



IIT Madras

ONLINE DEGREE

Computational Thinking Tutorial 2.8

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```
count = 0
while (Pile 1 has more cards) {
    Read the top card X in Pile 1
    if (X.TownCity == "Chennai") {
        if (X.Gender == "Female") {
            count = count + 1
        }
    }
    Move X to Pile 2
}

count = 0
while (Pile 1 has more cards) {
    Read the top card X in Pile 1
    if (X.TownCity == "Chennai" AND X.Gender == "Female") {
        count = count + 1
    }
    Move X to Pile 2
}
```

Hello CT students. In this tutorial let us see this piece of pseudocode here and how we can replace some other pseudo code in space of this nested if block. In place of this nested if block we can write a different piece of pseudocode and make it do the same thing and have it be equivalent to this particular pseudocode.

So, let us first understand this pseudo code. We are looking at the scorecard data set and there is a count variable which is initialized to 0. Now, we are going through the cards of pile 1, so as long as pile 1 still has cards we go through this while loop and we read the top card which is basically just taking the next card and then if this card access city is Chennai, if it is a Chennai card then we go inside this if block and we look at whether the gender of this card is female.


So, what we know is it is a Chennai card and it is also a female card. So, and then we are going into this if block and we are doing an increment on count which means we are counting the number of girls from Chennai, that is what we are doing here. We are first checking if it is Chennai and then further checking if it is female and then we are incrementing the count. So, every Chennai girl will get counted in this way.

Now, consider this piece of code here we are doing roughly the same thing till here and at this point what are we doing, we are writing both the conditions in the same if statement. So, we are

checking whether the city is Chennai and we are checking whether the gender is female. So, the thing with an AND is that it will make sure that every condition is satisfied and only then you go into this particular if block.

So, now we do not have a nested if block, a instead if block is when there is an if and an if within it, here we are combining both those conditions using an AND statement and then we are again doing the same thing of incrementing the count. So, these two pieces of code are exactly the same thing.

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```
Fcount = 0
Mcount = 0
while (Pile 1 has more cards) {
    Read the top card X in Pile 1
    if (X.TownCity == "Chennai") {
        if (X.Gender == "Female") {
            Fcount = Fcount + 1
        }
        else {
            Mcount = Mcount + 1
        }
    }
    Move X to Pile 2
}

Fcount = 0
Mcount = 0
while (Pile 1 has more cards) {
    Read the top card X in Pile 1
    if (X.TownCity == "Chennai" AND X.Gender == "Female") {
        Fcount = Fcount + 1
    }
    else {
        Mcount = Mcount + 1
    }
    Move X to Pile 2
}
```

However now, consider this piece of code here, let us look at what is happening here, we have two variables which are initialized to 0, there is Fcount and Mcount, so that is indicating female and male. Now, again going through the cards, we are going through each card and if the city is Chennai then we go into this block inside, so this applies only to Chennai cards whatever is inside this.

Then we are checking if the gender is female and we are incrementing the Fcount variable which means we are counting the number of Chennai girls. And if this condition is not true we have a Chennai card and it is not female, so we are making this Mcount increment which means this should be the count of male students, assuming there are only two genders in this dataset.

So, what is happening here overall is, we are looking if the card is from Chennai and then if it is female, we are incrementing Fcount and otherwise we are incrementing the Mcount, which means Fcount is to indicate Chennai females and Mcount is to indicate Chennai mails, so this is what this code does.

Now, consider this piece of code that has come below and let us see what is happening which is the same thing till here and here we have done this combination of conditions for these two nested if statements. So, if the city is Chennai and the gender is female that means it is a Chennai female, we are incrementing Fcount.

So, Fcount behaves exactly as before we are counting the number of Chennai girls. And if those two conditions are not met, then we go to Mcount and incremented. The problem here is this piece of code, this bottom piece of code is not equivalent to this piece of code because here Mcount was incremented only if the city was Chennai, so Mcount represented Chennai males.

However, here this Mcount is incremented in this else block and that else is if the city is Chennai and also gender is female. So, supposing this condition was not met because of the city not being Chennai, suppose it is a Madurai female what will happen then this if condition is not going to be met and we will go into this else block and we are going to increment this Mcount variable, although the person is not male and also not from Chennai.

So, this Mcount is going to give us something very different from the Mcount here. Thus, what we have seen earlier with nested ifs being combined as an AND statement is not going to apply when you have a situation like this, when this else is there you cannot do the exact same thing. So, you have to be careful about how you rewrite your logic whenever you attempt to do something like that. Thank you.