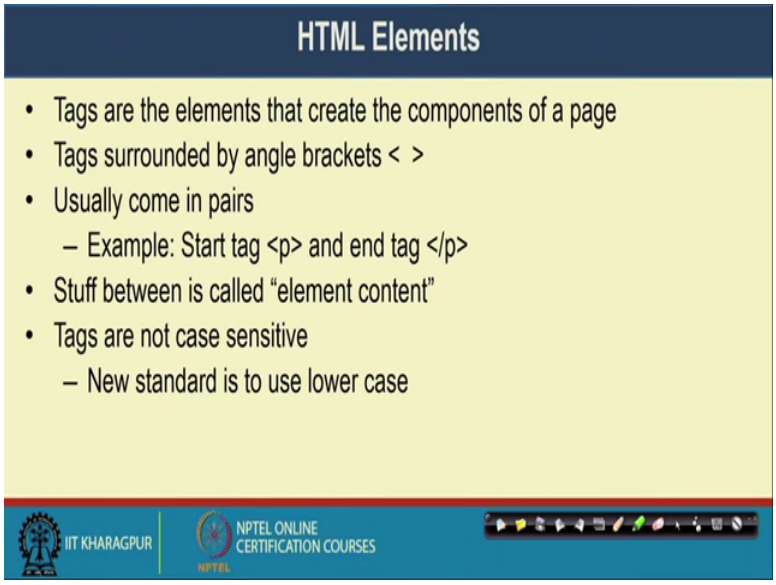

So, HTML elements, tags are the elements that create components of the page tag surrounded by a greater than and less than and greater than bracket usually come in pairs right. So, it is there should be a start tag, and there should be a end tag. So, p slash p, so for say tag for paragraph this is that. Stuff in between are element content right. Tags are not case sensitive new standard to use lower cases right.

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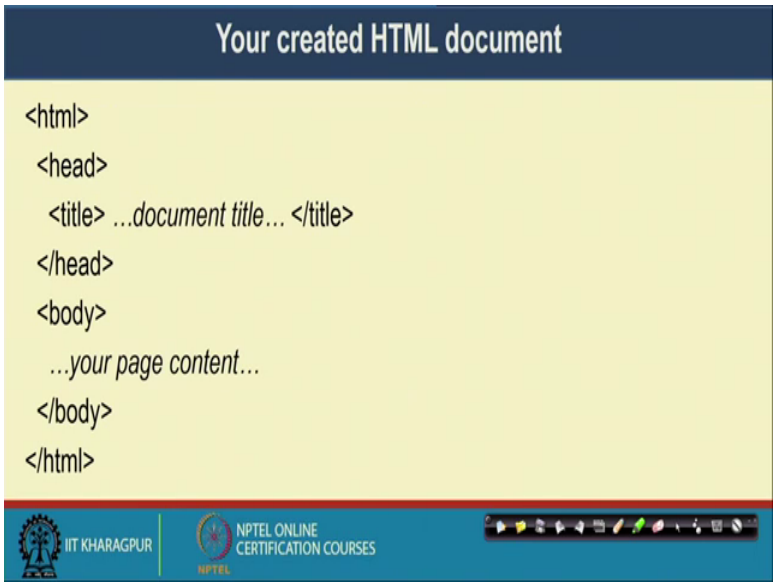

So, like a typical HTML document should have a HTML tag of HTML and slash HTML with source it is a HTML document. There is a header which you can give head that tag, and header can have title and other things, there can be a body or content tag.

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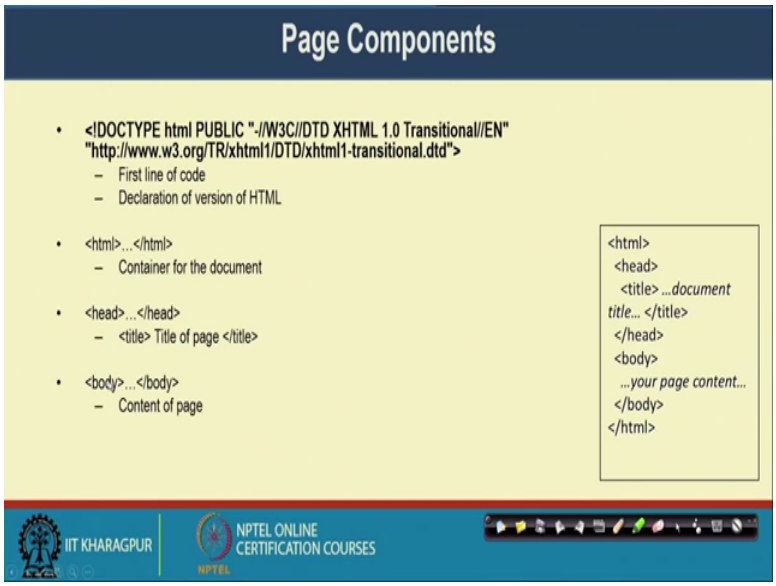

Right like what we see here like these are document type definitions which is in that DTD which defines that what are the things can be defined in HTML. And if you look at that HTML, HTML are the container of the whole document. Header is the title of the page right body of the content of the page. So, it comes up like this.

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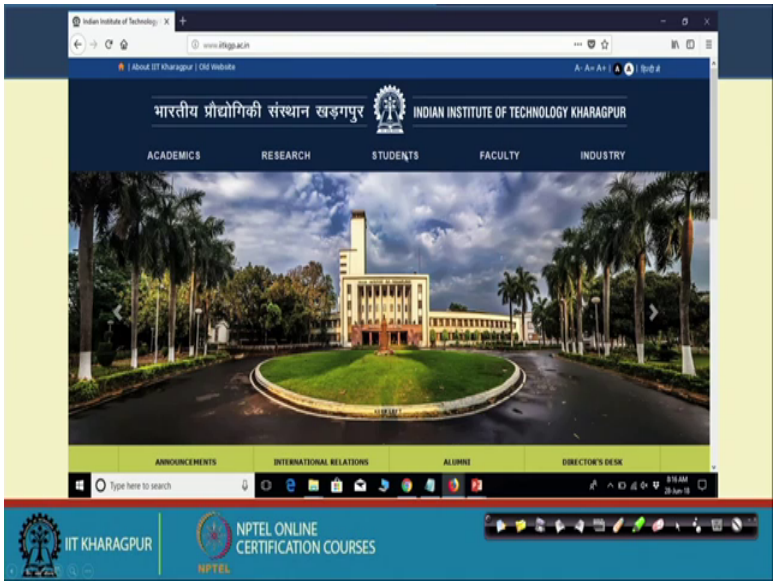

Like if we look at the IITKgp page. So, here if you see that is a particular title of the page is being displayed like which Indian Institute of Technology Kharagpur and type of

things right. So, the finally, the thing which is displayed by the browser is a HTML, some form of a HTML page.

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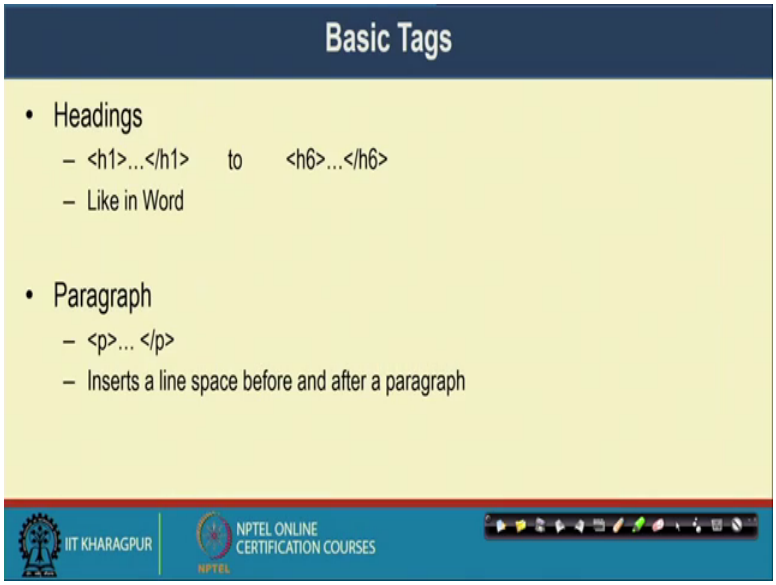

So, there are different tags it is first of all not possible to discuss all the tags and it may not be necessary also. So, those who are working on writing HTML should refer a book or web document some web documents to write thing. So, and there are different good tutorial one that is the one of www consortium or w three schools are excellent tutorials are there to for beginners to look at it. So, some popular tags are mostly used one is the heading. So, you can have different level of headings like a in word document (Refer Time: 05:36) and there are paragraph in certain line in between and before the a paragraph.

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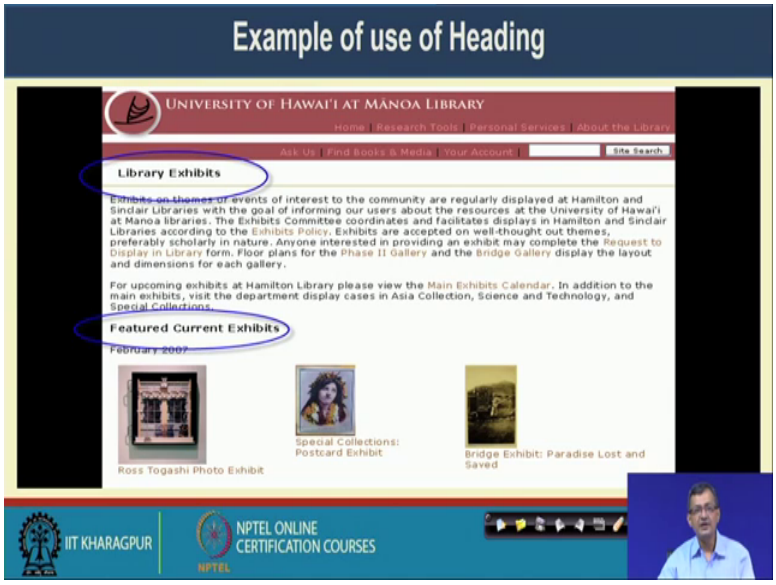

Like here are different types of headings. Similarly, we can have different type of paragraphs also.

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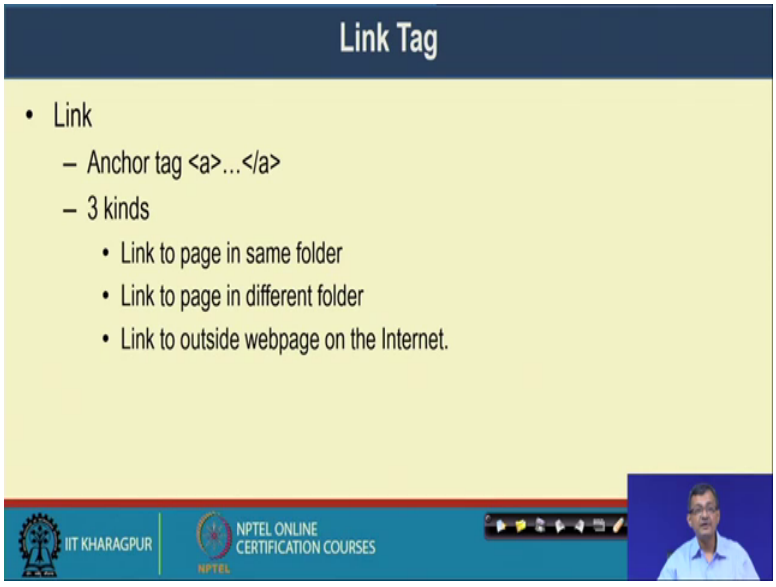

There are other tags which are interesting what we say link tag right. So, one document linking to other and type of those. So, three types of link. Link to a page of the same folder right, you can link to the same folder; link to a page of a different folder; and link outside the web page on the internet. So, it can be in the same folder the link is there. So, it can be some data to be popped up or image etcetera. And something in a different folder, so that link, but within that page or something can be totally outside the page domain itself.

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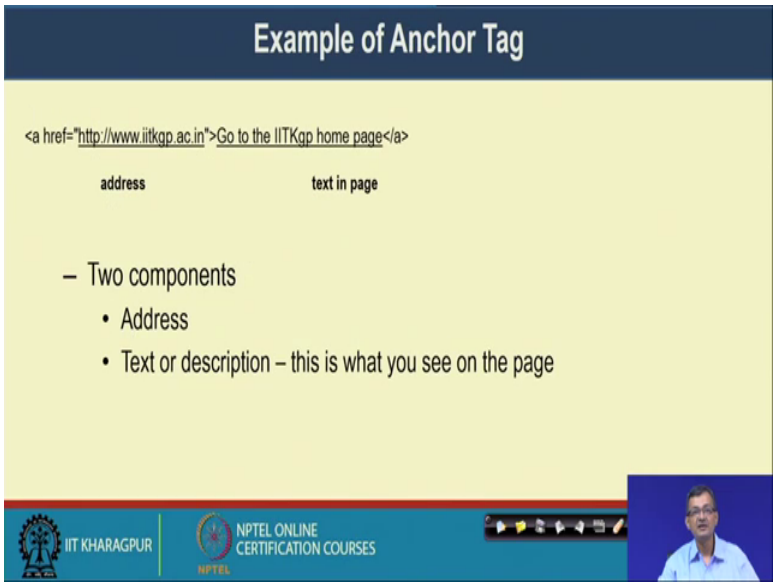

So, similarly it is like a if I have that link a href www IITKgp ac dot in then go to IITKgp home page, so I can have this sort of a linking to the things. So, two component, one is the address and the text describing the component. So, what we see that the text will be some sort of a hyperlink where if you click it will go to that particular page.

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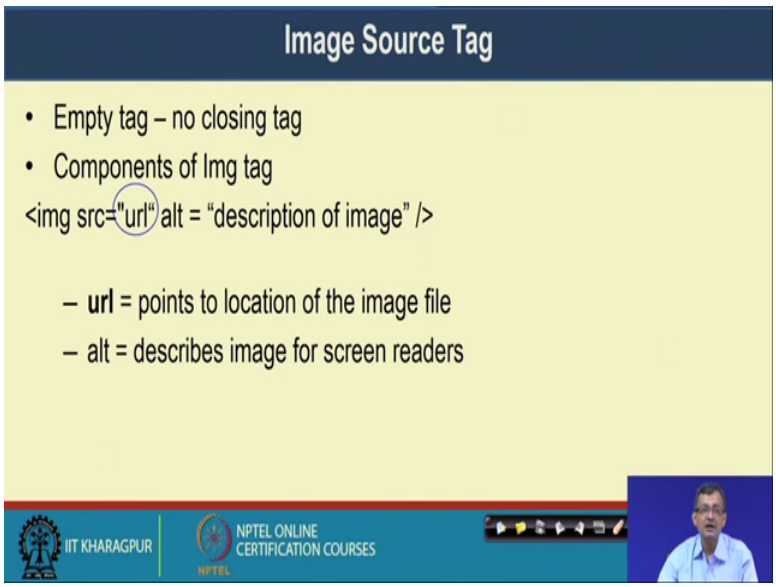

And we can have different things we can have image resource tags. So, empty tag no closing tag here. So, it is image source is the particular url. So, alternate is the description of the image. And url the points to the location of the particular file which

where the file is there it points to the things. And alt describes the image on the screen reader right. So, what is the description of the image on when we the description is given on the thing right. So, I can have IIT Kharagpur, say (Refer Time: 07:26) image or I can say something some other particular region image other type of things.

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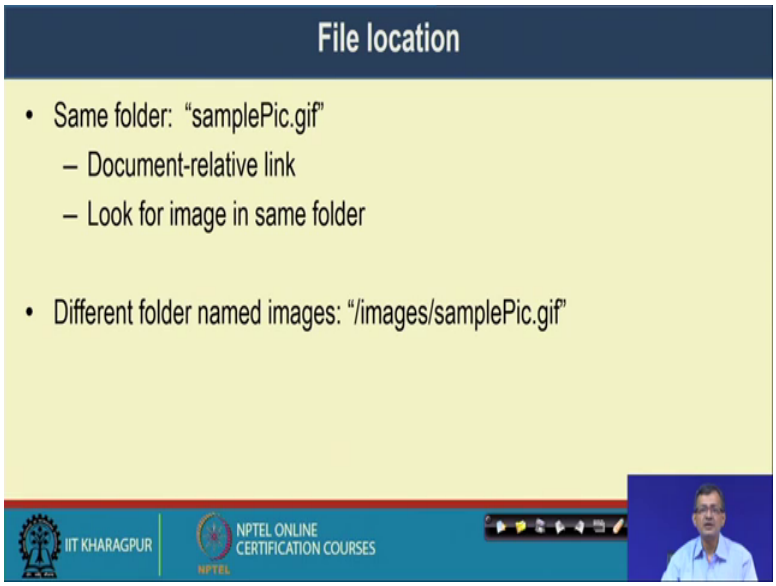

So, in this one example that same folder sample Pic dot gif document relative link; look for image in the same folder different folder names. So, I can have slash images slash samplePic dot gif. Either it may be same folder or in a different folder in that case I have to specify the particular folder.

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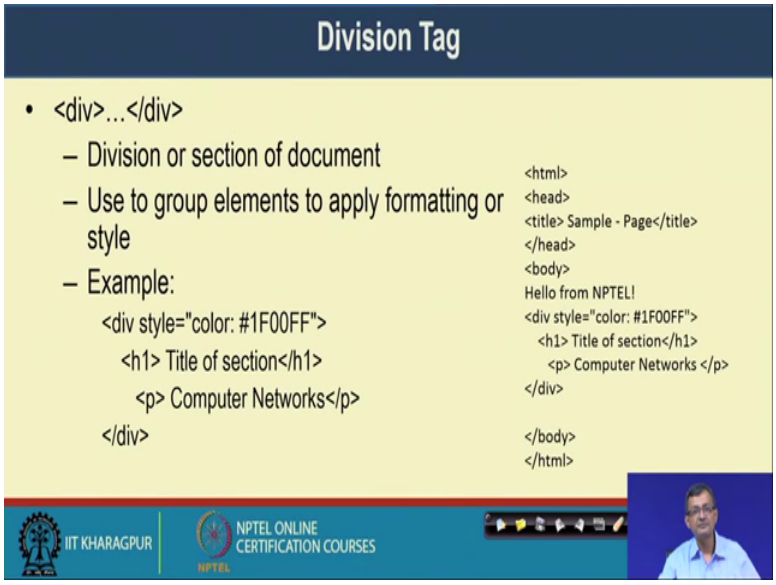

So, this is another thing division or section of the document. Use group of elements to applying format or style example div color, say title of the section, say computer network like here we have written a page. Say if I try to show you say I open it in a note pad and save it file save as so I saved it on the desktop. Say I say sample HTML say 1 dot html right. So, this is the file name I saved.

And if I go to this particular sample file where it is saved, let me just check the file where it is I let me save in a another folder. Open file, save as in the desktop I have a folder called SKG sample 1 dot HTML we can save. So, now, if we go to that particular folder then we can have those data displayed. So, let me check where the SKG say this is the sample I opened this open. So, this is displays, hello from HTML that if you if we look at we it was there right sample page, then hello from NPTEL particular color change in a section etcetera. So, it is getting displayed out here. So, not a good looking page, you need to have a good aesthetic of having that page to be displayed nevertheless you can write a very simple page just like that right.

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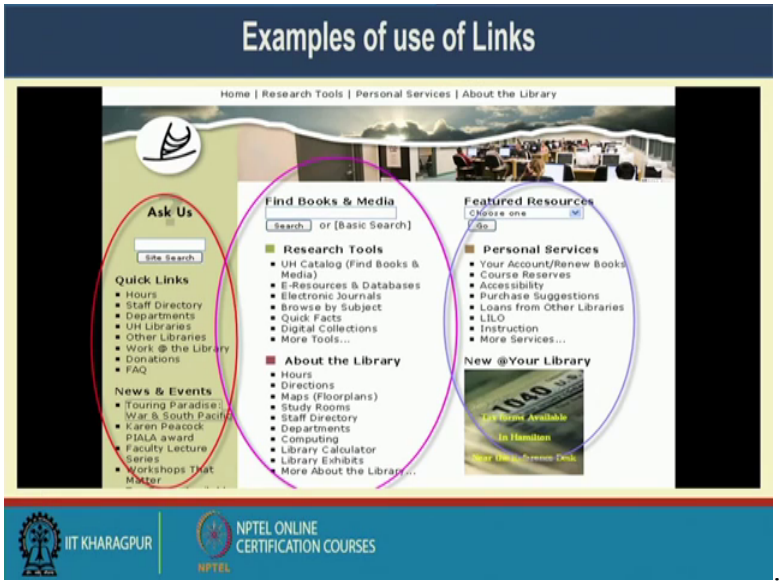

Like it is, it will show us like it was showing like this. Similarly, I can have meet my pages having like in this particular example page that different important links etcetera, I can able to display source links right.

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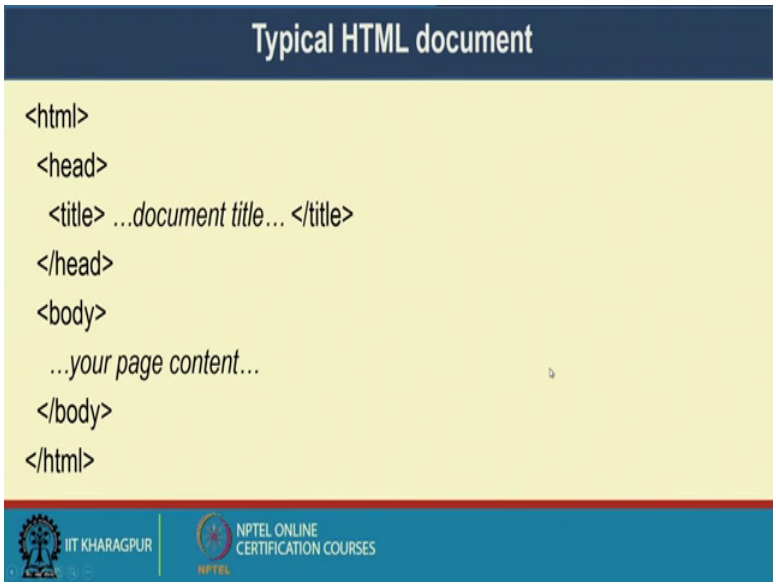

So, this is if we look at it a typical HTML document which have a title header your contents and so on and so forth.

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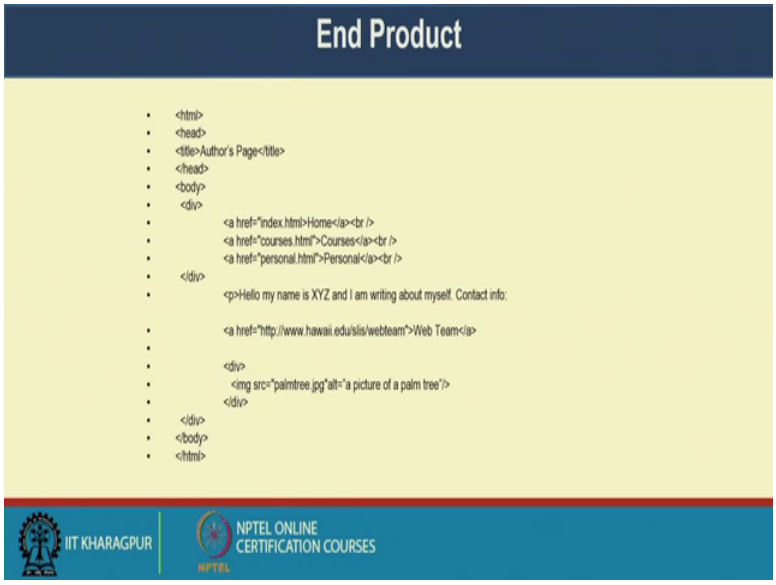

So, here is another page where the if we write that document I can have this sort of a document here. Again we can look at this particular thing. Say if I copy these, file save as let me save as a html 2 dot htm, save. Go to that folder now let me go to skg and then this is the array. So, course says personal xyz and I think something is there say there is some error so that is showing something some wrong or things are there. So, it is more of a other than the syntax, it is if you find it is more of a if your aesthetic sense which makes a page more appealing and type of things. Definitely a contact content syntax technology is there, but designing a page is more of a aesthetic of the of the person who is designing the page, so that that the html.

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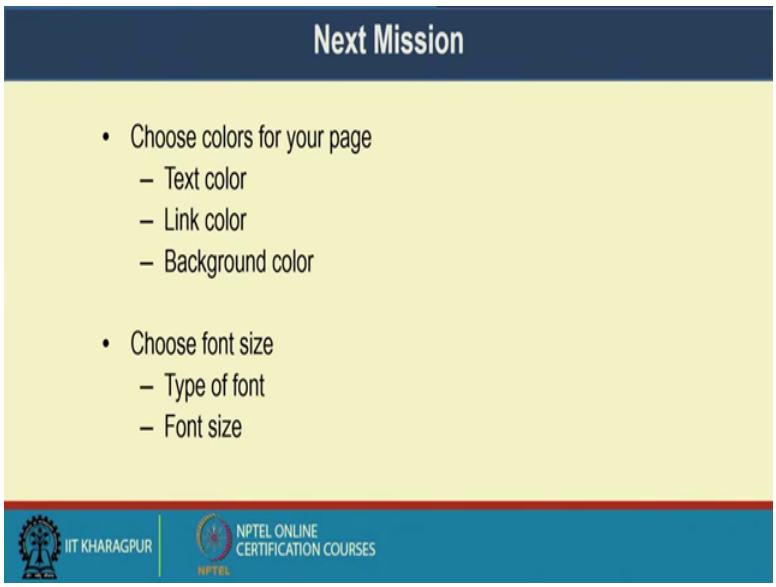

And we can have different type of things next color text color, link color, background color, choose font size and type of thing. So, lot of text level things are there. So, with this we now try to look at this covers our http and html basics. Some of the aspects we will be revisiting rather in different cases we will be again picking up some of this aspect. So, the next thing what we want to discuss is that another protocol which is called TELNET. So, what we have seen protocol called DNS, http one we like to see this protocol or FTP and this another very protocol for TELNET primarily use for remotely logging in to a system. So, I can TELNET to a server to another server at a at the other end of the network or in the same network or a different network.

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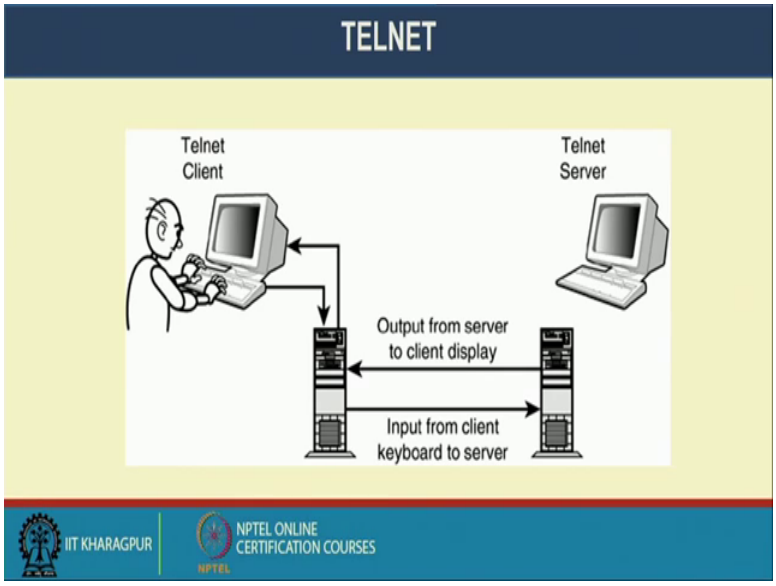

So, if we look at it, so there is a telnet client and there is a telnet server. There the client request goes the input to the things, it open ups takes the action on the things and return it back. So, if I say that the client program is telnet, the at the server there is a telnet server should be dynamic. Typically what we say it is a telnet d daemon. So, something the protocol is telnet; and the application is also telnet. Like if I say the protocol is kept a HTTP the application is small HTTP type of things or the client is there server is HTTP there, here also there.

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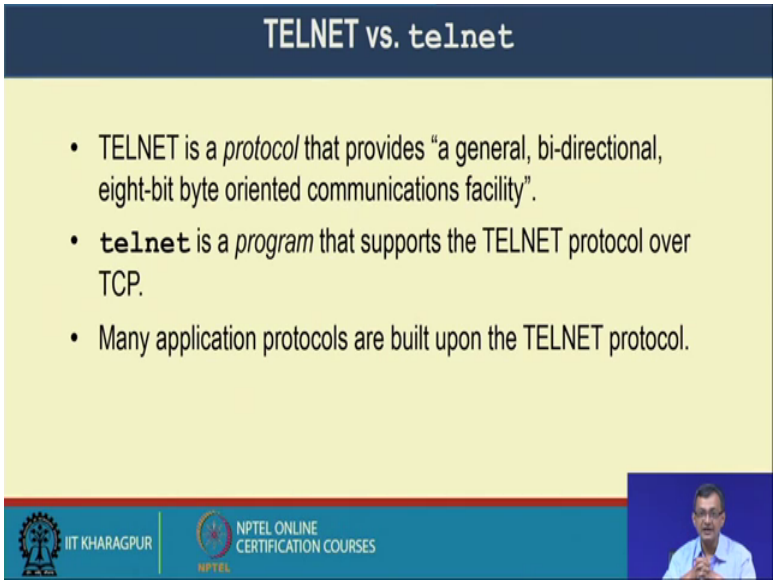

So, just to show the thing to telnet is the protocol that provides a general bidirectional eight bit byte orientated communication facility. Telnet is a program that supports TELNET protocol over TCP. So, it is a connection orientated service. Many application protocols are built upon the telnet protocol. So, I can built telnet as the some sort of a piggyback on telnet and built different applications underlining it will be using the TELNET protocol right, because it has a TCP orientated connection it is a bidirectional connection and so forth. So, name several protocol exploit this TELNET protocol

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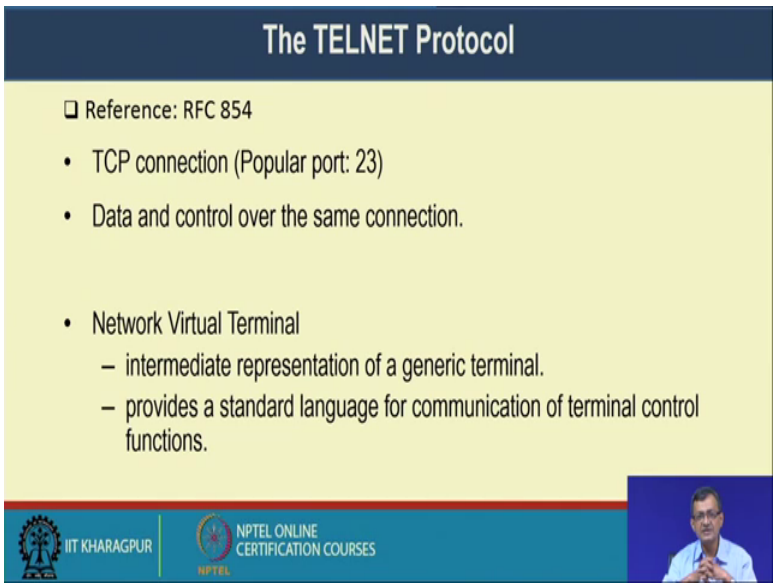

So, the RFCs 854 TCP connection, the popular telnet port is port 23, but I can do telnet in other port. Like a way I have seen in the HTTP also the well known port is port 80, but

I can do in different port here also. Data and control are over the same connection right. So, there is a another term comes into play while we talk into telnet is the network virtual terminal. Intermediate representation of a generic terminal, provides a standard language for communication of terminal control functions right. So, it is a intermediate representation of generic terminal, provide a standard language for communication of terminal control function, so that is a network virtual terminal.

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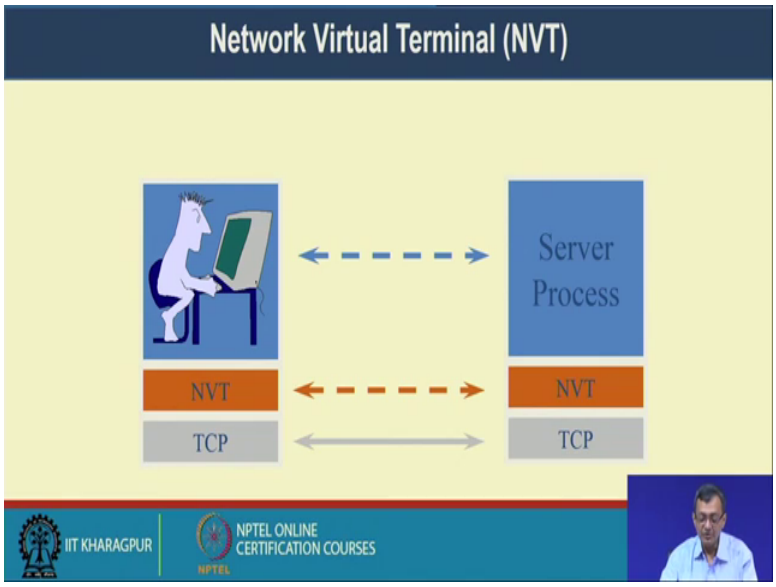

So, like that what we see underlining TCP is there over that NVT is there, over that there are different server processes right. So, what we have TCP, NVT server processes, and this communicates with the server processer, client communicates with the server process right so that is the telnet. If I look at it is the telnet client which is looking at the client server intern they have both have this NVT or the network virtual terminals. So, as we have seen intermediate representation of a generic terminal, so that it shows because telnet at the end you are trying to open up a terminal at the other end right.

So, from here you are trying to open up another terminal work on that particular other machines. So, this is there. Provided standard language for communication for the timer control function otherwise there will be lot of problem with the escape characters and type of thing. So, it provides the things. Underling the TCP is there that is the connection orientated transport layer functionality.

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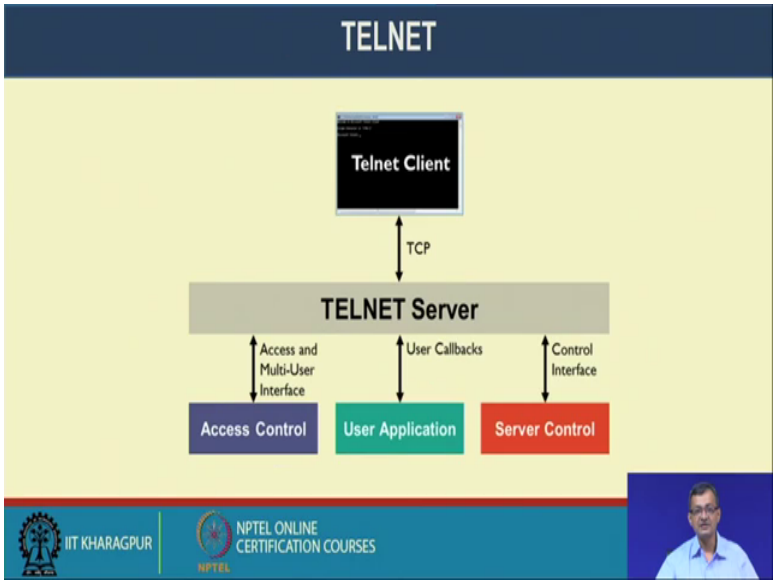

And if you look at the TELNET server have different type of things one is the user applications right, another is there are different server control or the control interface. There is a excess and multi user interface right. There are there can be multiple multiuser interface or telnet into handle that. So, the client when it connects, it is connects to the server and server takes care of those at the background thing.

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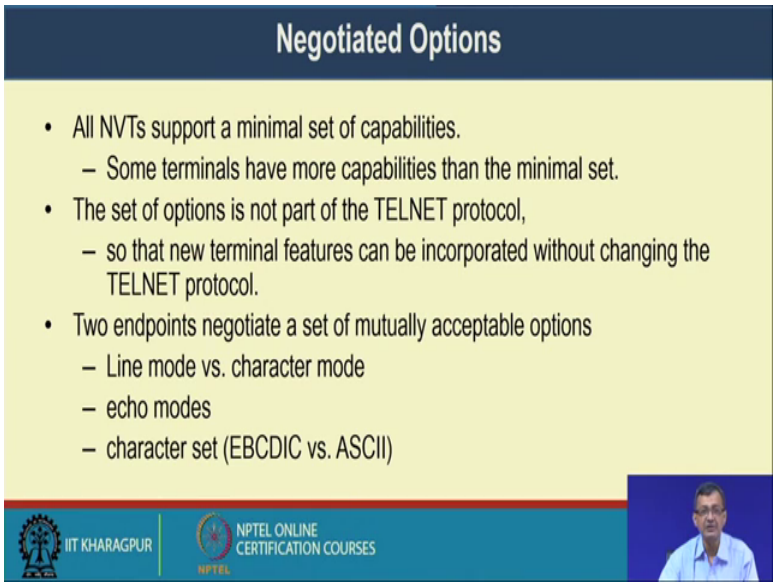

So, there are several negotiated option that all NVT supports a minimal set of capabilities right. So, the whichever is the system and type of things, it should support a minimum set of capability. Some terminal have more capability than the minimal set that is absolutely no issue, but they should have a minimal set. The set of options is not a part of

the telnet protocol. This options are not a part of these things, so that new terminal features can be incorporated without changing the telnet protocol. So, it TELNET protocol is more on making this communication to happen over this net right.

So, if you are increasing option or changing the option that is without effecting the telnet protocol. So, it detached it and gives a better interpretability. Two end points negotiate a set of mutual acceptable options right, so line mode and verses character mode, echo mode that whatever is there it a echoing back there is a character set EBCDIC versus ASCII and type of thing. So, they need to the end point need to negotiate mutually on a acceptable option; otherwise whatever you are keying in need to be transmitted and executed to the other end that will be a serious problem on that.

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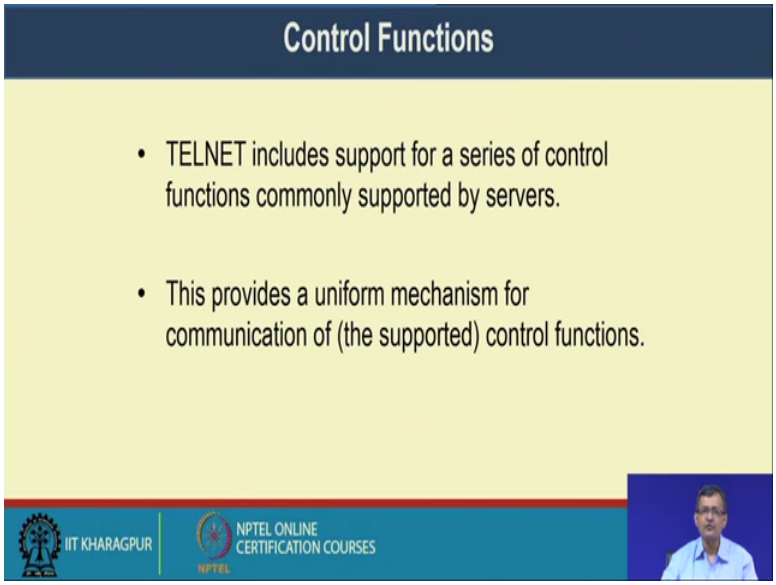

There are several control function. The TELNET includes support for series of control function commonly supported by the servers right so series of. This provides a uniform mechanism for communication of control function. So, there is a set of control functions, which are supported by the server. And this control functions allows this overall communication thing to happen right.

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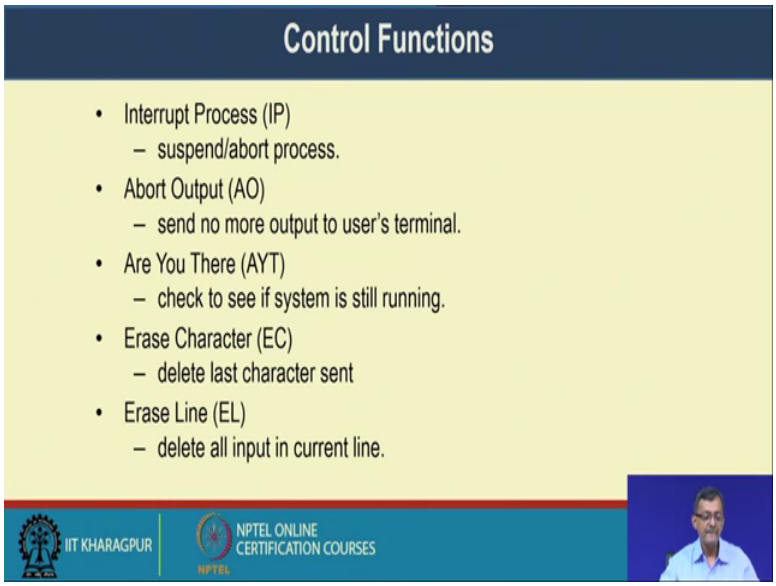

So, some of the control functions are here, like one is Interrupt Process IP suspend abort process; or abort output sends no more output to the user terminal. Are you there, some sort of a are you alive type of things check to see if the system is still running. There is Erase Character or EC delete last character sent right. So, there is a erase character control function, because there may be need to delete the last character which may be something extra character is coming into. Erase line delete all inputs in the current line right. So, these are the things which are which are different control function a set of some sample set of control functions of the TELNET.

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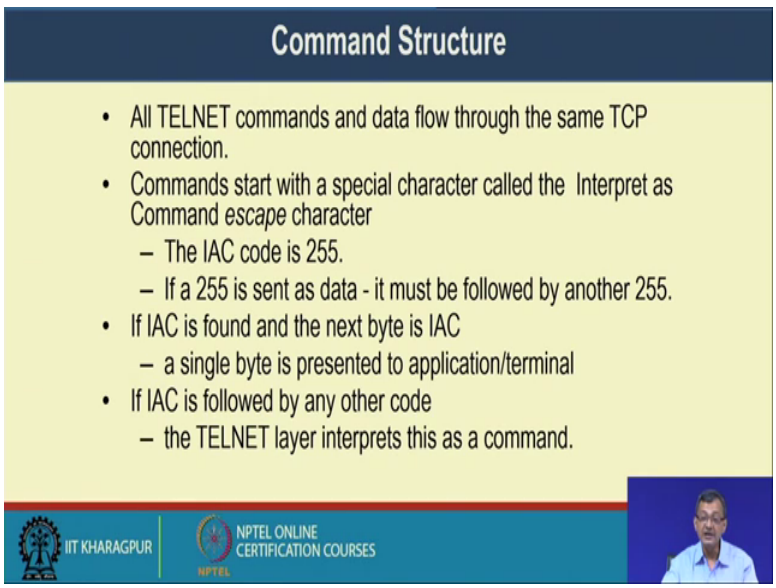

So, all TELNET commands and control flow throw the same TCP connection. So, there is one thing. So, there is no separate data and control connection unlike FTP right there was port 20, 21, one is data for one is control type of things, they are the same TCP connection. Commands starts with a special character called interpret command escape character or IAC code. So, there is a called IAC code is typically 255. And if a 255 is sent as data, then there should be followed by another 255 right. So, if the data itself is a 255, then it should be followed by another 255 if the IAC is found, the next byte is if a IAC found, the next byte is IAC, a single byte is represented to application and terminal. If IAC is followed by any other code, the TELNET layer interprets this as a command like. So, IAC after that there is any other code the TELNET interprets as a command and try to execute it as per the protocol for that commands or the rules for that commands.

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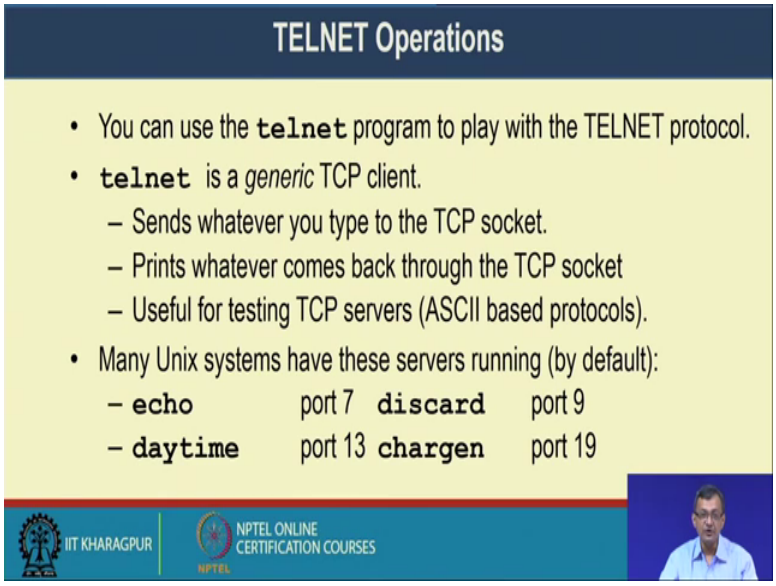

So, you can use telnet program to play with TELNET protocol right, or to work with the TELNET protocol. Telnet is a generic TCP IP client right. So, it is generic TCP sorry TCP client. Sends whatever you type on the TCP socket prints whatever comes backs to the TCP socket, so it is a very simple and vanilla type of things useful for test testing TCP servers ASCII based protocols right. So, there are different TCP servers which you can useful for testing. Even I can test say mail server. So, mail like SNTP is typically input 25. So, if I say telnet some mail, server port 25, it will respond back right. So, this is this is a mode of a I can we can roughly say it is a mode of a carrier protocol which

takes the things and get the commands (Refer Time: 21:49) if that particular thing is allowed in that particular other end of the server.

So, many Unix systems have these servers running by default like is one is echo server which runs in port 7; there is a discard server which is in port 9; daytime server which dispose with the day time is port 13; chargen server which is at port 19. So, these are the different servers which are different Linux systems run by default.

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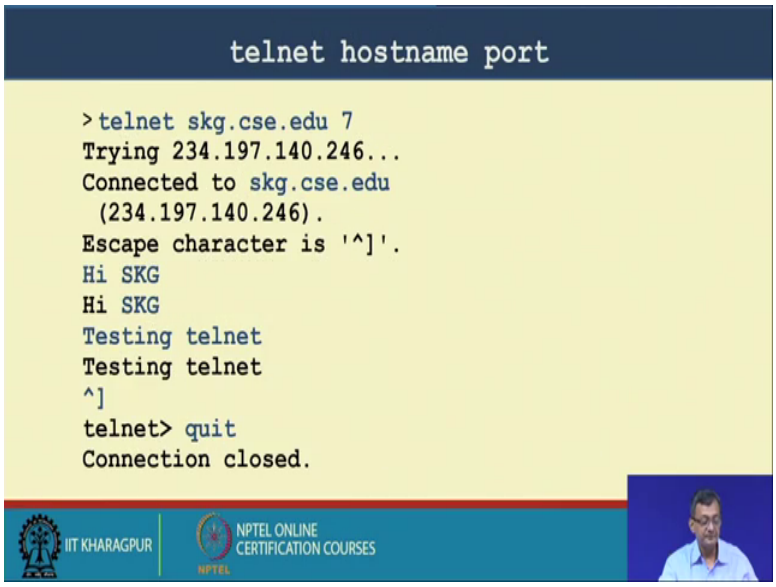

Like here if we do a port 7 that is echo server and give something then it response back like I say particular this is all fictitious thing means not mean some what we say example scenario telnet skg cse dot edu nothing as such nothing is there means no such server. So, it tries to the IP and then once it is connected, then it gives that particular escape character. And whatever you give it gives you a returning it back. And then once you quit, then it closes the connection. So, echo server is very handy to see that how whether that particular telnet server is running or not at the other end and whether it is responding properly. So, is a first level of cross check on the whole system.

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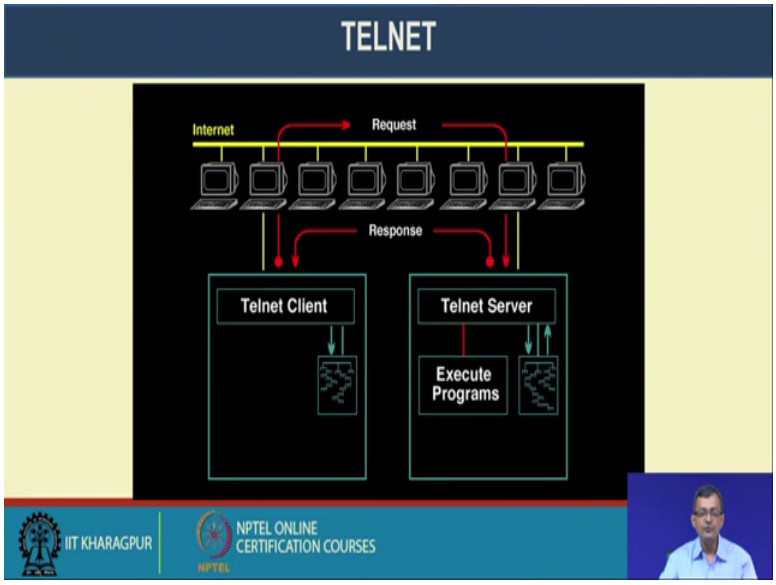

So, if we look at this particular telnet scenario, so it is it is basically what we have say I can have a telnet client and one end and the telnet server can be on the same system or in a different system right. So, what we do telnet to a particular server and then I can execute some program right. I can access directly etcetera here right. I can telnet to another server to a particular server and excess the things all provided you have the access to that particular server, so that means, if not only the requirement of the client telnet server, there is a requirement of authentication for that or what we say the user should be authenticated other end. So, when we you go for when we do a telnet, it usually replies it approaches back by a login password.

So, you have a if you are having a login password into the system, then you logged into the system and then you can browse to the directive structure, you can execute any program and type of things right. So, it can be within the system I can do a telnet into the within the system or I can do a telnet to a other system right. I can do a telnet to a any system over the network right.

And once you they are the connection is established, the connection stays with that, so long the execution is there over there is some error etcetera and you can whatever the whatever the per permission set provided at the other end is the accessibility of the client or the client or the user right. So, if you are given access to different directories etcetera you can access that and so and so forth so that you can do, it is as if you go as a user to that login from a remote location, so that you can do that.

So, with this let us conclude our today's discussion. The thing what we have seen today is two important protocol right which one is making this www to happen right. So, it is the hyper HTTP or hyper text transfer protocol. And along with HTML which is the markup languages. There are different other markup languages will see some of these things, but HTML is the most popular things and the browser any browser understand how to interpret the HTML. So, the browser has a some sort of a HTML interpreter or a parser, which parse the html tag and displace as per the things which is been given right. So, this makes that whole information get to your information all this exchange possible over this underlining network, so that is the one thing.

Another thing what we have seen is a protocol which is which is a connection orientated protocol is telnet which allows to remotely connect to the things right. One is that extracting information and display on the thing another is remotely connection to a another server, another machine which is either in the in your own network or own system I can telnet if the server is running from that I can telnet to the same server or in any server in the things. It allows me to work on another system and execute the thing right. So, this and as you have seen it is a very simple type of or very what is vanilla type of protocol and it allows lot of things to piggy back on it.

So, telnet becomes a carrier to different thing to execute on the things, because it established a connection orientated service. And any other applications which want to piggy back on the telnet is it is possible to do that right. And one other type of things what will be discussing in the in the application lab protocol in our subsequent talk is one is for this mail type of thing or SNTP type of server. And another is some sort of a management type of server or SNMP type of server. So, with this let us conclude today.

Thank you.