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CS 335
Artificial Intelligence

1st state: Using the rules "The American lives in the first house," "Tea is drunk in the third house," and the constraint "The American live next to the White house", we can easily fill in these states.

House No.	1	2	3	4	5
Color	Red/Yellow/Green/Blue	White	Red/Yellow/Green/Blue	Red/Yellow/Green/Blue	Red/Yellow/Green/Blue
Drink	Water/Beer/Orcahta/Milk	Water/Beer/Orcahta/Milk	Tea	Water/Beer/Orcahta/Milk	Water/Beer/Orcahta/Milk
Pet	Dog/Parrot/Monkey/Fish/Racoon	Dog/Parrot/Monkey/Fish/Racoon	Dog/Parrot/Monkey/Fish/Racoon	Dog/Parrot/Monkey/Fish/Racoon	Dog/Parrot/Monkey/Fish/Racoon
Nationality	American	German/Mexican/Pakistani/Indian	German/Mexican/Pakistani/Indian	German/Mexican/Pakistani/Indian	/German/Mexican/Pakistani/Indian
Sport	Soccer/Swimming/Polo/Jogging/Cricket	Soccer/Swimming/Polo/Jogging/Cricket	Soccer/Swimming/Polo/Jogging/Cricket	Soccer/Swimming/Polo/Jogging/Cricket	Soccer/Swimming/Polo/Jogging/Cricket

2nd state: After this point, we need to start filling in the graph with more conditional data to gain information. Since "the green house is immediately to the right of the yellow house" and we know the 2nd house is white, the first house MUST be blue/red, and since the Indian lives in the blue house, that makes the first house Red. This also means that the 4th house must be Yellow or Green, while the 3rd is Yellow or Blue, and the 5th is Green or Blue. We also know given "That Jogging is the preferred sport in the Red house," and that "the jogger lives next to the owner of the dog" that we can fill them out easily given the first house is Red.

House No.	1	2	3	4	5
Color	Red	White	Yellow/Blue	Yellow/Green	Green/Blue
Drink	Water/Beer/Orcahta/Milk	Water/Beer/Orcahta/Milk	Tea	Water/Beer/Orcahta/Milk	Water/Beer/Orcahta/Milk
Pet	Parrot/Monkey/Fish/Racoon	Dog	Parrot/Monkey/Fish/Racoon	Parrot/Monkey/Fish/Racoon	Parrot/Monkey/Fish/Racoon
Nationality	American	German/Mexican/Pakistani/Indian	German/Mexican/Pakistani/Indian	German/Mexican/Pakistani/Indian	German/Mexican/Pakistani/Indian
Sport	Jogging	Soccer/Swimming/Polo/Cricket	Soccer/Swimming/Polo/Cricket	Soccer/Swimming/Polo/Cricket	Soccer/Swimming/Polo/Cricket

3rd State: After this, the info becomes a bit harder to figure out. By process of elimination, given "Beer is drunk in the green house," "the Mexican drinks orchata," "tea is drank at the third house," and "the polo player drinks milk" we can safely say that the American drinks water. This is the first part of our questions answered. Beyond that, I feel it is hard to make any decisions without seeing the rest of the options so we fill that out as well. Since "the Pakistani owns the parrot" and "the cricket player owns a monkey" we are left with 2 options for house one, the fish or racoon. And since "beer is drunk in the green house," we know house 2 must be limited to orchata and Beer, while house 4 and 5 can be any drink.

House No.	1	2	3	4	5
Color	Red	White	Yellow/Blue	Yellow/Green	Green/Blue
Drink	Water	Orcahta/Milk	Tea	Beer/Orcahta/Milk	Beer/Orcahta/Milk
Pet	Fish/Racoon	Dog	Parrot/Monkey/Fish/Racoon	Parrot/Monkey/Fish/Racoon	Parrot/Monkey/Fish/Racoon
Nationality	American	German/Mexican/Pakistani/Indian	German/Mexican/Pakistani/Indian	German/Mexican/Pakistani/Indian	German/Mexican/Pakistani/Indian
Sport	Jogging	Soccer/Swimming/Polo/Cricket	Soccer/Swimming/Polo/Cricket	Soccer/Swimming/Polo/Cricket	Soccer/Swimming/Polo/Cricket

4th State: Continuing with pets. We do not get enough information to truly gain any sort of constraints from this part without filling in the rest. We know that "the mexican drinks orchata" so we know he can't be in the 3rd house, and we know "the pakistani owns the parrot" so he cannot be in the 2nd house, and since "the indian lives in the blue house" we can safely say he doesn't live in house 4. For the sports, since "the cricket player owns a monkey" we know that cricket is not played in the 2nd house since it owns a dog. And since "the polo player drinks milk," we know that Polo is not played in the 3rd house.

House No.	1	2	3	4	5
Color	Red	White	Yellow/Blue	Yellow/Green	Green/Blue
Drink	Water	Orcahta/Milk	Tea	Beer/Orcahta/Milk	Beer/Orcahta/Milk
Pet	Fish/Racoon	Dog	Parrot/Monkey/Fish/Racoon	Parrot/Monkey/Fish/Racoon	Parrot/Monkey/Fish/Racoon
Nationality	American	German/Mexican	German/Pakistani/Indian	German/Mexican/Pakistani	German/Mexican/Pakistani/Indian
Sport	Jogging	Soccer/Swimming/Polo	Soccer/Swimming/Cricket	Soccer/Swimming/Polo/Cricket	Soccer/Swimming/Polo/Cricket

5th State: At this point the data is rather unclear, therefore for the sake of time we can guess the data entries that gives us the best odds of success. First let us say the Mexican lives in the 2nd house to eliminate options from every other data field with "The mexican drinks orchata," for the drink, and "the cricket player owns a monkey," The German Likes soccer," the fact that the american already owns jogging, and "the polo player drinks milk," reduces us to swimming :

House No.	1	2	3	4	5
Color	Red	White	Yellow/Blue	Yellow/Green	Green/Blue
Drink	Water	Orcahta	Tea	Beer/Milk	Beer/Milk
Pet	Fish/Racoon	Dog	Parrot/Monkey/Fish/Racoon	Parrot/Monkey/Fish	Parrot/Monkey/Fish
Nationality	American	Mexican	German/Pakistani/Indian	German/Pakistani	German/Pakistani/Indian
Sport	Jogging	Swimming	Soccer/Cricket	Soccer/Polo/Cricket	Soccer/Polo/Cricket

6th State: Everything looks okay so let us take another field and pick randomly to see how it proceeds. This time we can say the 3rd house is blue. Due to the constraint that "the indian lives in the blue house," we know who lives there. This also forces house 4 to be yellow and house 5 to be green given "the green house is immediately to the right of the yellow house." We can also get rid of the parrot for house 3 since it belongs to the Pakistani and the Racoon from houses 4 and 5 since they are not adjacent to the swimmer.

House No.	1	2	3	4	5
Color	Red	White	Blue	Yellow	Green
Drink	Water	Orcahta	Tea	Beer/Milk	Beer/Milk
Pet	Fish/Racoon	Dog	Monkey/Fish/Racoon	Parrot/Monkey/Fish	Parrot/Monkey/Fish
Nationality	American	Mexican	Indian	German/Pakistani	German/Pakistani
Sport	Jogging	Swimming	Soccer/Cricket	Soccer/Polo/Cricket	Soccer/Polo/Cricket

7th State: from here it is just filling out the rest of the constraints. "Beer is drank in the green house" which is house 5 and forces the 4th house to drink milk.

House No.	1	2	3	4	5
Color	Red	White	Blue	Yellow	Green
Drink	Water	Orcahta	Tea	Milk	Beer
Pet	Fish/Racoon	Dog	Monkey/Fish/Racoon	Parrot/Monkey/Fish	Parrot/Monkey/Fish
Nationality	American	Mexican	Indian	German/Pakistani	German/Pakistani
Sport	Jogging	Swimming	Soccer/Cricket	Soccer/Polo/Cricket	Soccer/Polo/Cricket

8th State: We can eliminate Soccer in house 3 given "The German likes Soccer" and leaving us with the 3rd house playing Cricket and owning the Monkey given "the cricket player owns a monkey." This then allows us to attribute the Racoon to house 1 since no other houses adjacent to the swimmer are available.

House No.	1	2	3	4	5
Color	Red	White	Blue	Yellow	Green
Drink	Water	Orcahta	Tea	Milk	Beer
Pet	Racoon	Dog	Monkey	Parrot/Fish	Parrot/Fish
Nationality	American	Mexican	Indian	German/Pakistani	German/Pakistani
Sport	Jogging	Swimming	Cricket	Soccer/Polo	Soccer/Polo

9th State: Everything still works and we are very close. Since the Milk drinker is a Polo player give "the polo player drinks milk" we can safely fill in that field. This allows us to fill in the rest of the chart given "the german likes soccer," and "the pakistani owns the parrot."

House No.	1	2	3	4	5
Color	Red	White	Blue	Yellow	Green
Drink	Water	Orcahta	Tea	Milk	Beer
Pet	Racoon	Dog	Monkey	Parrot	Fish
Nationality	American	Mexican	Indian	Pakistani	German
Sport	Jogging	Swimming	Cricket	Polo	Soccer

Therefore, the German owns the fish and the American drinks water.