

Tableau & Exasol: Better together



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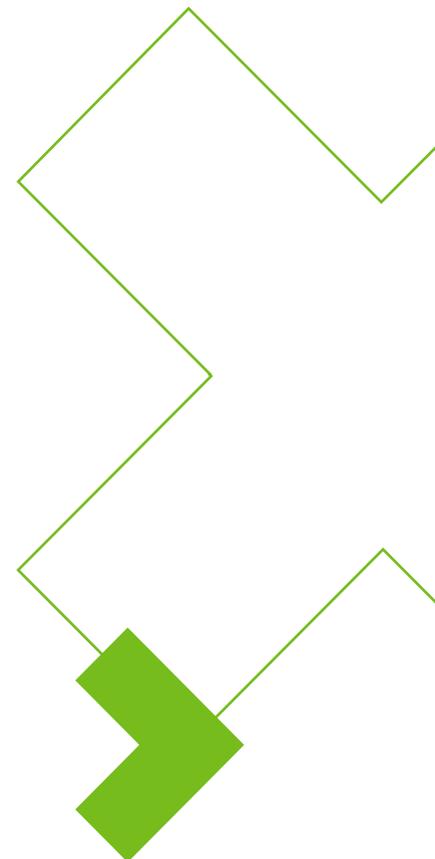
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Empower your Analytics

Addressing the pain points with the right solution

Data has been heralded as the 'oil of the 21st century' (C. Humby, 2006) and just like oil, data in its rawest state doesn't yet add value to those looking for insights.

Data Analytics is our refinery turning raw data into information, actionable insights and valuable assets for an organization.

As organizations embark on their data journey, they come across different challenges which they can address with the right methodologies and solutions.

In this e-book, we focus on a number of concepts, which form a solution that addresses an organization's requirements for data analytics, actionable insights, and scalable and compliant systems to drive outcomes and business success.



Empower your Analytics

Data democratization

The core idea behind data democratization is to make everyone in the organization an analyst. Sure, there are trained data scientists and data analysts, statisticians and business analysts with a strong background in data analysis, who make a living by finding insights and communicating information. But why stop there? Why not include other knowledge workers including policy analysts, administrative assistants, engineers, marketing managers, sales people and call center staff in your analytical workforce?

When jobs are too narrowly defined, passionate, motivated, and highly knowledgeable people are prevented from accessing the right tools and systems and opportunities are lost. These are not just opportunities to gain insights and improve the bottom line, but also opportunities to enrich the jobs, careers and day-to-day work life of employees who might eventually move on to a place where their talents are recognized, valued and given space to grow.

Crowd-sourcing insights by giving ALL your knowledge workers access to data and analytical tools lets you harness the combined human intelligence in your organization to develop business intelligence that is second to none. Supporting your people with training and ongoing development programs is essential to ensure high quality outputs and to keep their skills sharp. It will also help with employee retention because an internal community of analysts can develop and accelerate everyone's skills and capabilities in a self-learning environment.



Best of breed analysis tools

Data democratization will only be successful if the tools provided to the analysts are easy to setup and use. Quick successes are important to build engagement. 'New analysts,' coming from non-traditional backgrounds such as social studies, the arts and business studies, often hold valuable knowledge and insights into the business. They do not necessarily have the scientific analytical training that the rest of your analysts went through. Lowering the barrier to entry by providing intuitive tools designed for business users rather than developers with a computer science background, helps to make your new analysts hit the road running.

So what do your analysts need? What are the characteristics of these best of breed tools that help you harness the capabilities of your entire workforce?

The tools you use should fulfill the following requirements:

- ▶ The end user can easily install and setup the software by themselves with minimal input from technical experts - remember the low barrier to entry.
- ▶ The tool supports compliance with data regulations in the markets you operate in now and in the future. The tool also applies industry best practices.
- ▶ The vendor is innovative and focused on continuously improving their product. They are in touch with their customers' needs and requirements and deliver what they promise.
- ▶ The tool is supported by the vendor and their partners as well as an active community that drives enablement of users and helps you keep your people engaged with developments, content and thought leadership.

- ▶ The tool integrates with other market leading analytic software, giving you flexibility to work with vendors, systems and technologies aligned to your organization's business strategy, requirements, locations and processes.

The next three points focus on the most important pillars that support an architecture for an analytics environment to realize your data and analytics strategy.

A Data Warehouse for exploration and complex analytical queries

Your data needs to be kept in a database that can be accessed by your analysts no matter whether there are 10 or 10,000 of them. The data warehouse (DWH) needs to be responsive, able to handle complex queries with ease and empower your analysts, not hinder them. They should not roll their eyes when someone mentions the DWH, instead they should find it a useful

tool that allows them to focus on the essentials: fast analysis, rapid iterations, finding insights, drilling into details, modelling, testing hypotheses and bringing it all together in a consumable format for the rest of the business.

The solution also needs to give you flexible deployment options. Does your business have a 'cloud-only' strategy or are you required to have all your infrastructure on-premise? No matter where you are along the continuum from on-premise to cloud-only, make sure that the tool you choose serves your needs and will serve your needs in the future.

Who else is using it and what do they say? Find some reference customers and talk to them about their experience. Has the vendor been around for a while and has a proven solution that will not disappear from the market suddenly. Do they have a roadmap for research and development as well as other aspects of their business and are they actively pursuing growth opportunities? Do they have use cases similar to your own and are they creating solutions that help with considering the future of your own analytics environment?

Finding the right tool will require evaluation, research and for you to ask a lot of questions of a number of people. Do not be afraid to seek those answers. The investment you make in your infrastructure should be a strategic decision with longevity so find a vendor that supports your business on its journey.

Data Preparation capabilities to bring together your data sources

Only on the rarest of occasions are analysts provided with perfectly clean and complete data. Most of the time they need to clean the data first or rely on the work of someone else responsible for cleaning the data. Data preparation tools have come a long way in the recent decade and are now much easier to use by anyone, whether your analysts come from a computer science background and have programming experience, or have an arts background working in a business unit. Equipping your team of analysts with intuitive and easy-to-use tools to prepare data themselves rather than relying on other teams upstream, brings the end-to-end analysis process closer to where the questions are raised and answered.

If your organization has a good process that provides analysts with datasets, and no data preparation is required from your team, you can consider yourself very fortunate because such a 'division of labor' can often lead to delays, miscommunication and less than optimal results.

With data preparation capabilities brought into your team or business unit, your analysts are empowered to make the connections at a data architecture level and across the entire data lifecycle. The insights they gain by working with, preparing, cleaning, and joining data will inform upstream and downstream processes and systems with regard to:

- ▶ Data quality, i.e., what can be improved in earlier stages to reduce the work required during data preparation?

-
- ▶ Data availability and freshness, i.e., which parts of the process take a long time, when does data become available and how do delays affect the entire analysis process?
-
- ▶ New data sources, i.e., what additional data (whether already existing or not) would be useful for analysis and what are some of the 'gaps' that could be filled?
-
- ▶ Efficiency gains, i.e., what are other teams doing with data and data preparation and how can synergies be used to avoid duplication and wasted efforts? How can people collaborate more effectively and pool their skills to create even better and more analytical insights for the organization?

Empower your Analytics

Data preparation is multi-faceted and not limited to cleaning data. Data preparation encompasses bringing together disparate data sources, be they spreadsheets, text files, live databases or a combination of these. It also involves enriching datasets, for example with geographical information such as GPS coordinates derived from addresses and the addition of data layers from publicly available sources such as census data to provide valuable insights for survey analysis.

When data preparation becomes a task for a business team instead of being done centrally, it is important to ensure the necessary level of governance, transparency and sharing. Individuals should not build processes and workflows in a 'black box' environment where others cannot see, understand or replicate how results were derived. The work needs to lead to the correct outcomes and be done in a structured way that suits your business and provides people with the flexibility to do their jobs well.



Empower your Analytics

Visual analytics for rapid insights

The best way to show insights is often by communicating them visually in a format that can be easily shared across your organization and accessed by the people who need to take actions based on the findings.

After you go through the process of storing your data, preparing and enriching it for analysis, it is important to provide your analysts with the right visual analytics tools to find insights and communicate information. This gives your decision makers the relevant information to take action and achieve the goals set for the organization.

There are a number of visual analytics tools available to help you gain insights quickly. They 'close the loop' and turn your data into your most valuable asset.

Continuing with a mindset of data democratization, your organization can benefit from equipping as many analysts as possible with the tools to access and work with data. License costs can be a factor that impacts this, but are often

offset by the benefits of giving access to a large pool of analysts, especially when you want to become a truly data-driven organization.

In many organizations, spreadsheets and Excel-based analysis of data (or 'wallpapers of numbers') are still very common or even the norm. What makes visual analysis so much more effective for finding insights in your data?

- ▶ Presenting data visually in bar charts, line charts, histograms and scatter plots allows you to see trends, outliers, clusters and patterns much more easily.
- ▶ Being able to manipulate the visual display by using different fields from your dataset for visual characteristics such as size, color or shape helps your users find insights faster. Changing the structure and layout of rows, columns, and filters, lets you iterate on various hypotheses more quickly than any table-based manipulation ever could.
- ▶ Building different views of the same dataset can be done in a matter

of minutes using drag-and-drop functionality. This results in a more complete view of your data and helps get those insights faster.

- ▶ Building different views of the same dataset can be done in seconds using drag-and-drop functionality. This results in a more comprehensive exploration of your data and helps get those insights faster.
- ▶ There is no rigid and inflexible, unwieldy reporting because the fast iterations let you build insightful dashboards quickly and at low cost. Gone are the times where report developers spent days building a report only for management to change their mind and most of the effort being wasted. With modern visual analytics tools you can produce your reports at low cost and with high flexibility.



Exasol & Tableau

Value Proposition

At Exasol we are passionate about data and analytics and have made it our goal to provide more than a software solution and to answer the 'Why' and 'How' behind our recommendations.

Organizations are seeking out advanced analytical capabilities supported by in-memory database technologies to handle their growing data volumes, data complexity and pressures for insights. The need for complementary solutions has emerged stronger than ever before, to enable fast decision making and more effective use of data.

Some systems address all data storage, processing, analysis and reporting needs at once but do not excel at any of those capabilities. Organizations today are looking for best in class tools that integrate with each other to give them exactly what they need: easy to use software that provides valuable insights for decision making to achieve the desired business outcomes.

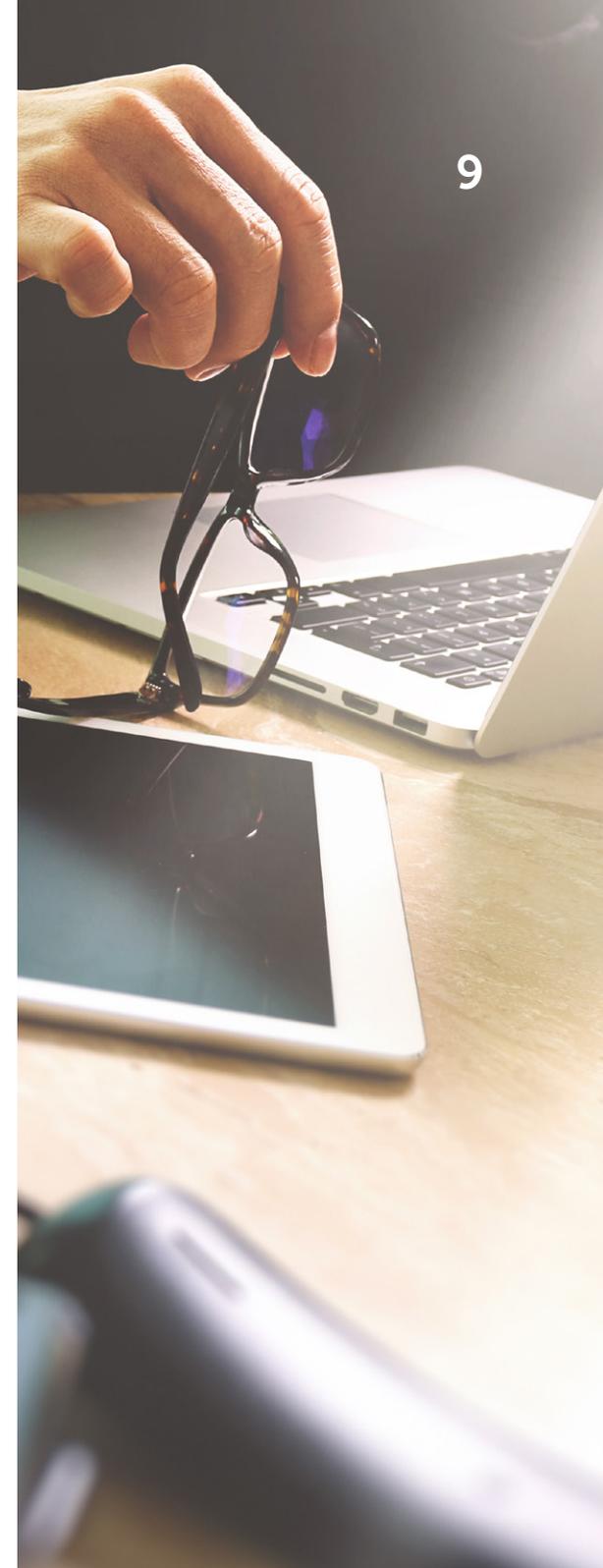
Our alliance partner Tableau Software has developed a market-leading visual analysis tool that supports the ideas of data democratization, features easy to-use drag and drop functionality, is supported by a passionate and enthusiastic community and has a native connector to our Exasol database, ensuring a tight integration between the tools.

The value provided by using Exasol + Tableau to work with and get value from your organization's data can best be broken down into three distinct categories:

Scalability

When you work with data you want to be able to scale easily and quickly as your data requirements grow. You want flexibility to support a higher data analysis and processing demand during peak times in your organization's sales cycle or leading up to key events in your financial year.

Exasol gives you the flexibility to scale your environment in the direction and magnitude you need. Our solution is most commonly deployed across a cluster of servers to distribute the processing tasks in a massively parallel approach, using in-memory technology to handle your queries at rapid speeds. The size of these clusters can be changed according to your needs. With flexible, cloud-based deployments, for example, you do not even have to manage the infrastructure yourself.



Exasol & Tableau

Value Proposition

When you connect Tableau to Exasol using a live connection, you are able to query the database directly and make full use of its powerful performance. You're about to give Tableau licenses to another 200 users in your business? No problem, get them connected and make them part of your insight-finding, data analyzing workforce to drive your organization forward. Exasol will be able to handle the additional users with ease.

Performance

Tableau is the visual front-end for your data analysis and literally paints a picture of your data. If your users experience performance issues in Tableau, noticeable through slow times for data loading and the rendering of visualizations, they will most likely 'shoot the messenger' and blame the visualization tool. This can be a major setback on your way of democratizing data and building your 'army of analysts'. If end users become frustrated and

reject a tool (and most likely the reports coming out of it), adoption success is at risk.

Is Tableau to blame for poor performance though? The most likely reason for 'slow reports' is a poor-performing data source in the backend. By supporting Tableau with a high-performance database that powers the processing of data, Tableau can focus on what it does best: visual analysis. This is a very simple way to significantly improve the user experience in your organization.

Exasol's live connection to Tableau means that no matter how large your dataset, you can stay in the flow of analysis as you explore your data. You will probably forget how much data you are working with, because sub-second response times and rapid rendering of visualizations take the focus away from performance questions and let you 'get on with your job'.

Data Governance

Data democratization can sound very scary because giving access to many people (or everyone!) to analyze data and find insights, means removing some of the limitations and controls that were previously in place.

We don't recommend removing safeguards and security measures completely. We suggest that data governance is a topic that can be more easily managed with a central analytics solution such as Exasol, where rules around user access, data loads, etc. can be managed centrally. The decisions you make on how your data is handled and by whom, are then embedded in the data source. This gives you control and peace of mind that these rules are carried through to anyone using the data.

A live connection from Tableau to Exasol with data governance applied upstream, means that users only see and access data they are supposed to. No matter how much they drill

into details, analyze and visualize the results, the appropriate level of access is guaranteed and no one will 'accidentally' stumble across data they should not see.

In addition to internal controls, your data is also more effectively protected from accidental leaks and data privacy breaches. Compared to data extracts used for analysis, a live connection to the data means that each user logs into the database and sees what they are supposed to see, not what someone else sent them packaged in a file.

Combining Tableau and Exasol to power analytics in your organization allows you to gain value from your data fast and to build a platform your analysts will love to use, driving adoption and accelerating data analysis across the business.

Exasol & Tableau

Best Practice

When using Tableau and Exasol together, there are a few tips and suggestions you can apply that we consider best practices. These mainly concern the use of live data connections. Working with live connections gives you many advantages as we discussed earlier in this document. To make the most of these and get setup the right way, here are our recommendations:

Build views in Exasol that bring together the data in the format you need for analysis.

- ▶ You can prototype these views easily in Tableau by joining the relevant tables in the 'Data Source' window and testing out what structure is required.
- ▶ You may want to create a few 'master views', for example for Finance, Marketing, Product or Customer data. Those views would contain the most commonly used data across your organizations.

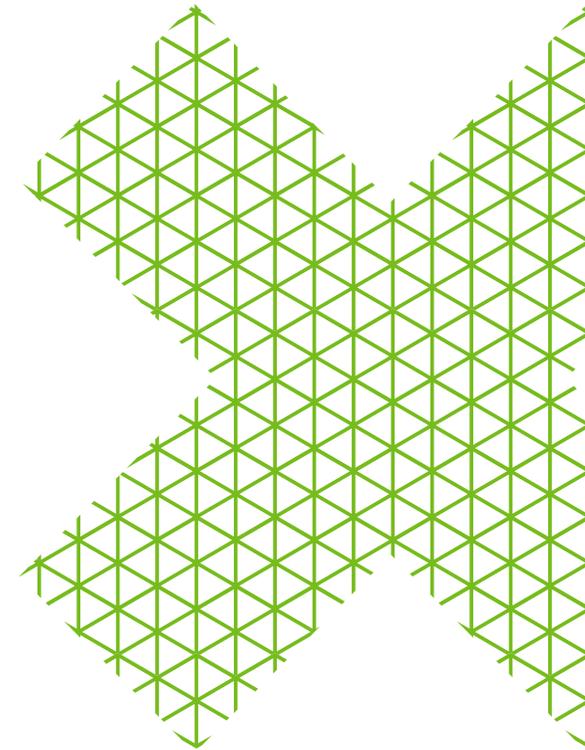
- ▶ With row-level security applied at the database level, make these views available to your analysts for their work, particularly for ad hoc analyses.

Create Tableau Data Sources to save time and achieve consistency

- ▶ Tableau Data Sources (TDS) are metadata files which contain the connection information (for the database connection), the field names, default properties such as color, shape, sort order and aggregation and other metadata such as hierarchies, groups, sets, database filters and calculated fields.
- ▶ You can create Tableau Data Sources by saving a connection to a table or view. This file will be very small as it doesn't contain any actual data and just the 'data about data'. When an analyst in your organization opens the TDS file, they will be prompted to login to Exasol with their user credentials. They will then see the data structured exactly the

way you saved it and will benefit from the calculations you have already created, the color defaults you applied and the hierarchies you setup, saving them time and effort. This gives your analysts an easy way to create consistent reports, especially when corporate standards for field names, colors and fonts are required.

- ▶ Your Tableau Data Source files should be loaded to your Tableau Server so that you don't have to send files around. Your analysts connect directly to those files on the Tableau Server (single source of truth) which gives them a live connection to Exasol, a prepared metadata file and one single place for finding their data connections.



Exasol & Tableau

Best Practice

Establish standards for publishing

- ▶ To keep order and consistency in the published reports and dashboards and to have a clear approach for publishing rights, it is important to have a well communicated process.
- ▶ Give your analysts the flexibility and freedom to connect directly to the database for their ad hoc analyses and then to use published TDS files for any 'official' reporting that is consumed by the different stakeholders for decision making. This helps you strike a balance between unrestrained analysis

with access to data and achieving consistent and reliable reports based on a single source of truth.

- ▶ Encourage your analysts to feed into the governance process by creating Tableau Data Sources that can be used by the analyst community across your organization. This will likely be an iterative process to ensure any custom calculations and other settings are reviewed but can be a valuable way of getting a number of standardized metadata files published for everyone's benefit, saving time and effort while achieving consistency.



Build views at the database level



Create Tableau Data Sources and publish them to Tableau Server

.tds



Create publishing standards and processes to ensure consistency. Crowd-source additional standardized data sources for sharing across the organization



Value Proposition Conclusion

Whether your organization is using environmental data to analyze and communicate factors of climate change or you are using web browsing data to improve your customers' experience in your online shop, using best of breed products like Exasol and Tableau can be game changing for your analytics strategy.

Both tools not only work extremely well together, but are also suited to use cases across industries, empowering analysts and decision makers everywhere.

As you move from traditional Business Intelligence tools to the new generation of analytics software, data education and the ongoing development of your analysts are key.

Yes, these tools are easy to use, but that doesn't mean that ongoing training and development can be neglected. Many analysts can become proficient with certain software fairly quickly. It should be the goal, however, to develop them into experts because with that expertise they can more effectively access the advanced analysis capabilities that will provide your organization with insights that equate to a giant leap forward.

Anyone can be an analyst, but give them the resources, be it tools, training or access to an internal and external community, they need for their growth and they will become great analyst and a key driver in achieving the outcomes of your data-driven strategy.

Data and analytics have been hot topics in the last few years and their importance will continue to grow as more and more organization recognize their value.

Just as we saw with the move to 'digital', 'online' and 'mobile,' data and analytics are here to stay and will become an integral part of every knowledge workers' day-to-day life. Refusing to engage with data, to develop knowledge about using, analyzing and working with data and transforming it into valuable, actionable information is futile.

We will see more and more data analysts investing time and effort into upskilling themselves on topics like data science, data preparation, data privacy and security etc. Analysts are recognizing the need to have skills across the entire data lifecycle, up and down the stack of tools used by their organizations.

With the growth of this expertise we also expect a number of new roles to develop in data-driven organizations. They will focus, for example, on the building of internal communities around analytics and data, supporting the idea of data democratization, enablement and knowledge sharing. Other roles will involve bridging the still existing gaps between the backend infrastructure and databases and the business and analyst community. Coordinating between these people and enhancing their collaboration will be a task that can add significant value as more organizations transition to a data-driven future.



Architecture

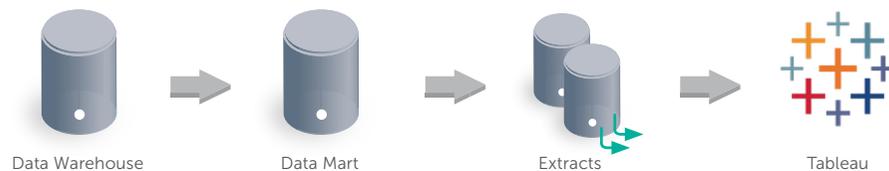
Combining Exasol and Tableau as your analytics platform gives you a tested and stable solution. It also improves your chances of successful adoption across your organization because of the easy setup, the flexible deployment options and the strong community, partner and vendor landscape supporting both tools and enriching your experience as a user.

With Tableau as the front-end for ad hoc analytics and potentially for standard reporting, Exasol can be deployed in a number of ways to enhance the analytical experience for your analysts, internal stakeholders and infrastructure owners.

The typical starting position is one where Tableau is used with data extracts as shown in the diagram below:

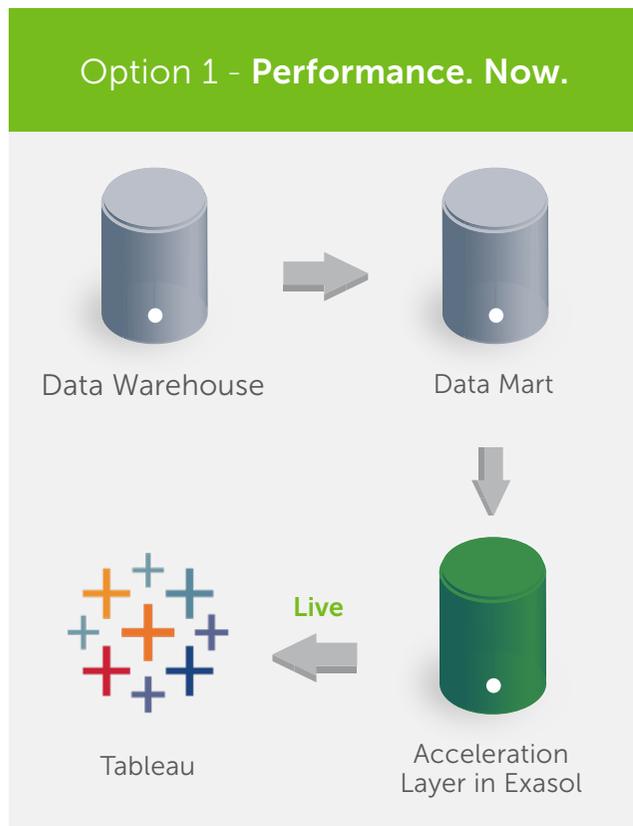
Limitations of using data extracts

- ▶ Performance can be impacted
- ▶ Data is outdated as soon as an extract is created and new data becomes available
- ▶ Data extraction and publishing add unnecessary load to Tableau Server
- ▶ Extracts need to be managed and maintained
- ▶ The more extracts are created and loaded onto Tableau Server to be used, the greater the impact of these challenges



Architecture

There are flexible options to deploy Exasol in your existing data landscape



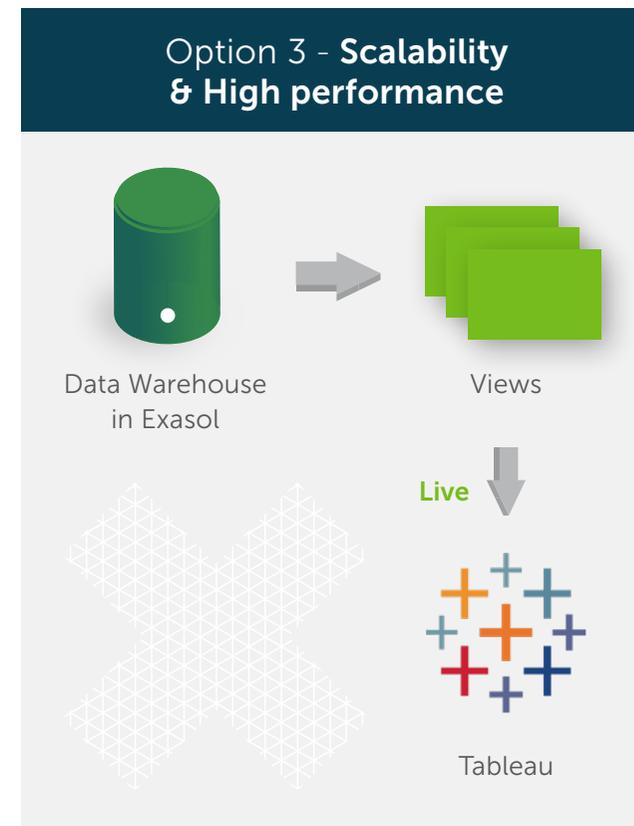
Acceleration layer

The fastest and easiest way to address performance issues is by adding a small instance (single node or small cluster) of Exasol as an acceleration layer into your existing architecture.



Governance & Speed

Replacing your data mart(s) with Exasol allows you to make data governance a more central part of your architecture while also achieving faster performance.



Scalability & High Performance

You can truly transform your analytics environment and create advanced capabilities, performance and robust governance by moving your Data Warehouse to Exasol as a sustainable, long-term solution.

Use Cases

16

We are proud to serve over 130+ customers in more than 16 countries around the globe. And while we believe ours is the best analytic database for BI, reporting and much more, we'd rather let our customers do the talking.





Netzeffekt

17

High performance analytics that boosts online marketing performance



By using Exasol, several particularly complex queries are processed in near real-time. The database also offers great integration with Tableau – adding Exasol to Tableau as a data source is as simple as selecting a menu option in Tableau.



Florian Sanger - Technical Director at netzeffekt GmbH

Innovative online marketing

- ▶ BI analytics is now an integral part of the product and services range
- ▶ Flexible scalability enables growth
- ▶ Measuring campaign impact is now much more granular
- ▶ Adding Exasol to Tableau as a data source is as simple as selecting a menu option

6 weeks

From first tests to production

500%

Performance advantage over legacy solution



Kreditech

18

A technology platform that enables banking on algorithms and big data scoring



Exasol and Tableau simplify our business operations considerably, and the fast analytics we can now do have already translated into a positive return on investment; we can run ad-hoc reports at any time as well as easily create powerful visualizations and dashboards for management and marketing teams using Tableau.



Sebastian Ranzinger - former Head of Business Intelligence at Kreditech Holding SSL GmbH

A technology platform that enables banking based on algorithms and big data scoring

- ▶ Credit decisions based on 20,000 data points
- ▶ Fast decision making based on innovative technologies
- ▶ Combination of Exasol and Tableau brings enormous speed advantage

under 2h

analytic queries now run in just under two hours, compared to 24 hours previously

easy to use

reduced maintenance and administration overheads thanks to the cloud solution

Infection Control with Fast Data Analytics



Now, anyone within the organization can get access to see certain data through Tableau Server and 311 members of staff are actively using Tableau Desktop - much larger than the original business intelligence and data architecture teams of 24 people.



Mark Jackson - Head of Business Intelligence
at Piedmont Healthcare

The Exasol advantage:

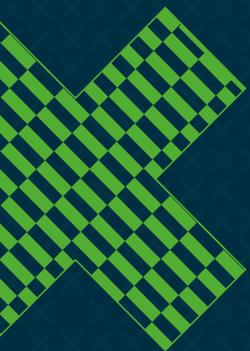
- ▶ Complex analytic queries on vast amounts of data are now answered in seconds, Piedmont can analyze more data than ever before and front-end users now gain much deeper insights into important data.
- ▶ Exasol has improved the democratization of data at Piedmont, opening greater access to more decision-makers who can now rely on the data to improve the running of their healthcare practice.

555 bn rows
of data processed

50x faster
analytic queries

40% reduction
in illness rates caused by
infections





Exasol AG
Neumeyerstr. 22 – 26
90411 Nuremberg
Germany
www.exasol.com

Tel: +49 911 23991-0
Email: info@exasol.com

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Exasol UK Limited
4th Floor, 33 Cannon Street
EC4M 5SB London
United Kingdom

www.exasol.com
Tel: +44 20 3813 8310
Email: info@exasol.com