

Hybrid/OCP Workgroup

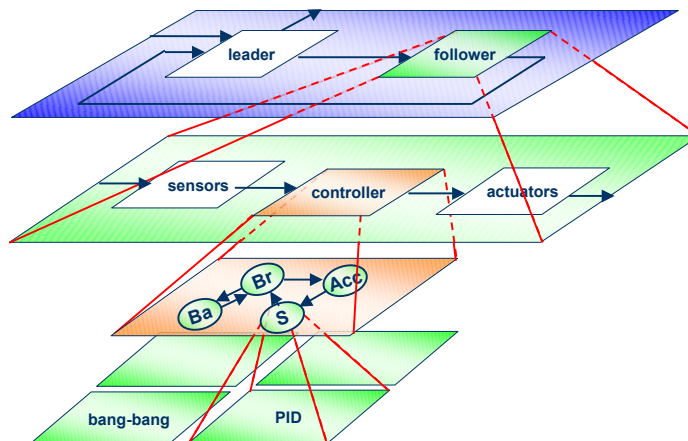
Issues

- Heterogeneous model semantics (common principles, differences)
 - Ptolemy II
 - FRP
 - CHIRP
 - Simulink/Stateflow/Matlab
 - Giotto/Masaccio
 - OCP

Software Synergies

- Relationship between:
 - OCP
 - Controls API
 - Ptolemy II
 - CHIRP tool
 - FRP tools
- Where are the synergies?
- How can we leverage the synergies?

Hierarchical View



What is a Domain? MoC + Realization

The definition of the interaction of components (the model of computation) and the software that supports this interaction.

Multi-domain modeling means:

- Hierarchical composition
 - heterogeneous models allowed
- Domains can be specialized
 - avoid creeping featurism
 - enable verification/validation

Features of a MoC

- Time
- Information sharing
- Control flow
- Determinism
- Dynamic reconfiguration
 - E.g. higher-order abstractions

Time

- How is time represented/manipulated in each MoC?
- Coordination of time across MoCs
- Coordination of real-time needs across MoCs (and conveyance of these needs to the OCP)
- Models of time
 - Priority based (fixed or dynamic, as in RT-ARM)
 - Time triggered protocols
 - Global chronology
 - Global synchrony

Taxonomy of MoCs

- Continuous time
- Continuous space
- Discrete events (placed in time)
- Finite state machines
- Stream-based (functional/dataflow)
- Rendezvous-based (CSP, CCS, Pi)
- Discrete time
- Publish and subscribe

Milestones

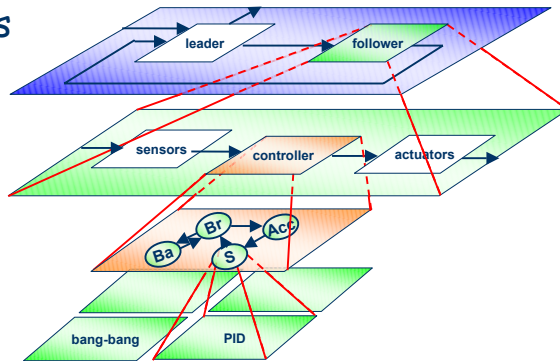
- Figure out how timed MoCs interact with OCP publish/subscribe
 - E.g. time triggered, continuous-time, discrete events
- Figure out how dynamic reconfiguration/higher order abstractions interact with publish/subscribe
- Expand controls abstraction to cover dynamic scheduling & reconfiguration.
- Determine how MoCs support verification/certification (correct by construction).
- Define abstraction of real-time QoS for application builder.

Implications for OCP

- Domain plug-in interface for OCP
- OCP as interoperability fabric
- Divide API so technology can be reused
- Resolve semantics questions
 - time strategy?
 - stream-based model strategy?
 - reconfiguration strategy?

What technology can be shared when building Domains?

- Abstract syntax
- Type systems
- Components
- Interfaces
- ...



Meetings (Small groups preferred)

- Multi vehicle
 - Northrop, Stanford, GaTech, Boeing??
- DSL's, FRP, streams, HoFs, continuous-time
 - Yale, OGI, ??
- RTOS support in OCP - QNX
 - Boeing, Stanford, Berkeley, ??
- Midsummer SEC WG meeting (OCP, MoC)
 - all