CTDB Remix

I: Dreaming the Fantasy

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SambaXP 2017

CTDB Project

Motivation: Support for clustered Samba

- Multiple nodes active simultaneously
- Communication between nodes (heartbeat, failover)
- Distributed databases between nodes

Features:

- Volatile and Persistent databases
- Cluster-side messaging for Samba
- IP failover and load balancing
- Service monitoring

Community:

- `ctdb.samba.org`
- `git.samba.org/samba.git`
- `wiki.samba.org/index.php/CTDB_and_Clustered_Samba`

Overview

- Dreaming the Fantasy
  - How did we get here?
  - Evolving the design
  - Laying the foundations
  - New Architecture
- Designing the Reality

How did we get here?

SambaXP 2013

Wish List

- Split monolithic code into separate daemons
  - Logging, IP handling, Services monitoring
- Proper CTDB library - libctdb
  - Database operations are missing
  - Thread-safe (avoid talloc/tevent?)
- CTDB Protocol
  - Version tracking
  - Auto-generated marshalling/unmarshalling code
- Scalability – large number of nodes
  - Database recovery
  - Handling record contention
- Pluggable Monitoring and Failover
  - Integration with 3rd party HA

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- Introduced lock helper, event helper

2014 Recap

CTDB merges with Samba

- CTDB merged into Samba tree (Nov 2013)
- CTDB standalone waf build (Jun 2014)
- CTDB build integrated in toplevel build (Nov 2014)

2015 Recap

Parallel Database Recovery

- Protocol marshalling
- New abstractions
- New Communication framework (`tevent_req` based async)
- New Client Code
- Database recovery helper
- Re-implemented `ctdb` tool using new client API

2015 Recap

Parallel Database Recovery

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2016 Recap

- Introduced killtcp helper, lvs helper

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Event daemon

- New abstractions - `run_proc`, `sock_daemon`
- Event Protocol
- Event client code
- Event handling daemon

Evolving the design

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Identifying CTDB functions

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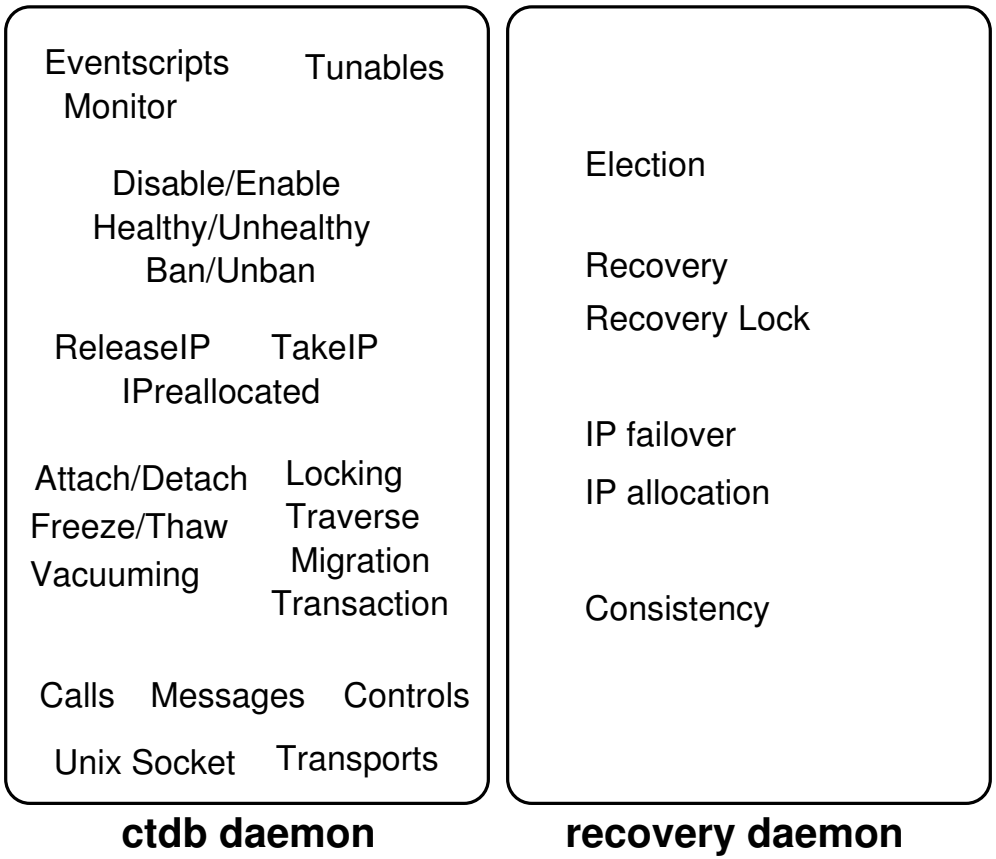
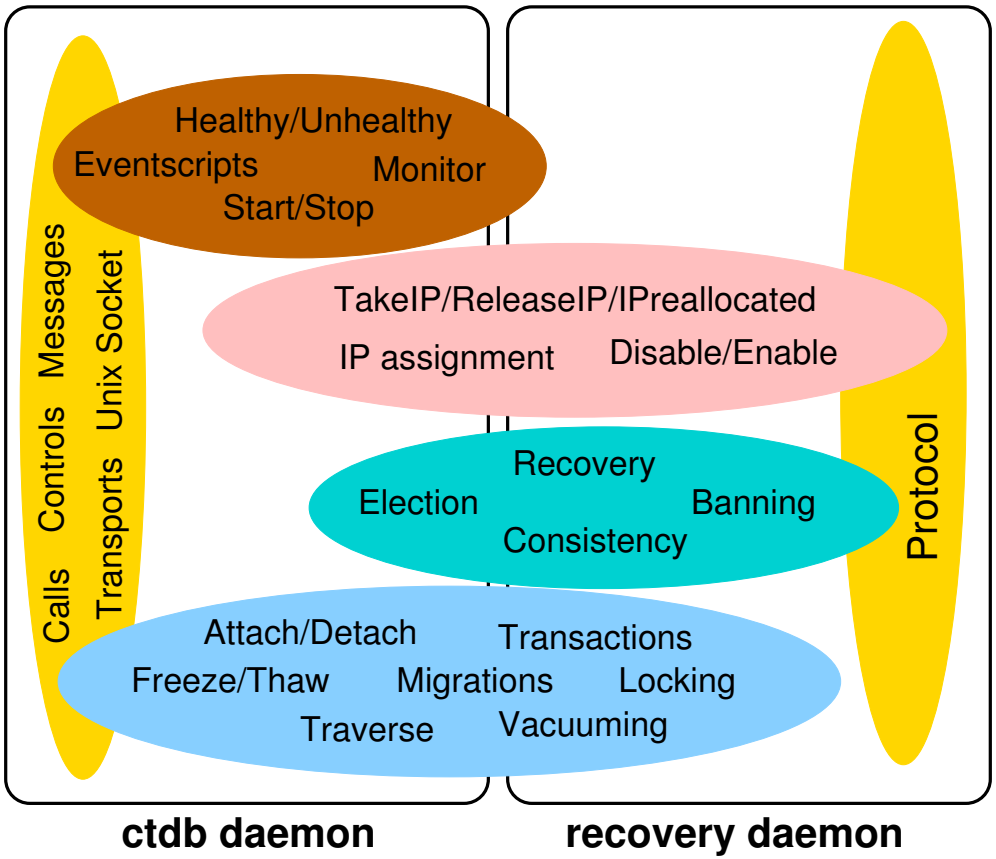
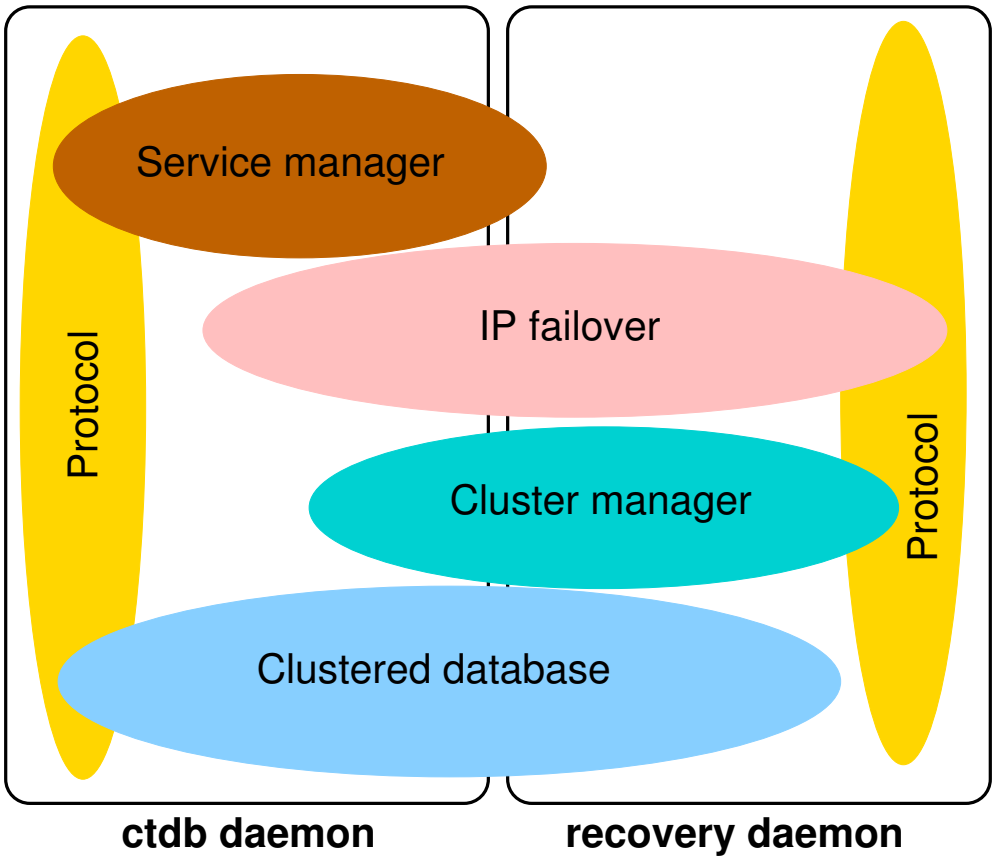


Grouping CTDB functions



Evolving the design

New subsystems



Evolving the design

Redesign of server code

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  - Main concern is the transport

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- tmsgd - fd passing (SambaXP 2016)

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- Proxy design never took off

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- `run_event` abstraction

Laying the foundations

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CTDB State management

- Solved differently for different things
  - tickles - Protocol to sync tickle lists
  - nfs locks - Using persistent database
- Persistent databases are slow
- We are in the business of clustered databases
- New database model?

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Replicated database

- State information needed during lifetime of CTDB
- Volatile (`CLEAR_IF_FIRST`)
- Replicated (Re-use existing API)
- Uses `g_lock` and transactions

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Database Performance

- 2 nodes (Intel Xeon E5620, RHEL6), 30 second test

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- Why are transactions with mutexes so slow?

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  - Used by recovery daemon, samba
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- New daemons can use new protocol

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- Loose coupling to CTDB

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  - Notifications (subsystem $\rightarrow$)

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- State transition graphs

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- Candidates
  - Cluster Manager
  - Service Monitoring
  - IP Failover

New Architecture

Cluster Manager

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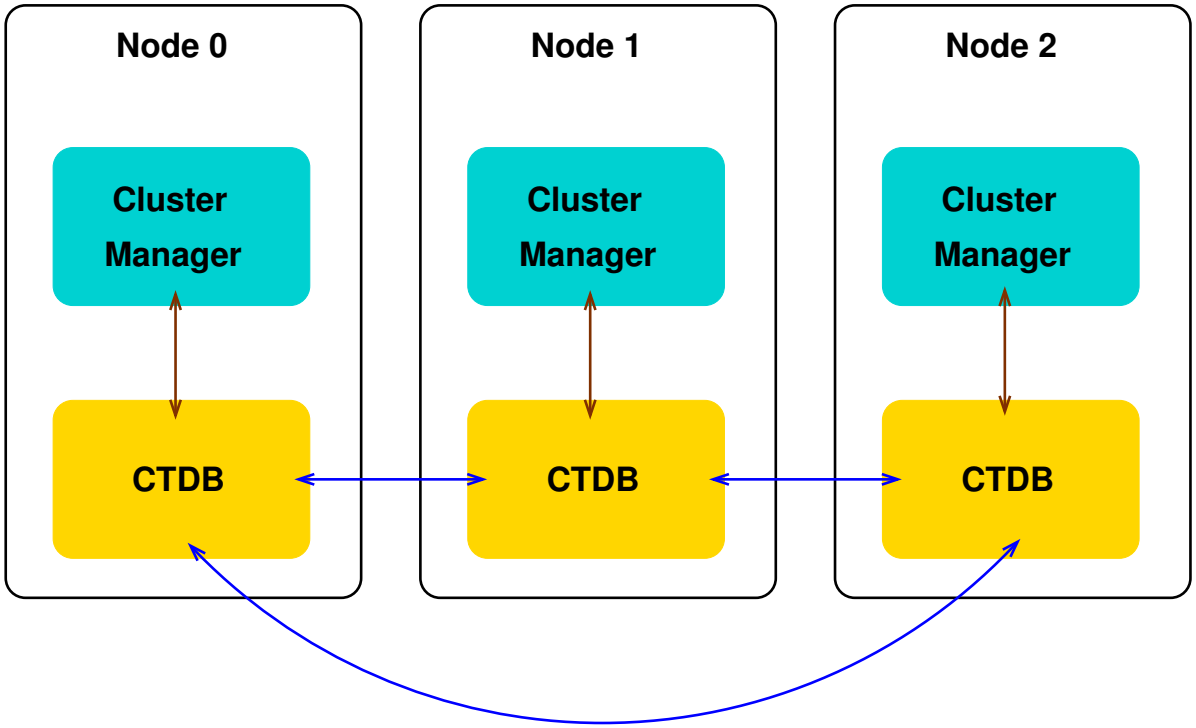

Cluster Manager

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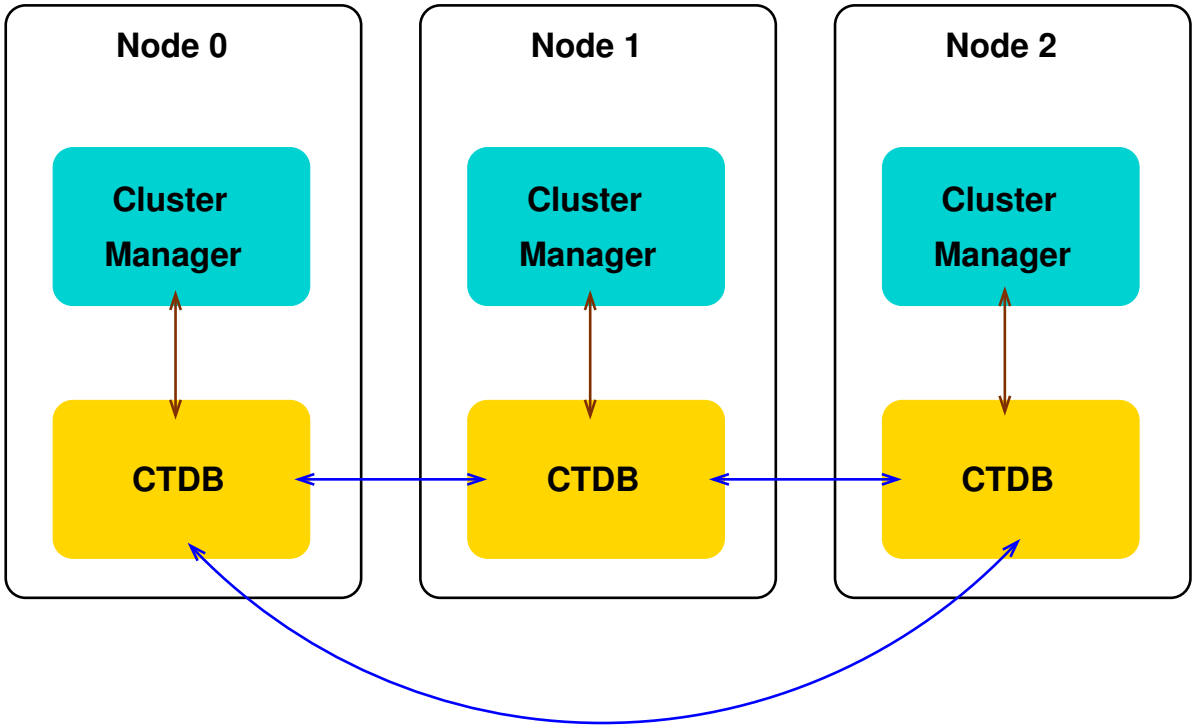

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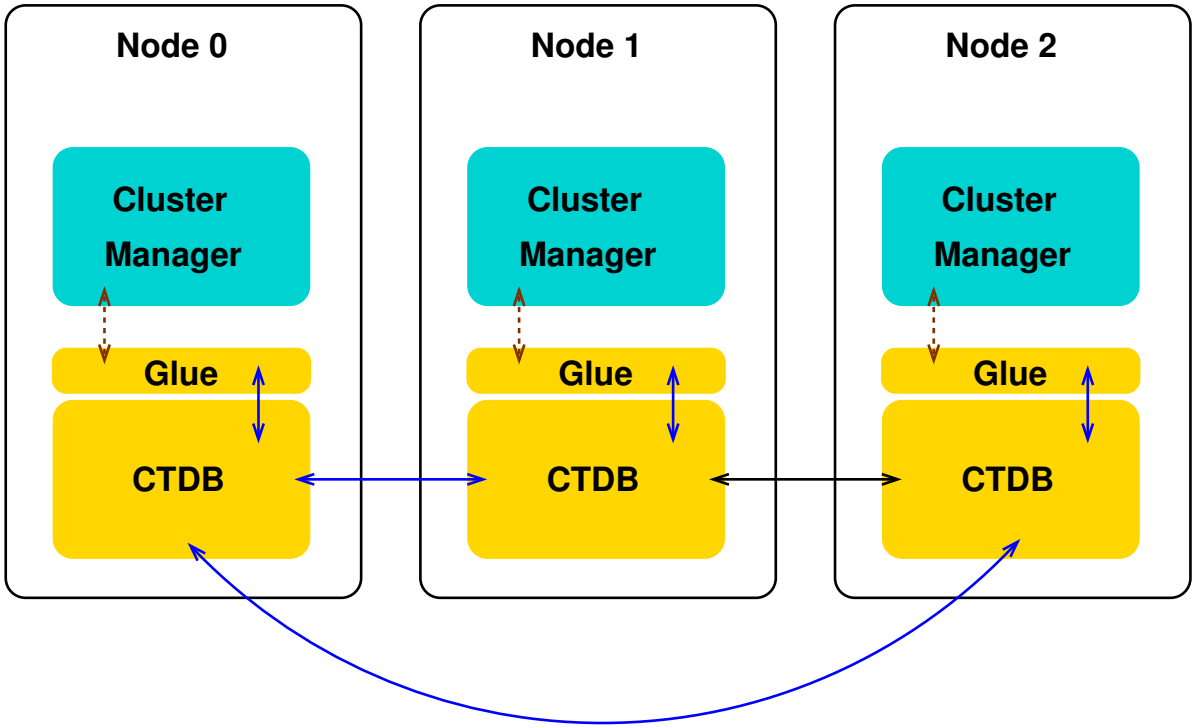

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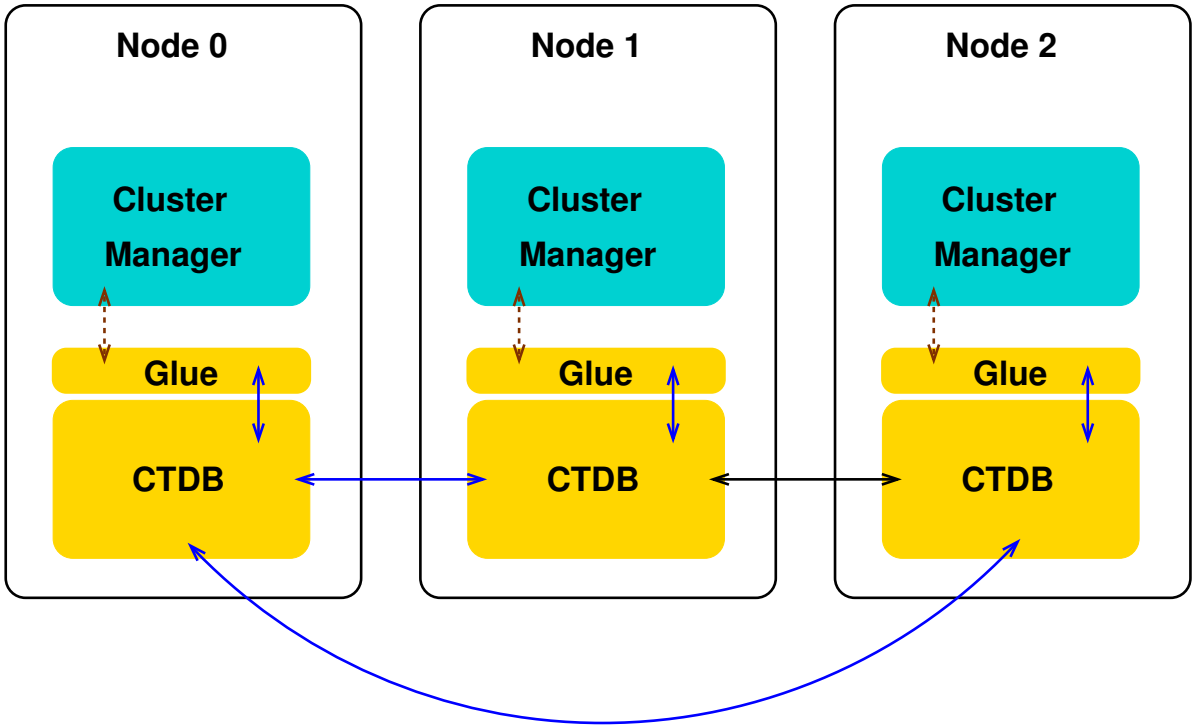

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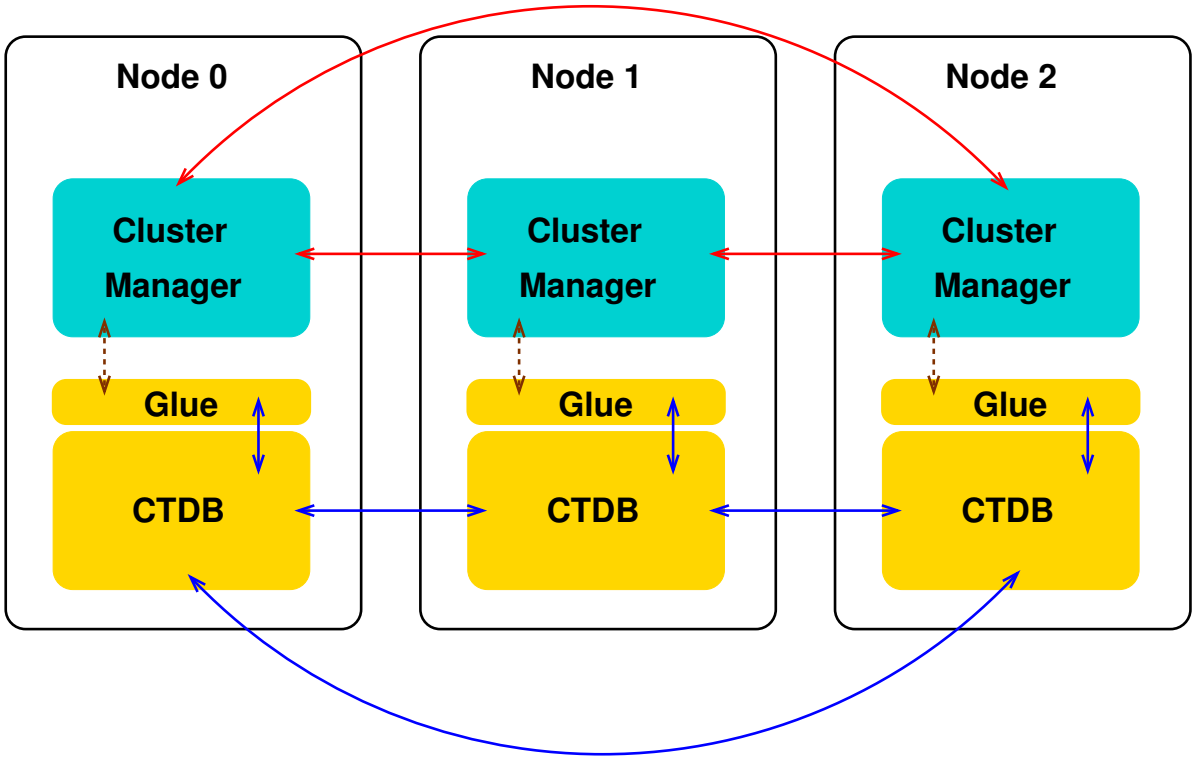

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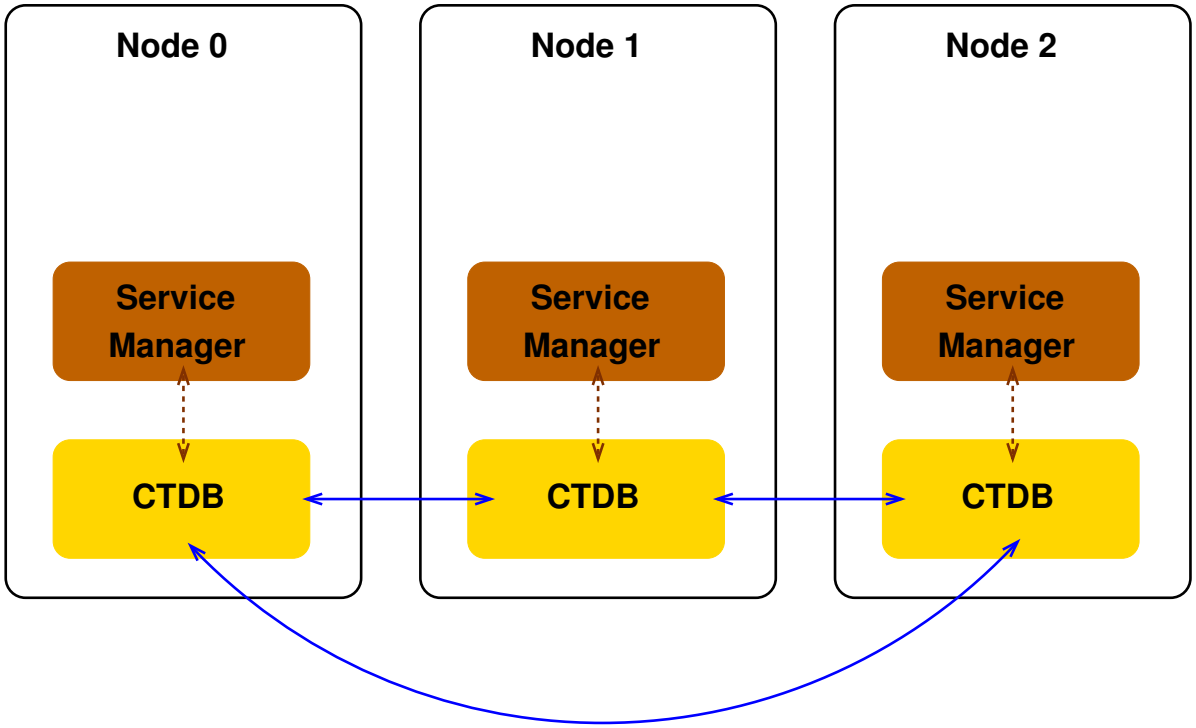

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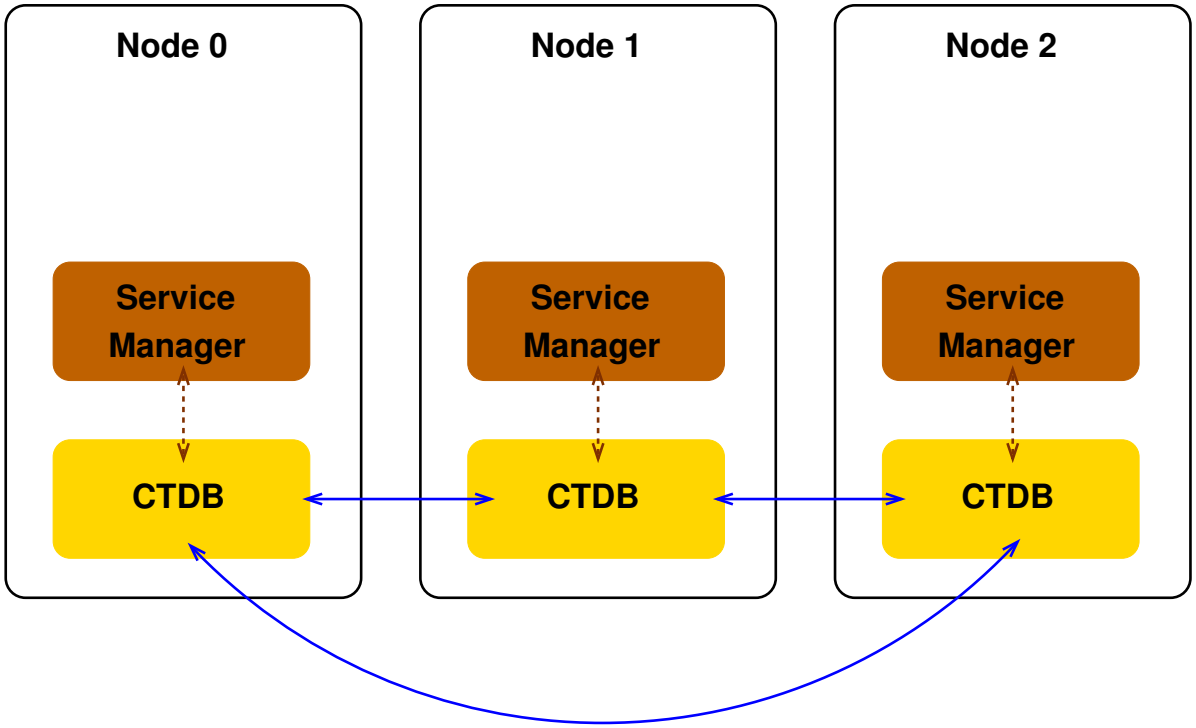

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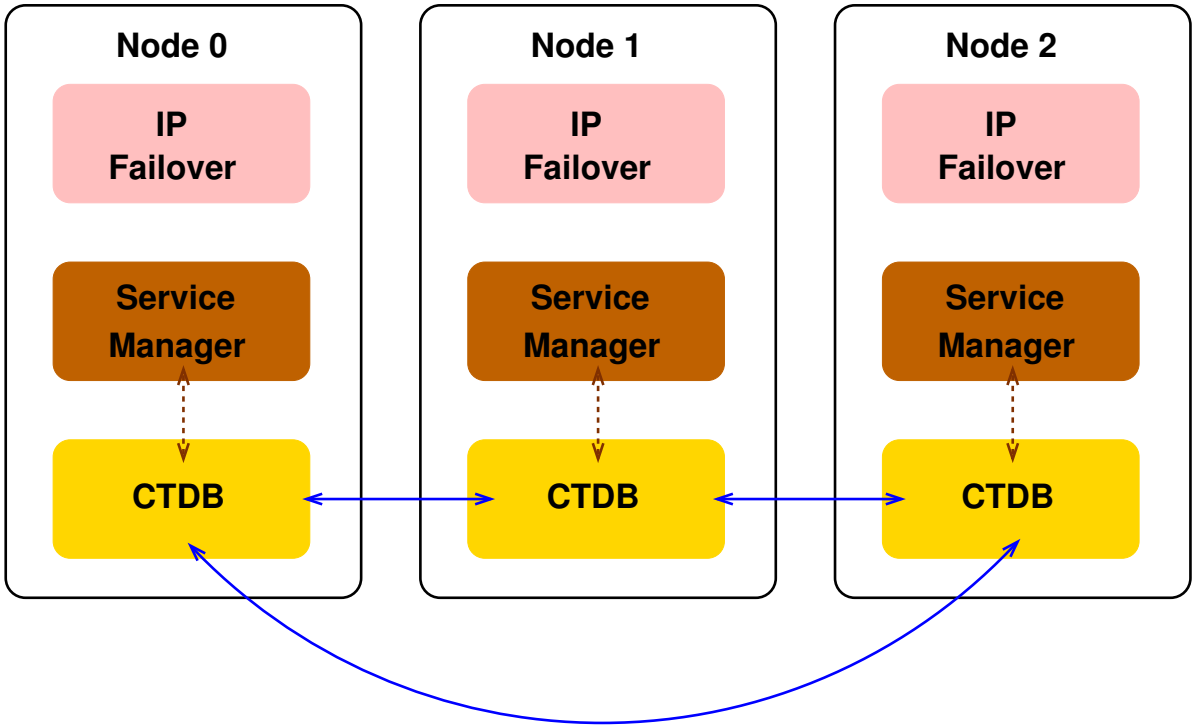

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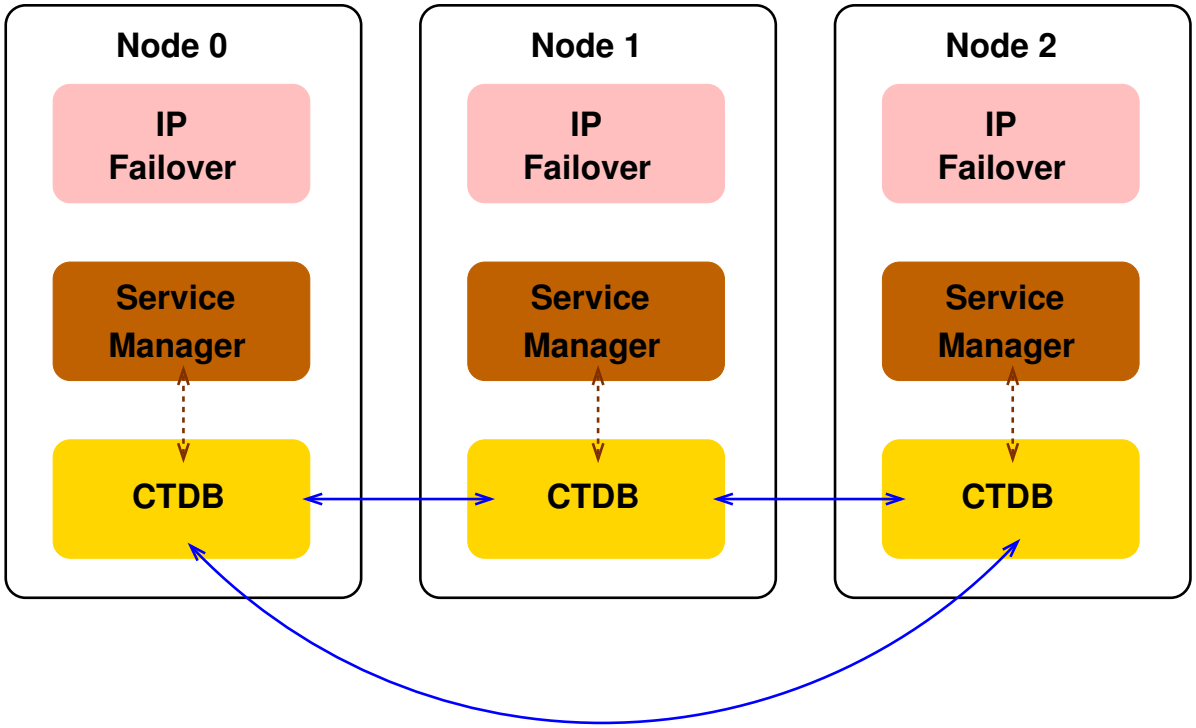

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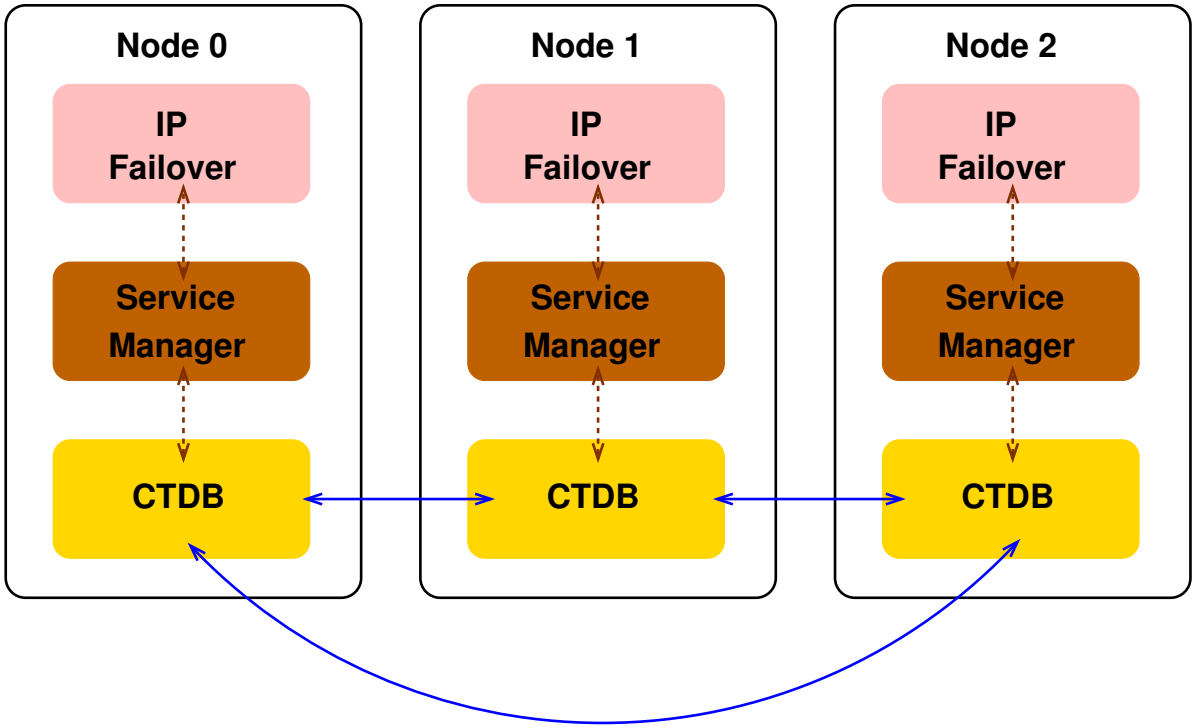

Questions / Comments