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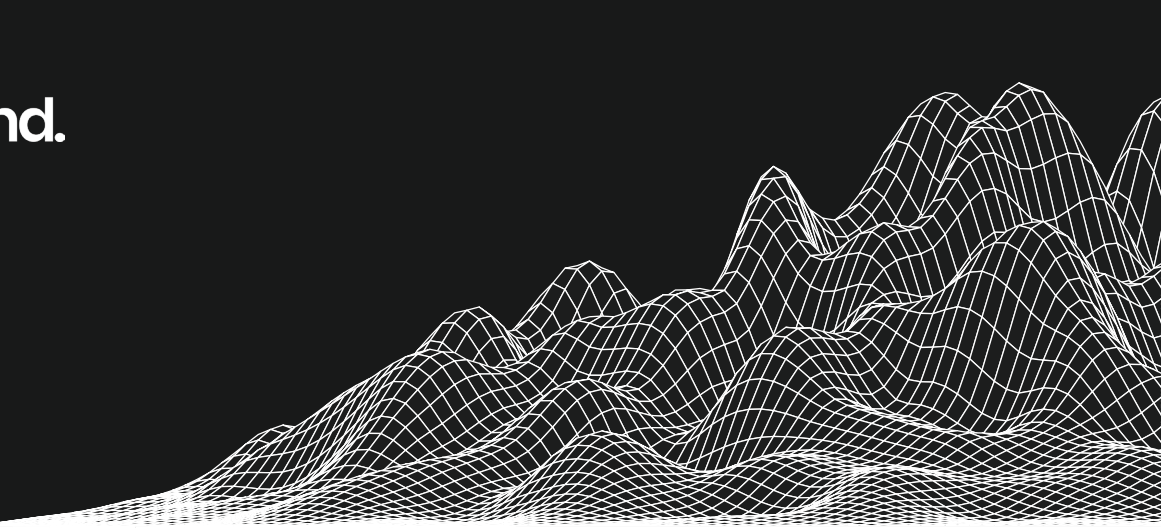


Invoices

AWS Lambda Case Study

Executive Summary

Vodafone Group Finance required a platform to be created which would allow them to view all the invoices they have received from their top suppliers. The invoices focused on broadband circuits from customers all around the world. The invoices would be delivered as Excel and PDF formats, requiring a sophisticated system that was able to read the invoices into a standard format ready for alignment and processing.

The system would have to read from multiple data sources, on-premise and in the cloud, make smart matching decisions, and learn from manual matching rules that are specified by the staff.

The Challenge

Vodafone Group Finance follows the procedures set by Vodafone Group Technologies. This includes using the public cloud. One of the biggest challenges faced by the customer was ensuring that any solution going live met the security, privacy and technology compliance requirements set out by the group.

With this project using new technologies such as Rekognition, it was a challenge to ensure that the security and privacy teams were happy with the usage as well as the approach towards keeping the customer's data safe.

About Vodafone

Vodafone Group Finance is part of Vodafone Group PLC, a multinational telecommunications company. Its' registered office is located in Newbury, Berkshire, England and its' global headquarters is based in London, England. It predominantly operates services in the regions of Asia, Africa, Europe, and Oceania.

Why Vodafone Chose Us

Firemind were chosen as the vendor to provide this bespoke solution in part due to their knowledge of the internal requirements for building cloud-based architecture. This includes security, access control, as well as separation of concerns. Firemind has, through their working relationship with Vodafone, in the past understood the internal processes required to deploy a cloud solution, and support the business unit through this process.

To be able to understand the business challenge, a clear understanding of the businesses internal requirements had to be understood, Firemind carried out workshops as part of the requirements gathering process to better understand how the solution would fit into the business, providing technical, and business solutions to the challenge at hand. Fireminds experience working with Vodafone's internal processes in the past supplemented these workshops.

Why Amazon Web Services (AWS)

Vodafone chose Amazon Web Services for this solution at the recommendation of Firemind. AWS' mature offerings in the serverless platform including AWS Lambda, DynamoDB made AWS a natural choice for a new application.

The application, by its nature, would be used at peaks throughout the year, and will not be used at other times, making it an ideal fit for the AWS pay-as-you-go pricing model, as well as the AWS Serverless offerings abilities to instantaneously scale up as necessary.

AWS provided the capabilities to meet and exceed the internal security requirements, making security a first-class citizen, ensuring commercially sensitive data was behind strict access controls, using advanced IAM controls, as well as being encrypted at rest and in Transit.

Our Solution

Firemind's solution was designed and built around using four key services provided by AWS: S3, Lambda, Aurora Postgres and Textract.

As part of the design process, we came to the conclusion that many of the processes and solutions we wanted to implement needed to be event-based, i.e. when an invoice is uploaded, when the lines of the invoice are ready to be processed or when Textract is finished analysing a document. The obvious choice here was Lambda. The primary event invocations used include S3 uploads, SQS messages and SNS messages, triggered by either a user or external sources such as Qlik Sense or Email. This allowed for complete automation of the invoice matching process.

When it came to designing a solution for supporting PDF uploads, Textract stood out as the best service for our use case. This conclusion was reached after creating some test models, and with the dataset that already existed, this was likely to be too inaccurate. Amazon S3 was configured to trigger a Lambda that would start the Textract document text detection. Because Textract is only available in particular regions, it had to move the data between regions. Once Textract has completed the analysis, it publishes a message to an SNS topic which invokes another Lambda to process the document data. The processed data can then be persisted and accessed later by saving it to a database, specifically Aurora Postgres. The process that the Lambda function uses to invoke the data can vary based on the type of invoice and will depend on the vendor's initial file format. Each method for processing different types of invoices was a bespoke function written precisely for that purpose. This was largely to enhance the AWS Machine learning offerings, without needing to implement a full machine learning model to extract lines from the invoice.

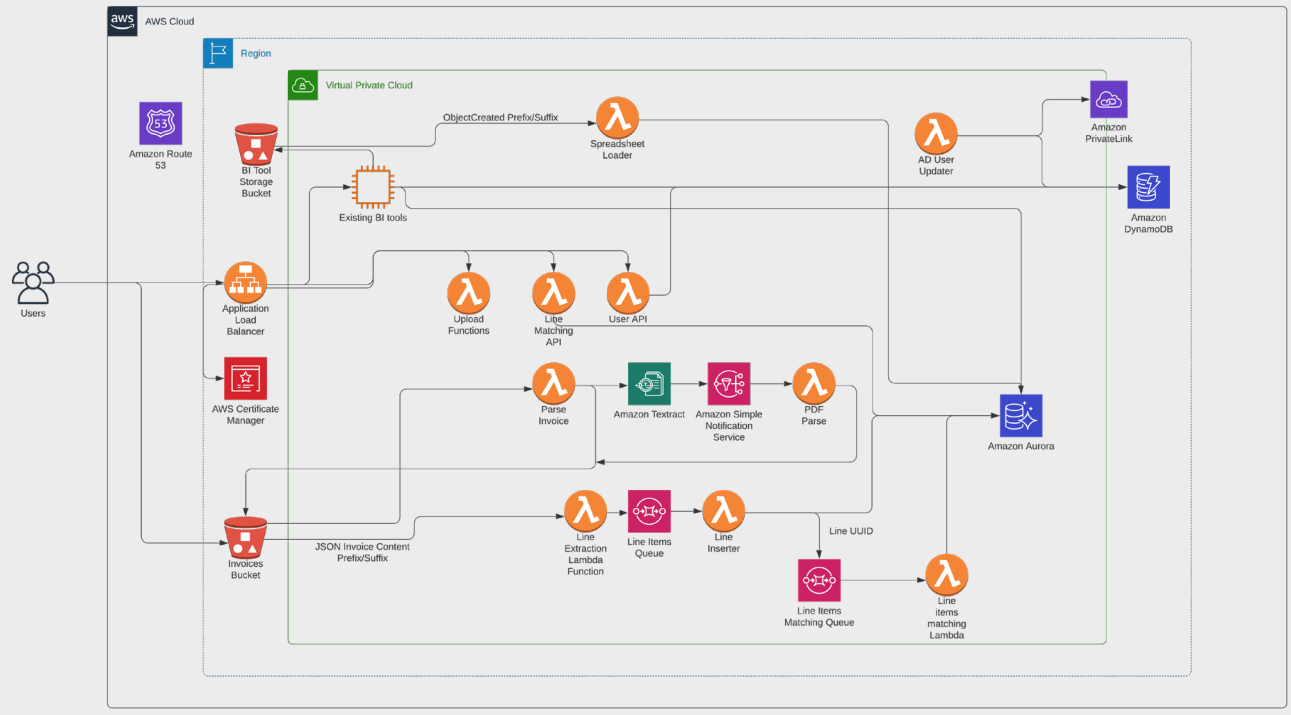
The monitoring of the architecture in this enterprise application is also an important part of the solution. This is why Firemind has used Lambda with CloudWatch. Services can be monitored for failures, metrics on queues can be gathered and checks on overall operational health can be made.

The service is interacted with via an existing Qlik Sense installation, this installation has been configured to make API calls via API Gateway to the Lambda's running the service, and this is where the analysis of invoices takes place. The invoice processing service provides invoices as individual lines to the BI tools, where scripts have been written to perform additional ETL, as well as provide insights.

Firemind have built the authentication for this service around the existing on Premise LDAPS service, and users will only be able to access invoices from vendors they have a working relationship with, this allows for highly sensitive data to be stored within the solution.

This combined with the fact that data is encrypted at rest as standard, as well as in transit through every part of the data's journey means the service is highly secure and can carry confidential information.

Simplified Infrastructure Diagram



Results & Benefits

The solution has the ability to instantly extract data from millions of scanned document pages, PDFs, spreadsheets, and images with machine learning. Using the managed services provided, it ensured that the total cost of ownership was significantly lower than installing competitors' software that was required to run on virtual machines. The overall comparison was the time saved before all invoice processing was done manually usually taking 5 days per invoice with 60% per line matching accuracy. Now using Firemind's solution, an invoice is fully processed within 3 minutes with matching as high as 95%.

The biggest benefit for the customer was the reduced manual processing means that the teams can be distributed to other work that's more efficient and less labour intensive.

Next Steps

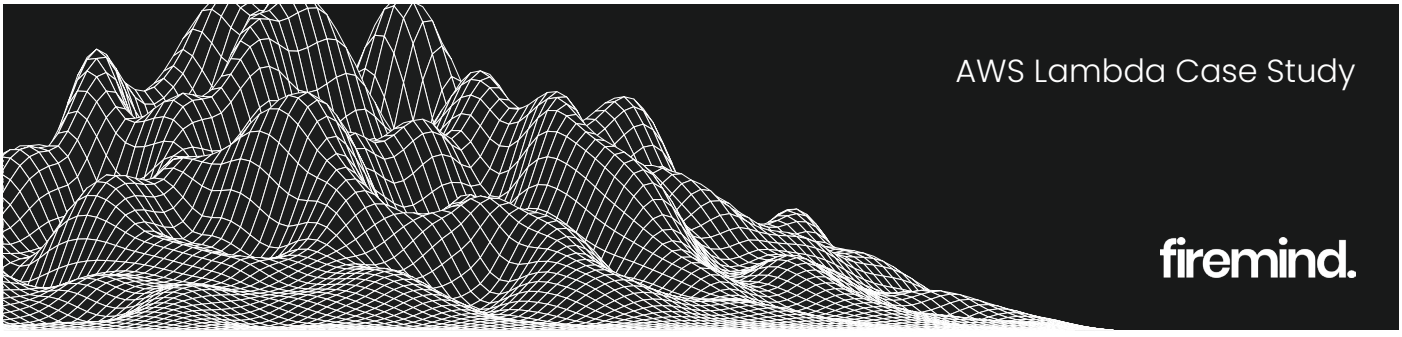
Given the success of this pilot, Vodafone Group Finance wants to roll it out to all of the vendors for broadband circuits and include a mechanism that allows the staff to "drag and drop" new rules for new vendors.

This new service is expected to allow the invoicing team to create new rules for new vendors by describing the specific areas of the invoice required in a simple and straightforward user interface that can then translate the rules into the format that the processing tool requires.

About Firemind

Firemind leads with innovation to drive better value, discover insights, and deliver tangible outcomes. We deliver smart and secure digital solutions designed for every business goal.

Built on the foundation of pioneering data science, great engineering, powerful visualisation and intuitive user experience, our expertise spans across multiple verticals. Firemind utilises a whole range of technology services to provide rapid, cost-efficient and innovative business solutions.



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