

## Some old slides on unification

These were produced with SICStus Prolog; the prompts are little bit different.

# The unification predicate

Consider this query:

```
| ?- X = 1.
```

```
X = 1 ?
```

This is read "unify X with 1".

Another way to read it: "X must have the value 1."

X was able to unify with 1 because X had not been previously unified with anything else—it was previously *uninstantiated*. The unification *instantiates* X with the term 1.

In contrast, consider this:

```
| ?- X = 1, X = 2.
```

```
no
```

In this case, X is unified with 1, and then, because X is already unified with 1, it can't be unified with 2—the query fails. (*X must have the value 1 and X must have the value 2.*)

## Unification, continued

Note that the following query gets as far as the `write`.

```
| ?- X = 1, write(X), X = 2.  
1  
no
```

Logical variables can be unified with each other:

```
| ?- A = 1, B = 1, A = B.  
  
A = 1,  
B = 1 ?
```

In this case, A and B unify because they have the same value.

```
| ?- A = B, B = 10.  
  
A = 10,  
B = 10 ?
```

In this case, A and B unify because neither has been unified with a value yet. When B is unified with 10, A is unified with 10 because A was previously unified with B. (*A and B must have the same value and B must have the value 10.*)

## Unification, continued

A transitive case:

| ?- **A = B, B = C, A = 10.**

A = 10,  
B = 10,  
C = 10 ?

*A and B must have the same value, B and C must have the same value, and A must have the value 10.*

The unification of A with 10 causes A, B, and C to all be instantiated with the term 1

## The unification predicate, continued

A rule can use unification to produce a result in an argument of a rule invocation:

$$f(X, Y, Z) \text{ :- } X = 1, Y = 2, Z = 3.$$

Usage:

```
| ?- f(A,B,C) .
```

```
A = 1,
```

```
B = 2,
```

```
C = 3 ?
```

```
| ?- f(1,2,3) .
```

```
yes
```

```
| ?- f(A,B,3) .
```

```
A = 1,
```

```
B = 2 ?
```

# The unification predicate, continued

Another rule:

$$g(X, Y, Z) \text{ :- } X = Y, Y = Z.$$

Usage:

| ?- **g(1, B, C)** .

B = 1,  
C = 1 ?

| ?- **g(A, 10, C)** .

A = 10,  
C = 10 ?

# Unification, continued

At hand:

$$f(X, Y, Z) \text{ :- } X = 1, Y = 2, Z = 3.$$
$$g(X, Y, Z) \text{ :- } X = Y, Y = Z.$$

$f$  combined with  $g$ :

$$?- \mathbf{f(A, B, C), g(C, D, E)}.$$
$$A = 1,$$
$$B = 2,$$
$$C = 3,$$
$$D = 3,$$
$$E = 3 \text{ ?}$$