Computer Aided Decision Systems Industrial Practices using Big Analytics

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Lecture – 06

Introduction to Model-base Management Systems

Good evening, welcome to the yet another lecture of Web-Based Decision Support System for Business Managers. Today, we are going to discuss another component of the decision support system.

So, we have been going through that,

i) What is a decision support system?

ii) What are the type of decisions?

iii) Why mostly business decisions are unstructured decisions? And,

iv) What are the decision process that mostly business decision makers follow?

In the previous class, we saw one of the critical components called the 'Database management system', which is a sub component of the 'Decision Support System'.

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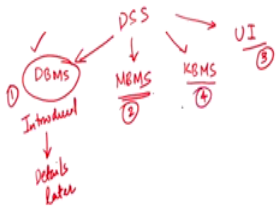

So, today if you look at the slide, we are going to take the next aspect of the decision support system. We had DSS and the four components:

- DBMS (Database Management System),
- MBMS (Model Based Management System),
- KBMS (Knowledge base Management System)
- User Interface.

Now today, we are going to do the 'Model Based Management System' and after that we will go into 'User Interface' and then the fourth one will be 'Knowledge Base Management System'. We will go in this order.

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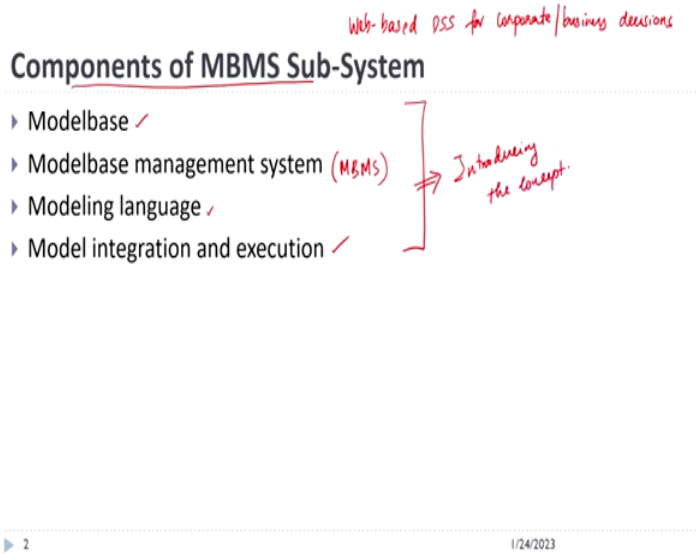

So, if you look into the Model based Management subsystem, remember we are talking from a web based DSS for corporate or business decisions.

So, the four major sub components we will be discussing is

i) Model-base,

ii) MBMS (Model Based Management System),

iii) Modelling Language.

We will know that what is the modelling language? and how do you integrate and execute models?

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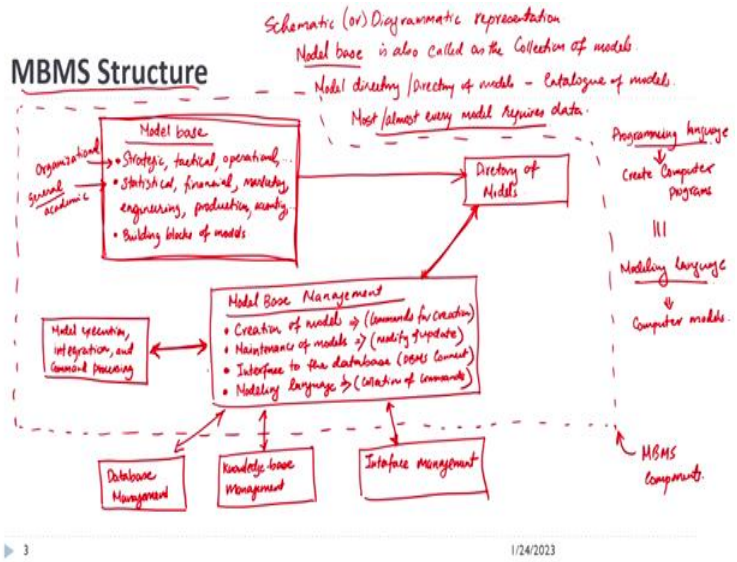

So, the first most important thing that we need to look into is the MBMS structure. Let us take a look into how the MBMS structure is? Let us look into schematic or a diagrammatic representation of the various modules and how they interact.

So, the first one we start with the:

i) Model-base- This is the first most important sub component of MBMS, some people also say that the model-base is also called as the (collection of models). The main type of models that you may have here is strategic, tactical, operational, etcetera. These are organizational models. We can also have statistical, financial, marketing, engineering, production, accounting, etc. These are general or academic models. The another one is the building blocks of models.

All of these different models gives rise to something called as a 'Directory of Models'. Some people called it as (model Directory or Directory of Models). Basically, it is a {catalogue of models}. So, if you say that I want to know which are the statistical models and which will contain the different regression, classification etcetera models like that. So, this is a model directory.

ii) Model Base Management- You are basically managing the model base as part of it. So, what happens here? The first one is called:

- Creation of Models- a language for creating something using commands in a particular modelling language to create models.
- Maintenance of Models- it is mostly used to modify and update the models.

Before we go to the third part, one of the important thing that you should understand, that almost every model requires data. This is an important aspect of modelling. Then the third one is:

iii) Interface to the database- since the models require data, you need to create some interface to connect to the database or you can say 'DBMS Connect'. How do you connect to the database management system that is one another aspect of the model based management?

iv) Modelling Language- it is also known as 'collection of commands'. This is basically a model language because it allows for creation of models. So, it creates, computer programs equivalently, similarly modelling languages and computer models. So, instead of a programming language, because it contains specific commands to write a computer program. Modelling language contains specific commands to create a computer model. So, the Model Based Management System then interacts with the model directory. It basically pulls the model from the model directory, it allows you to create a model, put in the directory of the models and maintain that model. Interface the models with the database and it provides you modelling language. It has three modules which are external to this 'Database management', then you have second one is called as 'Knowledge Base Management' and then third one is 'Interface Management'.

In my opinion, the portion (you can see in the slide), like this you can think about it as the MBMS components and these are external to MBMS.

And then there is also one more aspect of Model Based Management, which we have not discussed as part of it that is also known as 'Model Execution', 'Integration' and 'Command Processing'. So, when you create a model and you want to run the model using a specific set of data, then you need the 'Model Execution' aspect. Sometimes you may want to do something like model integration. For ex- I want to do multiple linear regression with a trend model. You want to integrate two different models together, so that it is also made possible with the help of this model execution and integration module as part of it.

So, this is also some people call as a capability but most of the time these capabilities are provided by a separate module of the system. So, I hope you understand the overall design of the Model Based Management System.

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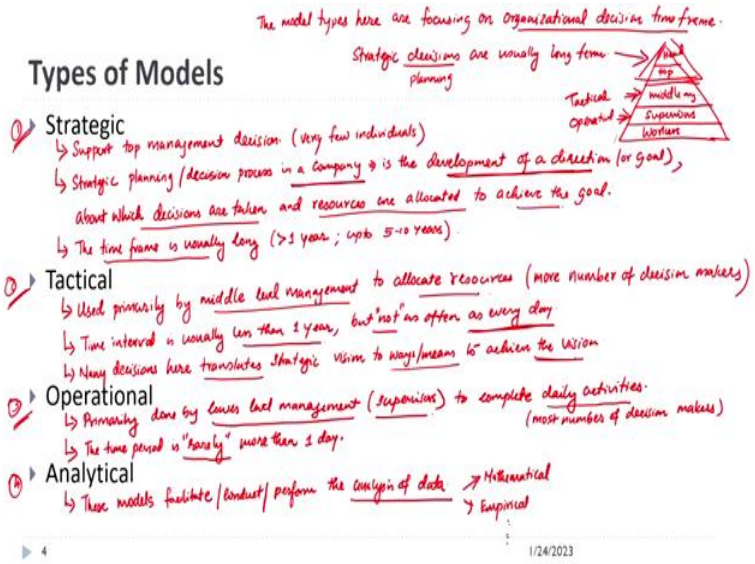

So, we move to the next slide which is known as a type of models and this is an important discussion. There are multiple ways you can categorize model. Here we are focusing on organizational decision time frame.

So, in this case we basically name four models as part of this as:

- Strategic
- Tactical
- Operational
- Analytical

There are many other divisions, but for us, these are the four major classification that is important to us.

- Strategic models-

- it is used to support top management decision. So, if you think about the management pyramid, you can understand it (as shown in slide). So it is like the workers at the lower level, then supervisors, the middle management and then you have the top management. Maybe you have the head or CEOs as part of this. So, what is the Strategic? Sometimes, you should understand when we say strategic top management decision or I can use the word strategic decisions are usually (long term). So, sometimes these strategic decisions are also known as strategic planning, because this is in the time horizon, that is very long.

- We will say that strategic planning /decision process in a company- it is the development of a direction (or goal), about which decisions are taken and resources are allocated to achieve the goal.

- Other part is the Time Frame. The time frame is usually long. So we can say, that the time we have taken here is greater than {1 year; up to 5-10 years}. So, the time period here is the Decision Time Frame. The consideration is, that it is a long term decision making process.

➢ Tactical-

- So, this is primarily used by middle level management to allocate resources, as said earlier. So, if there will be {more number of decision makers}, they are compared to the strategic.

- Time frame is usually less than 1 year, but not as often as every day. Daily decisions are 'not' part of this. This is not a daily process, but it is not a long term either.

- Many decisions here translate strategic vision to ways/means to achieve the vision.

➢ Operational-

- This is primarily done by lower level management (supervisors) to complete daily activities. So, the main level is the lower level management or the supervisors. Most number of decision makers is part of operational decision.

- The time period is very rare, more than 1 day. So, you rarely go into the tactical domain it is mostly you make decisions on a daily basis. So, the supervisors are the ones who do the operational models. They make the operational decision.

➢ Analytical-

➢ These models facilitate or conduct or perform the analysis of data. Suppose, you have a set of data with you, you analyse that and from that analysis of the data, you derive mathematical model or empirical model, using for making the decisions. So, lot of the time you can think that it basically can come out of the form of a mathematical model, or an empirical model, etcetera. So that is all part of the analytical approach, but the main thing is, it requires data and uses data to analyse this one.

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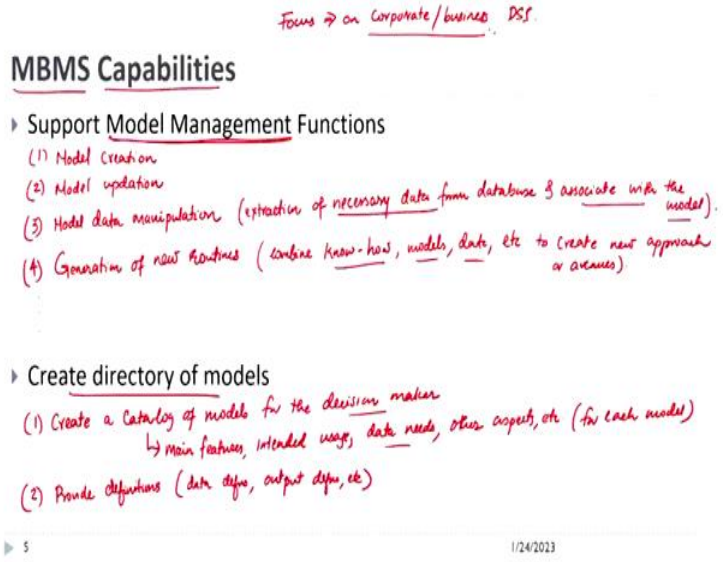

So, now let us look at the next slide which says the MBMS capabilities. What are the capabilities of the model based management system?

- Support Model Management Functions-

i) Model Creation

ii) Model Updation

iii) Model Data Manipulation (extraction of necessary data from database and associate with the model).

iv) Generation of new routines (combine know- how, models, data, etc. to create new approach).

- Create directory of models-

- Create a catalogue of models (main features, intended usage, data requirements, other aspects etc.) for the decision maker.
- Providing Definitions (these definitions include data definitions, output definitions, etc.)

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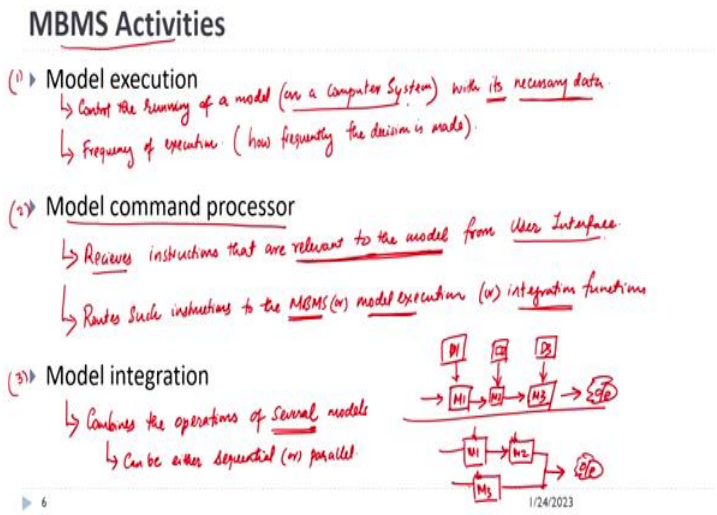

So, now let us look into the next slide which we call it as the MBMS activities. Now, what are the major activities? So, for us, there are three major activities:

- Model execution-
  - It controls the running of a model (on computer system) with its necessary data.
  - Frequency of Model Execution This tells us that how (frequently the decision is made)
- Model Command Processor-
  - Receives instructions that are relevant to the model from user interface
  - Routes such as instructions to the MBMS (or) model execution (or) integration functions
- Model Integration-
  - It combines the operations of several models. (The combination can be either sequential or parallel). Let us say, there are three models (as shown in figure).

So, the data for the model-1 will be data-1, then you have data-2, then data-3, which is part of this model (as shown in figure), is also taken in the model that is executed in a sequential manner. Certain times, the parallel execution is you have model-1 that goes to model-2 and you can have model-3 like this its own data. Each model has its own data coming in, and then the results get combined and then you get the output as part of this.

So, with this we conclude the current model base management, it is an introduction to the model based management, so we give you a bird's eye view and when we get into the relevant topic later in the course, we will elaborate on other aspects and maybe see how model based management and maybe we will look into few models that are part of the system.

So, thank you very much for your listening and we will go to the next topic which is basically the user interface component or user interface management system which is a subsystem of the decision support system. Thank you very much.