Course on E-Business
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Lecture 36 Fundamentals Of Web Services

Welcome back we will continue our discussion on interoperability of information system in this context we have already sent that interoperability happened at can happen at 3 level first one was your communication level where we had little discussion on about discussion on this common object I mean the object level object level compatibility at the communication level then at the next level we were talking about EDI and XML.

And we are now at the third level which is about interoperability of process see we talked about interoperability has two dimensional interoperable of data that we have discussed just now then just in the previous lecture then interoperability of service so this interoperability of service is is the one is what we are going to be doing while talking about web services then next is interoperability of process so this when this many services are combined together they automate a whole process that also we are going to talk in this lecture.

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We are going to learn what is web service existing standard fo the same then how to connect what is the approach to connect multiple web services for business process automation we are also going to see that motivating example that we started few classes back about that's VMA how VMI how these concepts can be with respect to VMA we're going to see this concept how they are real how they can be realised and that will help us understanding this thing better.

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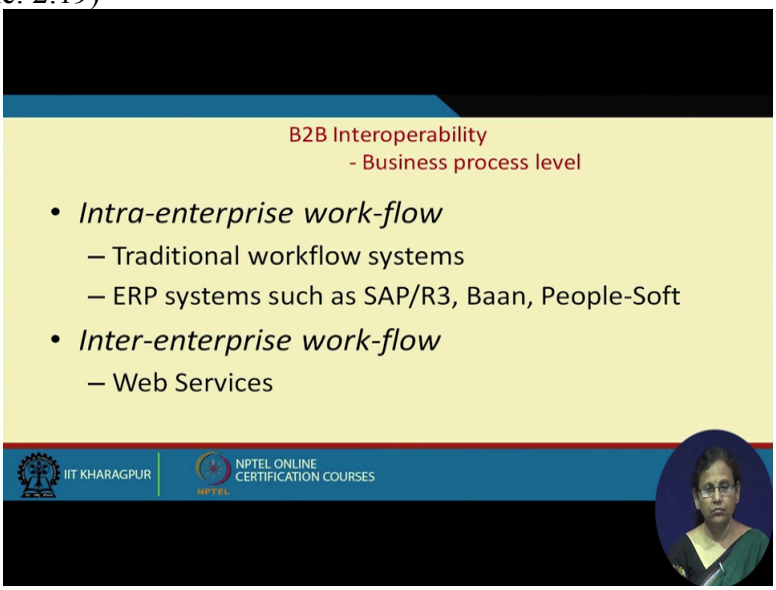

When it comes to interoperability at the process level either you can use some kind of intermediate software which are otherwise called workflow system to connect heterogeneous heterogeneous information system your ERP system your legacy system etc while this intra enterprise workflow is good for similar kind of software systems.

When you have to web base system to integrate them the current currently the standard that is used is called web services is web services various web services standards are used by the companies to automate the inter enterprise workflow and specifically both the parties up to use web base system for implementation of this web services.

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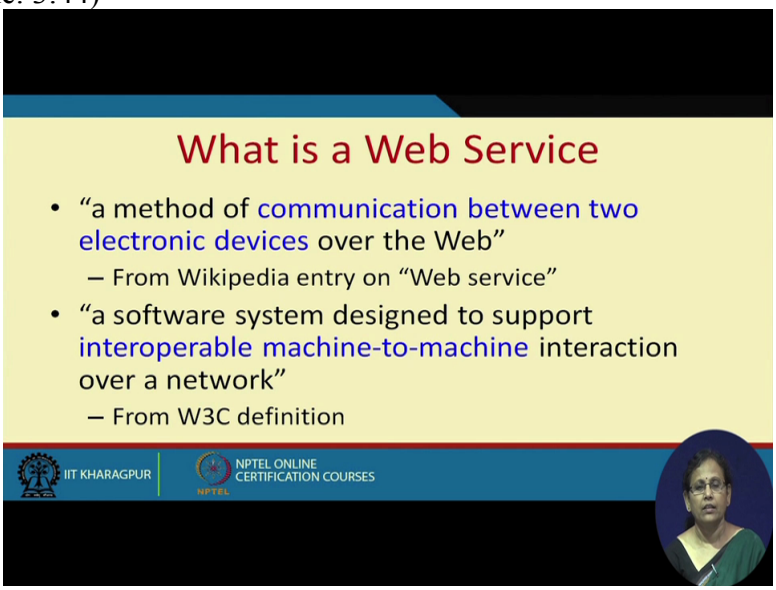

Now what is web service? Its a method of communication between two electronic devices over the web it is it is also defined as a software system designated to support interoperable machine to machine interaction over a network. Though we are talking about this Web services as a standard for connecting for com making to heterogeneous information systems communicate with each other.

This standard is again required for machine to machine communication lets see machine to machine communication and automation of the whole manufacturing process and connecting that with your supply chain all this things are discussed on the industry 4.0 program anyway there are also we need some kind of common standard to follow to make the machines communicate with each other at I'm not while talking about the machines that can be real manufacturing machines as well ok.

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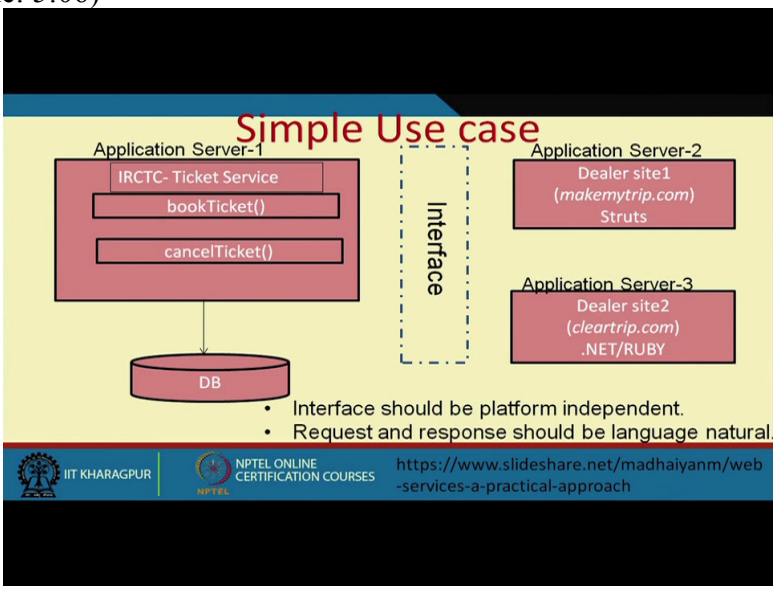

So now let us take a simple use case to understand what is the need for what's the need for using web services all of us book tickets which are otherwise available from IRCTC from many other software many other website like makemytrip.com cleartrip.com from there also we are able to buy this ticket to book the tickets.

Suppose IRCTC provides some facility to these two companies to access to its database to see that its see unless otherwise it has proper access with IRCTC server it may so happened that while booking some seat it there might be duplications while cancelling ticket there might be delay so both this other sides other dealer sides now need to communicate with that of IRCTC through some common interface.

The problem here is both this dinner sites maybe running on different web platform so also IRCTC so this interface that we are talking about to communicate both this IRCTC server with that of the dealer server has to be platform independent and there has to be some common standard which all the server can understand.

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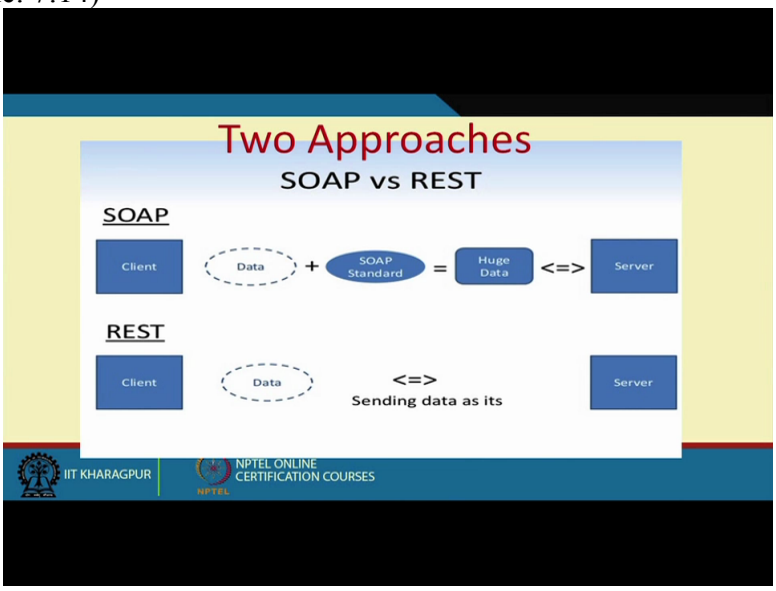

There are two approaches for this so web services that common interface is called web services there are approach it two broad approaches if people adopt one is called the soap protocol another is rest protocol in the soap protocol it is the data plus the soap standard which is transported over the internet to the server because it contains the data as well as the standard with that makes the data file little bit.

And it is not very desirable because it consumes a lot of bandwidth however a rest which is a quite simpler principle which works over http it is simply transfer the data as an XML file to the server or XML or (())(8:19) to the server. It does not have that extra overload to understand the standard so therefore many companies now a days adopt rest.

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So these are the terminologies soap is the simple object access protocol its a envelope for soap request or response then there is a language call WSDL web service description language which help in writing the interface for soap web services then once the services are created at one end of either by any one of the host communicating host then there has to be some place where the other party would be coming.

And looking for the availability of service that is called as service repository so this particular service repositories that is UDDI Universal description discovery and integration repository is at on which is closely associated with soap protocol rest is a completely different kind of protocol its name is representational state transfer protocol its an architectural style for communicating with the services it buy architectural style we mean this simplest specifies a specific way of communicating.

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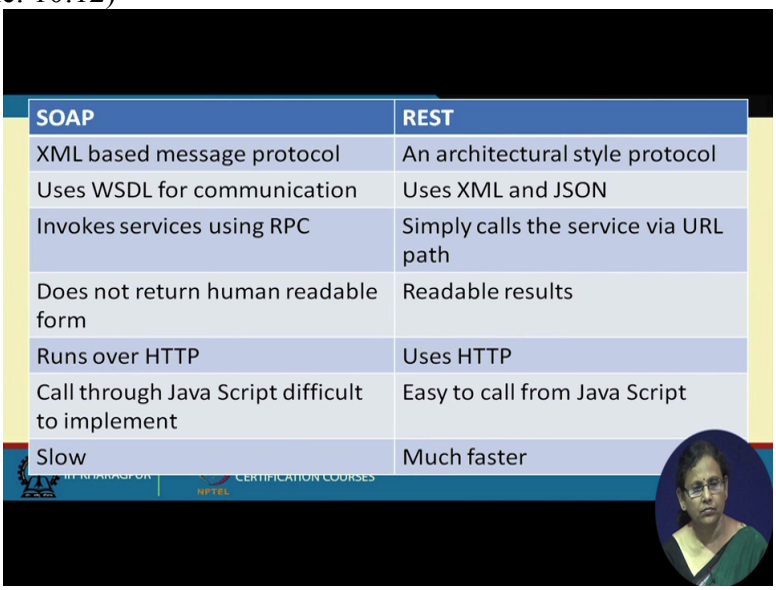

Now if we compare soap with rest soap is an XML best message protocol where XML files and generated and sent but here it is an architectural style protocol which simply tells how to do things here to to send that XML data and the protocol details some other communication language is used called web services description language where as rest can send data in XML and JSON format.

Now soap invokes services using remote procedure calls but rest simply cause the service via URL path means it is simply it can simply access a link. Soap does not return any human readable form but rest return rest because the data is in XML or in JSON format both are in readable format soap runs over http rest uses http because runs over means it is it is another layer above http.

But it simply uses http to transfer it doesn't have any other protocol defined any other new layer defined its a protocol of course but new layer defined now soap call your soap calls through java script means making a call to soap through java script is difficult where as soap can be rest from a java script you can easily make a call to rest soap is slow and rest is faster so most of the companies now adopting rest protocol.

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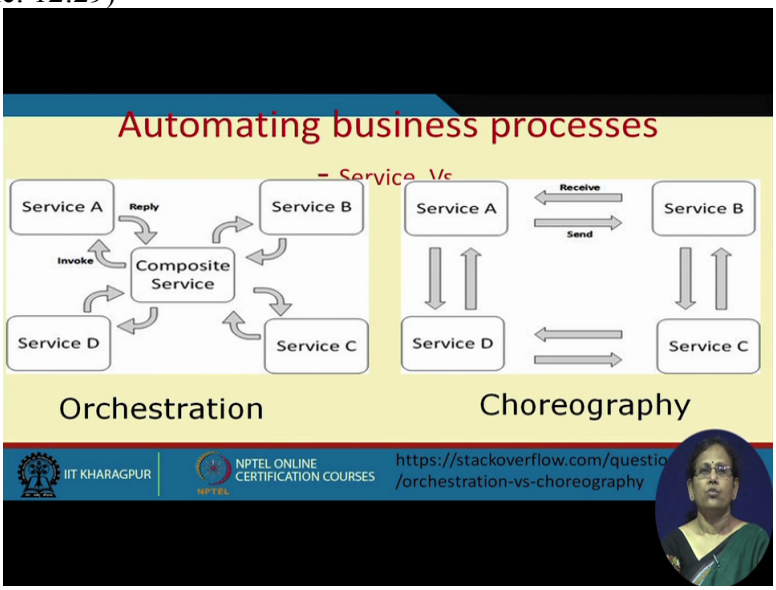

So far we have been talking about the web services which can automate only one business flow let's say in that VMA example that we discussed if we are transferring only stock detail only one kind of data we need only one service there will be a client at one side there will be a service at one side the client will be sending request to the service and consummate.

Whereas if you have multiple search services working together to automate a whole business process this process level automation process level interoperability can be achieved using many web services who will be interacting with each other so this process of web services interaction can be implemented I mean there are two models to implement this interaction process one is orchestration second one is choreography through orchestration we have one centralised composite service who like a orchestra master will be instructing each of the services and coordinating the activities this is the composite service who will be interacting in some order with individual services and if possible might be transferring the data among them.

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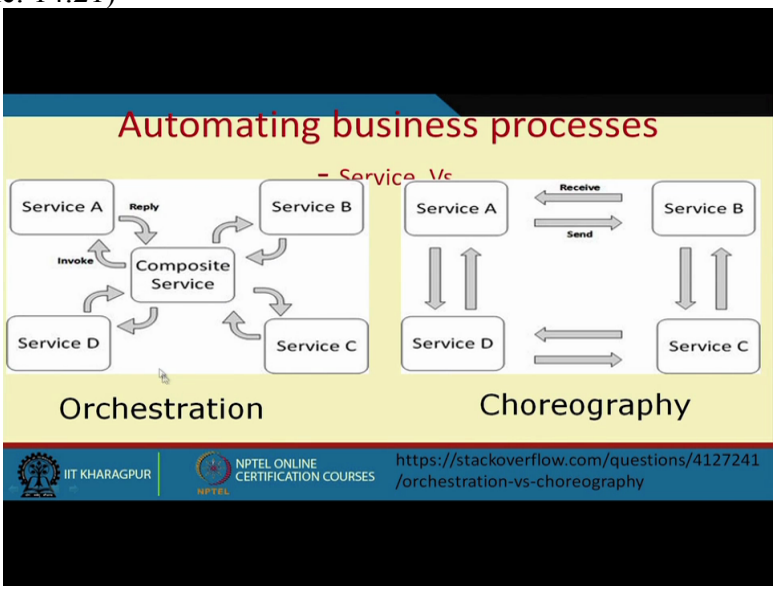

This is called orchestration because there is one person one service who will be instructing other just like in our orchestra master but in case of choreography model the services them self do not can communicate and do not require on any centralised process to give them instruction so they are the implementation in two different ways.

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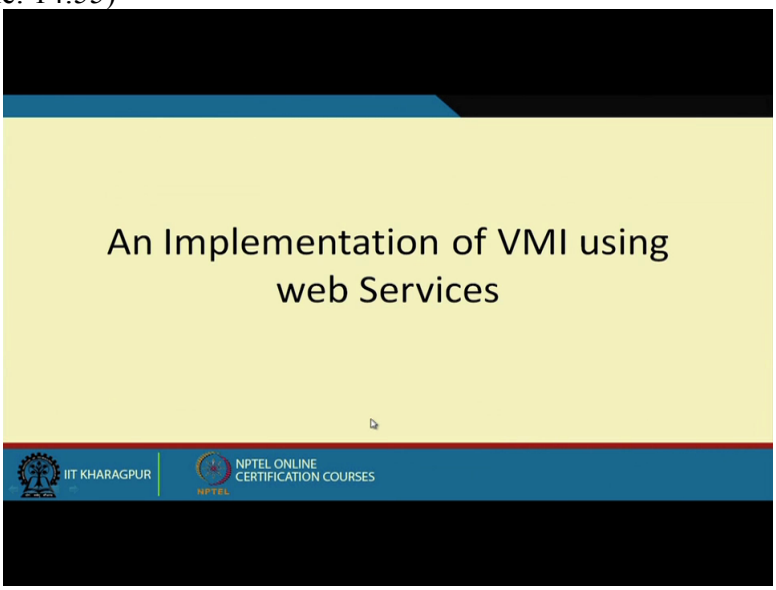

Let us have a look at it how this whole idea is implement can be implemented in the context of VMI web services in case VMI vender manage inventory because that is our running example and we continue with that example.

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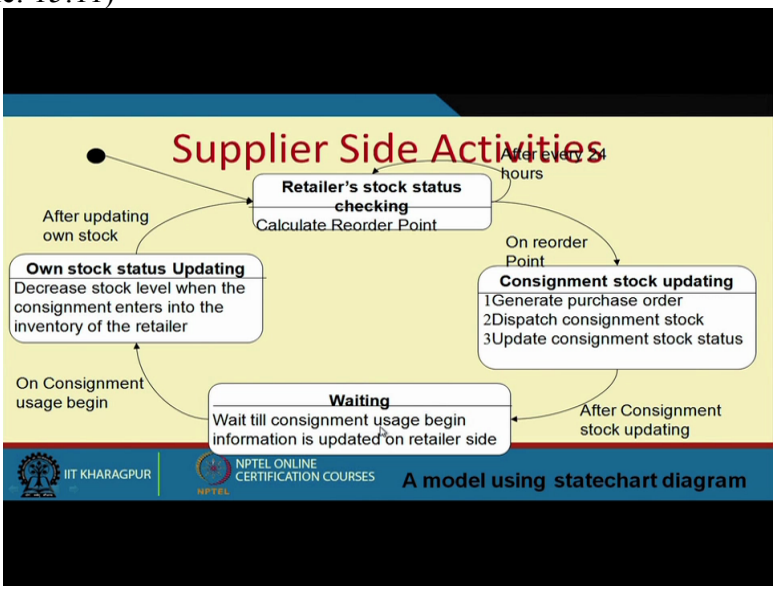

This is again to make you to remind you about the information flow and the supplier site.

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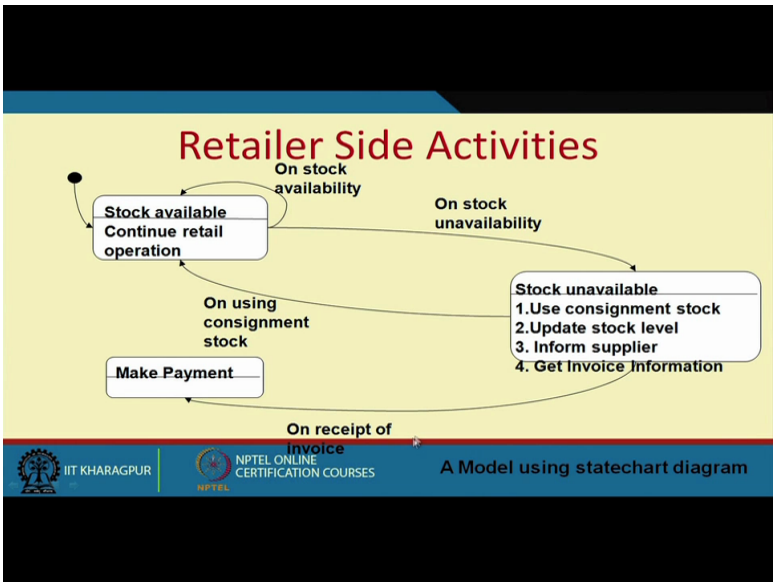

And this is the information flow at their retailer side.

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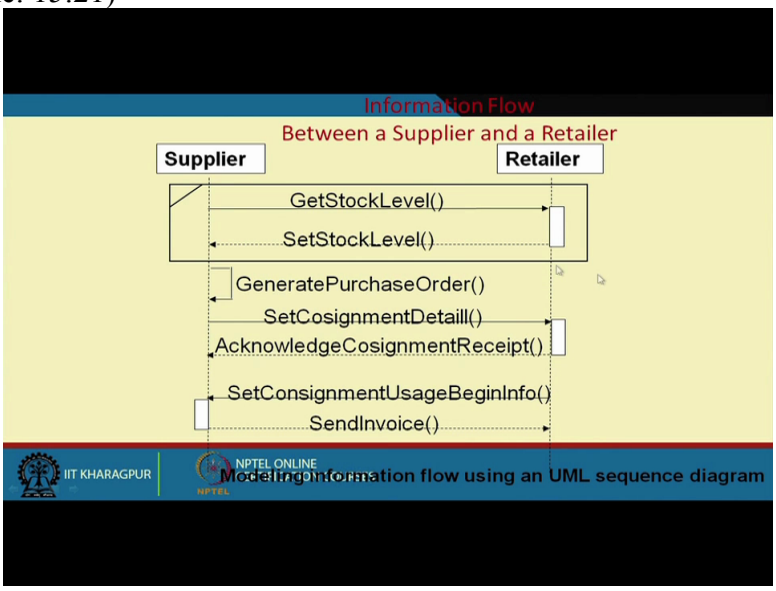

And this is between them the information flow.

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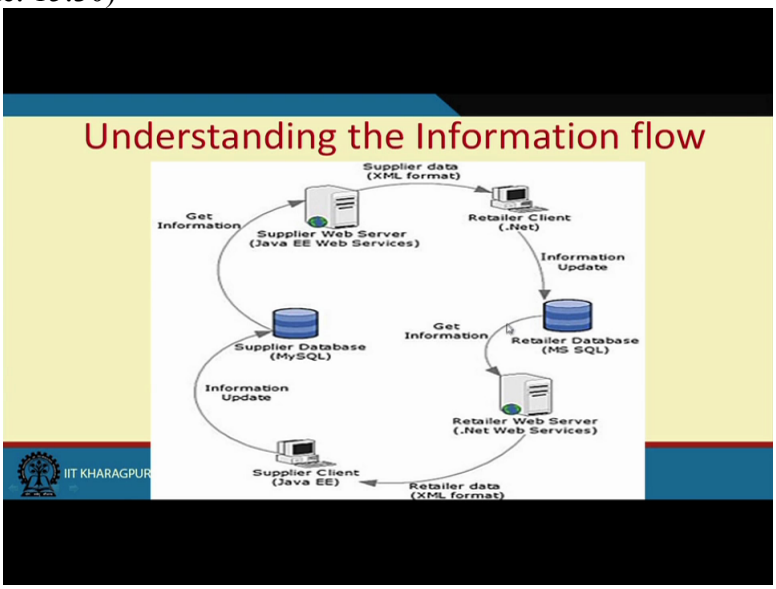

Now when this information flow that retailer data comes to the client server or client server comes to the retailer server data comes from the retail supply server to the retailer server many it happens in the number of steps both the server intern connect to the their databases so this databases the web server will be connecting to server will be getting the data from the database then it will sent to the suppliers client.

Supplier's client will be storing it into the database and this database will be accessed by the supplies web server and supplier's web server will be sending the data to retailer's client so this cycle of sending the data from retailers to the supplier continues like this.

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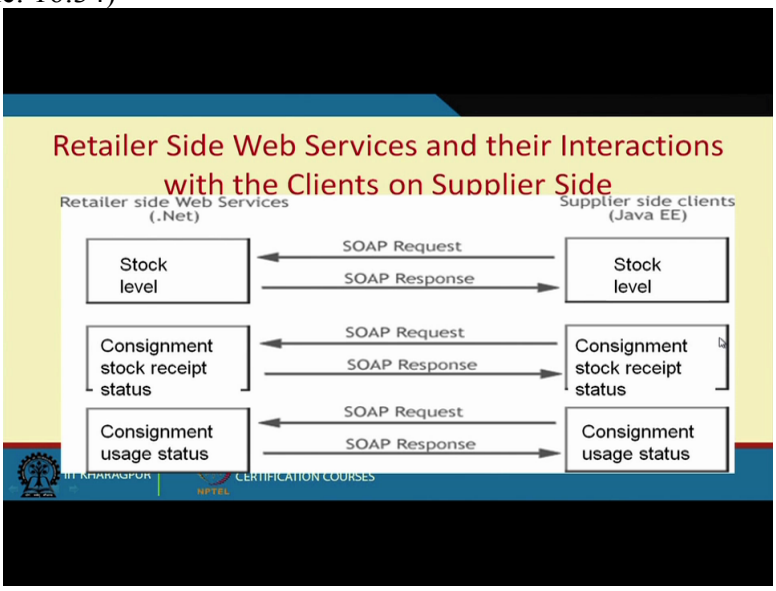

If we remember try to remember the information flow that was happening between both the parties what kind of information they are they were sending and receiving the supplier was requesting the retailer to get the stock level so to implement this there has to be some service which the retailer has to host and at the end which may be a different technology all together the supplier can send a can receive the request.

So even if they are heterogeneous request. Heterogeneous systems supplier sends the request and sends the request to what at the supplier side there will be client installed that client will send a request to the retailers web server where a service is hosted and that service will send based on the suppliers request will compile the data and send that data as a soap response or a rest response to the supplier side client.

Then the other data that we were sending exchanging between supplier and buyer was consignment stock received status.

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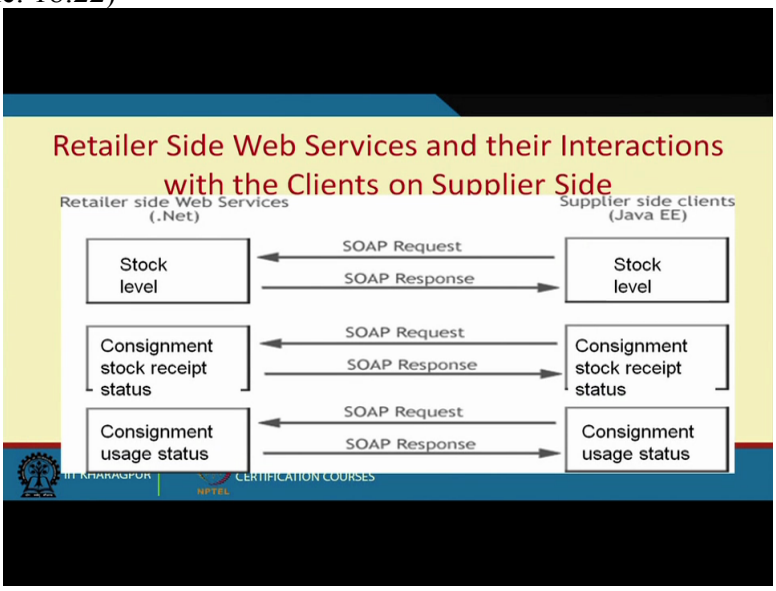

When the user when the supplier sends the consignment stock physically it also sends a status report then it was also requiring this supplier the consignment uses status because the consignment is a stock which lies though lies in the retailers store actually belongs to the supplier this is there in the suppliers inventory data. So unless otherwise he gets is consignment stock users status detail he cannot update his own inventory so therefore and other services required.

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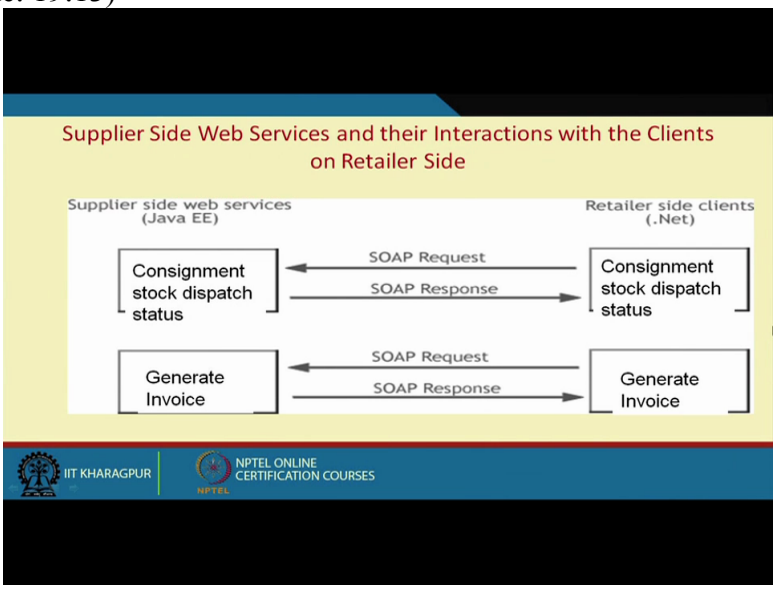

Then some services has to be hosted on the supplier side as well the retailer side requires the date I mean the has to have the data when the consignment stock was dispatched now who has this information who sends the consignment stock the supplier sends the consignment

stock so therefore this information is available when the consignment stock was dispatched was available in the supplier side web server.

So what the supplier will will do supplier will host web service which has to be and the corresponding client has to be installed at the retailer side so the retailers client accesses that service and whenever an consignment stock dispatch information is available it is send back to the retailer then there is another service has to be hosted at the supplier because it generates that data that data that he generates is the invoice.

So after the we know the cycles if necessary you please see revisit the cycles that happen at the retailer supplier end.

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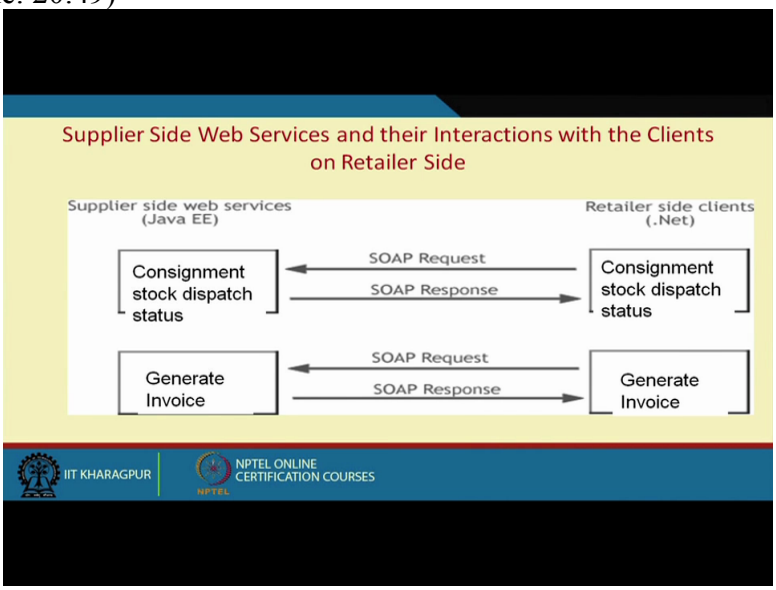

During VMI process so the retailer has to after certain step is over after the items the invoice is items the consignment stock is he has started using the consignment stock he generates the invoice and he has to get the invoice from the supplier so therefore supplier side will host a service which is for generating the invoice and retailer will retailer side client will consume that.

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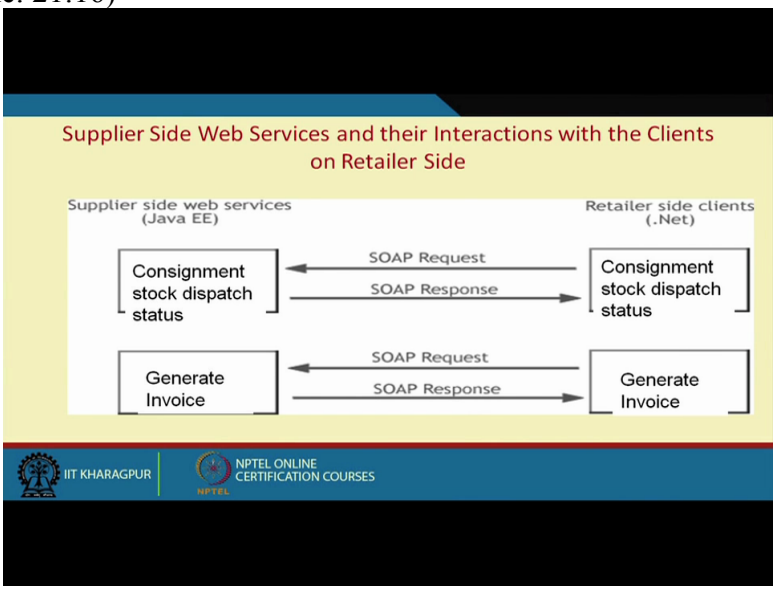

So in the problem in this model is for every information exchange that is happening between both the parties one individual service is installed and corresponding client has to be there in the retail side. Now the question is who will be activating this client to access or say once that client is activated it will be automatically connecting.

So either you put this client in a loop so that automatically it keeps checking lets say after after each 10 minutes 5 minutes or something or maybe in a day 1 the service part and get that information or it has to be because all this information exchange do not happen all the time if you look at the cycles at both the retailer and supplier end they happen only after a sequence of operation are realised.

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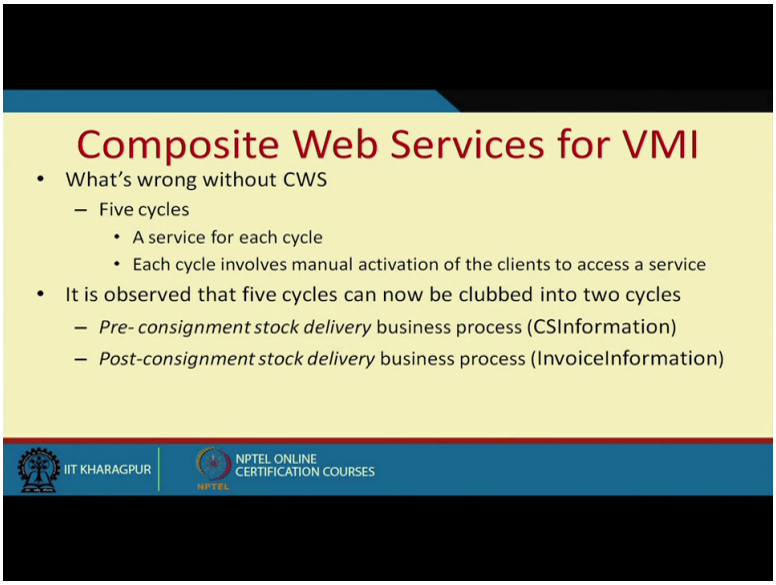

So therefore to automate the whole process at both the end we need to have some mechanism as I told you to automate the whole business process with consists of many stage of stages of information exchange that happen in the individual link of the workflow work flow consists of many its a complete path it consists of many entities or activities in between and the information flow that is happening between any two.

So if we take all the entities and consider all the information that flow many services which are responsible for this individual leg of information flow now need to be integrated so as I told you this integration can happen either through orchestration where there is a centralised 1 a centralised service which will be coordinating the activities of the other or it can be or it can be orches orchestrated or it can be choreographed in case of choreography there is no central master as such.

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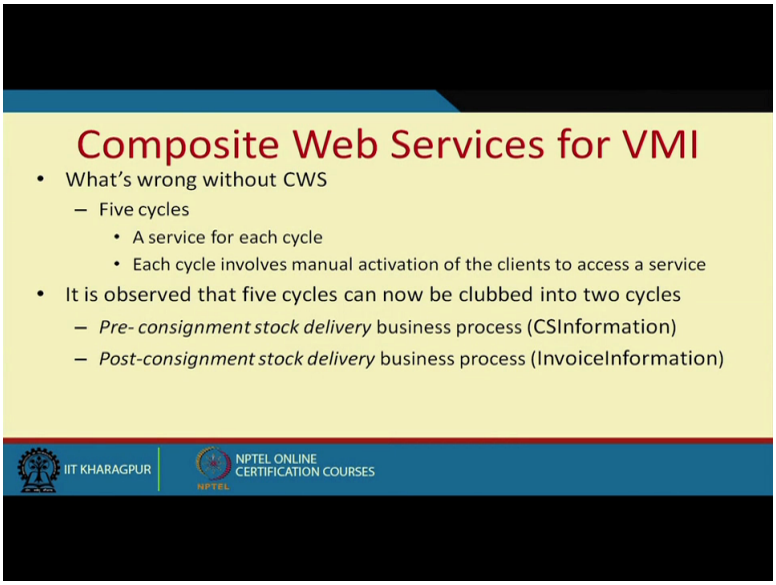

So the 5 cycles that we just saw a individual services those 5 services are.

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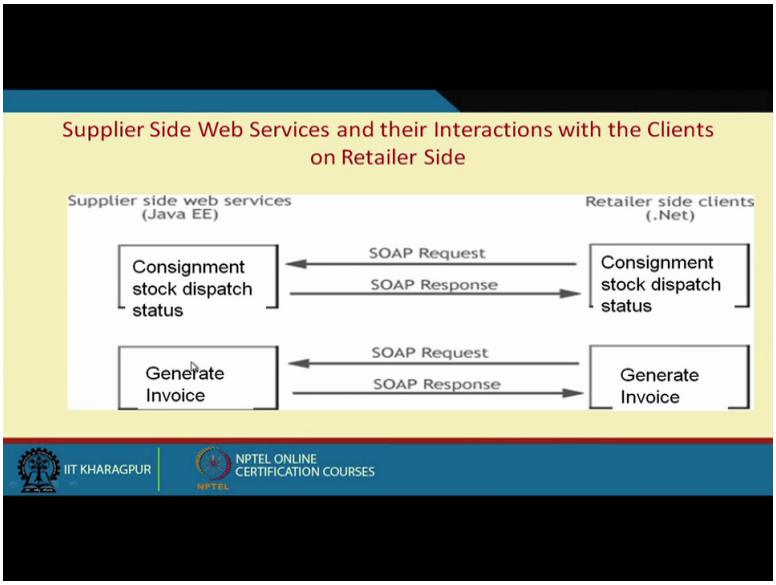

1, 2, 3 then 4, 5

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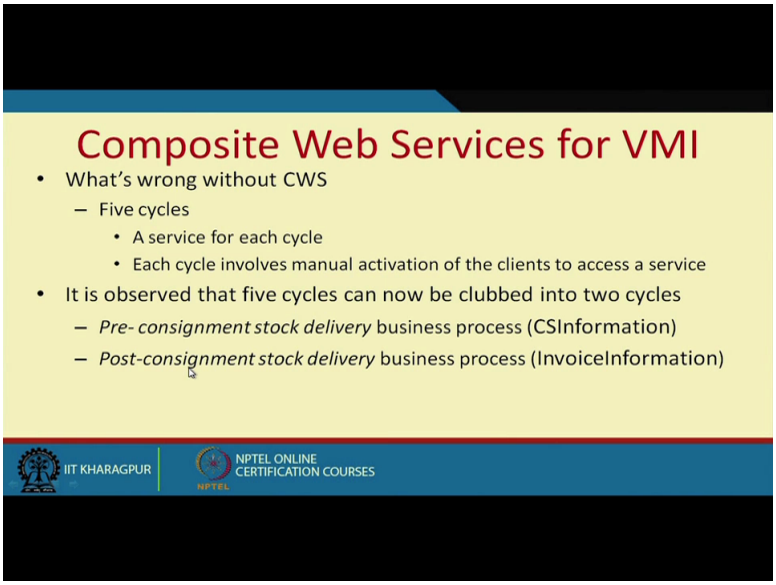

So now some design has to be made and let's say some design has been made where we make it into two business processes first one is free consignment stock delivery business process and subsequent example when we talk of the example we call it as CSI in CS information then is a post consignment stock delivery business process which is about sending this invoice information.

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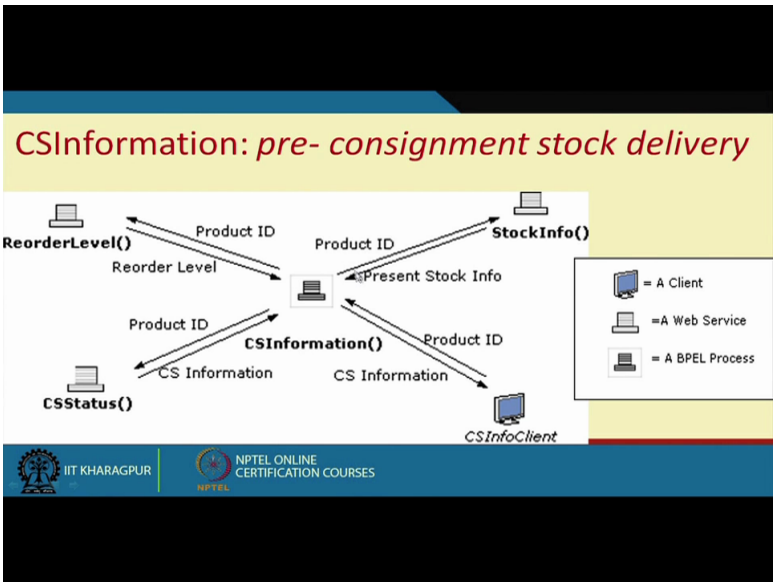

So this centralised service which is implemented in case of a soap in case of soap to implement such centralised services you use some kind of language so there are many languages available assuming that this is a some business process there is language called

business process execution language assuming that one such language here that language is used this particular centralised service implements that.

And communicates with the respective web services who participates. So basically this is one service this is second service this is third service and only once the client initiates the process then there will be coordinated as for the process description given here.

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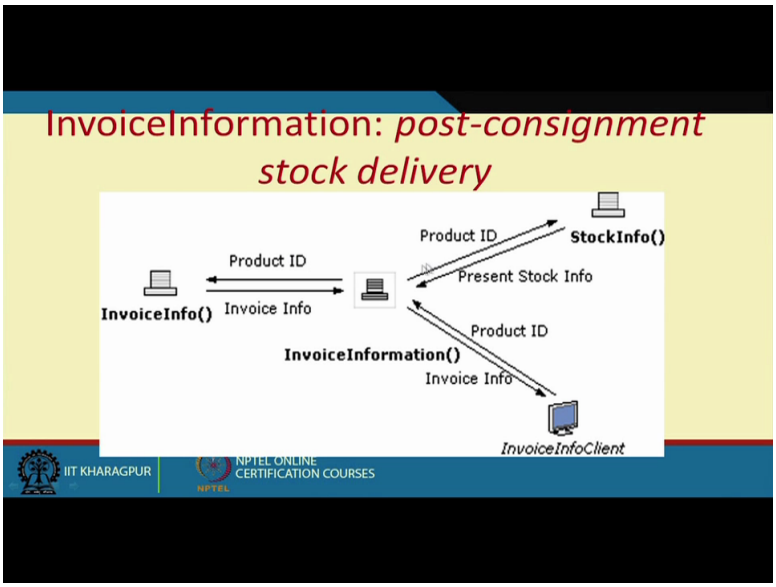

Similarly another two processes like getting the giving the product information getting the invoice giving the product ID getting the stock information these things together these two these two services put together are coordinated by this central business process execution language made centralised service once this service is called up on this will be coordinating with these two these two individual services.

And carry out a complete business process so what we understood so far is using web services we can make automate only one information exchange it is possible to make automate only one information exchange between two parties so when FB and a business process is basically required in number of exchanges because there will be a number of activities.

And with twin and maybe some person will be responsible for each activity and between any two activities or any two person there in the information flow so for each of the leg of information flow one service will be hosted and if we have a complete group of search then you need a some you need some mechanism which will be coordinating this activity so either there will be centralised service.

Which will be coordinating all these services to make the complete work flow automated or there will be a the design has to be made in a manner so that all the services communicate with each other and make the process whole business process run automate. Ok so we this finish thank you very much!