

Artificial Intelligence

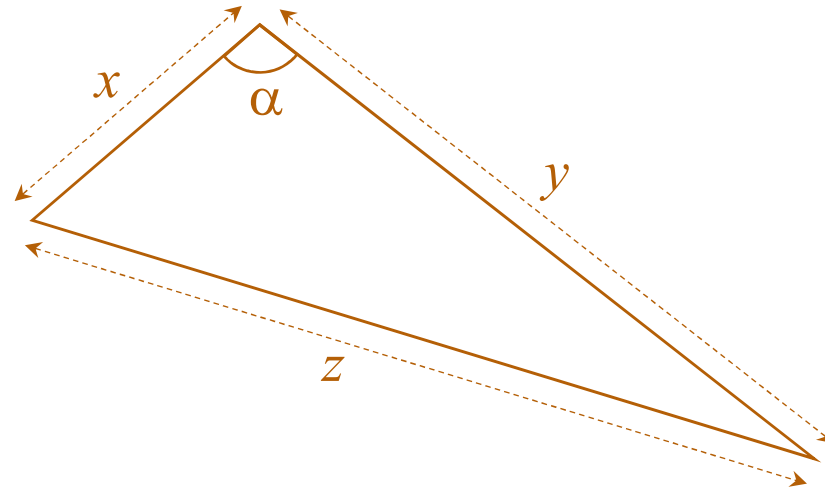
Knowledge Representation & Reasoning

Antoine Zimmermann



Knowledge and deductions

**General
knowledge**



$$x^2 + y^2 = z^2$$



It is a right
triangle



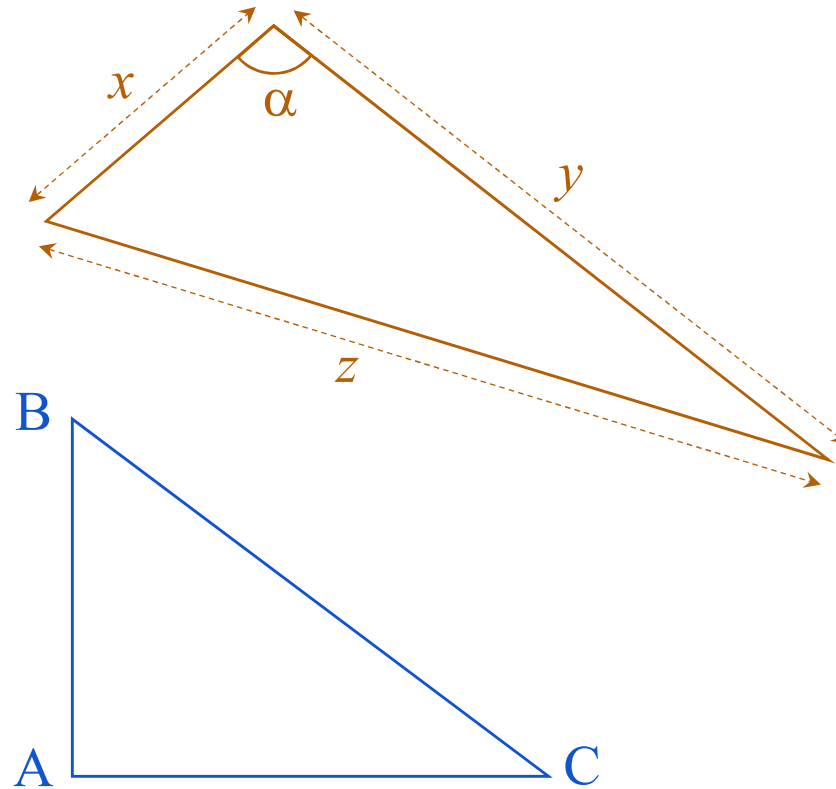
$$\alpha = 90^\circ$$

Knowledge and deductions

**General
knowledge**

and

**Observations or
particular case**



$$x^2 + y^2 = z^2$$



It is a right
triangle



$$\alpha = 90^\circ$$

$$AB = 6 \text{ cm}$$

$$AC = 8 \text{ cm}$$

$$BC = 10 \text{ cm}$$

Knowledge and deductions

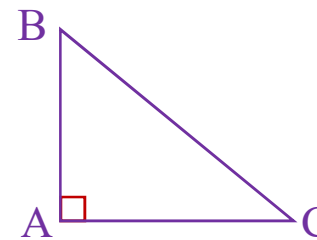
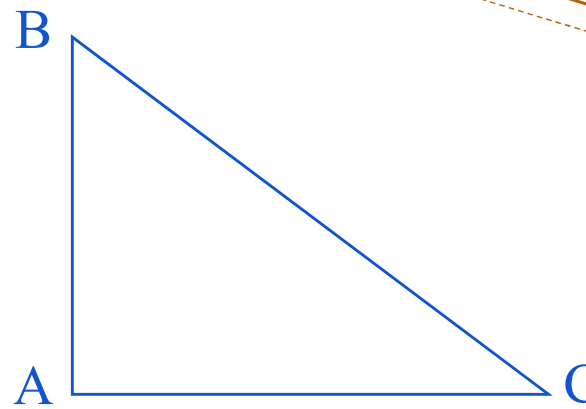
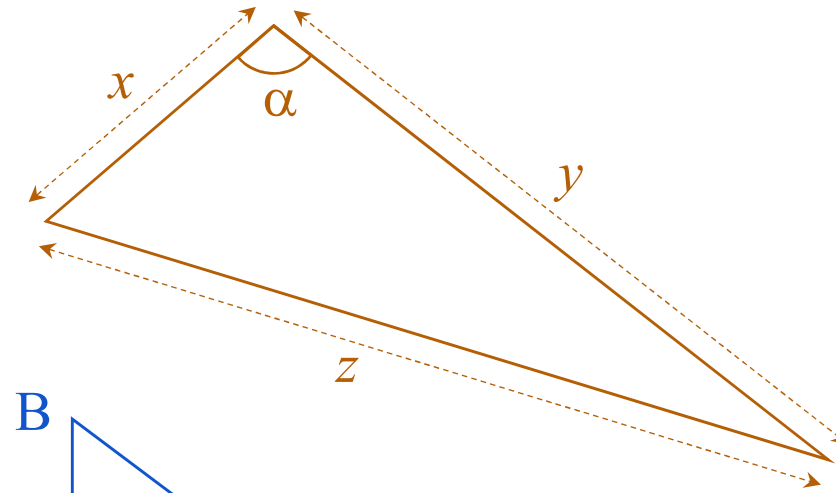
**General
knowledge**

and

**Observations or
particular case**



**Deduced/inferred
knowledge**



$$x^2 + y^2 = z^2$$



It is a right
triangle



$$\alpha = 90^\circ$$

$$AB = 6 \text{ cm}$$

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ABC is a right
triangle

Knowledge and deductions

**General
knowledge**

and

**Observations or
particular case**



**Deduced/inferred
knowledge**

All birds have feathers, a beak and lay eggs.



Eggs? **no**
Beak? **no**
Feathers? **no**



Eggs? **yes**
Beak? **no**
Feathers? **no**



Eggs? **yes**
Beak? **yes**
Feathers? **no**

Not a bird!

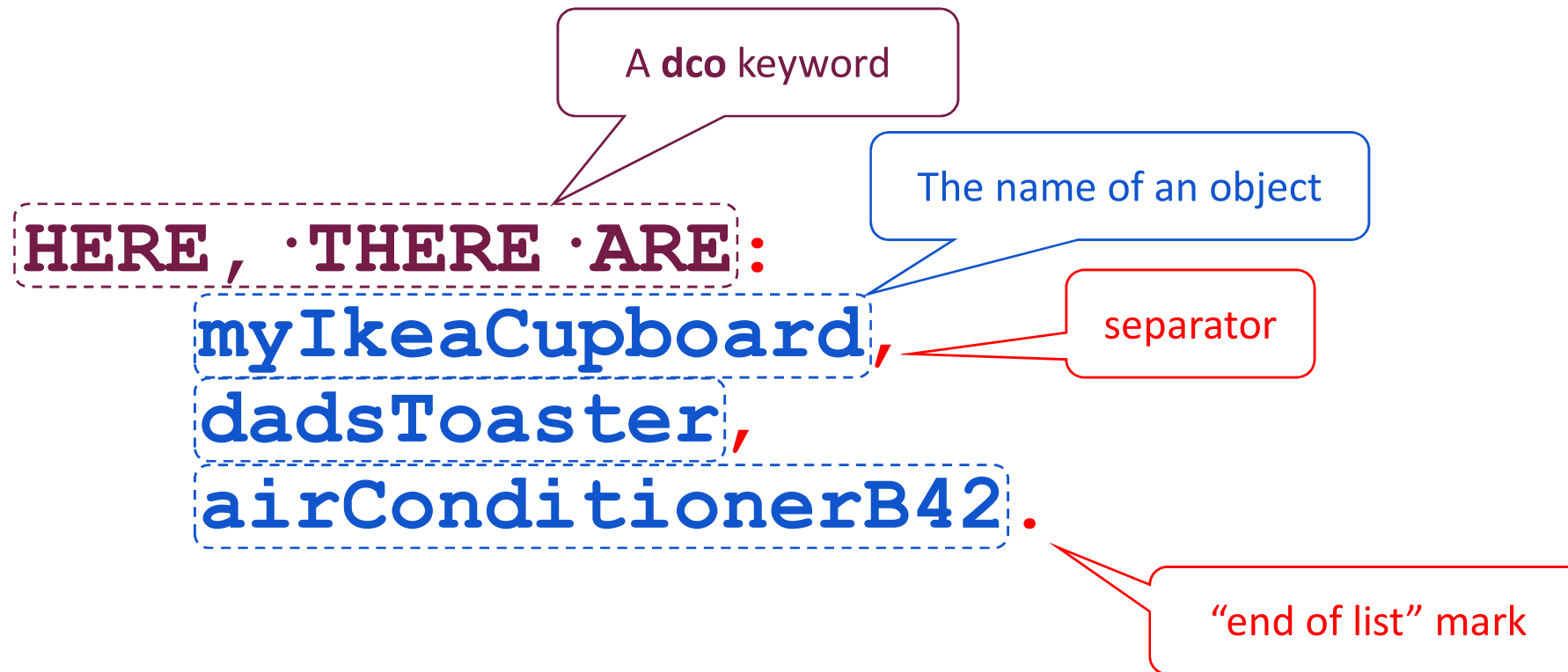
dco: A simple language to
describe connected objects

List objects in a room

HERE, THERE ARE:

**myIkeaCupboard,
dadsToaster,
airConditionerB42.**

List objects in a room



Description of an object

```
myIkeaCupboard  
  IS ·OF ·TYPE Cupboard  
  AND ·CAN open, close.
```

Description of an object

The name of an object

myIkeaCupboard

An object type or class

IS · OF · TYPE

Cupboard

AND · CAN

open,

close.

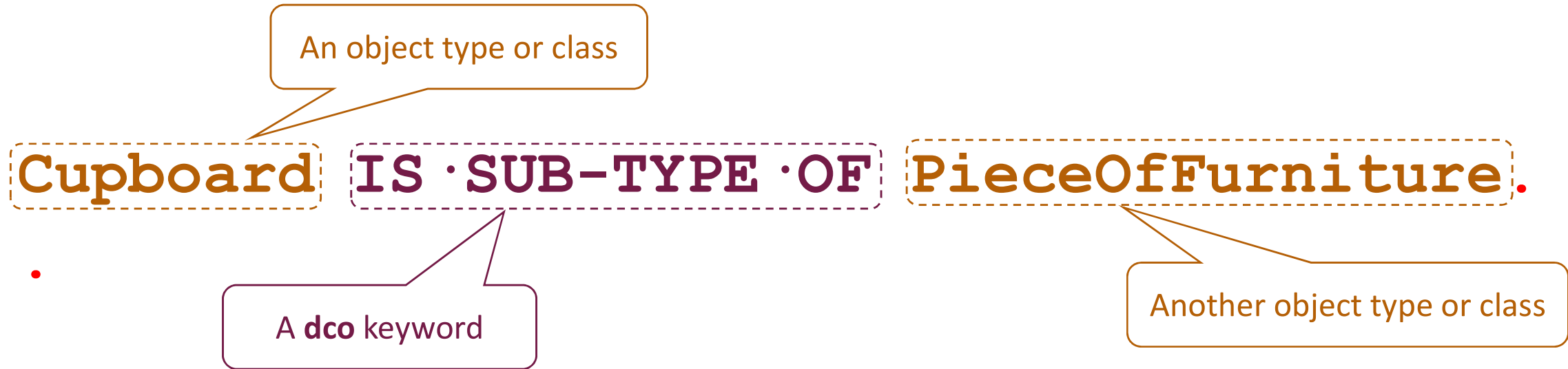
Possible action

A **dco** keyword

General knowledge

Cupboard IS ·SUB-TYPE ·OF PieceOfFurniture.

General knowledge



Deduction/Inference

Knowledge: **Cupboard** IS · SUB-TYPE · OF **PieceOfFurniture**.

+

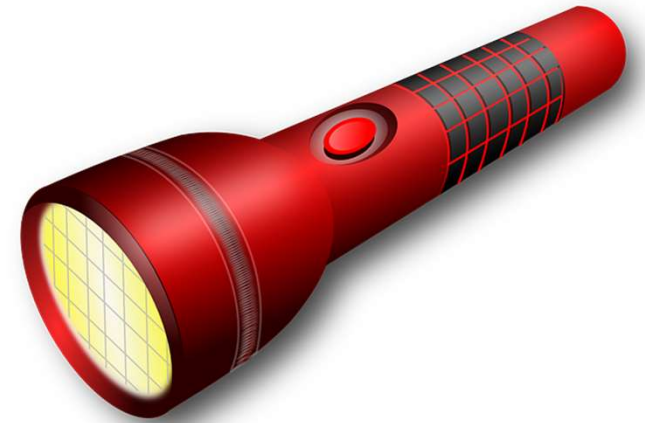
Observation : **myIkeaCupboard**
IS · OF · TYPE **Cupboard**.

=

Conclusion : **myIkeaCupboard**
IS · OF · TYPE **PieceOfFurniture**.

The goal of your “AI”

- Your AI wants to **light the room** in which it is
- To do so, it has to find an object of type **IlluminatingObject** with action **switchOn**.



The rules of the “game”



A **dco** keyword

- You start from the box **ENTRY · POINT**
- You look inside a box **only if you saw the name** inside another box
- You **continue to explore** until you are **certain** that you have an object of type **IlluminatingObject** with the action **switchOn**.

Online demo (on the Web)

tinyurl.com/lighttheroom