

# Microservices for Airlines Industry

by Sunil Tufchi



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# 1.

## Introduction

The purpose of this whitepaper is to document operational and business challenges that airline domain faces on a day-to-day basis with respect to its operations, and how microservices-based architecture can help overcome them and offer benefits.

### **Intended Audience:**

The following are the intended readers of this document:

- Business decision makers in airlines domain
- Technology decision makers in airlines domain
- Business managers and users in airlines domain
- IT management in airlines domain
- API/Microservices Centre of Excellence teams

# 2.

## Summary

This whitepaper details out the business challenges the airlines industry is facing today (from a technology point of view) and how microservice architecture can be the answer to these issues. It also talks about some of the key sales play for microservices-based architecture and highlights the functional overview of airlines domain in the context of sub-domains such as revenue planning, cargo management, CSS, shipping monitoring, etc. The document also describes some of the low-level use cases such as ticket reservation process and airport merchandising, and gives a view on how microservices architecture can redefine these areas.

### 3.

## Definitions, Acronyms, and Abbreviations

Term	Description & Remarks
MSA	Microservices-based Architecture
PSS	Passenger Self-service
KYC	Know Your Customer
STP	Straight Through Processing
SOP	Standard Operating Procedure
LOB	Line of Business
ESB	Enterprise Service Bus
CSS	Customer Self-service
NDC	New Distribution Capability
MVP	Minimum Viable Product
MLP	Minimum Lovable Product
GDS	Global Distribution System
OTA	Open Travel Alliance

### 4.

## Why Microservices?

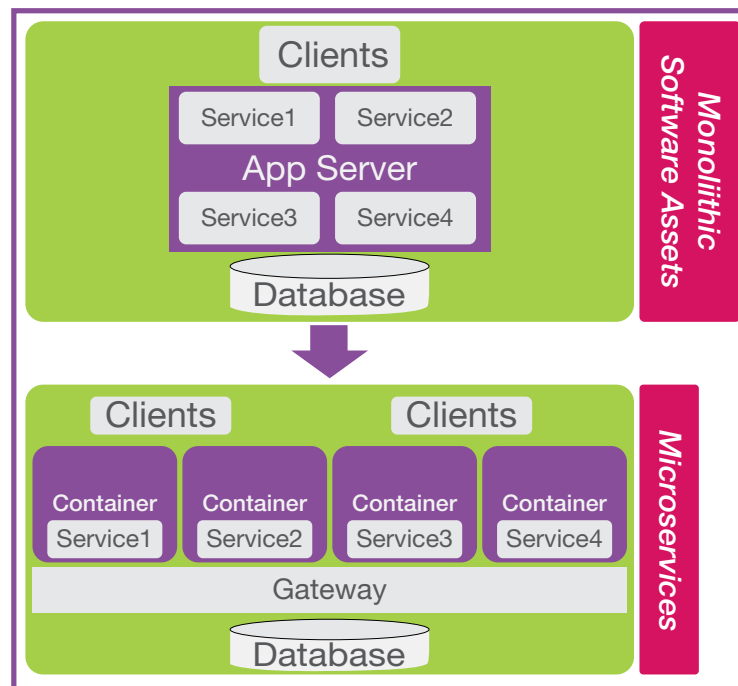
### a. Business Challenges

Some of the business challenges that airlines industry faces in today's rapidly changing marketplace are as follows:

- Increased **time to market** for new customer services (Up-sell / Cross-sell / New offerings scenarios) due to dynamic digital process disruptions
- CXOs are increasingly thinking of **monetization of digital assets** via Services / API Economy so that enterprise IT no longer remains a cost center
- Sky rocketing software **development / maintenance** costs in digital economy due to siloed efforts within an enterprise's boundary
- Businesses relying heavily on monolithic packaged implementations for rendering customer services are **constrained by vendor product upgrade schedules** for ensuring best in class customer experiences
- Enterprise product vendors take **longer cycle times** for coming up with product versions (Minimum Viable Product to Minimum Lovable Product (MVP to MLP))
- **Geo-specific readiness** for rapid roll-out of products and services
- **Expensive digital integrations** across omni channel / SaaS systems

## b. Solution

The key solution to resolve the above-mentioned challenges faced by the airlines industry is going to be through the change of their existing monolithic software architectural patterns to a microservices-based architecture. This solution intrinsically breaks down a monolithic, tightly coupled application into a loosely bound context specific microservices-based architecture, to make it more flexible and responsive to change.



## c. Advantages

Some of the key advantages that a microservices-based architecture can bring to an enterprise are as follows:

- Manifold increase in ability to handle growth and diversity of existing and emerging digital channels (more than 3x as per the analyst reports)
- YoY cost savings of more than 20% on enterprise IT budgets for API/microservices adoption
- Software reuse via microservices adoption reduces TCO by 25-30%
- New services adoption time reduced by more than 90%
- End-to-end business agility established through DevOps/Cloud Ops methodologies which are tailor-made for microservices implementation

## 5. How do Microservices Benefit the Airlines Industry?

- Airline industry is currently undergoing transition as everything is moving towards digital, including the existing physical networks
- Significant pressure to consistently realize true revenue growth and profitability potential
- Several businesses have global audience due to advancement in technology, and the airline industry is no exception
- Offering improved customer experience has become more important than ever before
- Current distribution system is not able to keep up with the travelers' expectations. How NDC (New Distribution Capability) will impact the distribution system needs to be seen.

## 6. Sales Play – Microservices Architecture in Airlines

Some of the typical use cases in the airlines domain which can be the candidates for microservices-based architecture are -

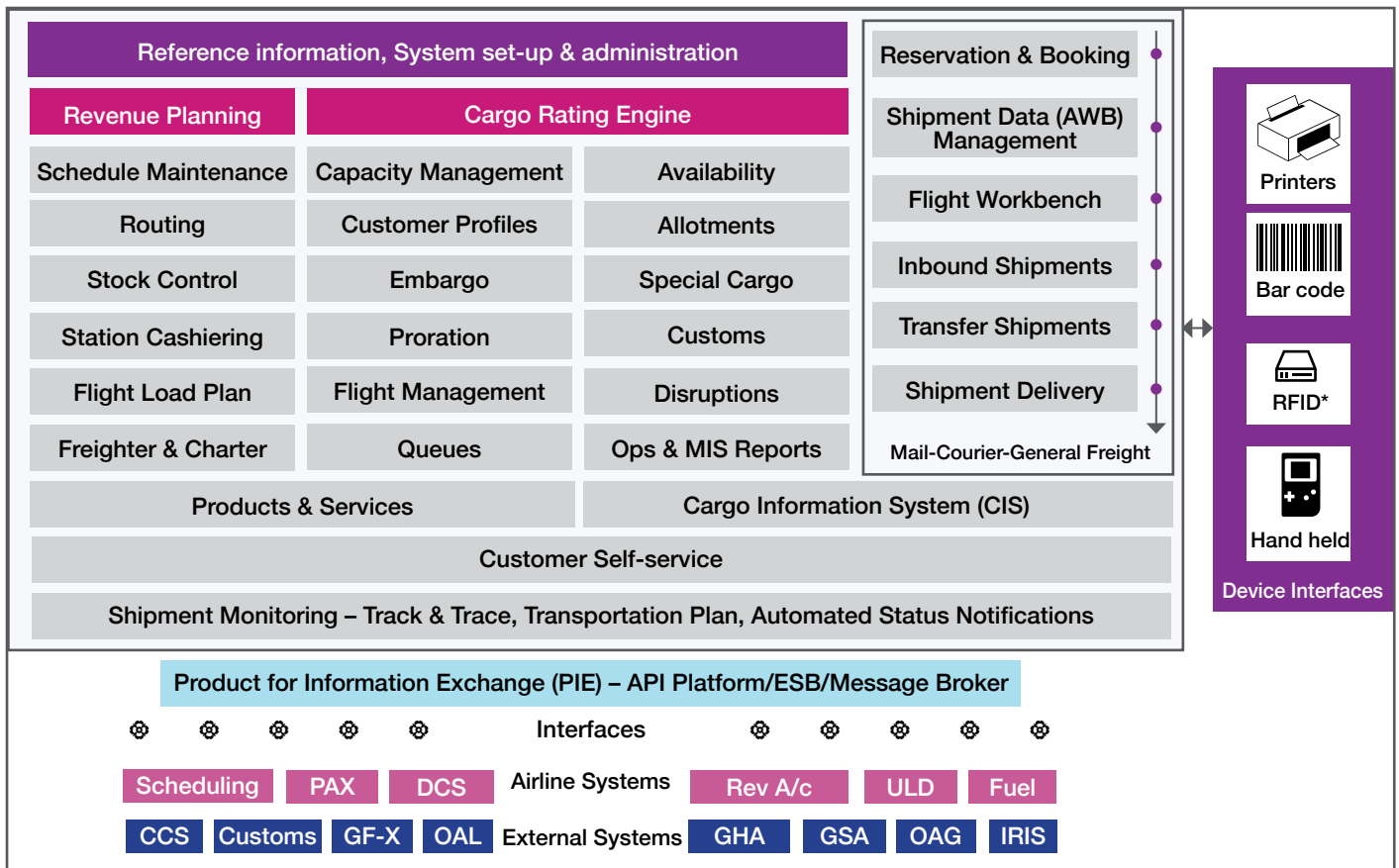
Benefits of using microservices-based architecture in these cases are -



- MSA helps in building distributed architecture capabilities
- The airport applications will use microservices infrastructure to check and consume the services to solve the specific need of passengers
- The MSA helps us to generate personalized recommendation and display it on a mobile device based on the inputs received from various systems
- Inference engines for developing personalized recommendations can be developed as microservices, for other travel applications to consume
- MSA tackles the heart of the travel system's heterogeneity by abstracting the complexity, providing specific business functions and promoting content sharing across the travel service providers
- Reduced time to market for new service launches
- Facilitates seasonal scalability requirements
- MSA also aligns with the approach of defining airline industry standards on the data model, content interchange, and passenger-centric services

# 7. Functional Overview - Airlines

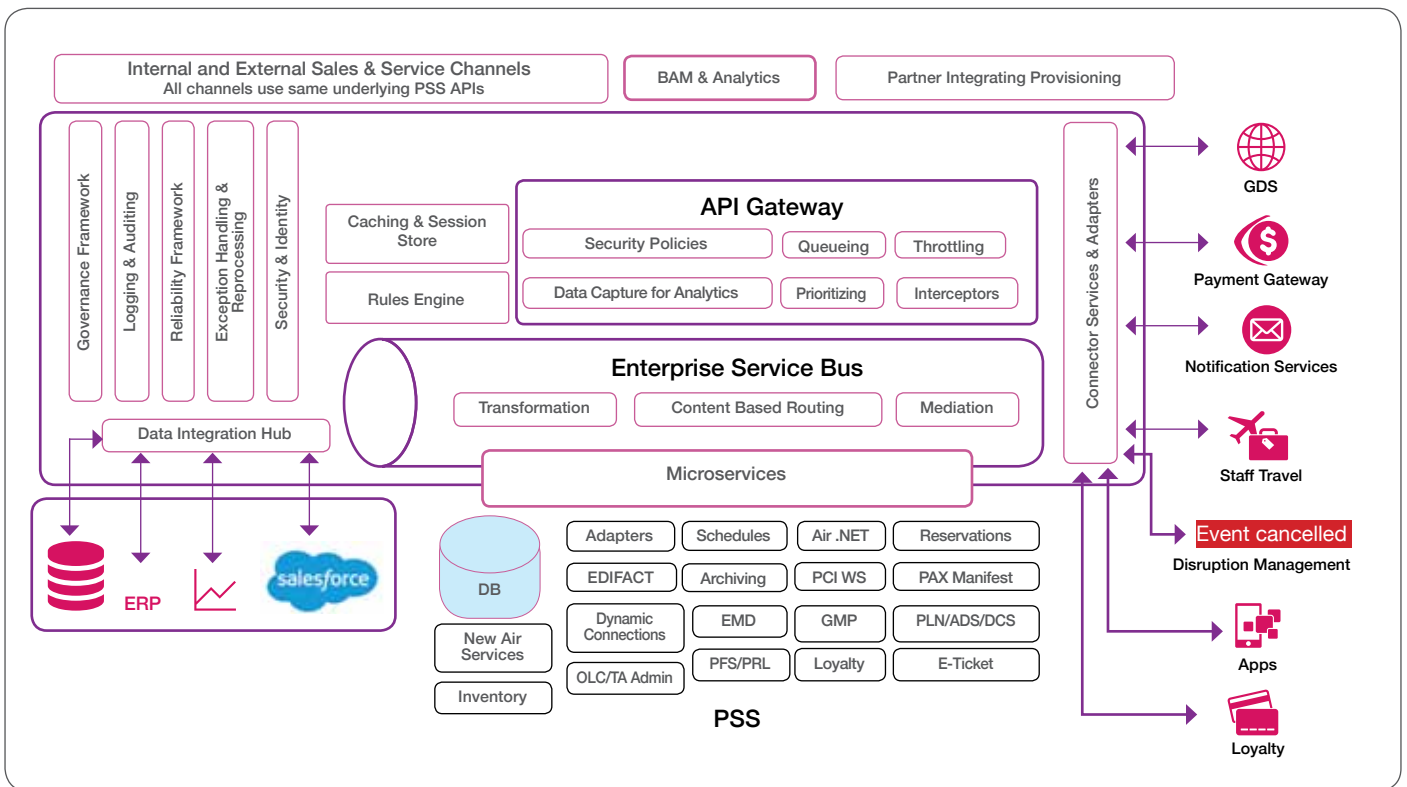
The below given infographic shows us how disparate functional and technology components come together to create a functional view of the sub-domain like cargo management in the overall airlines domain. It also depicts how the API platform, ESB or a message broker-based integration architecture can help to integrate the enterprise assets to realize this solution. The bottom part shows the key backend and external systems of the airlines, which will integrate with the solution to provide the necessary services and data.



# 8.

## Microservices-based Architecture for PSS

Given below is microservices-based architecture for PSS. The right pane of the architecture shows the third-party systems, and the key PSS systems appear at the bottom. The overall design comprises of an API gateway, enterprise service bus, data integration hub and microservices. The top part highlights the internal and external sales & service channels that use the same underlying PSS APIs. In addition to this, the system also has BAM and analytics capabilities. All the third-party systems such as GDS, Payment gateway, third-party apps, etc., will use the connector services and adapters, or the API Gateway to access the services.

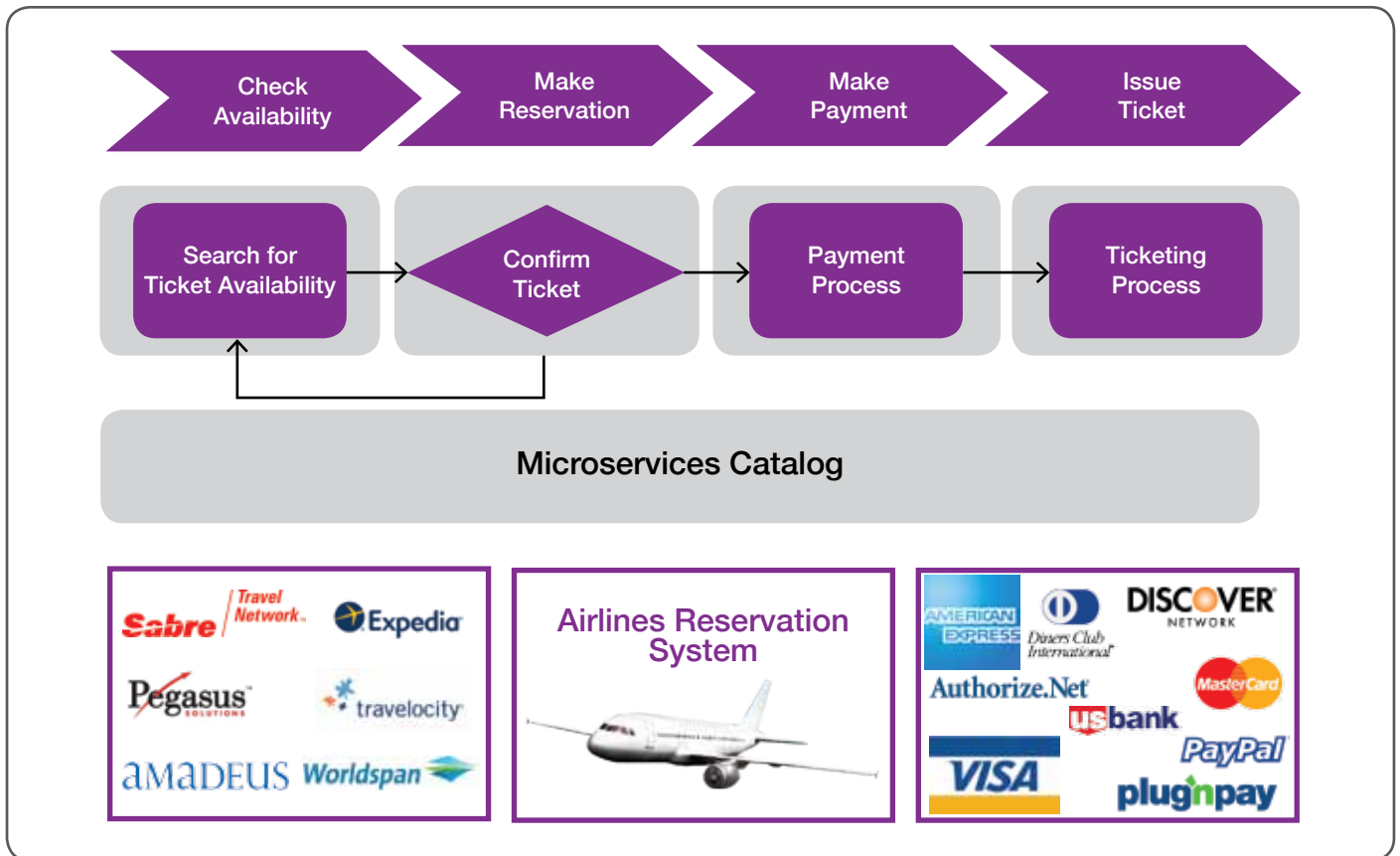




# 9. Microservices User Stories: Ticket Reservation Process

Depicted below is a typical process ticket reservation process.

The key elements of this process flow are -

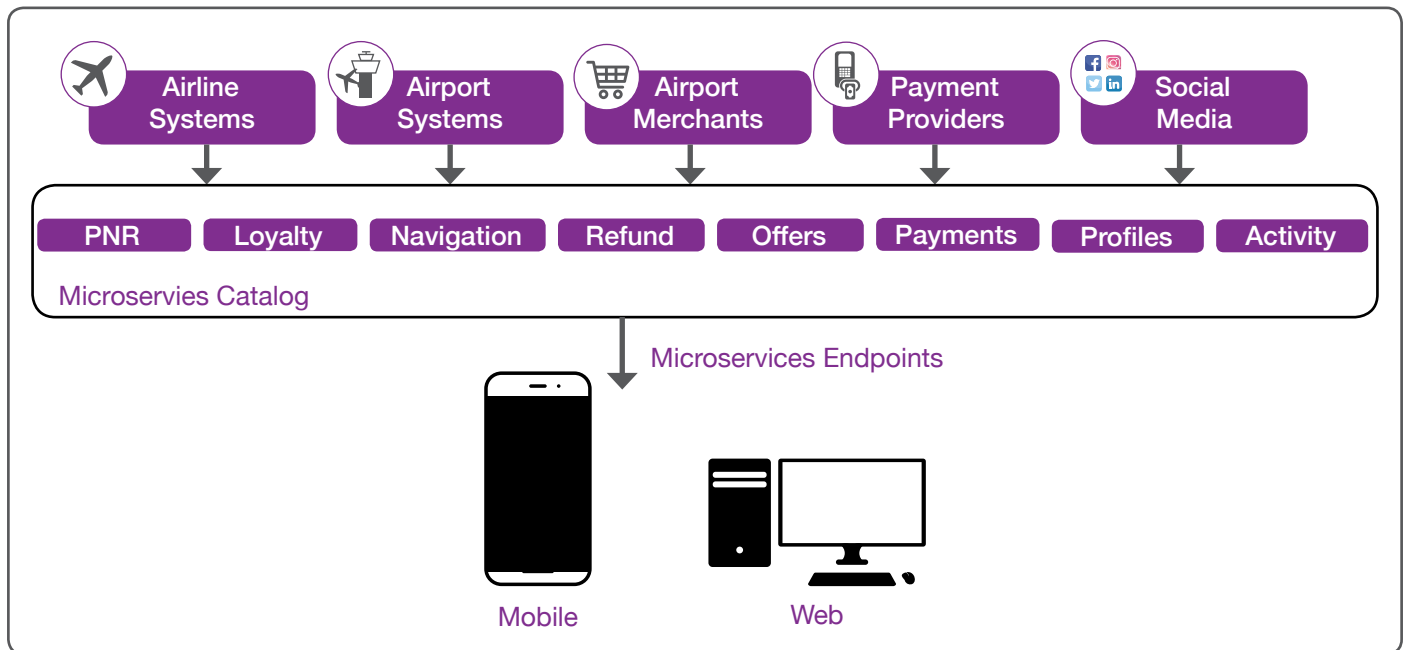


Some of the challenges in building a successful and scalable reservation solution for airlines are as mentioned below -

- Airline industry requires complex integrations with relatively disparate systems. There is a need of seamless interaction with GDS and off GDS system standards like OTA.
- Interoperate with numerous entities involved within the airlines industry, such as airports, hotels, car rental companies, intermediaries
- Maintain consistency across the booking process and shield the front-ending reservation portals/channels from the underlying application complexity and changes
- Needs an established services platform for the successful delivery and scaling of reservation solutions

# 10.

## Use Case: Airport Merchandising using Microservices Architecture



# 11.

## Assessment Approach for Microservices

### a. Assess current state

- Partner with key internal resources spanning the common application and architecture approach in place, to understand the underlying implementation approach, if any
- Identify current existing architecture principles and models, and use of HTTP and JSON restful APIs
- Gather documentation including product profiles, standards docs. Use case/requirements artifacts and architecture diagrams of select applications.
- Understand culture and daily practices of application builds
- Review current release process that is both understood and enforced
- Review software delivery model and any automated framework for deployment & testing
- Review current use and approach to web services and APIs
- Visualize future desired state
- Develop microservices business/IT vision statement

## b. Deliverables

- Microservices business/IT vision statement
- Business case with stated business drivers and challenges
- Current state assessment document
- Future state assessment document
- High level gap analysis and recommended microservices adoption
- High level road map, which describes the recommended approach with proposed and optional rollout approaches
- High Level of Effort (LoE)
- High level project plan – for microservices implementation
- Staffing plan / delivery team – proposed team for phase II implementation
- Executive workshop to educate the executive teams on benefits of microservices and their role in accelerating business feature innovation, road map, project plan and delivery team necessary for initial delivery and implementation

# 12. Conclusion

The microservices architecture has been adopted by leading industry players as part of building distributed architecture capabilities for their enterprises, and supporting a services platform which can scale quickly. Airlines are evolving new business models by selling ancillaries, and collaborating with partners such as airports, merchants to push sales during the trip. Passengers, who are at the center of airline industry, are being offered a customized experience to gain their loyalty. Microservices help to create an appropriate solution for the business requirement at hand that provides rapid deployment of new features to meet time-to-market business requirements. With the microservices architecture, it is very easy to build new functionality in the sub-domains in the airlines domain such as reservation systems, passenger self-service, baggage management, airport merchandising, etc.

Microservices architecture also syncs well with the approach of defining industry standards on the data model for the airlines domain, content interchange required to be built, and passenger-centric services.

# Author

## Sunil Tufchi

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Sunil comes with 21+ years of experience in the IT Services industry, and currently heads BPM/EAI Practice at Mphasis, with key responsibilities around sales/account enablement, alliance enablement, thought leadership, domain and technology solutions, niche skill pool management and delivery assurance. He also leads initiatives around domain solutions, specifically in the areas of integration and BPM.

## About Mphasis

Mphasis (BSE: 526299; NSE: MPHASIS) applies next-generation technology to help enterprises transform businesses globally. Customer centricity is foundational to Mphasis and is reflected in the Mphasis' Front2Back™ Transformation approach. Front2Back™ uses the exponential power of cloud and cognitive to provide hyper-personalized ( $C = X2C_{n=1}$ ) digital experience to clients and their end customers. Mphasis' Service Transformation approach helps 'shrink the core' through the application of digital technologies across legacy environments within an enterprise, enabling businesses to stay ahead in a changing world. Mphasis' core reference architectures and tools, speed and innovation with domain expertise and specialization are key to building strong relationships with marquee clients. To know more, please visit [www.mphasis.com](http://www.mphasis.com)

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