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ALTWORX ARCHITECTURE

Improving decision making and reducing operational risk through the seamless and simplified union of functional, enterprise, IoT and Big Data Infrastructure

Product Areas / Segments

Effective real-time process monitoring in ever-changing environments

Company growth brings new complexities. Small companies resolve issues easily by small groups of people working in the same room. Big companies on the other hand, have processes across many departments, employees are expected to be experts only in parts of processes involving their departments, they can rarely afford to focus on higher-level cross departmental strategy. Altworx modeling capabilities, allows stakeholders to regain control of complex processes. The Altworx engine compares models & reality in the real time, enables detection of inefficiencies, and reports them appropriately.

Internet of Things

With the expansion of internet connectivity even to the most remote devices, we see the need for collection and processing of these data sources arising. Manufacturing machines, HVAC[1], security systems and even simple sensors nowadays deliver data valuable from the business perspective. Most IoT providers focus purely on data collection and storage. The tricky part is the integration with existing IT systems – this is where the main focus of Altworx lies. It is proven there is no technical limitation for collecting any data now, but IoT is still something elusive. Altworx is capable of interconnecting these non-enterprise systems and modeling new processes incorporating them all. Altworx is so lightweight, it can in fact be deployed into a small remote “thing” itself and thus scale its functionality without any limits.

Data quality & data governance in the real-time

Larger businesses are bound to carry the weight of heavy, incompatible IT systems and getting these systems to talk together is a major task on its own. Each of these systems hold its data in its own data storage, in its own data formats and structures and standard integration products are left to deal with the unification and integration of the data at the inter-system boundaries. While deploying Altworx on these inter-system boundaries as an integration product is a valid choice, Altworx solution adds an additional layer of integrity protection and data governance aiming to reveal discrepancies inside complex cross-boundary processes.

[1] Heating, Ventilation, and Air Conditioning

Product Goals

Manageability

New trends, such as Big Data, created new professions. Non-trivial applications now depend on specialists with data science background. Data scientists are technical experts on the matter, however, they do not replace business stakeholders with their deep inside domain knowledge. The modeling capabilities of Altworx puts implementation and maintenance back into the hands of the business owners.

Notifications & Escalations

People are in constant motion. They travel, work in shifts, move around the company. Communication features of Altworx allow them to be reached anywhere in real-time via various communication channels. When one cannot be reached, the escalation process in Altworx ensures their substitute or superior is informed about events crucial to the business operations.

Technology

Altworx is a modern, reactive, scalable, distributed service-oriented integration framework with a focus on high-level service orchestration.

We are seeing that traditional SOA tools are unable to catch their breath with the expansion of big data problems and large scale deployments such as the Internet of Things. At the same time, we are witnessing a massive explosion of micro-services architectures and Altworx itself is largely inspired by this approach.

We do, however, see the need for capable service-oriented architecture even today and we believe the need for it is even stronger than ever. Horizontal cross-department, cross-system integration is absolutely necessary in order to improve businesses efficiency. As can be seen in Figure 1, Altworx fits right in between systems, departments and/or processes.

Altworx is a fast way to build an integration solution. Thanks to the benefits of Erlang, such as a built-in distributed environment, built-in message passing primitives, Altworx does not need to worry too much about clustering or writing a brand new message bus. Altworx has all the features required for building a scalable integration product directly in Erlang.

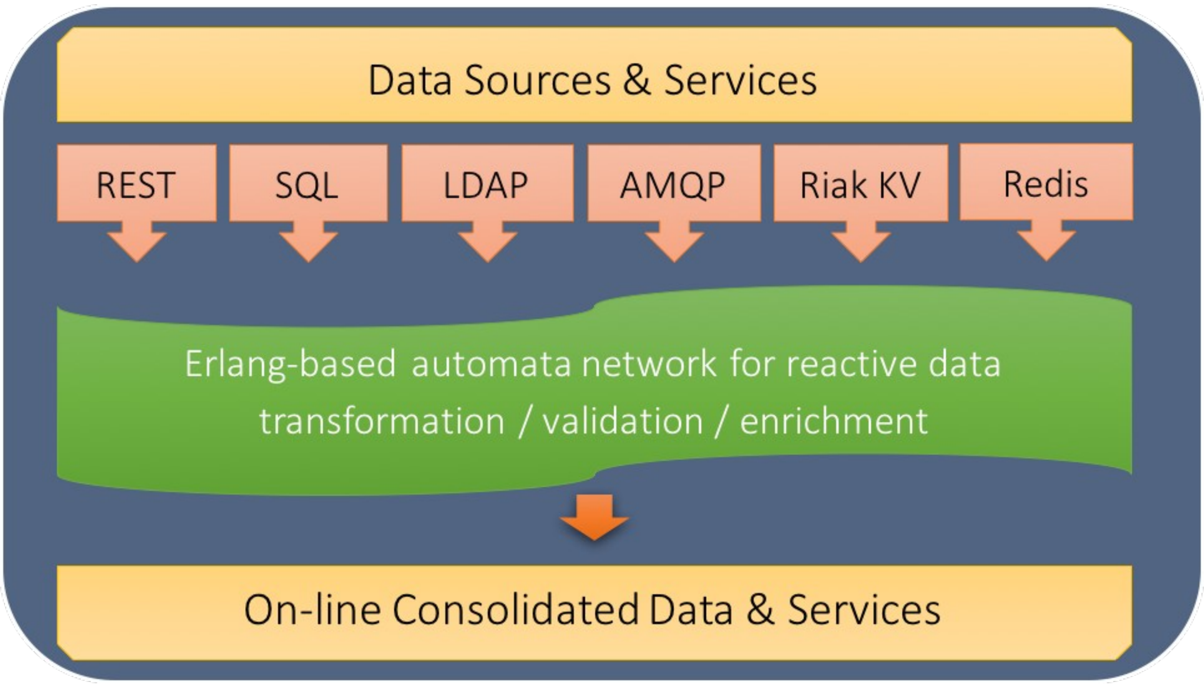
Data Sources & Services
REST
SQL
LDAP
AMQP
Riak KV
Redis
Erlang-based automata network for reactive data transformation / validation / enrichment
On-line Consolidated Data & Services

Figure 1 High-level architecture

Architectural patterns

Altworx naturally fits very well within micro-services architectures[2]. We see the following areas as how a combination of pure micro-services with service-oriented architectures can add major benefits to business owners and technicians.

Smart endpoints vs. dumb pipes

Micro-services tend to focus on development of smart endpoints, i.e. ones that can handle various situations related to how they communicate with the rest of the world. Altworx can enhance the endpoint robustness and offer

[2] Erlang is the right tool to implement micro-services architecture and Altworx itself is implemented as a set of micro-services

added logic without making any modifications to endpoints whatsoever. In case of “dumb” endpoints, this benefit is even stronger and most businesses still heavily depend on legacy software which was not designed with external integration in mind.

Decentralized governance

In micro-services, the applications own their entire lifecycle, including data quality management. This usually works well, as long as the scope of the data is isolated to such micro-service. As long as the quality of data needs to be monitored across multiple services, there are not many options out there. Altworx offers a large-scale, distributed mean to provide data governance across many independent services and processes by being the single point of truth on the matter of data quality requirements. The independence of such monitoring is especially important, as the services themselves can only be responsible for the quality of their own work, not throughout the entire organization though.

Decentralized data management

Modern polyglot systems do not use a single data storage solution, instead multiple independent database solutions are used and transactional-less coordination between services is used, with the expectation of eventual consistency instead of insisting on full ACID transactions which do not scale, especially not in distributed environments.

Altworx can act as an orchestration tool in between various data operations in independent services and applications and generate new streams of data, such as events, business notifications or audit logs.

State in distributed world

Typical SOA deployments push the state management to the backend services. In the case of micro-services, there is no shared state management whatsoever. Altworx enables brand new interactions by providing an ability to orchestrate independent services by integrating them with a shared state.

This removes the need for modifications of backend services and allows new ways to generate data in context of the business. Figure 2 shows the process of handling an input message by a stateful automat.

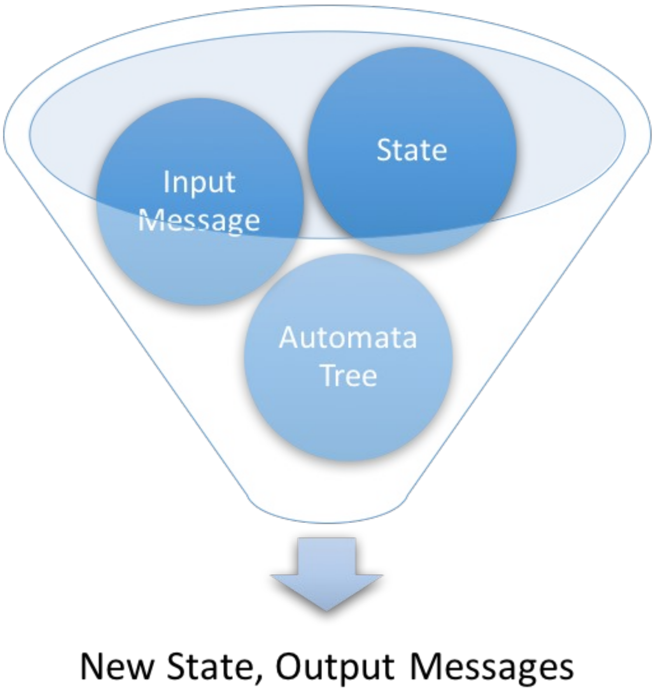

Figure 2: Stateful Automata

Implementation

Altworx, is a product with following features:

- Configurable integration engine, supporting micro-services and service-oriented architectural patterns implemented as a stateful network of automats, as shown in Figure 3 and Figure 4
- Dynamic reconfiguration of the engine in run-time
- Support for various external connectors, such as HTTP, RabbitMQ, various SQL and NoSQL databases, etc.
- Easy extensibility and ability to write new connectors and group them into composite components
- Custom error handling, built on top of Erlang's fault tolerance capabilities

- Added internal state allows building integrated solutions with minimal to no changes required to the consumed services

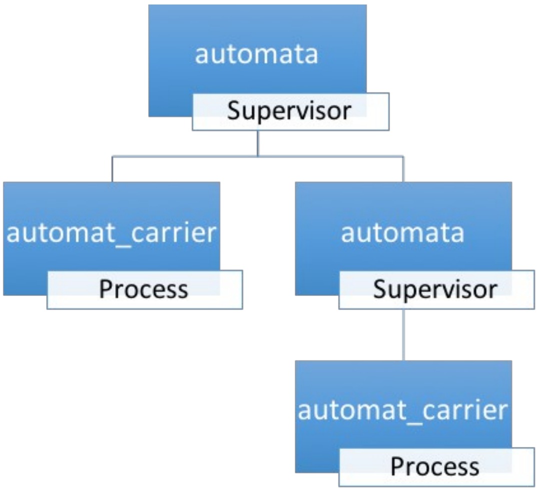

Figure 3: Automata Network

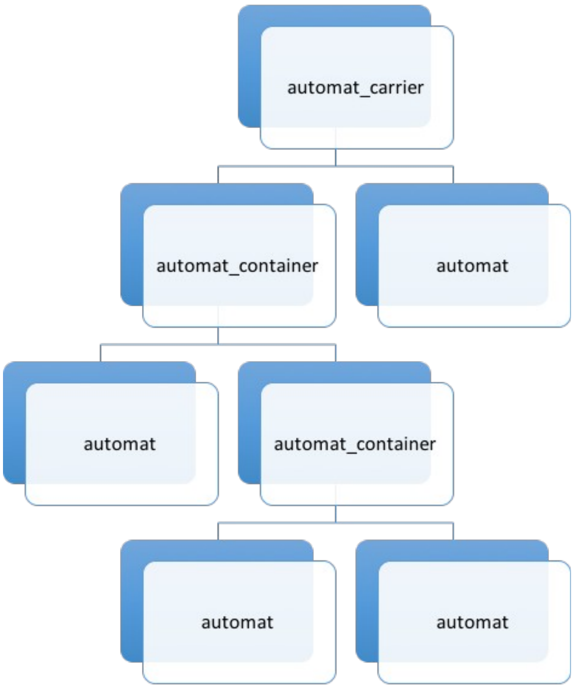

Figure 4: Structure of Single Automat