



# IIT Madras

ONLINE DEGREE

**Computational Thinking**  
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**Department of Electrical Engineering,**  
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**Local operations and max in single iteration**  
**Part 2**

Professor. Madhavan Mukund: So, let us do something different now. So, let us go that paragraph that we had. So, if you remember, we wrote down the paragraph as one word per card.

Professor. G. Venkatesh: Kept in a sequence but.

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Professor. Madhavan Mukund: Now, we have them in the same sequence and what we had done was I think we had put the punctuation with the word so for instance, “It was Monday morning”. This was the first sentence and the sentence ends with the full stop. So, the full stop was kept with morning.

So, actually we can go through this and we can kind of identify where the sentence is end, provided of course it in the correct order which it is now. So, now what can we do with this?

Professor. G. Venkatesh: If you know where the sentence ends, then an interesting question that we can ask is, what is the longest sentence in this paragraph? So, what is the longest

sentence means that, longest defined as the one which has the most number of words, let us say.

Professor. Madhavan Mukund: So, wherever a sentence starts, we should start counting the words.

Professor. G. Venkatesh: Start counting the words.

Professor. Madhavan Mukund: Wherever a full stop comes, we have...

Professor. G. Venkatesh: of course, also count the longest sentence in terms of number of characters in the words and add it up, but for moment, let us just count it.

Professor. Madhavan Mukund: So, let us count the words. So, when we start counting when we see a sentence starting that means, after a full stop, we start counting. When we hit a full stop, the sentence is over.

Professor. G. Venkatesh: Over.

Professor. Madhavan Mukund: So, we have...

Professor. G. Venkatesh: we have the number of words in that sentence.

Professor. Madhavan Mukund: And then we have...

Professor. G. Venkatesh: We have to keep that aside and keep the count. When we come to the second sentence, we have to start again.

Professor. Madhavan Mukund: Yes.

Professor. G. Venkatesh: We have to because it is a new sentence.

Professor. Madhavan Mukund: Correct.

Professor. G. Venkatesh: And then we start counting again the words and then when we hit a full stop, at that point again we have a count for the sentence. So that count has to be kept aside.

Professor. Madhavan Mukund: So, you are saying we have to keep separate, remember the count of each sentence, but...

Professor. G. Venkatesh: and then if there are 4-5 sentences, then we will keep 5 counts, we will keep like that and then we will take all those 5 counts and find out which of those counts

is the highest like what we did just now we found the maximum total, like that we will find which of the counts is highest.

And that will tell us which is the...

Professor. Madhavan Mukund: But if it is a very long paragraph, will not there be many counts, I do not know how many sentences there are in this I think there must be a better way to do this?

Professor. G. Venkatesh: What is the better way to do this? I mean, they we have to keep track of the counts of all the sentences and...

Professor. Madhavan Mukund: So, when we were doing the marks, actually we only kept track of the maximum marks that we have seen so far. We only needed one variable, it did not matter that there were 30 students in the class or 100 students in the class, we never needed to remember anything except compare the next mark with the previous maximum.

Professor. G. Venkatesh: maximum. So, can we do that here? When so which means that here we are looking for the maximum count, count, count being the number of words in the sentence.

Professor. Madhavan Mukund: Yes.

Professor. G. Venkatesh: So, if you are looking at the maximum count, then we need only keep that maximum, maximum count, maximum number of words in the sentence count.

Professor. Madhavan Mukund: So, what I suggest is that, we keep the number of words that we have seen so far, the longest sentence we have seen so far.

Professor. G. Venkatesh: The word number of words in that.

Professor. Madhavan Mukund: Then each new sentence we count that sentence from scratch, we start from the beginning and count. When we get a number for that sentence...

Professor. G. Venkatesh: we compare it with the...

Professor. Madhavan Mukund: either we update it or we skip it.

Professor. G. Venkatesh: Like we did earlier, update and skip.

Professor. Madhavan Mukund: So, we never actually have to remember all the sentences.

Professor. G. Venkatesh: We do not need to keep track of the sentences in this one, this particular problem. So, let us try that.

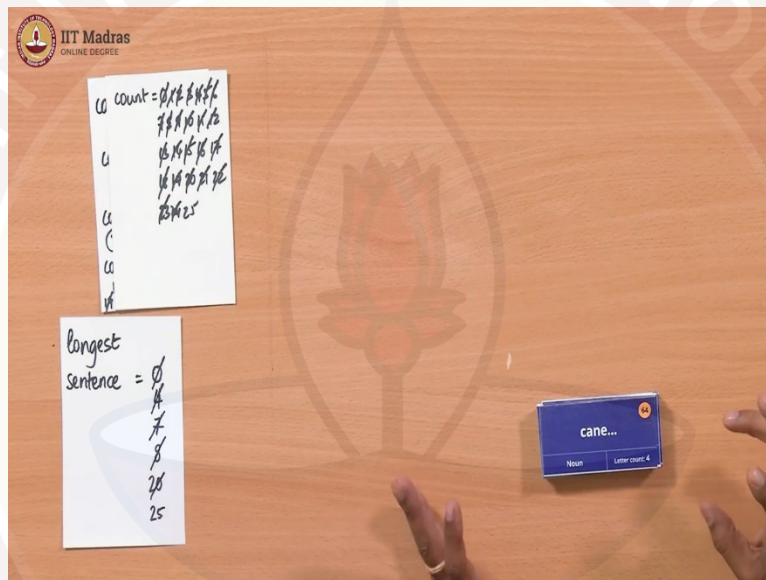
Professor. Madhavan Mukund: Let us try that.

Professor. G. Venkatesh: So, what did we say we will do, we will start with a variable which is.

Professor. Madhavan Mukund: So, let us call it longest.

Professor. G. Venkatesh: longest. Longest and initially we need to set it to some value.

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Professor. Madhavan Mukund: let me call it longest sentence, so, remember what it is.

Professor. G. Venkatesh: Longer sentence.

Professor. Madhavan Mukund: So, initially let us say that it is 0 because we know that a sentence...

Professor. G. Venkatesh: Because a sentence has to have at least one word, so 0. We can start with 0 and I am going to go through the words, you tell me when we have hit the end of the sentence. As we do this, we count. So, do we keep count in another card...

Professor. Madhavan Mukund: So, maybe I will do that.

Professor. G. Venkatesh: So, we need another variable, call that count, count is keeping track of the number of words you have seen so far. We start with 0. So, we have first card.

Professor. Madhavan Mukund: 1.

Professor. G. Venkatesh: second.

Professor. Madhavan Mukund: 2.

Professor. G. Venkatesh: Third.

Professor. Madhavan Mukund: 3.

Professor. G. Venkatesh: Next, now this one has a full stop.

Professor. Madhavan Mukund: 4. So, our first sentence has 4 words in it. And as far as we know now this is the longest sentence because our earlier estimate was only 0. So, now we say the longest sentence has 4 words.

Professor. G. Venkatesh: 4 words. Now what do we do with count? Do we cut it....

Professor. Madhavan Mukund: We have to start again...

Professor. G. Venkatesh: we cannot continue because it is new sentence.

Professor. Madhavan Mukund: Yeah.

Professor. G. Venkatesh: So we just discard that earlier value of count and start with count equal to 0 again. So, again.

Professor. Madhavan Mukund: 1.

Professor. G. Venkatesh: next card.

Professor. Madhavan Mukund: 2.

Professor. G. Venkatesh: next card.

Professor. Madhavan Mukund: 3.

Professor. G. Venkatesh: next card.

Professor. Madhavan Mukund: 4.

Professor. G. Venkatesh: next card.

Professor. Madhavan Mukund: 5.

Professor. G. Venkatesh: next card.

Professor. Madhavan Mukund: 6.

Professor. G. Venkatesh: This one has a, next card has a full stop.

Professor. Madhavan Mukund: So we have seen 7 words in this sentence.

Professor. G. Venkatesh: 7 words in this sentence.

Professor. Madhavan Mukund: Previous longest sentence had 4 words.

Professor. G. Venkatesh: 4, so we can...

Professor. Madhavan Mukund: So, now replace...

Professor. G. Venkatesh: so, we can we replace 4 with 7 and again that counting has to...

Professor. Madhavan Mukund: Get reset.

Professor. G. Venkatesh: get reset to 0, because we are seeing a new sentence now. We start again.

Professor. Madhavan Mukund: 1.

Professor. G. Venkatesh: next one.

Professor. Madhavan Mukund: 2.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 3.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 4.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 5.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 6.

Professor. G. Venkatesh: next.



Professor. Madhavan Mukund: 7.

Professor. G. Venkatesh: next one, this has a full stop.

Professor. Madhavan Mukund: 8.

Professor. G. Venkatesh: So, we got a slightly longer sentence, 8. So, we can replace this.

Professor. Madhavan Mukund: So, I replace our... This length to the longer 7 by 8 and again we reset..

Professor. G. Venkatesh: We reset count to 0. And then we can start again.

Professor. Madhavan Mukund: 1.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 2.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 3.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 4.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 5.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 6.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 7.

Professor. G. Venkatesh: next, this is comma not a full stop.

Professor. Madhavan Mukund: 8.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 9.

Professor. G. Venkatesh: next.



Professor. Madhavan Mukund: 10.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 11

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 12.

Professor. G. Venkatesh: next, wow.

Professor. Madhavan Mukund: 13.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 14.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 15.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 16.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 17.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 18.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 19.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 20, I am running out of space. So it is 20, so this is of course much bigger than 8 which was our earlier longer sentence. So now we say that our longest sentence has 20 words.

Professor. G. Venkatesh: Alright.

Professor. Madhavan Mukund: So, I now need to keep counting. So, let us go back and so, the next sentence...

Professor. G. Venkatesh: set count to 0.

Professor. Madhavan Mukund: set count to 0 again.

Professor. G. Venkatesh: I doubt that there will be another set as larger than this one, but let us see.

Professor. Madhavan Mukund: let us see.

Professor. G. Venkatesh: First one.

Professor. Madhavan Mukund: 1.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 2.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 3.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 4.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 5.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 6.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 7.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: this is 8.

Professor. G. Venkatesh: colon. Next.

Professor. Madhavan Mukund: 9.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 10.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 11.

Professor. G. Venkatesh: next, semi colon.

Professor. Madhavan Mukund: 12.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 13.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 14.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 15.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 16.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 17.

Professor. G. Venkatesh: next comma.

Professor. Madhavan Mukund: 18.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 19.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 20.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 21.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 22.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 23.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 24.

Professor. G. Venkatesh: next.

Professor. Madhavan Mukund: 25.

Professor. G. Venkatesh: So, the last sentence was actually the longest and it had 25.

Professor. Madhavan Mukund: So, this way what we have done is we have just been keeping track of the longest sentence and each time we count a new sentence, we restart the counting process. So, we keep counting again and again. So, we have one variable count which we keep reusing. So, although on the card it looks like we have kept track of the count of each sentence, each time we reset to 0, the previous count is lost.

Professor. G. Venkatesh: Gone.

Professor. Madhavan Mukund: So, we do not really know that the previous one is 20 or 8 or 7 because we are just reusing so, we have 2 variables. We have the count variable which we keep restarting each time and we have this longest sentence variable which is updated every time we see a longer sentence, just like we did for the maximum marks in the last.

Professor. G. Venkatesh: So, this is a single iteration actually. In one iteration, we have managed to find the longest sentence keeping track with two variables, one which keeps a count of a number of the words in the sentence, another which keeps track of the longest sentence we have seen so far. And we did not need to remember which sentence contributed to the longest number of...

Professor. Madhavan Mukund: The difference between the previous one and this one was there the quantity we were counting the max was directly given to us in each card. Whereas, here we had first we had to calculate that quantity by going across multiple cards. Then once we got it in one place, then we compare. So, it is a little bit more complicated counting than

the previous one, but still it just combines what we have seen so far. Which is how to count cards and how to keep track of the maximum.

Professor. G. Venkatesh: And the filtering also is very interesting here because they are actually looking for the card which has a full stop in it.

Professor. Madhavan Mukund: Yes.

Professor. G. Venkatesh: That is the first filter.

Professor. Madhavan Mukund: Yes.

Professor. G. Venkatesh: The second filter is at that point we look at the value of the count.

Professor. Madhavan Mukund: Yes.

Professor. G. Venkatesh: which is a value of variable actually now.

Professor. Madhavan Mukund: Yes.

Professor. G. Venkatesh: So, so far we have compared constant card with a constant. We have compared in the last one, we compared the value of the card with a variable.

Professor. Madhavan Mukund: Variable.

Professor. G. Venkatesh: And now we are comparing the value of one variable with another variable.

Professor. Madhavan Mukund: With another variable. So, we are getting slightly more complicated now in our computation. Very good, very good.