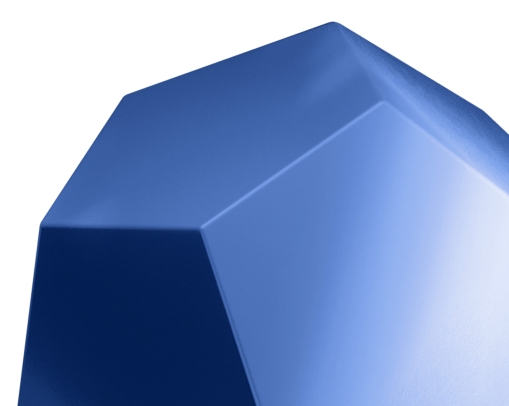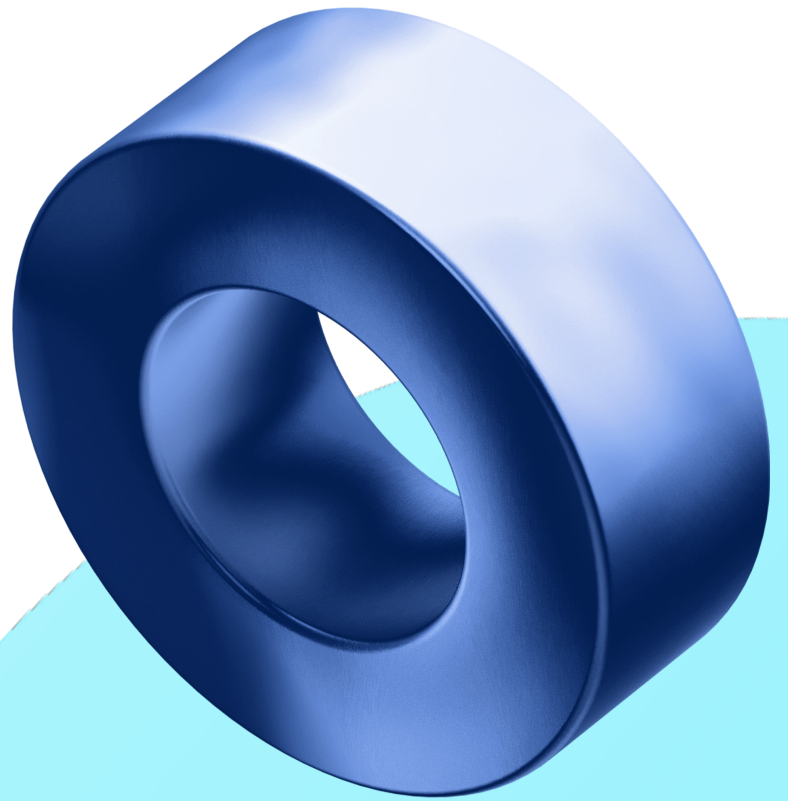# Data Transit System

Whitepaper

Data Transit System

Overcome data integration challenges and improve time to market of new applications and services

Contents

01 Bridging the data gap

Almost every large company accumulates multiple silos of data over time, generated by both transactional and analytical applications. When going after a wider view on activity or launching new services, multiple source data integration projects are often faced with a lot of challenges if the company lacks the proper technology. Statistics show that a large proportion of data integration or data migration efforts fail or encounter massive delays due to technical issues.

Data Transit System helps you overcome challenges emerging from working with data silos by offering a simple and efficient way of managing data sources and easily translating and aggregating data between different formats, in a highly secure environment.

Another frequently encountered challenge in many organizations is interfacing with various legacy or monolithic systems and including their functionality in otherwise cloud-native business processes.

DTS can provide such interfaces and connect those systems with other services using modern protocols like Web APIs and Event Engines.

When using Data Transit System you will get:

- **Quick access** to internal or external data sources; including legacy systems
- **Multiple options** for viewing and integrating data into your own workflows and applications
- **Support** for invoking functional routines in all connected systems
- **Advanced** data streaming features
- **Centralized data source access management** and **advanced security features**
- **Optimized distribution of available resources** to ensure application performance

Data Transit System helps you exploit all the data and functionality available in your existing systems, regardless of their location, interfacing patterns and access rate, thus decreasing the time to market of new applications and services.

02 Key differentiators

DTS competitive advantages are linked to the platform architecture, the integrated technologies and the unique features on offer. DTS scores higher than its direct competition on interoperability, usability, secure access, data privacy and compliance.

- Can access data from virtually any relational database (connectors for the most widely used databases in the enterprise environment are pre-built and available)

- Can automatically integrate any REST or SOAP web service endpoints (Web APIs)

- Can consume and post messages of event streaming platforms (Apache Kafka)

- Makes all connected systems available to consumers via multiple APIs (Java, .NET, Magik, HTTP)

- Generates and manages fully customizable Web API endpoints

- Does not copy or store data

- Can access both table/collection-level data and results of procedures and functions, or any other programmed logic available in supported systems

- Features a dedicated graphical interface that simplifies source management, as well as all other aspects of configuring, monitoring and operating the product

- Can act as Single Point of Access, thus simplifying the implementation of security protocols

- Simplifies the data anonymization process and is GDPR compliant

- Provides highly secure operation modes based on a fully auditable and standardized security scheme

03 Product Overview

What is DTS ?

DTS is a middleware solution that allows access to systems of various types (databases, cloud services, functional monoliths, event streaming platforms, etc.). With DTS, enterprise data and business logic can be consumed in new, innovative ways, helping companies meet their informational needs.

The DTS platform does not copy or store data, it works like an enterprise bus that sits between the sources and the company's applications or services. Data is manipulated directly within source systems or applications.
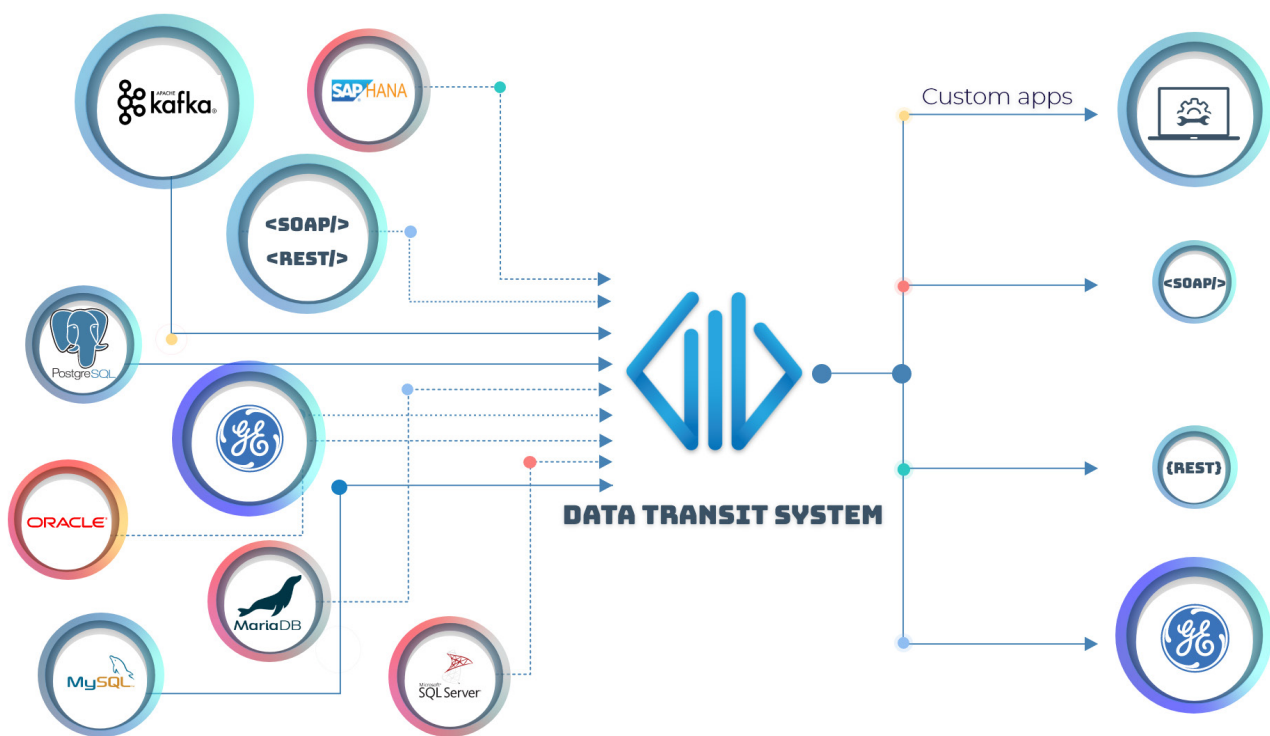
DTS can access data and functionality from various systems through pre-built connectors (currently, there are connectors available for Oracle, PostgreSQL, MS SQL Server, Smallworld, SAP HANA, MySQL, MariaDB, Apache Kafka, as well as SOAP and REST Webservices) and feed it to pre-built, auto generated or custom clients. DTS currently offers a pre-built client for Smallworld, can generate Webservice clients that provide access via SOAP or REST APIs, and includes fully featured Java and .NET Client APIs for building custom clients or integrating into existing applications.

How it works

DTS organizes all configuration, mappings, and operations into Projects. Each Project can include several Connectors, each of which defines the access pattern to a particular system and the list of Resources that will be targeted in that system. Projects also contain information about Aggregate constructs that should be made available to clients, as well as any HTTP consumer endpoint definitions.

Projects can be Published at any given time, thus making them instantly available for operation. When a Project is in operation, all the resources it includes are available live to all types of DTS clients as configured.

Just use the UI to create a Project, connect to your desired source systems, choose what resources you want to exploit and Publish the Project. This is all that is required to get DTS up and running!

To also deploy Web APIs for a Project's resources, the DTS Webservice Designer section of the UI allows you to model APIs and deploy them to your preferred application server with great ease. All DTS client web APIs 100% automatically generated and packaged – no development or configuration work is required.

For instance:

Applications and workloads used by front-office departments need data from one or more sources in the back-office or outside the organization. Traditionally, this uses a specially built web API to connect front-office applications to back-office data systems. This solution requires specific skills in data source technologies, Web API design and development, code review, testing and integration and generates processes that consume a lot of time and money. DTS simplifies the entire process by automatically generating services - not facilitating their construction - and allowing companies to develop and use custom applications without having to create a custom integration every time they need to connect to data sources.

04 Packaging & delivery

The **DTS** architecture is based on **micro-services**, with each component running in its own **Docker container** over as many instances as is necessary to serve the redundancy and throughput requirements.

DTS is delivered as a package that is composed of Docker images, Java libraries and configuration files. The minimum runtime configuration required consists of a single virtual machine running Docker and Java but even so, it provides its full feature set, with **scaling** and **monitoring features** facilitated by its own container orchestration Agent. DTS can also be seamlessly deployed in Kubernetes clusters via Helm chart or Kubectl configurations.
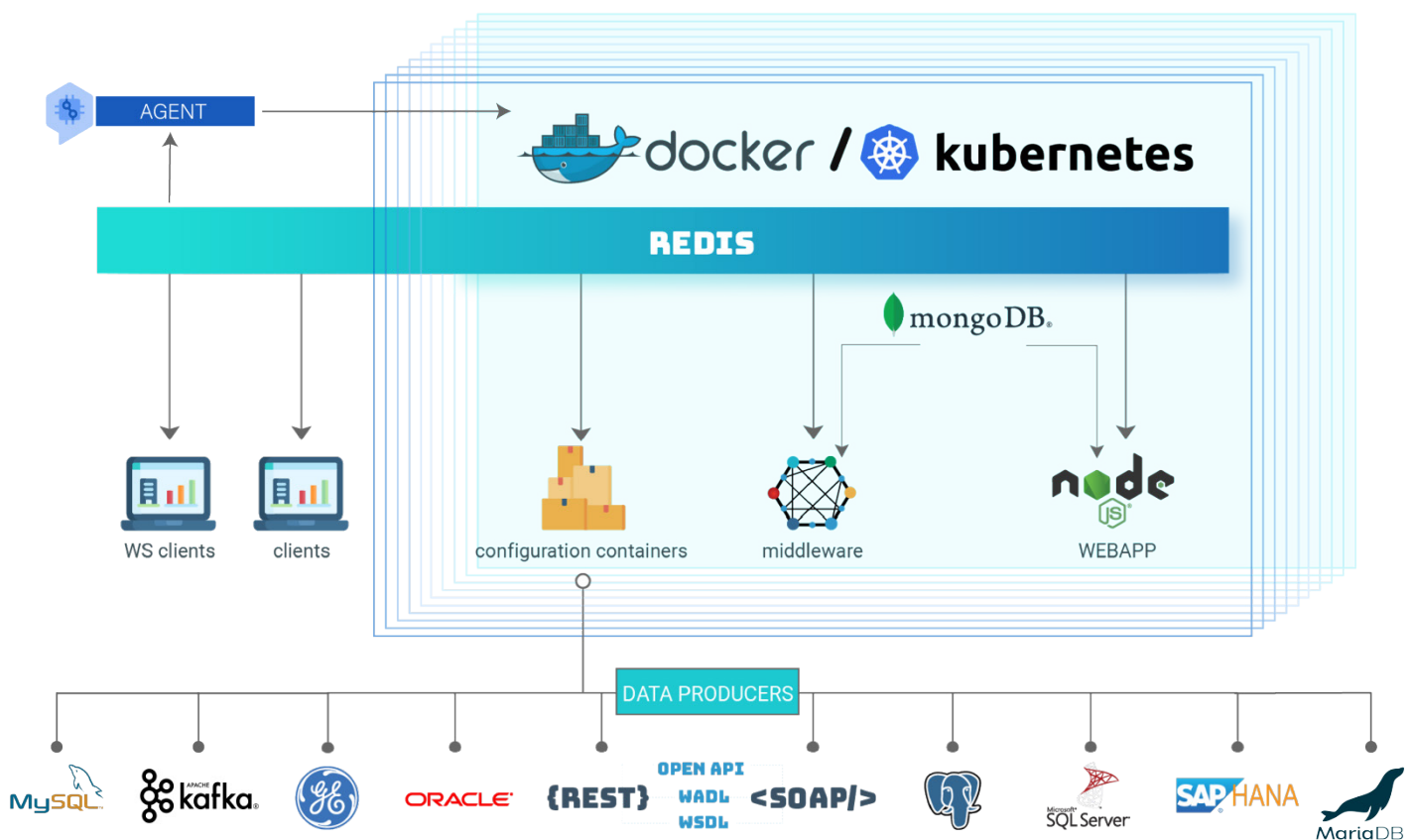
05 Features

AUTOMATIC INVENTORY OF DATA SOURCES
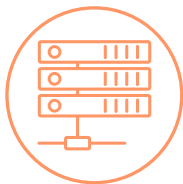
DTS automatically identifies the structure, attributes and programmed logic of data sources. All this information is extracted and presented in the graphical user interface in an intuitive format that facilitates the selection of fields / metadata that are intended to be visible / used.

INVOCATION OF ROUTINES FROM DATA SOURCES

Unlike other visualization solutions, DTS does not only allow the making of queries in the source data structures, it also facilitates the execution of routines in the connected systems and the delivery of results. Note: While DTS does not provide facilities for writing into source data structures directly, the routine invocation feature can be used to call on functionality which does make changes in the data source.

DATA ANONYMIZATION

DTS helps companies access critical information by anonymizing sensitive data without the administrators interacting directly with the data at storage level or employing complex obfuscation tools. The data is not modified in the source and therefore no copies of it are created. The sysadmin can ask DTS to deliver the respective data without including certain attributes, by filtering out records based on selection predicates or to mask certain fields through various procedures.

LOAD BALANCING

Depending on the level of traffic and the volume of requests to access data sources, DTS can automatically start/stop containers/Producers. DTS automatically scales based on configured parameters and assigns requests to containers / VMs / Producers based on their load level. It thus ensures a higher level of performance and optimizes the use of allocated resources.

ENCRYPTION AND AUTHENTICATION WITH ACCESS CERTIFICATES

DTS provides access control and encryption of communications between DTS modules and data sources through: **X509** Certificates, **AES 256-bit GCM** mechanism encryption, **RSA ECB** key exchange.

CUSTOM CLIENTS AND CONNECTOR TYPES

DTS provides an API Library which companies can use to build their own custom clients or connectors, and configure them to specific requirements. Customization can be done easily - the definition for each connector type also contains instructions on what the interface should look like per type of connector / client. DTS delivers complete training support and tutorials on how to create custom clients.

EVENT STREAM INTEGRATION

DTS Projects can include Connectors to Apache Kafka instances, which allow clients to subscribe to Topics and poll messages as well as publish their own. This can allow systems that otherwise are completely disconnected from event pipelines to react to them in near real-time.

AGGREGATION AND COMPLEX RELATIONSHIPS BETWEEN MULTIPLE DATA SOURCES

DTS allows the definition of relationships between objects from various independent data sources and the creation of aggregate flows, which integrate responses from all sources included through the defined relationships. The customization of the data aggregations delivered by the middleware is easily done through the web graphical interface, and the results of the extraction and the relationing of the records from the component sources are delivered as ordinary data streams.

For instance:

Let's imagine the situation where records from Oracle table OFFICES could be related to records from a SAP HANA table called EMPLOYEES on the basis of OFFICES.OFFICE_CODE=EMPLOYEES.MAIN_OFFICE_CODE. This would be a simple query if the tables were in the same database, or at least in databases of the same type. DTS provides the functional equivalence of such queries across separate and heterogeneous data sources. In this case, we would use the DTS UI to define an aggregate using the aforementioned relationship, including the desired fields from each source table and immediately be able to consume combined data based on that relationship as easily as streaming it from a single table.
Aggregates can get a lot more complex than that, of course. They can include much more complex relationships, more sources, even include routine results in the mix.

06 Benefits

DTS can access data from multiple data sources

Almost every large company accumulates multiple silos of data over time, generated by both transactional and analytical applications. When going after a wider view on activity or launching new services, multiple source data integration projects are often faced with a lot of challenges if the company lacks the proper technology. Statistics show that a large proportion of data integration or data migration efforts fail or encounter massive delays due to technical issues.

DTS doesn't just provide access to data, but also to routine logic

Any behavior that can be programmed into one of the connected sources can be invoked through DTS, giving developers extensive possibilities to aggregate data, model APIs and define reactions, which in turn allows organizations extract more value from their existing systems.

DTS works as a connectivity hub

This means that a single point of access needs to be secured, documented and maintained, for both internal use and external APIs.

DTS automatically generates Webservices

It eliminates costs generated by development, testing, and deployment. This eliminates repetitive tasks and enables developers/sysadmins to spend less time integrating, focusing instead on delivering and improving their applications. The ability to reuse these integrations from one project to the next also increases productivity gains and savings downstream.

DTS centralizes data governance access and monitoring

DTS provides centralized governance of all connectors to data sources. Companies can now control and monitor how data sources are being accessed in real time. In addition, simple and fast anonymization guarantees that data is accessed and processed in line with the compliance requirements (GDPR & comp). Also, the use of DTS simplifies auditing processes.

DTS is easy to use

The web UI provides a simple visual representation of the data sources and their structure featuring straightforward controls for connections and user-friendly management tools. The web UI is also able to fully design and generate custom services to act as DTS clients, eliminating the need to write code.

The DTS rapid learning curve consisting of a two-week training course completely covers the usual requirements of a company. With the help of DTS, a single sysadmin can be trained and tasked to develop, maintain and manage the integration of applications, services or micro-services with multiple data sources.

DTS automatically ensures redundancy and scalability

The architecture based on containerization technologies - Docker and Kubernetes – allows all DTS components to be developed, scaled and managed independently. Once a project is created, DTS generates other containers automatically, performing scaling and load-balancing. This ensures improved developer agility, simpler and more cost-effective scalability and greater resilience.

DTS provides cost reductions

DTS helps companies to save money by:
• eliminating the need to develop dedicated applications for accessing isolated and/or hard-to-access databases
• accessing specific skills in the development/integration areas
• eliminating repetitive tasks specific to testing processes and data in use
• streamlining the management of data sources and connectors
• providing integrated security features.

DTS increases agility, speeds up data access and decreases time to market

By simplifying access to multiple data sources and providing multiple configuration options, DTS streamlines application development and decreases time to market. DTS eliminates bottlenecks (such as data transmission and conversion), reducing communication delays and increasing accuracy.

07 Practical applications

The DTS approach supports different scenarios for data source integration and application integration.

Use case 1

Accessing multiple data sources in companies with legacy infrastructure

where there are silos of isolated data, each with its own method of access and data structured in a specific format. In order to view the respective data, it traditionally is necessary to create dedicated applications for each source. It is a process that requires specific skills, time, money, and the result increases the level of complexity - administrators must manage several dedicated applications.
DTS eliminates these limitations by operating as a multi-source middleware that provides data from these sources with no need for individual APIs and programming effort. DTS can provide access to this data through REST APIs, a standard which is understood by any modern process or application.
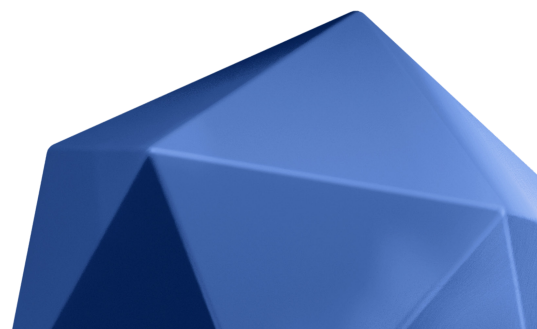
Use case 2

Installation of new systems

Data migration is difficult and expensive. Old software may not process data in the same manner as new software; a new service may need to be connected and your old system may not be able to support the functionality at all. At the same time, security is a difficult issue for monolithic platforms that are no longer up to date. Upgrading to new security requirements requires skills, time and budget. Because of this, many companies are limiting access to those platforms and the data and specific functionality locked within.
With DTS, the transfer is no longer necessary, the data can be accessed easily, quickly and safely.
Eventually, this scenario leads to a fully functional hybrid integration - a mix of on-premise and cloud systems where diverse solutions are brought together to work as a whole.

Use case 3

Access external data sources

Providing live access to addresses supplied by a web service or external data base
A company may need to access an external service or database that it doesn't manage itself and to which access is difficult and requires a lot of development. Usually, the access is made either through dedicated web services or through direct access permissions to the database.
DTS allows the visualization of external data sources and their inclusion in the company's own workflows in a transparent way, safely , and without writing special code.

EXAMPLES: utility providers, telecom operators, etc. who access landbase information from databases or services owned by the local/central authorities and/or from geospatial databases in separate departments.

Use case 4

Company with multiple users who need to access multiple mission critical databases

Creating and managing multiple users for a mission critical data source is a complicated, time-consuming process. DTS eliminates the issue by functioning as a Single Point of Access - all users/consumers who want to access a certain set of data sources use the middleware and the only credentials provided go to DTS.
Each DTS client receives an individual digital certificate, which is verified by the middleware controller. For added protection when providing external access via DTS' client Webservices, they can be positioned behind a reverse proxy (e.g., nginx), which acts as an intermediary for any web request and can implement any number of authentication and security policies.

08 Conclusion

DTS helps companies access data from various sources (including legacy systems and difficult to reach databases), integrate it into applications and workflows, and control access. Based on information from a client or front-end application, DTS can customize the data streams provided.

DTS manages traffic dynamically across distributed data sources to ensure the optimal allocation of resources and the desired performance levels. The DTS platform provides secure connections and data transfer. DTS establishes a secure connection from the front-end application or services to back-end data sources by encryption. In addition, DTS provides authentication and authorization capabilities through credentials delivered as digital certificates.

Licensing options

Regardless of use-case or scenario, Data Transit System is licensed per server or cluster instance and offers a flexible license model, so customers can choose the purchasing method according to their technical requirements and budget.

- **Perpetual Licence** (one-time purchase) and optional M&S subscription (annual recurring fee)

- **Subscription Licence** (annual recurring fee) – M&S included

For both models, DTS license prices are based on connector types (which determine what systems can be integrated) and the numbers of permitted parallel (active) streams and calls (which determine the overall available traffic capacity of the system). Regardless of the options selected, any purchase includes the core services, support for deployment, training, and the minimum traffic package of 10 active streams + 10 active calls.