

G53KRR: Answer to the exercise on production systems

Exercise For the following production system, trace the results, assuming that the conflict resolution strategy is: an instance of most important applicable rule is selected. If there are more than one such instances, the instance is selected randomly. The order of rule importance is: R3 more important than R1, R1 is more important than R2.

F1 *animal(tiger)*

F2 *animal(cat)*

F3 *large(tiger)*

F4 *eatsMeat(tiger)*

F5 *eatsMeat(cat)*

R1 $\forall x(\text{animal}(x) \wedge \text{large}(x) \wedge \text{eatsMeat}(x) \supset \text{dangerous}(x))$

R2 $\forall x(\text{animal}(x) \supset \text{breathesOxygen}(x))$

R3 $\forall x(\text{dangerous}(x) \supset \text{runAwayNow})$

Answer Cycle 1: the conflict set is:

rule instance 1 Instance of rule R1 with x/tiger (matches F1, F3, F4)

rule instance 2 Instance of rule R2 with x/tiger (matches F1)

rule instance 3 Instance of rule R2 with x/cat (matches F2)

The instance which is selected is rule instance 1, because R1 is more important than R2. It is applied and a new fact added to the WM: **F6** *dangerous(tiger)*.

Cycle 2: the conflict set is:

rule instance 2 Instance of rule R2 with x/tiger (matches F1)

rule instance 3 Instance of rule R2 with x/cat (matches F2)

rule instance 4 Instance of rule R3 with x/tiger (matches F6)

Note that rule instance 1 is removed because it was used, and we don't apply the same rule instance twice.

In cycle 2, rule instance 4 is selected, because R3 is more important than R2. *runAwayNow* is added.

Cycle 3: the conflict set is:

rule instance 2 Instance of rule R2 with x/tiger (matches F1)

rule instance 3 Instance of rule R2 with x/cat (matches F2)

Randomly select instance 2. Add *breathesOxygen(tiger)*.

Cycle 4: the conflict set is:

rule instance 3 Instance of rule R2 with x/cat (matches F2)

Select instance 3. Add *breathesOxygen(cat)*.

Cycle 5: conflict set empty.