

Traditional methods

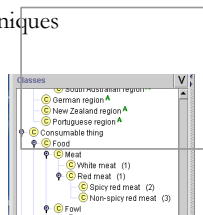
- Flat text files – eg. CLIPS, Prolog, KIF
- These are still important for formal comprehension (RDF, XTM)

```
(defclass Consumable^thing
  (is-a USER)
  (role concrete)
  (single-slot name_
    (type STRING)
    (cardinality 0 1)
    (create-accessor read-write)))
(defclass Food
  (is-a Consumable^thing)
  (role concrete))
(defclass Meat
  (is-a Food)
  (role concrete))
```

Visualizing Knowledge Representations

Visualization Techniques

- Most ontology editors provide simple visual metaphors for users
- Most common is a collapsible, direct manipulation tree
- Protégé, Ontoedit, Kaon
- Familiar to almost all computer users



Other techniques

- Ontolingua, a web-based ontology development system, uses hyperlinks to relate concepts
- SemNET (1988) – powerful techniques (3D graphics, fisheye perspective views, clustering, animation), was not widely adopted
- Indented lists in early systems

Graph Visualization

- Some formalisms are well-suited to node and arc style visualizations:
 - Bayesian nets, semantic networks and frames
 - These can be mapped to graphs and visualized accordingly.
 - Advantage: Lots of research on graph visualization
 - Royere tool (GVF) shows some examples of how to visualize graphs (more later in the term!)

New Approaches

- These metaphors quickly fail in most production environments
 - The typical Protégé ontology is more than 1000 frames
- Need a visualization metaphor to support understanding and sharing these large knowledge-bases
 - KAON
 - Isaviz
 - Graphviz
 - Other tools ...