

Cho cơ sở tri  
thức gồm  
các luật sau.  
Hãy vẽ đồ  
thị AND/OR.

$$P \Rightarrow Q$$

$$L \wedge M \Rightarrow P$$

$$B \wedge L \Rightarrow M$$

$$A \wedge P \Rightarrow L$$

$$A \wedge B \Rightarrow L$$

$A$

$B$

$$P \Rightarrow Q$$

$$L \wedge M \Rightarrow P$$

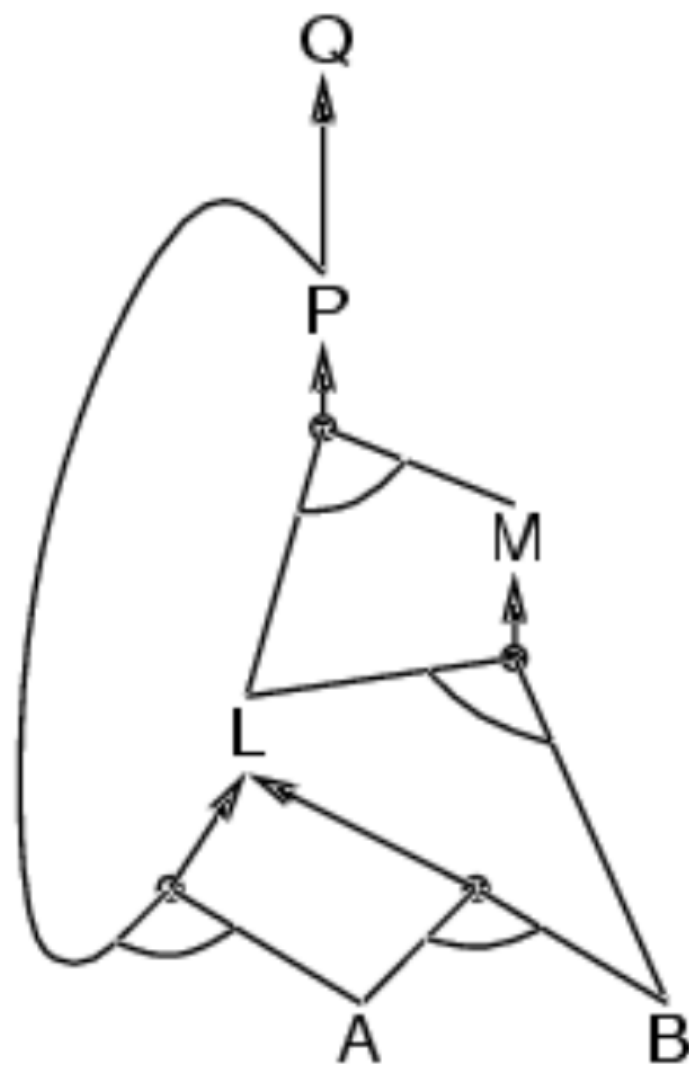
$$B \wedge L \Rightarrow M$$

$$A \wedge P \Rightarrow L$$

$$A \wedge B \Rightarrow L$$

$A$

$B$



# Suy diễn tiến – Ví dụ

$$P \Rightarrow Q$$

$$L \wedge M \Rightarrow P$$

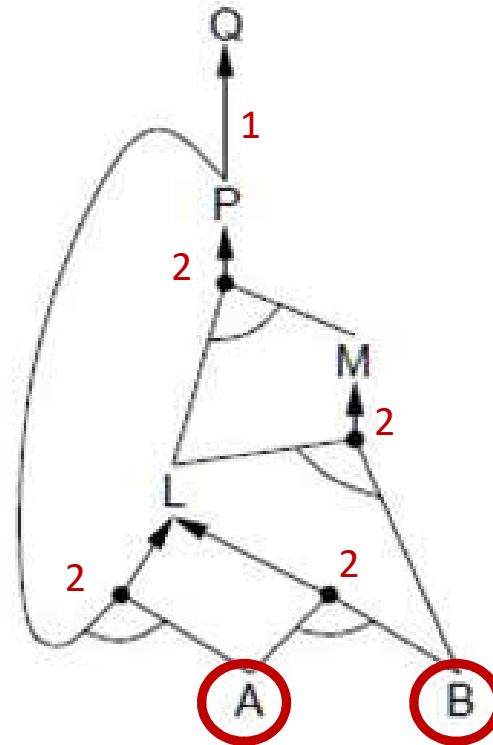
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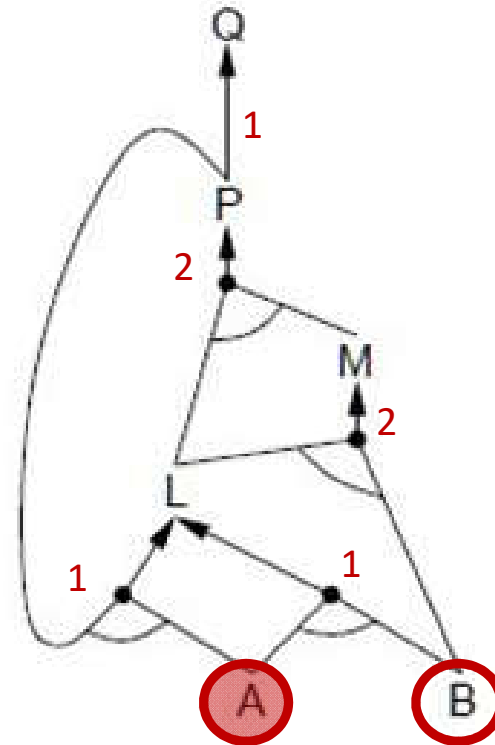
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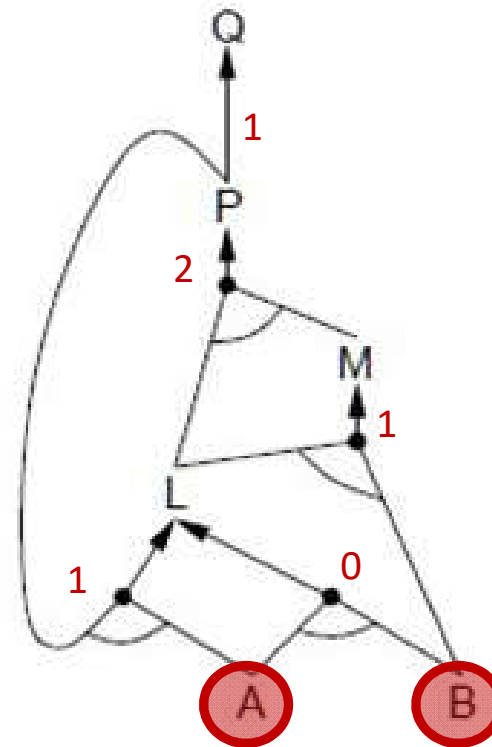
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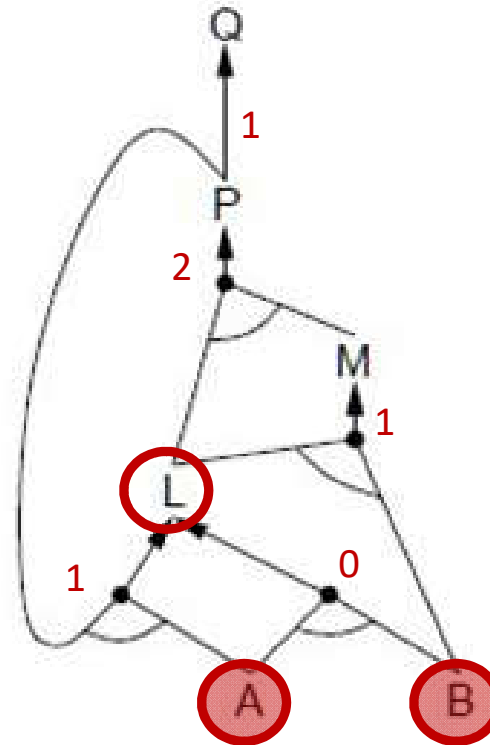
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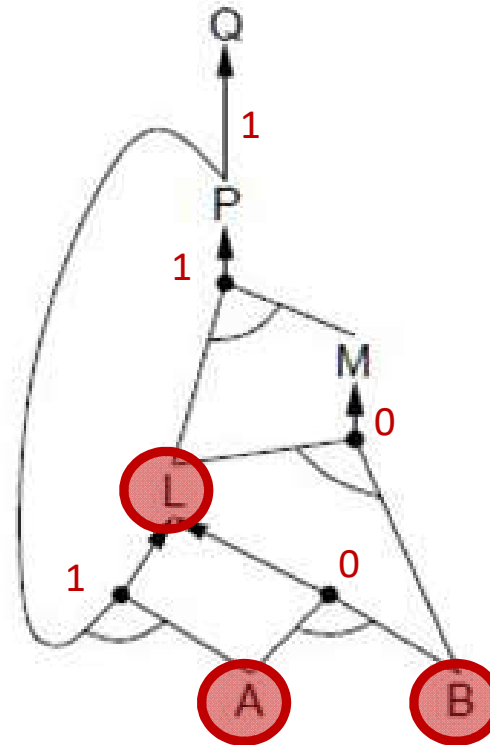
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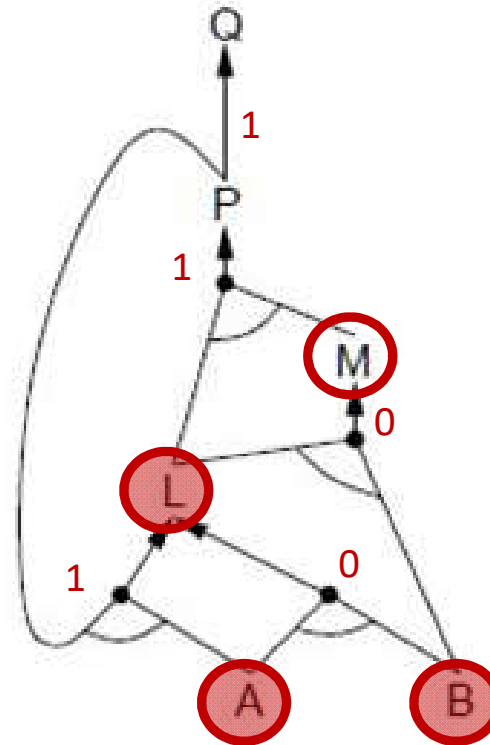
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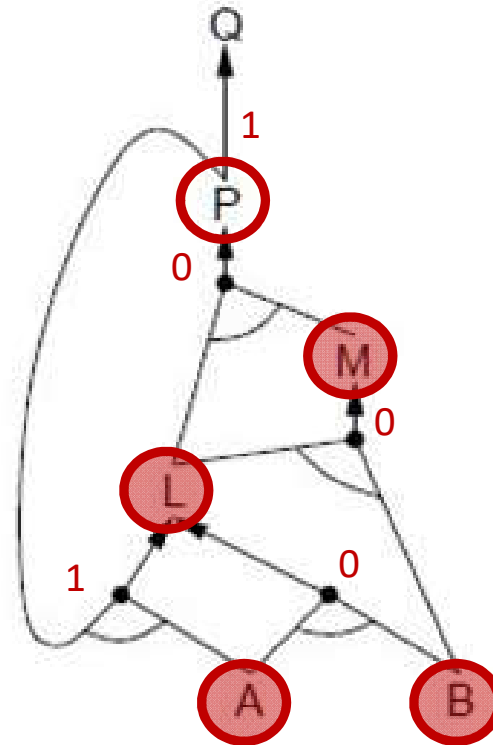
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## Suy diễn tiến – Ví dụ

$$P \Rightarrow Q$$

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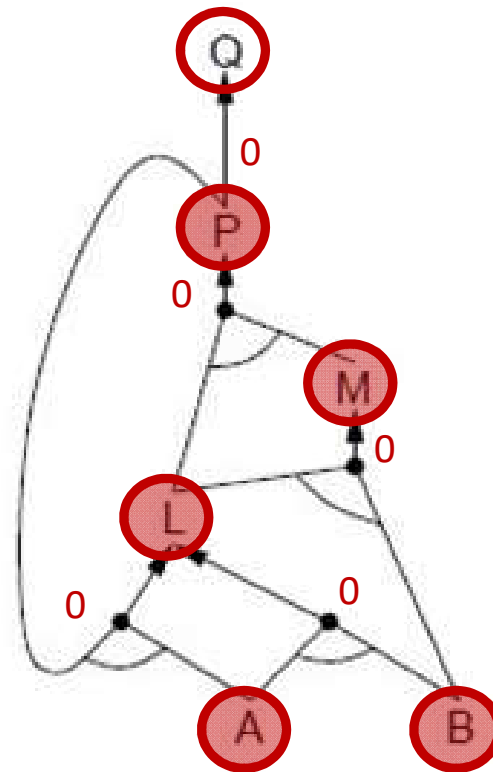
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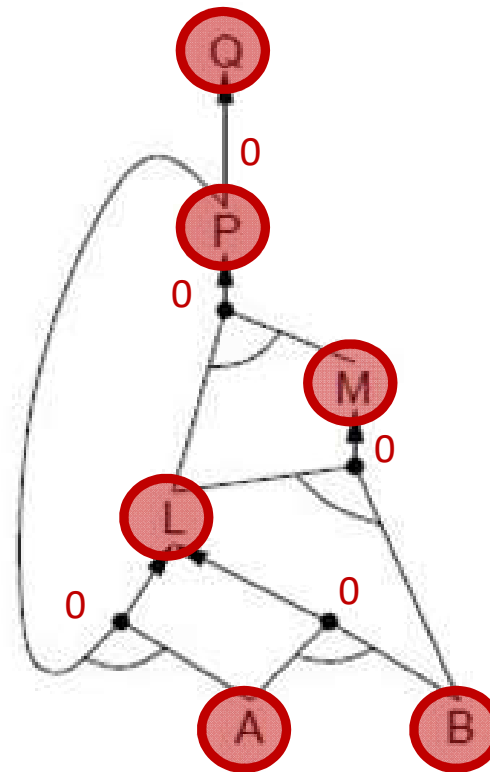
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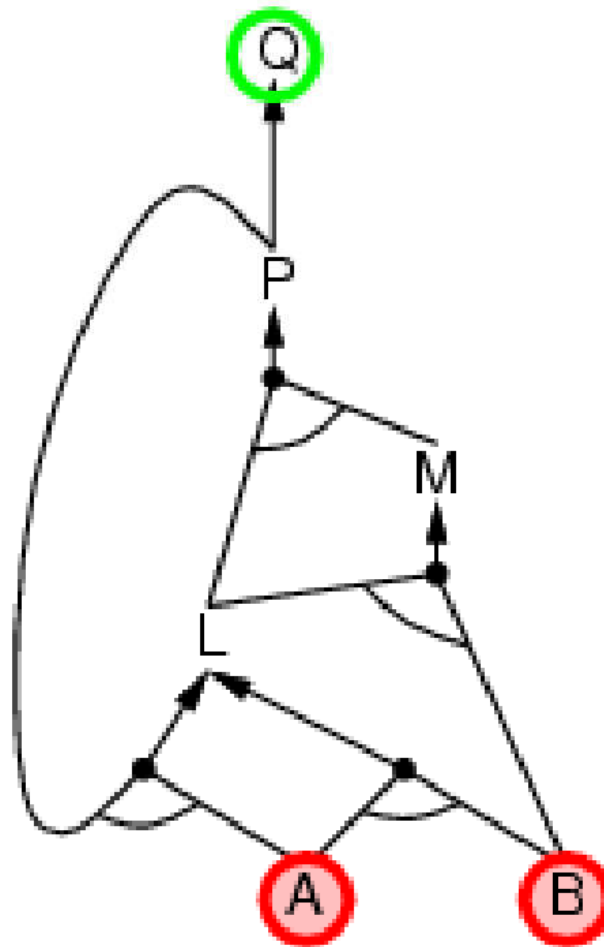
$$A \wedge B \Rightarrow L$$

$A$

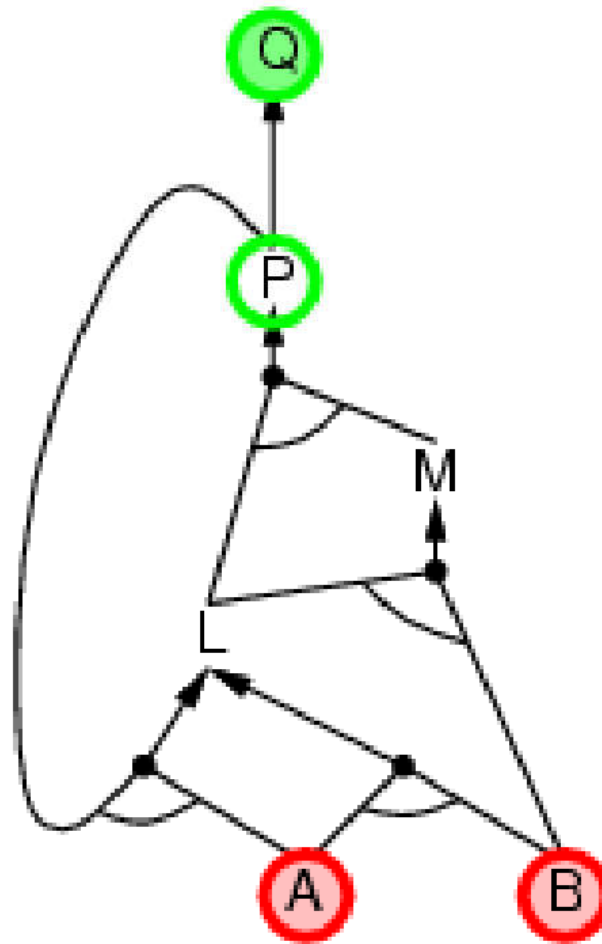
$B$



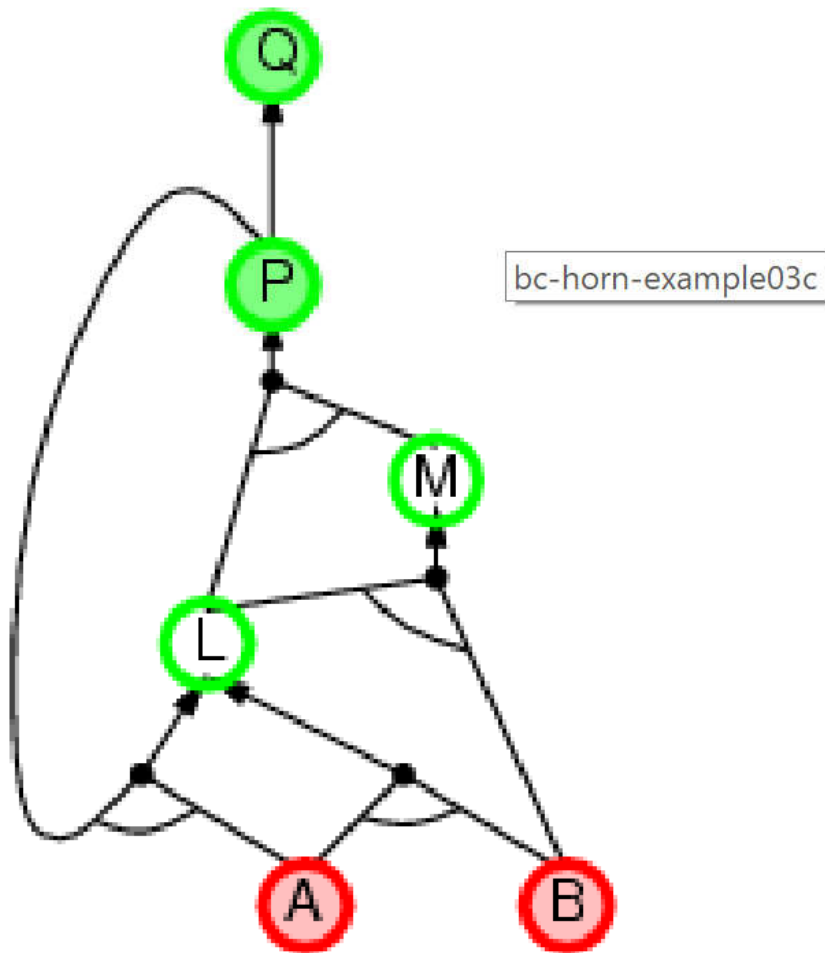
## Suy diễn lùi – Ví dụ (1)



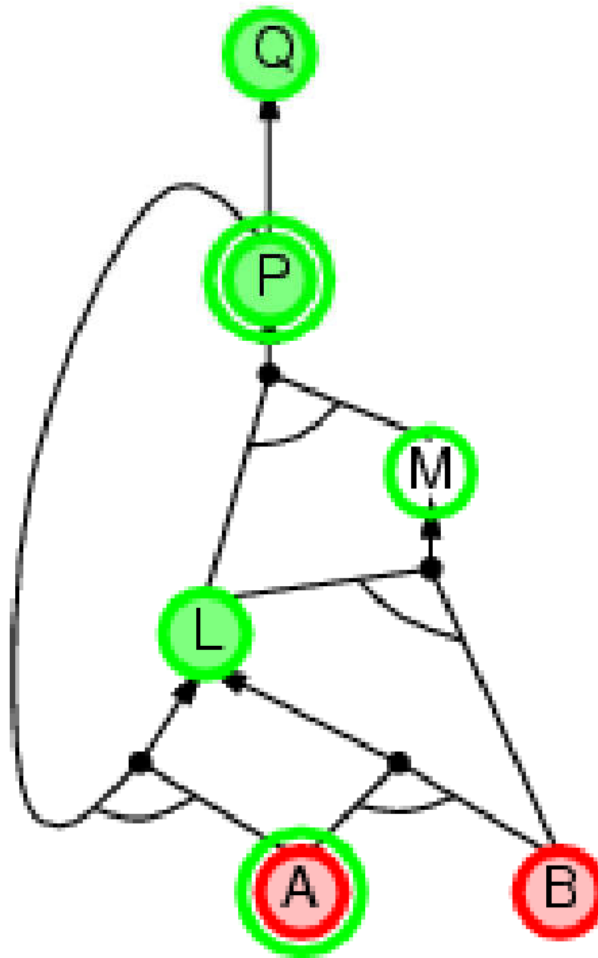
## Suy diễn lùi – Ví dụ (2)



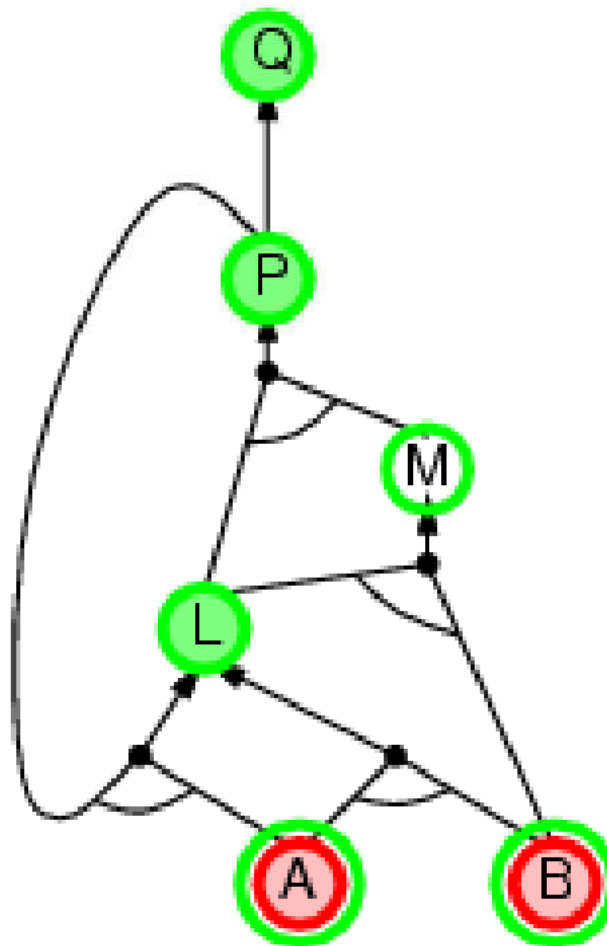
## Suy diễn lùi – Ví dụ (3)



## Suy diễn lùi – Ví dụ (4)



## Suy diễn lùi – Ví dụ (5)





- Theo luật lệ nếu một người Mỹ bán vũ khí cho quốc gia thù địch với nước Mỹ thì bị coi là phạm tội. Nước Nono, là kẻ thù của nước Mỹ, Nono có tên lửa, và tất cả tên lửa của nước này đều mua của đại tá West, Một người Mỹ.
- Chứng minh đại tá West có tội.

# Forward Chaining Example

- ...Một người Mỹ bán vũ khí cho quốc gia thù địch là có tội:  
 $American(x) \wedge Weapon(y) \wedge Sells(x,y,z) \wedge Hostile(z) \Rightarrow Criminal(x)$
- Nono có tên lửa  
 $\exists x Owns(Nono, x) \wedge Missiles(x)$   
 $Owns(Nono, M_1) \text{ and } Missile(M_1)$
- ...Tất cả tên lửa đều do đại tá West bán  
 $\forall x Missile(x) \wedge Owns(Nono, x) \Rightarrow Sells(West, x, Nono)$
- Tên lửa là vũ khí  
 $Missile(x) \Rightarrow Weapon(x)$

# Forward Chaining Example

- Kẻ thù của nước Mỹ được gọi là thù địch  
 $Enemy(x, America) \Rightarrow Hostile(x)$
- Đại tá West là một người Mỹ  
 $American(Col. West)$
- Nước Nono là kẻ thù của Mỹ  
 $Enemy(Nono, America)$

# Forward Chaining Example

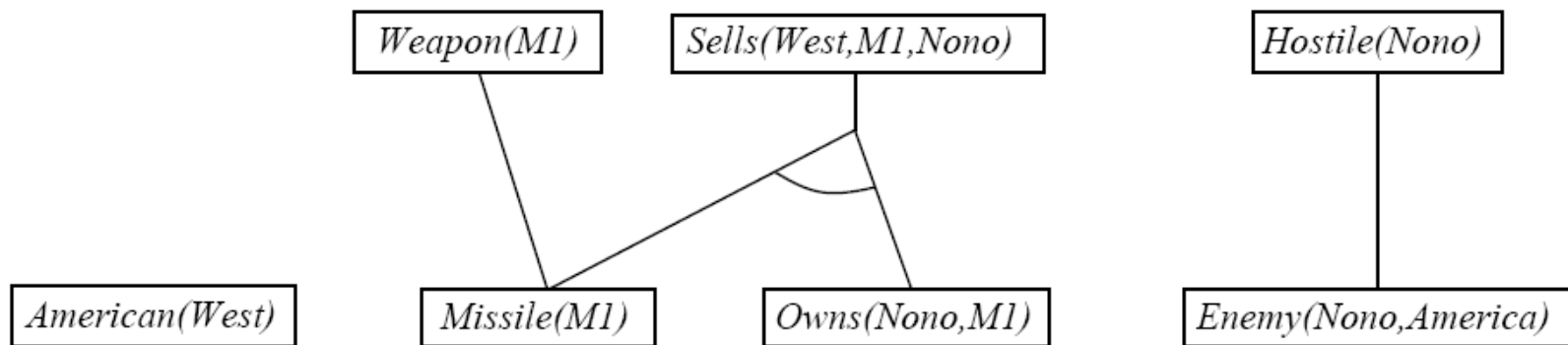
*American(West)*

*Missile(M1)*

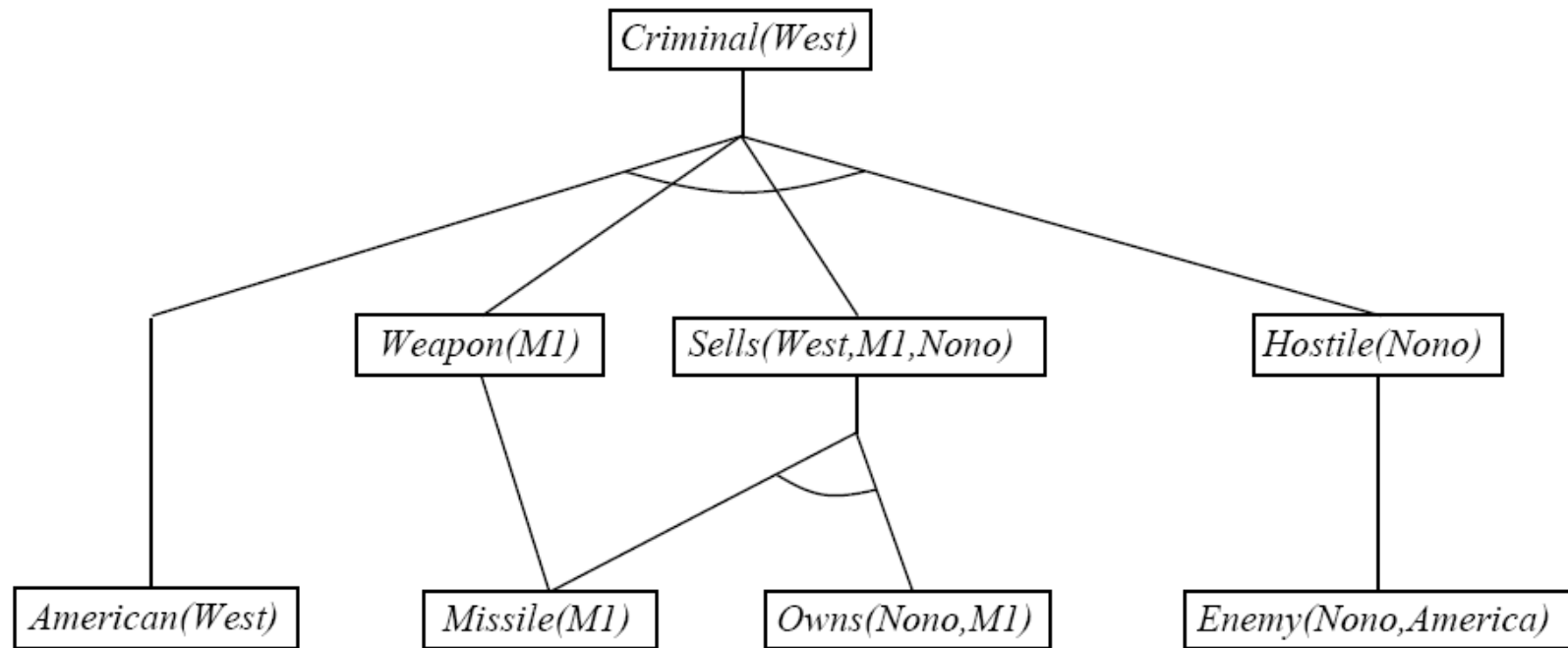
*Owns(Nono,M1)*

*Enemy(Nono,America)*

# Forward Chaining Example



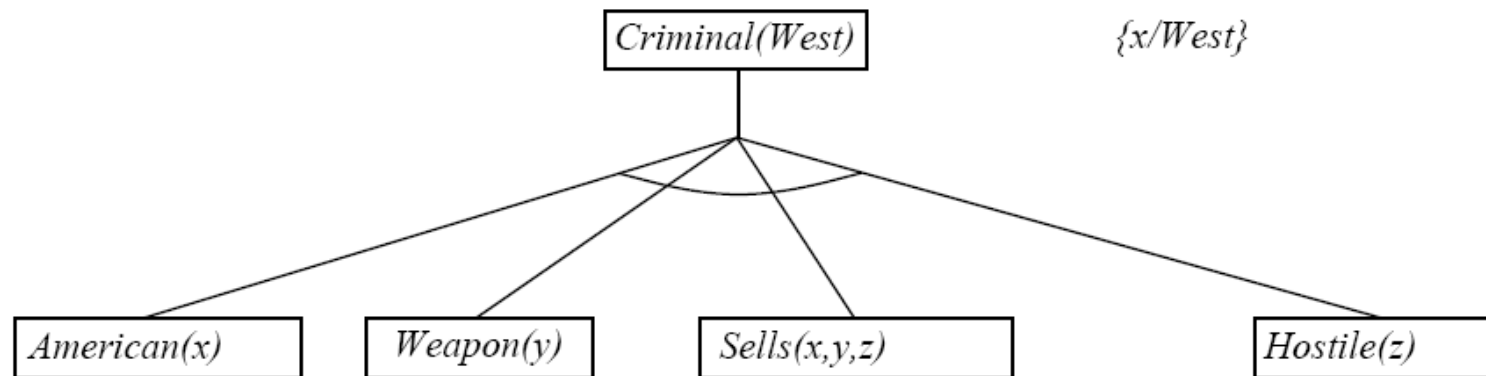
# Forward Chaining Example



# Backward Chaining Example

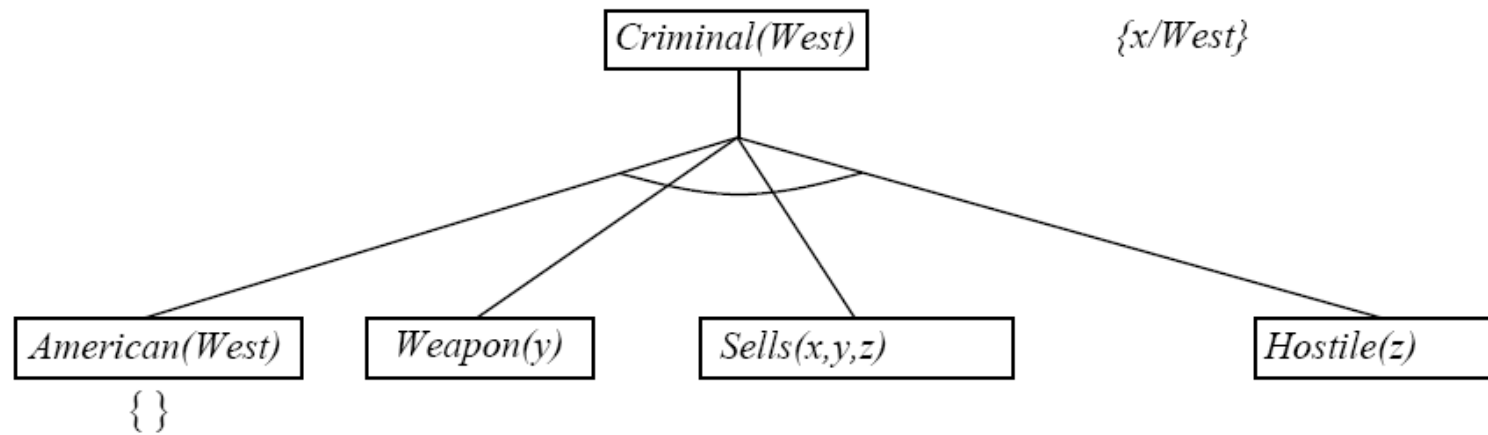
*Criminal(West)*

# Backward Chaining Example

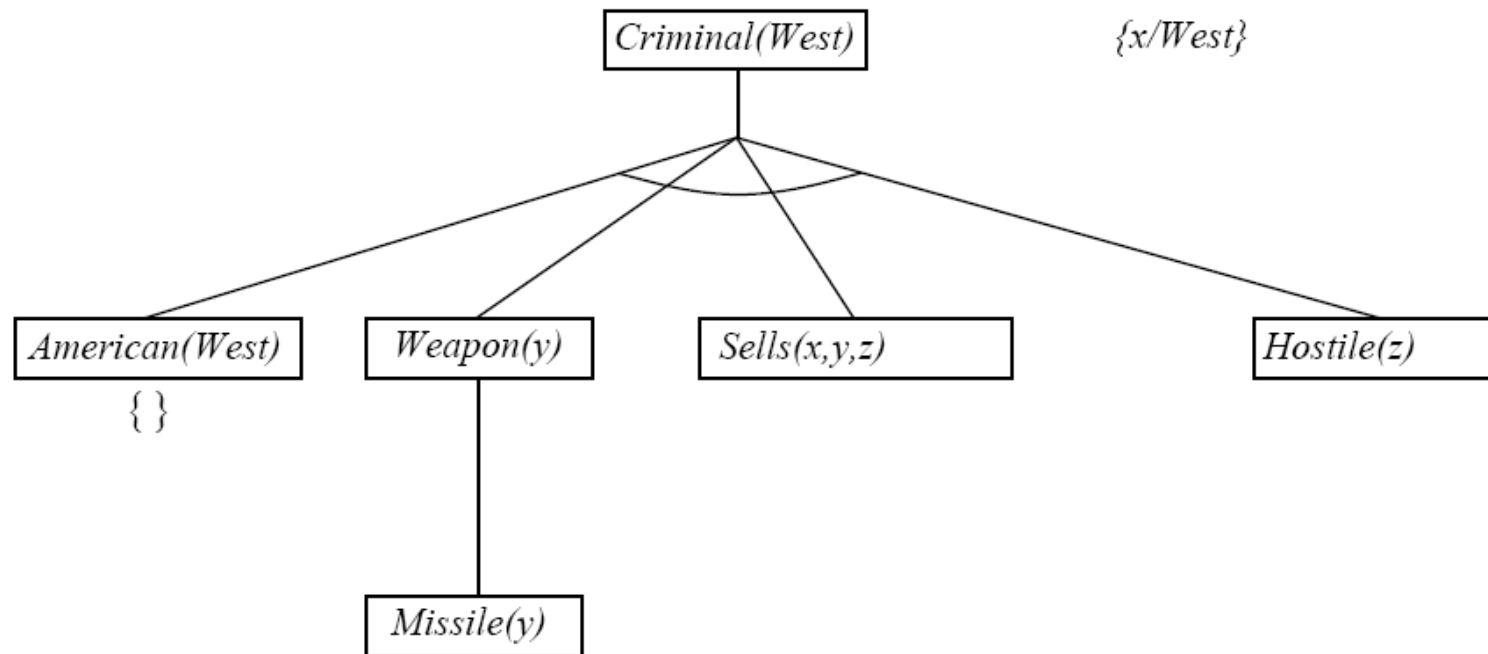




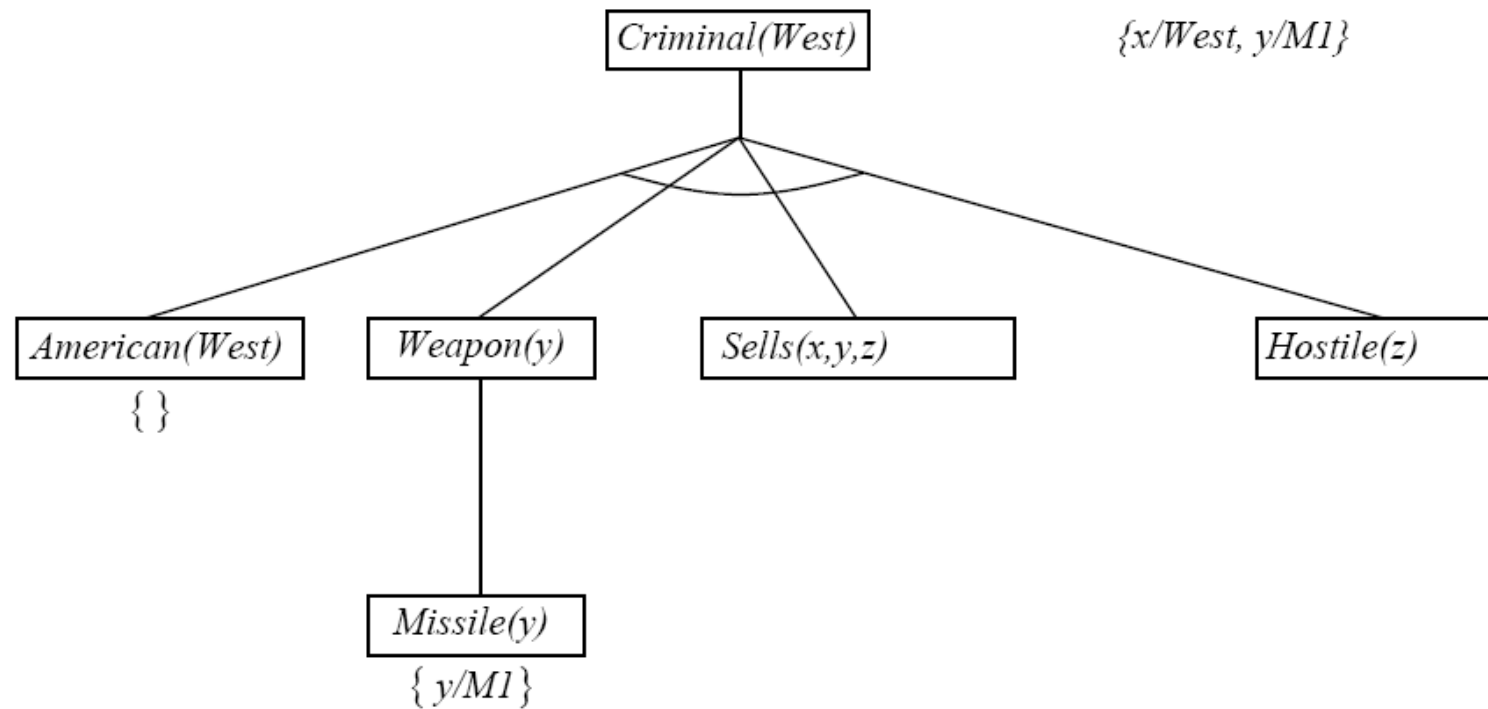
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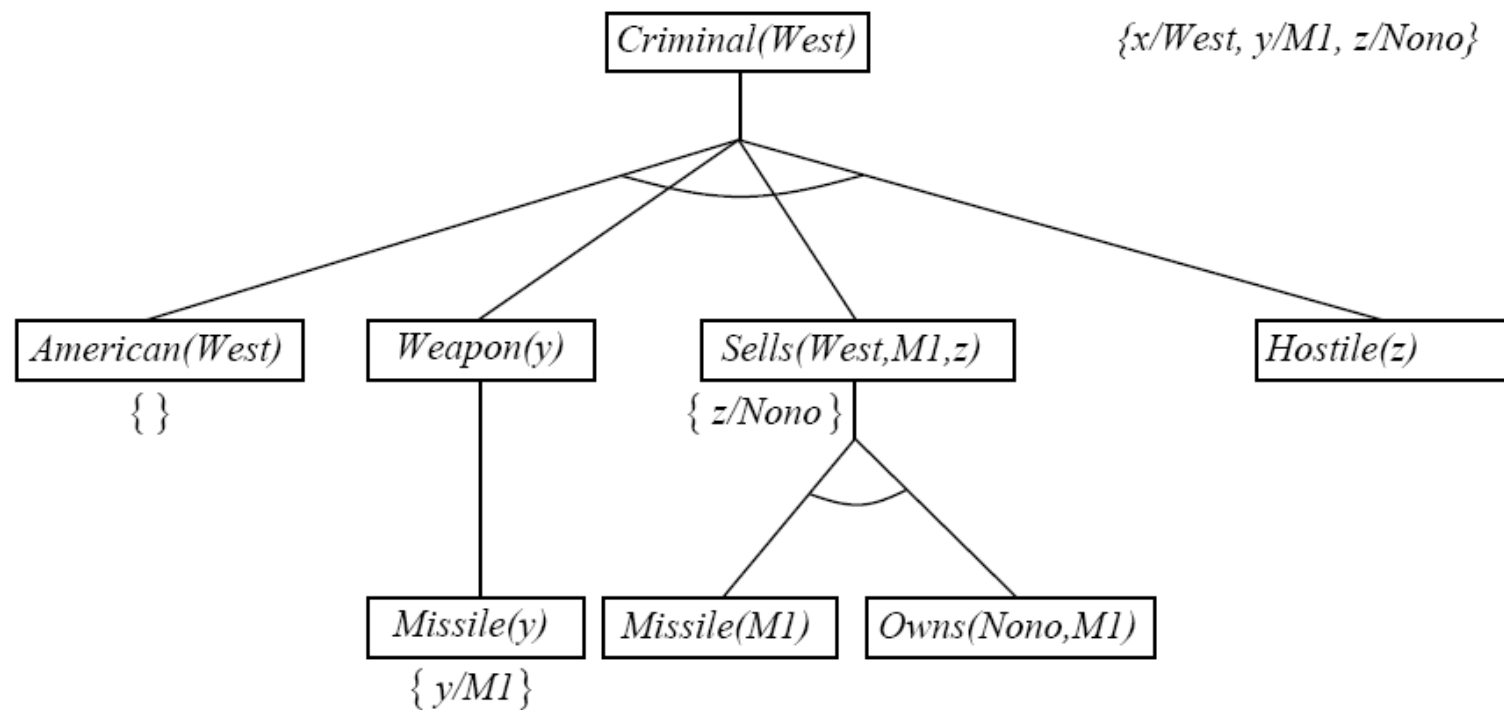
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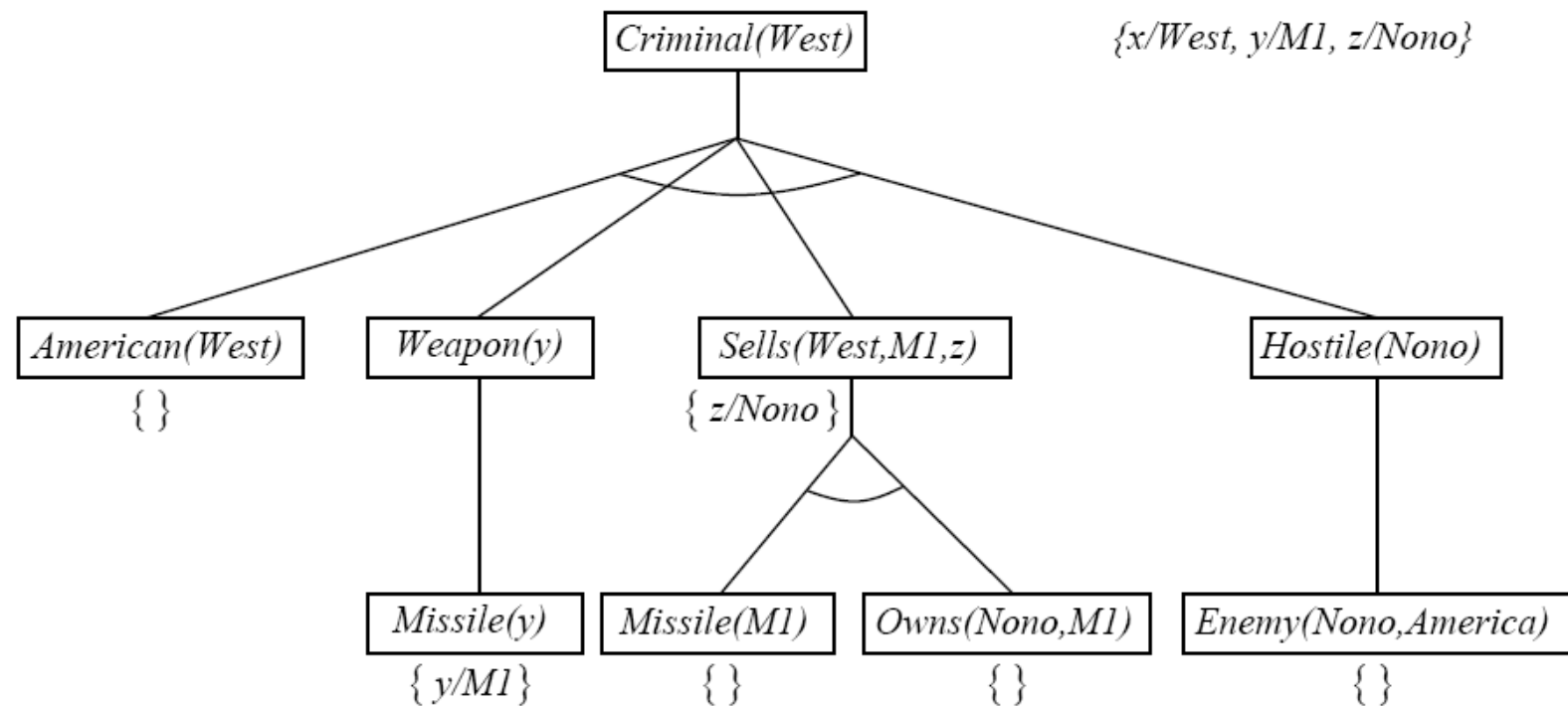
# Backward Chaining Example



# Backward Chaining Example



# Backward Chaining Example



- Cho tập các luật và dữ kiện như hình bên, hãy vẽ đồ thị AND/OR để tìm vị trí của Fred

### Predicate Calculus Example

1. Fred is a collie.  
**collie(fred).**
2. Sam is Fred's master.  
**master(fred,sam).**
3. The day is Saturday.  
**day(saturday).**
4. It is cold on Saturday.  
 **$\neg$  (warm(saturday)).**
5. Fred is trained.  
**trained(fred).**
6. Spaniels are good dogs and so are trained collies.  
 **$\forall X[\text{spaniel}(X) \vee (\text{collie}(X) \wedge \text{trained}(X)) \rightarrow \text{gooddog}(X)]$**
7. If a dog is a good dog and has a master then he will be with his master.  
 **$\forall (X,Y,Z) [\text{gooddog}(X) \wedge \text{master}(X,Y) \wedge \text{location}(Y,Z) \rightarrow \text{location}(X,Z)]$**
8. If it is Saturday and warm, then Sam is at the park.  
 **$(\text{day}(\text{saturday}) \wedge \text{warm}(\text{saturday})) \rightarrow \text{location}(\text{sam},\text{park}).$**
9. If it is Saturday and not warm, then Sam is at the museum.  
 **$(\text{day}(\text{saturday}) \wedge \neg (\text{warm}(\text{saturday}))) \rightarrow \text{location}(\text{sam},\text{museum}).$**

- Fred is a collie.

collie (fred).

- Sam is Fred's master.

master(fred,sam).

- It is Saturday.

day(saturday).

- It is a cold Saturday.

$\neg$  ( warm(saturday) ).

- Fred is a trained dog.

trained (fred).

- Spaniels or collies that are trained are good dogs.

$$\forall X [\text{spaniel}(X) \vee (\text{collie}(X) \wedge \text{trained}(X)) \Rightarrow \text{gooddog}(X)]$$

- If a dog is a good dog and has a master then he will be with his master.

$$\forall (X,Y,Z)[ \text{gooddog}(X) \wedge \text{master}(X,Y) \wedge \text{location}(Y,Z) \Rightarrow \text{location}(X,Z)]$$

- If it is Saturday and warm, then Sam is at the park.

$$\text{day}(\text{saturday}) \wedge \text{warm}(\text{saturday}) \Rightarrow \text{location}(\text{sam}, \text{park}).$$

- If it is Saturday and not warm, then Sam is at the museum .

$$\text{day}(\text{saturday}) \wedge \neg (\text{warm}(\text{saturday})) \Rightarrow \text{location}(\text{sam}, \text{museum}).$$



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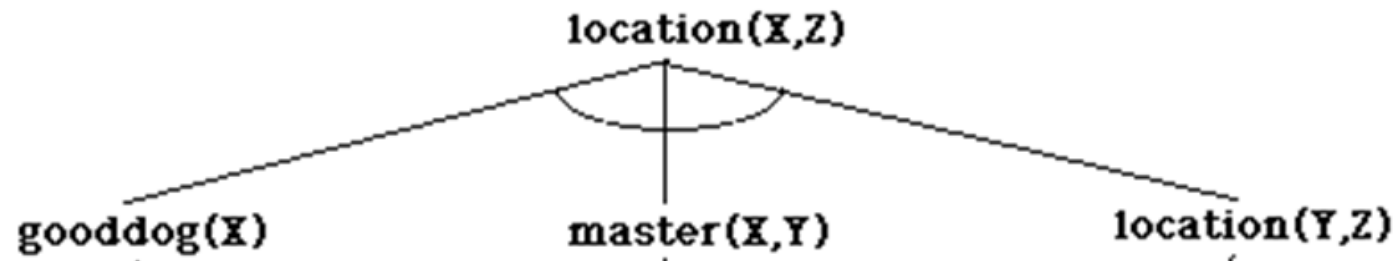
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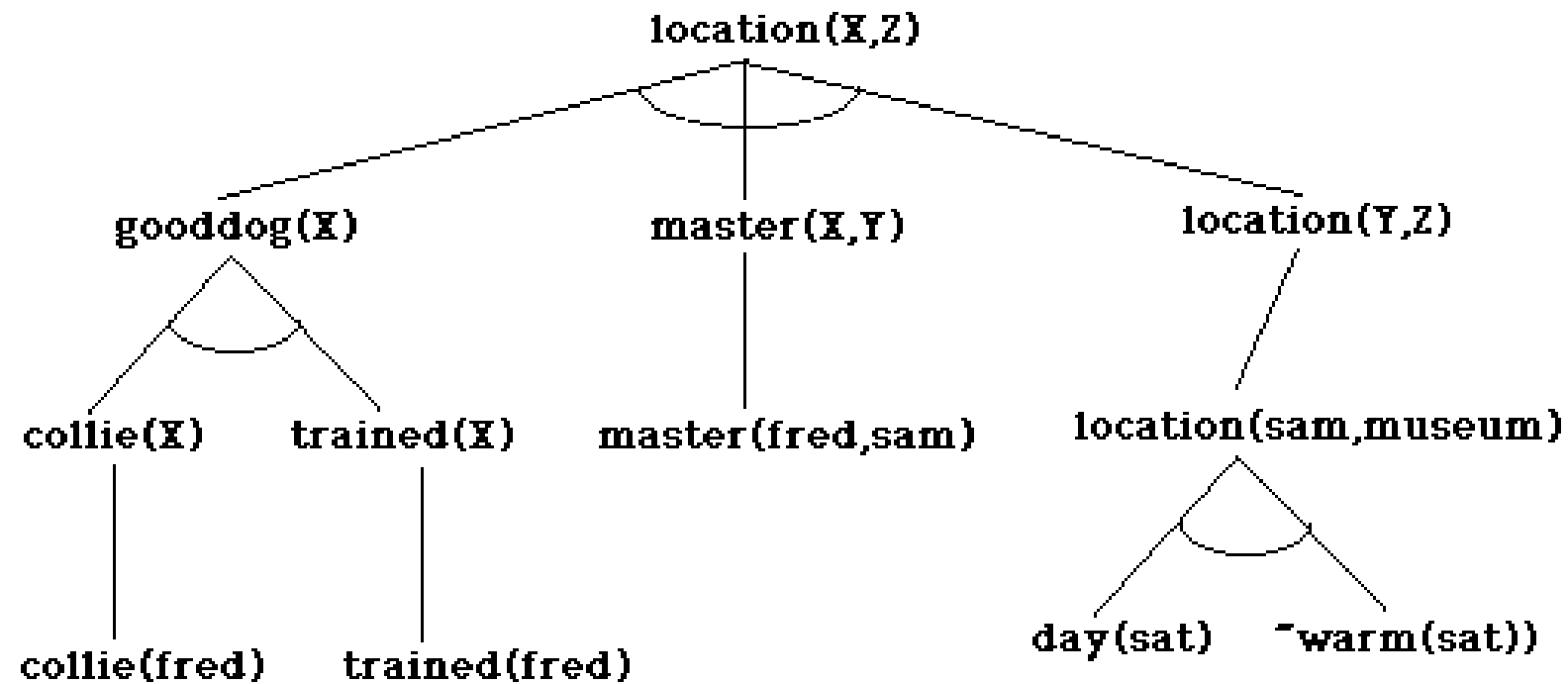
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Goal-Driven Search: Where is fred?

Substitutions: {fred/X, sam/Y, museum/Z}