ICORE **PLATFORM** 4

Aggregate, Analyze, Visualize & Cure

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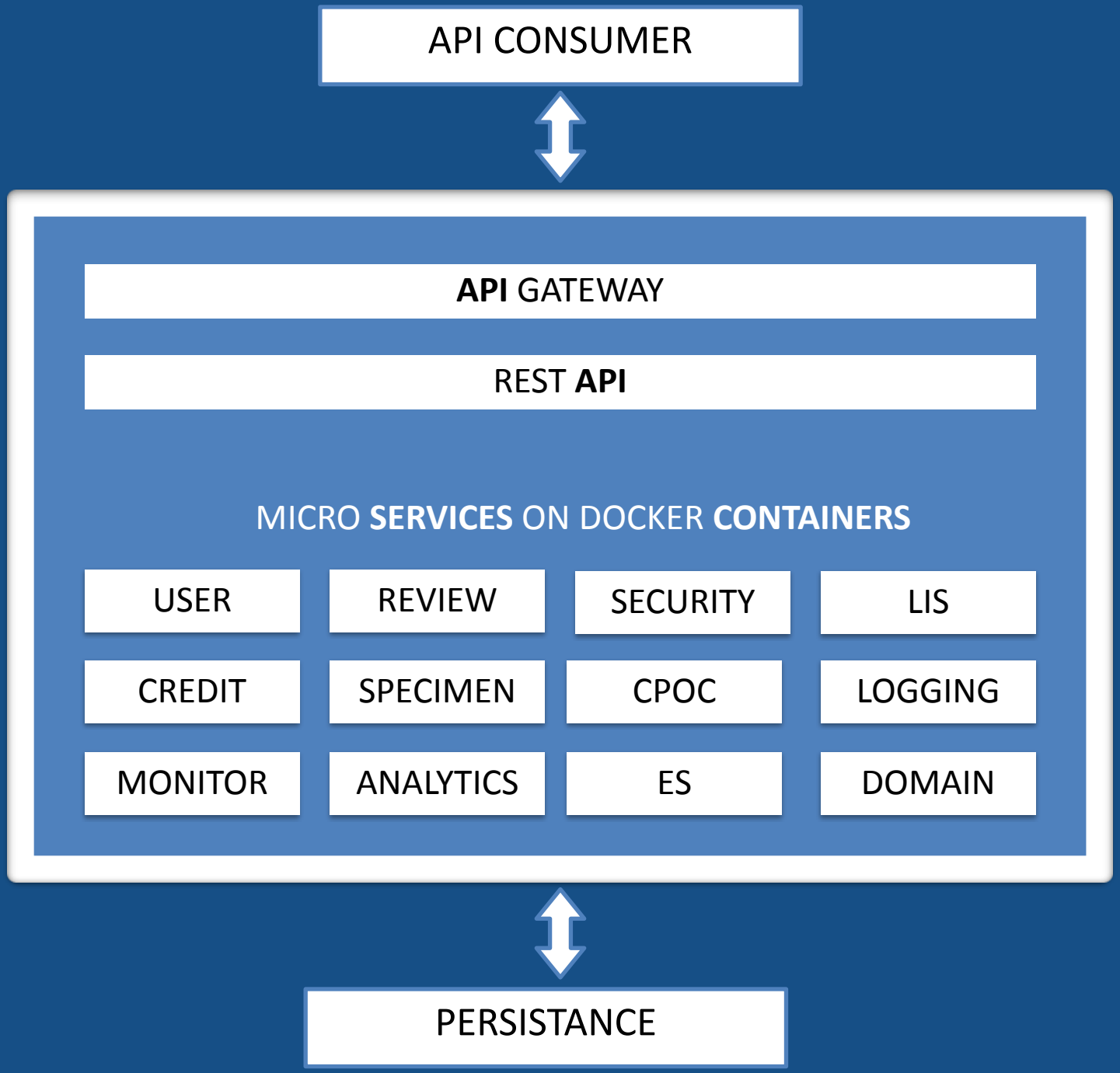
August 2017


WEB
iPhone/iPad
Android
Desktop
Partners / Developers
ICORE APPLICATIONS
ICORE PLATFORM 4
DATA LAKE
GCP
SQL
Cloud SQL
Data Store
Storage

ICORE **PLATFORM** 4


API CONSUMER
API GATEWAY
REST API
MICRO SERVICES ON DOCKER CONTAINERS
USER
REVIEW
SECURITY
LIS
CREDIT
SPECIMEN
CPOC
LOGGING
MONITOR
ANALYTICS
ES
DOMAIN
PERSISTANCE

SECURITY

- All services are managed through a secured global API gateway infrastructure
- API service is only accessible over encrypted SSL/TLS channels
- Every request requires the inclusion of a time-limited authentication token generated via human login or private key based secrets through the authentication system.
- All access to INDX Google Cloud Platform resources is regulated through the same robust authenticated infrastructure that powers other Google services.
- We set up a regulated Google managed domain to access our GCP resources
- We use and rely on Google intrusion detection
- We use Cloud Security Scanner to identify the most common vulnerabilities, specifically cross-site scripting (XSS) and mixed content, in our applications
- Data in transit is secured with SSL
- Data at rest stored in persistent disks is encrypted under the AES 256-bit

SECURITY

- To create encrypted channels between INDX private IP environment on premise into the GCP network, we use Cloud interconnect and managed VPN
- This allows us to keep some instances completely disconnected from the public internet while still reachable from our own private infrastructure.
- We at INDX regularly keep the VM operating system and applications up to date with the latest security patches.
- We depend on Google for security and patching of the host OS environments
- We manage permissions at the project level in GCP and provide team members with least privileged access
- We control the network permissions to specify the origin and type of traffic permitted to reach each compute instances in our deployments

LOGGING

- All platform API requests, such as web requests, storage bucket access, and user account access, are logged.
- We use Google Cloud Logging and Google Cloud Monitoring, that make it easy to collect and analyze request logs and monitor the availability and health of infrastructure services like VM instances
- These tools also make it easy for you to create custom dashboards and set alerts when issues occur.
- With Cloud Platform tools, we can read operations and access logs for auditing and issue triaging

SCALABILITY

- A scalable web application is one that works well with 1 user or 1,000,000 users
- Gracefully handles peaks and dips in traffic automatically.
- By adding and removing virtual machines only when needed,
- Scalable apps only consume the resources necessary to meet demand.
- Elasticity in design.
- Ensure you're only paying for the compute resources the application needs at specific moment in time.

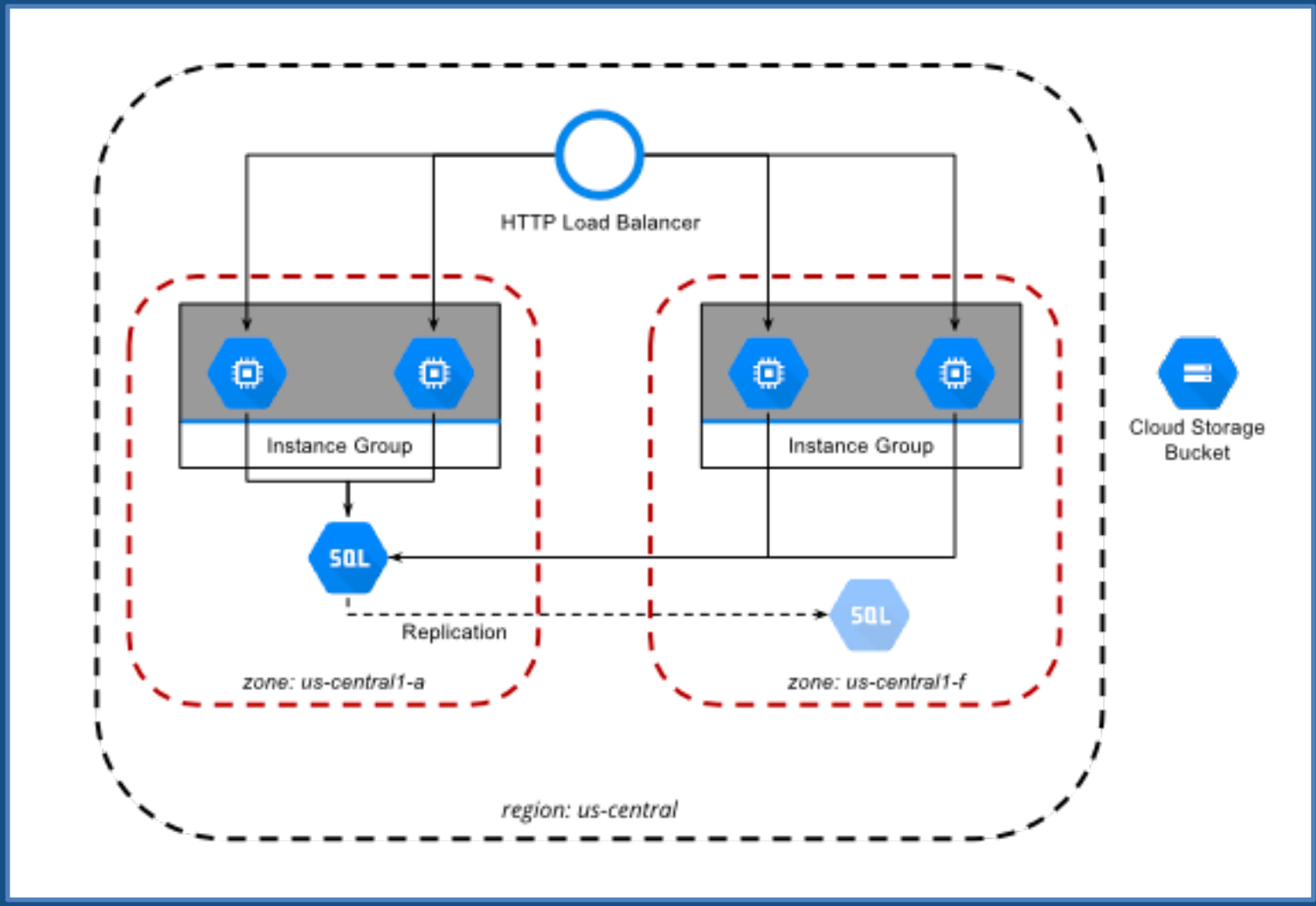
Adjusting capacity to meet demand

HIGH AVAILABILITY

- Continues to function despite expected or unexpected failures of components in the system
- If a single instance fails or an entire zone experiences a problem, a resilient application remains fault tolerant—continuing to function and repairing itself automatically if necessary
- Load balancing traffic
- Hosting servers in multiple data centers
- Robust storage solution

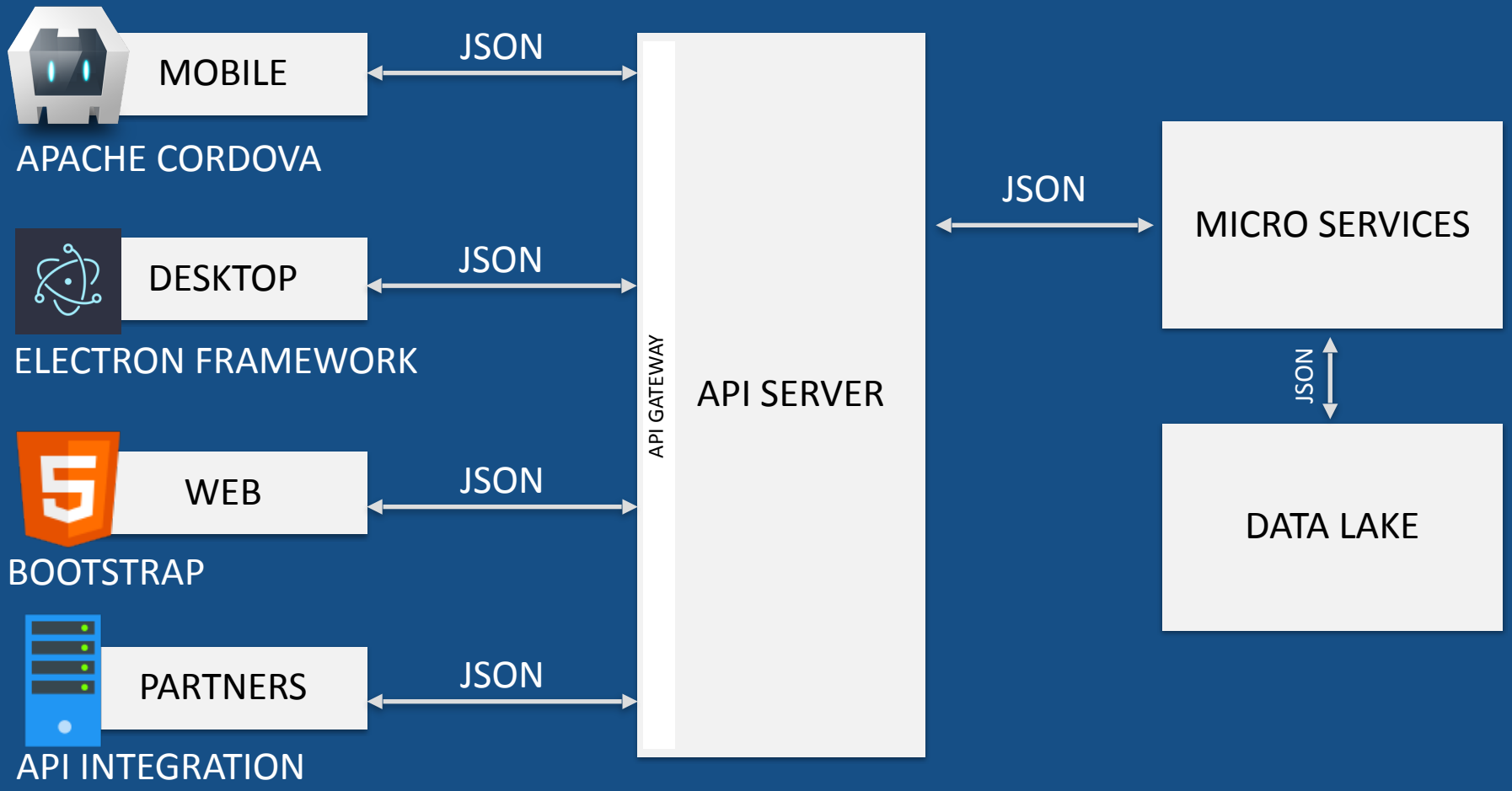
Design to withstand the unexpected

ARCHITECTURE

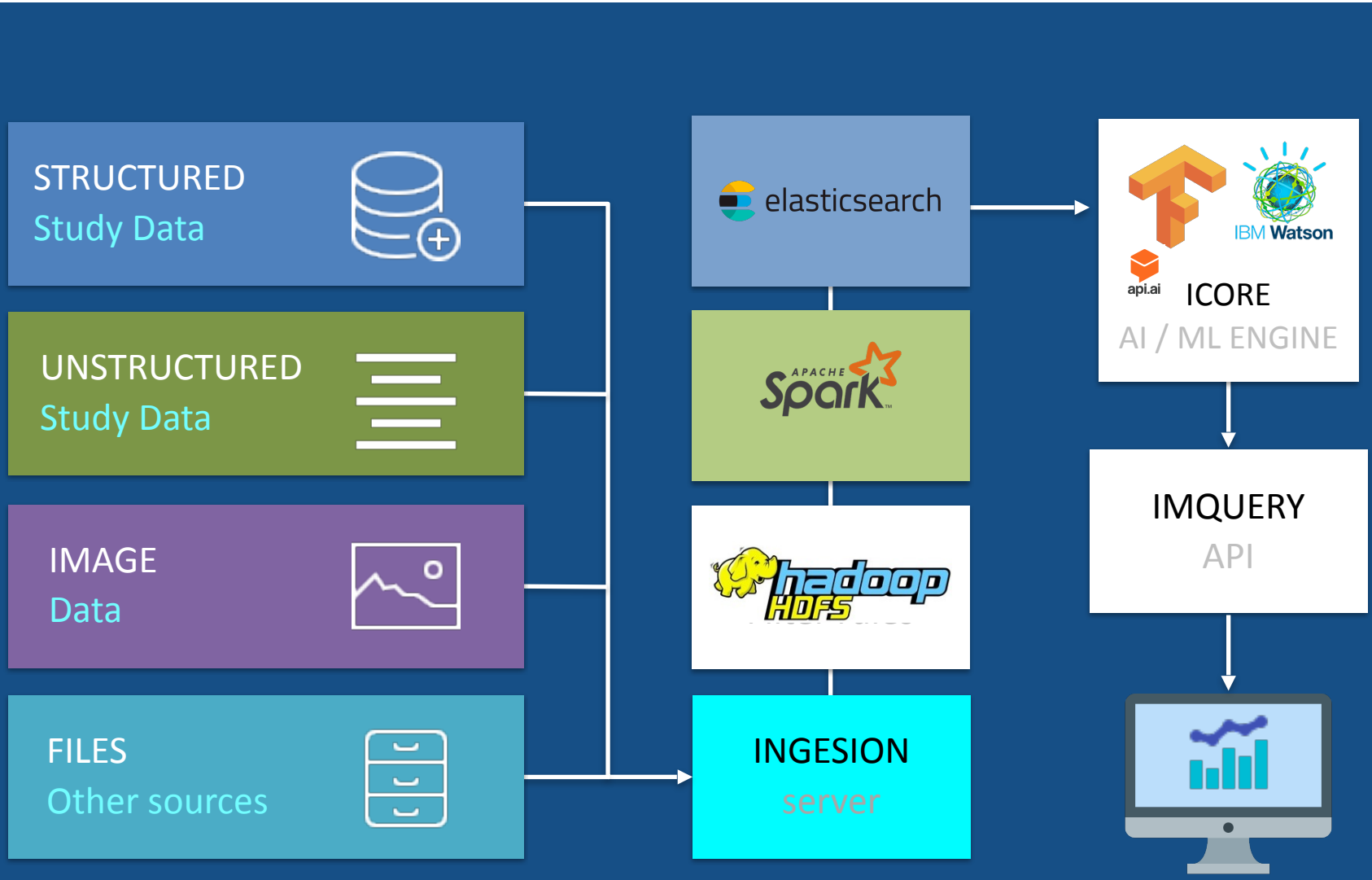


ICORE **APPLICATIONS**

APPLICATIONS ARCHITECTURE



IMQUERY


STRUCTURED
Study Data
UNSTRUCTURED
Study Data
IMAGE
Data
FILES
Other sources
elasticsearch
APACHE Spark
hadoop HDFS
INGESION
server
IBM Watson
api.ai
ICORE
AI / ML ENGINE
IMQUERY
API

ICORE **DATA LAKE**

OBJECT STORE

Database & Storage

ICORE 4 Transactional database

RELATIONAL

CLOUD SQL

NO-SQL

CLOUD DATA STORE

OBJECT STORE

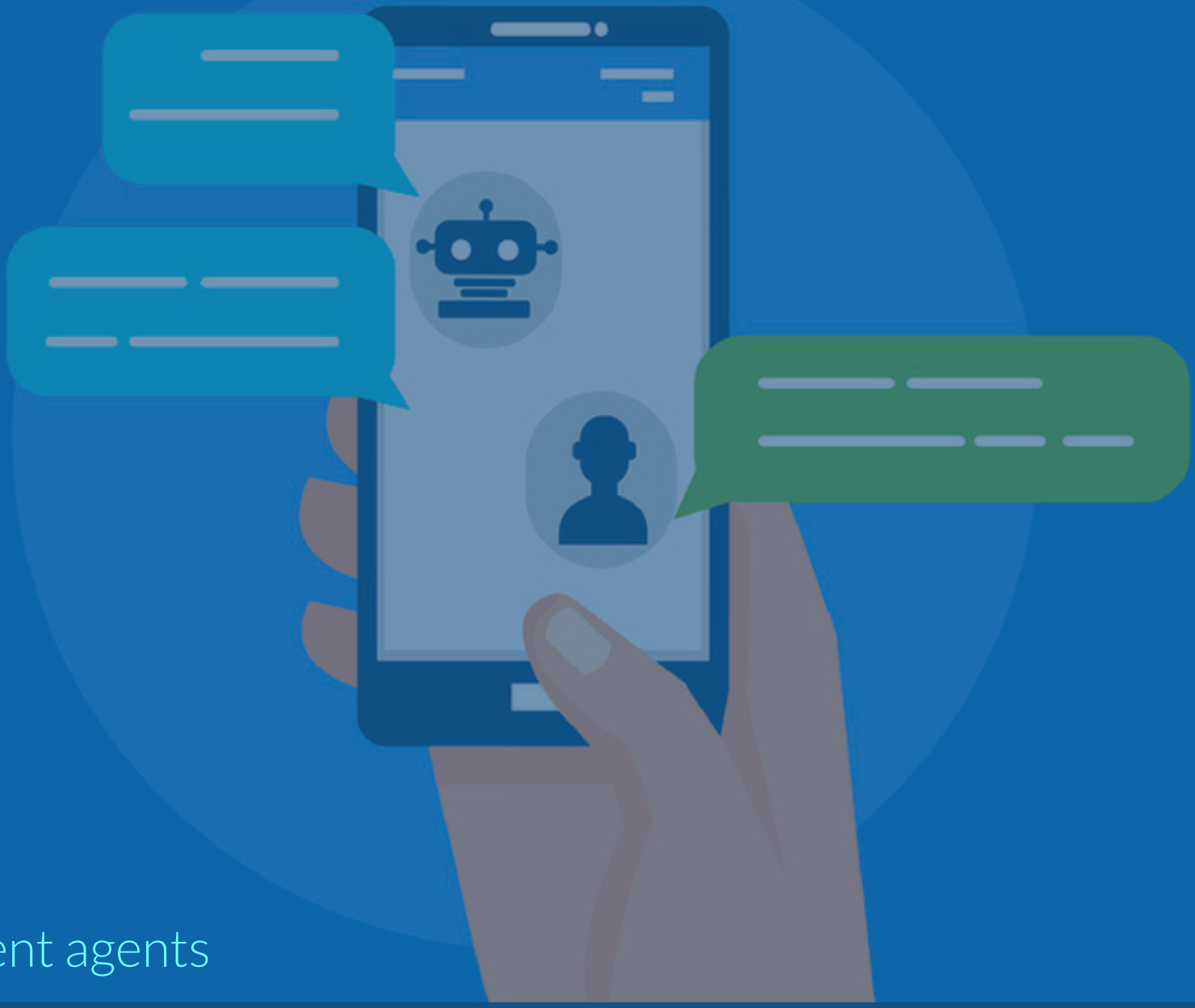
Database & Storage

ICORE 4 File database

Google Cloud Storage

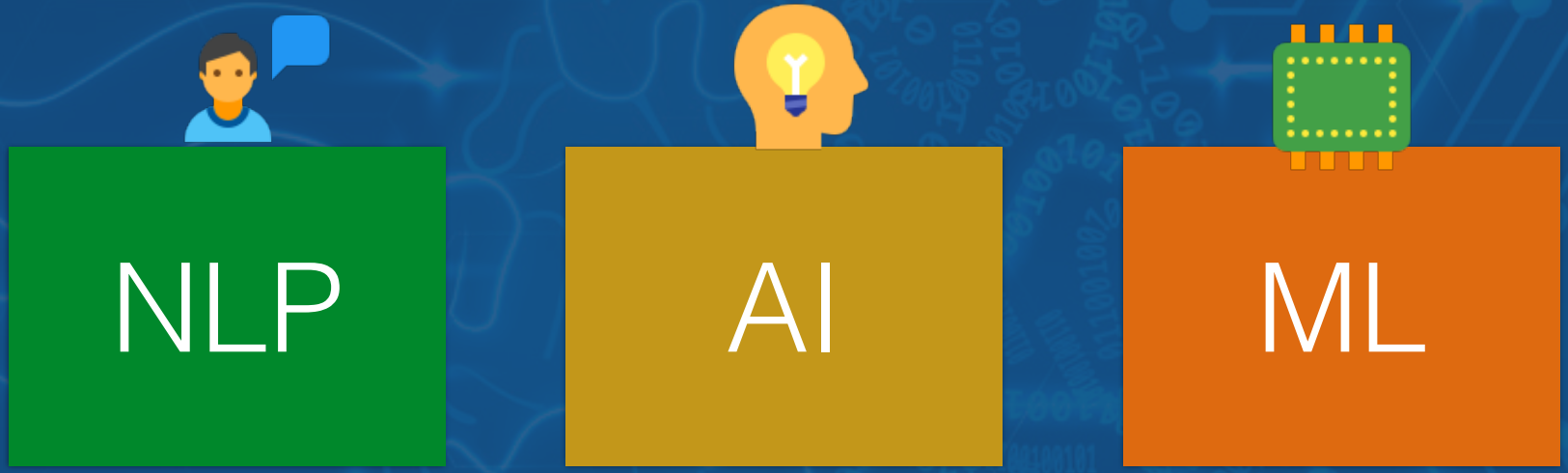
ICORE **IMQUERY**

IMQUERY BOT



Intelligent agents

IMQUERY BOT behind the scenes

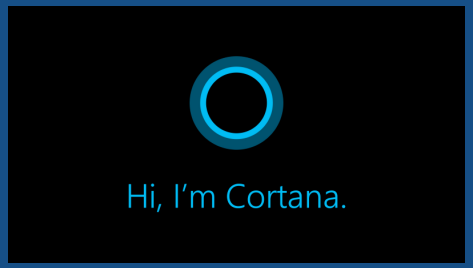


Natural language processing

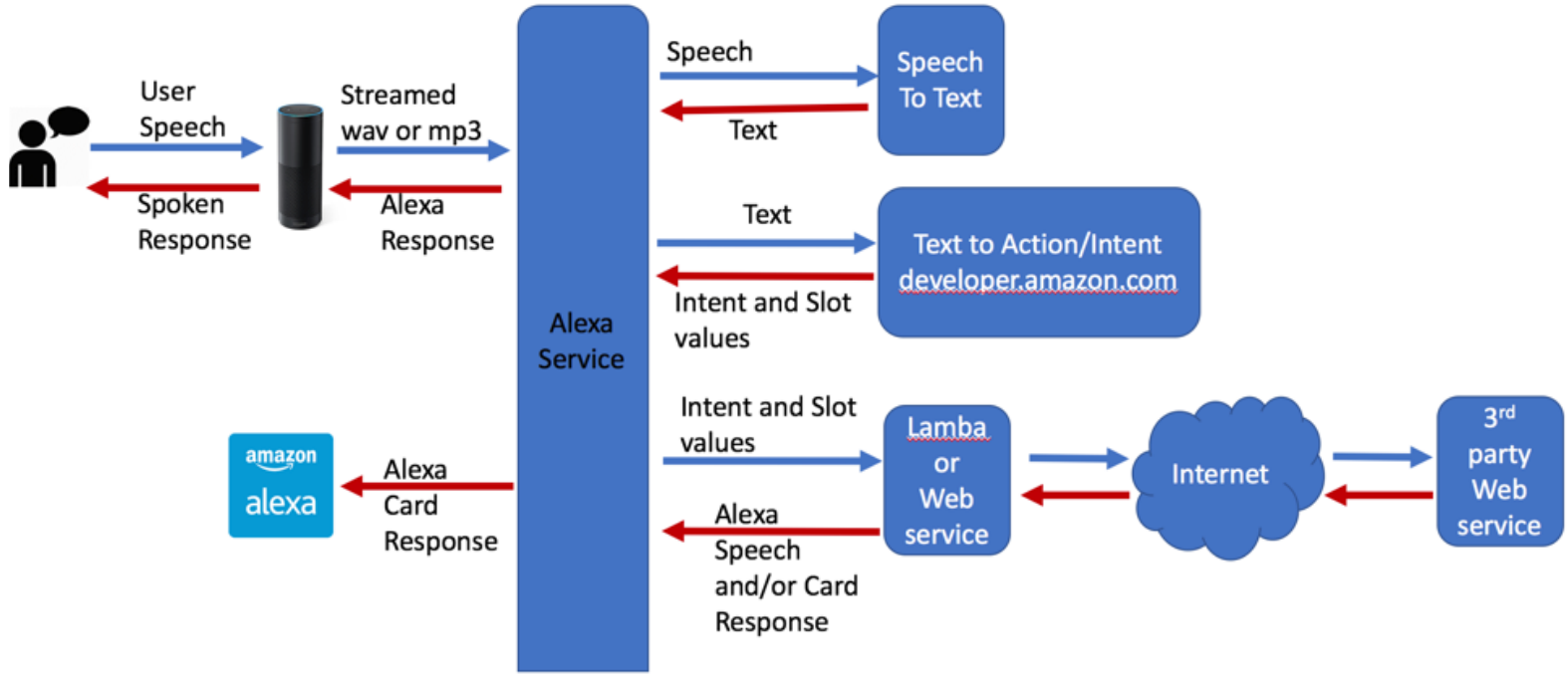
Artificial Intelligence

Machine Learning

Example AI Engines



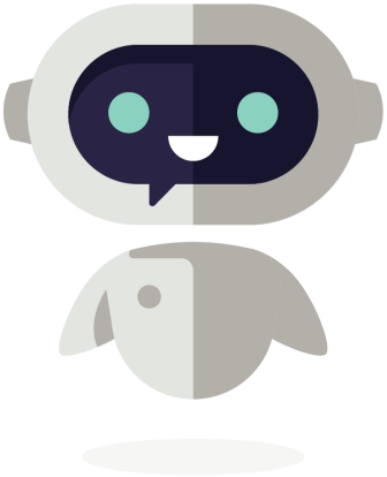
BOT Architecture



INDX Solution

IMQUERY

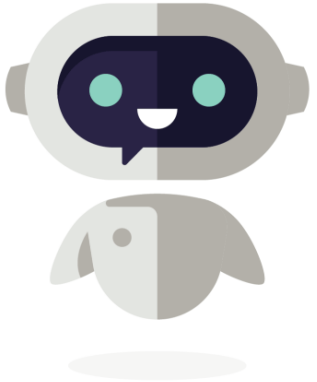
smart study agent



powered by **INDX**, AI

FEATURES

INDX
smart health agent



- Voice interface
- Chat or messaging interface
- Answer general study related questions
- Sample generation and tracking
- Enriches patient data by cleansing, categorizing, and classifying it, making it easier to understand than ever before.
- Collect new data through AI-powered conversations. This new interface provides a more seamless and engaging customer experience
- Transforming data into insights using NLP + AI + ML = Analytics

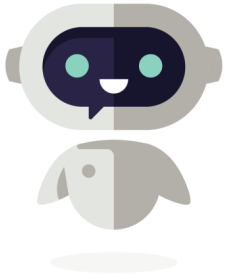
FEATURES

INDX
smart health agent

Show patients who had adverse effects in the CD40 study

Show patients who have expressed PDL1 PD1 on tissue

IMQUERY Architecture



INDX
smart health agent

USERS | CHAT / VOICE INTERFACE | API | MICROSERVICES

INDXBOT

SLACK TELEGRAM MESSENGER