Puzzles, Headaches, Perl

Andy Adler

There are two kinds of people in the world.
   People who think there are two kinds of people
   and the rest ...

Scenario

- You have got some important work to do

- Like now!

- Someone just sent you one of those brain teaser puzzles.

- You can't ignore it, because maybe, they'll think you can't do it ...

Problem: from Scientific American

- Facts:

- There are 5 houses (along the street) in 5 different colors: blue, green, red, white and yellow.

- In each house lives a person of a different nationality: Brit, Dane, German, Norwegian and Swede.

- These 5 owners:

  - drink a certain beverage: beer, coffee, milk, tea and water,

  - smoke a certain brand of cigar: Blue Master, Dunhill, Pall Mall, Prince and blend

  - keep a certain pet: cat, bird, dog, fish and horse.

Problem: continued ...

- 1. The Brit lives in a red house.
- 2. The Swede keeps dogs as pets.
- 3. The Dane drinks tea.
- 4. The green house is on the left of the white house (next to it).
- 5. The green house owner drinks coffee.
- 6. The person who smokes Pall Mall rears birds.
- 7. The owner of the yellow house smokes Dunhill.
- 8. The man living in the house right in the center drinks milk.
- 9. The Norwegian lives in the first house.
- 10. The man who smokes blend lives next to the one who keeps cats.
- 11. The man who keeps horses lives next to the man who smokes Dunhill.
- 12. The owner who smokes Blue Master drinks beer.
- 13. The German smokes Prince.
- 14. The Norwegian lives next to the blue house.
- 15. The man who smokes blend has a neighbor who drinks water.

Problem: made worse ...

- Question: Who keeps fish?

  BUT ...
  The author of this problem said that 98% of the people in the world couldn't solve it.

- Now I was stuck...

Problem space

- Possibilities = 5! ^ 5 = $2.4*10^{10}$
    - In terms of bits of info = 34.5

- Each hint reduces possibilities by 4/5, and thus gives 2.32 bits of info.
    - Hints give 34.8 bits of data

- Estimated uncertainty is thus ~ 0 bits

Computer solution

- ❑ IDEA: lets iterate through the possibilities.
- ❑ At each step we check if layout is inconsistent or violates data

- ❑ Data: encode attributes as hash, people as array.
- ❑ Not yet defined attributes are *undef*

Perl code: Initialization

```perl
#!perl -w
@housecolour =qw(blue green red white yellow);
@nationality =qw(Brit Dane German Norwegian Swede);
@beverage    =qw(beer coffee milk tea water);
@smoke       =qw(BlueM Dunhill PaulMaul Prince Blend);
@pet         =qw(cat bird fish horse dog);

my @pers= ({hp=>1}, {hp=>2}, {hp=>3}, {hp=>4}, {hp=>5});
```

Perl code: Validate State

```perl
sub verify {    my @pers= @_;
    for my $cat qw(hp hc nat bev smo pet) {
        my %verif;
        for my $pers (@pers) {
            next unless $pers->{$cat};
            return 0 if $verif{$pers->{$cat}};
            $verif{$pers->{$cat}}=1;
    }   }

#    1. The Brit lives in a red house.
    { my $p = getpers(\@pers, "nat", "Brit");
      if ($p && $p->{hc} ) {
          return 0 unless $p->{hc} eq "red";
    } }
#    4. The green house is on the left of the white house
    { my $p1 = getpers(\@pers, "hc", "green");
      my $p2 = getpers(\@pers, "hc", "white");
      if ($p1 && $p2 && $p1->{hp} && $p2->{hp} ) {
          return 0 unless ($p2->{hp} - $p1->{hp} ==-1);
    } }
```
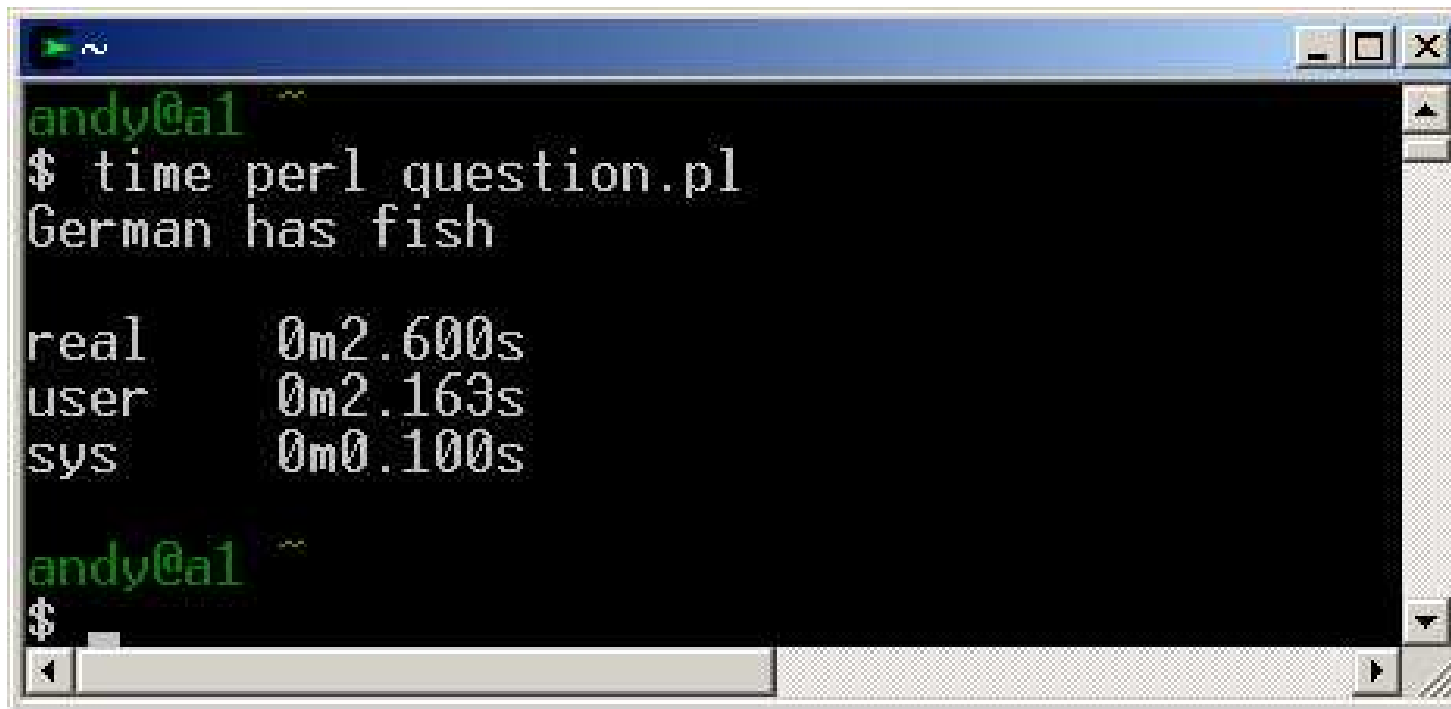
Perl code: Iterate through states

```perl
for (@nationality) {
    $pers[0]->{nat}= $_;
    unless (verify(@pers)) { $pers[0]->{nat}= undef; next }
for (@housecolour) {
    $pers[0]->{hc}= $_;
    unless (verify(@pers)) { $pers[0]->{hc}= undef; next }
for (@beverage) {
    $pers[0]->{bev}= $_;
    unless (verify(@pers)) { $pers[0]->{bev}= undef; next }
for (@smoke) {
    $pers[0]->{smo}= $_;
    unless (verify(@pers)) { $pers[0]->{smo}= undef; next }
for (@pet) {
    $pers[0]->{pet}= $_;
    unless (verify(@pers)) { $pers[0]->{pet}= undef; next }
print $p2->{"nat"}," has fish\n";
    $pers[0]->{pet}= undef; }
    $pers[0]->{smo}= undef; }
    $pers[0]->{bev}= undef; }
    $pers[0]->{hc} = undef; }
    $pers[0]->{nat}= undef; }
```

Running the code

- ☐ On: WinXP PII-350 under cygwin perl

Code tricks

- ❑ Iterate through all possibilities, but bail out as early as possible if it doesn't work

- ❑ Test values must be *undef*fed before failing back to previous case

- ❑ Debugging is quite hard: add iterations gradually.