Build your own Real-Time Billing using CGRateS

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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/analysis service
- Clustering through remote/replication for internal cache and database
- Data versioning with automatic migration
- Agile in developing new features
Internal Architecture
Build your own Real-Time Billing
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

1. Session-Authorization
   - Maximum Session Duration
   - Resource Authorization
   - Add Session Properties
   - Session Roaming

2. Session-Start
   - Authorize Sessions Increment
   - Start Automatic Session Debits

3. Session-Update *
   - Update Session Counters
   - Incremental Session Debits

4. Session-Stop
   - Correct Session Counters
   - Close Sessions Charging
   - Close Session

5. Session-CDR
   - Correct Session States
   - Change Sessions States
   - Request/Generate CGRateS release (Start, Threshold)
   - Store/Export CDR
Session-Authorization

```json
{
  "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
}
```

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

```json
{
  "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
}
```

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

```json
{
   "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

```json
{
    "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