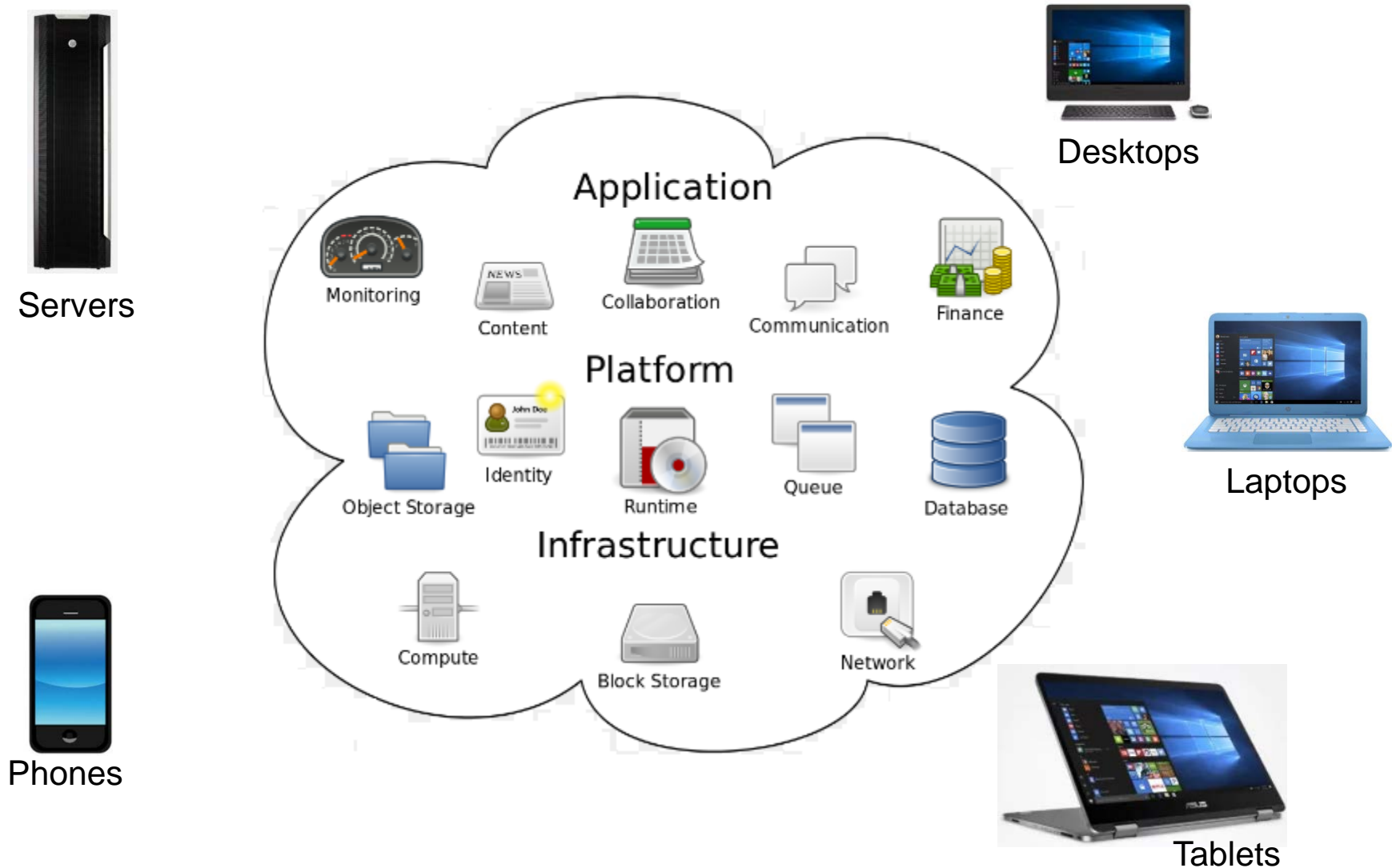

Extend NonStop Applications with Cloud-based Services

Phil Ly, TIC Software

John Russell, Canam Software

- **Cloud Computing and Microservices**
- **Amazon Web Services (AWS)**
- **Integrate NonStop with AWS Managed Services**
- **AWS Data Loader, Shadowbase Gateway and JSON Thunder**
- **Q & A**

Cloud Computing



The delivery of computing services over the internet

- **Services**

- Infrastructure (servers, storage)
- Platform (operating systems, databases)
- Software (application)

- **Deployment Types**

- Private (managed internally)
- Public (Amazon (AWS), Microsoft (Azure), IBM, Google, ...)
- Hybrid

- **Coming Fast**

- \$180B USD industry in 2017; +20% growth annually.

Why Cloud Computing?

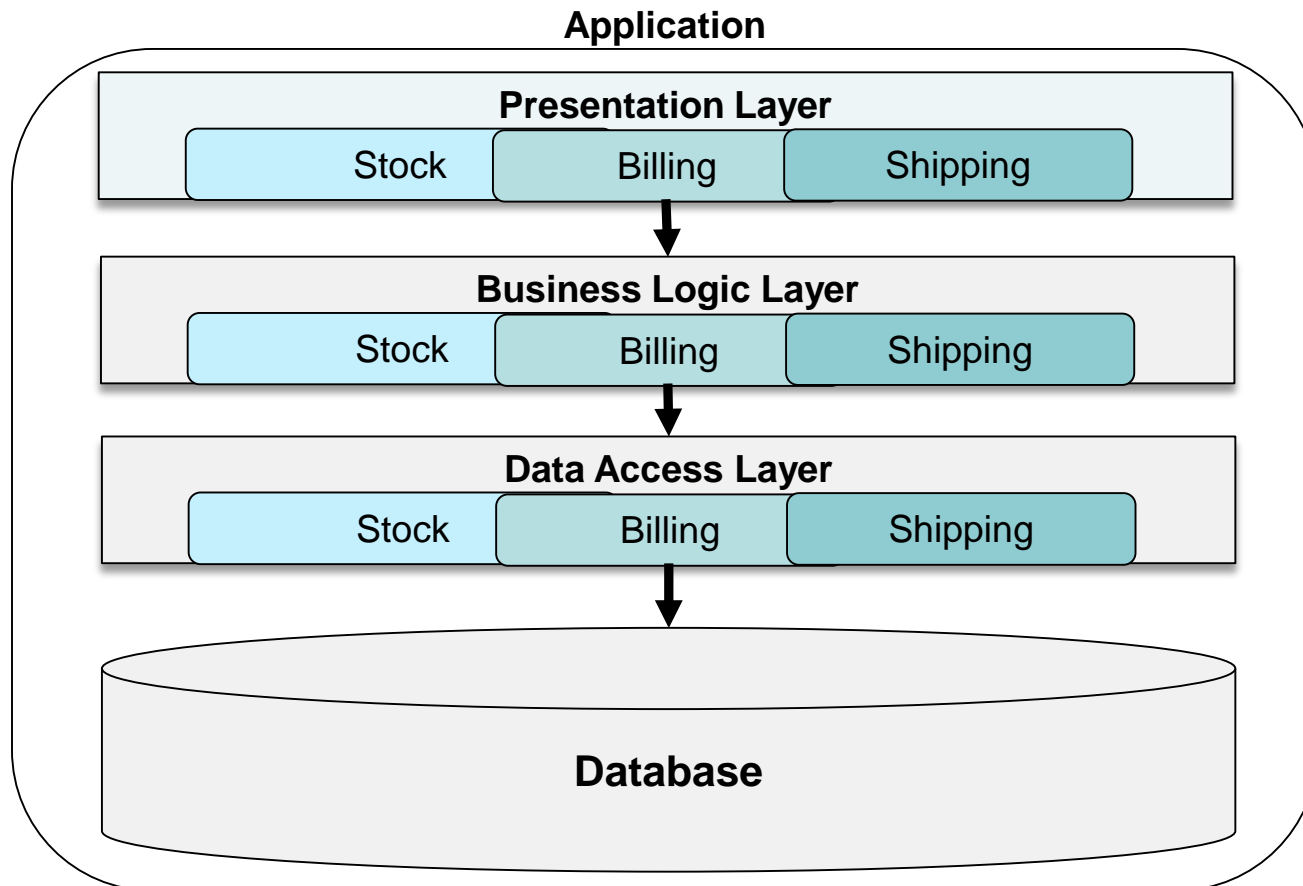
- **Flexibility / Scalability**
 - Instantly scale services up or down to meet needs
 - Stop guessing capacity
- **Reduced Cost**
 - Less cost upfront investment in hardware
 - Pay for what you use
- **Backups, Disaster Recovery, Automatic Updates**
 - Managed for you
- **Excellent for developing microservices!**

Microservices



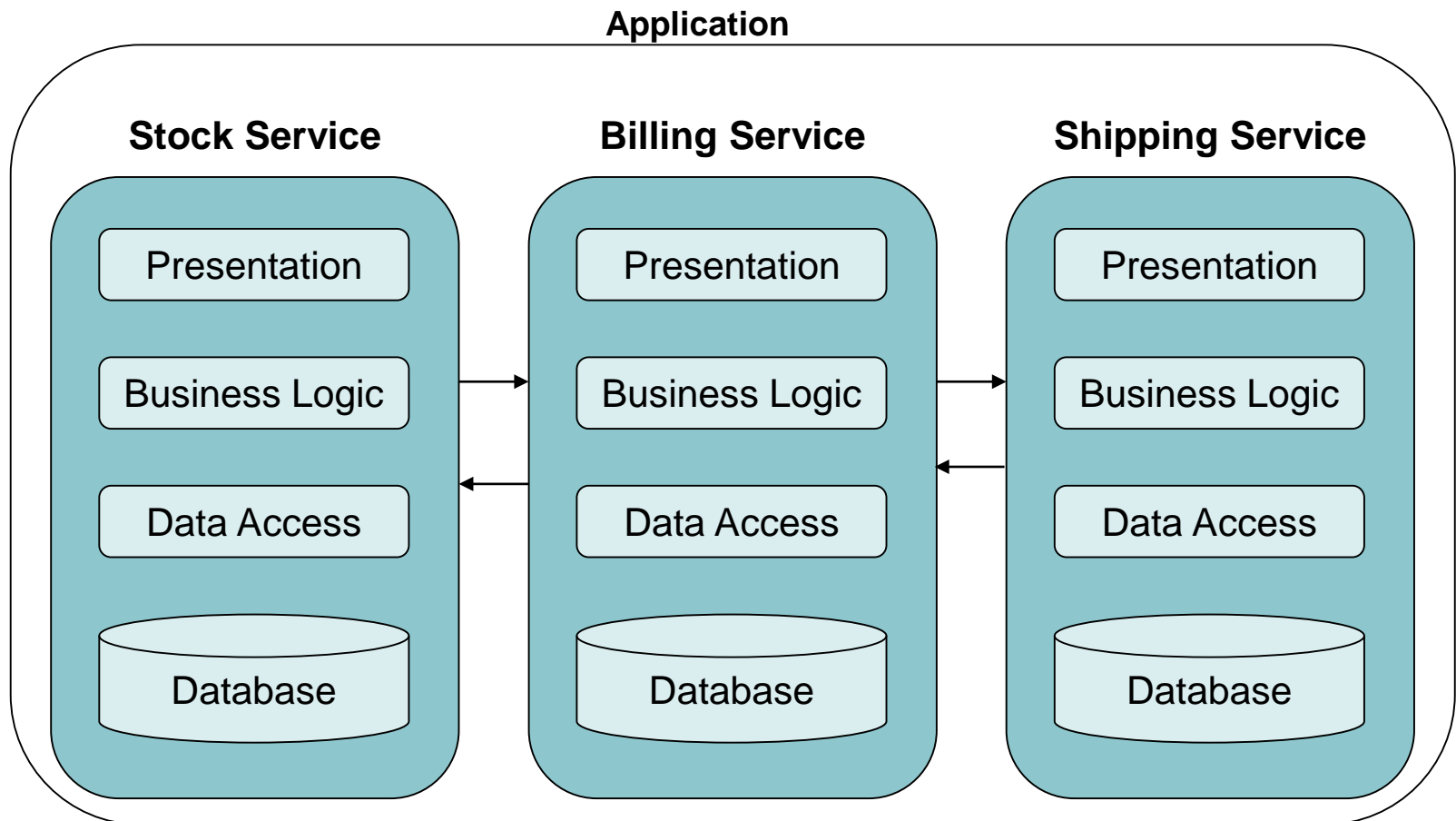
• Traditional Architectures

- Monolithic – everything packaged together
- Problems in one area of application can impact entire application (e.g. CPU utilization)
- Development impacts – small changes can have big impacts



- **Microservices**

- A way of breaking large applications into smaller, independent, and loosely coupled modules.



- **Specialized**

- Designed to do one thing very well
- Solves a specific problem

- **Autonomous**

- Independent process. No dependency on other microservices
- Not just code modules or libraries
 - ❖ Contain everything needed to execute
 - Operating system, code, database, runtime and dependencies, packaged as one unit of execution

- **Loosely Coupled**

- Build and deploy independently

- **APIs**

- Communicate with each other via APIs
- Typically RESTful APIs

- **Cloud services ideal for developing microservices**
 - Enable development of self-contained services (O/S, database, networking, etc.)
 - Deploy to virtual machines
 - Scale only the service that needs to be scaled

- **Amazon Web Services**
 - Managed services
 - Building blocks for microservices

Amazon Web Services



- > 120 services and growing

Compute

Amazon EC2
 Amazon EC2 Auto Scaling
 Amazon Elastic Container Service
 Amazon Elastic Container Service for Kubernetes
 Amazon Elastic Container Registry
 Amazon Lightsail
 AWS Batch
 AWS Elastic Beanstalk
 AWS Fargate
 AWS Lambda
 AWS Serverless Application Repository
 Elastic Load Balancing
 VMware Cloud on AWS

Storage

Amazon Simple Storage Service (S3)
 Amazon Elastic Block Storage (EBS)
 Amazon Elastic File System (EFS)
 Amazon Glacier
 AWS Storage Gateway
 AWS Snowball
 AWS Snowball Edge
 AWS Snowmobile

Database

Amazon Aurora
 Amazon RDS
 Amazon DynamoDB

Networking & Content Delivery

Amazon VPC
 Amazon CloudFront
 Amazon Route 53
 Amazon API Gateway
 AWS Direct Connect
 Elastic Load Balancing

Developer Tools

AWS CodeStar
 AWS CodeCommit
 AWS CodeBuild
 AWS CodeDeploy
 AWS CodePipeline
 AWS Cloud9
 AWS X-Ray
 AWS Tools & SDKs

Management Tools

Amazon CloudWatch
 AWS Auto Scaling
 AWS CloudFormation
 AWS CloudTrail
 AWS Config
 AWS OpsWorks
 AWS Service Catalog
 AWS Systems Manager
 AWS Trusted Advisor
 AWS Personal Health Dashboard
 AWS Command Line Interface

Machine Learning

Amazon SageMaker
 Amazon Comprehend
 Amazon Lex
 Amazon Polly
 Amazon Rekognition
 Amazon Machine Learning
 Amazon Translate
 Amazon Transcribe
 AWS DeepLens
 AWS Deep Learning AMIs
 Apache MXNet on AWS
 TensorFlow on AWS

Analytics

Amazon Athena
 Amazon EMR
 Amazon CloudSearch
 Amazon Elasticsearch Service
 Amazon Kinesis
 Amazon Redshift
 Amazon QuickSight
 AWS Data Pipeline
 AWS Glue

Security, Identity & Compliance

AWS Identity and Access Management (IAM)
 Amazon Cloud Directory
 Amazon Cognito

AR & VR

Amazon Sumerian

Application Integration

Amazon MQ
 Amazon Simple Queue Service (SQS)
 Amazon Simple Notification Service (SNS)
 AWS AppSync
 AWS Step Functions

Customer Engagement

Amazon Connect
 Amazon Pinpoint
 Amazon Simple Email Service (SES)

Business Productivity

Alexa for Business
 Amazon Chime
 Amazon WorkDocs
 Amazon WorkMail

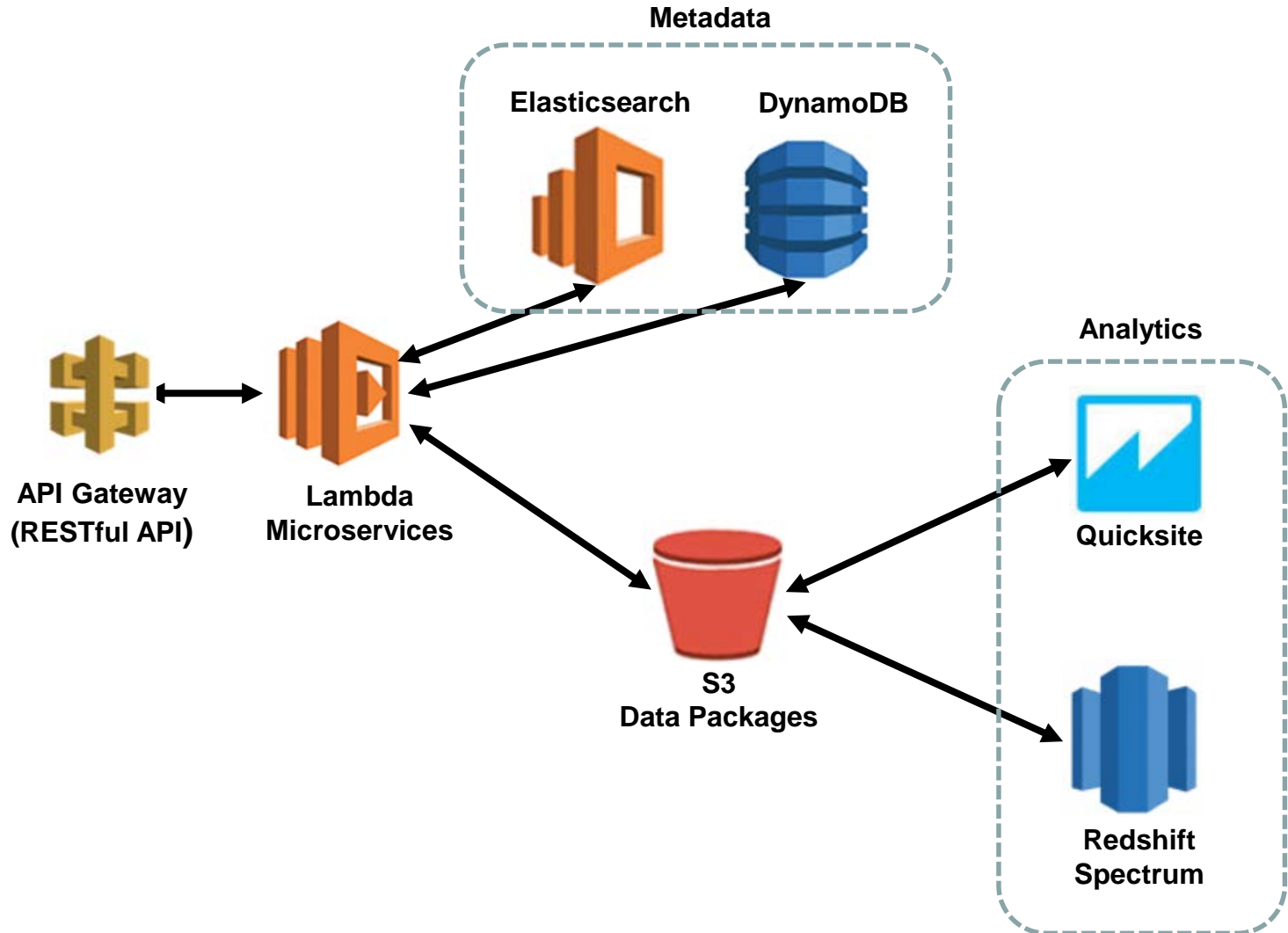
Desktop & App Streaming

Amazon WorkSpaces
 Amazon AppStream 2.0

Internet of Things

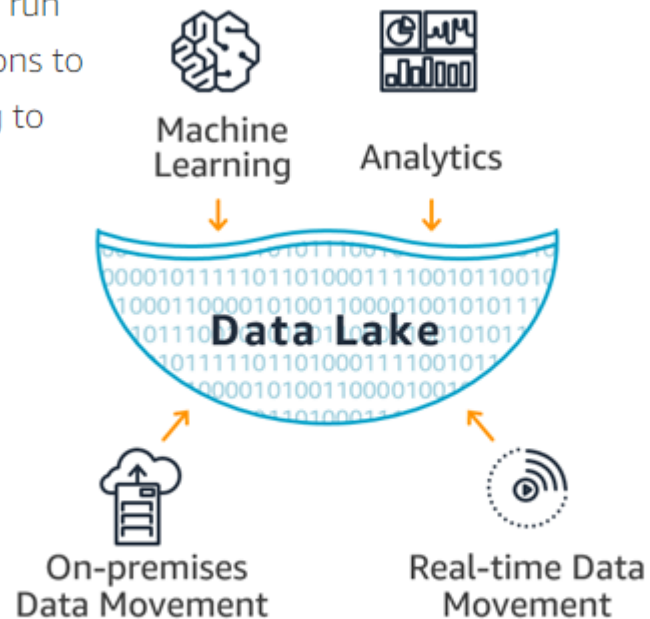
AWS IoT Core
 Amazon FreeRTOS
 AWS Greengrass
 AWS IoT 1-Click

AWS Data Lake Solution



What is a data lake?

A data lake is a centralized repository that allows you to store all your structured and unstructured data at any scale. You can store your data as-is, without having to first structure the data, and run different types of analytics—from dashboards and visualizations to big data processing, real-time analytics, and machine learning to guide better decisions.





A **bucket** is a logical unit of storage in **Amazon** Web Services (AWS) object storage service, Simple Storage Solution **S3**. **Buckets** are used to store objects, which consist of data and metadata that describes the data.

Use cases

BACKUP & RECOVERY

Amazon S3 offers a highly durable, scalable, and secure destination for backing up and archiving your critical data. You can use S3's versioning capability to provide even further protection for your stored data. Amazon S3 and Amazon Glacier provide four different storage classes to help you optimize cost and performance while also meeting your Recovery Point Objective (RPOs) and Recovery Time Objectives (RTOs).

[Learn More About Backup & Recovery »](#)

HYBRID CLOUD STORAGE

The AWS Storage Gateway helps you build [hybrid cloud storage](#), augmenting your existing local storage environment with the durability and scale of Amazon S3. Use it to burst a workload from your site into the cloud for processing and then bring the results back. Tier colder or less valuable data off of your on-premises storage into the cloud to reduce costs and extend your storage investment. Or simply use it to incrementally move data into S3 as a part of backup or migration projects.

[Learn More About Hybrid Cloud Storage »](#)

DATA ARCHIVING

Amazon S3 and Amazon Glacier provide a range of storage classes to help customers meet the needs of compliance archives for regulated industries or active archives for organizations who need fast, infrequent access to archive data. Amazon Glacier Vault Lock provides [write-once-read-many \(WORM\) storage](#) to meet compliance requirements for records retention. Lifecycle policies make transitioning data between Amazon S3 and [Amazon Glacier](#) storage classes simple, automating the transition based on customer-defined policies.

[Learn More About Data Archiving »](#)

CLOUD-NATIVE APPLICATION DATA

Amazon S3 provides high performance, highly available storage that makes it easy to scale and maintain cost-effective mobile and Internet-based apps that run fast. With S3, you can add any amount of content and access it from anywhere, so you can deploy applications faster and reach more customers.

DATA LAKES & BIG DATA ANALYTICS

Whether you're storing pharmaceutical or financial data, or multimedia files such as photos and videos, Amazon S3 can be used as your data lake for Big Data analytics. Amazon Web Services offers a comprehensive portfolio of services to help you manage Big Data by reducing costs, scaling to meet demand, and increasing the speed of innovation.

[Learn More About Data Lakes and Big Data Analytics »](#)

DISASTER RECOVERY

Amazon S3's highly durable, secure, global infrastructure offers a robust disaster recovery solution designed to provide superior data protection. Cross-Region Replication (CRR) automatically replicates every S3 object to a destination bucket located in a different AWS Region.

[Learn More About Disaster Recovery »](#)



Amazon API Gateway

Amazon API Gateway is an AWS service that enables developers to create, publish, maintain, monitor, and secure APIs at any scale. You can create APIs that access AWS or other web services, as well as data stored in the AWS Cloud.



AWS **Lambda** is an event-driven, serverless computing platform provided by **Amazon** as a part of the **Amazon** Web Services. It is a compute service that runs code in response to events and automatically manages the compute resources required by that code.



Amazon DynamoDB

Amazon **DynamoDB** is a fully managed proprietary NoSQL database service that is offered by Amazon.com as part of the Amazon Web Services portfolio



Amazon Redshift Spectrum

Redshift Spectrum is a new feature of **Amazon Redshift** that allows you to run complex SQL queries against exabytes of data in **Amazon** without having to load and transform any data. Feb 23, 2018



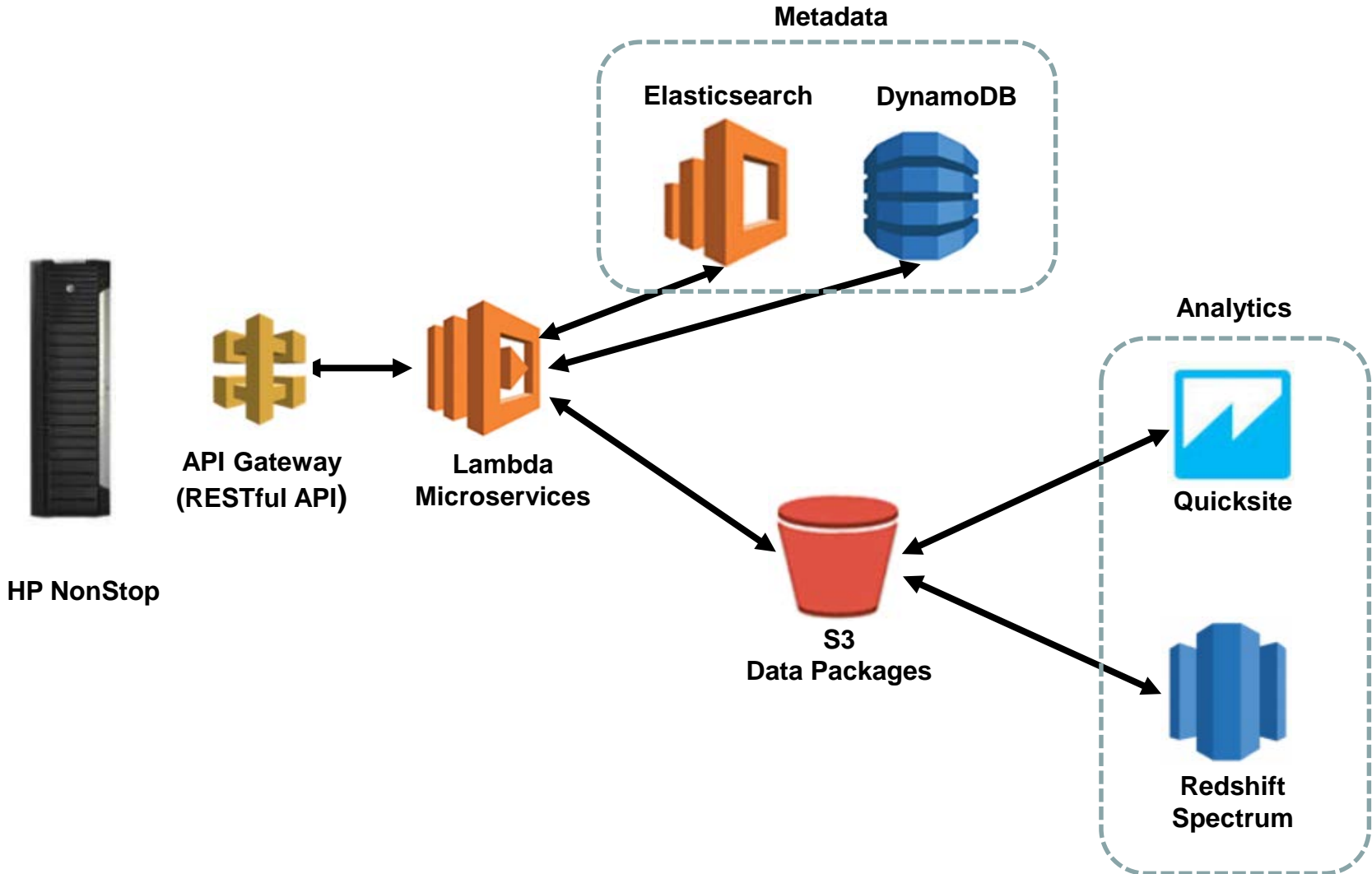
Amazon Elasticsearch is a search engine that is commonly used for log analytics, full-text search, and operational intelligence use cases. RESTful APIs are provided for uploading and searching data making it easy to use.



amazon QuickSight

Amazon QuickSight is a fast, cloud-powered business analytics service that makes it easy to build visualizations, perform ad-hoc analysis, and quickly get business insights from your data.

AWS Data Lake Solution





Amazon Kinesis makes it easy to collect, process, and analyze real-time, streaming data so you can get timely insights and react quickly to new information.



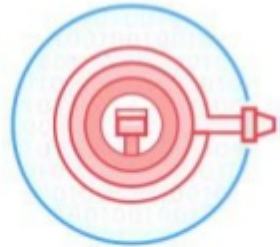
amazon web services

Amazon Kinesis



Kinesis Streams

Stores data as a continuous replayable stream for custom applications



Kinesis Firehose

Load streaming data into Amazon S3, Amazon Redshift, and Amazon Elasticsearch Service

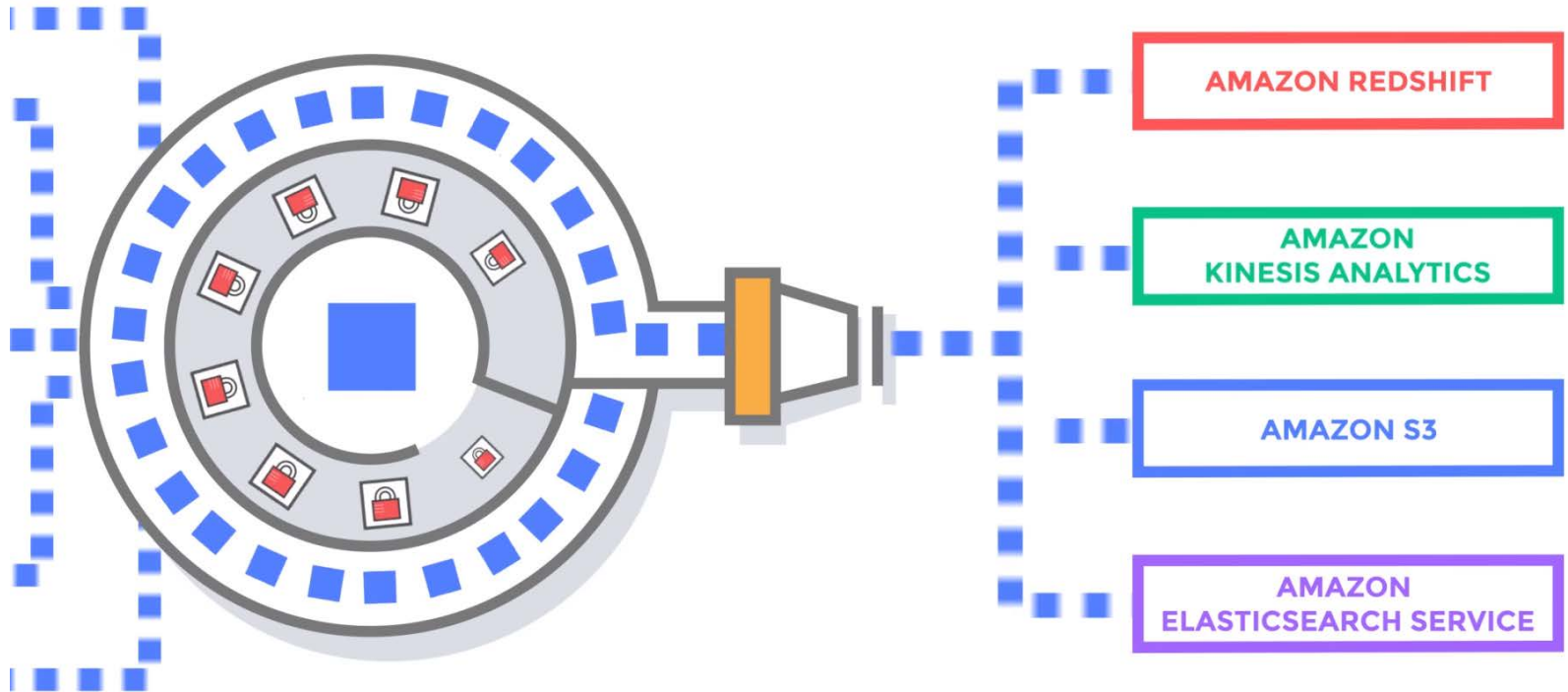


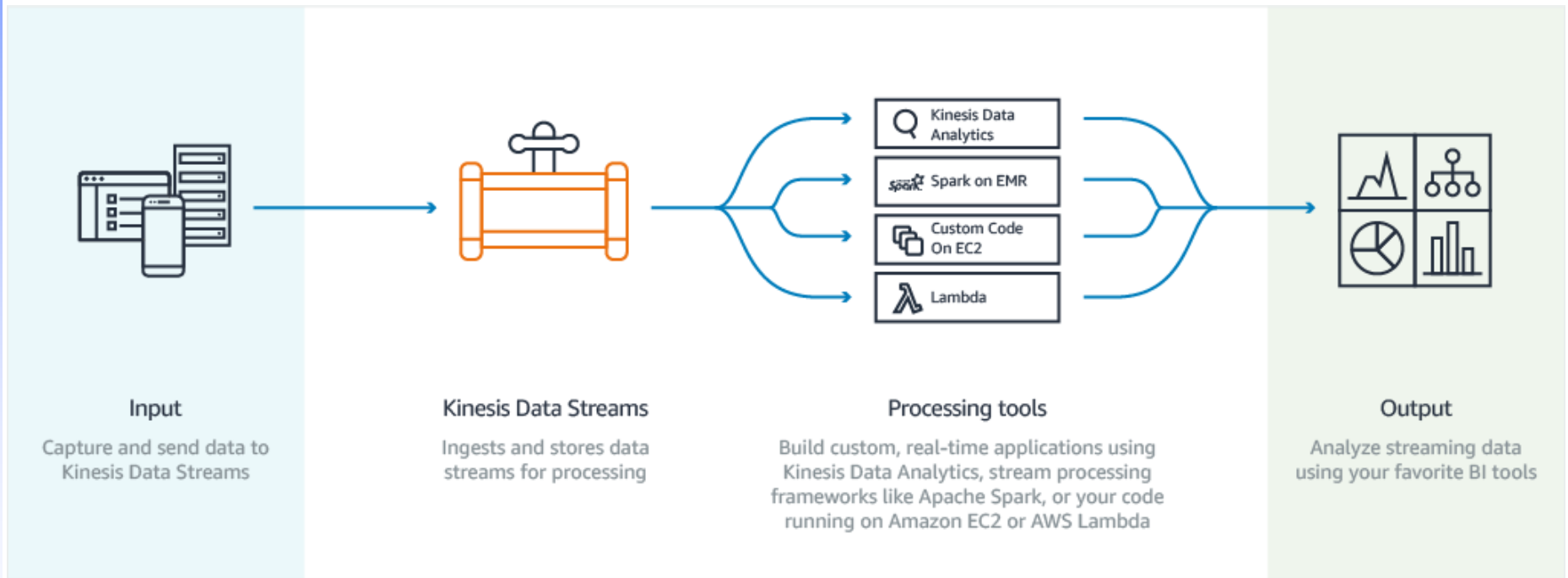
Kinesis Analytics

Analyze data streams using standard SQL queries

Amazon Kinesis makes it easy to collect, process, and analyze real-time, streaming data so you can get timely insights and react quickly to new information.

AWS Firehose

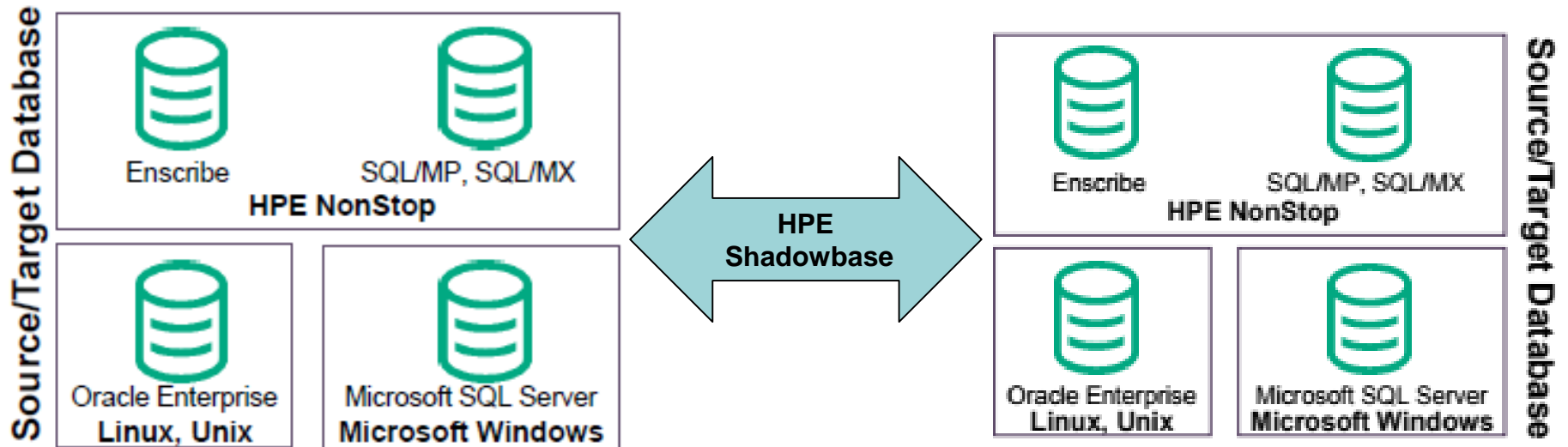




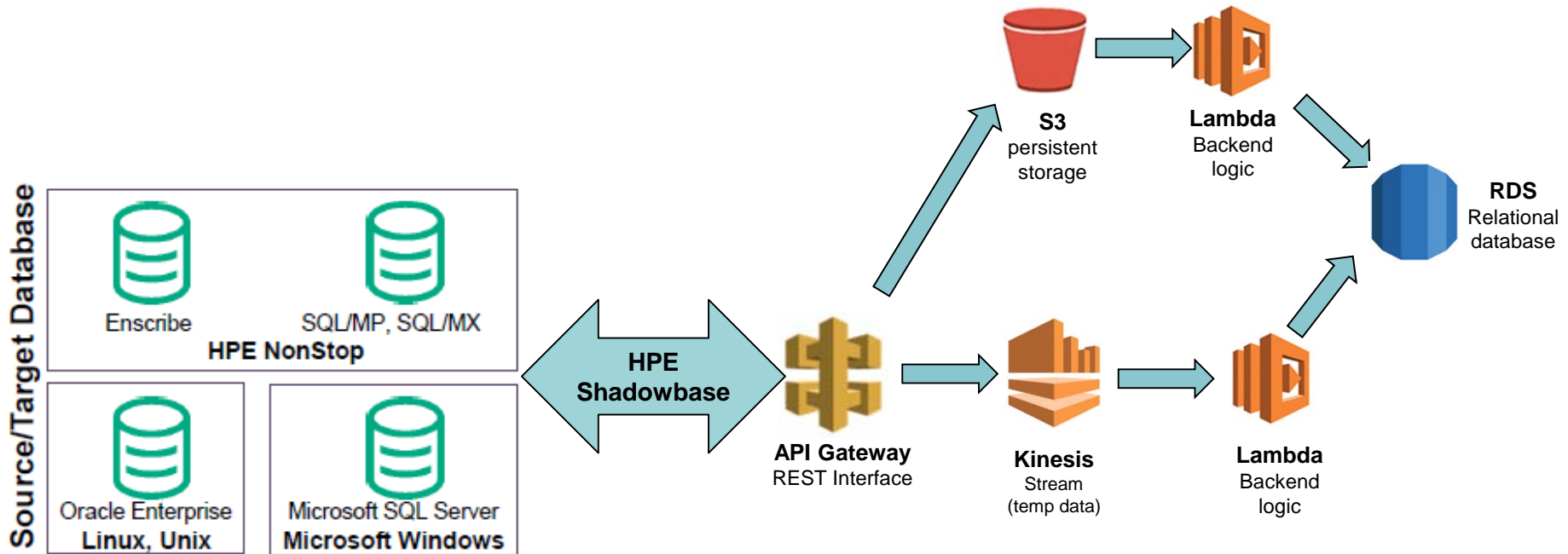
AWS and NonStop



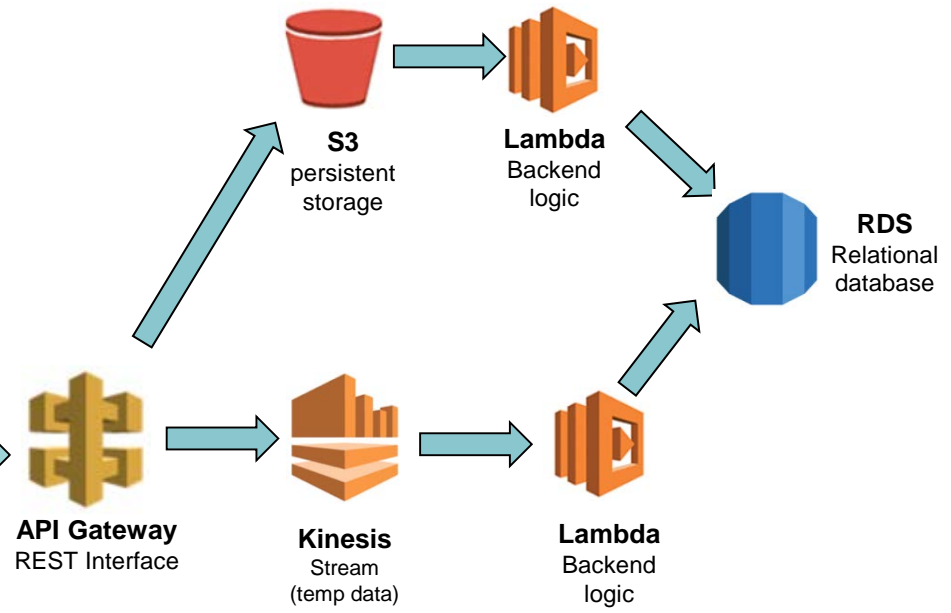
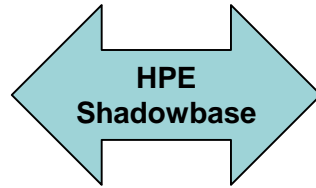
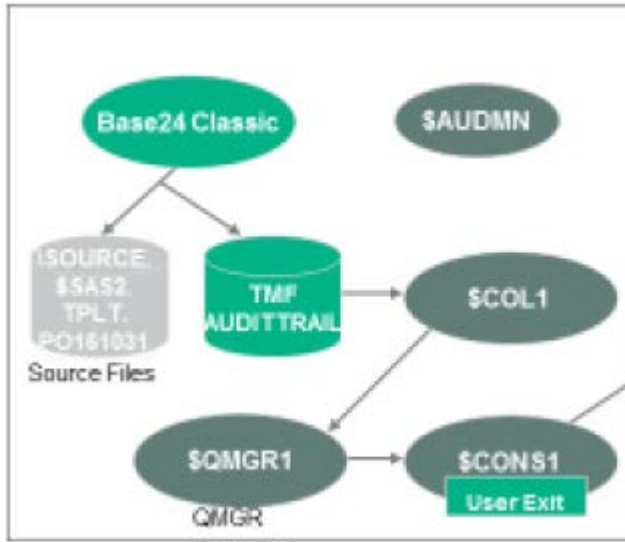
Shadowbase Replication



Shadowbase Gateway



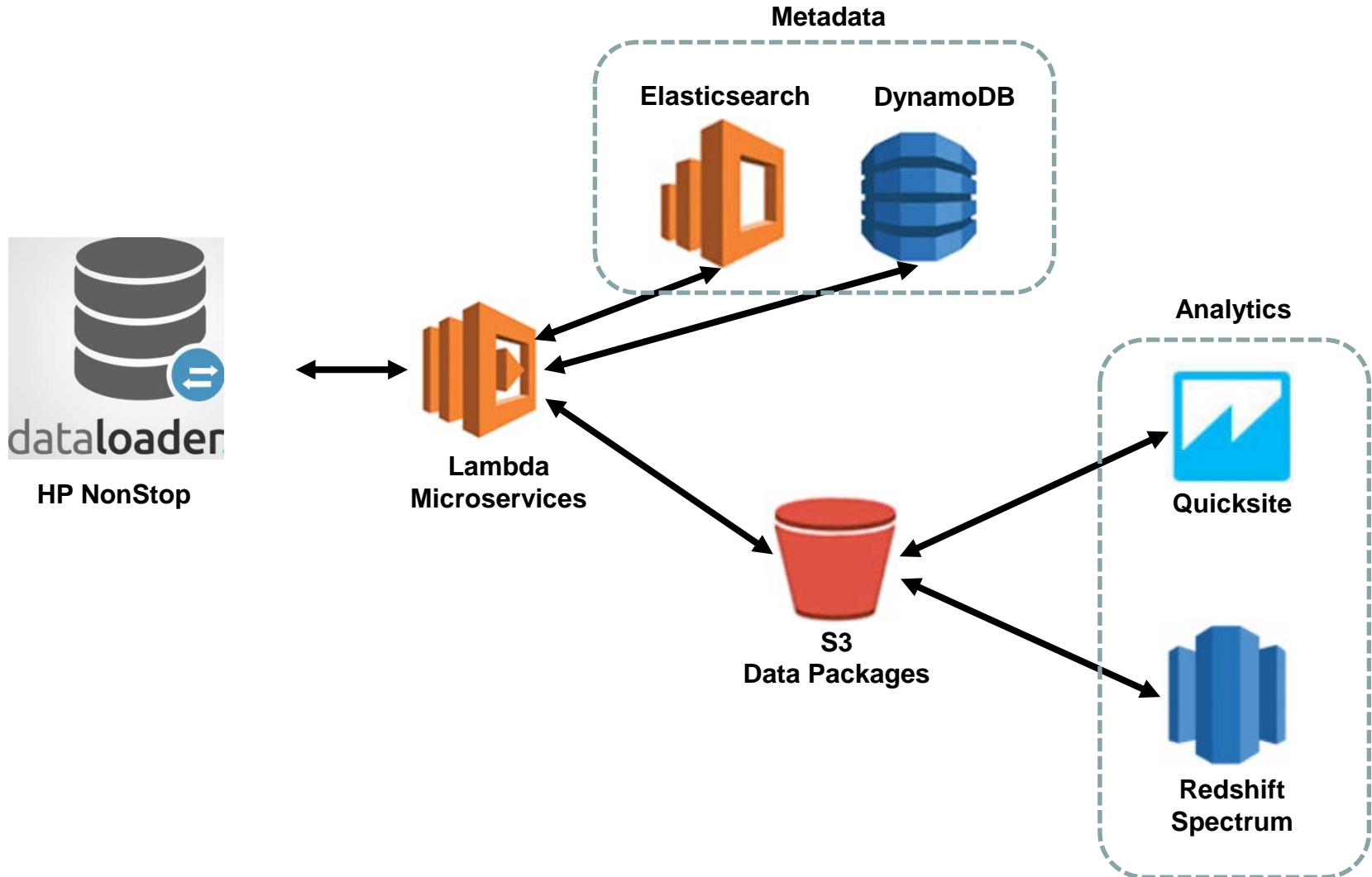
Shadowbase Gateway





Canam AWS data loader provides a BATCH gateway interface from Windows or NonStop platforms to extract data from flat file or SQL data objects into an Amazon S3 objects.

AWS Data Lake Solution



JSON and NoSQL



- **NoSQL Databases**

- **Not Only SQL**

- MongoDB, CouchDB, Cassandra, DynamoDB (AWS), ...

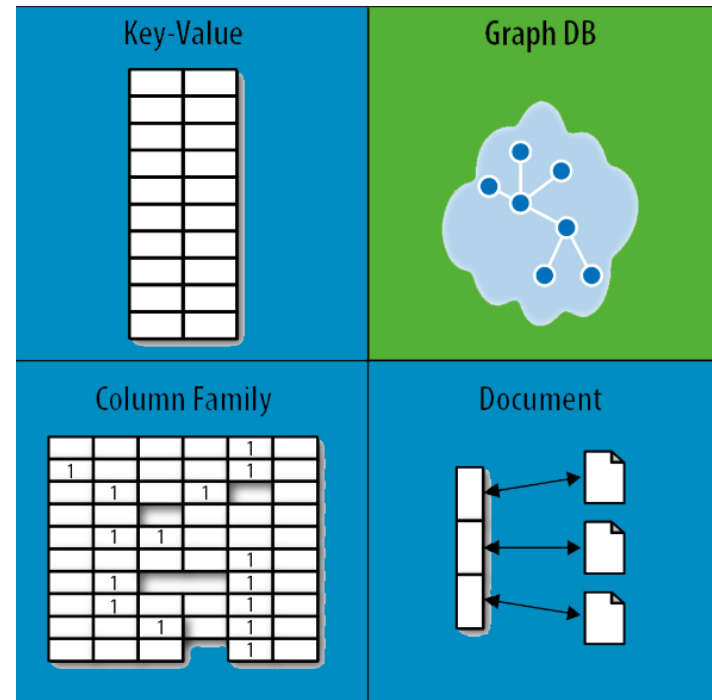
- **Four Types:**

- Key / Value Pairs

- Wide Column

- Graph

- Document

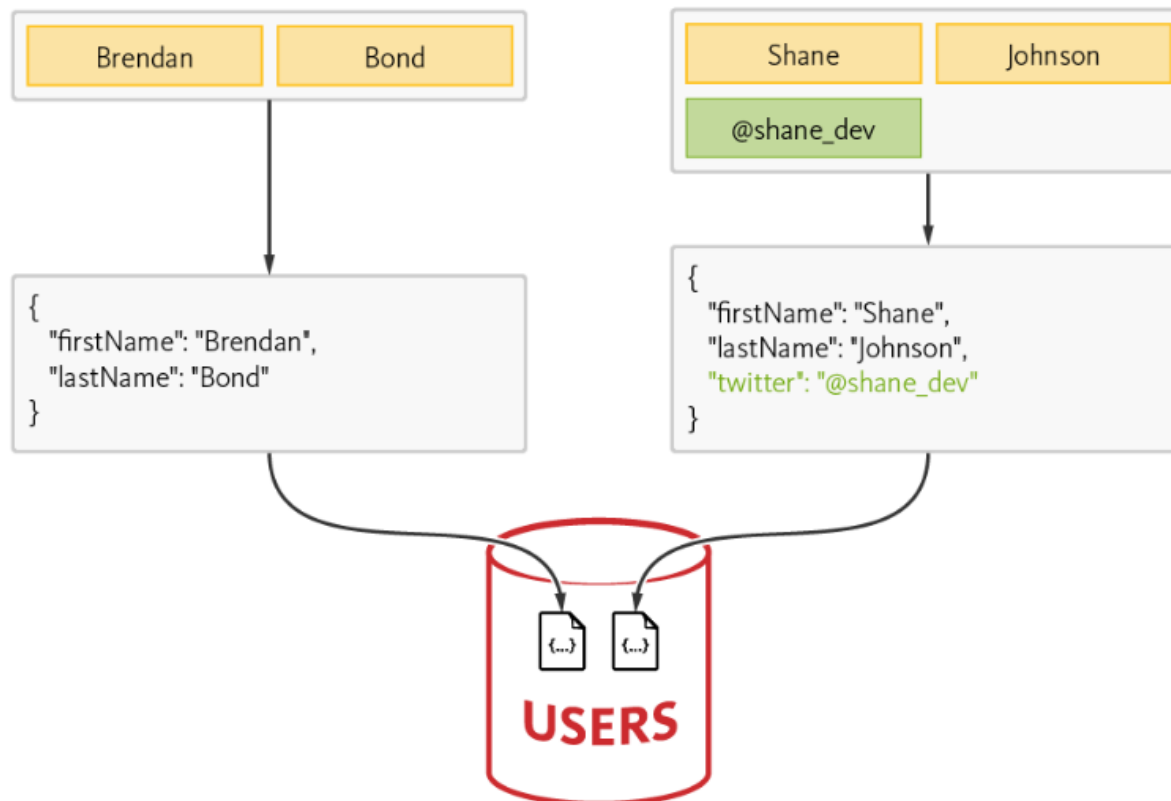


Why NoSQL

- **Big Data Analytics**
 - Terabytes, petabytes of data
- **Focus on Performance and Availability**
 - Partitioned databases over multiple servers / Sharding
 - Eventual consistency
- **Scalable**
 - Scale “out” not “up”
 - Add servers vs processors, memory and storage to same server.
- **Flexible**
 - Schema-less

- **Document NoSQL**

- Stores documents
- CSV, XML, YAML, ...
- **JSON – lightweight, easy to work with**



NonStop to NoSQL

NonStop Structures

Files

Id	Name	Inv Nbr	Amt
1	John Smith	A11	100.00
2	Susan Wilson	B22	50.00
3	Jack Johnson	C33	700.00

Databases

Id	Name
1	John Smith
2	Susan Wilson
3	Jack Johnson

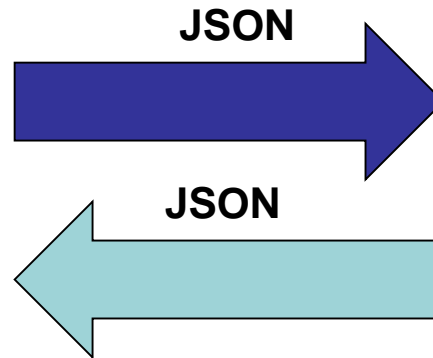
Inv Nbr	Amt
A11	100.00
B22	50.00
C33	700.00

NoSQL Document Database

```
{
  "CustId":1,
  "CustName":"John Smith",
  "Invoice":
  {
    "InvNbr":"A11",
    "Amt":"100.00"
  }
}
```

```
{
  "CustId": 2,
  "CustName": "Susan Wilson",
  "Invoice": {
    "InvNbr": "B22",
    "Amt": "50.00"
  }
}
```

```
{
  "CustId":3,
  "CustName":"Jack Johnson",
  "Invoice":
  {
    "InvNbr":"C33",
    "Amt":"700.00"
  }
}
```



- Application modernization tool for **JSON/XML**
 - Quickly modernize programs so they can
 - Create XML, JSON instances (Writer)
 - Read / Parse XML, JSON instances (Reader)
- Windows based development tool
 - Visual designer
 - Provides 100% code generation of designed solution
 - Generates all COBOL or C program code and to implement
 - XML/JSON writer
 - XML/JSON reader
- Works with DataLoader to integrate NonStop applications with cloud services

NonStop to NoSQL

NonStop

Files

Id	Name	Inv Nbr	Amt
1	John Smith	A11	100.00
2	Susan Wilson	B22	50.00
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Databases

Id	Name
1	John Smith
2	Susan Wilson
3	Jack Johnson

Inv Nbr	Amt
A11	100.00
B22	50.00
C33	700.00

COBOL / C / TAL

```
IDENTIFICATION DIVISION.
PROGRAM-ID. BANKW.
ENVIRONMENT DIVISION.
CONFIGURATION SECTION.
DATA DIVISION.
WORKING-STORAGE SECTION.
```

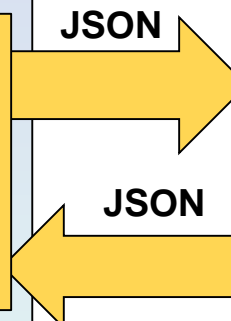


NoSQL Document Database

```
{
  "CustId":1,
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  }
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```

```
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  "CustId": 2,
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  }
}
```



- Leverage Cloud Computing benefits
- Expand NonStop applications to interoperate with Cloud Computing
- Canam and TIC Software Solutions
 - AWS Data Loader
 - Shadowbase Gateway
 - JSON Thunder
- Contact us to learn more!
 - www.canamsoftware.com
 - www.ticsoftware.com

SUMMARY



Thank you!

Q & A