

Database Management System
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Lecture # 1
Introduction to Database Management System

Welcome to this course on introduction to database systems. This is an introductory course usually taught at the first semester of third year under graduate course, is also expected that you should have done course on data structures, file systems probably operating system to better appreciate the concepts covered in this course. Though the course material may not assume completely that you have understood all the prerequisites, it could also be done probably independently because wherever the concepts are required they would have been covered and some difference to the background material would have been indicated in the appropriate sections. It's a 42 lecture module of one hour duration and expected to be covered in a semester long course.

What we will be doing is the two instructors in this course, when myself will be covering the transacting processing system at the later stage of the course and the other instructor Dr. Srinath will be covering the initial sections on database design ER modeling and other basic concepts in the initial sections of the course. What I am going to do in today's lecture is give a brief introduction to databases and show the importance of databases and also in the process introduce some of the basic concepts that we will be covering in much more depth as we go in to the course.

As the term databases indicates ever since data has been digitized and we are able to store data in digital form, we see that the mode of data that is being stored by corporates and other organizations as increased from a few kilobytes over a period of time to now terabytes. Now databases in that sense have become an integral part of our day today life in that we actually do lot of transactions, our day today transactions whether it is railway reservation or it is an airline ticket reservation or withdrawal of money from a bank. In some sense we are actually working with the underlining databases that this organizations have. They actually store the costumer data and other information, user information in the form of databases, in the form of databases where it is accessible by a number of other entities so that our regular transactions like withdrawal of money from the bank or reserving a ticket for a train, these are actually are business processes that are working with the underlining data that is stored in this organizations.

In that sense databases are an essential thing in the business processing world and they become a key entity in terms of developing these applications, business process applications. To show what kind of you know, importance database have assumed in recent times, I will just show you an example of a business transaction in how we actually work with these business transactions in our day today life. I realized only yesterday that I actually have to pay a premium for one of my LIC policies and in normal sense what we do is for paying this policy, the LIC actually sends us an reminder which

is a paper copy posted through the postal mail and normally look at this remainder and then you will actually send somebody or you go to the LIC branch and try paying the premium across through your cheque or something bank cheque or other mechanism, if you carry the cash you will use the cash to actually deposit and then take the receipt back.

All this requires that you physically now move from one place to the other place and sometimes stand in the queue, if there are more people waiting to do this transaction and then the process you will really have to spend time in doing this transaction, business transactions in your day today life. But now with the digitization and the storing of this data into the digital form into the databases, what you start realizing is that it is possible for you to actually access this data online and then see that you have to pay a premium and then see you know if you know actually do this and get on to your bank you know and then pay the premium online through the bank and also get the receipt of this [inaudible] transaction back on your email, in your email box which means the whole transaction can be completed sitting in your office without moving even an inch from your office and fully finish this entire business transaction. And this is sometimes what we call as work flow to show how this work flow actually takes place. Let us see how the scenario which had explained earlier can be managed and I will show you online, how this whole thing actually can be done.

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So we will actually go to the LIC's database. So this is the LIC's portal which actually gives the user the ability to login to this LIC portal. Now I basically try login in to this database. So once I login here, I should be able to get all my data relating to what are the policies that I have with LIC and what are the premiums that I paid earlier with LIC and what are the due dates.

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And if I actually want to calculate the lone information, I should be able to do all this say for example you know you [inaudible] pay premium which have paid online, so I can say that in this particular year I want to see what are the premium that I have actually paid which shows that these are the premium that I have paid already online in this particular year. So this database actually shows you know, for example if you want to see the receipts you can see online. So all this is being managed for you by the LIC database.

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So once you logged in and all those informations relating to you is available, this becomes a one single point access for you. And now we can say for example, one of the

transactions that I want to execute now is I actually want to actually do an online premium payment.

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And once I want to do this online premium payment, I have to choose the policies for which I want to pay the premium online and it suddenly gives me a lot of options here. I can say this is the premium for which I want actually do it online. So now what I will do is I will say submit, so this should take me saying that yes this is the premium that I have to confirm which says that would you like to pay for this particular policy, this much amount of premium online.

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Now if I say yes actually it will say you know I can only be paying the premium in my name and all that you know things which are indicated here and it also tells that I am going to get on to more secured way of paying this premium.

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This is the transaction id automatically generated and it says how do we actually want to make this payment. I can say since I have now various ways in which these can be pay probably, you can see that there are now city bank debit card you know, SBI. Let us say that I have SBI account, so I will now try to do this using the SBI net banking.

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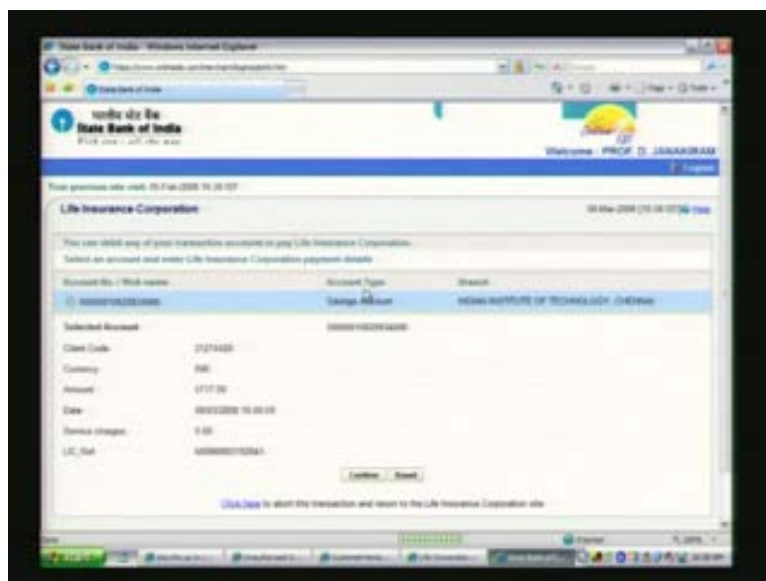
So this will take me to SBI database now. It automatically pushes me to the state bank of India's gateway, payment gateway. Now this will put me into the, you know database of state bank of India.

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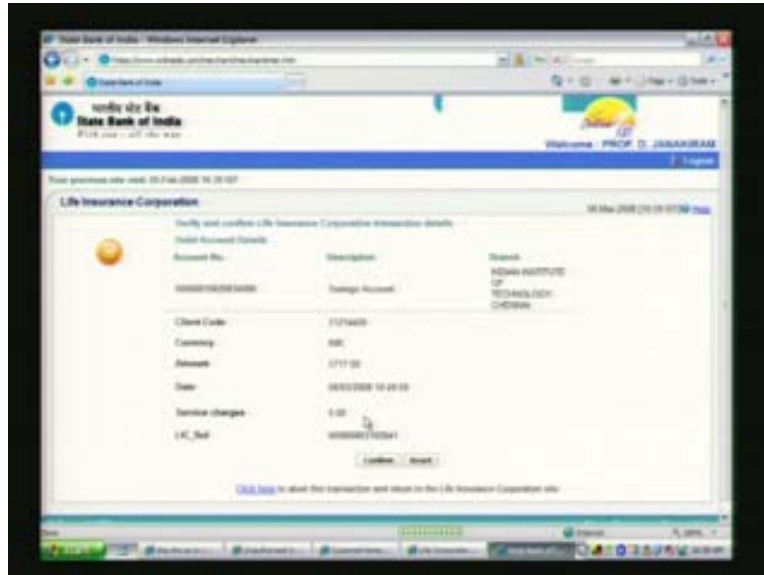
Now I will login into state bank of India's database, give my details and now say let me submit this which should say yes, now it says I have logged into this.

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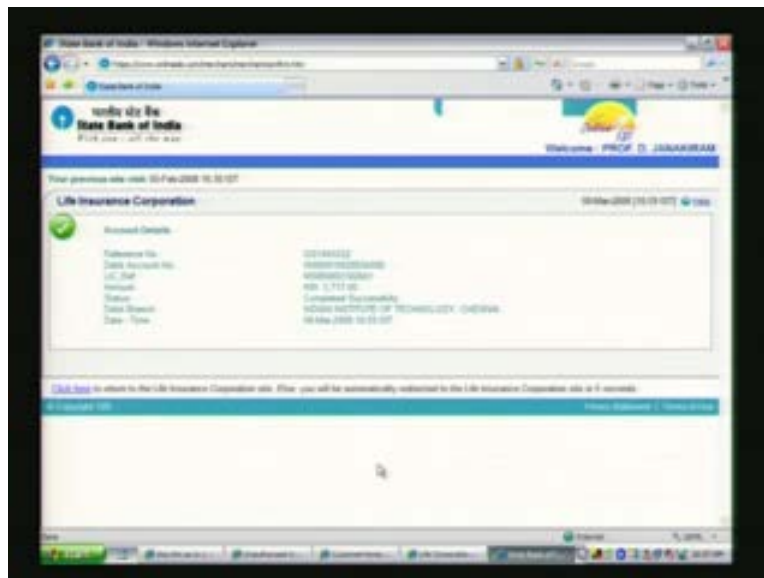
And it says now would you like to confirm paying this money to LIC, you say confirm.

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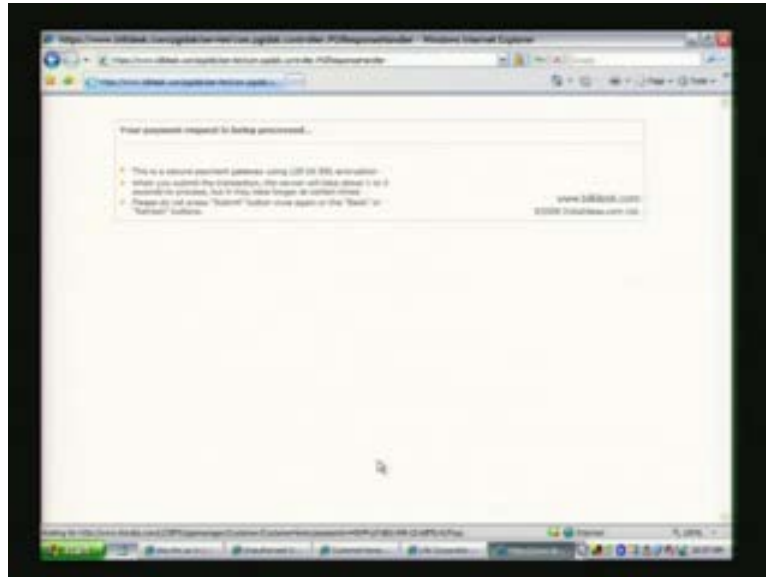
So it says verify and confirm life insurance con transactions detail, so it gives the client code, it gives the Indian rupees and date and you say service charge is 0 and the branch is Indian institute of technology Chennai then I say confirm.

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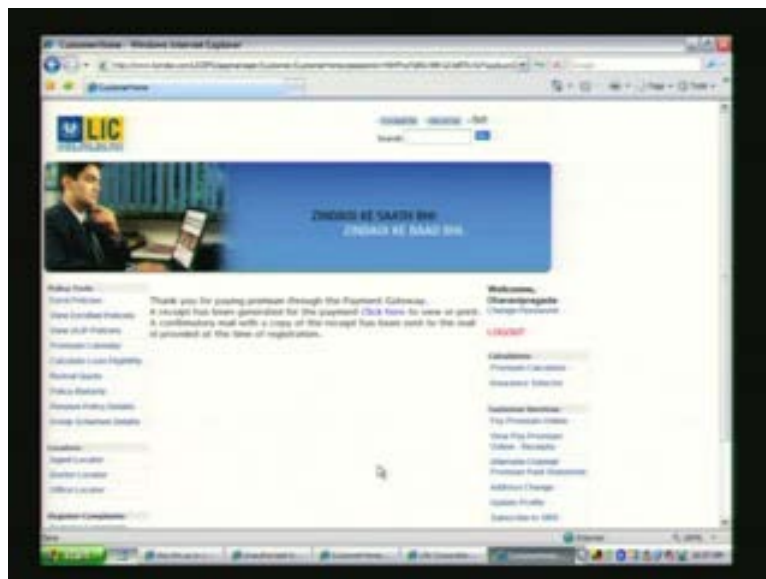
And this should now, it says that I have actually paid, your payment request is being processed.

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So this will basically, underlying take into the SBI's database. Now I am gone to LIC, looked at the premium that I need to pay and I told this much premium I need to pay to LIC and then I have gone to my SBI account. Now I said this much amount be given to LIC for paying my premium and it's automatically done.

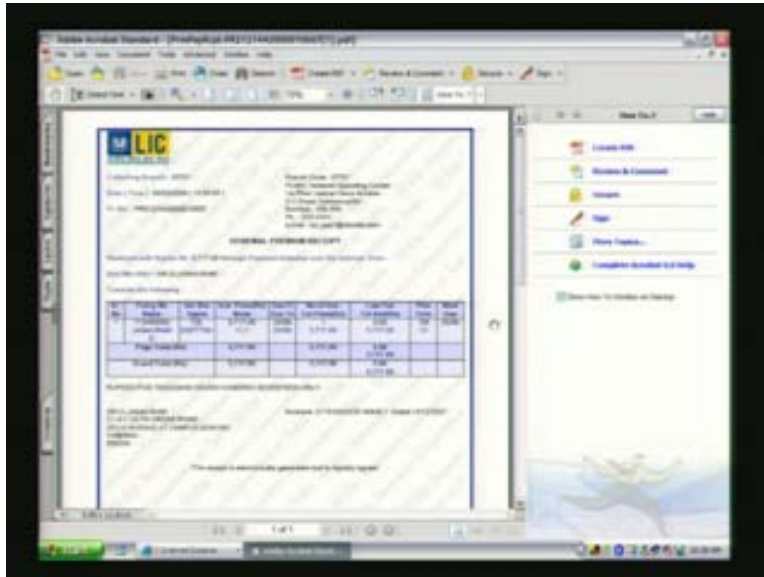
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Now you can see I come back to LIC's portal and it says thank you for paying premium though the payment gate way where the receipt has been generated for the payment, click here to view or print. A confirmation mail with a copy of the receipt has been sent to the mail id provided at the time of registration.

So you can see that now it will give me the full registration, the receipt which is needed for me if I storing it for future requirements to show that I have paid this premium. This is important because at a later point of time, we need to say that yes we have paid this premium, so we need this receipt which tells that this is the receipt.

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And interestingly if you basically look at it, this receipt is electronically generated and is digitally signed. So it doesn't require any more signature of anybody else, the LIC can in future confirm that since it is digitally signed by LIC it can be confirm and saying that this receipt is generated by LIC and you can see the whole details are available for me here and I can store it for my future reference. This is what we mean by actually a business transaction and a work flow. As you can see that I am moving from one database to the other database and in the process actually I am accessing data that is stored in this organizations databases and doing business transactions with them. And please remember this is very important because these are business transactions.

At a later point of time, the bank cannot say that it has not paid this amount to LIC and LIC at the later point cannot deny that I have not received this amount. So there are lots of issues involved here like the properties of the transaction that we need to ensure saying that the customer is protected again as double payment. For example if he clicks twice, he has to be protected saying that this transaction is actually carried out once and not twice and his money as is available in his bank account is properly reflex this payment. So as you can see this has become now an integral part, this is one of the business transactions I could execute this online sitting right now here and you can imagine, it can be done very late in the night when you realize that you have to pay this premium and with no intervention of the bank officials with the no intervention of the LIC officials. Since this data is digitized and exposed, you are able to actually as a customer access all these data and do this online without any hassles.

And hence this becomes an integral part of our day today life. And hence databases are an extremely important subject for us in terms of developing these applications and making them usable by in our day today life by people. Lot of other examples also exists for example, if you go to clear trip dot com you can similarly make payments and buy your tickets and do so many other things with respect to booking your reservations and things like that. So in some sense this course is going to focus you and tell you the underlining examples or principles in developing these kinds of databases. And what I am going to do in the next half an hour is to actually show you an example of how I could have developed this example and what are the different components that are available for you when you are actually developing these kind of applications.

For this what I am going to do is I am going to take a simple application that we have in IIT madras and we are going to show how incrementally I can develop a database model and a database application for this business process within IIT madras. The business processes actually one of trying to allow people to purchase computer systems and peripherals by the faculty of IIT madras where there are different vendors who can supply these peripherals at different prices. So the idea is actually to allow the faculty to be able to purchase these systems at a very competitive rate and what IIT madras does is actually it enters into what is called the rate contract with various vendors for a supply of computer peripherals and computer systems.

Now this process is done every few months to actually take care of the varying rates of this computer items and the vendors can bid at different points of times and then the best competitive vendor is chosen for a given computer system. And then that is made available to all the faculty so that they can use that rate contract system to actually obtain their necessary computer items without going through any other purchase procedure. And this is done often to actually allow the systems which keep changing in terms of their configuration to be brought in to the rate contract system.

Now one of the requirements here is the vendor should be able to quote at regular intervals into for IIT for various computer system configuration. They should also be able to see what IIT's requirement is and once these things are chosen, the systems are chosen then they should be made available to the faculty so that they are able to actually choose whatever systems they need and are able to generate the required papers for purchasing those systems. Now when we initially had a paper based system, all the vendors used to quote, supply their quotes on paper and then they used to be personal in our purchase department who use to enter all the things into a word processing system like Microsoft word providing a comparative statement of different vendors for this computer configurations. And so it's basically file systems that we are using but then lot of processing, manual processing of entering these data in that which is usually other problem because this involves a TDS, a typing of the details provided by the vendors and then circulation of this papers to various members so that they can look at the details and then choose the systems that are most competitive.

Now the problem in this particular case as we can understand is that which used to take nearly 3 to 4 weeks minimum for the entire process starting from the vendors quoting to

the selection. It used to take 3 weeks to 4 weeks and used to involve lot of manual processing by various people and also circulation of large quantity of papers containing this data two various members involved in choosing these things. So obviously this is a very good case where one can think of how this whole processing can be improved as a business case and see how one can bring in an automated processing by choosing databases as an example of introducing data base systems for automating the entire business process or work flow from one end to the other end to just show what are the likely business processes or work flow elements that will be involved in this. I will just take you to a site which actually gives a first cut requirement of what was developed to show how this whole thing can be sort of automated in using the database concepts in a nice way.

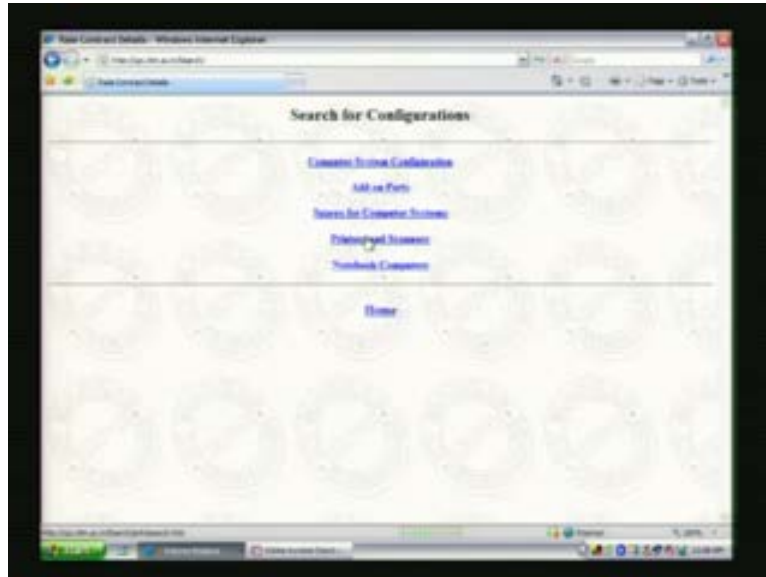
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So this actually gives an initial flow of how we could probably introduce the database systems for automating this business process. And one of the key things as I was explaining was to actually search through these rate contract details which were approved which could be used by various faculty members in choosing their requirements.

Now as given earlier now I can actually quote through this which actually says that you can search through this rate contract details. Let us understand this one business process of how exactly one can search through this rate contract.

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This actually take you to the various other menus that we have, for example one can search through computer system configuration or add on parts or space for computer systems or printers and scanners and note book computers. So if I go into computer system configuration then I can search through this computer system configuration.

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Now I can search for example IIT specification number wise where each specification will give the different specifications for the computer systems or you can have the search through vendor name or through brand name or processor name or a combination of this.

For an example let us say I actually click on specification number wise and submit this then I can actually see all the specifications IIT has in this particular case. There are ten specifications in this case let us say I actually choose the fourth specification and submit that specification.

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Then now I can see all the vendors who actually quoted for this specification **right** and their prices.

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Important Note: Please read the comments at the end of each specification while choosing. The actual vendor quote would have indicated specific deviation to IIT Specification in the comments column.

Details of Computer System Configuration:

| S.No. | IIT Specification | Quote# | Company Name | Unit Price | Unit Price (without discount) | Monitor Category | Comments |
|-------|---|----------|--------------------|------------|-------------------------------|------------------|----------|
| 4 | Seed Case 2 (See S1440 L11-036) Seed Chipset suitable motherboard +MB 1944 FSB 2x DDR LL Cache 912 MB 512 MB DDR SDRAM Bus Speed 400 MHz 80 GB SATA IDE (7200) 17" Super-Thin (Single-Monitor) 1.44 MB FDD 17" Inches LCD Monitor 20GB + 25 + 12 ports USB or FireWire Optical Mouse 304 Inter-Kit (Based on-board) add-on Audio 12x Drive DVD-RW/Combo Controller 10 / 100 / 1000 Mbps 8-ITV - Micro ATX cabinet with 500W On Board SATA RAID level 0 10 | Seed-021 | Mu OCS Network Ltd | Rs 29900 | Rs 29900 | CCS | selected |
| 4 | Seed Case 2 (See S1440 L11-036) Seed Chipset suitable motherboard +MB 1944 FSB 2x DDR LL Cache 912 MB 512 MB DDR SDRAM Bus Speed 400 MHz 80 GB SATA IDE (7200) 17" Super-Thin (Single-Monitor) 1.44 MB FDD 17" Inches LCD Monitor 20GB + 25 + 12 ports USB or FireWire Optical Mouse 304 Inter-Kit (Based on-board) add-on Audio 12x Drive DVD-RW/Combo Controller 10 / 100 / 1000 Mbps 8-ITV - Micro ATX cabinet with 500W On Board | Seed-021 | Mu OCS Network Ltd | Rs 29900 | Rs 29900 | CCS | selected |

For example I can see here there is a company InfoTech limited which quoted for the specification 4 at 25000 rupees for G 33 chipset. For P 33 P 35 chipset actually it is available at 25500. So what this gives is actually all the vendors and whoever has quoted for the system and they prove to be in the rate contract and what are available in this rate contract can be searched by using this. One can in fact do a little, better search by saying for example if you want to actually take a specific processor or a CPU clock speed and also a vendor name then you can actually submit this quote here.

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Now you can say a canonical electronics private limited is a vendor name and I want clock speed 2.8 and I want to see all specifications matching these two requirements then I will basically submit this. I get one specification matching this requirement which says that this is the available system for me in the rate contract which I probably put order if that satisfies my requirement. Now to understand what is happening here as you can see here we need to get this information organized in the back end database and have this information stored properly into our database system.

It's quite possible that I actually navigate through data which means that I actually retrieve at one level. For example you can see when actually go with specification number I am actually retrieving the data at one level. Now we can see these are all the data that I have as for a specification number is concerned. Now I can say for 5 is what I am actually choosing which means that I am actually drilling down, I am navigating using into the database by saying for 5 now I need the information. So I get to the second level by saying please get the information on 5 for me.

This is what we understand as a navigational query where you are navigating through the data, has a post to actually retrieving all the information that satisfies a particular criterion. For example one can say I want to find out all the students who have registered my database systems course or my paradigm programming course or my grid computing course or I want to find out for example a further intersection of the sets by saying I want to get all those students who registered for my paradigm programming course and also my course on grid computing.

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| S.No. | IIT Specification | Chipset | Computer Name | Unit Price | Unit Price (without monitor) | Monitor | Category | Comments |
|-------|--|--|--|------------|------------------------------|---------|----------|----------|
| 1 | Intel Core 2 Duo E6700 2.33 GHz Intel Chipset suitable interfaced with 1000 FDD Dr. 1000 L2 Cache 512 MB 11.1V 90 DEE Bus Speed 1000 101 MB/s 80 GB SATA IDE (7200) 8-pin (Compact Master Termination) 1.44 MB FDD 17 inches LCD Monitor (SAMTEL PHILIPS SAMTRON 1527N9000) size 23.8" x 28" x 12" ports USB 2.0 95.5 inch Diagonal Mouse 300 Keys Key Board network card on board 1.5x DVI-D Video Extension Controller (C) 1001 1000 14bits ATX - Micro ATX cabinet with 500W On board SATA RAID level 0 - 0 | Intel Core 2 Duo E6700 2.33 GHz Intel Chipset suitable interfaced with 1000 FDD Dr. 1000 L2 Cache 512 MB 11.1V 90 DEE Bus Speed 1000 101 MB/s 80 GB SATA IDE (7200) 8-pin (Compact Master Termination) 1.44 MB FDD 17 inches LCD Monitor (SAMTEL PHILIPS SAMTRON 1527N9000) size 23.8" x 28" x 12" ports USB 2.0 95.5 inch Diagonal Mouse 300 Keys Key Board network card on board 1.5x DVI-D Video Extension Controller (C) 1001 1000 14bits ATX - Micro ATX cabinet with 500W On board SATA RAID level 0 - 0 | Intel Core 2 Duo E6700 2.33 GHz Intel Chipset suitable interfaced with 1000 FDD Dr. 1000 L2 Cache 512 MB 11.1V 90 DEE Bus Speed 1000 101 MB/s 80 GB SATA IDE (7200) 8-pin (Compact Master Termination) 1.44 MB FDD 17 inches LCD Monitor (SAMTEL PHILIPS SAMTRON 1527N9000) size 23.8" x 28" x 12" ports USB 2.0 95.5 inch Diagonal Mouse 300 Keys Key Board network card on board 1.5x DVI-D Video Extension Controller (C) 1001 1000 14bits ATX - Micro ATX cabinet with 500W On board SATA RAID level 0 - 0 | Rs 21000 | Rs 17679 | CCCL | network | |
| 2 | Intel Core 2 Duo E6700 2.33 GHz Intel Chipset suitable interfaced with 1000 FDD Dr. 1000 L2 Cache 512 MB 11.1V 90 DEE Bus Speed 1000 101 MB/s 80 GB SATA IDE (7200) 8-pin (Compact Master Termination) 1.44 MB FDD 17 inches LCD Monitor (SAMTEL PHILIPS SAMTRON 1527N9000) size 23.8" x 28" x 12" ports USB 2.0 95.5 inch Diagonal Mouse 300 Keys Key Board network card on board 1.5x DVI-D Video Extension Controller (C) 1001 1000 14bits ATX - Micro ATX cabinet with 500W On board SATA RAID level 0 - 0 | Intel Core 2 Duo E6700 2.33 GHz Intel Chipset suitable interfaced with 1000 FDD Dr. 1000 L2 Cache 512 MB 11.1V 90 DEE Bus Speed 1000 101 MB/s 80 GB SATA IDE (7200) 8-pin (Compact Master Termination) 1.44 MB FDD 17 inches LCD Monitor (SAMTEL PHILIPS SAMTRON 1527N9000) size 23.8" x 28" x 12" ports USB 2.0 95.5 inch Diagonal Mouse 300 Keys Key Board network card on board 1.5x DVI-D Video Extension Controller (C) 1001 1000 14bits ATX - Micro ATX cabinet with 500W On board SATA RAID level 0 - 0 | Intel Core 2 Duo E6700 2.33 GHz Intel Chipset suitable interfaced with 1000 FDD Dr. 1000 L2 Cache 512 MB 11.1V 90 DEE Bus Speed 1000 101 MB/s 80 GB SATA IDE (7200) 8-pin (Compact Master Termination) 1.44 MB FDD 17 inches LCD Monitor (SAMTEL PHILIPS SAMTRON 1527N9000) size 23.8" x 28" x 12" ports USB 2.0 95.5 inch Diagonal Mouse 300 Keys Key Board network card on board 1.5x DVI-D Video Extension Controller (C) 1001 1000 14bits ATX - Micro ATX cabinet with 500W On board SATA RAID level 0 - 0 | Rs 21000 | Rs 18669 | CCCL | network | |

So in that sense we have various ways we retrieve this data and hence the data model becomes extremely important, what is the kind of a data model we have becomes extremely important. And also another interesting fact that we should see when we see data models is that here is a case where the data is well organized as a table. For example I have an IIT serial number and have an IIT specification, I have a chipset, have a company name unit price, unit price without monitor, category thing like this. This is more like a table organization of the data.

Now lot of information if you see for our business purposes gets very easily organized as flat tables of this nature and that is one kind of a data model that is extensively used while storing the data. Their other data models that are possible for example you could have data models where you have an object where the information could be unstructured

which could mean that you have a field name and you have a corresponding value but then one field in that particular object could actually point to another object and that could point to another object. When example for such a kind of data model or real world data model is for an example, if you want to store the information about maruti 800, what are all the parts maruti 800 has, it fits more as a object data model because you are going to specify now what kind of engine maruti 800 has and within that what kind of other parts that engine has.

So you are going to actually store the information more in terms of objects and the objects linking each other and that becomes an object data model where you have a flat model like this, flat table base model is often also called the relational model. And as you go into this course you will see in detail how the relational model can be used for storing data and how the relational database system can be used for developing applications that fit very well into the relational model.

What I have shown here is a simple example of using the relational model for building this computer rate contract system. I will further go down and show how the relational model fits in here in terms of developing the application. One of the important things that we should note down here is for example this also enables the vendors to come in and give information of what they have directly once I have enabled this database system.

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That can be shown here for example by saying that a vendor who wants to quote to me can login here. For example you can see here it allows the vendor to login here and in this particular case I can give a guest name, guest is the login and then with the password you can login now which shows that now he is allowed to actually enter my system and he can quote to my various requirements.

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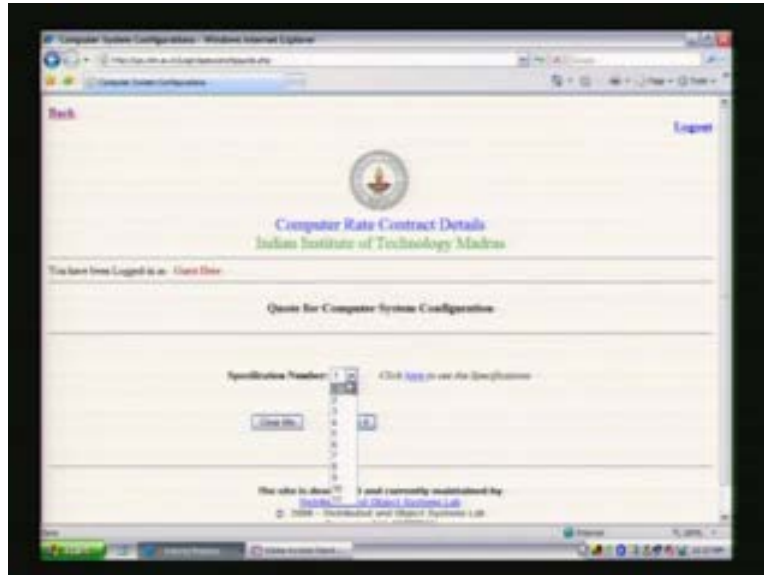


For example in this particular case I have a computer system configuration. Now for the computer system configuration there are different kinds of specifications which I need.

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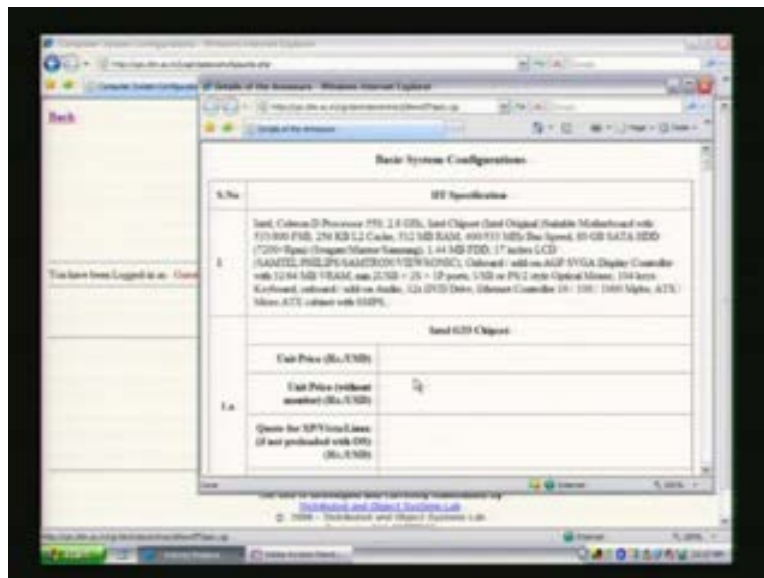


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So he can say that he wants to quote for the specification one here, he can also click here to see the specifications that I have at the moment for the computer systems. So this gives the list of specifications that he has for the computer systems.

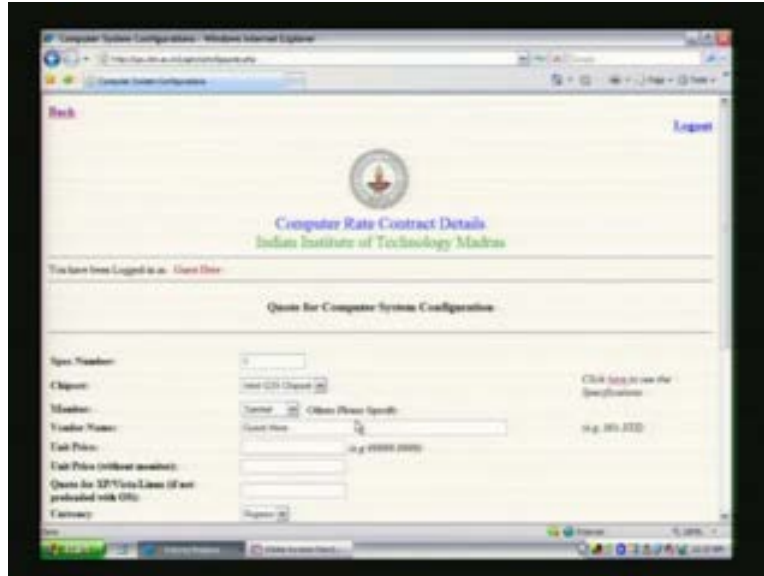
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Now from this he can choose for which specification he wants to quote for the computer system configuration. Once he decides his specification for which he is going to quote, you can basically allow him to quote here by saying that now he can give this information, in fact he can say that this particular specification one he wants to quote it let us say at 25000 then you can say he can supply that information here unit price and he

can say the unit price without monitor could be 18000 in this case assuming that he has some calculation for the monitor.

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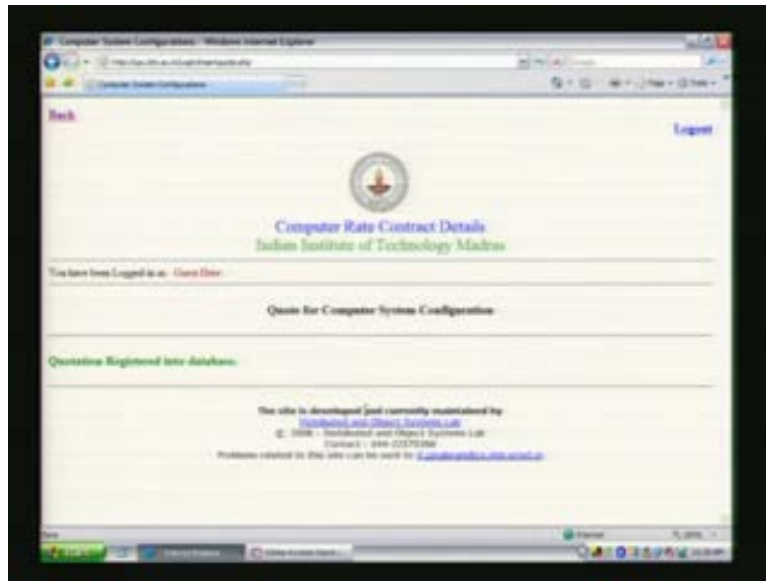
So he basically can give this information and also put some comments saying that extra something here. If he wants to say that the additional component, cost component that he is going to use in this. Once he is decided to quote for this, he can say that this is the information that I can give it to you as for a specification one is concerned then he can say he is actually quoting for this which means that this information gets into my database now.

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I will show you in a minute where exactly this gets in and gets stored for me and that's where basically the entire relational database system concept makes sense. Once he is doing this update, this goes in and get stored in an appropriate table in my database system and I will be able to retrieve or use this information later to make my decisions or other business processes or transaction to access this particular data.

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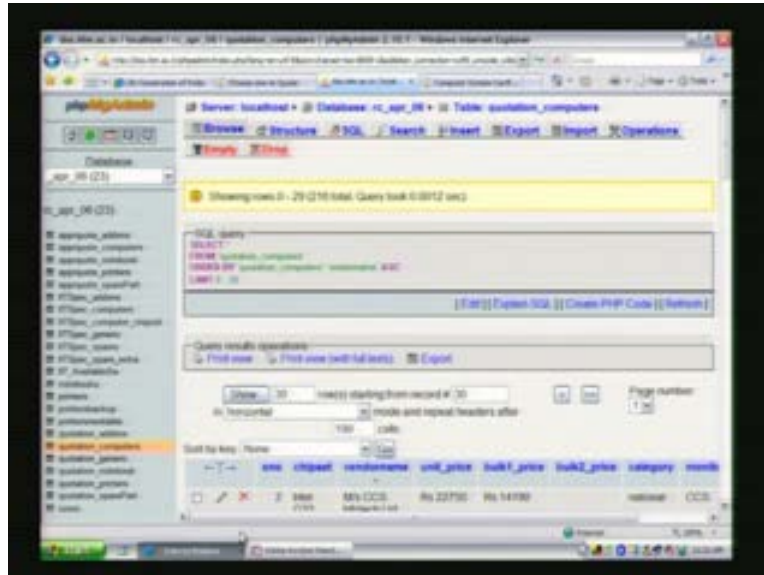


Now you can say that this confirms saying that you have logged in as a guest here and you have quoted from my computer system and the quotation is registered into the database. This is extremely useful for various reasons because now the vendor doesn't need to actually come to IIT madras. He can be anywhere, he can be situated in Delhi, he can be in Chennai, different parts of Chennai, all that he needs to do is he need to registered with me so that he has a id and the password. Once he has that he just logs into my system and able to quote into my system.

And once he quotes that quote is actually stored into my database system and other processes and transaction in my database system will be able to actually access and do the necessary processing here. Now let us understand what are the key challenges are conceptual thing that we should be understanding in building this. Now for a minute let us understand this application, what we have as different entities in these applications and how do actually store this data or create my tables and my data and then how do actually make the transactions work with this particular data that I have underneath.

Now the most important requirements in this particular case is to actually see that underneath I have actually created a database system. In this particular case I am using a MYSQL relational database system which actually allows me to actually create tables and store the database underneath server for me.

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Now what are the different ways actually I can now put my data into this system? For example here is the key database system that I am using for actually creating this rate contract system that is called rate contract rc.april.6 06 and this has actually got all these tables as you can see I have actually got several tables underneath which are all storing the information for me. For example one can see that there is an approved quotations for add on systems, this is one table. Then I have the approved quotation for computer that is another table and approved quotations for note books and approved quotation for printers.

Now we can see these are all the tables in some sense they form the schema of the database and this is very critical in database design which you are going to study as part of your course here. How do I design my database system? The starting point for design of the database systems is actually understanding the different entities that are there in your domain. For example in this particular case there are vendors, there are users, there are people who select based on the what the vendors have quoted. So you have actually got different entities and they have some relationship with each other.

For example vendors quote into your data and then there are people who actually pick information from this and choose. So actually you have to understand what are the key entities in your domain and how exactly each entity in terms of what attributes these entities have. For example one of the things that you can see here which is one of the tables for example here shown here is the quotations for computers which is something that I have used here, this is one of the tables.

Now this table has different fields, these are entities for example if you see quotation computers has some kind of a table which comes from my entity which we will see in a minute what is the relationship and how do I actually break an entity in to a table. Now in this particular case you can see serial number, chipset, vendor name these are all the attributes or the fields that I have for this particular table. If you take for example vendor

name and they all are registered with IIT madras then vendors will have a user name and a password and then their address. These are all the attributes that a vendor entity will have and when actually I have this vendor as an entity, one way I could possibly create this information in to my database is by actually converting this entity into a table.

For example in this particular case as you can see a simple thing like users for example has, to the users of the system and they have the information on company user name and password being available in this particular table. So if you see user as an entity, these are the fields that will be available as part of that entity. So one easy thing when you are designing your database system is to actually convert the entities into tables, relational tables and store this information. Now there are lots of issues and in terms of converting an entity in to a table because if this information is duplicated for example this company name and id is duplicated in other places. For example it is available in other places, the company name is available in other tables then what happens is this duplication of data will create problems when you actually, a company says that now it has changed its name. Then you have to go and then start changing this name at multiple locations.

So one of the key things that we understand, when we are designing database is that one fact at one location. So you don't want to store the same piece of fact at multiple locations because it causes lot of problems for you. So database design concepts will explain how exactly this process of design could be done and how one can come up given an entity relationship diagram, how you can come up with tables like this. For example the database design in this particular case has all these 23 tables and this is the essential part when I design my system and this is the key of the whole concept and how do I actually arrive at these 23 tables and each table for example has its own for example in the case of quotations, you can see this is the schema that I have.

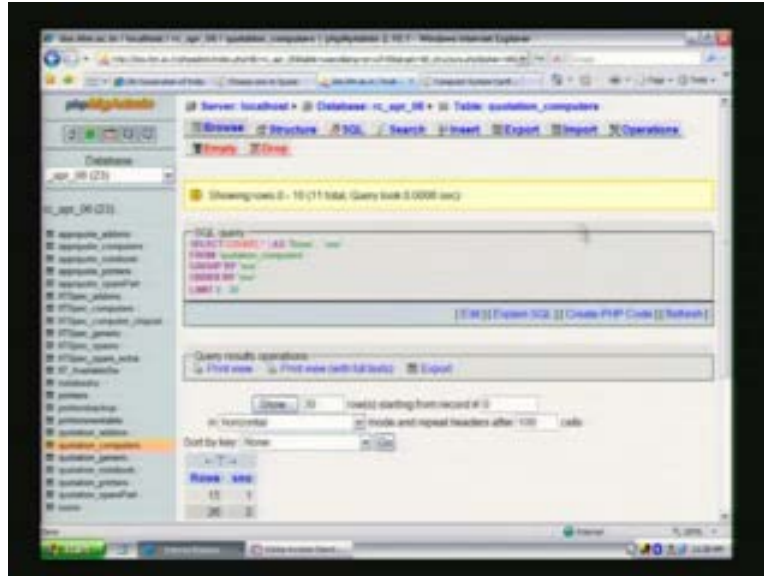
You can see the table here has serial number, chipset, vendor name, unit price, bulk price bulk two prices. For example if they quoting for more then some number of systems whether there is a discount additional with monitor, without monitor all these stuff and then whether the monitor is what kind of monitor brand that they are supplying with me and what are the comments. For example whether he wants vat to be added or its included and all this. So this is what we understand as the database design.

Now these schemas also changed. For example tomorrow I don't want this bulk two price to be quoted because it is no longer my requirement. Then I drop this particular field from my quotation for computer which means that I no longer need this particular field to be available. This is what we understand as schema change in my system, in my database. And often these schemas change because as the systems evolve, business processes evolved and systems evolved schema changes are natural. And your system should be able to cope up with this schema changes that's other important issue when we actually deal with databases.

Now in this particular case we will go and see the quotations for computers and see what we have done earlier in terms of these quotations whether that is available in this particular case. As you can see here I am using the php admin and directly getting into

the database. For example in the particular case, I can go and then browse for example the values of the database.

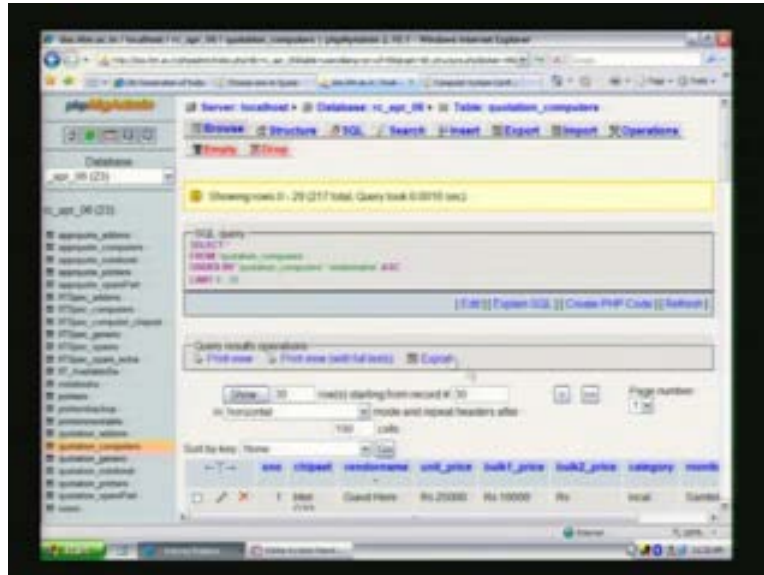
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Now you can see that these are the values that are available for this particular field. So I can also probably browse the entire database, so you can see that this information that's available in this particular table can be, you can use the browse and you can see what is the information available. For example quotations for computers you can see now here, you have Dev systems which quoted intel G 33 chipset for this unit price, this is a bulk price they didn't quote bulk two price. Then it's a category is its a local vendor and the monitor is the viewsonic and then a some comments for people to look at for both viewsonic or acer TFT monitors, you probably would like to supply both of them. So you can see this. This is what we have as the information right now. One can even see how this data gets changed when something got updated.

For example you can go to the, as we saw earlier you can go to the computer system and once you have quoted for that, you probably can see based on here what I had given earlier as a guest has come up now here.

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You can see that I have inserted earlier as a guest and quoted 25000 and 18000 as the unit price and without monitor I have quoted 18000. So that information is reflected here as you can see here and the default samtel has been picked up and I said vat is extra and that is also available for me here. Now as far as the work flow is concerned, I can use this information whatever people have quoted and pick whatever quotations that I want, put them into the approved quotations for examples for computers. This will basically reflect the approved quotations for the computers.

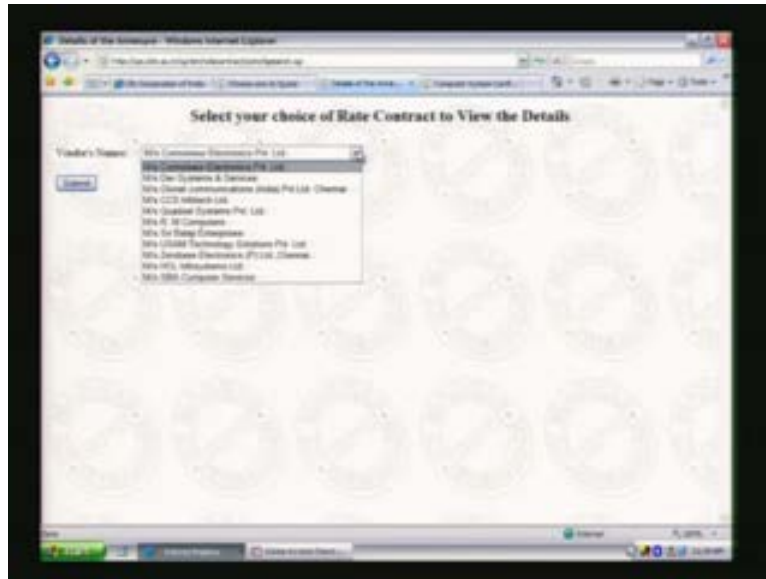
Now you can see all the approved data is available in this particular case and then this is the approved systems for computer systems and that's how the information can be organized in terms of your database tables. I can pick the informations from one table and then you know it can be added on to the other table. All this is what basically are called transactions. So you are going to look at in this course in detail how transactions operate on the database system on the underlining data and change the state of the data as it goes. For example each one of this can be seen to be a transaction for example, one can think of which are the things that are actually transactions in this particular case.

I am searching through the computer configuration as I have actually shown you earlier. Now in this particular case I am actually the first level search is not a transaction because it is just giving me all the fields that I can use for searching. Now you can see once I come here, this is the point where I choose a specification and once I choose a specification or a vendor name for example I am actually trying to make a query into the database. It is at this stage actually it goes and picks up this data from the database table that I have underneath.

For example these are all the vendors that I have in my system and now once I choose one more vendor here and I say, let us say I am actually choosing the one of the vendors that is available here and then submit that thing. It again goes and reads the data from the

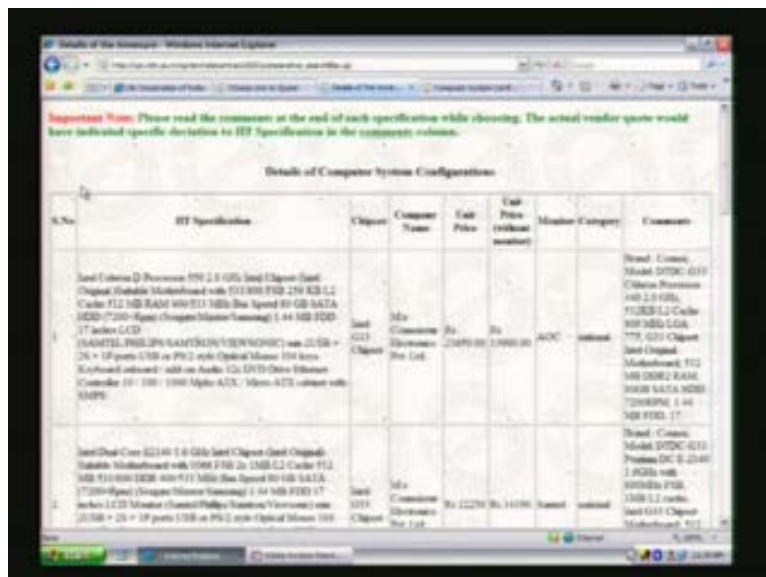
database. These are actually called the read only transactions because all that they are doing is they are just going into the database and reading the information that I have and then giving me in a convenient form where I can look at it through my browser. So lot of thing will be happening underneath but then ultimately all that it is required here is to go, carry the database, get the required information and show this information for somebody who is asking for that information.

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So these are actually read only transaction, they are just reading the values that are stored in the database.

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But as opposed to this kind of transactions, one can even think of the other kind of transactions which we saw here. We actually said that one can login as a guest and once he logs in as a guest now, you can sort of quote for the computer system. Now once he says that for a particular system, 3 is quoting now and then he give some data here saying that please take my quote as let us say 12000 and then give the other thing as 8000. Then I think what we are doing in this process is, we are actually updating our underneath database.

Once he says quoted what is happening is you will be seeing that the whole quote has been registered into the database which means that the data has been now been written in to the database. So these are actually write transaction, they are writing in to my database. There are some transactions which can go and both do both read as well as write from my database. To summarize what's happening here, what we are trying to do is given an application like this, we have been able to design the underneath tables which are the database models and store the data in that particular model and have our transactions which are actually accessing this data and supporting various business processes that I have in this particular case searching through my rate contract, allowing my vendors to quote into the database and allowing my faculty to choose and then order the related computer systems.

So the entire business processing of the data is automated using an underlining database system and hence database systems become extremely critical in terms of supporting automating this processes and eliminating manual processing and manual production of the papers so that the whole work flow gets completely automated and we have a simple and elegant and nice way of actually handling our business processing systems.

Now what you are going to see in this course as part of this course is you are going to see how this database design can be done, what is the meaning of transactions and how they operate and how do they actually maintain the consistency of the underlining data and provides certain properties when we develop these systems and make it available for day to day use for the people. So these issues are going to be covered in depth in the next 41 lectures that we have in this course. Thank you.