Programming in Java
Prof. Debasis Samanta
Department of Computer Science and Engineering
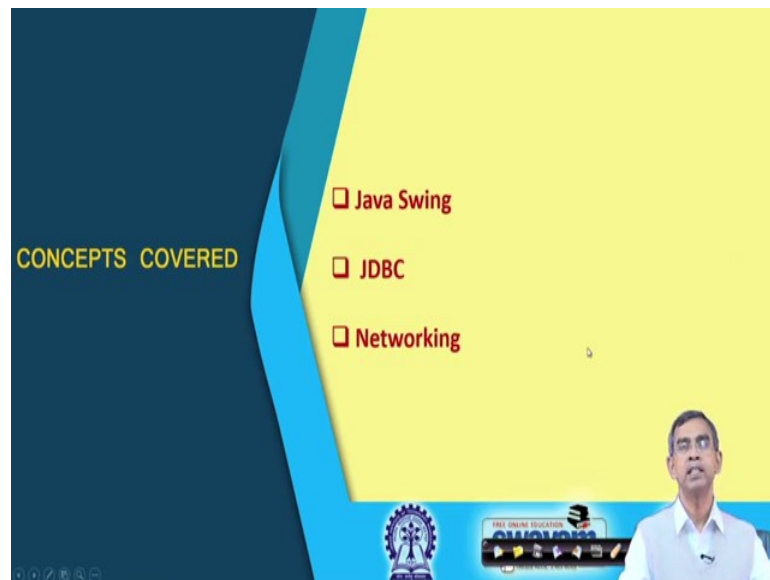**Indian Institute of Technology, Kharagpur**

Lecture – 60
Case Study – V

So, we are almost at the end of our course plan and definitely which is my endpoint, in fact, it is your I mean point of starting. So, my endpoint means your beginning, in fact, you have to start it. Now, anyway so, this is the concluding section session and in the sessions, we are going to discuss about two more interesting projects so that these projects you can take as a challenge and then try to implement these projects. And, definitely I am sure that if you can take this project and then you will enjoy a lot.

Now, let us have a discussion about the project idea. This is the 10th program projects and we as the name that you can see here the name of the project is Course Management Systems. You probably know exactly it is managing the course. What is the course? Whenever students attend some classes and take some involvement in a course he becomes the participants of the course; then there is a teacher called the course coordinator, who basically control many information about, right say what are the marks obtained by each student and then grading and so many these things are there.
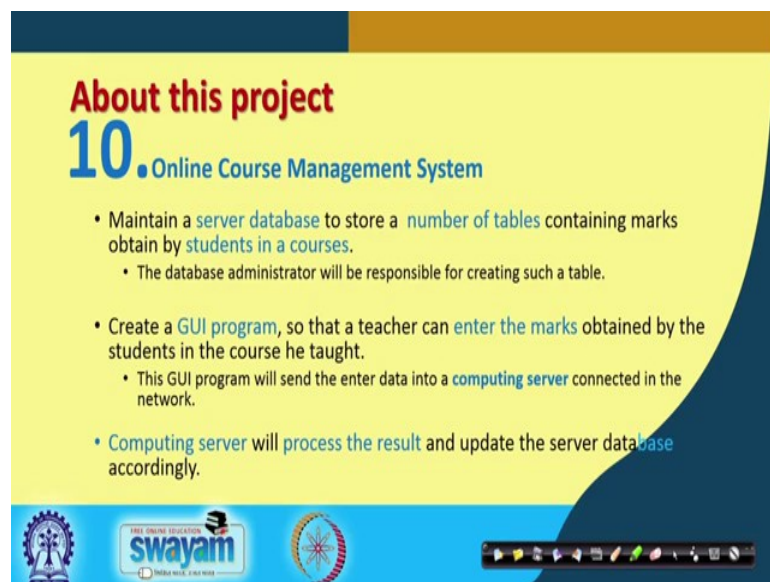
Now, in these projects similar kind of things needs to be maintained so that the course-related information needs to be stored and then the user can enter the marks and you can process the results, the results can be available, the user can see, the teacher can see, a student also can see whatever it is there. So, many other improvement can be done. It is a starting point of the projects and then you can extend this project adding some idea from your side as well as.

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Now, let us see exactly for this project what is the skillset that you should have. You have to implement this project using Java Swing as it is proposed here, then JDBC and networking that knowledge is required so that you can implement this project.

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Now, idea about this project let us come to the idea. So, we have to maintain a server database. This server database will store a number of entries; it is basically a number of tables I can say, each tables for each subject. Say suppose one student taking physics, maths, chemistry then three tables are to be maintained. It may be that is all students'

same students are not taking all the subjects. So, there should be another table also which includes all the students under this particular year or semester who are active in an academic program. So, there will be a list of student, the student's information and then marks obtained by different students in different courses.

So, this is the table or database that needs to be maintained and here the administrator can maintain this information otherwise you can develop one interface for which database can be enter whatever the projects that you have already some idea can be applied here also, but I am thinking that all the database table is entered by the administrator. So, here you do not have any burden on a responsibility for this.

So, create a GUI program therefore, here the teacher can enter the marks obtained by the students in the course he has offered. So, here the facilities that will be available so that is to user can run a program. Once the user runs the program and interface will appear and using this interface the user can enter the marks obtained by the different subjects who attended the course.

And, then there will be a computation aspect, the results of the results stored in the database will be compiled for either for each student or for each course whatever the way that will be decided. And, then accordingly the results will be compared result means grading can be done depending on some rule base say if marks are greater than 90 percent then he should be added EX grade if 80 to 90 percent A grade or this kind of grading composition you can decide and implement it.

So, the computing server will be there which will basically do all this computation task, not in the teacher's machine. So, the teacher's machine is another machine, the server will compute all this thing another machine and then database which will be stored maybe in the different machine or the same server machine we will assuming that database can be maintained in a different server.

So, there is three-layer architecture as we see from the user site from the server site computation and then from another server from the storing the database.
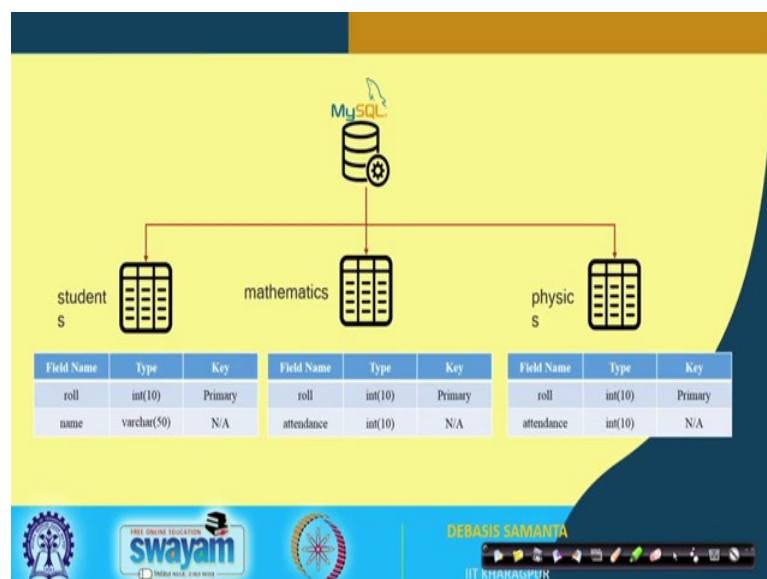
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Anyway, so, now we will consider for simplicity maintain a database server in some machine which is connected to the net and the database should contents two tables as we have mentioned here as a practice purpose you can just simply add on more only you can add some other subjects other things also. So, the student table is there, maths subjects mathematics table is there and the physics table is there; three tables are to be maintained in the MySQL server.

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Then whenever the database administrator will maintain this table we have to fix the table database. So, I have given an idea about how the database table look like. So, for the students, it will have the roll number and name, and then we have given the type that our roll is of type integer of size 10, then name is varchar of size 50 and then roll number is the primary key here and then this is the other is there.

Now similarly, for the maths, roll, attendance and then marks obtained will be to be added here. Similarly, physics also the name roll number and the marks need to be maintained here. In the slides marks are not shown here, but you have to add the marks they are also in this entry. Anyway, so, these are the different entries are to be there.

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And so, GUI program; this is a typical look I am not necessary that you have to follow the same look. If you have some better aesthetic sense then you can design the layout of your own and then you can use it. So, you can develop the layer in such a way that the user, maybe say teacher from his own mobile also can access this program. So, a browser should be according to that way only. So, the GUI window will be planned this way. So, that it is compatible to anywhere actually there.

Anyway, so, the first task in this project is basically there; after the database is created this is the first task. Our second task is basically to create the GUI programs for the data entry interface for the teacher and so I have already told you this is the look of that teacher interface is there. Here the user will enter the student name and then enter the

marks and everything, and then order and everything if you want to face the data it will show in which order it will get it and then rank and everything will be there. Otherwise, you can decide some other interface of your own also so that the user can use it and then can go on adding the data into the system.
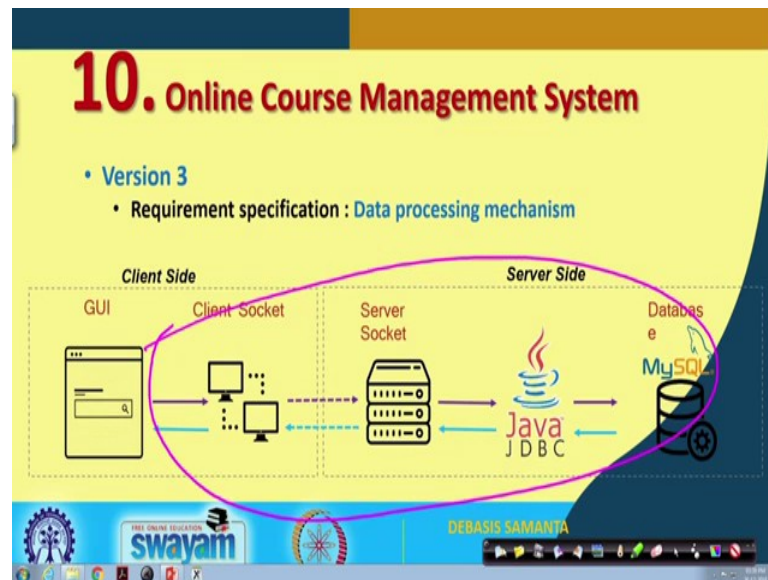
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Now, once the user enter the data, it will go directly to the computing server and then from the computing server, it will go to the MySQL database that the user or any user cannot directly access the database. So, a database is a back end server we can say and then add them. So, this is the database server at the backend of the computing server. And at the front end the user program so that the user interface is there which will communicate to the computing server which can be again communicated to the back end server like this.

Now so now, next is the data processing mechanism. Here the computing server will take care. Computing server can access the database server by means of program and then depending on the user requirement either preparing the results or sorting of the marks based on some ascending or descending order and many other utilities that can be added here in the computing server.

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So, this is the data processing mechanisms are there. Now, I will just quickly brief about the data processing mechanism that you should follow here; nowhere the step by step. So, there is a socket program that you have to develop and we can say it is a client socket and then the server socket is basically at the server end which will basically you computing aspects will be there and then MySQL the server is there. So, there are three entities, three computing entities; one is the client-server and then the database server is to be there in this system.
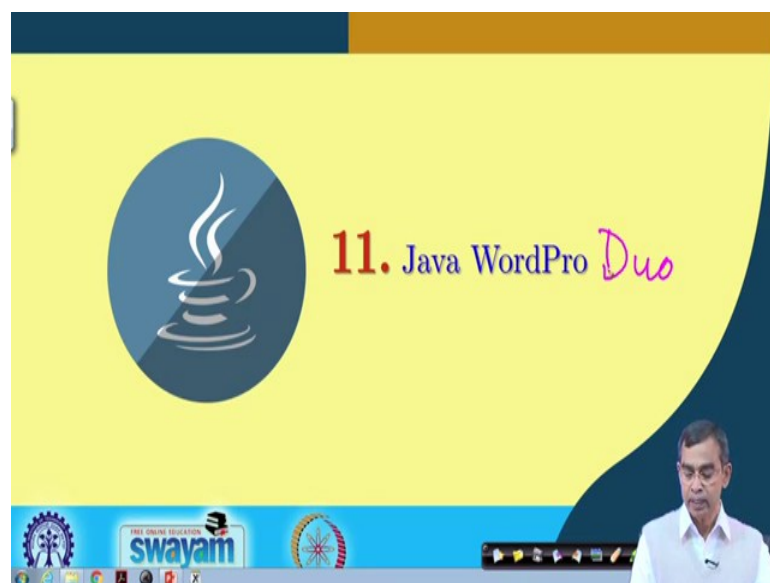
And, then the teacher who can insert the marks is there. So, a teacher will be there who can enter the marks. So, from the GUI interface here the teacher will enter the marks here and then once the teacher enter the marks it will go to the client sockets. These sockets can run in the same machine or like it is actually basically it should run in the same machine. Once the result is going there it will go to the server socket whatever the in data that the user that the teacher has populated it will go to the server. Then the server will send it to the MySQL server through the JDBC connectivity.

Now, again if either wants to retrieve something any user say student or any other teacher then another GUI should be developed there, then through the same GUI it sends a request go to the computing server first, then MySQL and the MySQL written the result computing server we will process according to the requirement or some retrieval

information that is there and then it will go to the client sockets and then finally, it will display on the users machine.
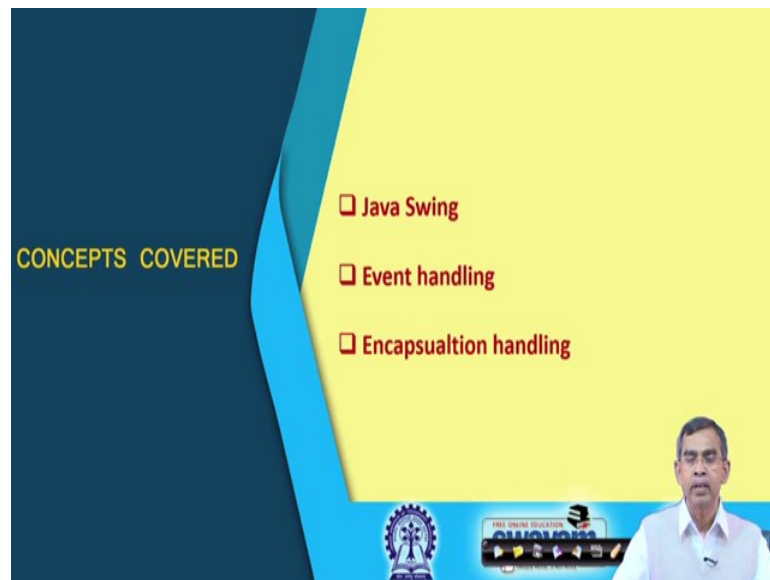
So, this is basically the idea about how the flow of data we will take place from the user to the system itself. As this is the three-tier architecture as I told you. So, these basically look like a three-tier architecture as it is shown here. So, this is basically the architecture that you have to consider for in this project actually and this architecture has been planned little bit typically level I should say bit high because here so, many tiers are to be implemented and then they should be properly synchronized communicates, but it is only for the experienced user and they can do it easily. And, it is not the very heavy job actually you can make the cattle the job according to your own time and then knack and interest you can do it the minimum version of it also. So, this is about our tenth projects.
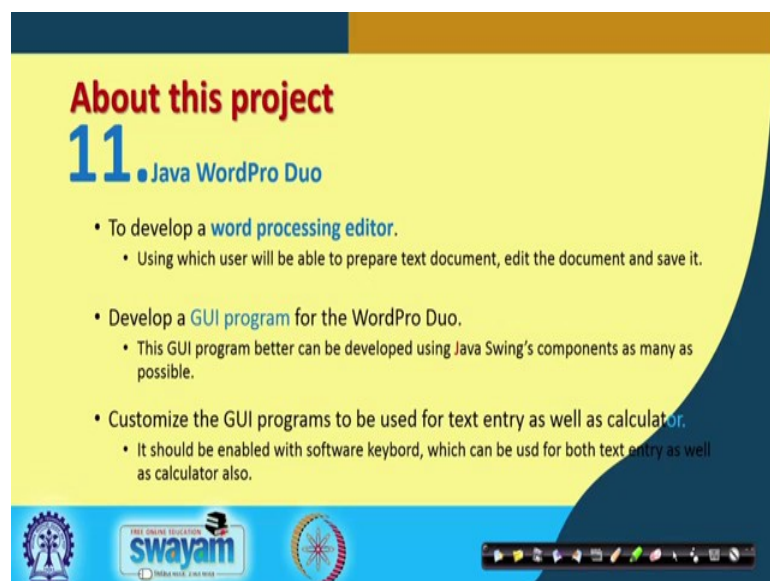
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And our next project and this is the most challenging project. Challenging project in the sense that it is because a lot of other things are to be exercised and then your the knowledge level has to be highly applied here and the program is called Java WordPro Duo. So, here the name is not complete here. So, Java Word Pro Duo this is the project actually that we are going to discuss. Now, let us see what is the project idea so that you can understand what exactly this project it is and this project is as the name implies word pro stands for word processing and duo means it will do more than one job actually at the same time. So, that is why it is a duo.

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Now, for this project the skillset that you should consider here swing, even handling, encapsulation handling, that is all; it is no network involved, it is no JDBC involved, no other and a what is called the things involved, only the GUI and the programming is involved. Now, so, this is the smallest level, but lot of other things. So, if you want to make yourself is a I mean great Swing programmer, then this project really you can think for as a good what is called the task actually, is a good challenge for you.

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Now, let us see what is the idea of the project. So, as I have mentioned that this project is basically is a word processing is there. So, we have to develop a word processing editor. You are already familiar which some word processing the editor that most only you have used while you are compiling you are typing your program. For example; Notepad plus, WordPad, Notepad these are the work. So, a similar kind of software you have to develop. It is also I mean the problem is solved actually, but from your side, whether you have solved this problem? If the answer is no, then there is a challenge that how you can develop such a word processing document editor or word processing editor, text editor we can say like that. So, it is not a big job. It is a simple application of Java Swing that can help you to do the job very easily actually.

Now, next is that you have to develop a GUI program for the WordPro. So, is very nice looking graphical user interface to be developed you have to have a little bit some ideas so that whatever the existing or processor is there how your software can be comparable to them. So, you can add a few more things so that you can say that you see this is the thing that is my program where the other program does not have this kind of thing are there. So, colorings and so many other things also you can add it if you can do it. It is not the big job, it is not infeasible, it is practically feasible. So, you can do it, only you have to think about that what you want to do and then think about how this can be done.

So, this what and how to resolve rigid if you re can resolve these what and how questions then you can solve these problems very easily. So, that is why there is a lot of customization and moreover, the main customization is that how this word processing system can be used for both the composing a document as well as is a calculator purpose. So, an idea is there and if you can then such a document I mean word processing document can be also implemented compatible with any Indian language; that is also a challenging job and that is also a very beautiful project also and the calculator also can be ok. So, if it is an Indian language compatible maybe say in Hindi or in Bengali then you can do it typing in Bengali or Hindi like this one.

So, a job is it is not a very novel of it is kind, but it is a challenging as well as and it will give a lot of experience and learning scope. So, that you can use to develop more other more advanced and sophisticated program in different application and moreover you if you developed in here you can use it in the windows the android operating system, if we can develop it here you can use it in a macOS if you can develop infer the desktop you
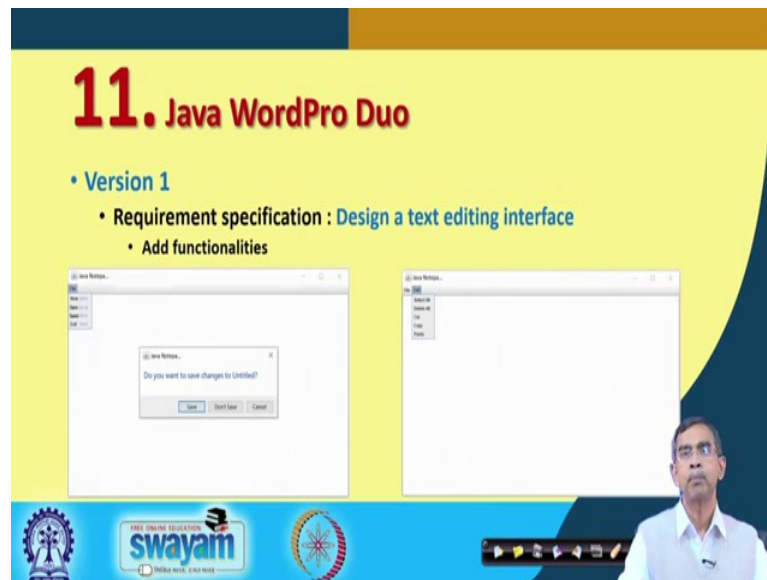
can use also in for laptop or tabloid or it is in notebook or it is in a mobile handset, Smartphone whatever it is there. So, the scope is very high, application potential is also heavy.

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Now, let us see how it looks like in the first phase the step by step if you do it then the job becomes easier. You should not try to do all the things together, one by one. So, first, you have to see how a canvas sort of thing which basically appears is a Windows should be given to the user so that the user can type anything. Whatever the user we will type it will appear on the canvas itself. So, this basically adds an editing panel or frame looks like. So, a typical look as it is shown here you have to implement like this.
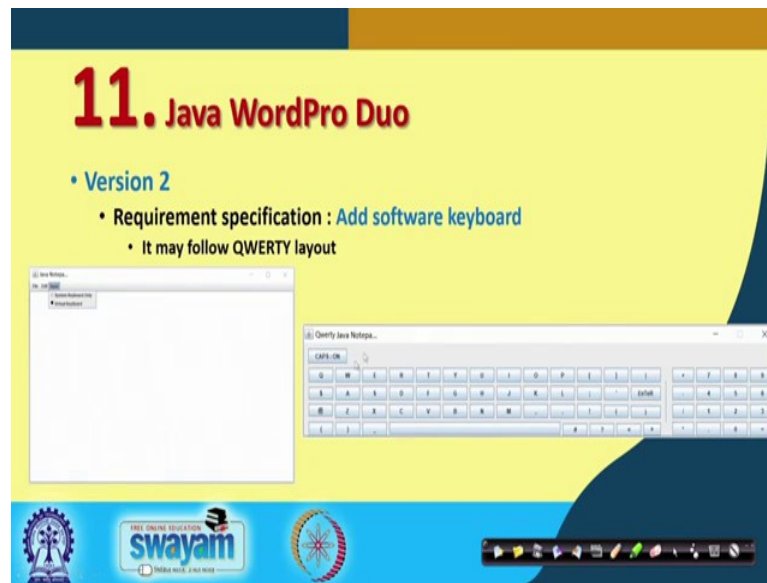
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Then you have to add on functionalities into this frame one by one. As you see here we have added one functionalities called the file. You can see any word processing what are the menus are there you can go on adding all those things one by one. Once the file it is there it will give New, Open, Save or Exit these kind of things are there. So, this File Open if it is there, now if you want to save it for example, here then it will ask that Save or Don't Save or Cancel whatever it is there.

So, after adding this File option you can add few more buttons also there and then you can add it is. For example, after File, Edit; Edit means it can have the editing facilities like editing, Cut, Paste and then Select All whatever the things are there you can apply it here. So, here basically even handling for each component if you add one by one, go on adding, test the program and go to the next step and so on, so on. This way you can see an after few efforts you can develop a nice document WordPro program like.

Then, our next version is that so, input, as I told you it should be used for a dual purpose dual, means text editing. So, if it just text editing, then fine. Now, whenever if the text editor from where you can type it. So, obviously, you use the standard keyboard which is already attached to the things, but in some mobile environment there is no standard keyboard. So, if you want to use it for the mobile setting then how it can do that.
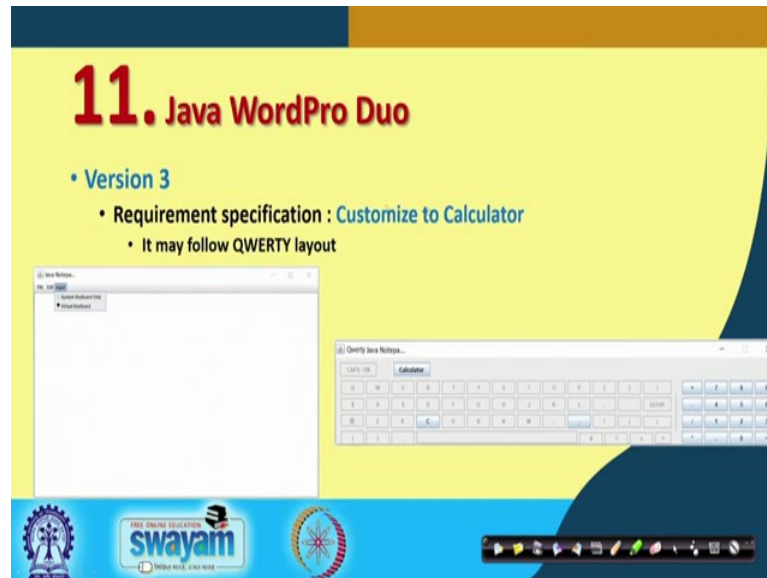
So, for these things you can develop one software keyboard. Even the software keyboard also can be used using your lap laptop or using your PC also. If your PC or laptop touch enable, so, after touching also it can be done or clicking also by mouse pointing also it can be done whatever it is there. So, keyboard and then keyboard has the software, keyboard, as well as the hardware keyboard, is compatible with there.

Now, so far the software keyboard it is there I have given a layout of the software keyboard. Once the user selects that system keyboard or virtual keyboard; I mean a software keyboard, then this kind of things will appear for the user. So, that user can click it or touch it and then accordingly the text will be entered and then it will display on the screen. So, this is the only layout and this basically obviously, a little bit complex. It is not so simple as the calculator panel is there, it is very difficult.

It is not difficult actually, it is only voluminous because so many keys are involved and not all keys are of equal size. There are maybe function keys also which I have not mentioned here you can do; again the caps key click also caps is there also, numeric keys

there also, punctuation keys are there also, all those things will be settled it out. But, everything is possible writing a simple software program in fact, and using Java is not a very difficult job for any programmer.

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And, then the software keyboard that you have developed also can be utilized to use as a calculator. So, a calculator for the display here is there and then the you see whenever you use as a calculator here. So, there is a calculator button will be there if you select it then it will act as a calculator, in this case, all the button will be in a disable stage. So, no response will be there, no event operations will be there. However, all the calculator related buttons will be there and then you can use it.

And, more important thing is that you can little bit improve this calculator by adding some more I mean character button also there so that some expression; say, suppose A equals to 5, B equals to 10 and C equals to 100. If you add and then you can express A star B plus C divided by A plus B plus C this kind of an expression also can be carried out using this calculator is easy. So, this is the advantage of this calculator in addition to the calculator for text entry and really very useful because you will get the two facilities in the same product that is why this product is called the duo project.

Anyway, so, we have discussed about many other things which are related to this then I am almost at the concluding part. But, before going to this concluding portion I want to

make one more thing very clear that whatever the programs that we have used in our entire throughout the entire course those programs are available.

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And, the link I have given in these slides, you can see the link. So, it is basically https then cse.iitkgp.ac.in/dsamanta. So, this is the link actually as we see. In this link if you follow then you will find one HTML page there which contains all the necessary pieces of information; those I have used in this course also it is already there. This is a very huge resource and then you can get all the documents from there also.

In addition to this resource where all the programs that I have used I have already deposited there, you should download all the program and run them. Just try to run it if you run it then you can learn it. If you do not nurture this program you will not be there, only learning theory, syntax and everything we will help we will not help you to learn it much more.

And, then another thing is that in the first introduction slides in the first lectures you can note I have given one tutorial link of the website. So, it is called a Java tutorial from the Oracle you can even the from the Google search engine type that Java tutorial from Oracle. So, it will give the link. So, it is basically standard edition is there and the Oracle is the one another party of now developing these Java system actually. They are a part of the Java development team. So now, they maintained a very nice link nice web page which basically gives for all aspects of the Java programming with examples and all the.

So that you can consider as a complement to this course learning whatever you are. If you find any difficulties to learn from my delivery then you can consult quickly there and you can learn also like that. Another important resource that you should consider so that you can horn your skill is basically Java API. Now, Java API is very important; very important because if you know the different methods belongs to the different class then you can try to apply it. But, I have not mentioned all the methods that can belong to a particular class. For example, the string. Under the string, there may be said a hundred methods are there. How so many methods can be discussed in a short duration of half an hour lectures or like that I did not do that.

However, you can have all the methods, their constructors, the return type, the peels and then description everything that is also from the Java Oracle sites again; the same Oracle website you can follow. It will give you all the information about. So, you can give a type like Java API from Oracle. So, it will give all the packages whatever it is and it is basically the genuine source; the source from the developer itself. So, source from the creator itself. So, this is a very important source, that you can think about it.

And, as I told you already, so, I am almost at the endpoint and I told you my endpoint is not it is my endpoint is basically your starting point for your things are. So, with these things, I would like to conclude this course here and then I obviously, wish you all the best and ever success in your career. And, also I want to convey my thanks to all of you for attending this course and thanks for your attention throughout this long journey. I wish you all the very best for the career point of view, from your development point of view ok.

Thank you very much.