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CARNIVAL CORPORATION SAILS AHEAD WITH FUTURE SYSTEMS

An adaptive enterprise architecture powers breakthrough guest experiences and crew interactions

In a converted military facility in Florida, Carnival Corporation's Global Experience & Innovation team formulated a vision for a guest journey unlike anything in the cruise industry. To bring this extraordinary vision to life, Carnival's innovation team enlisted Accenture to help the world's largest "experience enterprise" design an ultra-modern, flexible, scalable technology architecture—an approach pioneered by the largest social media networks.

MAKING WAVES IN CRUISING

Carnival Corp.'s CEO Arnold Donald has dubbed today "the golden age of cruising." With growth in guest numbers, fleet sizes, ticket prices and a sea of new competitors, the description certainly fits. However, as dynamic as the industry is, the cruise travel category remains under penetrated.

The company's leadership knew to expand the market for cruise vacations, the cruise model itself had to change. The focus needed to go beyond building and marketing new ships to leveraging the company's scale to create a new and sustainable competitive advantage. With the world's largest fleet spanning nine distinct brands, Carnival Corp. envisioned a new model that elevated guest experience enablement above the physical ship platform.

This new model leverages IoT to create the world's first Experience Internet of Things™ (xIoT™). This makes truly personalized vacations, which were previously available only to elite travelers, available to everyone traveling on the largest of ships. The new model minimizes the visual use of technology by embedding the xIoT into the ship's physical environment and focusing the associated real-time intelligence on empowering guest and crew human interactions. In short, Carnival Corp.'s innovation focus was to disrupt the traditional relationship between scale and service to deliver the personalization of small ship cruising to a ship of any size or vintage.

MONOLITHS TO MICROSERVICES

The cruise giant needed advanced enterprise class technology to deliver its personalization at scale vision. The technology had to be a future-ready system—expressly made for continuous change, high transaction volumes, resiliency, and most importantly, the interconnected and interdependent world—a "living" system of applications, infrastructure, process and people. Carnival's Global Experience & Innovation team turned to Accenture—its premier innovation partner—to help develop the living architecture to provide this potential "technology utopia" that would span from guest homes to ports to ships to islands while simultaneously empowering human, digital and physical experiences.

Accenture championed a microservices-based platform. This is an approach to architecture that uses tools like application programming interfaces (APIs), containers, event streams and the cloud to decouple applications into individual services that are typically assembled around specific business functions. This modular architecture was ideal for Carnival Corp.'s xIoT platform. It would make it possible to scale innovation at speed, reuse components efficiently, and streamline integration and data sharing.

As exciting as this new flexibility was, the transformation had multiple challenges. First, executing a microservices strategy is deceptively difficult. There are countless, interdependent elements to orchestrate when decomposing monolithic systems into discrete functions. Getting to the end-state elegance of a microservices architecture inherently requires developers to labor through a maze of permutations and possibilities. Added to that is the complexity of working on the massive scale of a ship.

Second, data quality and architectural discipline must be very strong due to the data-dependent nature of the systems. The effectiveness of a microservice depends on how autonomously it can operate, which is driven by how interconnected the data is. As microservices evolve and new functionality is added that requires different data elements, technical decisions get exponentially more complicated and require enormous leadership discipline to maintain platform harmony. This discipline goes well beyond what is needed in conventional agile based "digital" transformation efforts.

Finally, unlike digital-native companies that were built on microservices architectures, Carnival Corp. had to move beyond legacy systems without any business disruption. Consider too the unique challenges that come with massive technology transformation for cruise ships—floating cities that weigh hundreds of thousands of gross tons, hold thousands of passengers, sail continuously anywhere in the world and have no terrestrial communications infrastructure.

THE OCEANMEDALLION™

All guests on board a MedallionClass™ Experience ship receive a free OceanMedallion™. This is a sophisticated, wearable device that enables every guest to connect to a secure experience Internet of Things™ (xIoT™) network composed of thousands of sensors and digital devices. The light, quarter-sized disc facilitates the enhanced guest experience but has no discernible technology—no on-off switch, no charging, no menu to navigate.

The Medallion™ holds a guest's unique digital identity and communicates with the xIoT on board as well as in select ports and provides crew members with information about each guest to help them provide bespoke services and experiences. The Medallion enables a frictionless payment, keyless stateroom access, cashless casino, accelerated embarkation and much more.

THE GUEST IS THE COMPASS

This transformation had an unconventional start. In September 2016, the team gathered at Carnival Corp.'s Global Experience & Innovation Center (XIC), a converted military facility in Doral, Florida. There, the innovation team created a replica of every physical touchpoint in the guest experience journey—from the living room where people make their travel choices to the airport, the port of embarkation, the stateroom and onboard points of interest like the pool and casino. Walking through the space and following the storyline that Carnival Corp. had provided, developers could literally immerse themselves in the next guest experience.

For months, the Accenture team—including people from Fjord, Accenture's design and innovation consultancy, along with multiple other top creative, business and technology teams—worked intensely to translate Carnival's vision into a holistic development plan. The plan was not only comprehensive, but relentlessly guest-centric.

With this development plan, the next step was to get started with the new architecture. Determining where to start development for a massive program with such a clear and aggressive vision can be challenging. Combining the strength of both traditional Waterfall and Agile development methods into a novel "hybrid" model, the Carnival and Accenture team conceived a custom design of OceanHospitality™, the world's first, identity-based, microservices-enabled cloud property management system.

An event-driven architecture made it possible for the new system to respond to change in ways that the old one never could. For fast, scalable stream processing, the team used Apache Kafka®, an open source streaming platform. For the data tier, the team turned to the Apache Cassandra™, an open source database management system.

From day one, teams followed an experience-led design with clearly defined development principles. Part of this was grouping delivery teams by end-to-end customer experiences. Initially, experience creators, technology innovators, business operators, creative designers, software developers and testers worked on domain teams aligned to an experience capability, not a technical platform. By centering on the guest experience, better development decisions could be made on how to engineer the microservices. Organizing applications along experience and data dimensions made it possible to enable guests' experiences across previously siloed operating verticals. This provided Carnival the unique opportunity to innovate in a manner that mirrors the guest experience.

Accenture embedded with Carnival's Global Experience & Innovation team and worked with a broader collection of niche development teams. Their mantra of no "vendor boundaries" made it possible to progress rapidly, using a 24/7/365 delivery model leveraging centers across the world. And, their continuous development and integration approach—including testing, performance and engineering—enabled the rapid release of hundreds of microservices.

It was critical to build the right translation logic to develop a new ship-agnostic services platform model. This made the existing single ship "on premises" model obsolete and made it possible to transition seamlessly without negatively impacting the guest and crew experience. The novel hybrid development approach made it easier for guests and crew to absorb the change because the outcome was precisely defined and continuity was maintained throughout, even amid challenges.

At the height of the effort, Accenture had more than 20 scrum teams of six to 10 developers working with Carnival's innovation team to deliver the solutions to enable new guest experiences. These include seamless payment, keyless personalized stateroom access, and frictionless embarkation. Accenture assisted with an innovative crew application that leveraged the OceanMedallion™ to magically help crew identify guests in real-time so service delivery could be personalized and customized.

Accenture Technology professionals also contributed to the system that manages the lifecycle of the OceanMedallion™, including ordering, fulfillment and shipping. To help ensure a secure system, Accenture helped design and implement the user authentication services and continues to operate security services while continuing to apply the latest security capabilities to the platform.

All of this was possible because Carnival Corporation's Global Experience & Innovation team followed a collaborative development approach that seamlessly integrated Accenture's team and collectively committed to achieving extraordinary outcomes. Delivering this level of ambitious transformation requires an extensive knowledge of technology, operations, business—and most importantly—the guest experience. Accenture's breadth of capabilities and passion to assemble leading expertise from all five of its businesses—Technology, Strategy, Consulting, Digital and Operations—made these outcomes achievable.

REACHING THE DESTINATION

In a relatively short time, Carnival Corp. has shattered technology limitations that historically constrain cruise operations. At the same time, it created a new technology model to enable experiences that make a cruise vacation second to none.

Making its guest-centric vision a reality demanded a fresh approach to building a technology-based ecosystem. This involved harnessing the "art of the possible" and shedding old processes and beliefs while aligning the experience, operations, business and technology into a unified model. By merging software, hardware, data and cloud into a living system that adjusts to people—rather than expecting people to adjust to systems—Carnival Corp. is scaling innovation at speed with future systems. And guests are getting more of the vacation they love.

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