

3 Mini Talks of 10 minutes each



OS/application inversion
Anil Madhavapeddy



Living Databases
Pavlo Baron



**Why do we still not give a
@#%! about testing?!**
Trisha Gee

The OS/App Inversion:
escaping POSIX to bring Git to the datacentre
QCon New York Mini talk

Anil Madhavapeddy (speaker)
with Thomas Gazagnaire and Benjamin Farinier
University of Cambridge Computer Laboratory

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Common features every distributed system needs

- **Persistence** for fault tolerance and scaling
- **Scheduling** of communication between nodes
- **Tracing** across nodes for debugging and profiling

Most distributed systems run over an operating system, and so are stuck with the OS kernel exerting control. We use *unikernels*, which are application VMs that have complete control over their resources.

What if we just used Git?

- **Persistence**

- `git clone` of a shared repository across nodes
- `git commit` of local operations in the node

- **Scheduling**

- `git pull` to receive events from other nodes
- `git push` to publish events to other nodes

- **Tracing and Debugging**

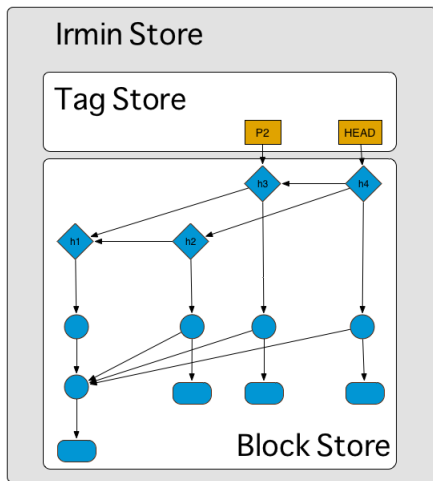
- `git log` to see global operations
- `git checkout` to roll back time to a snapshot
- `git bisect` to locate problem messages

- **New Problems**

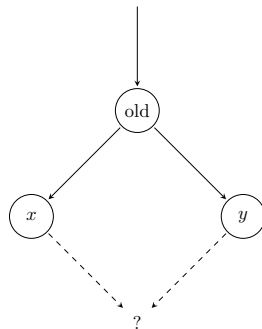
- `git rebase` needed for distributed garbage collection
- Shelling out to `git` is slow and lacks control

Irmin, large-scale, immutable, branch-consistent storage

- Irmin is a library to **persist** and **synchronise distributed data structures** both on-disk and in-memory
- It enables a style of programming very similar to the **Git workflow**, where distributed **nodes fork, fetch, merge and push** data between each other
- The general idea is that you want every active node to get a **local (partial) copy of a global database** and always be very explicit about how and when data is shared and migrated



```
type t = ...  
(** User-defined contents. *)  
type result = [ `Ok of t |  
               `Conflict of string ]  
  
val merge: old:t → t → t →  
          result  
(** 3-way merge functions. *)
```



Irmin Features

- Still pre 1.0, but several useful datastructures such as distributed queues and efficient ropes.
- HTTP REST for remote clients, or library via OCaml.
- JavaScript compilation for pure browser operation.
- Bidirectional operation, so `git` commits map to Irmin commits from any direction.
- Open source at <https://irmin.io>
- **Want to know more?** I'm giving a full talk on this on Friday at 1015 titled "Functional Distributed Programming with Irmin"!

Teaser: Xen Toolstack using Irmin

<https://www.youtube.com/watch?v=DSzvFwIVm5s>

Questions