An Application for a Certified Grid Computing Framework

Bor-Yuh Evan Chang

Advisors: Professors Robert Harper and Frank Pfenning

Carnegie Mellon University
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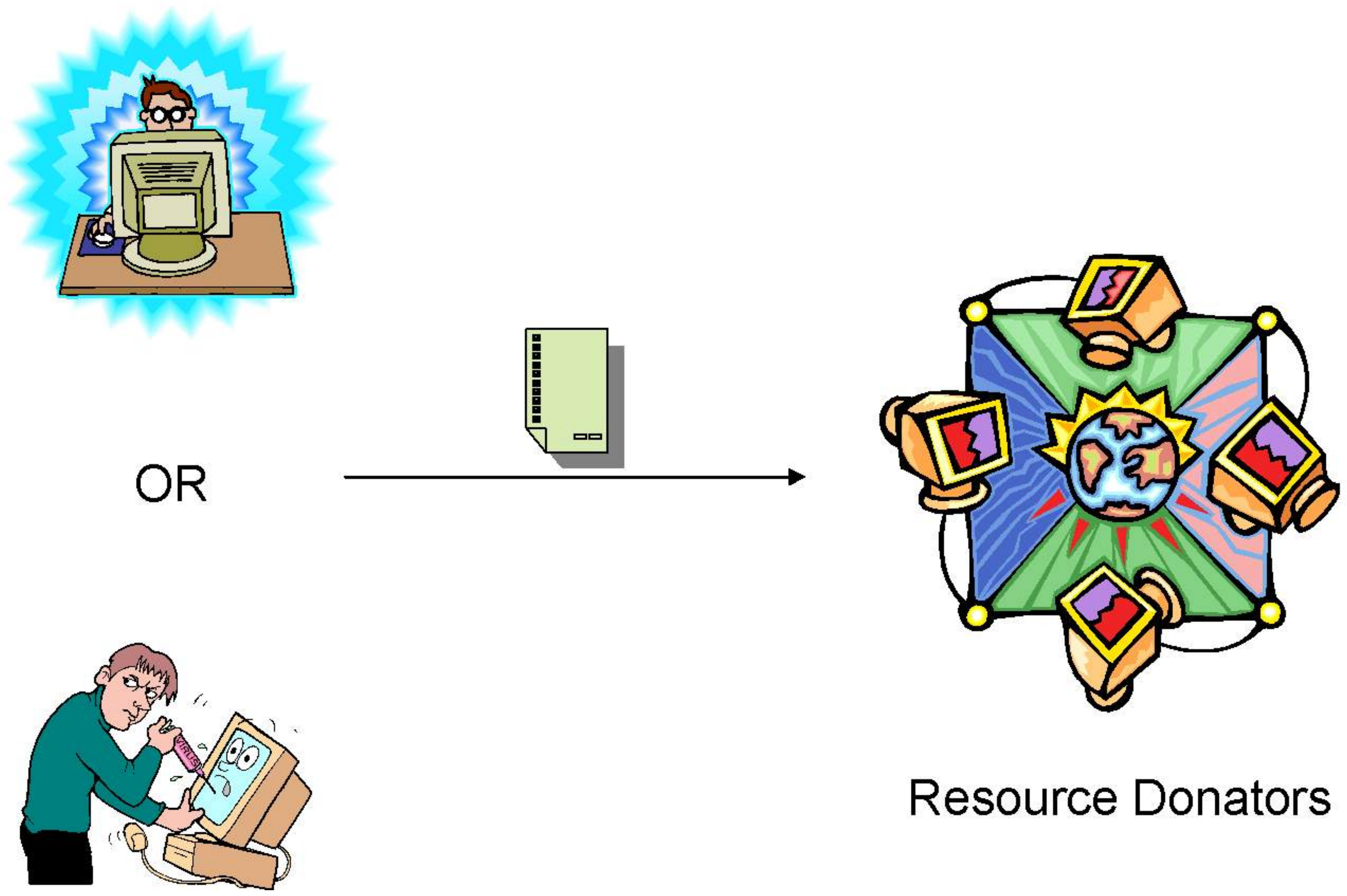
The Big Picture - ConCert



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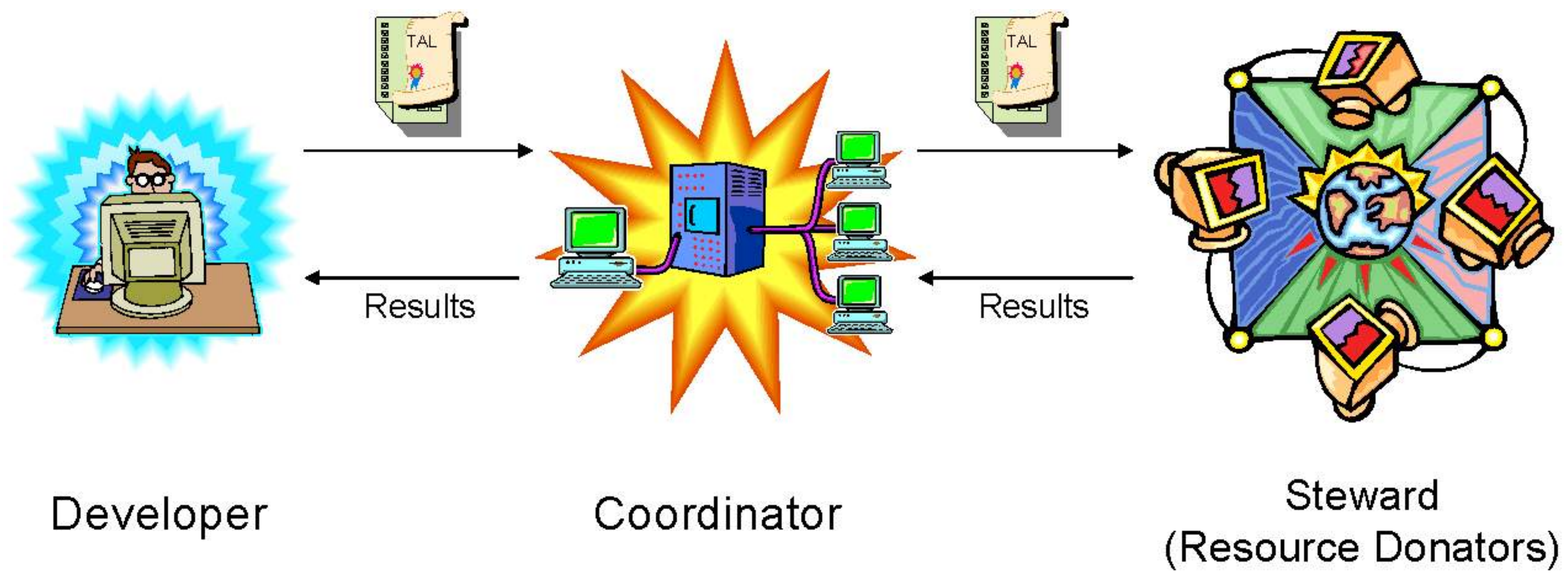


Vision: Distributed-application developer utilization of donated resources is completely transparent to the donator, but the donator is confident the specified safety, security, and privacy policies will not be violated.

ConCert Framework - Conductor

- Joshua Dunfield
  - basic protocol and system for distributing and verifying software
  - makeshift certifying Standard ML compiler
- Margaret DeLap
  - examining load balancing and task brokering issues

My Research Plan

- Develop a substantial application using the ConCert framework and make the ConCert framework capable of supporting such an application

- Goals
  - make apparent the current shortcomings
  - drive the architecture to a more robust and stable state
  - work on the framework top-down

What Application?

- Parallel Theorem Prover

- Why?
  - Check validity of results easily
  - Build upon my previous experience

What's Happening

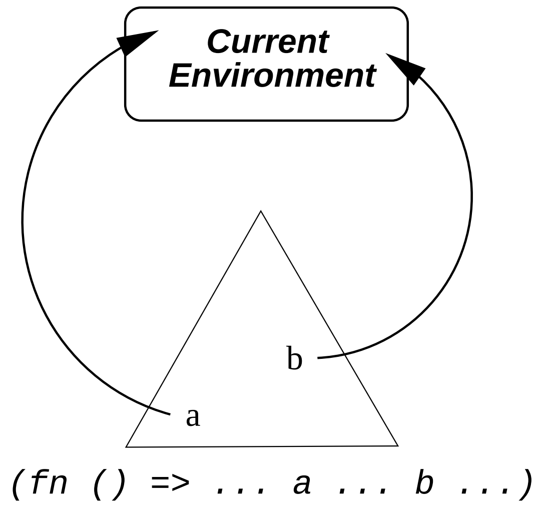
- Investigated adapting existing theorem provers (Gandalf, E)
- Decided to develop our own - a subgoal-reduction based parallel theorem prover for intuitionistic linear logic
  - Advantages:
    - *focusing* strategy helps with independent subproblems
    - few existing linear logic provers
  - Concerns:
    - uncertain about cost of communication

Utilizing the ConCert Framework

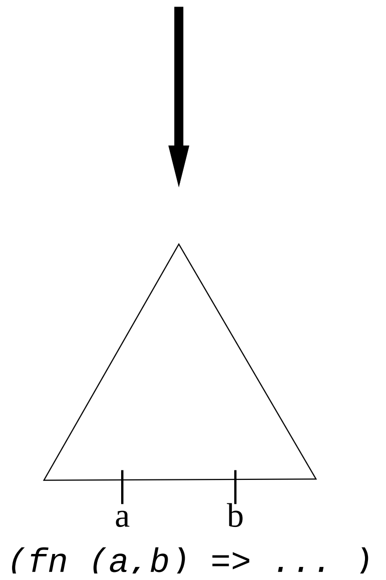
- Parallelism in theorem proving
  - AND-parallelism
  - OR-parallelism $\leftarrow$ exploitable
- Conductor requirements
  - program can specify new thread on this machine or another machine
  - framework manages how thread is distributed
  - program can signal thread to terminate

How do we write code for Conductor?

Ideal:



Currently:



Next Steps

1. Complete an implementation of the theorem prover in CML
2. Develop mechanism to communicate with the framework to spawn a thread on another machine
3. Factor out functions to spawn
4. Develop means for the developer to kill threads on other machines