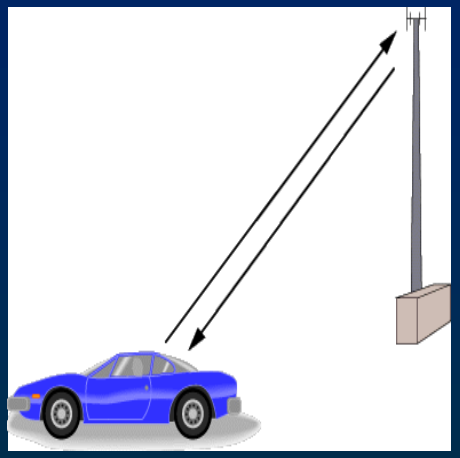
Actors for CyberThings

Carl Hewitt

iRobust™ International Scientific Society

Standard IoT™ International Standards

Internet of Things



homes

offices

factories

cars

tablets

refrigerators

phones

televisions

schools

routers

fridge

health

energy

security

entertainment

safety

learning

productivity

DataCenterism

All electronic information is stored in corporate and government datacenters.

Datacenterism

inexorably becomes

CyberTotalism

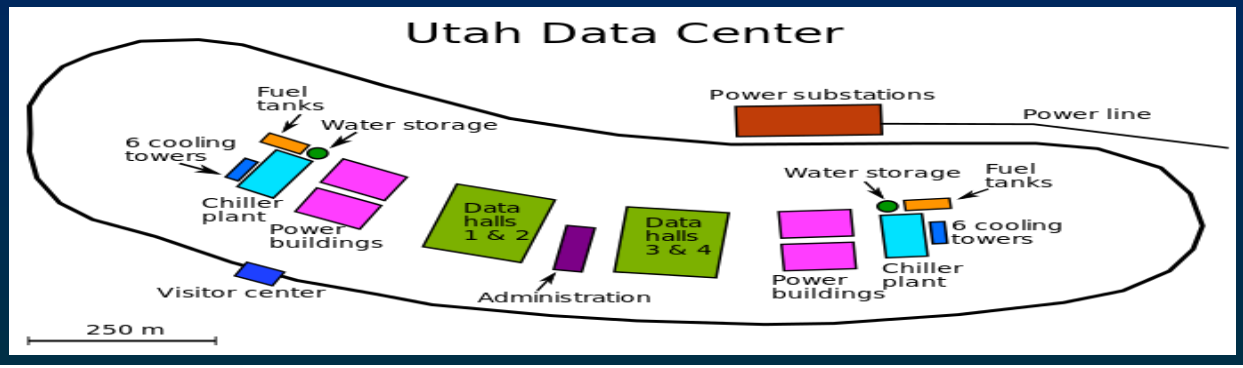
CyberTotalism

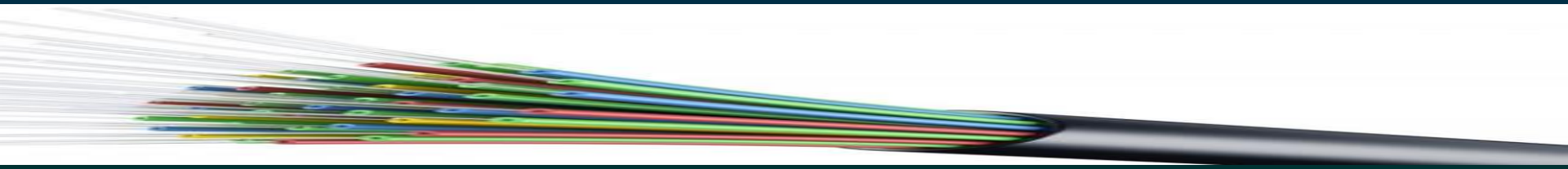
All electronic information is accessible by security forces from corporate and government datacenters.

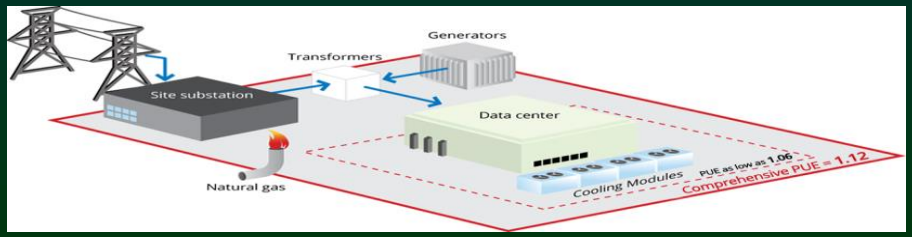
Sensitive Information

Nonpublic citizen information that can be used directly or indirectly against the citizen.

CyberTotalism
all IoT information
accessible by security services







NSA/FBI
Mandatory Backdoor Proposal

- Each country will have its own backdoors for IoT
- Massive pervasive surveillance will become the norm.
- Government security monitors will become more powerful

Warning

The next slide makes some people uncomfortable

- Feel that it is disrespectful of authority
- Believe that government officials cannot foment terror

State Terrorists

Achieve political objectives by creating a general climate of fear.

- J. Edgar Hoover (FBI)
- Joe McCarthy (US Senate Permanent Subcommittee on Investigations)
- Erich Mielke (Stasi)

Installing Backdoors assists CyberTerrorists

- controlling, modifying, and otherwise operating citizens' Internet of Things
- stealing citizens' sensitive information

Corporate Enlistment CyberTotalism

Mass pervasive surveillance

- Complicity
  - Executives
  - Engineers
- Loss of competiveness
  - Inflexibility
  - Standardization of surveillance

Escape the trap?

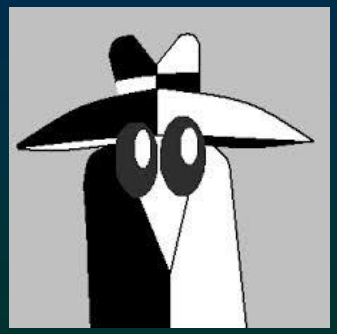
Silicon Valley must again reinvent itself

Need Alternative to DataCenterism

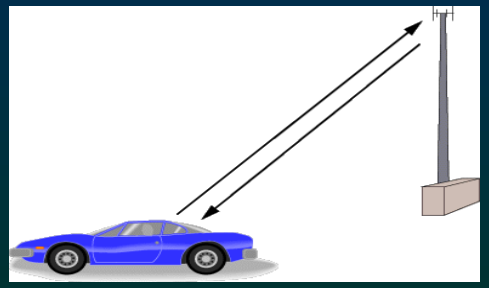
CyberLocalism

A citizen's IoT information is stored locally in their own equipment without mandatory backdoors

IoT Backdoors



fridge



CyberLocalism

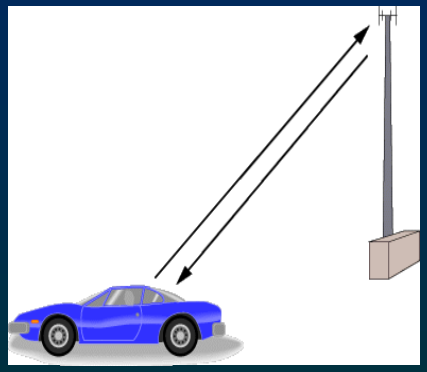
No Mandatory Backdoors

If the US government mandates auditing against backdoors

Auditing will rapidly spread to the rest of the world

Islet™

Citizen's IoT info coordinator



fridge

aDatacenter

aFriend

aClub

Islet™

CyberThing Coordinator

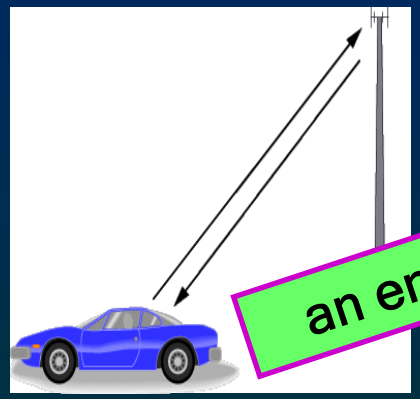
Physical or electronic artifact of Internet systems

- light fixture
- email
- refrigerator
- voice mail
- cellphone
- SMS
- electronic door lock
- *etc*.

Own your CyberThings!℠

Islet

Sharing Information



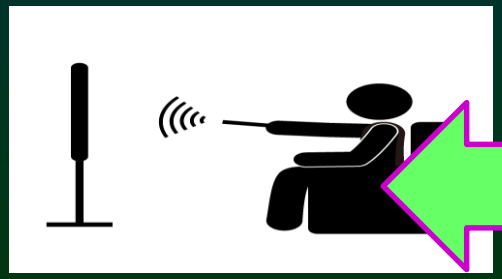
aDatacenter

an encrypted message

fridge

an encrypted message

aFriend



an encrypted message

Islet advantages over Datacenterism

- Coordination effectiveness
  - versus datacenters of competitors
- Responsiveness
  - versus load balancing on datacenters
- Reliability
  - works even communication with datacenters is cut off

Islets

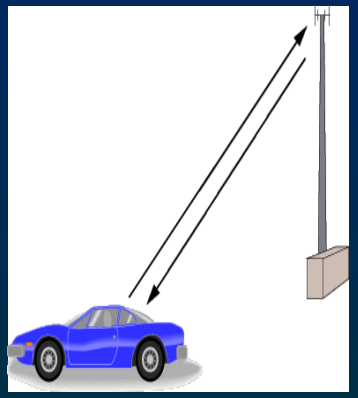
must be

profitable

Commerce Agent

- Gathers offers from merchants for a customer
- Receives commissions when deals are executed by customer

Islet Mediating Consumers and Merchants



anAgent

aMerchant

anAgent

aMerchant

IoT needs Standards

Islet

CyberThing Coordination

- light fixture
- email
- fridge
- voice mail

- cellphone
- SMS
- door locks
- auto

CyberThing Coordination

Massive concurrency required to provide interactive responsiveness

Actor Model

No operational overhead

- Storage
- Communication
- Processing

Actor Systems

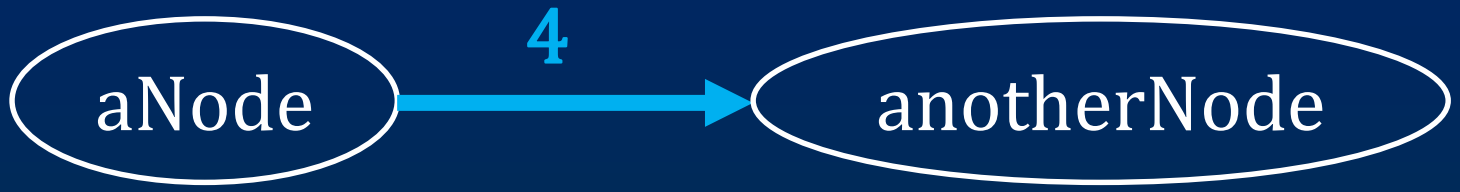
Islets exponentially faster than

Parallel Lambda Calculus

Illustration Underlying Issue

Compute a minimal cost path between start and finish.

Notation



Link[aNode, anotherNode, 4]

Path[$node_1$, $node_3$, 8]

Concurrently Working Forward

When ⊩ Path[*start*, *finish*, *aCost*]→

⊢ *aCost*=**Minimum** {*nextCost* + *remainingCost*

| ⊫ Link[*start*, *next*, *nextCost*],

⊩ Path[*next*, *finish*, *remainingCost*]}∎

// a cost from *start* to *finish* is the minimum of the set of the

// sums of the cost for the next node after *start* and

// the cost from that node to *finish*

Concurrently Working Backward

When ⊩ Path[*start*, *finish*, *aCost*]→

⊢ *aCost*=**Minimum** {*remainingCost* + *previousCost*

| ⊫ Link[*previous*, *finish*, *previousCost*],

⊩ Path[*start*, *previous*, *remainingCost*]}▮

// a cost from *start* to *finish* is the minimum of the set of the

// sums of the cost for the next node after *start* and

// the cost from that node to *finish*

Islet

- Distributed
- Intermittently connected
- Pervasive inconsistencies
  - IoT
  - Web

Inconsistency Robustness

Information system performance in the face of continual, pervasive inconsistencies.

Inconsistent Information

Inconsistency Robustness

Edited by

Carl Hewitt

and

John Woods

assisted by

Jane Spurr

Inconsistency robustness is information system performance in the face of continually pervasive inconsistencies---a shift from the previously dominant paradigms of inconsistency denial and inconsistency elimination attempting to sweep them under the rug. Inconsistency robustness is a both an observed phenomenon and a desired feature:

- Inconsistency Robustness is an observed phenomenon because large information-systems are required to operate in an environment of pervasive inconsistency.
- Inconsistency Robustness is a desired feature because we need to improve the performance of large information system.

This volume has revised versions of refereed articles and panel summaries from the first two International Symposia on Inconsistency Robustness conducted under the auspices of the International Society for Inconsistency Robustness (iRobust http://irobust.org). The articles are broadly based on theory and practice, addressing fundamental issues in inconsistency robustness. The field of Inconsistency Robustness aims to provide practical rigorous foundations for computer information systems dealing with pervasively inconsistent information.

Studies in Logic 52

Inconsistency Robustness

Ed
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Jo

Studies in Logic 52

Inconsistency Robustness

Electronic Versions of Articles on HAL

https://hal.archives-ouvertes.fr

Standard IoT

http://StandardIoT.org

- Promote CyberLocalism using Islets
- Unify using Actor Model
  - Standards by consortia
  - Corporate de facto standards

Standard IoT BoF*

today at lunchtime

1. Grab lunch
2. Find our table
3. Everyone is welcome

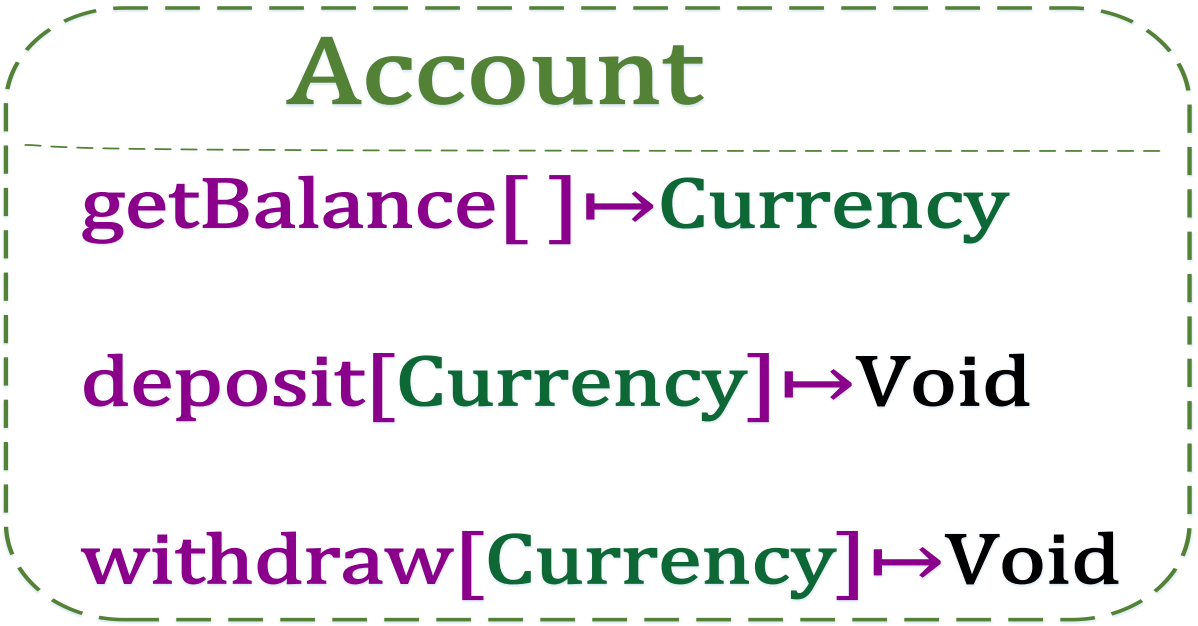
*Birds of a feather

Questions?

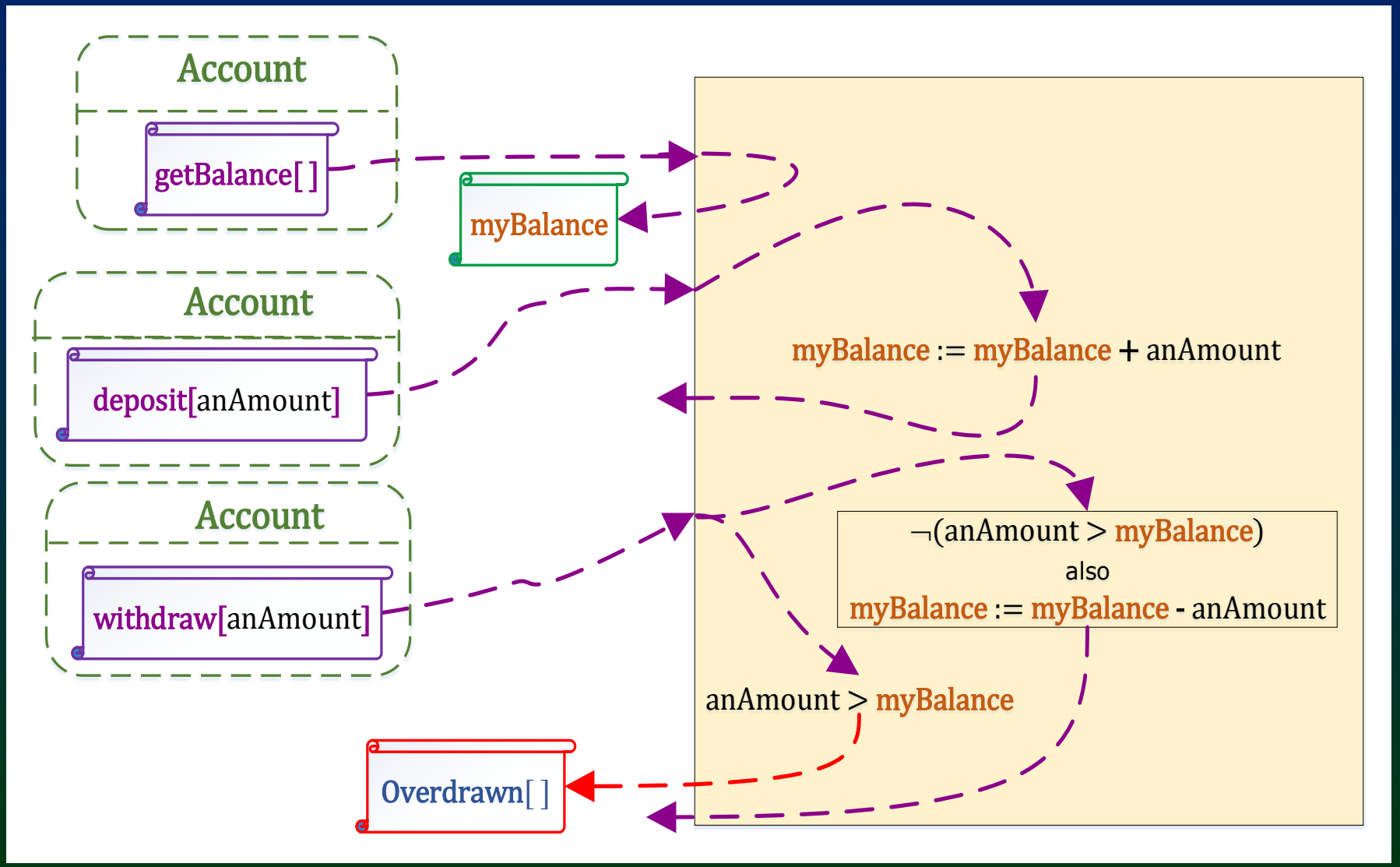
Standard IoT

- Promote CyberLocalism using Islets
- Unify using Actor Model
  - Standards by consortia
  - Corporate de facto standards

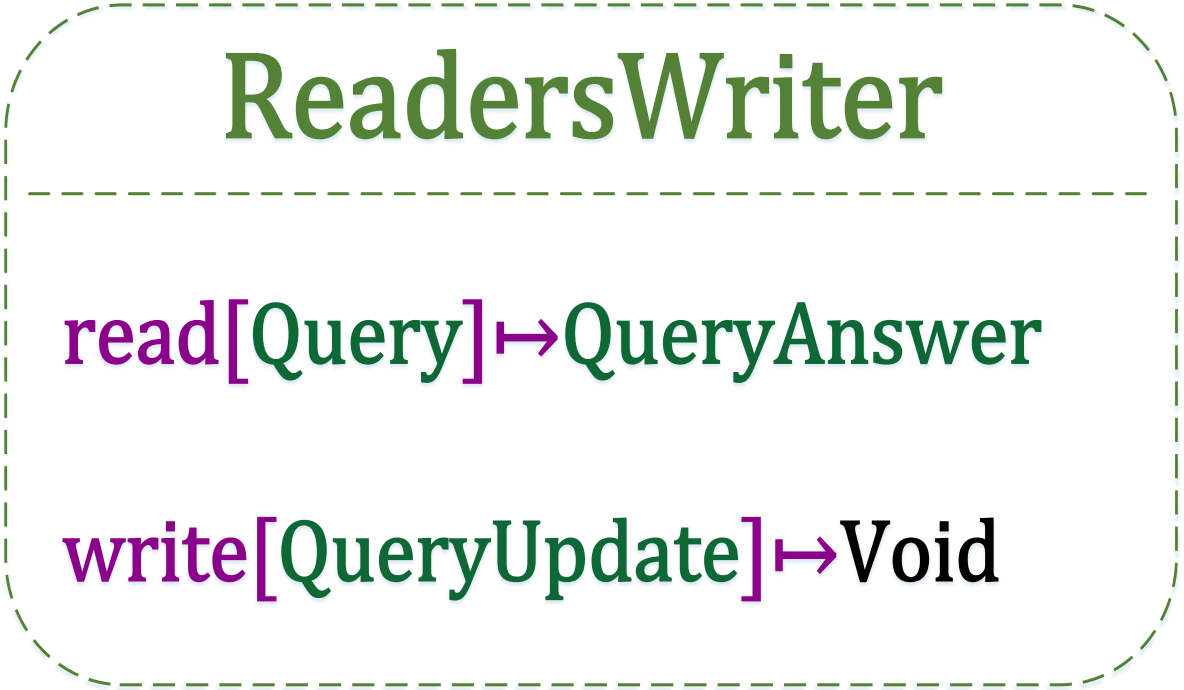
Types (Interfaces) and Messages



Message Passing



Coordinating Activities



Holes in Cheese