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# Research Letter

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## Positioning CortexPlatform – Innovative NoSQL Platform for Analytical Services (PaaS)

*CortexPlatform is a cloud-based platform [1] for rapid and agile development and deployment of innovative analytical services. It is especially suited for joint business/IT projects and governed self-service development tasks performed by power users.*

*CortexPlatform is based on the bi-temporal, multimodal NoSQL database technology CortexDB. It enables transparent access to transactional and analytical data and eases the management of complex data structures. It has been developed based on findings in brain research.*

*CortexPlatform use cases span from advanced business intelligence solutions master data management (management of list of materials), to dispositive planning (operational resource planning) and catalogue management (new generation of repositories).*

*“NoSQL databases are increasingly popular for a range of data-intensive applications that require horizontal scaling. In fact, the NoSQL market will enjoy a 35.1 percent compound annual growth rate (CAGR) from 2014 to 2020, reaching \$4.2 billion by that year, according to Allied Market Research.” [2] Indeed, NoSQL technologies drive the evolution of new, innovative development platforms that offer new approaches to PaaS and PaaS solutions.*

<sup>1</sup> Note: CortexPlatform can also be delivered on premise upon request.

<sup>2</sup> See Information Management, Slideshow “10 NoSQL Enterprise Use Cases”, <http://www.information-management.com/gallery/10-NoSQL-Enterprise-Use-Cases-10026900-1.html>, accessed May, 05th, 2015

## What makes CortexPlatform unique?

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It differs from traditional development platforms by the simple fact that transactional and analytical data can be accessed within any services and applications developed by CortexPlatform. This enables new types of applications that up-to-now were rather difficult to develop or it was even impossible to deliver such applications like the ones we shall discuss in the use case section.

CortexPlatform is empowered by its underlying multimodal, bi-temporal NoSQL database technology CortexDB [3]. The rich NoSQL functionality of this technology moves typically tedious development tasks into the database and provide a comprehensive set of features like join-free access to any structured and unstructured data or availability of validity time & transaction time of data objects as standard functionalities and services. It disburdens and speeds up development, and simultaneously, it considerably enhances the performance of all CortexPlatform enabled services and applications: They best match the requirements of cloud-based applications, and faster application delivery means better time-to-market.

## Selected Use Cases:

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- **Performance Management (Business Intelligence) for Retailers.**

**CortexCEP** (Customer Engagement Platform) provides a customizable and extendable standard software for retailers like car dealer management etc. It enables a 360° combined customer and product view based on operational data that can be further enriched by analytical and any other external data. Standard functionality includes customer analytics like ABC analysis, lead management, potential analysis, and cross selling. It also includes product analytics like demand planning and various other key metrics like average usage time, average life time at any level of detail. Furthermore, there is also analytics about services, spare parts, and accessories like ABC analysis per salesman, volume, volume of sales, price, profits, and product life cycle. Finally, there is also analytics about employees, again ABC analytics per article, volume, volume of sales including analysis about sales incentive programs.

**CortexCEP** (Customer Engagement Platform) can also be applied for various other vertical markets, for instance for transparently reporting and analyzing complex relations of financial and insurance products versus customer data.

- **Aftersales Direct Marketing for retailers.**

Retail should increase customer loyalty in after sales through a needs-based approach. Retail and OEM should also perform operational success controlling. Processes should provide OEM overview of all campaigns carried out by retail as well as enable benchmarking the entire retail organization and central campaigns.

**CortexPlatform Aftersales Direct Marketing App** integrates all sources in a data warehouse and links relevant Service Events with product and customer data. It builds a score value system for each product, customer, services, and retail, and allows target group selections for any combination of spare parts and any customer groups. Finally, it provides business analytics and campaign management for CRM and CEM. As a result, customer needs are activated and loyalized.

<sup>3</sup> See Wolfgang Martin Team Research Letter "Positioning CortexDB"  
[http://www.wolfgang-martin-team.net/paper/ResearchLetter\\_Cortex\\_180315\\_fin.pdf](http://www.wolfgang-martin-team.net/paper/ResearchLetter_Cortex_180315_fin.pdf), accessed May 18th, 2015

It enhances service efficiency by optimizing service potentials and increasing sales of spare parts. Finally, target-actual comparisons show attainment of the targets and provide benchmarks in retail.

- **Analysis, Validation and Management of Bill of Materials (BOM).**

Managing bills of materials (BOM), in particular recursive structures from various systems sets up many challenges, i.e. data dependencies describe possible combinations of parts for each configuration and country; different bills of material come from construction, logistics and manufacturing and have to be harmonized and synchronized; some parts have different names and numbers; high volume of very complex data (typically, construction assigns parts to several hundred vehicle types, logistics orders parts, and production selects parts (each vehicle configuration comprises +/- 5000 parts); data need to be transferred carefully causing a huge amount of manual work needed to harmonize data in tools like Excel. But given a production of several thousand cars per day; the time-window for generating BOMs is limited to a couple of hours.

**The CortexPlatform BOM Balance App** unifies data from all different input systems and transfers it to CortexDB. Data dependencies, relations and roles of single articles and vehicles are mapped in CortexDB by its built-in GraphDB features. Fields with same content are compared to check attributes. The BOM Balance App detects anomalies automatically. For instance, it identifies product numbers not existing in all input systems. Finally, BOM generation takes milliseconds on commodity hardware, for instance on an expandable dual core computer with 4GB RAM (no expensive in-memory servers with several terabytes of RAM needed!) By its 100% control over all input data, the BOM Balance App increases dramatically data quality. Due to (much) faster processing it saves time and data processing cost considerably. Finally, it reduces production downtime caused by wrongly-assigned parts, and it provides higher flexibility, i.e. a shorter lead time for customers: Changes can be made up until the last minute which definitely leads to increased customer satisfaction. BMW's car manufacturing runs such a solution based on CortexPlatform and CortexDB.

- **Dispositioning and Monitoring of assets and resources (“objects”).**

Large databases of assets and resources like investments, buildings, people and materials are difficult to manage due to its complex data structures and their nearly infinite data dependencies. But it is not only necessary to build an effective and efficient management of all assets and resources for economic reasons, but also for compliance requirements with its legal requirements on documentation and archiving. The situation becomes even more complicated when merger and acquisitions happen, and assets and resources have to be merged.

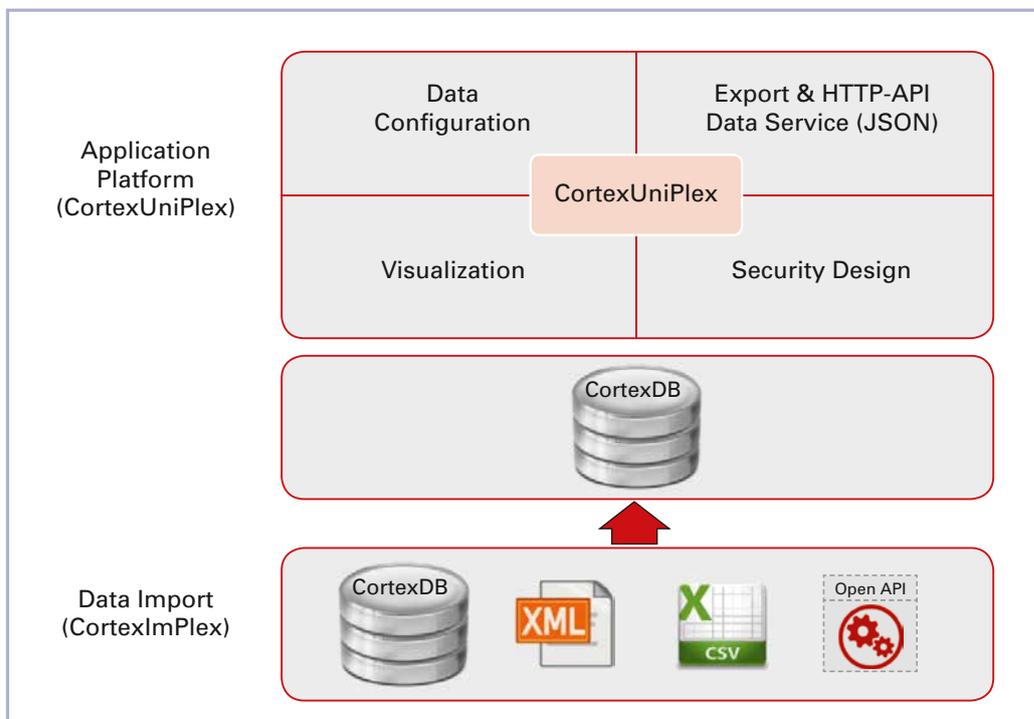
**CortexPlatform Disposition Tool for Monitoring Objects** provides a powerful solution to such challenges. It documents all data in CortexDB. This NoSQL technology eases the addition of any new databases with additional assets and resources. It allows flexible changes and extensions while the database is operationally running, even if they have a different structure. Built-in search tool provide a set of keys to be assigned to a particular resource based on the combination of any keys pointing to it. A key benefit is compliance with current and any new regulations. It also has shown cost savings like an optimization of security staff's monitoring routes. It also reduces risks caused by overlapping responsibilities and ownerships of various objects. Finally, it also creates new business opportunities by the system's scalability and flexibility.

## Features of CortexPlatform:

The CortexPlatform platform comes with productivity tools for managing data input via data integration and output via deploying analytical services. (For more technical details see appendix.)

- **CortexUniplex** defines a database schema based on CortexDB to handle real data with defined field and record types, links and pointers as well as field based temporal data. The powerful integrated list functionality provides the user interface for data presentation. An implemented role system guarantees that each user only has access to the data he or she is authorized to use.
- **CortexImplex** is a data integration tool for CortexDB written in Java and based on Cortex-Uniplex. It provides a connector to CortexDB and a software development kit (SDK) for developing application programming interfaces (APIs) to CortexDB. CortexImplex makes it easy to import data from other systems or from files into CortexDB by enabling three layers of access to the CortexDB: natively, via Java, or via CortexUniplex tools.
- **CortexAPI**. CortexAPI provides data services enabling updates of JSON objects within a database completely controlled via the CortexUniplex configuration and access authority. They disburden development tasks considerably, and enable fast and easy access and use of the underlying data model.

## CortexPlatform – The Multi-Model NoSQL DBMS Framework



Source: Cortex AG

## CortexPlatform Advantages:

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To summarize, CortexPlatform provides unique features delivering various benefits:

- Access to transactional and analytical structured and unstructured data in any CortexPlatform developed services and applications means disburden the data warehouse and ETL processes. Indeed, CortexPlatform delivers DW solutions without ETL processes.
- Rapid and agile application development across innovative data services without programming.
- Flexibility to change the database schema as required by business departments and software developers – the system adapts to the processes rather than the other way round.
- Storing the validity time & transaction time of data objects accelerates and disburdens development: Faster application delivery means better time-to-market.
- Powerful multimodal NoSQL database standard services enabling join-free access to any data.
- Simple modeling of complex structures empowers short project times.
- No need of data transformations when linking different data sources.
- Change requests on the fly, enabling self-service usage by business units.
- One NoSQL technology for all enterprise applications where relational technology comes to its limits.
- Extremely high performance on standard hardware (low footprint).
- CortexPlatform has a low TCO (total cost of ownership).

**Take Away.** CortexPlatform is an innovative cloud based platform based on the powerful multimodal, bi-temporal NoSQL CortexDB technology. It disburdens and accelerates application development of SaaS products and in-house development of SaaS applications, as well as it delivers cloud-based solutions that best match cloud performance requirements. It also empowers development and deployment of innovative solutions that manage both transactional and analytical structured and unstructured data without the need of ETL processes. As the use case scenarios show, CortexPlatform unlocks a new class of applications necessary for the digitalization of organizations.

This makes CortexPlatform a preferred choice when selecting development platforms (PaaS) for networked systems, complex configuration systems, and very large data volumes, as well as for systems with high data dependencies and/or constant changes.

## About Cortex AG

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**Cortex AG** specializes in innovative NoSQL database technologies for processing large and complex data volumes. It provides an integrated family of products, suited to any type of enterprise application, that enable customers to create applications for data warehouses, business intelligence, business analytics, PDM, MES, CRM, CMS, etc. with no need for programming.



The product family is centered on CortexDB, which is a bitemporale multi-model database. It stores data in a completely new way and enables powerful database queries on any attributes as well as combinations of attributes and the relationships between them. Benefits to customers include agile software development, analytical and transactional data in the same database, change requests on the fly, self-service by business departments, and low-level hardware requirements.

Further information is available at [www.cortex-ag.com](http://www.cortex-ag.com)

## About the author

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**Dr. Wolfgang Martin** is a leading European authority on:

- Business Intelligence, Analytics, Big Data, Performance Management
- Business Process Management, Information Management and Governance,
- Cloud Computing (SaaS, PaaS)

He focuses on technological innovations that drive business, examining their impact on organization, enterprise culture, business architecture and business processes.

More information at [www.wolfgang-martin-team.net](http://www.wolfgang-martin-team.net)

## Appendix

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Overview of the CortexPlatform tools:

- **CortexUniplex** defines a database schema based on CortexDB to handle real data with defined field and record types, links and pointers as well as field based temporal data. It uses descriptions of field and record types (document types) to organize data in nested structures.

The powerful integrated list functionality provides the user interface for data presentation. That includes the linking of data records in unlimited structural depth including recursively linked data. Complex database queries can be defined based on lists representing data joins. These lists, for instance, can be used as input for pivot tables and dashboard graphics.

Object viewers can be configured to show all the necessary data in the nested data structures of a data object that is not directly linked to a record and should be jointly presented by multiple lists. As an example, in financial services, take a person as a data object that can now easily be linked to

all his/her investments, stakes in organizations, real estate etc. across various data sources and applications.

CortexUniplex deals with data in json structures (stacked arrays of objects) which can be accessed either by JavaScript, php, C++ or Java. An implemented role system guarantees that each user only has access to the data he or she is authorized to use.

- **CortexImplex** is a data integration tool for CortexDB written in Java and based on CortexUniplex. It provides a connector to CortexDB and a software development kit (SDK) for developing application programming interfaces (APIs) to CortexDB. CortexImplex makes it easy to import data from other systems or from files into CortexDB by enabling three layers of access to the CortexDB: natively, via Java, or via CortexUniplex tools.

CortexDB offers a dynamic schema for import and update of data records. A pre-definition of fields and data set types is not necessary, but recommended). It empowers CortexImplex the creation of data records with field content even without configuration.

Furthermore, CortexImplex exploits the CortexUniplex configuration. The definition of rights and roles as well as data set types and fields can be used for data import. Consequently, data import is strictly controlled by the data security system, and data without access authority is not imported.

CortexImplex also provides a pre-defined abstract java class for identifying interfaces and systems that are not included in the CortexImplex standard functions, and enables Java developers to customize and to extend CortexImplex.

The CortexImplex standard edition comes with predefined read and import routines for csv and xml files. Furthermore, it can access any CortexDB via a pre-configured CortexUniplex for reading and writing CortexDB data across distributed CortexDBs. JavaScript V8 is also supported so that calculated values can be stored either in the same CortexDB or other CortexDBs.

- **CortexAPI** provides data services enabling updates of JSON objects within a database completely controlled via the CortexUniplex configuration and access authority. They disburden development tasks considerably, and enable fast and easy access and use of the underlying data model.

Individual applications or CortexUniplex customizations always honor the access rights of users. Hence, updates of data always respect the user's context.

JSON objects allow the application of various program languages. Web applications, in particular, profit from fast integration facilities.

CortexPlatform runs on cloud like Amazon AWS and the Google Compute Engine. Interested users can test CortexPlatform in a self-service sandbox. (<http://cloud.cortex-ag.com>)

For other supported cloud environments and further information please contact Cortex [www.cortex-ag.com](http://www.cortex-ag.com).



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powerful connections

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