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KAZOO - The VOIP cloud platform

March 6th 2020

Who Dis?

James Aimonetti

Erlanger since 2006 – Thanks Joe!

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About Me

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Developer
Cook
Fermenter
Dad
Regen Ag

2600Hz - Who Dat?

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Started in 2010

Hippie commune of telecom

Bridge the gap between open source and commercial systems

Telco-in-a-box

blue.box

Problem to Solve

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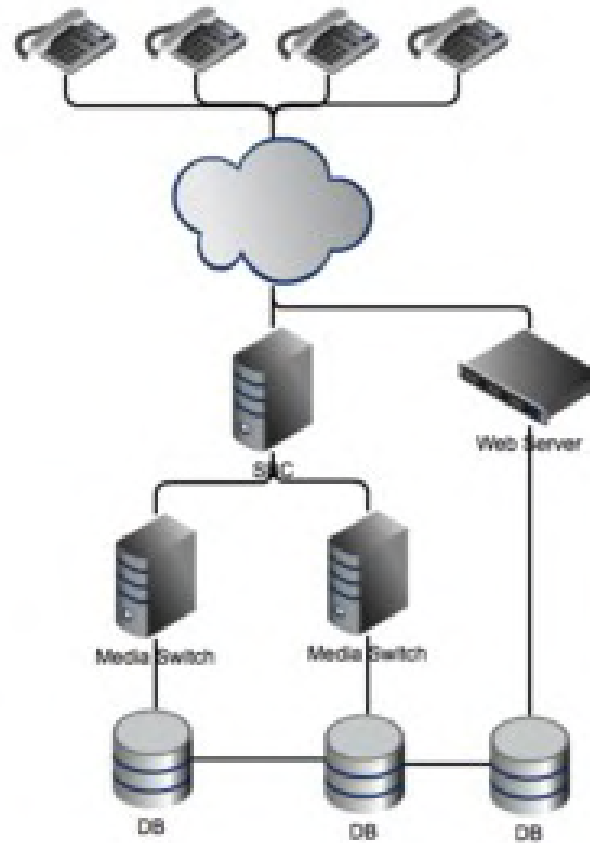Roll your duct taped solution on top of Asterisk or FreeSWITCH

Purchase a commercial offering
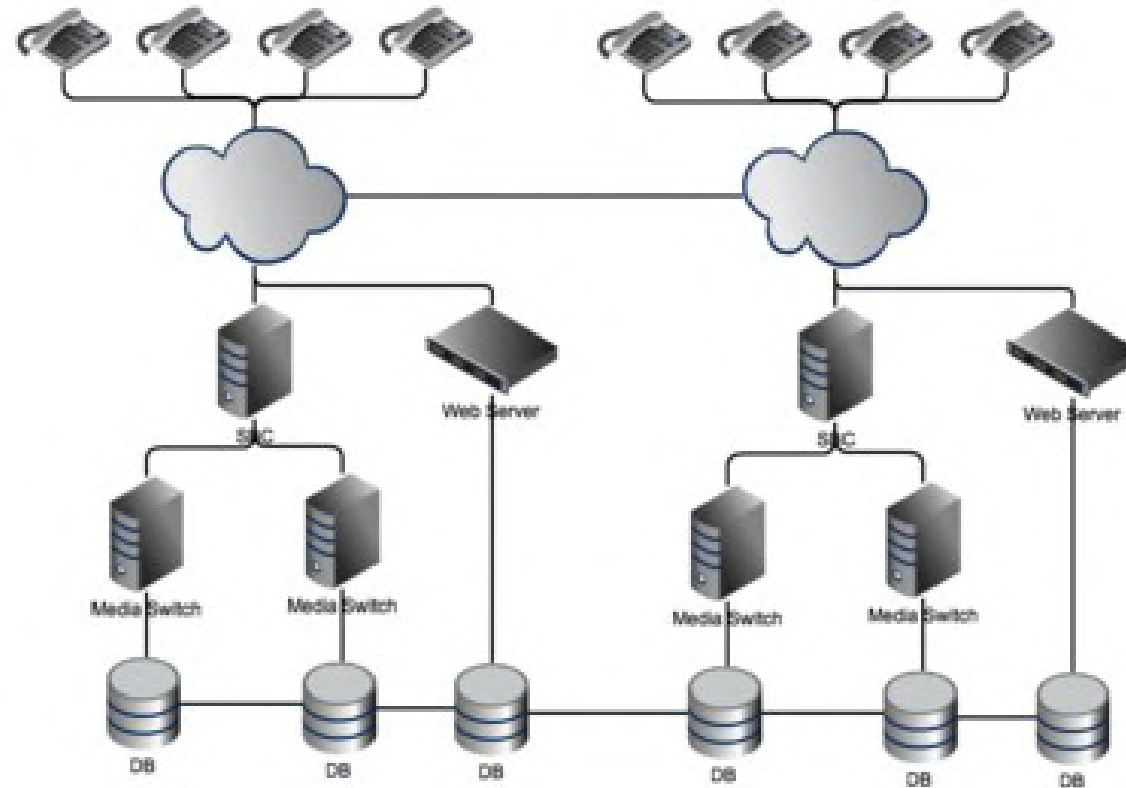
Resell another provider's offering

Roll your own

Roll your own

Roll your own

Enter KAZOO

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- Use a platform designed and tested to scale
- Share the common tasks and features with others
- Keep your own differentiators to yourself

Pro:
 - Low cost
 - Instant ability to start
 - Full customization - full control
 - Rapid development

Con:
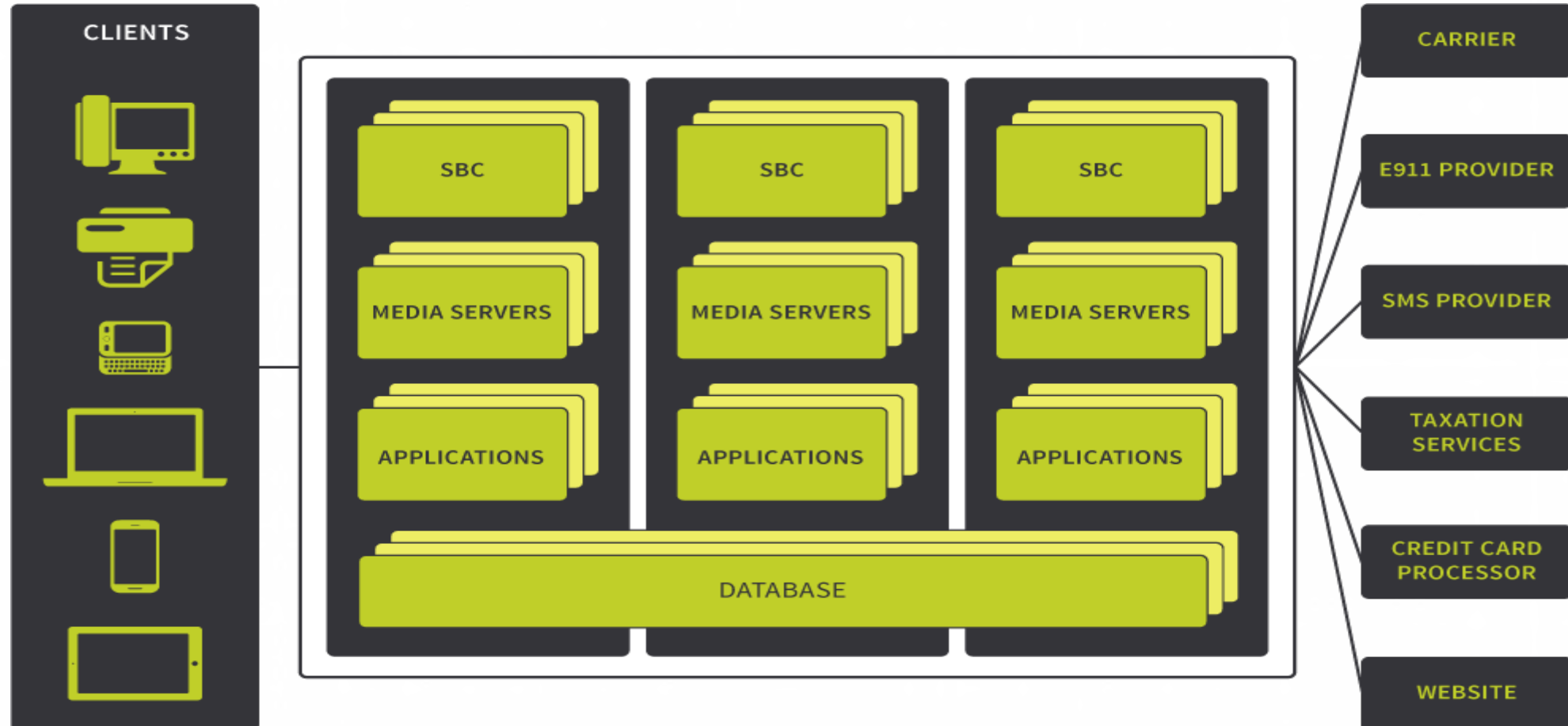 - Core product must succeed and be maintained

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119 Contributors

- ~30 are/were 2600Hz employees
- 14 of which are/were Erlang engineers
- 746 Github stars, 386 forks
- Accepted PRs from every continent except Antarctica
- ~290K lines of Erlang, + ~10K of "other"

KAZOO - 2010

The Beginning - Learn me some telecom!

Originally called Whistle

FreeSWITCH interaction:
  - Used a text-based Event Socket Layer (ESL)
  - experimenting with mod_erlang_event

rebar 2 build system

Each app was bespoke

KAZOO - 2010

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mod_erlang_event

C-Node code based on mod_event_socket

Was better than ESL

Built for OpenACD (call center system using Erlang and FreeSWITCH) - gen_smtp was part of this effort too

Single (hidden) Erlang VM connection supported; "bug" allowed more but wasn't officially supported

DistErl for all communications between nodes

KAZOO - 2010

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Cluecon 2010 demo

Clients included:
 - 24-hour care facility
 - Short-mid term rentals in NYC for int'l travellers

Major components:
 - Kamailio, FreeSWITCH
 - RabbitMQ, CouchDB

KAZOO - 2011

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First behaviour: gen_listener
 - Standardized AMQP connection and consumption

 - Removed AMQP-specific bits from apps

 - Apps use gen_listener like a gen_server with an extra callback for AMQP payloads received.

KAZOO - 2012

Removed .beam from repo
 - were included to ease deployments to private networks
 - releases were still a dark art, no relx as I recall

Renamed Whistle to KAZOO and tagged it as 2.0
 - Focus on features
 - Cowboy coding continues

KAZOO - 2013

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KAZOO 3.0 released
 - Project has matured
 - Feature parity (mostly) for hosted PBX

Replace mod_erlang_event with mod_kazoo
 - First class support for multiple connections
 - Distribute events over TCP sockets
 - DistErl for control from KAZOO

KAZOO - 2014

MODBs – Month-only databases
- Store data related to a point in time
- Archive-able
- Separate account config from account usage
- Less work for secondary indexing

KAZOO - 2015

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Makefile overhaul
 - Removed rebar 2
 - Direct calls to dialyzer, xref, eunit, etc
 - More tooling added to update .app configs
 - More tooling to only analyze changed files
    - dialyze-changed, dialyze-hard
 - erlang.mk to manage deps

KAZOO - 2016

Increased loads started to expose new scaling issues
 - Cache serialization
 - Move protected ETS to public, parallelize read/write

Federation appears!
 - Decrease inter-datacenter traffic

Documentation appears
 - AST parsing of API endpoint modules

KAZOO - 2016

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Storage plans appear
 - Save VM, fax, and more off-cluster
 - Google Drive, Azure, AWS, FTP, HTTP, etc

KAZOO - 2017

KAZOO 4.0 – Webscale!
 - Some clusters toying with 1,000,000 devices!

KAZOO - 2018

Cache stampedes
 - Re-register hordes after network flap

KAZOO - 2020

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KAZOO 5.0 – Looking to the future
 - Self-service features
 - Dependency deprecations, rewrites
 - Elixir added to toolchain
 - More cluster-wide tooling
 - Lots of technical debt remediation
 - More auto-discovery, auto-config

KAZOO - 2020

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KAZOO 5.0 – AKA The Great Breakening

Better delineate community-support apps vs 2600Hz-supported apps

Prepare for an App exchange

yum install kazoo

Erlang Engineering

Internationalization

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Community helped immensely here
 - Code / regexps to handle country-specific
 - Use cases

Plain English when possible to ease language barrier
 - **AccountId** vs **AcctId** or **Id**
 - Basic spell checker for common mistakes (for Karl)
 - JSON accessor modules vs JSON key strings
   - kzd_devices:sip_username(Device) vs kz_json:get_value(<<"sip_username">>, Device)

Internationalization

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kazoo_media – int'l prompts

kazoo_numbers – int'l number handling

Hiring

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Venn diagram of telecom/VoIP + Erlang = ∞

Culture of mentoring / teaching
 - Encoded in tooling as well

Unlikely places sometimes:

- Finding KAZOO and running his own business on it

- KAZOOCon conference attendee staying in same SF hostel

- Reddit comment threads

- Erlang ML

- French SF school

Ethos

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VoIP infrastructure is hard! Try to welcome those interested

- Be Egoless
- NTSB-style investigation - blameless, how to avoid next time, improve processes/checks/tests
- Things will crash, code for it; bugs will appear, encourage finding them early (before prod)
- You are not your code: shared ownership
- Learn from everyone else, no matter how much you think you know already

Tooling

- CI
  - Dialyzer
  - Formatting
  - Docs
- Testing
  - EUnit, PropEr, kazoo_proper, make-busy
- AST parsers
  - Doc generation, schemas, API endpoints, config options
- Makefile

Documentation

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Live in the repo where devs work

Build doc sites on commits to master

AST parser to detect documentable changes
 - Fail CI if unstaged
 - Helps reviewers as well

Docs for different audiences
 - API developers
 - Sysadmins
 - End users

War Stories

The Pool Phone

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Reseller has hotel customer with phone by pool for emergencies

No address configured - $75 per call for violation

Power washing causes short

1,000+ calls = $75,000 bill

"Generously" reduced to $20,000

FreeConferenceCall.Com

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Traffic pumping – boo

Company coordinated merger over 2 days between offices

$0.22 per minute, per call, billed to us
$0.01 per minute billed to client

Not a profitable client after that

Ring Groups

Company setup a ring group on main line

Added all employees

100+ devices, multi-kilobytes of bridge string sent to FreeSWITCH

Destroyed packet framing

Sound Fun?

Thank You!

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