Introduction

DBS Bank has earned a reputation as a digital trailblazer among banks, often looking to emulate the technologies of leading tech firms. Its interest in cutting-edge database and middleware solutions – including Ant Group's OceanBase database and SOFAStack middleware, and Tencent's TDSQL distributed database – reflects DBS's strategic push to be "digital to the core". By exploring these advanced systems, DBS aims to strengthen its technology infrastructure in line with its digital transformation goals, gain competitive advantages in scalability and agility, and ensure robust regulatory compliance in an increasingly demanding environment. Below, we examine the motivations behind DBS's interest in these technologies and how they fit into the bank's broader IT strategy, along with any relevant initiatives to date.

Strategic Goals Driving Interest

Digital Transformation and "Tech Company" Mindset: A core DBS strategy is to operate more like a technology company than a traditional bank. CEO Piyush Gupta and other leaders have stressed the need to learn from "technology greats" and digitize DBS "to the core". This means overhauling legacy systems and adopting modern, cloud-native architectures. Solutions like OceanBase and TDSQL – born from internet giants handling massive scale – align perfectly with this vision. They offer the kind of distributed, scalable architecture that digital natives use, which DBS sees as vital for building a "rock-solid foundation" for digital services. Rather than applying superficial "digital lipstick" on old systems, DBS wants deep infrastructure change. Evaluating OceanBase (a distributed SQL database originally developed by Ant Group) and SOFAStack (Ant's financial-grade middleware platform) is a way for DBS to study proven tech architectures that powered China's fintech boom. Similarly, Tencent's TDSQL, a high-performance distributed database, embodies the kind of cloud-era core system DBS may aspire to.

Modernizing Core Systems and Reducing Legacy Dependence: DBS's interest is also driven by a need to replace or augment legacy core banking systems (like mainframes and proprietary databases) with more flexible solutions. DBS has already pursued open-source alternatives – for example, migrating dozens of applications from Oracle to MariaDB, an open-source relational database. In that initiative, DBS explicitly sought **open technology, cost efficiency, scalability, and regulatory compliance**. Distributed databases like OceanBase and TDSQL tick those same boxes: they run on commodity hardware, scale horizontally, and avoid the vendor lock-in of legacy databases. Embracing such platforms is consistent with DBS's goal of simplifying its tech stack and "continually simplifying the technology stack" to drive innovation. In short, these technologies offer a path to modernize DBS's backend for the cloud era, supporting microservices and real-time data needs that traditional core systems struggle with.

Innovation and Ecosystem Ambitions: Another strategic motive is DBS's desire to create new digital offerings and ecosystems quickly, staying ahead of

both banks and tech competitors. The bank has broadened its business model to act "more like an Alibaba or Amazon," integrating banking with marketplaces, e-wallets (like PayLah!), and AI-driven services. To support this ecosystem approach, DBS needs a highly agile and scalable technology base. Middleware like SOFAStack – which provides a suite of cloud-native, financial-grade components (for example, high-throughput transaction processing, distributed messaging, etc.) – can enable faster development of new services. Likewise, OceanBase and TDSQL can handle surges in user activity without compromising performance. By investing in these areas, DBS positions itself to roll out innovations (such as real-time payments, AI personalization, and blockchain-based services) on a robust platform. Ultimately, the interest in these technologies serves DBS's strategic goal of being a **"22,000-person start-up"** that is nimble and customer-centric.

Competitive Advantages Sought

Adopting advanced distributed databases and middleware can confer significant competitive advantages to DBS:

- **Massive Scalability & Performance:** OceanBase and TDSQL are designed for extreme transaction volumes and concurrency, as demonstrated in China's financial industry. For instance, Ant Group's OceanBase set world records with **707 million transactions per minute** in benchmarks, and it has powered high-profile events like Alibaba's "Double 11" sales. Chinese banks have used these technologies to achieve huge scale; Bank of Nanjing, for example, rebuilt its core on SOFAStack + OceanBase and scaled from handling 200k loans to 5 million, processing **1 million transactions per day** after the upgrade. Seeing such results, DBS likely views these platforms as a way to future-proof capacity and performance. As Southeast Asia's largest bank, DBS's transaction load is ever-growing – especially with more digital customers – and these distributed systems can **scale out** easily on cloud infrastructure. High throughput with low latency translates to smoother customer experiences (no slowdowns during peak usage) and the ability to launch services that can serve millions concurrently, a clear edge over less scalable rivals.
- **High Availability and Fault Tolerance:** A key promise of these technologies is **"always-on" resilience**. OceanBase, for example, was built with a multi-site architecture ("three data centers in two cities") to survive disasters without data loss. TDSQL similarly offers strong consistency across distributed nodes and automatic failover. By leveraging such designs, DBS can minimize downtime – a crucial competitive factor when customers demand 24/7 digital access. In practice, this means if one data center or node fails, the system continues running seamlessly on others. This level of resilience can become a selling point (as outages have hit some competitors). It's also essential for meeting regulators' uptime expectations (discussed

more below). In short, interest in these platforms is driven by DBS's need for **near-zero downtime** operations, which protect its reputation and keep customers loyal.

- **Cost Efficiency at Scale:** Running on distributed open systems can be far more cost-effective than legacy setups. DBS learned this from its MariaDB migration – seeing **30–70% cost savings** for certain workloads by eliminating proprietary licensing fees. OceanBase and TDSQL similarly run on commodity servers and often open-source or license-flexible models. Bank of Nanjing reportedly saved **90% in account management costs** after moving to the new OceanBase-powered core . For DBS, which continually looks to optimize its cost-income ratio, such savings are attractive. Lower infrastructure cost per transaction gives DBS pricing flexibility and ability to invest more in innovation. Additionally, avoiding expensive mainframes or proprietary databases reduces dependency on a single vendor's pricing and roadmap – a competitive advantage in agility. Thus, interest in these technologies is partly about **economic advantages**: doing more with less and scaling without linear cost increase.
- **Faster Time-to-Market (Agility):** Modern middleware stacks like SOFAStack are built for microservices and DevOps, which accelerate development. DBS has been reorganizing its tech architecture into microservices and using containers (e.g. Docker, OpenShift) to deploy applications quickly . These new platforms would complement that approach – they're **cloud-native** and support rapid, independent scaling of services. In DBS's MariaDB case, flexibility to deploy in containers and use a topology suited to microservices was a big benefit . SOFAStack provides a suite of ready components (service registry, high-availability frameworks, etc.) which could reduce the need to build or buy separate middleware pieces. Overall, adopting such integrated stacks means DBS developers can innovate and roll out new features faster than competitors tied to monolithic cores. The ability to quickly launch new digital products, or iterate in days instead of months, is a significant competitive edge in banking.
- **Real-Time Data and AI Capabilities:** Another advantage is improved data accessibility for analytics and AI. Distributed databases often have features for **hybrid transactional/analytical processing (HTAP)** or at least easy replication to data lakes. In DBS's current setup, they use change-data-capture from MariaDB to Hadoop for real-time analytics . OceanBase is known to handle both fast transactions and analytical queries on fresh data. By using such technology, DBS can glean insights (fraud detection, personalized offers, risk metrics) on up-to-the-second data. This feeds into their AI/ML initiatives – something DBS "continues to double down on" . Thus interest in advanced databases is also about empowering DBS's data-driven services (from customer "nudges" to risk management) with timely,

rich data – a competitive differentiator in delivering personalized, intelligent banking.In sum, DBS sees these next-gen database and middleware technologies as tools to **outperform peers on scalability, reliability, cost, and innovation speed**. Embracing them helps DBS maintain its edge as one of the "World's Best Banks" by ensuring its tech capabilities meet or exceed those of new digital-native entrants and big-tech competitors.

Regulatory Compliance and Resilience Considerations

As a systemically important bank in Singapore, DBS faces intense regulatory scrutiny on its technology resilience and data management. Its interest in robust distributed systems is partly driven by **regulatory compliance needs**:

- **Operational Resilience Requirements:** Regulators like the Monetary Authority of Singapore (MAS) demand high uptime and have penalized DBS for past outages. Notably, a major digital banking outage in November 2021 prompted MAS to term it "unacceptable," and a repeat incident in 2023 led MAS to temporarily cap DBS's expansion until issues were fixed . This backdrop makes reliability more than just an IT goal – it's a board-level compliance imperative. Technologies such as OceanBase and TDSQL, which offer multi-site redundancy and automatic failover, are attractive solutions to **strengthen resilience**. Indeed, DBS's CEO highlighted that the new CIO's priority is to "strengthen our technology resiliency" after those incidents . Adopting a distributed database that can keep services running despite node failures or site outages directly addresses regulators' expectations for continuous availability. In essence, DBS's exploration of these technologies is in line with ensuring compliance with stringent business continuity and IT risk guidelines set by MAS and other authorities. A more robust architecture means fewer disruptions to consumer services – a key outcome regulators want.
- **Data Integrity, Security, and Auditing:** Financial regulators also require strict controls on data accuracy, security, and auditability. Any new database considered by DBS must deliver **ACID-compliant transactions**, robust security, and detailed auditing capabilities. OceanBase and TDSQL were designed for banks and government-scale workloads, so they include features like strong consistency, encryption, role-based access, and audit logs. DBS's own open-source adoption playbook shows this concern: when migrating to MariaDB, they valued features like *data-at-rest encryption* and *user activity auditing* to "ensure compliance" with finance industry regulations . We can expect DBS to similarly scrutinize OceanBase and SOFAStack for compliance features. Early indications are positive – OceanBase has built-in security modules and has been used in highly regulated Chinese banks, suggesting it can meet compliance standards. By leveraging technologies proven in other banks, DBS can

satisfy regulators that any new system won't compromise on **data security or integrity**. This is critical not just for risk management, but also for meeting local data governance laws (e.g. ensuring customer data remains consistent across distributed nodes and recoverable in disasters).

- **Regulatory Endorsement of Innovation:** Interestingly, regulators in Singapore and regionally are encouraging banks to adopt cloud and innovate, as long as risks are managed. MAS has published guidelines on cloud usage and even partnerships with fintechs, provided proper controls are in place. DBS's interest in external fintech technologies (like Ant's and Tencent's) likely factors in compliance from day one – e.g. ensuring any third-party software meets MAS Technology Risk Management (TRM) guidelines. Working with established platforms can be easier to justify than building a new system in-house from scratch. Moreover, using multi-cloud or multi-data-center setups (which these distributed systems enable) can help DBS satisfy regulatory requirements for geographic diversity in disaster recovery. OceanBase's *"three-center, five-location"* deployment approach (as used by Ant) can support stringent recovery time objectives with zero data loss , aligning well with regulatory expectations for critical systems.
- **Transparency and Vendor Management:** Compliance isn't just technical; regulators also watch over outsourcing and vendor dependencies. One attraction of open-source or self-deployed solutions like OceanBase Community Edition or SOFAStack is that DBS could have more transparency into the code and control over the system. DBS has expressed that it likes to "be connected to the open source community" and not rely solely on vendors . This philosophy can appease regulators by reducing black-box dependencies. If DBS uses, say, an open-source version of these technologies, it can inspect and even tailor the code, and ensure continuity even if a vendor changes course. On the other hand, if engaging a vendor (Ant/Tencent), DBS would do so carefully under MAS outsourcing rules, likely after the tech has a solid track record. The fact that banks like ICBC and others have run core functions on OceanBase provides comfort that these systems have passed regulatory muster elsewhere. In summary, DBS's due diligence on these technologies would heavily weigh regulatory compliance, but those same considerations are a driving force *for* adopting them – to bolster resilience and control to meet regulatory standards.

Fit with DBS's Broader IT Strategy

Integrating OceanBase, SOFAStack, TDSQL or similar middleware into DBS's stack would not be an isolated move, but rather part of its holistic IT strategy.

Key aspects of how these technologies fit into the broader plan include:

- **Cloud and Hybrid Infrastructure:** DBS has been migrating to a hybrid multi-cloud architecture for greater scalability and resilience . It uses both private cloud (e.g. Pivotal Cloud Foundry) and public cloud (AWS/Azure) components in a mix-and-match approach. Distributed databases like OceanBase are designed to be cloud-agnostic and can run on commodity clusters, making them suitable for hybrid deployments. For example, DBS could deploy OceanBase across its private cloud data centers and burst to public cloud if needed, achieving true elasticity. This aligns with DBS's strategy of not "betting on one horse" for cloud platforms . In fact, DBS already runs container platforms (Red Hat OpenShift, etc.) to orchestrate microservices – a distributed database could be offered as a containerized service to developers on the same platform. In short, these technologies would **enhance DBS's cloud-native ecosystem**, providing a scalable data foundation beneath its cloud-based apps. They essentially fulfill the need for a cloud-ready, database-as-a-service component in DBS's architecture, completing the stack (alongside container orchestration, CI/CD pipelines, and cloud middleware).
- **Microservices and Middleware Modernization:** DBS's IT architecture has been evolving from monolithic applications to a microservices-based model for flexibility. Middleware plays a critical role in such an architecture for service discovery, transaction management, messaging, etc. SOFAStack is essentially a **one-stop microservices framework** that offers these capabilities out-of-the-box, tuned for financial transactions. This could accelerate DBS's ongoing re-architecture of its applications. Rather than continuing with a patchwork of legacy middleware (like older ESBs or messaging systems), DBS could adopt a proven, modern middleware stack to support its hundreds of microservices. This fits well with DBS's cultural shift to agile DevOps – teams can focus on business logic while the standardized middleware handles reliability concerns. In fact, DBS has experimented with similar tools (for instance, using Kong API gateway to modernize APIs) . Adopting SOFAStack or similar would be a continuation of that trend, bringing consistency and **"financial-grade" robustness** to its middleware layer. It's a way to ensure that as DBS becomes an API-driven bank (exposing many services to partners and ecosystems), the underlying middleware can handle the load securely and efficiently.
- **Open-Source and In-House Engineering:** A notable aspect of DBS's IT strategy is its embrace of open-source software and building internal engineering talent. DBS's group CIO has said open source "has been pivotal" to their transformation

  . The bank uses Apache Kafka, Spark, Hadoop, PostgreSQL, MariaDB

and more
, and even plans to contribute back to open source. In this context, OceanBase (which was open-sourced by Ant in 2020) and SOFAStack (also open-sourced) fit their philosophy. DBS can leverage a community-driven technology and possibly contribute enhancements or plugins relevant to its needs. This not only reduces license costs but also gives DBS **technical sovereignty** – its engineers can deeply understand and tweak the code. The interest in these technologies thus dovetails with DBS's strategy of being a tech innovator rather than a passive consumer. It's worth noting that DBS hosted internal open-source conferences to share successes of using open tech in a "risk-averse" industry
, indicating a cultural commitment to such technologies. By evaluating OceanBase or TDSQL, DBS's engineering teams are expanding their toolkit of scalable open solutions, which could later be adopted enterprise-wide if proven. It's an example of DBS staying at the forefront of technology experimentation within the banking sector.

- **Data Strategy and Analytics:** DBS's broader strategy places heavy emphasis on data analytics and AI to personalize services and drive efficiency. The bank's data platforms rely on streaming and real-time processing (using tools like Apache Kafka and Spark). A distributed, high-performance database would enhance this by serving as a **central source of truth that can feed downstream analytics in real-time**. For example, TDSQL has strong consistency guarantees which means analytical systems see up-to-date, accurate data – crucial for risk or fraud models. OceanBase's ability to handle transactional and some analytical workloads on one system (HTAP) could simplify DBS's data architecture (fewer ETL delays between OLTP and OLAP). This aligns with DBS's push for real-time intelligence; as one DBS architect put it, *"the ability to stream data from our OLTP databases to our Hadoop cluster in real time is critical for us to have real-time insight"* . Adopting a modern distributed DB can either provide that streaming out-of-the-box or at least not impede it with legacy constraints. Therefore, these technologies support DBS's **analytics goals** by enabling a more integrated and timely data pipeline, feeding their AI/ML models that power customer insights and operational automation.
- **Multi-Regional Growth and Compliance**: Finally, DBS operates across multiple markets (Singapore, Hong Kong, India, Indonesia, etc.). Its IT strategy often involves creating common platforms it can reuse in different countries . Distributed databases that are geo-distributed can help unify DBS's infrastructure across regions while still allowing local data residency as required. For instance, TDSQL and OceanBase support deployment across multiple regions with consistent replication. DBS could potentially deploy a cross-region core banking database that serves all its Asian markets with appropriate sharding or

tenancy – something hard to do with older tech. This fits the bank's strategy of having common, strategic platforms across locations to accelerate rollouts
. It also plays into regulatory compliance per country (data can be partitioned or localized as needed in a multi-region setup). Thus, the interest in these technologies also reflects **DBS's regional expansion needs**, ensuring its IT backbone can scale and adapt globally.

Past Initiatives and Use of These Technologies

Open Source Database Adoption: While DBS has not publicly announced the use of OceanBase, TDSQL or SOFAStack in production, it has undertaken analogous initiatives. Most prominently, DBS migrated a substantial portion of its databases from Oracle to MariaDB (an open-source RDBMS) starting in the mid-2010s. This project saw over 30 applications – including mission-critical payment and corporate banking systems – running on MariaDB, with the first major ones going live in 2017. The migration's success (noted by significant cost savings and performance benefits) demonstrated DBS's willingness to replace legacy tech with modern databases. It also proved that open-source databases can meet DBS's strict reliability and compliance requirements, as those MariaDB systems featured encryption, auditing, and real-time data streaming to Hadoop for analytics. This experience likely set the stage for considering next-generation databases like OceanBase or TDSQL. In fact, MariaDB itself highlights DBS Bank as a key enterprise user of open-source databases. The shift to MariaDB shows a clear pattern: DBS is **willing to pioneer new database tech** (within reason) to achieve flexibility and cost-effectiveness, which lends credibility to the idea that DBS would explore Chinese distributed databases as a next step in that evolution.

Mainframe Decommissioning: In a related modernization effort, DBS has worked to eliminate legacy mainframes. DBS Hong Kong notably became the first of the bank's regional units to fully decommission its mainframe in 2019, migrating core banking functionality to modern systems. While details are scant publicly, such a migration would require a combination of new core banking software and databases capable of handling core workloads on distributed infrastructure. It's possible that in this process DBS evaluated various solutions (from traditional core vendors like Temenos, to in-house builds, to emerging tech like Ant's stack). The fact that DBS accomplished this indicates it has developed confidence in **distributed architectures for core systems**. This context explains why DBS's tech leaders are interested in the likes of OceanBase and SOFAStack – these could be the building blocks of a future distributed core banking platform. Even if not used yet, they represent the type of technology DBS would consider for any large-scale core revamp or greenfield digital bank initiative, given the bank's trajectory away from monoliths.

Collaboration with Chinese Tech Firms: DBS's interest in Chinese-born technologies also stems from its growing partnerships with Chinese fintech and

tech companies. For example, DBS has worked with Ant Group's international arm on a blockchain trade and treasury project (Trusple platform and Treasury Tokens pilot). In that collaboration, DBS gained exposure to Ant's technology capabilities. Although that project was blockchain-focused, it underscores a relationship where DBS can learn about Ant's broader tech stack (which includes OceanBase and SOFAStack). Additionally, in 2024 DBS appointed **Eugene Huang – former CEO of Ping An Technology – as its new CIO**. Ping An is another Chinese financial giant known for its advanced IT (and OneConnect fintech platform). Huang's background includes overseeing middleware and IT infrastructure for Ping An's many businesses. By bringing him on, DBS signaled a desire to inject Chinese fintech tech expertise into its leadership. It's reasonable to expect that under his guidance, DBS will intensify exploration of systems akin to those used at Ping An, Ant, and Tencent. In industry forums, DBS executives have also shared stages with OceanBase representatives – for instance, at fintech summits in Hong Kong and Singapore– suggesting an active dialog with these tech providers. While no official statement confirms DBS deploying OceanBase or TDSQL yet, these engagements and hires show **concrete interest and knowledge exchange**. DBS could be running proof-of-concepts or internal sandbox trials with these systems to evaluate their fit.

Ecosystem and Open Innovation Programs: DBS also runs innovation programs (like accelerators and hackathons) and participates in industry groups where emerging technologies are tested. It partnered in fintech accelerators in Hong Kong, for example, which could bring exposure to middleware solutions like SOFAStack via startup solutions. Moreover, DBS's **Engineering excellence teams and Centers of Excellence** internally focus on areas like cloud database services, API middleware, etc., which likely keep tabs on global tech trends. DBS has publicly stated it looks to contribute to open source in the future– a hint that if they do adopt something like OceanBase (open-sourced in 2020), they might actively participate in its community. So even if direct past use is limited, DBS is building the internal capacity (skills, partnerships, leadership) to leverage these advanced databases and middleware when the opportunity arises. In the meantime, the bank continues to refine its existing open-source stack (such as using Apache Kafka for streaming, Redis for caching, etc.), ensuring that once a decision is made to incorporate a distributed SQL database or a new middleware framework, the surrounding ecosystem at DBS is ready to maximize its value.

Conclusion

DBS Bank's interest in OceanBase, SOFAStack, TDSQL and similar technologies is driven by its relentless push to remain at the forefront of digital banking. Strategically, DBS aims to transform its core systems and infrastructure to mirror the speed, scalability, and innovation of tech giants – an ambition that naturally leads it to explore the state-of-the-art in databases and middleware. The bank envisions competitive advantages from these technologies in the form of massive scalability, higher resiliency, faster product development, and

lower operating costs, all of which help it defend and extend its market leadership. Crucially, DBS's focus on these platforms is tempered by a need to satisfy regulators' demands for stability and security, making the proven track record of OceanBase and TDSQL in financial settings very appealing. Integrating such technologies aligns with DBS's broader IT roadmap of cloud adoption, microservices architecture, open-source utilization, and data-driven services – essentially serving as the foundation on which "DBS 2.0" (a truly digital bank) can run.

While DBS has already embarked on this journey through moves like open-source database migration and mainframe elimination, the coming years may see deeper forays into these advanced systems. We can expect DBS to continue piloting and gradually incorporating these technologies where they make sense, especially under a leadership now bolstered by expertise from Asia's fintech innovators. In doing so, DBS must balance innovation with governance, but if successful, it will reinforce its position as a **global leader in digital banking technology**, leveraging the best of East and West in fintech to serve its customers. The bank's interest in OceanBase, SOFAStack, and TDSQL today could well translate into the digital core of its operations tomorrow – a core built for relentless growth, agility, and resiliency in a fast-evolving banking landscape