Programming in Java
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Lecture - 50
JDBC – I

Now, we shall start learning about JDBC. The full form of the JDBC is Java Database Connectivity and these concepts will be covered in 6 sessions including today. So, first we will learn about actually so, far the JDBC is concerns there are three things to be learned. First of all the database management system and then how the database management system can be connected. And, this itself is called the JDBC driver and then finally, the java application which basically will help a programmer to connect a database from the application as an endpoint.

So, three things are there so, for the database management system is concerned there are many tools many packages are known. In this course we will cover one system which basically helps a programmer to maintain a database is call the MySQL. So, we will discuss about the MySQL and the MySQL is a database management system and then we will discuss about how these MySQL can be installed. If you are new to this MySQL then all this information is highly essential for your learning. So, I do not know exactly whether you are familiar to SQL or MySQL or rather relational database management system anyone.

Anyway so, considering that you do not have any background knowledge about the database management system handling. So, I will take a quick tour to the SQL base database management system which is very popular one is the MySQL. So, in this session we will try to learn about how the MySQL can be installed. And then finally, we will see exactly using this MySQL if once installs in your machine successfully then how we can manage the database management system related to task. Namely, how we can create a database management database, how we can create a table under a database and then how you can accomplish different operations to the database.

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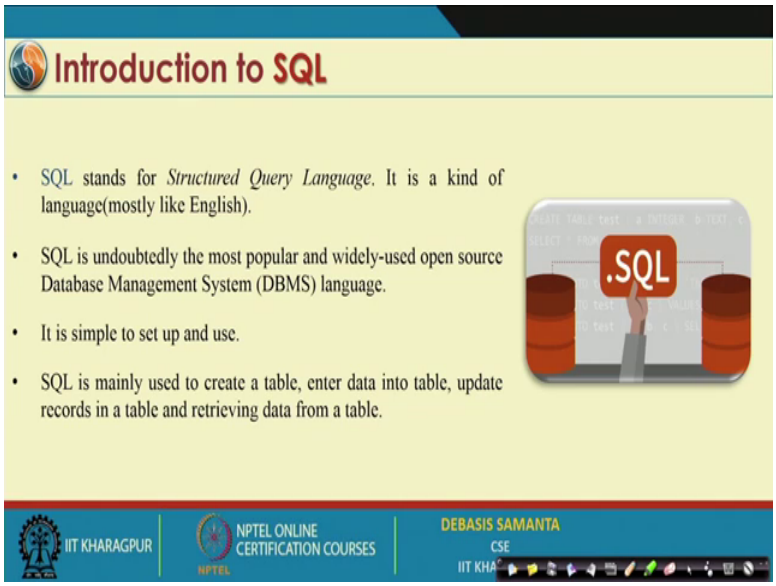

Now so, first what exactly the MySQL it is. So, it is a very popular one software usually you know for the database management system handling one language has been provided. It is very popular and a standard language it is called the Structured Query Language. We usually call this language as a fourth generation language, if we set C, C plus plus, Java they are the third generation language. The language of course, but the thing is that it follow certain syntax that is why it is sometimes it is called the language, but truly SQL is not a language like Java, C, C plus plus.

Anyway, SQL programming whatever it is there we can do it in English like syntax actually. And it is basically a de facto standard nowadays; every database management system engineer prefer the SQL base system. And, SQL base system is basically follow there are many type of database management system like relational database management system, object oriented database management system; SQL is in fact, an relational database management system. Now, regarding the relational database management system we will discuss few things about it, few salient points about this.

Now, the SQL is basically is very simple and it is easy to use and that is why it is fourth generation language; actually that the difference between 3 GL and 4 GL. Third generation and fourth generation language is that, third generation language is basically how to do concept; that mean if you want to solve certain problem how this problem can be solved. Then we have to write a details about it, but whereas, as the fourth generation

language, it is what to do. Just you tell that what you want to have then automatically the SQL processor will take care about your what aspects and then solve the problem. You do not have to write so, much details about the programming. So, that is why SQL is basically a lightweight concept.

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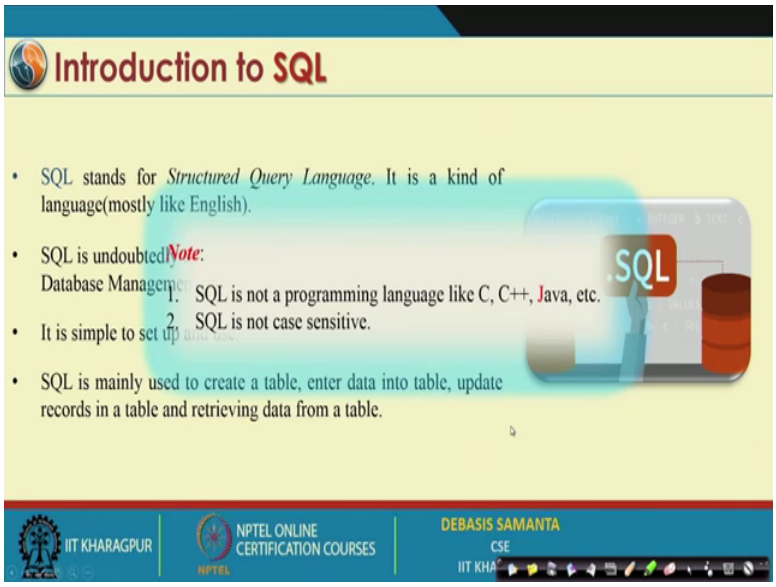

Now, using this SQL we can do many things, that we will be going to discuss and another thing is that whatever the syntax that you can write that is basically in English of course. And you know in English, there are two type of characters: lower case and upper case. SQL do not distinguish whether you have typed in lower case and upper case; that means it is case insensitive.

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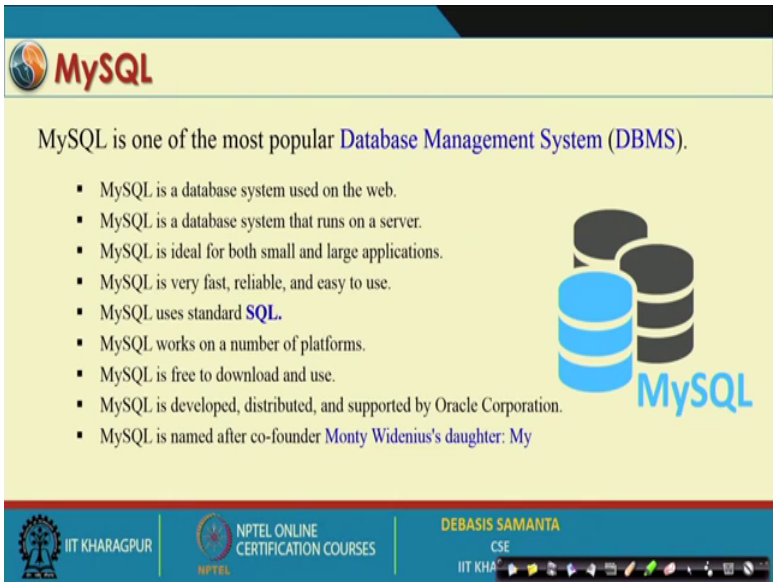

Now, SQL has many advantageous and there are many tools which basically leverage the concept of SQL. And, as I know the SQL is structured query language that is what we have learned in the last slides. The MySQL is a specific application is a tool which basically developed by Monty Widenius and it is basically My, My is his daughters name. So, that is why MySQL he gave the name about his fond daughter. So, MySQL so, it is not that MySQL means it is mine SQL is not like that and then it is basically the SQL can be installed in your stand alone machine like PC, laptop whatever it is here.

And, then once you installed it then you can maintain your database very easily. And as you know it provide the structure query language and structure query language become a de facto standard. This means that you can test it, you can use it, you can solve many problem and then once you have done it using MySQL then finally, you can deploy to any other systems which basically have an interface about the SQL. So, that is this is the beauty of these things. So, MySQL is initially developed, distributed and supported by Oracle corporation. As you know Oracle is a joint player in the field of database management system. Now, I will first quickly tell about how the MySQL can be installed in your machine.

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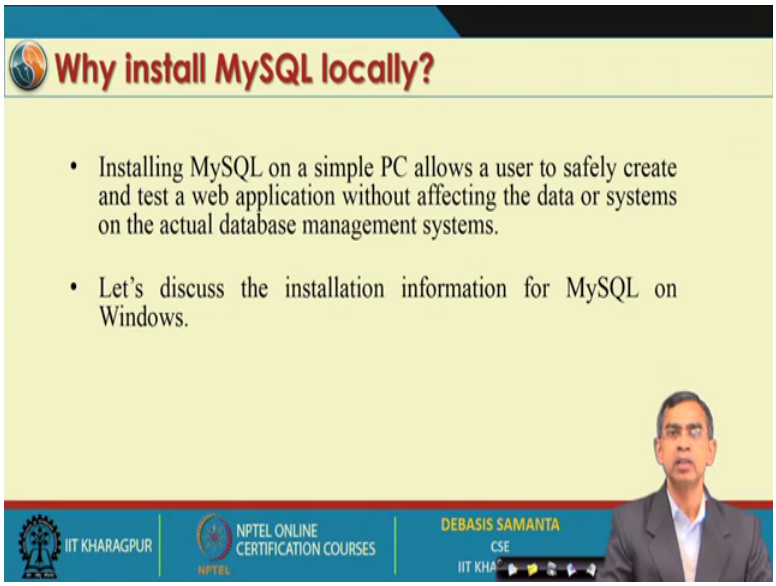

Now, there are many ways the install can the MySQL can be accessed from different sources; I will discuss about the installation of MySQL in Windows environment. However, the basic steps and procedure are very similar to any other environment like macOS or Linux.

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Now, you can download a very go to resource of the SQL is basically contains many thing, if you want to have an Apache server or if you want to develop something in PHP. PHP is one another sort of programming language for web programming it is called the

Hypertext Pre-processor. And, the MySQL they are basically bundled together and there are many sources for which the for example, here XAMPP, WAMP Server etcetera. So, all those things you can download from that link which I have given for XAMPP for Windows, I have given the links similarly for WAMP for windows also the second link you can follow.

So, these are the well known link and definitely this is the free source actually; you do not have to pay anything, you can download it is freely open source.

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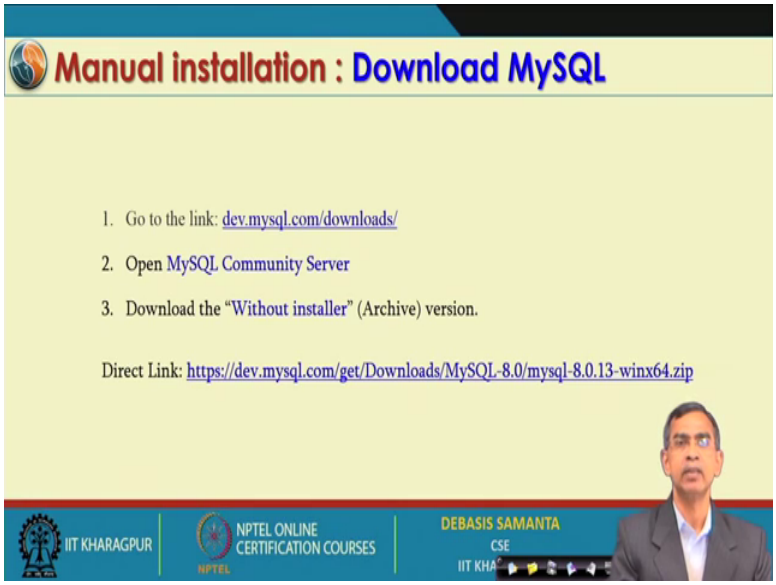

Now, I am telling you how the other source that you can follow to download your MySQL software. So, if there is a link as I have given here, dev mysql dot com downloads. So, from this link you can go and in this link you can find MySQL community server. So, you just click this link then it will face to you, it will align to you in the MySQL community server. You open this link and then finally, you can find there are many what is called the softwares available for freely downloadable. And, out of which we have to select without installation and is an archive version.

And, then directly also you can follow the link on which you can download the software. I have mentioned here for the software and for the 64 bits machine, if we have the 64 bit machine then it easier. And, the latest version I have mentioned here as MySQL 8.0 0.13 this is the current version. So, you can download it and if it is change the version you can again download the newer version and you can re-install it whatever it is there. So, this is

the kind version that you can and this will be download as a zip file.

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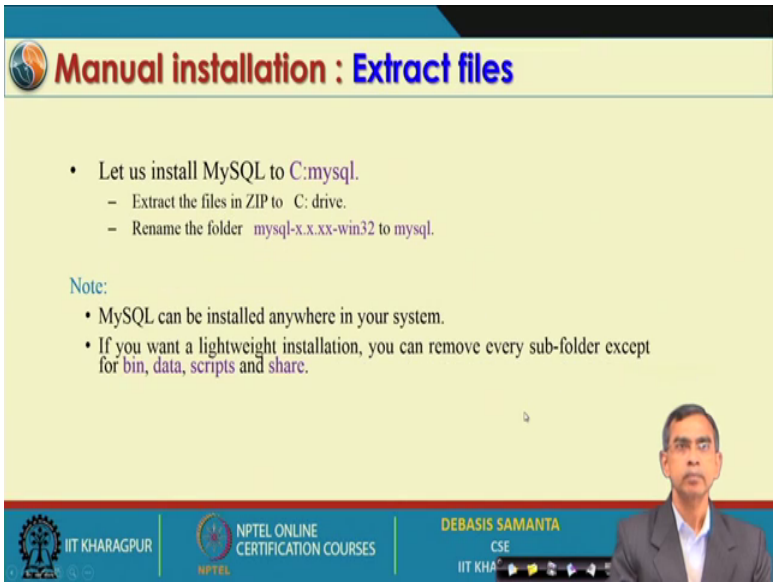

So, you have to unzip this file. So, what is the idea about is that where you want to install that you have to decide. So, if you suppose you want to install in C drive and under the name of mysql. So, then you should extract the file; I mean, zip file that you have downloaded to extract all the files it is there; I mean unzip the files actually into the C drive. And, then you should rename the folder otherwise if you directly start installing then it will take the same name actually here mysql version and then Window 32 for example, instead of Window mysql 8.0 dot 13 then Window 64. So, you can just rename this file to mysql rename this folder to mysql. Then MySQL can be however, MySQL can be installed anywhere, but the basic steps are same.

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So, now you have to place the folder on the another drive to make backups and reinstalls easier; actually as you know MySQL maintains a database repository. So, data repository for which you have to create one directory separately for you; by default it should be the directory in the same as the MySQL is installed. So, better is that the directory can be maintained in some other drive for example, in D drive. So, the default name is data that you have to do you should not change it. For example, here I have send is that D colon D data is the directory drive where we want to maintain all the data repository under MySQL server.

And so, we can copy all the contents which is there once after in the folder that is the MySQL you can move to that D data. So, there are some that system file is there, you just move all the system file into the newly created directory, that you have create that we have just now done in the D drive and then you have two folders. So, you should remove one folder. So, C then mysql data that folder should be removed. So, it should have only one existence.

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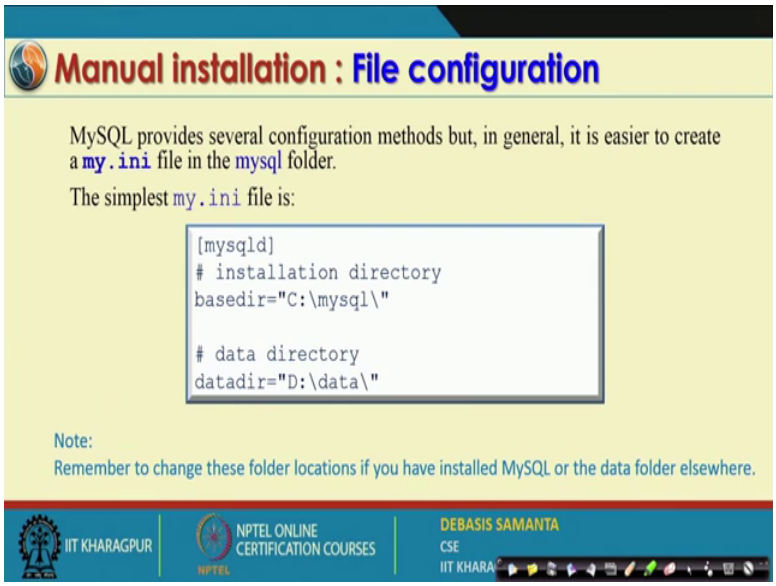

So, this will complete the installation of the MySQL and then there is a little bit configuration it needs to be done; for this configuration there is a file, it is called the my ini file. So, it is a initiation file which you can find it mysql folder. So, you just using any editor let us say WordPad or Notepad you just type this contents. In this my ini file and then it will basically complete the my ini file. So, just typing this file and save this file into the mysql directly it is there.

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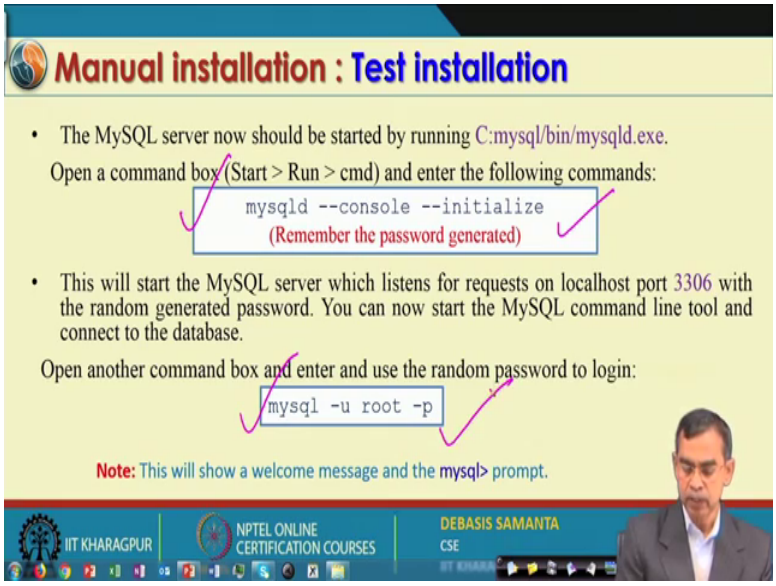

So, this is basically the configuration there are few more configuration also you have to

consider ok. So, there are few more configuration is required, here I have mentioned exactly what are the configure and you should consider. The thing is that, if you want to; I mean, MySQL server is now ready to run actually. And, then you can run this by first time if you want to run it, then you should try this command actually C colon mysql bin mysqld dot exe. So, this is basically to run the MySQL server first time. And, for this things you just go to the Start, Run command and then following the command also you can do it for the initialization.

And then here the password you they will ask it so, you can give some password for example, here this is the password that you can set and then root is the password like. So, you can give the root password or guess password whatever it is there and then you can also change the password at a later stage. So, that option is there I will tell you exactly how the password can be change at a later stage. So, these are the things that you should do, first of all ini file and then you have to run the SQL server first time and then change the password there.

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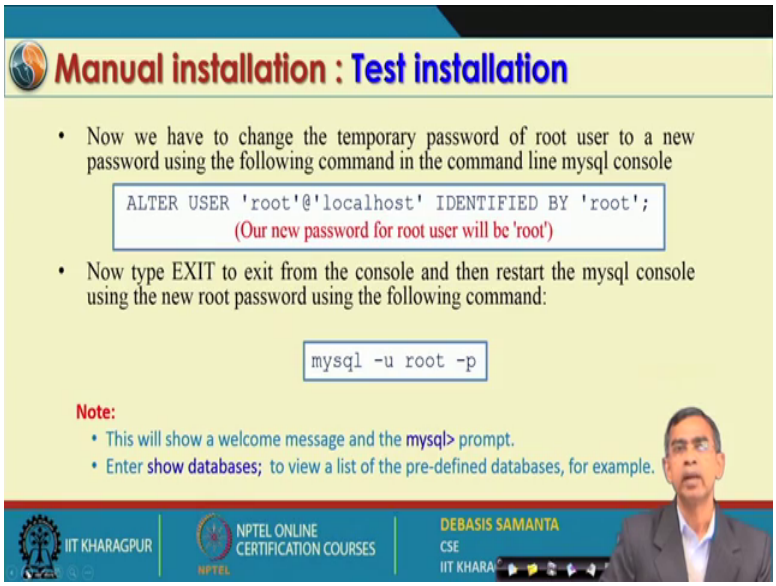

So, these are the ones you do these things then your next step is basically to set the class path. So, that you can run this program from any other directory like.

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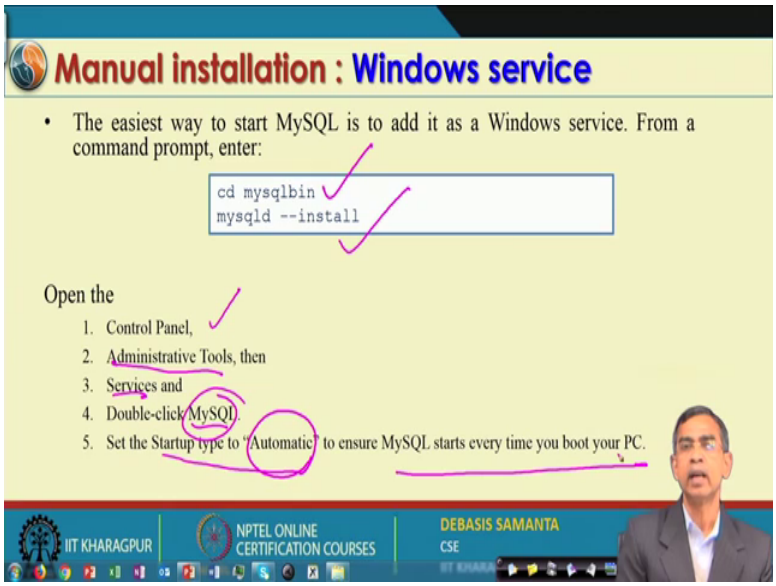

So, here is basically how the how you can do this. So, this is basically call you have to create a Windows service. In order to do the Window service from the command prompt you have to go again. And, then in the command prompt you have to write this command cd mysqlbin and then mysql install. And, that also can be done in this way control panel you have to go in this environment. And, then there is a administrative tool we have to select it and then services and double click you can under the service you see MySQL is already available. So, you have to double click and under the double click is the startup type it is basically select the automatic.

So, this will basically ensure that you can run this MySQL server as soon as you boot the system; that means, you just on the system automatically MySQL is ready to serve you. Then you have to go to the command from MySQL and then you can use it whatever the way you want to use it. So, these are the different procedures that is very much necessary so far the setting up of the MySQL service is concerned. Now, I will discuss about how the MySQL statements can be, there are what are the SQL statements exactly. So, that you can execute from the MySQL server.

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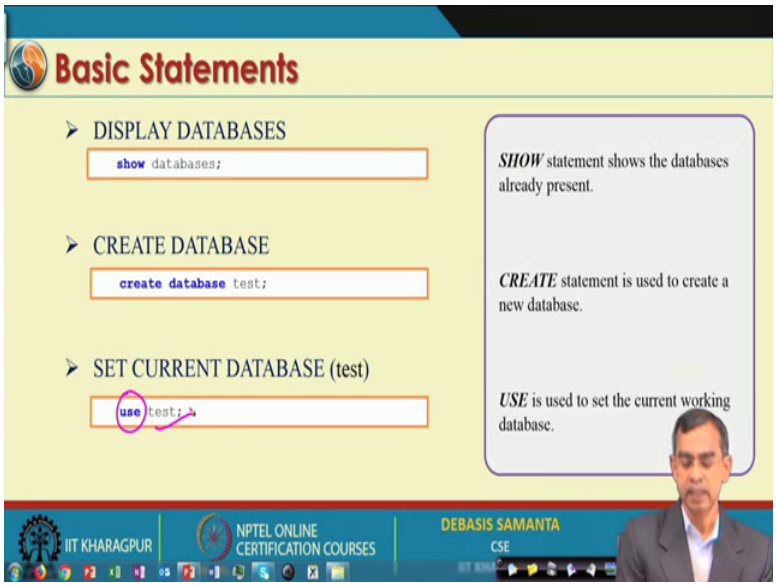

Now, there are different statement and the first statement that you can do is basically show statement. I can say it is the show command, it basically you can type in either small letter or capital letter it is not an issue. And then show database; that means, if this is the full command actually; it will basically tell you what are the database which are available under the MySQL at the moment. So, is basically this is the command, I am just telling you what are the different command that you should learn as the first time ok. So, this is a first command that you can think about it and then the next command that you can think about the create database.

So, how you can create a database as you see here, the create database is the command and then you have to give the name of your database. For example, I have given the name of the databases test, that mean every database should be uniquely identified by a name; unique name. And, that name is essential and every user should know about what exactly the database. This is implies that MySQL server can maintain many database in the same server or in the same machine. So, that is why the different and under a database there are a lot of tables will be there. So, that is what you have to first create a database and the mean is this.

Now, suppose already there is a database which has the same name then definitely it will report an error. So, that you that database create is not successful, please try with some different name. So, this is idea about the second command which basically the how we

can create the database of your own and then finally, you have to initialize the test. So, for this things, the command is use command. So, use and then give the name of the database that mean, this database is therefore, now active for your work. So, these are the three commands are very beginning. So, if you want to create a database of your own which is new and then you can just do it and then finally, activate it by using the use command.

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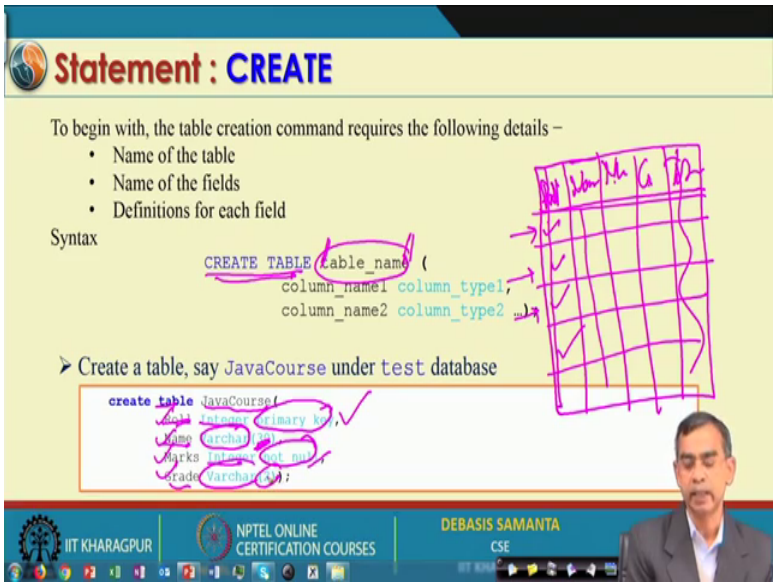

And then there are many other commands which are basically useful. So, you have so far create a database which is a name and under this database we want to maintain tables. So, first I will tell you how a table can be created. Now, as you know a table is basically look like this, a table has its own name. So, there should be name and there will be some columns, these are columns are call attributes. So, this is the attributes and then each row will contain a record. So, each row will contain a record. Now so, attributes and then table name are the first thing that you should ensure that whenever you have to create a table.

And, this command is basically create table is command that basically tell you exactly what is the way you can create a table of your own. So, the column is that you have to first give the table name. So, this is the command create table and this is the table name that you have to specify. So, my table name may be say NPTEL data like this and whatever it is there and then all the column name, say suppose this is the one column

name. So, may be say roll number roll and this is another column say name and this is the another column say marks and this is the another column say grade and this is our total whatever it is there so, these are the column name. As you see here I am in the process of creating one table and the name of the table in this case is JavaCourse and I created four columns here Roll, Name, Marks and Grades.

So Roll, Name, Marks and Grade so, five columns is not there. And then we have to specify for each attributes what is its type. As you see here for the Roll column that mean attributes type is Integer and I mention that this is the primary key, if you know one key should be unique all values then this is the primary key. So, this column will contents all records having the unique values unit columns. So, all values are unique like so, this is called the primary key and then the Name is basically is a character is a Varchar is the syntax for that. So, that SQL can understand about it and 30 is basically maximum string.

That means, you can store a name of maximum 30 characters in this column so, name. And then, Marks is again Integer and it is not null; that means, if you enter any null then you will not be able to null it. And primary key is also not null; that means, no record you can enter for which this element has the null value, null value means no value ok. So, integer Mark's is also should be a non not you have discussed it here and Grade is also a string of two characters. So, this way we define one table and this is the command, if issue this command to SQL server then SQL server will create a table under the active database which is the test in this case. So, this completes how the database can be created.

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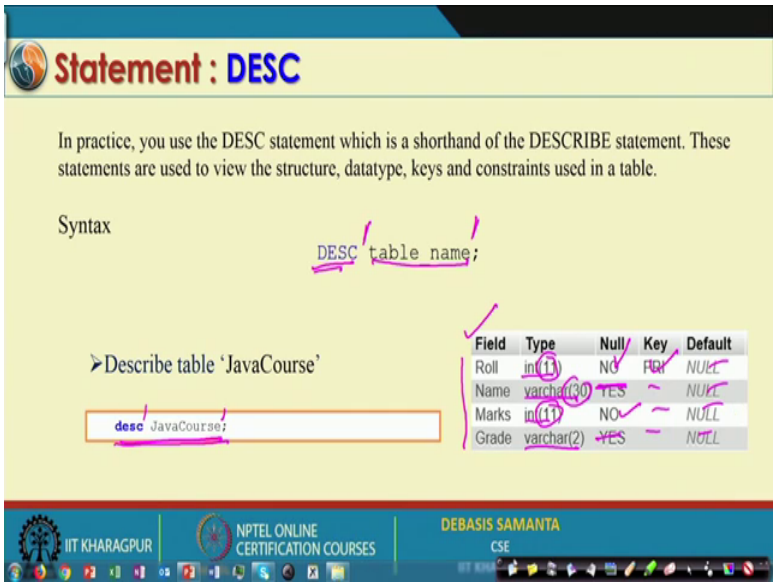

And then, if you want to know exactly the database that you have created what is its description. So, the description can be obtained by the command is called a DESC, it is basically the short form SQL sometimes allowed to give you short form describe; short form of describe statement. Now, if you type this command describe followed by the table name, in this case table name is JavaCourse then you will be able to see exactly which is the structure of the table. So, this is the command here desc then database table name is JavaCourse and then it basically give the structure.

So, as you see here so, it basically what are the fields and then type it is there. So, in this case the fields also call the attributes there are four and then type is int. So, basically 11 digits can be there, Marks also integer 11 digit can be there and the Name is string 30 and varchar is 2 30 and here you see null or not null. So, this means no null value is there no null value; however, this can have null value also.

And then finally, you see whether there is any is primary key or not. As we have mentioned this is a primary key, this is the primary key and other is nothing is determined non-primary key and then default is basically null. So, initially whenever you create the table that time there is no default value, you can also while you are creating some default value say 0 0 0 all this thing can be included there also.

So, this is the structure of the database that just now we have created and after creating the data table as we have seen it, you can see the structure of the database. And, using

this also what are the different type of fields also can be created, we will discuss shortly about this different type of filed that can be possible using SQL.

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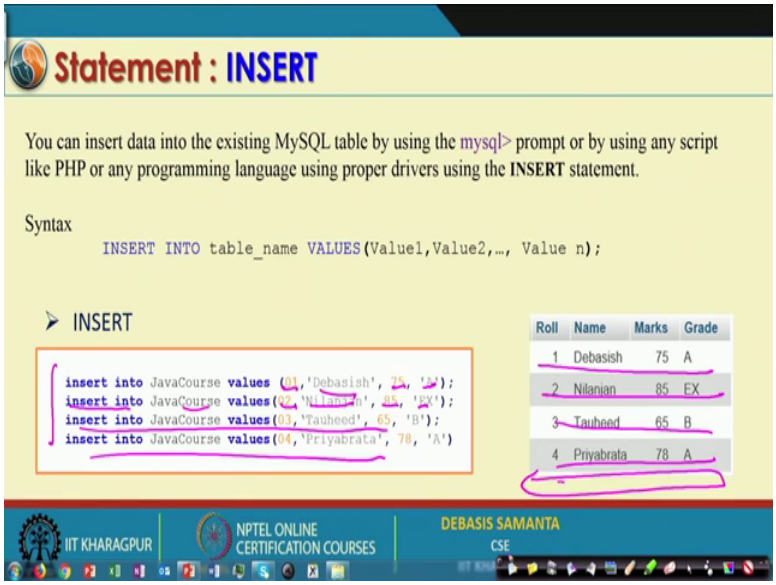

And the next is that your table; your database is ready, under these database a table is ready, but at this moment the table is empty. Now, it is your task to enter the data into the table. Now, the data into the table can be inserted by another command in SQL it is called the INSERT, INSERT INTO. Then this is basically table name for example, JavaCourse and then what are the values that you want to enter in each rows. So, here Value1, Value2, dot, dot, Value n provided that there are n number of fields are there. So, this is the command INSERT INTO is basically default in setting record into a table.

Now, if the table in contents already some record, the insert the command will insert into the appending mode. So, whatever the records are there it will be there and then it will start appending the record at the end of the existing records. So, this the statement as we have see here with this ok, we have issued four insert common one by one. First insert into JavaCourse values 01 Debasish 75 A, as you see here it is basically like; insert into JavaCourse values 02 Nilanjan 85 EX. So, it is the second record and this way this is the third record and this is the fourth record that we have inserted.

So, we have seen exactly four insert command as have been issued to insert four records successfully one after another. If you again type another click insert command so, the next record will come here and so on. So, this is the simple way the insert command can

be issued to the SQL system and your SQL will insert one by one.

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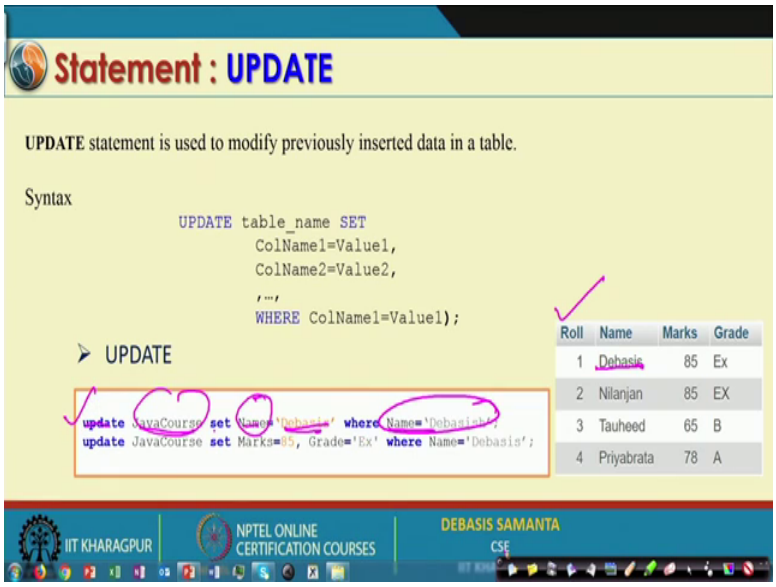

And here is the UPDATE command, if you want to change some values in a particular record that can be done using the UPDATE command. So, here the command syntax is UPDATE then table name and then SET. So, these are the command syntax and then table name in for example, in this case JavaCourse and then which column that you have to change its. So, column name Value1 Value2; that means, these are the new value that you have to changed it. And, then this is the condition for which record that you want to tell. If you where star then for all it will be there, if we instead of star actually the short form that where star means all or where all otherwise you column name equals to Value1.

That means, it will change those columns whose column name is Name1 is Value1. This is basically condition; that means, if you want to update particular records then which record should be updated that has to be mentioned here. Now, here is an example if you see there is a two update command we have done it here; update this is the table name set Name Debasish that mean we want to update this table at the Name field by Debasis where, Name is Debasish. That means, this is the condition, this means that earlier table that we have created, if you see this entry was d e b a s i s h and then by means of this update command we will be able to change this one. So, this table basically is shown after the update I mean first command is executed.

Now, let us see the second command another command update again, the same table

name set Marks 85 Grade Ex where Name equals to Debasis. So, after this one if this Debasis earlier it was 65 a, now it become 85 Ex. As you see here update command will basically help you to change the values in a records, satisfying certain condition that we have there.

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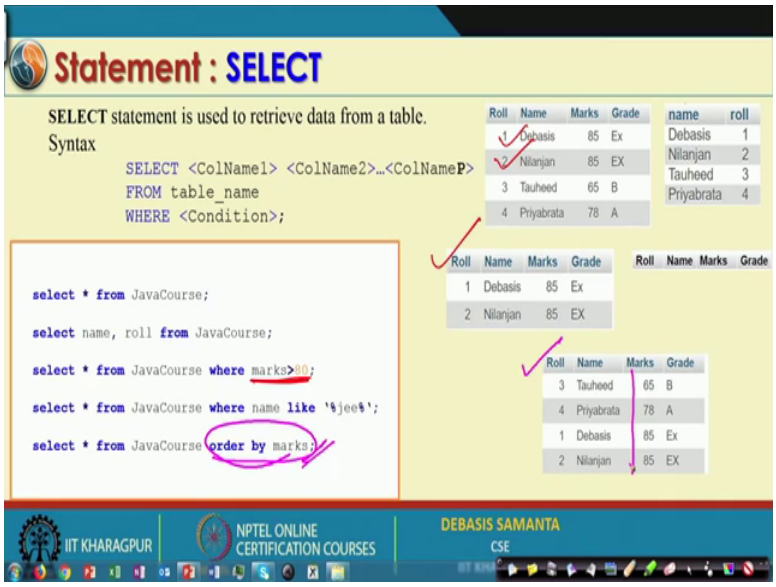

And so, this is the update and then finally, SELECT is very popular one command; if you want to read some records from the existing table in a database then the select command is there. So, select command is basically stand because, syntax is SELECT FROM WHERE. So, this is the command syntax that you have to remember, SELECT then you can select all columns, then select star FROM the which table we have to read, we have to mention. And, if you want to select some record which satisfy certain particular condition then you can mention this one. So, this is basically the way by the select command can be executed.

Now, let us have some command execution on the existing database that we have just now created namely the JavaCourse. And, there is a select star from JavaCourse, this means that we want to select all the fields from the table JavaCourse and there is no condition means, it will basically select all. So, no condition needs to be satisfied. If you exit this command then you will be able to see this kind of database is there. Now if you want to run the next command, next command say suppose select name roll from JavaCourse So, this is the command that we have select name roll that mean only two

fields from the table. So, this basically will be the output once you execute this command.

You can see this output on your console, in your console the display screen all these tables will look like in this table form. And then next commands, let see the another command on the same database like select star; select star means all field from JavaCourse where marks is greater than 80. That means, it will select all the fields the marks is a greater than 80; that means, in this table as you know this is the initial table only these two records qualify for this statement. So, it will basically display this output and next another column; you see another command that is the select star from as we see the command again select star from JavaCourse where name like this one. So, name like means it is basically whatever the other things are there, only there should be at least two three characters like j e e.

Now, this is the condition it is there, where name like is another syntax for, there are many other selects common is syntax and compositions are there. I am giving you the basic concept at this stage only, you can follow any SQL book. So, that you can learn many other command formation from that under the select there are many other command formation actually. And, then nested select although select within select so, many other things are there that I just want to skip at the moment. Now, if you execute this command then it may not satisfy any record may not satisfy this condition. In that case it will display the blank table, as you see here no any values, in any records which has the name having any three characters say j double e. So, it will return a null table, blank table in this case.

Now, our next command that we are going to is this select star from JavaCourse order by marks. Now, we can understand what is the meaning; meaning is very simple in English like. So, you can understand if I do not say anything also you will be able to order by means it will display the table, but according to by default is according to the ascending order. Otherwise order by marks you can write descending also it can be there, by default it is an ascending order. As we see this basically select the entire, I mean display the entire table and when the marks is basically in the ascending order of the marks is there. So, this is the few commands that you can think about how the how the table can be created anyway.

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So, these are the few command that we have discussed about. So, for the select is concerned and next we will discuss about another very important command DELETE. So, using this command, if you want to delete any record that you could that. So, this is the command syntax is DELETE FROM, WHERE. So, delete means it is the table name that you have to specify and you can delete entire records, if it satisfies certain Conditions. So, we have two condition like, all the conditions as you like say name equals to say d e b a s i s whatever it is there like this one so, it will delete that record.

Now, let us see one example so, that you can understand how the delete command can be executed for the database, that we have created namely JavaCourse under the test table; JavaCourse under the database test. Now, this the one example that delete from JavaCourse where mark is less than 66; you can understand it will delete all the records which has satisfy this condition. As you see there are few records as the marks 65 those has been deleted like this one. So, after the successful execution of this command it will give the output like this. And, you note one thing one it is deleted; that means, it is physically removed ever no logical deletion takes place.

So, delete command is very dangerous in that sense that you should issue this command, once you delete it then you will not be able to recover it later on ok. So, this is the delete commands and then there is another command also delete from JavaCourse then you can understand this means it will delete all the records from your table.

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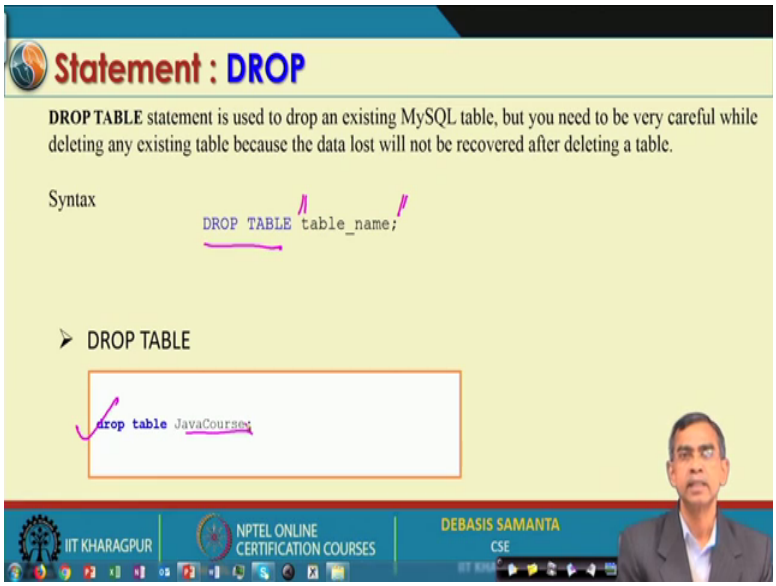

Now, DROP TABLE is another command which basically to delete the entire table. So, dot table is also another very dangerous command of course, and as you needs syntax is very simple drop table, this is the command and then you have to give the table name which you want to delete it. so here. Now, as we see the example a drop table JavaCourse this mean that whatever the records it is there, it will be deleted forever. And, then if you again select start from database it will say that database or table does not exist; this kind of commands it is there if you want to select it there.

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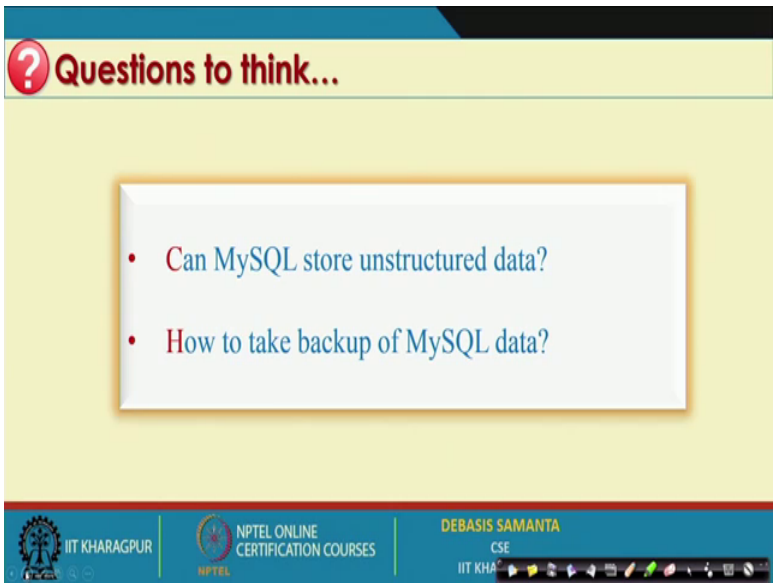

So, we have to just learned about the setting up of MySQL and also we have learned about few important and 1frequently occurred SQL statements. I hope you have understood, but this is just at the beginning stage; if you run with many other database creation, many other tables you can create. And, then for each table you can run just you can just come into the playing mode like. So, play with this one right, but you have to install the MySQL first, MySQL installation is not a big job.

In our demonstration 1 we will give a thorough step of how the MySQL can be installed in your machine, that time if you have your own laptop you can write attain this session using your laptop and you can follow it. So, everything is very simple, but before that you can install all the softwares from the net and then start our procedures seeing our demonstration. So, MySQL should be installed beforehand you know so, that you can practice it about it. In our next session we will discuss about JDBC driver regarding and then we will discuss about it and then; obviously, MySQL is a structure language.

So, unstructured data cannot be maintained by this one and then how to take backup of MySQL data ok. Those things you can find if you give this search into the net, net will give you a lot of solutions for keeping a backup data. Now, in your backup data as you see say suppose you have to install a MySQL with a newer version, but you do not want to lose your data. So, that is why your data should be stored in a separate drive that we have done here D. So, D drive can be copy anywhere and then if you install again newer version and your in setting, if you mention that your data is that right so, that data can be accessible always.

So, absolutely no problem, if there is a problem or the MySQL server is corrupted or there is a breakdown in your machine you will not lose any data there; provided that you have keep you kept the backup all the times you have there. So, database security is not an issue so far the MySQL is concerned there. And, many system actually usually follow several backup of the same system, those are the different issue that is for the more reliable database management if you want to have it. So, thank you we will come to the next session where, we will discuss about JDBC driver.

Thank you very much.