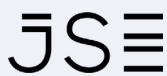# JSE

| www.jse.co.za

Industry
Financial Services

Profile
The JSE, founded in 1887, is the largest stock exchange in Africa. It ranks as one of the 20 largest stock exchanges in the world by market capitalization. The JSE has operated as a marketplace for the trading of financial products for over 120 years. During this time, the JSE has evolved from a traditional floor-based outcry market to a modern securities exchange providing electronic trading, clearing and settlement in underlying and derivative instruments for a variety of asset classes, and has extensive surveillance and regulation capabilities. The JSE also operates the South African government bond market on behalf of the National Treasury and is a major provider of financial information.

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Johannesburg Stock Exchange Leverages the Denodo Platform to Verify Billions of Dollars in Trades Every Day

Not many businesses compare to stock exchanges when it comes to the need for real-time data. When billions of dollars are at stake, trading venues cannot afford to go slow or go wrong. Keep reading to learn how the Johannesburg Stock Exchange (JSE) built a modern data integration architecture, using the Denodo Platform as one of its foundational components, to service the real-time data needs for a variety of critical functions, including post-trade settlement and share price valuations.

Business Need

In the last two decades, through the JSE's acquisition of the South African Futures Exchange (SAFEX) in 2001 and the Bond Exchange of South Africa (BESA) in 2009, the JSE inherited an IT landscape composed of many legacy systems.

As the JSE operates in a broad spectrum of the capital markets, its day-to-day operations involve a large number of core business systems. Chester Enslin, the head of IT Enterprise Integration and Software Quality Assurance at the JSE, says, "The difference with the JSE and other exchanges is that we also provide a post-trade function within the end-to-end service, whereby trades that are executed within the various capital markets are also settled centrally." Generally, the post-trade and collateral management aspects of an exchange is offset to other institutions who calculate net position and risk for a particular trader. These amounts can quickly run into billions of dollars.

Chester adds, "We've got to work out their position throughout the day as an institution, to ensure that we can guarantee the settlement when it comes to the end of the day, otherwise we might have a situation where the trader can't pay, and you can just imagine the devastating consequences."

The JSE has over 180 disparate data sources that intertwine its data landscape. For example, Millennium IT is used for capital markets trading, MTS is used for government bond trading, and RTC is used for real-time clearing settlement and risk for derivative markets. Over 120 different applications need to operate in perfect harmony to ensure that there is accurate settlement. Many are small in data volumes but high in complexity, so data integration is a top priority.

The data had to be sourced and integrated from various heterogeneous data systems including relational databases, flat files, and APIs, to serve the needs of the various functions. Using traditional batch-oriented extract, transform, and load (ETL) processes was a cumbersome and inefficient process. Additionally, the different versions of data entities across different systems created confusion and skepticism around data authenticity. In this high-speed trading environment, it is imperative to remain 100% accurate for 100% of the time, so the JSE looked beyond the traditional ETL and batch processing solutions for data integration.

The Solution

To consolidate its intricate data landscape and aggregate data in real time, the JSE implemented the Denodo Platform, a data integration and data management solution built on data virtualization, to build a logical data layer. With its broad array of data sources including structured and unstructured data sources spread across hybrid environments, the JSE uses many of the out-of-the-box adapters provided by Denodo to connect to the data sources.

All the relevant information sourced from these systems is compiled into base views on the Denodo Platform. The JSE has built more than 1,700 base views on top of these data sources, which are processed by transformation rules to produce derived and interface views. During the writing of this case study, there were approximately 2,200 derived views and 550 interface views at the JSE, all built on the Denodo Platform. All of these views ultimately get combined into 44 canonical models to present information to the rest of the institution as a single source of truth. One of these canonical models, which provides information about financial instruments, joins 45 data sources. The data integration layer processes about 2 billion rows a month.

Self-service analytics also plays an important role at the JSE. Through an Information portal, users can log in and query the data without tampering with the operations of source systems.

Figure1: The modern data architecture at the JSE, with the Denodo Platform serving as a logical data layer that aggregates different forms of data from heterogeneous source systems and makes the integrated data available in real-time to consuming applications. The Denodo Platform processes approximately 2 Billion rows per month at the JSE.
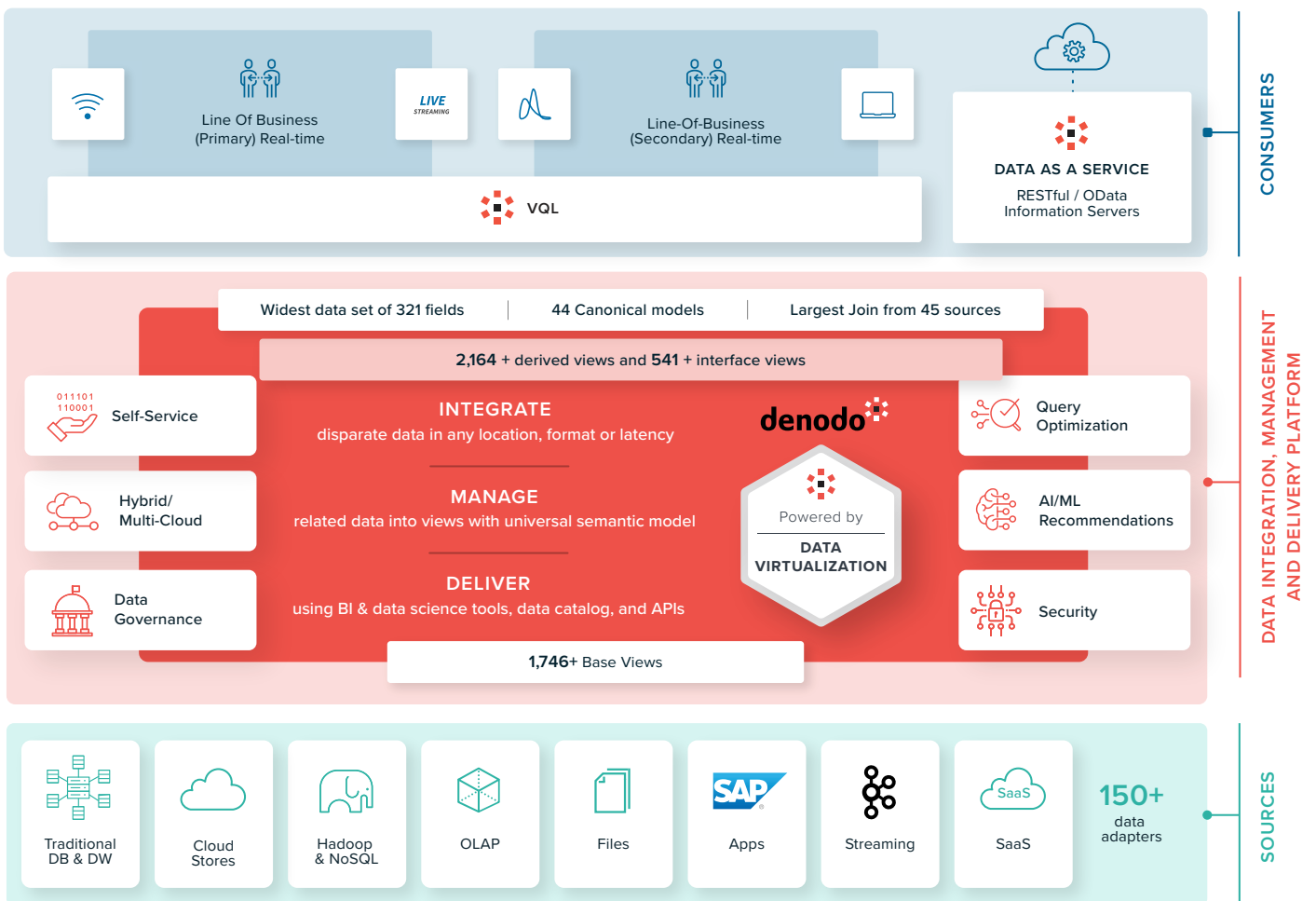
Benefits:

Reduction in data-integration effort: By using the Denodo Platform, it is now comparatively much easier and less expensive for the JSE to integrate data systems and perform testing. Data integration is simpler and more reliable.

Availability of reliable, real-time data: Since the Denodo Platform implementation, the JSE has eradicated data misinterpretations and reduced duplication. The platform has contributed to the exchange's efforts towards a reliable and trustworthy market infrastructure – and to date the JSE has affected settlement for its markets with 100% accuracy for 100% of the time, despite significant events such as the COVID-19 pandemic, which introduced extreme market volatility. Having a single version of the source data has helped avoid the pitfalls of inaccurate derived data, where incorrect calculations and closing balances were commonplace.

Increase in business agility: The rapid data integration, made possible by data virtualization, enables the JSE to run multiple projects simultaneously due to increased control and versioning capabilities. With data virtualization, the impact of physical changes applied to the source systems can be shielded from the consumer systems, and vice-versa.

> ❝ *Denodo's data virtualization layer enabled us to serve the real-time data needs of our business. Since implementing the Denodo platform, we have been able to provide 100% accurate data, 100% of the time for our various functions, particularly post-trade settlements.*"

- **Chester Enslin,** The Head of IT Enterprise Integration and Software Quality Assurance at JSE

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BITanium is a proud South African company. We expose the power of data to make our customers more competitive. We believe that data is the last remaining competitive differentiator – how you treat it, keep it, and use it defines the difference between mediocrity and success. We help our customers transform their data from its raw state into a finished, valuable, and actionable product. This is achieved through data storage, analysis, visualization, and deployment solutions. The insight produced enables intelligent business decisions that make the difference between remarkable and average.

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Denodo is a leader in data management. The award-winning Denodo Platform is the leading data integration, management, and delivery platform using a logical approach to enable self-service BI, data science, hybrid/multi-cloud data integration, and enterprise data services. Realizing more than 400% ROI and millions of dollars in benefits, Denodo's customers across large enterprises and mid-market companies in 30+ industries have received payback in less than 6 months.

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