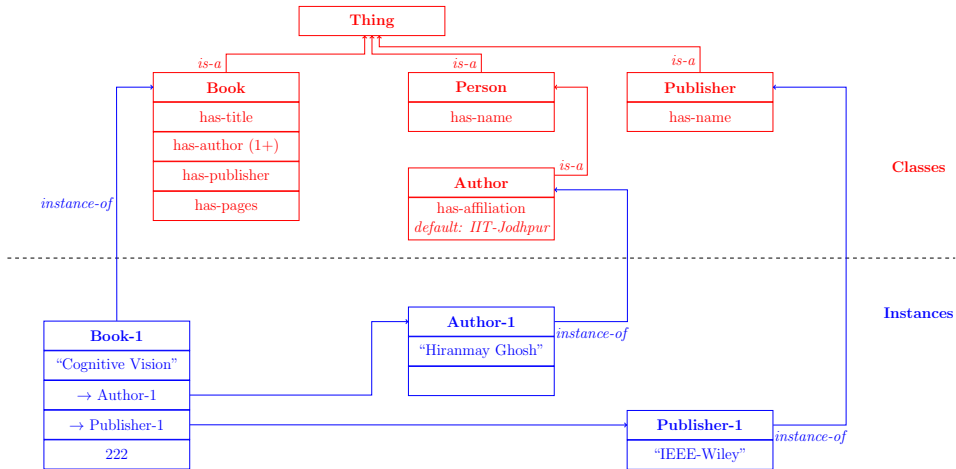


# Biological Vision and Applications

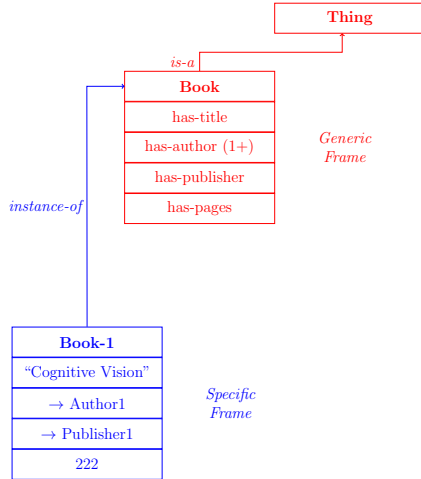
## Module 07-02: Frame-based representation

Hiranmay Ghosh

# Frame-based representation



# Frames, slots and fillers

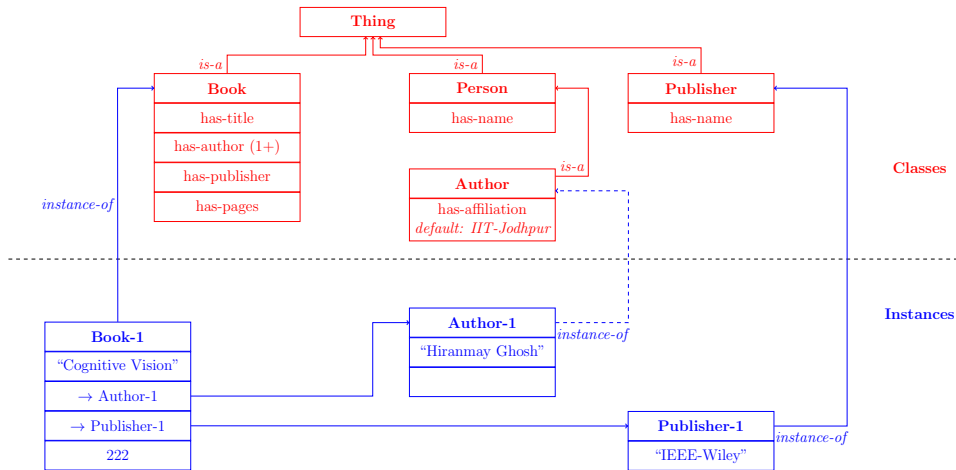


- A frame has a label
- A frame consists of one or more **slots** (attributes)
- A slot contains a **filler** (value)
  - ▶ Reference to another frame
  - ▶ Literal
  - ▶ not specified
- A frame inherits attributes and default values of its parent
- Value restrictions
  - ▶ Data types / range
  - ▶ Cardinality

# Ontology and data

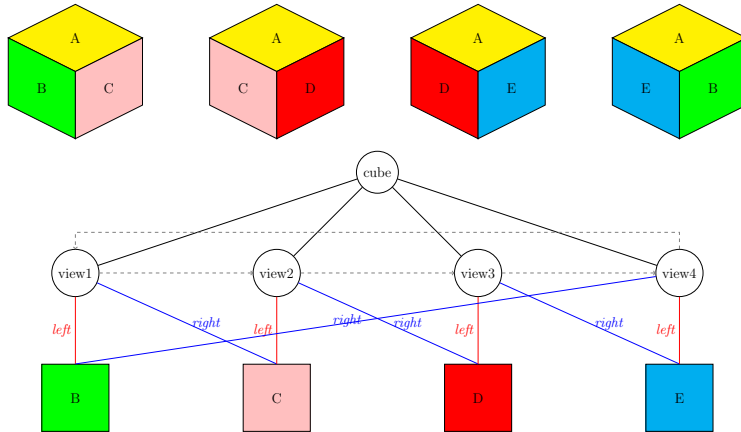
- The generic frames and their interconnections define a model (schema) for a domain
  - ▶ A domain is a bounded part of the world
  - ▶ The model is also known as an **ontology**
  - ▶ An ontology imposes constraints on data and their organization
- The specific frames represent instances of the classes (data)
  - ▶ They are defined and organized following the constraints of the ontology
- **Web Ontology Language (OWL)**
  - ▶ W3C recommended standard for web-based knowledge representation
  - ▶ Is defined as a schema over RDF/RDFS

# Inferencing with frame-based representation



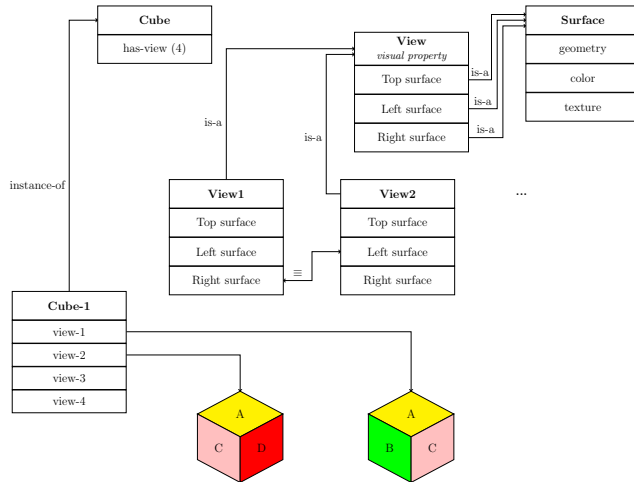
# Frame based representation & Visual cognition

## Visual events and viewpoints

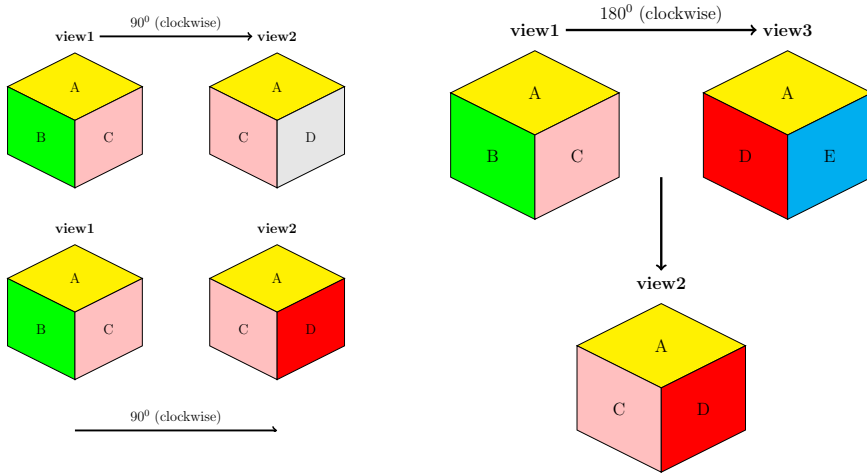


# Frame based representation & Visual cognition

## Viewpoints: frame-based representation

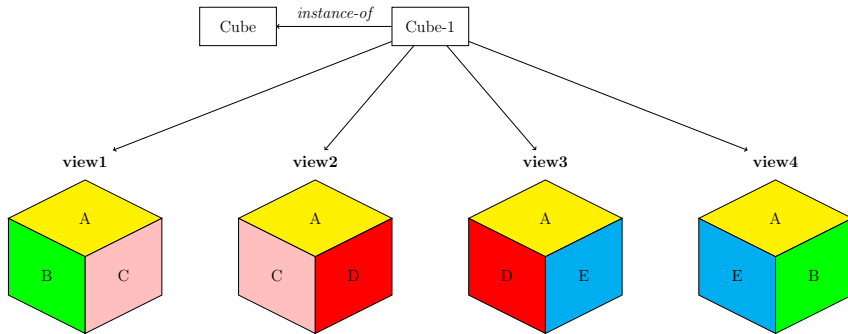


# Inferencing with visual frames

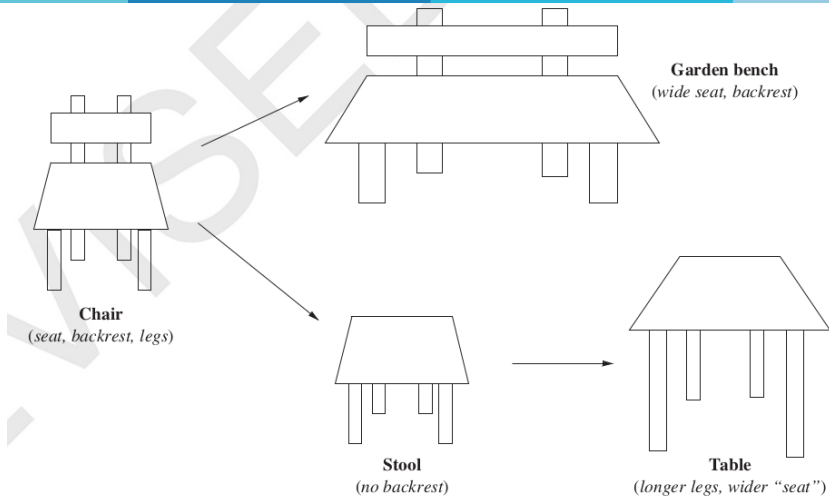




# Inferencing with visual frames



# Specialization of concepts



# Frame-based representation and Visual cognition

## Summary

- A compact and efficient representation of visual world
- A frame represents a specific view of a system (object / scene)
  - ▶ Remembered in declarative memory
- A **frame-system** is a collection of frames representing different views of a system
  - ▶ Different frames of a system describe the system from different viewpoints
  - ▶ Change of viewpoint (movement) results in transformations across the frames
- When one receives a new percept, one recalls the nearest matching frame from memory
  - ▶ Leads to object recognition
- If no available frame sufficiently match the current situation, the closest frame is extended to define a new system

Minsky's paper (1974)

Quiz 07-02

End of Module 07-02