Programming In Java
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Lecture – 02
Java Programming Environment

So, in this lecture, we are going to learn about how we can write our own program and then the same program can be executed in our machine. So, today we will discuss the different steps of programming in Java in a very simple way. So, if you do not have any idea, it is not difficult, you will be able to follow it. Now, let us see how we can write our first Java program.

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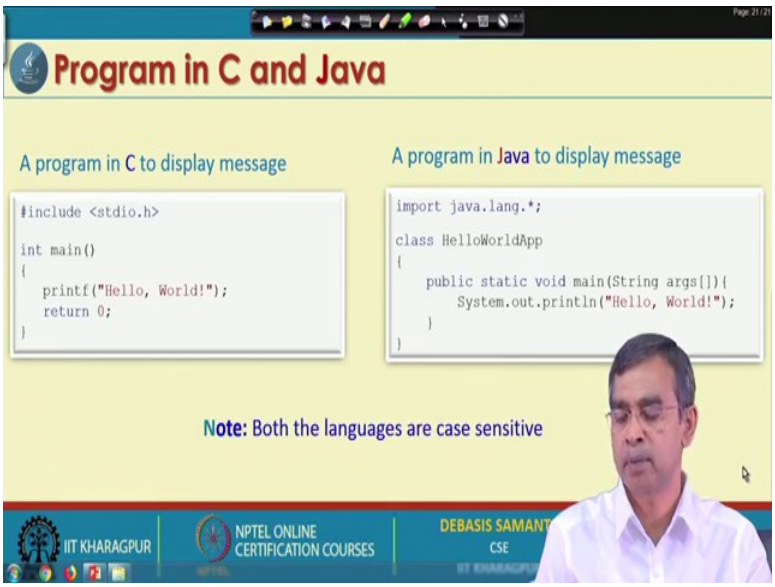

Now, before going to write the first Java program I just tell about how we usually write a program for example, in C. So, if you know C programming then it is good that you will be able to follow it. So, here is basically the idea it is given here how a C programming will look like that. So, it has basically (Refer Time: 01:03) preprocessing statement at right, say include. So, here is basically the include and then it basically the main. So, the main function as you know the C programming is basically functionoriented programming.

So, there should be one function called the main function. So, this program is written in the C programming and you can see that this program will basically if you run it then it

will print a message called “Hello, World!”. Now, let us see how the same right task can be executed by writing a Java program. Now, a Java program will typically look like this. Now, you can see the difference between the two programs: one program is in C and another is in Java.

So, it is ‘include’ in C, but here it is ‘import’ in Java. And here you write the main, here also we write the main like this, but with a peculiar that if syntax. The peculiar syntax is like this public static void which is not required there only int or some void can be there in C. So, here is the special thing we learn about the meaning of these things which are required in Java. The print statement is there in C to print a message. Here in Java to do the same thing we need this kind of syntax – System.out.println(“ ”) and then within this double quote the message that needs to be printed.

So, essentially the two programs will do the same thing, but they are written in a different syntax and different language construct. So, this is the idea about that and this is your first program and one more thing that I should mention here is that Java as it is objectoriented programming. So, we have to develop an object. An object is basically developed by means of defining a class. So, here this is the name of the class that basically we will be used to run; I mean, run this program as an object. So, the name of the class here is called HelloWorldApp this is the name you can give a 1, a 2 like this one also. But there are few things that you have to follow it before giving the particular name and whatever it.

Now, we have to learn about how we can run a program in Java to print a message and this is a typical look of this program, you may find it a little bit difficult. So, that what are the different syntax and everything, but as the time pass and then you will discuss many things. So, all these things will be easy for you and then you will be able to accustom to this concept. So, you should not be worried about that. Now, after running this and another important thing is that as a case sensitive, both the programming language as you know or if you know already C programming then you know that C is a case sensitive and Java is also a case sensitive. Case sensitive means for example, where the System is filled it like this. So, the first character is capital S and it matters.

So, if you write this program which system as small letters all characters in small capital, small letters then it is not the same thing as it should be. And here, for example, the name

of the class is HelloWorld and you see the some is capital letters some is small letters this means that they are distinguishable. So, if you write all in small letters this means that it defines a new class and like this. So, these are basically the case sensitive and Java is a case sensitive programming language. Then while you typing the program then you should consider whether they have the right letters have been chosen or not.

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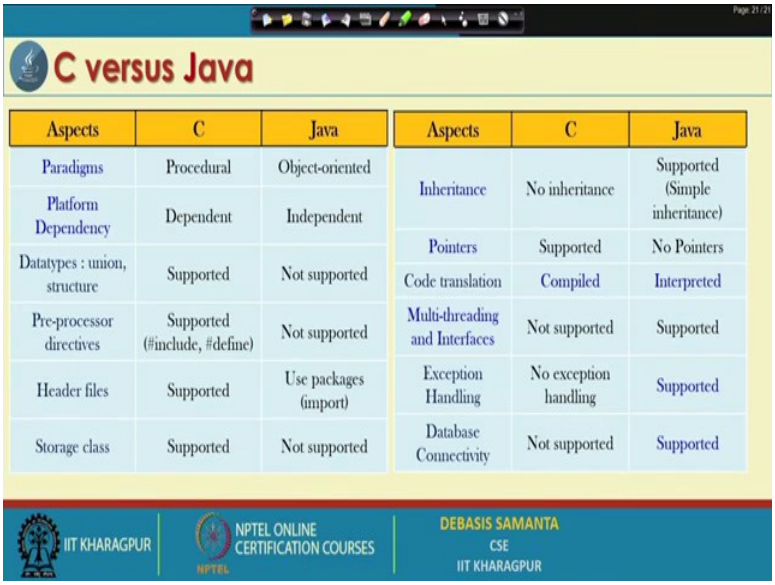

Now, here again, there are few more differences about the C programming versus Java programming and regarding the paradigms that we use, by this paradigm, the two program languages are totally different. And, also C programming is not the platform independent whereas, Java programming is the platform independent. And few things you can note it from this table that many things which support C programming but does not support Java programming. This may be a little bit surprising, but is not the surprise actually Java developer wants to make the programming as simple as possible, as easy for the programmer is it possible.

So, that is why the many critical and then complex issues which basically leads to a lot of errors have been carefully ignored in Java programming setting. So, that is why there are many things which are not supported by Java programmer and in addition to this there are few things also which is not possible in functionoriented programming like C, but it is possible in Java programming. For example, inheritance a concept we have discussed in the last lectures. It is basically not possible in C whereas, it is possible in

Java. A pointer is one great deal of errors and then is learning capabilities actually so, it usually very difficult to cope with this concept.

So, Java developer has ignored this there that means there is no business of pointer in Java programming; few things are very much essential. So far the distributed programming and then internet applications they are called multithreading and interfaces those things are there. And, to make the robust and most reliable programming the Java introduced the concept which is new of its kind. In fact, is called the exception handling which is not there in C programming language, but it is readily available in Java programming. And, database connectivity usually C does not support database connectivity, but with Java, we will be able to connect the database. All these are the basically facility over the C programming and that is we can enjoy from the Java programming environment.

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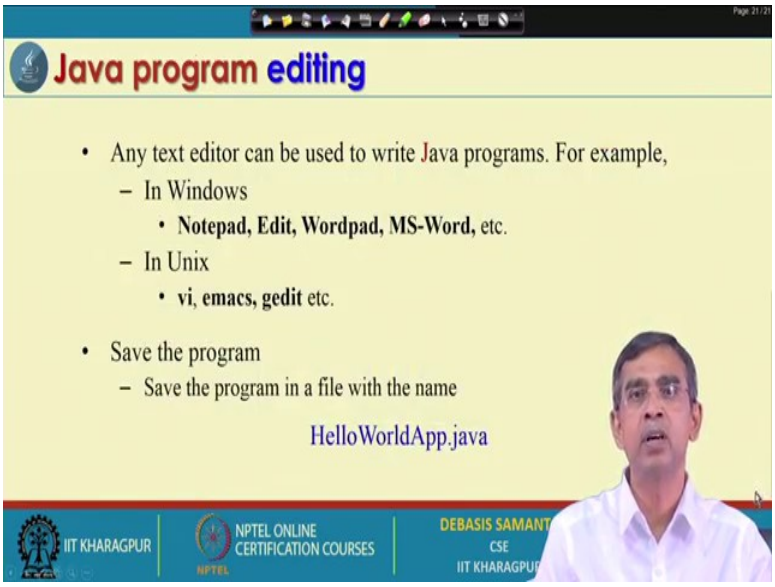

Now, so we have discussed the first program that we can write in java programming, we have an idea about it. Now, let us see how we can type this program, what setting should we have to do that. Now, you can use any editor, there is a text editor like say Notepad or MSWord or Edit command in Unix whatever it is there. In Unix there is some other command editor also there like vi, emacs and gedit. So, you can use any editor and then type any text like your java program that we have discussed in a few slides back HelloWorldApp you can write it.

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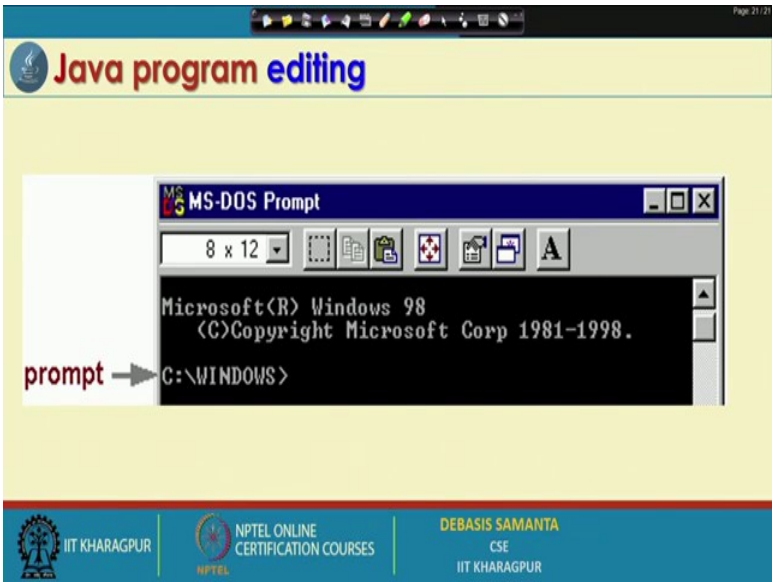

So, writing the program using editor is not a big thing to discuss and once you write this program you have to save this program. So, you should save this program in a particular directory and that can be used using any command in Unix or any prompt common prompt from the windows. So, that you can make a directory and all the program that you have developed using editor can be safe there.

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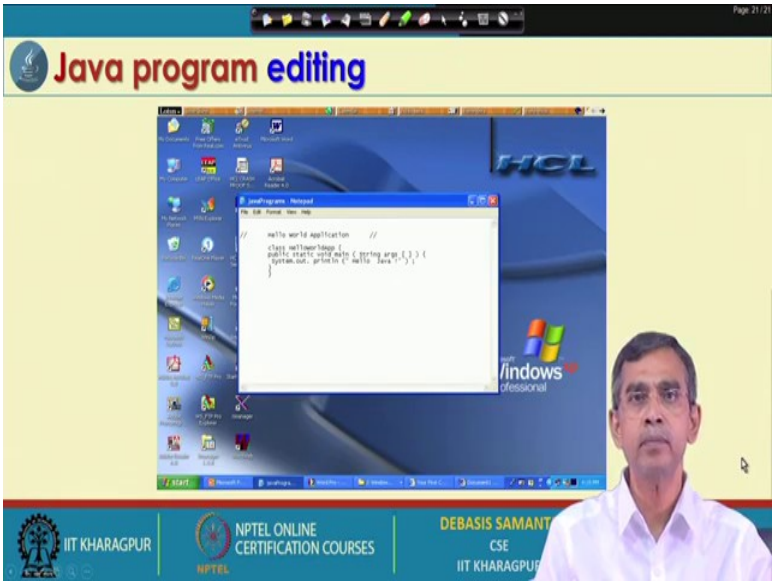

And while you save this program then particular care, ok, I mean task should be taken into consideration is that naming of the program.

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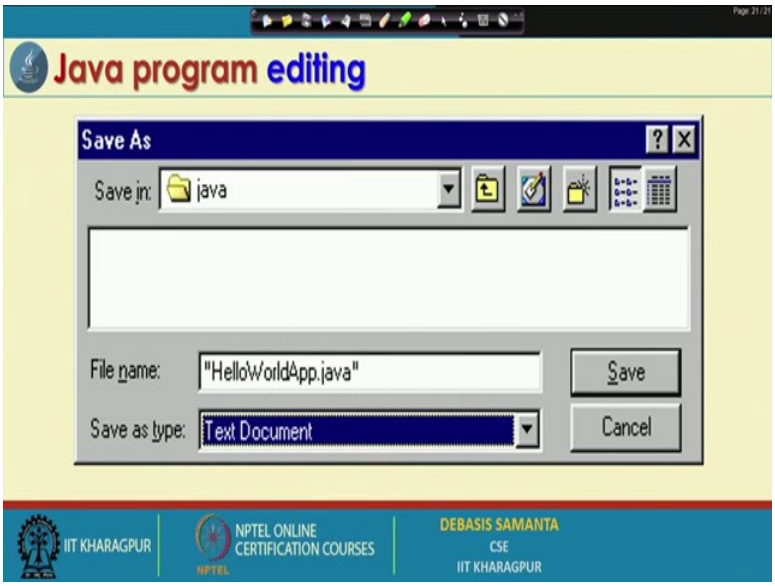

The name of the program should be the same as the name of the class that you have defined. For example: in the ongoing example the name of the class that we have given HelloWorldApp. So, the name of the program; that means, this program should be saved as a HelloWorldApp and one more important thing that you should know is that extension. For example, in case of C program the extension should be '.c' whereas, in case of java the extension of the program should be . java; that means, the program in java should be saved as '.java' file.

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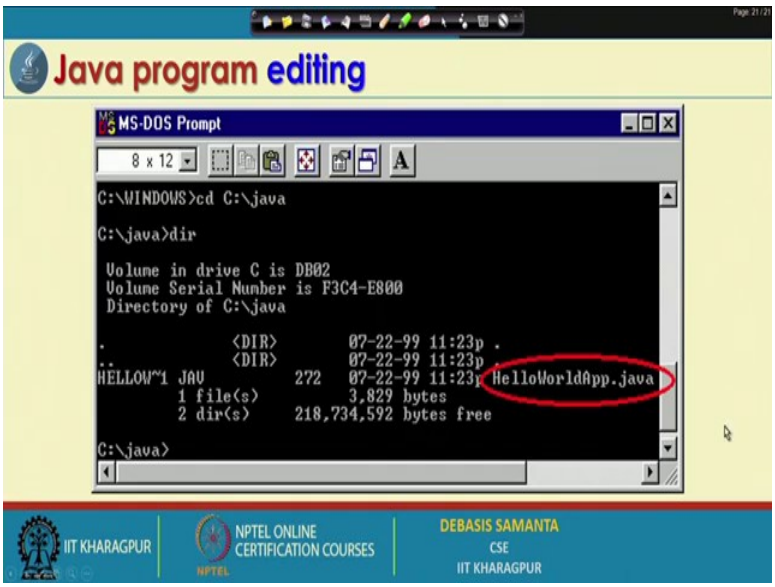

So, and then the directory that you can see; here after saving you will be able to see this kind of program has been safe in your current working directory.

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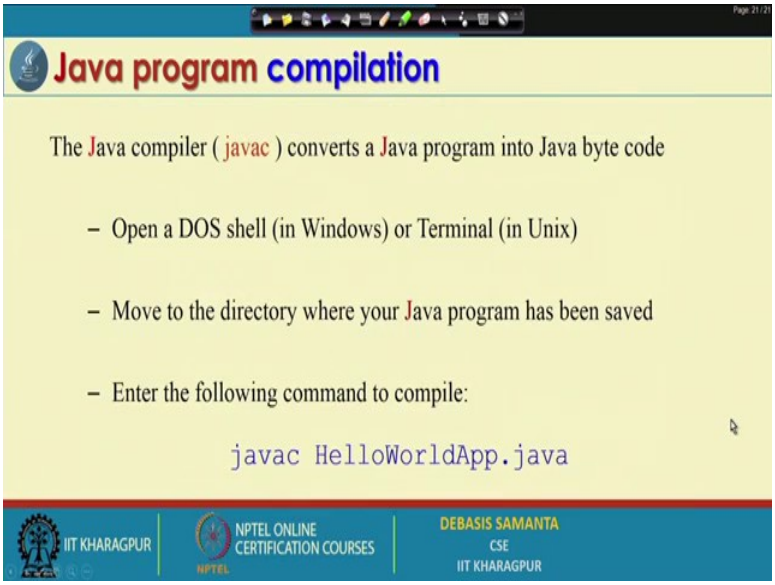

So, once so this is basically the task of editing; that means how you can type your program using an editor like gedit editor or Notepad or MSWord. Now, I will come to the discussion of how you can compile this program that means translate this program. As you know the java file is basically is a highlevel program that means a program written in a highlevel language. So, this program in order to execute it should be translated into a machine level code binary code form.

Now, I will discuss how this can be I mean compiled or translated. Now, for this translation there is a program provided by the Java developer and the name of the program or you can say the command is called java c javac it is called the javac; it is a basically short form of java compiler. So, you can use javac as a command and then type this javac followed by the name of the java file. For example, javac HelloWorldApp . java. So, if you run this and if there is no error in your program then java will compile this program successfully.

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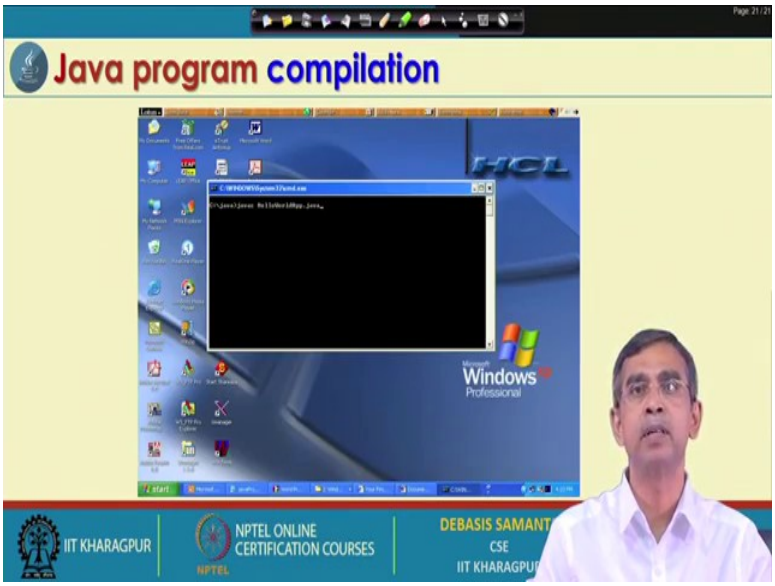

So, this is a command that you can use from your command prompt, Windows or from your Unix terminal the program. And, once the program is successfully compiled this . java file will be converted into one file having the same name as the name of the java file earlier, but the extension is different. The name of the file with executable code is called . class. So that means, HelloWorldApp . java will be translated into a code a file is called HelloWorldApp . class.

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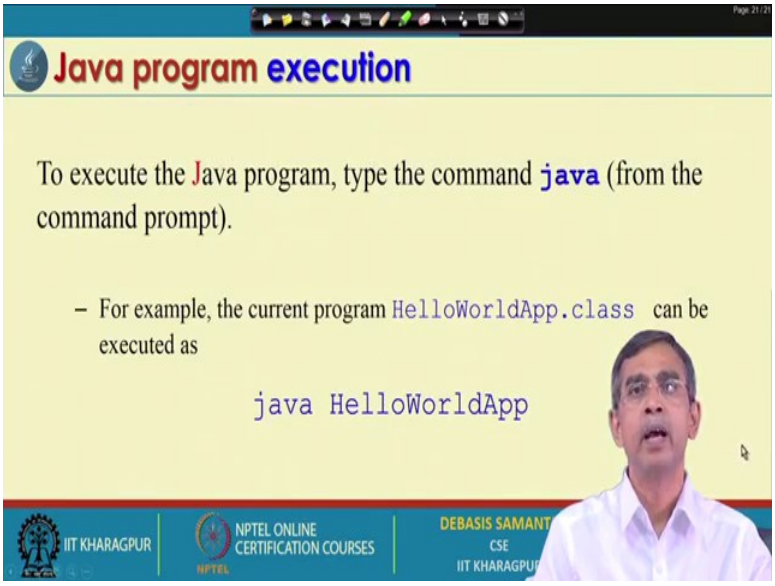

So, this is basically the task that the compilation we will do for you and then running that mean execution. So, the class file that you have already created you can execute the same file from the same directory if you type the command from the directory. So, the class file which belongs to the directory say you are working directory and then from the directory, if you run this command, like the then it will run the program.

And, here you see while you run this program you do not have to specify them . class, just simply name of the file without any extension it will run your program. And, if there is no error during runtime also sometimes an error is there then this program will produce the output on the screen or it will be store the output. So, we learn about how to edit a program, then how to compile it and how to execute the program ok.

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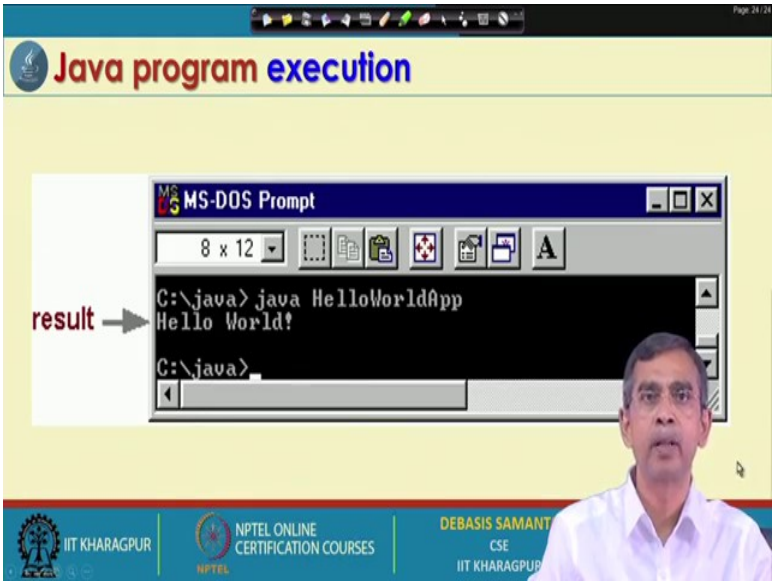

So, the concept is pretty simple and it needs few I mean practice to cope with this.

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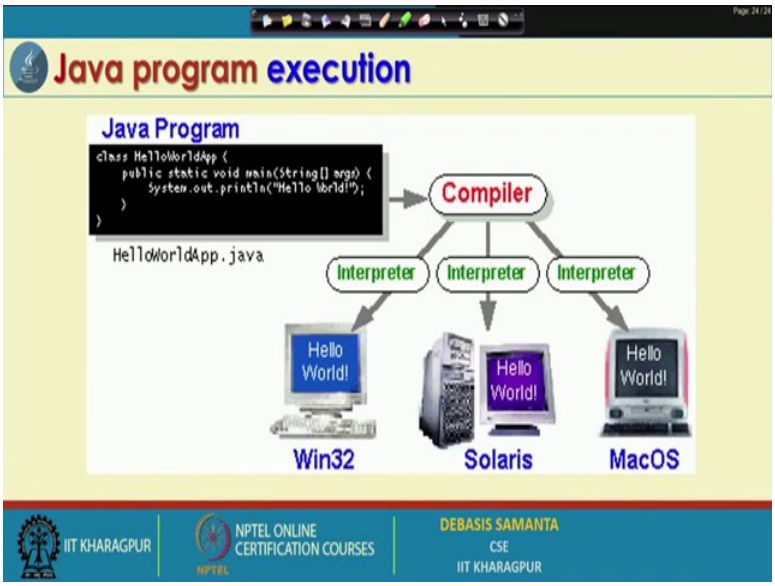

So, in our one demonstration, we will give you enough program so, that you can practice on your own. Now, before going to our next discussion I just want to highlights a few things about. I several times told about that programming is a platform independent whereas, C programming is not; what it does mean actually. So, here the meaning can be understood here. For example, this is the program that you have written using any editor Notepad like and then the name of the program is HelloWorld java. And, this program is translated by a compiler called javac this one.

Then platform independent it does means that the same file that you have developed should be executed in one machine we say Windows 32, in another machine we say Windows 64 or in another machine say Solaris or is a MacOS or like that. So that means, the program which is compiled successfully should be executable in any operating system whether it is Windows or it is Unix or it is MacOS, then it is called the platform independents. So, that concept is basically possible here. This means that the file that we built by compiling that means . class file is basically one sort of thing which any machine can understand it ok.

If it is not platform independent this means that compiler will compile one code which basically only one particular machine can understand it. So, C compiler is basically the different C compilers are there or the translating the program into the different machines that is why it is totally platform related. That means the same machine which basically

compiles for this machine cannot be executable into another machine. Maybe high-level language program same, but the ultimate executable thing is basically different.

So, that is why the C programming cannot provide us the platform-independent concept, but here is basically because of the concept of . class. Now, here again, question is that what is the special thing in the . class.

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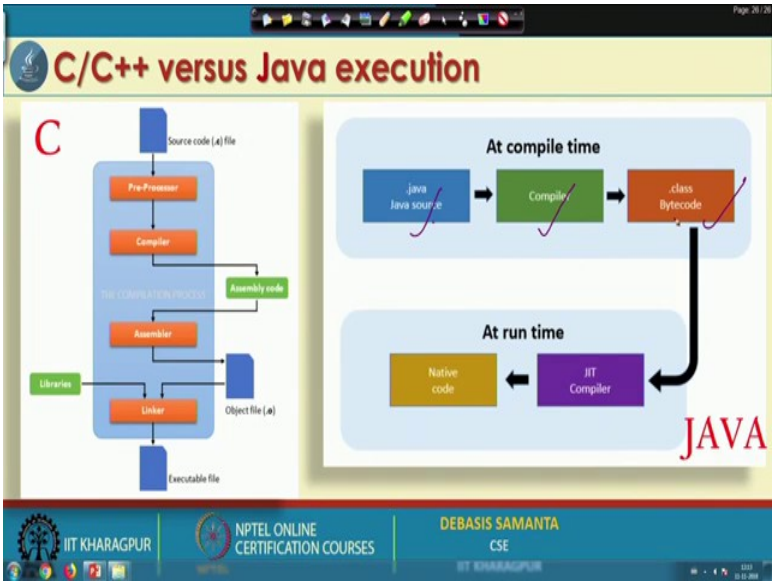

So, that that idea is basically the concept of . class is basically one code which basically any machine can understand; that means, this executable code is basically developed targeting a virtual machine. Now, regarding this concept, we will discuss in details whenever you will discuss the platform independent issue in a more detail manner. Now, is a programming language and mainly it is an object-oriented programming language. Like there is another object-oriented programming language before came into the market that time another programming is also very popular; it is called the C++.

The programming is basically is an extension of C, C is a function-oriented whereas, C++ is object-oriented, but the two programming language all through object-oriented programming has radically many different features are there. So, let us quickly see what are the difference between the two programming environment C or C++ and Java. Now first of all so far the program building and software development is a concern they follow the complete different task; the task that that is followed in C, C++ is shown here. So, here if you write a program that is you call the program file, source file it is and the

source file has certain preprocessing; that means, it will link and if it is any library and everything.

So, they first undergo through preprocessing and then finally, pre proposed things will be compiled. And, then after the compilation, it produces the assembly code. Assembly code is basically the program in numeric at, sharp like this one. Then the assembler will be there which will basically translate the assembly code into the assembler ok, using assembler into the machine level. And here these assembler is basically different assemblers are there in the different what is called the architectures. Similarly, the different compiler because of the different machine, different architecture, different operating system follow the different assembly code.

And then different hardware, the microprocessor follow the different machine level code from the same assembly language programming actually. So, the assembler will convert a high-level program written in .c or . cpp for C++ and then finally, produce an object file. And, sometimes these object file may take some help of some libraries or build in the program. So, this is a built-in program that needs to be linked and finally, the executable file will be created. So, this is the way the conventional C or C++ programming work for us; that means, from writing from program to executing a program. Now, let us see the same thing how it works in the system, environment; it is in fact pretty simple.

It is not so complex task rather it basically these are java file program written in java . java file and then there is a compiler. This compiler is the same compiler, what about the machine you use (Refer Time: 18:57) not an issue. This compiler will translate into . class file, . class file in technology it is called the program not in binary form or not in machine level code rather it is in the form of code it is called the byte code. It looks like 1 0 0 0 1 1 like this one machine level code, but its formats its syntax is totally different.

So, this is the byte code, byte code is now we can say is executive code; then in order to run these byte codes we need one interpreter. So, basically, this is one it is called the interpreter, an interpreter and interpreter as you know interpreter basically take one code, run it then go to the next run it like this one. So, it is an interpretative mode, it is not that the way compiler and then the executive code finally, is produced for this machine and then it will execute. Now, here you can think that here in C or C++ everything is

basically the compilation whereas, in the case of two things are there both interpretations as well as a compilation are there.

So, it halfway compiles the program into byte code and then the next halfway it basically execute the byte code into the corresponding machine. So, here the idea about that this bytecode that will be produced is targeting a hypothetical machine irrespective of the architecture it is there. And, the interpreter for every architecture there is a corresponding interpreter. So, these interpreters know that if this is a byte code then how to work with this and then that way the machine independence is maintained here in case of the environment.

So, this is the idea about the execution of the two different programming concepts, for example, C C++ and apart from this thing there are few more differences are there. So, far the two programming languages both are object-oriented programming languages C++ and Java, I will quickly summarize the different concept it is here.

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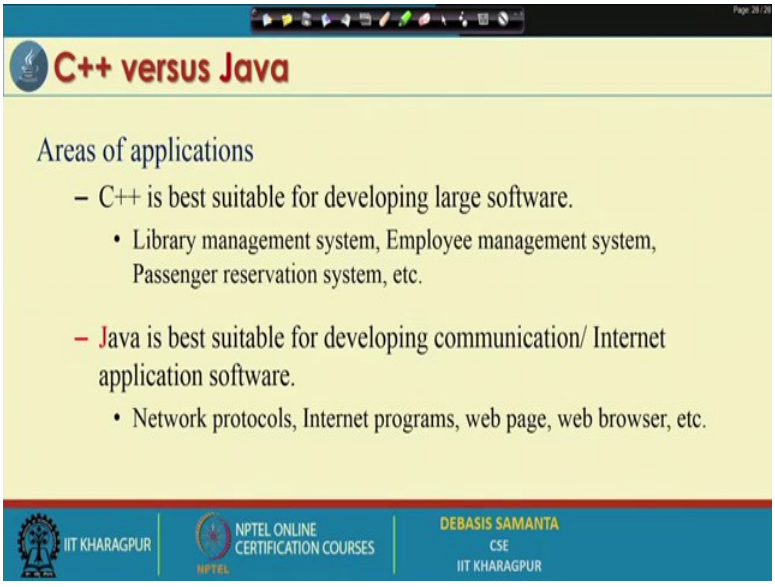

So, C++ and both are object-oriented programming, but they are a target are not (Refer Time: 21:38) same. For example, C++ usually preferable for developing very large software such as library management system, employee management system, then a passenger railway reservation system like this. Whereas this can be used to develop all these kind of systems of course, but in addition to this is a very special programming

language which is suitable for developing particularly communication or internet application related software development.

For example, if you want to develop networking technology, to develop many protocols in networking then you should use instead of C++. For internet programming; that means, how the browser work, how the remote desktop can work; all these things are best suitable. You if you want to develop the web page, the web page is a very common things nowadays many organization they maintain their web pages including any information and then many services.

So, web services, for example, the bank, and everything. So, the webpage you can develop and then web browser also; that means, it will browse any webpage if it is available on the internet or www. So, these are the programming that you can do using programming better and in C++ sometimes they are not possible or infeasible.

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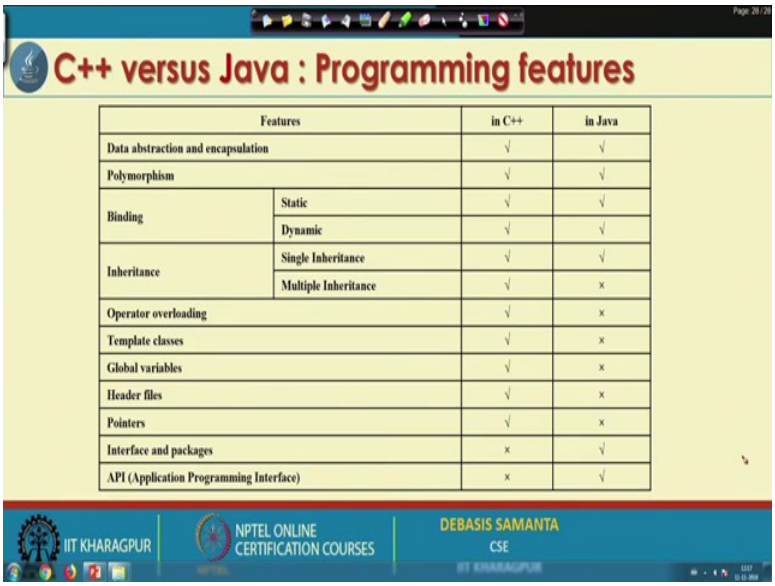

So, these are the difference in the task that the two programming languages are there. Now, I will just feature wise I will tell about how the two programming languages are different. Now, here I have mention a few important things which are possible in C++ and which are not possible in and vice versa. Now so, for the encapsulation is concerned we have discussed that is an object-oriented programming and encapsulation is a programming feature. So, both C++ and provides the encapsulation and that means, they allow us to develop our class file. Polymorphism if you see both C++ and provides a

polymorphism and binding; that means, how the different a data can be bind to the different functions or methods.

There is a concept called the binding and there are two types of binding; the static and dynamic both kind of binding is possible in as well as in C++. And, then inheritance here is a bit different in C++ and Java. C++ supports are both single as well as multiple, multiple is a very complex inheritance mechanism. On the other hand, does not support multiple inheritances, supports only single inheritance. And, then operator overloading this is another important things; that means, that different operator, for example, the plus-plus can be used for adding two numbers, plus can be used for adding two documents like this; this is a polymer print concept actually.

So, operator overloading is a concept of polymorphism. C++ allows operator overloading whereas, Java does not allow operator overloading. And, then template classes these basically C++ allow template class; that means, one template means is basic class can be developed which basically not suitable for creating an object, but it is a template only. But Java does not give any facilities to create a template class. There are few more things like a pointer. Pointer is not possible in Java whereas, a pointer is possible in C++. And, interface and packages Java is a very good one features regarding this whereas, in C++ does not have.

Now, here we can see many things; many things for example, here in C++ whereas, Java they do not have and few things, of course, Java has where the C++ does not have. Now here obviously, I told you that what is the reason behind this. The reason is that Java we want to develop a user-friendly one programming environment. In order to make a user programming user-friendly environment the Java developer (Refer Time: 26:22) down many complicated features which basically associated with a lot of errors; a lot of errors in the program list to the program which is not a robust program or reliable program. So, eliminating some features which are very complex and erroneous so, we can make a reliable and robust Java programming; that is the beauty of the Java programming and that that is why Java become a great programming language is here.

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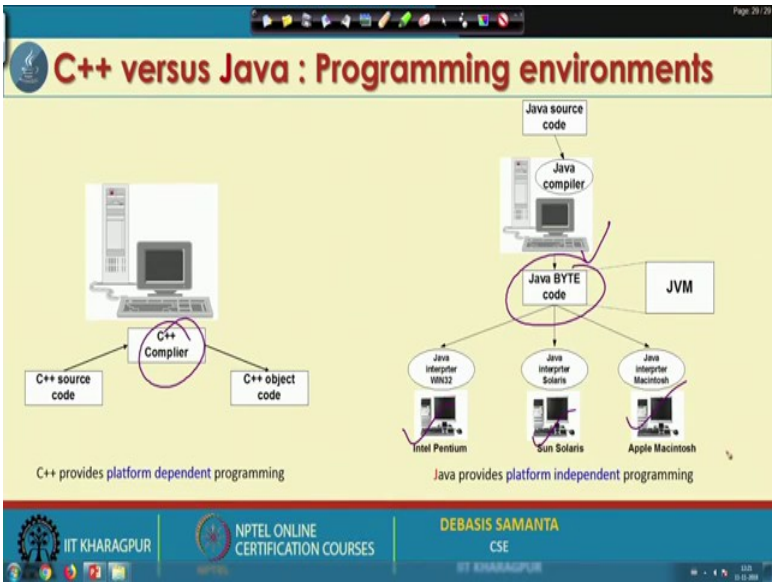

And another difference this is obviously there another see difference is there C++ again is an object-oriented programming, but it is not platform independent. That means different compiler is required to translate the C++ code into the different programming languages whereas, Java is a platform independent programming language this means that that. So, Java code will create a byte code and then byte code will be interpreted in a different programming environment. And this way the platform independent; that means, the same code can be executed wherever you want to run it.

But here the different compiler is required to run your same program in the different programming environment. So, this is the idea about the two programming languages C++ and Java and the basic difference between them ok. So, we have learned in this lecture the idea about the programming the different steps of programming in Java and how Java programming is different from the C++ or C programming or other functional programming concept.

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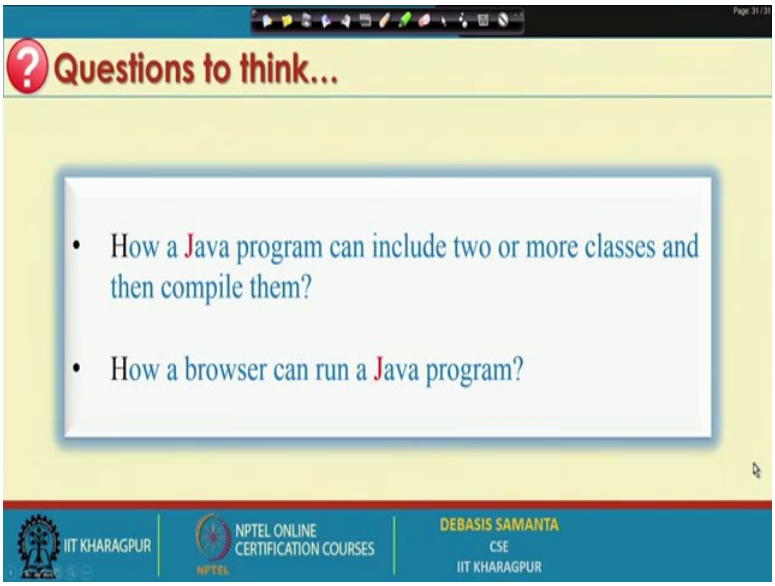

Now, so far we have discussed a very simple program which includes only one class. In our example, we have considered one class namely HelloWorldApp.java, but is it possible that a program can consist of more than one classes. And, if it consists more than one classes whether the same techniques for compiling and executing is there or not or we have to follow the different concepts. And, also how a browser can execute a Java program; those are the interesting things in Java. So, all these things we will cover in our next lecture.

Thank you very much.