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How to Build a Cloud Native Image Recognition Solution

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CTO

SPS

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Principal Director for Cloud Native, DevOps, and Observability

ORACLE
Cloud Infrastructure

Introductions

Introducing myself (Rolando Carrasco)

- SPS (Mexican Consulting firm) CTO
- IT professional with 20+ years in the industry
- Oracle Groundbreaker Ambassador and Oracle ACE Director
- Experienced professional on distributed systems. Strong Service Orientation and Integration background
- API Management specialist
- Latin-American Oracle Users Group President
- Book writer and tech reviewer
- Katacoda contributor
- Arcitura certified Professional and Instructor (Microservices and API Management)

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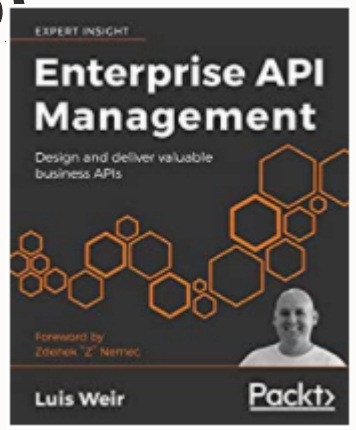
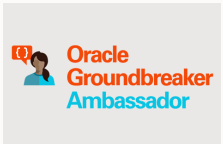
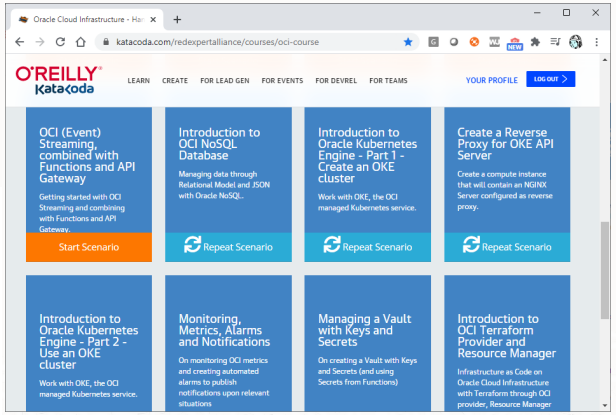
Tech Reviewer



Co-author

Tech Reviewer





Introducing myself (Akshai Parthasarathy)

- Principal Director of Product Marketing for Cloud Native, DevOps and Observability at Oracle Cloud
- Techie with 12+ years of experience in on-prem and cloud infrastructure
- Georgia Tech BS and MS in Elec/Comp Engineering
- UC Berkeley Haas MBA
- 2 patents, numerous publications

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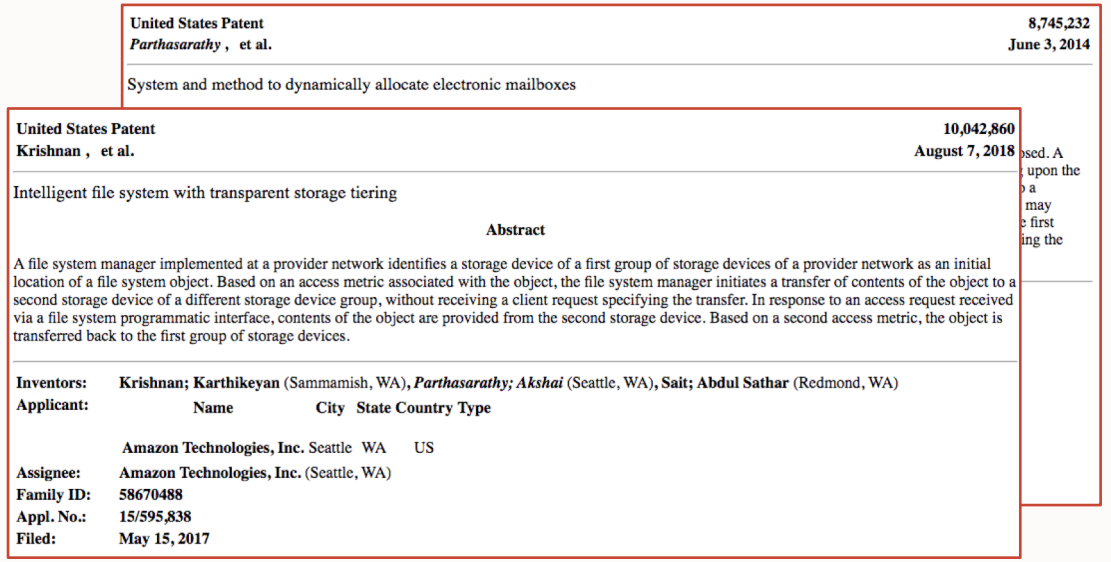
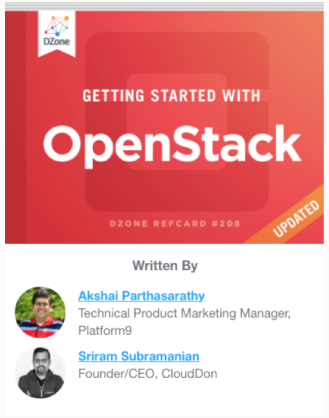
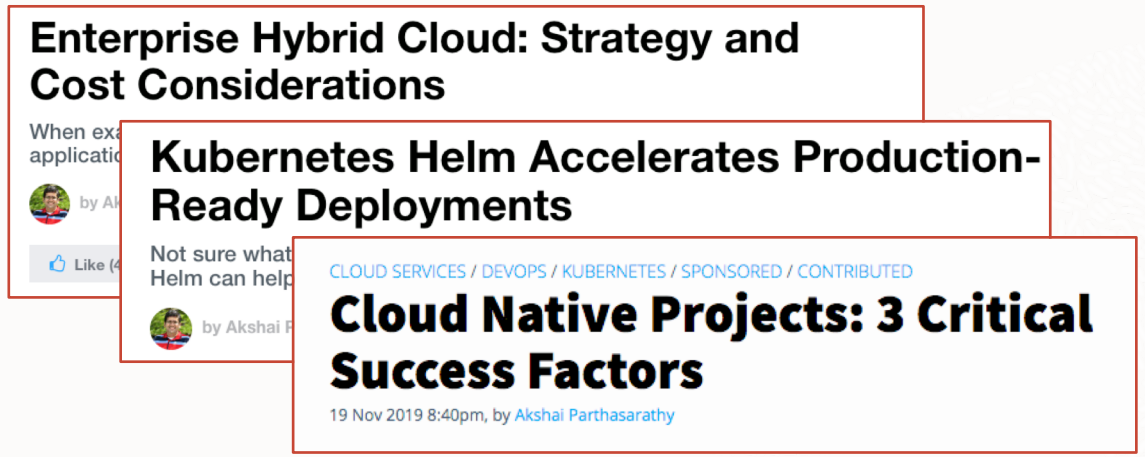






Georgia Tech

Berkeley Haas

More about the story

Introduction

Our goals for this presentation

- Our practical presentation is about a specific use case and how to solve it using Cloud Native principles
- We want to share our experience--the way we've created a product (API) built on top cloud native services
- We will share with you how Oracle Cloud Native products were used to solve the use case

The use case

- In almost every industry/company there is a need to get/retrieve information from documents
- Scanned documents, photos, IDs, contracts, balances, etc.
- There are institutions who have a complete group of people, or even teams, who are focused on manually capturing that information into systems.
- These teams spend a lot of time doing this, and they commit errors in the process

Use case (continues)

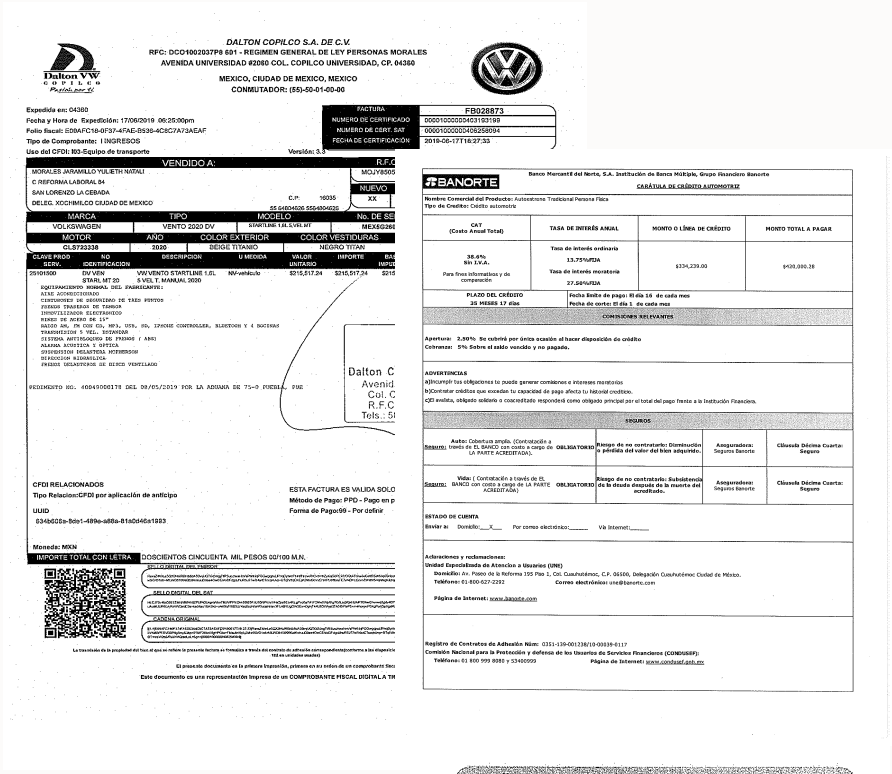
Context

- There are multiple channels from where those documents are received: customer service (within the branches), online channels (web, mobile), email, USBs, hard drives, etc.
- The information that is retrieved from these documents needs to be validated against enterprise systems, or as a minimum be stored in databases for future processing or usage
- Account for steps to validate the given document, e.g. false IDs.

Use case (now let’s narrow it)

Particular use case

- SPS undertook a project with a customer who has the characteristics previously mentioned, but focused on automotive loans/credits
- Loan approval is done after qualification of document, e.g. credit balance check, ID check
- At least 15 types of documents need to be reviewed, including addresses, loan payments, and credit scores



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DELEG. XOCHIMILCO CIUDAD DE MEXICO

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VOLKSWAGEN	VENTO 2020 DV	STARTLINE 1.6L 5 VEL T. MANUAL

MOTOR	AÑO	COLOR EXTERIOR	COLOR VESTIDURAS
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EQUIPAMIENTO NORMAL DEL FABRICANTE:
AIRE ACONDICIONADO
CINTURONES DE SEGURIDAD DE TRES PUNTOS
FRENOS TRASEROS DE TAMBOR
INMOVILIZADOR ELECTRONICO
RUEDAS DE ACERO DE 15"
RADIO AM, FM CON CD, MP3, USB, SD, IPHONE CONTROLLER, BLUETOOH Y 4 BOCINAS
TRANSMISION 5 VEL. SINCRONA
SISTEMA ANTIBLOQUEO DE FRENOS (ABS)
ALARMA ACUSTICA Y OPTICA
DISPOSITIVO RELANTIZA MOVIMIENTO
DEFENSION MINIMALISTA
FRENOS DELANTEROS DE DISCO VENTILADO

PEDIMENTO NO. 400490008178 DEL 08/05/2019 POR LA ADUANA DE 75-0 PUEBLA, PUE

CFDI RELACIONADOS
Tipo Relacion:CFDI por aplicación de anticipo
UUID
034b6038-8de1-489e-a88a-81a0d46a1983

ESTA FACTURA ES VALIDA SOLO
Método de Pago: PPD - Pago en p
Forma de Pago:99 - Por definir

Moneda: MXN
IMPORTE TOTAL CON LETRA: DOSCIENTOS CINCUENTA MIL PESOS 00/100 M.N.

Este documento es una representación impresa de un COMPROBANTE FISCAL DIGITAL A TR

BANORTE
Banco Mercantil del Norte, S.A. Institución de Banca Múltiple, Grupo Financiero Banorte
CARÁTULA DE CRÉDITO AUTOMOTRIZ

Nombre Comercial del Producto: Autoestrena Tradicional Persona Física
Tipo de Credito: Crédito automotriz

CAT (Costo Anual Total)	TASA DE INTERÉS ANUAL	MONTO O LÍNEA DE CRÉDITO	MONTO TOTAL A PAGAR
38.6% Sin I.V.A. Para fines informativos y de comparación	Tasa de interés ordinaria 13.75%FIJA Tasa de interés moratoria 27.50%FIJA	$334,239.00	$430,000.38

PLAZO DEL CRÉDITO: 25 MESES 17 días
Fecha límite de pago: El día 16 de cada mes
Fecha de corte: El día 1 de cada mes

COMISIONES RELEVANTES
Apertura: 2.50% Se cubrirá por única ocasión al hacer disposición de crédito
Cobranza: 5% Sobre el saldo vencido y no pagado.

ADVERTENCIAS
a)Incumplir tus obligaciones te puede generar comisiones e intereses moratorios
b)Contratar créditos que excedan tu capacidad de pago afecta tu historial crediticio.
c)El avalista, obligado solidario o coacreditado responderá como obligado principal por el total del pago frente a la Institución Financiera.

SEGUROS

Seguro: Auto: Cobertura amplia. (Contratación a través de EL BANCO con costo a cargo de LA PARTE ACREDITADA). OBLIGATORIO	Riesgo de no contratarlo: Disminución o pérdida del valor del bien adquirido.	Aseguradora: Seguros Banorte	Cláusula Décima Cuarta: Seguro
Seguro: Vida: (Contratación a través de EL BANCO con costo a cargo de LA PARTE ACREDITADA) OBLIGATORIO	Riesgo de no contratarlo: Subsistencia de la deuda después de la muerte del acreditado.	Aseguradora: Seguros Banorte	Cláusula Décima Cuarta: Seguro

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Teléfono: 01-800-627-2292
Correo electrónico: une@banorte.com
Página de Internet: www.banorte.com

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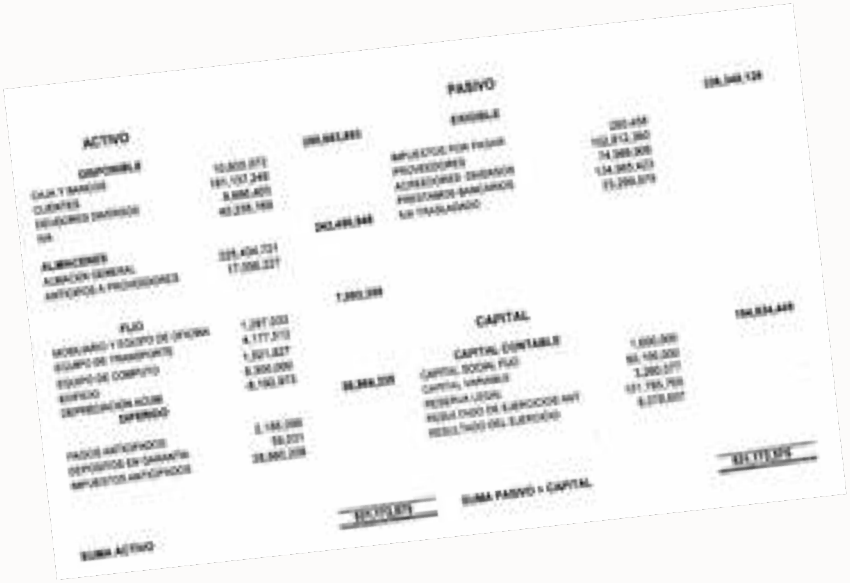
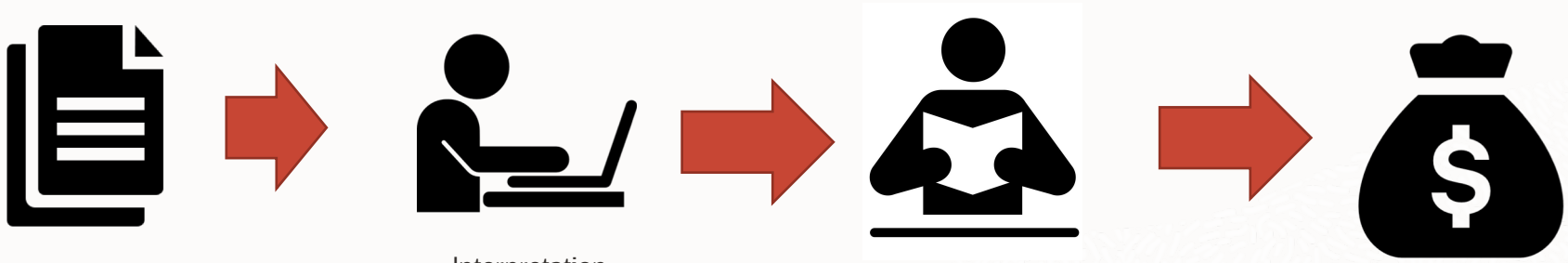
Comisión Nacional para la Protección y defensa de los Usuarios de Servicios Financieros (CONDUSEF):
Teléfono: 01 800 999 8080 y 53400999
Página de Internet: www.condusef.gob.mx

Challenges and current situation

- Image processing is done “after the fact”
- If the image has any type of issue, then it was almost impossible to ask the customer to resend that information
- Rotated images
- Documents were scanned as ***tiff***, with a very low resolution
- Multiple images to be classified





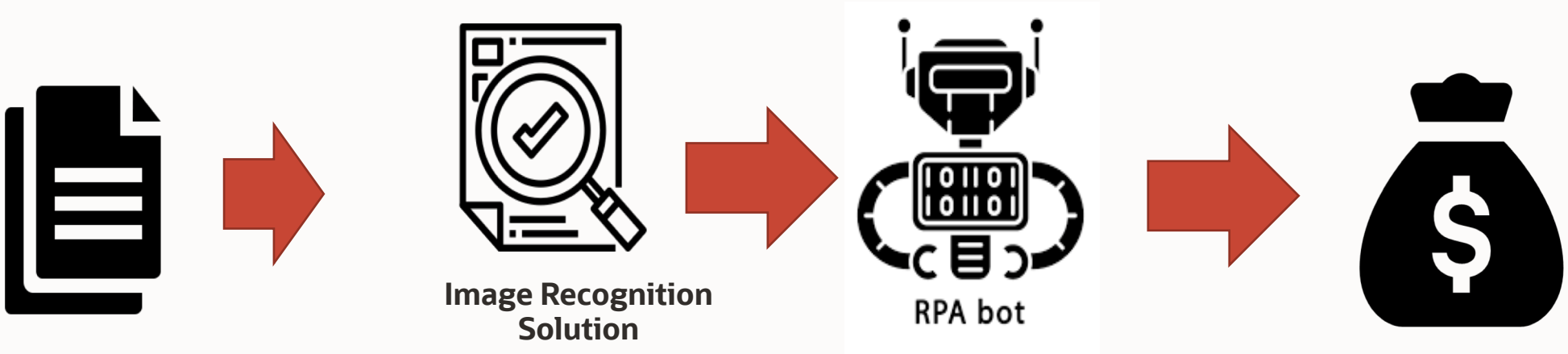
Interpretation, classification & recording

Human loan evaluation and approval

Our main goal

Expose an API** that is able to receive the document, analyze it, manage it in the system, transform its format, curate it, **and give a result with a % of confidence

Proposed Solution



Data interpretation, classification and recording

Automated evaluation and approval of credits and loans

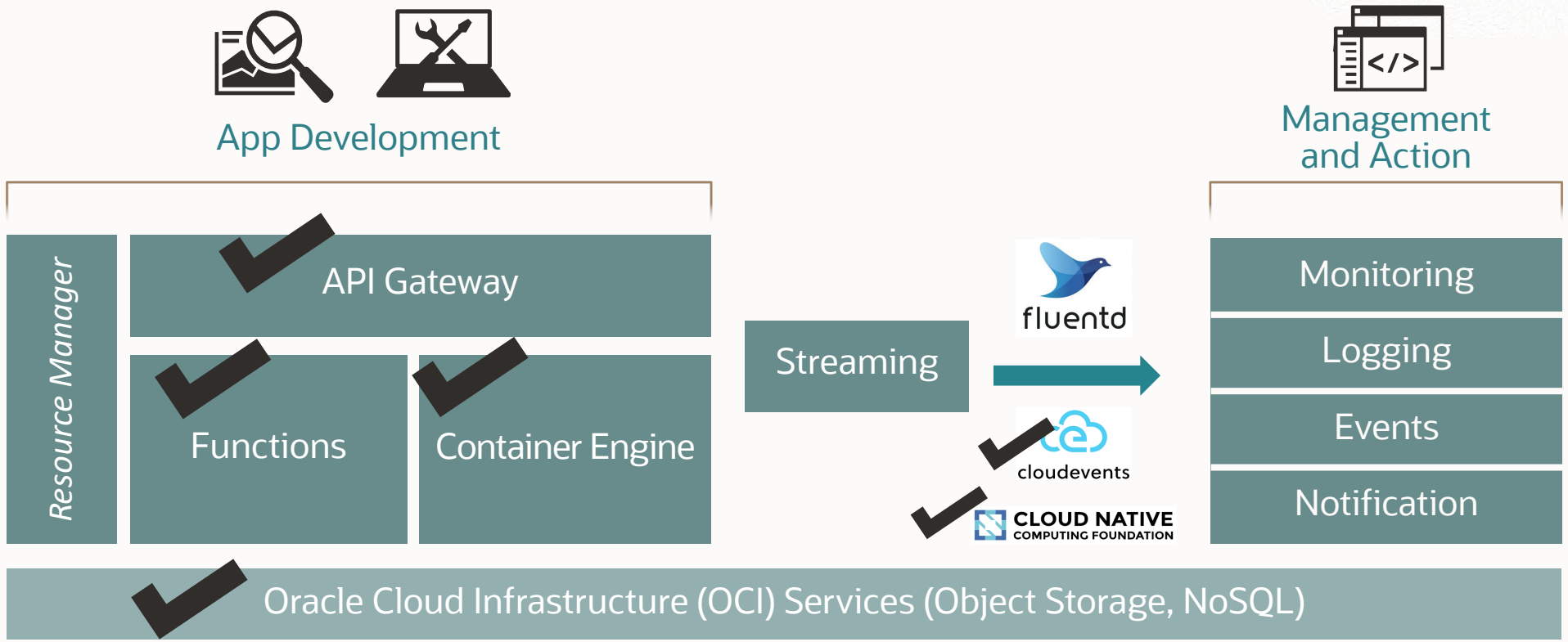
Proposed Solution

Data interpretation, classification and recording

Evaluate and approve credits and loans

The toolkit

Oracle for Cloud Native and DevOps



services/projects used for this solution

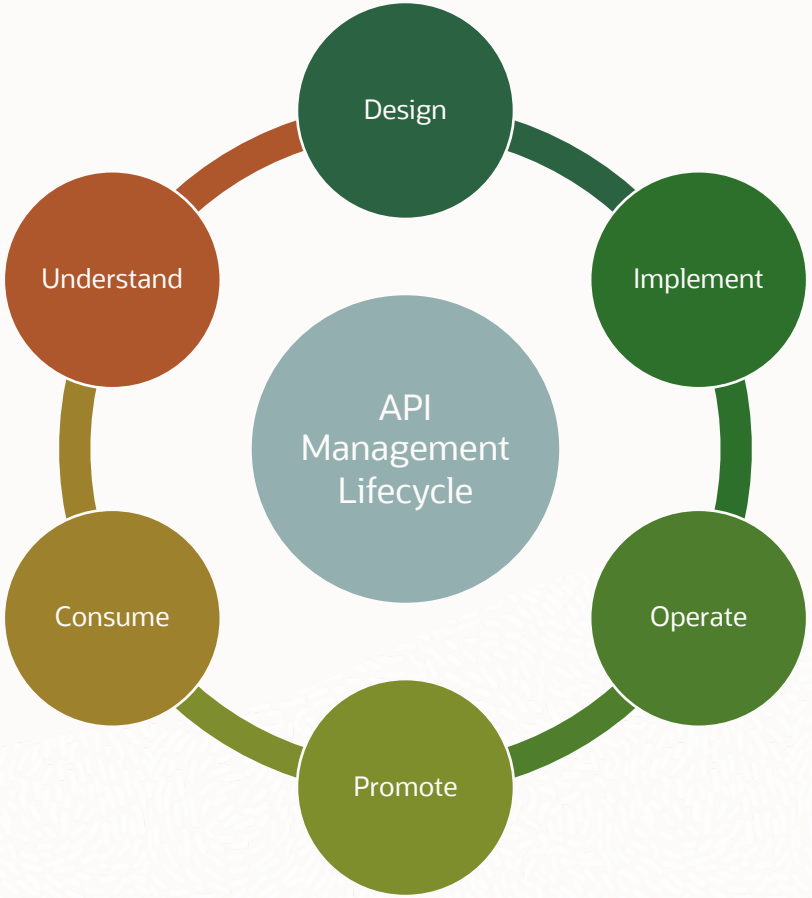
API Management and Oracle Cloud Infrastructure API Gateway

What Is API Management?

- Manage the lifecycle of APIs (Application Programming Interfaces)
- Design APIs: manage specifications and API mockups
- Deploy APIs: receive API calls and route them to back-end services
- Promote and Consume APIs: create developer portals to API discovery, control access for consumption

Why Use API Gateway in our case?

- Entry point for our consumers/customers who want to process their documents
- Very easily integrated with Oracle Functions
- Serverless service, we just configure and use it. No need to worry about the provisioning and maintenance of the infrastructure.



Serverless and Oracle Functions

What Is Serverless?

- Serverless computing provides a platform to run functions – small pieces of code – without provisioning servers
- Functions consume compute resources for a short durations
- Containers are the ideal way to run Functions. They are lightweight and quick to spin up or down.

Why Use Oracle Functions in our case?

- We have identified particular activities that can be represented as functions
- We can rapidly deploy them without the need to worry about the infrastructure provisioning and maintenance
- Developer-friendly: easy to have a local environment and seamlessly deploy into OCI

Fn Project and Oracle Functions

- Fn Project is an open source serverless platform that runs anywhere
- Oracle Functions is a managed service based off open source FnProject.io

Containers and Oracle Container Engine for Kubernetes

What are Containers?

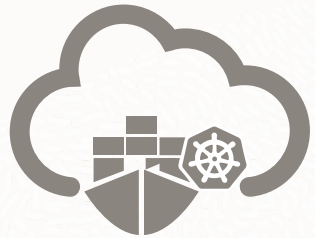
- Technology to easily package and move apps between different environments
- Package only the app's code and dependencies, without the operating system
- Microservices: a next-gen software design style that advocates use of small services to build apps

Why Use Containers in our use case?

- Some customers already have a Kubernetes-based implementation and need to deploy this solution on top of it. We provide this alternative.
- In phase II of our product, we will incorporate a set of web-based applications for documents management, and we'll use OKE.

Oracle Container Engine for Kubernetes

- Orchestration at scale for of containers
- Based on unmodified Kubernetes
- Continuously patched and certified
- Integrated with Cloud Infrastructure Registry, Developer Cloud Service, and other cloud services



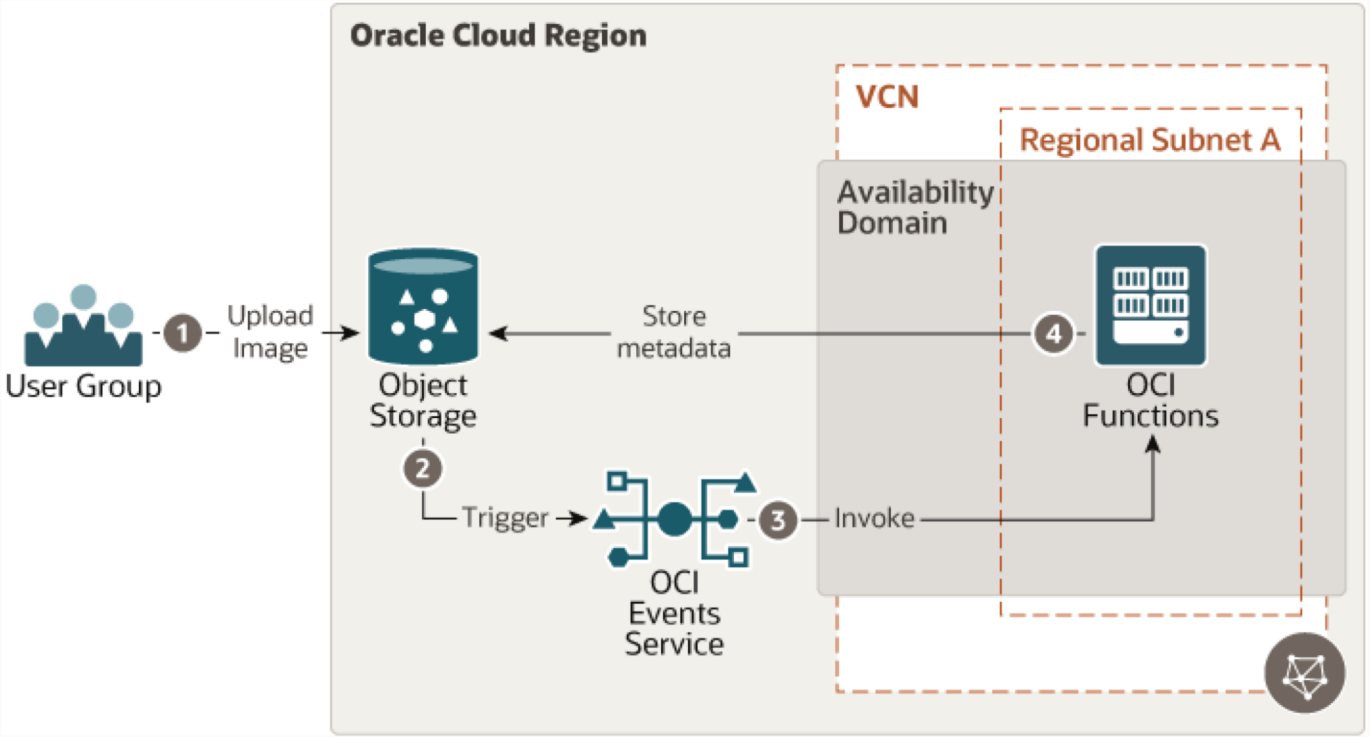
Oracle Cloud Infrastructure Object Storage

What Is Object Storage?

- Internet-scale storage platform
- Store unlimited amount of unstructured data of any content type
- Securely store and retrieve data from anywhere

Why Use Object Storage in our use case?

- We can store all documents in the object storage
- We can apply archiving rules for the documents
- We can use it to retrieve the documents for analysis or review



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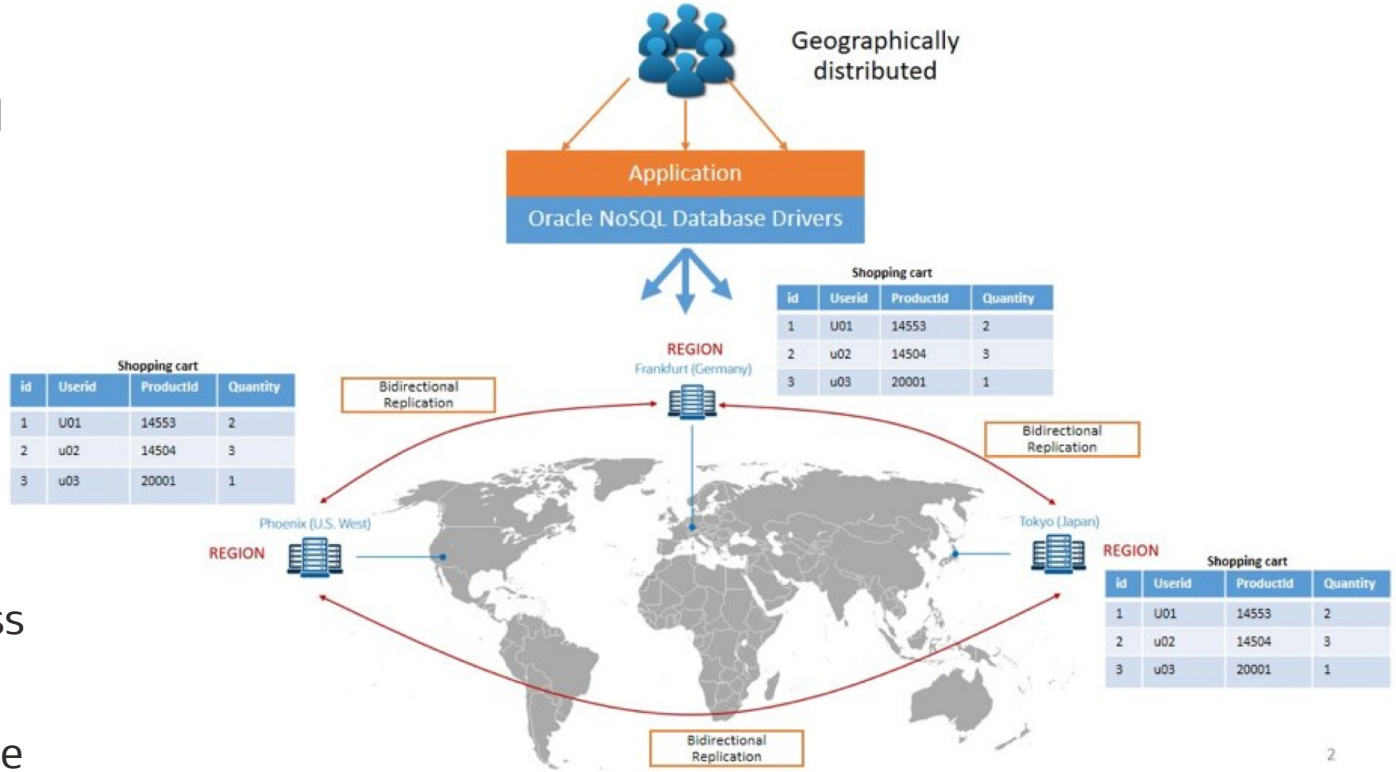
Oracle NoSQL Database

What Is NoSQL Database?

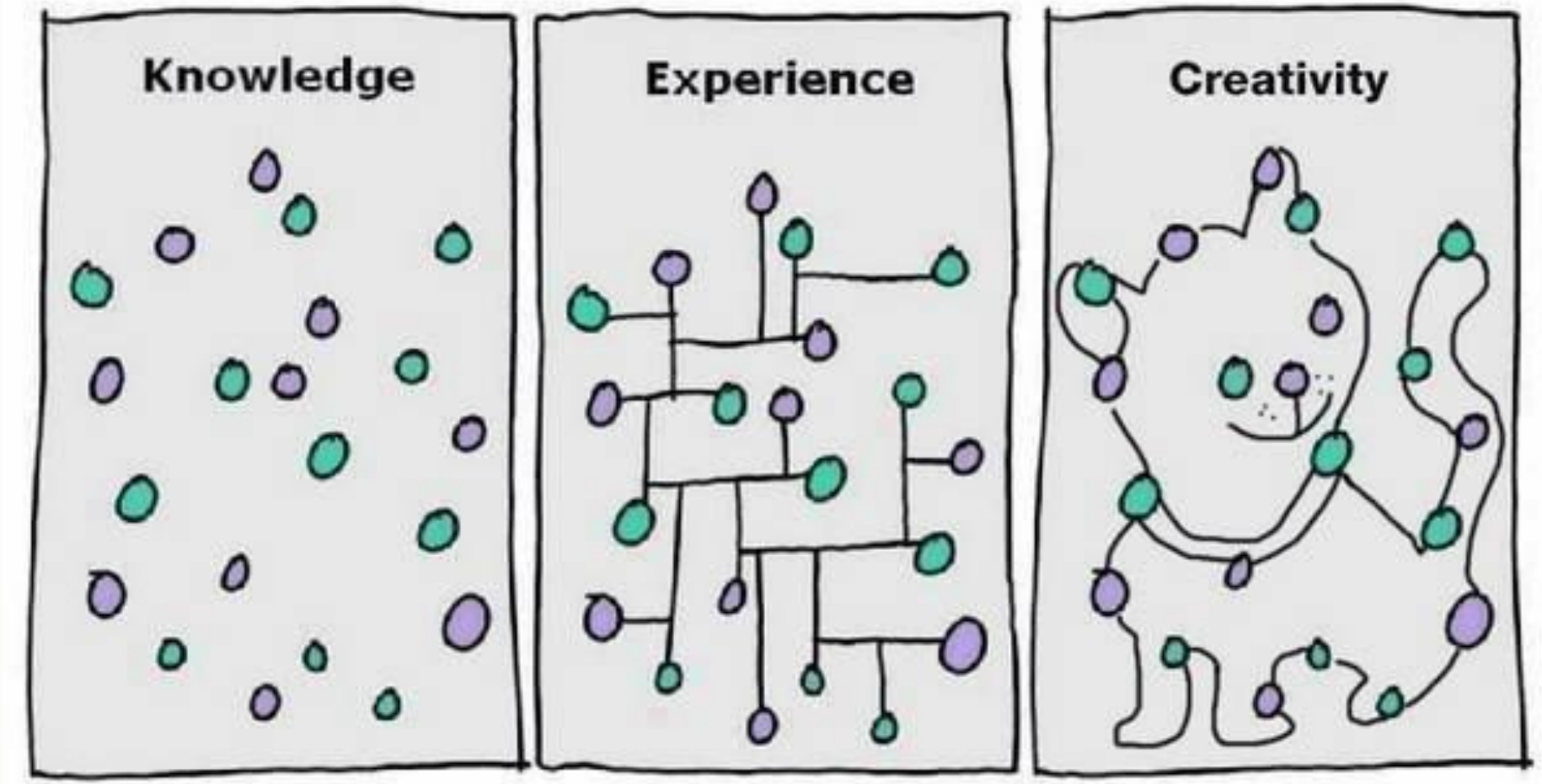
- Database for JSON document, key-value, and columnar data models
- Predictable single-digit millisecond response times
- Securely store and retrieve data from anywhere

Why Use NoSQL Database?

- We are saving results of document analyses
- The information is very useful for the business
- This info helps us with future queries
- JSON format enables other applications to use the info for other use cases.



Connecting the dots



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Steps in the solution process

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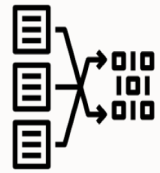
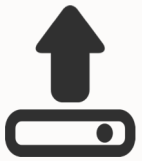
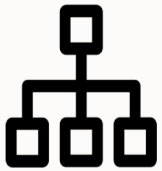




Transformation | Document Upload | Classification | Curation | Tagging | Learning | Recognition

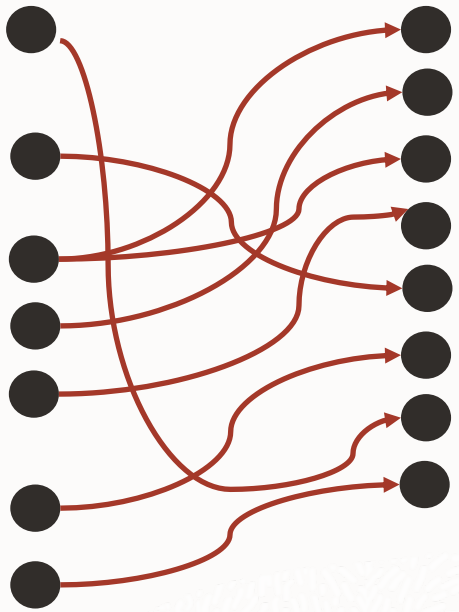
Needs vs. Products

Needs	Product/Service
Transformation	Scanners, cameras, etc. (physical components)
Classification, Curation, Tagging	Oracle Functions (Serverless FaaS)
Documents Upload	OCI Object Storage (Serverless)
Documents Upload	OCI API Gateway (Serverless)
Documents Upload	Oracle Container Engine for Kubernetes (OKE)
OCR, Classification	Google Vision (SaaS)
Learning, Recognition	Google AutoML

Use case solved with Cloud Native principles and technology

Use case needs

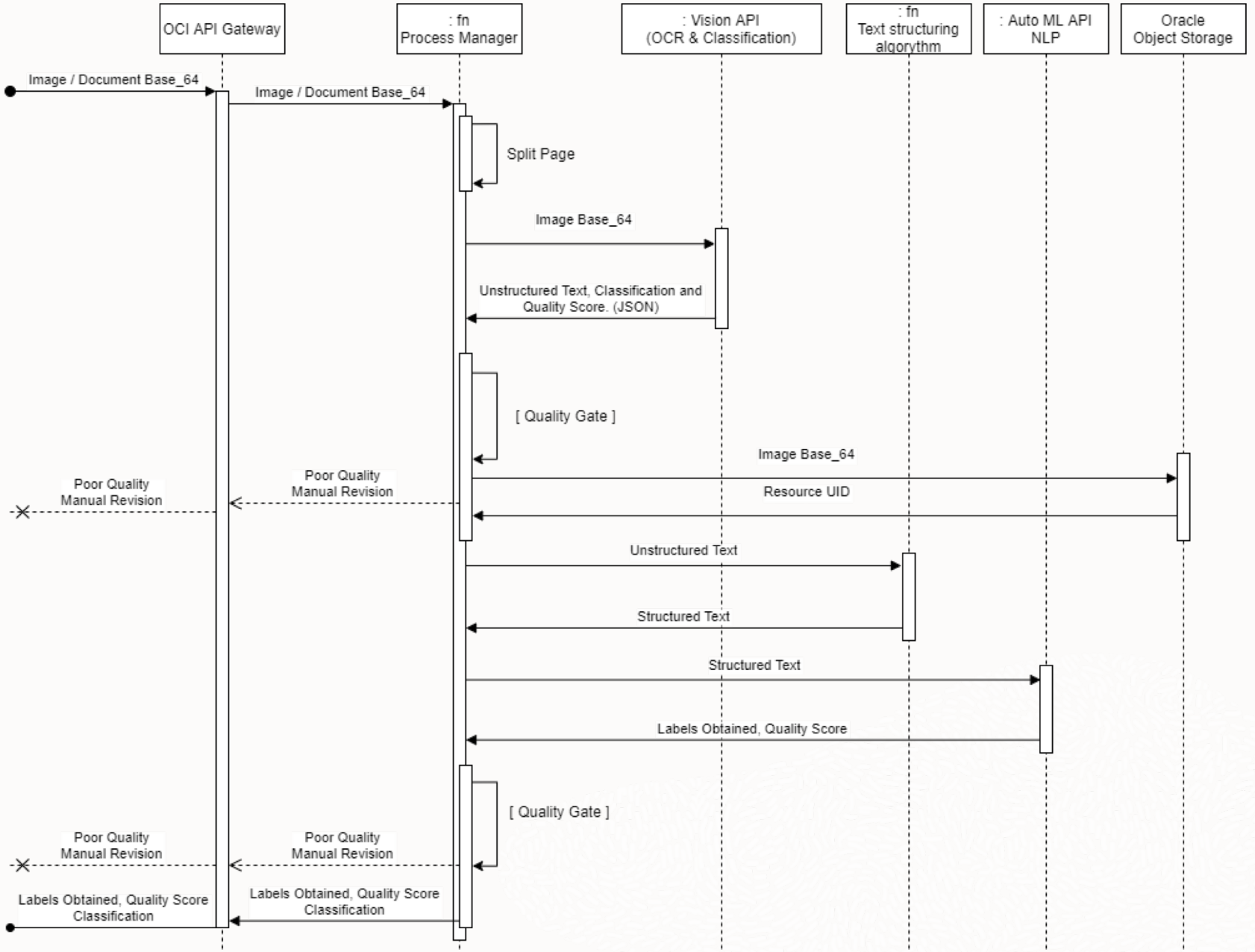
- Be prepared to receive different amounts of documents at different times, different rhythms, bulk upload, transactional upload, etc.
- React to events once the information is identified & retrieved in the document.
- Constant changes
- Constant incorporation of new channels
- Incorporate changes to be tested on production without affecting the whole system.
- Pay only for what is used
- Use existing services instead of installing them or developing them



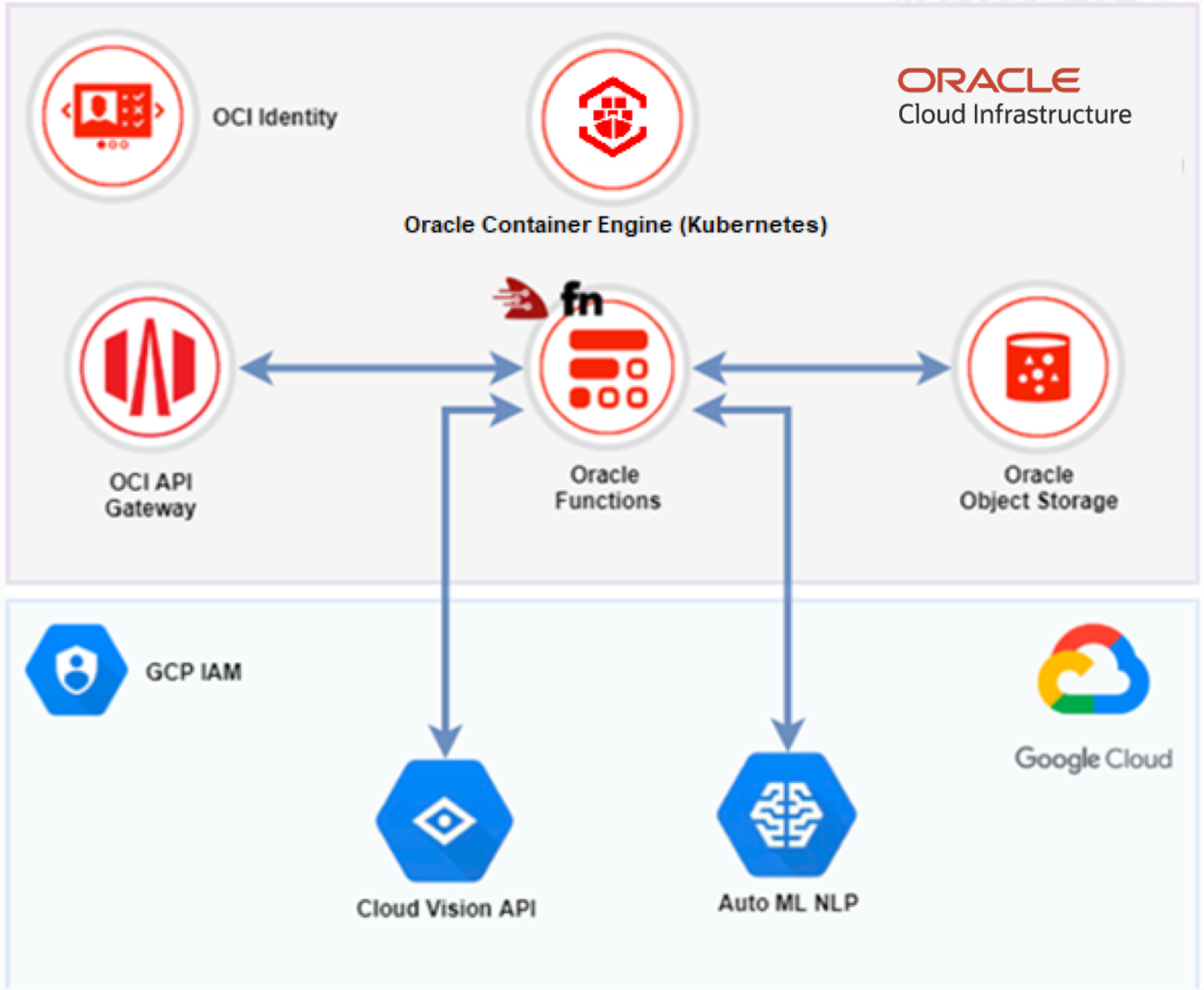
Cloud Native Solution

- Change is the rule
- Continuous Delivery
- Constant releases
- Blue, green deployments
- Event based architecture
- Serverless/Functions as a Service
- Scaling and elasticity
- Cloud Native services already provisioned by a cloud provider

API Flow Process



Architecture



Demo time!

What we learned

For the business

- Streamlines the credits and loans approval and delivery.
- Allows self-service for customers by enabling different online channels for documents (mobile, web).
- Expose API to third-parties, including fintech institutions, for credit approvals
- Provide a flexible way to validate various types of forms, e.g. various types of address validation docs
- Introduce Machine Learning into the processes—algorithm that gets smarter with use. More accurate data extraction and faster credit approvals
- No manual intervention in the data capture, except for digitalization

Technical

- Streamline the deployment
- Constant changes to the systems for new use cases and additional features
- Scalability and elasticity to receive different loads of documents
- No servers to maintain and/or provision. Most of the elements to be used are serverless
- Object Storage to maintain the history of the documents and persist them for auditing
- API enablement

Resources

Github repositories:
- https://bit.ly/3dFuzXb

Katacoda scenarios:
- https://bit.ly/37ozz1v

Product webpages
- oracle.com/cloud-native/
- oracle.com/devops/
- oracle.com/manageability/

Try Oracle Cloud
- oracle.com/cloud/free/

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