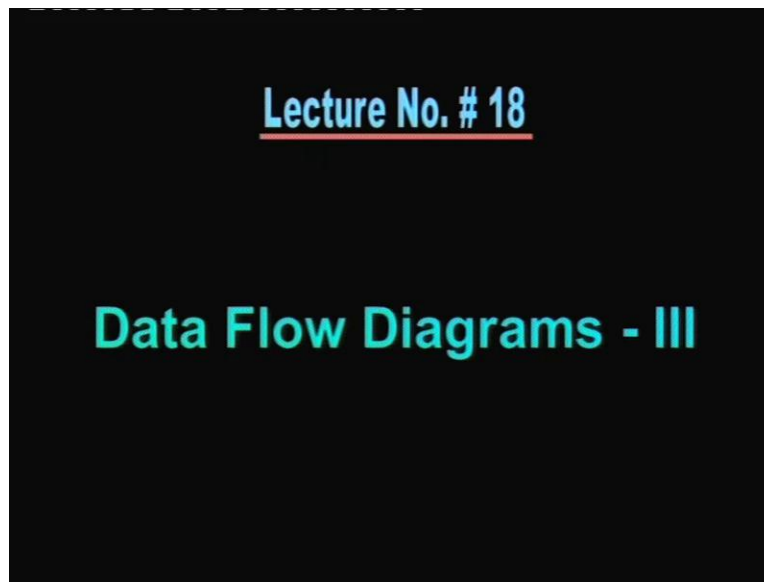


**Management Information System**  
**Prof. B. Mahanty**  
**Department of Industrial Engineering & Management**  
**Indian Institute of Technology, Kharagpur**

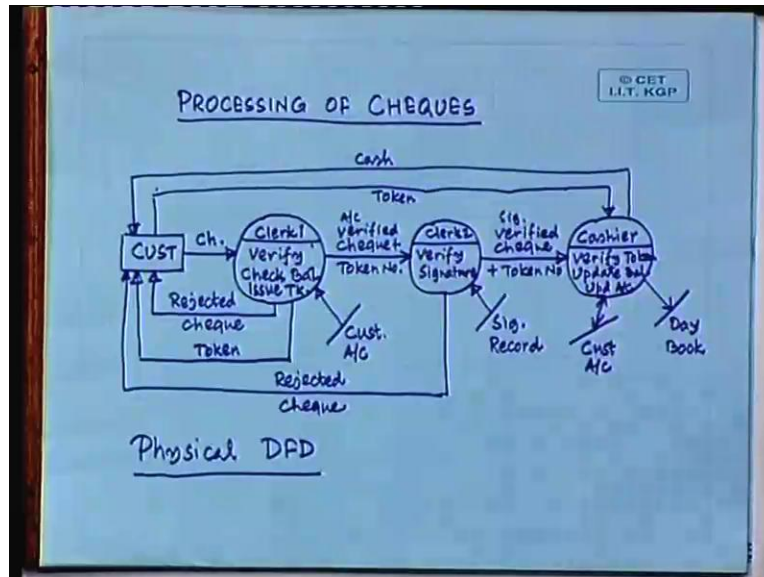
**Lecture - 18**  
**Data Flow Diagrams - III**

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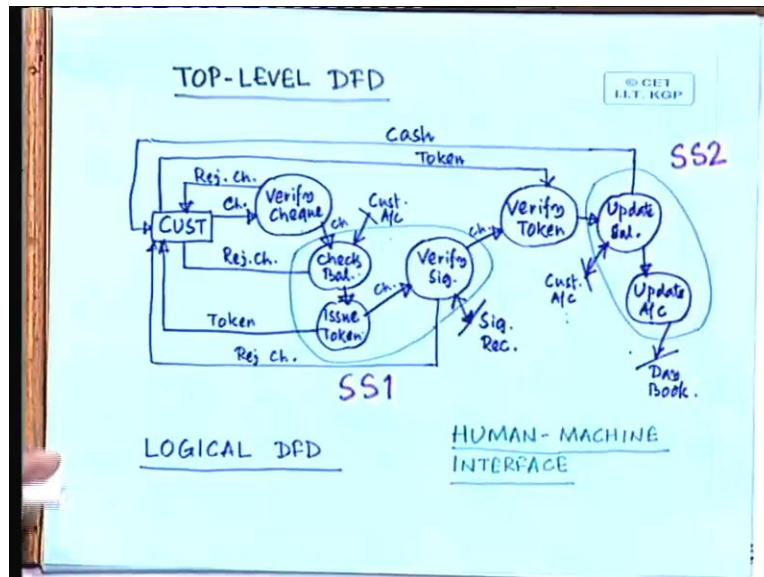


Right, so today we are in the middle of discussions of the case study. Now if you recall, this is the diagram we had drawn in the previous class where about the processing of cheques right and you can see that in the processing of cheques, we have the customer the clerk 1, clerk 2 and the cashier and together you know the processing of cheque has gone through in the various stages. Then afterwards we have removed the people from this diagram and drawn what is known as a logical data flow diagram. In the logical data flow diagram the people are removed and the process is that is the verify cheque, cheque balance, issue token, verify signature, verify token update balance, update account. You know that has been depicted later on what we had continue to discuss is that assuming the final solution will have two people system right two people system the we can think of two sub systems as a part of the human machine interface, the sub system 1 is a first person who will issue the token and sub system 2 who will be basically giving the cash all right. So this is how we have thought of this particular system.

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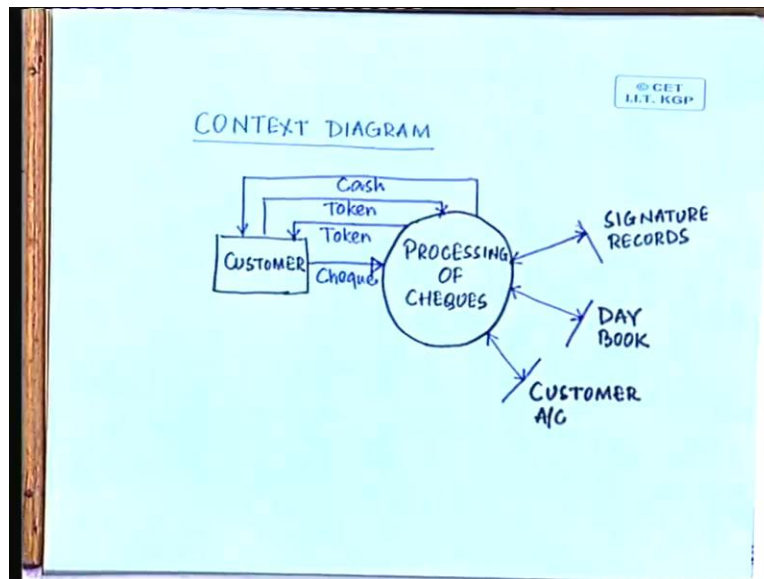
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Now certain other things are also to be shown in this diagram plus there is a context diagram which we should also develop. So how should the context diagram look like what will be the two structures that should be present in the context diagram, what are the two structures, what must be present to begin with. First of all you tell me the context diagram should have how many

process symbols or the circles, how many will be there in the context diagram 2, it should be just 1, you know there should be just one process symbol in the context diagram. The context diagram should basically have only one process symbol.

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So we can write processing, processing of cheques right, processing of cheques there is a only one process symbol and we have only one entity in this case but suppose there are more entity we can show them as well, right. So we have the customer and we have the processing of cheques, these are the two symbols which will be there but there should be the very idea of the context diagram is that a context diagram should have only one a context diagram should have only one symbol of your process symbol but there may be more than one symbol representing the entity. Then we must also show in these diagram the various flows of data, what are the things that are going from the customer to the process and what is being given by the process, irrespective of whatever it may be the first one is the cheque and then it gets the token then presents the token and it obtains cash right.

So these are the data flows that are taking place between the customer and the system while processing with the system the system is using a number of data files right. So in fact all may not

be two ways but let me put two ways because processing of cheques may include others as well. So it will be like this the very first one is our customer account file, customer account file. The second one is the day book; you recall the day book which the accountant was updating and finally the signature file, signature records. So if you just recall that we have actually used this three data files signature records, day book and customer account for the cheque processing system and all these are interacting with the process, all right.

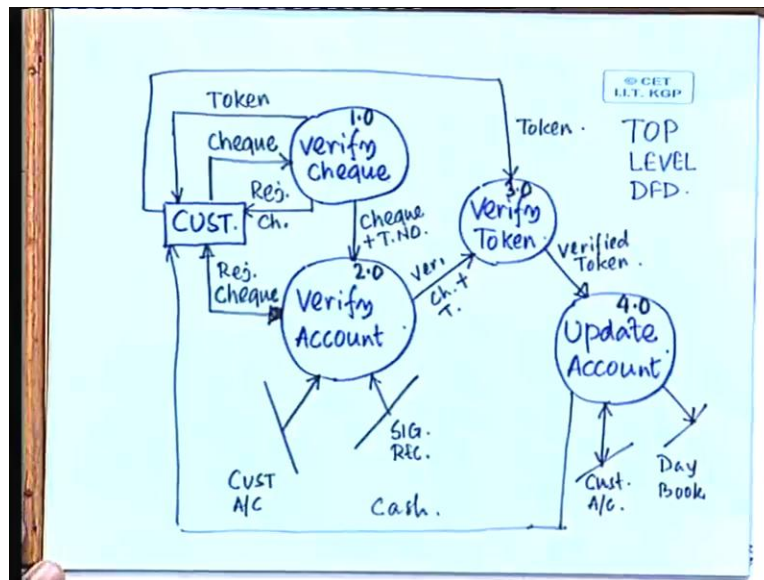
So basically the context diagram is an overall diagram which shows what are the entities and what are the data stores that the system is interacting with, all right. So, all flows which are between some process and the entities will be depicted here. Now this is a simple system will see later on when will take a little different other kind of systems as well how this will be actually present in the context diagram, fine. So the context diagram is like the beginning diagram and as we go deeper and deeper we get top level data flow diagram. Now see we called it the logical data flow diagram, the previous day this diagram we called a logical data flow diagram essentially you can also call it a top level, top level data flow diagram and you can actually number the processes 1, 2, 3, 4 like this all right.

So the logical data flow diagram is also so basically we start with a physical data flow diagram if we are starting with some kind of you know manual system, identify the logical processes, draw the logical data flow diagram that could be also our top level data flow diagram if necessary because this is too simplified, we are not drawing any detailed data flow diagram because each and every such thing is already available, all right detailed this is already quite detailed. So it need not be called a detailed data flow diagram and then onwards, we found out the subsistence and drawn a context diagram okay.

Now, see suppose we do not want to call these our top level data flow diagram, all right. Can you draw another top level data flow diagram which will show only the two subsystems, only the two sub systems? Instead of drawing these can you draw this please try what is to be done is that we are now drawing a top level data flow diagram which will include the customer, the manual processes verify cheque, verify token and two subsystems. We can give them some name, we can give them some name, may be we can we can say that say, token processing and cash processing

you know we just can give its this just a name or we may call the verify account instead of token processing and this one you may call as you know update, update account, update account incidentally it also handles cash.

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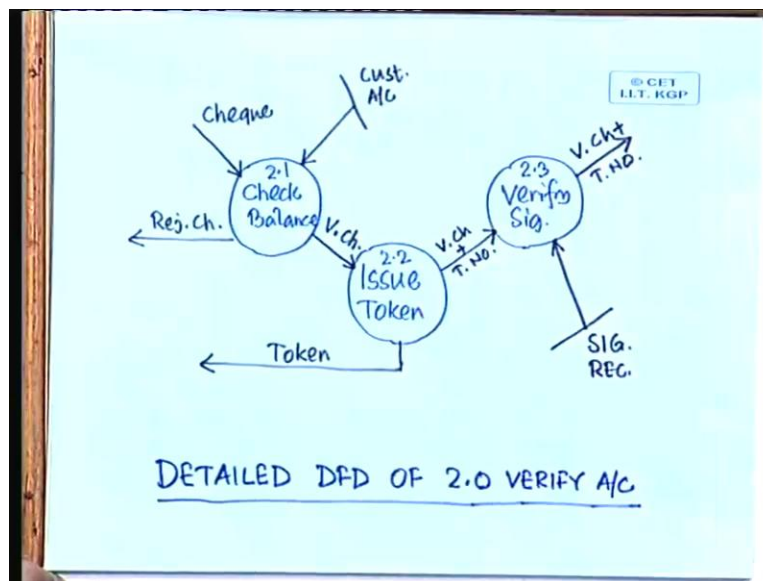
So how will it look like, it will have basically 3 processes, in fact 4 processes we have the customer here, verify cheque, verify account then we have verify token and finally update, update account right. So we may also give them some names say for example, we can call this one as 1, this one as 2, this one as 3, this one as 4, all right. So we can give them some names and then here customer is presenting the cheque, I think yes we have made a mistake here okay, I will just put it back. So this is where the cheque is being presented and then this one is there. Now actually what may happened yes, you can reject it or you may give him the token it could be rejected cheque or it could be the token then after this verifying this cheque, we have the cheque plus token number.

Then at this stage we may reject it again. So then this cheque plus token number we again send after we may say that verified cheque plus token and how to verify basically this one is just verifying cheque and this verification is actually based on 2 files, one is yes customer account

another is signature record and after this verification, verifying the token which is the manual process you verify token means at this stage the customer presents the token to the second clerk then after this verified token then update account again you have to update into the day book and the customer account and obviously, the cash is given here. So we can draw overall line to represent the cash all right.

So you can see that these diagram could be updated to show the now what has happened in these diagram, this could be one of the proposed diagram, one of the proposed data flow diagram which includes the manual processes and the your computerized or automated processes, all right. So this is let us call it as our new top level data flow diagram and we shall see how this top level DFD, we can expand further, we shall include one new concept as we expand this top level data flow diagram, fine. So this is our top level data flow diagram.

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Now let us take only one such thing that is our subsystem one let us say, verify accounts all right the verify accounts is our subsystem one then from the previous diagram subsystem one, we can easily see what are the contents of this verify account. Basically, it has got 3 processes, what are the 3 processes one is check balance, one is issue token, another is verify signature. So these are

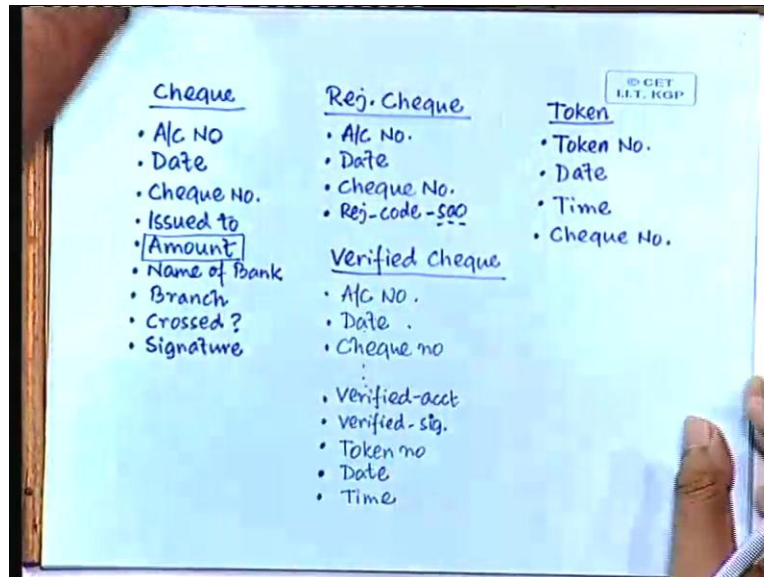
the 3 processes and since all of them are actually part of 2, can you see that all of them are actually part of 2?

So that 2.0 can be expanded and we can use various schemes obviously, this is not the only scheme but we can as well use this, there is nothing wrong in using this way 2.1, 2.2, 2.3 all right. There could be other schemes as well some schemes says we should number it as 0.1, 0.2 like that and then, this one is the first level detailed data flow diagram. So we write 1 point something, 1.2.1 like that to really show that this is the first level, this is the second level etcetera or else we can use simple notifiers.

So these are the 3 processes which are there and if you really look at this then, this check balance actually what we get here is the cheque and you are checking with the customer account file then issue token. Now after checking balance, you may also reject the cheque. So you can say rejected cheque and this is we may call verified cheque then issue token here, you are issuing token, see here in this since is a detailed data flow diagram, there is no need to really show the entity. We need not show the entity that is already there in the top level data flow diagram or in the context diagram, it is already there, it is not necessary that we keep on repeating the same thing again and again. Then, this is the cheque verified cheque plus token number and signature verification is done from the signature record and then, finally signature verified cheque along with token number is transmitted onwards all right.

So this is a detailed data flow diagram, we can give the heading like this, this is the detailed right. So this is the detailed data flow diagram of two that is verify account fine. So similarly you can show the other one that is the update account. Now comes further detailing, what is that further detailing for every data that is flowing, please listen carefully every data that is flowing we must give the attribute structure and every process we should write they you know in a very simple language, the logic and any processing that is done there, is it okay. So what is basically happening? Can you tell me first of all cheque, what does the cheque contain, it contains let us write them down yes, so we must define them one by one.

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First and foremost is a cheque so the cheque means what are the things that the people should record out of a cheque. First of all yes, account number yes, so one by one let us write date, date then your cheque number, cheque number basically cheque number and date is most important thing. We wrote account number first whatever account number, date, cheque number then, name, name to whom the cheque is being issued, issued to then amount, very important amount anything else signature, signature is there but then I think name of the bank is very important, name of the bank. We are assuming it is a cheque of the same bank that is our basic assumption but suppose it is an outstation cheque then all these are required name of bank, branch code, number of branch, yes they expect that I think the branch here means code number of the branch, branch code number that they would like to know and anything else signature, signature, yes then crossed or so you just say crossed account payee or not then finally signature but signature how do you put it. We are assuming signature will be verified automatically. So signature in this case could be some sort of you know picture or some identification in some way which is you know which we are putting in the form of a jpg file or some other picture file.

So that the signature that is available already in the signature record, we can verify against this two, all right. So these are the things that we must identify with what is a cheque, what is a



cheque. Basically, what are the attributes or data that moves with a cheque similarly, what are the minimum information that you must make available with a rejected cheque, rejected cheque all of the above, all of the above, is it required, **no sir any of the above** no, see please understand it is a transaction, so all information is not necessary this is the complete information of a cheque.

So basically all that we require is how to identify a cheque, all right how to identify a cheque. Basically, by again the first 3 account number, date and cheque number and then why rejected let us say, we have identified 3 reasons broadly for know rejecting a cheque, what are this 3 reasons, one is yes not enough amount, signature not matching or it is not a cheque is a that is what is the first you know please see the first, what is this verify cheque, verify cheque, is it a cheque first of all, it may not be a cheque, see how it there are many ways a cheque need not be a cheque, I mean looks like a cheque but signature while he signs or while he writes the amount he has made a cut and it is not signed all right, it is not signed.

So something like this the amount that is written and amount that is given they are not matching. The date that is given as already gone or that date cannot exist for example 29 th February 2003, it does not exist but suppose somebody writes such a date, what can be done all right. So these are various reasons by which we can say it is not a cheque right. So these are the 3 broad reasons, so what we can do we can just write a rejection code. You see, we may not use 3 fields, we can simply use a rejection code. The rejection code could be due to signature not matching due to not enough amount, so s, a or others o, some some simple code rejection code, it could have three values s, a, o all right. So we can just put s, a, o, s means signature not matching, a means account not available amount not there, o means other reasons okay.

So these are the information that should be there in the rejected cheque, what should be there on token yes or if you want it because we in this case, please understand these, these we have assumed that these verify token. You see these are all we have assume to be computerized, check balance to be computerize, issue token to be computerize, verify signature also to be computerize all right.

So issue token these token is actually being printed from computer that is what that is how we have thought of all right. So if that is so then these token should basically contain not only token number and other thing, you may actually print the cheque number as well, cheque number, date something like this, okay. So make it little better we may we may print token number, date, time and cheque number all right. So these are the assume these are the attributes, token, see we are that is a manual token you are talking of see, we have gone for if you recall, please recall these diagram that we had previous day we have two subsystems, subsystem one and subsystem two.

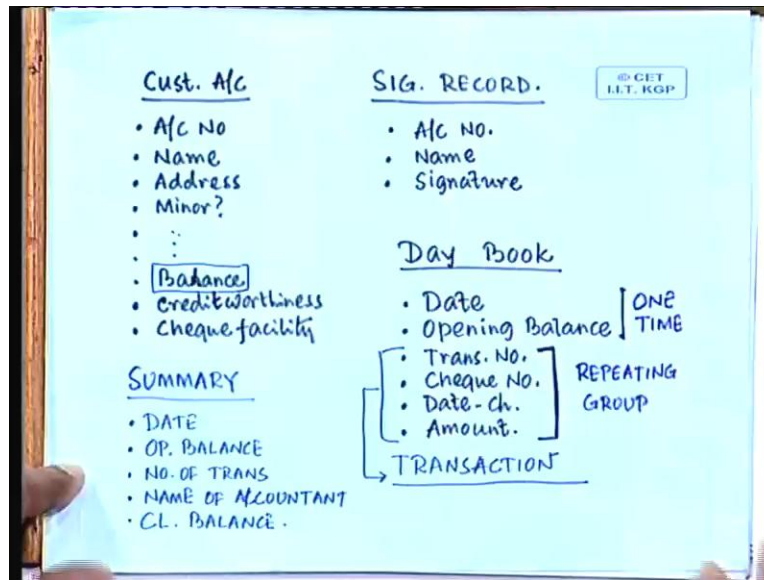
Now what we have assumed it will be two person implementation, it could be one person implementation also in that case token is not required all right and we assume that these portion would be computerized that means check balance, issue token, verify signature all 3 will be done by computer all right. So because of these the token need not look like the token we are usually accustomed to all right, it is a printed document since, it is a printed document it may have something other than the token number, date, time and cheque number okay and apart from that you know to signify that it is really a token, you can have some peculiar things of the bank symbol.

So that people cannot copy it some kind of serial number that is the token number already there but something else which could be part of a pre-printed stationary like a railway ticket. There are so many things already printed all right. Then, this is these is these are about the attributes. So in our detailed data flow diagram, you are suppose to you know while we have the cheque we must write all these details basically, what is the cheque cheque means your account number plus date plus cheque number plus issued to plus amount plus name of bank, branch crossed or not signature etcetera.

Similarly, what is a rejected cheque, we already understood then what is a verified cheque with token number and what is this verified cheque with token number. Basically, this could be see the verified cheque would have all the attributes of the cheque and also include apart from that all that and maybe we may have two more fields verified account, yes or no and verified signature yes or no, is it okay. So the verified cheque could have account number, date, it could have cheque number. So basically what this person has done he has put the flag on, the verified

account flag on, verified signature flag on okay, it may not be the person, it may be the process the process has made that particular flag on okay.

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So this is about the verified cheque and also definitely token number. These 3 things, we can take from the token, token number and date and time stamp, date and time stamp as in the token because remember these date is the cheque date, cheque date need not be the today's date, it could be one or two days before also all right whereas these date and time is that of token number which is the stamp coming directly from token okay. So these are also to be notified about the verified cheque then comes the two files, we have two files, one is the customer account, another is the signature record, what should be there customer account, account number, name, address, age, instead of age we may say minor or not sometimes you know a person may hold an account and he is actually a minor.

So all that thing but there could be many details about the person, is it not all these so many things but most important thing is balance. The balance, photograph, yes signature, signature we are keeping separately balance anything else you want to like to have anything else yes, some identification marks that that are part of all these dot dot, you know I have put number of dots

basically all about the person, all about the person and other things which are historical information about him all right. So balance maybe we can keep some sort of a flag which you may call credit worthiness, what is credit worthiness means whether he can be given some kind of credit, if he is a not a reliable customer, we may not give him, call him credit worthy, all right sometimes we can have these as an important thing, credit worthiness. Then after that what we we might put see does he have a cheque facility first of all, does he have a cheque facility, we may check that also. So we can have a check facility flag which is relevant here, we can as well have this okay.

So this is about a customer account file most important figure here is the balance and many other details about the person. We shall discuss more about these while we discuss the data base management systems all right. At this point I think this much should be okay, then the signature account or the signature record, what should be part of the signature record, yes account number name, signature, right. So it is a simple file account number name and signature that could be part of the signature record although it is not in these particular detailed data flow diagram but there is one more file which we are using that is our day book, what should be there in the day book, date, day book the first and foremost thing is the date, opening balance, see there is going to be a problem if you start like this, I will tell you what will be the problem.

See you are basically writing the transactions there all right. So what transactions you will write first of all transaction number one, see every transaction that comes all right, every transaction that comes you have to write, let us say some transaction number, transaction number then cheque number, you want to put for that particular transaction, no sir, yes sir, it should be cheque number because otherwise, you cannot cross reference cheque number, you need not do anything you know it will be cheque number and date may, date of the cheque basically this is the date of the cheque then amount .

Now the problem is this transaction, these are the transaction details, see up to this point is our transaction details whereas this opening balance and date, these are more like one information. You see there will be it is like a repeating group, can you see this this date and opening balance it is like one time information, this is like one time information whereas these transaction number

to amount this is like a repeating group please understand it carefully, see we have the day book it has date, opening balance, transaction number, cheque number, date of the cheque, amount etcetera.

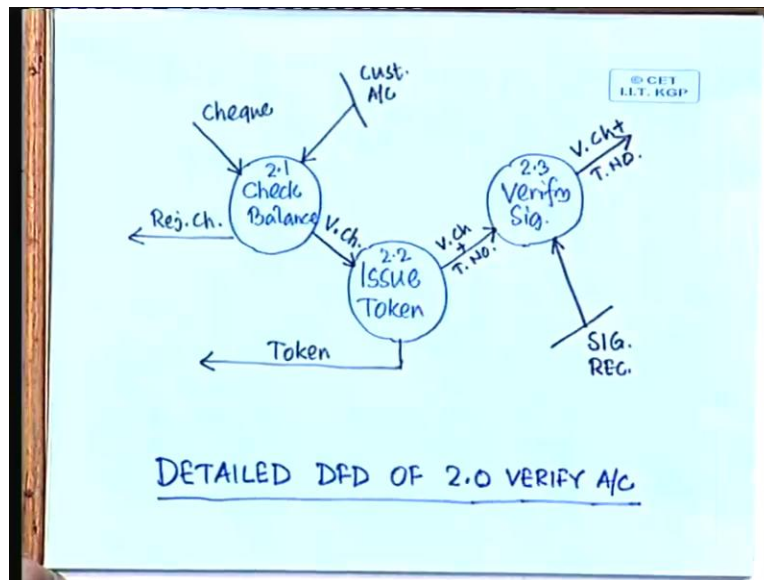
Now date and opening balance is an one time information to be included right in the beginning and each transaction number they are like a repeating group, they are to be repeated every time a new transaction comes, have you understood what I wanted to say because first customer comes you enter his details, second customer again you have to enter transaction number, cheque number etcetera, etcetera.

So this portion is like a repeating group, so it is always better that we do not keep, what is known as a repeating group in a file, you should not mix one time information and repeating group information in a file that is one of the very simple way to give the cracks of the data base design is you know first and foremost do not have keep repeating groups that means some information should be static, some should be continually changing, should not be like that. You should find an unique record key all right because of this you cannot keep information like this, cannot keep information like this. Actually the opening balance need not be kept, the reason being the opening balance is already there, see this is this one is you know with regard to cashier definitely, so we may keep let us say two separate files, one is the transaction another is the master.

The master is where you are keeping the details of the particular accountant, particular accountant where he keeps his date, opening balance, number of transactions, closing. It is like a summary information all right. So may be one file summary, the summary file may contain date, opening balance, number of trans, name of the accountant who is doing all these and closing balance whereas the day book could be actually the summary or the transaction. So this portion the repeating group portion, you may call as a trans or transaction. So transaction part is only the transaction number onwards all right transaction number, cheque number, date of the cheque amount.

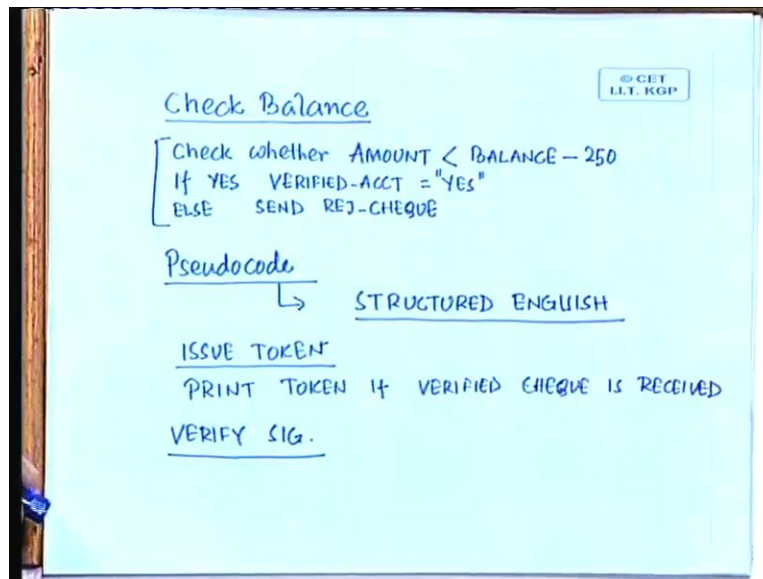
So what happens the transaction number could be a key, a record key, there will be multiple records but in the same file you are not keeping both one time information as well as the repeating group information, all right. So this is the first thing about it then afterwards, so these are the various files or various data that is flowing in this particular diagram. Let us go back to the diagram.

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So what is the cheque, we now have understood what information is carried by a cheque, a verified cheque after balance, verified cheque after issuing token, verified cheque after signature verification all right, what is a rejected cheque, what is a signature record, what is a customer account, what is a token, all right these we have understood we have identified detailed information about each of them all right. Next let us find out about the processes, so what these are the three processes we have if you go back to the detailed data flow diagram, one is the cheque balance, issue token and verify signature all right that are the these 3 processes, cheque balance, issue token, verify signature.

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Let us see what will happen basically in each of these processes. First process check balance, so check whether see we have to be exact now, you see this amount, we have the amount here in the cheque file and in the customer account file, we have the balance file all right. So these two figures we should actually find out and in that term check whether amount, see this is the equation, check whether amount is less than balance minus 250 because if we assume a minimum of 250 must be maintained all right if yes, if yes then what if yes, what should be done you should do something, what you should do is you see this verified account flag on in the verified cheque all right if yes else send rejected cheque all right.

So basically what should be printed in a rejected cheque, see we are not writing because we are having this while you right actual program at that time you must say what is a rejected cheque, how does it look like, I mean whether you should do something, right over it or do what, is it okay. So this is actually something like a pseudo code, we can say it is a pseudo code, a pseudo code is usually written in a language which is known as structured English.

So you can write your pseudo code for each of the processes by using what is known as a pseudo code all right, issue token is pretty simple, what should be there in issue token nothing is there

just print token if verified cheque is received right. So issue token if verified cheque is received. Finally, verify signature, what should be there in verified signature again check whether the signature in the cheque **in the cheque** matching that of the signature record, if it is matching then fine put the verified signature flag on else send again a rejected cheque all right. So that is what it is we stop here about this particular exercise, I will in very short, I will take one or two more examples of data flow diagram and then move over to the next chapter, okay. Thank you.