



IIT Madras

ONLINE DEGREE

Computational Thinking
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Lecture - 4.6
Procedure to find same date of birth for different students

So, let us get back to another problem we had seen before, which is to find out in this class whether there are two students with the same birthday or not.

(Refer Slide Time: 00:29)



So, the straightforward way of doing it is to take each card – each student, and go through all the other students looking whether that same birthday as this one appears in that card or not.

So, for instance, we can start with the first card which says Rahul was born on 30th of April, then we will systematically go through all the other cards and look for anybody else born on 30th of April. If we find such a person, then we are done. Otherwise we have to take the next card say Priya and look and see whether anybody is born on 17th of July and so on. So, for every card, we have to compare with every other card.

Every card, you have to compare with every other card.

And, one of the things we said is that because we have already compared Rahul with Priya the first time; when we go to Priya, we need not compare back with Rahul.

Now, here.

That is the.

I mean my observation is since we are just doing procedures.

Yeah.

And parameters and all that. This business that you give one card, you have a deck and you have a card. And to check whether in these in this deck, there is another card which has the same birthday.

Yeah.

As this.

Does not matter what this card is actually.

That is.

You could give me another card the procedure is the same.

Yes.

Take the birthday from this card.

And check against.

Go through check against all the cards.

Yes.

So, that looks like a nice thing to write as a.

Procedure.

Procedure. So, you give me the. So, this birthday could perhaps be the parameter.

Yes.

Isn't it? It can be the parameter it says search for this. So, I do not even know (Refer Time: 01:49).

For example, I could ask you to look for somebody who has the same maths marks.

So, you can take this card take the, yeah exactly.

Or born in the same city.

Yeah.

Or whatever.

Or whatever. So, you can give me 30th April as the date to search for, and give me the entire deck. I will go through this whole deck.

And say.

Of course, this card you should take out.

Yeah.

You give you the deck without this card.

And, you will say yes or no.

And, I will say yes or no.

Yes

I will say yes or no you, do not want to know the pair right. You are not looking for that; you only want to know whether or not there is a match.

Correct.

So, I will say yes or no, the answer is yes or no, yeah. So, that can be a procedure.

Correct.

Ok.

So, I will give you this right. So, first let me start by saying ok, I am looking for 30th of April, so I give you this deck and say please look for 30th of April.

(Refer Slide Time: 02:47)



So, I look for 30th April on this. So, I am looking. So, I have this is 13th October, 12th Jan, so none of this is 30th of April. So, I am comparing each time with the birth date here.

Yeah.

So, I go through the whole thing like this; and at the end of it, I find that there is no 30th April. So, I said no to you.

Ok. So, now you. .

So, I have to write it I guess (Refer Time: 02:59) right. Do I write the result?

Yeah, you would have to write the result. So, maybe you have to write say no, tell me because you have to communicate the answer.

So, I say answer is no.

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No, yeah you have to say yes or no.

No in this case ok; I give you the answer ok.

So, now you give me back the cards.

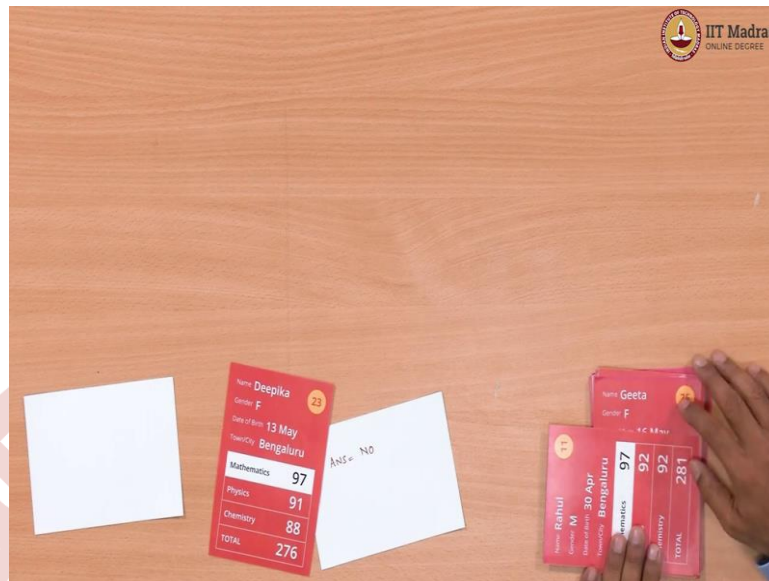
Yeah.

Ok. So, now, I would.

What will you do now?

Keep this card and normally I would look at the next card. So, I would kind of put this card I mean I do not want to mess up the stack. So, I will say that I am now looking for 13th of May right.

(Refer Slide Time: 03:34)



Ok.

So, I give you this cards back, but I want to ask you to.

Before 13th of May.

13th of May.

But you have forgotten that you have seen Rahul, right

Yeah. So, I would maybe tell you that the cards I have say I have give you the cards in this form. So, I have turned the cards that I have already seen.

Ok.

And now you must.

I give you this.

Look for the cards.

You have marked this card.

Yes, I have marked this card, and you must look for the remaining cards.

You do not want me to look at this card.

You need not, it is up, it is up to you, but I am I can save you that work.

Ok.

By telling you that.

Alright. So, what do I do, I have to check?

You have to go through all of it, and look for 13th of May.

13th of May all right. Let me look for 13th of May. Now, I do not think there is a 13th of May, but let me check any case.

Yeah. So, you are just again checking.

Again I am checking every card.

(Refer Slide Time: 04:33)



For the date.

See here there is 5th of May, there is no 13th of May.

Yeah.

30th of December like that I am checking, and there is no 13th of May. So, I return the answer, this answer is no, same answer.

Yeah, you give me the same answer

Ok

Now, you will give me back the card.

And I give you the cards back yeah, here you are.

And now I have seen two cards, but where is the card?

Which card?

I gave you one card turned this way you know.

I messed it up?

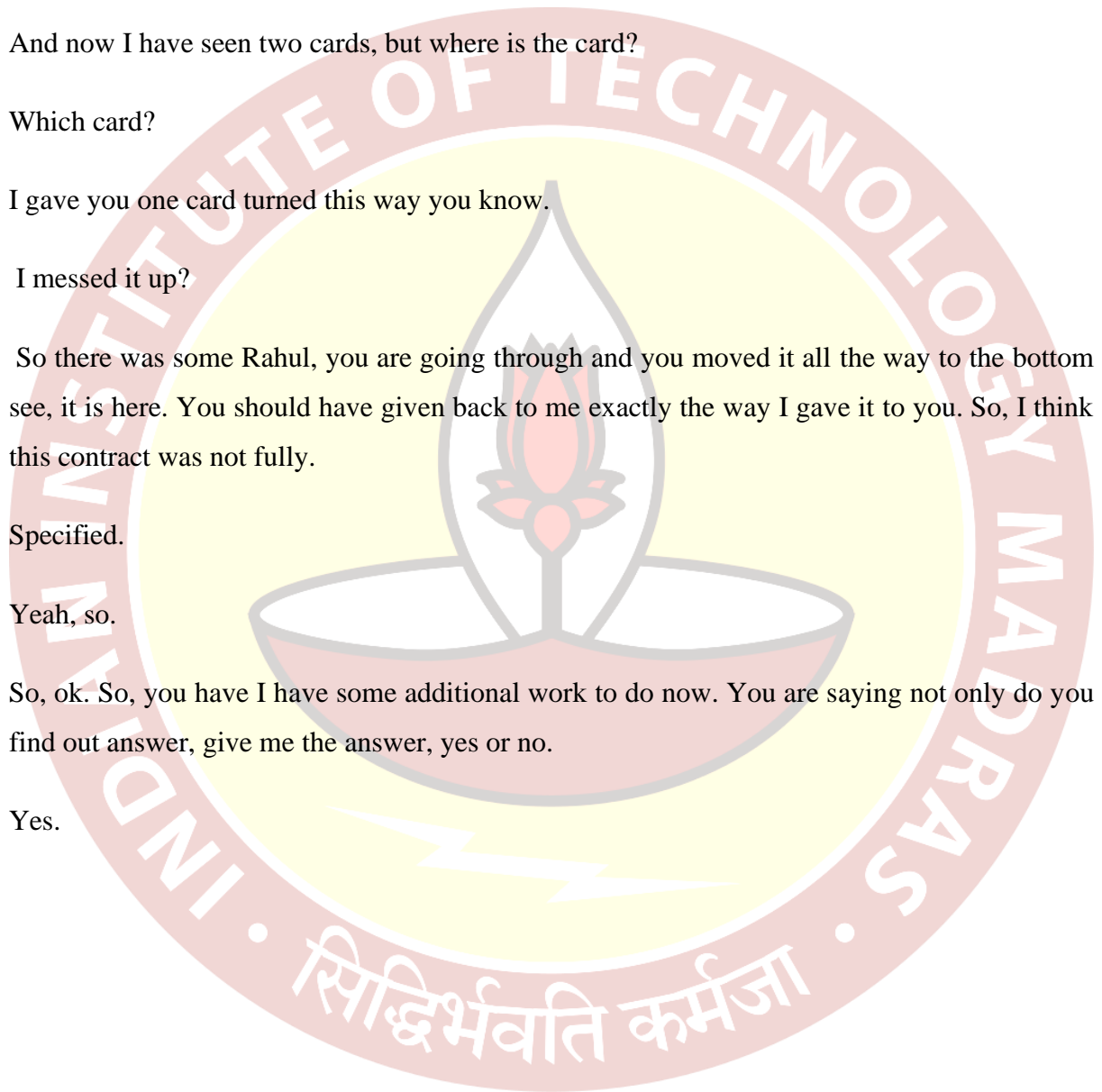
So there was some Rahul, you are going through and you moved it all the way to the bottom see, it is here. You should have given back to me exactly the way I gave it to you. So, I think this contract was not fully.

Specified.

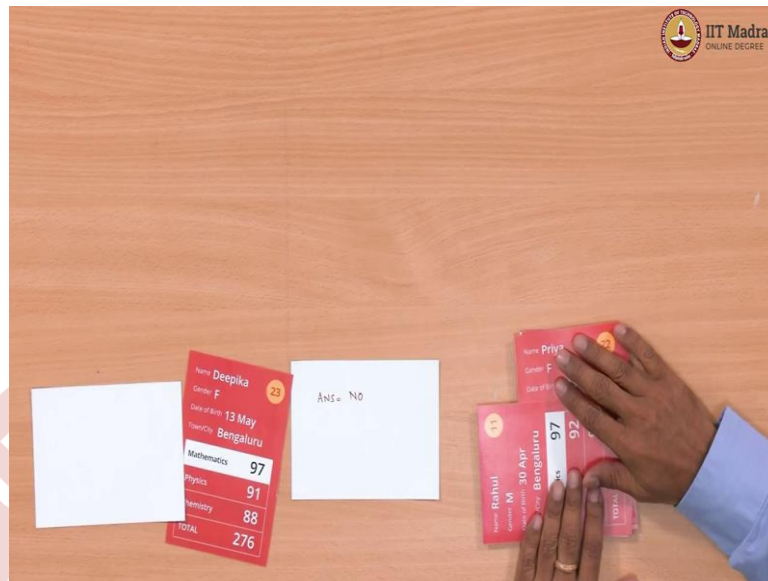
Yeah, so.

So, ok. So, you have I have some additional work to do now. You are saying not only do you find out answer, give me the answer, yes or no.

Yes.



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But, return the back the cards to me in such a way that those cards that were kept like this, I should give it back to you keeping like this.

Exactly.

I should keep it like this.

Yes.

If I see this card like this I keep it like this only.

Yeah, because otherwise I will not be able to.

Alright.

Track of which ones I (Refer Time: 05:34).

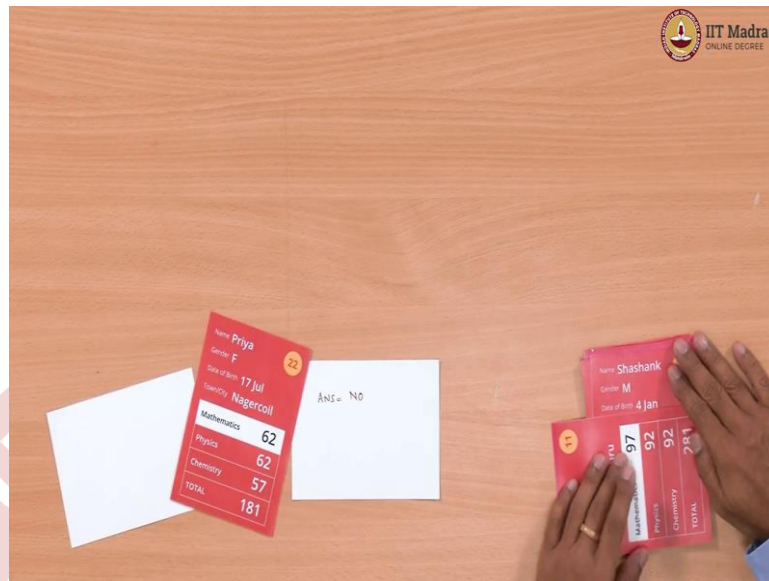
And I will I will remember that I will remember that.

So, now I will tell you that I have done Rahul, I have done Deepika.

Both of them you keep this way.

So, I will keep this way. And now I have Priya, so 17th of July is what I am looking for. And now I give you the cards again carefully like this.

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Yeah.

So, now I have to search.

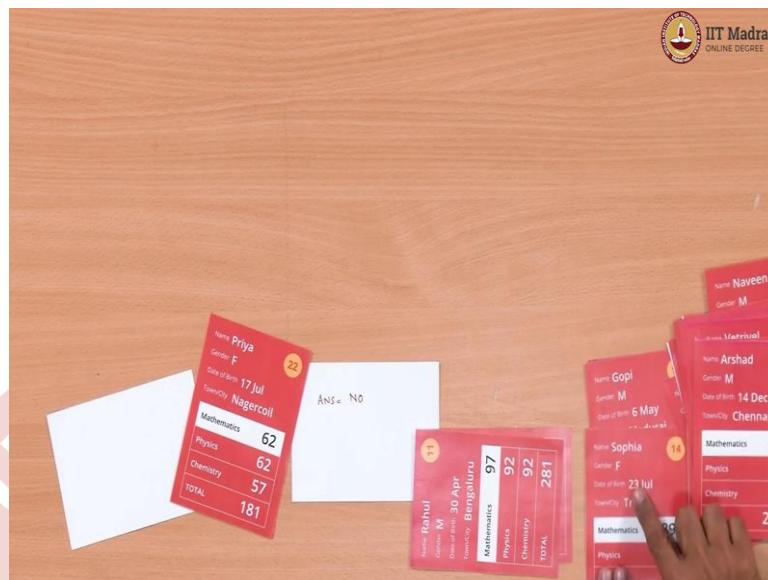
Yes.

And I do not need to look at these two. So, I would not look at these two. And in this I have to see 17th of July.

Yes.

Right. So, I quickly go through them, 17th of July is it there or not? So, again I am messing up these cards. But I want to remember that these cards, I should not mess up.

(Refer Slide Time: 06:18)



I have to give it back to you. So, 17th of July does not look like it is 23 July is there ok. There is no 17th of July. So, my answer is no, same answer ok.

Yeah.

But, now you want me to give these cards back to you exactly like this.

Yes.

So, I have put this like this, and I give it back to you like this.

Yeah.

Right, with this answer no.

Yeah, because otherwise I would have to go back and I might accidentally ask you to look for 30th April again or 13th May again, so that is the reason that I want to do this.

Ok.

So, in this case, we have a limited we have some extra constraint. So, there is possibly a side effect as you said you may be reshuffling these cards. But this separation of these two sideways and upright, you must maintain.

Maintain.

Right. So, for example, I now do 16th of May, and again I give you this thing with these marked. So, once again you must search for 16th of May without disturbing

I can ignore I can I mean I do not.

First of all, you can use the fact that these have already.

These have already bins I may not have to I will not look at that.

Yeah.

And you want me to see 16th May. So, the 6th May not 16th May. So, again I can go through this list like this, and quickly and I am messing up this right.

Yeah.

(Refer Slide Time: 07:29)



Which is 5th May. I am messing up these, but that is all right, because you said you are not worried about these. All you want to make sure is that when I return it to you these cards status I do not change ok. So, I returned it back to you without changing the effect of these cards.

So, we could keep doing this.

We keep doing it.

So, each time I process this card, I add it back in this new sideways stack, and then I would take the next card and so on right. So, this is something which is.

At the end somewhere you will find something where the answer hopefully is yes.

Yeah, we I think we saw one.

We saw one.

Was one which was correct. So, that is, but I think the main point here is that we are adding some constraint to the content.

And the constraint is that earlier we said that when you give me the deck, I am allowed to change the order of the deck in any way I want. Now, you are saying that I will give you the deck, but there is a contract now you are saying.

So, some part of it you should.

Some part of it you should not change.

Yes or some aspect.

Keep intact some aspect of the deck you should keep intact.

Yeah and that could be even stronger, I could have even told you do not disturb anything.

Anything return the deck in exactly the same way, I gave it to you.

Yes.

You can say.

No side effect.

Then I have to make sure that when I see the cards, I am seeing it in such a way that I can bring the stack back to the original state before I give it back to you.

Exactly.

Alright. So, I have to make sure.

And, it becomes part of the contract.

That becomes part of the contract.

Whenever we can call a procedure. We have I guess the contract tells us several things the first contract is what are we getting back right. So, I have to trust that the procedure is doing what I tell it finding the maximum or in this case finding a matching birthday, yes, no.

So, the answer is correct. And, the second part of the contract is the state of the information that I gave to the procedure. So, is that.

Is it allowed to have side effects?

Yeah, is it allowed to have side effects, how much of a side effect?

How much of a side effect?

So, no side effect is the extreme case, any side effect.

Sometimes, it is not possible at all like we saw in the shopping bill.

Yeah.

You did not give me the deck at all. So, there is no way I can do that.

Yeah, because one card anyway you are not allowed.

You gave me only one card. So, I cannot do anything to the deck that is one way. The other way is where you gave the marker to me, and I was changing the order completely and it was alright.

Yeah.

Side effects are allowed. So, it is ok.

Yeah.

And, third is that partially you can allow some side effects.

Yeah.

But, the important thing from my perspective as the person who is subcontracting the work to this delegating this work to a subcontractor, I need to be clear about what expectation I have. At the end of the thing what is undisturbed. So, I would know for example, that the sideways cards and the upright cards are as they were before. But they may be shuffled or I might have a stronger effect.

And, it should not have a your whatever you are doing. Your activity should be able to work.

Yes.

Even though I have messed up the cards.

Yes. So, I am not counting on the fact that you are keeping the same order or not keeping the same order

Yeah.

I understand

And it does not matter to me

Does not matter to you

Right. So, that part of it some issue I should not be making assumptions about things which I do not know about.

Correct.

So, the assumptions are limited to the contract.

Yeah. So, the contract says this is what is allowed, you should be robust into that. So, in case tomorrow you are doing something else.

But giving me back the same answer. My procedure should still work.

Yeah.

So, that is separating out this concern like we discussed earlier, you do your job, I do my job, and we each do our job assuming the other person is doing what we asked them to, but we do not make any additional assumptions.

Right.

