CHAPTER III
KNOWLEDGE REPRESENTATION FORMALIMS

Predicate logic

Example

- All dogs are animals

- All animals will die

- Fido is a dog

- Formalize these statements in first-order logic

- Prove that Fido will die using resolution
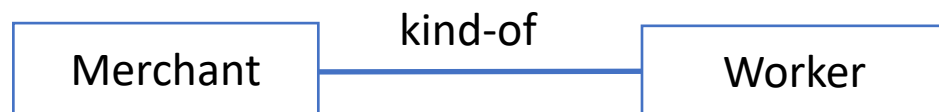
The relationships in semantic networks
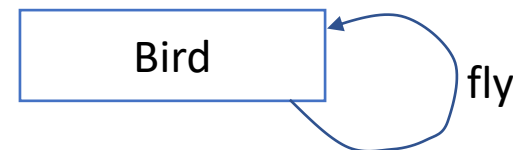
Examples

•Ali is a merchant

| Ali | is-a | Merchant |

•A merchant is a worker

| Merchant | kind-of | Worker |

•Birds possess wings

| Birds | possession | Wings |

•The bird fly

| Bird | fly |

SN construction

The Semantic Network (SN) allows for representing an entire discourse. To construct a Semantic Network, it is necessary to break down the discourse into a series of **atomic propositions**.

Example of a discourse:
A merchant is a worker, a worker is a person. A merchant possesses a business register and a business authorization. Ali and Mustapha are two merchants, Ali is old and Mustapha is young

SN construction

Atomic propositions:
- o A merchant is a kind of worker
- o A worker is a kind of person.
- o A merchant possesses a business register and a business authorization.
- o Ali is a merchants
- o Mustapha is a merchant
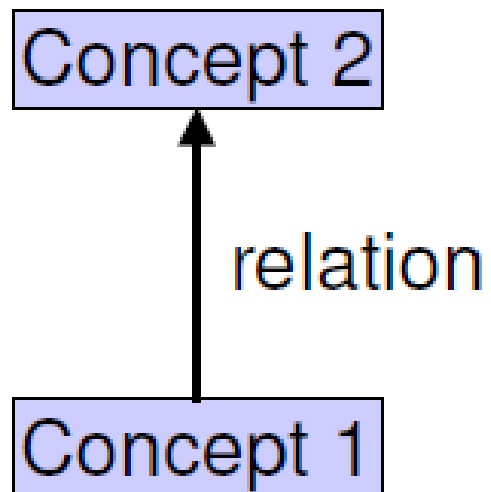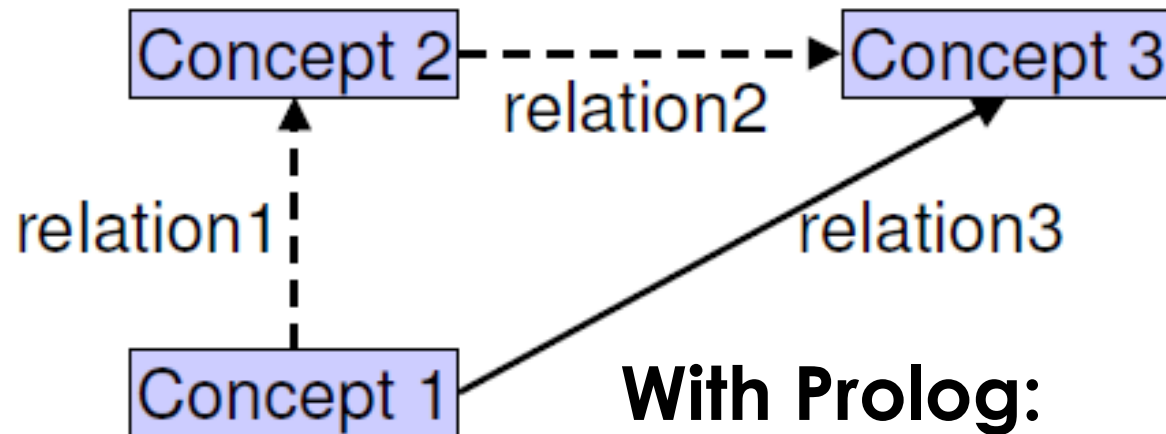- o Ali is old
- o Mustapha is young

SN construction
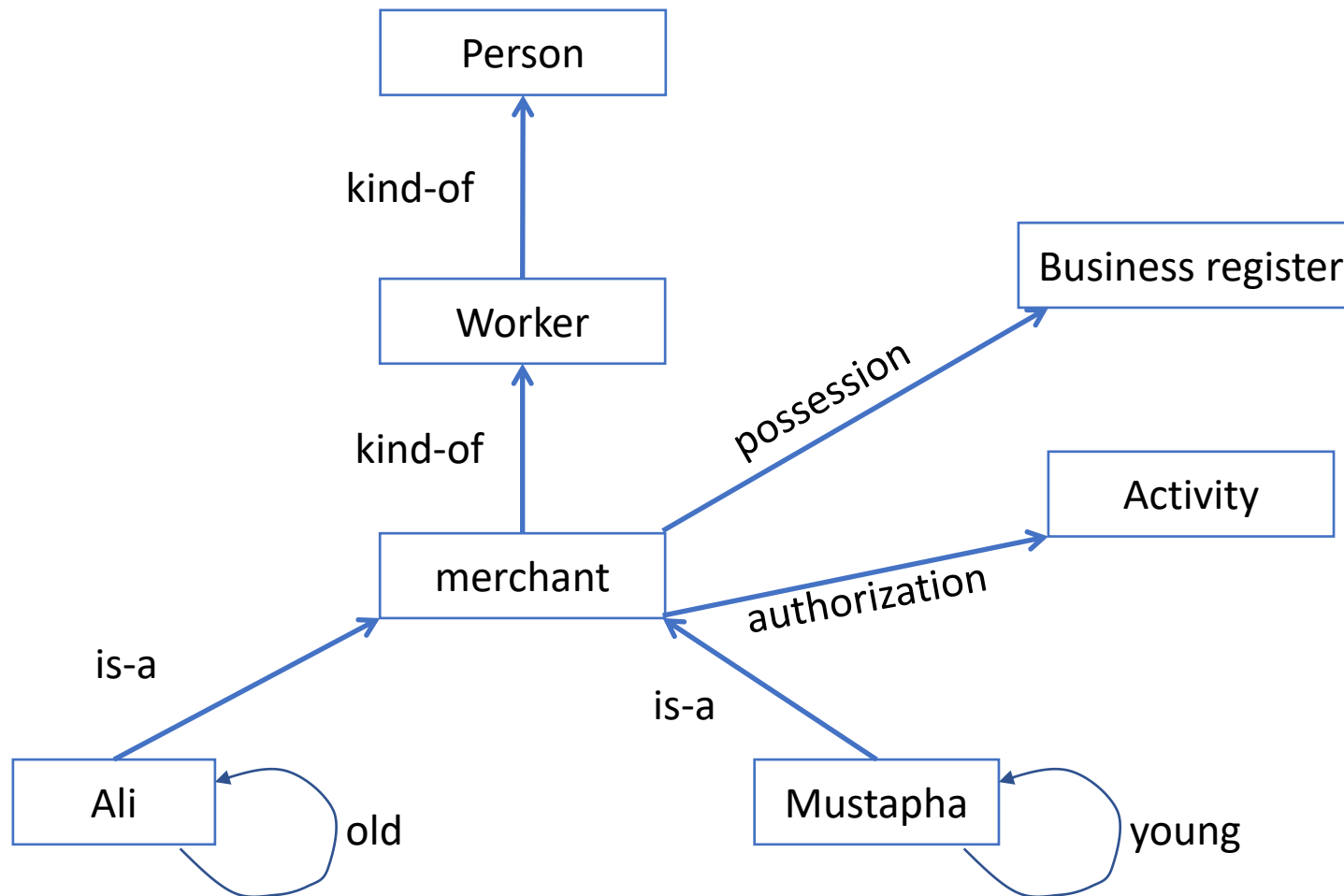
Prolog

▪ **Relation between concepts**

With Prolog:

```
relation(concept1, concept2).
```

Auxiliary network

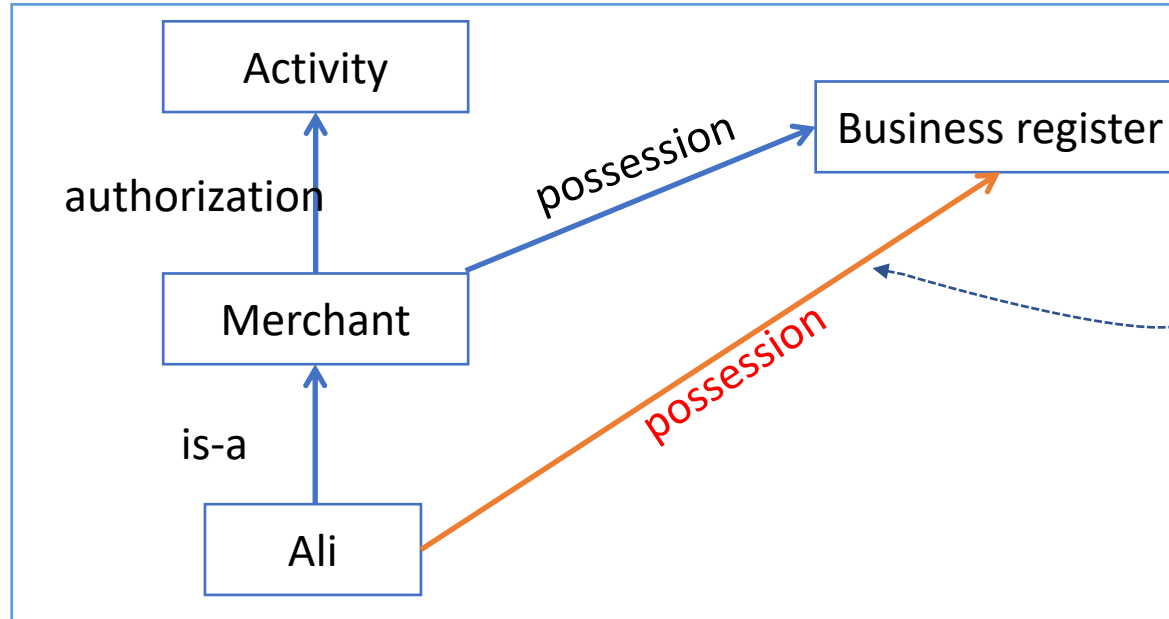▪ **Deduction (Inference) by auxiliary network**

With Prolog:

```
relation3(Concept1, Concept3) :-
        relation1(Concept1, Concept2),
        relation2(Concept2, Concept3).
```
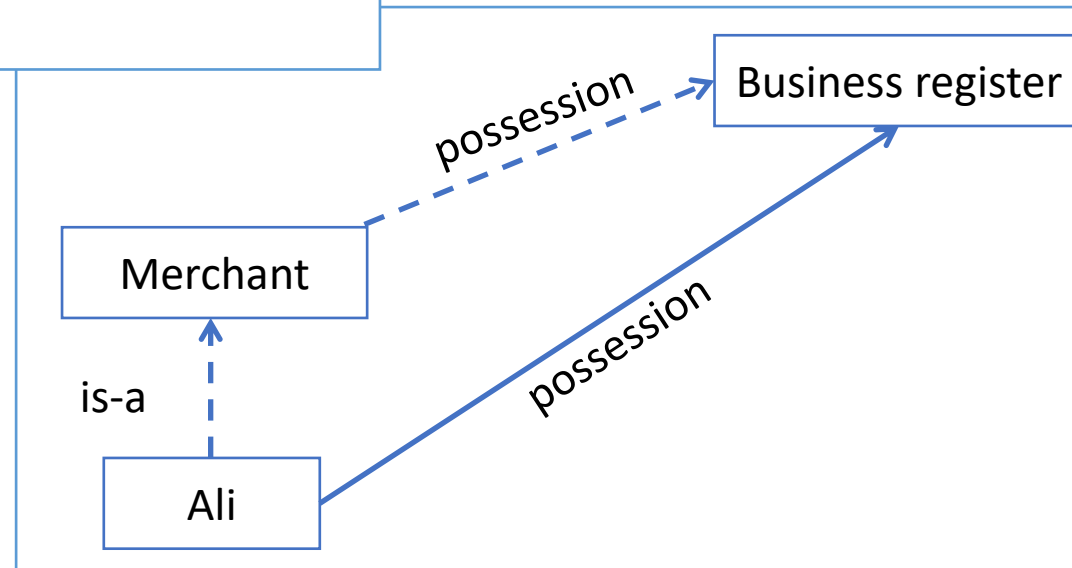
Auxiliary network

SN

Activity

authorization

Merchant

is-a

Ali

possession → Business register

possession (red)

possession (orange)

Deduction of a new fact
(new arc)

AN

Business register

possession (dashed)

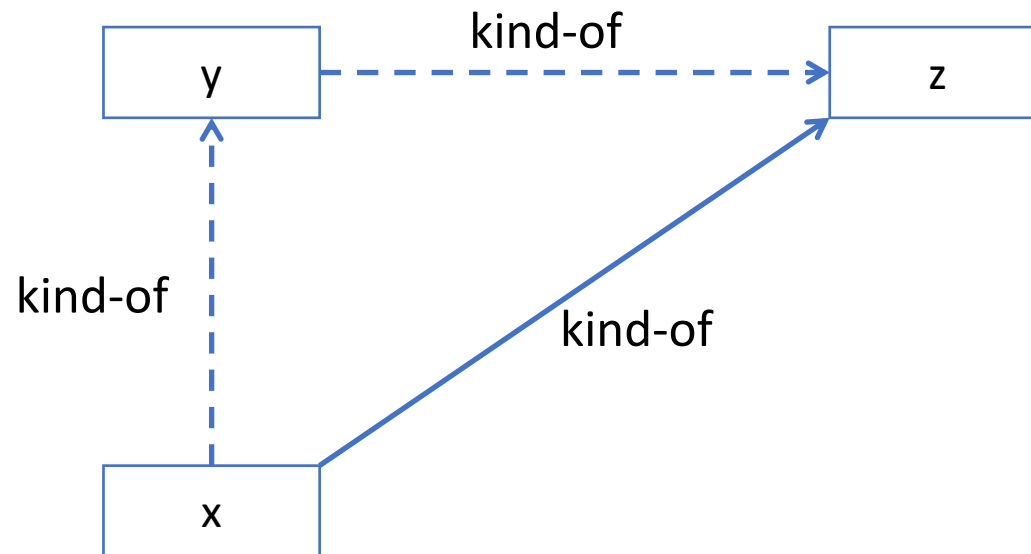Merchant

is-a

Ali

possession

**The relation Ali possesses
A business register is
added to SN**

Deduction by application of AN

- The principle is to apply successively with the right order several auxiliary networks on the SN.

Deduction by application of AN

Example: Who has a business register?