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Authors:
Larry Carvalho
Matthew Marden

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Generating Value Through IT Agility and Business Scalability with AWS Serverless Platform

Business Value Highlights

409%
five-year ROI

9 months
to payback

60%
lower five-year cost of operations

89%
faster compute deployment

33%
higher developer productivity

$20.66 million
higher revenue per organization

80%
more efficient IT infrastructure teams

EXECUTIVE SUMMARY

Digital transformation efforts at enterprises are increasingly being driven by developers who are delivering applications at an accelerated pace by taking advantage of the improved agility and productivity enabled by cloud services. Serverless platforms offer a simplified programming model that completely abstracts infrastructure and application life-cycle tasks to concentrate developer efforts on directly improving business outcomes. At the heart of typical serverless architectures are functions that execute code. These functions are launched on invocation and shut down on completion, eliminating the problem of idle compute capacity. Serverless functions also scale up automatically to meet the rate of incoming requests, delivering a new level of scaling efficiencies to applications. In addition to functions as a service, serverless applications are supported by a range of fully managed services including API management, database services, storage, messaging, analytics, streaming data, and monitoring. IDC sees application development best practices increasingly following the serverless application model and the serverless application model growing at a higher pace than the traditional platform-as-a-service approach.

IDC spoke with organizations that have chosen to run a variety of business applications on the AWS Serverless Platform, which consists of a collection of AWS cloud-delivered services targeted for abstraction with fine compute granularity. These organizations stressed how the AWS Serverless Platform has delivered true IT and business scalability by removing almost all friction in expanding and contracting compute and storage environments. This helps IT organizations not only better support the business but also benefit from more cost-effective IT environments tailored closely to changing business requirements. Based on interviews with AWS customers, IDC estimates that the organizations will achieve benefits worth an annual average of $382,600 per business application ($10.71 million per organization) on the AWS Serverless Platform by:

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- **Enabling development teams to focus on logic for delivering business applications, features, and services** by automating delivery, scaling, and management of compute and storage
- **Addressing business opportunities in a timely and robust way, thereby increasing revenue,** by having an infrastructure foundation that automatically scales to meet business demand in a timely but cost-neutral fashion
- **Reducing the impact of application and service outages** through built-in availability
- **Minimizing staff time** required to manage infrastructure and applications

SITUATION OVERVIEW

The cloud adoption journey typically starts with the lift and shift of workloads to the public cloud infrastructure because moving workloads from on-premise to public cloud does not require significant changes to existing environments and the availability of migration tools makes the task easier. This first step enables enterprises to reduce the on-premise footprint while gaining benefits of lower costs and high security of the public cloud. The second step to modernize these environments is to leverage containers, modern cloud services, and open source tools. The popularity of containers has led to significant benefits in improving application efficiencies. The third step of cloud adoption is to refactor applications to leverage serverless platforms that package the entire application life cycle built around functions that deliver the next level of agility to customers. While broad cloud computing adoption follows these steps in sequence, IDC's interviews with customers in this survey showed several customers skipping the first two steps and directly refactoring on-premise applications built on proprietary systems that delivered a higher-than-average ROI.

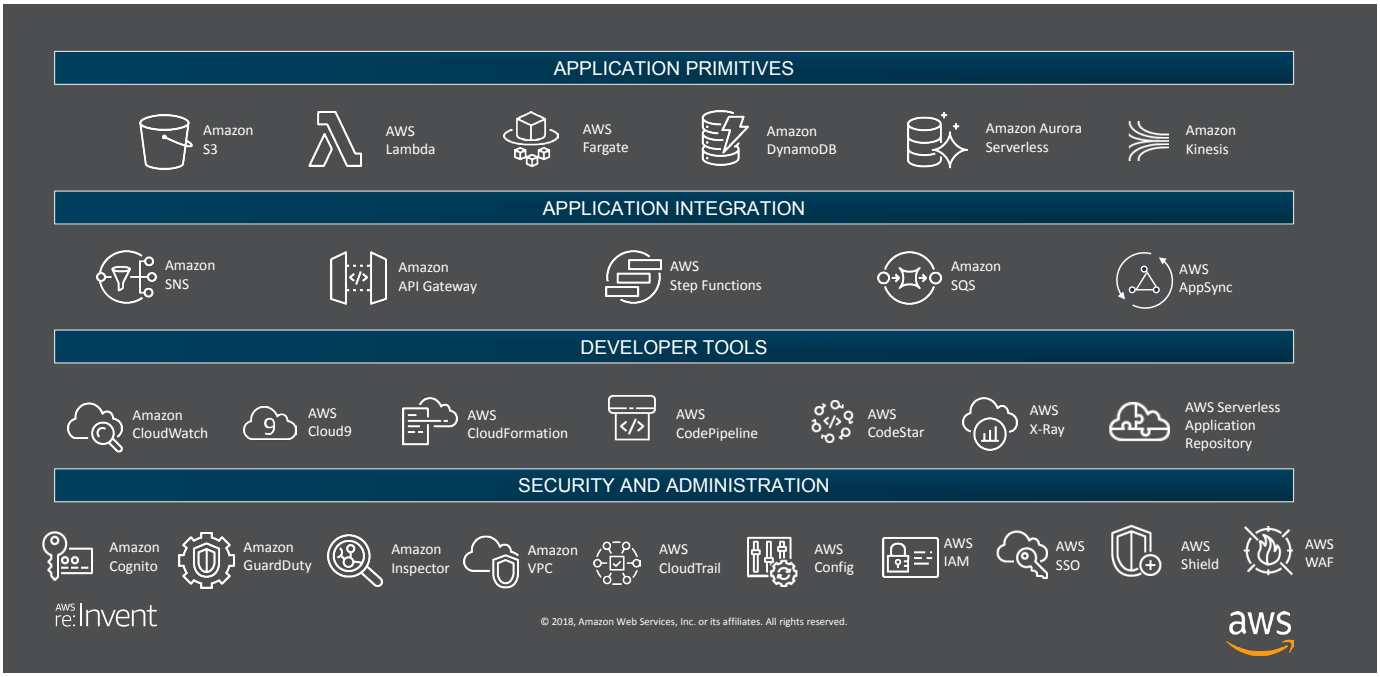
Improved agility in building, delivering, and modifying applications pays off for the effort to rewrite applications using the serverless architectural paradigm. Lower costs gained from fully managed infrastructure and functions-as-a-service efficiencies that virtually eliminate compute waste are drawing start-ups to exclusively build applications with the serverless model. As enterprises have realized the economic benefits of cloud adoption through the first two steps described previously, more organizations are rethinking application design with microservices to gain extreme agility. The serverless application design relieves developers from most tasks of the application development life cycle, resulting in higher efficiencies because they can focus their efforts purely on writing application code.

AWS SERVERLESS PLATFORM

When AWS announced AWS Lambda in 2014, it primarily consisted of delivering a completely abstracted functions-as-a-service offering that packaged compute cycles into segments billed by every 100ms. As AWS Lambda adoption grew, it soon became apparent that developers expected the complete application life cycle to be combined into an offering that could be assembled into an end-to-end application development platform.

While several of AWS' fully managed services can be combined into a solution built on the AWS Serverless Platform, the high-level view of core building blocks is depicted in Figure 1.

FIGURE 1 The AWS Serverless Platform



Source: AWS, 2018

Developers prefer that a cloud platform support a variety of languages that are appropriate for their application, and to that effect, Lambda supports Node.js, Python, Java, C#, Go, and PowerShell. Other services that contribute to the value of AWS Serverless Platform from a developer lens are AWS X-Ray, AWS Cloud9, AWS Serverless Application Model (SAM) and SAM Command-line Interface, AWS CodePipeline, AWS CodeCommit, AWS CodeBuild, AWS CodeStar, and AWS CloudFormation.

Cloud adoption requires an end-to-end security protocol that is easy to implement in the application architecture. AWS Serverless Platform leverages AWS Identity and Access Management for access control, Amazon Cognito or Amazon API Gateway's Lambda authorizer for authentication, and Amazon Virtual Private Cloud (VPC) for creation of virtual private networks for hybrid access of functions.

Composition of applications from ready-to-use components is gaining popularity on public cloud platforms. AWS Serverless Application Repository has integrations available to a variety of AWS partners as well as prebuilt application components that can be used in a variety of use cases. The following use cases leverage a combination of AWS services and are most popular among AWS Serverless Platform customers:

- **Batch processing:** This is a very popular use case where files uploaded to Amazon S3 would be processed by an AWS Lambda function that significantly accelerates batch processing through the ability of running jobs in parallel. Another similar use case is transcoding video in small chunks using AWS Lambda, which reduces both the cost and the time taken compared with transcoding done using Amazon EC2.
- **Real-time stream processing:** An example would be a social media stream loaded into Amazon Kinesis that triggers AWS Lambda to generate trend data and store the data in Amazon DynamoDB for analytics.
- **Extract, transform, load**: Similar to traditional batch processing, the AWS Lambda function operates in an abstracted fashion that would read and transform each record and then load it into the target destination.
- **Internet of Things (IoT) back ends:** This use case uses AWS IoT for data ingestion and device management, while AWS Lambda is used to do data analysis and store the data in Amazon DynamoDB.
- **Mobile back ends:** This use case provides user authentication (Amazon Cognito), connection (Amazon API Gateway), logic (AWS Lambda), and notification (Amazon SNS).
- **Web applications:** This use case leverages AWS Lambda, Amazon API Gateway, Amazon S3, and Amazon DynamoDB to build autoscaling websites powered by serverless back ends.
- **IT automation:** This popular use case leverages AWS Lambda to automate the management of AWS services to handle requirements such as compliance, security, and AWS account creation.

Other use cases built on the AWS Serverless Platform are chatbots, Amazon Alexa skills, DevOps choreography, clickstream analytics, on-the-fly image resizing, and stored procedures.

THE BUSINESS VALUE OF AWS SERVERLESS PLATFORM

Study Demographics

For this study, IDC interviewed 11 organizations about the impact of using the AWS Serverless Platform on their IT costs and operations and business outcomes. Companies surveyed were primarily large organizations with over 10,000 employees and $7 billion in annual revenue on average. Most surveyed organizations were United States based, but Japan and the United Kingdom were also represented. The following vertical industries were represented: communications, data analytics, financial services, manufacturing, online media, real estate, retail, technology, transportation, and travel. The diversity in terms of industry verticals reflects variety in how organizations can leverage the AWS Serverless Platform to support their IT and business operations (see Table 1).

TABLE 1 Demographics of Interviewed Organizations

	Average	Median
Number of employees	11,738	5,000
Number of IT staff	585	200
Number of business applications	524	65
Revenue per year	$7.03 billion	$917 million
Countries	United States (9), United Kingdom, and Japan	
Industries	Communications, data analytics, financial services, manufacturing, online media, real estate, retail, technology (2), transportation, travel	

n=11 Source: IDC, 2018

Choice of AWS Serverless Platform

Business success today requires agility and flexibility to respond to changing needs but without compromising on having a cost-effective IT foundation. Organizations must address the constant pressure to minimize the time required to deliver new applications and functionality to internal and customer stakeholders. The organizations interviewed for this study emphasized that they chose the AWS Serverless Platform based on their need to address these dual challenges. They noted considering the following advantages of the AWS Serverless Platform in choosing it over other on-premise or cloud solutions:

- Providing their businesses with greater IT agility and flexibility
- Enabling development teams to build application logic rather than deal with IT infrastructure
- Reducing the time to market for new applications and features
- Easing the burden of administering and provisioning IT resources
- Optimizing IT costs, including moving opex-focused and flexible cost models for IT resources

One study participant moving from an on-premise environment cited its inability to be sufficiently agile as driving its move to the AWS Serverless Platform and specifically AWS Lambda: *"On the business side, it was taking too long to add new capacity to support services. Everything needed to go through layers of processes. Business needed compute that's ready right away, and AWS Serverless Platform was ideal for this."* Another interviewed organization addressed the connection between IT resource flexibility and cost, saying: *"We worked with Docker and some other traditional server-based management tools but opted to go with the AWS Serverless Platform. … The biggest factors in that decision were much lower overhead in terms of operating costs and the ability for anyone on our team to do anything they needed to do on the platform."*

AWS Serverless Platform Use by Interviewed Organizations

Study participants are making extensive use of AWS Serverless Platform as indicated by several key metrics shown in Table 2. The workload volume run on the AWS Serverless Platform is demonstrated by the number of requests made per week — 1.25 billion on average. The spend on AWS Serverless Platform, ranging from under $100,000 per year to more than $10 million per year, also reflects the participants' extensive use of the platform.

These AWS customers reported running various business applications and workloads on the AWS Serverless Platform, with a focus on workloads that benefit from automated scalability. Overall their experiences represent a diverse mix of business-critical applications, including analytics and modeling, customer service systems, financial reporting, image processing, inventory management, and valuation and risk management workloads.

Use of the AWS Serverless Platform by interviewed organizations also reflects varied previous approaches and migration paths. The sample included organizations that moved both from on-premise environments and from other cloud platforms, including Amazon EC2 Reserved or On-Demand instances. Most organizations interviewed foresee increased use of the AWS Serverless Platform. Several reported adopting a "serverless first" approach, with others noting that they will continue to look for applications and workloads that fit the overall serverless architectural approach.

TABLE 2 AWS Serverless Platform Use by Interviewed Organizations

	Average	Median
Maximum number of requests per week	1.25 billion	42 million
Number of AWS Lambda functions	794	338
Number of business applications	28	11
Number of terabytes	408	50
Number of users of business applications	5,705	500

n = 11 Source: IDC, 2018

Business Value Results

Interviewed organizations chose the AWS Serverless Platform in large part to provide seamless scalability from both an IT perspective and a business perspective. They reported minimizing the friction that deployment, management, and support of compute and storage resources exert on operations, generating benefits for their IT and business organizations.

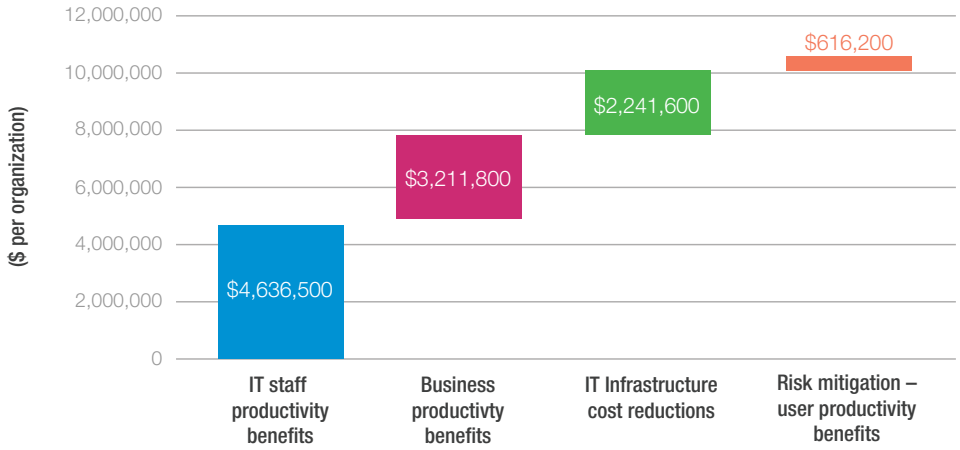
The AWS Serverless Platform has been particularly beneficial to development teams at interviewed organizations, which are much more productive working on a platform that automates delivery of cost-effective compute and storage resources. Meanwhile, IT teams benefit from the integration and automation of compute and storage resources, and lines of business gain from having a platform that can extend cost effectively and with ease to support

demand from new customers or business applications, or even new business sites or branches, as new and potential business opportunities arise.

Based on interviews with AWS Serverless Platform customers, IDC calculates that they will achieve benefits with an average annual value of $10.71 million per organization ($382,600 per business application) in the following areas (see Figure 2):

- **IT staff productivity benefits:** Development teams capture significant productivity gains because they need less time to deliver an increased number of new applications and features. Further, teams responsible for IT infrastructure and application management require less time for day-to-day monitoring, deployment, and support activities. IDC puts the annual value of efficiencies and productivity gains at an average of $4.64 million per organization ($165,700 per application).
- **Business productivity benefits:** Organizations increase the velocity with which they can address business opportunities, which results in higher revenue. Further, end users benefit from faster delivery of new applications and features. IDC quantifies the value of revenue and productivity gains at an average of $3.21 million per organization ($114,800 per application) per year.
- **IT infrastructure cost reductions:** More efficient use of compute and storage capacity, optimization of licensing costs, and reduced operating costs allow study participants to reduce costs associated with deploying and running their IT infrastructures. IDC values these cost savings at $2.24 million per organization ($80,100 per application) per year.
- **Risk mitigation — user productivity benefits:** Reduced frequency and duration of unplanned outages mean that organizations lose less productive employee time and reduce the risk of revenue loss during outages. IDC estimates the value of productivity and revenue losses avoided at an average of $0.62 million per organization ($22,000 per application) per year.

FIGURE 2 Average Annual Benefits per Organization



Average annual benefits per organization: $10.71 million

Source: IDC, 2018

Providing IT and the Business with Agility and Scalability

Interviewed AWS customers viewed increasing the agility of their IT and business operations as fundamental to the choice of the AWS Serverless Platform. They need to eliminate — or at least substantially minimize — manual processes related to provisioning and managing compute and other IT resources. Like most organizations, they cannot afford to have their development and business processes slowed by considerations related to deploying and operating compute and storage resources. They reported substantial gains in compute and storage flexibility afforded by leveraging code-based automation of their overall environments. As a result, organizations have increased the velocity with which they address business opportunities, while users benefit from earlier delivery of enhanced functionality through new applications and features.

Time to access compute and storage resources is a useful proxy for IT agility. Table 3 shows how AWS Serverless Platform customers have reduced the time required to access compute and storage resources to minutes, with on-premise migrators seeing reductions from hours or even days and migrators from other cloud solutions seeing substantial relative reductions. With typical deployments measured in minutes, study participants have made significant strides in minimizing the extent to which extending and making changes to their IT environments exert a drag on their business operations. For example, one organization reduced the time needed to deploy new compute resources from 10 days to one hour by moving from on-premise to

AWS Lambda and the AWS Serverless Platform. On an average organizational basis, study participants reported cutting the time required to deploy new compute by an average of 89% and new storage by 96% (see Table 3).

While organizations that have moved workloads to the AWS Serverless Platform from both on-premise and other cloud environments benefit from increased agility, on-premise migrators are seeing greater average relative benefits. For example, on-premise migrators have reduced the time required to deploy compute resources by an average of 99% compared with 75% for organizations moving from other cloud environments. Study participants moving from both on-premise and other cloud environments discussed these benefits in specific terms:

- **An organization moving from an on-premise environment cited the ease of deploying compute resources to support development:** *"We deploy new software with the AWS Serverless Platform, but we don't have to manage compute deployment because it's automatic for us. … We've gone from using internal tools and needing two days to deploy compute to it taking about two minutes with the AWS Serverless Platform."*
- **An organization moving from another cloud-based solution discussed the benefit of automatic scaling to demand for compute/storage:** *"We've really benefited from automatic responses to capacity needs with AWS Lambda and the AWS Serverless Platform. Before, we had a capacity of 100 instances, whereas now we have the equivalent capacity of 2,000–3,000 instances per day. Those instances all scale down to pretty much nothing at night or over the weekend, when we don't have developers doing anything. We were already doing some of that beforehand, but it wasn't as flexible in terms of being able to scale up and down."*

TABLE 3 Impact of AWS Serverless Platform on IT Agility

	Before/Without AWS Serverless Platform	With AWS Serverless Platform	Difference	Change (%) (Calculated Based on Averages)	Change (%) (Average Change per Organization)
Compute deployment					
Time to deploy new compute (days)	19.3	0.1	19.2	100	89
Staff time to deploy new compute (hours)	75.8	0.1	75.7	100	88
Storage deployment					
Time to deploy new storage (days)	14.2	0.5	13.7	96	96
Staff time to deploy new storage (hours)	80.4	0.1	80.3	100	100

n = 11 Source: IDC, 2018

Driving More Timely and Effective Development Activities

Interviewed AWS customers related much-improved IT agility to more effective and efficient application development. With constant pressure on development teams to deliver higher functionality in the form of new applications, features, and updates, they require timely and cost-effective access to compute and storage resources. Historically, they have often faced cumbersome manual processes in procuring and deploying IT resources, which creates friction and slows down their efforts.

Interviewed organizations described how their development teams have captured significant productivity gains because they need less time to deliver an increased number of new applications and features. This productivity bump was especially pronounced for organizations moving from on-premise environments. However, those migrating from other cloud environments also reported productivity gains as their developers benefited from automated delivery of needed IT resources.

Table 4 quantifies the substantial positive impact that moving to the AWS Serverless Platform has had for interviewed AWS customers. Overall, their development teams can now develop and release more new applications (18% more) and features (115% more) to their business counterparts even as they speed up development life cycles to a substantial extent (76% and 66% faster for new applications and features, respectively). For example, an on-premise migrator cut its development life cycle for net-new applications from six months to one month with the AWS Serverless Platform, and an organization that moved from a mixed environment reported quintupling the number of new features it delivers to the business per year. This means that development teams generate and deliver more value to their businesses, with IDC putting the average productivity increase for their development teams at 33%.

Study participants discussed these benefits in more detail:

- **An organization cited the benefit of rapid deployment compared with its on-premise environment:** *"The AWS Serverless Platform allows developers to rapidly deploy functionality without tangling with servers because the serverless approach is much more modularized. … We're deploying code and not specifying server capacity or anything else. AWS does all that for you, and our developers are about 20% more efficient."*
- **An organization migrating from another cloud solution noted its improved ability to support development:** *"Before the AWS Serverless Platform, we weren't getting enough test jobs completed. We would end up with queue times taking hours before the staff could get test runs done, a horrible loss of developer time. … We also weren't able to get developers enough compute to be able to handle the workload. Now we're actually able to handle it all."*

TABLE 4 Impact of AWS Serverless Platform on Application Development

	Before/Without AWS Serverless Platform	With AWS Serverless Platform	Difference	Change (%)
Application developer productivity levels				
Productivity level in terms of FTEs per organization	60.7	80.8	20.1	33
Equivalent value of application developers per year per organization	$6.07 million	$8.08 million	$2.01 million	33
New applications, new logic				
Number developed per year	20.5	24.2	3.7	18
Development life cycle (weeks)	21.9	5.2	16.6	76
New features				
Number developed per year	187	402	215	115
Development life cycle (weeks)	5.2	1.8	3.4	66

n=11 Source: IDC, 2018

Leveraging IT Scalability to Improve Business Results

Surveyed organizations discussed how they have leveraged increased IT and business scalability with AWS Serverless Platform to improve business results. They cited the core requirements of their businesses that IT support fast responses to new business opportunities and allow for the delivery of new services and approaches in real-time fashion. When IT cannot react sufficiently, nimbly, or effectively or cannot provide required levels of scalability or performance, then they face the real possibility that they will either miss out on potential business opportunities or see an erosion of their existing businesses. Study participants reported that the AWS Serverless Platform has helped them bridge the gap between what their businesses require and what their IT organizations can provide, which is helping them support business initiatives and win more business.

AWS customers provided a number of specific examples:

- **An organization moving from a mixed on-premise and cloud environment noted increasing the velocity with which it can serve customers by running real-time analysis to better qualify sales leads, leading to revenue gains worth tens of millions of dollars per year:** *"AWS Serverless Platform allows us to do more analysis in real time. This provides better leads, and leads drive revenue. We've seen 30% year-over-year increases*

in revenue, and we would not be able to do it without the AWS Serverless Platform. We could not serve our customers well if not for the velocity of the AWS Serverless Platform. Instead of achieving 30% year-over-year revenue growth, we might be seeing 5% or 10% year-over-year revenue growth."

- **An organization moving from an on-premise environment explained the value of agility and quick movement, which has supported tens of millions of dollars of additional revenue per year:** *"The AWS Serverless Platform has enabled our business, and it goes back to agility. The key to our brand is to make quick moves. Business comes up with something, and then they want it yesterday. So the key to this strategy is having the agility."*

- **An organization moving from another cloud environment has enabled its business by lowering the cost of functionality, increasing its revenue by millions per year:** *"We've lowered the overhead of feature development with the AWS Serverless Platform. This allows us to spend more time developing innovative products. We've gained millions of dollars of additional revenue from the platform per year."*

Table 5 quantifies the extent to which study participants have leveraged the AWS Serverless Platform to support their businesses. On average, these organizations reported gaining $20.66 million in additional revenue per year by better addressing business opportunities, as well as another $144,100 per year by reducing the frequency of revenue-impacting unplanned downtime.

TABLE 5 Business Productivity Benefits: Increased Revenue

	Per Organization	Per Application
Revenue impact from better addressing business opportunities		
Additional revenue per year	$20.66 million	$738,300
Recognized revenue (assumed operating profit) per year — IDC model*	$3.10 million	$110,700
Revenue impact from reducing unplanned downtime		
Additional revenue per year	$144,100	$5,200
Recognized revenue (assumed operating profit) per year — IDC model*	$21,600	$800

* The IDC model assumes a 15% operating margin for all additional revenue.

n=11 Source: IDC, 2018

AWS customers also reported that their use of the AWS Serverless Platform has enhanced business performance by offering a reliable platform that reduces end-user productivity losses associated with unplanned outages. While this benefit was more pronounced for organizations that migrated from on-premise environments, several organizations migrating from cloud environments also noted how automated scalability and failover capabilities of the AWS Serverless Platform help prevent outages and minimize their impact. As shown in Table 6, study participants reported reducing the frequency of unplanned outages by 71% on average with the AWS Serverless Platform, contributing to a 74% reduction in user productivity lost during such outages.

TABLE 6 Impact of AWS Serverless Platform on Unplanned Downtime

	Before/Without AWS Serverless Platform	With AWS Serverless Platform	Difference	Change (%)
Unplanned outages per year per organization	25.8	7.5	18.3	71
MTTR (hours)	4.4	1.9	2.5	58
FTE impact — lost user productivity per year	11.5	3.0	8.5	74

n=11 Source: IDC, 2018

Minimizing Time Spent on Tasks Associated with Server and Storage Resources

AWS customers reported that AWS Serverless Platform has helped them not only realize development and business benefits but also reduce the amount of time their IT teams must spend on day-to-day tasks associated with deploying and managing server and storage resources. They explained that these teams save significant amounts of time because of automated functionality that reduces the number of manual touch points, especially in terms of addressing variations in demand for compute and storage capacity. Study participants spoke in specific terms about these benefits:

- **Efficient and cost-effective IT operations:** *"Services from AWS Serverless Platform are enabling us to be leaner and faster in terms of time and operations. We're probably saving 10–20 people."*
- **Handling spikes in demand and traffic automatically:** *"There's no impact on our IT team when there are spikes in demand with the AWS Serverless Platform, so it allows us to do other things. This is because the performance isn't any less when there are spikes, so we spend less time dealing with it."*

IDC found that organizations moving from on-premise infrastructures capture the most significant absolute and relative benefits because the staff time required for activities such as monitoring, deploying, and supporting infrastructure decreased substantially. However, even organizations moving from other cloud environments noted the significant impact of largely removing the manual interaction required for key activities. Table 7 shows how the AWS Serverless Platform benefits teams responsible for infrastructure-related activities, including the infrastructure and application management and help desk functions. The impact on IT infrastructure management (80%) and application management (68%) is especially significant.

TABLE 7 Impact of AWS Serverless Platform on IT Staff

	Before/Without AWS Serverless Platform	With AWS Serverless Platform	Difference	Higher Efficiency/ Productivity (%)
IT infrastructure management (Time spent in terms of FTEs per organization)	7.8	1.6	6.2	80
Application management (Time spent in terms of FTEs per organization)	28.5	9.0	18.5	68
Help desk (Time spent in terms of FTEs per organization)	5.1	4.6	0.5	9

n=11 Source: IDC, 2018

Providing the Business with a Cost-Effective IT Platform

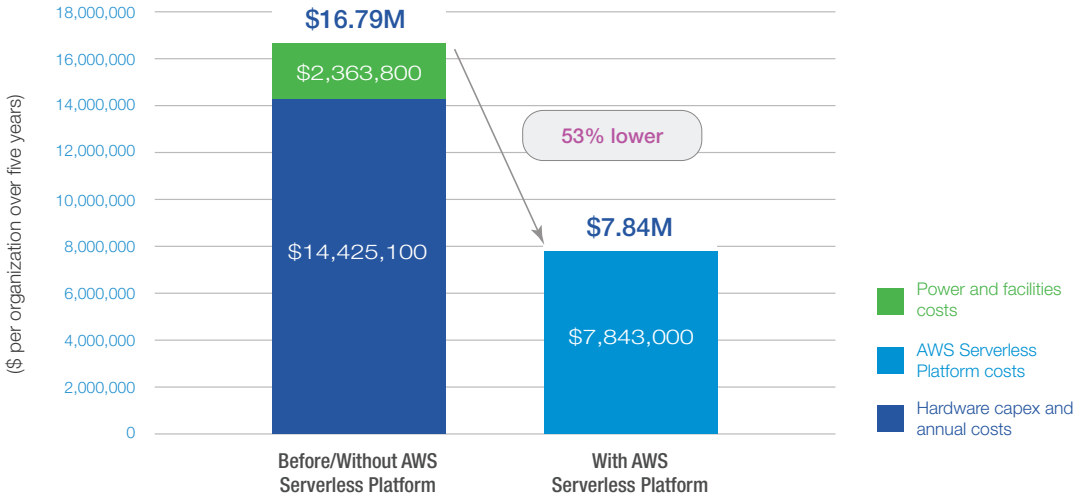
Interviewed organizations also reported that the AWS Serverless Platform has provided their business with a more cost-effective IT infrastructure. In particular, they can scale quickly, automatically, and effectively to actual demand without needing to overprovision on-premise environments or make inefficient use of cloud resources. Study participants traced cost savings to factors such as diminished need for hardware investment, lower licensing costs, and the ability to handle changing traffic patterns in a cost-effective manner. AWS customers described these benefits:

- **Ability to spin up compute capacity on demand for parallel processing at predictable cost:** *"Because of pay per use with the AWS Serverless Platform, if we use one concurrent Lambda execution, a job may take 15,000 hours to finish. But if we use 15,000 Lambdas, it will finish in one hour, and the cost is the same. It's scalable and can achieve performance when it really counts. That's not doable for any type of on-premise infrastructure."*
- **Handle traffic spikes cost effectively:** *"One of our most important applications that we're running on the AWS Serverless Platform has demand spikes. Customers don't know that there*

are spikes, and there's no impact to them. But there would be a huge impact to our compute cost if we weren't using the AWS Serverless Platform. … If we were using EC2 now with the applications that are on the AWS Serverless Platform, there are cases where it would cost 75% more on EC2, but I'd say 30% more on average."

IDC projects that these organizations will spend an average of 53% less with the AWS Serverless Platform than they would with an alternative approach, which includes a mix of on-premise and other cloud platforms (see Figure 3). Both on-premise and cloud migrators benefit from lower cost, although the cost savings for on-premise migrators (58% on average) were greater than the cost savings for cloud migrators (44%).

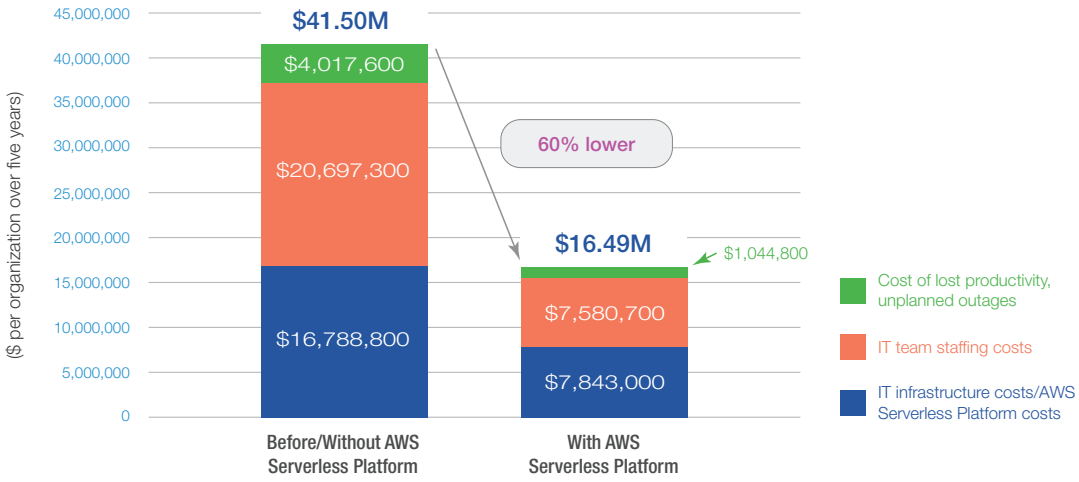
FIGURE 3 Five-Year Cost of Infrastructure/AWS Serverless Platform



Source: IDC, 2018

IDC calculates that for study participants, the five-year cost of running their AWS Serverless Platform environments will be 60% lower than the five-year cost of running their legacy or alternative environments. This calculation considers the cost of deploying IT infrastructure or other cloud infrastructure resources, AWS Serverless Platform, IT staff time requirements, and lost user productivity due to unplanned outages. As shown in Figure 4, this reflects a substantial cost efficiency for these organizations over five years ($25 million lower cost over five years), allowing these organizations to invest both staff time and money in new technologies and initiatives designed to ensure their business success.

FIGURE 4 Five-Year Cost of Operations



Source: IDC, 2018

ROI Analysis

Table 8 provides IDC's analysis of the value and costs for study participants of using the AWS Serverless Platform. IDC projects that on average, these AWS customers will achieve discounted benefits in the areas discussed in this study — including lower IT costs; higher developer, IT staff, and end-user productivity; and increased revenue — worth a discounted average over five years of $37.31 million per organization ($1.33 million per application) based on a total discounted investment, including AWS fees, staff time for migrations and management, and other third-party costs related to use of the AWS Serverless Platform, of $7.33 million per organization ($0.26 million per application). IDC projects that with this level of average benefits and investment costs, these organizations will realize an average five-year ROI of 409% and break even on their investment in an average of nine months.

TABLE 8 Five-Year ROI Analysis

	Five-Year Average per Organization	Five-Year Average per Business Application
Benefit (discounted)	$37.31 million	$1.33 million
Investment (discounted)	$7.33 million	$0.26 million
Net present value (NPV)	$29.98 million	$1.07 million
Return on investment (ROI)	409%	409%
Payback period	9 months	9 months
Discount rate	12%	12%

n=11 Source: IDC, 2018

CHALLENGES AND OPPORTUNITIES

Customers interviewed for this study stated that the AWS Serverless Platform is extremely efficient, scalable, and easy to use for applications. Although the business code is owned by users and redeployment on other serverless platforms is possible, dependencies on the entire AWS stack for successful implementations lead to lock-in fear among customers. Using open sourced aspects of the serverless platform such as the AWS Serverless Application Model and availability of alternatives such as OpenFaaS on Amazon EKS can help alleviate customer concerns.

AWS Fargate is often looked at as an option to the AWS Serverless Platform by customers that want to overcome limits such as running time and memory of AWS Lambda. AWS would benefit from educating customers about matching their managed services portfolio to different application use cases being implemented so that customers can pick the appropriate services for their needs.

As demands for new applications grow and the shortage of professional developers worsens, the AWS Serverless Platform has a good opportunity to grow enterprise serverless platform adoption, reducing the deficit between application demand and the ability to meet that demand.

CONCLUSION

The ability of organizations to respond to business requirements is increasingly being driven by whether their development teams can deliver timely and functional applications and services by eliminating non-value-added tasks. Historically, managing and carrying out infrastructure and application life-cycle activities have consumed substantial amounts of developer time. Time spent by developers on these activities means that they have less time to focus on building the logic that underpins valuable business applications and features. Stated differently, many organizations have failed to maximize the value of skilled development teams in improving business outcomes.

Serverless technology that abstracts infrastructure and application life-cycle activities can help organizations address the challenges related to development and business flexibility. The AWS Serverless Platform offers organizations the ability to leverage the AWS cloud with core compute functions as a service with AWS Lambda supported by other services within the broader AWS portfolio as well as integrating with on-premise workloads.

IDC's research demonstrates the significant value that organizations can achieve with the AWS Serverless Platform, whether migrating from another environment (e.g., on-premise, traditional VM based, or cloud) or coexisting with other application environments. At base, study participants reported that they have made their IT operations much more agile and scalable with AWS Serverless Platform. Automated, code-driven delivery and use of resources have freed up application development teams to focus on creating high-value logic for applications and services that drive the business while reducing the time required to deliver. Meanwhile, these organizations optimize infrastructure costs with flexible access to IT resources as needed, and IT infrastructure teams can step back from day-to-day deployment and support activities to take on other projects and initiatives. These benefits generate value in terms of higher employee productivity, revenue gains, and lower costs that IDC projects will result in an average ROI of 409% over five years for study participants' investment in and use of AWS Serverless Platform.

APPENDIX

IDC's standard ROI methodology was utilized for this project. This methodology is based on gathering data from organizations currently running business applications on the AWS Serverless Platform as the foundation for the model. Based on interviews with these study participants, IDC has calculated the benefits and costs to these organizations of using the

AWS Serverless Platform. IDC used the following three-step method for conducting the ROI analysis:

1. **Gathered quantitative benefit information during the interviews using a before-and-after assessment of the impact of using the AWS Serverless Platform to run various business applications and workloads.** In this study, the benefits included staff time savings and productivity benefits, increased revenue, and IT infrastructure–related cost reductions.

2. **Created a complete investment (five-year total cost analysis) profile based on the interviews.** Investments go beyond the initial and annual costs of using the AWS Serverless Platform and can include additional costs related to migrations, planning, consulting, and staff or user training.

3. **Calculated the ROI and payback period.** IDC conducted a depreciated cash flow analysis of the benefits and investments for the organizations' use of AWS Serverless Platform over a five-year period. ROI is the ratio of the net present value (NPV) and the discounted investment. The payback period is the point at which cumulative benefits equal the initial investment.

IDC bases the payback period and ROI calculations on a number of assumptions, which are summarized as follows:

- Time values are multiplied by burdened salary (salary + 28% for benefits and overhead) to quantify efficiency and productivity savings. For purposes of this analysis, based on the geographic locations of the interviewed organizations, IDC has used assumptions of an average fully loaded salary of $100,000 per year for IT staff members and an average fully loaded salary of $70,000 per year for non-IT staff members. IDC assumes that employees work 1,880 hours per year (47 weeks x 40 hours).

- Downtime values are a product of the number of hours of downtime multiplied by the number of users affected.

- The impact of unplanned downtime is quantified in terms of impaired end-user productivity and lost revenue.

- Lost productivity is a product of downtime multiplied by burdened salary.

- The net present value of the five-year savings is calculated by subtracting the amount that would have been realized by investing the original sum in an instrument yielding a 12% return to allow for the missed opportunity cost. This accounts for both the assumed cost of money and the assumed rate of return.

- Because every hour of downtime does not equate to a lost hour of productivity or revenue generation, IDC attributes only a fraction of the result to savings. As part of our assessment, we asked each interviewed organization what fraction of downtime hours to use in calculating productivity savings and the reduction in lost revenue. IDC then taxes the revenue at that rate.
- Further, because IT solutions require a deployment period, the full benefits of the solution are not available during deployment. To capture this reality, IDC prorates the benefits on a monthly basis and then subtracts the deployment time from the first-year savings.

Note: All numbers in this document may not be exact due to rounding.

IDC Global Headquarters

5 Speen Street
Framingham, MA 01701
USA
508.872.8200
Twitter: @IDC
idc-insights-community.com
www.idc.com

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