



Advanced
Consulting
Partner

Data & Analytics
Competency

Machine Learning
Competency

DevOps Competency

Amazon Elastic
MapReduce (EMR)

Immersion Day Partner



How Can You Enable Your Teams with Data Centric Decisions for Your Business?

LEARN HOW YOU ACHIEVE TRANSFORMATIVE DATA ANALYTICS PLATFORM ON AMAZON WEB SERVICES

DAN MARKS

Mactores Cognition, Inc. | Seattle, WA



Table of Contents

Executive Summary	3
Why Cloud for Data Modernization?	5
Current Challenges in Technology	6
5 Ways AWS Delivers Business Value	7
What Does AWS Analytics Services Offer?	8
Think Big, Invest Small, Move Fast	9
Customer Use Cases and Reference Architecture	10
Retail Use Case: Datalake for Consumer Analytics	10
Financial Services Use Case: Data Warehouse and Risk Modeling Using ML	11
Manufacturing Use Case: Realtime Shop Floor Optimization and Job Runtime Prediction	12
Marketing Analytics Use Case: Providing Personalize Customer Experience	13
How to Measure Success?	14
Pillar 1: Reduce Time to Market	14
Pillar 2: The Total Cost of Ownership	14
Pillar 3: Business Outcomes	15
Pillar 4: Agility	15
Empower Your Enterprise With Data-Driven Decisions	16



About the Ebook Author

DAN MARKS, VP BUSINESS FOR MACTORES COGNITION, INC.

Dan leads the collaboration with CXO's and their teams around solving complex business problems as a thought leader aligning the right Data & Analytics solutions to business problems, primarily focused on transformation and growth.

Dan is backed by a strong engineering team at Mactores which quickly solves core business problems and drives disruptive change by applying the automation techniques to Data Analytics, DataOps, Machine Learning and MLOps. Mactores designs, deploys, integrates and manages rapid migration and transformation solutions to accelerate enterprise data platform modernization using automation developed over 10 years of successful implementations.

As insightful problem-solvers, the team at Mactores comes prepared with solutions that can be immediately implemented. Their extensive knowledge base, highly experienced team members, and exposure spanning multiple industries enable them to offer their clients the exemplary solution to meet their business needs.

Executive Summary

Ongoing cloud computing developments are rapidly moving the promise of gaining business value from data into reality. With thousands of data sources already streaming data, many companies leverage the cloud to gain significant benefits from this data storm. These benefits include faster time to market products and services, the lower total cost of ownership (TCO), improved operational efficiency, and more agile application development.

To help dig deeper into the business value gained, Mactores conducted both in-depth interviews via workshops and deployed proof of concepts for 20 enterprise customers in 8 verticals to examine their cloud-based data platform transformation efforts, and the various tools and services they use. These interactions uncovered several essential factors that can help other organizations build next-generation data analytics platforms to make data-centric business decisions. Included among them are:

1. **Many organizations can realize the benefits of data lakes, machine learning, and advanced visualization.** In this eBook, the enterprises Mactores worked with represent eight significant industries: Internet and Technology, Manufacturing, Service Providers, Financial Services, Media and Entertainment, Advertising and Marketing, Healthcare, and Professional Services.
2. **The most critical factor in delivering successful efforts towards gaining business value from data platform modernization is the ability to capture, ingest, store, and process cloud data far less expensively and securely than could ever be done in on-premise environments.** These modernization efforts have allowed users to take advantage of advanced analytics techniques, especially to analyze structured and unstructured data in combination, use AI and Machine Learning effectively, and helped them to exploit their company-wide data repositories.
3. **Remarkably, after relatively brief forays into cloud-based utilization of data platforms, some organizations find that this move is not just an operational advantage to the business.** Instead, it triggers new possibilities of revenue generation and delivers immense business outcomes, as is discussed in more detail throughout the eBook.
4. **The benefits of cloud-based data platforms are often measurable.** Data queries to the cloud in one organization resulted in an impressive 400x improvement over on-premise-based solutions. Another company witnessed a 98% improvement over on-premise systems for a decision-making algorithm delivering risk and threat analysis.

Companies we worked with also cited a common challenge to cloud-based analytics platforms. While the cloud significantly lowers the cost and other barriers for data processing (such as the time and effort to deploy the required infrastructure), the challenge most often mentioned is the lack of personnel with the appropriate skill sets in this developing area. To get the most value out of cloud-based data platforms quickly, these customers leveraged many of Mactores' Accelerators to reduce risk and time to market.

Additionally, other ongoing challenges can create roadblocks that prevent organizations from reaching short and long-term goals, such as continually growing and changing data sets and operational silos spread across globally distributed environments. The desire to incorporate different types of data into analytics projects is just the start of the complexity. Many businesses are stuck on traditional infrastructures, or on-premise databases (Oracle, Microsoft SQL, Sybase) and data warehouse appliances (Netezza, HP Vertica, Teradata, Oracle Exadata, Greenplum) with legacy hardware and software limitations, which simply can't keep up with modern analytics requirements.



Cloud adoption is widespread, and the emergence of a data lake is driving more enterprises to look for new approaches to generate insights from previously ignored data or simply could not be effectively or efficiently processed. Cloud services provide an alternative to on-premise infrastructure to store and process data sets, both large and small. Furthermore, these services can lower the barriers to adoption by reducing the need for large capital investments, enabling pay-as-you-go models, and seamlessly facilitating global expansion. As a result, enterprises can reduce the cost and time involved in configuring new big-data processing and analytics platforms.

In June 2020, Mactores surveyed its customer's senior-level IT executives with knowledge and responsibility for their organization's analytics initiatives and goals. The survey focused on critical factors that have had an adverse impact on their organization's data analytics strategy and investments during COVID-19. Cost has been the largest adverse impact to an organization's data analytics strategies and investments, as cited by 67% of respondents (see Figure 1). More than half of respondents cited multiple data sources, and 40% cited a lack of skills necessary in data analytics operations. The lack of collaboration across the business, including various personnel involved in data strategies such as IT, data analysts, and line of business owners, was cited by 32% of organizations. And when accounting for the security, governance, and compliance requirements, 32% of organizations were cited.

Which of the following has had an adverse impact on your organization's data analytics strategies and investments during the COVID19 pandemic? (Percent of respondents, N=310, multiple responses accepted)

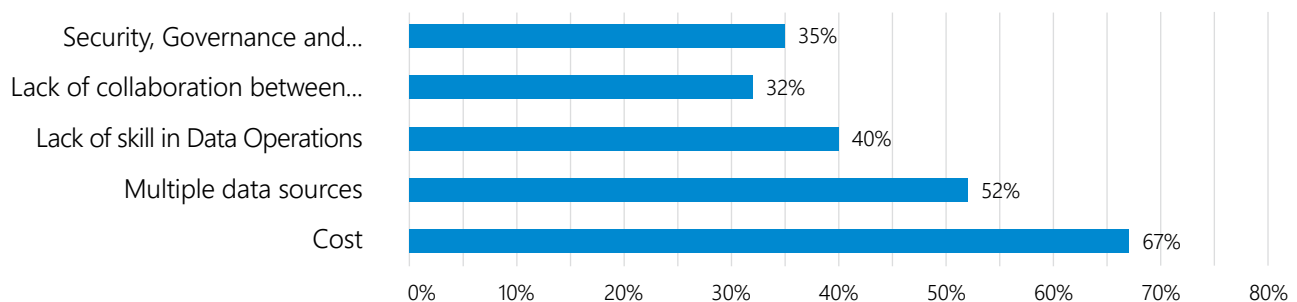


Figure 1: Top Five Areas that Adversely Impacted Data Analytics Strategies and Investments in FY2020.

By turning to a cloud-based data analytics platform, organizations will ensure the following critical components are being applied to all data:

- Instant accessibility to data
- Infrastructure flexibility to handle changing and diverse data sets
- On-demand scalability to handle real-time performance requirements to support high concurrent user counts
- Cost-effectiveness to keep budgets in check
- Reduced risk through a single security model

Current Challenges in Technology

While organizations' first instance of collecting, curating, and storing data from multiple sources for analysis was done in an enterprise data warehouse (EDW), limitations around scalability, performance, type of supported data, and cost have forced organizations to look for other ways to analyze diverse data sets. The initial architecture they turned to included Hadoop-based, scale-out architectures deployed on generic hardware with distributed storage and processing resources. This served as an effective means to initially satisfy multiple business units that desired a more comprehensive view of data while utilizing a more cost-effective, scalable infrastructure. Organizations could migrate certain data sets and workloads from their enterprise data warehouse to their Hadoop systems (data lake).

This continues to be a common practice and is found in Mactores' customer base. The top two ways enterprise data warehouse and data lake technologies interact are to:

- Gain key optimizations for specific workloads by offloading from an EDW to a data lake
- Enable organizations to better incorporate next-generation technologies like AI and ML

As pressure continues to be placed on different areas of the business to gain real-time, actionable insight, organizations are experiencing unforeseen challenges that include: the inability to satisfy real-time requirements; data pipelines (ETL) execution time; data type mismatch between data warehouse and data lake: row-based vs. columnar data models; and various other operational challenges. Additional challenges need to be overcome: the less-than-efficient speed at which data can be ingested; an inability to accurately discover and catalog data effectively; and, immature security and governance tools.

The cost and complexity of buying, building, maintaining, and supporting a rapidly changing and expanding hardware and software environment consisting of numerous open-source projects is simply more trouble than it's worth. With more than 80% of organizations implementing an on-premise data lake today, the Mactores data and analytics team recommends leveraging AWS data analytics services.

5 Ways AWS Delivers Business Value

All 20 enterprises that contributed to this eBook are using the cloud for data processing to increase competitiveness. They are doing so by providing products or services to their internal and external customers that would not have been possible or affordable using traditional data-processing and analysis techniques or deployment models.

The study identified five fundamental ways that the combination of cloud computing and big-data analytics are delivering business value:

1. **Faster time to market:** Query times for one organization improved by 4,000% over on-premise systems, enabling far more rapid and informed decision-making while shrinking product and service development time.
2. **Lower TCO:** >50% cost savings over on-premises environments.
3. **Reduced management overhead:** >50% reduction in operating costs, freeing up valuable IT staff time for more strategic, business-focused development tasks.
4. **Improved developer agility:** From concept to full production deployment in 24 hours.
5. **New revenue opportunities:** Faster, more convenient access to analytics helps uncover new revenue opportunities in minutes, not days.

What Does AWS Analytics Services Offer?

AWS offers a plethora of services for multiple use cases to build a highly scalable, secure, and modular data analytics platform. The following table identifies all major use cases and associated AWS Services:

Category	Use cases	AWS service
Analytics	Interactive analytics	Amazon Athena
	Big data processing	Amazon EMR
	Data warehousing	Amazon Redshift
	Real-time analytics	Amazon Kinesis
	Operational analytics and search index	Amazon Elasticsearch Service
	Dashboards and visualizations	Amazon QuickSight
Data movement	Real-time data movement	Amazon Managed Streaming for Apache Kafka (MSK) Amazon Kinesis Data Streams Amazon Kinesis Data Firehose Amazon Kinesis Data Analytics Amazon Kinesis Video Streams AWS Glue
Data lake	Object storage	Amazon S3 AWS Lake Formation
	Backup and archive	Amazon S3 Glacier AWS Backup
	Data catalog	AWS Glue AWS Lake Formation
	Third-party data	AWS Data Exchange
AI and Machine Learning	Data labeling	Amazon SageMaker Ground Truth
	Build	Amazon SageMaker Studio Amazon SageMaker Notebooks
	Train and tune	Amazon SageMaker Experiments Amazon SageMaker Model Debugger Automatic Model Tuning
	Deploy and manage	Amazon SageMaker Model Monitor Amazon SageMaker Neo Amazon Augmented AI

While the adoption of cloud computing is historically associated with data-driven startups, Mactores has enterprise customers across all industries investigating and adopting cloud services. The winning strategy to emerge over the last 2-3 years has been for these enterprises to think big, invest small, and move fast. This eBook provides a snapshot of a group of companies that have already adopted cloud services for their data modernization initiatives. These initiatives are primarily focused on storing, processing, and analyzing data that was previously ignored due to the incompatibility with traditional on-premise infrastructures and traditional data storage and processing techniques.

Incompatibility with traditional, on-premise infrastructures is due to several factors:

- Relational databases were not designed for storing and processing unstructured data
- Relational databases are not engineered to process large-scale data volumes
- Relational databases are better suited for processing predefined queries, rather than enabling data analysts and data scientists to explore data sets in search of new insight

We believe the primary factor driving adoption of emerging data-processing technologies is an economic one because the processing and storing of big data are no longer prohibitive. Cloud services provide the opportunity to invest in small amounts, which removes the barriers to adoption for these data-processing platforms by removing the requirement to build, configure, and manage on-premise infrastructures. This enables developers to move fast from proof of concept to production quickly and provide data analysts and data scientists with quicker business insight.

The combination of cloud services and new approaches to storing, processing, and visualizing data have provided enterprises with an opportunity to drive business change and fulfill emerging business objectives. However, the adoption of data processing in the cloud is still in its early stages. The participants in this study also highlighted their intentions to expand their cloud-based data processing, providing a glimpse into the potential direction of big-data processing cloud services.

Interviewees in the study used a wide range of AWS offerings, such as Amazon Simple Storage Service (S3) for cloud storage, Amazon Redshift for data warehousing, and Amazon's Elastic Map Reduce (EMR) – a Hadoop-as-a-service offering that is compatible and interoperable with Hive, Presto, and other Hadoop-related projects. Meanwhile, some customers were also running Hadoop distributions on cloud infrastructure. Amazon's DynamoDB NoSQL database and Amazon Relational Database Service (RDS) are also either being used in production or test and development, along with other cloud services.

Retail Use Case: Datalake for Consumer Analytics

“A Retail company builds 10X faster data lake on AWS, which costs 15% of what it used to cost on-premise with about 500 TB of data which was collected throughout the last 30 years.”

Use Case: Their analytics teams would continuously analyze the data to measure their brand performance for sales, trade promotions, a recommendation engine for distributors, and supply chain. These analysis are needed to improve efficiency in the business processes. The customer has multiple data sources, including brand performance, primary, secondary & retailer sales coming from ERP and 3rd party market analysis datasets, including structured and unstructured data. They had challenges executing batch processing jobs, which would take up to 20 hours for each job and more than 3 minutes to execute user queries. They were expecting more data sources and large amounts of data to be processed in the future. Hence the need for a cloud-based Ad-hoc query engine was required. They needed a

scalable Data lake on the cloud to make it super simple to run future use cases with predictive analytics.

The Solution: Mactores data engineering and data science teams provided services to architect and deploy batch processing using AWS Lambda on AWS Infrastructure with best practices and well-architected framework. The architecture included AWS Lambda for Automation, Amazon S3 for Data Lake, Amazon EMR for Batch Jobs, AWS Glue for Data Catalogue, and Amazon Athena connected with Tableau for Ad-hoc Querying. The Mactores Data Science Team stays engaged by working with the customer to build Machine Learning Operations (ML-Ops) using Amazon ECS and Amazon Sagemaker.

Business Outcomes: Now that the users received better-suggested order quantities to distributors, they achieved a 40% improvement on the prescribed basket size. Specialized services for real-time, micro-batch, large batch processing, and predictive analytics on one platform. The data platform costs reduced to 15% compared to on-premise, with no license fees, so their investment was reduced to \$4,200 per month on AWS, down from \$28,000 per month when using their on-premises infrastructure.

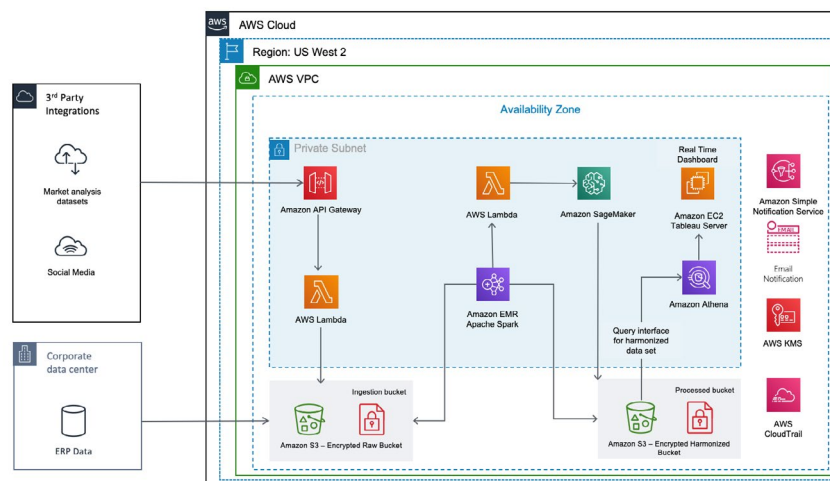


Figure 2: Datalake for Consumer Analytics

Financial Services Use Case: Data Warehouse and Risk Modeling Using ML

“A Financial Services company in the insurance domain achieves rapid results and high customer satisfaction due to real-time fraud detection with high accuracy using AI.”

Use Case: Financial Services within the insurance domain continuously are trying to avoid the potential losses of millions of dollars annually on fraudulent claims. This company provides insurance on the person’s age and condition to help its customers establish policies and premiums. This customer initially built predictive models based on ZIP codes and other general data using Python and R languages on-premise, but building the models was complex. The results did not provide enough differentiators to boost the business. The customer needed an easier solution and would support faster, more accurate modeling for property-specific estimates.

The Solution: Mactores Data Engineering team built a Datalake along with a streaming analytics engine using Amazon Kinesis. The Mactores Data Science and

customer Data Science teams collaborated to use Amazon Sagemaker tools to build models by consuming data lake to assess credibility of each person before offering insurance estimations for insurers and businesses. Now armed with person-specific values, they don’t need to rely on broad, profession-based estimates. Wide variety of data from social media, 3rd party and historic data of 100 million+ policies was used to train and validate these models in 2 weeks. This rapid transformation was possible due to the end-to-end data lake deployment using Mactores Automation. Security and Authentication was also critical to this customer; therefore, AWS Key Management Service (KMS) and AWS Identity and Access Management (IAM) were used to control and govern the data in the data lake.

Business Outcomes: The data lake and ease of use built into Amazon Sagemaker dramatically streamlined the process of building predictive models. Models that previously took 6 months or longer to create, are now complete in 2 weeks or less. Now the customer provides application developers with programmatic access to predictions through APIs. This transformation opened up new opportunities for data analytics services the customer uses to enhance consumer experience.

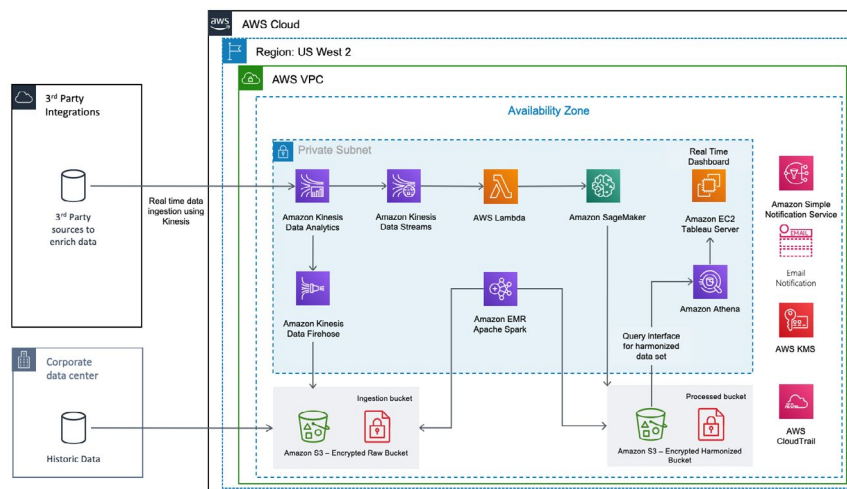


Figure 3: Data Warehouse and Risk Modeling Using ML for Financial Services

Manufacturing Use Case: Realtime Shop Floor Optimization and Job Runtime Prediction

“A construction manufacturing company gains 350% in operational efficiency while reducing the cost of construction by 5x using Amazon Datalake and AI.”

Use Case: A construction automation company was challenged with predicting delays in completing construction projects which were co-dependent on 18 different processes. Construction manufacturing and supply chain depends on factors such as prefabricated building construction material, purchase of utilities, shipping to the construction sites and on-site assembly of the materials to perform the finishing of the construction. Since their entire project is complex and co-dependent on manufacturing and supply chain, the company was challenged with forecasting delivery dates of each material on the site so they can co-ordinate their on-site team to complete the project with minimum risk of delaying construction. Delay in construction results in costs due to the increase in working hours, which

severely affects company's operational costs of the project.

The Solution: The Mactores data engineering team built a comprehensive data lake in Amazon S3 while using Amazon Kinesis, AWS Glue, and Amazon Athena for multiple users to consume historical and real-time analytics. This data lake was ingested with data from SAP MES, SAP S4, RFID and GPS systems. AWS Glue along with AWS Step Functions was used to build data processing pipelines, while Amazon Athena provided analytics environment for enterprise users. The Mactores data sciences team helped the company build a Deep Neural Network (DNN) using Amazon Sagemaker, which also hosted a production model.

Business Outcomes: A customer gained a 350% increase in operational efficiency and 5x reduction in costs to execute construction projects. The data lake provided high agility for all teams working internally and externally on construction projects to consume the real-time updates and predictions for the job completion time from manufacturing floor. Customer could find new ways to optimize their profitability due to this data lake and machine learning model.

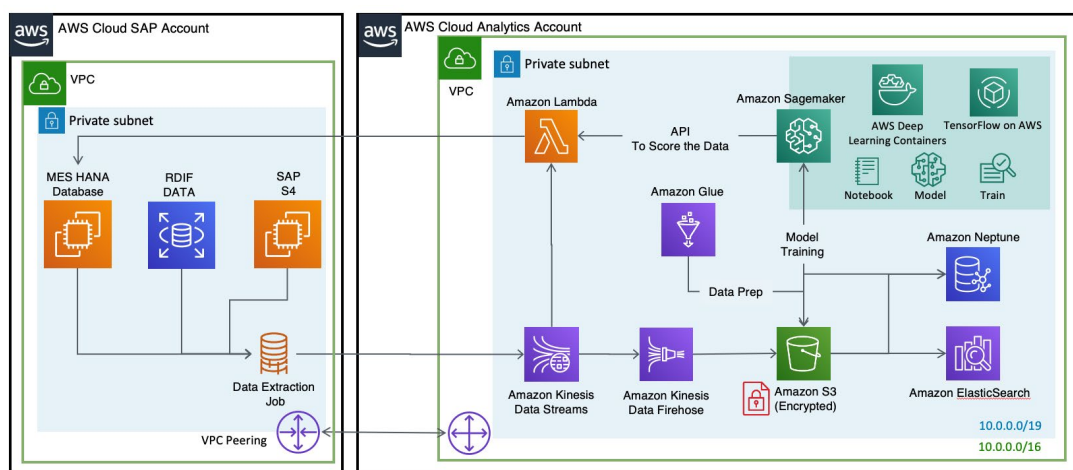


Figure 4: Realtime Shop Floor Optimization and Job Runtime Prediction

Marketing Analytics Use Case: Providing a Personalized Customer Experience

“A data-driven marketing and strategy company focuses on building intelligent, intuitive and real-time customer relationships gained 5x performance and 70% reduction in technology costs by adopting Amazon Redshift and Amazon EMR.”

Use Case: Customer was challenged to manage multiple databases at scale of 10-15 terabytes for multiple marketing campaigns. Their on-premises IT infrastructure proved costly and could not scale. They needed the infrastructure to be cost-effective so the business could be viable, easy to maintain, minimize the load on its lean technical team, and flexible to support peaks and troughs in usage. Processing Marketing Data for Cohort Analysis and building learning models on petabyte data posed a major challenge for the customer. Their management team was also experiencing poor reporting and analytics response time for enormous data volumes which caused a delay in critical decision making.

The Solution: Mactores Data Engineering team built a data lake along with cloud-based data warehouse with high availability and scalability on AWS. Their existing unstructured data was migrated to Amazon S3 data lake while Amazon Kinesis along with AWS Glue was used for ingestion, processing and storing new unstructured data to Amazon S3. To help customer

analyst identify patterns and trends in their marketing campaigns, the unstructured data is stored in Amazon S3 through Amazon Kinesis Firehose. Batch Processing Jobs were processed through Amazon EMR for unstructured data analytics, while Amazon Redshift was used for data warehousing and storing the processed data to perform Self Service BI & Cohort Analytics. Mactores effectively integrated Tableau with Amazon Redshift to give customer a single window view of their data to help them create more precise business models with rich analytics.

Business Outcomes: Customer can now process marketing analytics at a record time of 1.5 Mins on a petabyte of marketing data. Their development team can manage multiple customer data in separate Amazon S3 buckets for security and compliance. The cost of operation is lowered by over 70% with the help of Amazon Spot Instances. With Automated High Scale Out EMR Deployment, the DevOps operations team could save an additional 40% of time to invest on development of better Cohort Analysis for businesses.

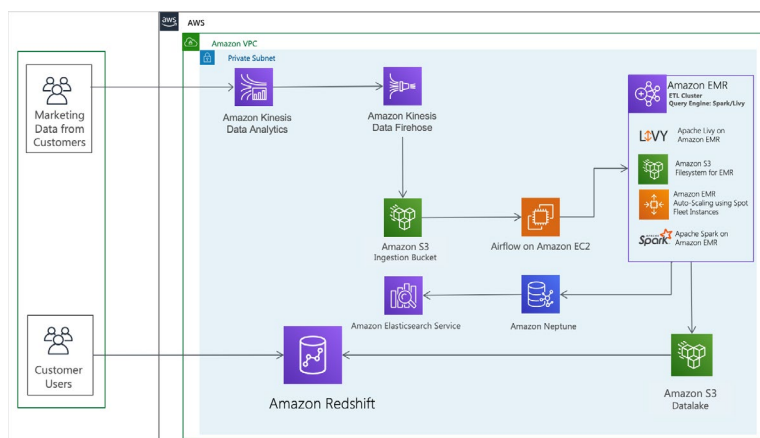


Figure 5: Personalized Customer Experience used for Marketing Analytics

With the use cases described in this eBook, Mactores helped each customer achieve 4 Pillars of Success with their data platform modernization achievements. Following are details of the advantages these customers experienced in their data platform modernization.

Pillar 1: Reduce Time to Market

Faster time to market is frequently the driver for embracing cloud for startups and emerging industries, empowering them to move from ideation to production without the need to design, purchase, configure and operate on-premises infrastructure. This essential advantage is clearly identified by the retailer use case where they experienced the added advantage of scalability offered by AWS. As they are now empowered to be more responsive to the peak demands. Another advantage identified by this use case is to attract cloud engineers and developers, which has enabled them to hire and retain talent.

The retailer additionally refers to time to market as its primary enabler to embrace cloud for data analytics platform having been able to develop and launch their offerings more quickly thanks to the availability of Mactores Accelerators and Automation on AWS.

The marketing strategy firm has likewise observed numerous advantages – cost savings, lower time to market, high agility and high profitability. Their overall importance changed relying upon who was responding: the finance division, the marketing experts or the IT teams. For the marketing strategy firm's CTO, nevertheless, the essential advantage was rapid time to market with new ideas.

Pillar 2: Reduce Total Cost of Ownership

Larger and established big-data users tend to be drawn to cloud services by the opportunity to reduce costs and improve operational efficiencies. Perhaps not surprisingly, the financial services firm use case above focused its attention on cost-reduction benefits, achieved by migrating from an on-premises data lake to an Amazon data lake at roughly 40% of the cost. This financial services regulator also has a strong focus on cost; it uses a variety of key performance indicators (KPIs) to measure its success with its cloud services. These KPIs include whether the project is fit for purpose; whether it was delivered on schedule; and whether it was delivered on budget.

The company discovered via an initial costing project that it could save 35-40% of the cost of a comparative on-premises environment. Additionally, the company has found that by constantly evolving its cloud services to take advantage of innovative new services and technologies, it is able to fulfill its goal of reducing costs by 12-14% annually.

Big data is so intrinsic to the financial services firm's business that it has applied more generic business indicators to measure the success of its project, using aspects such as month-over-month revenue and market share. As for the system itself, cost is a significant indicator, as is the ability to produce reports in a timely manner to measure the success of the business.

Pillar 3: Focus on Business Outcomes

As described in the manufacturing company use case, the key performance indicators are more specific to the system; cost, uptime, application performance and security. And, these were viewed within the context of the larger concern of how the business as a whole is performing.

Similarly, within the marketing strategy firm use case, they measured multiple indicators related to the cloud service; performance and relative cost are the key benefits, with the most important indicators related to the business itself. Here, the KPIs include how many customers are using the service; how much customer data it is handling; and how much value it can deliver to customers.

The consultancy use case also saw multiple advantages. While saving money is the most obvious upside, faster time to market and revenue-generation improvements have also stood out as significant benefits. Meanwhile, the consulting firm also zeroed in on customer-related indicators such as new revenue generation, new customer generation and customer retention. The marketing strategy firm also estimates that it has saved costs in terms of avoiding having to hire people to manage and maintain the services themselves.

Pillar 4: Embrace Agility

Within the marketing strategy firm use case, speeding time to market and the ability to modify and expand its platform in an agile manner is key to making a decision between whether an application should be deployed on-premises or in the cloud. While cost is often the primary driver for established industries and vendors, as noted above, agility often becomes a greater benefit that can help drive broader adoption by enabling and supporting new business initiatives. In addition to cost considerations, agility is also a key factor for the financial services firm, specifically the ease with which it can provision new compute and storage resources in the cloud compared to the paperwork and hurdles required to provision server hardware on-premises.

Agility is also cited as a benefit by the marketing strategy firm, which notes that improved agility is a benefit for both the operations team and the business analysts.

Empower Your Enterprise with Data-Driven Decisions

As organizations continue to embrace a data-centric mantra, data lakes can serve as a foundation to the modern Enterprise. But data lake technology won't be successful if it remains just in the realm of data scientists, or even data engineers. With adequate security in place, data lakes should be made easily accessible to a wide range of users, from CIOs and line of business owners, to developers and business analysts. If implemented properly, a data lake will enable all personnel throughout a business to ask more questions, come together with new ideas, and walk away with useful and actionable insights. And to ensure a data lake can satisfy both the current and future demands of a business, it's essential to architect it with surrounding technologies and services that enable cost-effective simplicity, agility, scalability, and security. With the right tools and best practices, an organization can use all its data, making it accessible to more users and fueling better business decisions.

When looking to properly architect a data lake solution, ensure the key elements are satisfied: data ingestion, infrastructure, management, analytics, visualization, and machine learning. Organizations must be able to bring data to the data lake on their terms. They must be able to reliably store, manage, and prepare the data for analytics. They must be able to access the data from a wide range of analytics solutions based on the size and type of data, the speed at which it needs to be analyzed, and the cost associated with analyzing it. And finally, they must be able to see and interact with the data through visualizations and dashboards—while being placed on a path to easily integrate next-generation technologies like machine learning for predictive insights.

Mactores is helping businesses of all sizes build productive data lakes and data platforms. And while every business might not be ready to transition from an on-premises approach to a cloud-based data lake, Mactores is well equipped to help organizations explore new and better ways to store, process, and analyze their most valuable asset—data.

If you want to know how Mactores can help you in achieving your data platform modernization goal, please fill out the following survey and participate in a custom workshop tailored to your needs.

- ▶ **Take the Survey**
- ▶ **Register for a Workshop**

