TLA+

Temporal Logic of **Actions** Plus other Stuff

Benjamin Ranck – Jetabroad October 2015

What and Why

- Precise language to specify behaviour
- Force you to think about the problem holistically
- Allow you to test and verify correctness
- Freedom to optimise and tweak an algorithm with safety

IT IS NOT a code generator

Three Primary Components

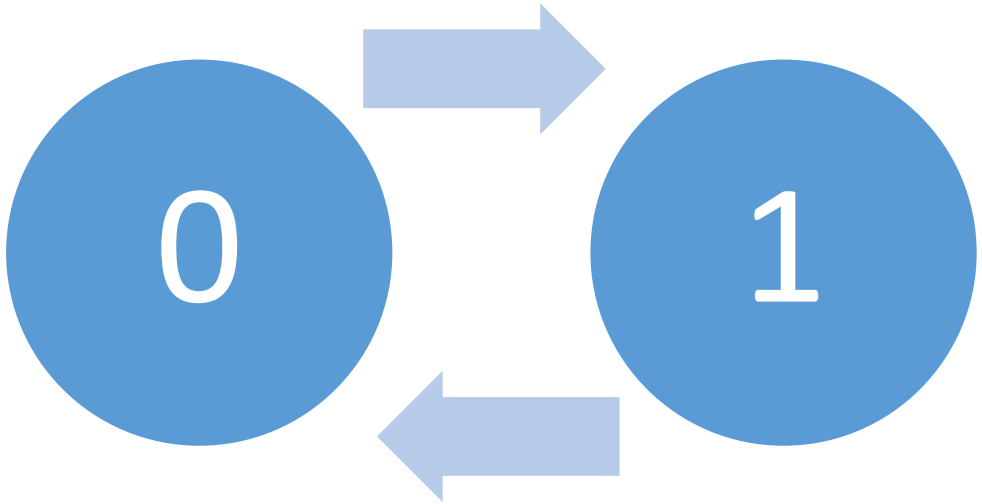
- TLA+ Language and PlusCal language for specifying
- Model Checker for checking invariants
- TLAPS for checking proofs

TLA+ Language and PlusCal

- TLA+ is a very mathematical language
  - Based on propositional and predicate logic; ∨ ∧ ¬ ≡ ≠ := ⇒ ∀ ∃ ∩ ∪ ⊆
    - Has temporal operators; ‘ □ ◊
    - Includes some standard modules; Sequences, Integers, Reals, Naturals, FiniteSets
  - Non-typed
  - Symbolic
- PlusCal
  - C-like language (if, else, while) mixed with TLA+ constructs

Some Demos

- https://www.youtube.com/watch?v=BVtQNK_ZUJg



Suggested Reading

- Specifying Systems book free download - http://research.microsoft.com/en-us/um/people/lamport/tla/book.html
- Tutorial Hyperbook - http://research.microsoft.com/en-us/um/people/lamport/tla/hyperbook.html
- AWS TLA+ Article - http://cacm.acm.org/magazines/2015/4/184701-how-amazon-web-services-uses-formal-methods/fulltext