Management Information System
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Lecture - 17
Data Flow Diagrams - II

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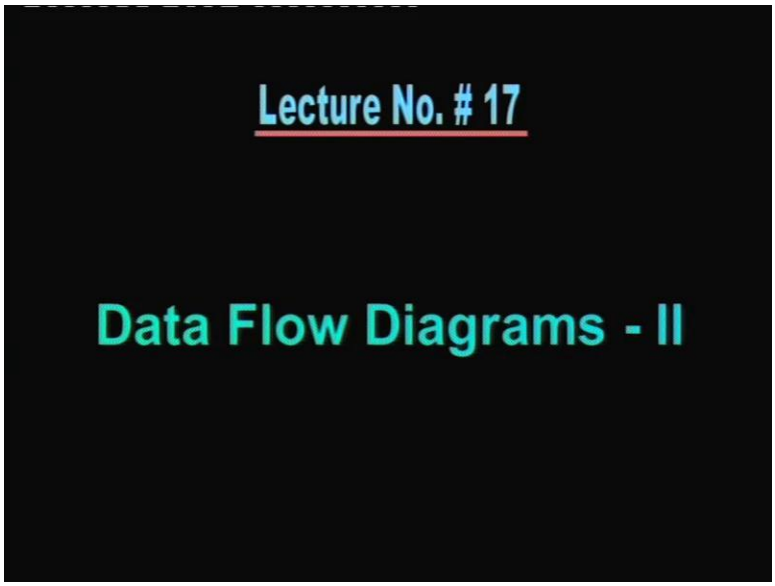

So today, let us continue the decisions on the data flow diagrams In the previous class if you recall we were discussing about data flow diagrams or in short DFD's and I have told you that essentially in a data flow diagram we have 4 symbols, the process symbol, the data store symbol, the data flow symbol and the entity symbol all right. Now, I was also telling you that the data flow diagrams can be broadly classified into physical. So I was telling you there are two levels of classification, on one level of classification we have the physical data flow diagrams versus the logical data flow diagram, on other kind of classification basically the leveling of data flow diagrams, we have the context diagram, we have the top level data flow diagram and the detailed data flow diagram of each bubble or each process which is involved in the top level data flow diagram.

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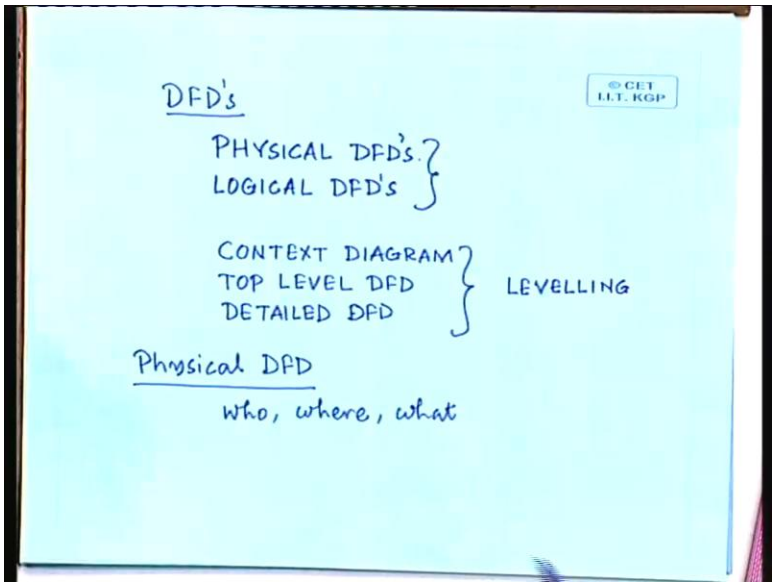

Now the physical versus logical data flow diagram basically the, these physical you know this is one can say that the physical data flow diagram you can get when you actually visit a particular place and observe who is doing this data transformations, what data is being taken and where the data transformation is taking place, is it okay. So the basic question about physical data flow diagrams who, where and what that means, who is processing the data, where the data is being processed and what is being processed, identify this.

So let us try to understand this, we will come to logical data flow diagram because this requires understanding of the physical data flow diagram first. Once, we understand the physical data flow diagram by making use of the physical data flow diagram, we can actually do or obtain the logical data flow diagram. Essentially, we take out the physical processes out of that or in other words if some people are processing or it was being done in a particular sequence right, it was done with certain things in mind but instead of the people, instead of the file movement, instead of the manual system, we just try to get the logical processes out of it that means remove people, remove location and we develop what is known as a logical data flow diagram all right.

So we will discuss logical data flow diagram little later, let us try to see what is happening in a physical data flow diagram. So to begin with let us say processing of let us take processing of cheques in a banking situation. Usually, what happens we have let us say, we have a clerk one to begin with we have a clerk one and who is the entity the entity is a customer the entity customer presents a cheque to the clerk one, all right. Now what this clerk one is actually doing one when he gets the cheque. First and foremost he is verifying, he is verifying the cheque now after it is verifying suppose it finds that the cheque is not proper or it is not a cheque at all its something else or whatever then he returns the cheque.

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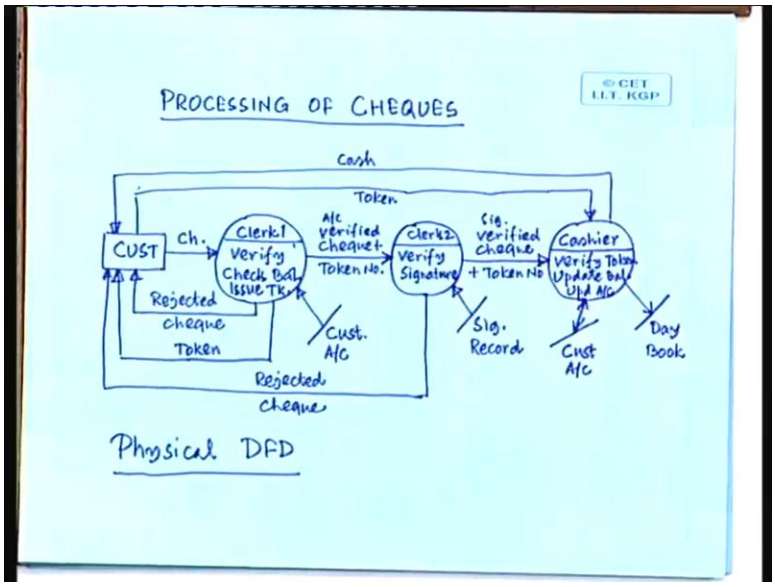

So this is rejected cheque, so this is one activity, verify. Now there are two more activities, one is a check balance, all right. So say he checks the balance now, what may happened suppose the balance is not proper, he does not have enough money in the bank, the cheque cannot be issued, he can reject the cheque. Obviously, it is not always so simple it depends on bank to bank some bank may not check the balance at initial stage, it may be done little later but then it becomes an offence because your cheque is bouncing all right.

So after balance is checked then you issue token, all right. So these are the 3 broad activities which are now you see it is easy to make a common mistake while drawing a data flow diagram. We usually associate sometimes these arrows with some activities, all right. Suppose in a as if in a network diagram, project network diagram, suppose we write issue rejected cheque or give token, issue token, presents cheque, see all these are wrong, please remember what I am trying to say that customer to clerk one, on this arrow suppose you write present cheque then you are wrong. Please recall, this is a data flow diagram what is flowing is data, when this data is flowing under what conditions that we are not modeling.

You see there might be a physical flow but just looking at this diagram, you do not understand that physical flow which activity is first whether rejects cheque is first issuing token is first or giving cheque is first. You do not know how you have obtained these basically you have gone to a bank you have observed some customer see this can be drawn by pure observation. You see a customer is coming you see some clerk is there and the clerk is doing what he is sometimes verifying the cheques sometimes he is issuing token sometimes he is checking balance.

So by observing the clerk or discussing with the clerk or by observing the activity, all right you can obtain this much of the diagram. Fine, now we have to move little further say, there is a second clerk. Now, obviously when he is checking balance he cannot do it out of nothing. So he has to access the customer account file, now this need not be an online computerized updated file, the customer account file can actually be a manual, it could be a register, it could be a manual process, is it all right.

So he does it then what he provides to the second clerk is the cheque plus token number. You see token is one thing; the token number is something else all right. It is not token; it is the number basically he writes the token number on the cheque, all right. Then what the second clerk does second clerk verifies signature signature right. So we are assuming a standard process in our bank may be but some other bank may not be like this, now he verify signature, now after he has verified signature he may actually reject the cheque again, how he does it again by looking at a signature record, all right again at a signature record, all right.

Now after this we have the cashier. So we have the cheque plus token number, we can write actually verified cheque actually you see since the data is getting transformed so at each stage, we should not be having exactly same thing if there is no transformation then you know what is happening, why the process exist? The very fact that there is a process, the idea is the processes doing something, what it is doing we have a cheque now we have cheque plus token number but not only just cheque verified cheque the verified means account verified you see this is account verified cheque and this is signature verified cheque right and then cashier.

So, what the cashier should be presented with, the cashier should be presented with the token. Now what the cashier should do first again verify token right. So he should verify token then after verifying token, he may reject there may be a rejected, I am not drawing it but there could be another set of rejection say, it may happen that you might have lost your token and somebody else have brought that token, all right or you might have lost your token and brought another token. So you may not be allowed, so he has to verify the token and if he has some doubt he may again ask some questions all right.

Now after this token is verified then what else he has to do, he has to give the money, update the balance all right and so he has to update balance then he should also update accounts. Now we may show it but it does not make much difference here although this is why you have gone to the bank, the cash part, right the point is if we are not thinking of an automated teller machine if you are thinking of an automated teller machine well and good, all right. Otherwise, if you are thinking the cash giving will be still a manual process if you are not thinking of going for automating the cash giving part as well then we may not even show it. The cash part please understand, as I said that this is the physical part of the process the cash although is more looking more like a document but actually it is a material all right, it is not a document and in information system we are actually discussing documents rather than the material.

We assume the material is there actually for the material part of the system we must have a good physical system available that is really not much of a concern definitely concern but not that much of a concern for information system development, right. Say for example, if the cash is too bulky how to handle how much big should be cashier cage, these are not information system

questions, these are physical system questions and you may have your physical system analysis and design separately done and this is probably one of the jobs of industrial engineers, is it not. Now after this you see as I, as I have written here update balance update account so usually what happens he updates again the customer account file, I am drawing the arrow 2 ways because you have to retrieve the record first. You have to retrieve the record first and then there is a concept usually they use what is known as day book, what is a day book, day book is actually a secondary cheque, a transaction which he updates that means what he has handled during the day all right.

So if we just keep customer account only he updates customer account and gives the money. Now think due to whatever reason the data base gets corrupted or something happens or the updation did not take place properly if you do not separately keep the transaction detail also in the day book. Sometimes, it will be difficult to find out what has happened and also the audit requirements says that you have to record each transaction also separately, all right because you must remember these customer account is like a master file. In a master file any transaction that happens is already updated all right by looking at the master file you do not know whether the master file is updated or not updated and the problem is if a transaction has not happened by updating it twice is not the answer, is it not.

Suppose your bank has 100 rupees and you have deposited 20 rupees. Now suppose, you are not sure whether the updation has taken place or not taken place, if you update it again it will not be 120, it might be 140 as well, if the earlier one was successful then it will be updating twice, updating twice is not the answer, all right that is why transaction image is often kept either separately or as a part of the data base itself. In many, you know modern data base systems you need not keep a separate day book, as you update the customer account it automatically keeps a transaction image all right. So, that becomes little redundant.

So this is our physical data flow diagram from the nature of the physical data flow diagram, you can must have understood by now that these physical data flow diagram development basically requires identifying the processes basically, people where are they the processes actually are

people or locations, people or locations and then identify individual thing that the people actually do.

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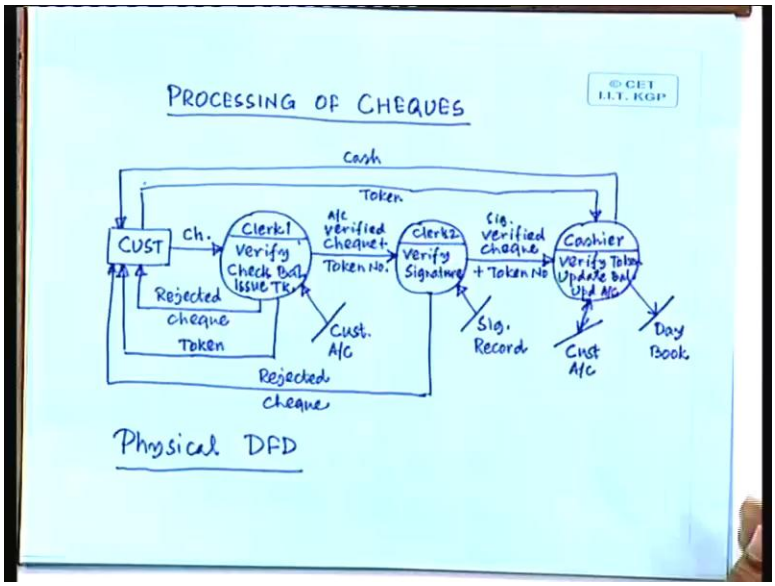

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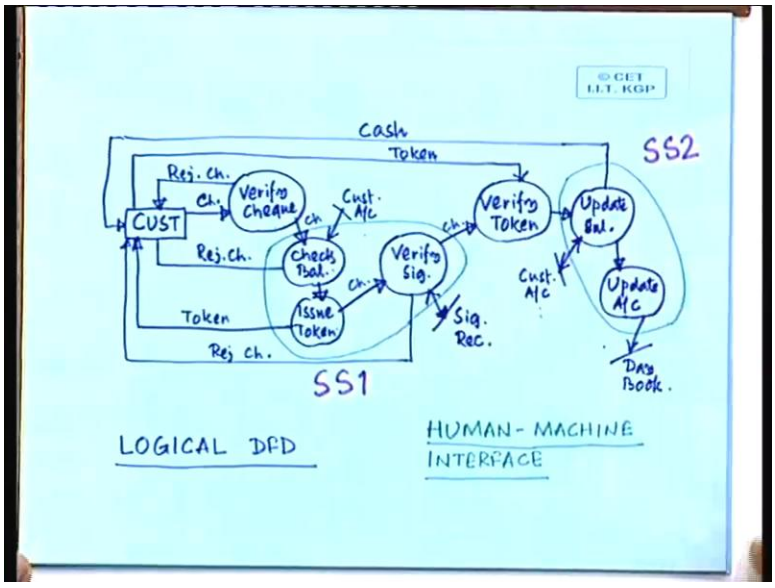

So this is our first stage that is a physical data flow diagram. Now from here what we need to do now is remove people, all right remove people, remove locations, remove the details that we have already put. For example, clerk one, clerk two cashier remove this all right then you find out only the logical processes what are the logical processes verify cheque, cheque balance, issue token, verify signature, verify token, update balance, update account. So these are the logical processes or the logical work which have been actually being done all right identify them put them into the logical sequence that will be our logical data flow diagram clear. So please draw this logical data flow diagram.

So we can see the first part between customer and the verify cheque we have we issue the cheque and as you issue the cheque then we may reject the cheque all right then verify cheque is the first activity and from verify cheque, we rejected cheque we give back to the customer then balance again if balance is not proper we give the rejected cheque then we issue the token and token is given for checking balance, we need to use the customer account file then for verifying signature we need to sorry, this way we need to look at the signature record and this for update balance again we require customer account both ways because we update it and finally, your update account we require the day book then after verifying signature also the cheque can be rejected. Then, your after the take his you know token is verified you can present the token here and you can give the cash. Sometimes, if you think going back all the way to the customer may be little too much you can also draw another customer somewhere else right.

It is not necessary that everything we have to relate back to the same entity if you feel the diagram becomes too cluttered to do that we can always draw customer once again somewhere here, same thing we have done with customer account, we have drawn the customer account here, we have also drawn customer account here, right we have drawn it two times. So this is an example of a logical data flow diagram. So as this is our physical DFD customer, clerk 1, clerk 2, cashier and we have the various processes and we have used these processes here in the logical data flow diagram all right.

So all these verify cheque check balance issue token, verify signature, verify token, update balance, update account. They are all present here, so what we have basically done in the

process, we have identified the activities, we have identified the flows of data and we have identified the transformations and while so doing we have, while so doing we have identified the or we have build the connections look at these the connection between these bubbles or the processes are only in terms of data not in terms of logic. Basically, this makes the entire diagram very loosely coupled right. So the, we have been see the beauty of the data flow diagram or the good thing about data flow diagram is that it is a loosely coupled diagram, what do you mean by loosely coupled diagram that means the coupling between one process to the other is only through data.

You see the people are already removed the constraint that we had placed upon ourselves because you must remember that moment you put a physical system constraint on you, it becomes little fixed, it becomes little fixed, all right. Say, for example but physical system constraints are very difficult because it creates a lot of fixed ideas in people's mind. For example, when I used to be a student and we used go to those movies in Nethaji auditorium all the, you know our hostel students used to sit in the same place and too my surprise even 20 years later I do not know really but I guess the uh my hostel students are sitting in the same place RK.

So you see the RK people are still sitting in the same place where they used to sit 20 years ago and most likely all the usual sounds and usual things they are making even 20 years down the line. Now you see its not, now suppose 20 years ago or the students who were passed before me even 20 years ago or 30 years ago if they would have done things little differently if the RK hall people sat in the movie hall instead of that particular point, may be at some other point may be, today's RK hall people would have sat there only see the point I am trying to make that once a tradition is set it is very difficult to break the tradition very difficult even if you wish, sometimes.

So and usually it always happens with physical systems you see most of you were coming to this class you are more or less sitting on similar positions, all right. Now even if you wish, no I will not sit here let me go to totally different place another location of the class, you see you have some resistance somewhere in you. These resistance is a, you know probably and nature of human being that we have a little bit of fixed ideas when you we affix our self to some physical systems, all right.

So if you think in the physical data flow diagram that this clerk 1, he sits in one corner of the room, this clerk 2 he sits in some distance away, the cashier sits some distance away that is the picture which is also painted in our mind when we are the analysts. See I am the analyst, I go to the bank, I find the clerk is sitting in one place another clerk is sitting in another place, the cashier is sitting in another place. These becomes ingrained in my mind any system, I think of I cannot get out of these fixed ideas very easily to think about or nothing will be there all these things will be replaced by a single ATM is very difficult to even think. See ATM is something we already know so it is not difficult to think, all right but think about old payroll systems, think about old payroll systems,

You know just think that anybody who has seen the old way of developing payroll software, the people used to sit a large number of clerical people they used to sit in a big room all right and there are tables after tables arranged in some sequence, somebody is calculating gross pay somebody net pay, somebody some kind of deductions, somebody putting them together, somebody writing a ledger full you know room full of activity, all right. To think about that these entire room of activity will not be there and instead you can think of an automated activity through computer is very difficult until unless you think differently.

You keep getting back to the fixed ideas, all right. This is why the physical data flow diagram if you unless until and unless you remove the locations and the people you cannot start getting ideas, all right that is the basic idea that physical DFD is a tool which helps you in get these logical processes, identify what each clerk is doing all right, put them in a diagram that is physical data flow diagram then you forget these diagram and then forget the people also identify the logical things and the sequences.

Now your that physical part is over, you do not have to remember who is where? For that matter probably you give this diagram to a new analyst who has not go into the bank. If he has understood the process properly he has not seen the bank, he does not know where the clerk one clerk two cashier what each one of them was doing, how they are linked, he knows these what are the logical processes that are to be done all right. So that is the thing about logical data flow diagram now, after we have identified the logical data flow diagram we have to now think of the

a particular important concept which is known as human machine interface. You see human machine interface actually is a direct outcome of what amongst them will be computerized, what amongst them will remain manual. These again is not a not a what do I say that easy process or unique process, what exactly means by unique process is there is no unique suggestion.

We may have a number of alternate suggestions, all right. So we may have even alternate proposals and each proposal may be feasible with different solutions. Suppose you want a complete automation, one kind of solution, one kind of technical, physical, operational feasibility, one kind of costing that will be required to develop the system or maintain the system if you want to keep it partly manual another kind of situation. Think of let us say, the kind of automation that most of the banks have already done, forgetting the ATM for the time being, all right. Then, you will find certain activities such as verify the physical check, verify the physical cheque actually is not automated, all right. The cheque balance could be automated, issue token not automated but if you are thinking of only single window system, single window system then the token itself is not required.

So we may as well forget issue token and verify token. Signature, the verify signature you may like to automate all right, you may like to automate or may not like to automate then update balance, update account, you can definitely automate, okay before we come to single window kind of a system let us try to think of a two window system. Let us have the token anyway, all right. Let us have the token anyway let us try to put it exactly what we see now in our state bank and when you want to automate then, you see we can basically have in fact the token also may be if you can make some special paper kind of things, it can also be partly automated, it can also be partly automated instead of a metal token you may actually give some kind of a slip which is a special kind of paper which cannot be copied etcetera, etcetera all right think of this.

Now what we may can do therefore let us put it in a circle, see and we put another circle here all right. So these two circles actually are can be called as our subsystems. So we may call this as subsystem 1 and subsystem 2 okay. So we can see that thinking of from the logical data flow diagram if we want to basically computerize it as a 2 window system, as a 2 window system, we can keep we can keep you know 2 window systems and in the 2 window system, the 2

subsystems we have defined, the first one is basically checking balance verifying signature and issue token and the second one update balance and update account at the cashiers end all right.

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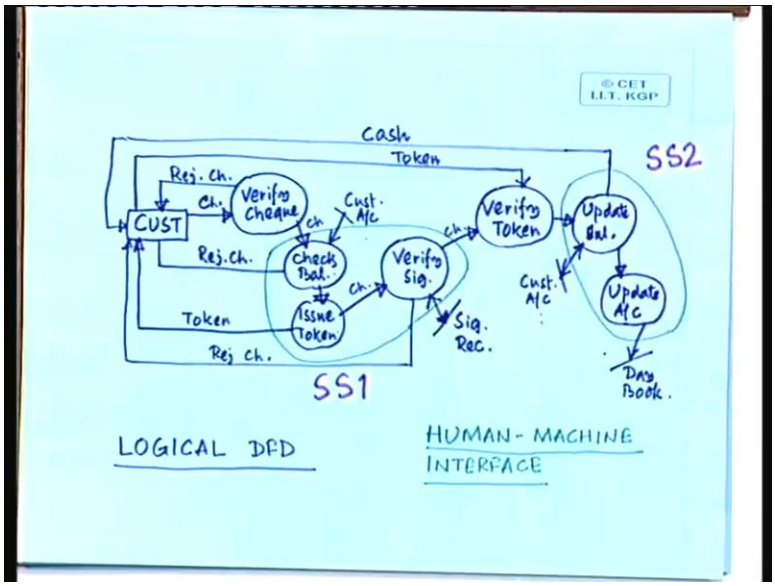

So let us just quickly write them down what we have said right now that draw physical DFD. So determine levels of automation, examine each process, each process may be automated, manual, semi-automated, all right. Then, find many alternate solutions and package them. See for a given solution, identify subsystems, so draw physical data flow diagram, identify the logical processes, draw the logical data flow diagram, determine levels of automation, examine each process, all right identify whether the process will be automated or semi-automated or the process will be left manual, find many alternate solutions package them.

So actually what he was sending package them into a proposal. So after your data flow diagram analysis basically you are presenting a proposal, this is we are still at the system analysis stage all right. We are obtaining a proposal this proposal has got many alternate solutions and one has to choose between them. This is where the management comes in you make a presentation, these are the ideas if you go for this, these are the feasibility considerations, these are the operational feasibility considerations, all right. Say for example, if you give ATM now and make it the only

choice in the our state bank there will be many users who are may be ordinary villagers, who may not be able to apply the system properly and probably ATM will be not meaningful for very small customers. Say a person who does just want some 100 rupees it may not be feasible to have a sophisticated ATM for this kind of users all right.

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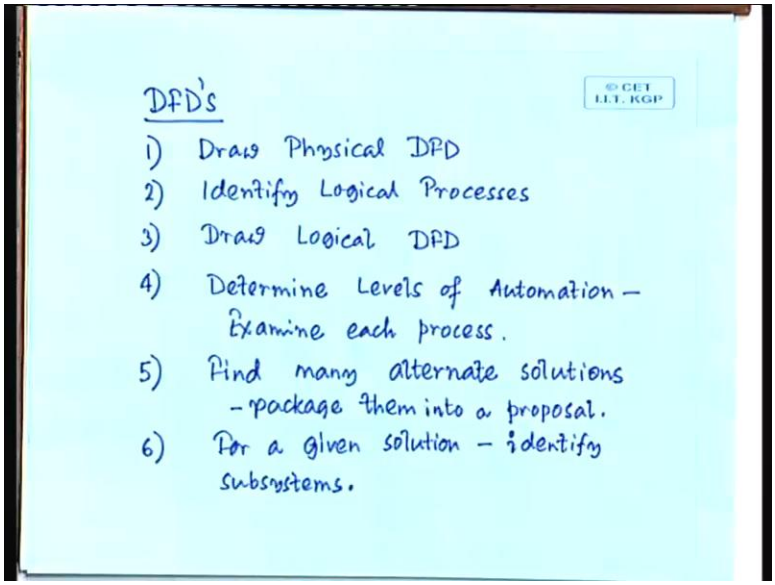

The cost of maintaining this operation may not be you know good enough for a country like ours. See you must remember, one of the major reason for automating the whole thing is where you do not have enough people, most of the times in the western countries they do not have people because they do not have people, they have to automate whether they like it or not whereas in our country, our strength lies in huge work force all right.

So is not always just because you, we will computerized blindly computerizing is not the answer have to examine whether computerizing is really required and is it financially beneficial to the company, cost of development and maintenance should be upset by the benefits that you are getting, if there are no again many a time we feel that by computerizing, we actually can you know reduce people, we can actually improve upon the process but what really happens before

the computerized system is fully implemented, actually the number of people rises, cost rises and everything is on the way up, till it is completely implemented.

So these points we must remember. Then we have to identify subsystems see while you are identifying subsystems, you have to think of the human machine interface, this is an important topic we will take it up some other day, the human machine interface is human machine interface, what really happens see we have our subsystems.

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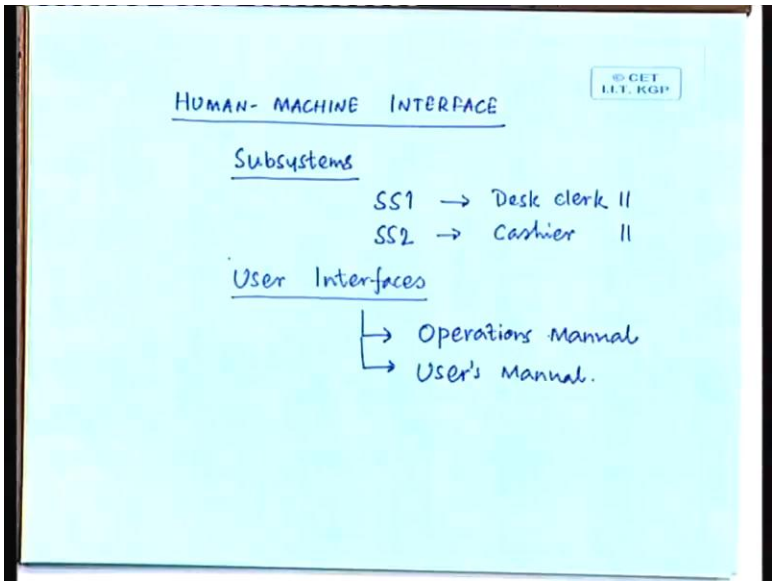

Now these subsystems are actually you may say that they are some sort of islands of computerization, some sort of islands of computerization. We have say SS 1, SS 2 but in between SS 1 and SS 2, SS 1 is probably be used by desk clerk and SS 2 will be probably used by the cashier all right. So what should be the user interfaces? What should be the user interfaces? The user interface is between SS 1 and SS 2, what sort of, see movement you if you make fully automated everything is fine, there is nothing else much to think of only think of the end-user or the customer but if you are having let us say and user interface where you know apart from customer, you also have people desk clerk, cashier etcetera then what the clerk has to do

and what the system has to do. These must be properly identified and that is actually known as user interfaces.

So all the user interfaces must be properly developed. There are 2 manuals usually they are developed for this purpose, we will discuss them later, one is known as operations manual another is known as user's manual. Now this user's manual and operations manual they should be part and parcel of this okay. So we stop here today and we will continue with this and also see some case studies in next class by the way, okay stop here.