Kamailio and FreeSWITCH at Scale

Tips, tricks, and lessons learned

Fred Posner • qxork.com • ClueCon 2024

Kamailio and FreeSWITCH at Scale

Agenda

Introduction

Kamailio - What, Who

Thinking Different

Tips & Tricks

Questions

Introduction

Hi. I'm Fred.

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- VoIP Consultant, LOD.com

- Dad / Husband

- I ❤️ Kamailio

- **APIBAN** (apiban.org)

- "Keep Moving Forward"

Kamailio - *What, Who*

Kamailio

The Open Source SIP Server

- Successor of OpenSER and SER

- Mature Project: Over 20 years

- Modular

- GPLv2+

- **Powerful** and Lightweight…

300,000+

Registrations @ 4GB RAM

5000+ CPS

as Stateless Load Balancer

3000 CPS

For 5 million calls on a Raspberry Pi

Kamailio

What

- SIP Proxy Server

- SIP Registrar Server

- SIP Location Server

- SIP Application Server

- SIP Dispatcher Server

- SIP Websocket Server

Kamailio

Who

- Daniel-Constantin Mierla
  Co-Founder

- Elena-Ramona Modroiu
  Co-Founder

- (Here at ClueCon)

Think Different

"Indecision may
or may not be my problem."

Jimmy Buffett

Think Different

Start with your design…

- FreeSWITCH

    - Modular based

- Kamailio

    - Modular based

- Your Design…

Think **Modular**
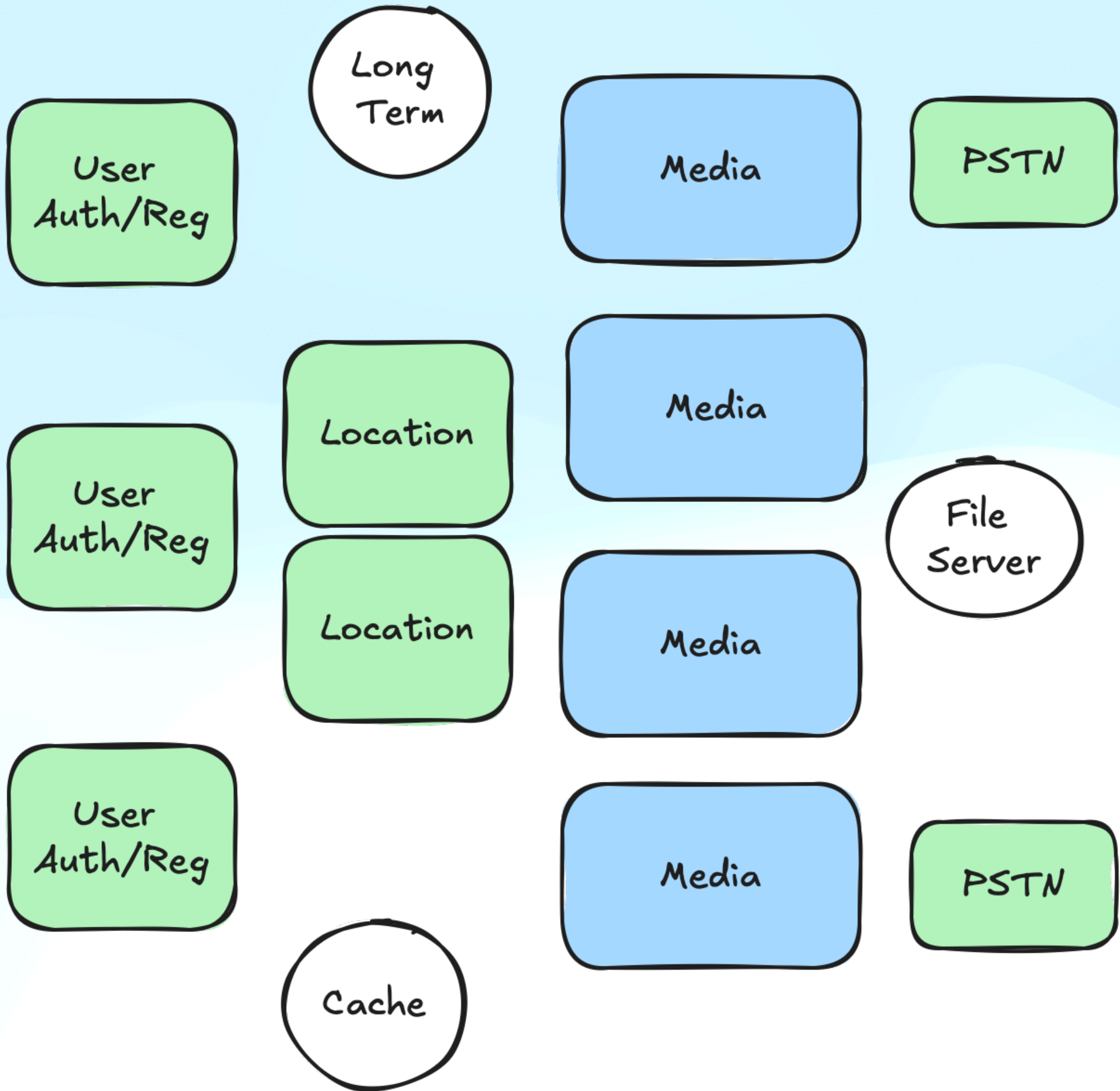
Why Modular?

Modular Design

Benefits

- Cost Efficiency

- Scalability

- Flexibility

- Reusability

- Quality

- Easier Maintenance

Tips & Tricks

Optimize your OS

Tips & Tricks
Optimize your OS

- Debian is still generally used my most of the devs

- Ulimit

  - -c/d/f/l/q/u/x/l: unlimited

  - -n: 999999

  - -s: 240

- Ethernet Tuning

- Virtualizing Tuning

Offload

Tips & Tricks
Offload

- Move User Authentication / Registration to Kamailio

- Move LCR / Carrier Gateways to Kamailio

- Move TLS/TCP/Websockets to Kamailio

- Move Presence to Kamailio

FreeSWITCH

Tips & Tricks
FreeSWITCH

- Reduce logging

- Core I/O is blocking

- Conferences increase threads

- More Sofia profiles!!

- Load only necessary modules

Tips & Tricks
FreeSWITCH: Events

- Events can be your best friend

- Heartbeat (monitor/trigger based on CPU, Sessions, CPS)

- Handle via outside process (moving files, cdr's, presence)

- Treat Usage Differently

  - Conferences

    - Recording

    - Transcoding

    - Etc.

- Keep FreeSWITCH dumb

Tips & Tricks
FreeSWITCH Event

```go
import (
...
    "github.com/palner/fs-
eventsocket/eventsocket"
...
)

func main() {
    ...
    fs.Send("events json ALL")
    for {
        ev, err := fs.ReadEvent()
        if err != nil {
            log.Fatal(err)
            break
```

```go
    switch ev.Get("Event-Name") {
    case "HEARTBEAT":
            go HandleHeartbeat(ev)

...

func HandleHeartbeat(ev
*eventsocket.Event) (string, error) {
    idleCpu, err :=
strconv.Atoi(ev.Get("Idle-Cpu"))
    if idleCpu < 65 {
        ... launch new instance of FS
```

Kamailio

"Cache = Ca$h"

—@miconda (who knows the original author)

Tips & Tricks
Caching

- Kamilio Redis integration

- Kamailio HTABLE

- API -> Redis

- Background service for long term storage (NATS, etc)

- Use X-Headers to save lookups

Dispatcher

Dispatcher

Since 2004

- Load nodes via text, database, RPC

- Reload / add / delete nodes without restarting

- Limit nodes as needed

- Group nodes by function/usage

CELEBRATING

20

YEARS

Tips & Tricks
Dispatcher

```go
import (
...
    "github.com/palner/pgrtools/pgkamtools"
...
)

func main() {
    ...
    _, err := DispatcherAdd("200", "sip:10.1.1.2:5060",
kamurl)
    if err != nil { ...
```

Tips & Tricks
Kamailio Dispatcher

- Attributes can designate any need, such as CPS, Total Calls, prefix, socket, …

- Add / Delete / Reload as needed

- Event routes based on node up/down

- Various routing algorithms

- Stateless or Stateful (for failover routes)

Final thoughts…

Tips and Tricks
Kamailio

- N+1 Gateway Nodes
  (great for bridging/AnyCast)

- DMQ for Geographical Redundancy

- NATS ne NAT ;)

- Presence Node(s)
  (pua_json, etc)

- Run in memory when possible
  (use ASYNC/NATS/etc for
  redundancy/long term storage)

Questions?

Ask Me Anything

Fred Posner - qxork.com

- Questions?

  - Kamailio

  - APIBAN

  - You name it…

- Thank you for flying Kamailio!

- **See you at Kamailio World!**