WHITE PAPER

The Temenos and Yugabyte Partnership

Discover How YugabyteDB Exceeds Temenos' Demanding Database Requirements

yugabyteDB

Temenos: Introduction and Current Position

Temenos is the world's leading open platform for composable banking, creating opportunities for over 1.2 billion people around the world every day. They serve over 3,000 banks from the largest to challengers and community banks in 150+ countries by helping them build new banking services and state-of-the-art customer experiences. The Temenos open platform helps their top-performing clients achieve return on equity three times the industry average and cost-to-income ratios half the industry average.

Temenos Transact supports two major banking business operations: manufacturing and distribution. Distribution covers high-volume queries (for example: what's my balance?) that can be efficiently served by many different types of databases. Manufacturing is all business transactions (for example: make a payment). Manufacturing demands transactional consistency of changes made in two different places.

Aspiration and Obstacle

Many Temenos customers are migrating to the cloud and new customers expect cloud native solutions. Temenos plans to further expand its Banking-as-a-Service (BaaS) and SaaS offerings for customers who do not want the overhead of infrastructure management.

But the transactional data layer is an obstacle. As more clients look to take advantage of the cloud, new database technologies have emerged that align more closely to an elastically scalable, always on cloud-based architecture.

For decades, transactional consistency—critical to manufacturing operations—has been, uniquely, the strength of traditional, monolithic SQL databases. However, they suffer two critical limitations. First, they only scale vertically (more data and/or more processing requires a bigger single box or close-cluster). Secondly, to achieve high availability they need complex, expensive backup and recovery processes that involve additional infrastructure, specialty software, and manual intervention. This would be manageable on-premises, but does not fit naturally into cloud computing paradigms.

Temenos could not achieve their goals by continuing to rely on monolithic databases for manufacturing business operations. They needed a high-availability, scale-out transactional database. This need led to a new collaboration, using YugabyteDB, which was designed from inception to deliver cloud-native, transactional consistency with unlimited horizontal scale-out, built-in resilience, and high availability.

Temenos Data Layer Options

	Technology	Small	Medium	Large
On–Prem	Monolithic Database	$	$$$	$$$$$$
	YugabyteDB	$	$$	$$$
Cloud	Monolithic Database	$	$$$	X
	YugabyteDB	$	$$	$$$

The big question that Temenos asked Yugabyte was: "Can you translate this elegant architecture into a real-world solution?"

Criteria for Success

Temenos' customer offering includes a choice of database and a choice between on-premise, cloud, or managed service. It demands simple, low-cost operations and it must meet the needs of banks of any current or potential size.

To support offering on-premises or in the cloud, for any size of bank, for all manufacturing business operations, Temenos compiled an exacting definition of database requirements.

The manufacturing database must be:

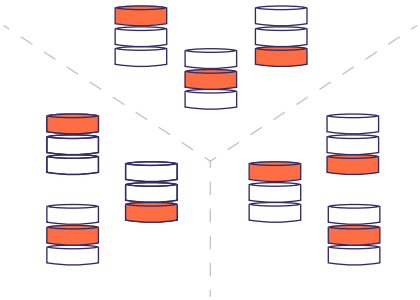
- **Cloud native**
- **Cloud agnostic**
- **Available as a managed service and on-premise**
- **Capable of meeting exceptional non-functional Requirements**
- **Open source**
- **Supported by a large and active developer community**

Exceptional Non-Functional Requirements

- **Deployed across multiple failure domains for resilience (three or more)**
  - Survives partial or entire loss of a failure Domain e.g., loss of a cloud region
  - Delivers multi-availability zone, multi-region, multi-cloud and high availability
- **Recovery Time Objective: ~3 Seconds**
  - Time taken for a RAFT consensus to form
- **Recovery Point Objective: Zero**
  - Entire cluster is transactionally consistent

A **Failure Domain** is ANY of:

- **Availability Zone**
- **Region**
- **Cloud Provider**



Measuring YugabyteDB's Capability: The Temenos High-Water Benchmark

To measure whether YugabyteDB could be the vehicle to unlock all these choices, Temenos presented the High Water Benchmark, which tests Temenos' cloud native architecture. It is run periodically to understand the solution's scalability and define the operational envelope with realistic business transaction workloads.

Fully deployed, the High Water Benchmark engages multiple vendors and their products to deliver a working business solution at real scale.

In 2019 Temenos processed 50k business transactions per second.

The 2022 High Water Benchmark set a target of 100k business transactions per second for Amazon Web Services (infrastructure), YugabyteDB (new candidate for manufacturing) and MongoDB Atlas. The balance of distribution transactions to manufacturing transactions reflects actual observed customer behavior.

There are approximately three times as many distribution transactions as manufacturing transactions, but the latter are much more database-intensive and require transactional consistency.

What are Manufacturing Business Transactions?

A reservation is what happens when you make a card payment. The card processor asks Temenos to reserve funds. This lowers the available balance. If the payment does not go through, the reserve is released. If it does go through, the position is updated.
Activity: Each reservation is 9 database reads and 2 database writes.

A booking is a posting for one account such as an accrual, cash deposit, or charging interest and fees.
Activity: Each booking is 13 database reads and 2 database writes.

A payment is a credit transfer. This is usually five transactions: reserve funds; send credit transfer; receive credit transfer response; update positions; and report done.
Activity: Each payment is 25 database reads and 9 database writes.

A transfer is a movement of money from one account to another.
Activity: Each transfer is 29 database reads and 8 database writes.

Benchmark Results

The benchmark project represented remarkable and sustained collaboration. As with all complex benchmark projects, achievement of the goal was not immediate, but the process clearly demonstrated Yugabyte's commitment to customer success. This commitment was not lost on Temenos' senior management.

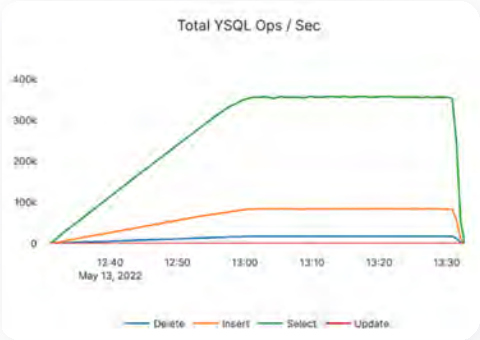
	Business Activity	Database Activity	Reads: Writes Per Bus. Txn	Business Txn Per Second
Manufacturing	Payments	~350K database reads per second ~80K database writes per second on a YugabyteDB	29 : 5	465
yugabyteDB	Reservation		9 : 2	8,750
	Booking		13 : 2	12,790
	Transfer		29 : 8	1,485
	Sub-Total			**23,460**
Distribution	Balance Inquiry	1 or 2 database read operations per business transaction on a Mongo Atlas DB		47,315
	Transaction List			32,100
	Sub-Total			79,415
Grand Total				**102,875**

> “Temenos’ leading platform for composable banking, combined with Yugabyte’s unrivalled global database expertise and its service capabilities, delivers exceptional technology performance, scale, and resilience to Temenos customers. YugabyteDB was a natural fit with our vision for the future of our technology cloud-based proposition.
>
> **Tony Coleman, Temenos Chief Technology Officer**

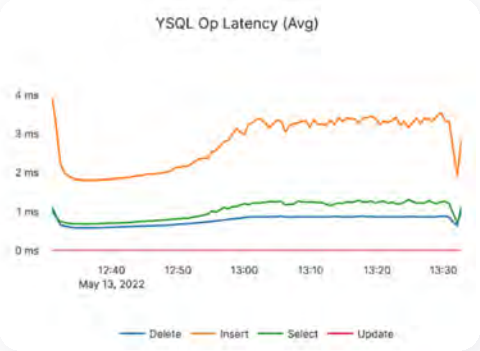
The table above shows the final results. YugabyteDB successfully achieved a transactional throughput that represents the needs of a major bank serving 100 million accounts.

Each benchmark run lasts for an hour. In the first thirty minutes the client transaction generators ramp up to the target load. The next thirty minutes sustains the maximum load.

The chart below shows the throughput, measured in the database operations that implement the business transactions.



But, just as important as throughput is latency. A customer is not going to wait long before they become frustrated with any negative online experience their bank offers them. The next chart shows latency over the same benchmark run.



Even under sustained peak load, YugabyteDB maintains hugely impressive database latency levels.

Conclusion

Temenos’ continuous high-spend R&D represents their insistence that there is always a better offering they can bring to market. Their vision for the next stage of their digital transformation, modernization of the data layer, was ambitious and market-leading; it now seems secured.

Yugabyte feels privileged to be part of this journey and proud to be selected as key database partner by the one of the world’s leading banking ISVs.