The CTDB Report

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Samba Team / IBM (ADL, LTC)

SambaXP 2020

Overview

Audience

Developers! :-)

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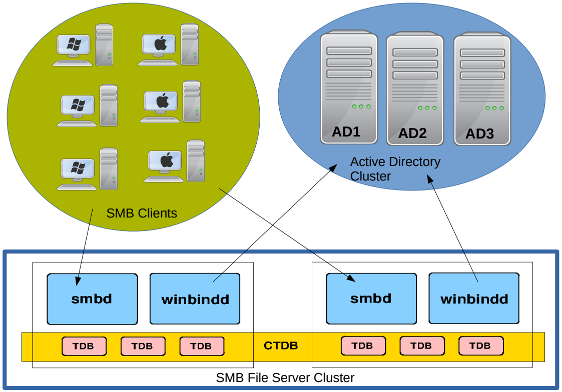
. . . but don't leave if you're not a developer. . . this might still be interesting!

Clustered Samba



What is CTDB?

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- Clustered database for Samba metadata
- Cluster-wide messaging transport
- Cluster management — leadership, membership
- Dynamic IP address failover

Progress in the past year

Committers

Martin Schwenke	269
Amitay Isaacs	32
Björn Jacke	14
Volker Lendecke	11
Ralph Boehme	8
Mathieu Parent	3
Anoop C S	2
David Disseldorp	2
Swen Schillig	2
Andrew Bartlett	1
Björn Baumbach	1
Günther Deschner	1
Noel Power	1
Rafael David Tinoco	1
Renaud Fortier	1
	349

Commits by area

Test (flakiness, portability, restructuring, ...)	140
Code cleanups (csbuild, memory leaks, ...)	44
Vacuuming (improvements, simplification, testing)	29
TCP connectivity (bug fixes)	24
Typos (docs, debug, comments, ...)	19
Cluster mutex (lock rechecking, ...)	18
Recovery (bug fixes, improvements)	17
Common code features (cmdline, conf, ...)	9
Hot records (bug fixes)	8
Build	8
Tools (ctdb, onnode, ...)	6
Scripts (event scripts, ...)	6
Docs	2
Other	19
Total	349

Tests

- Clustered Samba now tested in autobuild
  - Effort originally started by Michael Adam
  - Continued and completed by Volker Lendecke
  - Assisted by Martin (integrated CTDB's `local_daemons.sh`)
  - Initially just a single test (`base.ntdeny2`)

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  - Assisted by Martin (integrated CTDB's `local_daemons.sh`)
  - Initially just a single test (`base.ntdeny2`)
- Added collections of test suites:
  UNIT, INTEGRATION, CLUSTER
- Formalised test results: skip, fail
- Fixed a lot of flaky tests
- More test infrastructure passes ShellCheck
- Lots of cleanups

Code cleanups

- CTDB standalone compile nearly passes csbuild
- `ctdb/` subdirectory is now `unsigned`/`signed`-clean
- More shell scripts (mostly) pass ShellCheck

Vacuuming

- Vacuuming simplified
- All in the vacuuming child (nothing left in recovery daemon)
- Vacuuming child fetches records to LMASTER for deletion
- Added control to trigger fast vacuuming run for testing
- Now have quite extensive vacuuming tests

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9. Contributors: Amitay, Martin, Noel, Ralph, Volker

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- Experimental branch, passes tests...

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9. Fixed by confirming flags of remote nodes and dropping inactive nodes from recovery

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2. Databases frozen in recovery helper
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   - So late-joining nodes might not have all databases!
3. The result is that late-joining nodes can be banned
4. Fixed by moving attach of missing databases into recovery helper

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- Fixed. . .

Plans

Separate daemons

- event daemon
- service daemon
- failover daemon + connection tracking daemon
- cluster daemon
- database daemon
- transport
- smbd proxy
- . . .

Design ideas

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New abstractions

- `tdaemon`
- `tclient?`

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Flaws in previous design

- Too many sockets
- Protocol inconsistencies
- Too much copy/paste of code
- Complicated test set up

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- Problem solved!

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        uint32_t length;
        uint32_t magic;
        uint16_t protocol_version;
        uint16_t payload_version;
        struct transport_endpoint dst;
        struct transport_endpoint src;
        uint32_t flags;
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- New protocol
- Design it right from beginning – endian neutral

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- Proper marshalling API (`struct transport_packet`)

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- Still required lot of code for protocol handling
- Needs more thought . . .

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- Build / dependency issues
- Need better solution ...

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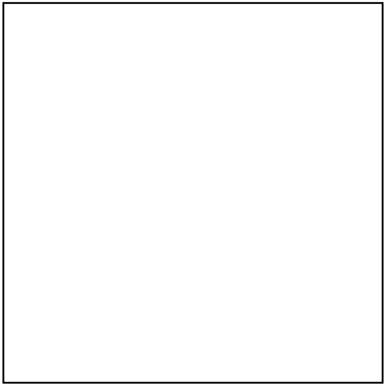

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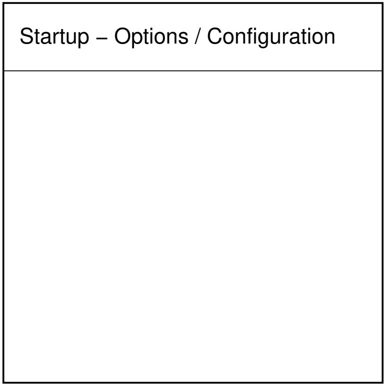

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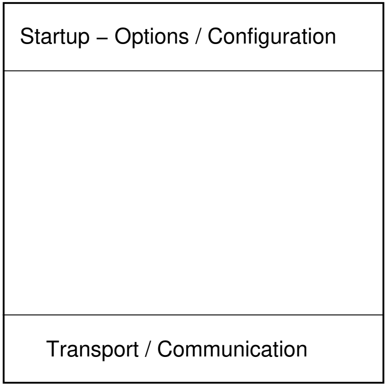

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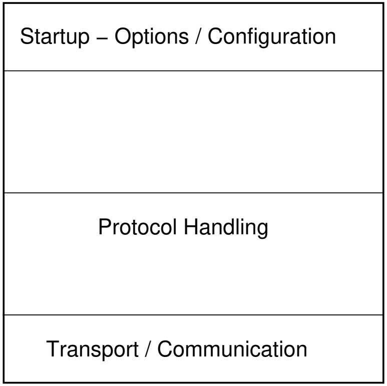

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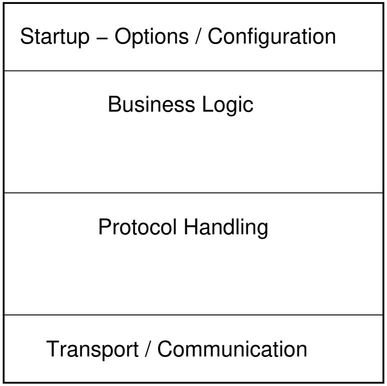

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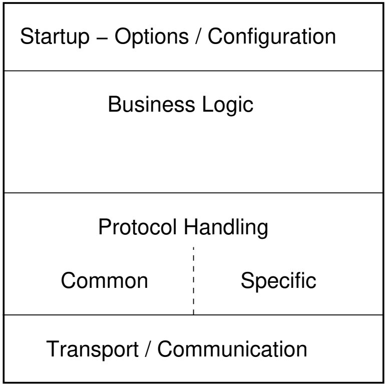

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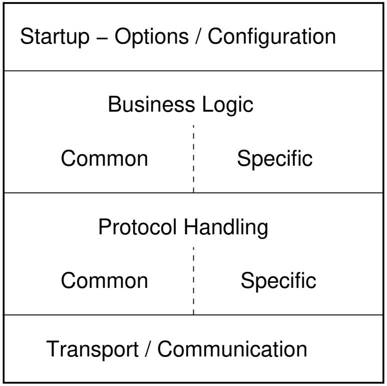

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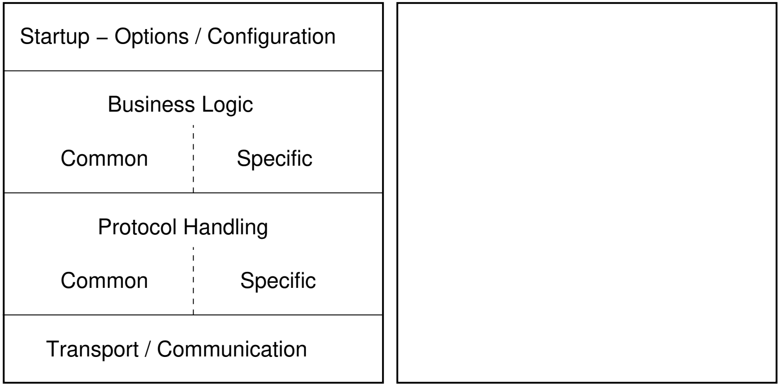

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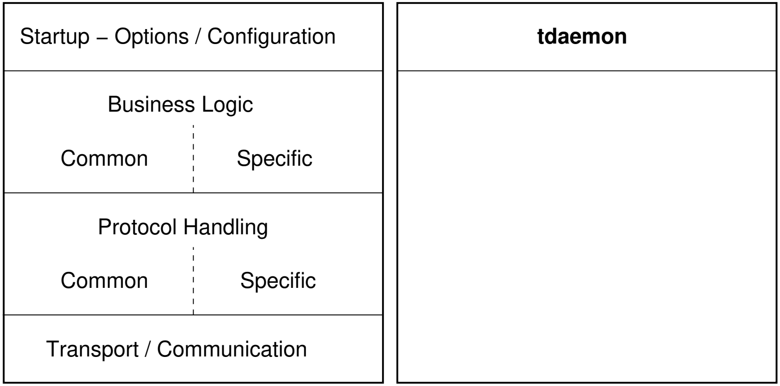

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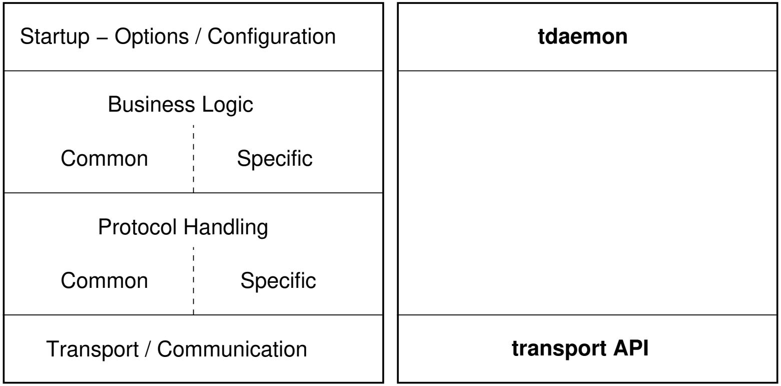

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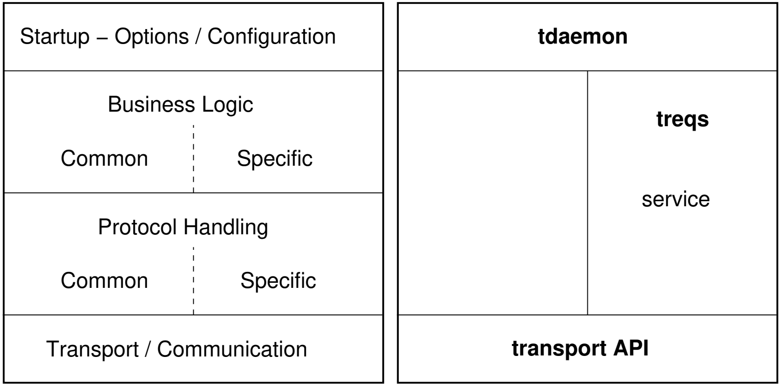

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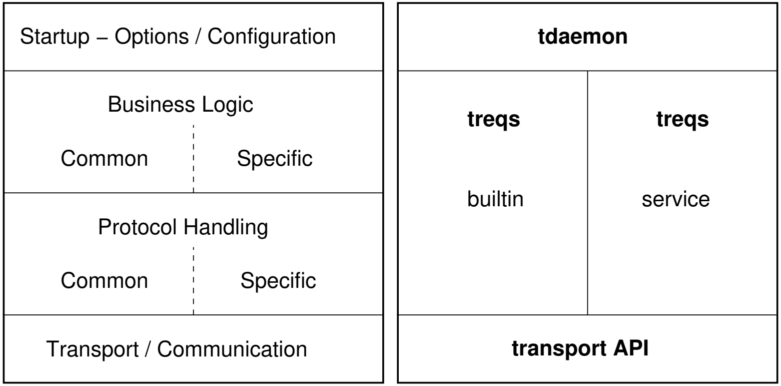

Code: transport daemon

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```
int main(int argc, const char **argv)
{
    struct tdaemon *daemons[2];

    daemons[0] = transport_tdaemon();
    daemons[1] = NULL;

    return tdaemon_main(argc, argv, daemons);
}
```

tdaemon abstraction

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```
static struct tdaemon _transport_tdaemon;

struct tdaemon *transport_tdaemon(void)
{
    _transport_tdaemon = (struct tdaemon) {
        .name = "transportd",
        .endpoint_id = CTDB_ENDPOINT_TRANSPORT,
        .builtin = builtin_treqs(),
        .service = transport_treqs(),
    };
    return &_transport_tdaemon;
}
```

tdaemon abstraction

- One daemon (abstraction) to rule them all
- Single process and forked processes model
- Actual business logic is separated into backends (`treqs`)

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treqs abstraction

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- Encapsulate business logic for a service

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- Independent of transport

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```
struct treqs {
    struct tevent_req * (*init_send)();
    bool (*init_recv)();
    struct tevent_req * (*reconfigure_send)();
    bool (*reconfigure_recv)();
    struct tevent_req * (*activate_send)();
    bool (*activate_recv)();
    struct tevent_req * (*deactivate_send)();
    bool (*deactivate_recv)();
    bool (*command_match)();
    struct tevent_req * (*dispatch_send)();
    bool (*dispatch_recv)();
    struct tevent_req * (*run_send)();
    bool (*run_recv)();
};
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- Protocol handling, main loop

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    static struct treqs _transport_treqs = {
        .init_send = transport_backend_init_send,
        .init_recv = transport_backend_init_recv,
        .reconfigure_send = transport_backend_reconfigure_send,
        .reconfigure_recv = transport_backend_reconfigure_recv,
        .command_match = transport_backend_command_match,
        .dispatch_send = transport_backend_dispatch_send,
        .dispatch_recv = transport_backend_dispatch_recv,
        .run_send = transport_backend_run_send,
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    };
```

builtin (treqs) backend

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- Built-in (common) request handling for all daemons

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- ping, (de)activate, debug, memory use, . . .

Way ahead

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What's missing

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What's missing

- Integrating config handling
- Sorting out single process transport
- Test infrastructure changes?

Way ahead

What's missing

- Integrating config handling
- Sorting out single process transport
- Test infrastructure changes?

What's next

Way ahead

What's missing

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- Sorting out single process transport
- Test infrastructure changes?

What's next

- `transport` done; testing ...
- Implement other daemons - `cluster`, `event`, ...

Forward?

Incremental progress?

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Incremental progress?

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- This is churn but potentially lets us get some of our work into a release before everything is finished
- Maybe this is worth doing. . .

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- Any volunteers?

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Questions?