FRAMES AND INHERITANCE

- A frame system is:
  1. A Semantic Net
     Nodes: frames
     links: slots
  2. Together with:
     - Notions of
       * hierarchy
       * inheritance, and
       * default values
     - Demon procedures
- A frame system is used to:
  - Represent individuals (instances) and classes
  - Represent stereotypical situations or events

Example:

Animals
Alive: true
Flies: false

Birds
Legs: 2
Flies: true
ako:

Mammals
Legs: 4
ako:

Penguins
Flies: false
ako:

Cats
ako:

Bats
Legs: 2
Flies: true
ako:

Opus
Name: Opus
Friend:
is-a:

Bill
Name: Bill
Friend:
is-a:

Pat
Name: Pat
is-a:

OBSERVATIONS

Frames: frames represent individuals and/or classes

Slots:

- **is-a:** (is-a-member-of-the-class)
  connect an instance to its class(es)
- **ako:** (a-kind-of)
  connect a class to its superclass(es)
- **other:** attributes or properties
  their values may be inherited from a superclass

Hierarchy: Given by the is-a and ako slots

INHERITANCE

- An instance inherits the slots and slot values from its superclasses.
- The expected value of a slot is called **default**.

  Defaults can be overridden.
- Where to inherit from?
  - If there is 1 is-a slot per instance and 1 is-a slot per class:

    Simple Inheritance: Inherit from the most specific superclass.
  - Otherwise:

    Multiple Inheritance: Use a preference list to decide which superclass to inherit from.

MULTIPLE INHERITANCE

```
                           Animate

                    ako                 ako


          Vocalization                             Vocalization
Speech <------------  Cartoon          Penguin  ------------>  Squawks
                      character


                       is-a                is-a

                            OPUS
```

Convention: information from specific classes should override information for more general classes.

Preference list: For the example:

OPUS, Cartoon Character, Penguin, Animate.

- each class appears before all its superclasses and all its direct superclasses appear in (left-to-right) order.

Procedure: topological sorting of the classes

DEMON PROCEDURES

- Are procedures attached to slots.
- Can be triggered:
  - when the slot is created,
  - when reading the value of the slot,
  - when writing the value of the slot, OR
  - by request.
- When triggered they:
  - Compute the value of a slot (using perhaps the values of other slots)
  - Modify/update other slot values
  - consider a slot value in a particular context
- Demos procedures make frame systems different from other semantic nets.

FRAMES AND COMMONSENSE

- Frames can represent stereotypical situations or events (e.g. birthday parties, eating at a restaurant, attending a lecture, ...)
- Frames representing tightly related stereotypical situations can be grouped into a script