$$C(X) \rightarrow D(X)$$

$$D(X) \rightarrow C(X)$$

and similarly for $equivalentProperty$. Transitivity of a property P is easily expressed as

$$P(X, Y), P(Y, Z) \rightarrow P(X, Z)$$

Now we turn to Boolean operators. We can state that the intersection of classes C_1 and C_2 is a subclass of D as follows:

$$C_1(X), C_2(X) \rightarrow D(X)$$

In the other direction, we can state that C is a subclass of the intersection of D_1 and D_2 as follows:

$$C(X) \rightarrow D_1(X)$$

$$C(X) \rightarrow D_2(X)$$

For union, we can express that the union of C_1 and C_2 is a subclass of D using the following pair of rules:

$$C_1(X) \rightarrow D(X)$$

$$C_2(X) \rightarrow D(X)$$

However, the opposite direction is outside the expressive power of Horn logic. To express the fact that C is a subclass of the union of D_1 and D_2 would require a disjunction in the head of the corresponding rule, which is not available in Horn logic. Note that there are cases where the translation is possible. For example, when D_1 is a subclass of D_2, then the rule $C(X) \rightarrow D_2(X)$ is sufficient to express that C is a subclass of the union of D_1 and D_2. The point is that there is not a translation that works in all cases.

Finally, we briefly discuss some forms of restriction in OWL. The OWL statement