

Write a Prolog program based on the facts and rules given below.

For the facts below, use one of two binary-relationships: `part_of` (for components) or `made_of` (for material types metal, plastic, and fiber).

A hotplate has the following parts:

cord, body, heating element, and cover

The cover of a hotplate has the following parts:

knobs

The cord of a hotplate has the following parts:

wire and insulator

A heating element is made of metal.

Knobs are made of plastic.

Wire is made of metal.

Insulator is made of fiber.

**Example fact: `part_of(cord, hotplate)`.**

Define rule(s) for transitivity for `part_of`: If object A is part of B and object B is part of object C, then object A is part of object C.

Define rule(s) for upward inheritance of material with respect to `part_of`: An object is made of a material if any part of the item is made of the material.

Be careful to avoid infinite loops (a clue is the error message "Out of stack space" when running a program).

Transitivity rules of the following form can cause infinite recursion:

```
rule(A, C) :- rule(A, B), rule(B, C). /* do not use this */
```

Instead, use two rules:

```
rule2(A,B) :- rule(A,B).  
rule2(A,C) :- rule(A,B), rule2(B,C).
```

Use your program to answer the following questions on the back of this page. Turn in this sheet at the beginning of class on the due date.

**CMPS 5113**

**Name:**\_\_\_\_\_

**Prolog Homework**

**Roster Number:**\_\_\_\_\_

**Due: Wednesday, Nov 16**

Use your program to answer the following questions:

- 1) Which objects contain metal?
  
  
  
  
  
  
  
  
  
  
- 2) List all of the parts that make up a hotplate:
  
  
  
  
  
  
  
  
  
  
- 3) Which objects contain plastic or fiber?
  
  
  
  
  
  
  
  
  
  
- 4) Which objects contain metal or fiber?