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Computational Thinking
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Flowchart for Sum with Filtering

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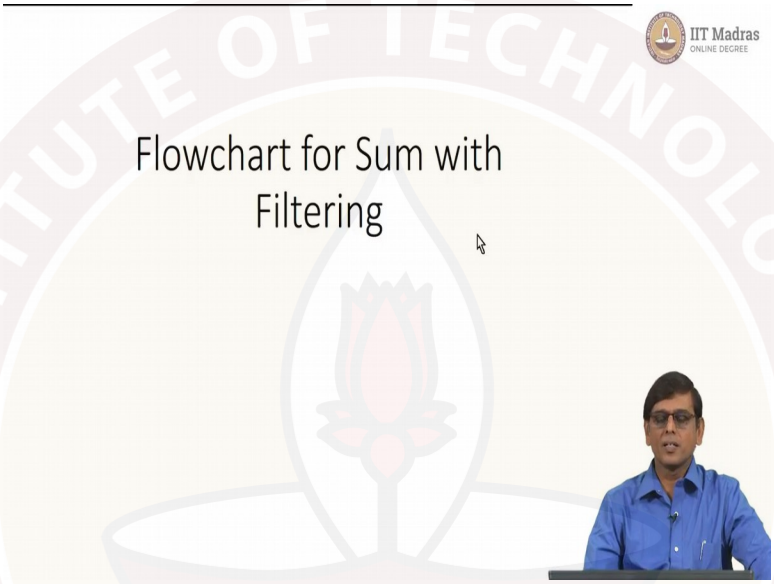

In the last lecture we saw that we could do iteration with filtering, which means we could not do an operation for all the cards but you could check if the card satisfies some condition like for example, where is a boy or a girl or whether the date of birth is within a certain range. And then select those cards which satisfy those conditions which is called the filter.

And then do only account operation or an accumulate operation for only those selected cards. So, in this, in this lecture I want to basically look at how to convert a flowchart, how to convert such a procedure in which there is filtering going on in to a flowchart. So, we are going to consider specifically doing a flowchart for sum in which sum filtering is being done.

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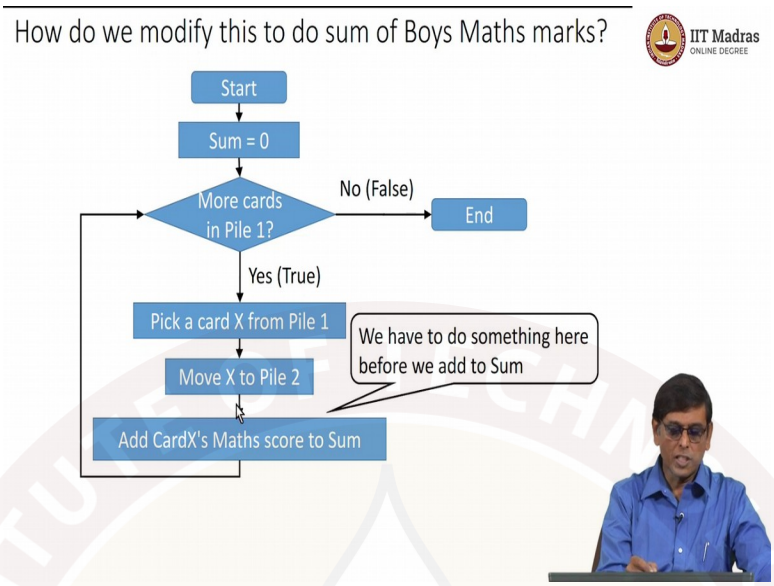

So, for example, suppose we want to modify the flowchart for doing sum which is shown here, to do only the sum of boys maths marks, we do not want to add up all the maths marks of all the students, we want to only add up all the (stu) maths marks of the boys in the class. So if you want to do that, then just this flowchart basically is adding all the cards, somewhere in here we have to check whether the card is that of a boy and only then do the sum, and if that is not of a boy then we should not do the sum.

So, the question really is where do we do this check of whether it is a boy or not? So, clearly it is not at the initialization, somewhere inside the iterator we have to do it. So, in the initialization step, where we are setting sum to 0, there is nothing to be done. We are going to check whether there are more cards in pile 1, that we are going to do whether it is boys or girls, we are going to do that. And inside this we have to pick a card from pile 1, we have to do that anyway, we have to move the card to pile 2, that also we have to do anyway.

But it is only here that where we are adding the math score to sum that we need to make sum change, so we have not do it for all the cards. So after, between here and here, if that card X belongs to a girl then we should not do the addition. But if it belongs to a boy then we have to do the addition. So, something in here, we have to basically insert something in here so that we can check whether it is a boy or a girl. And how do we do that, we have seen earlier that the way to

do check and proceed in the flowchart is by using a condition box and the condition box is denoted by diamond. So, we have to insert in sum, inside this we have to insert a diamond.

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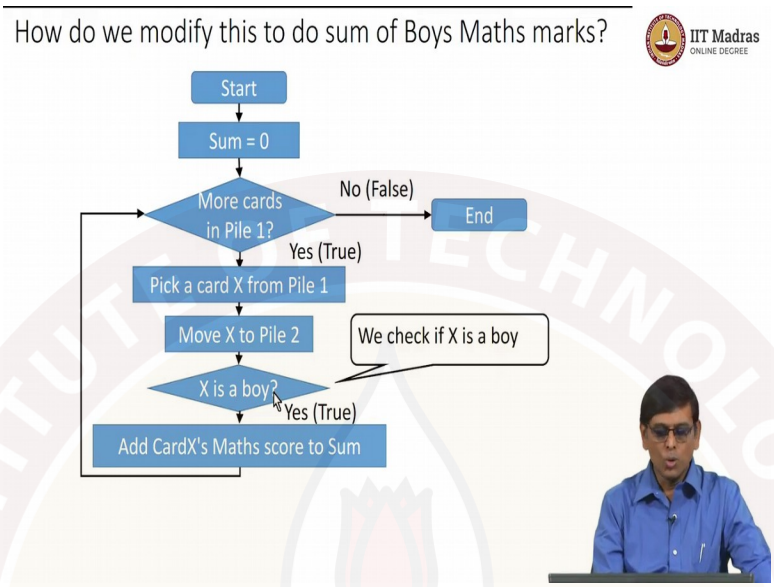

So, I am moving these boxes, so that I can create some space and I inserted basically a diamond box. And what are we checking inside the diamond box? We are checking whether the card X has boy written on it, which is M, in our case basically the card will have M the gender M written on it. So, we are checking whether X is a boy or not? So, if X is a boy then we continue through the process which basically means that we add the maths marks to sum. But on the other hand, if the X is not a boy then there is nothing to do really, there is nothing to do.

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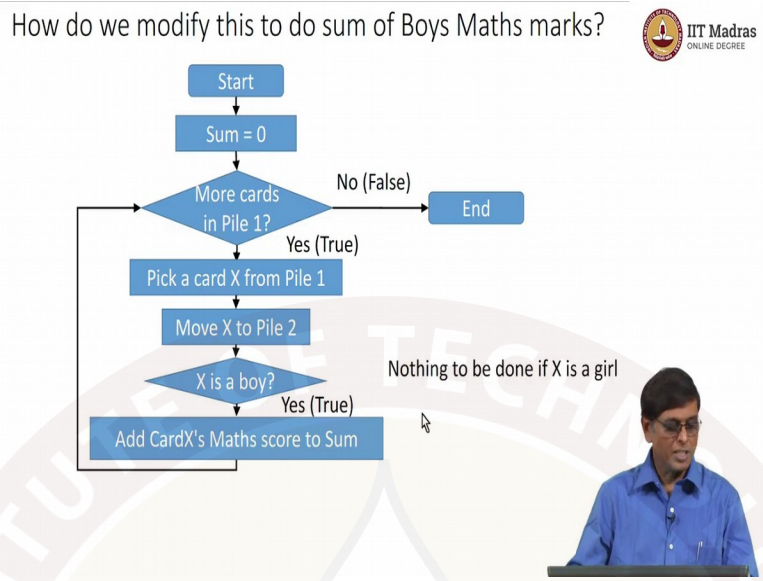

So, when we check X is a boy, it could turn out that the card X actually is a girl, in which case there is nothing to be done. So, how do we represent that nothing is to be done? So, basically if there is nothing to be done then we are not adding the maths score to sum, so in some sense we have to skip this next step. And so, the easiest way to represent that nothing needs to be done is to bypass this box and go to the point after this.

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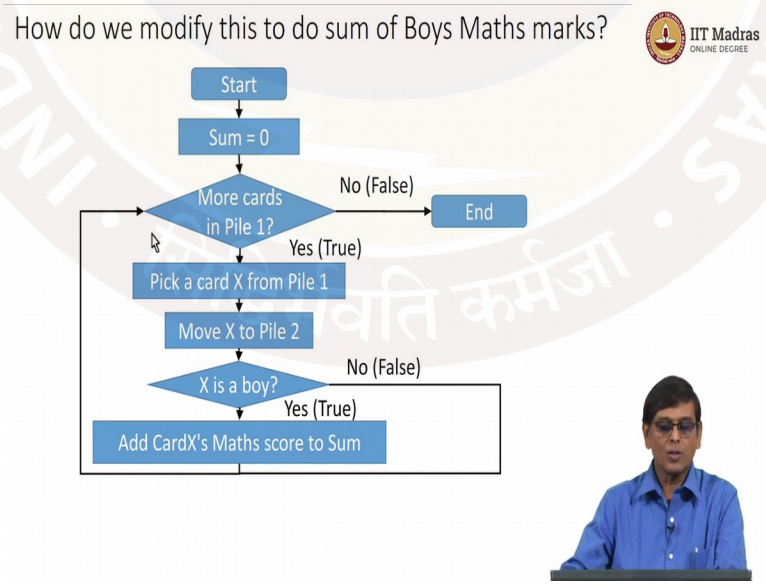

all the way back like this to this decision box. So basically, you are keeping this, adding maths to sum and going back to the beginning of the iteration which you remember beginning of the iteration is checking whether there are any more cards in pile 1.

So, essentially the condition check here, the condition that we are checking here for filtering, if whether X is a boy, there are two possibilities; one is X is indeed a boy, which means the condition comes out true, in which case you will add the maths marks to sum or it could come out false in which case you do nothing and the way to represent nothing is you bypass this box, that is go around this box and go back to the start of the iteration.