DIAMANTI

Intesa Sanpaolo Fast-Tracks
its Digital Transformation with the
Diamanti Enterprise Kubernetes® Platform

INTESA [nnn] SANPAOLO

Intesa Sanpaolo is the leading banking group in Italy and one of the top banking groups in Europe, with a market capitalization of 38.1 billion Euro (as of September 30, 2019). Intesa Sanpaolo has around 5,000 branches and 19 million customers in approximately 40 countries worldwide.

In 2018, the bank launched a strategic digital transformation initiative it called Digital Architecture Reengineering Works Through Innovation. The strategy was to embrace a microservices and container architecture, and migrate from monolithic to multi-tier applications. The goal was to accelerate development cycles, shrink application footprints for more flexibility, and improve scalability and reliability. The bank's IT group was transforming itself into a software company with a bimodal IT model based on modern CI/CD practices. At the center of the initiative was the challenge of running containers managed by Kubernetes.

The bank first tested pilot container projects by running them on its legacy virtualization infrastructure. Those pilots have been successful and have been brought into production, but the desire to look for the best solution to manage cloud-native technologies, both on-premises and in the cloud, has pushed research into understanding which technologies to adopt, and how they compare with each other and which are the best uses for each of them.

Challenges

- The bank's legacy infrastructure hindered deployment of containers and Kubernetes in production

- Microservices architecture was difficult to deploy across zones and sites

- Developing and running more than 3,000 in-house applications was becoming unmanageable

Benefits

- Diamanti's purpose-built bare-metal platform simplified container deployments and eliminated the virtualization tax

- Multi-zone and multi-site clustering are easy to implement on Diamanti

- Diamanti QoS capabilities enabled the bank to improve scalability and density

For on-premises compute requirements, the bank management decided to evaluate a bare-metal infrastructure. That decision forced a whole new set of challenges around integration and creating new building blocks from scratch. Fortunately, the bank's IT team learned about Diamanti and its full-stack Kubernetes solution that delivers bare-metal performance with industry leading quality-of-service guarantees—all fully compatible with the cloud.

From a software perspective, the bank could stay focused on a Kubertnetes and containers strategy. At the same time, the underlying infrastructure layer based on Diamanti could also meet all of its requirements for storage and network virtualization with high performance levels to satisfy business unit SLAs. Diamanti gave the team a convenient mechanism to provide high availability across multi-zone and multi-site clusters with quality of service guarantees for different applications with different levels of business criticality.

Today the bank runs more than 3,000 applications in a metro-cluster environment along with data replication (DR) at distant sites. Of those, more than 120 are now running in production in the new microservices architecture, including two of the 10 most business-critical for the bank in a multi-cluster and multi-site model with data replication providing high availability.

To start the project and incorporate Kubernetes into the eventual solution, the bank built its first Kubernetes cluster on the existing virtualization infrastructure layer. That was enough to quickly kickstart the project during the evaluation phase and provided a fast and easy way to move quickly to the design phase where IT leadership had already decided upon a bare-metal solution.

What kinds of applications did the bank want to run on microservices? From the start the team focused on two classes of applications. All new applications were immediately built with a microservices approach.

For existing, monolithic applications, the bank followed the so-called Strangler Application pattern. As new functionality was added to any legacy application, each new feature was added as a new microservices mini application. The legacy and the microservices applications ran in parallel until eventually they were migrated into one new application at which point the old monolith was "strangled" at its end of life.

Software development moved from a scenario where all actors insisted on a single pipeline, and where a single commit could fail a build and stall the development, test and deployment process. That process shifted to one where each actor had their own stream of development for each dedicated component.

This change made life easier to operations in scaling the needs of the application team for their specific infrastructure. It was an elegant solution. Each component of the application relied on a dedicated container which could be scaled horizontally. By avoiding the domino effect of failure, reliability dramatically improved. The new approach also simplified automation, eliminating a lot of manual steps on both the developer and operator side of rolling out a new application. This led to much better code quality overall.

While the shift to containers, Kubernetes and a microservices architecture led to order of magnitude improvements in scalability, reliability and speed of development and deployment, there were also substantial challenges for the bank to manage.

- **Sizing:** The first challenge came with accurately sizing the underlying infrastructure required to run the microservices architecture since it was based on a new paradigm. The rules the bank used in the past, for traditional monolithic applications, needed to be refined and changed. Microservice applications do not behave in the same way as monolithic applications and they don't consume the same amount of resources. There was a new learning curve that had to be mastered.
- **Processes:** Making microservices work with the existing datacenter ecosystem is a fundamental change in the way the bank built and implemented the applications and provided the underlying infrastructure with resources. The team found that using a container platform together with the Diamanti technology was extremely useful in this process. From the application point of view, the new paradigm, however simple for greenfield applications, will require a lot of work for the thousands of applications that the bank intends to rewrite as microservices.
- **Cultural challenges:** The concept of DevOps and differences in mentality between developers and operations required a new way of thinking about creating and deploying applications.

The team found significant operational benefits in embracing the new architecture. Change management is now based on a new paradigm, and change processes now take weeks to release a new build versus months under the old system. The streams of software development are now parallel rather than serial for many stakeholders. This not only reduces the time to development but also reduces many of the risks and isolates domino effect of cascading failures. These were the key goals for the bank's strategic digital initiative.

Diamanti supported all those aspects with specific counterparts from the infrastructure's perspective:

- The full-stack platform model improved speed of deployment and scalability with simplified support from a single vendor as applications and use cases continue to expand;
- Multi-zone and multi-site clustering is easy to implement without complex software-to-hardware (e.g. storage and network) integrations;
- Networking and storage architecture with hardware acceleration and QoS let the bank reach the level of scalability and density it needed provided by the Diamanti bare-metal platform.

ACKNOWLEDGEMENTS

ABOUT DIAMANTI

Diamanti delivers the industry's only purpose-built, fully integrated enterprise Kubernetes platform, spanning on-premises and public cloud environments. It gives infrastructure architects, IT operations, and application owners the performance, simplicity, security, and enterprise features they need to get cloud-native applications to market fast. Diamanti provides the lowest total cost of ownership to enterprise customers for their most demanding applications.

Based in San Jose, California, Diamanti is backed by venture investors ClearSky, CRV, Engineering Capital, Goldman Sachs, GSR Ventures, Northgate Capital, Threshold Ventures (formerly DFJ Venture), and Translink Capital. For more information visit www.diamanti.com or follow @DiamantiCom.

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