An Introduction to SoarML

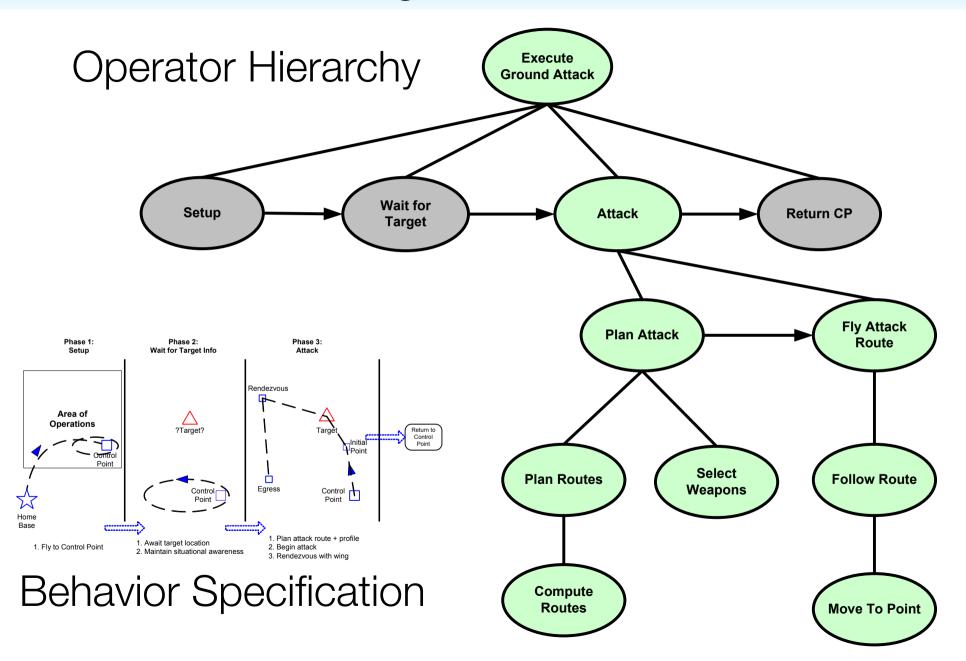
Design

An <u>abstraction</u> that defines the constraints, form, and function of your software

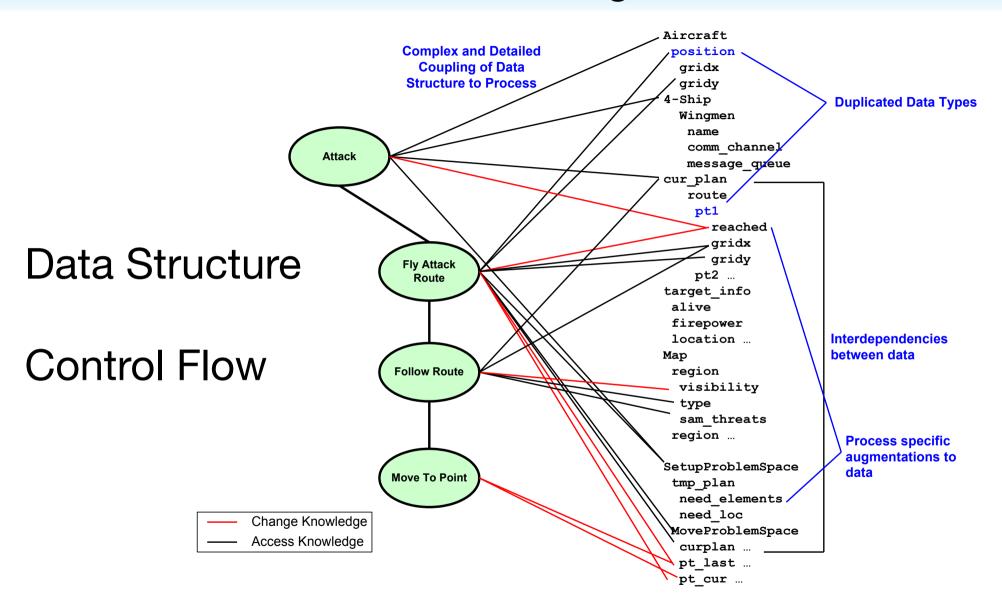
Allows manipulation and analysis
Directs implementation (what and how)
Facilitates human communication and review
Suggests ways to share and reuse software

At Soartech you sometimes here: "Listen to the architecture" This means let the design of Soar guide your implementation

Design and Soar



What is Missing?



HLSR work drove SoarML development

Elements of Soar Design

Working Memory Structure (borrow from UML ojbects)

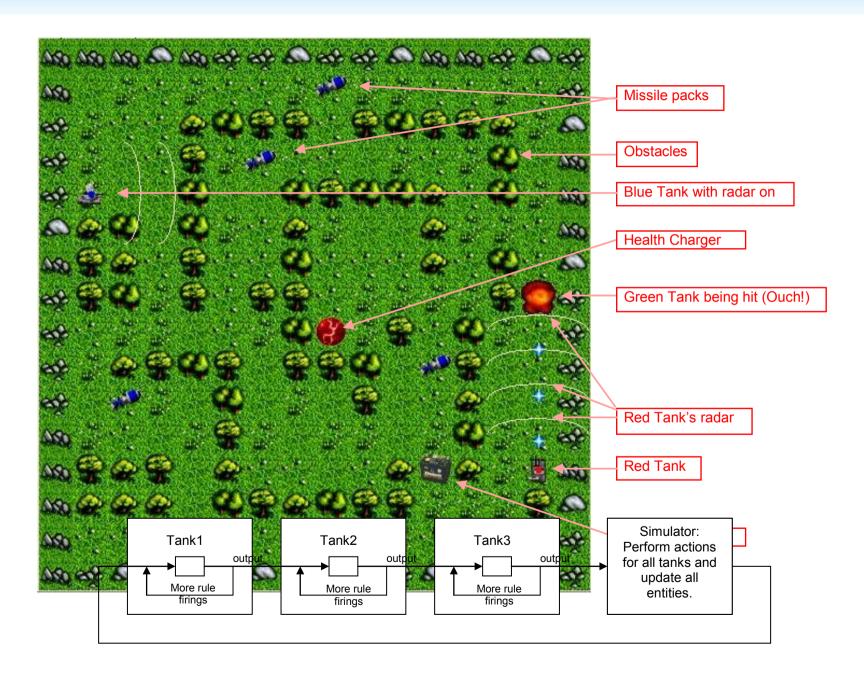
Goals

(borrow from agent design languages)

Processes

(blends goals and memory with operators)

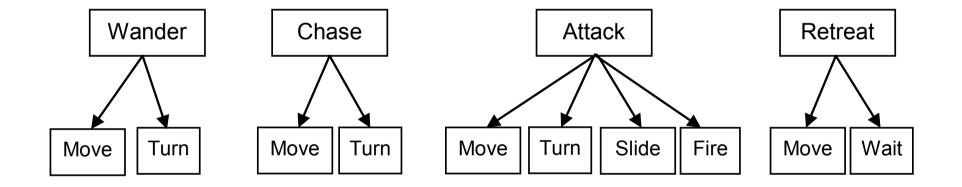
Tank Environment



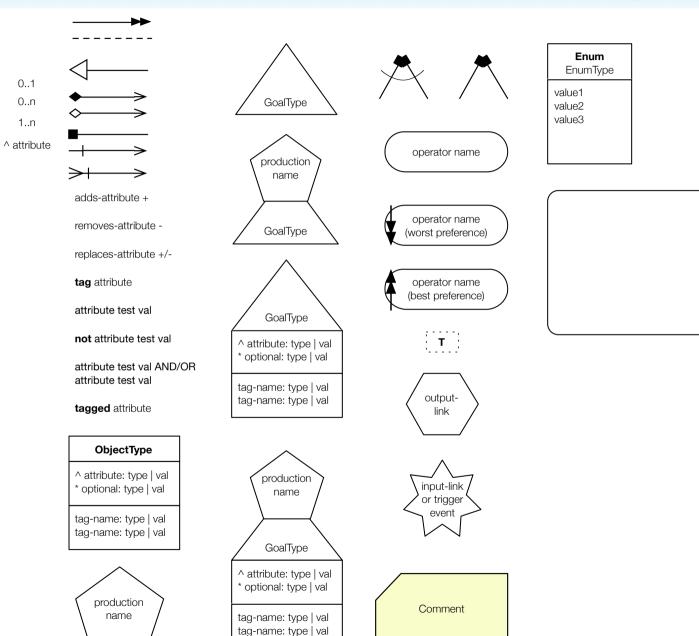
Overview of IO

```
^io
^io
                                                    ^input-link
   ^input-link
                                                          ^rwaves
      ^blocked
                                                          ^backward yes/no
         ^backward yes/no
                                                          ^forward yes/no
         ^forward yes/no
                                                          ^left yes/no
         ^left yes/no
                                                          ^right yes/no
         ^right yes/no
                                                       ^smell
      ^incoming
                                                          ^color none/red/blue/purple/...
         ^backward yes/no
                                                          ^distance none/0-28
         ^forward yes/no
                                                       ^sound silent/left/right/
         ^left yes/no
                                                               forward/backward
         ^right yes/no
                                                       ^clock 1-N
      ^radar
                                                       ^direction north/east/south/west
         ^eneray
                                                       ^energy 0-1000
            ^distance 0-13
                                                       ^energyrecharger no/yes
            ^position left/center/right
                                                       health 0-1000
         ^health
                                                       ^healthrecharger no/yes
            ^{\text{distance }0-13}
                                                       ^missiles 0-N
            ^position left/center/right
                                                       ^my-color blue/red/purple/...
         ^missiles
                                                       ^radar-distance 1-14
            ^{\text{distance }0-13}
                                                       ^radar-setting 1-14
            ^position left/center/right
                                                       ^radar-status on/off
         ^obstacle
                                                       ^{random} 0.0-1.0
            ^{\text{distance }0-13}
                                                        ^resurrect no/yes
            ^position left/center/right
                                                        ^shield-status on/off
         ^open
                                                        ^{x} 1-14
            ^distance 0-13
                                                        ^v 1-14
            ^position left/center/right
                                                 ^io
         ^tank
                                                    ^output-link
            ^distance 0-13
                                                       ^move.direction left/right/forward/backward/none
            ^position left/center/right
                                                       ^rotate.direction left/right
                                                       ^fire.weapon missile
                                                       ^radar.switch on/off
                                                       ^radar-power.setting 1-14
There are 41 productions in simple-bot
                                                       ^shields.switch on/off
```

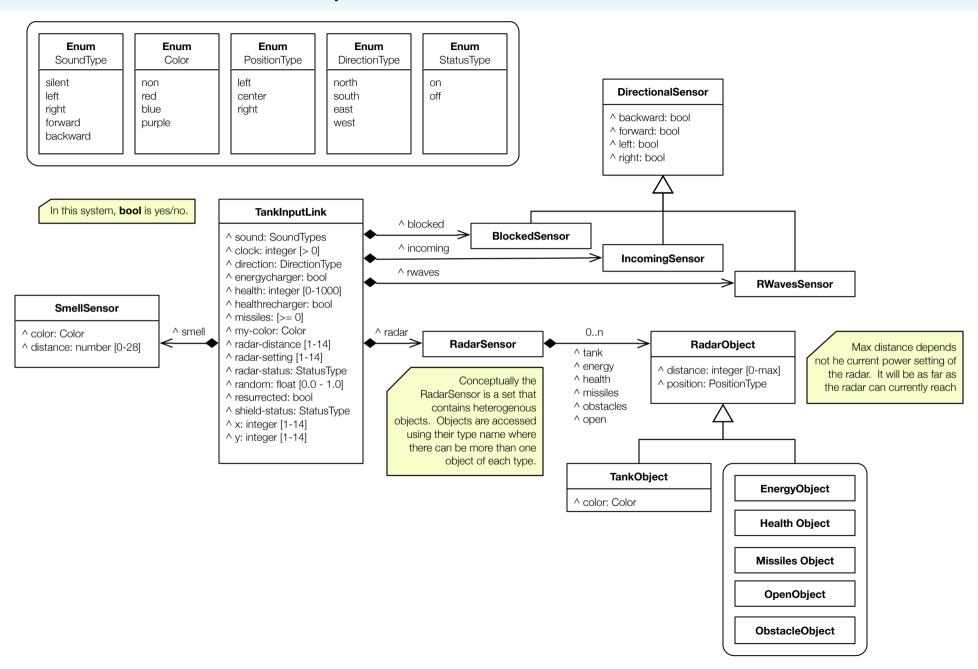
Design in Tutorial



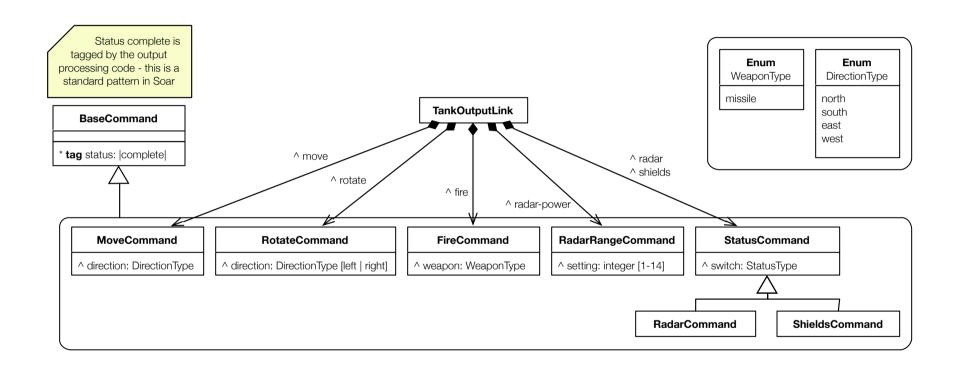
SoarML Symbols Template (Omnigraffle)



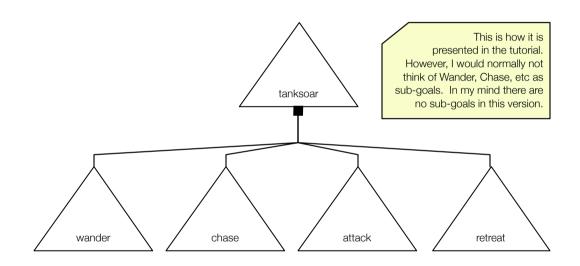
Input Link in SoarML



Output Link in SoarML

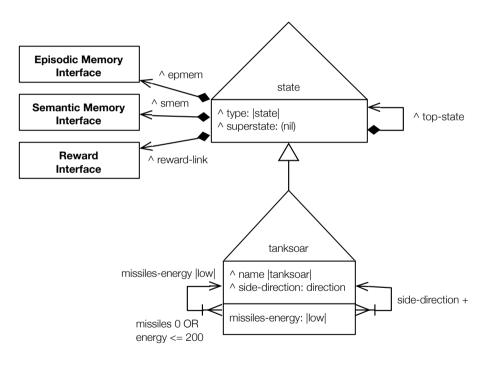


The Goal Hierachy



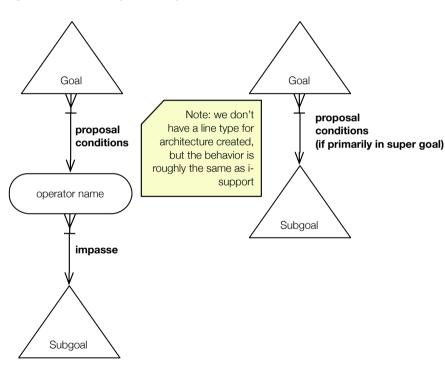
Goals: Conventions

Basic Goal Structure

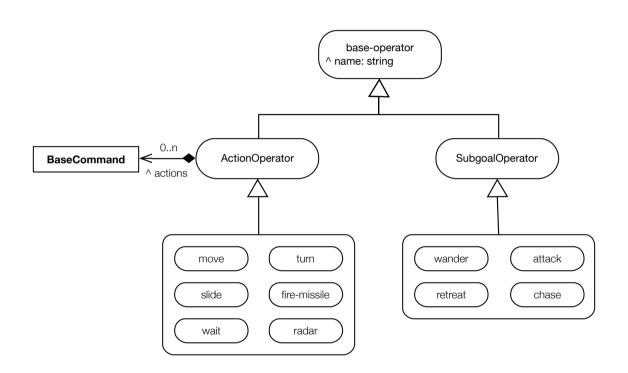


Impasse States as Goals (Michigan Goal System)

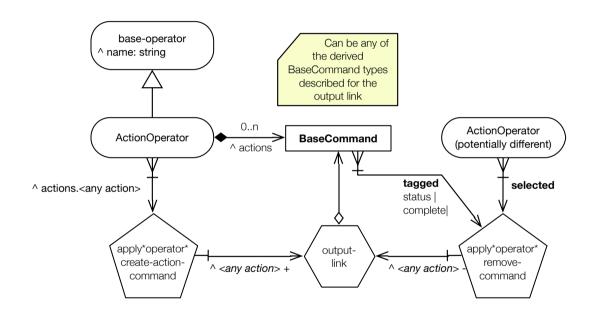
Shorthand



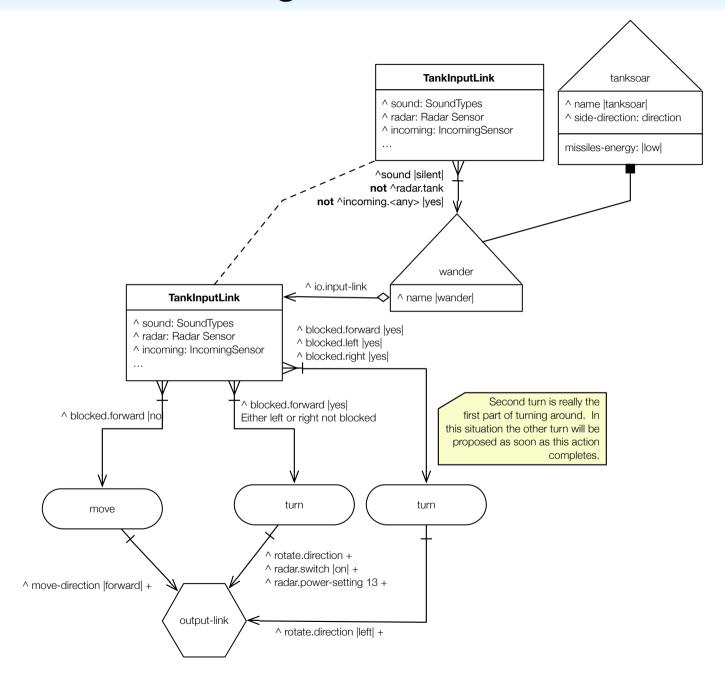
Operator Type Hierarchy

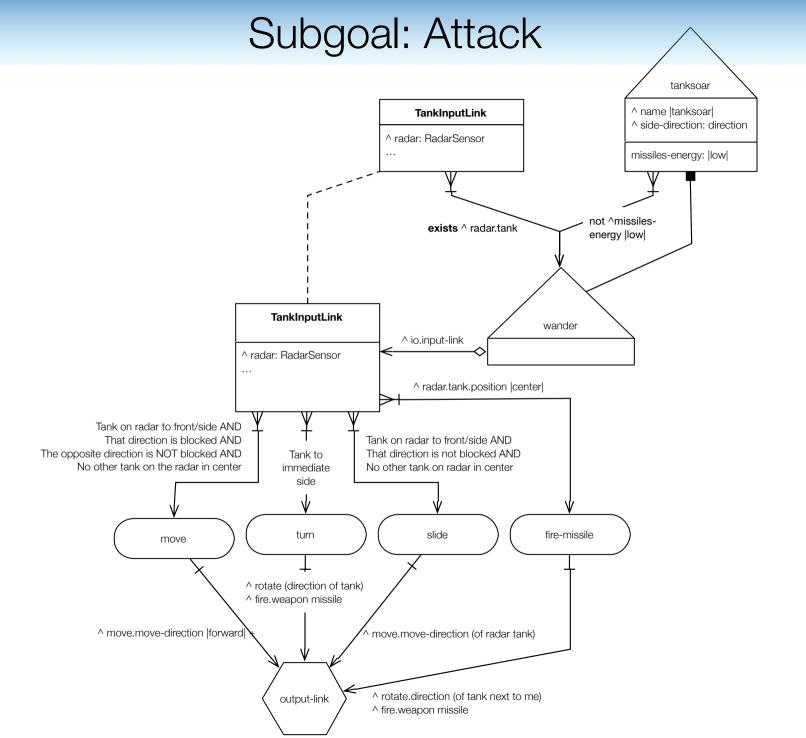


Aspect: External Action Handling

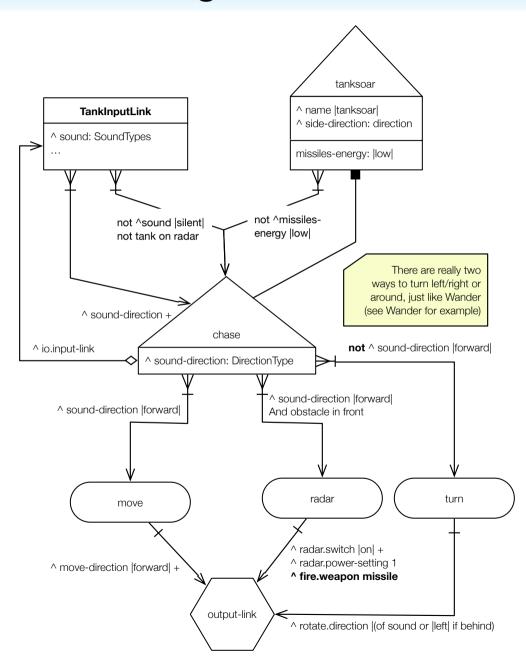


Subgoal: Wander

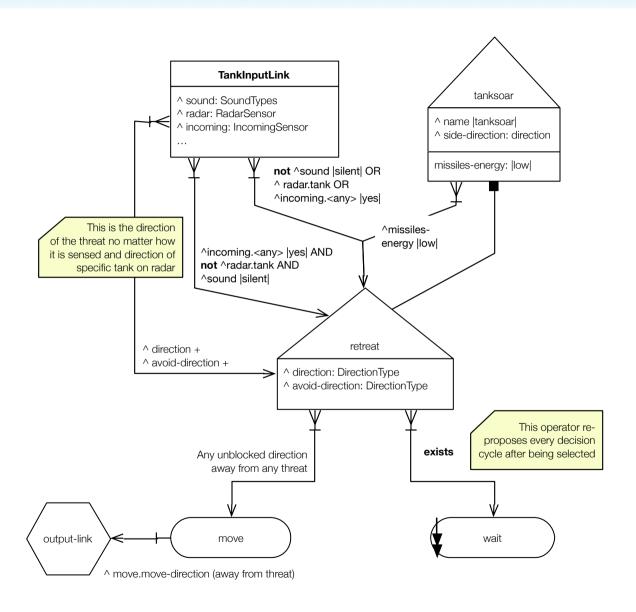




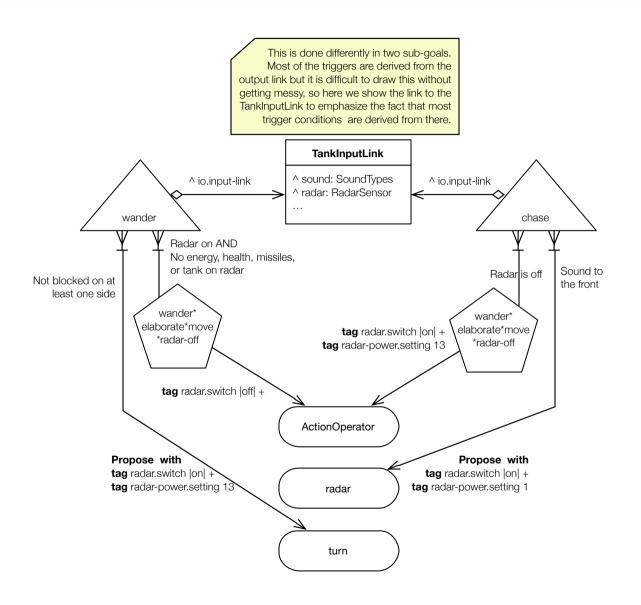
Subgoal: Chase



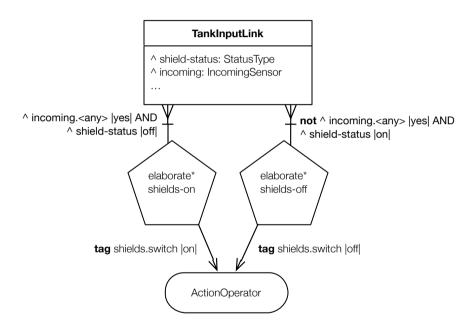
Subgoal: Retreat



Aspect: Radar Control



Aspect: Shield Control



Where to go from here

https://confluence.soartech.com/display/soartechaie/Soar+ML

Useful practice activities

- * Documenting existing code
- * Whiteboarding a Soar design
- * Reviewing design or code

Learning

- * Review with Me
- * Also: Glenn and Bob M.

Primitive Design Constructs

