
# IIT Madras

## ONLINE DEGREE

**Computational Thinking**
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**Local Operations and max in single iteration**
**Part 4**

Professor Madhavan Mukund: So last time we were trying to decide which shop was doing well by looking at the number of bills that each shop generates and we found that SV Stores had 15 bills compared to I think 9 bills for Sun General and 6 bills for Big Bazaar .

Professor G Venkatesh: But there is something I noticed, right, while we are going through the cards. Though SV was doing well, if we just look at it from bills the value of bills in SV was relatively small, on other hand Big Bazaar, I noticed that the total value of the bills was very high. So there could be the situation that you know I mean some other shop is doing better when you do not look at the number…

Professor Madhavan Mukund: But the total value of…

Professor G Venkatesh: Total value, yeah, Add the value, may be that is another metric we should use. May be that is a better metric.

Professor Madhavan Mukund: So then what we would need to do is to find out among all the shops their total value of the bills and which of these is maximum.

Professor G Venkatesh: That I think is a better way, may be a better way.

Professor Madhavan Mukund: So then this is like when we go through the cards instead of just counting the cards we actually have to add up the total amount and keep these totals separate from its shop.

Professor G Venkatesh: But again here we have, I mean we do not know the number of cards, number of shops, we do not know how many shops are there…

Professor Madhavan Mukund: Yeah so we would to have to keep…

Professor G Venkatesh: So we would have to keep track of...

Professor Madhavan Mukund: Yeah for each new shop we would have to start again, new total…

Professor G Venkatesh: New total again.

Professor Madhavan Mukund: Or update total if you already seen the shop and then of course what we want do in the end is find the maximum of these.

Professor G Venkatesh: So again, what like we learnt last time…

Professor Madhavan Mukund: We can keep of incrementally whatever maximum…

Professor G Venkatesh: You have seen so far.

Professor Madhavan Mukund: Keep up, so let us try to do that, so we do in one iteration, what we will do is we will keep variable number of totals, keep updating them or create a new total…

Professor G Venkatesh: So we can use, so SV let us use the word, let us use the variable SV to represent the total this time, not the contract, not the count, total.

Professor Madhavan Mukund: So instead of plus 1 we will do plus the bill number, and as usual we start with 0.

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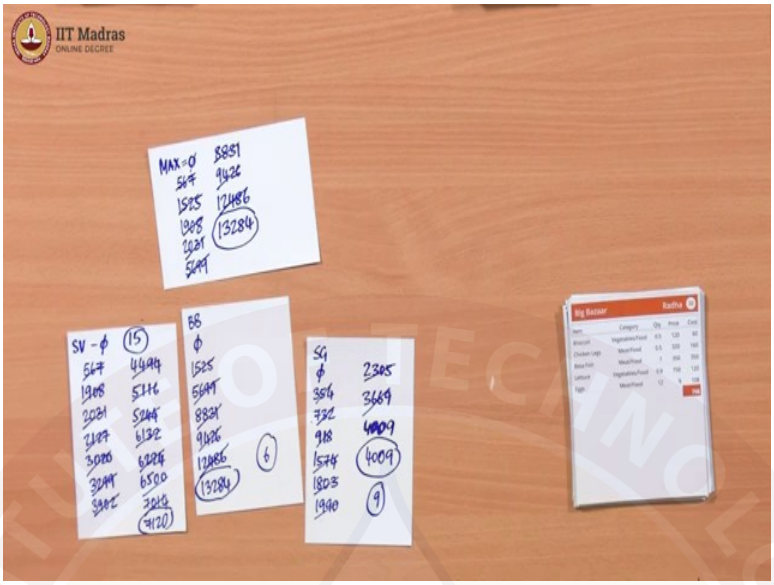


So we will start, we know that let us keep max here, so max is always 0 to start with but we do not have any shops, so we do not know which of these cards are going to be used in principle. So now we start with the first one, so first one is SV.

Professor G Venkatesh: So first one is SV.

Professor Madhavan Mukund: And so we initially had 0…

Professor G Venkatesh: But you have to update it to its value.

Professor Madhavan Mukund: But we updated the first value, so the first value I will just write below because it is going to be bigger number, so 567.

Professor G Venkatesh: 567, yeah. So you have seen the first card…

Professor Madhavan Mukund: And of course then I should also…

Professor G Venkatesh: Update the max to 567.

Professor Madhavan Mukund: Update the max to 567. So the current value of max is 567 after one bill.

Professor G Venkatesh: Now we are seeing, the second bill is form Big Bazaar…

Professor Madhavan Mukund: So this is a new bill.

Professor G Venkatesh: So we need a new bill, yeah.

Professor Madhavan Mukund: So I start with 0 and then…

Professor G Venkatesh: 1525 is the…

Professor Madhavan Mukund: 1525, now this is the first bill but this is bigger than the maximum that we had, so the maximum now becomes…

Professor G Venkatesh: 1525. Now we are seeing SV stores again, it has 1341.

Professor Madhavan Mukund: So we have to write 1341 and I think we get 1908 which now makes it total higher than the max, so 1908 is now the maximum bill we have seen across all shops.

Professor G Venkatesh: Now we are seeing SV stores once again, it is 123..

Professor Madhavan Mukund: It is 123, so this becomes now 2031.

Professor G Venkatesh It is again more than max.

Professor Madhavan Mukund: So this 2031.

Professor G Venkatesh: Now we are seeing Big Bazaar once again.

Professor Madhavan Mukund: So this 4174…

Professor G Venkatesh: 4174.

Professor Madhavan Mukund: So this becomes now 5699 which is of course bigger than 2031, so the maximum sum we have seen so far is 5699.

Professor G Venkatesh: 5699. Now we have got Sun General, new shop…

Professor Madhavan Mukund: New shop, we start a new

Professor G Venkatesh: Start with 0 first.

Professor Madhavan Mukund: Start with 0 and replace with 354.

Professor G Venkatesh: 354. Now SV stores back again, 96.

Professor Madhavan Mukund: 96…

Professor G Venkatesh: So they have to add 96 to whatever number of their…

Professor Madhavan Mukund: 2127. Now this is smaller than 5699, so we do not make…

Professor G Venkatesh: So you do not update it. Next is Big Bazaar 3132.

Professor Madhavan Mukund: So this becomes now 8831 and this is now bigger maximum, so max now gets updated to 8831.

Professor G Venkatesh: Now we have 595, big bazaar…

Professor Madhavan Mukund: 595, so this becomes now 9426 which is again increasing this maximum, so this is now 9426

Professor G Venkatesh: Sun General 378.

Professor Madhavan Mukund: Sun general, so 378 so now this becomes 732 but there is no change in the maximum because that is much smaller than this.

Professor G Venkatesh: SV stores 893.

Professor Madhavan Mukund: So 893 becomes 3020 but again it is much smaller than that, so there is no…

Professor G Venkatesh: Yeah I think SV stores has a long way to catch up with Big Bazaar now right, its 3 9426. Next is Sun General which is 186.

Professor Madhavan Mukund: 186 takes me to 918 but still much below the maximum.

Professor G Venkatesh: Big bazaar again, 3060.

Professor Madhavan Mukund: So this is 12486…

Professor G Venkatesh: I think they have gone way ahead I do not think anybody will catch up.

Professor Madhavan Mukund: So now this is 12486…

Professor G Venkatesh: I do not think anybody is catching up with Big Bazaar, Sun General 656.

Professor Madhavan Mukund: 656 that is 1574.

Professor G Venkatesh: Sun General 229.

Professor Madhavan Mukund: That is 1803.

Professor G Venkatesh: Sun General 187.

Professor Madhavan Mukund: That is 1990.

Professor G Venkatesh: SV stores 279.

Professor Madhavan Mukund: That is 3299.

Professor G Venkatesh: SV stores 603.

Professor Madhavan Mukund: That is 3902.

Professor G Venkatesh: SV stores 592.

Professor Madhavan Mukund: That is 4494.

Professor G Venkatesh: SV stores 622.

Professor Madhavan Mukund: That is 5116.

Professor G Venkatesh: SV stores 128.

Professor Madhavan Mukund: That is 5244 but this is still well below that, so we do not have to do any update.

Professor G Venkatesh: Sun general 315.

Professor Madhavan Mukund: 315, that is 2305 but still well below that.

Professor G Venkatesh: SV stores 888.

Professor Madhavan Mukund: 888 will take us to something like 6132…

Professor G Venkatesh: Still less than…

Professor Madhavan Mukund: Much below that, this is 12 thousand…

Professor G Venkatesh: 12 thousand yeah.

Professor Madhavan Mukund: This is 6 thousand.

Professor G Venkatesh: SV stores 92.

Professor Madhavan Mukund: So that is 6224.

Professor G Venkatesh: Sun General 1364.

Professor Madhavan Mukund: Big bill for Sun General but not too much, 3669 I think.

Professor G Venkatesh: SV stores 276.

Professor Madhavan Mukund: 276 will take us to 6500.

Professor G Venkatesh: Sun General 340.

Professor Madhavan Mukund: 340 will take this to 4009.

Professor G Venkatesh: SV stores 514.

Professor Madhavan Mukund: 514 will take this to 7014.

Professor G Venkatesh: SV stores 106

Professor Madhavan Mukund: 106 will take us to 7120.

Professor G Venkatesh: We got one more Big Bazaar at 798…

Professor Madhavan Mukund: 798, so now finally this is 13284 but this also means that we have to update…

Professor G Venkatesh: Update the maximum.

Professor Madhavan Mukund: Maximum to 13284.

Professor G Venkatesh: So we have got number of things here, right, we have got the totals for SV which is now 7120 that is a total number of…

Professor Madhavan Mukund: All the bills added up across the amounts.

Professor G Venkatesh: Across the amounts, yeah.

Professor Madhavan Mukund: This is the totals of Big Bazaar 13284…

Professor G Venkatesh: Which also happens to be the max.

Professor Madhavan Mukund: Then we here we have 4009 as the total for Sun General and we also on the side we computed that the maximum across these was 13284 without having to again compare these as a separate iteration. And of course if we add 5 shops or 6 shops we would have that many more sums but this would have been keeping track among all of them of their max as we go along. So in one iteration we have managed to both add up all the bills which requires filtering, right, for each bill we have to look at which shop it is and depending on that we have to add that shop, then we compare to the max and each time if the max increases we replace the max with a new max.

Professor G Venkatesh: So it looks like Big Bazaar even though it had very small number of bills generated. The total maximum is high, so one would assume that the average bill size for Big Bazaar is. How would you find the average bill size for all these shops now?

Professor Madhavan Mukund: So average would just be total by divided by the number. So last time we knew how many…

Professor G Venkatesh: What the account was.

Professor Madhavan Mukund: Yeah so I think if we can do it here but I think we had if you remember right we had 15 bills here so we would divide this by 15…

Professor G Venkatesh: To get the average.

Professor Madhavan Mukund: Then we would divide this by I think 6 and this by 9.

Professor G Venkatesh: And clearly Big Bazaar would come out as the highest average.

Professor Madhavan Mukund: Correct.

Professor G Venkatesh: So it is because their average bills as even though the number of bills is very small…

Professor Madhavan Mukund: Yeah, so if you just do a rough calculation this is something like 400 and both these bills are around 400 each and whereas this bill is more like 2000…

Professor G Venkatesh: 2000 something, right. So Big Bazaar is doing 2000 per shop visit per generated bill…

Professor Madhavan Mukund: Whereas these are…

Professor G Venkatesh: Whereas these guys are doing 400 each which is why even though there have many more footfall is very high, very large number of bills they are generating, still their total sale value is much less than Big Bazaar.