Embedded System Design with ARM
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Lecture – 19
Mbed C Programming Environment

Welcome to the next lecture. So, in this lecture I will be talking about Mbed C Programming Environment. So, I will introduce this embed C programming environment and I will show you that how you can actually program using this environment. So, first starting it there are certain requirements please follow the slides that is there to do the steps that are required for this particular programming.

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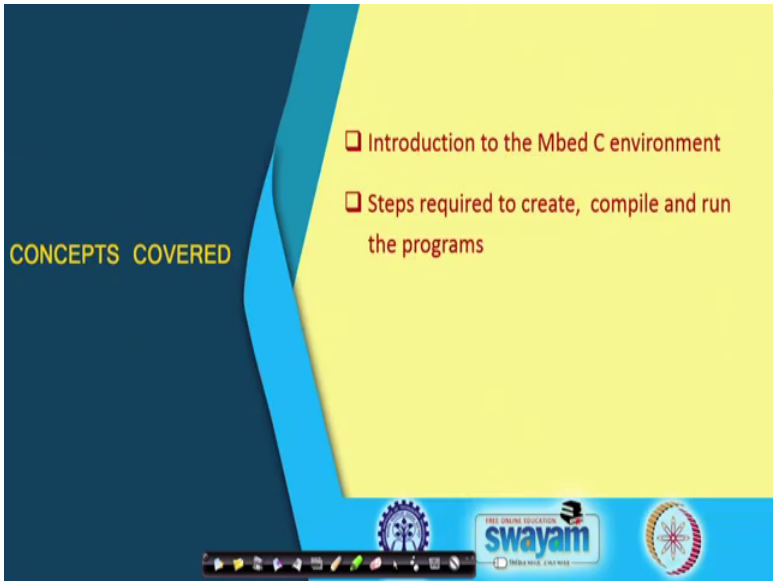

So, as I said I will introduced to Mbed C environment and I will show you the steps that are required to create compile and run the programs.

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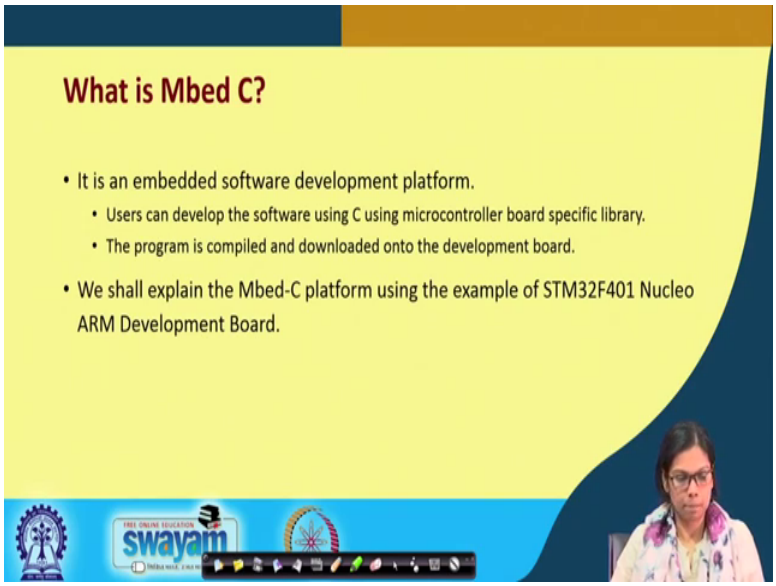

So, firstly, what is Mbed C? It is an embedded software development platform what user can do users can develop the software using C and these microcontroller board specific library. The program is complied and downloaded onto these development boards and we shall also explain the Mbed C platform using the example of STM 32 F 401 Nucleo ARM Development Board. So, what we will be basically doing here is that will first show you that how you have to use this particular board. So, for using this particular board you need to register and you have to also check certain functionalities which is there whether it is there in your supported in your PC or laptop ok.

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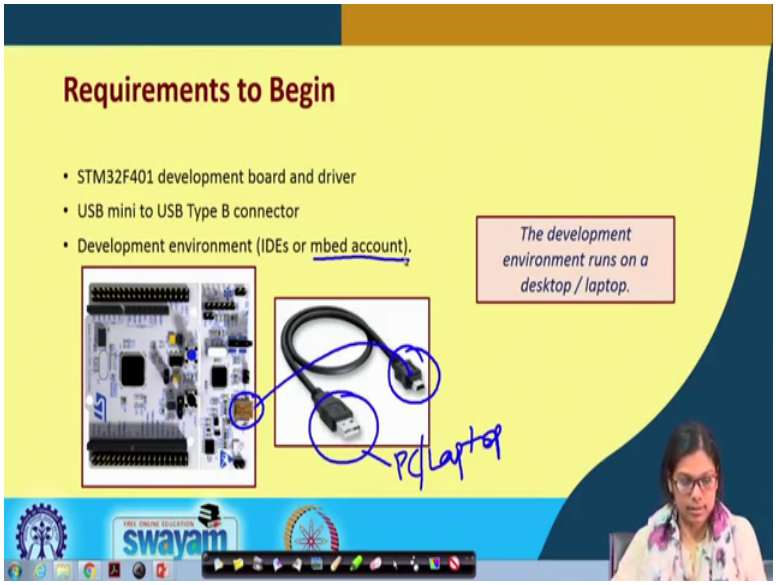

So, we will look into that. So, this is the first requirement to begin you need to have this board in place and the driver ok. You also required this USB mini to USB type B connector. So, you will connect this part of the. So, you will be connecting basically this part here and this part will be connected to your PC or laptop ok. So, this is the first thing you need to do and the as I said for development environment in this case we will be using through and online complier that is mbed. So, you need to create this account in mbed ok. So, let us see that ok.

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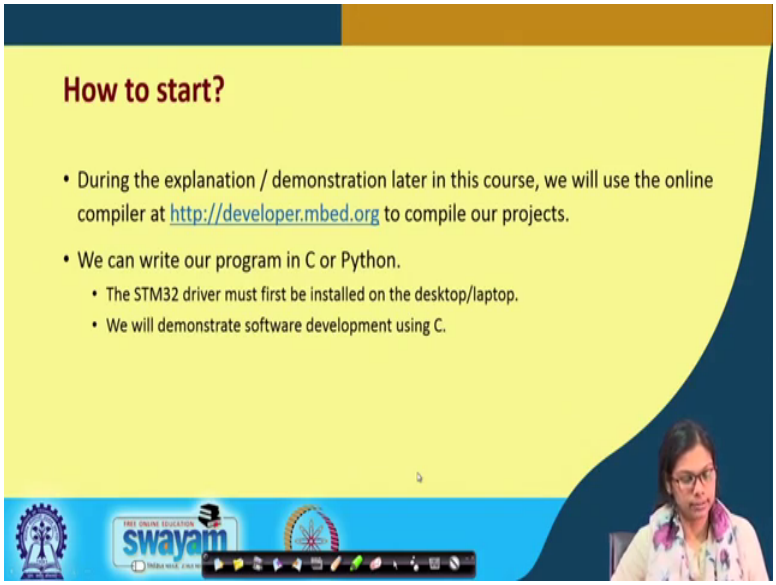

So, how to start? So, during the explanation or demonstration later in this course we will use this online complier which is present in http developer dot mbed dot org to basically compile our projects. So, we can write our program in C or python, but most specifically will be writing in this C the STM 32 driver must first be installed on the desktop or laptop then we will demonstrate the software development using this C ok. So, please remember that you need that USB cable, you need to go here where you will have your online complier and you have to also make sure that the STM driver is installed or not ok.

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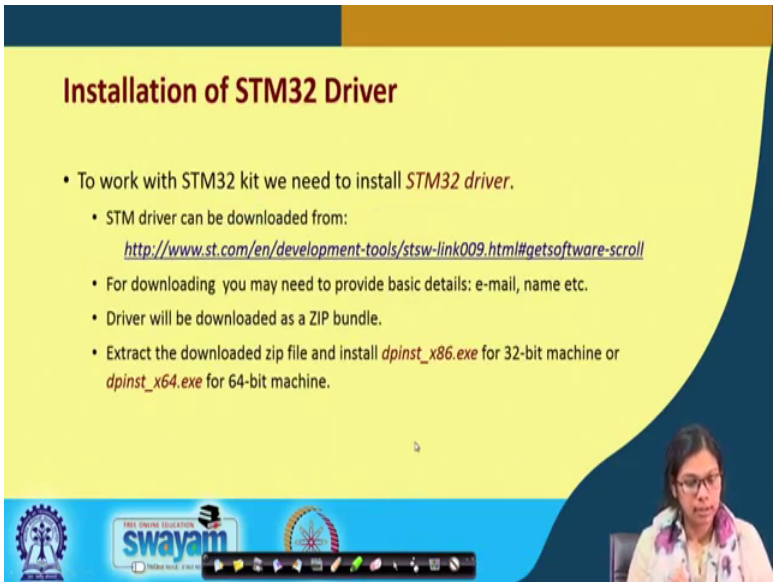

Installation of the STM driver is fairly straight forward. So, all you need to do is that you need to go this particular URL just a second yeah. So, you need to go this particular URL you need to download this, when you download this you have to provide some basic details you already know that this is required for every such kind of a downloading. Then the driver will be downloaded as a zip bundle extract the downloaded zip file and install this particular file for 32 bit machine or if it is 64 bit machine then do download this one.

So, these are an important step prior to using this particular device that you need to install the drivers properly please go ahead and do that ok.

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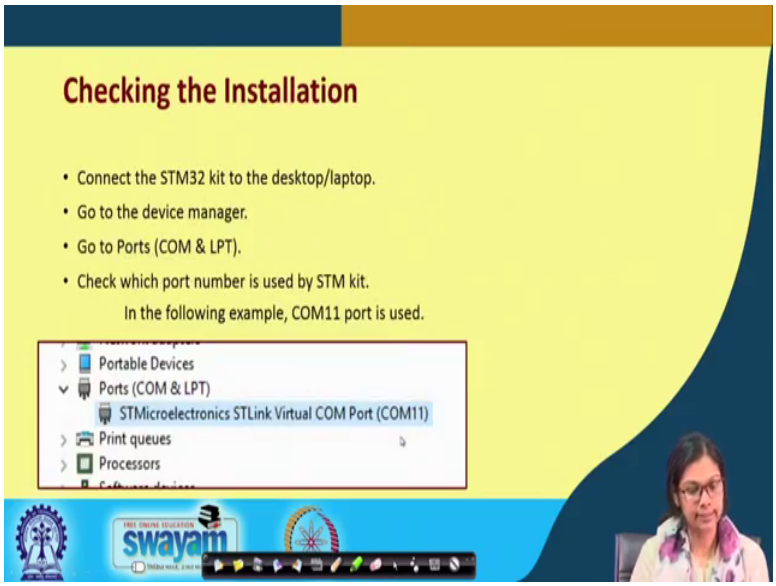

Next checking the installation; once it is already you have meet the installation of the driver connect this STM 32 kit to the desktop or laptop, I have already told you the connector that you have use for it. Go to device manager and to the ports and this com and LTP. And they are basically you will see that for example, under this ports com and LT LPT STM microelectronics ST link virtual to com port 11, does not matter that it will be the same com port 11 in your PC, it could be 7 8 9 any other com port ok, but you need to check that; once the diver is correctly installed this will be shown there ok.

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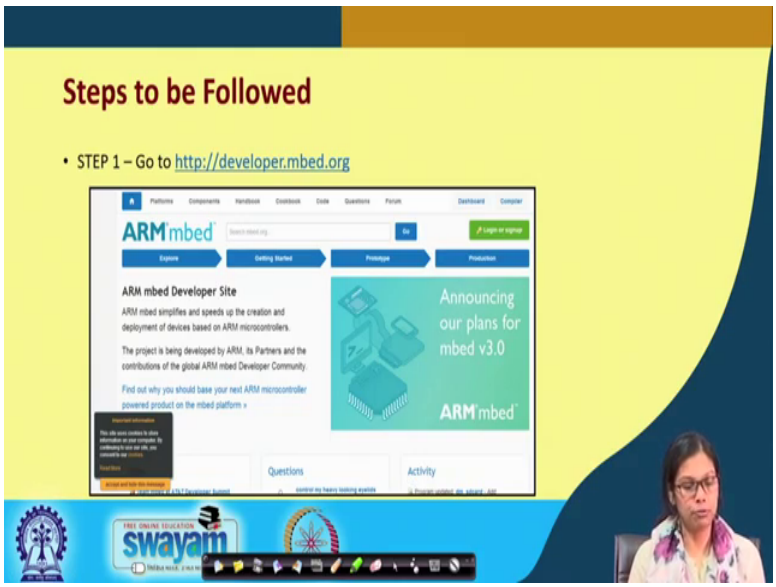

Now, what are the steps to be followed? First step is you have to go to developer dot embed dot org this side looks somewhat like this is the first step.

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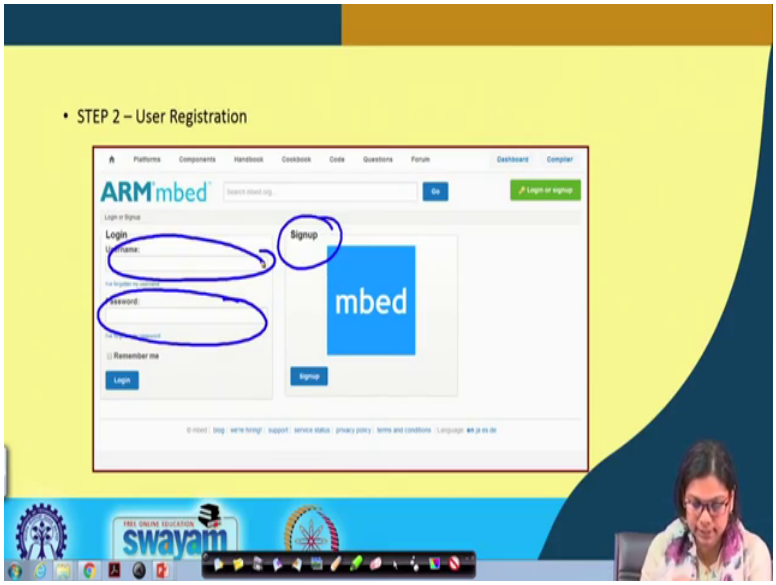

Then you see that there is a place for this user name and password of course, you have to first signup to do this. Please remember your user name password whatever you give here and then you go ahead. So, this is a simple process that you have to follow please follow that.

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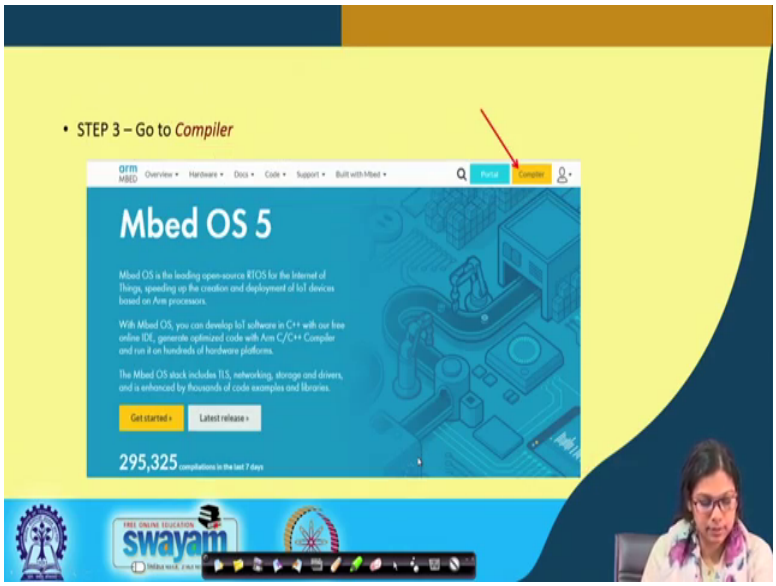

And then you will have once you already login put up your details you will have a screen like this where you will find something which is written called compiler click on that complier.

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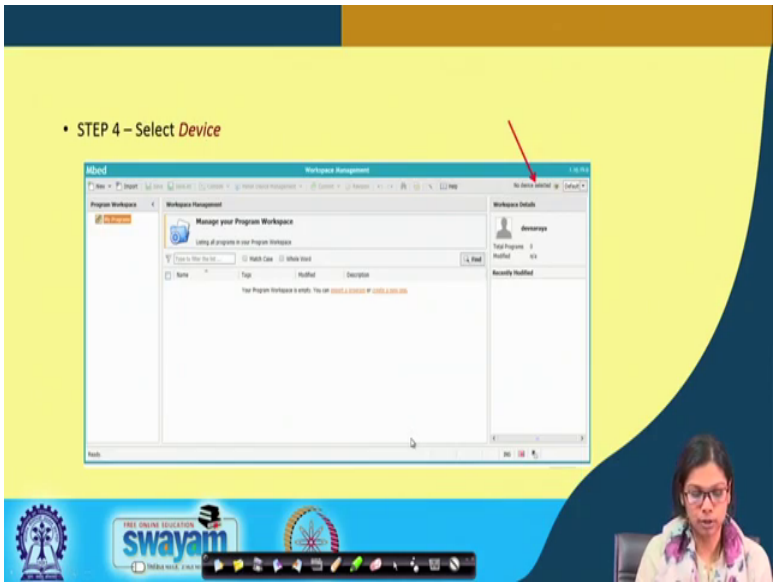

And then you move on once you click on that complier for the first time those who are doing will come across this problem where you will see that it is written no device selected, but you will be using some device right. So, either it is STM F 4 0 1 RE or another device. So, if that is. So, then you have to select that device.

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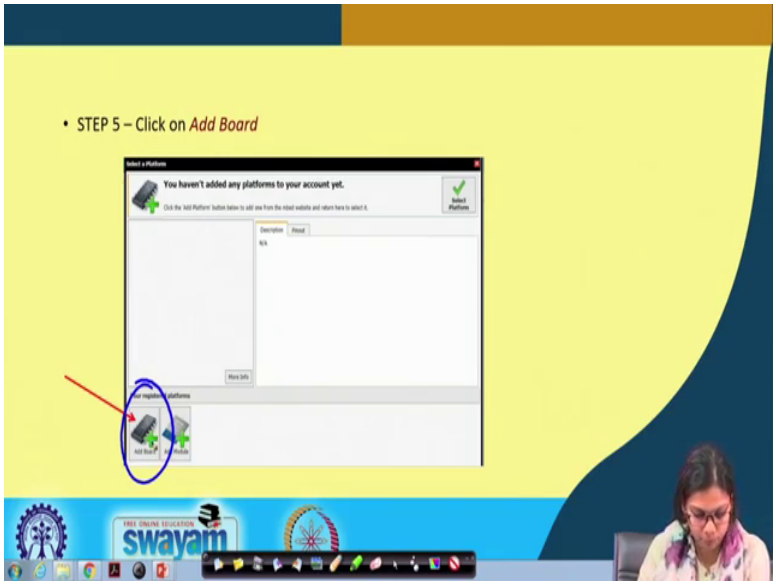

In doing so, the next step that you have to follow is you click on there and then you will see that something like this comes in add board click on this particular thing that is add board.

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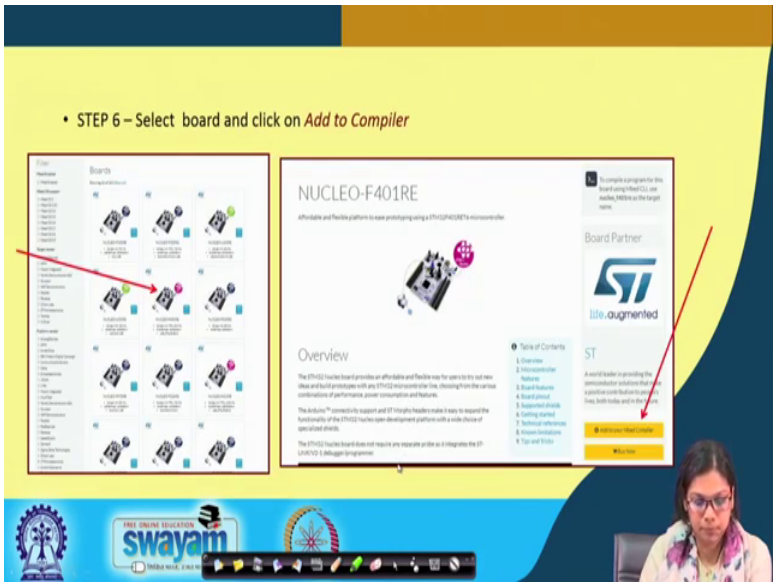

And then you select this one for the one we are using is this one nucleo F 401 RE this is the board that we are using. So, it will be similarly whatever board you are using you have to select that particular board. So, for our case it is this board.

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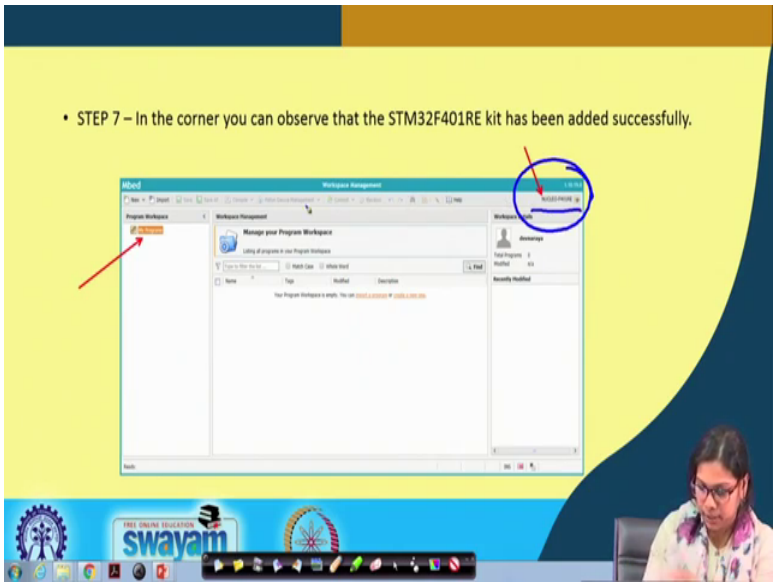

So, we select that board and then we move on. And once you do that you will see here that this particular board got selected, earlier it was showing no device selected. Now, once you do the following steps you will see that nucleo F 401 RE is selected.

Let us move on; once you see this particular screen you will also see my programs and you see that it is almost empty nothing is here as of now, but if you keep on writing the programs it will show up. Once I show you from my account you will see that there are many programs which are written here.

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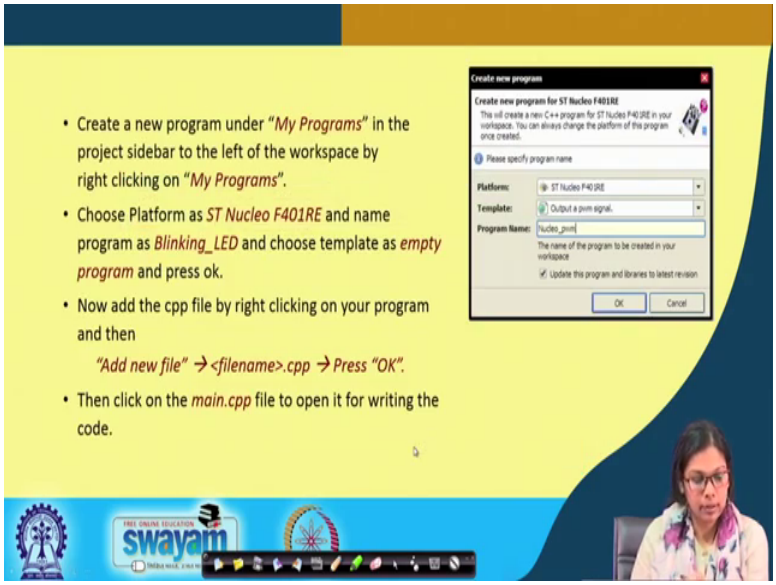

Next the step is create a new program under 'my programs' in the project slide bar to the left of the workspace by right clicking on my programs, you right click on my program then you create a new one and name the program as let us a blinking led and choose an empty template and then you press ok.

So, these are the steps that needs to be followed up once you start writing the first program. Now what you have to do? Now you have to add the cpp file by right clicking on your program and then add a new file filename and then press then you have to click on this main dot cpp where you will be writing the code ok. I will take it to this tool after just finishing few more slides ok.

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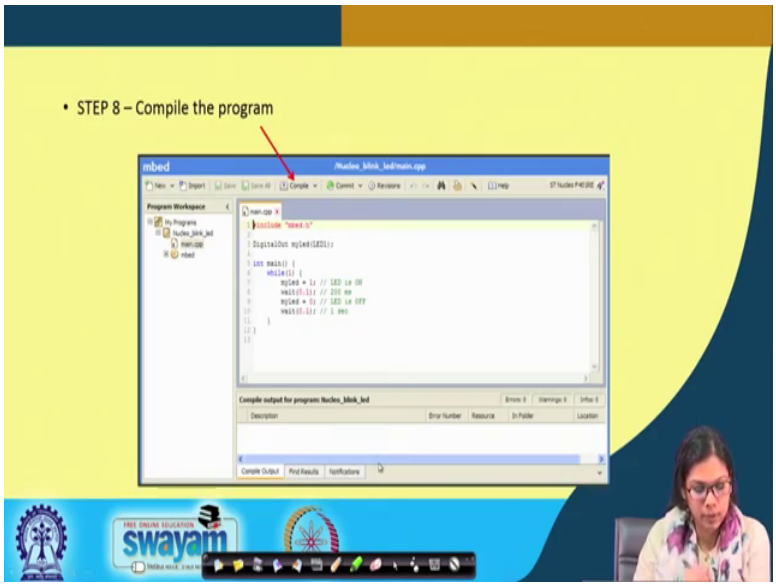

So, now this is. So, this is where this is your main dot cpp when you click here you see this is the main dot cpp for your program; the program is nucleo underscore blink underscore led. So, we are doing something out here I will discuss what we are doing in course of time, but this is how you have to right the program.

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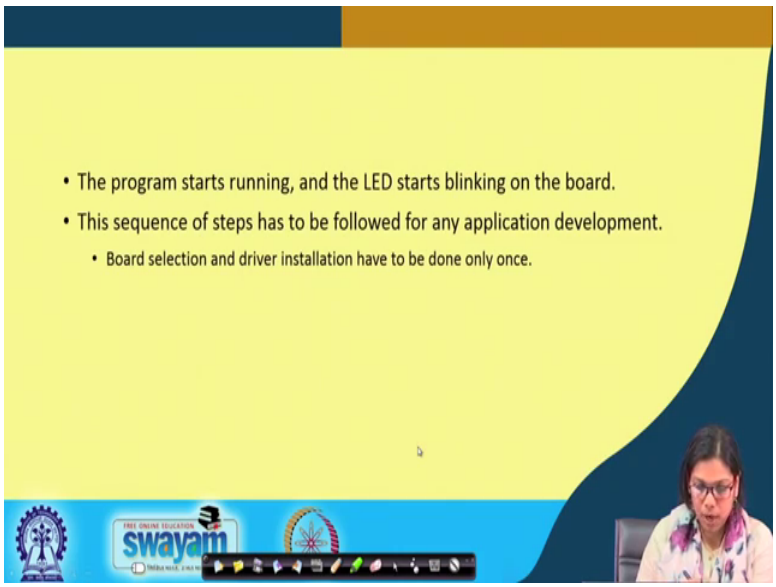

And then you have to basically let compile the program once you write it then you have to basically compile it. So, compile button is shown here at the top you click on the

compile button and then it will compile once you compile then the code will get downloaded save it in the download folder.

The program starts running and the LED starts blinking on the board. This sequence of steps has to be followed for any application development the board selection and the driver selection have to be done only once, but you need to do this unless and other wise do this it will not be able you will not be able to run the programs ok. And finally, this is the whole thing that I wanted to say, but now I will take you to the tool of this particular program that I have just now set.

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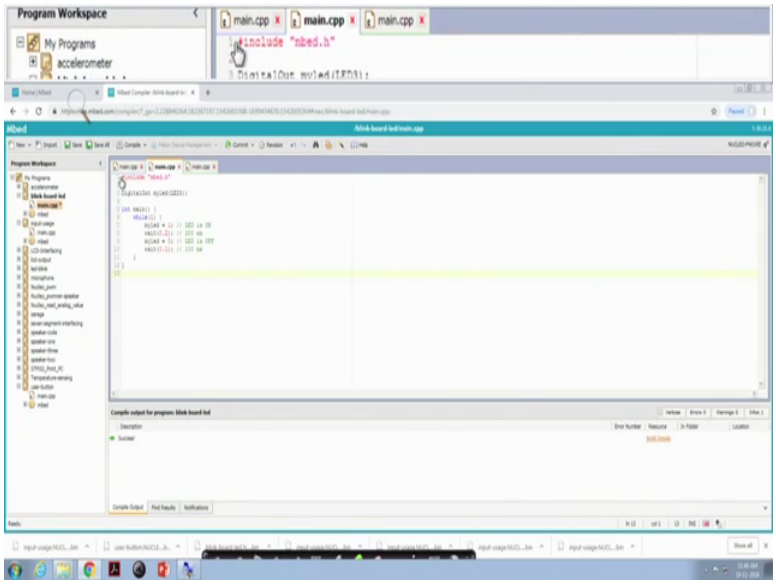

Now, you see this is the environment that is there this is the simple program that I am showing you can see this that this is the whole set of course. So, what we are doing the first step that is required is as I told you.

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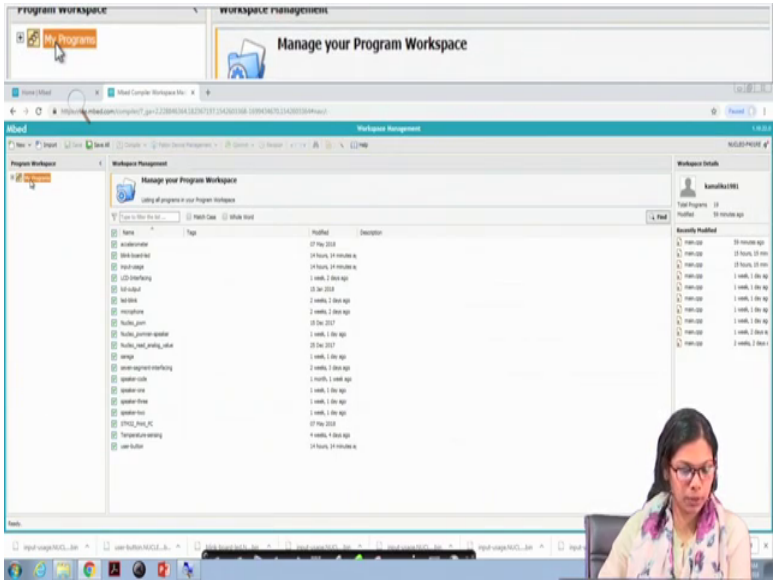

This is my program you have to right click here click on main program.

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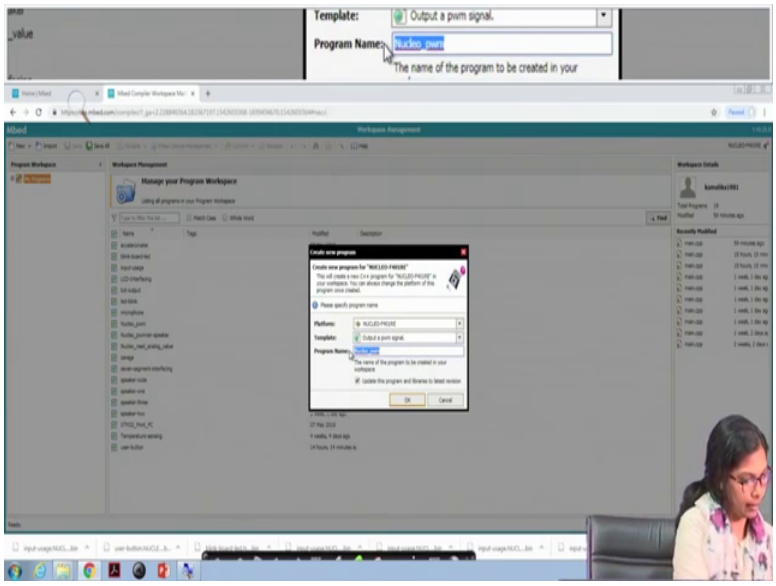

And then you see that something like this will come up and you have to give a name to this program let us say blink LED I have given this name and I click ok.

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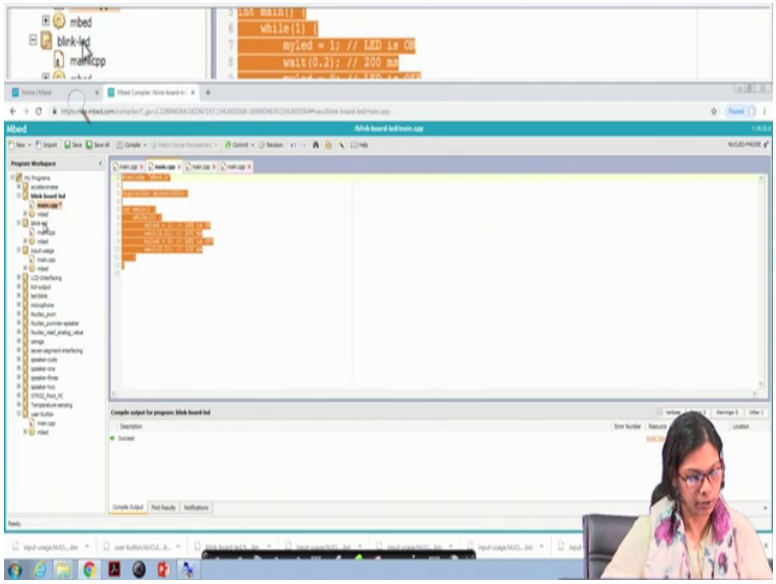

Once I do this you double click on this name and you see a some sample code is there. So, we will just cut out this sample code and we will be using a sample code somewhat like this somewhat like this in here.

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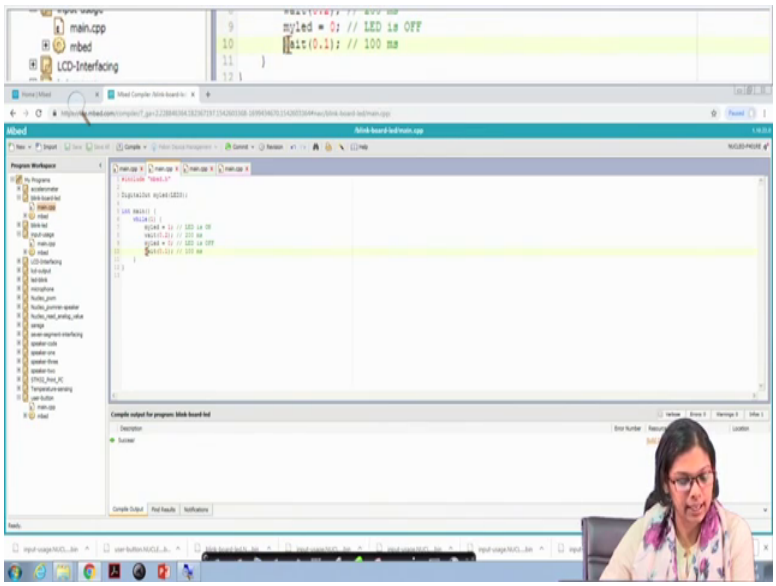

So, I click here this is main dot cpp as I told you I will I will save this control s I save this ok. So, what we are doing this is hash include embed dot h this is the header file that you need to include on the first go. Then the next thing that you are doing is digital out my LED; LED 3, this is one of the output pin digital out means the output pin this is the

object my LED; my LED will be using it in our program. And the name of the LED in that board that STM board is LED 3 int main what we are doing in a continuous while loop while one means it is continuously running.

In a continuous while loop I am doing this my LED equals to 1 that is LED is on when we pass one two it; that means, it will glow and then I wait for sometime and then I said my LED 0 and then I wait again for sometime. So, this is the simple code that I have written. The main idea of showing you this code will be looking into more details in next slide, but to show you how you can write the code.

Now, I will use this compile button to compile it, now the code is getting compiled you can see and I have told you that, it will get saved in download folder this is the download folder you can see I save this.

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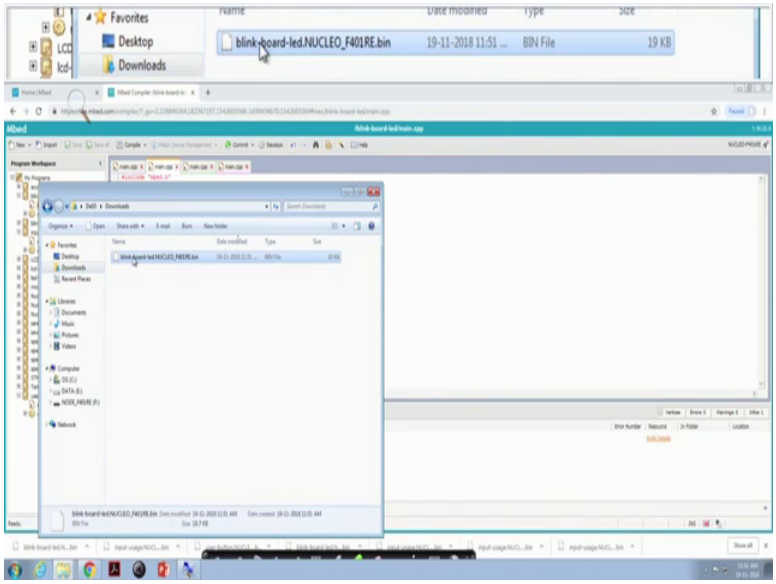

And I go to this download folder this is the download folder and it is already there. You basically copy it or you can cut it from here and you can see in the left side that you are also getting this particular thing which is the board which is mounted on the PC you click here you go here and you paste it here ok.

If we do something like this the on board led will start glowing of course, I will show you this in the subsequent slides. So, this is I am showing you just the way how you can connect using STM board with your PC or with your laptop and how you will write a

program and how you will compile that program ok. So, this is how you have to do it. So, the next steps that are there required will be seeing couple of programs with the board will be done in the next slide.

Thank you.