Matera
Digital Twin

Transaction software built for modern digital and instant payment demands

matera   avanade   Microsoft

Introduction

The swift rise in digital transactions is revolutionizing financial services. These changes are also increasing the demands on payment and transaction systems. As a result, operational costs are escalating and Core banking systems are struggling to keep up, making any kind of innovation difficult for financial institutions.

Introducing Digital Twin, software that can increase capacity and insure availability so financial institutions can handle these increased digital demands without replacing their Core.

The capabilities of Digital Twin were recently tested by Avanade using Microsoft Azure's infrastructure. This study demonstrated how Digital Twin can solve one of the biggest challenges faced by financial institutions today.

01. Digital Twin | A high-performance, cloud native solution that insures availability of operations with unlimited ability to scale

Digital Twin is software that sits on top of a **core banking** platform and enables **real-time transaction authorizations** and **balance updates** 24X7 for DDA and other financial accounts. It delivers a streamlined digital experience while **keeping operational costs low**.

The following illustrates how Digital Twin is deployed:
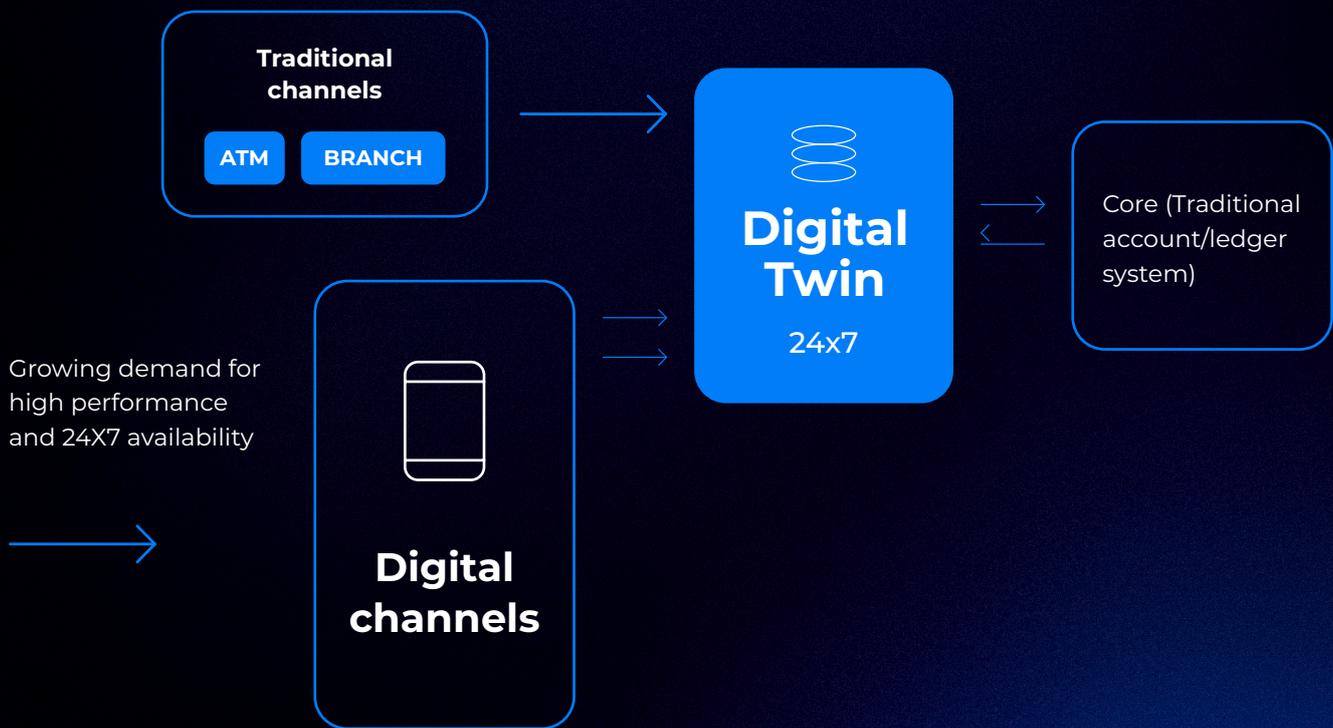
Digital Twin is the smart way for financial institutions to accelerate digital transformation without replacing their Core.

- **01.** Support growing transaction volumes with a robust and scalable platform

- **02.** Unify experiences on digital channels through a flexible and highly-adaptable solution

- **03.** Leverage the same Core Banking platform to serve diverse, versatile markets

- **04.** Capitalize on customer insights through a comprehensive 360-degree view

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Modern tech stack to address the challenges of digital transformation!

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Technology that creates value

Digital Twin is built with the latest technology and pairs **event-driven**, **microservices** and **Kubernetes architectures** with the **top cloud services**.

The result is a solution that works 24x7!

"Digital Twin is the result of technical experience optimized over 30 years in the market. It's a robust and innovative product that provides the foundation to support the instant payments revolution as well as support a smooth digital journey. The partnership with Microsoft and Avanade is essential for us to create technology that safely meets the demands of the largest and most demanding customers."

Ricardo Chisman

Matera President

"With cutting-edge technology and state-of-the-art architecture, Digital Twin's potential to scale is unlimited and can benefit financial institutions of all sizes."

Bruno Samora

Chief Product Officer from Matera

02. Digital Twin Performance

Testing Digital Twin's capabilities involved processing digital transactions on 145 million test accounts to measure throughput.

The Digital Twin software was deployed using Avanade's expertise in a Microsoft Azure cloud environment. 145 million test DDA accounts were loaded on to Digital Twin to assess how many transactions could be processed on these accounts.

Load tests were performed first to analyze application and cloud behavior, identify application limits and insure sustainable cost optimization.

The throughput test produced surprising results.

Digital Twin was able to process over 12,000 transactions per second across these 145 million accounts, and over 3,400 transactions per second on a single account.

145 million accounts and over 12,000 transactions per second.

Guaranteed Scalability and Volume

These impressive metrics showcase how Digital Twin is architected to support the digital demands of the largest financial institutions.

Throughput

12,565 tps

Transactions distributed across multiple accounts, serving individual payment scenarios

3,419 tps

Transactions on a single account, capable of supporting instant payments for big companies

high performance

aligned with competitive costs

"Matera's Digital Twin solution combined with the technical leadership of Microsoft accelerates our ability to offer valuable solutions to financial institutions. Digital Twin not only increases capacity and insures availability to process digital transactions, but it provides a simple path to the cloud. Financial institutions can reliably accelerate their path to the cloud without replacing their legacy Core in the short term."

Fabio Hasegawa

President of Avanade Brazil

03. Microsoft Azure: Secure, Future-Ready Cloud Solutions

Microsoft Azure - Reliable Technology For Vital Resources

Since Satya Nadella's arrival as Global CEO of Microsoft, the company has experienced a series of extraordinary changes, particularly in the realm of cloud products and services. From the development of computational resources to substantial investments in cybersecurity, cognitive services, and artificial intelligence, Microsoft has distinguished itself in the market by consistently providing top-notch platforms that enable its customers to securely host vital resources for their operations, **ensuring optimal performance and availability**.

Microsoft's goal of empowering every individual and organization on the planet to achieve more has led to significant investments in building a dependable, secure, and high-performance platform. This has enabled partners like Matera and Avanade to develop Digital Twin into a high-performance product using several standard "Cloud Native" capabilities of Microsoft Azure. By leveraging these capabilities, Digital Twin is able to execute transactions and fulfill the performance, availability, and security requirements of major

Brazilian and international banks. Furthermore, Digital Twin's use of standard "Cloud Native" resources allows it to benefit from cloud computational services, delivering optimal performance, elasticity, scalability, availability, and cost-effectiveness. In other words, Digital Twin can dynamically scale cloud computing resources based on transaction demand, utilizing only the services needed to serve the active user base at the time of the transaction.

"Cloud Native" resources are highly resilient enabling consistent execution of processes in a distributed manner. This is considered the most efficient approach to leveraging the cloud, as it minimizes unnecessary costs associated with idle resources generating substantial financial savings compared to traditional computing. Traditional computing relies on provisioning large, fixed resources that fluctuate between periods of high utilization and inactivity, without the ability to reduce costs during periods of downtime.

THE RESULTS OF THE TESTS CARRIED OUT WITH THE DTW SIMULATING 145 MILLION ACCOUNTS ARE SHOWN IN TABLE 1.

| Scenario	Transaction per second	Average response time per transaction (seconds)
Transactions distributed across multiple accounts	12,565	1.0
Single account transactions	3,419	0.3

<div align="center">TABLE 1</div>

To achieve this outstanding performance, many infrastructure and development services from the Microsoft Azure cloud platform were used.

- Azure Kubernetes Service (AKS) was one such feature. It's a version of Kubernetes designed specifically for Azure. Microsoft recruited one of the creators of Kubernetes to develop AKS, providing the market with a reliable service for running containers and microservices. This investment in top-tier software engineers with deep knowledge of open source platforms has established AKS as one of the safest and most stable platforms for running standard "Cloud Native" containers and microservices.

- Digital Twin employs Infrastructure as Code (IaC) technology for cloud infrastructure provisioning, ensuring consistent product delivery to customers. The development practices employed are based on agile methods and DevSecOps, with Azure DevOps serving as a key service that supports Digital Twin software engineers in sprint planning and the safe and efficient delivery of code.

- Additionally, Digital Twin leverages several platform-as-a-service (PaaS) features from Microsoft Azure, such as the managed Azure MySQL database and Kafka Topology-based event and message exchange services. The use of PaaS services enhances product security, reduces complexity, and lowers operational costs associated with software updates, allowing the team to focus on Digital Twin's core features.
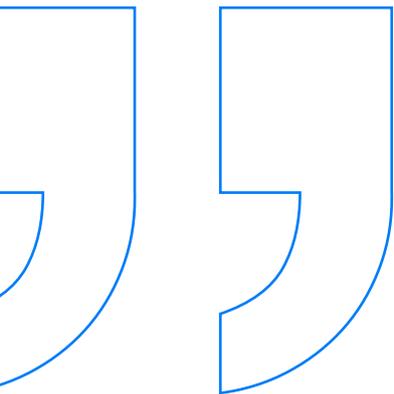
"The financial sector has undergone an important transformation paving the way for new services that offer more agility, security and use data to personalize customer journeys. Matera's solution, implemented jointly with Microsoft and Avanade, enables financial institutions to keep pace with this transformation. And, leveraging the cloud is fundamental to offer the scalability, layers of security and agility necessary to innovate."

Tânia Cosentino

President of
Microsoft Brazil

About the companies

About Matera

Matera is a trusted technology provider of technology solutions for financial institutions. With over 30 years of experience and a team of nearly 1,000 professionals, Matera has optimized these solutions for efficiency, security and reliability. Over 250 financial institutions including two of the top three banks in the world trust Matera. Matera operates in both Brazil and the United States.

To learn more: www.matera.com

About Avanade

Avanade is the leading provider of innovative digital, cloud and consulting services, industry solutions and design-led experiences across the Microsoft ecosystem. Every day, our 60,000 professionals in 26 countries make a genuine human impact for our clients, their employees and customers. Avanade was founded in 2000 by Accenture LLP and Microsoft Corporation.

To learn more: www.avanade.com

About Microsoft

Microsoft (Nasdaq "MSFT" @microsoft) is enabling digital transformation in the era of the intelligent cloud and the intelligent edge. Microsoft's mission is to empower every person and every organization on the planet to achieve more. The company has been in Brazil for 33 years and is one of the subsidiaries of Microsoft Corporation, founded in 1975, which is present in over 190 countries. From July 2021 to June 2022, the company invested more than US$ 15 million in donations and discounts for non-profit entities, impacting more than 2,000 institutions with software donations, purchase discounts and support for training projects. With the launch of the Microsoft For Startups Founders Hub, 443 new startups were approved, totaling 703 supported startups, which together have consumed USD 11,898,488.00 of Azure cloud credits.

Attachments

Compute services were implemented inside an Azure cluster

Kubernetes Services (AKS) with the following features:

- Auto-scale PODs configured to handle processing spikes
- PODs provisioned for maximum capacity with load balancing mechanisms
- Microservices design pattern implemented by microservices coordination model
- Reactive services implemented with data model based on Event Sourcing

Provisioning of the AKS cluster was performed using Terraform through Infrastructure as Code (IaC) pipelines built on Azure DevOps. To enable the application pattern based on Event Sourcing and allow the exchange of messages in the microservices choreography, the Kafka message broker was used.

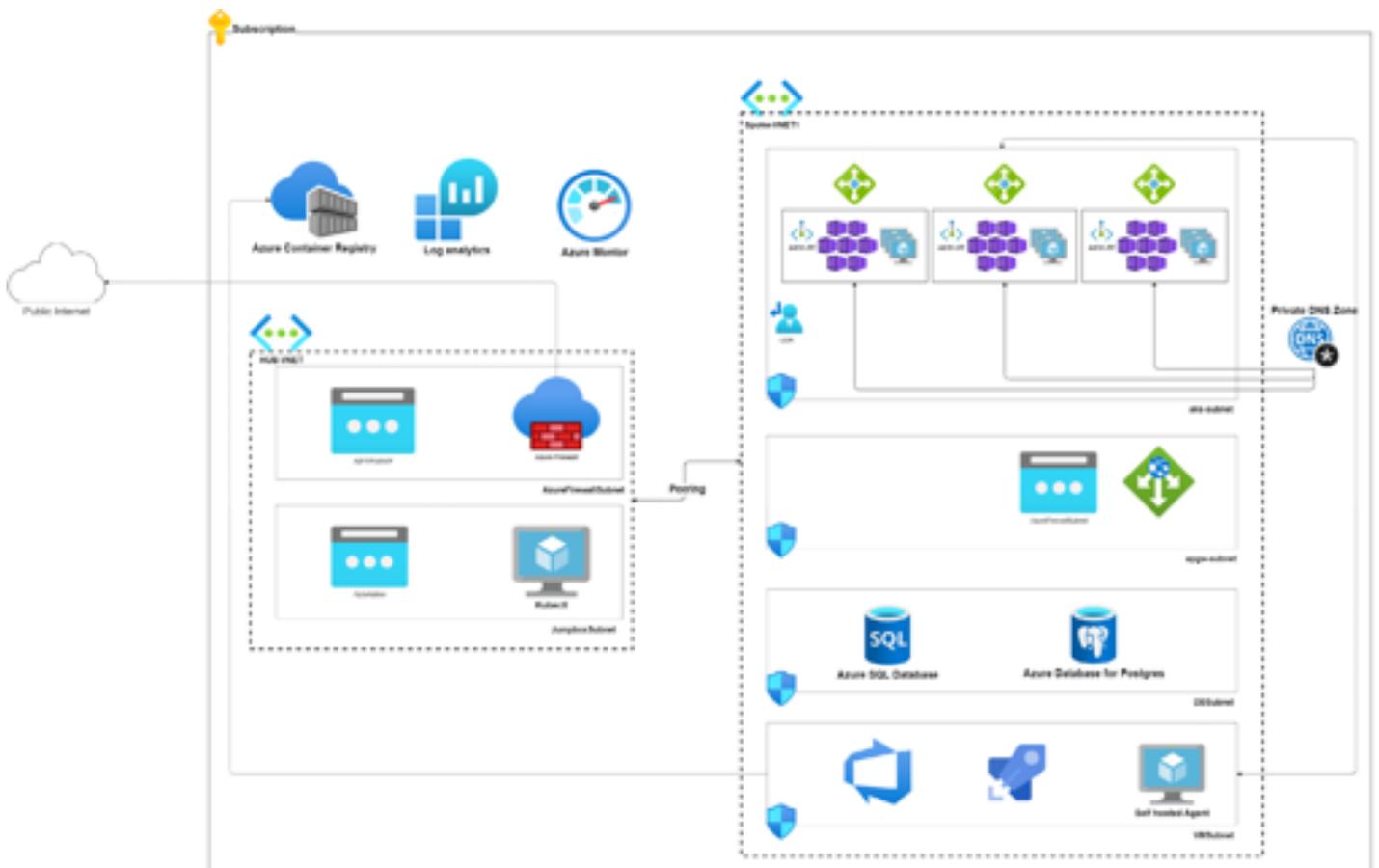The outline and its topology was provisioned using the Kafka Topology solution.

Topics were used to allow the scalability of computing services and ensure the flow of messages without creating bottlenecks for the estimated TPS volume. Using topics enables functionality and partitions for consumer groups.

Several reading processes consumed information generated by consumer groups, each associated with a partition within the parallel reading structure. Database services were based on Azure MySQL platform as a service (PaaS). Multiple parallel database instances were created, enabling thousands of database transactions to be serviced to meet the Digital Twin target of 12,000 tps.

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Attachments

The base architecture for the application is shown in the diagram below:

Zoom to improve reading

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