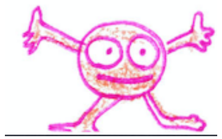
AIMS: Mini-Project Presentation

- **Automatic App Navigation** (with Amazon Web Services) conducted by Amazon Prime Video Team at London
- **Rust Programming** for Actor Languages (AcTyx AG (https://www.actyx.com/))
- **Verified Multi-Agent Programming with Actor Models** (Model Checking of Go) www.mrg.cs.ox.ac.uk



Nobuko Yoshida (nobuko.yoshida@cs.ox.ac.uk)

Communications are Ubiquitous

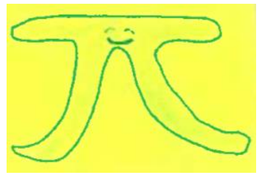
- Increasingly, **communications** are the way to organise software and systems.
- Industry trend – programming languages with **explicit message-passing primitives.**

microservices

Why Session Types, Why Now?

Significant academic and industry interests via fundamental breakthroughs

Binary Session Types — ESOP'98



Joined W3C Standardization — 2002

Multiparty Session Types — POPL' 08










Problems: Concurrency Bugs

- Communications increase **concurrency bugs**
  - Survey of 4K users [golang.org]
  - Analysis of 6 large software systems [ASPLOS 19]

deadlock

channel errors

More than a half of concurrency bugs in Go are caused by communications.

The Go Gopher

Problems: Concurrency Bugs

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More than a half of concurrency bugs in Go are caused by communications.

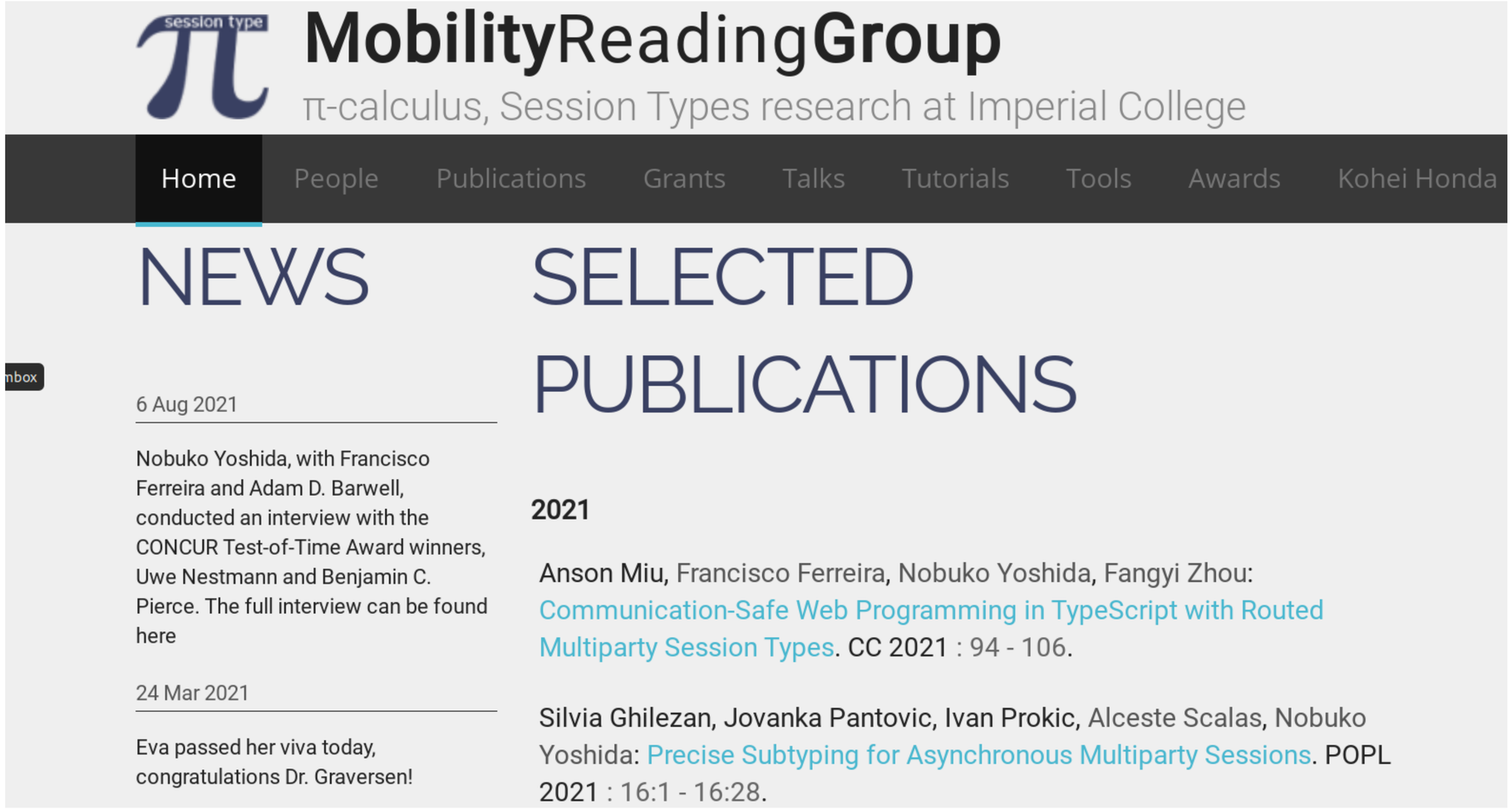
Session Types

- Prevent concurrency bugs.
- Can abstract, implement and manage communications as **Protocols.**
- **Clean, Cheap** and **Retrofittable.**

What class of CA corresponds to MPST?

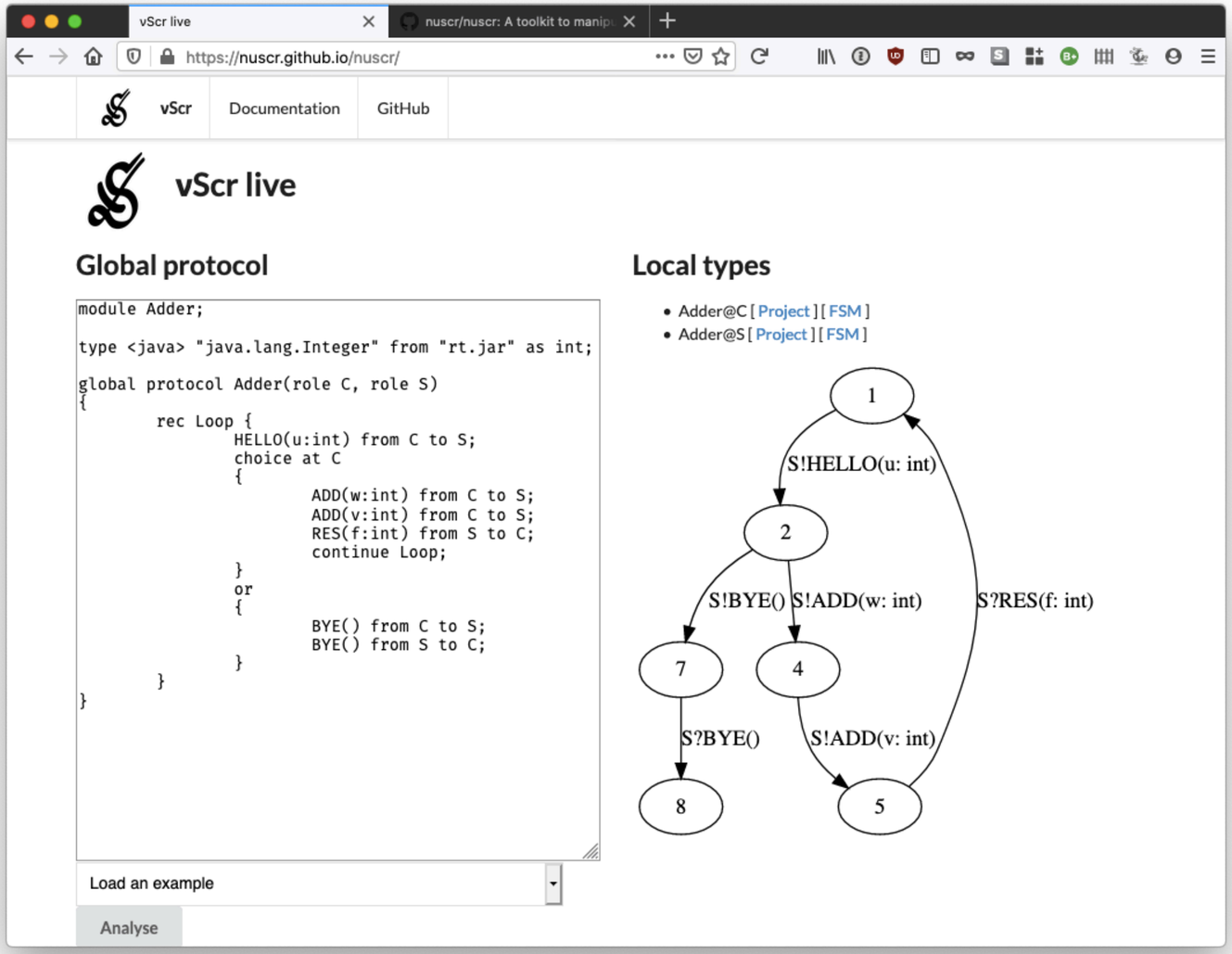
Mobility Reading Group

http://mrg.cs.ox.ac.uk

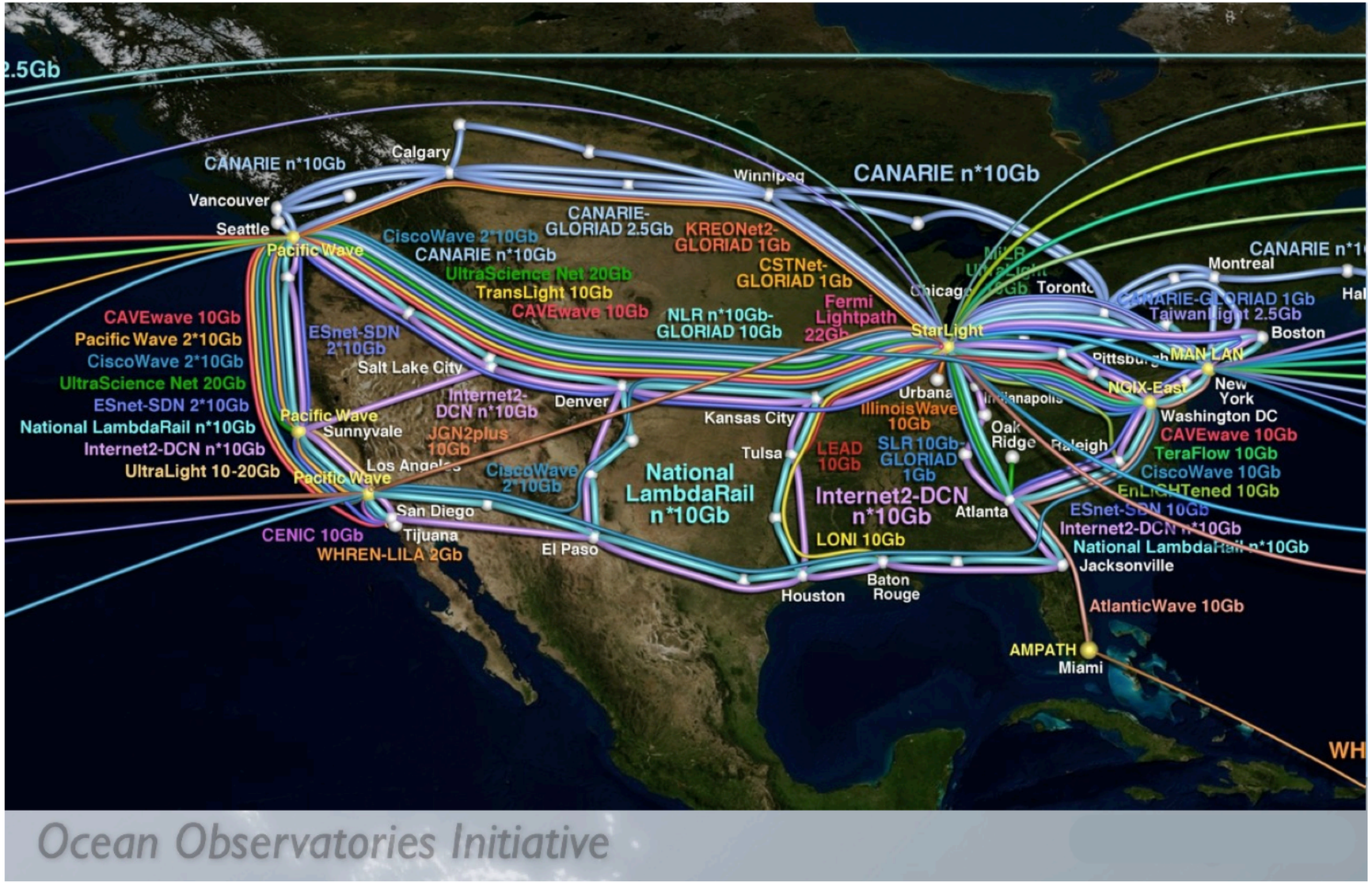


vScr An Extensible Toolchain for Multiparty Session Types

- It’s small and easy to modify
- Available on opam
  - opam install nuscr
- Available on GitHub
  - https://github.com/nuscr
- Available on the web
  - https://nuscr.dev

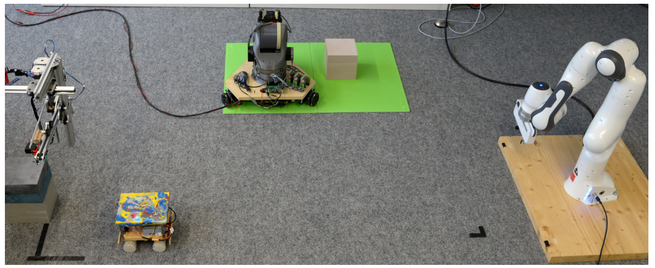


More Applications on Multiparty Session Types



OpenTelemetry

Distributed Traces



Robotics

Zooid

Mechanisation

Rust and Multiparty Session Types

- Multiparty session types and communicating automata
  - Invited paper in the FCT ’21 proceedings
  -  **https://github.com/scribble**
  -  **https://github.com/nuscr**
- Applications of multiparty session types using communicating automata
  -  **https://github.com/zakcutner/rumpsteak**