

Reimagine Application Modernization with

SERVERLESS ARCHITECTURE

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IS THE SERVERLESS WORLD AN IDEAL ONE?

Cloud computing has become the game-changer in reimagining technology in today's digital world. It has enabled organizations to focus less on IT infrastructure and more on business functions, processes, and services. In fact, Cloud computing is no longer about hosted infrastructure for as-a-service commercial models but a strategic imperative to survive and thrive in the modern world.

Big Cloud service providers are investing millions of dollars and hours in developing Cloud-native and automation technologies to help their customers develop secure, smart, efficient, and scalable products and services with Serverless computing. Serverless architecture is being used to fast-track customer initiatives to support app modernization programs that accelerate the adoption of serverless technologies in legacy applications.

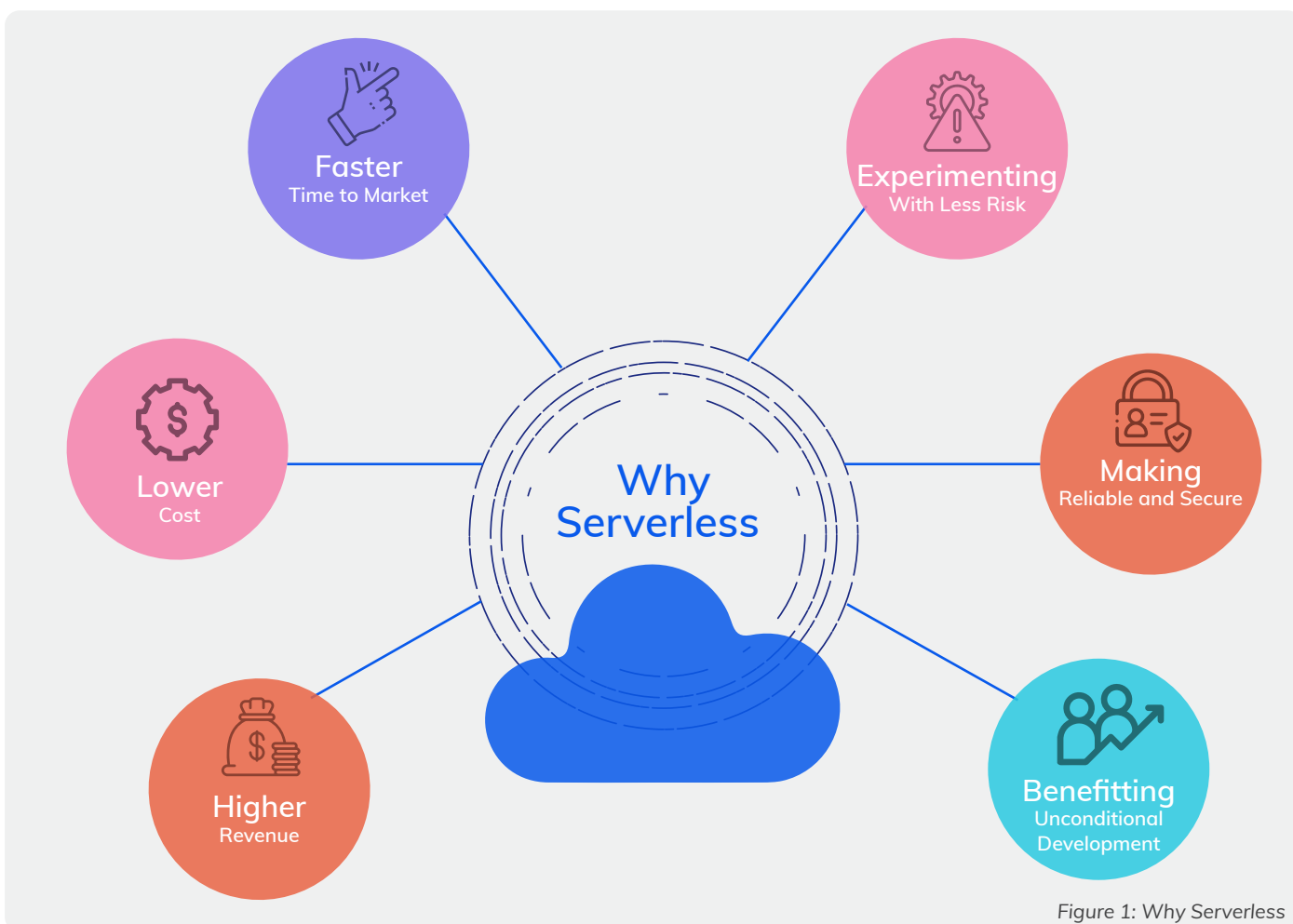


Figure 1: Why Serverless

With the evolution of Cloud technologies, serverless architecture has seen an uphill trend recently. According to a report by Mordor Intelligence on the Serverless computing market, a growth rate of 23.17% (CAGR) has been predicted during the 2021-26 period. The increasing adoption of Cloud-native apps and Internet of Things (IoT) applications will also provide growth opportunities for Serverless infrastructure providers.

More than ever, businesses today can transform their business model with minimal overheads for IT infrastructure. As a result, these businesses are clocking higher revenue, incurring lower costs, achieving faster time to market, benefitting via unconditional development and deployment, experimenting with lesser risk, and making applications more reliable and secure.

GO SERVERLESS

Serverless computing is a method of providing Cloud services on a pay-per-use basis. A Serverless Cloud provider allows tenants to write and deploy code without the hassle of managing the underlying infrastructure. While Cloud computing works on an on-demand infrastructure that can scale up and down, Serverless computing operates on a pay-as-you-go model (the consumer is charged only when their piece of code runs on a Serverless service). In a nutshell, Serverless computing uses servers, but the support and maintenance of these servers are delegated to a service provider. Some of the more well-known providers of serverless computing include AWS Lambda, Microsoft Azure Functions, Google Cloud Functions, and IBM OpenWhisk.

To better understand the difference between Serverless computing and traditional Cloud Computing (Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS)), we need to understand the individual stack's responsibilities that are managed by the vendors of IaaS, PaaS, or SaaS solutions (refer to figure 2). Before Serverless, the most effective way to build SaaS applications was to develop Microservices and deploy them on a PaaS. To understand Serverless better, split the application layer into two parts - client (who runs the application on the browser or mobile) and server (that handles the client requests). As a result, there is a faster development to deployment cycle, and the overall operation cost is drastically reduced.

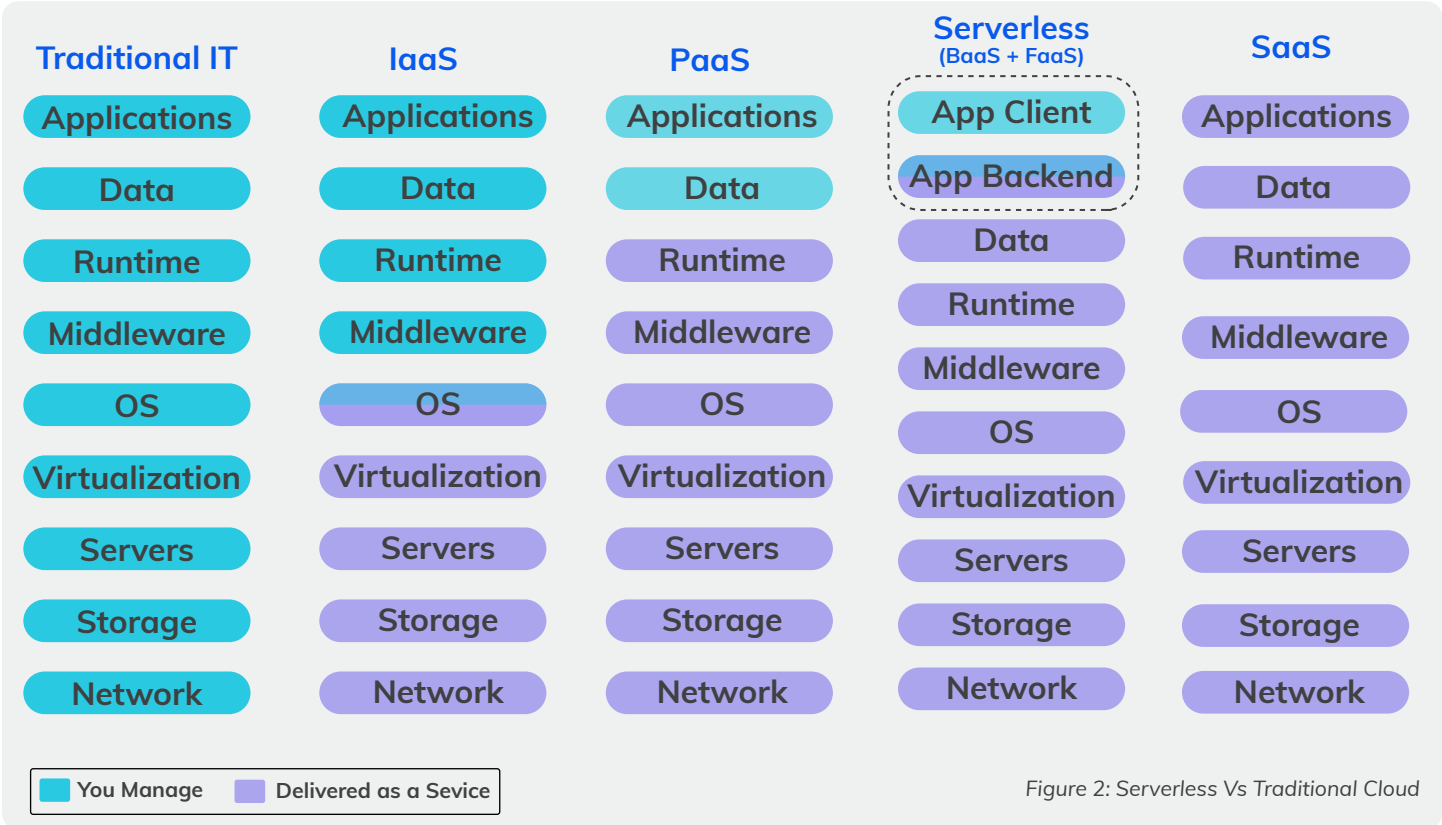


Figure 2: Serverless Vs Traditional Cloud

DISRUPT YOUR INDUSTRY WITH SERVERLESS COMPUTING

Although the Cloud provides on-demand scalability and enterprise-grade security, configuring and managing environments is still a big challenge. The below-mentioned trends further provide the tailwinds to reimagine infrastructure services.

Eliminate Time-Consuming Approach

Serverless applications allow developers to code in response to events. The code can be deployed immediately while automatically scaling to meet demand. Products and features can be released faster because Serverless leverages Microservices architecture; developers can upload bits of code and release a new product feature (one function at a time). This also makes it possible to quickly update, patch, or fix an application without making changes to the entire application. As a result, development teams become more productive and can bring products to market more quickly.

Improve Business Values

Microservices-based easy-to-manage functions and APIs are the heroes of today. Long timelines of waterfall project models are giving way to agile delivery models with faster iterations and small incremental deployments. Cloud computing helps businesses achieve this goal by letting the Cloud Service Providers (CSPs) handle most of the workload. It enables developers to focus their efforts on business logic and deliver more value to the business.

Reduce Latency

In this era of real-time video streaming, latency is a significant factor in any architecture. Traditional approaches and Cloud computing always struggled to provide the right balance between latency and setting up a data center closer to the user base. In Serverless architecture, the application is not hosted on an origin server. Therefore, it is possible to run application functions on servers close to the end-user. This reduces latency because requests from the user no longer have to travel all the way to an origin server.

Disruptive Business Models

The digital ecosystem is continuously disrupting traditional businesses. New products, services, and business models are the norm as new-age competitors continually change the market dynamics. There is increasing prominence of adaptability and agility for dynamic ecosystems. As a result, organizations are under tremendous pressure to respond and adjust business models that meet consumers' growing expectations. Serverless computing provides a robust foundation where organizations can dare to dream big and think differently.

THE SERVERLESS MECHANISM

Here is a characteristics snapshot of the Serverless architecture.

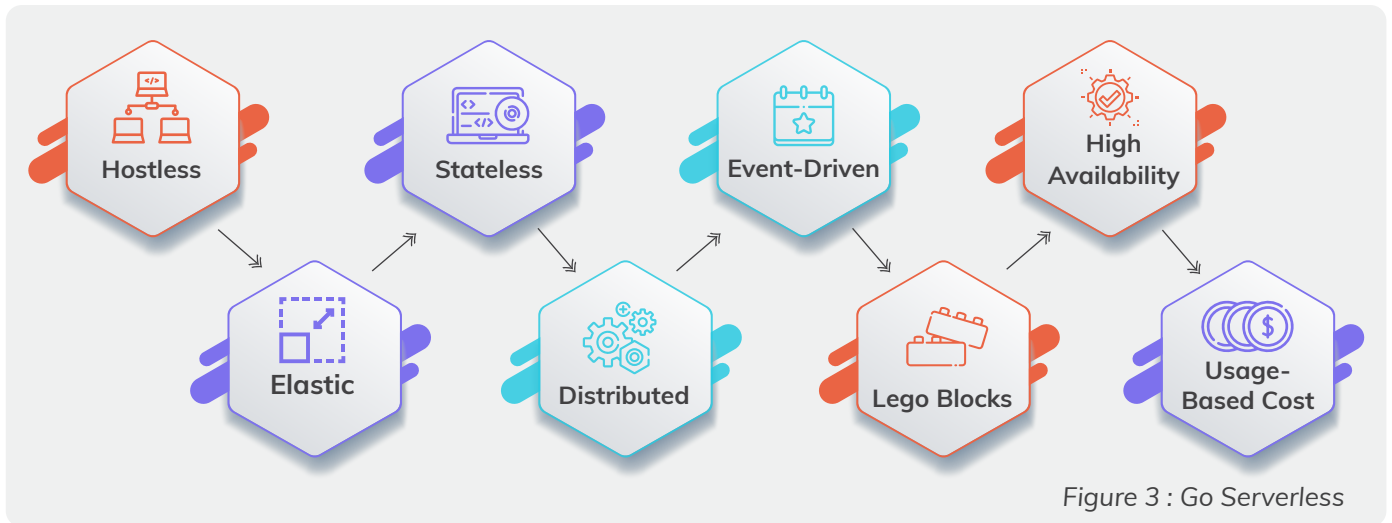


Figure 3 : Go Serverless

Hostless

Since you are running code without any host server, you will have significantly less operational overhead on server maintenance.

Elastic

You will be able to scale from zero to the maximum allowed, then back to zero, mostly being managed automatically.

Stateless

By not storing data in your application, you will be able to spin up more instances, without worrying about the application state, to scale horizontally.

Distributed

Because Serverless computing is stateless, all data must be kept on the Backend-as-a-Service (BaaS) platform, to inherently distribute the architecture.

Event-Driven

You will have your architecture components loosely coupled, making it easier for you to introduce a new function that listens to a change.

Lego Blocks

In Serverless computing, every architecture component is an interoperable managed service. You can aggregate these services together to create higher order functions (i.e., your business application). Hence, the correlation with Lego blocks.

High Availability

Having a distributed architecture also means having a single region of high availability. Serverless architecture can use other availability zones that are still up, even if one of them is failing in your Cloud vendor's region.

Usage-Based Cost

Since you are not running your code on a dedicated server, you are obligated to pay only for what you use.

SERVERLESS AND EVENT-BASED COMPUTING

Serverless functions are based on event-driven architectural characteristics of Serverless computing. Specific events are triggered and automatically run a piece of code in response. These events can further trigger a sequence of events (based on the rules). The most common way to use Serverless computing is to provide a function that the Serverless computing platform will execute. As such, platforms designed for this purpose are called Function-as-a-Service (FaaS) systems. They typically allow small pieces of code represented as functions to run for a limited amount of time (at most minutes), with executions triggered by events or HTTP requests (or other triggers).

As we move towards an event and data-driven future, the ability to act in real-time on data is gaining importance in digital businesses.

By combining Serverless technology with event-driven architectures, businesses can optimize their Cloud costs without sacrificing performance. Businesses can now focus on developing applications and worry less about performance and infrastructure maintenance.

SERVERLESS PLATFORMS USE CASES

Serverless architecture is best used while performing short-lived tasks and managing workloads that experience unpredictable or infrequent traffic. Below are a few use cases for Serverless computing

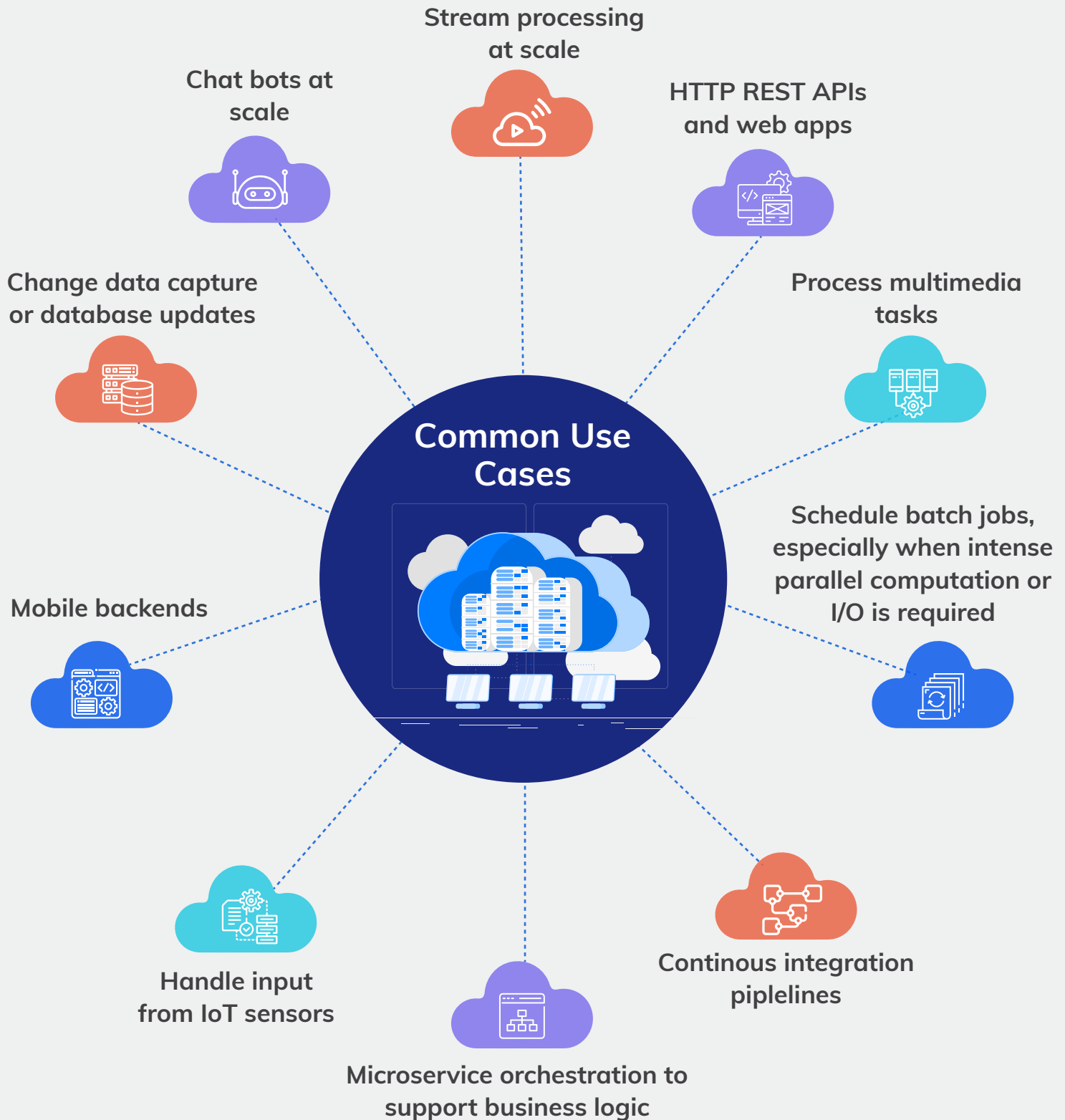


Figure 4 : Use Cases

TRIGGER-BASED TASKS

Serverless architecture is the best fit for any business process where user activity triggers an event or a series of events. For instance, a user signing up on your website may trigger a user database change, which may, in turn, trigger a welcome email to offer default discounts. All this backend work can be handled through a chain of Serverless functions.

MICROSERVICE ORCHESTRATION

The Microservice model focuses on creating small services that do a single job and connect using APIs. Serverless has gained significant momentum while provisioning these Microservices as it never charges for idle capacity.

SECURITY CHECKS

When a new container is deployed, a Serverless function can be invoked to scan the instance for security loopholes or vulnerabilities. These functions are also a more secure option than Secure Shell (SSH) verification or a two-factor authentication.

CONTINUOUS INTEGRATION PIPELINES

Serverless architectures help automate many of the stages in your Continuous Integration/Continuous Deployment (CI/CD) pipelines. For example, as developers perform code commits, it can trigger a function to create an automated build via Jenkins, and pull requests can trigger automated tests.

MULTIMEDIA TASKS

Serverless is ideal for structured text, audio, image, and video data. It can be used to perform tasks like data enrichment, transformation, validation, cleansing, normalization, image-related operations (like rotation, sharpening, etc.), optical character recognition, or video transcoding.

DATA STREAM PROCESSING

Apache Kafka with FaaS and database/storage may offer a powerful solution for real-time build out of data pipelines and streaming apps. Such architectures are ideally suited for working with all sorts of data stream ingestions (for validation, cleansing, enrichment, and transformation), including IoT sensor data, application log data, financial market data, and business data streams (from other data sources).

HTTP REST APIS

You can leverage Serverless API Gateways to build RESTful APIs that scale with demand.

ASYNCHRONOUS PROCESSING

Serverless functions can handle batch jobs or behind-the-scenes application tasks. It helps seamless rendering of product information or transcoding videos after upload, especially when intense parallel computation is required, eliminating user-facing latency.

GET THE SERVERLESS ADVANTAGE



REDUCE COSTS

You can optimize your IT cost by adopting the Serverless pay-as-you-go model. When a company goes Serverless, it effectively outsources server and database maintenance. You are no longer in charge of the massive investments necessary for internal architecture management. The amount you may save will be determined based on your use case. You only have to pay based on your actual consumption with Serverless computing, so you do not have to waste money on servers that aren't being used.



FASTER SET-UP

Similar to Cloud services, Serverless offerings have built-in scalability. Over or under-provisioning happens automatically as you pay just for the service usage, and the Serverless architecture infrastructure will grow or shrink based on demand.



FAILOVER

Disaster recovery is integrated into CSP offerings. Because Serverless components are based on the pay-per-use model, setting up failover infrastructure in paired regions of given geography comes at a fraction of the cost compared to the traditional server-based architecture. The additional benefit is bringing the recovery time down to near zero, making seamless switch over a possibility at a fractional cost of existing setups.



BUILT-IN SCALING

When it comes to setting up your infrastructure, Serverless computing can save you time. You might be up and running and hosting apps in a production-ready environment in minutes. One of the best features of Serverless computing is how easy it is to use, and it is getting better everyday.



RAPID DEVELOPMENT AND DEPLOYMENT

Serverless architectures enhance the developer's productivity by reducing the complexity and effort to build, test and deploy codes. Serverless systems support agile development protocols, allowing developers to focus only on writing their code and accelerating the development process. Developers can release applications faster to market and deliver quicker updates because of a reduced development period.



REDUCED TIME TO MARKET

By using a Serverless architecture, you can deploy apps faster with minuscule lead time. Serverless architectures also enable running multiple versions of code to meet tight deadlines and support multiple release cycles.

SUCCESS WITH SERVERLESS

Application Modernization of the Prepayment Fee Engine for a Leading Wholesale Bank

Prepayment Fee Engine: The application is used for Advance (Loan) Prepayment Fee Calculations (taking into consideration the reclosure amount and other interest factors).

The client wanted to upgrade the Fee Prepayment application to:

- Replace the legacy system
- Develop a centralized Prepayment Fee Calculation Engine
- Enhance the User Interface (UI)
- Incorporate parameters for all prepayment fee calculations in the new UI

These criteria had to be addressed as soon as possible to reduce financial losses and meet deadlines.

Solution

Opteamix began working closely with the technology and business teams to implement a centralized and modified Prepayment Fee Calculation Engine using the AWS Serverless Architecture (with AWS Lambda). The application was being developed with a more intuitive User Interface (UI) to support the client's requirements.

After mapping out an elaborate plan, Opteamix developed the Prepayment Fee Calculation Engine using an adapted Agile Framework, customized for efficient global delivery. The deployment was carried out with the help of small teams to handle each of the different aspects of upgrading the application (UI, Architecture, Centralization, etc.) while integrating multiple modules to accelerate the time to market.

Value Delivered

Modernized Prepayment Fee Calculation Engine

- Efficient streamlined business processes
- Integration with in-house applications/modules
- Advanced reporting and analytics functionality
- Quick prepayment fee calculations

Centralized Prepayment Fee Calculation Engine and Enhanced UI

- Enhanced Customer Service
- Powerful pipelines
- Includes features that take automation to the next level

Switching to Serverless Architecture

- 30-40 percent cost reduction
- Decrease in need for IT resources
- Reduced testing efforts

REIMAGINE THE FUTURE WITH SERVERLESS

With the suitable architectural considerations and impeccable due diligence, Serverless presents a way forward to move from legacy infrastructure to Cloud models. However, industry incumbents must move away from the status quo and embrace this change. A structured approach with a defined roadmap can play a vital role - especially when the current software architecture paradigms for many enterprises are based on the legacy monolithic models. In the Serverless paradigm, the focus is not on infrastructure but on delivering the required business values, which in turn changes the economic model for IT service delivery. Serverless has already proved its potential to enterprises leading to significant cost reductions associated primarily with IT support and maintenance, reducing time-to-market, and fostering innovation. Serverless computing is a strategic imperative to gain an edge over competitors.

Opteamix has been working with its clients as their strategic technology partner to implement their Cloud Migration and Application Modernization Roadmaps. Success stories of Opteamix Cloud Team have been around designing and implementing multiple Modernization Projects on AWS Serverless Architecture

Developing Serverless Cloud-Native Apps has helped our clients:

- ◎ Scale with resilience and flexibility
- ◎ Enhanced and embedded security
- ◎ Self-healing
- ◎ Easy customization and integration
- ◎ No cost on OS management and utilization
- ◎ Focus on the business logic in the code as the unit of deploy

About the Author



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Azad Muhamed heads Opteamix's Cloud, Application Modernization and Serverless practices. Azad has close to 20 years of experience in solutioning, designing, developing, and implementing complex enterprise applications for well-known enterprises across the globe. He has delivered projects across industries, from Banking and Financial Services to Retail, Aviation, and Telecom. Azad is our go-to expert in providing technical solutions and designing applications for enterprises leveraging native Cloud services such as AWS Lambda, Amazon DynamoDB, etc., using Serverless architecture patterns.

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Opteamix is a digital automation technology consulting firm with deep expertise in Application Development, Robotic Process Automation, AI, DevOps, Enterprise Mobility, and Test Automation Services. As a next-generation technology firm, we work on innovative technologies to automate and digitally transform our client's businesses.

From building innovative financial service platforms and managing applications that aid in administering health benefits to automating business processes, we help develop and maintain mission-critical applications vital to our client's business. Opteamix leverages Agile and SAFe methodologies to deliver projects using global teams that help us deliver positive outcomes for our clients at an optimized cost and faster time to market. We are headquartered in Denver, Colorado, with a wholly-owned delivery center in Bengaluru, India.

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