

Fraud Detection with Automatic Mitigation using CGRateS

Dan Christian Bogos
dan.bogos@itsyscom.com

Kamailio World, April 2014



Our Background



Over 7 years of experience in architecting server side solutions in VoIP environment

Platform implementations covering both wholesale and retail business categories

Responsibly understanding real-time processing constrains and the seriousness of live system outages

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About CGRateS

Modular architecture

Easy to enhance by rewriting specific components
JSON/GOB RPC API

Multi-tenancy support

Built-in task scheduler with support for one time as well as recurrent actions

Test driven development

```
dan@CGRateSDev: ~
root@CGRateSDev:/# cat /proc/cpuinfo | grep "cpu MHz"
cpu MHz          : 3399.996
root@CGRateSDev:/#
root@CGRateSDev:/# cgr-tester -runs=100000
2014/04/03 17:56:57 Running 100000 cycles...
2014/04/03 17:56:58 {*out call cgrates.org 1001 1002 0.3 [0xc2100a8d20] true} 99999 <nil>
2014/04/03 17:56:58 memstats before GC: Kbytes = 728 footprint = 5062
2014/04/03 17:56:58 Elapsed: 611000739 resulted: 163665.923160 req/s.
root@CGRateSDev:/#
root@CGRateSDev:/#
root@CGRateSDev:/# cgr-tester -runs=100000 -rater_address="127.0.0.1:2013"
2014/04/03 17:57:15 {*out call cgrates.org 1001 1002 0.3 [0xc2100a6780] false}
2014/04/03 17:57:15 Elapsed: 7999101294 resulted: 12501.404386 req/s.
root@CGRateSDev:/#
root@CGRateSDev:/#
root@CGRateSDev:/# python /usr/local/src/cgrates/cgrates.git/cgrates/data/tester/cgr-tester.py
(500000, {u'Direction': u'*out', u'TOR': u'call', u'Destination': u'1002', u'Account': u'', u'Ch
hedPrefix': u'1002', u'Increments': None, u'MatchedDestId': u'DST_1002', u'CallDuration': 60000
11:13:23.190554134+02:00', u'TimeStart': u'2014-04-03T11:12:23.190554134+02:00', u'RateInterval
u'Months': [], u'WeekDays': [1, 2, 3, 4, 5], u'Years': [], u'StartTime': u'08:00:00', u'EndTim
e': 0.4, u'RoundingDecimals': 4, u'Rates': [{u'RateIncrement': 60000000000, u'GroupIntervalStar
u'Value': 0.2}, {u'RateIncrement': 10000000000, u'GroupIntervalStart': 60000000000, u'RateUnit':
RoundingMethod': u'*up'}, u'Weight': 10}, u'Cost': 0.2, u'MatchedSubject': u'*out:cgrates.org:c
.org', u'Subject': u'1001'})
Elapsed: 80s resulted: 6221 req/s.
root@CGRateSDev:/#
root@CGRateSDev:/#
root@CGRateSDev:/#
```

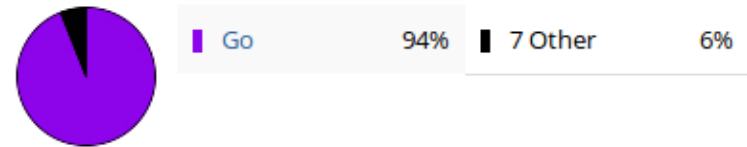
Fast and ... very fast



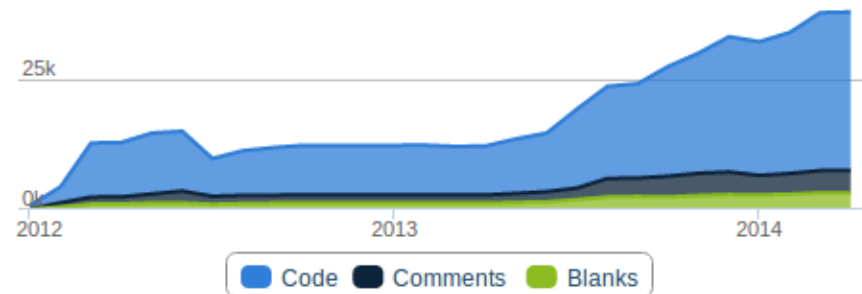
In a Nutshell, cgrates...

- ... has had 1,705 commits made by 3 contributors representing 30,407 lines of code
- ... is mostly written in Go with an average number of source code comments
- ... has a young, but established codebase maintained by a small development team with increasing Y-O-Y commits
- ... took an estimated 8 years of effort (COCOMO model) starting with its first commit in January, 2012 ending with its most recent commit 2 days ago

Languages



Lines of Code



Actively maintained

Rating

Highly configurable rating

Connect fees, rate units, rate increments, rates grouping, various rounding methods, configurable decimals in costs,

Multiple TypeOfRecord support

(eg: calls, premium calls, SMS, internet data, etc)

Multiple rating subjects with fallback

(useful for example with roaming CDRs)

Recurrent charges

Rating profile scheduling

File Edit View Help

History Commit

Branch: master

Subject	Author	Date
<input type="radio"/> unstaged Unstaged changes		Sun 04 Aug 2013 06:59:45 PM EI
<input checked="" type="radio"/> master 'historic commit'	Radu Ioan Fericean	Sun 04 Aug 2013 06:51:41 PM EI
'historic commit'	Radu Ioan Fericean	Sun 04 Aug 2013 06:51:41 PM EI
'historic commit'	Radu Ioan Fericean	Sun 04 Aug 2013 06:51:41 PM EI
'historic commit'	Radu Ioan Fericean	Sun 04 Aug 2013 06:51:41 PM EI

.....

Details Changes Files

destinations.json

```

diff --git a/destinations.json b/destinations.json
index 7a25f64..473490b 100644
@@ -1,2 +1,3 @@
1 - [{"Key": "GERMANY", "Object": {"Id": "GERMANY", "Prefixes": ["+49"]}},
2 + [{"Key": "FS_USERS", "Object": {"Id": "FS_USERS", "Prefixes": ["10"]}},
3 + [{"Key": "GERMANY", "Object": {"Id": "GERMANY", "Prefixes": ["+49"]}},
4   {"Key": "GERMANY_MOBILE", "Object": {"Id": "GERMANY_MOBILE", "Prefixes": ["+4915", "+4916", "+4917"]}}
5 \ No newline at end of file
6

```

Loaded 5 revisions in 0.04s

Git powered History Server



Accounting

Prepaid, Postpaid, Pseudo-prepaid controller

Concurrent sessions per account

Pseudo-sessions support

Multiple Balances per account (monetary/minutes per destination, data usage, sms)

Shared Balances

Balance lifetime controls

Accounts/Rating Profile Aliases

CDRs

Realtime CDR Server

Offline CDR Import (eg: csv format)

Automated via Linux inotify or scheduled

Multiple mediation processes on the same record

Configurable extra fields in cgrates.cfg

CDR Exporter

CSV, Fixed Length Fields

API Server

Tariff plan management

Partial and full rates reload without restarts
CSV imports

Realtime costs and account management

Manual add/debit actions
Query costs and accounts status

Operational commands

Used resources
Registered raters in case of using balancer

Fraud detection

Part of Accounting Subsystem

Tightly integrated, balance operations cannot avoid it

Balances monitoring

Minimum & maximum balance monitors

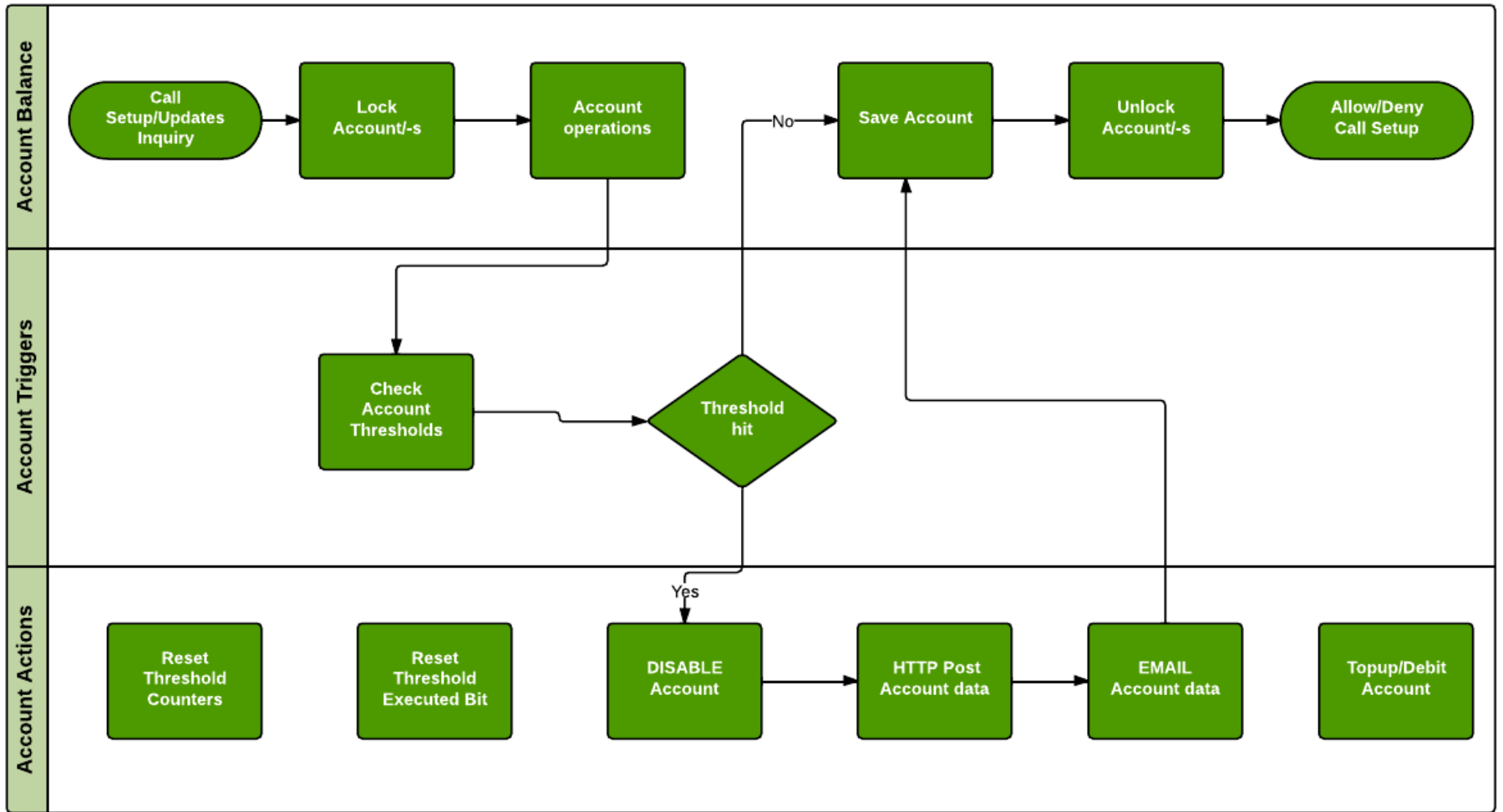
Counters monitoring

Minimum & maximum counter monitors

Scheduler integration

One-time, recurrent triggers

Synchronous & Asynchronous Actions



Account handling logic

Direction: out
Tenant: cgrates.org
Account: 1001

Balances

Direction: out Type: monetary

- Value: 5
- Value: 5

Alarms

- Type: min_balance Value: 2
- Type: max_balance Value: 20
- Type: max_balance Value: 30
- Type: max_counter Value: 5

Direction: out
Tenant: cgrates.org
Account: 1001

Balances

Direction: out Type: monetary

- Value: 5
- Value: 5
- Value: 21 ←

Alarms

- Type: min_balance Value: 2
- Type: max_balance Value: 20 (FIRED)
- Type: max_balance Value: 30
- Type: max_counter Value: 5

CGR-Sentinel
POST triggered

Direction: out
Tenant: cgrates.org
Account: 1001 (DISABLED)

Balances

Direction: out Type: monetary

- Value: 5
- Value: 5
- Value: 30 ←

Alarms

- Type: min_balance Value: 2
- Type: max_balance Value: 20 (FIRED)
- Type: max_balance Value: 30 (FIRED)
- Type: max_counter Value: 5



Where to go from here

Website

<http://www.cgrates.org>

Documentation

<http://cgrates.readthedocs.org>

Code + issues tracker

<https://github.com/cgrates/cgrates>

Support

Google group: [CGRateS](#)

IRC Freenode: [#cgrates](#)

Thank you!

Questions?