.local
Stockholm

Implementing Right to Erasure with CSFLE

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Advisory Solutions Architect MongoDB

Tom McCarthy
Senior Solutions Architect MongoDB

€4.4b

€4.4b

Cumulative sum of GDPR fines as of October 2023

Source: https://www.enforcementtracker.com/

Agenda

Intro on right to erasure

The role of encryption

Simplifying it with MongoDB

Next generation of in use encryption

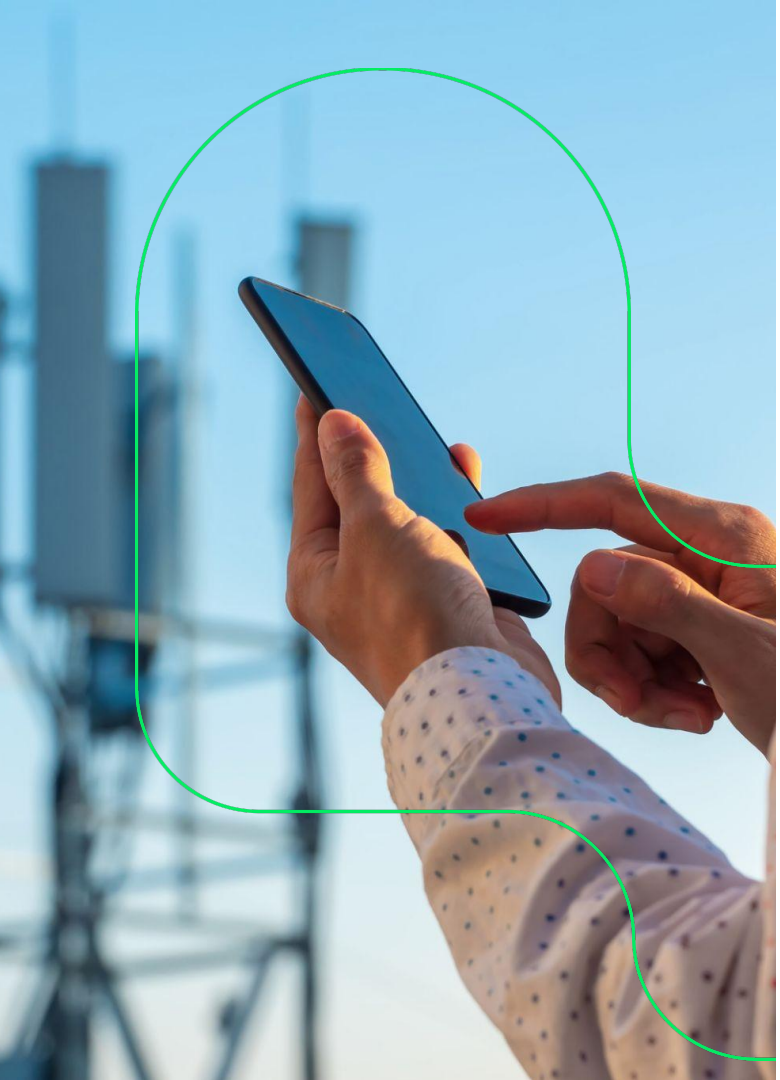
Tom McCarthy

Sr Solutions Architect

- Cloud expert
- Python ~~zealot~~ fan
- Developer experience advocate
- Definitely not a lawyer

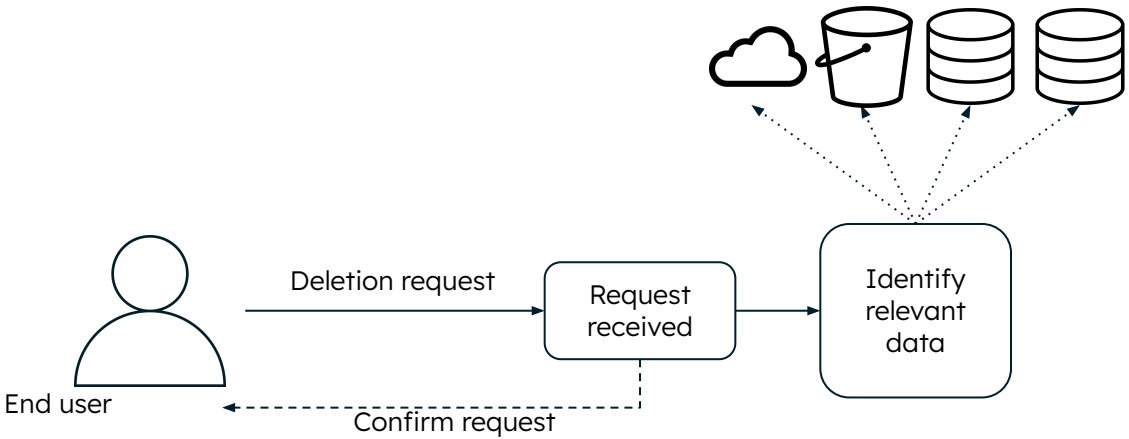
Right to Erasure

(the right to be forgotten)

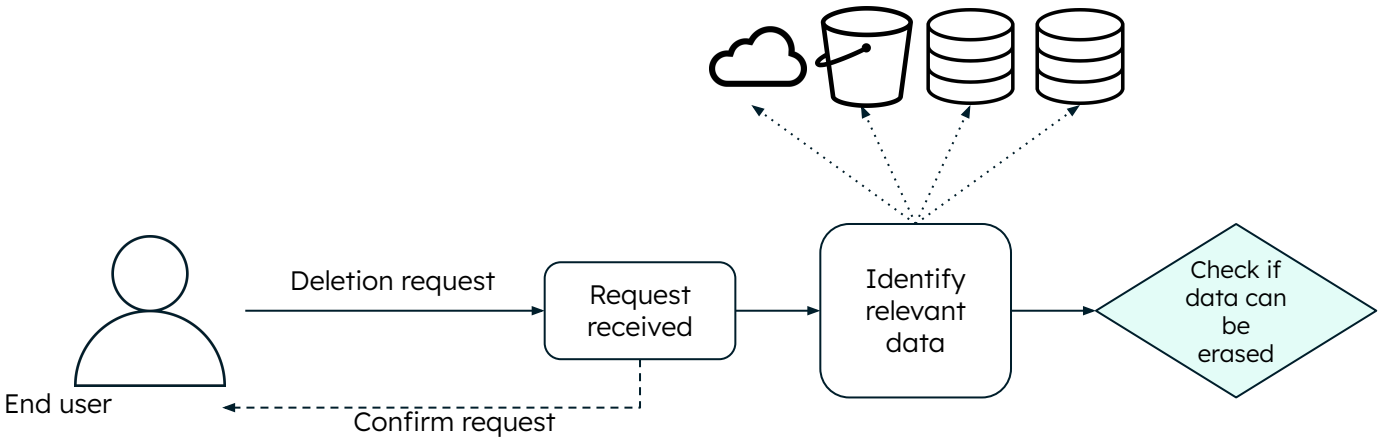


As an end customer or individual, I can request that a company delete all personal data they have about me.

What does it mean for your business?



What does it mean for your business?



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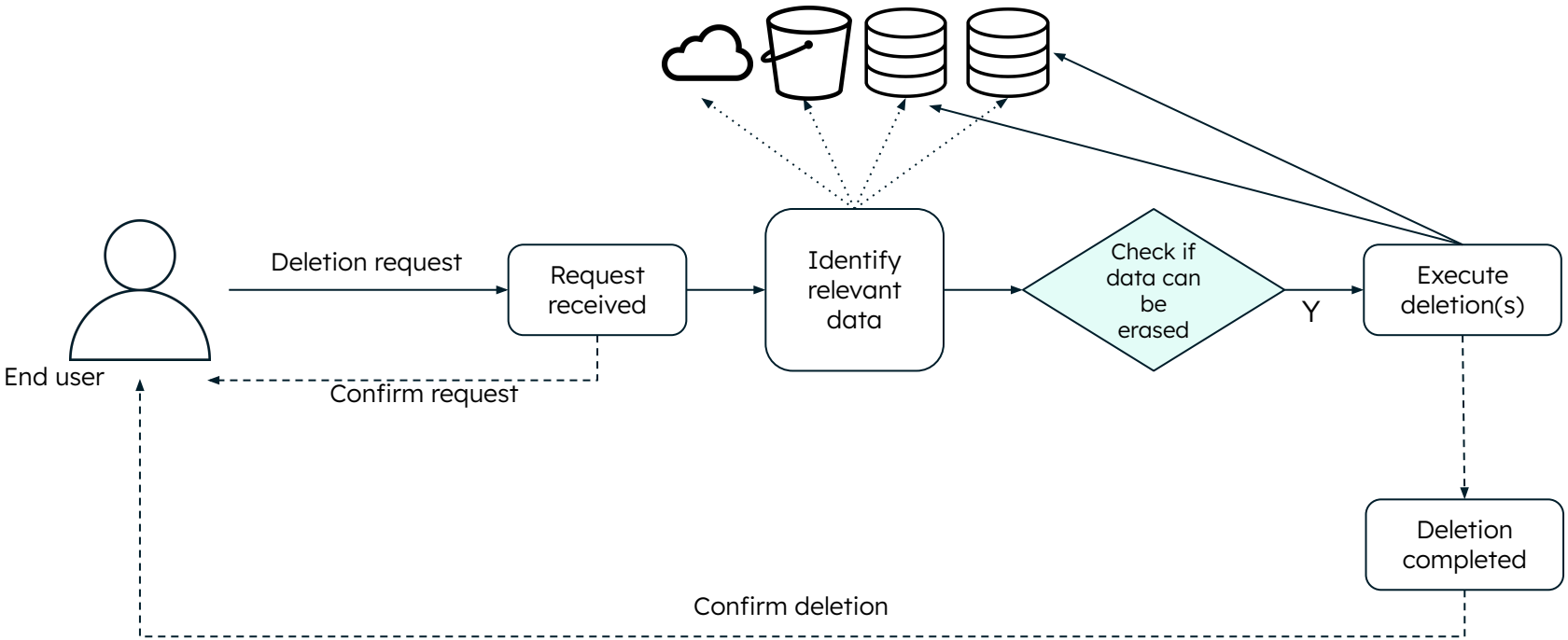

The role of encryption

What is Crypto Shredding

ssn: 901-01-001


```
{
    "customerID": "C12345",
    "ssn": "901-01-0001",
    "firstName": "John",
    "lastName": "Doe",
    "email": "johndoe@email.com",
    "address": {
        "city": "Springfield",
        "state": "IL"
    },
    "dateJoined": "2023-10-19"
}
```



```
{
    "customerID": "C12345",
    "ssn": "xxxxxxxxxx",
    "firstName": "xxxxxxxxxx",
    "lastName": "xxxxxxxxxx",
    "email": "xxxxxxxxxx",
    "address": {
        "city": "xxxxxxxxxx",
        "state": "xxxxxxxxxx"
    },
    "dateJoined": "2023-10-19"
}
```



```
{
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    "dateJoined": "2023-10-19"
}
```


User registration

Secure Key Management

Data Encryption

Customer Encryption Key

Reading data

ssn: 801-01-001


```
{
    "customerID": "D52345",
    "ssn": "801-01-0001",
    "firstName": "Adam",
    "lastName": "Doe",
    "email": "adamdoe@email.com",
    "address": {
        "city": "New York",
        "state": "NYC"
    },
    "dateJoined": "2023-10-20"
}
```



```
{
    "customerID": "D52345",
    "ssn": "xxxxxxxxxx",
    "firstName": "xxxxxxxxxx",
    "lastName": "xxxxxxxxxx",
    "email": "xxxxxxxxxx",
    "address": {
        "city": "xxxxxxxxxx",
        "state": "xxxxxxxxxx"
    },
    "dateJoined": "2023-10-20"
}
```



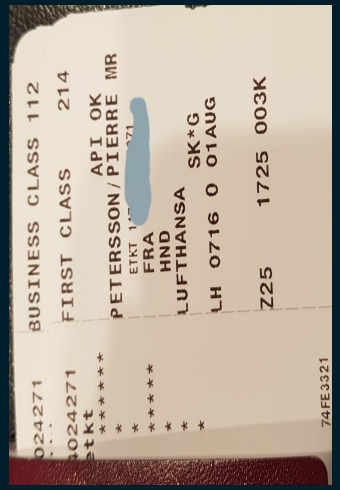
```
{
    "customerID": "D52345",
    "ssn": "801-01-0001",
    "firstName": "Adam",
    "lastName": "Doe",
    "email": "adamdoe@email.com",
    "address": {
        "city": "New York",
        "state": "NYC"
    },
    "dateJoined": "2023-10-20"
}
```

What is Crypto Shredding

ssn: 901-01-001

User registration | Secure Key Management | Data Encryption | Shredding the key | Proof of unreadability

ssn: 801-01-001



Father, Husband, Coder, Air mileage collector

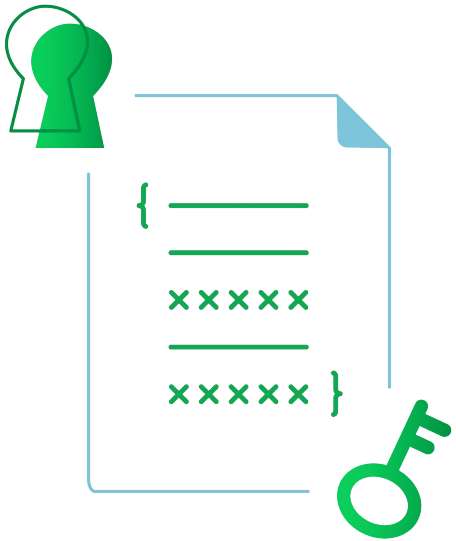
Pierre Petersson

Advisory solutions Architect MongoDB

20+ Years
Public Speaker
ex-Amazonian

SCAN ME

Simplifying it with MongoDB

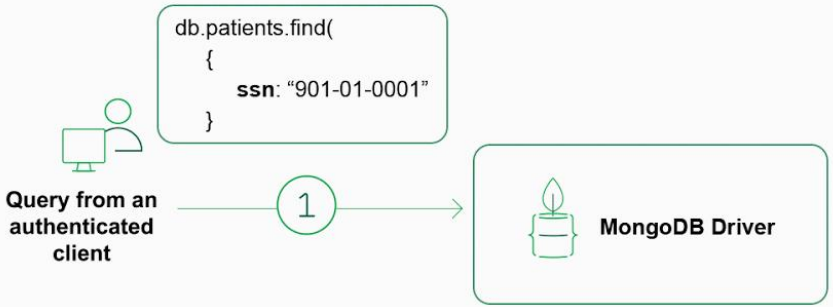


MongoDB Client Side FLE gives you a **safe and simple approach**

Select an encryption key, configure the fields to be encrypted in the MongoDB driver..and **GO**

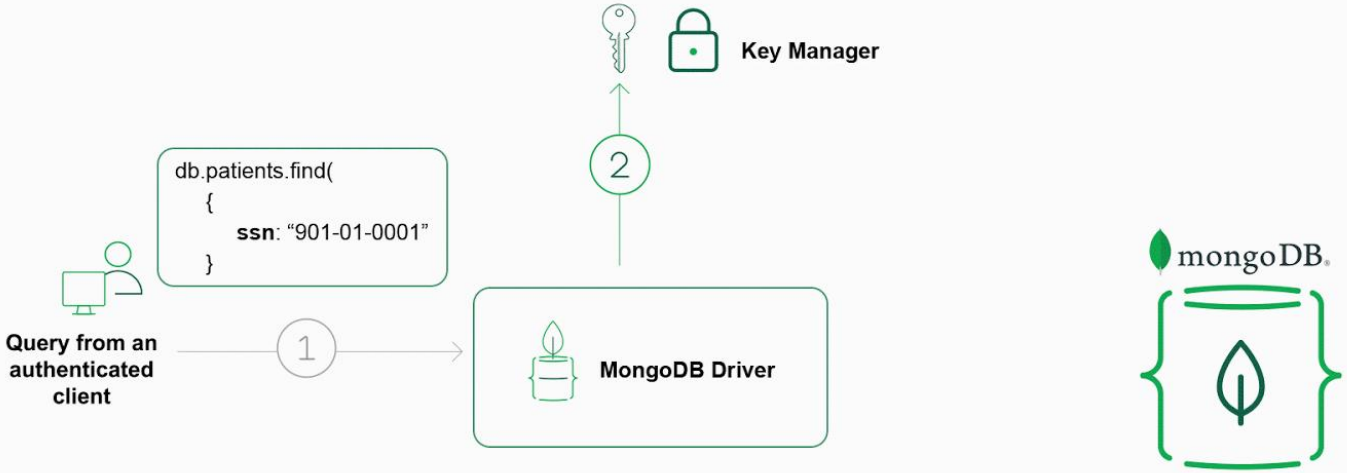
- Sensitive data **never leaves the application** without first being encrypted. Data **remains encrypted** server-side
- No need to **modify applications**
- Encrypted data is **still queryable**
- **Minimal performance impact** to the database and the application
- **Reduce Cognitive load,** intuitive and easy for developers to configure and setup

Query a document with CSFLE enabled



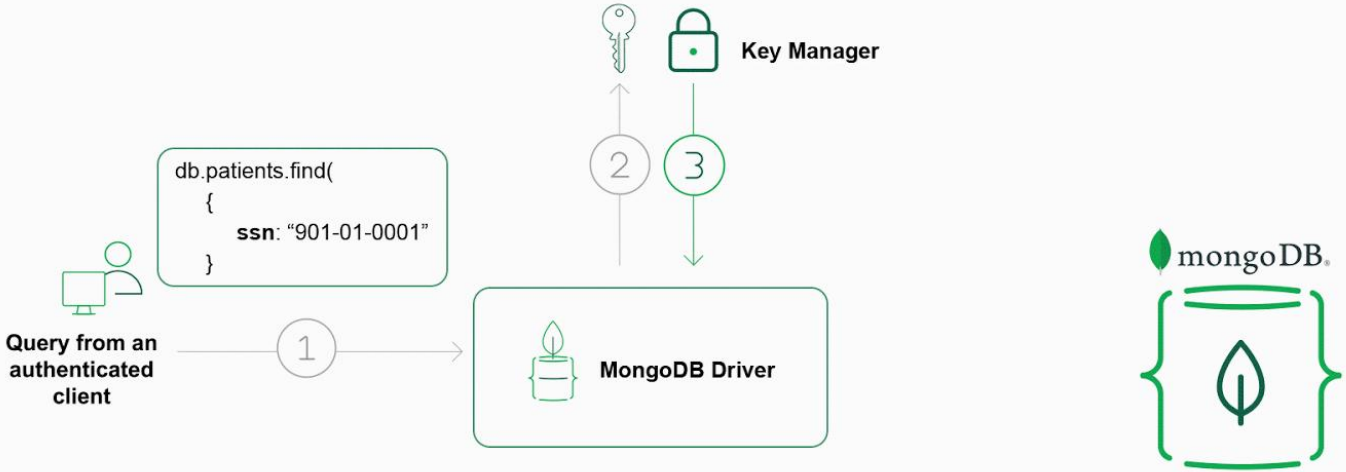
Upon receiving a query, the MongoDB driver checks to see if any encrypted fields are involved

Query a document with CSFLE enabled



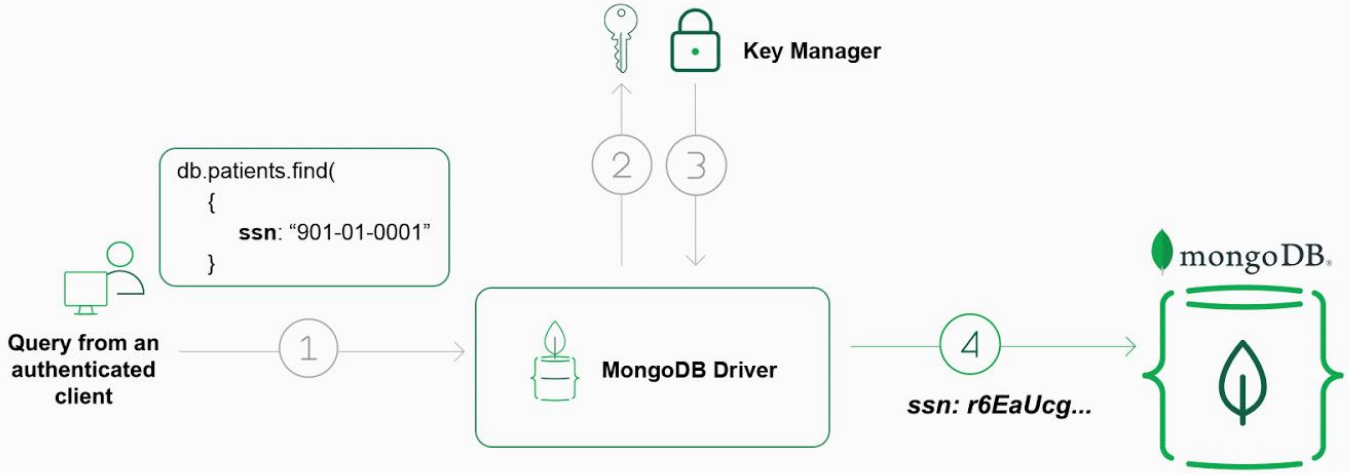
The driver requests the envelope encryption key from the KMS key provider

Query a document with CSFLE enabled



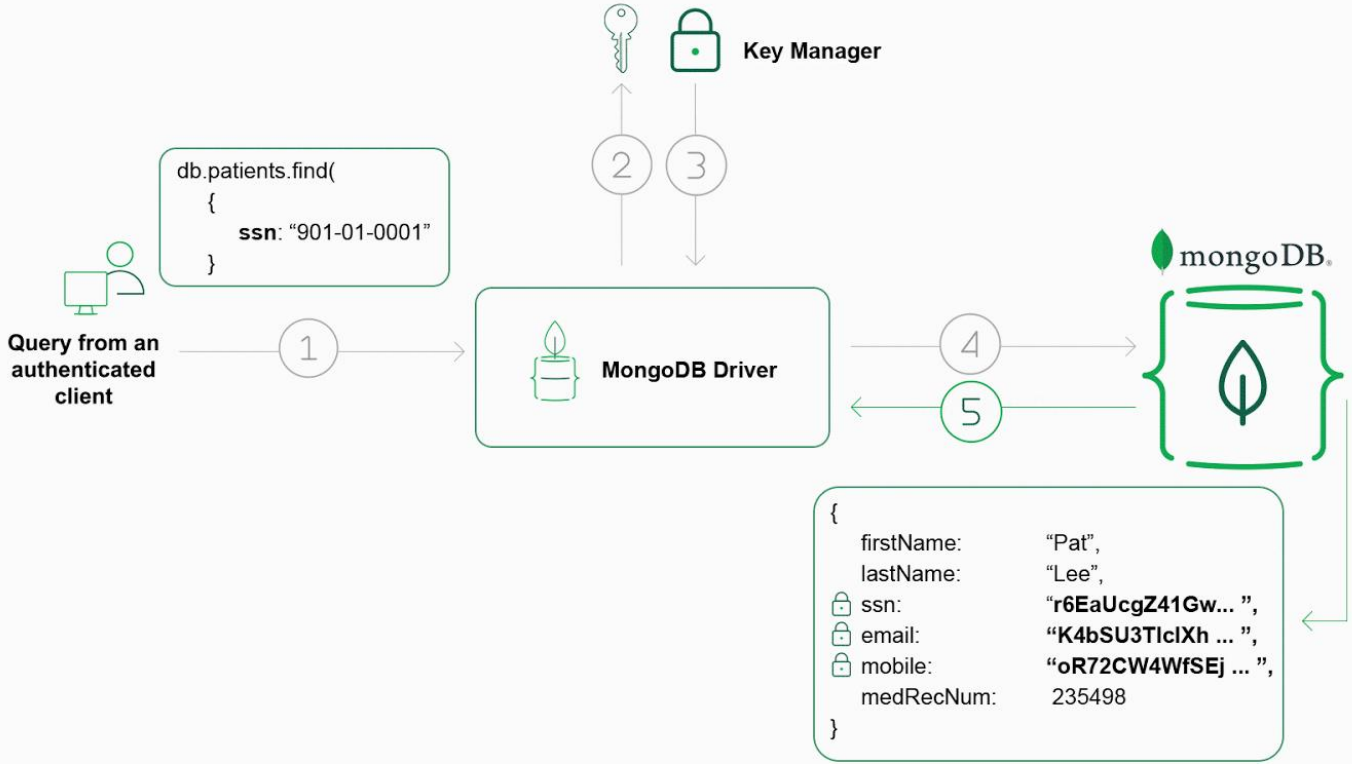
The driver decrypts the data encryptions keys using the envelope key, which then encrypts the sensitive fields

Query a document with CSFLE enabled



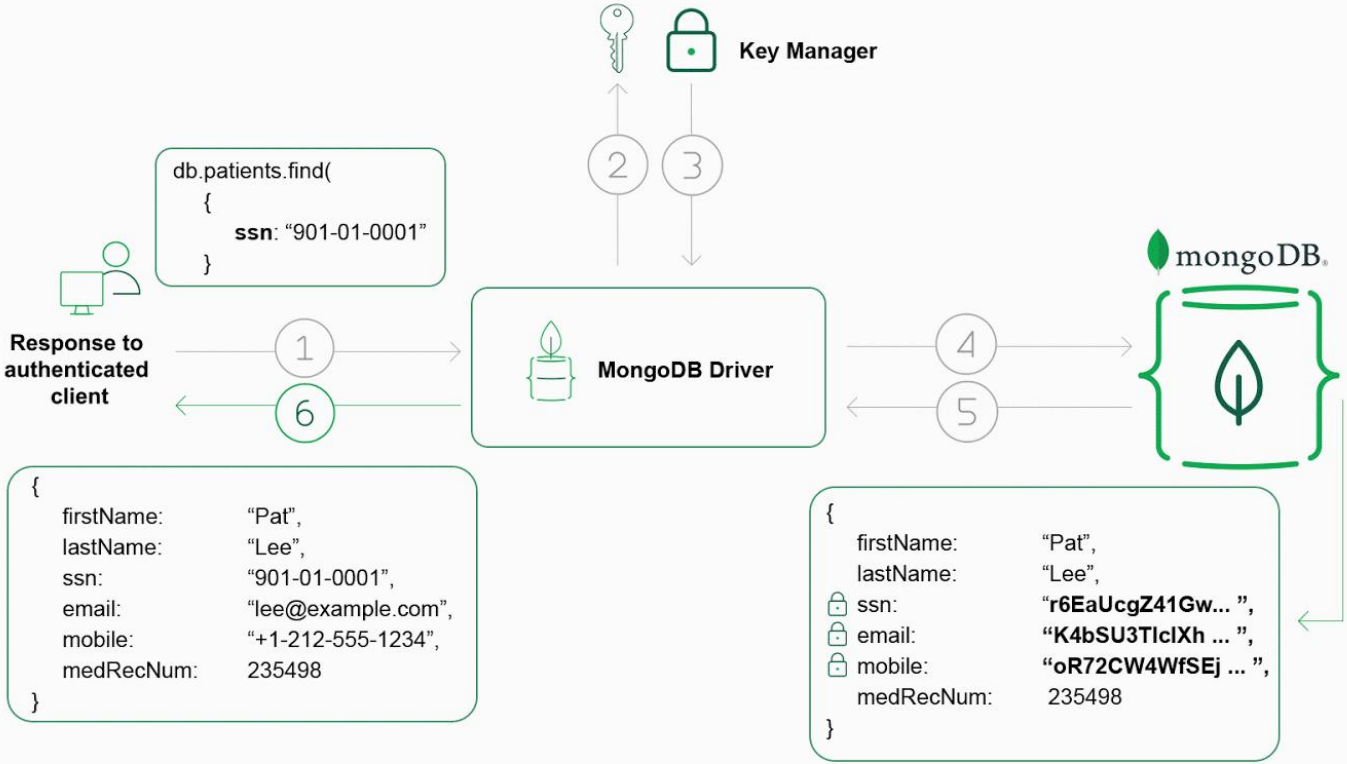
The driver submits the query to the MongoDB server with the encrypted fields rendered as ciphertext

Query a document with CSFLE enabled

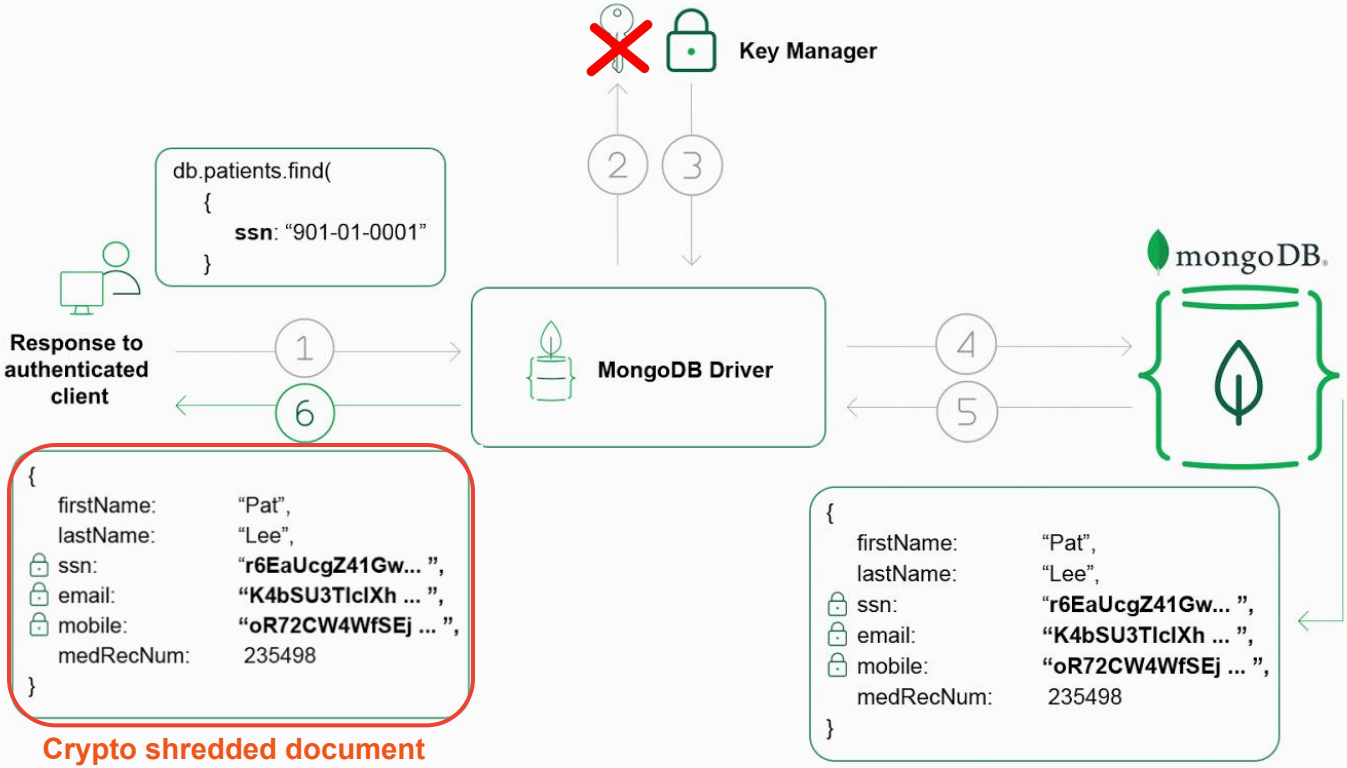


MongoDB returns the encrypted results of the query to the driver

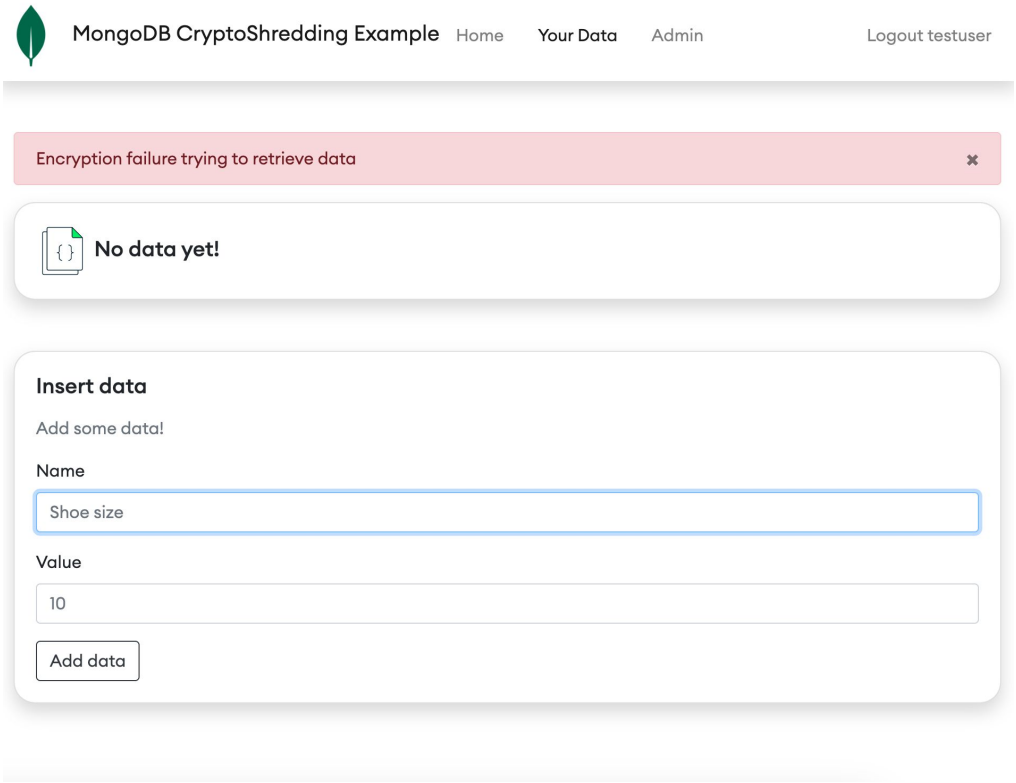
Query a document with CSFLE enabled

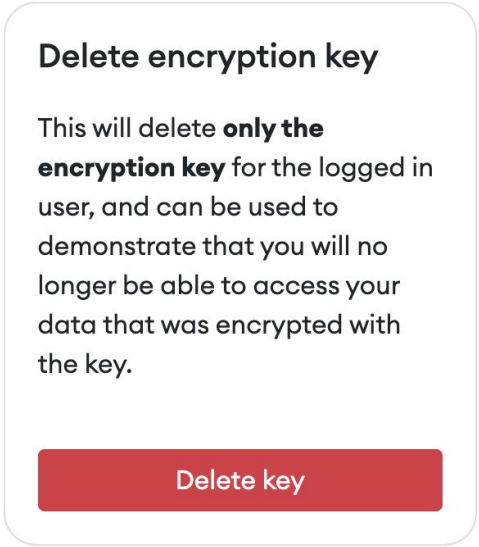


CSFLE Right for erasure by removing encryption key



Let's See it In Action!





https://github.com/to-mc/flask-mongodb-cryptoshredding-example

Next generation of in use encryption: Queryable encryption

Use Cases

Industry: Financial Services
Bank application needs to find transactions using a **range of dates** or **dollar amounts** for fraud detection

Industry: Human Resources
HR system allows searching for employees by the **last 4 digits** of their social security number

Industry: Health Care
Customer support agents needs to find patient records by searching for the **first few characters** of their name

CSFLE vs Queryable Encryption Trade-offs

	Inserts	Find (equality)	Find (range, prefix, suffix, substring)	Storage Overhead	Frequency Leakage
FLE	Fast	Fast	No	Minimal	Possibly
Queryable Encryption	Slower	Fast	Yes	Yes	None

https://www.mongodb.com/collateral/queryable-encryption-technical-paper

Client-Side FLE / In-use encryption

Design Goal

Provide some of the strongest levels of data privacy and security for regulated workloads

- Simplify compliance with modern privacy regs: “Right to Erasure”
- End to end protection of your most sensitive data
- Increase your confidence in moving to managed services in the cloud
- Enable querying on encrypted data, in a secure, fast and scalable way

Additional Resources

Resources CSFLE
Client-Side Field Level Encryption The Next Generation of Privacy & Security MDBW22 Video

Whitepaper CSFLE

CSFLE Multi Cloud Environments MDBW22 Video

Queryable Encryption Resources
Docs (very much a WIP): https://www.mongodb.com/docs/upcoming/core/queryable-encryption/
Blog post: https://www.mongodb.com/blog/post/mongodb-releases-queryable-encryption-preview
Product page & FAQ: https://mongodb.com/products/queryable-encryption

Achieving Scalable Data Intelligence with BigID & MongoDB

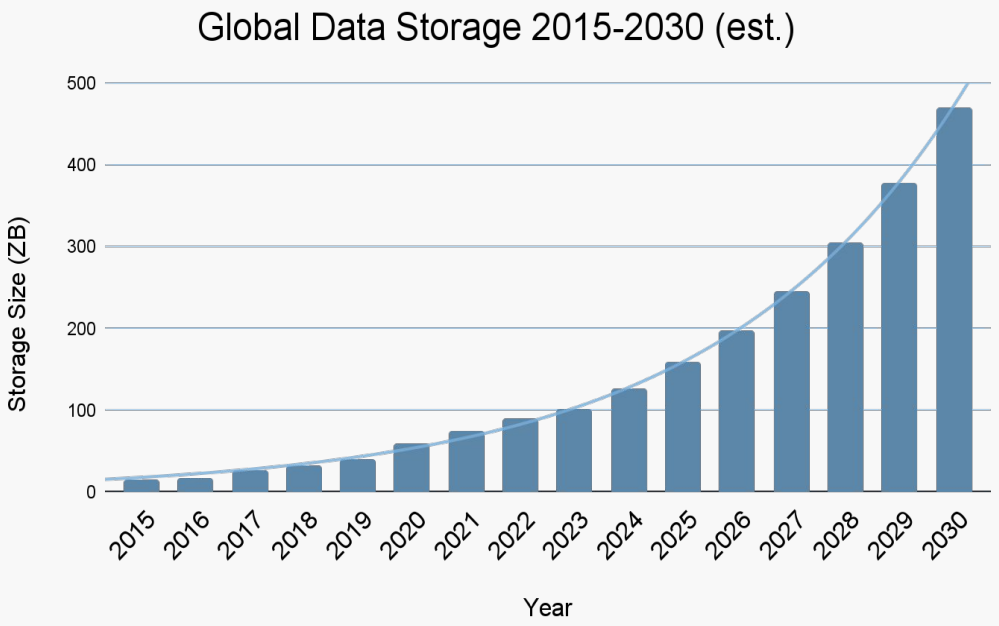
Andreas Holmström

Sr. Solutions Engineer - BigID

MongoDB World Tour
.local STHLM

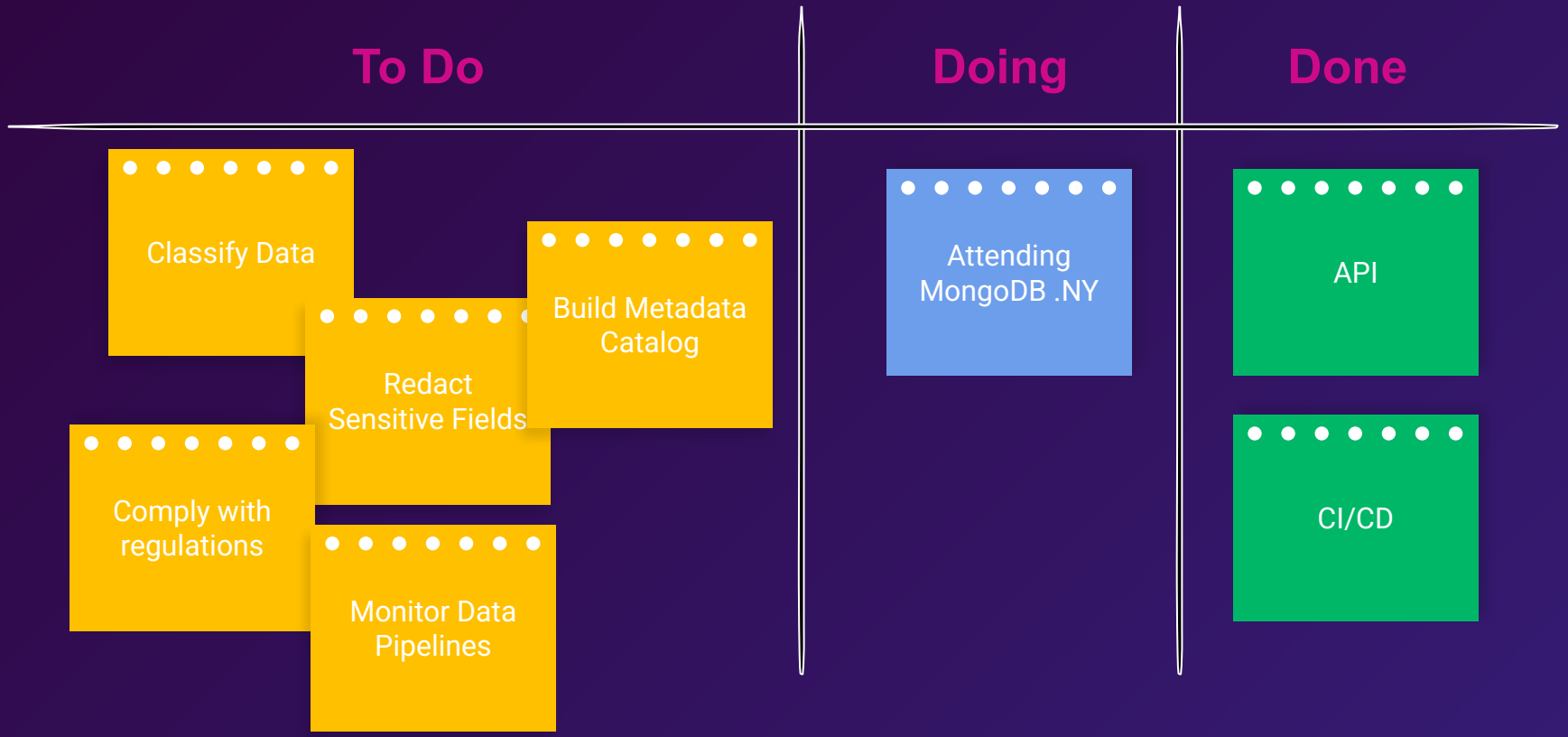
“Data is a precious thing and will last longer than the systems themselves”

- Tim Berners Lee



BigID

The Problem



BigID

We'll discuss

How to reduce risk and gain visibility to your data using an API, dev first approach

- The Problem - You have lots of data. You need to control it.
- The Solution - Data Discovery & Classification
- The Method - Shift Left ←

BigID

BigID and MongoDB

- **Data Intelligence Platform for Privacy, Security & Governance**
- **Using MongoDB since 2016:**
  - BigID's internal database (containerized & via Atlas)
  - Connectors to scan, classify and action data in MongoDB
- **Strong Partnership**
- **Come meet us at our stand!**

BigID & MongoDB

How MongoDB powers BigID's Scalable Data Intelligence Platform

Flexible Data Model

- Component of BigID Data Catalog
- Avoid "Migration Script"
- Use of MongoDB as both "Documents Store" and "Full DB" with aggregations, joins and transactions

Availability

- High availability through the automated distribution of data across multiple servers
- Data remains accessible even in the event of hardware failures or other disruptions within a cluster

Scalability

- Vertical scaling based on CPU, Memory, and Disk utilization
- Horizontal scaling enabled using sharding and replica sets
- All managed automatically by Atlas

Support for KMS

- Encrypt data at rest using a cloud providers Key Management Service
- Support for Bring-your-own-key with customers for enhanced management capability

BigID

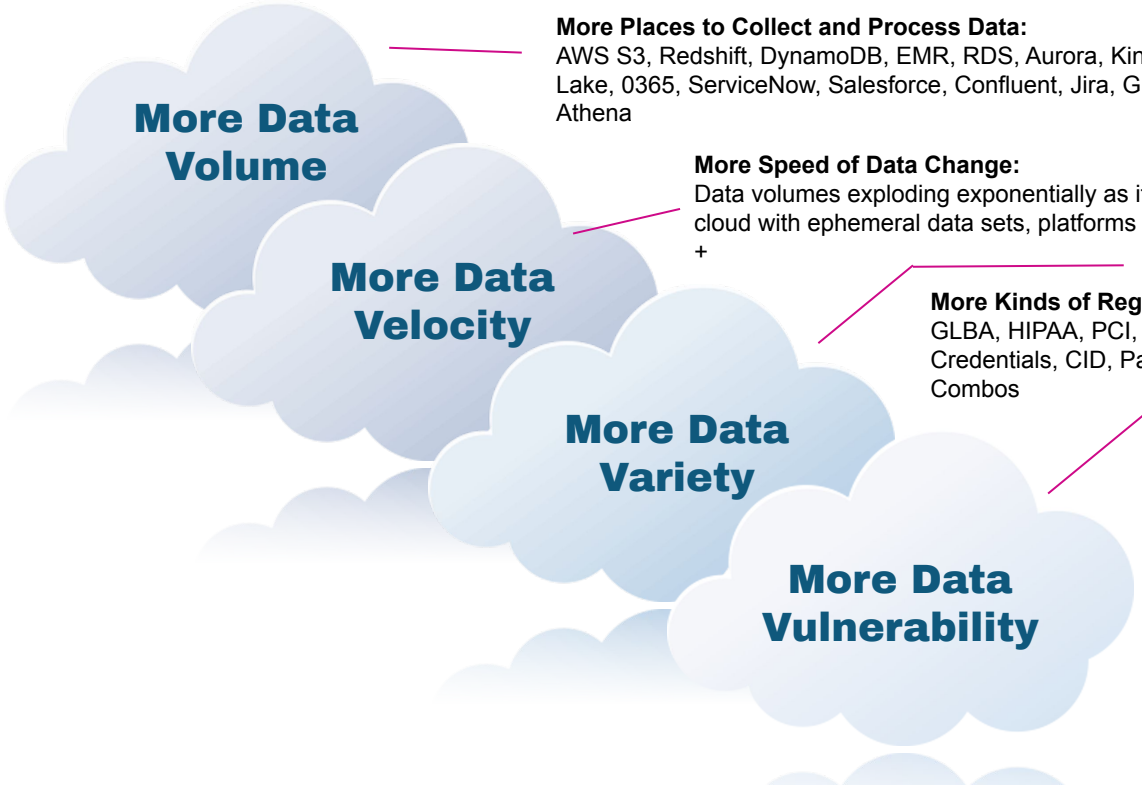
Know Your Data

Data Discovery & Classification

With great ~~power~~ *data* comes great responsibility

Know your data

This was Hard in Data Center, Harder in the Cloud



More Places to Collect and Process Data:
AWS S3, Redshift, DynamoDB, EMR, RDS, Aurora, Kinesis, Databricks, Snowflake, Azure Data Lake, 0365, ServiceNow, Salesforce, Confluent, Jira, GitHub, GitLab, Cohesity, Confluence, Athena

More Speed of Data Change:
Data volumes exploding exponentially as it becomes easier to add, copy, move in cloud with ephemeral data sets, platforms like snowflake and databricks, email, files +

More Kinds of Regulated, Sensitive, Critical Data To Track
GLBA, HIPAA, PCI, SOX, GDPR, CCPA, PII, PI, PCI, Credentials, CID, Patents, Research, ML Models, Data Combos

How do you measure & remediate risk:
open access, excessive privileges, duplicate data, sovereign data, misconfigurations, ROT data, credential leaks, embedded code

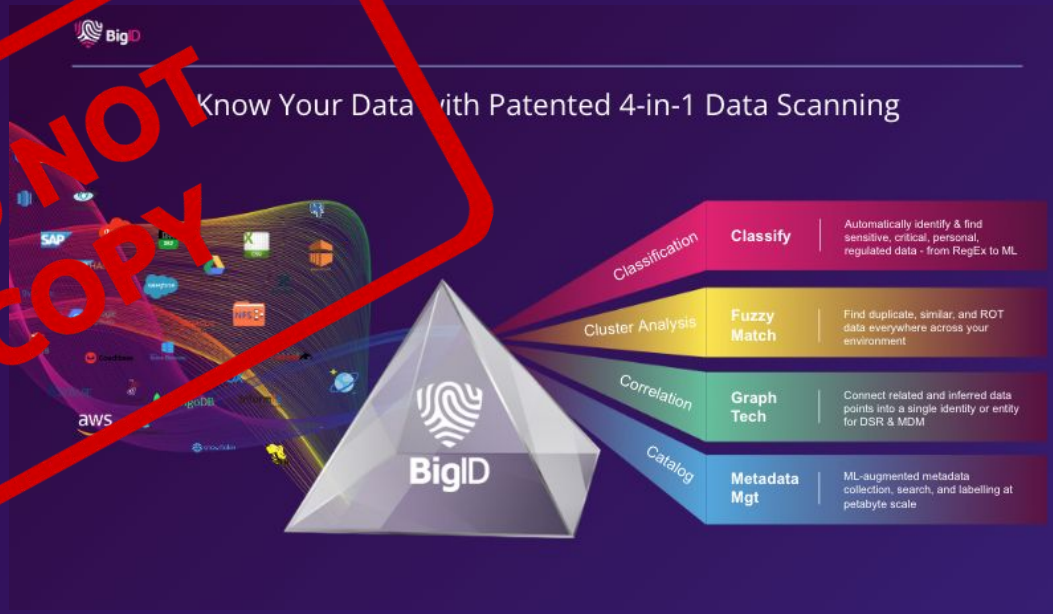
Data Discovery & Classification

Map & Connect

Enumerate & Scan

Process & Analyze

Report & Query



BigID

API & Dev First

Shift←Left

Shift Left
Breakdown

Definition

Practice of doing X earlier in the process or value chain

E.g: Automatic QA Testing; Code Vulnerability Scans

In Practice

- Integrate & automate as code and data are created
- Extending new & existing tools
- Applies to more fields: Privacy, Compliance, etc

The Benefits

- Addressing issues before they reach Production
- Reduce risks and costs
- Speed up dev efficiency

Leverage tools with Open API

Plug into Data Pipelines

CI/CD

Examine The Code

Extend Capabilities

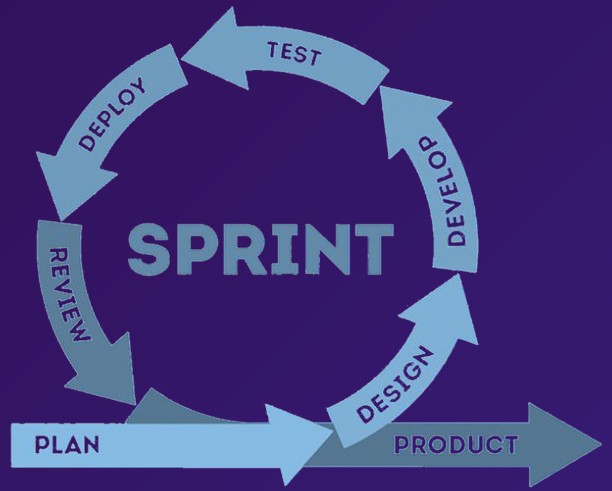
Part of your Code Lifecycle

Scanning Code Repositories (bitbucket, github, gitlab etc)

- Find sensitive data like passwords or certificates
- Detect customer data processed by apps / microservices
- Notify on PII without an approved purpose of processing
- Locate DB tables referenced in queries that use PII

CI/CD

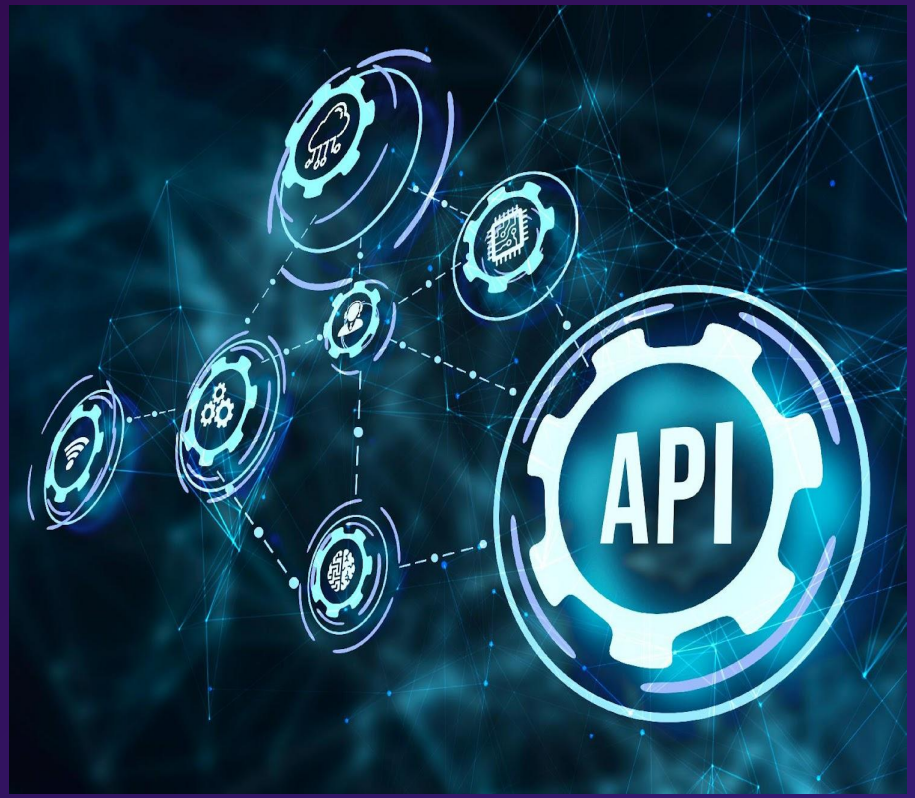
- Run as part of build (e.g. Jenkins)
- Monitor api gateway (e.g. nginx)



Open API

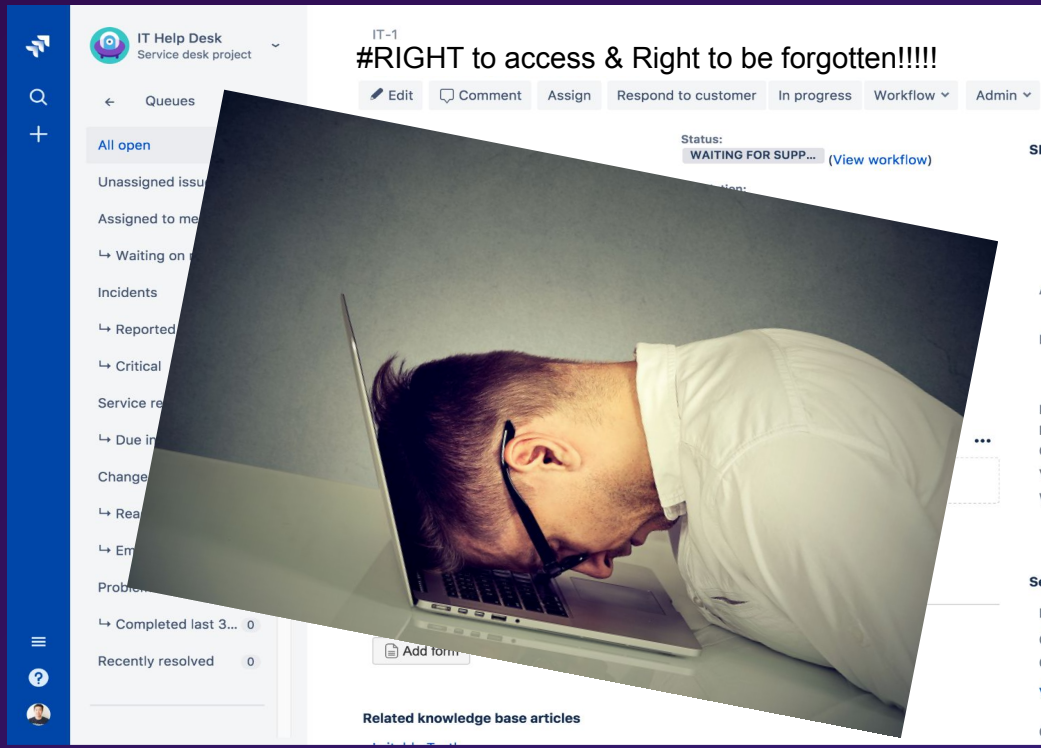
Developers can automate recurring tasks, integrate home-grown systems and extend capabilities better if they have tools with:

- Open, documented, comprehensive APIs
- Standard communication and authentication protocols
- Tech stack / language agnostic integrations



Privacy automation

- End to End user experience to manage, consent, access, deletion, rectification, completing requests in minutes or hours rather than many days or weeks!
- CSFLE deletion, much better as access is only required for one DB, which reduces the attack surface and speeds up the deletion process
- Allows auditor to track privacy requests!
- Limit internal tickets and manual workflows

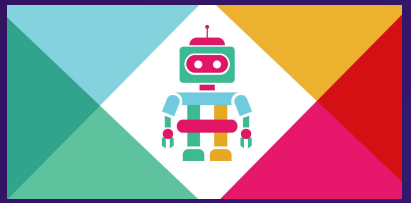


Extensibility

- A FRAMEWORK for developers
- Plugins (or apps) that allow
  - Adding new capabilities
  - Integrating multiple systems
- Industry Examples
  - Splunk add-ons
  - Kafka Connect
  - Slack apps & bots
  - Snowflake & DataBricks external Functions

splunkbase

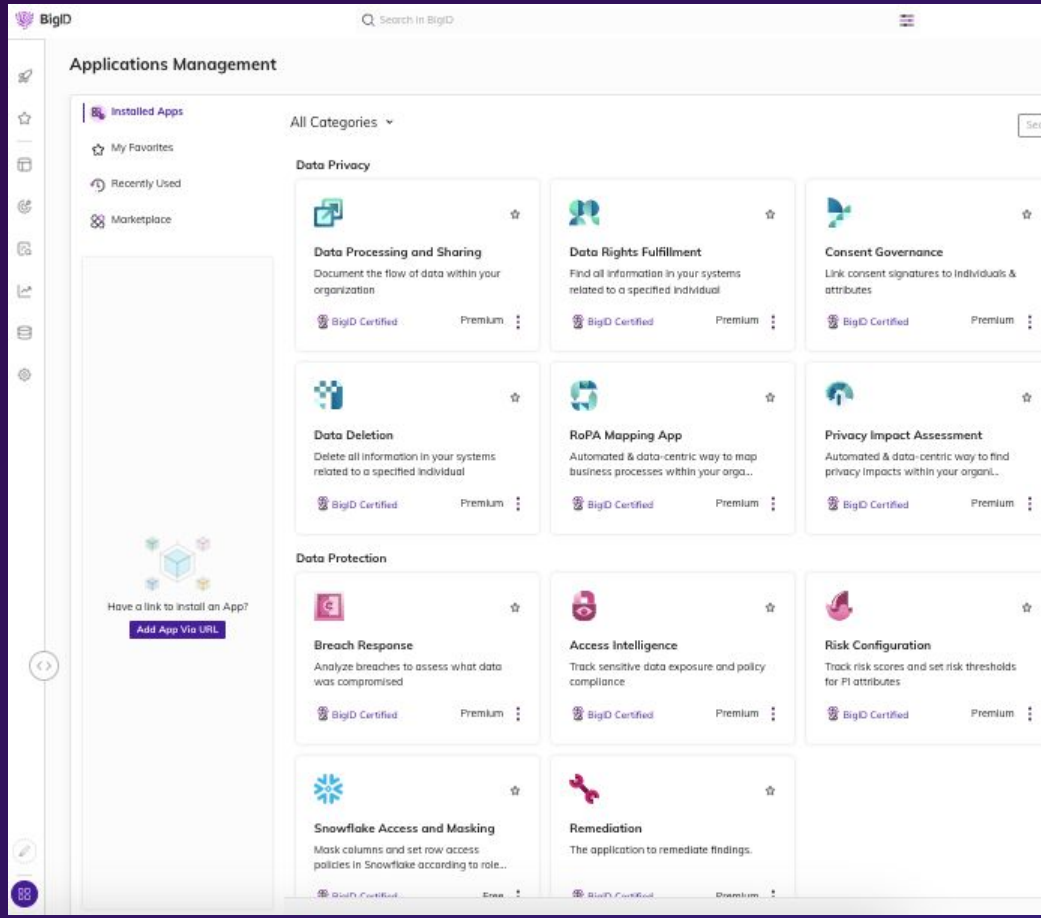
kafka



Application Framework SDK

A call for developers to:

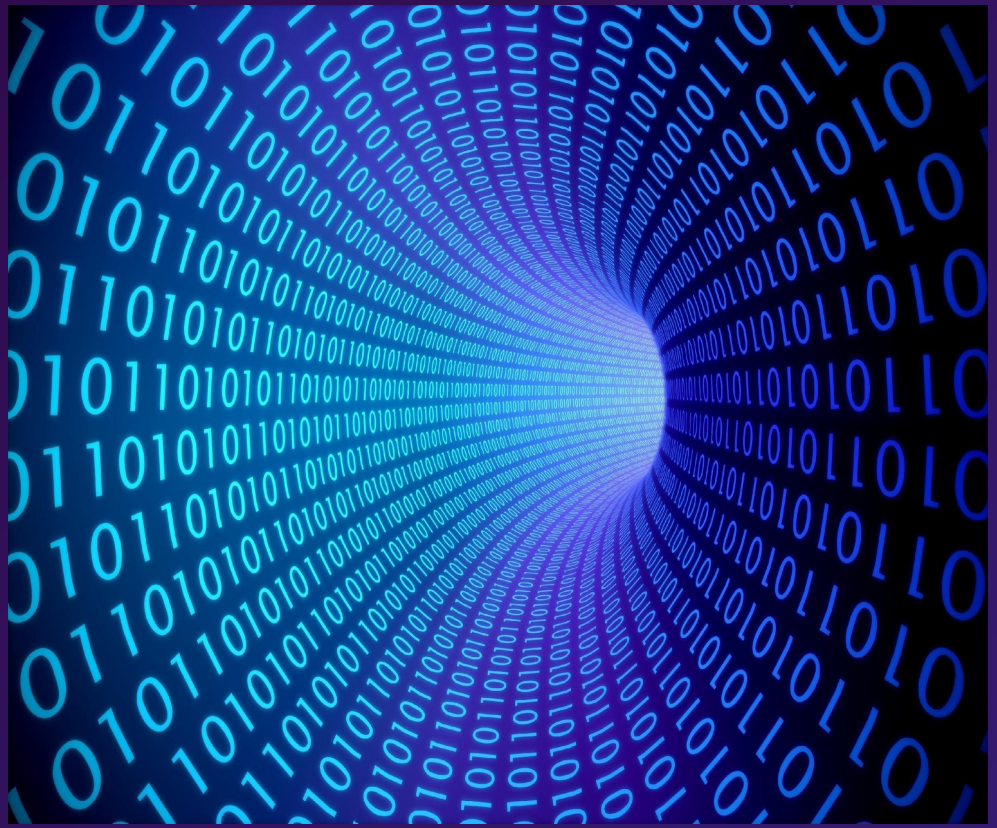
- Leverage the platform's REST APIs
  - Scan new data stores as they are created
  - Automate compliance
- Integrate it in pipelines
  - API GW + Data-in-Motion
  - Classification SDK
- Extend it
  - Connect to systems – connector SDK
  - Create new applications – APP FW SDK
- Find additional Apps and plugins on the BigID Marketplace



Data Pipeline

Plug into processes like:

- Data-in-motion: Data moves from one store to another
- Ingesting Data from Partners
- Data Sharing with 3rd Parties
- Processing, aggregation and analytics



BigID

Solutions and Examples

Please come speak to Us!