Object-Oriented Analysis and Design
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Lecture – 47
Interaction Overview Diagram

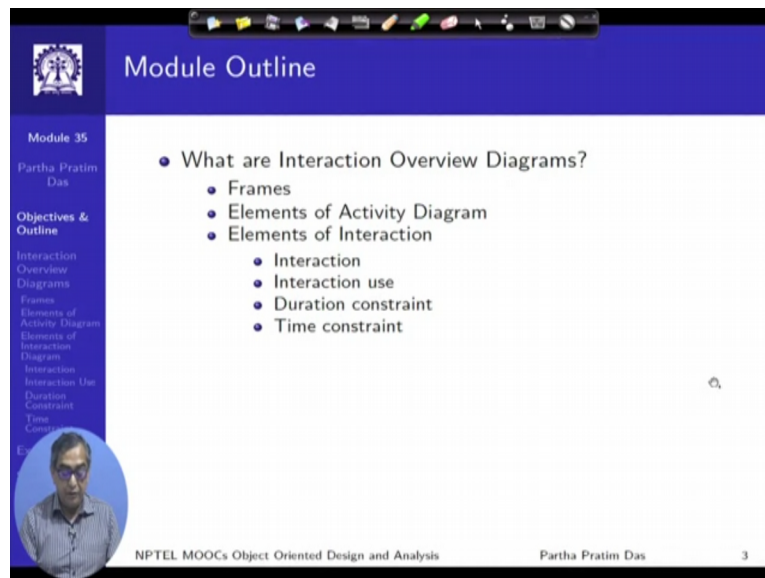Welcome to module 35 of object-oriented analysis and design. We have been discussing about variety of UML diagrams.

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And we have specifically looked into 2 kinds of we have looked into structure diagrams and behavior diagrams and in the structure diagram we have primarily looked at the class, in behavior we looked at use case and the whole bunch of interaction diagrams and in the last 3 modules we have looked at the activity diagrams. So, this is what we have seen so far. So, in this context we will try to understand the interaction overview diagram which is kind of an it's not a significantly independent diagram.

It is kind of a mix of activity and certain part of the interaction diagram. So, we will try to understand does it.
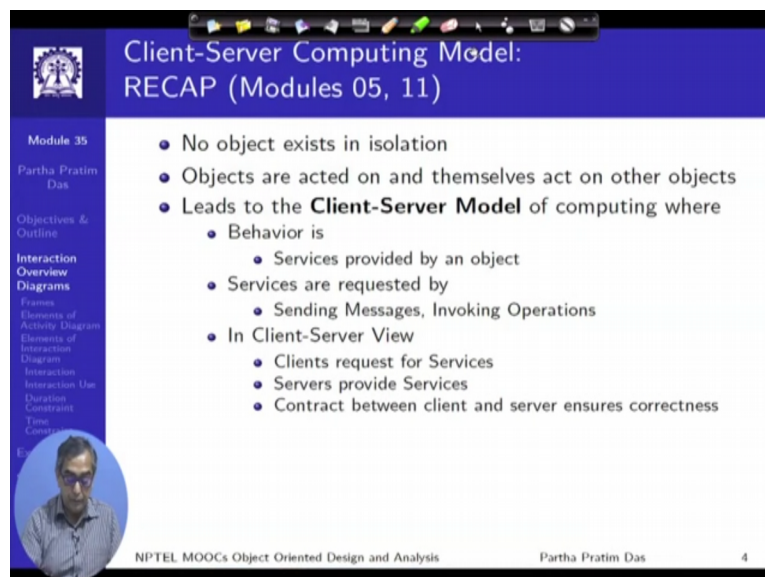
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Client-server model you must be master of this now.

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Interaction diagrams overview diagrams as I said is not separately listed here because these are the different these are the different means of interaction diagram that you have, the structural diagram that you have and interaction overview diagram represents the overall flow of control. It gives you a view of the system at a relatively higher level than individual diagrams that you are looking at. So, this need to be captured very carefully starting from the early phases, starting from the analysis phase and in that way, it plays an important role.

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Certainly, like all other diagrams, it gets refined in the design phase.

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So, what are interaction overview diagram. Interaction overview diagrams provide overview of the flow of control. An important thing is the notes are interactions or interactions uses. So, they are not just elementary notes of activities or objects that we have. If we look at where the diagram is placed, that is the reason I was pointing you to the classification of diagrams is, it is one diagram which combines the elements of activity diagram as well as the interaction diagrams.

Of course, amongst the interaction diagrams significantly uses the elements from the sequence diagram. Therefore, you will find that the major components of the interaction diagram as listed below are borrowings from the activity diagram or the elements of different interaction diagram or the sequence diagram to be more precise.

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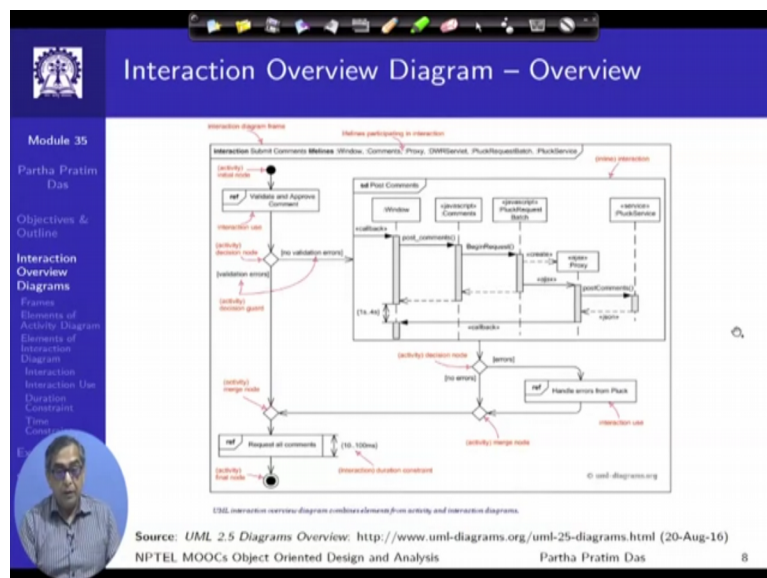
So just I would like to give you an overview of the interaction overview diagram. So, if you look into this diagram and try to initially we you may not be really concerned about what is the system that it is trying to describe and so on. But if you just look at the diagram and try to look at the

different icons and primitives being used, something should strike you. What should strike you? Is that in this diagram we are using the icons nodes of multiple different diagrams, for example if you look into this part, what are these?

These are basically lifelines, the heads of lifelines, these are tails of lifelines and so on. These are executions, these are executions, these are messages, these are different messages and so on. So clearly you have a sequence diagram. If you look into this part, these if you look into these, these are different kinds of control notes, we are certainly talking about the activity diagram. So, this is one diagram where we are trying to use both of these diagrams at an appropriate manner so that it can have a total view of the system at a different level.

So, let's get little deeper than this. So, this is this is where it starts, greenish yellow. The first you say is the interaction is validate and approve comment. So, let's assume that the situation is something like this that there is some webpage on which users are allowed to put comment and once the user has put the comment then you want to check whether comment can be, is a valid one and you approve it to be this pattern. So that's the that's the basic activity.

So, this is what you would like to do. So, this is a reference showing that this is an interaction which is detailed somewhere else. So, if you use this diagram, again I would like to remind you that UML diagrams are not pictures. These are these are actually active items, so when you use a proper UML tool like rational rose or visual paradigm, any of these, then these diagrams are actually active on so. You would be able to say double click on this which says that you are referring to some UML diagram to validate and approve the comment process.

So that is kind of the first activity that you do here which is known as the interaction use. And then so you are not really in this particular instance, you are really not bothering about the details of how do that validate and approve. You know that if you click on you can go there and see what are the details or the interaction there. But you just want to use the interaction and the outcome of that interaction which goes into an activated decision mode.

So, you are here now it is an activated decision mode as we said and having 2 decision outcomes of, validation is ok there is no errors or validation has errors. Now if this is the outcome, let's say first we take the error case. If the validation is erroneous then you come here which is as you can see is a merge node, guessing if validation was not ok then you go on here, certainly your control will flow through this and you refer to request for all comments and you put a time window you could not yet

introduce what a time window is, it's a duration constant.

So, within this you put the comments and then you close this activity. So, this is this is you get as you can say this is one flow that you can see and in this flow, their advantage that you are trying to take, the reason is this is called interaction overview diagram, you really do not want to get into much details. So, if you get to this failure this is one reference here, another reference here, 2 decision nodes and you are quickly into the completion activity.

Now certainly if you really want to know what is validation, really want to know what is requesting for all comments, you can click and go to that details. On the other hand, if you had a at this outcome from the validate, that is there is no validation error that if you had a success then your control o flows to, according to activity diagram it should have flow through an activity mode. But here we use a total what is this, SD post comment which is basically sequence diagram interaction that we are showing.

It flows into the sequence diagram interaction and this whole thing as if, so this whole thing in one way is an activity where the control flows and the control come out from here. But you do not show it simply like the activity rounded box, rather you show it with a detailing of the inside sequences that born, that is once you do not, you have no validation error then this is where you have wretched and these are the different lifelines, these are at a other further details of java object.

So am not getting into them, they how do they interact and exchange messages and actually do all that and finally tell you whether after the validation whether the comment could be posted. And this is the total posting process for the comment which you are showing in lot more details in terms of the

If so when this whole perceived activity for which you are actually showing the sequence diagram details, when this that would complete and the control will come out, you have possibilities of having an error or being successful. So you put a decision node again in the activity diagram and if there are no errors then you put a merge node to merge with an error flow and come back here and complete this.

So, this is the another major flow that you can see from here, starting from here, validation was okay, you went through the posting, the posting was ok, you come through, so the second major activity you can see. The only difference being that you have this particular activity expanded a lot

and also what can happen is after the post comments have happen, you may have some errors so that the comments could not be posted. So, you could have errors under that condition, again you want to handle the errors which you for which you refer.

You refer to the handling error, is again may be a very detailed activity. So, you do not look at that interaction, show that interaction here, you just refer to it as a as a use of the interaction, so you can come through this. So that gives you the third major pathway, so this flow which is, so you have basically if you look at if you if you look at in the in the overall conditions then you will find that the comments was received. So, based on whether it is valid and approved, we have one flow.

If it is valid then whether it can be posted or cannot be posted, we have another 2 flows, on that total 3 flows you are showing here. And if you leave aside this part then rest of it is actually activity diagram. So, what you are trying to say is here this particular interaction headline is interaction submit comments lifeline then you have all these different lifeline objects. So, this interaction submit comment this particular overview diagram,

in this overview diagram, you want to get in overview of what happens when you submit a comment at that you are specifically interested in the sequence details, interaction details of the actual posting operation. These are the remaining activities are kind of together preconditions and post conditions that can happen so that this can happens both way. So, the interaction overview diagram has to appropriately choose as to which part it for example in other way could be you could have met this as a reference also.

You could have met this as a reference, references post comment instead of having this old detail, you could have just say that go there and find out what happens in post comment. But you do not want to do that because this is where you want to show that this is where the major system than a mix the major happy flow of the activity exists and you want to focus on that and you want to focus on that in terms of actual interactions whereas the many interactions you want to abstract out and you can see if 3 places where you just refer them but you do not actually get into them.

So that is the basic that balancing is the basic objective of the interaction overview diagram
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And therefore, there are hardly any new you know concepts or nodes coming into this interaction diagrams naturally have frames like earlier before, the interaction frames. So, they are typically with interaction word and then you put a name and it could refer to as I have already mentioned it could refer to other frames that are that are already available. So, if you click on this so online shopping it says that in terms of an overview what is online shopping is you search items and checkout which is at the top level.

If you do search items then it will expand to another interaction overview kind of diagrams or connectivity diagram which will show you how to search items. So that's a being able to abstract at multiple levels and provide overview is a major purpose of this diagram and this is how it is framed (Refer Slide Time: 15:19)

Then for representing this interaction you borrow we borrow from the activity diagram, we borrow different elements and these are typical elements that you borrow, so you can see a whole lot of control nodes, the initial, flow final, activity final, decision node, merge node, fork node and join

nodes are which is taken from the activity diagram and you can use them and you have already seen in the last example, we have seen the use of our decision node.

We have seen the use of merge, initial, flow final, these kind of, now we will not see flow final, these are activated final, these kinds of nodes we have already seen, these are borrowed and just used in the same semantics.

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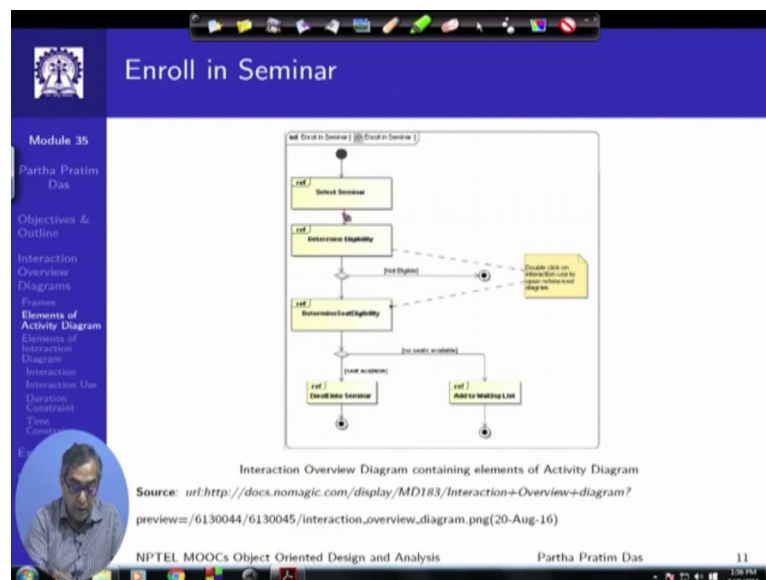
Example another could be that I want to enroll for a seminar, so enrolling for a seminar so enroll for a seminar these are interaction overview, is select the seminar, determine the eligibility, determine the seat eligibility, enroll into the seminar, add to the waiting list. So, we these are the different interactions that need to be done and with those interactions what we show here as an interaction overview diagram is a total flow of the activities given that these interactions are detailed summary.

It is a how do you enroll for a seminar if I select the seminar, then how do you what do you do next is certainly determined whether you are eligible to attend, if you are eligible if you are not eligible decision node of activity diagram if you are not eligible, you reach the final node of the activity but if you are eligible the you see whether seats are available for you to join so determine the seat availability, if seats are not you check whether they would allow you to waitlist so that you will notified when seat is available.

So that is another activity and which will finally take you to the activity final node. Otherwise if seats are available then you have to actually do the enrollment whatever that need the print, the price and so on so. So, this now naturally each one of these if the select seminar would have a detailed activity diagram interaction all that so it will have the sequencing of operations how do you

select what how whether you search, whether you browse, what conditions you apply and so on.

So, you do not want this top-level view to be cluttered with all these details of selecting the seminar, determining the eligibility and so on. At the same time if you just put all those diagrams together then it gets difficult for us to conceive as to what will be the total flow is being talked of. So, this interaction overview diagram basically gives you an ability to combine the interaction diagrams and the activity diagrams in a multilevel hierarchical manner so that you have all these in the top-level diagram.

And if you just you just read the notes here, so if you double click on any one of them, then that will expand and show you where interaction overview within that, that in turn may have other references which again can be expanded in that way.

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Besides that, activity diagram elements, it also takes an element from other interaction diagrams, primarily the sequence diagram so you have seen interaction, interaction use and so on. So, all those elements will be used again in the same context.
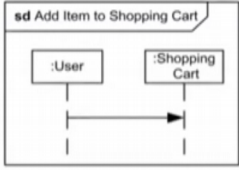
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Interactions are being shown in this manner, the SD and then you put that put the name of that and show that interaction explicitly as we had shown in the example or you could have instances of interaction use.

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So, in the earlier example you recall that for actually posting the comment we had shown the interaction with all the details total flying sequence details and for the others of validate and approve and so on we just used references. So that's a when you say reference here, basically mean that the interaction is being used so this interaction is available elsewhere and can be opened in the application.

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Besides that, in the interaction overview diagram you can provide constraints, particularly duration constraints so this is a this is a notation that you show, these as we will later that these are again borrowed from the timing diagram, we have not yet done the timing diagram. So, we haven't seen this but these are basically from the timing diagram. So, it says that this is a diagram showing that there are 3 states, of water h20 rather, ice, melting and water and this this is all the state change and it remains in this state for this duration.

So, whenever you have to show duration, you just show this kind of and then you write what is the time duration that is. Here you can see that the duration is again in turn shown as a range so which reads that. So, this diagram will read that for the ice to melt into water, the melting time is anywhere between 1 minute to 6 minutes. So, such duration constraints can be regularly put.

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The other is you could put a time constraint. Time constraint is basically an explicit time or explicit range of time that you associate with an event. So, you are saying that you have a lifeline of a

person and you have 2 states sleep and awake and I associate with this event of transition from sleep to awake, I associate a time 5:40 am to 6 am which will mean that the person wakes up from sleep between 5:40 am and 6 am.

This is specifically talking about a particular this is also an interval constraint because it gives you an interval but you are talking about a specific time in this case.

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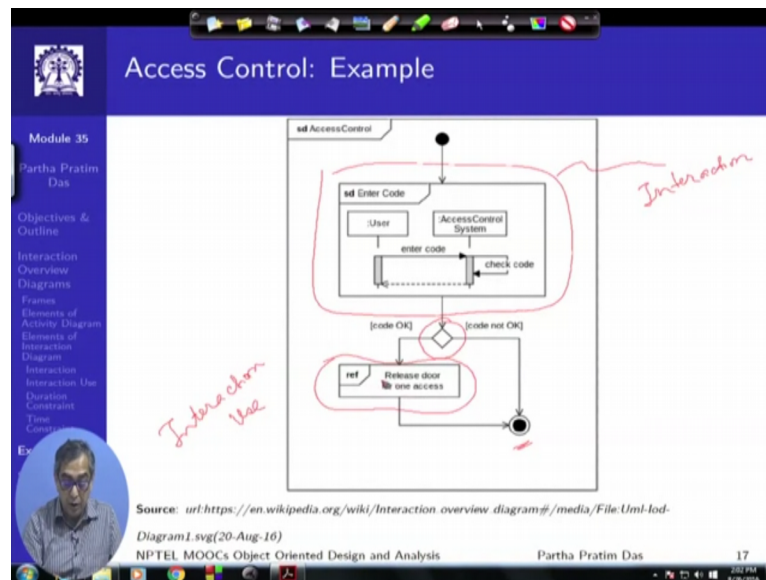
So, with this we could take a look into some examples again. So, this is another example I think we have already discussed quite a lot of this. So, this is another example we start here naturally you end here. And this is you are showing an interaction here with the details of what the user does to the access, it's trying to get access to the system. So, it enters the code and the access control system, message is sent to the access control system, access control system uses a self-message to check the code and finally provide the response.

So, if I look at the whole thing is a this is an interaction that am using and this is sequence diagram interaction and then I have the again the decision node coming from the activity so if the code is not okay, you immediately reach the final activity final state node after it but if it is ok then am doing a reference so this is when am doing an interaction use. So here we have not shown how to release door for one access.

There may be several logics involved in that, several activities involved in that. This left says there is it is defined somewhere and we are just using that interaction so that's a reference to this.

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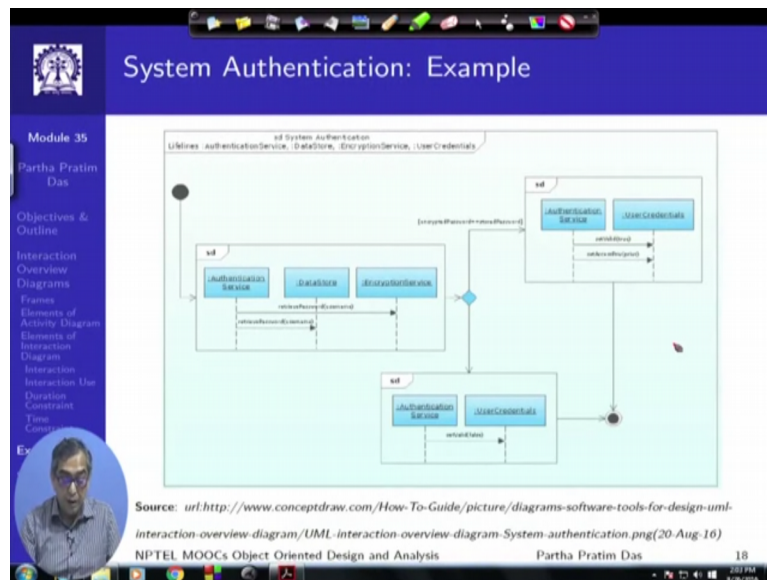
So, this is typically how the interaction diagrams will be drawn. You could look at I would leave live this primarily for you to go through and understand better from the slide so we were saying the SD is system authentication lifelines involved are all these authentication service, data store, encryption service and user credential, authentication service you can see here in this, the data store is here, encryption service is here and user credentials are here so that that basically describes at the top level.

Now if I look at the structure of the interaction overview diagram we will see that there is one interaction here, there is another interaction here and there is a third interaction here. This particular interaction overview diagram does not use a does not have a ref that is interaction use. So, it looks at these 3 interactions and then builds in terms of the activity diagram with these notes. So, we have a start here you first do this interaction, then you have a decision mate to either this interaction or this interaction and finally you merge at this node.

So, there is a little bit of shortcut the merge node is not explicitly shown, it is shown that you both of them actually end. So, in this interaction again we have the sequence diagram showing the authentication service and say retrieve password message and from the data store password is retrieved and then you check whether the so you retrieve the password and then you put that retrieved password to the encryption service am sorry you retrieve the password from the data store using the encryption service so you get an encrypted password.

And this encrypted password and the stored password will have to match. if they match then you do this interaction, if they do not match then you do this interaction. So, if they match then you get the other user details, the validations and you have the success, if they do not match, you do not have a

failure and each one of them finally ends up with the activity final node. So, this shows another way of am just another way of showing the interaction overview diagram.

So, the advantage of these diagrams are this is I mean if you just do sequence diagram these are 3 different sequence diagrams. If you just do activities like the rounded boxes and draw that this is where your initial comment, this is where you have a decision which goes here and goes here and then you have this is the final and you have this, if you just draw this activity then you have a very abstract view, we just do not know what is happening.

So on one in the activity we have a very top level abstracted view may of a of this kind of a system, in terms of sequence diagrams you have 3 disjointed sequence diagrams which you do not know how they interplay and that is a place that the interaction overview diagram take which show you a mix of these details and the activities with the choice that you have a choice as to whether you want to show an interaction in depth in the diagram itself or you just want to use that interaction and show the details somewhere else. Giving you a much better scope to comprehend and represent the diagrams.

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So, to summarize we have discussed about interaction overview diagrams, we have introduced that we have seen that it is basically a combination of appropriate combination of activity diagram and interaction diagrams primarily the sequence diagram and we have shown a couple of examples discussing how interaction overview diagram can be used effectively for building UML models.