KB = {

a. CanBikeToWork → CanGetToWork

b. CanDriveToWork → CanGetToWork

c. CanWalkToWork → CanGetToWork

d. HaveBike ∧ WorkCloseToHome ∧ Sunny → CanBikeToWork

e. HaveMountainBike → HaveBike

f. HaveTenSpeed → HaveBike

g. OwnCar → CanDriveToWork

h. OwnCar → MustGetAnnualInspection

i. OwnCar → MustHaveValidLicense

j. CanRentCar → CanDriveToWork

k. HaveMoney ∧ CarRentalOpen → CanRentCar

l. HertzOpen→ CarRentalOpen

m. AvisOpen→ CarRentalOpen

n. EnterpriseOpen→ CarRentalOpen

o. CarRentalOpen → IsNotAHoliday

p. HaveMoney ∧ TaxiAvailable → CanDriveToWork

q. Sunny ∧ WorkCloseToHome → CanWalkToWork

r. HaveUmbrella ∧ WorkCloseToHome → CanWalkToWork

s. Sunny → StreetsDry

}

Facts: {

t. Rainy

u. HaveMoutainBike

v. EnjoyPlayingSoccer

w. WorkForUniversity

x. WorkCloseToHome

y. HaveMoney

z. HertzClosed

aa. AvisOpen

bb. McDonaldsOpen

}

Prove that 'CanGetToWork' is entailed by Backward-Chaining. Trace all steps, showing the goal stack, show which rules are used at each step, and indicate if and when back-tracking occurs.

|  |  |
| --- | --- |
| *Goal stack* |  |
| CanGetToWork | Initial |
| CanBikeToWork | Push rule a |
| HaveBike, WorkCloseToHome, Sunny | Push rule d |
| HaveMountainBike, WorkCloseToHome, Sunny | Pop HaveBike, push rule e |
| WorkCloseToHome, Sunny | Pop HaveMountainBike since it’s a known fact |
| Sunny | Pop WorkCloseToHome |
| HaveBike, WorkCloseToHome, Sunny | Pop Sunny since no known rule and no facts; backtrack to next rule for HaveBike |
| HaveTenSpeed, WorkCloseToHome, Sunny | Pop HaveBike, push rule f |
| WorkCloseToHome, Sunny | Pop HaveTenSpeed and backtrack because it cannot be proved so go back to rule b AND discard the stack |
| CanDriveToWork | Pushing rule B |
| OwnCar | Pop CanDriveToWork, push rule g |
| CanDriveToWork | Pop OwnCar because there is no known rule; backtrack to CanDriveToWork |
| CanRentCar | Pop CanDriveToWork, push rule j |
| HaveMoney, CarRentalOpen | Pop CanRentCar, push rule k |
| CarRentalOpen | Pop HaveMoney since it’s a known fact |
| HertzOpen | Pop CarRentalOpen, push rule i |
| CarRentalOpen | Pop HertzOpen, since HertzOpen is not a known fact, I will backtrack to CarRentalOpen |
| AvisOpen | Pop CarRentalOpen, push rule j |
|  | Pop AvisOpen since it’s a known fact |
| NULL | Stack is empty, thus proved |