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Web Programming Fundamentals

Problem Solving

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

**1) Define the problem.**

**a) Do this in your own words.**

A man needs to bring a cat, a bag of seed, and a parrot across a river, but he can only bring one at a time. If he leaves the parrot and the seed together, the bird will eat the seed. If he leaves the cat and the parrot together, the cat will eat the parrot. He needs to make it across the river with all three items alive and intact.

**b) What insight can you offer into the problem that is not immediately visible from the word problem alone?**

One should think about what the man is leaving on the other side of the river while he goes back to get something else. The cat and parrot (or parrot and seed) should not be left together on either side. Another important idea to note is that, once an item is on the other side of the river, it can still be returned to the original side.

**c) What is the overall goal?**

The overall goal is to get all three items on the other side of the river without the cat eating the parrot, and without the parrot eating the seed.

**2) Break the problem apart.**

**a) What are the constraints?**

The cat cannot be left alone with the parrot, and the parrot cannot be left alone with the seed.

**b) What are the sub-goals?**

The man will need to bring one item across the river, leaving two that can be left together. Then he will need to come back to fetch the rest of the items while considering the same issue on the other side.

**3) Identify possible solutions.**

**a) For each of the sub-problems you’ve discussed in #2, what is a possible solution?**

The man could bring the bird first, leaving the cat and seed. He could then go back and get the seed. Then he could leave the seed on the new side of the river, and take the parrot back to the original side. He could then trade the parrot for the cat, leaving the parrot alone. Once he’s on the second side of the river again, he can leave the cat with the birdseed and go back for the parrot.

**4) Evaluate each potential solution.**

**a) Does each solution meet the goals?**

Yes, the solution meets the goals.

**b) Will each solution work for all cases?**

Yes, the solution will work for all cases.

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

**a) Explain the solution in full.**

On trip one, take the parrot, leaving the cat and birdseed together. On trip two, bring the birdseed, leaving the cat alone. On the way back from trip two, bring the parrot back to the original side, leaving the birdseed. Before leaving for trip three, trade the parrot for the cat and leave the cat on the second side with the birdseed. Go back for the parrot, and make one more trip across.

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

I drew a river on a piece of paper, and then used smaller pieces of paper to represent the cat, the parrot, and the birdseed. I then moved the representative pieces across the river as the man would, while continuously ensuring that the cat and parrot were not left alone, and neither were the parrot and birdseed.