

Solution to Exercise 5.

Clara and Doris carpool to work. On even days Clara drives Doris and on odd days Doris drives Clara. In the former case, Clara is the driver and Doris is the passenger; in the latter case Doris is the driver and Clara is the passenger. When Doris is hill Clara is the driver. Both Clara and Doris have a drive license and the drive license is needed to drive. Passengers do not need the drive license.

Question 1: The predicate calculus is OK as a KR Language at least at the beginning with the above specification. NB. The formalization task is always related to the world described at the beginning, for this reason FOL is correct here (see the answer to question 3). Anyway, providing a formalization with a non monotonic formalism it is not wrong (but more difficult).

Question 2: When we provide a formalization it is not always needed to report everything is written in the test but just the abstraction that are needed to model a given world.

Here what we want to know is the fact that Clara and Doris carpool to work, when this is possible with the related conditions. For example is the carpool predicate that include information on the driver and on the passenger.

We assume the following Predicates:

carpool(Driver,Passenger,Place,Day)

drivelicense(Person)

hill(Person)

This is a possible KB (NB not the only one):

FORALL ?day. even(?day) AND drivelicense(Clara) → carpool(Clara,Doris,Work,?day)

FORALL ?day odd(?day) AND drivelicense(Doris) → carpool(Doris,Clara,Work,?day)

FORALL ?day hill(Doris) AND drivelicense(Clara) → carpool(Clara,Doris,Work,?day)

drivelicense(Clara)

drivelicense(Doris)

The we assume for each working day the facts odd(day1), odd(day3),.....
even(day2),even(day4),.....

Question 3:

We can represent the additional knowledge as follow:

even(current_day)

NOT drivelicense(Clara)

However, if we extend the KB with NOT drivelicense(Clara) it become not consistent, and it is not possible to prove that they carpool to work.

To represent this extension a default logic is needed, and an additional condition should be added and formalized: if one of the two is hill the other will be the driver.