Marketplace

Layered pub/sub networks in Racket

tonyg@ccs.neu.edu, 29 Sep 2013

An operating system is a collection of things that don't fit into a language. There shouldn't be one.

– *Dan Ingalls, "Design Principles Behind Smalltalk", 1981*

VMs: A Browser Application

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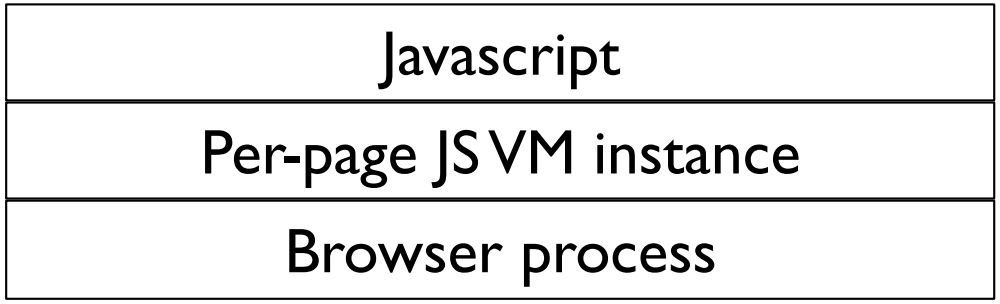

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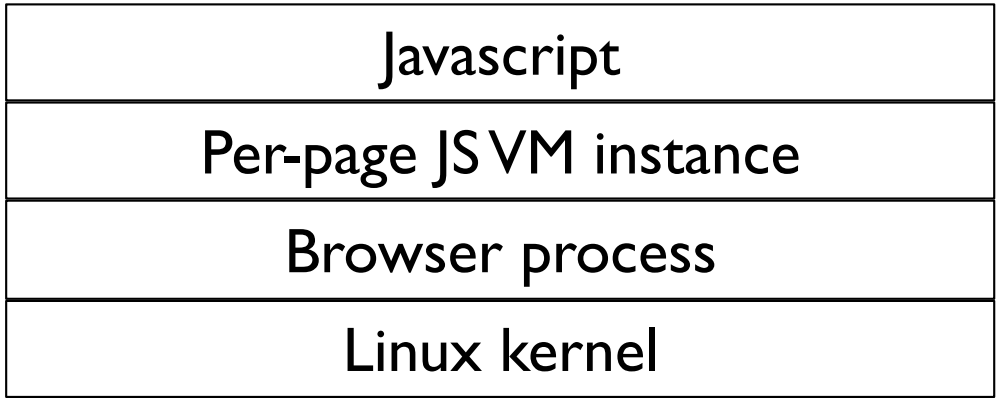

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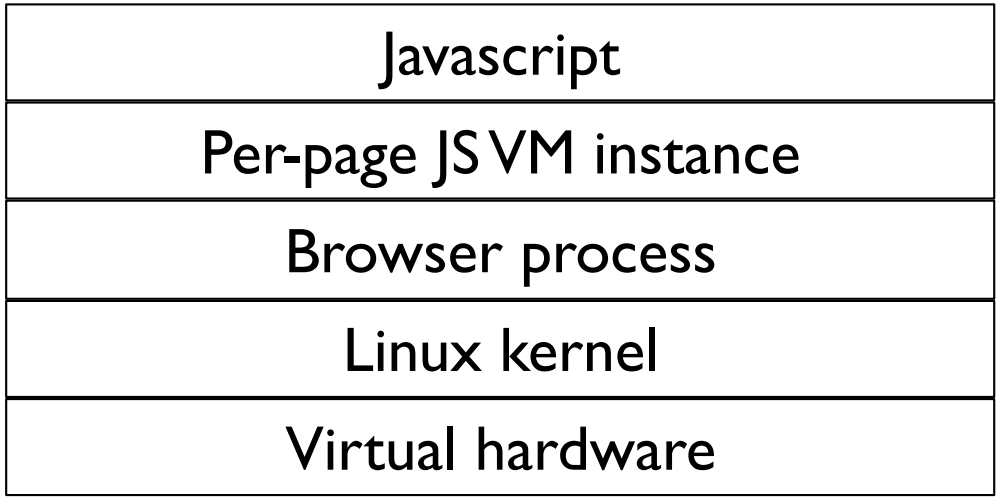

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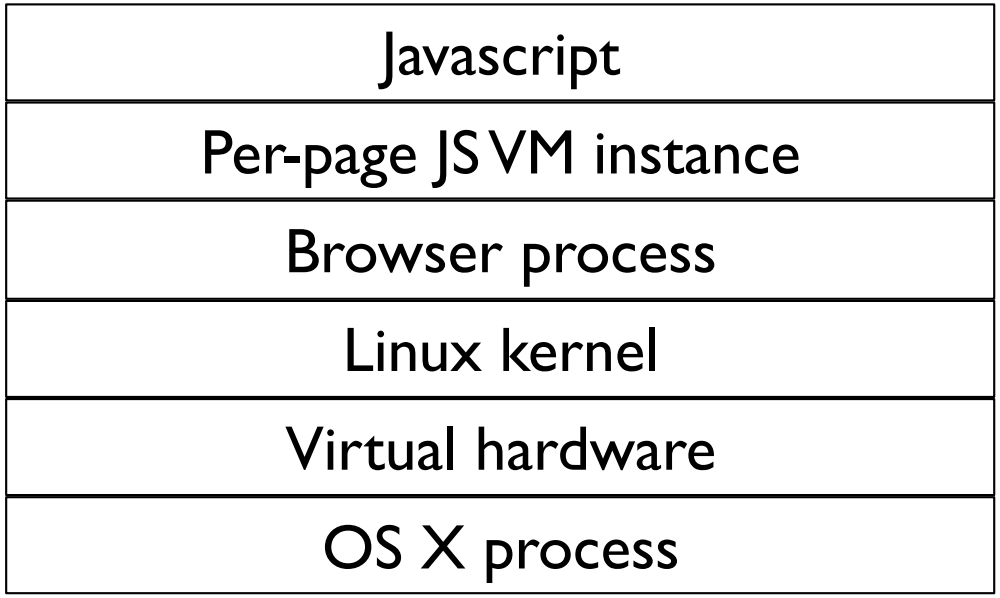

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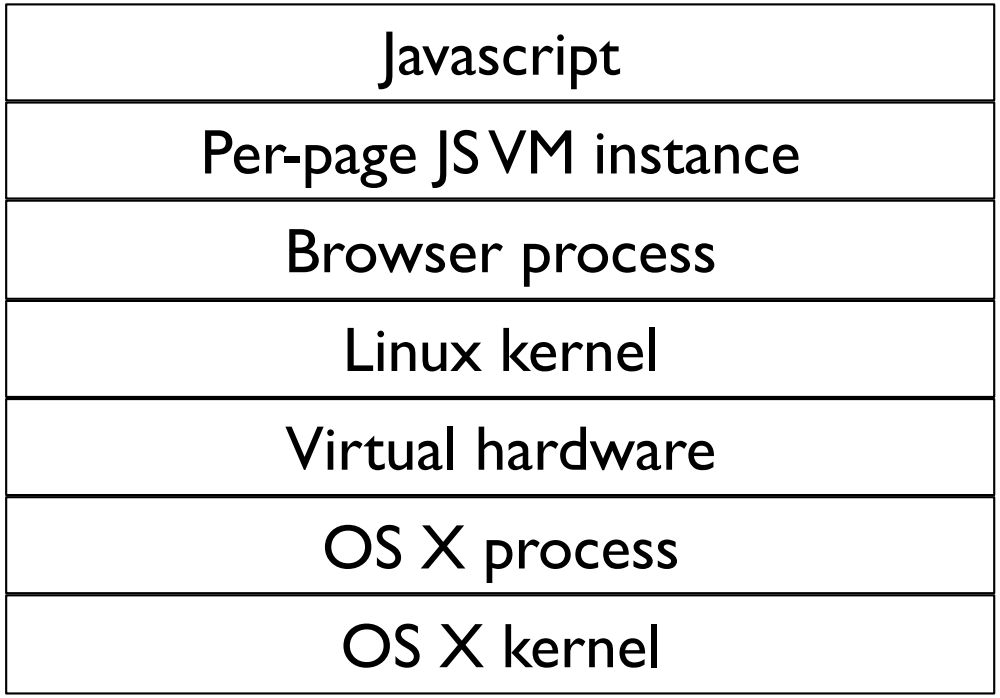

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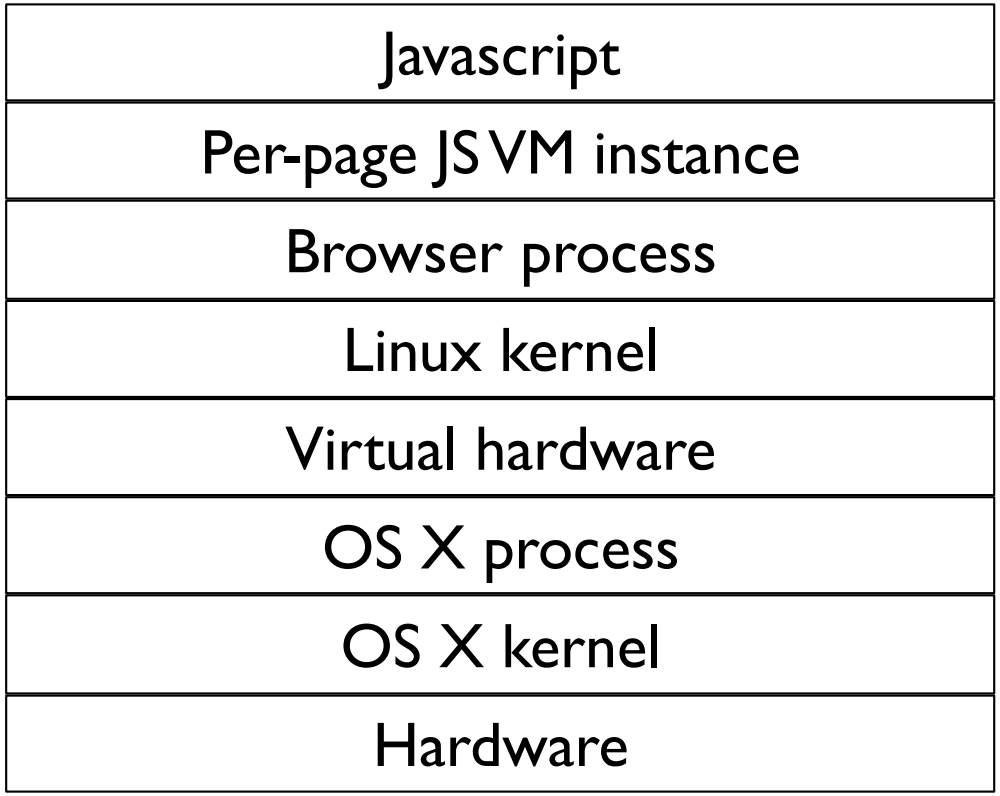

Networks: A Typical Packet

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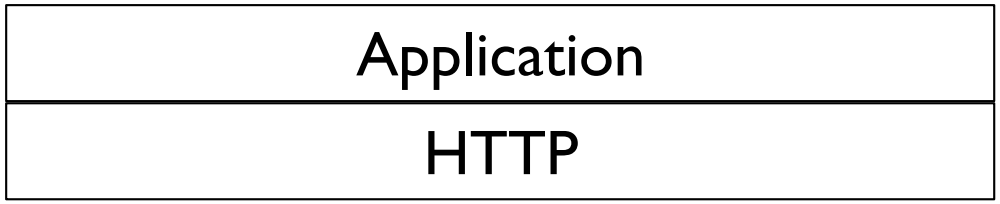

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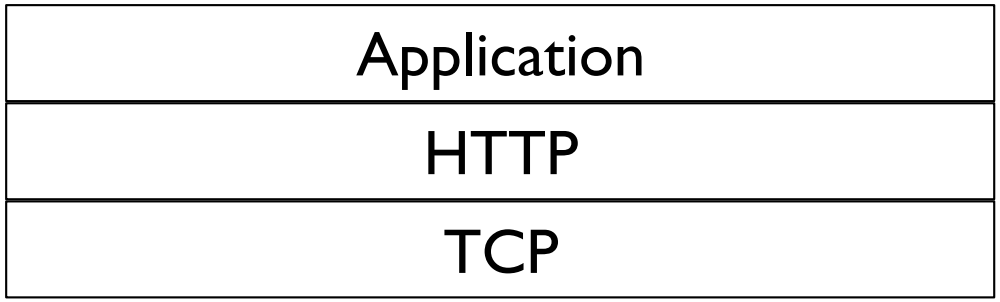

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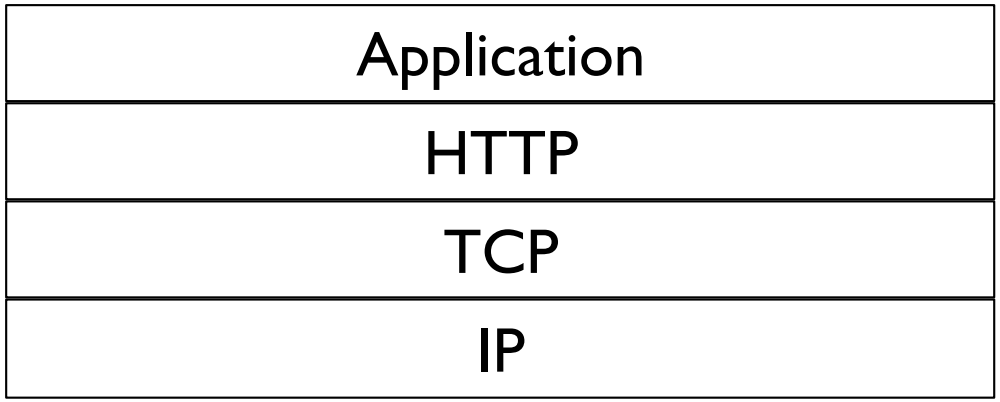

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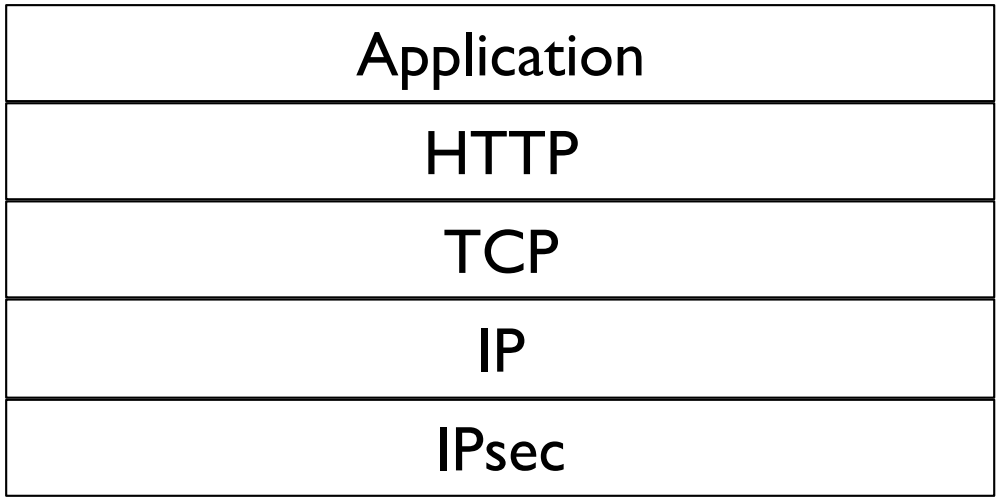

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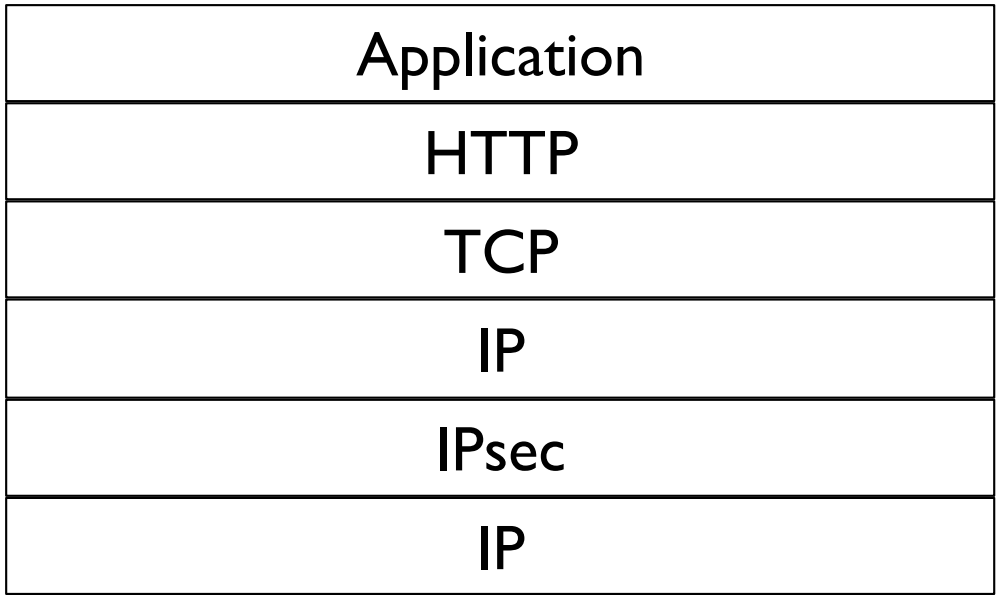

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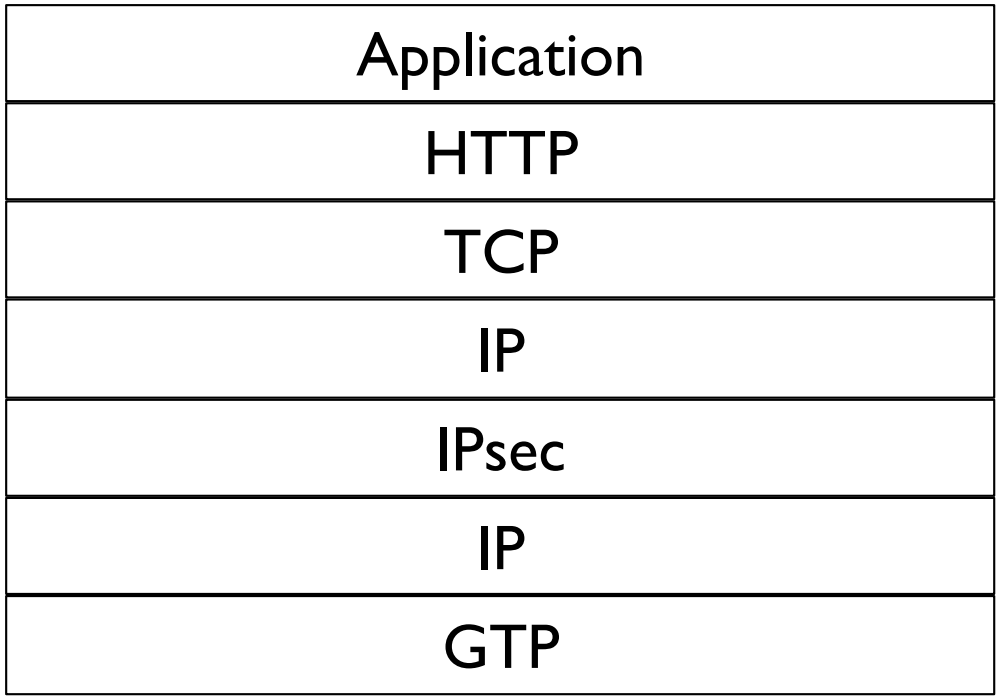

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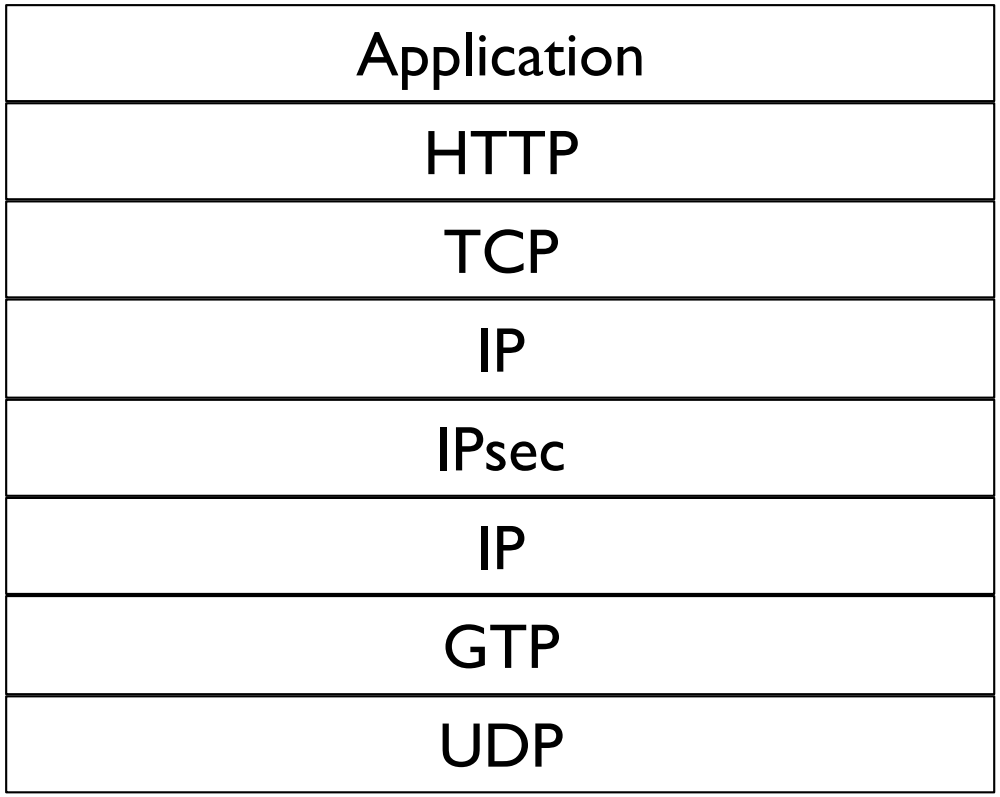

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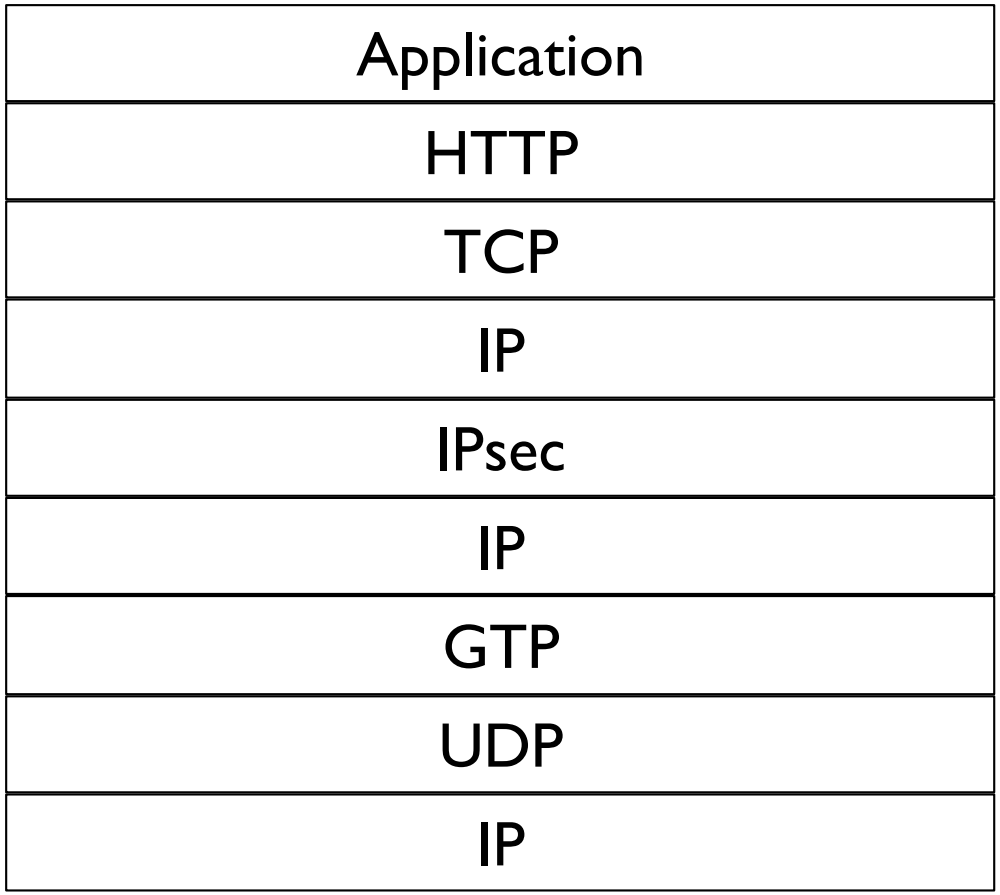

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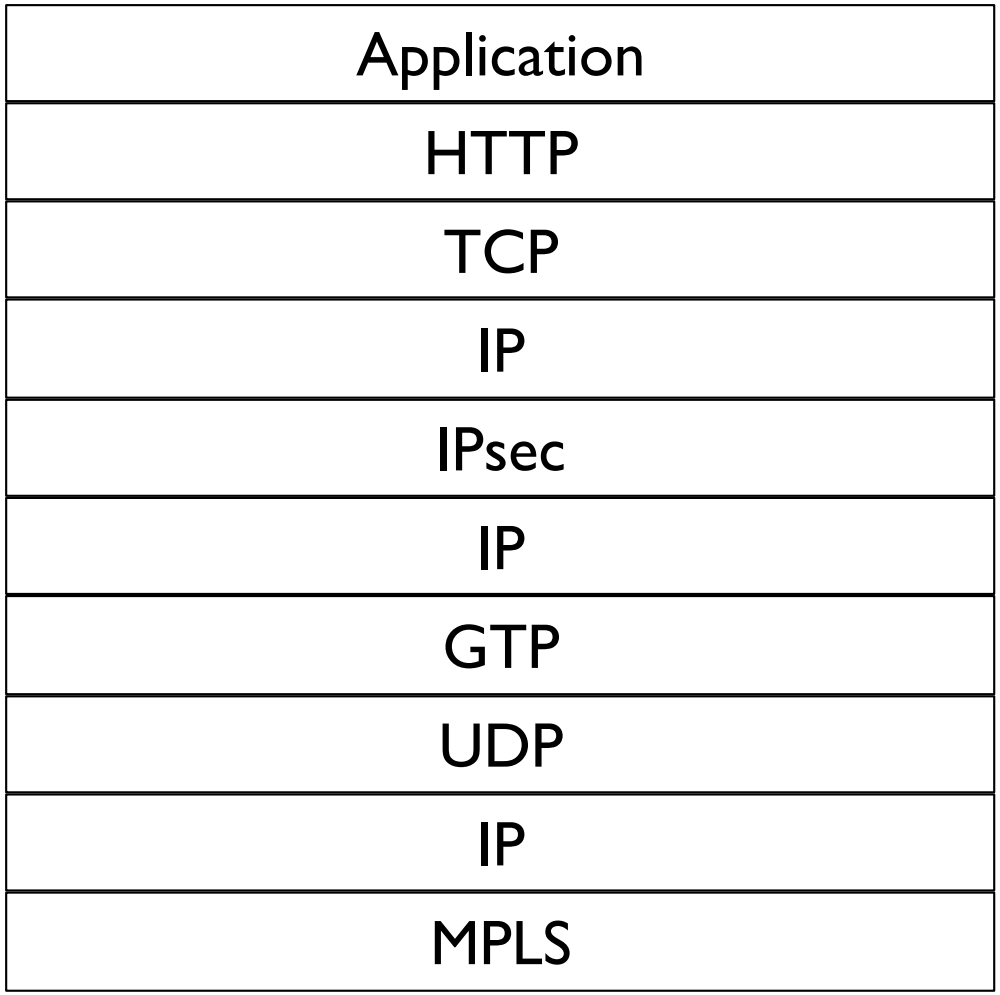

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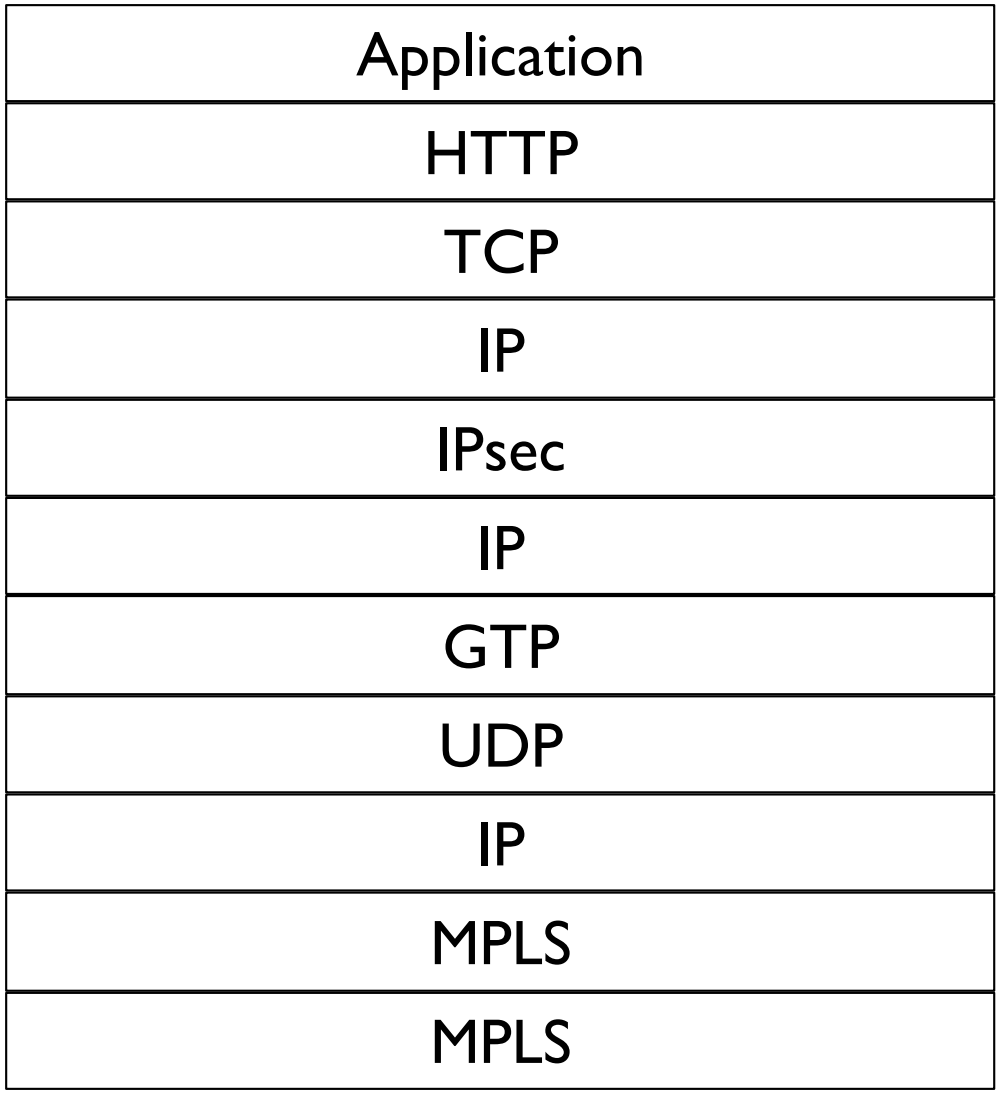

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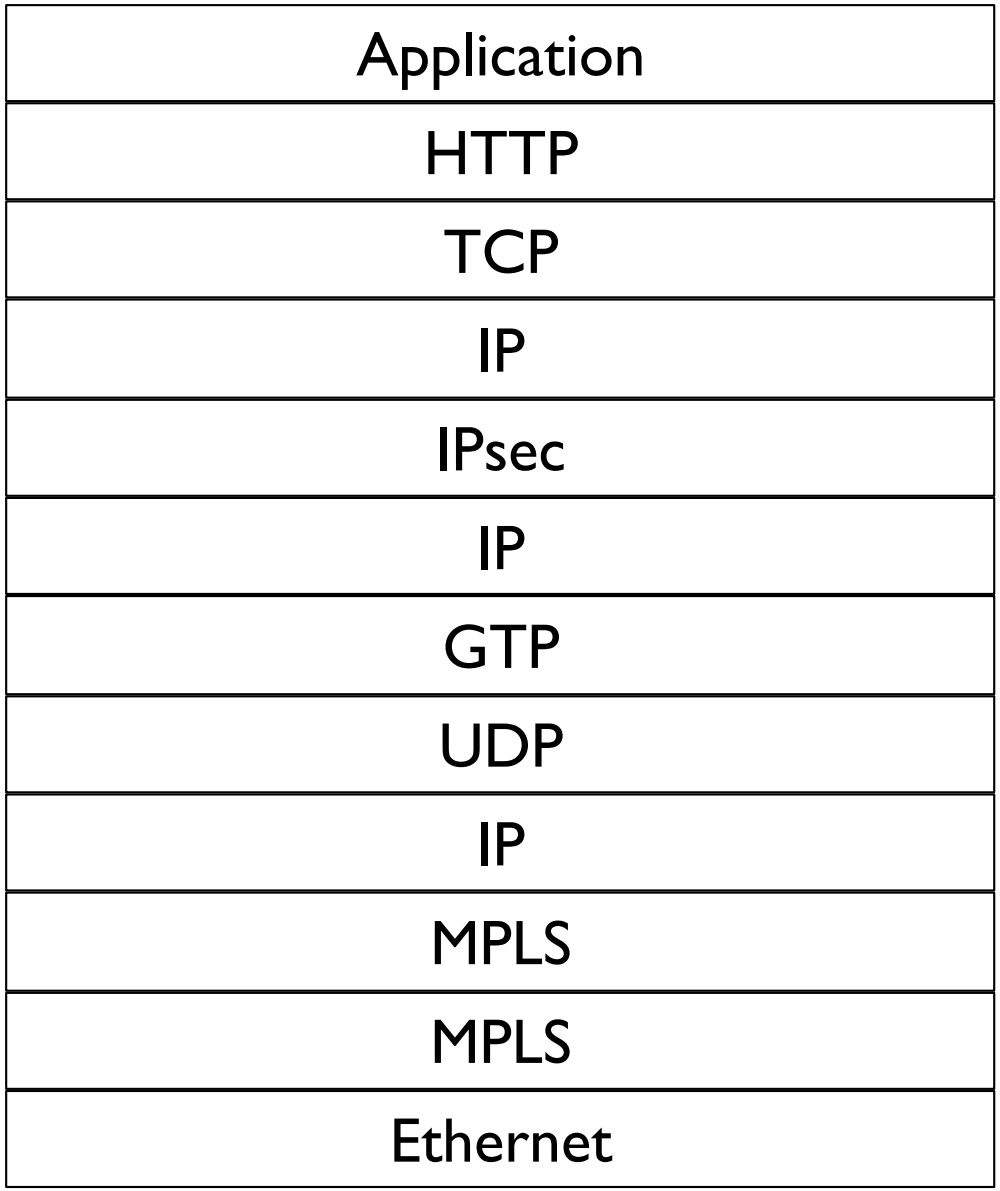
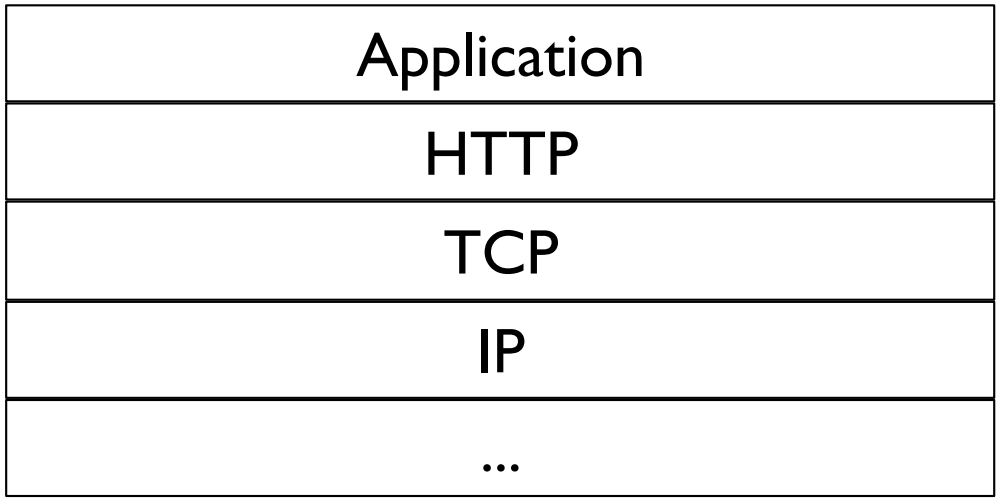
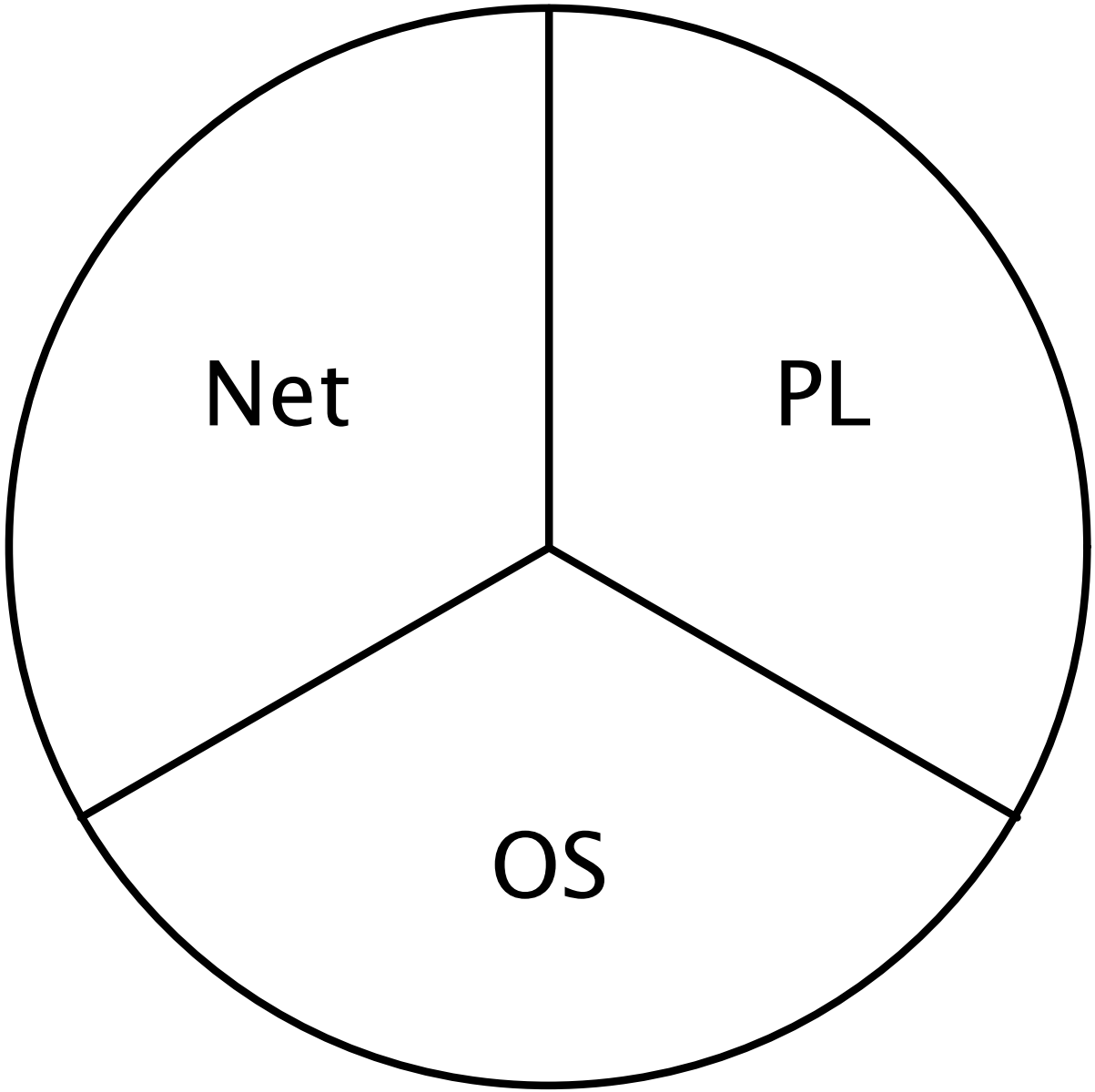


Layers do a lot for you

- Modular system
- One protocol per layer
- One naming system per layer
- (De)multiplex flows

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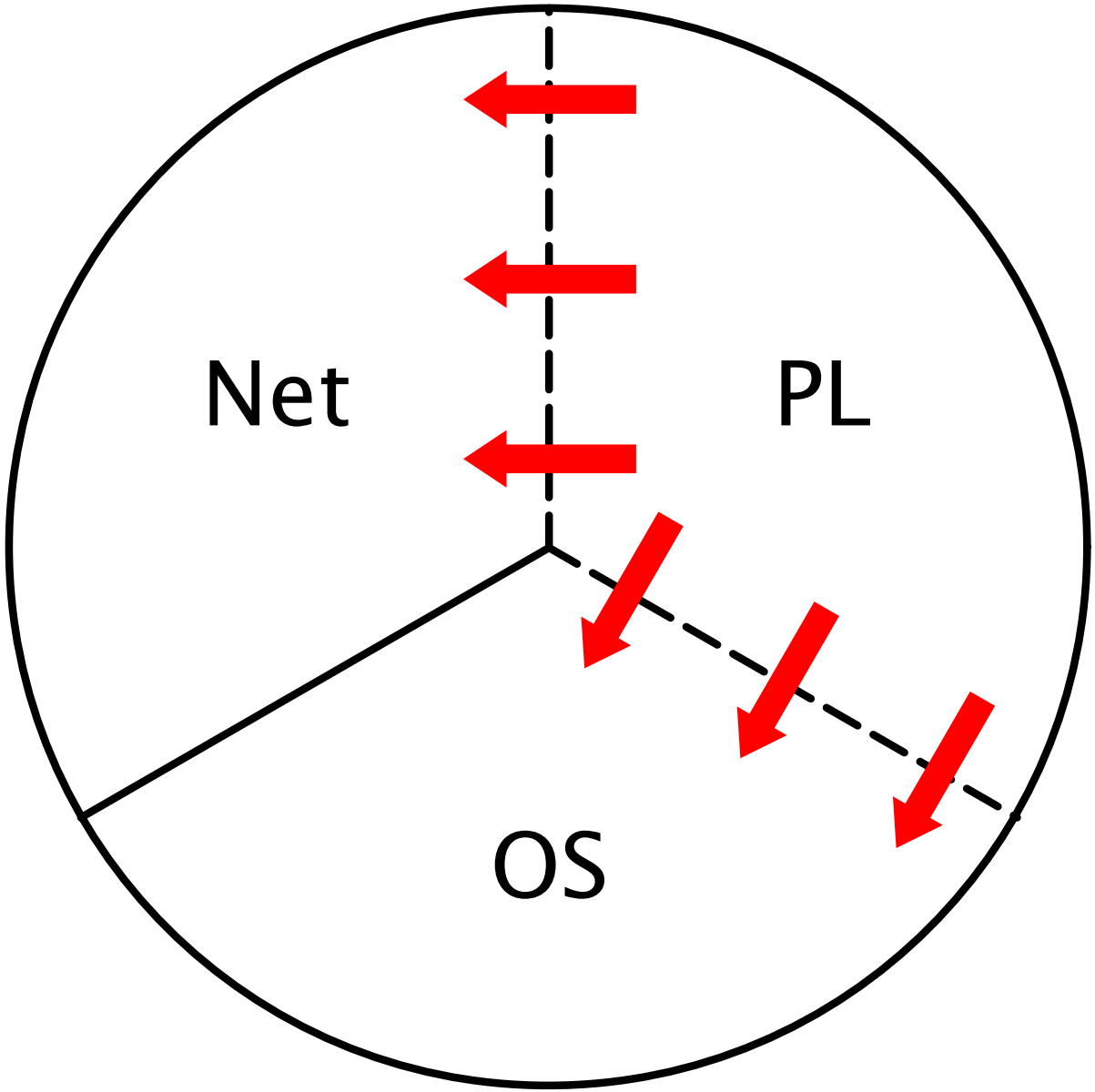
PL
OS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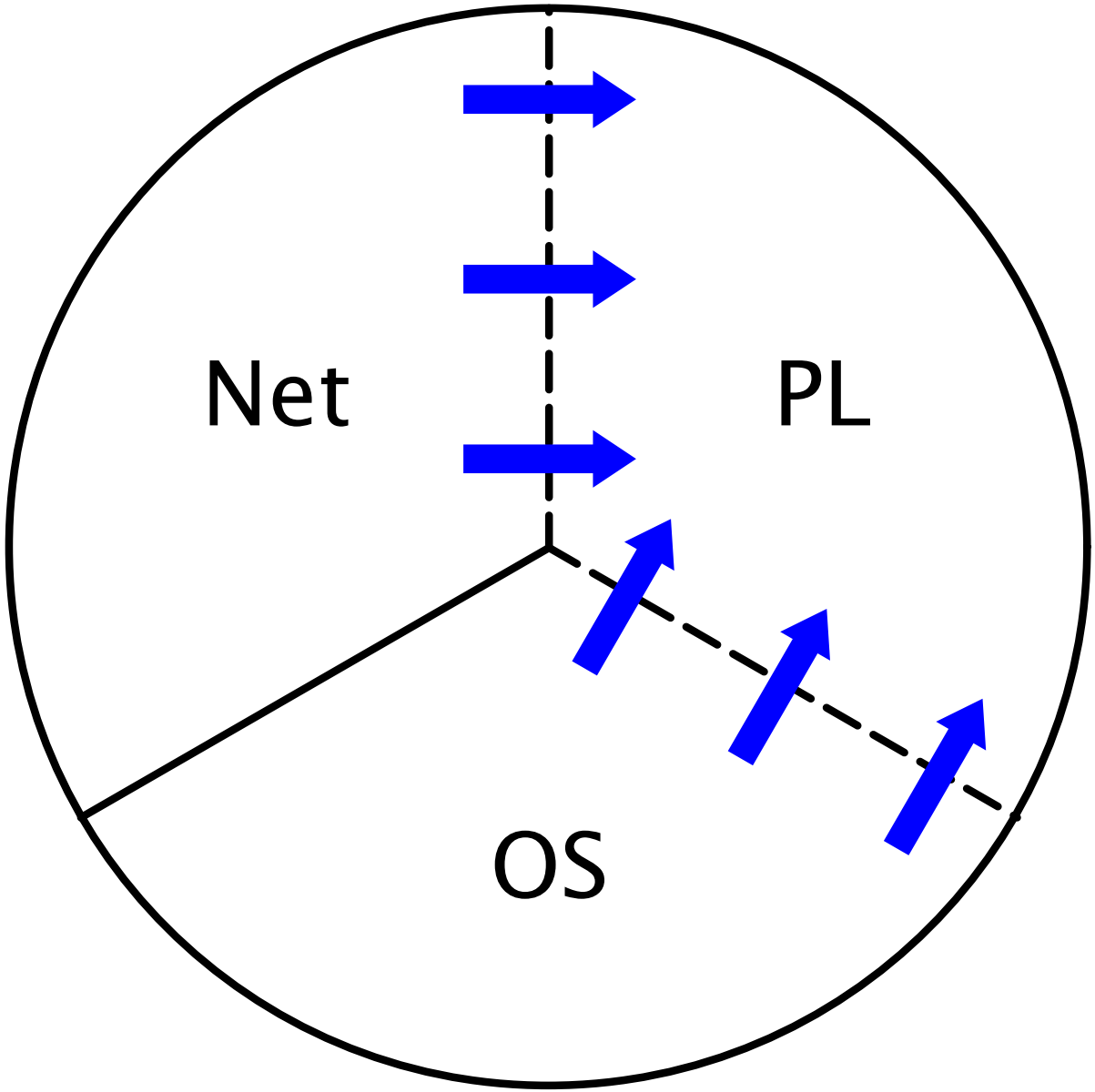
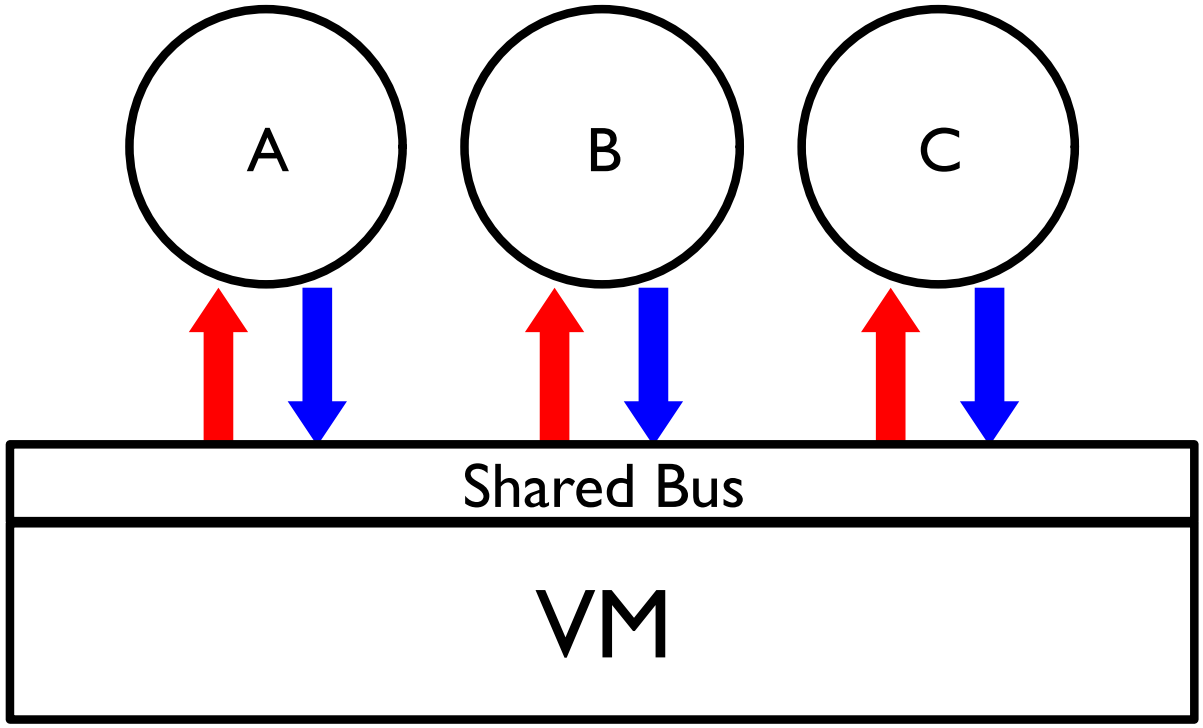
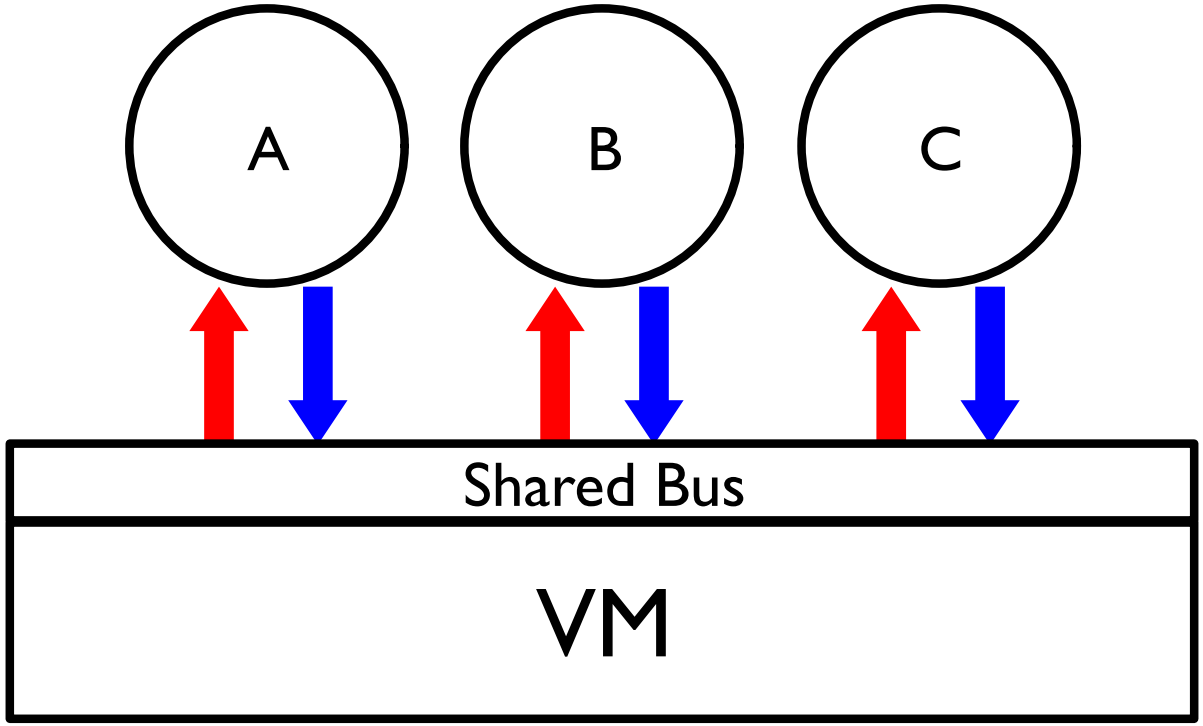

Net
PL
OS

$$\text{actor} : \text{Event} \times \text{State} \to [\text{Action}] \times \text{State}$$

actor : Event × State → [Action] × State

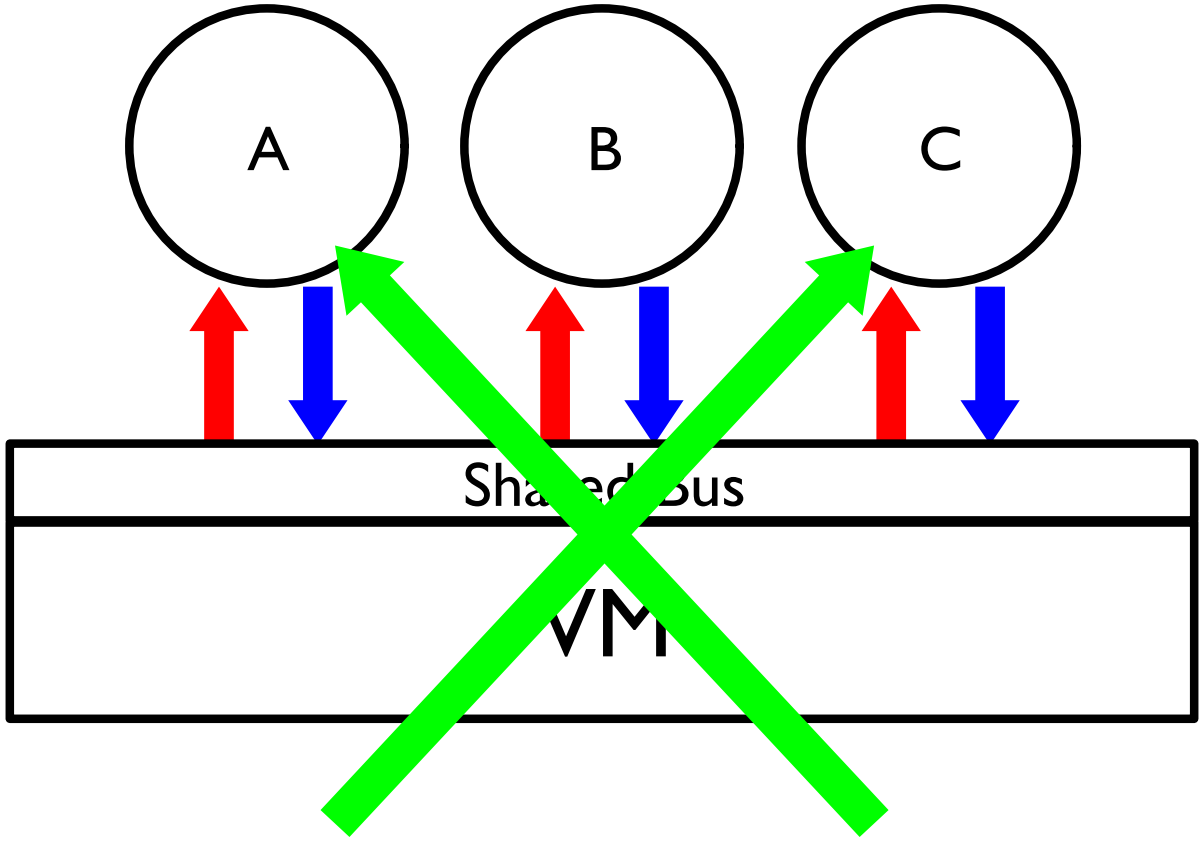


actor : Event × State → [Action] × State




```
(subscriber                    (publisher
    `(price gold ,?))              `(price gold ,?))
```

actor : Event × State → [Action] × State

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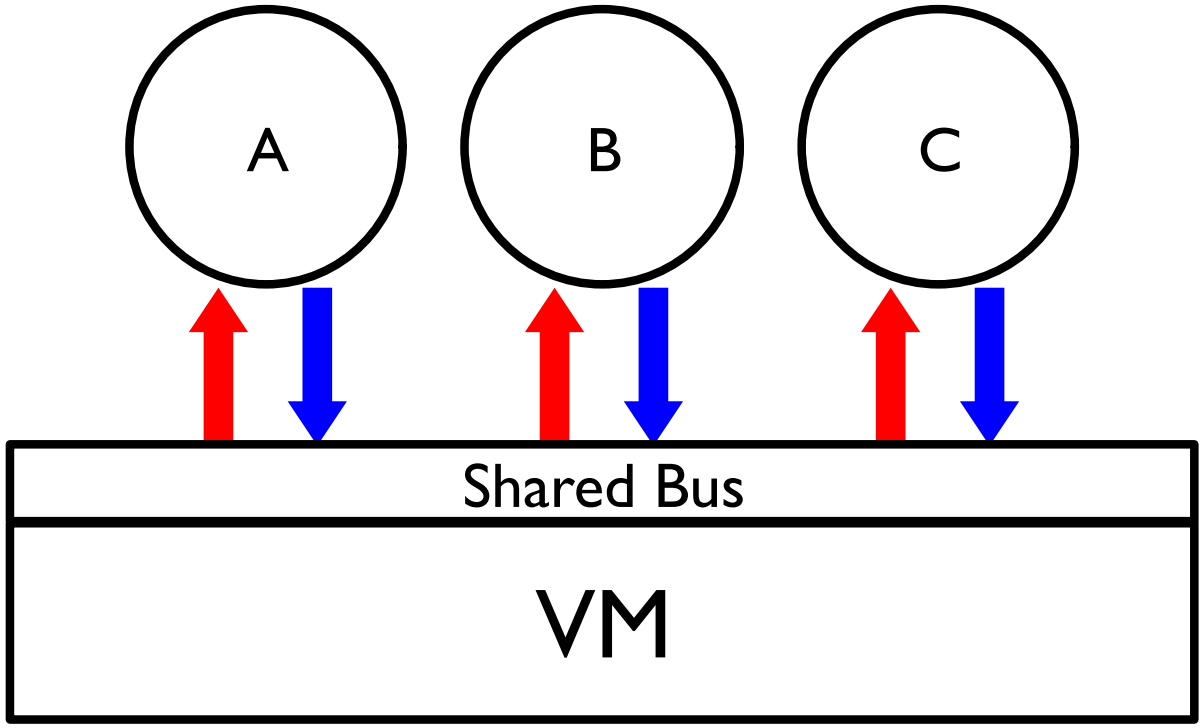
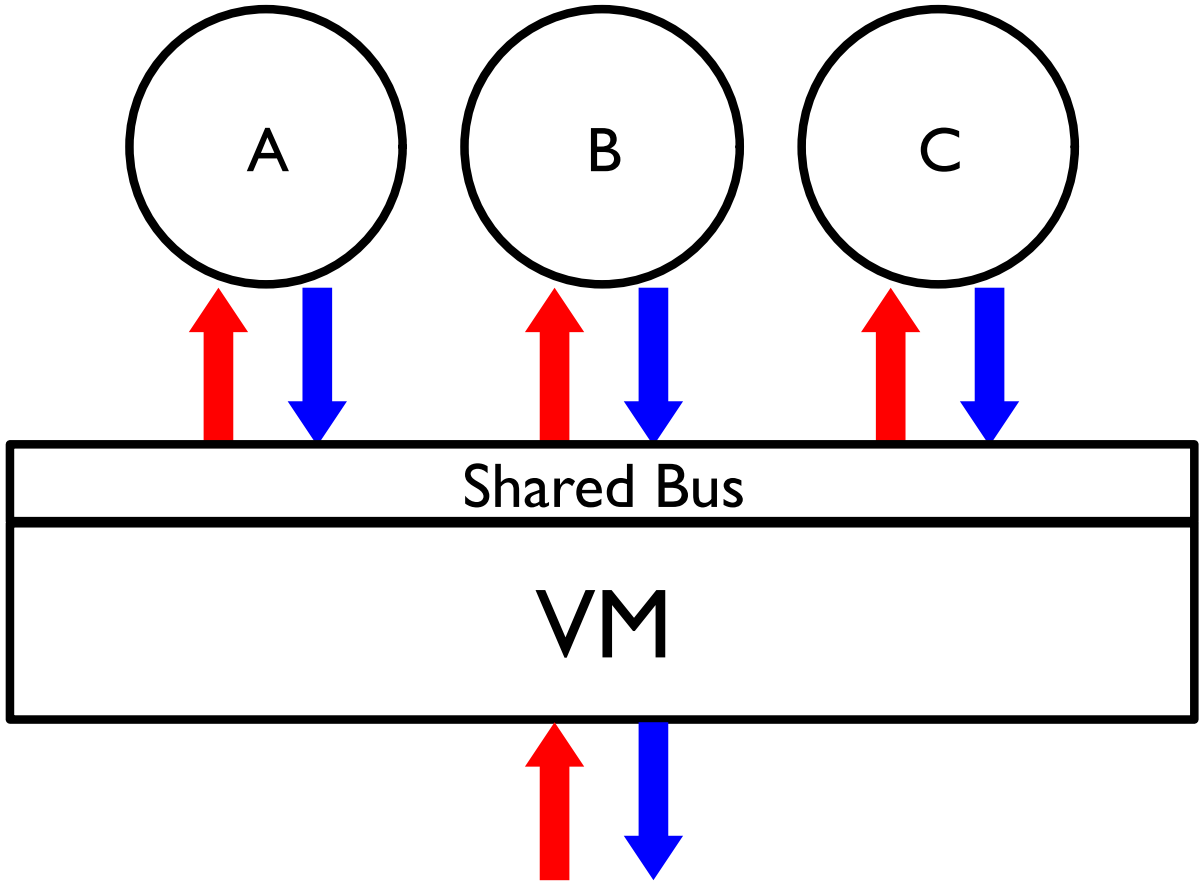


$$vm : Event \times State \rightarrow [Action] \times State$$



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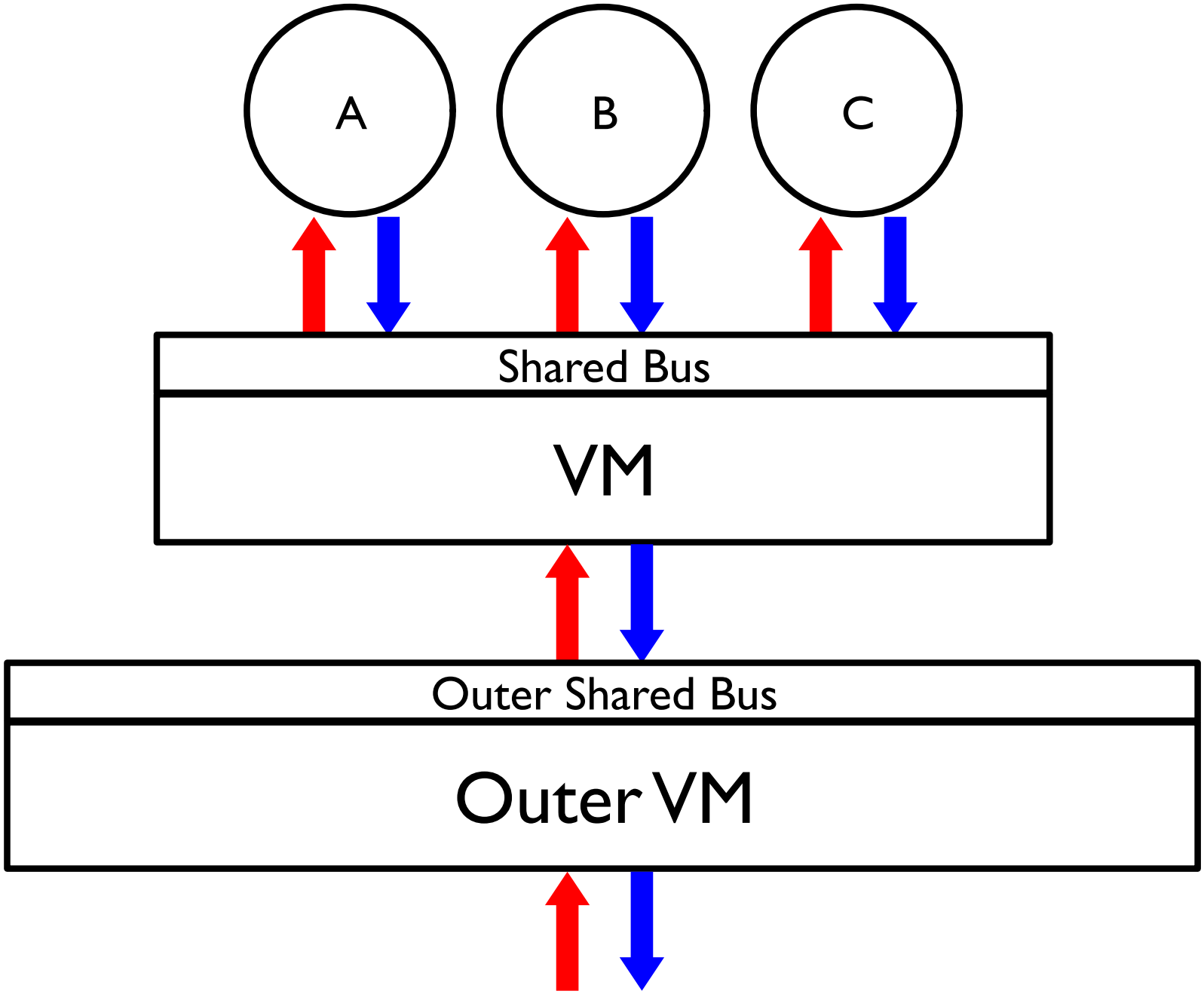
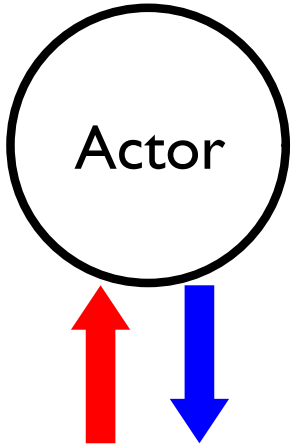


$$actor : Event \times State \rightarrow [Action] \times State$$

Events

- message delivery
- presence notification
- absence notification



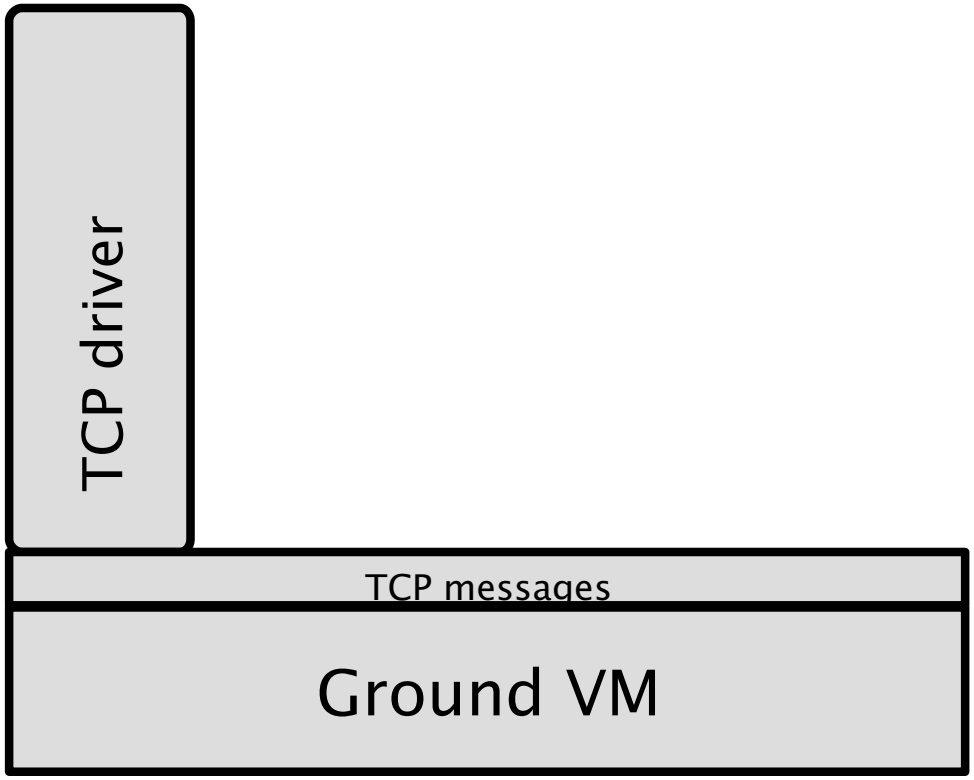
Actions

- send message
- spawn actor
- quit

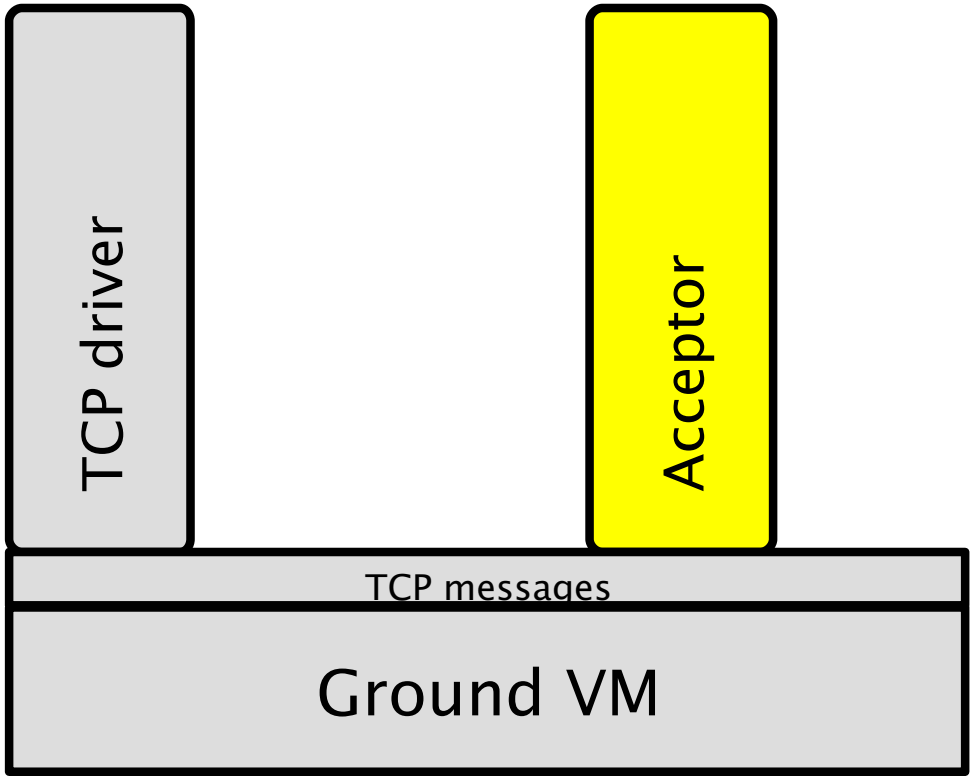
- add/delete subscriber
- add/delete publisher

- observe subscribers
- observe publishers

```
$ raco pkg install marketplace
```

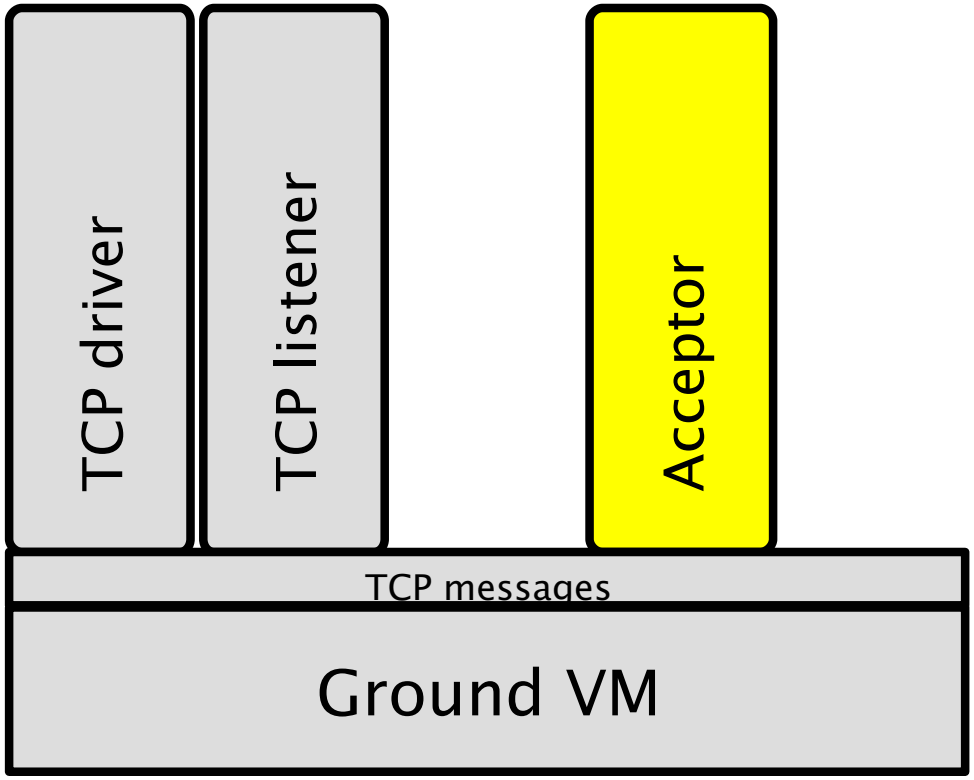



```
#lang marketplace
```




```
#lang marketplace

(observe-publishers
    (tcp-channel ? (tcp-listener 5999) ?)
  ...)
```

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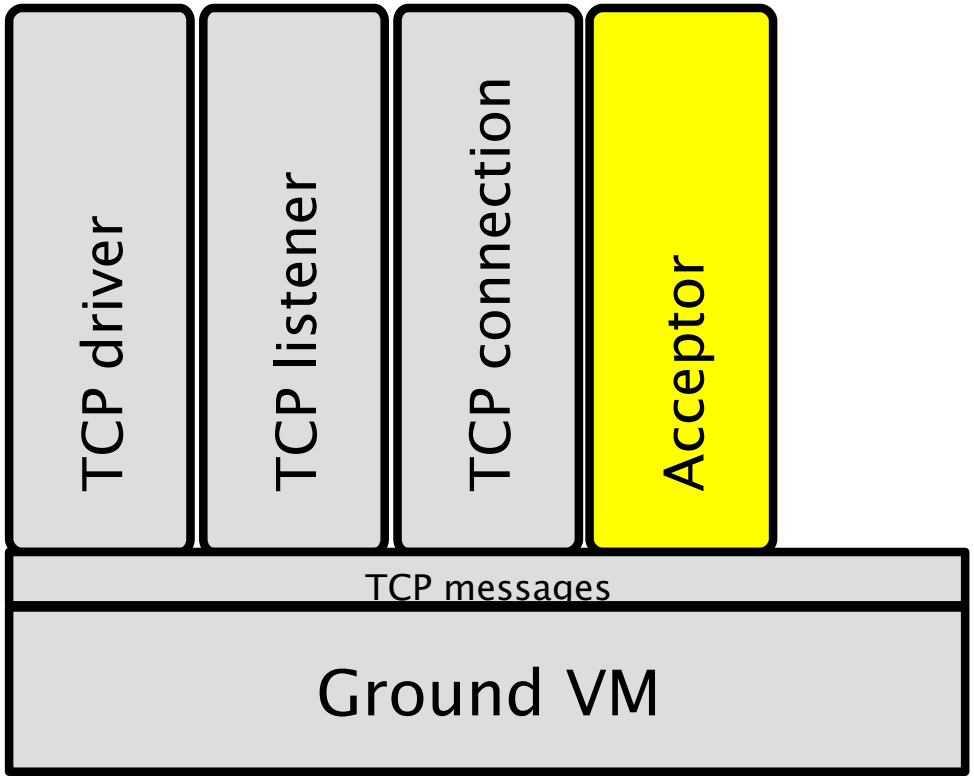
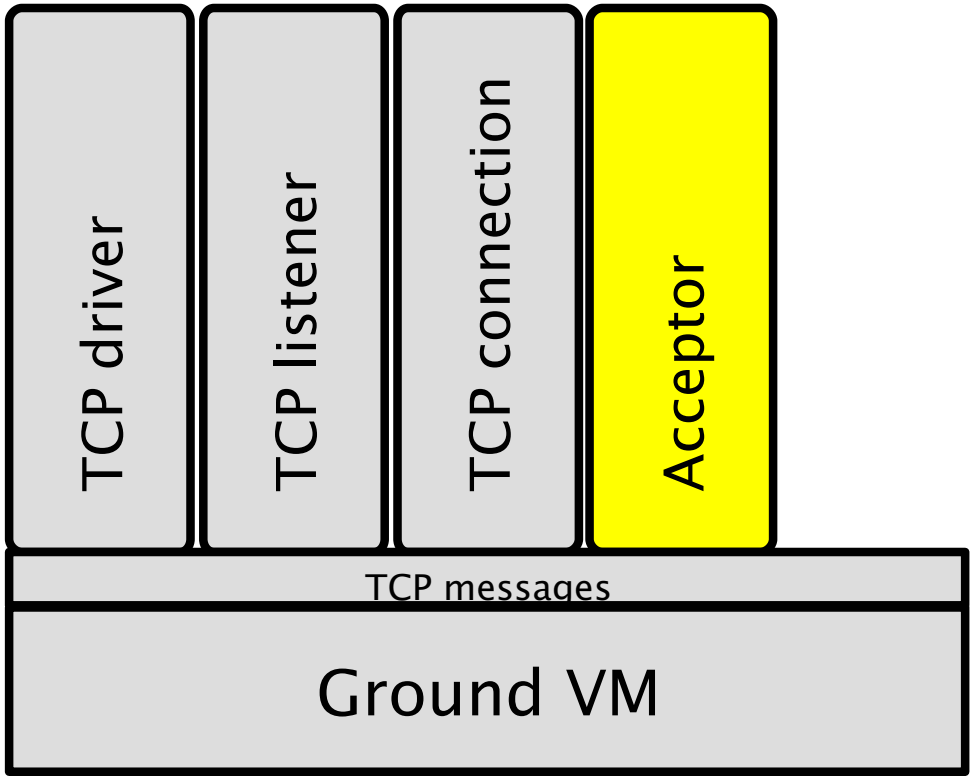


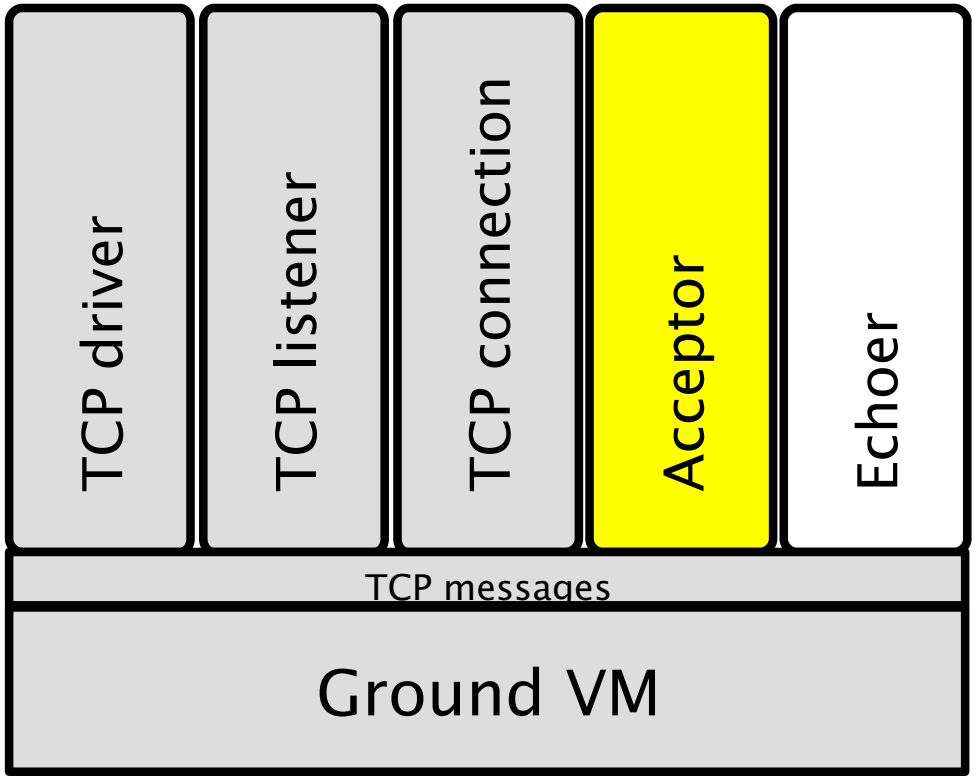

```
#lang marketplace

(observe-publishers
    (tcp-channel ? (tcp-listener 5999) ?)
  ...)
```



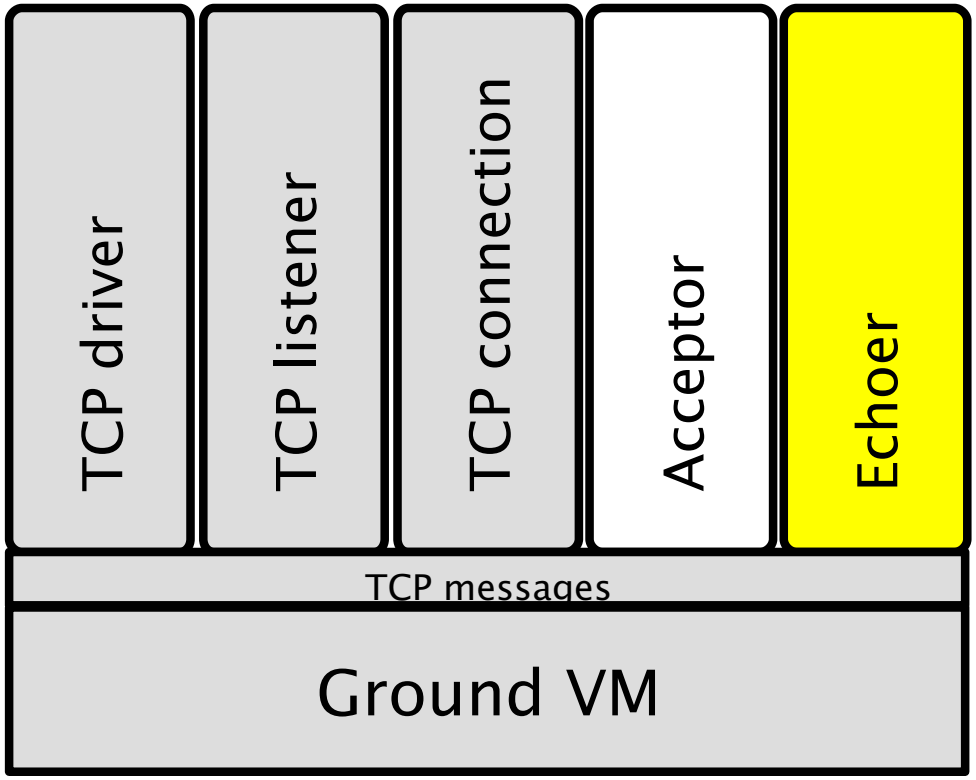

```
#lang marketplace

(observe-publishers
    (tcp-channel ? (tcp-listener 5999) ?)
  (match-conversation (tcp-channel from to _)
    (on-presence ...)))
```

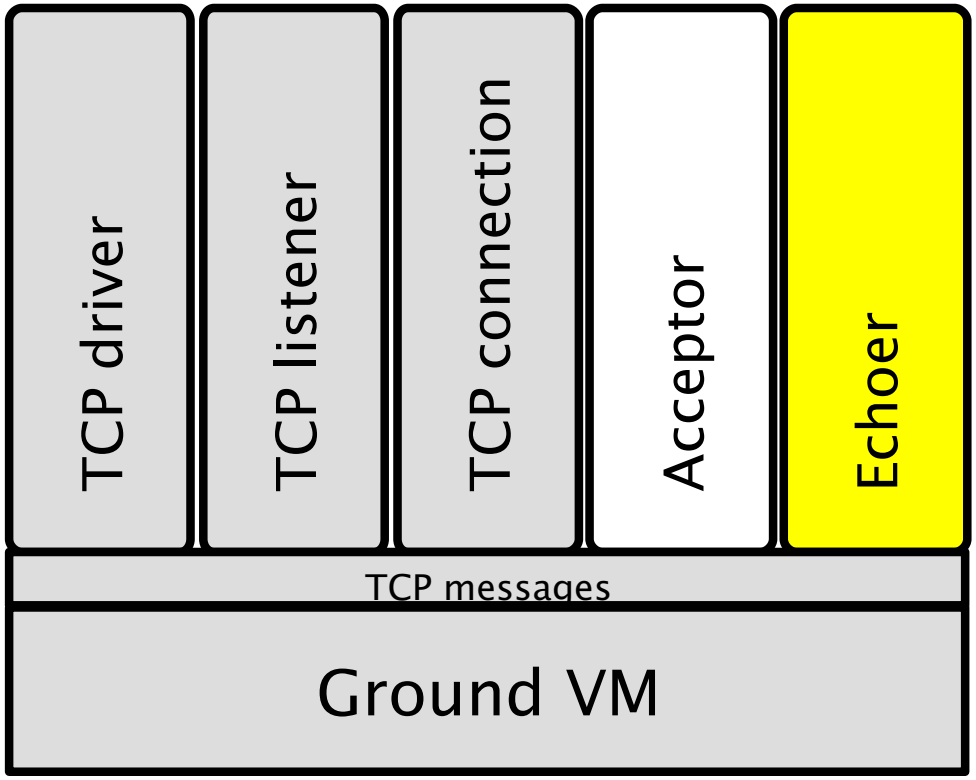



```
#lang marketplace

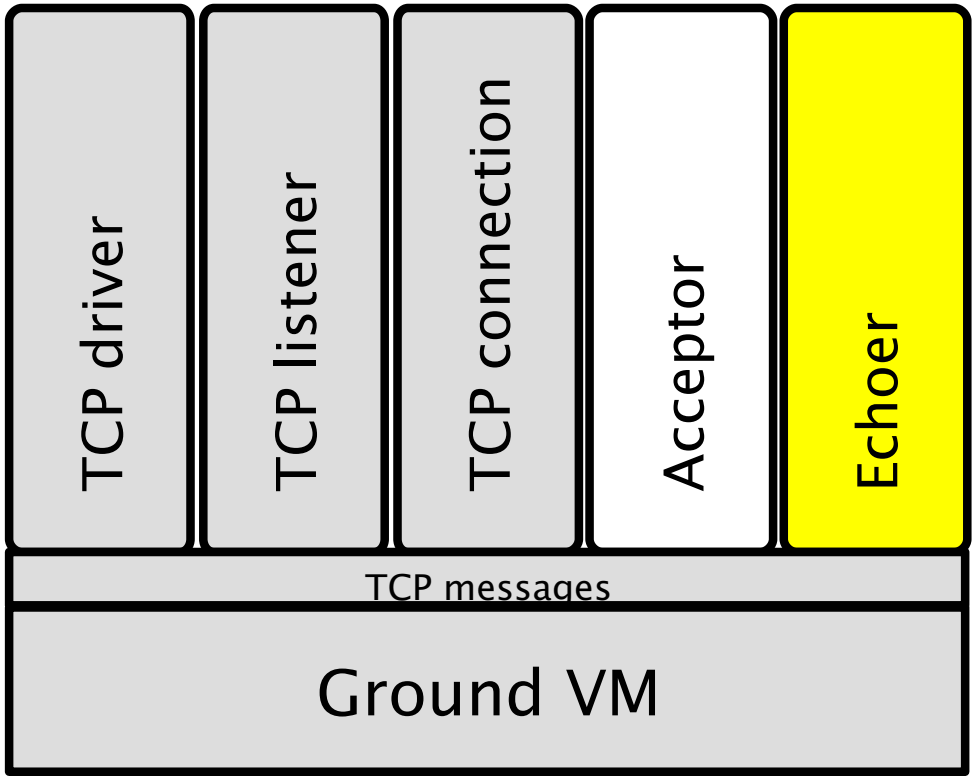
(observe-publishers
    (tcp-channel ? (tcp-listener 5999) ?)
  (match-conversation (tcp-channel from to _)
    (on-presence (spawn (echoer from to)))))
```



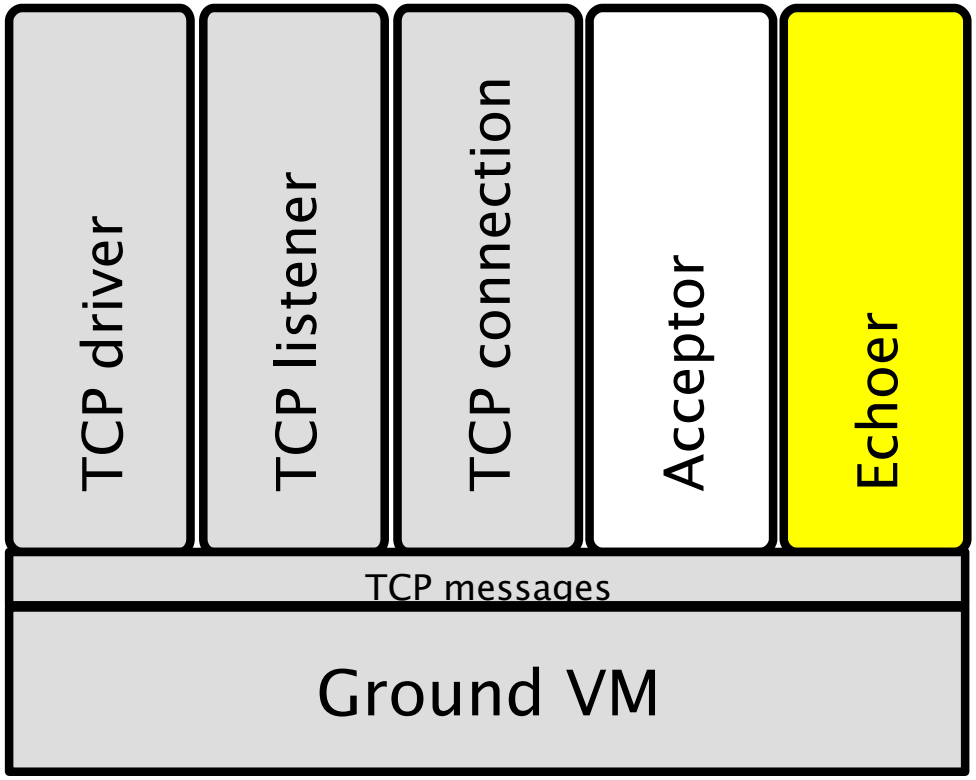

```
(define (echoer from to)
  ...)
```



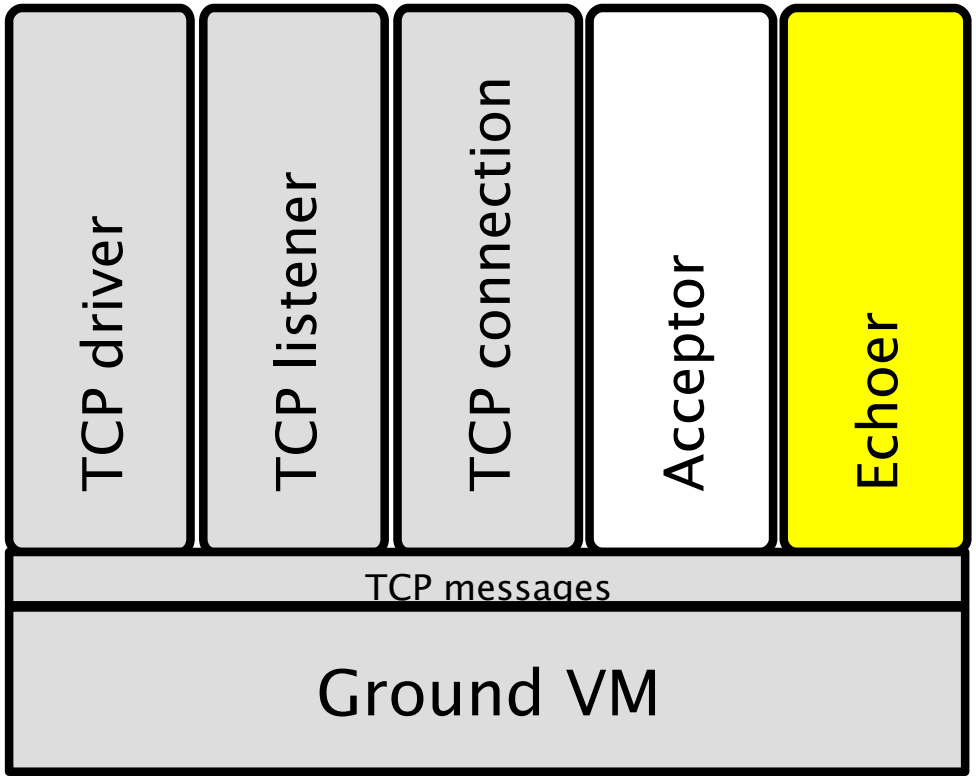

```
(define (echoer from to)
  (transition 'no-state-in-particular
    ...))
```




```
(define (echoer from to)
  (transition 'no-state-in-particular
    (publisher  (tcp-channel to from ?))
    (subscriber (tcp-channel from to ?)
      ...)))
```




```
(define (echoer from to)
  (transition 'no-state-in-particular
    (publisher  (tcp-channel to from ?))
    (subscriber (tcp-channel from to ?)
      (on-message
       [(tcp-channel _ _ data)
        (send-message (tcp-channel to from data))])
      ...)))
```

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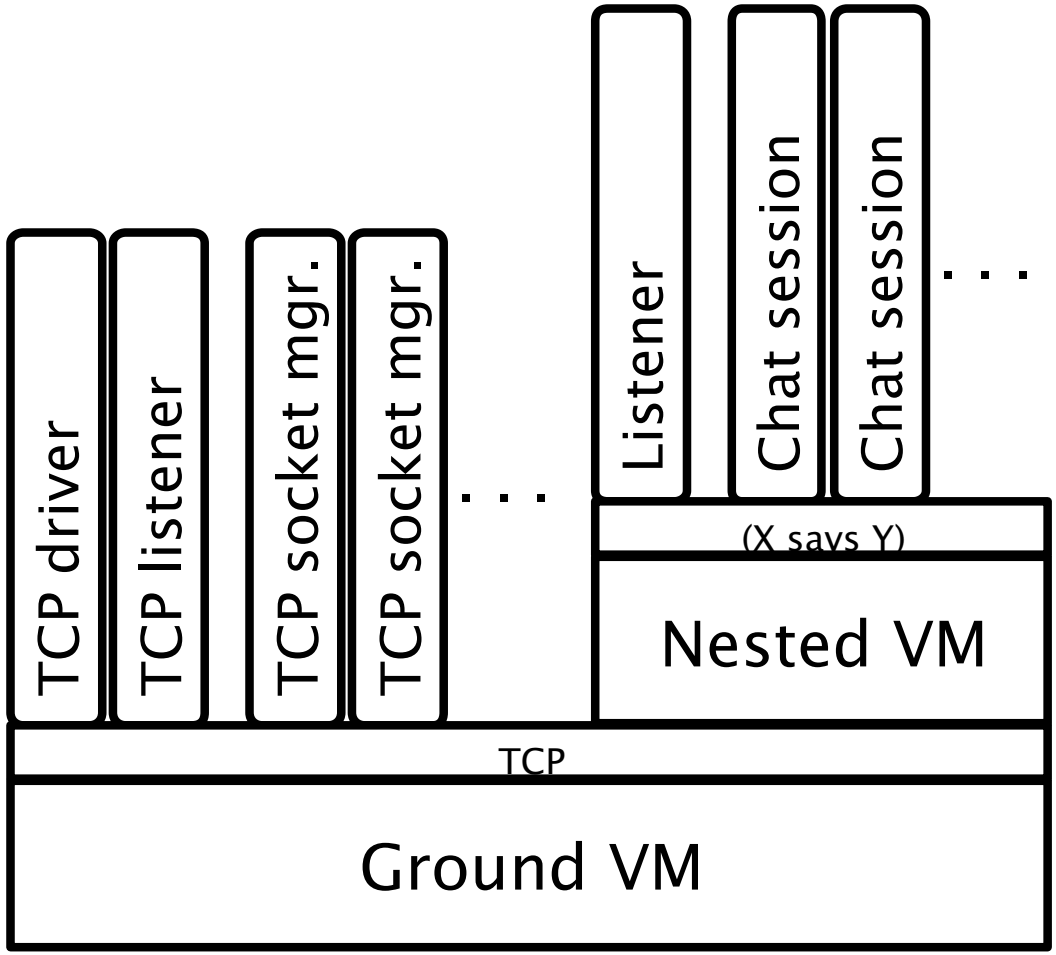
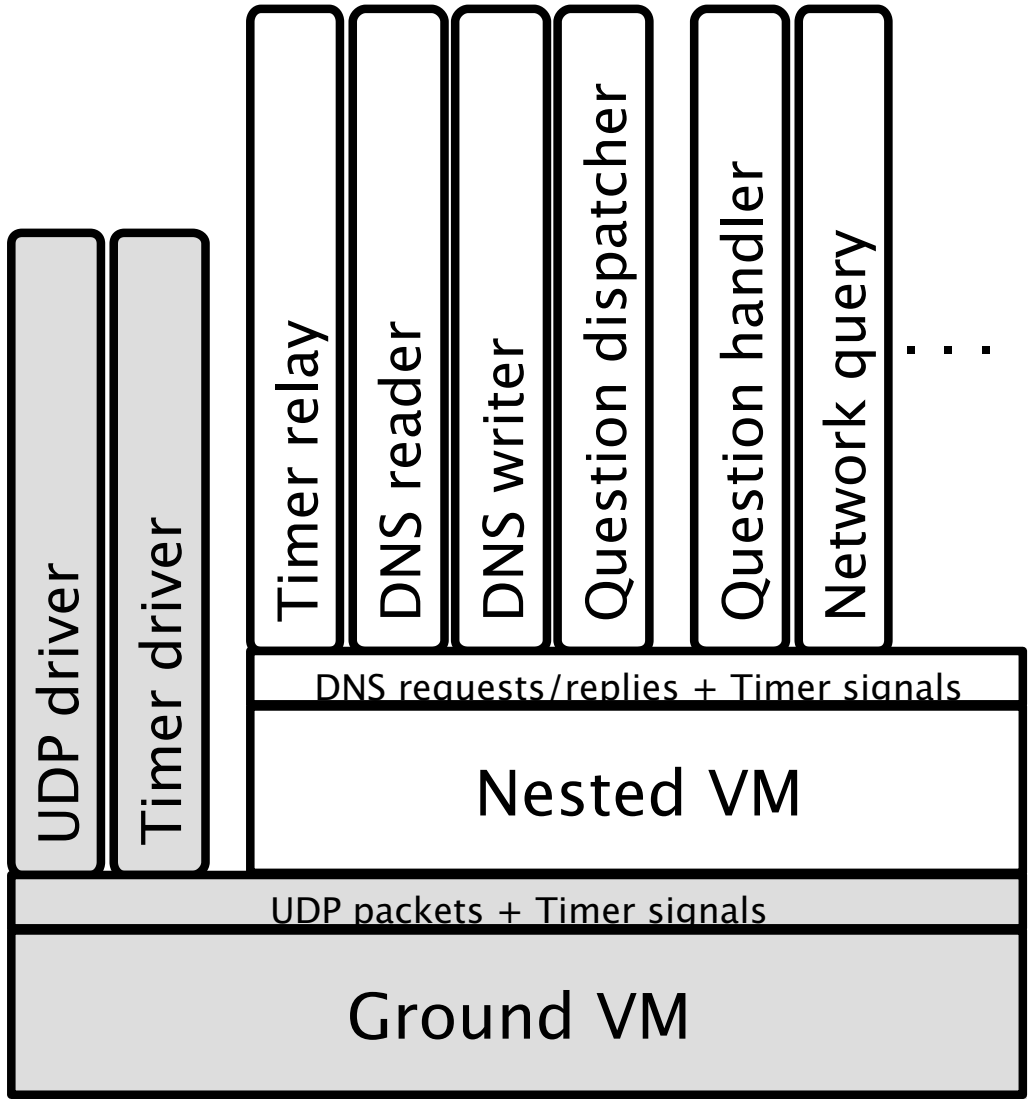
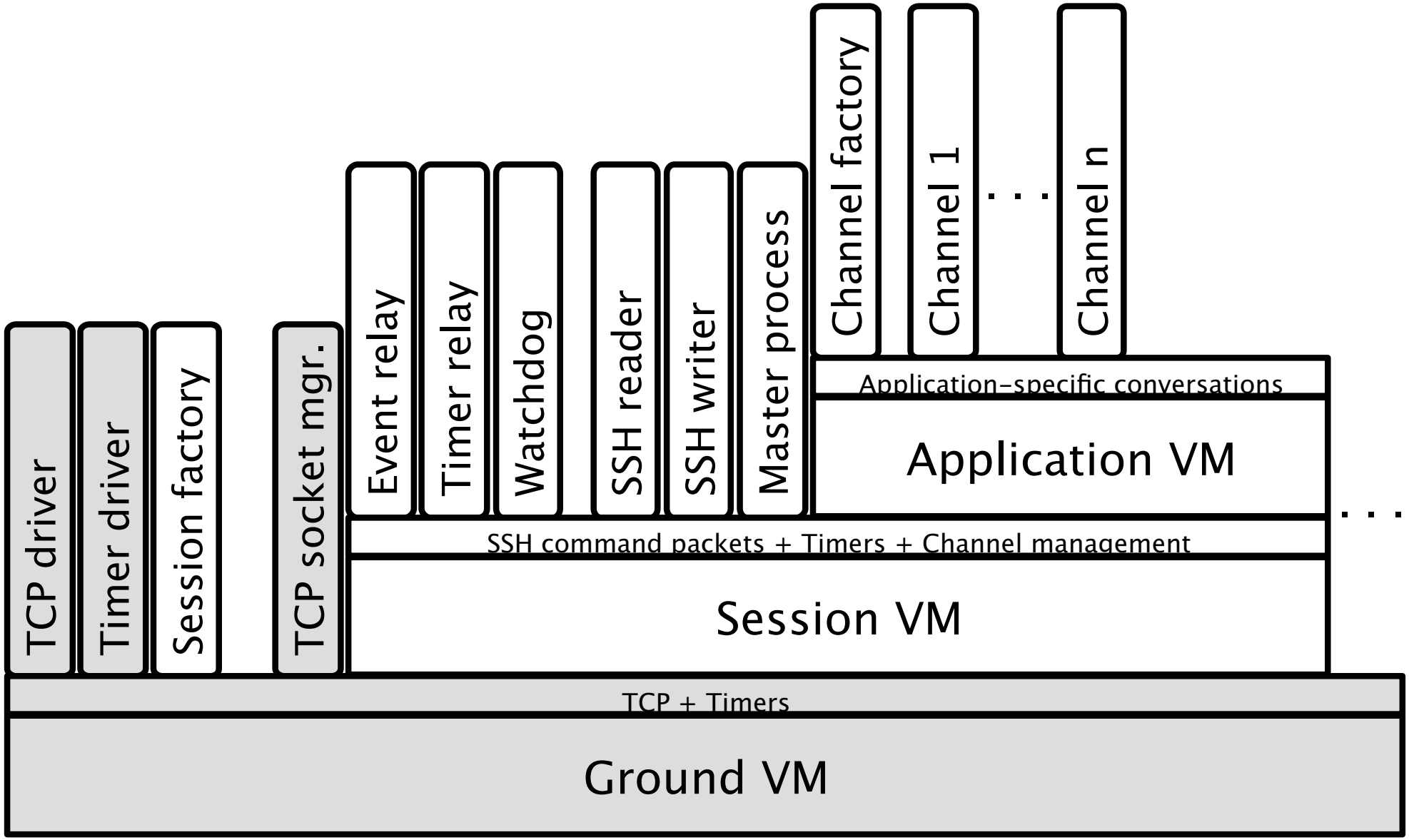
(define (echoer from to)
  (transition 'no-state-in-particular
    (publisher  (tcp-channel to from ?))
    (subscriber (tcp-channel from to ?)
      (on-message
       [(tcp-channel _ _ data)
        (send-message (tcp-channel to from data))])
      (on-absence (quit)))))
```



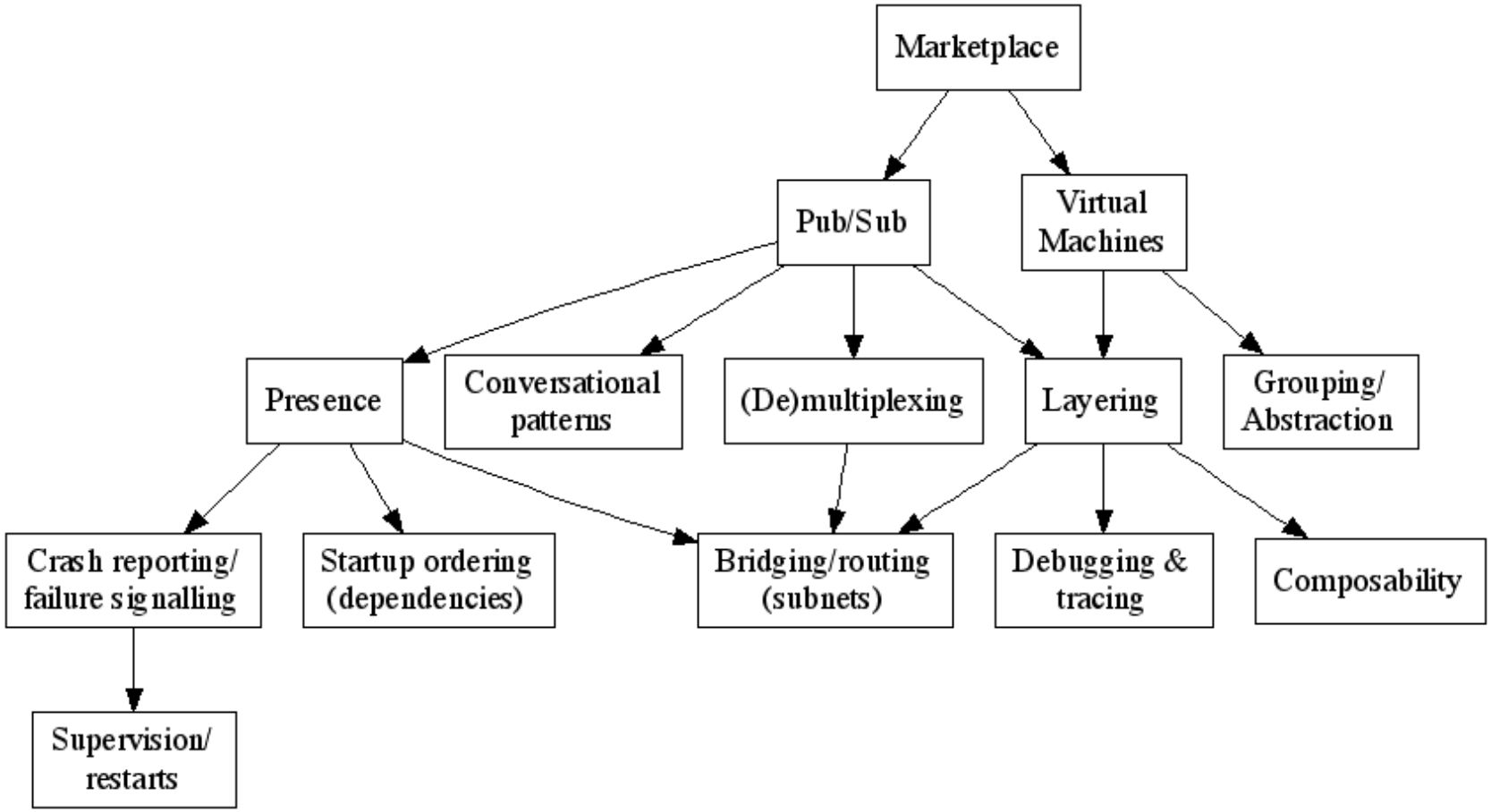
github.com/tonyg/marketplace



github.com/tonyg/marketplace-dns



github.com/tonyg/marketplace-ssh



www.ccs.neu.edu/home/tonyg/marketplace

github.com/tonyg/marketplace {-dns, -ssh}