Get your `lambda<T>`


```
for_each( your_base.begin(), your_base.end(),
          [&my_base](base_t & b)
          { my_base.push_back( move(b) ); } );

// all your base are belong to us
```

http://cierecloud.com/cppnow/

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Ladon

A Distributed State-Machine Framework

ciere consulting

Michael Caisse

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Part I

Projects

Semiconductor Manufacturing

- mid-late 1990's
- Irix based SGI machine
- Several SBC's running VxWorks
- X/Y Stage, mask holder, transfer robot ...
- Cordination of soft items
- Real-time Object Oriented Modeling (ROOM) Evangelist

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Event Driven Video Systems

- 1998 - 2002
- Intel based computers
- 4 - 16 video channels input
- cordination between dozens of systems
- cordination with external triggers
- run-time plugable behaviour
- Java and C++ ROOM implementations

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Cielometer

- Coldfire processor
- 1M flash / 64k RAM, No OS
- CPLD support/cordination
- Laser control
- Environmental control
- Optical feedback systems
- Signal processing algorithms
- Communication with multiple devices
- ArgoUML graphics to code, Bare-wire support

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Visibility Sensor

- 5 Coldfire processors
- Self organizing
- Various optical and electronic cordinations
- Environmental control
- Signal processing algorithms
- Communication with multiple devices
- Targeting / colouring, run-time communication binding, real-time MSC generation

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Elecro-magnetic Subterrain Mapping

- 4 Coldfire processors
- 256k Flash / 32k RAM, No OS
- Self organizing
- EM field generation
- Signal collection
- Signal processing
- Time synchronization and jitter control
- Multi-drop time-division communication

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Custom Calibration Equipment

- PC running Linux
- Pnuematic actuators
- Various analog and digital hardware I/O modules
- Serial communication with unit under test
- Barcode scanners
- Coordinating with remote instance MongoDB
- Protocol grammars specified via Qi/Karma

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Glass Sorter

- PC running Linux
- Control firing sequence for 864 air-jets
- Control line scan camera
- Cordinate/control memory (DMA and streams)
- Image processing algorithms
- Control various conveyors, actuators, sensors...
- Various physical/logical and protocols for devices

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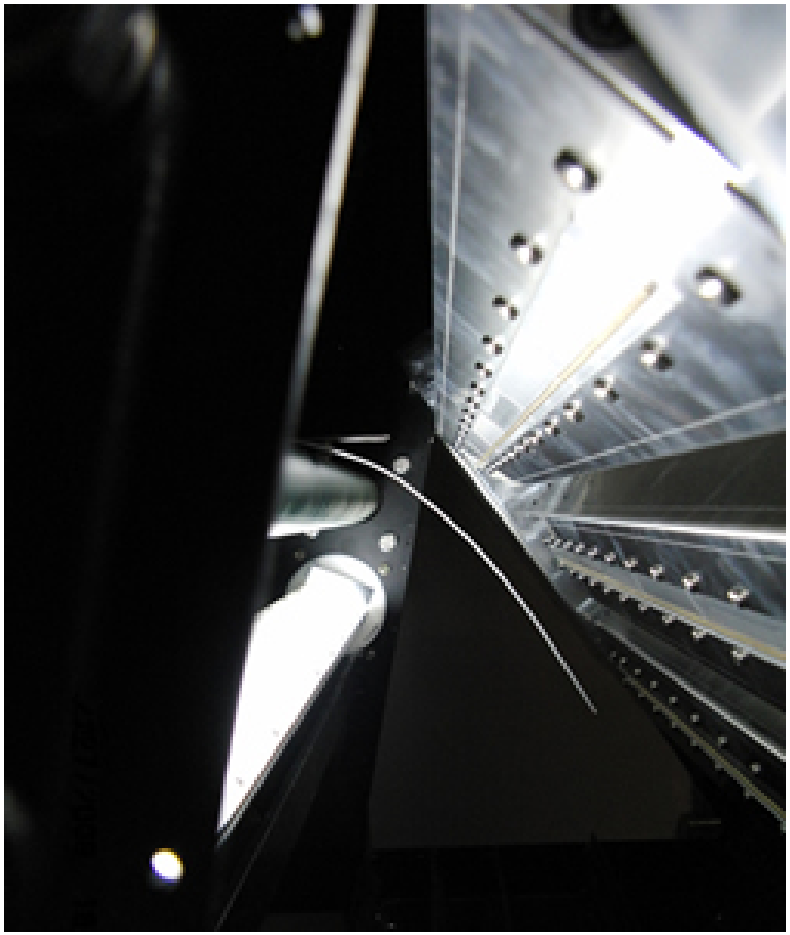
Glass Sorter



- 4-way sorting
- 7.5 tons of material per hour. 4-crushed wine bottles a second.
- 170,000 air jet firing decisions made a second
- Over 4-million pixels processed each second to determine firing sequence
- 5ms flight from scan line to first row of air jets

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Part II

Why State-machines

State-machine

- Event driven system... reactive
- Plainly deterministic
- Easier to reason about
- Forces consideration of errors

Where?

Where?

- Communication protocols
- Trivial machines with a dozen states

Part III

Introduction

A Brief History

- Real-time Object-Oriented Modeling (ROOM), Selic, Gullekson, and Ward. 1994 Wiley
- ObjecTime implemented the ROOM concepts
- 1997, Rational Software took a substantial interest
- OMG accepts Rational's modified ROOM as UML real-time
- Rational fully purchased ObjecTime who was in turn acquired by IBM - 2003
- 1998 OMD Java version – OMD RT-Suite (ROOM) first released 2000
- 2012 - OMD is now Ciere Consulting and Ladon is a modern implementation (Modern C++ and Javascript)

Etymology

Ladon

$\lambda\alpha\delta\omega\nu$

Part IV

Concepts

Credit

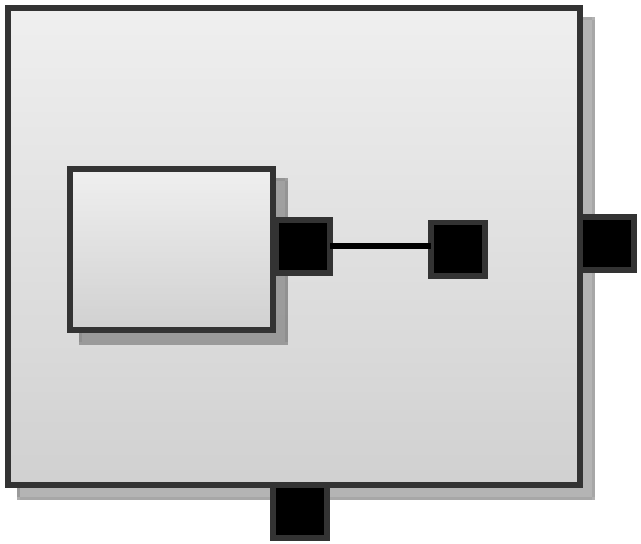
Ladon largly uses the concepts and langauge of ROOM.

Actor

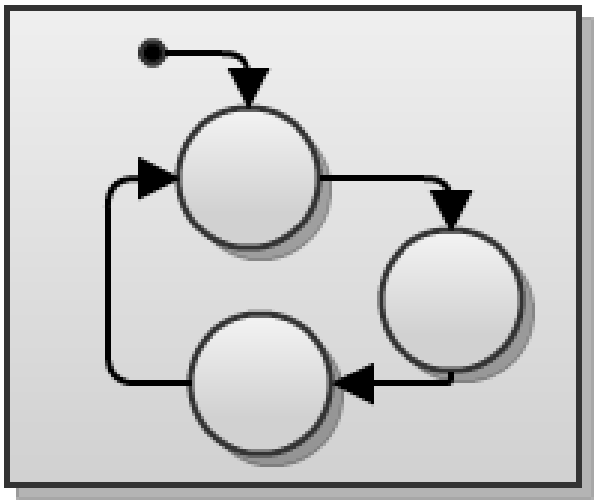
The main component in Ladon is the Actor

Actor - Structure and Behaviour

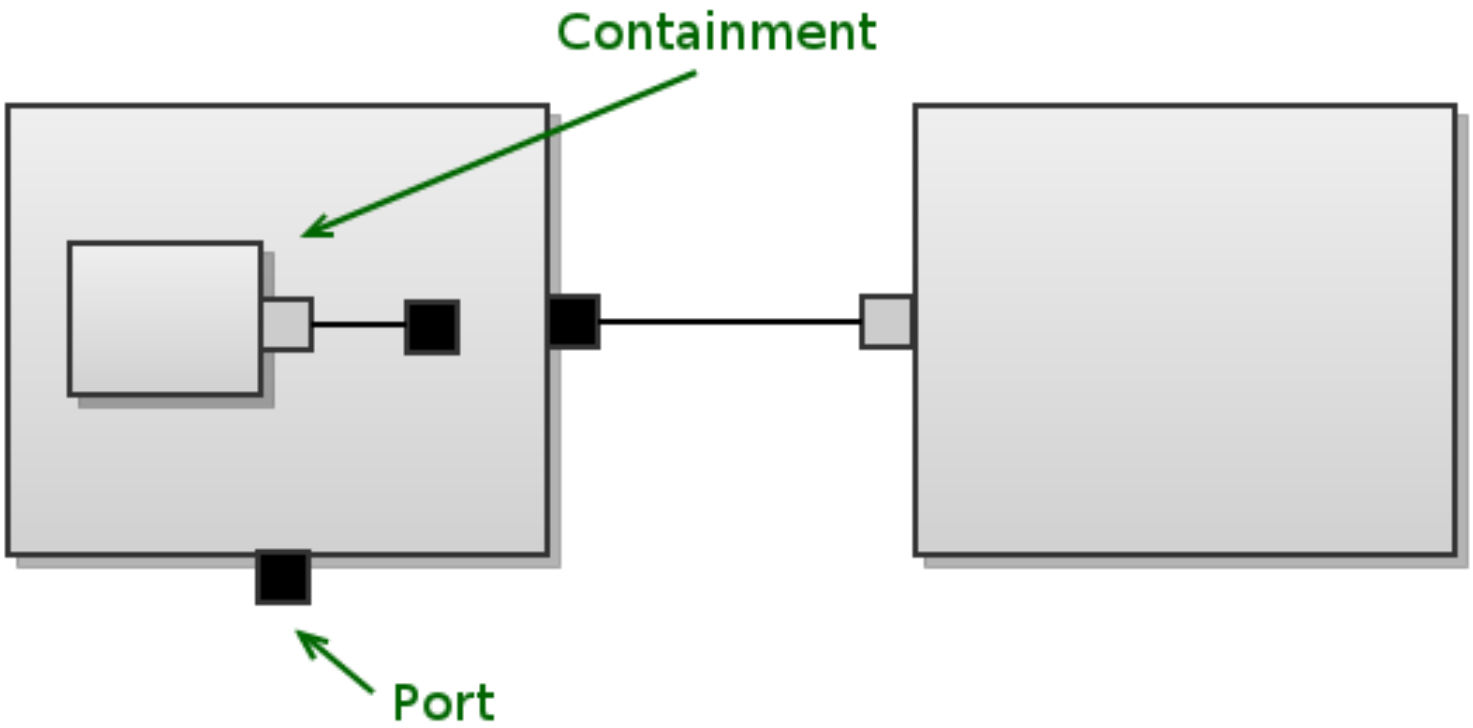
Structural View



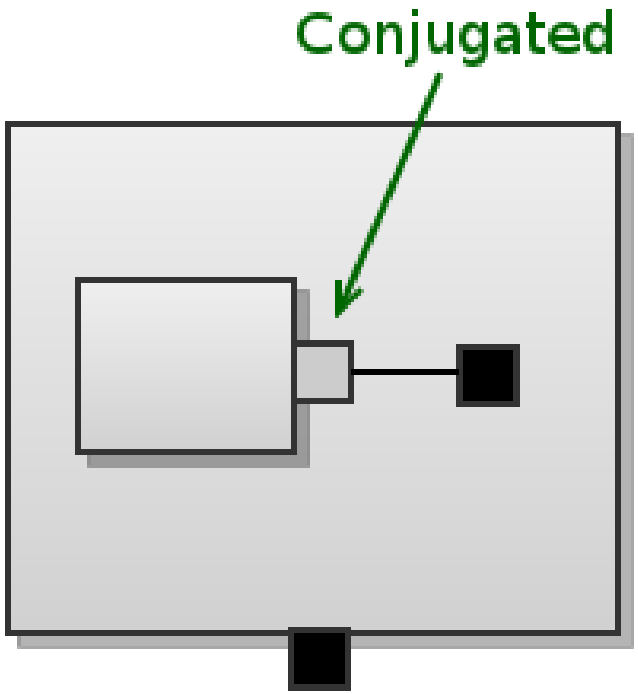
Behavioural View



Actor - Structure



Actor - Port



- Port implements a *Protocol*
- A *Protocol* specifies an In set and an Out set of *Messages*
- A *Message* consists of a signal and a payload
- A conjugated port swaps In and Out sets

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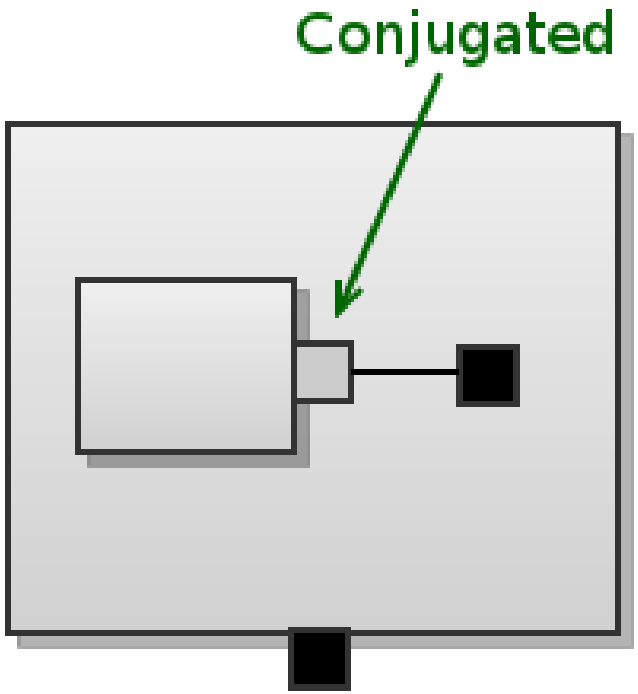
Actor - Port



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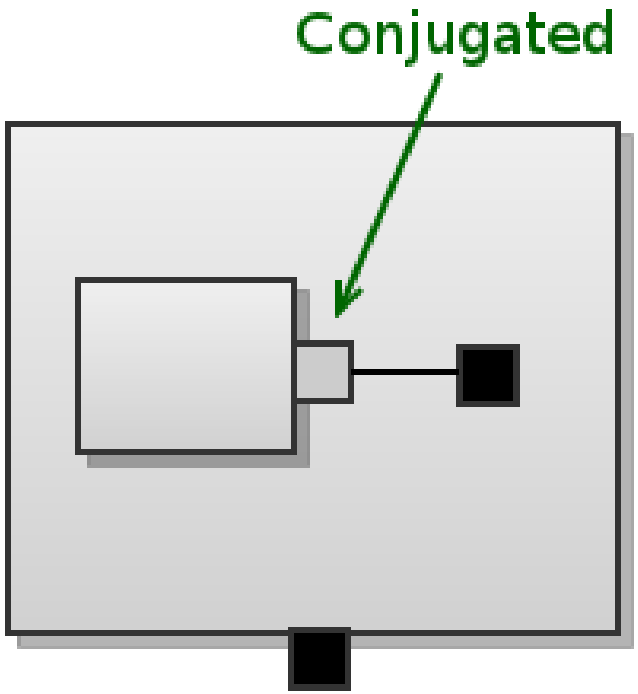

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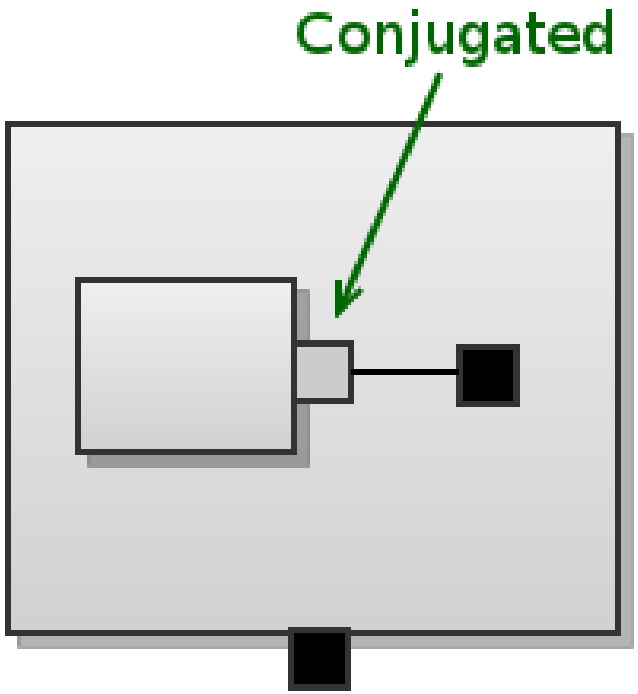

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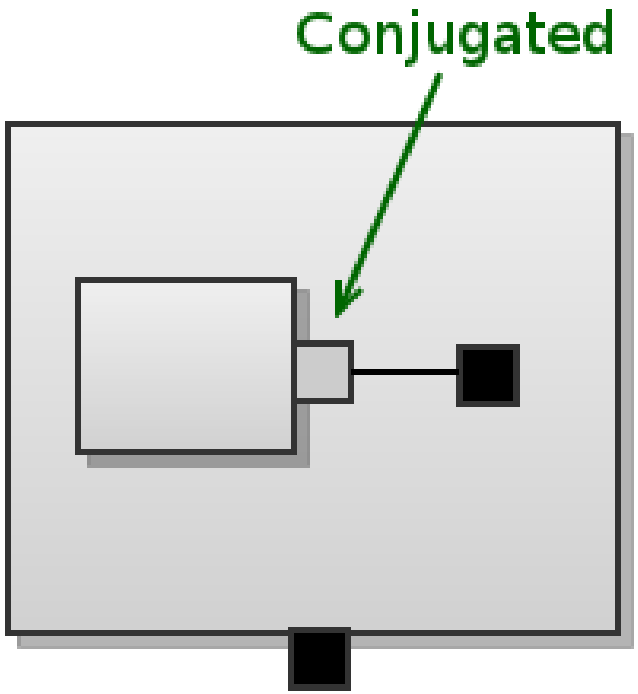
Actor - Port



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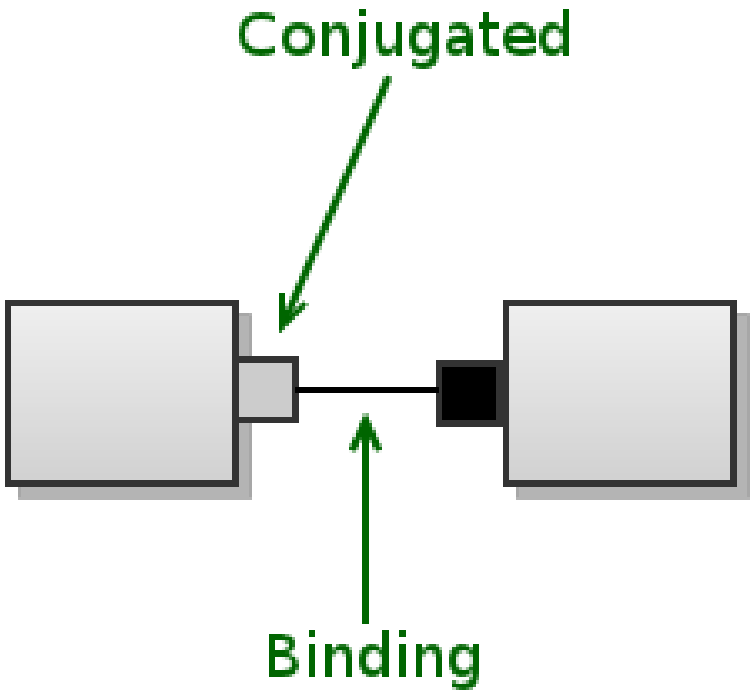
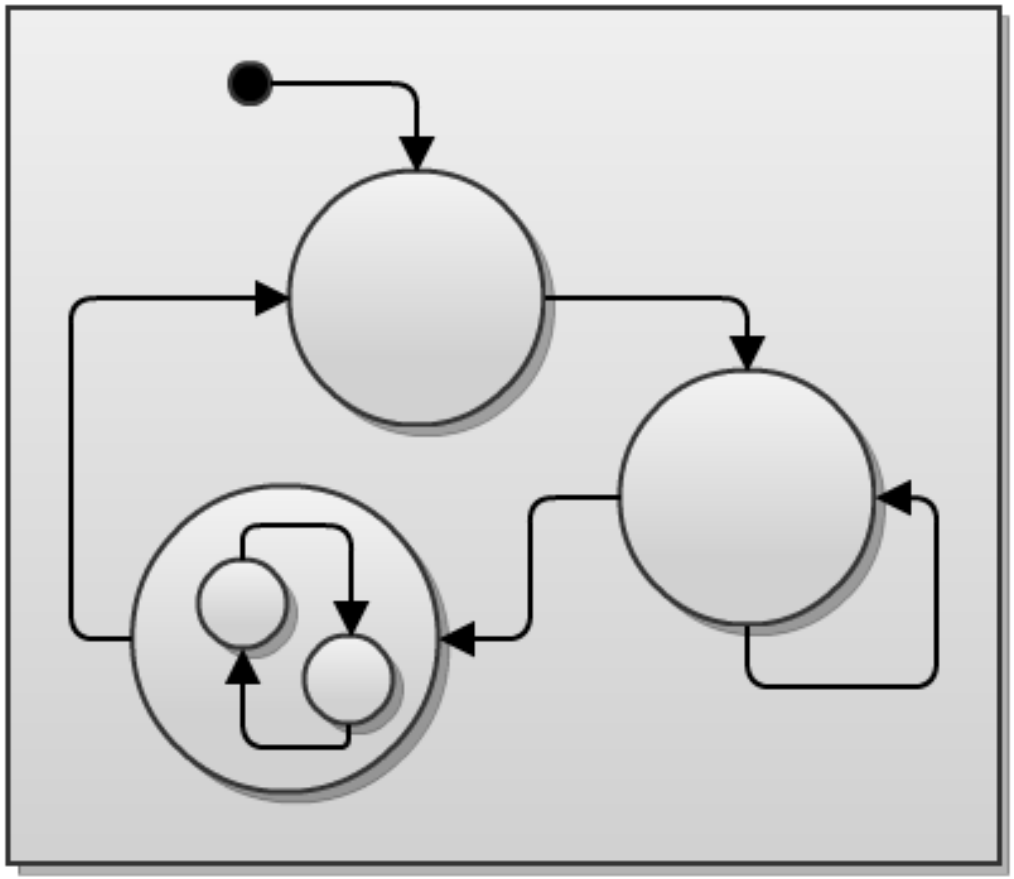
Actor - Port

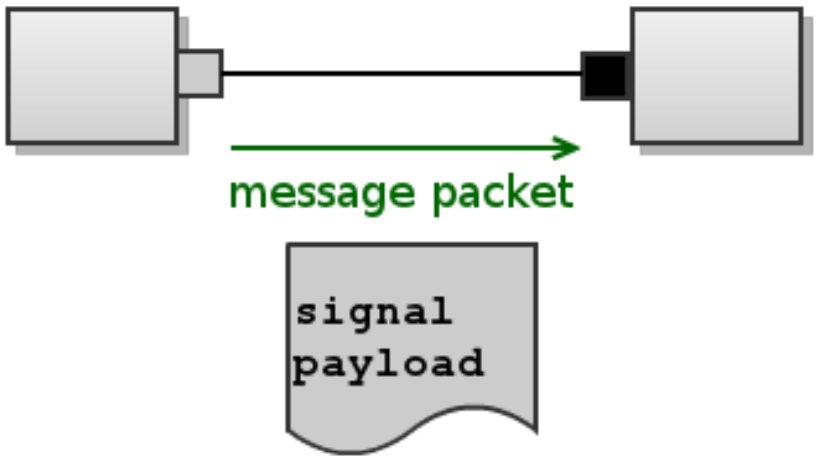


Actor - Behavioral



Actor - Message Passing

dir	signal
in	ping
out	ping
in	start_task
out	task_done



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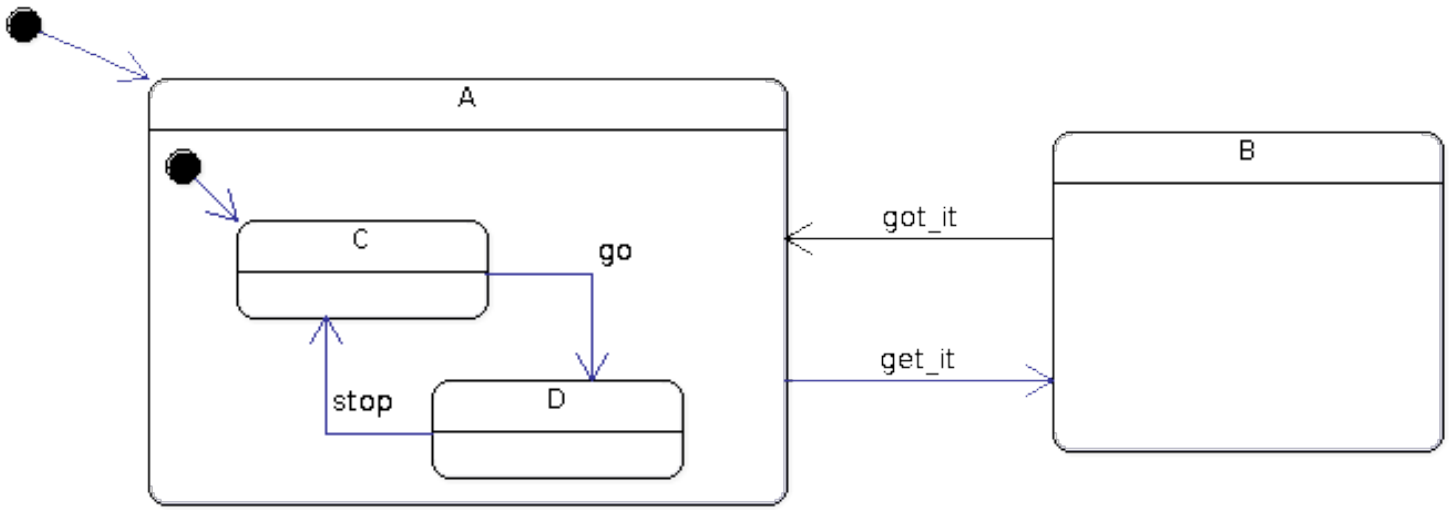
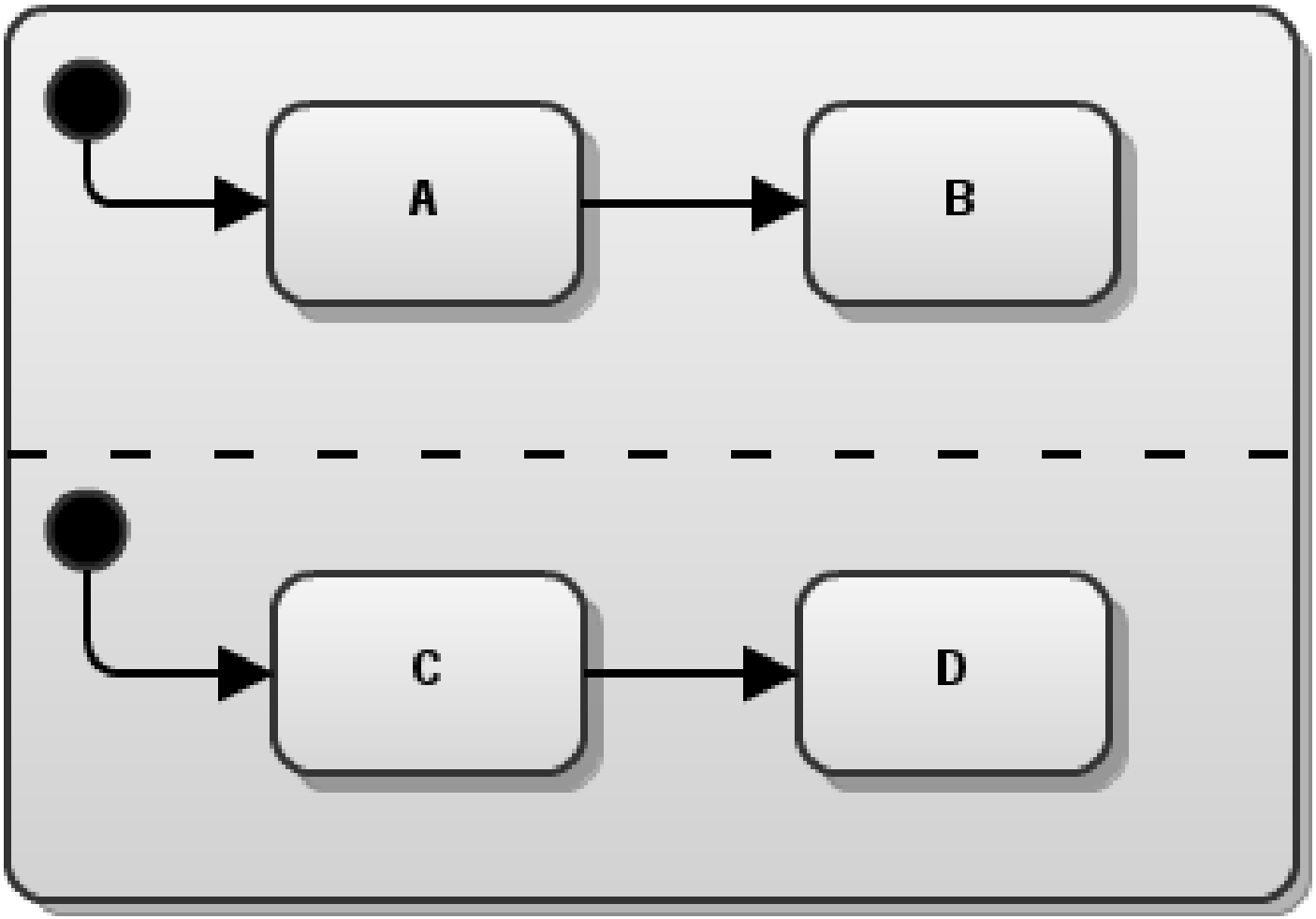
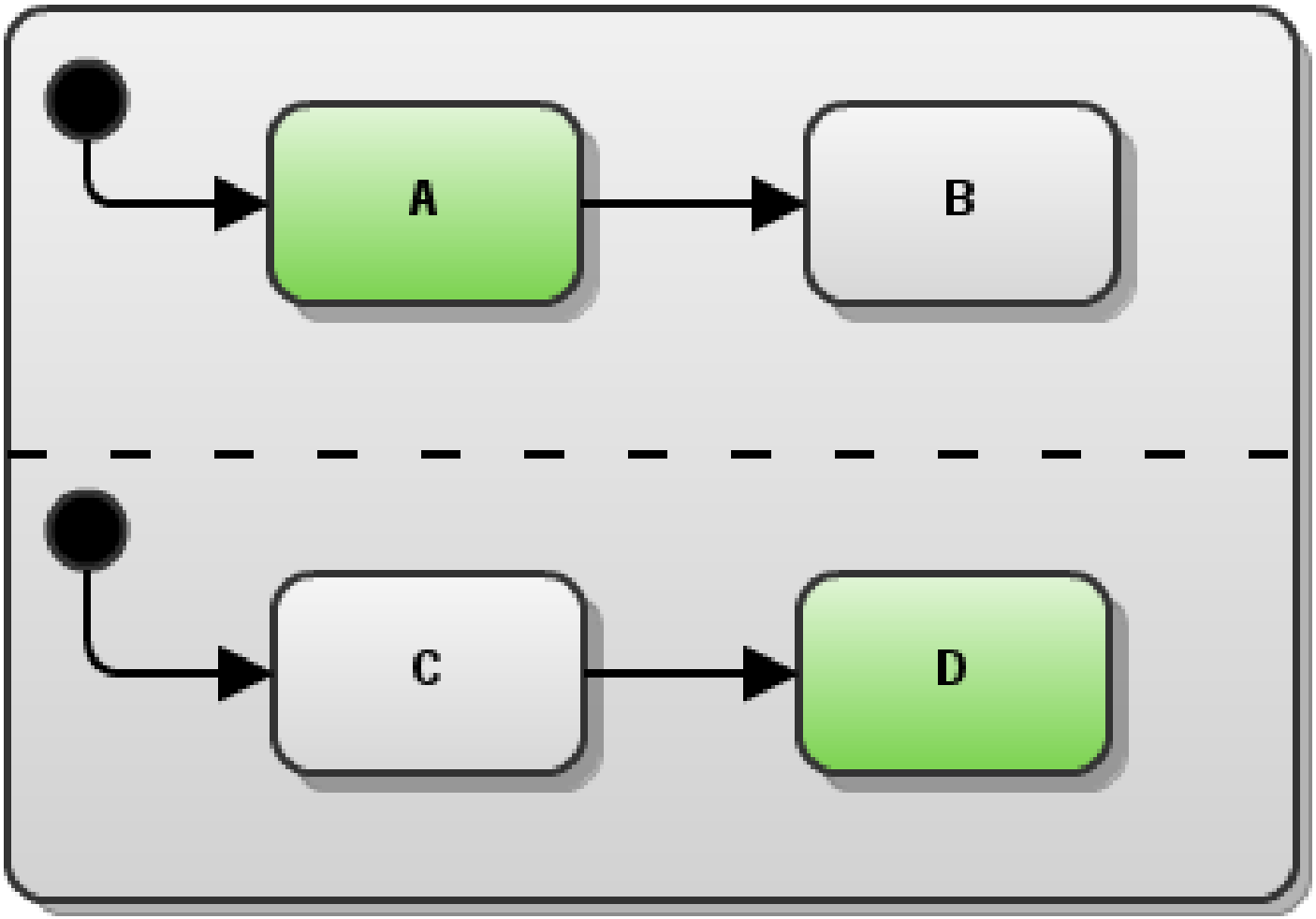
Actor - Simple Example



Orthogonal Region



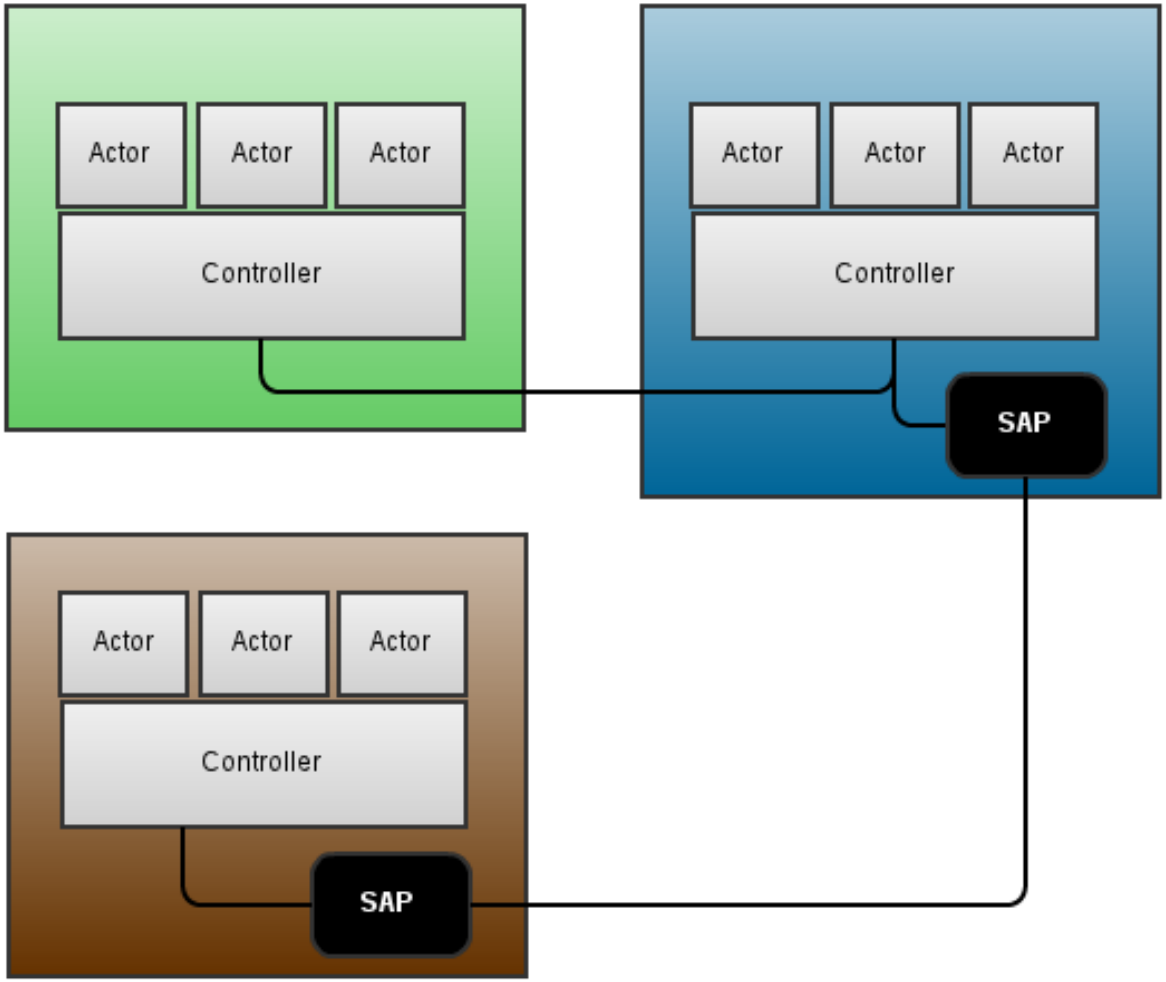
Orthogonal Region



Part V

Architecture

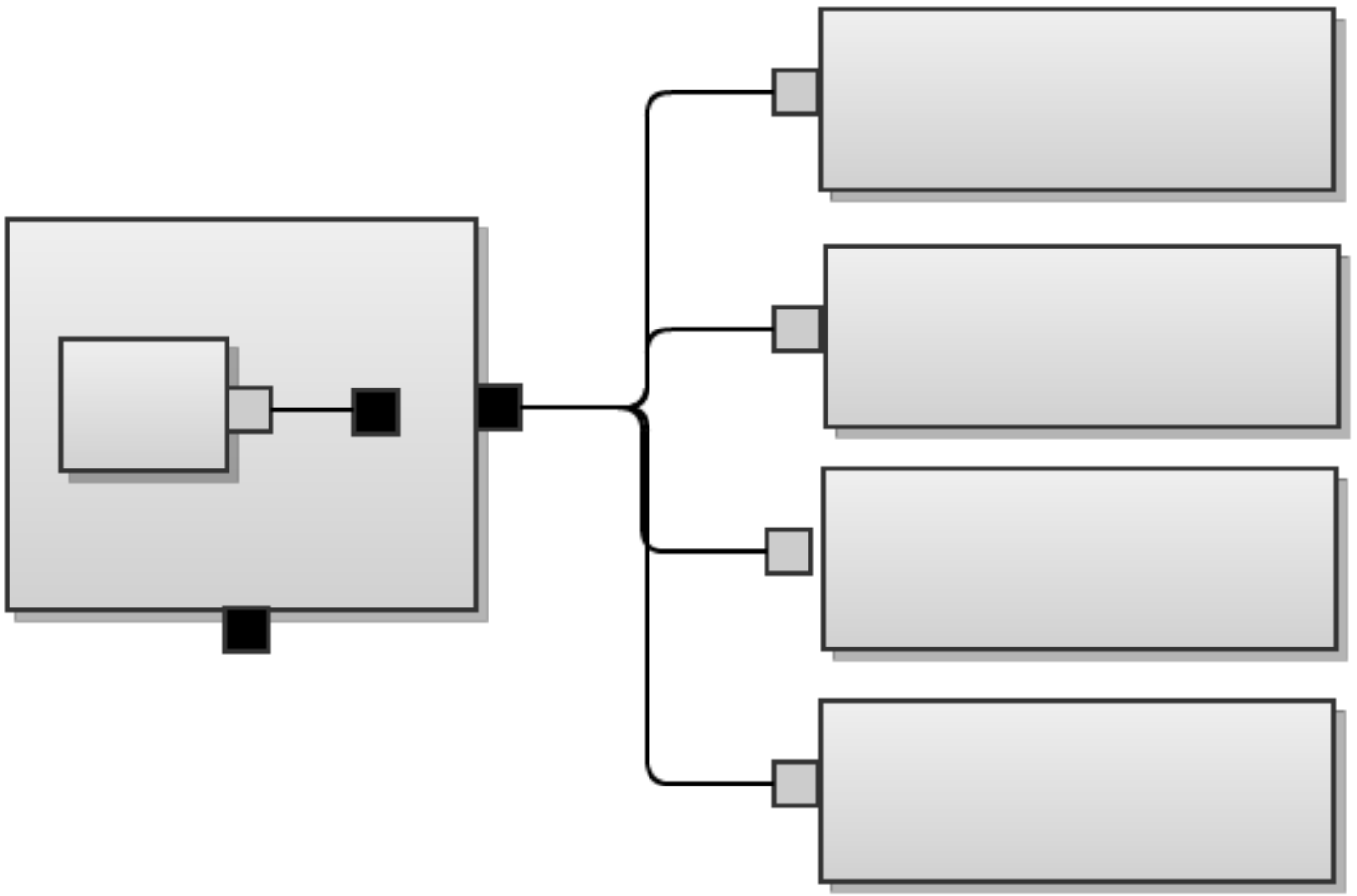
Some Impl



Part VI

Example

Example



Part VII

Techniques

Part VIII

Status

Status

- Ladon C++
- LadonJS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