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Scalable Data Infrastructure 201303-02
Problem Solving

A Cat, a Parrot, and a Bag of Seed:

**1). Define the problem**

The problem is that the man does not know how to get himself and his passengers across the water all at the same time. This problem is just about getting the passengers to one side, but looking at what happens when he gets each item to the other side and has to take a trip back across the water to get the next. The overall goal is to take one trip across the water transporting everyone without losing any of him or her.

2) **Break the problem apart**

The constraint is the capacity of the boat, which is limiting one trip across the water. Another constraint is the man's inability to make more than one trip due to the probability of losing one or more of his items. The sub goal is decide which passenger to take across first to prevent another from consuming that item.

3) **Identify potential solutions**

Solution #1:If the man took the parrot first, this would leave the cat and the seeds. The problem does not state the cat's interest in the seeds so it would not eat them.

Solution #2: If the man hid the seeds first, then took the cat across the water this would prevent the cat from eating the parrot. The he could come back, get the seeds and bring them over the water. Lastly he could come back and get the parrot and bring it across the water.

Solution #3: What if he took the cat, and put the bag of seeds in his mouth and went across the water. Then travel back for the parrot.

**4) Evaluate each potential solution**

a) Does each solution meet the goals? Yes.

b) Will each solution work for ALL cases? No, all but one.

**5) Choose a solution and develop a plan to implement it.**

The man only has room for himself and one other item, so if he were to transport the two items that are less likely to consume one another first that would be the parrot. The solution is to take the bag of seeds, hold them with his teeth and take the cat across first. Then he should come back for the parrot and bring the parrot across with the bag of seeds still in his mouth.

b) Describe some test cases you tried out to make sure it works.

What I did was took this scenario and applied logic. If the cat is a threat to the parrot, and the parrot is a threat to the seeds, than it makes sense to transport each over in an order that will not impose risk even while on the other side. Since there is physically no room in the boat for all, instead only two at a time; the best solution is to utilize the resources the man has. In this case, that would be his teeth. With this solution, no one animal or seed in in immediate danger, nor does the man have to worry about losing any of his resources while he takes trips back and forth.

Socks in the Dark:

**1) Define the problem**

The problem is that matching socks need to be selected, but it is dark so it is difficult to figure out how many socks need to be picked in order to get close to a matching pair. A problem that is not apparent from reading the word problem is that the person picking the socks might be colorblind. Although it is dark, white may tend to

stand out a little more in the night. The brown and black socks may appear the same color in the dark. The overall goal is to select at least one pair of matching socks and one pair of each color.

2) **Break the problem apart**

The constrains are the dark, and there are more than just a few socks in the drawer. The sub-goals are to successfully select matching socks.

A solution would be to grab 5 pair of socks from the drawer using probability. A solution would be to first choose two pair of socks that would be white. The simplest

way to do this would be to check the socks against each other. So for example, if I picked up 4 socks I would look to see if one is significantly different than the other. The one which is brightest, I would but to the side and assume it is a white sock. I would then continue until I have successfully retrieved two pair of white socks. Next, I would choose 10 socks, and know that of those 10, there would be 3 matches

**4) Evaluate each potential solution**

a) Does each solution meet the goals? Yes

b) Will each solution work for ALL cases? No

**5) Choose a solution and develop a plan to implement it.**

The overall solution would be to take out 12 socks. If there are 20 socks, with a variation of matches in the total, the probability of getting 4 matches out of 12 socks is very high. From then, I would chose the white using the color tone method, then one pair of black and one pair of brown socks by pairing the darkest tones. The method I used in solving this problem was some probability and some common knowledge of picking socks in the dark.

Predicting Fingers:

**1)Define the problem**

The problem is we do not know how high the little girl will count using this method. Some insight that I can offer that is not immediately visible from the word problem is that if the little girl is very young, she may not count that high. She may mess up while counting; she may also forget which number she was on. The overall goal is to find out what finger she will land on, and to find out what number she is counting up to.

2) Break **the problem apart**

The constraints are that we do not know how far she will count up to. The sub goal is to find out, or assume how she may continue or what finger she will land on.

**3) Identify potential solutions**

Assuming that the little girl will count to 100, the solution is simple. We know that when counting to five, she will end up on the pinky. So 5= thumb, index, middle,

fourth, pinky. Then when she counts to ten, it is backwards. If she counts to 100 using this method the whole time, she will either end up on the thumb or the pinky.

Solution 1# Assume she is counting 10 100 using this same method the whole time.

Solution 2# Assume she will only count to half of that amount.

**4) Evaluate each potential solution**

a) Does each solution meet the goals? Yes

b) Will each solution work for ALL cases? Yes

**5) Choose a solution and develop a plan to implement it.**

The solution is to assume the little girl will count to 100. Each time she counts 5 more is going to be a definite outcome of her landing either on her pinky or the thumb. What I did was I counted 10, the same method that the little girl is using. After counting 10, I knew I would either end up landing on my thumb at 20 or pinky at 15.