An Introduction to Programming through C++
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Lecture No. 6 Part – 2
Conditional Execution
Most general form of if

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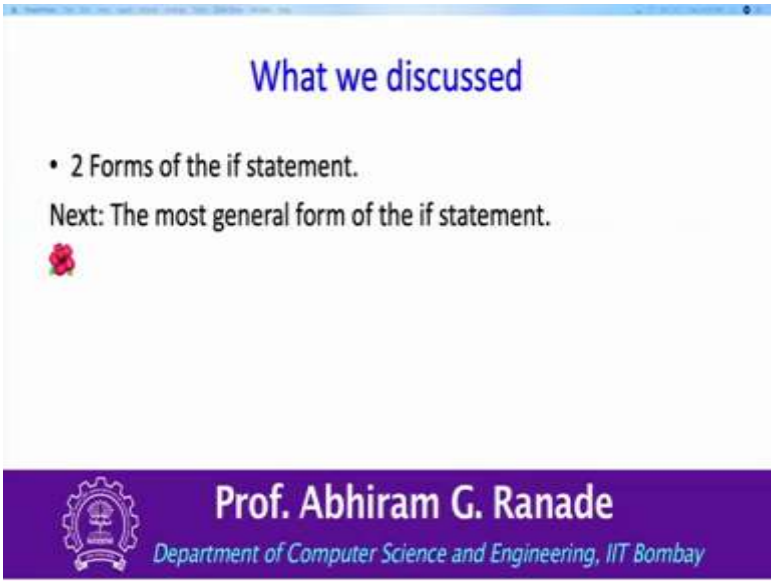

Welcome back, in the previous segment, we discussed 2 forms of the if statement and now we are going to discuss the most general form of the if statement.

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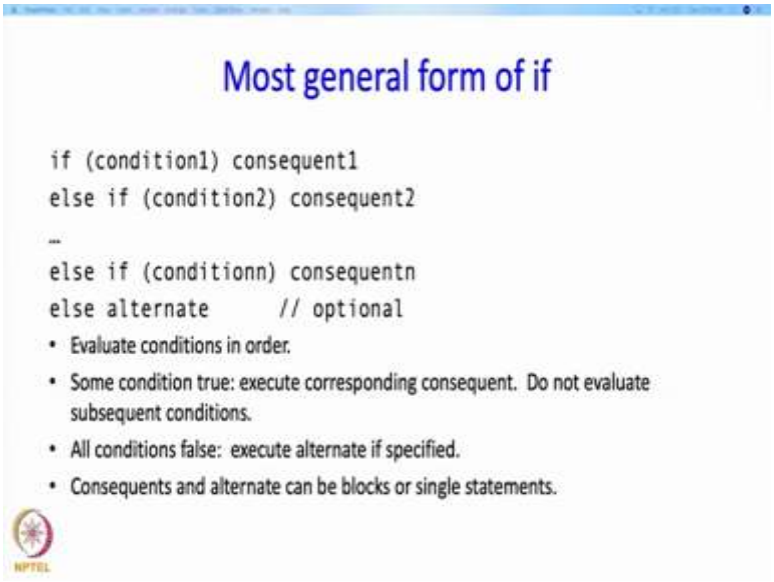

So this is as follows, it begins with; if (condition) consequent. But now we are going to have many condition and consequent, so now we will just write condition 1 consequent 1. elseif (condition2) consequent2, and you can have several such elseif, condition 3 consequent 3, condition 4 consequent 4 and so on. And finally the last statement the last condition, will be if(condition n) consequent n. And followed by that you can have else alternate. And this else alternate is optional. So how does this work? Well, we are going to evaluate conditions in order, okay, so condition 1, condition 2, condition 3 and so on. If some condition turns out to be true, then we execute the corresponding consequent. But once a condition is found to be true, we do not evaluate subsequent conditions. So we, deem the execution of this statement to be over at that point and we go on to the next statement of the program.

If all conditions are false, so condition 1 through condition n, all of them turns out to be false, then we execute the alternate, if it is specified. If it is not specified then we just declare that, this, the execution of this if statement is over. This entire, this entire statement say from here to here, gets over if these conditions are all false, and the alternate is not specified. And as always consequents and the alternate can be blocks, or single statements.

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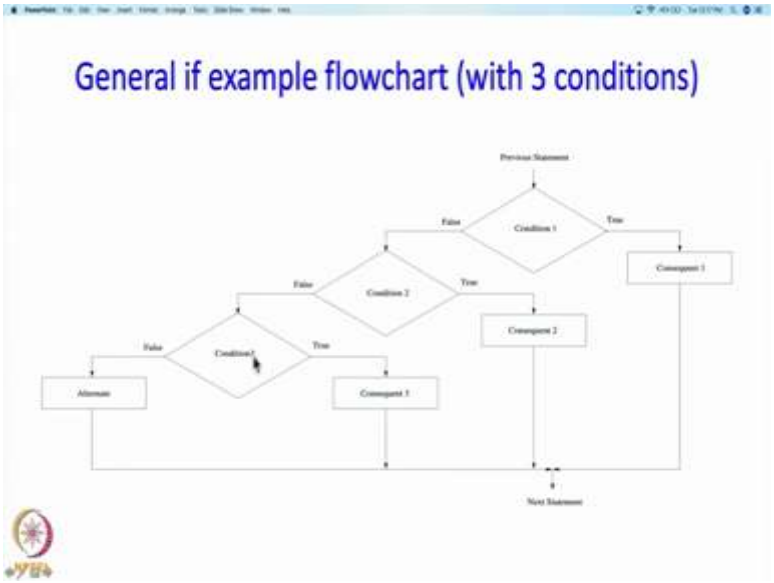

So I want to describe the if statement, suppose it has 3 conditions, then what it would look like? We draw the flow chart for it. So let us see, so over here, we have the flow chart of the previous statement. So control executes the previous statement and now enters, this is now trying to

execute our if statement. So our if statement has 3 conditions so it executes the first condition, condition 1 is executed, if it is true, then what happens? Well in the case, consequent 1 is executed, not only consequent 1 is executed but we know that after that, none of the other conditions are executed or their consequents are executed, we directly go on, to the next statement of our program. Declaring that this if statement execution is over, so that is what, this branch is saying. If this condition 1, that we executed turned out to be false, then we execute, then we execute condition 2. If this condition 2 is true, then we take this branch and execute consequent 2. And then we go to the next statement of the program. If this condition 2 is false, we execute condition 3 and then if that condition 3 is true we go on this side, execute consequent 3 and go on to the next statement. If this condition 3 is false, we go on this side and if there is an alternate specified, it will appear over here otherwise this branch will directly go on to this part. So that is how an if statement with 3 conditions, would look like if you drew it as flowchart.

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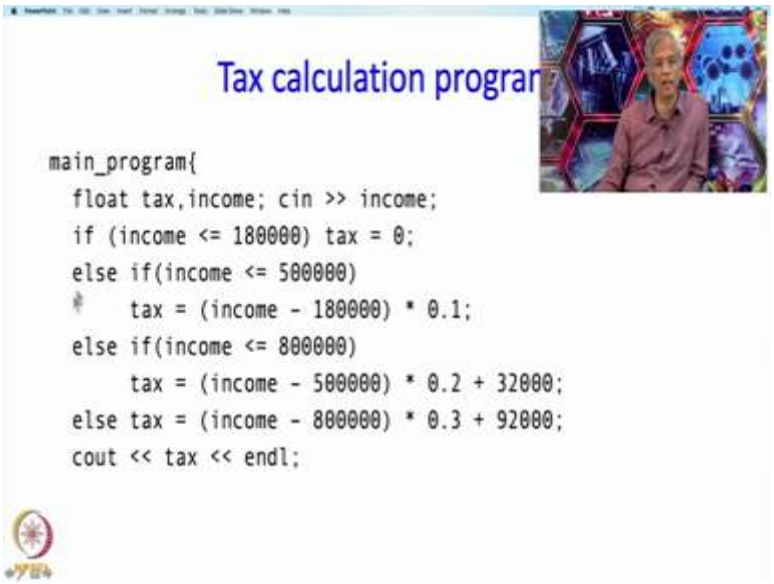

Alright, so what about our tax calculation program. So now you should be able to write it, so as before we are going to have, variables; tax and income. And we will read in the income into the variable income. Now, if income is less than or equal to 180000, we are going to say tax is 0, okay. And now we will use the more general if statement, so else, that means if this condition is false, then we check this condition, if income is less than 500000 then what do we do? Well then we say that the tax is equal to income minus or excess of income over 180000, 10 percent of that. So that is what this expression is implementing. So remember, that this expression is going to be

executed if this was false and this is true. So what does that mean? So if this is false, then the income is above 180000, but if this is true then it means the income is less than 500000. So indeed, this statement will be executed only if the income is greater than 180000, but is less than 500000 exactly as we wanted. But if the income is greater than 500000, then we come to this part. But again we are going to make one more check, if the income is less than 800000, okay. Then the tax is income minus 500000, 20 percent of it plus 32000.

Again let me indicate, when is this statement is going to, when is this statement is going to be executed? Well for that statement to execute, this condition must be false, this condition must be false. But this condition must be true and that happens precisely when, income is bigger than 500000, but less than 800000, okay. And finally, if the income is bigger than 800000, then the last part of a rule is used which is the excess income above 800000, 30 percent of it plus, 92000. And so, that concludes this if statement. So this general if statement looks, very large that is what is concluded. And then we print out the tax.

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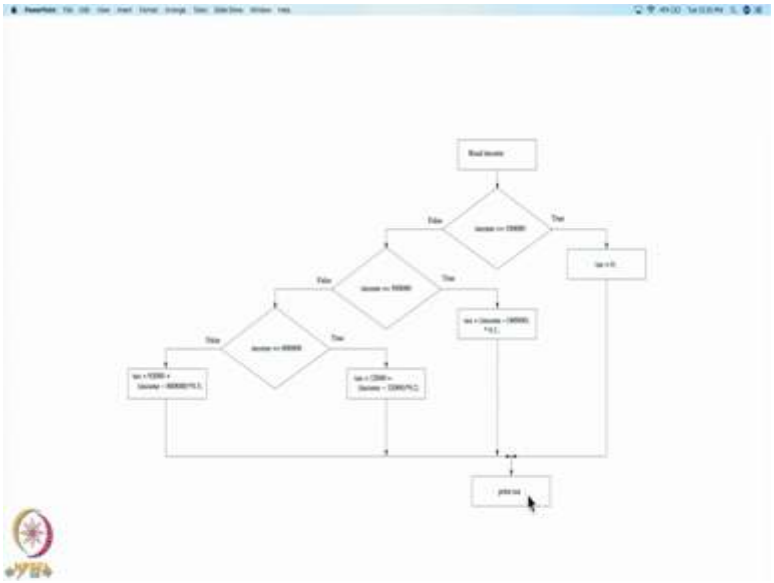

I have shown, this program, the entire program as a flow chart now. So first we are going to read in the income, then we are going to check, is it less than 180000, if it is, then there is no tax. Otherwise, we check is it less than 500000, if it is then the tax is 10 percent of the excess. Otherwise we check, if it is less than 800000, so then the tax is as per this box. If it is bigger than 800000, then it is as per this box and at the end, we just print the tax.

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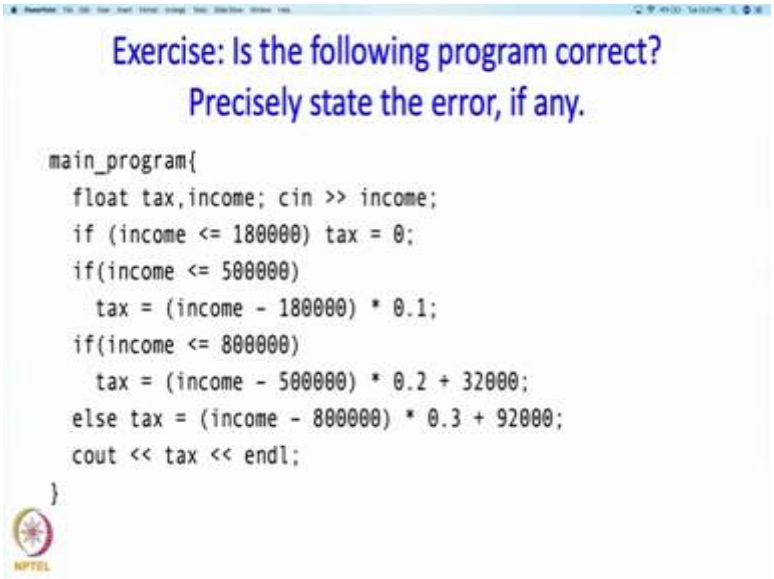

Okay, now I am going to show you a very small modification of the previous program, okay. So, so far it was the same but here instead of writing else if income less than 500000, tax is and so

and so. Else if income is less than 800000, tax is so and so, okay. So I would like you to, mentally execute the program. And tell me whether this program is doing exactly the same thing, as the previous program. When I say tell me, I mean think for yourself, okay. So, for which values of income, will it do exactly the same thing? For which values of income possibly will it do something different? Or in other words, if it does the same thing for all values, then it is exactly the it is a correct program. It is a program that which does the same thing as the previous program, which we said was correct.

But if it does something different for some values of income, then it is a wrong program and I would like you to tell me whether this program is right or wrong and if so, state what error it makes that is for what values of income will it produce an error?

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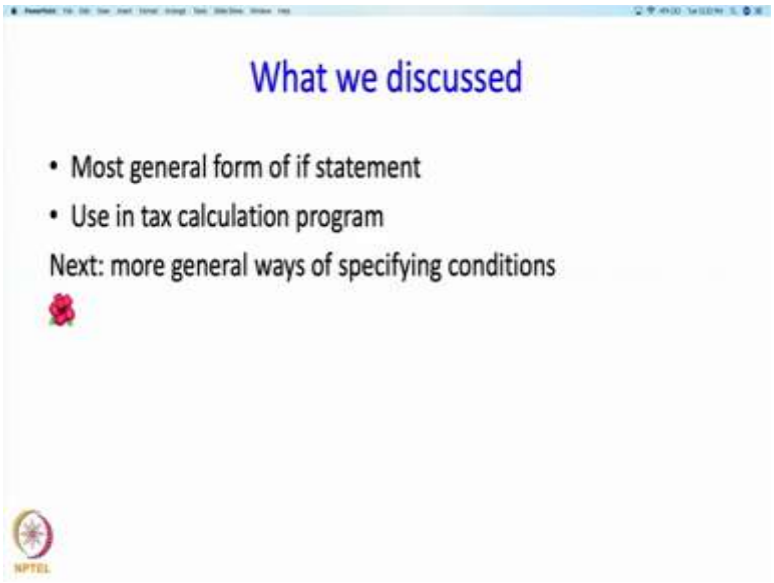

So what did we discuss in this segment? We discussed the most general form of if and we used it in our tax calculation program. Next, we are going to see more general ways of specifying conditions. So we will take a break.