Build your own Real-Time Billing using CGRateS

FOSDEM, Brussels 2023

CGRATES

carrier grade realtime charging

About us

Located in Bavaria/Germany with back-offices in Romania and Albania, over 16 years of experience with architecting server side solutions in VoIP environment

Platform implementations covering both wholesale and retail business categories

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

About CGRateS

Real-time Enterprise Billing Suite

Pluggable into existing infrastructure

Accommodate new components into ISP/ITSP network (eg: new Comm switch, SMS Service)

Non-intrusive into existing setups

Open Source Software

Born in 2010, first sources published in 2012

Full sources available on Github repository

100% Go (golang.org) from beginning

No add-ons in private repositories

Consideration for community contributions

Performance Oriented

Built-in advanced cache system (transactional, LRU + TTL records)

Asynchronous processing with micro-threads

Including API load balancer

3 branches, indefinitely supported

v0.10, Master, 1.0

Test driven development

Over 10000 tests as part of test suite

Modular architecture

Cloud-ready, micro-services with rich set of RPC APIs

Easy to enhance by rewriting specific components

Feature-rich

- Online/Offline Charging System (OCS)
- Multi-tenancy from day one
- Multiple DBs supported
- Real-time configuration reloads
- Rating Engine with Derived Charging and A-Number rating
- Account Balances Management with Bundles and **dynaprepaid*
- Session or Event Charging with balance reservation and refunds
- STIR/SHAKEN authentication
- CDR logging with support for Interim Records and RatingQueues
- High number of interfaces for event reader/exporter (AMQP/SQS/SQL/CSV/XML..)

- Fraud detection with automatic mitigation
- LCR with QoS/Bundles
- Call Statistics with pattern monitoring
- Dynamic pricing imports with templates
- Diameter/Radius/DNS/SIP Server with process templates (standard agnostic)
- Resource allocation controller
- API server with GOB, JSON, HTTP-JSON support
- Built-in High-Availability and Dynamic-Partitioning support
- API capturing/analisis service
- Clustering through remote/replication for internal cache and database
- Data versioning with automatic migration
- Agile in developing new features

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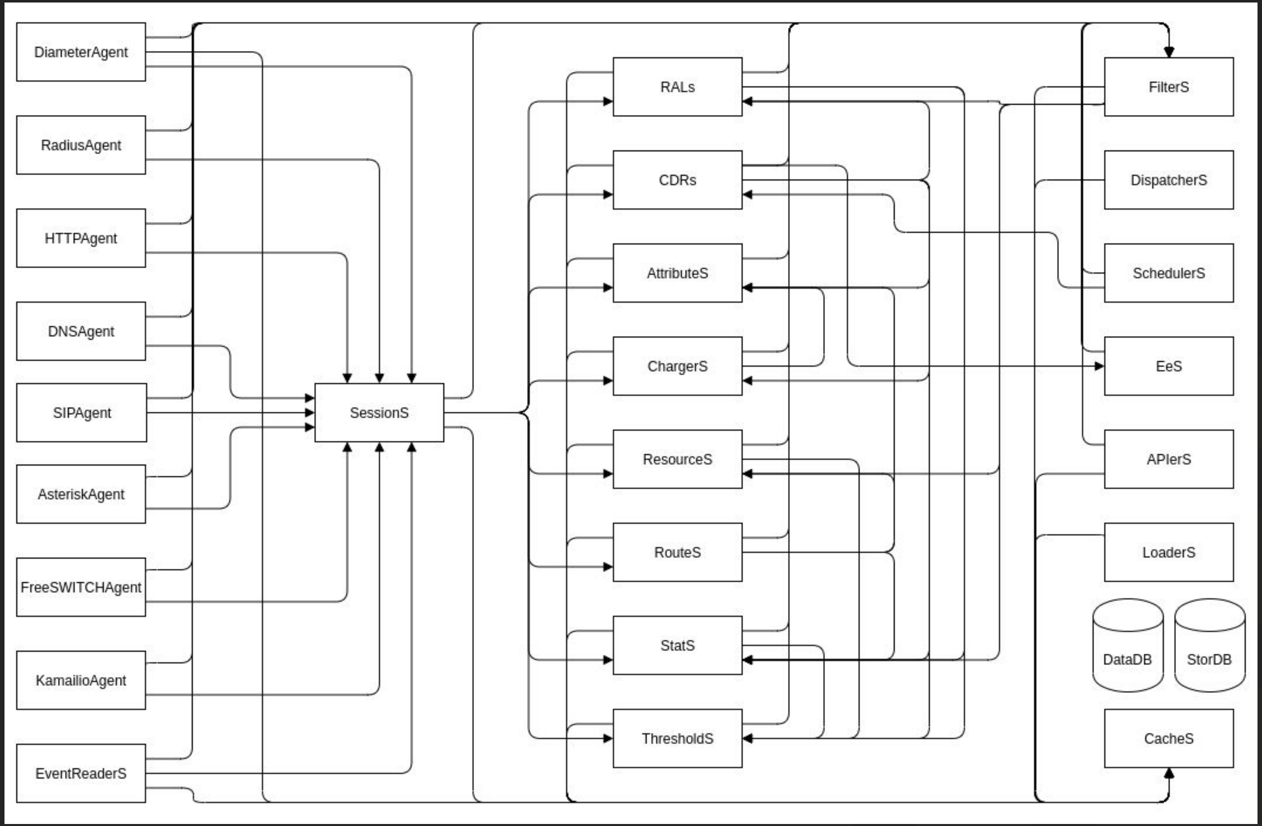

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Internal Architecture

Build your own Real-Time Billing

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Tariff Plans

Data sources

File stored in .csv format
Database stored (MySQL/Postgres/Mongo) with full set of CRUD APIs for remote management
Data load via APIs

Rating

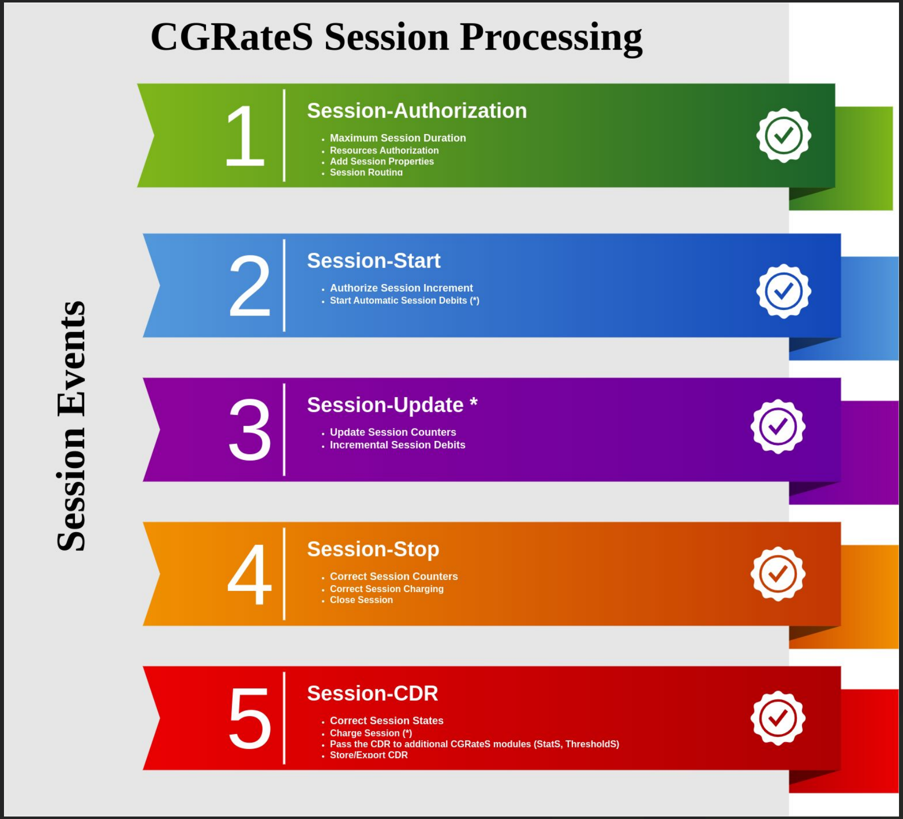
Data defined within RatingPlans
RatingPlans attached to rating subjects via RatingProfiles

Accounting

Accounts created via AccountActions or direct API calls
Actions to be run by Scheduler at regular intervals
ActionTriggers for Fraud Mitigation

Extra subsystems data

AttributeS
Resources
StatS
ThresholdS



CGRateS Session Processing

Session Events

1 **Session-Authorization**

- Maximum Session Duration
- Resources Authorization
- Add Session Properties
- Session Routing

2 **Session-Start**

- Authorize Session Increment
- Start Automatic Session Debits (*)

3 **Session-Update ***

- Update Session Counters
- Incremental Session Debits

4 **Session-Stop**

- Correct Session Counters
- Correct Session Charging
- Close Session

5 **Session-CDR**

- Correct Session States
- Charge Session (*)
- Pass the CDR to additional CGRateS modules (StatS, ThresholdS)
- Store/Export CDR

Session-Authorization

```
{
        "method": "SessionSv1.AuthorizeEvent",
        "params": [{
                      "GetAttributes": false,
                "AuthorizeResources": false,
                "GetMaxUsage": true,
                "ProcessThresholds": false,
                "ProcessStats": false,
                "GetSuppliers": false,
                "SuppliersMaxCost": "",
                "SuppliersIgnoreErrors": false,
                "Event": {
                        "Account": "1001",
                        "Destination": "1002",
                        "OriginID": "abcd123",
                        "RequestType": "*prepaid",
                        "SetupTime":
"2018-01-07T17:00:00Z",
                }
        }],
        "id": 2
}
```

```
{
        "id": 2,
        "result": {
                "Attributes": null,
                "ResourceAllocation": null,
                "MaxUsage": 10800000000000,
                "Suppliers": null,
                "ThresholdIDs": null,
                "StatQueueIDs": null
        },
        "error": null
}
```

Session-Initiation

```
{
    "method":
"SessionSv1.InitiateSession",
    "params": [{
        "InitSession": true,
        "Event": {
            "Account": "1001",
            "AnswerTime":
"2023-01-07T17:00:10Z",
            "Destination": "1002",
            "OriginID": "abcd123",
            "RequestType":
"*prepaid",
            "Usage": "5m"
        }
    }],
    "id": 4
}
```

```
{
    "id": 4,
    "result": {
        "Attributes": null,
        "ResourceAllocation": null,
        "MaxUsage": 300000000000,
        "ThresholdIDs": null,
        "StatQueueIDs": null
    },
    "error": null
}
```

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Session-Update

```
{
        "method":
"SessionSv1.UpdateSession",
        "params": [{
                "UpdateSession": true,
                "Event": {
                        "Account": "1001",
                        "AnswerTime":
"2023-01-07T17:00:10Z",
                        "Destination": "1002",
                        "OriginID": "abcd123",
                        "RequestType": "*prepaid",
                        "Usage": "5m"
                }
        }],
        "id": 8
}
```

```
{
        "id": 8,
        "result": {
                "Attributes": null,
                "MaxUsage": 300000000000
        },
        "error": null
}
```

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Session-Terminate

```
{
        "method":
"SessionSv1.TerminateSession",
        "params": [{
                "TerminateSession": true,
                "Event": {
                        "Account": "1001",
                        "AnswerTime":
"2023-01-07T17:00:10Z",
                        "Destination": "1002",
                        "OriginID": "abcd123",
                        "RequestType": "*prepaid",
                        "Usage": "12m"
                }
        }],
        "id": 10
}
```

```
{
        "id": 10,
        "result": "OK",
        "error": null
}
```

Session-CDR

```
{
        "method": "SessionSv1.ProcessCDR",
        "params": [{
                "Event": {
                        "Account": "1001",
                        "AnswerTime":
"2023-01-07T17:00:10Z",
                        "Destination": "1002",
                        "OriginID": "abcd123",
                        "RequestType": "*prepaid",
                        "Usage": "12m"
                }
        }],
        "id": 12
}
```

```
{
        "id": 12,
        "result": "OK",
        "error": null
}
```

Questions

Website
http://www.cgrates.org

Documentation
http://cgrates.readthedocs.org

Code + issues tracker
https://github.com/cgrates/cgrates

Support
Google group: **CGRateS**

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