New Topics in Database Integration

Tilghman Lesher
Senior Software Developer
Digium, Inc.
October 14, 2009

Overview

- Historical Features
- Database integration now
- Future features

Historical Features

- AstDB
- MYSQL command
- Static realtime

AstDB

- Simple key/value pairs
- No configuration
- Not well organized for complex data
- Difficult to remotely administer

MYSQL command

- Works well for arbitrary tables
- CON: single backend
- Does not always cleanup resources

Static realtime

- Works for nearly every configuration file
- No random access
- Not “really” database integration

What we have now (Asterisk 1.4)

- func_odbc
- Dynamic Realtime
- cdr_odbc

func_odbc (1.4)

- Each query has its own backend
- Single row result
- No transactions
- No failover

Dynamic realtime (1.2,1.4)

- Better abstraction of data
- Dialplan function isn't a good interface
- Improper caching (rtcachefriends) needed for some functionality

cdr_odbc (1.2, 1.4)

- Multiple backends, but one at a time
- Static layout
- “Userfield” - ugh

The future

- func_odbc improvements
- cdr_adaptive_odbc
- Realtime store/destroy/update2 (API)
- Adaptive realtime drivers (1.6.1)
- res_config_curl (1.6.1)
- ODBC transaction support (1.6.2)
- Realtime failover (in testing)

func_odbc (1.6.0)

- Multirow queries (ODBC_Fetch)
- Read/write handle separation
- HASH() containers
- Less escaping

func_odbc example

```
[FOO] ; in func_odbc.conf
readhandle=pgsql_slave1,pgsql_slave2
writehandle=pgsql_master
mode=multirow
readsql=SELECT * FROM foo
rowlimit=5
writesql=UPDATE foo SET f='${SQL_ESC(${VAL1})}'
writesql+= WHERE i='${SQL_ESC(${ARG1})}' ; 1.6.1+ only

[dialplan_context]
exten => s,1,Set(h=${ODBC_FOO()})
exten => s,n(next),Set(HASH(c)=${ODBC_FETCH(${h})})
exten => s,n,GotoIf($["${HASH(c,first)}"=""]?done)
...
exten => s,n,Goto(next)
exten => s,n(done),ODBC_Finish(${h})
```

More on HASH()

- Container prevents variable corruption
- Compatibility with CURL(), REALTIME_HASH() (1.6.2+)

cdr_adaptive_odbc

- Arbitrary CDR variables added
- Unneeded standard fields go away
- Fields with multiple types (i.e. disposition, amaflags, dates, times) adapt to column type
- Filters on accountcode (or any other field)

cdr_adaptive_odbc

```
[first]
connection=sqlserver
table=AsteriskCDR
alias src => CallSource
alias dst => CallDestination
static "asterisk-314" => Machine ; 1.6.2+

[second]
connection=pgsql_master

[this_name_has_no_connection_to_anything]
connection=salesdb
filter accountcode => sales_dept
```

cdr_adaptive_odbc

- Functionality developed here has started to appear in other CDR drivers (MySQL, PgSQL, SQLite)
- CEL also inherited this approach (1.8+)

Adaptive realtime

- Grew out of cdr_adaptive_odbc
- Uses table metadata to adapt queries to tables
- MAY be configured to CHANGE table structure (e.g. lengthen password field)
- Defaults to generating warnings

Adaptive realtime

- Will allow us to add arbitrary columns in future, without compromising existing functionality
- I.E. an upgrade won't cause Asterisk to fail to update your DB

Realtime API changes

- store/destroy (INSERT/DELETE)
- update2 - removes need to have a single column primary key (1.6.2+)
- require - Ensures backend supports critical fields (1.6.1+)

res_config_curl

- HTTP-based configuration backend
- For databases without ODBC drivers or poor (unstable) drivers
- Written originally to support jmls & his Progress database backends
- Sample backend in contrib/scripts/dbsep.cgi

ODBC transaction support

```
[FOO1]
writehandle=psql_master
writesql=UPDATE foo SET value='${SQL_ESC(${VAL1})}'
writesql+= WHERE keycolumn='${SQL_ESC(${ARG1})}'

[FOO2]
writehandle=psql_master
writesql=UPDATE bar SET value='${SQL_ESC(${VAL1})}'
writesql+= WHERE keycolumn='${SQL_ESC(${ARG1})}'

[dialplan_context]
exten => s,1,Set(ODBC(transaction,psql_master)=foo)
exten => s,n,Set(ODBC_FOO1(keyval)=somevalue)
exten => s,n,Set(ODBC_FOO2(otherkey)=othervalue)
exten => s,n,ODBC_Commit(foo)
```

Realtime failover

- Still in testing (team/tilghman/realtime_failover)
- Introduces negative caching for db connections
- Handles multiple connections from extconfig.conf

Further discussion

- Ideas? Comments?
- Come see me in the Code Zone
- Fresh baked bread FTW