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Universal IoT Platform

Secure telemetry data collection server for managing and monitoring the consumption of energy resources (gas, water, electricity, heat) based on Unix/Linux OS

Advantages and high potential

SOFTWARE READY FOR ASTRA LINUX SELF-CERTIFICATION

THE Open GROUP Silver Member

Secure Data Collection Server

Component

Server for collecting data from **household energy metering** stations

Component

Collection and processing of data from **transmitting telemetry modules**

Subsystem

Industrial metering units

Subsystem

Household metering units

Component

Mobile app **“Smart-Abonent”**

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Software Architecture

Operating system
Unix/Linux
special adaptation for secure operating systems

DBMS
PostgreSQL
PostgreSQL

Data collection server
Multithreaded GO
GO

Applications server
Ruby on Rails
RAILS

Web browsers
Chrome, Mozilla, Firefox, Safari, IE
and others

Scaling
City→Region→State →Worldwide

Virtualization
PROXMOX

Security
Unix/Linux
built-in security mechanisms, up to state secrets

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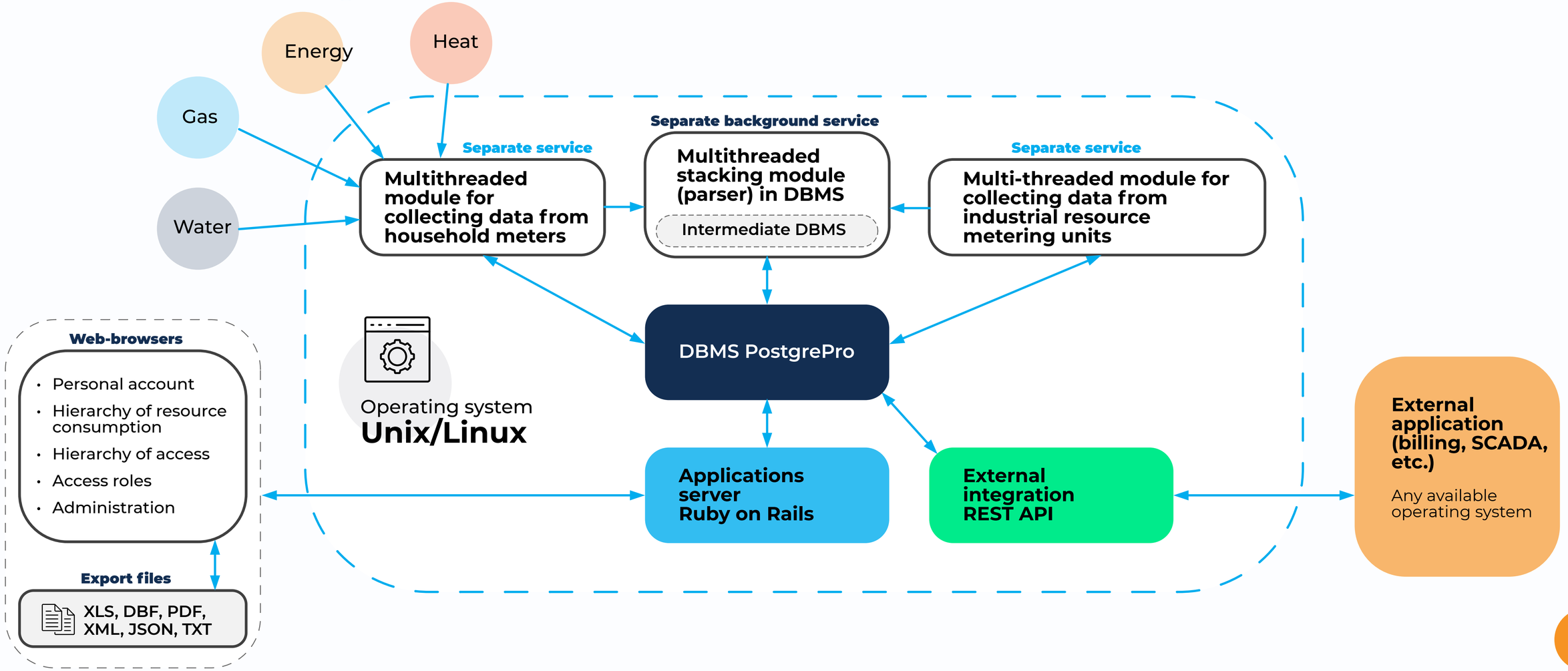
Structural diagram of the secure data collection server



Security

The core of the operating system of the data collection and processing server is implemented on the basis of the **Unix/Linux** platform and certified according to the high information security requirements.

Scalability

The database management system **PostgrePro** is used (the DBMS is certified according to the security requirements of information protection tools), which makes it easy to scale the server system.

Efficiency

The server software comes from **OpenSource**. Can be installed on existing server platforms as a virtual server without purchasing new server hardware.

Technical capabilities

- Maximum system performance and reliability.
- The transport TCP-IP protocol and the MQTT data exchange protocol are used.
- The amount of traffic is minimized by transmitting only incremental data.
- The telemetry modules work in a single subnet of IP addresses (for GPRS, 3G) and via the UDP protocol for NB-IoT networks.
- The entire logic of work - the functions of reading and processing data transmitted from metering devices - is performed on a secure collection server.
- Convenient and quick addition to the server of support for new types of devices and data exchange protocols without the involvement of developers.

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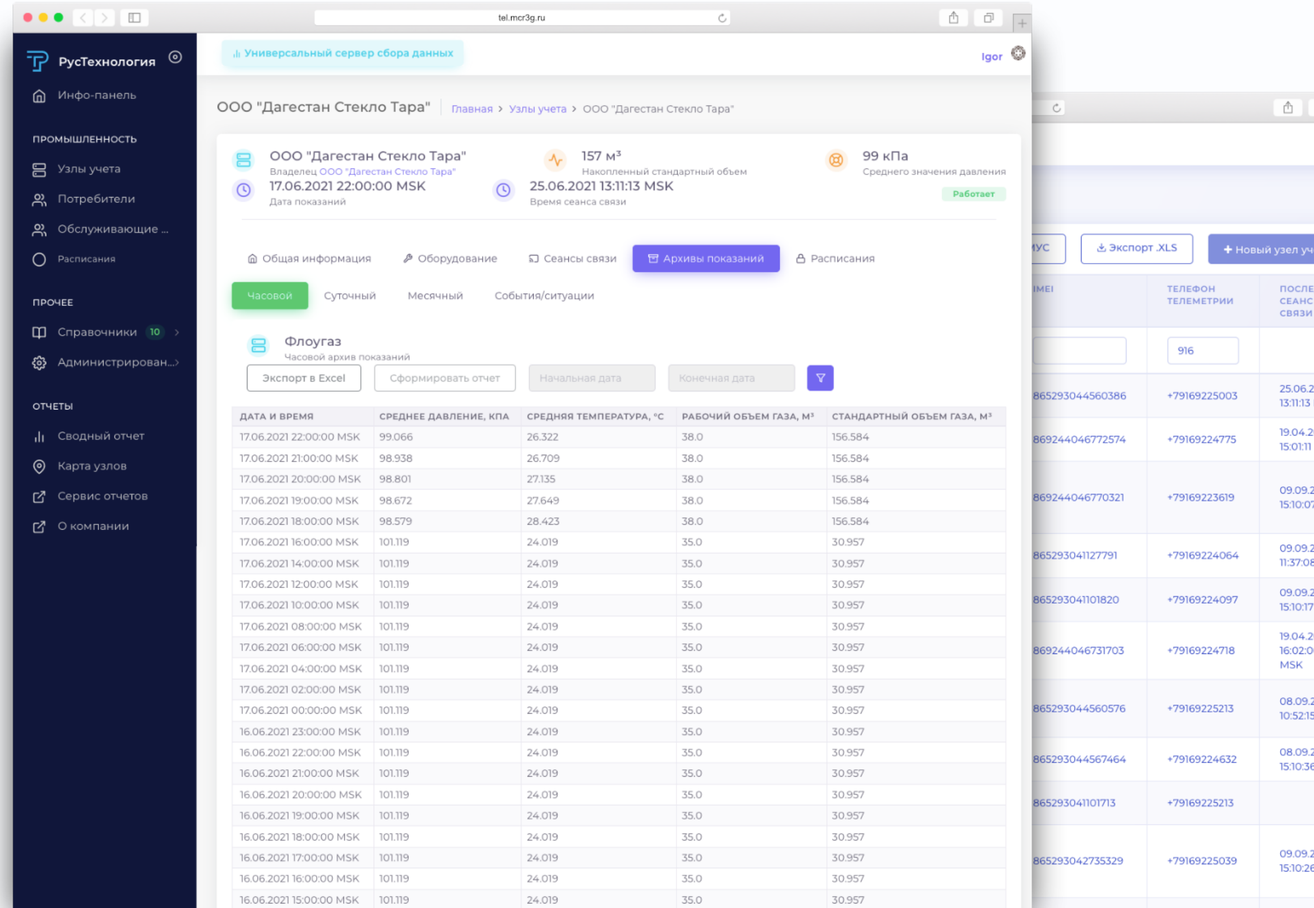
Application software features

- Universal module for scheduling communication sessions.
- Archive of hourly consumption readings, as well as a summary archive of consumption (by months/days/hours).
- Archive of events and emergency situations
- Shut-off valve control module.
- Module for building summary reports according to specified criteria.
- Data exchange is carried out using a secure HTTPS protocol.
- The software is open source



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External interaction

Data export

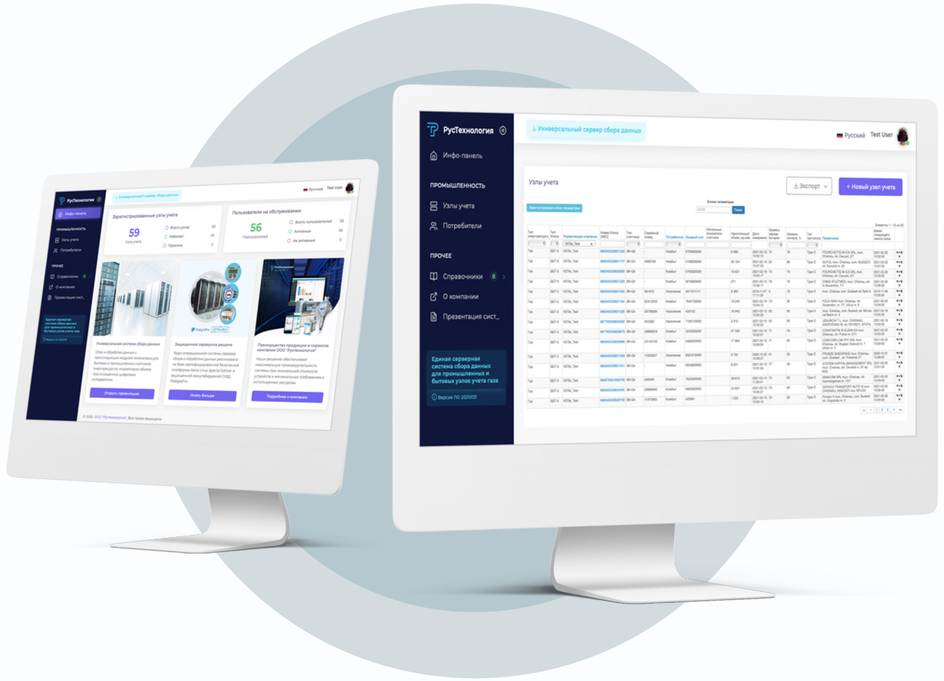
Various data export mechanisms have been implemented: export of information from the data collection server to the billing subsystem; export to CSV, DBF, XLS, PDF formats.

Web API

The Web API is implemented as a **REST-API** data package for exchange in the form of **JSON**. Authentication is based on a dynamically updated token, which guarantees the security of the received data and prevents the token from leaking.

OPC UA server

Implemented the ability to receive data through a cross-platform OPC UA server of our own design using a SCADA client.



CSV PDF DBF

OPC UA {RESTful API}

Windows Linux

Administration system

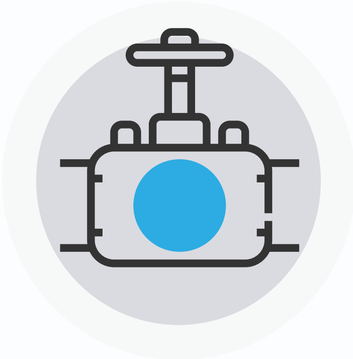
The system is administered via a secure HTTPS protocol through a browser. User authorization is implemented. There are no third-party software bookmarks, modules and libraries.

User hierarchy

User administration is built on the principles of **role-based access control (RBAC)**, in which each user is assigned a certain set of rights and powers. It is led by a company administrator who can manage users within their enterprise.

Hierarchy of energy transmission systems

The system provides real-time accounting of energy resource consumption by the objects of the energy transmission system, inheriting the hierarchical principle of connection.



Failover Secure Cluster

Failover secure cluster is adapted for **Huawei** and **Intel**-based ARM servers.

Component

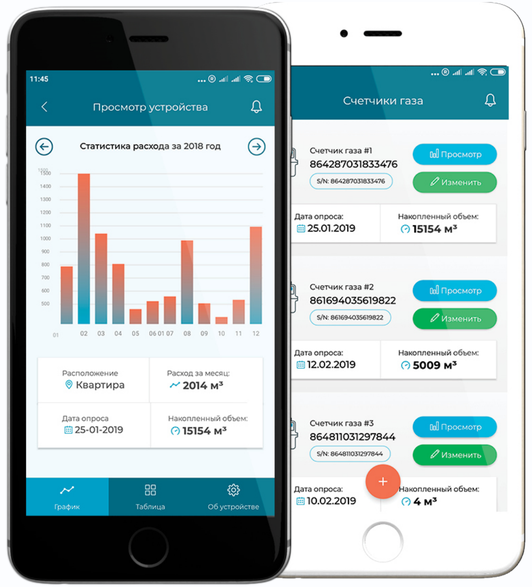
Mobile App “Smart-Abonent”

We offer a modern functional application for Google Android and Apple iOS mobile systems with a convenient, intuitive user interface. Control of metering devices and alarm sensors is carried out directly from the application. Complete integration of data with the accounting systems of resource-providing companies has been implemented.

Smartphone control

- "Smart Home" system.
- Control and analysis of all resource costs, and as a result, energy consumption optimization up to 20%.
- Ordering additional services to service and resource companies directly from the application.
- Enhance home security, intrusion control, natural gas and carbon monoxide leak control.
- Push notifications to smartphone.
- Tariff management and payment (all according to actual resource costs).
- No need to go to recalculations (change of tariffs, accrual according to the average).
- Control and accounting of multiple objects (help pay for resources of parents/children/rent, etc.)

- Cost statistics for the selected period, graphs of indications with visual dynamics, tables of indications with details for the period, widgets of the current state of the device.
- Connection of additional sensors (leakage, smoke, valves, etc.).



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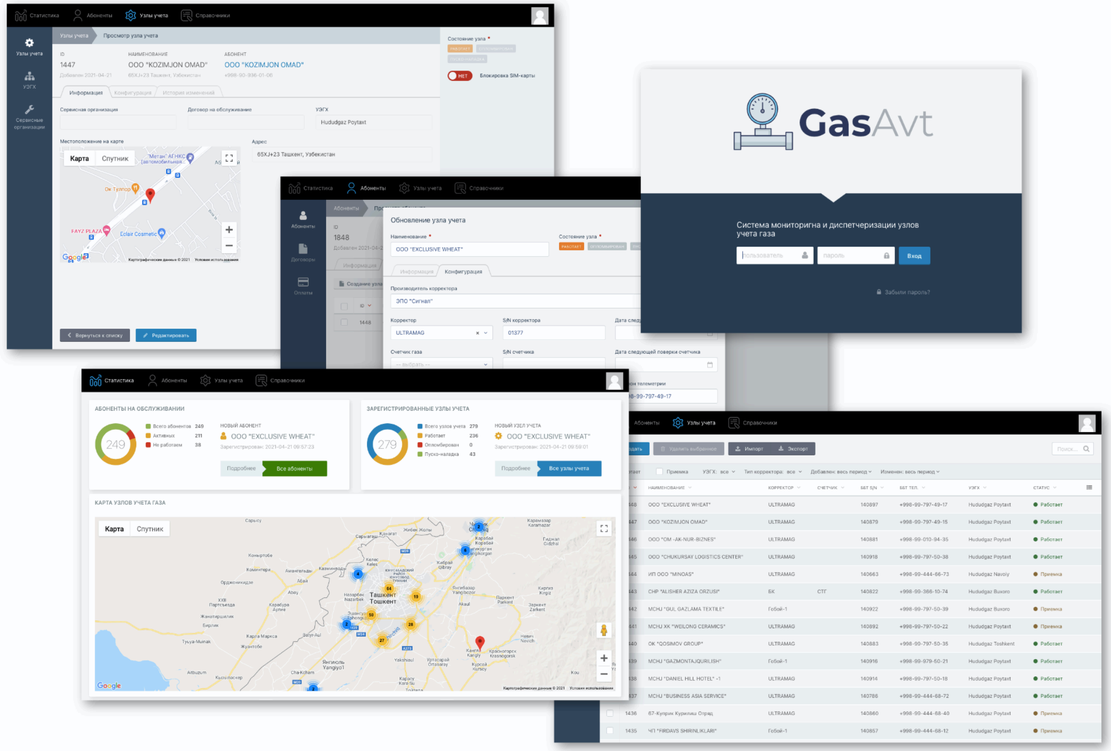
Software “Consumer Service System”

The software “Consumer Service System” is a ready-made solution for organizing a **centralized system for servicing** resource metering units and monitoring contractual relations with consumers.

The solution is the basis for building a **single control panel for metering units** and is connected to the Universal Data Collection Server software platform via the Web API.

The system is based on the Laravel framework, easily scalable and customizable according to the requirements of end customers.



Laravel

Open source

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Analytics module
Big Data Analysis

- A universal tool for building analytics and data analysis.
- Analytical report can consist of one or several components.
- The user creates a report and then fills it with components based on their requirements.

Components are added to the report using a special constructor, which consists of several steps.

1. **Data source selection.**
2. **Data request constructor.**
3. **The component update interval and component name selection.**
4. **Component type selection** (table, graphs of various types, cards of a predefined sample), as well as its preliminary size.

Service caches result

When viewing the generated report, there is no load on the component data source.

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All Inclusive

All payments are included in the cost of devices.

All software is free

100% Secure Soft

Operating system, DBMS, software.

Fast start

No setup required, devices are 100% ready to go.

Multilanguage

All system modules translation support

Certification

of the automated system

Stability

No third-party libraries and modules (100% independence)

Safety

Operating system Unix/Linux, up to state secrets

Full cycle from development to production

Minimal cost

Result:

- The lowest resource requirements
- Minimum cost of devices
- Maximum performance

How to get the server software:

1. Registration of a license for the Data Collection Server software, consisting of the following components:
   - "Server for collecting data from household energy metering units"
   - "Collection and processing of data from transmitting telemetry modules"
   - «Mobile app «Smart-Abonent».
2. Transfer to the Customer of the program code of all software components.
3. Assigning developers to each of the components in order to train the customer's programmers.
4. Training of specialists (software engineers) of the Customer in maintenance and modification of software components.
5. At the request of the Customer: support, modification, consultation of specialists.
6. Training of meter manufacturers' specialists in the universal data transfer protocol, so that meter manufacturers will be able to configure telemetry with the operation of the Data Collection Server software on their own.
7. Industrial operation.

Implementation period is 3 months