

DERIVATIVES SERVICE BUREAU

TECHNOLOGY WEBINAR

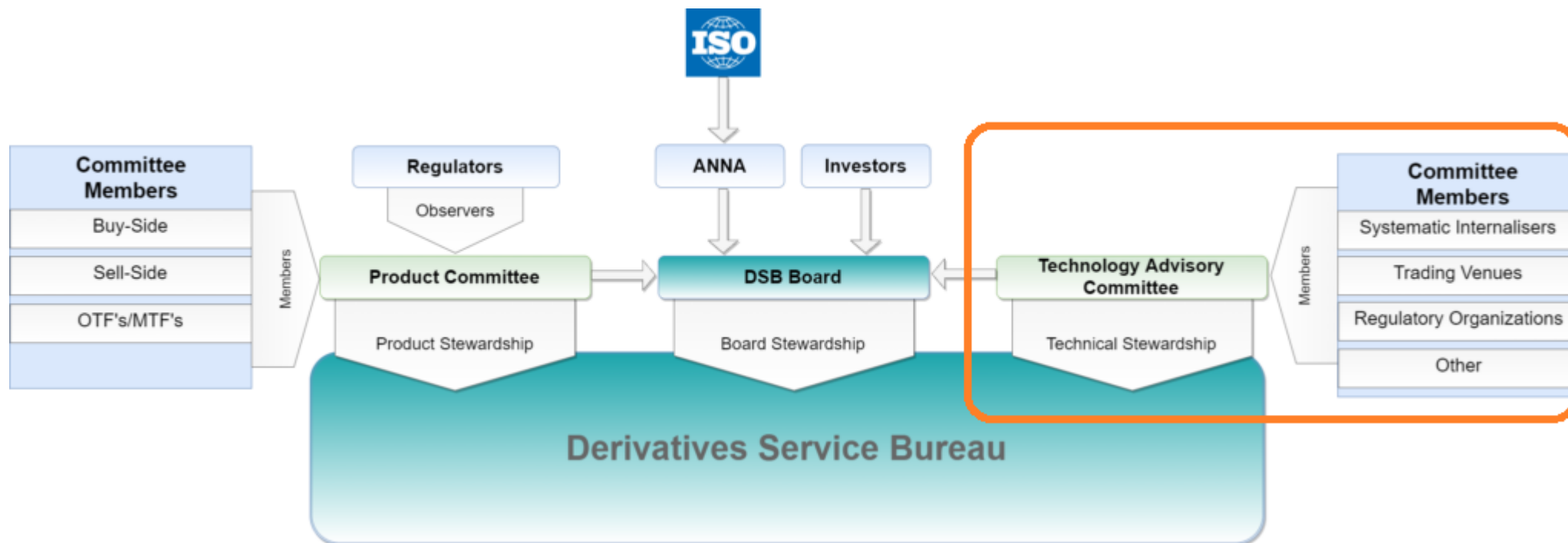
22nd March 2018

Agenda

- Introduction
- API considerations
- Resiliency considerations
- Performance considerations
- Software stack considerations
- Next Steps & AOB

Introduction

- Purpose of Webinar
- Purpose of Technology Advisory Committee (TAC)
- Current Status of TAC: <https://www.anna-dsb.com/technology-advisory-committee/>



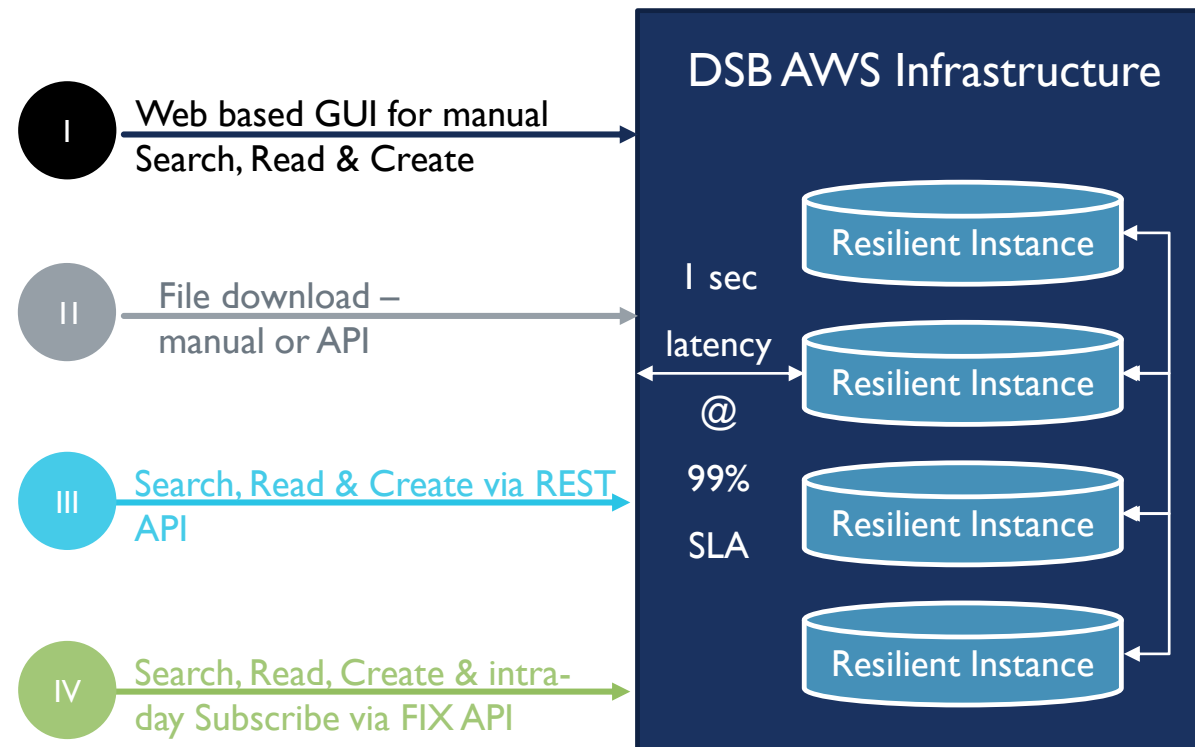
API Considerations – Interaction Modes

Existing Modes of Interaction

- Manual – GUI, File
- Automated - FIX, REST, File

Existing Payload Syntax

- JSON



API Considerations – Workflows

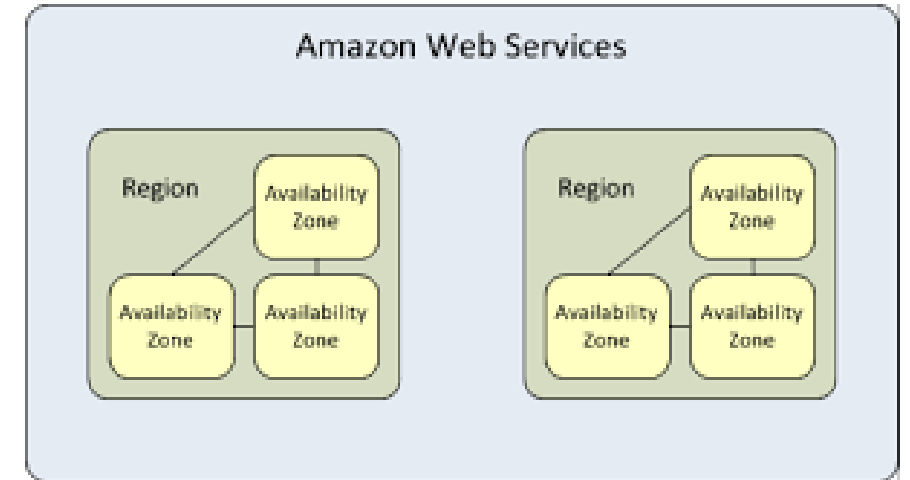
Workflows	REST API	FIX API	GUI
Retrieve or Create ISIN Record by Attribute	✓	✓	✓
Retrieve ISIN Record by Attributes	✓	✓	✓
Retrieve ISIN Record by ISIN	✓	✓	✓
Search for ISIN Records by Attributes	✓	✓	✓
Subscribe to ISIN Records	x	✓	x
Download Historical ISIN Records	✓	x	✓

API Considerations - Questions

- Should the TAC consider payload syntaxes other than JSON? (eg Excel for file download)
- Should the TAC consider additional modes of interaction apart from FIX/REST/GUI/File?
- Should the TAC consider workflows for existing APIs? E.g.:
 - Create 'list of ISINs' in a single API call?
- Are there any other API-related questions that the TAC should consider?

Resiliency Considerations - Architecture

- All infrastructure is in the AWS cloud
- All software is horizontally scalable, with no single point of failure
- Primary Region is Ireland
 - All software runs in each of 3 separate Availability Zones
 - NFS is shared across all 3 Availability Zones
 - DSB architecture ensures continuous real-time system availability in the event of the outage of any single Availability Zone (albeit running at 67% capacity)
- Secondary Region is in Virginia, USA
 - Infrastructure mirrors Ireland, but is not active
 - Switch to Secondary region requires manual intervention (4 hours)



Resiliency Considerations - Statistics

Availability			
Month and Year	# of Critical Incidents	Outage in minutes	Cumulative Availability
October 2017	0	0	100%
November 2017	0	0	100%
December 2017	0	0	100%
January 2018	1	12	99.99%
February 2018	1	99	99.94%

Availability Target is 99.9%

Current outages of 111 minutes were all caused by software performance issues rather than infrastructure failure. <https://www.anna-dsb.com/2018/03/16/dsb-technology-stability-and-performance-a-review/>.

There have been no infrastructure failures in the Ireland Region that has affected the DSB

Resiliency Considerations - Questions

Is the below set of questions appropriate for TAC consideration?

- Is an annual DR test, involving the failure of an entire AZ, the appropriate frequency?
- Is the current Intra-regional resiliency based on 3 x active AZs in Ireland sufficient?
- Is Cross-region resiliency required?
 - If yes, is a Warm DR site in US sufficient? Or should the EU/US region be Active/Active?
 - What frequency of cross-region DR testing is appropriate?
- Should the DSB consider a 3rd region deployment in Asia as well?
- Is the current availability SLA of 99.9% appropriate?
- Should dual-cloud provisioning be considered for additional resiliency? (eg Azure in addition to AWS)

What other resiliency questions should the TAC consider?

Resiliency Considerations – Load Testing

Approach


- If you wish to participate in the industry load testing, pls email technical.support@anna-dsb.com and:
 - confirm your interest to participate in the industry load testing
 - confirm that you will be ready to participate by the proposed date or else suggest the earliest date for readiness
 - Assuming readiness is confirmed, select your preferred load testing window by completing the table below.

Select your preferred test window (select one window period only)	<ul style="list-style-type: none"> - April 6th 00:00 - April 6th 08:00 UTC - April 6th 08:00 - April 6th 16:00 UTC - April 6th 16:00 - April 7th 00:00 UTC - April 7th 00:00 - April 7th 08:00 UTC
Select your connectivity types	<ul style="list-style-type: none"> - FIX / REST / GUI

Questions

- Is the approach appropriate?
- Does industry prefer 6 April / 7 April or a different date?

Performance Considerations

 Latency and Throughput Statistics			
Month and Year	50th percentile latency (ms)	90th percentile latency (ms)	99th percentile latency (ms)
October 2017	130	184	224
November 2017	108	141	214
December 2017	62	294	873
January 2018	175	595	1,291
February 2018	300	745	1,522

SLA is 1,000 ms @ 99th %ile

Should TAC consider the below questions?

- Is the target of 1 sec @ 99% appropriate?
- Should SLA include other metrics? (e.g. median latency?)

What other questions should the TAC consider?

Software Stack Considerations

Software Stack

- Apache Solr for search and data cache
- Apache Zookeeper for configuration management
- Apache Kafka for real-time messaging
- CNRI CORDRA for ISIN record lifecycle management
- Eclipse Jetty for REST API connectivity
- MongoDB for persistence
- QuickFIX/J for FIX API connectivity

Infrastructure Stack

- AWS Elastic Load Balancer
- Java 8, utilising CMS GC

Monitoring Stack

- Elastic Stack (ELK) for MIS and data-mining
- Nagios for system monitoring and alerting

Software Stack Considerations - Questions

Should the TAC consider the below questions?

- Should Java 9 VM be used alongside G1 GC in order to address the low-pause requirements of a large memory real-time system?
- Are there areas where proprietary software should be used instead of open-source software?
 - Eg ITRS Geneos for monitoring instead of Nagios?

What other questions should the TAC consider?

Next Steps & AOB

TAC membership: <https://www.anna-dsb.com/technology-advisory-committee/>

First TAC meeting in Q2 2018

