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Secure By Design: Codified Controls For Cloud Services

This talk will introduce the idea and method used by JPMorgan Chase & Co. to get cloud services approved for use in an accelerated timeline. This idea and method are now a project at FINOS and will use the collective efforts of members to build codified controls for cloud services so that we all can leverage secure by design cloud services.

FINOS Project

Financial Delivery Accelerator (FDX)– Cloud Service Certification

Project Leader: Jason Nelson

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Where to find it:

Github:
https://github.com/finos/cloud-service-certification

https://github.com/ScottLogic/finos-cloud-services-certification

Google Group:
https://groups.google.com/a/finos.org/forum/#!forum/fdx-cloud-service-certification

Wiki:
https://finosfoundation.atlassian.net/wiki/spaces/FDX/pages/904626436/Cloud+Service+Certification+Working+Group

Using Cloud Services at a Bank

- On-premise security controls must be adjusted for cloud security models
- How to map control frameworks to cloud service implementation?
- How to change a culture of NO into a culture of Yes.

What is the benefit?

- All financial institutions are re-inventing the wheel: Institutions have similar control frameworks, we are all trying to secure and stand up the same providers and services.
- This takes significant time and resources, delaying innovation: 6 - 18 months elapsed time, every institution is fact finding with cloud providers
- Results vary…: No guidance on how to implement controls, in-depth cloud service knowledge required to deliver this, we are not the cloud provider security experts

We built a process to
solve a problem.

- How do you know your process is broken?
- Why do accelerators solve for the problem?
- What does it look like?

What artefacts make an accelerator?

- Define standard control questions for cloud service: Prior art here - Cloud Security Alliance Cloud Controls Matrix (CCM), EU-CERT initiative
- Reference security document: Document to provide detailed guidance on implementation, answering standard process questions for compliance and security review
- Implementation of service to meet controls: Write infrastructure as code to stand up service and meet control objectives (Terraformor platform agnostic code)
- Test cases to prove efficacy: BDD test cases to prove efficacy of controls

Define standard control questions for cloud service

Example : https://github.com/finos/cloud-servicecertification/ blob/master/templates/S3%20control%20spreadsheet.xlsx

SECURITY DOMAIN	CONTROL STANDARD	BDD TEST SCENARIO
Encryption Encryption of data at-rest	Must ensure that end-to-end encryption is implemented such that data is encrypted at-rest and in-transit at all times.	Scenario: User attempts to save data without specifying encryption, should be rejected (or enforce encryption - to confirm) Scenario: User attempts to save data specifying SSE-S3 encryption, should be rejected Scenario: User attempts to save data specifying SSE-C encryption, should be rejected Scenario: User saves data to S3 bucket, validate that the cloud trail logs are updated appropriately Scenario: User creates cfn for an S3 bucket and does not reference SSE-KMS encryption, SDLC should reject the cfn Scenario: Validate encrypted objects being stored (store a known object to S3, pull HEAD object and check the KMS key ID or compare MD5 of plaintext vs ETag of the encrypted object (above and beyond - nice to have)

Reference security document

Example: https://github.com/finos/cloud-servicecertification/ blob/master/aws/dynamodb/ ServiceApprovalAccelerator-DynamoDB.docx

SECURITY DOMAIN	CONTROL & ARCHITECTURAL SUGGESTIONS	REFERENCES
Encryption Encryption of data at-rest	To support SSL connections, Amazon Redshift creates and installs an AWS Certificate Manager (ACM) issued SSL certificate on each cluster. The set of Certificate Authorities that you must trust in order to properly support SSL connections can be found at https://s3.amazonaws.com/redshift-downloads/redshift-ca-bundle.crt. RedShift endpoints are available over HTTPS at a selection of regions. Best practice: Set the “require_SSL” parameter to “true” in the parameter group that is associated with the cluster. For workloads that require FIPS-140-2 SSL compliance an additional step is required to set parameter “use_fips_ssl” to “true”	1. How to encrypt end to end: https://aws.amazon.com/blogs/big-data/encrypt-your-amazon-redshift-loads-with-amazon-s3-and-aws-kms/ 2. To make client side encryption work follow this pattern https://docs.aws.amazon.com/AmazonS3/latest/dev/UsingClientSideEncryption.html 3. https://docs.aws.amazon.com/acm/latest/userguide/import-certificate.html

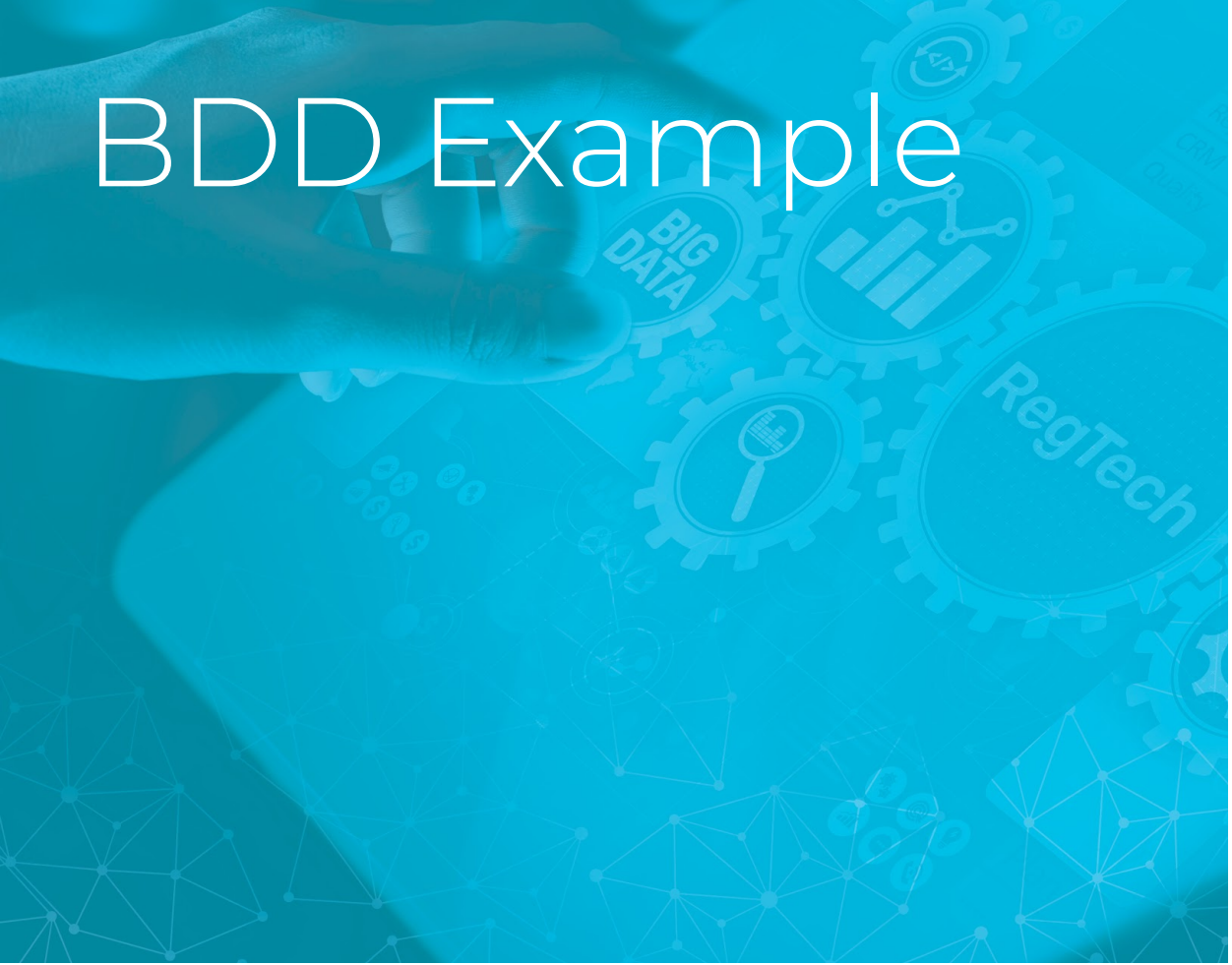
Implementation of service to meet controls


```
{
 "AWSTemplateFormatVersion": "2010-09-09",
 "Description": "Amazon DynamoDB Template",
 "Metadata": {
  "AWS::CloudFormation::Interface": {
   "ParameterGroups": [
    {
     "Label": {
      "default": "DynamoDB Table Settings"
     },
     "Parameters": [
      "pTableName",
      "pSSESpecification",
      "pHashKeyElementName",
      "pHashKeyElementType",
      "pReadCapacityUnits",
      "pWriteCapacityUnits"
     ]
    }
   ],
   "ParameterLabels": {
    "pHashKeyElementName": {
     "default": "Partition Key Name"
    },
    "pHashKeyElementType": {
     "default": "Partition Key Type"
    },
    "pReadCapacityUnits": {
     "default": "Read Capacity"
    },
    "pWriteCapacityUnits": {
     "default": "Write Capacity"
```

What is BDD?

- Changes how your project management approach defines work
- Defines outcome in simple full sentences the needed outcome of the work
- Can be tested, like code
- Example Please? https://github.com/finos/cloud-servicecertification/blob/master/aws/sqs/SQS%20BDD%20examples.txt

BDD Example



Feature: Create the SQS Cfn stacks in the correct region

Test that we can create the right SQS stack correctly in US and non-US region

Scenario Outline: Create the SQS Cfn stack in US and non-US regions

Given that I have valid AWS credentials with privileges to use CloudFormation

When I try to deploy the <regional> SQS stack in <region>

Then the stack creation should <result>

Examples:
regional	region	result
US	us-east-1	SUCCEED
Non-US	eu-west-1	SUCCEED
US	eu-west-1	FAIL
Non-US	us-east-1	FAIL

We built a tool to solve a problem.

- Why build when you can buy?
- How do you know you have a secure by design approach?
- How do you integrate BDD into your SDLC?
- Project participants are building tools to automate the implementation.

End results

- We were able to observe shorter time from use case to service approval.
- Having a structured approach enables cloud services adoption at a more rapid pace.
- Using code for controls allowed for reuse instead of reinvention.

Participant Perspective

- Deutsche Bank has been involved since early 2019
- Let’s hear how this project benefits DB and their approach to cloud.

Project Status

- We have active participation from several global banks, vendors, and cloud providers.
- About to release first complete set of CSC artifacts.
- Looking for more participants to actively engage.

Q&A

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Value for the Community

Current State before this project

- Majority of cloud security incidents due to misconfiguration: Services are not secure by default, configuration is often complex, nuanced and difficult to validate.
- All financial institutions are re-inventing the wheel: Institutions have similar control frameworks, we are all trying to secure and stand up the same providers and services.
- This takes significant time and resources, delaying innovation: 6 - 18 months elapsed time, every institution is fact finding with cloud providers
- Results vary: No guidance on how to implement controls, in-depth cloud service knowledge required to deliver this, we are not the cloud provider security experts

Proposed State with this project

- Set quality standards across artefacts: Members of all tiers can contribute to the project and ensure a common high level of quality is delivered and in less time.
- Encourage cloud vendors to produce more industry specific content: Member Participation and public release of the Accelerators will encourage cloud vendors to project more focused and quality content for Financial Services Industry.

Activity Evolution in the Foundat

Near-term focus of the Program

- Define standard set of controls to satisfy common framework requirements
- Review existing body of work - control definitions and implementations with working group members, amending to meet above controls
- Release service accelerators to community, incorporating updates
- Engage other Cloud Service Providers for contribution - Google, Azure

Outcomes and Impact

Members

- Collaboration: Request collaboration to review the existing body of work, defining standard controls and contribute with feedback regarding the best practice implementation provided
- Communication to other Financial institutions and regulators: Raise awareness with other institutions to contribute and influence cloud service providers to extend to other services.
- Participation: Present controls, sample implementations and test cases to regulators as standard approach to securely configure services?

Community at-large

- Awareness: Raise awareness of work to reduce duplication, applying pressure to Cloud Service Providers in order to provide standardised details for future service offerings
- Collaboration: Extended contributions would be appreciated, incorporating amendments to sample implementation of controls

Q&A

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Presentation Completion

Thank you for your attendance.

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