**Facts Rules and Queries**

Prolog programs describe relations, defined by means of clauses Pure Prolog is restricted to [**Horn clauses**](https://en.wikipedia.org/wiki/Horn_clauses). There are two types of clauses: facts and rules.

A rule is of the form

Head :- Body.

and is read as "Head is true if Body is true". A rule's body consists of calls to predicates, which are called the rule's goals.

**Facts:**

Clauses with **empty bodies** are called facts.

Facts describe **explicit** relationships between objects and properties objects might have

An example of a fact is:

cat(tom).

which is equivalent to the rule:

cat(tom) :- true.

Ram has phone number 123123123 is written in prolog as

phoneno(ram,123123123).

**Note**:

* Names of properties /relationships begin with lowercase letter
* The **Relationship name** appears as the first term
* Objects appear as comma separated arguments within parenthesis
* A period “.” must end a fact
* Objects also begin with lower case letters. The also can begin with digits like 1234 and can be strings of characters enclosed in quotes e.g color(penink,’red’).
* phoneno(ram,123123123). is also called a **predicate** or a **clause**

**Facts about a Department of BCS-**

%teaches(X,Y): person X teaches course Y

teaches(ram, CS301).

%student(X,Y): person X student course Y

student(hari, CS301).

Together, these facts will form **Prolog’s database**/ **knowledge base**

**Rules**

Clauses with bodies are called **rules**. An example of a rule is:

animal(X) :- cat(X).

Consider the following case which produces a general rule-

One teacher will guide a student if the student studies that very course id on which the teacher teaches

In prolog this will be written as:

Guide(Teacher,Student):-

Teaches(Teacher,Coursed).

Studies(Student, Courseid).

**Facts are unit clauses and rules are non-unit clauses.**

**Queries**

Queries will be based on facts and rules. We can ask questions based on the stored information.

Suppose we want to know if ram lectures in CSC301 or not, then we can ask:

?-teaches(ram,CSC301).

Yes

In GNU prolog, queried are terminated by a full stop.

To answer this query, prolog consults its database to see if this is a known fact or not.

We can also ask-

?-teaches(ram,X).

X=CSC301

If answer is true or yes then the query is succeeded

If answer is false or no then the query failed.

Syntax of a clause

:- means “if” or “is implied by” also called the neck symbol.

The built-in [predicate](https://en.wikipedia.org/wiki/Predicate_(mathematics)) ,/2(meaning a 2-arity [operator](https://en.wikipedia.org/wiki/Operator_(programming)) with name ,) denotes [conjunction](https://en.wikipedia.org/wiki/Logical_conjunction) of goals, and ;/2 denotes [disjunction](https://en.wikipedia.org/wiki/Logical_disjunction). Conjunctions and disjunctions can only appear in the body, not in the head of a rule.

Example on clause writing:

P:- Q;R.

Can also be written as

P:-Q.

P:-R.

P:-Q,R;S,T,U.

Is understood as

P;-(Q,R);(S,T,U).

Can also be written as

P:-Q,R.

P:-S,T,U.

How does a prolog program execute

