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Knowledge Based Systems

(CM0377)

Lecture 2

(Last modified 27th January 2001)

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Some goals for the family program

- parent_of(bill, albert).
- parent_of(john, jerry).
- male(fred).
- parent_of(X, alice).
- parent_of(jane, X).
- parent_of(X, Y).

NB *declarative* nature of Prolog means we can use rules in >1 way.

3

A compound goal

```
| ?- parent_of(X, jim), male(X).

X = bill ? ;

no
| ?-
```

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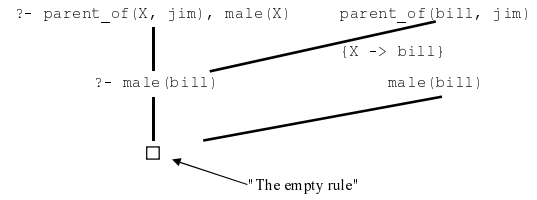
Proof tree



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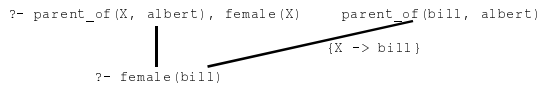
Failed proof tree



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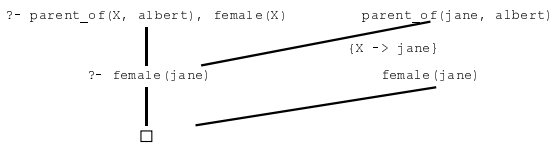
Successful proof tree



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A rule

- father_of(F, Ch):-parent_of(F, Ch), male(F).
- “F is a father of Ch if F is a parent of Ch and F is male”
- “Someone is a person’s father if he is his or her parent and he is male”

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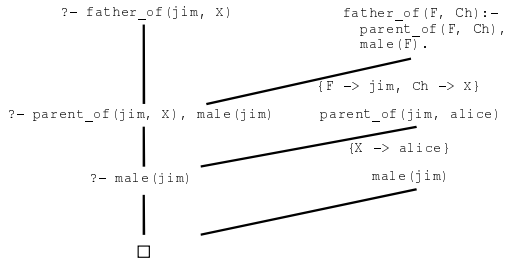
Proof tree: “Whose father is Jim?”



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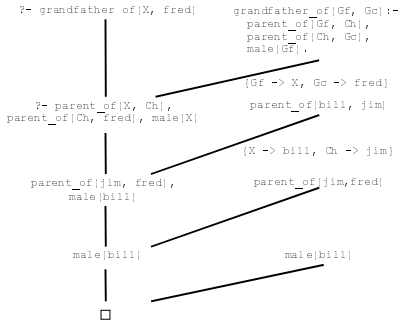
“Who’s Fred’s grandfather?”



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General pattern

- To answer a query

  $?- Q_1, Q_2, \ldots Q_n$

  find a rule

  $A :- B_1, \ldots, B_m$

  such that A matches with Q_1 and answer query:

  $?- B_1, \ldots B_m, Q_2, \ldots Q_n$

  instead *(resolution)*

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Exercise

1 Devise a query for 'Is Jim Fred's father?' and draw a corresponding proof tree showing that he is.

2 Devise an alternative proof tree corresponding to 'Whose father is Jim?', showing that Jim is a father of John.

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Next time

- More complex queries to the family program
- A numerical example
- Structures and lists in Prolog