Course on E-Business
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Module 05
Lecture Number 23
Components of E Business Infrastructure

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So we are going to talk about the infrastructure part of such E- Business companies. In order to make a company E- Business enabled what kind of information technology infrastructure is required that we are going to

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discuss.

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So in this particular lecture we are going to learn like, what is the goal of quality information services? Then we are going to learn what are various components of E- Business technology infrastructure.

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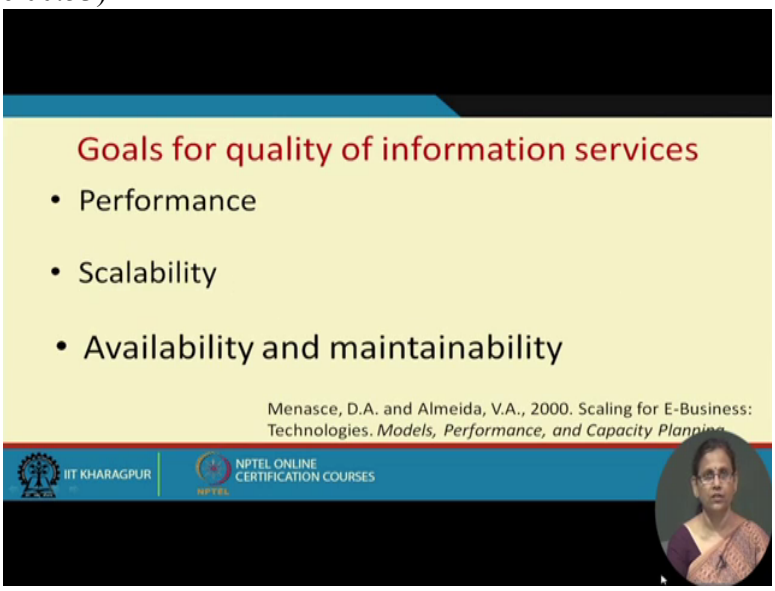

To start with, think that, think of a situation when you are actually busy going though the website of a specific company, specific let's say e-commerce company. Now if the company, if the website, suppose you are searching for a product. Now if the company, if the website takes huge amount of search time, will you stay there? No. You will immediately leave. Think of a second situation. You are searching for the website but the website is down. Will you be second time searching for the site? No. So it is very important that the information

service which is provided by a company is of very high quality in order to not only attract the customer, in order to generate the loyal customers.

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So three activities, three goals are important in case of any information service including

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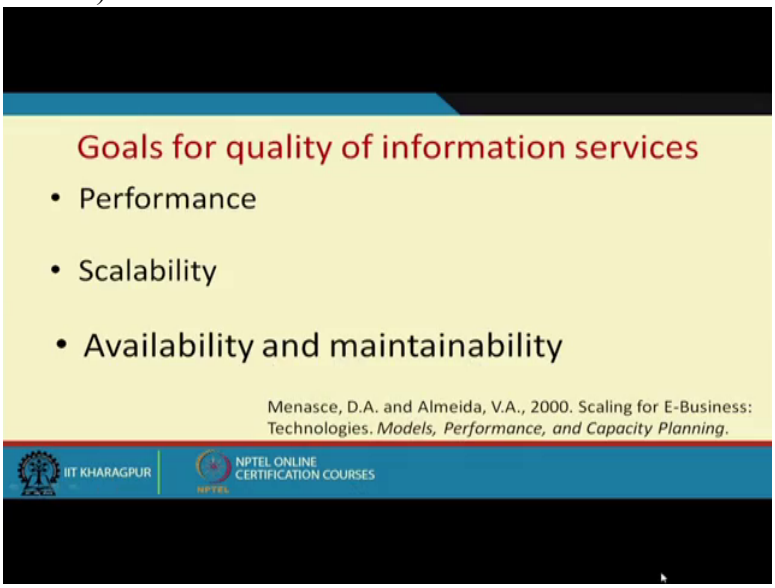

your E- Business activities that is

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performance, scalability, availability and

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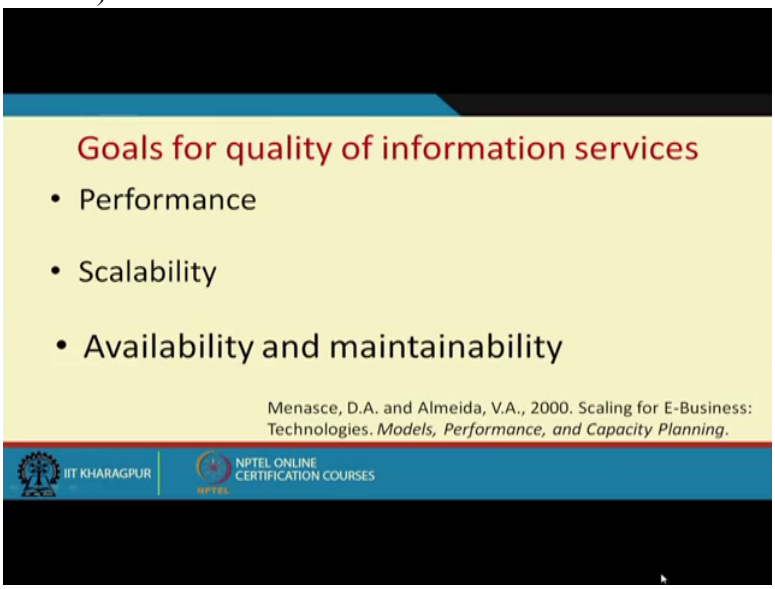

maintainability.

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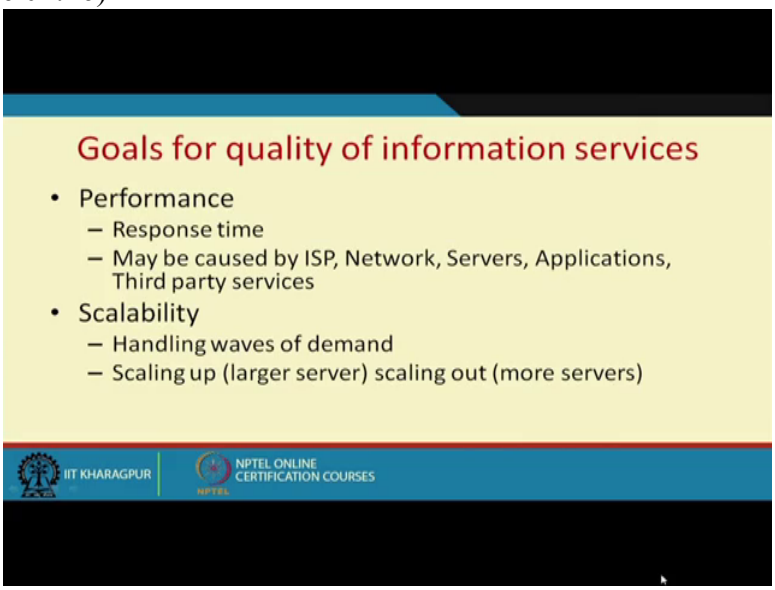

Now in case of performance, performance can be measured in terms of response time. By response time we mean the moment you submit a request till

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you get the response, that exactly, that difference between these two, when you submit and you get the response is called the response time. Now if there is a delay in getting response, if the response time is low, it can be caused due to many reasons. It can happen at the buyer's end. It can, it may be happening at the company's end. It may be the company's infrastructure which is creating problem. Its server is slow, its application is slow and sometimes the companies will be connected through some third party, let us say some advertising service they have connected. Or some security service they have connected payment service they have connected. That third party itself is slow.

Then it may not be always company's fault. It can be the fault of the I S P through which the company is connected. Again it can be the fault of the network itself and there is huge traffic and there is network is, there is jam in the network so there is packet drop, so the process is slow. And these I S P can also be slow at the buyer's side as well. So therefore whatever may be the reason, at least as an e-commerce company you should see that from your end, your infrastructure that is your server, applications and third party and the I S P at your side, network at your end, they are up to the mark so that at least from your end, there is no delay. And there is no performance degradation. And the response time is high. You do not contribute. From buyer's side he may be, his network may be slow. He may be, his data service through which he is connected, it may not be up to the mark. But you should never be, your performance should be up to the mark.

Then

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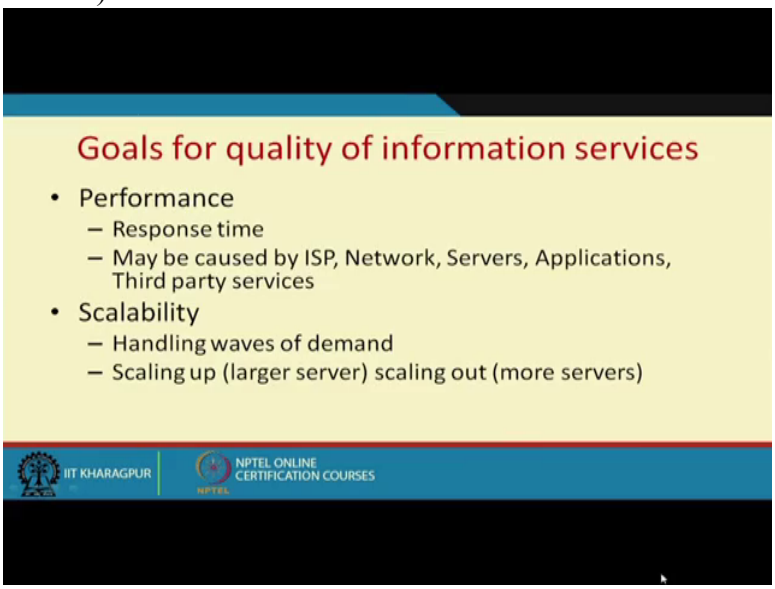

next is scalability. Think of that, few days back certain

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online retailer has announced for some sale. The first time when it did it, the customers rushed during that short period and their infrastructure was not able to handle this wave of demand. So what happened? Even if customers were eager to buy, the company was ready for this, the company was thinking it is ready for handling this wave of demand, the servers did not respond. So therefore in case the company and the company has to keep in mind that it has adequate provision for handling this wave of demand. So this can be done by either scaling up by buying larger servers or by scaling out, buying more servers and making a cluster out of it. And this scaling up and scaling out, it can be also happen with the help of some third party. It is not that company always has to invest in getting this infrastructure.

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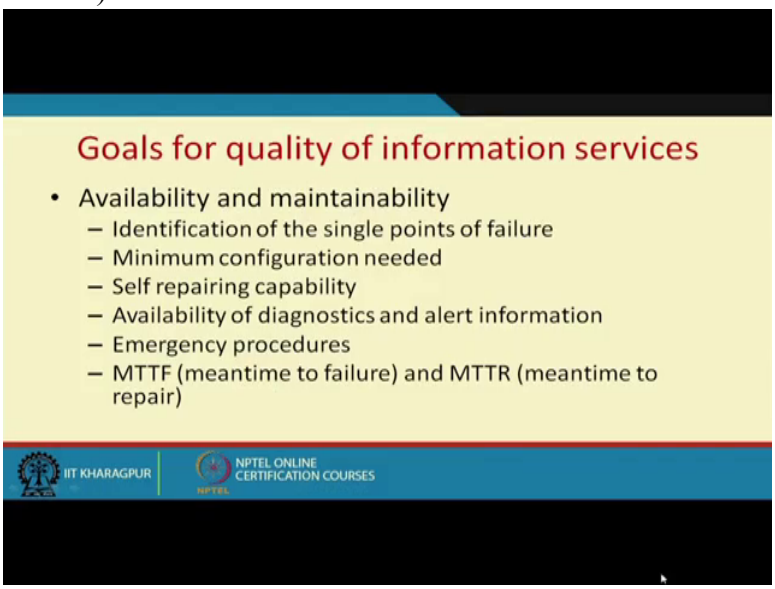

Then next is availability and maintainability. By availability we mean, by availability we mean if the company, if the company's, whether the company's website is available to the customer all the time or not. It depends; the availability again depends on the kind of business you are in. Think of a digital library like I triple E. So sometimes if you have been downloading

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papers from I triple E or Science Direct, you might be seeing that sometimes they actually announce that they are down for maintenance purpose. So availability is something which the company has to decide whether it has to provide 100% availability or it can afford to decrease its availability to let's say,99% of the time, it will be available and 1% of the time, it can afford to be down. Now why this downtime happens? This downtime happens because of, because the server is like any other equipment that needs maintenance.

So in order to

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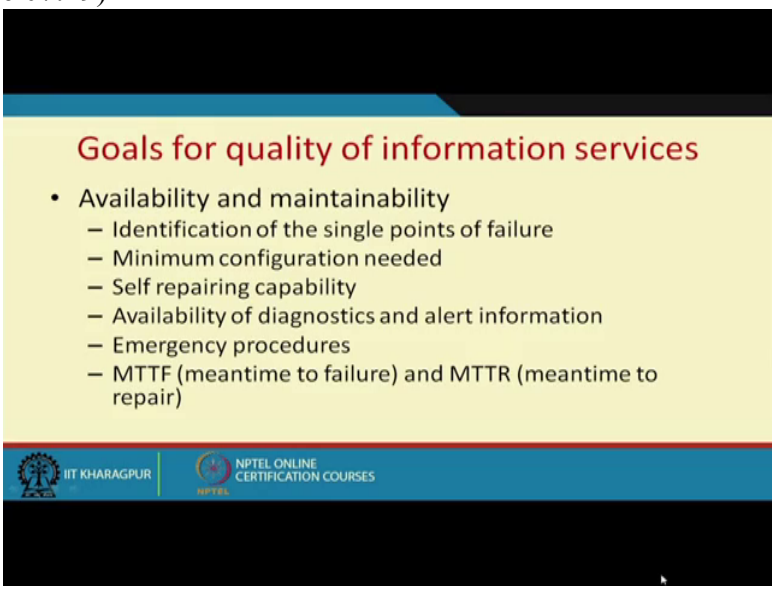

have this maintainability I have to trade-off between this availability and maintainability of the servers and the other

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infrastructure if the company, depending on the decision of the management, the amount of time they would like to make their server available they have to arrange certain kind of alternative, they have to make some kind of alternative arrangement like maybe they decide that they will have mirror of number of servers which, where the website is actually mirrored, and while one of the server is going down other two servers, other servers can be active. So the service quality will be decreased little bit but at least the service will be available all the time. So depending on, it depends on the kind of service the company is in, kind of

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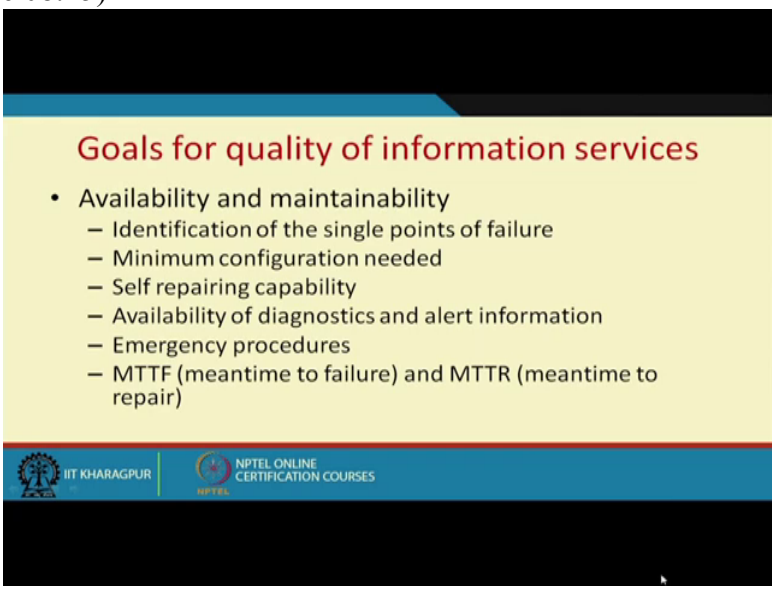

product and service the company offers. Then the company is to maintain this availability and to have this availability and high availability and maintainability maintained you have to find out what is your

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bottleneck point of failure. And studying your infrastructure you have to identify your single point failures and you should try to remove them. Then you should make arrangements so that always minimum configuration is needed. Then there should be self-repair capability of the software which are installed. You should have adequate provision for availability of diagnostics and alert

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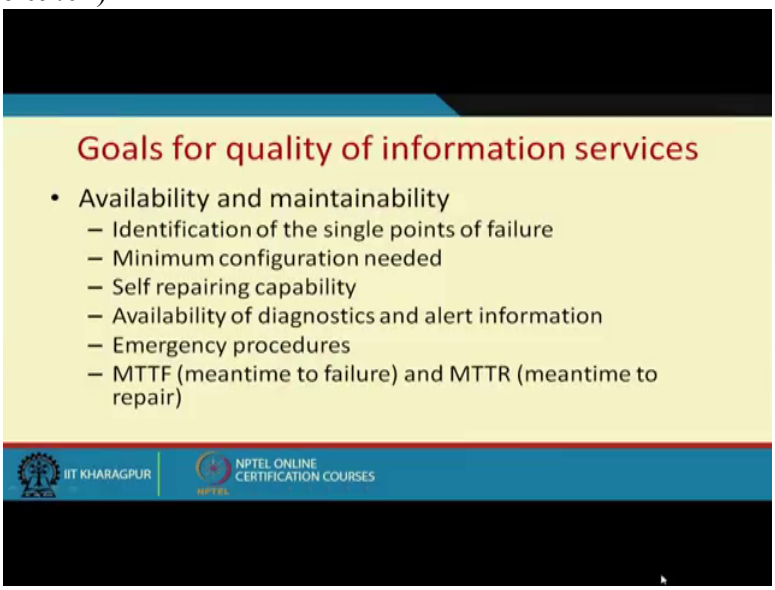

information whenever your server or the E- Business infrastructure goes down because of some reason. You should establish certain

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emergency procedures to manage your, in case the servers are down, to manage the situation you should have certain emergency procedure established. You should be constantly observing what is your mean time to failure and mean time for repair so that accordingly you plan your infrastructure.

When you look at the technology platform for E- Business we can see, as we have been talking so long, server is the most important component which contributes the, contributes to the

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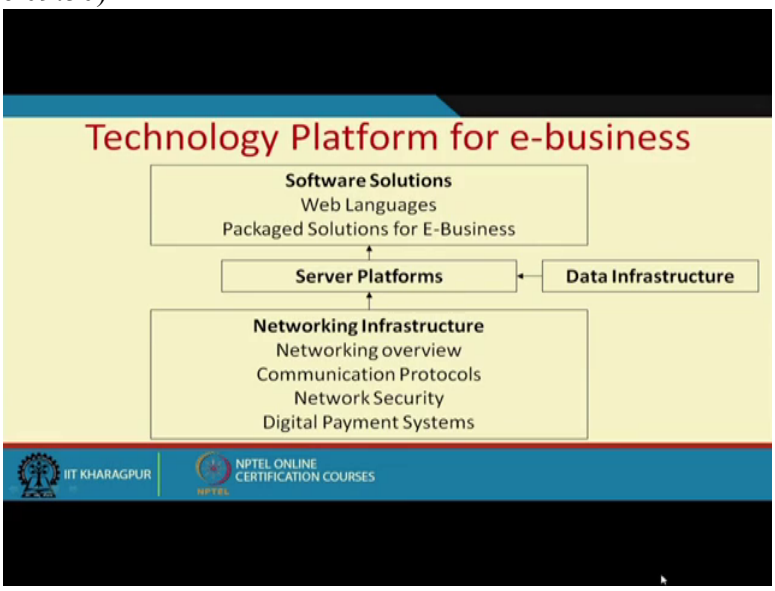

performance of the website. This server in turn is dependent on a number of software solutions. Either in the server you can keep some package solution like that of E R P, your Transaction Processing System et cetera and the servers which are otherwise called http daemons they should be, when we are talking about the server platform, we are in fact talking about 2 things. One is the physical infrastructure which is called the server and second is the H T T P server which is running in that physical server.

So that H T T P server we call that http daemon as well. Then this server in order to, and the, in order to be connected to the internet, it has to be, it has to have adequate networking infrastructure along with it. This networking infrastructure consists of both physical network as well as the corresponding communication protocol. It has to have proper security and in case you are in a business where you directly accept payment from the buyers, then it has to be connected to the digital payment system. Now this server also has to connect to the appropriate data infrastructure. In fact along with a server, web server you will have a database server but besides database server you may be having your data warehouses etc.

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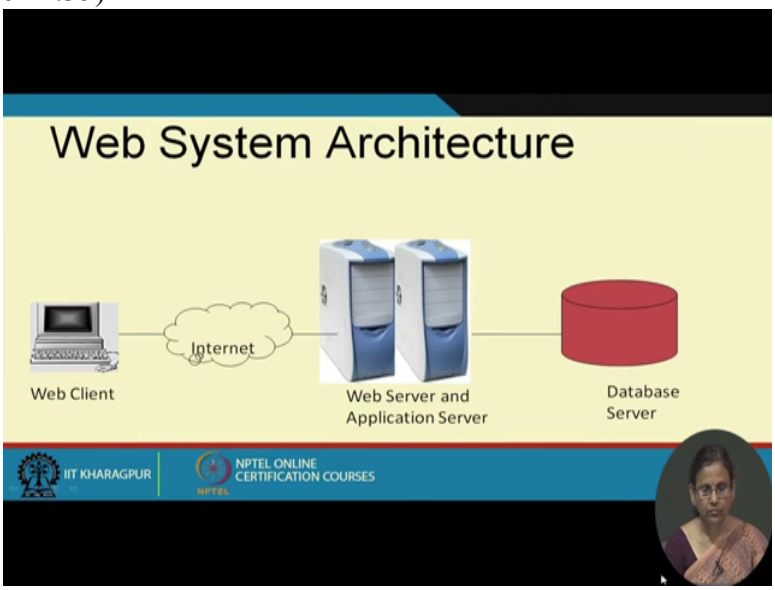

So this is a typical web system architecture where the user uses some kind of a web client. What it the web client? The browsers that you use, whether it is on a desktop machine or in a in your mobile device so those are actually clients. So you have a web client; the web client connects through the internet, it comes and connects to the web server. In the web server, in the server side, 3 important server elements are there. One is the web server, one is the application server and third one is the database server. This web server, application and database server, either they can be independent servers or they, all of them can exist in one physical server. In case your business is a small business, all of them can exist in a, one server but they are logically separate softwares, logically separate server softwares. So whether they are physically separate or not, web-based system has to have three important elements. One is the web server; second one is the application server and third on is a database server.

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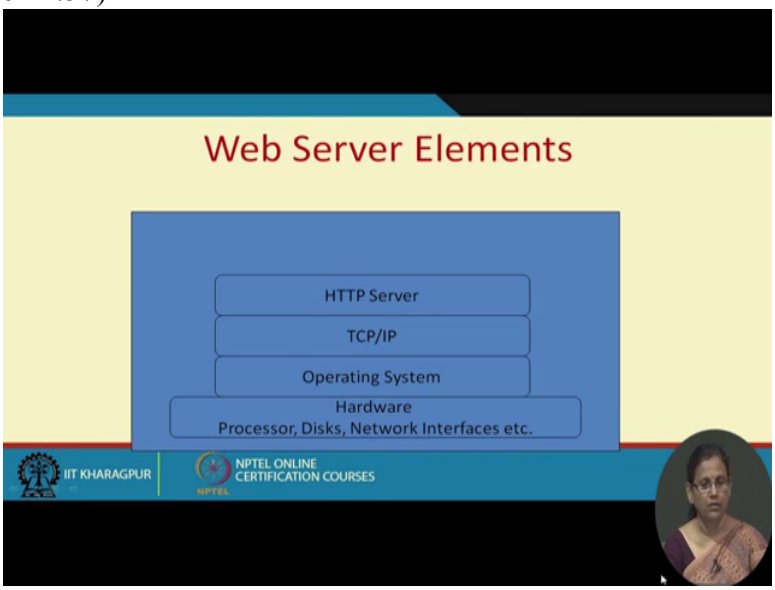

Again within this web server, this web server or H T T P server will be running over the T C P I P protocol which is above the operating system, then below that is your hardware which includes your processor, disk, network interfaces et cetera.

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So these are some

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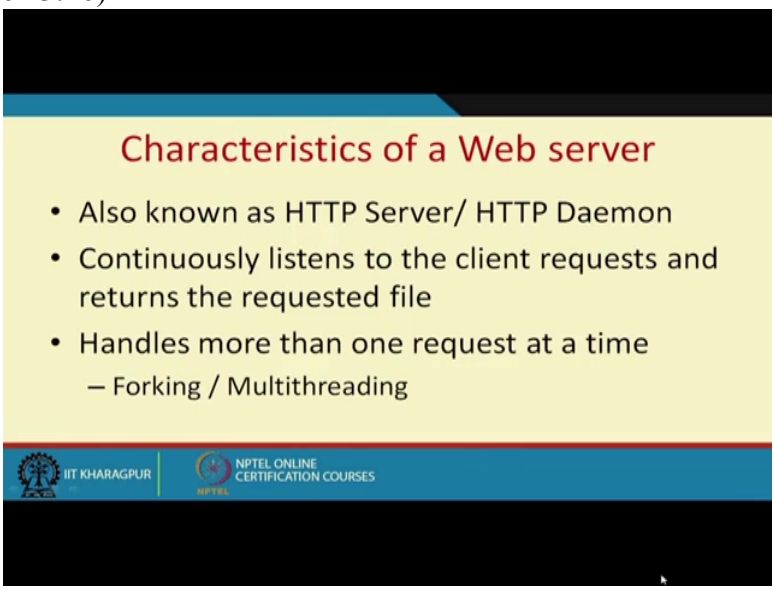

important characteristics of a web server. They are also called H T T P servers because they actually use this H T T P protocol therefore they are called H T T P server or H T T P daemon. These H T T P servers actually continuously listen to the client requests and return the requested file whenever contacted. Such servers can handle more than 1 request at a time. They do it by, in the process of multithreading or forking the main process.

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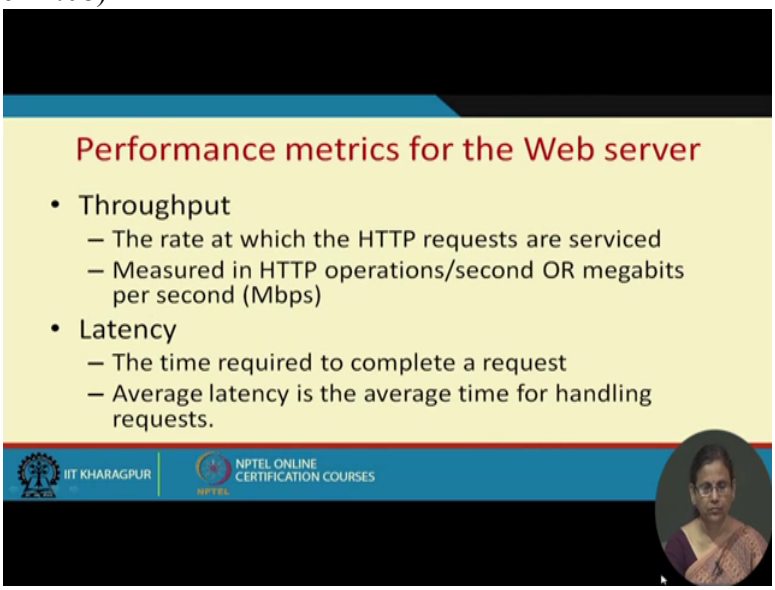

The performance of a web server is measured using two things. First one is throughput. What is throughput? Throughput is the rate at which H T T P requests are serviced. They are measured in terms of number of H T T P operations per second or number of mega bits delivered per second. Second important performance metrics for the web server is the latency.

It is the time required to complete a request. The average latency is the average time for handling the request.

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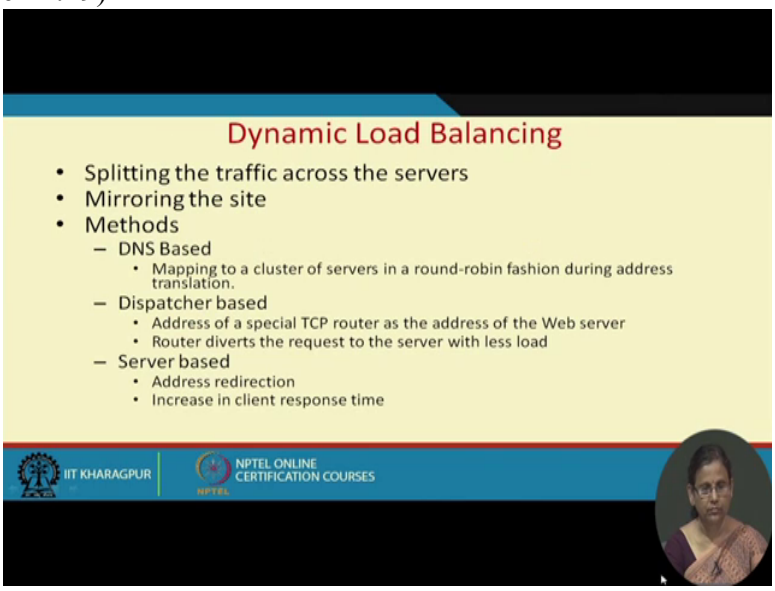

Then the servers as I was telling you, in case, in case you have to handle a large wave of demand only one server may not be sufficient. Your website has to be mirrored in a number of servers and whenever that, there has to be some way in which the traffic has to be splitted among these mirrored servers. So this splitting of traffic in order to maintain the high performance of the web based system can be done in 3 different ways. First one is your D N S based. In fact we are going to talk about may be this class or next class we are going to talk about what is a Domain Name System is or D N S is. D N S, at least right now I can tell you, D N S is, D N S can actually correlates, it connects

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a I P address of a server with that of your that textual address, web address which we generally call. So usually this textual address is usually can be mapped to only one I P, one server I P. But in case you have multiple servers mirrored, then at the D N S itself which makes the mapping between your website name with that of your I P address, multiple addresses can be attached. So with the same web address, let's say x y z dot com multiple such I P addresses will be there. So therefore any request which is made to x y z dot com can go to any one of these I P addresses in a, possibly in a round robin fashion, so that the load around all the servers which come under the same domain name can share the load. So this is called

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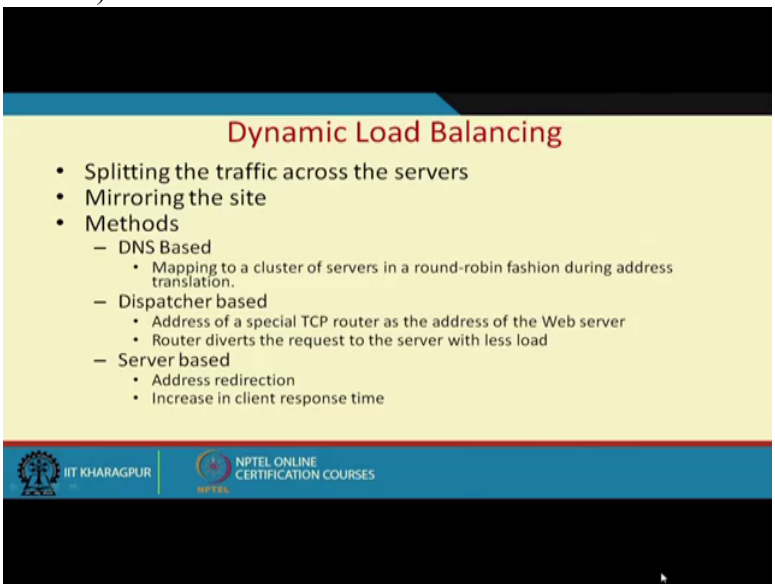

D N S based mapping. Second one is Dispatcher based mapping. In that case, the address of the website is assigned to a special router. We are going to talk about the router. But router is, is network device through which the server will be communicating with, I mean the server will be connected to the internet. So the router itself has, the your, in the D N S, during D N S mapping the I P address of the router becomes the, gets associated with the domain name let's say x y z dot com is associated with a router's address. Look router is not a server. Router is in turn, is connected with a number of servers. So it is router's job to divert the request to the server with less load. So the, you have to have the smart router who does this kind of request routing. Then last one is your server based.

So in the server based there will be a main server and once you put the request that main server will actually redirect your request to the actual server which contains the information that you are searching for. So such server based things you might have many times requested. So please wait for 2 minutes, we are diverting you to such and such location, or click here to directly go there. So this is your server based approach. So server based approach is basically the not a very desirable option because it increases, it adds an additional time of contacting that intermediate server, so which in turn increases your client's response time. So besides, so this is the whole situation of dynamic load balancing which can be done in 3 different ways.

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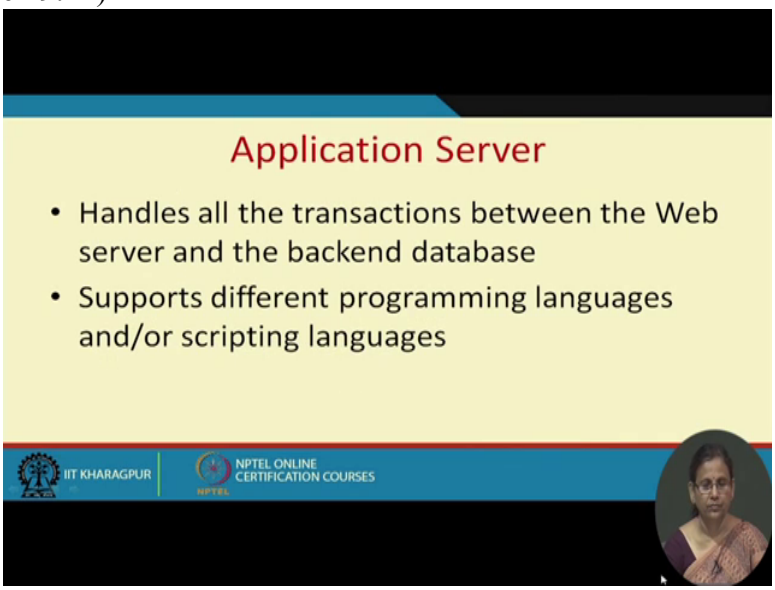

As I told you this web server, in the web based system three

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important elements are there. One is web server, another is application server and third one is your database server. So application server is the one which handles all the transactions between the web server and the backend database. So it is the intermediate server between the web server and backend database. It supports different programming languages and scripting languages using which it can take the data from the database server, carry out certain transactions and send that result back to the web server. Database servers will be containing the database management systems which in turn will be running query languages, will be having certain query language interface and once the database connectivity is made with that of the application server and queries are fired to the database server, then database server can send back the result of the query to the application server which in turn, which in turn will be formatting it in appropriate presentable form which will be sent by the web server to the client. And at the client side, you have a browser. That browser will be learning the formatting option, this, the page that is sent from the server to the client will be one H T M L page. That H T M L page will be containing the tags as well the information. The tags the browser can read those tags and appropriately format the information so that it is displayed properly to the end user.

There are many other important components and concepts in the E- Business infrastructure. They are mainframe and legacy systems. Look we have already discussed about our E R P. We have talked about the web based E R P, we have talked about the, your enterprise information portal and so on. All of them are, we have discussed all of them are web-based systems. Even your E R P which previously used to exist in a two tier system, now almost all

the E R P systems are three tier. By three tier here, let us try to understand what the three tier is. The three tier is, first tier is your web, web server; second tier is your application server, and third is your database server.

So in this three tier architecture, these all these modern systems that we are talking about, all of them are three tier architecture but the older systems which exist in the company may not be so. So those mainframes and legacy systems has to be connected with these web-based systems using appropriate integration technology. Then there is another element which is called proxies. Proxies are again another element, important element which helps in reducing the traffic. And they, and companies also have proxies, I mean the entire network of a company, of an organization will not be exposed directly to the internet. In fact all the requests from within the organization will be going out to the I S P's network through one or more proxies. So those proxies help reducing the network traffic. Now how do they help reducing the network traffic?

So usually the websites will have, the web servers will be delivering two types of pages, one is a static page, static H T M L page which change very infrequently. So those pages at least will be stored in the proxies and whenever any request is made to the site, it can be directly served from the proxies. The request need not come to the server. So they are very important element in terms of reducing the traffic. Similarly in an organization if the somebody is putting any request, that request will be routed through the proxies. If the proxy already has that request, it will be sent back to the user. It need not go to the outside host. Then these proxies also help in privacy and security of the network of the organization and they can provide the firewalls because, because you have, all your requests will be going through few proxies only. So therefore they will be going through the firewall. I mean the proxies can, firewalls can be installed which are security mechanisms which can be installed in the proxies itself. So the ingoing, the outgoing and incoming traffic can actually be filtered. Then they also, as we have told you they also help in

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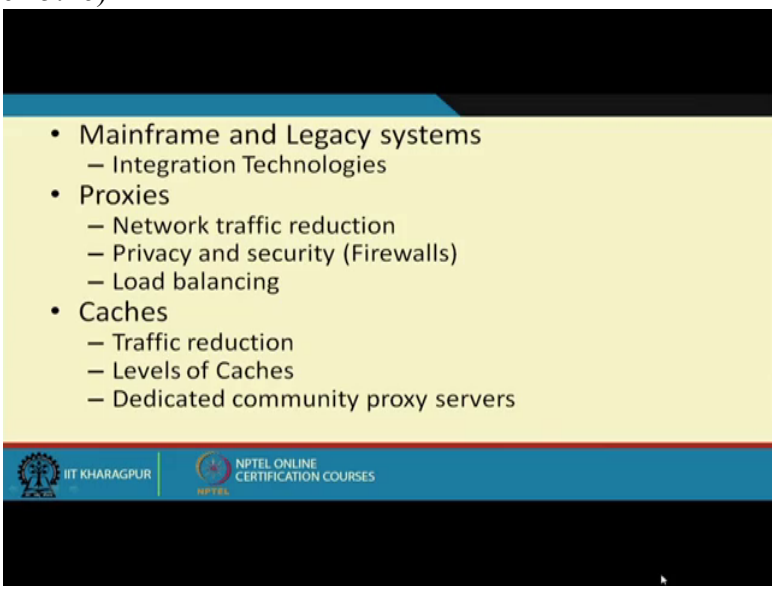

load balancing. Then you have the caches. These caches are again some kind of proxies which have the similar function like that of your network proxies. They also help in traffic reduction. They help in, and there can be number of cache, there can be number of proxy, proxy, proxy caches in your, the entire network. And there can be some dedicated community proxy servers as well.

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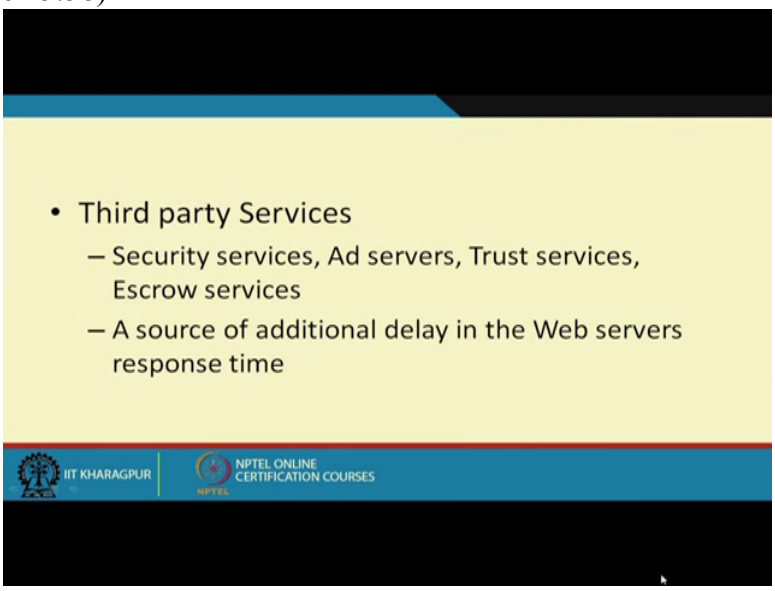

Then another important element is your third party services. These third party services include your security services like your trustee et cetera, Ad servers, then your escrow services like your PayPal et cetera, then such third party services. The performance of such

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third party services should be actually be considered while connecting them to your own website. Because if there is a degradation in the performance of those third party services then your, that delay is experienced by your customers as well. Then there are

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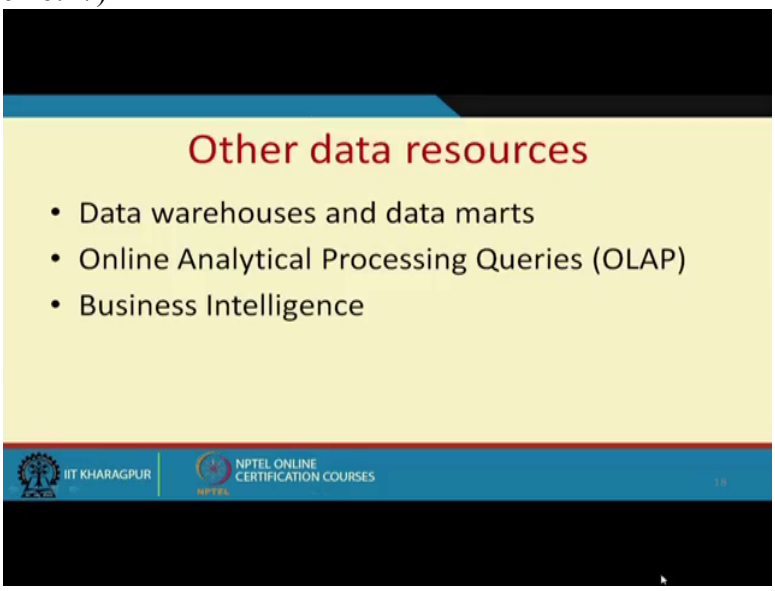

other data resources. One is the database servers where you collect all kind of transactions data and you have certain query system, your some S Q L query system, besides that the data from many such database servers which are, the related data elements from many such servers can actually be brought together, cleaned and put in something called a data warehouse and this data warehouse while this is an organizational repository of data, for specific

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interest groups if a part of that data is kept aside, that is called a data mart. These data warehouses and data marts which are institutional repositories of many different kinds of data is again a very important data resource in today's world, because many business intelligence applications actually built on them. Then such data warehouses, when the database management systems has, you can be assessed using S Q L, S Q L queries, the data can be fetched from a data warehouse and data marts, you can fetch the data using O L A P queries, these Online Transaction Processing Queries can help. While talking about the database technology we will be learning more about them but they can help you generating multi-dimensional view of the data. So with this we finish this lecture and here we saw the basic infrastructure components of a physical, infrastructure component of a web-based system which is the way to connect your E- Business with your internal and external stakeholders, thank you very much