

IIT Madras

ONLINE DEGREE

Computational Thinking
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Concept of abstraction

Professor. Madhavan Mukund: So, this object thing is quite interesting. We were saying last time that we think of this deck of cards or these trains or stations as being the units which do the calculations computation. So, we ask the procedure actually it is done inside an object.

Professor. G. Venkatesh: Yeah. It is done inside an object.

Professor. Madhavan Mukund: so, that is, but these objects...

Professor. G. Venkatesh: Where they come from?

Professor. Madhavan Mukund: I mean who makes the objects, how do you start an object, how do you know that you have a deck of cards?

Professor. G. Venkatesh: That we saw in the train thing, the train got created by somebody.

Professor. Madhavan Mukund: correct. The train thing we had like we said that the train card is like a template.

Professor. G. Venkatesh: Template.

Professor. Madhavan Mukund: A class of trains and we said make a train...

Professor. G. Venkatesh: We told the class.

Professor. Madhavan Mukund: We told the class, make a train starting on a Monday, another train starting on a Tuesday following this thing. But then for instance in the score cards we did not have this.

Professor. G. Venkatesh: Even station also, station where it come from?

Professor. Madhavan Mukund: station is also prominently there. So, we need some...

Professor. G. Venkatesh: We have to create it, maybe?

Professor. Madhavan Mukund: So, who is we?

Professor. G. Venkatesh: We as in some person?

Professor. Madhavan Mukund: The environment whoever is executing this whole, setting up this whole thing. So, we are a kind of....

Professor. G. Venkatesh: Some objects have to be created.

Professor. Madhavan Mukund: So, we are kind of organising our computation,...

Professor. G. Venkatesh: But I mean one thing is that they has objects. But one thing is that you need only create one object, if I create one object that object can create another like we saw we created a station, the station created trains or something.

Professor. Madhavan Mukund: Yes.

Professor. G. Venkatesh: So, you can create one object.

Professor. Madhavan Mukund: So, let us see for example we had this idea that this score card could be one single unit or it could be different people reporting marks in different subjects, so we said there maybe physics teacher...

Professor. G. Venkatesh: physics teacher.

Professor. Madhavan Mukund: maths teacher.

Professor. G. Venkatesh: maths teacher.

Professor. Madhavan Mukund: And then there is a class teacher who kind of coordinates these subject teachers.

Professor. G. Venkatesh: So, there are 4 objects.

Professor. Madhavan Mukund: So, we could create a class teacher you are saying and then leave it to the class teacher to create the other subject teachers.

Professor. G. Venkatesh: Any difference, I mean if the class teacher, if I say I create a class teacher object, the class teacher object then in turn creates physics, maths and chemistry teachers, objects versus I create all the four objects myself.

Professor. Madhavan Mukund: Well, what I suppose if the class teacher has created these subject teachers, unless the class teacher tells us who they are, we do not know who they are. So, in a way we do not directly have a way of...

Professor. G. Venkatesh: Accessing?

Professor. Madhavan Mukund: To access, talking, asking them to do things.

Professor. G. Venkatesh: So, if I make a class teacher and the class teacher creates these 3 objects, physics, chemistry and maths, then I cannot talk to the physics, chemistry and maths.

Professor. Madhavan Mukund: Unless the class teacher allows me to.

Professor. G. Venkatesh: Unless the class teacher passes that object to me.

Professor. Madhavan Mukund: They have to give me a way of contacting the.

Professor. G. Venkatesh: Otherwise, I cannot see them.

Professor. Madhavan Mukund: So, it is like supposing you are I do not know you are answering some enquires and then to answer supposing you are running an institute and somebody calls saying tell me something about whatever when, how to do this. So, you might ask somebody and then report back, but you do not give that person directly...

Professor. G. Venkatesh: You do not give the professor's number to....

Professor. Madhavan Mukund: Yeah. So, same way the class teacher may or may not let us...

Professor. G. Venkatesh: will not give us the phone number (laughs).

Professor. Madhavan Mukund: Do you want the physics marks, you come through.

Professor. G. Venkatesh: I have to ask only the class teacher. That is interesting. So, if I make, however if I make all the 4 objects, then...

Professor. Madhavan Mukund: you can directly

Professor. G. Venkatesh: I can talk to physics teacher directly. But that is a little chaotic because if I ask the physics teacher something will she will tell me I mean I ask the class teacher, class teacher will ask the physics teacher.

Professor. Madhavan Mukund: Yes.

Professor. G. Venkatesh: And then class teacher will tell me something and I can compare that.

Professor. Madhavan Mukund: Exactly and then it will be you might have to be doing the class, things. So, the class teacher may so for instance if we are computing some grades or something, the class teacher might have a rule to make grades and we might create our own

mechanism to make grades and then if we ask the class teacher for grades we will get a different grade.

Professor. G. Venkatesh: Difference grade.

Professor. Madhavan Mukund: If we get the 3 marks individually and compute the grade, we will give it.

Professor. G. Venkatesh: So, then we will okay, then we will have problems. So, better that in some sense for some problems at least, in this case at least, better that we allow only the class teacher to do all these things.

Professor. Madhavan Mukund: So, we basically need to know only a certain, I mean we do not need to know all the details.

Professor. G. Venkatesh: Better not to know the details.

Professor. Madhavan Mukund: So, for instance, we do not even need to know that there are 3 teachers, maybe the class teacher is actually keeping track of all the marks directly, who knows? Maybe a class teacher has a record. Maybe class teacher is the physics teacher.

Professor. G. Venkatesh: Correct, actually that is true.

Professor. Madhavan Mukund: That could be.

Professor. G. Venkatesh: So, and they may change also

Professor. Madhavan Mukund: Yeah.

Professor. G. Venkatesh: Physics teacher today maybe somebody but they may go on leave, somebody else may come as physics teacher. If I have a old physics teacher, I will call that physics teacher, teacher will say no, I am not there.

Professor. Madhavan Mukund: Correct. Correct. Exactly.

Professor. G. Venkatesh: Now this

Professor. Madhavan Mukund: So, this relieves us of knowing all these details.

Professor. G. Venkatesh: Knowing all these details.

Professor. Madhavan Mukund: So,...

Professor. G. Venkatesh: that was nice, that is a interesting difference.

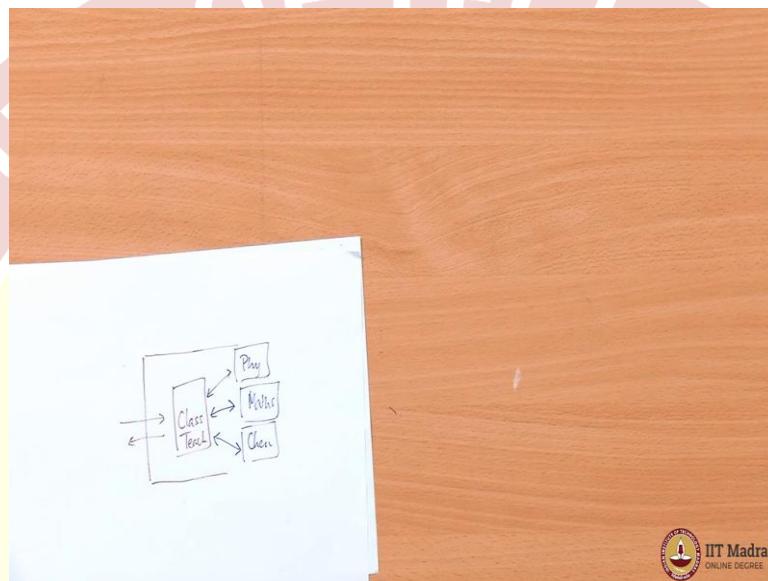
Professor. Madhavan Mukund: So, we basically have this indirect thing.

Professor. G. Venkatesh: So, if you draw it diagrammatically, it means that actually you have one object, are the other 3 objects inside this first object or...

Professor. Madhavan Mukund: May or may not be. Well in this case,...

Professor. G. Venkatesh: But you cannot see them.

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Professor. Madhavan Mukund: Yeah. I mean they are kind of connected here, so we could say that they are inside.

Professor. G. Venkatesh: Inside.

Professor. Madhavan Mukund: But they need not always be inside. They could be outside. So, here we have our class teacher with whom we can have a conversation, we can ask certain procedures to be executed.

Professor. G. Venkatesh: Okay.

Professor. Madhavan Mukund: And this class teacher has created this physics, maths and chemistry teachers. So, they are sitting behind.

Professor. G. Venkatesh: Or inside.

Professor. Madhavan Mukund: Or inside and then each of these teachers can now talk to the class teacher and so the class teacher can collect marks and add them up, give us the total,

give us the average, all these kinds of things by querying the inside teachers, but we do not have access to these teachers directly.

Professor. G. Venkatesh: access to them. So, this is a signified difference. Alright.

