Challenge September 2026
Zebra puzzle

A solution with IBM Bob and OPL CPLEX by Alex Fleischer
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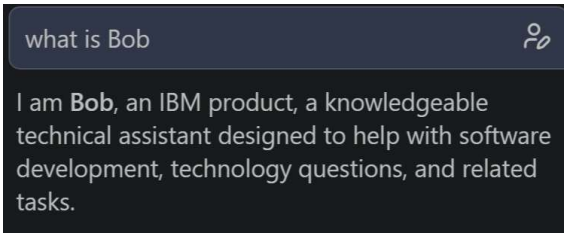
For this challenge I knew OPL CPLEX could help but I wanted to give it a go with Generative AI in general and IBM Bob in particular.

What is Bob ?

Let me ask Bob.



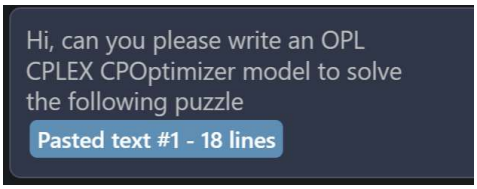
So within Bob I asked

Hi, can you please write an OPL CPLEX CPOptimizer model to solve the following puzzle

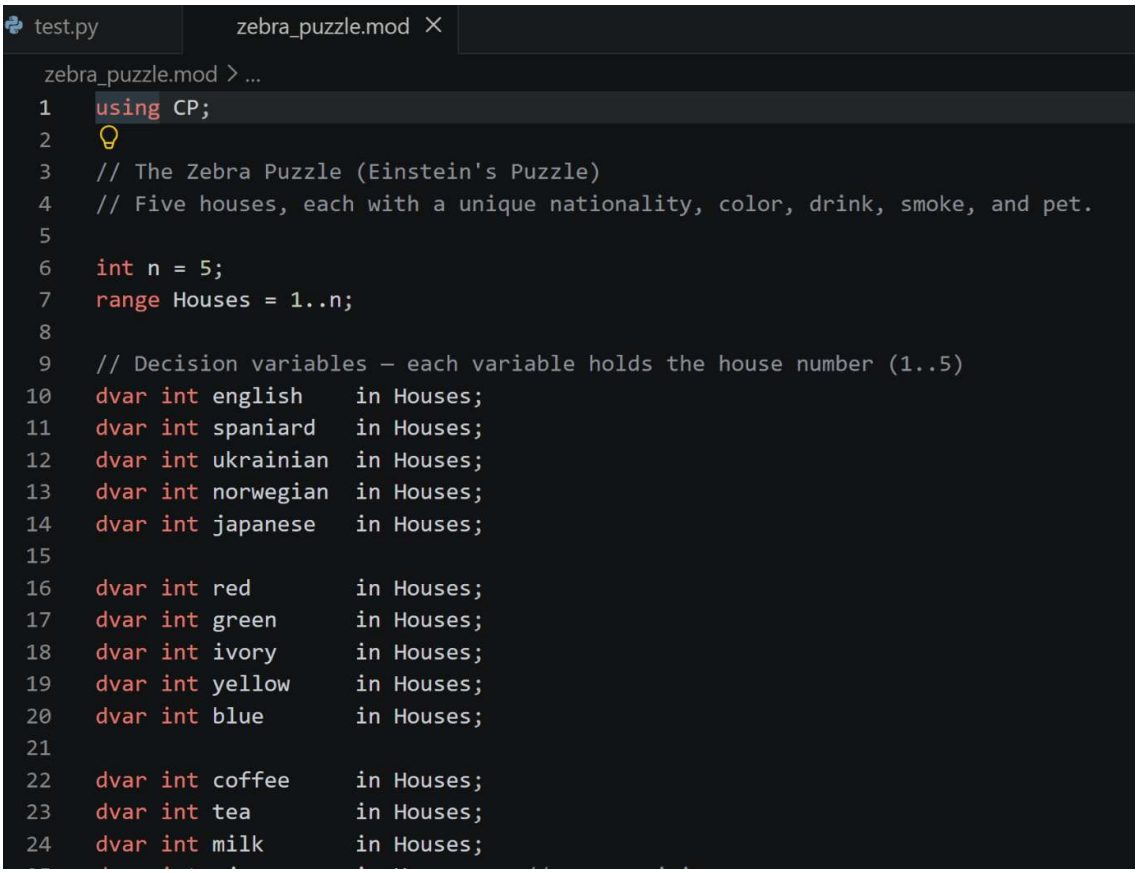
There are five houses.
The Englishman lives in the red house.
The Spaniard owns the dog.

Coffee is drunk in the green house.
The Ukrainian drinks tea.
The green house is immediately to the right of the ivory house.
The Old Gold smoker owns snails.
Kools are smoked in the yellow house.
Milk is drunk in the middle house.
The Norwegian lives in the first house.
The man who smokes Chesterfields lives in the house next to the man with the fox.
Kools are smoked in the house next to the house where the horse is kept.
The Lucky Strike smoker drinks orange juice.
The Japanese smokes Parliaments.
The Norwegian lives next to the blue house.

Question: Where is the zebra?



And 2 seconds later within Bob I see



using CP;

// The Zebra Puzzle (Einstein's Puzzle)
// Five houses, each with a unique nationality, color, drink, smoke, and pet.

int n = 5;
range Houses = 1..n;

// Decision variables — each variable holds the house number (1..5)
dvar int english in Houses;
dvar int spaniard in Houses;
dvar int ukrainian in Houses;
dvar int norwegian in Houses;
dvar int japanese in Houses;

dvar int red in Houses;
dvar int green in Houses;
dvar int ivory in Houses;
dvar int yellow in Houses;
dvar int blue in Houses;

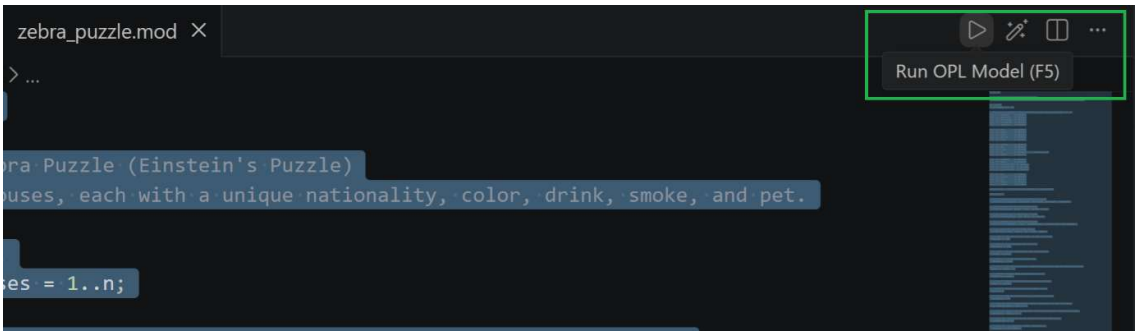
dvar int coffee in Houses;
dvar int tea in Houses;
dvar int milk in Houses;

```
dvar int oj         in Houses;   // orange juice
dvar int water      in Houses;

dvar int oldGold    in Houses;
dvar int kools      in Houses;
dvar int chesterfield in Houses;
dvar int luckyStrike  in Houses;
dvar int parliaments  in Houses;

dvar int dog        in Houses;
dvar int snails     in Houses;
dvar int fox        in Houses;
dvar int horse      in Houses;
dvar int zebra      in Houses;

// Arrays for allDifferent — OPL CP requires array arguments
dvar int nationalities[1..5] in Houses;
dvar int colors[1..5]        in Houses;
dvar int drinks[1..5]        in Houses;
dvar int smokes[1..5]        in Houses;
dvar int pets[1..5]          in Houses;

minimize 0;   // satisfaction problem — no objective

subject to {

  // Bind named variables to array slots
  nationalities[1] == english;   nationalities[2] == spaniard;
  nationalities[3] == ukrainian; nationalities[4] == norwegian;
  nationalities[5] == japanese;

  colors[1] == red;    colors[2] == green;
  colors[3] == ivory;  colors[4] == yellow;
  colors[5] == blue;

  drinks[1] == coffee; drinks[2] == tea;
  drinks[3] == milk;   drinks[4] == oj;
  drinks[5] == water;

  smokes[1] == oldGold;      smokes[2] == kools;
  smokes[3] == chesterfield; smokes[4] == luckyStrike;
  smokes[5] == parliaments;

  pets[1] == dog;   pets[2] == snails;
  pets[3] == fox;   pets[4] == horse;
  pets[5] == zebra;

  // All values in each category are distinct
  allDifferent(nationalities);
  allDifferent(colors);
```

```
  allDifferent(drinks);
  allDifferent(smokes);
  allDifferent(pets);

  // Clue 1: The Englishman lives in the red house.
  english == red;

  // Clue 2: The Spaniard owns the dog.
  spaniard == dog;

  // Clue 3: Coffee is drunk in the green house.
  coffee == green;

  // Clue 4: The Ukrainian drinks tea.
  ukrainian == tea;

  // Clue 5: The green house is immediately to the right of the ivory house.
  green == ivory + 1;

  // Clue 6: The Old Gold smoker owns snails.
  oldGold == snails;

  // Clue 7: Kools are smoked in the yellow house.
  kools == yellow;

  // Clue 8: Milk is drunk in the middle house.
  milk == 3;

  // Clue 9: The Norwegian lives in the first house.
  norwegian == 1;

  // Clue 10: The Chesterfields smoker lives next to the fox owner.
  abs(chesterfield - fox) == 1;

  // Clue 11: Kools are smoked next to the house where the horse is kept.
  abs(kools - horse) == 1;

  // Clue 12: The Lucky Strike smoker drinks orange juice.
  luckyStrike == oj;

  // Clue 13: The Japanese smokes Parliaments.
  japanese == parliaments;

  // Clue 14: The Norwegian lives next to the blue house.
  abs(norwegian - blue) == 1;
}

execute {
  writeln("=== Zebra Puzzle Solution ===");
  writeln();
```

```
  // Build a display array per house
  var nationality = new Array(6);
  var color       = new Array(6);
  var drink       = new Array(6);
  var smoke       = new Array(6);
  var pet         = new Array(6);

  nationality[english]   = "English";
  nationality[spaniard]  = "Spaniard";
  nationality[ukrainian] = "Ukrainian";
  nationality[norwegian] = "Norwegian";
  nationality[japanese]  = "Japanese";

  color[red]    = "Red";
  color[green]  = "Green";
  color[ivory]  = "Ivory";
  color[yellow] = "Yellow";
  color[blue]   = "Blue";

  drink[coffee] = "Coffee";
  drink[tea]    = "Tea";
  drink[milk]   = "Milk";
  drink[oj]     = "Orange Juice";
  drink[water]  = "Water";

  smoke[oldGold]      = "Old Gold";
  smoke[kools]        = "Kools";
  smoke[chesterfield] = "Chesterfield";
  smoke[luckyStrike]  = "Lucky Strike";
  smoke[parliaments]  = "Parliaments";

  pet[dog]    = "Dog";
  pet[snails] = "Snails";
  pet[fox]    = "Fox";
  pet[horse]  = "Horse";
  pet[zebra]  = "Zebra";

  for (var h = 1; h <= 5; h++) {
    writeln("House " + h + ": " +
            nationality[h] + " | " +
            color[h]       + " | " +
            drink[h]       + " | " +
            smoke[h]       + " | " +
            pet[h]);
  }

  writeln();
  writeln("*** The ZEBRA lives in house " + zebra + " (" + nationality[zebra] + ") ***");
}
```

Which I can directly run within Bob



And I get

=== Zebra Puzzle Solution ===

House 1: Norwegian | Yellow | Water | Kools | Fox
House 2: Ukrainian | Blue | Tea | Chesterfield | Horse
House 3: English | Red | Milk | Old Gold | Snails
House 4: Spaniard | Ivory | Orange Juice | Lucky Strike | Dog
House 5: Japanese | Green | Coffee | Parliaments | Zebra

*** The ZEBRA lives in house 5 (Japanese) ***

21 years ago when I joined ILOG this took me one hour but with Bob I get a nice OPL CPLEX model that I can fully understand and update in less than one minute.

Bob and other code generation AI tools will clearly make writing optimization models easier. A high level modeling language like OPL makes even more sense.

Thanks Bob!