



# Let's Scribble



Rumyana Neykova, Imperial College London

K.Honda, N.Yoshida,  
Raymond Hu, Pierre-Malo Deni'elou, Romain Demangeon, Tzu-Chen Chun

# Let's Scribble

---

```
protocol Hello(me, you)
{
    Hello from me to you;
    Hello from you to me;
}
```

Scribble is a language to describe application-level protocols among communicating systems. A protocol represents an agreement on how participating systems interact with each other.



# Scribble: basic construct

---

protocol def

send-receive

recursion

choice

```
protocol ListResources (client as cl,  
                        resource_registry as rr){  
  request(resource_type: string) from cl to rr;  
  rec loop {  
    choice at rr  
      { response (x) from rr to cl;  
        loop; }  
    or { completed() from rr to cl; }}  
}
```



# Scribble: More constructs

---

**interrupt** →  
**parallel** →  
**do** →

```
import ListingFormat.xsd as lf;
protocol ListMultipleResources (client as cl,
                               resource_registry as rr1,
                               resource_registry as rr2){
  interruptible {
    parallel {
      do ListResource(cl, rr1)}
    and{
      do ListResource(cl, rr2)}
  } by cl with timeout();}}
```



# Tentative constructs

---

Logic assertions = **Scribble Construct** @**{Logic}**

```
...  
request(resource: string) from cl to rr  
    @{resource in available_resources};  
...
```

Subsessions = **spawn Scribble Protocol**

```
...  
spawn ListResource(cl, rr ) at rr;  
...
```

Interrupts – anywhere in the protocol

---



# Scribble Community

---

- ▶ Webpage:

- ▶ [www.scribble.org](http://www.scribble.org)

- ▶ GitHub:

- ▶ <https://github.com/scribble>

- ▶ Tutorial:

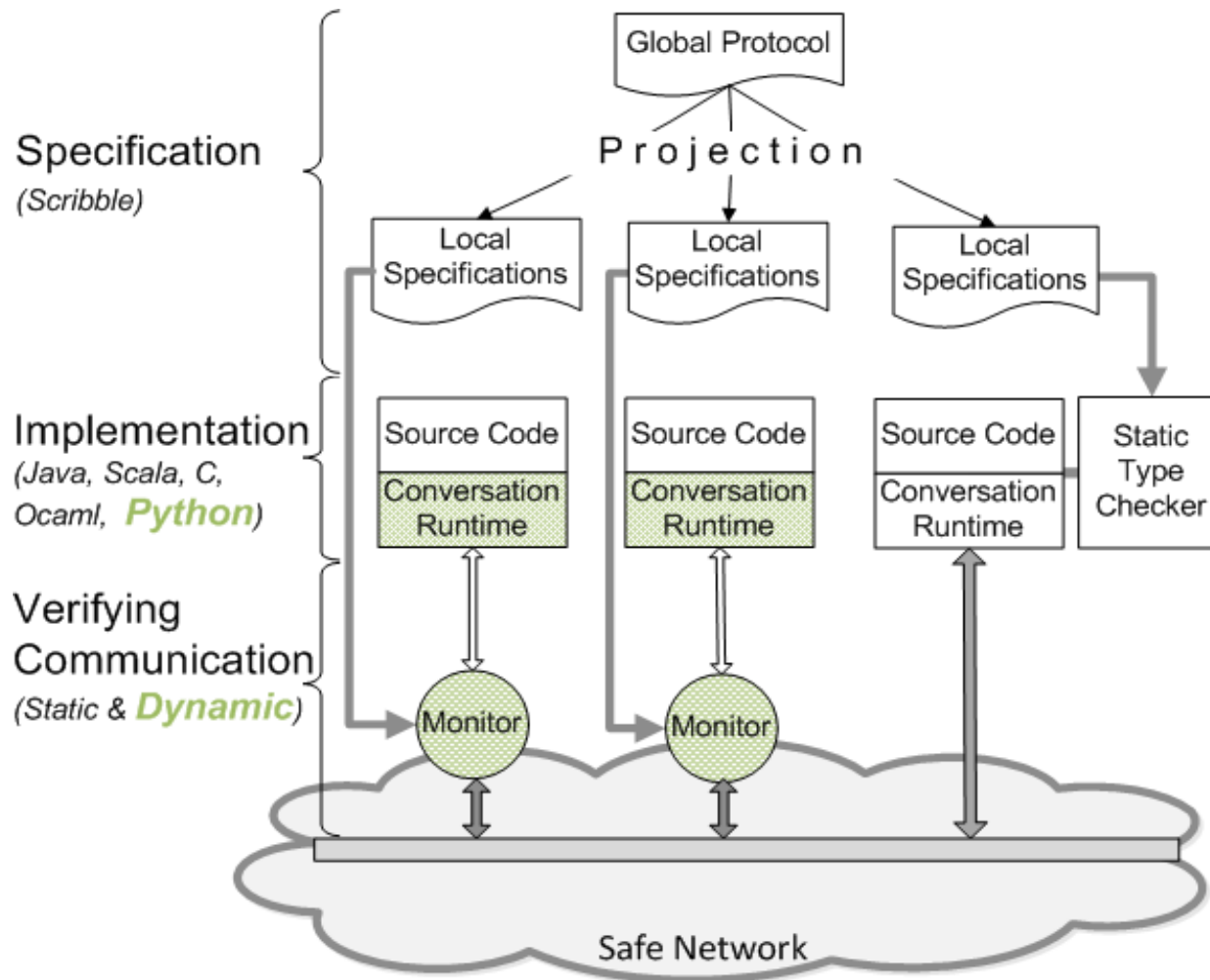
- ▶ [www.doc.ic.ac.uk/~rhu/scribble/tutorial.html](http://www.doc.ic.ac.uk/~rhu/scribble/tutorial.html)

- ▶ Specification (0.3)

- ▶ [www.doc.ic.ac.uk/~rhu/scribble/langref.html](http://www.doc.ic.ac.uk/~rhu/scribble/langref.html)



# Applications: hybrid framework



# How it can be used?

---



## /// How can it be used?

The development and validation of programs against protocol descriptions could proceed as follows:

- A programmer specifies a set of protocols to be used in her application.
- She can verify that those protocols are valid, free from livelocks and deadlocks.
- She develops her application referring to those protocols, potentially using communication constructs available in the chosen programming language.
- She validates her programs against protocols using a protocol checker, which detects lack of conformance.
- At the execution time, a local monitor can validate messages with respect to given protocols, optionally blocking invalid messages from being delivered.





# How to use Scribble

---

## Global Conversation (In Scribble)

```
protocol ListResources(client, registry){  
  Request(resource_kind) from client to registry;  
  Response from registry to client; }
```

## Local Type (In Scribble)

```
protocol ListResources at registry{  
  Request(resource_kind) from client;  
  Response to client;}
```

```
protocol ListResources at client{  
  Request(resource_kind) to register;  
  Response from register; }
```

Projection

Verification

## Programs (In Python)

```
p = Participant(name)  
c = p.accept_invitation('ListResources',  
                        'registry')  
resource_kind = c.recv('client')  
resource = get_resources(resource_kind)  
c.send('client', resource)
```

```
p = Participant(name)  
c =  
p.create_conversation('ListResources',  
                      'client')  
msg = 'Resource:asdf'  
c.send('registry', msg)  
resource = c.recv('registry')
```



# Case Study: OOI

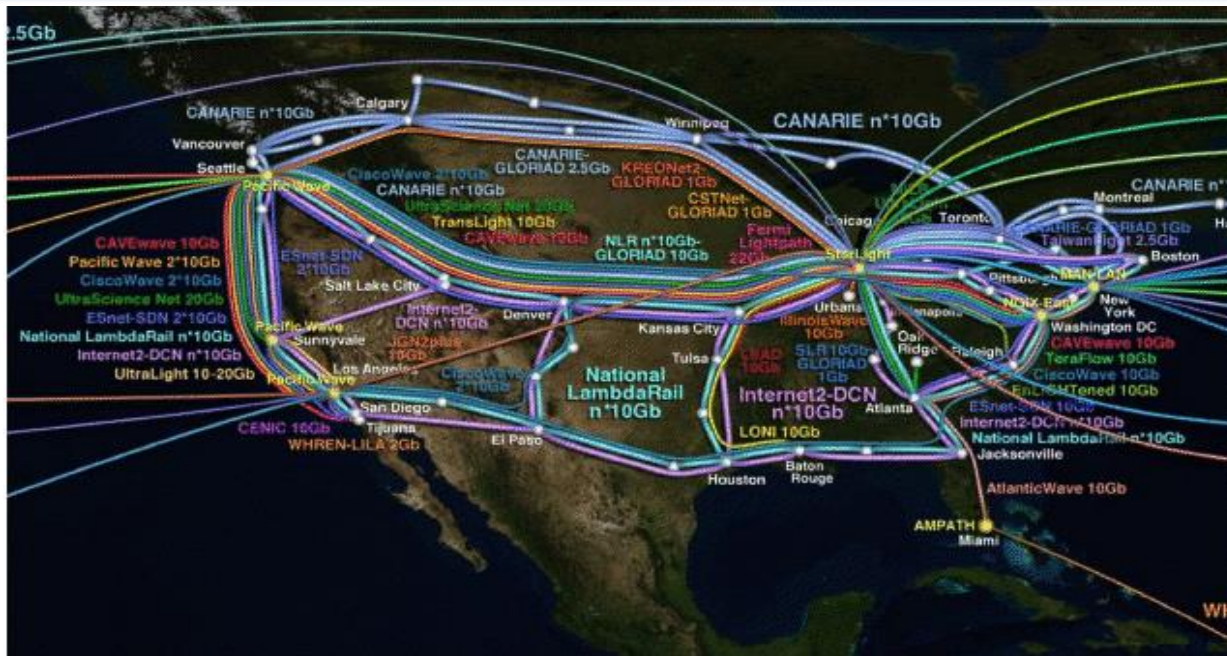
**OOI aims:** to deploy an infrastructure (global network) to expand the scientists' ability to remotely study the ocean



**Usage:** Integrate real-time data acquisition, processing and data storage for ocean research,...

# OOI Collaboration

**Collaboration:** build conversation layer on top of OOI network to guarantee global safety



**Challenge:** It is all RPC ☹️, how and why to transform it into conversation => Conversation over RPC Project

# Future work, interesting directions

---

- ▶ **Governance on top of Scribble**
  - ▶ Security, Policy
- ▶ **Language**
  - ▶ Generic protocols
  - ▶ flexible conversation flow (interruptible)
- ▶ **How to increase adoption? Applications?**
  - ▶ Tools for Scribble (plugin supports)
  - ▶ Specification of API, VM configuration/communication
- ▶ **Imports and checks on the communicates data**
  - ▶ Defining primary\base types
  - ▶ use of a common message formats such as yml
  - ▶ check integrity constraints, marshaling



# It is your turn ...

---

```
protocol Q&A(you, me)
{
  rec Loop
  {
    Questions from you to me;
    Answers from me to you;
    Loop;
  }
}
```

