CS 336 Recitation
Prolog

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Prolog: Programming with logic

- A Prolog program is a collection of facts and rules
  - Facts are like records in a table
    - wifeOf(alice, bob).
  - Rules can be used to infer new knowledge
    - husbandOf(H, W) :- wifeOf(W, H).
- We use a Prolog program by posing queries
  - Queries are expressed by describing the desired results, rather than by giving an algorithm to compute the results
    - wifeOf(alice, ben).
    - husbandOf(H, alice).
    - wifeOf(W, H).

- Student (snum, sname, major, level, age)
- Class (cname, time, room, fid)
- Enrolled (snum, cname)
- Faculty (fid, fname)

- Find the names of all Juniors
- result(Sname) :- student(_, Sname, _, junior, _).

write this as a rule in the program, and run “result(Sname).” as query
“Sname” is a variable, “junior” is a constant

- Student (snum, sname, major, level, age)
- Class (cname, time, room, fid)
- Enrolled (snum, cname)
- Faculty (fid, fname)

- Find the names of students who are enrolled in Database class
- result(Sname) :-
  student(Snum, Sname, _, _, _),
  enrolled(Snum, database).

- Student (snum, sname, major, level, age)
- Class (cname, time, room, fid)
- Enrolled (snum, cname)
- Faculty (fid, fname)

- Find the names of students who are NOT enrolled in any class
- result(Sname) :-
  student(Snum, Sname, _, _, _),
  \+ enrolled(Snum, _).

cannot change the order

- Student (snum, sname, major, level, age)
- Class (cname, time, room, fid)
- Enrolled (snum, cname)
- Faculty (fid, fname)

- Find the names of students who are enrolled in two classes that meet at the same time
- result(Sname) :-

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student(Snum, Sname, _, _, _),
enrolled(Snum, Cname1), class(Cname1, Time, _, _),
enrolled(Snum, Cname2), class(Cname2, Time, _, _),
Cname1 \= Cname2.
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X \= Y ⟺ \+ X = Y ⟺ not(X = Y)

- Student (snum, sname, major, level, age)
- Class (cname, time, room, fid)
- Enrolled (snum, cname)
- Faculty (fid, fname)

- Find the names of students who major in CS
  OR are enrolled in a course taught by Chon
- result(Sname) :-
  student(_, Sname, cs, _, _).
  result(Sname) :-
  student(Snum, Sname, _ , _, _), enrolled(Snum, Cname),
  class(Cname, _, _, Fid), faculty(Fid, chon).

- Supplier (sid, sname)
- Part (pid, pname, color)
- Catalog (sid, pid, cost)

- Find the pname's of parts for which there is some supplier
- Find the sid's of suppliers who supply a red part OR a green part
- Find the sid's of suppliers who supply a red part AND a green part
- Find the sid's of suppliers who supply ONLY red parts
  (Hint: Find the sid's of suppliers who do not supply non-red parts)
- Find the sname's of suppliers who supply at least 2 red parts that cost more than $500

- Supplier (sid, sname)
- Part (pid, pname, color)
- Catalog (sid, pid, cost)

- Find the pname's of parts for which there is some supplier
- result(Pname) :-
  part(Pid, Pname, _),
  catalog(_, Pid, _).

- Supplier (sid, sname)
- Part (pid, pname, color)
- Catalog (sid, pid, cost)

- Find the sid's of suppliers who supply a red part OR a green part
- result(Sid) :-
  ~~supplier(Sid, _),~~
  part(Pid, _, red),
  catalog(Sid, Pid, _).
  result(Sid) :-
  ~~supplier(Sid, _),~~
  part(Pid, _, green),
  catalog(Sid, Pid, _).

- Supplier (sid, sname)
- Part (pid, pname, color)
- Catalog (sid, pid, cost)

- Find the sid's of suppliers who supply a red part AND a green part
- result(Sid) :-

  ~~supplier(Sid, _),~~
  part(Pid1, _, red), catalog(Sid, Pid1, _),
  part(Pid2, _, green), catalog(Sid, Pid2, _).

- Supplier (sid, sname)
- Part (pid, pname, color)
- Catalog (sid, pid, cost)

- Find the sid's of suppliers who supply ONLY red parts
  (Hint: Find the sid's of suppliers who do not supply non-red parts)
- supplyOtherThanRedParts(Sid) :-
  ~~supplier(Sid, _),~~ catalog(Sid, Pid, _), \+ part(Pid, _, red).
- result(Sid) :-
  ~~supplier(Sid, _), part(Pid, _, red), catalog(Sid, Pid, _),~~
  catalog(Sid, _, _),
  \+ supplyOtherThanRedParts(Sid).

- Supplier (sid, sname)
- Part (pid, pname, color)
- Catalog (sid, pid, cost)

- Find the sname's of suppliers who supply at least 2 red parts that cost more than $500
- result(Sname) :-
  supplier(Sid, Sname),
  part(Pid1, _, red), catalog(Sid, Pid1, Cost1), Cost1 > 500,
  part(Pid2, _, red), catalog(Sid, Pid2, Cost2), Cost2 > 500,
  Pid1 \= Pid2.