

03/12/2024

LAB - 09

1) Using first order logic - prove the given query using forward chaining or forward reasoning.

→ It starts with a knowledge base to that base we put logic and using the inference rules we extract a new information from the existing base.

→ Using this forward chaining method we will extract the goal state given query.

→ As per the law, it is a crime for an American to sell weapons to hostile nations. Country A an enemy of America has some missiles, and all the missiles were sold to it by Robert, who is an American citizen.

To prove: Robert is criminal.

Representation in FOL

1 → It is a crime for an American to sell weapons to hostile nations

America = p $\exists p \wedge \exists q \wedge \exists r$ sells(p,q,r) A Hostile(r)

weapons = q $\exists q \wedge \exists r$ sells(p,q,r) \Rightarrow Criminal(r)

hostile = r $\exists r$ sells(p,q,r) \Rightarrow Criminal(r)

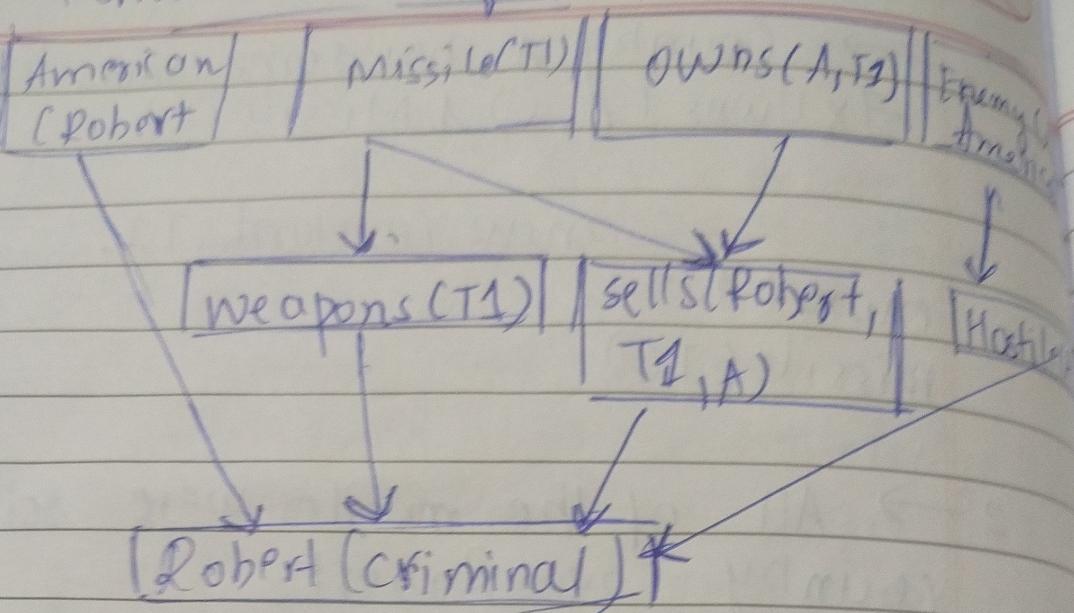
American }
 weapon

- 2 → Country A has some missiles
 $\exists x \text{Owes}(A, x) \wedge \text{Missile}(x)$
- Owns (Country A, x)
Missile (x)
- Owns (A, T1);
Missile (T1)
- 3 → All of the missiles were sold to
Country by Robert.
- $\forall x \text{Missile}(x) \wedge \text{Owes}(A, x) \Rightarrow \text{Sells}(\text{Robert}, x, A)$
- 4 → Missiles are weapons.
 $\text{Missile}(x) \Rightarrow \text{Weapon}(x)$
- 5 → Enemy of America is known as hostile
 $\forall x \text{Enemy}(x, \text{America}) \Rightarrow \text{Hostile}(x)$
- 6 → Robert is an American
American (Robert)
- 7 → The country A, an enemy of America
enemy (A, America).

To prove:

Robert is Criminal
Criminal (Robert).

Forward Chaining proof:



$\text{American(P)} \wedge \text{Weapon(V)} \wedge \text{Sells(P, V, R)} \wedge \text{Hostile(R)} \Rightarrow (\text{Criminal(P)})$