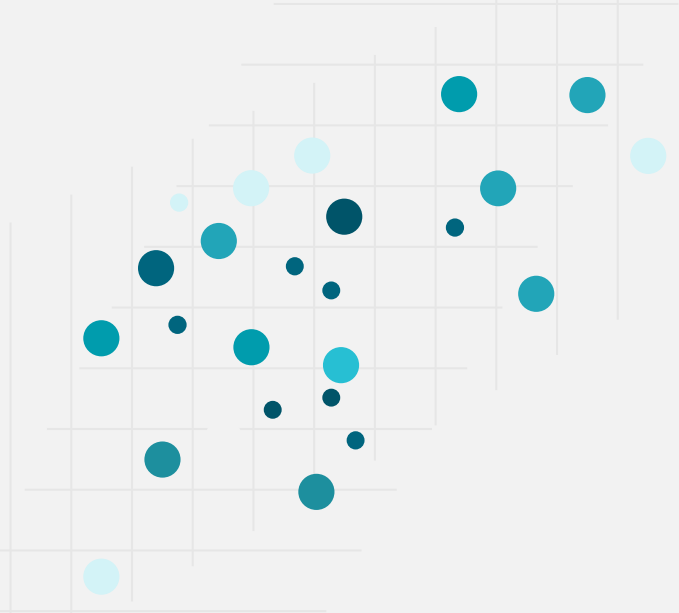
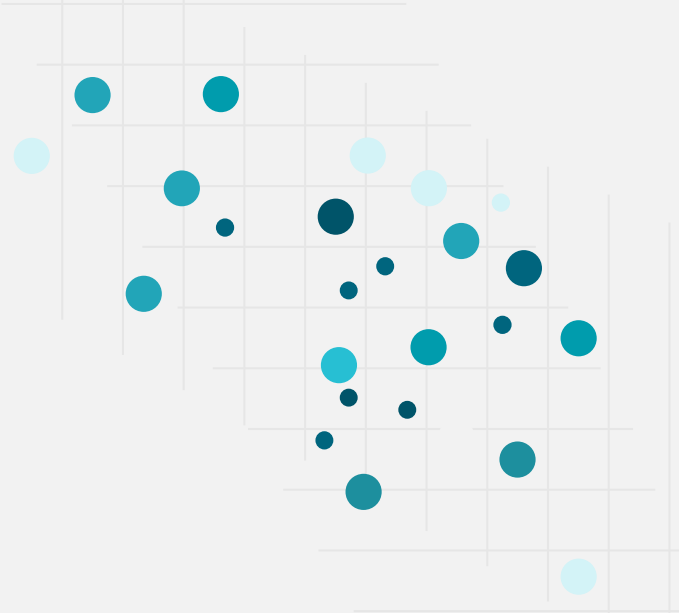


Application for Parallel Testing (APT)



Hartmut Rombach
hartmut.rombach@tps-data.eu

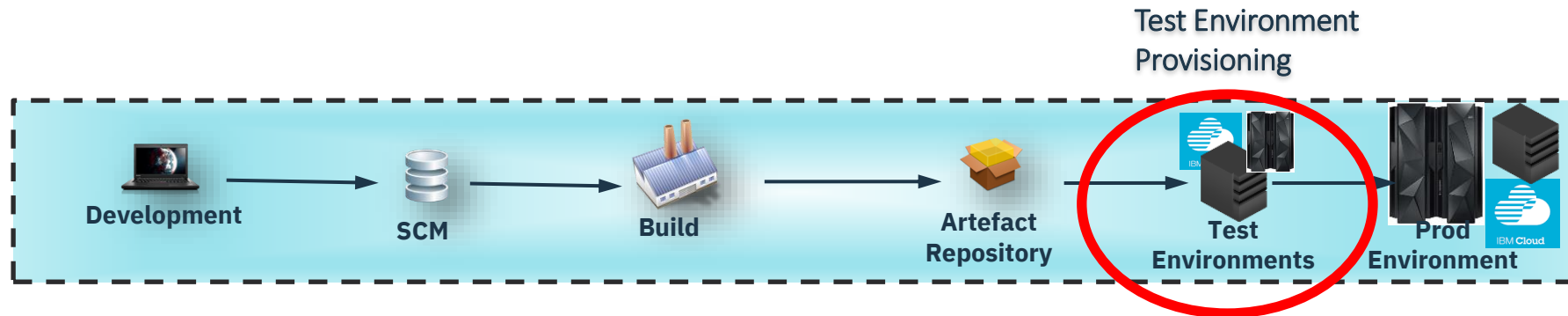
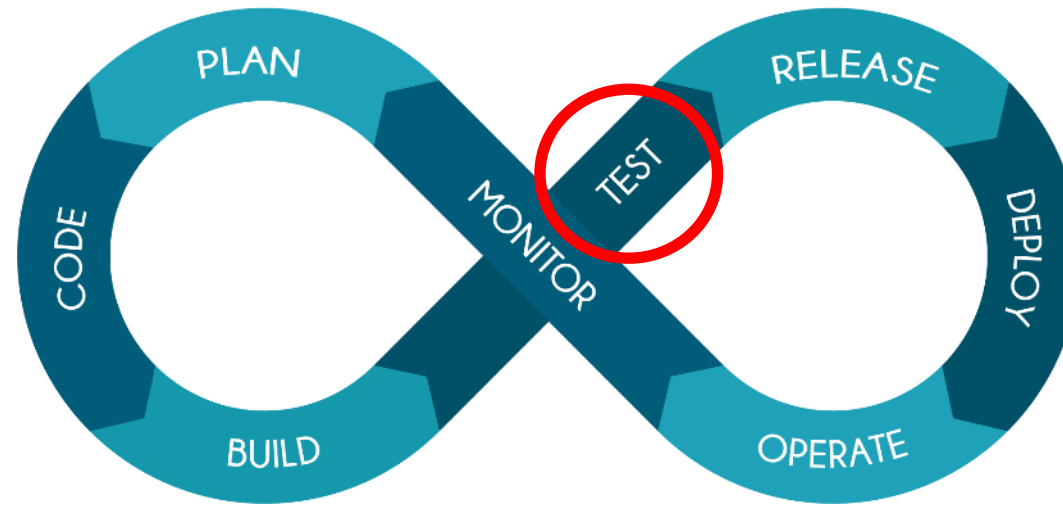
GSE z/OS-Expertenforum, Propstei Wislikofen
10. April 2024



- Introduction
- Positioning APT in DevOps
- Advantages of APT
- Concept of parallel tasks
- Subsystems and resources
- Installation process
- Cloning of libraries and data
- Compare with and without APT (customer story)
- Savings with APT
- Conclusion

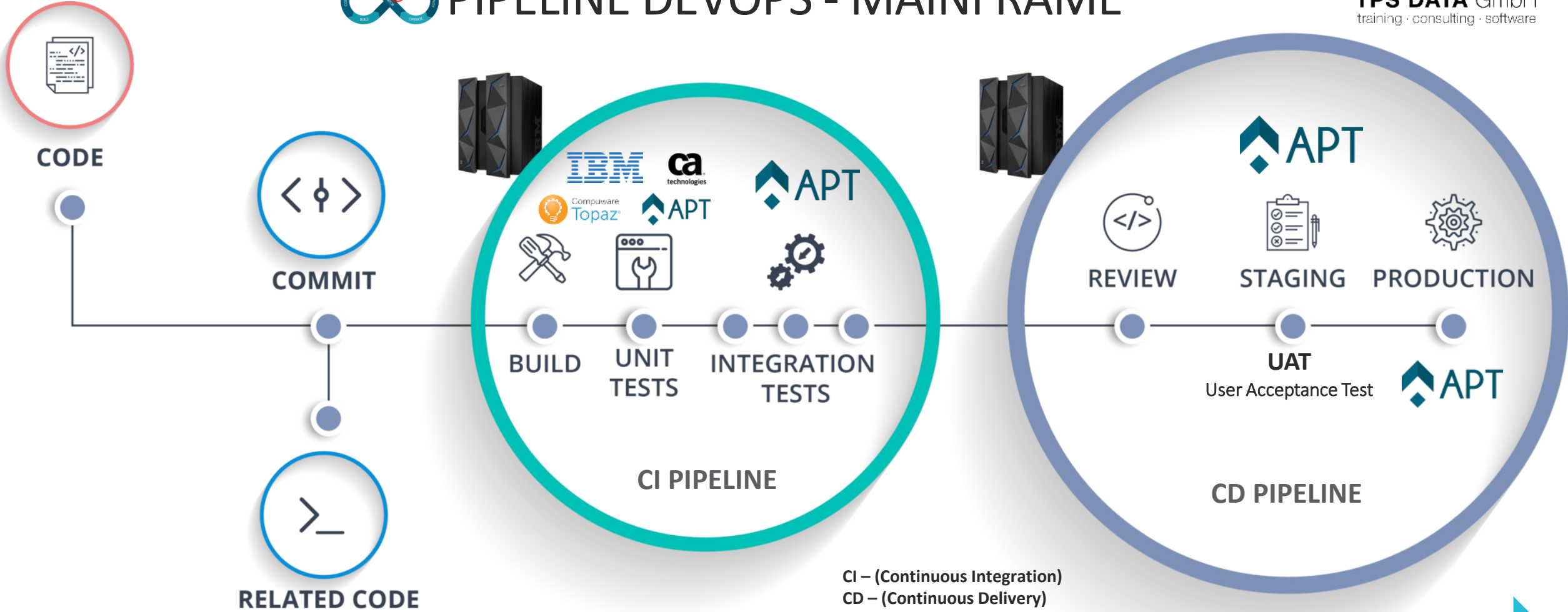


DevOps – Eccox APT Positioning





PIPELINE DEVOPS - MAINFRAME

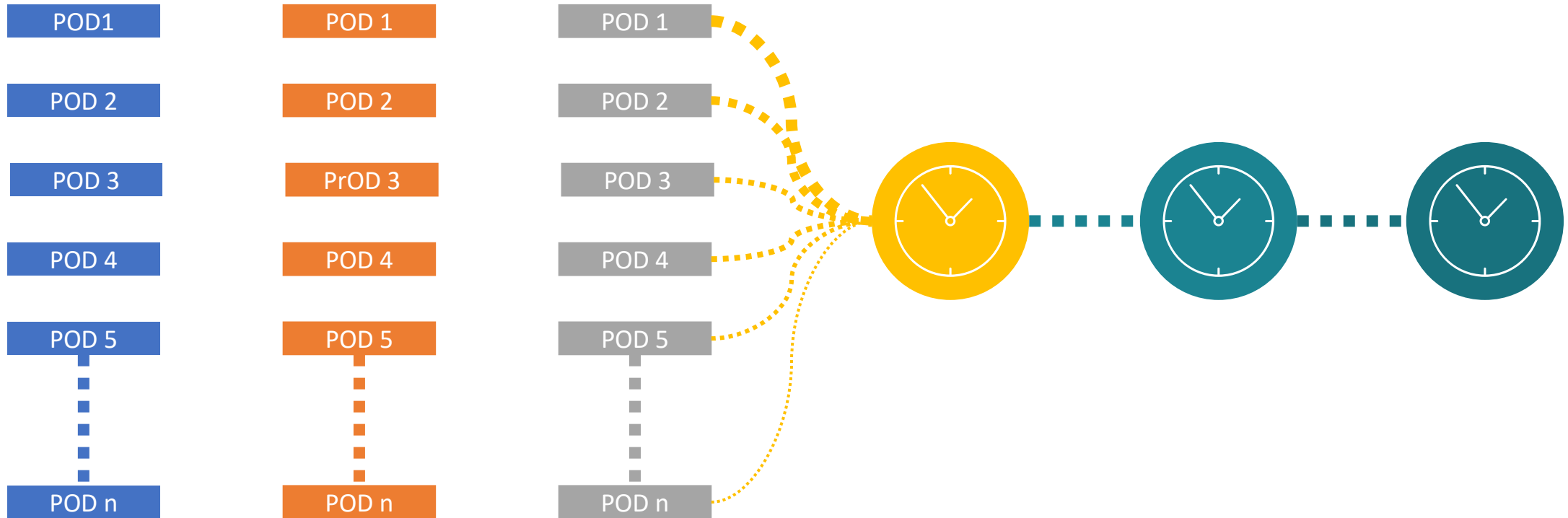


CI – (Continuous Integration)
CD – (Continuous Delivery)



APT CT – CONTINUOUS TESTING APT

Source: <https://dzone.com/articles/learn-how-to-setup-a-cicd-pipeline-from-scratch>



Testing Challenges

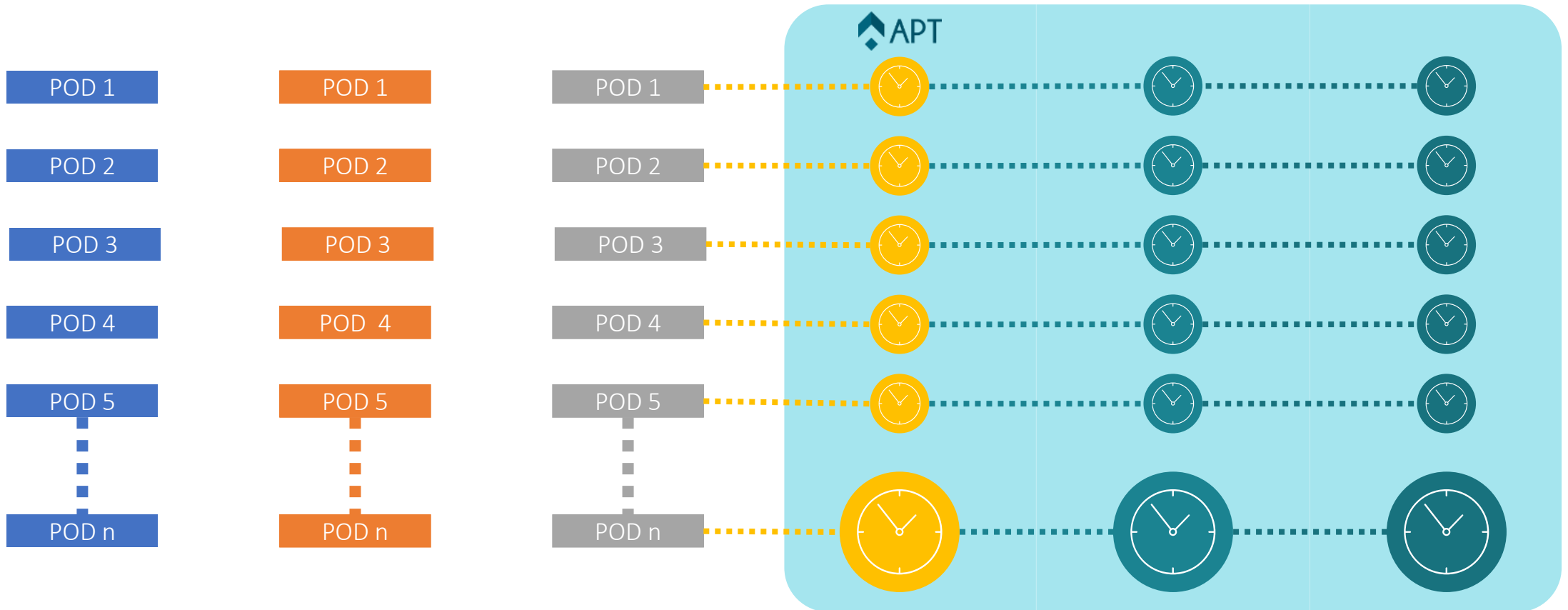
- Deploy new RELEASES more frequently;
- Ability to test while the full RELEASE is not ready;
- Highly Coupled Software requires testing to be performed late in the dev process;
- Different deploys compete with each other, causing instabilities in production;
- Inability to test new components at any time – continuous testing;
- High effort to keep test Environment available anytime;
- Lack of tooling for Agile Testing;
- Lack of continuous testing delays Production;
- Empower DEVs/Squads to run tests without dealing with infrastructure;



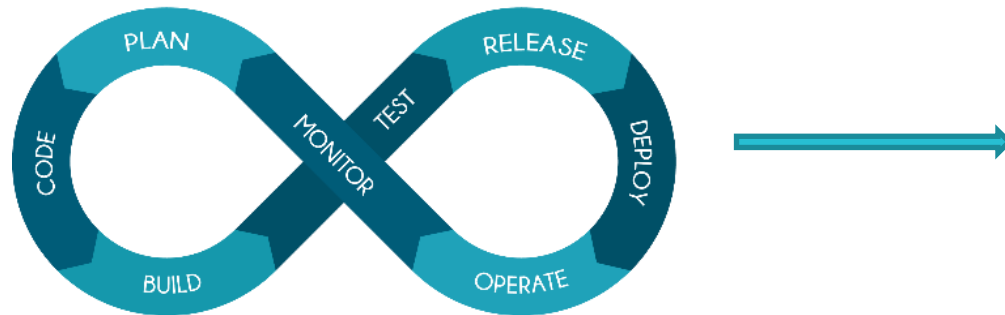


DevOps Cycle with Eccox APT

Unleash AGILE on Mainframe



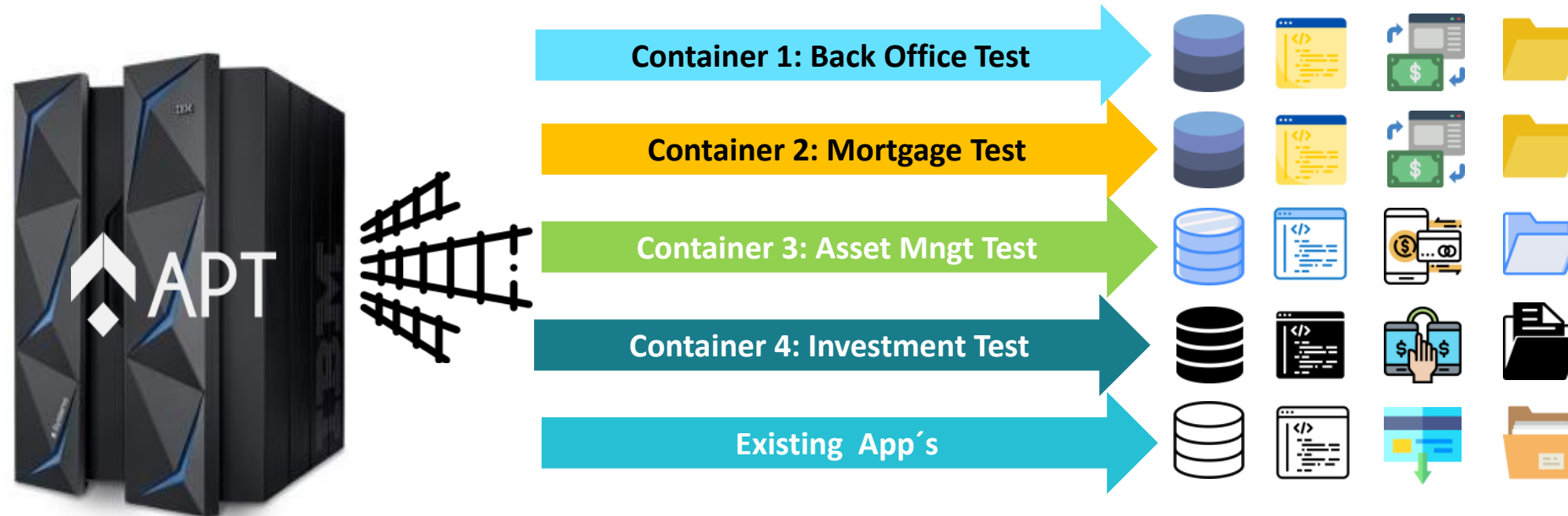
- **APT Container**
 - Repository containing the application artefacts (progs + data) required for the test
- **APT Discovery**
 - Identify and Selects the artefacts and their dependencies needed for the test, to be loaded into the Container



- Agility
- Isolation
- Scalability
- Reuse

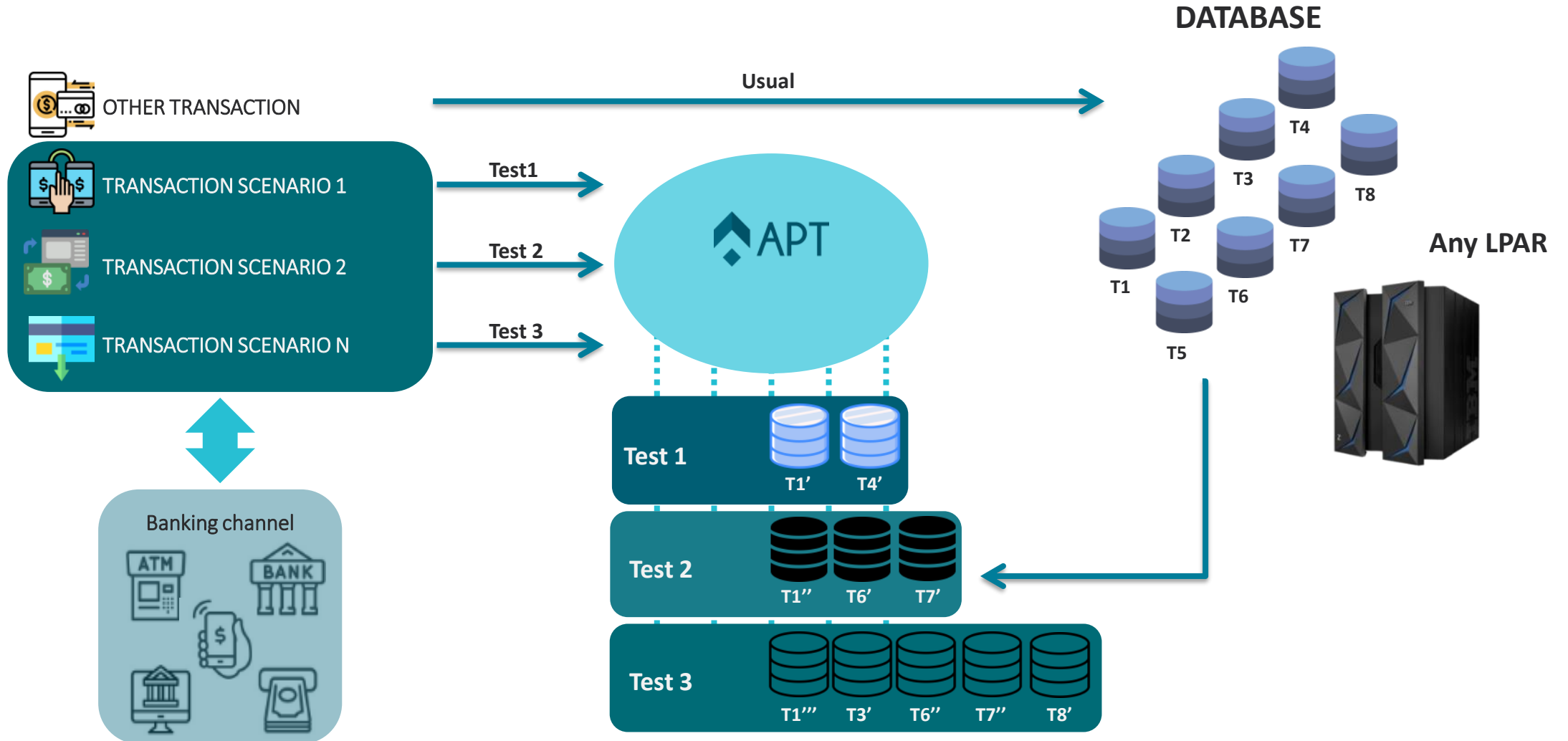
Eccox APT

One Isolated TEST Container for each Test Case sharing the same infrastructure and sub-systems



Eccox APT – Data Mover & Snapshot

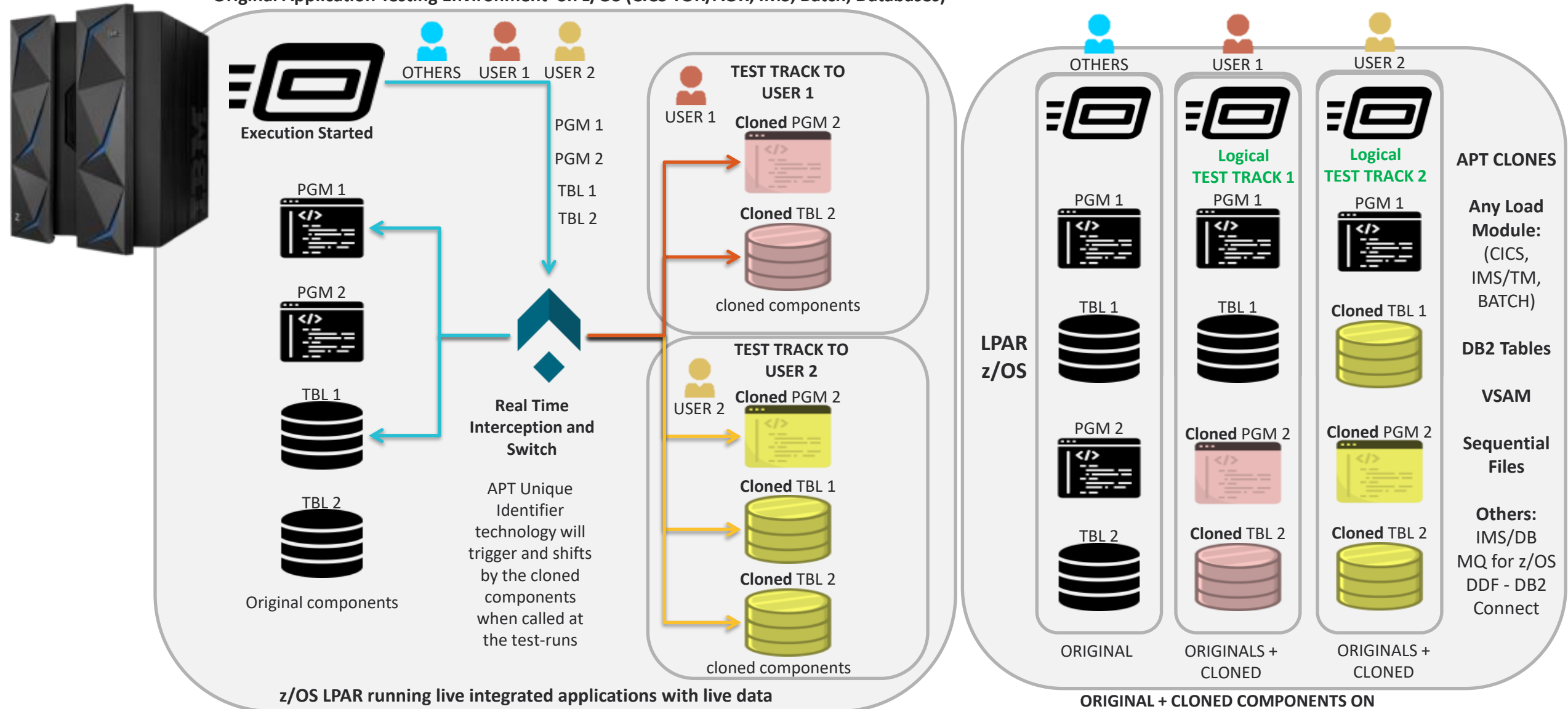
Automated Self-Service



HOW WORKS THE APT CONTAINERIZATION for PARALLEL TEST TRACKS on z/OS?

ON RUNTIME APT WILL SWITCHES EACH OF THE CLONED COMPONENTS ALLOWING FULL PARALLELISM AND ISOLATING ON z/OS

Original Application Testing Environment on z/OS (CICS TOR/AOR, IMS, Batch, Databases)



z/OS LPAR running live integrated applications with live data

ORIGINAL + CLONED COMPONENTS ON ORIGINAL DEV-TEST ENVIRONMENTS

Eccox Technology - Copyright 2024



APT Mainframe – Environment General Parameters

```
ECCOX APT V1R8 ----- Logical Test Environment ----- Menu
Command ==> _____ scroll ==> PAGE
                                     More:      +
```

```
Environment Code.: IVP           Associated STC name.: APTSRV18
Description.....: ECCOX IBM DALLAS ENVIRONMENT TEST
```

```
E Edit    V View
```

- E Environment General Parameters
- Logical Test Environment Application Libraries
- Production Environment Application Libraries
- TCP/IP connections between STC
- Mirroring Connections
- Search Services Configuration
- APT DB2 Isolation Rules
- APT DB2 Load Utility Parameters
- CICS/TS APT Parameters
- IMS TM APT Parameters
- SCM APT Parameters

Environment	Application	ID/Test Plan	ID/Container Name	Status	Container Actions
SW01	EBK	3 - EBK0001	4 - EBK DEMONSTRAT	New container	

Container Preparation

Unique Identifier

Show Requests

Show Components Clones

Show Cloned Object Library Names

CHANGEMAN®

LIBRARY

TRANSACTION

PROGRAMS

TABLES

JOB

DLI / DB

CSV FILE

TYPING

Show entries

Search:

Type

Component

Status

Pending Action

Date

Load data?

Set Component Actions

No data available in table

Showing 0 to 0 of 0 entries

Previous

1

Next

QUERY OF TEST CONTAINERS

Show entries

Search:

Container Name	Environment	Application	Test Plan	Status	Container Actions
<input type="text"/>	<input type="text" value="All..."/>	<input type="text" value="All..."/>	<input type="text" value="All..."/>	<input type="text" value="All..."/>	
52-CREATE TABLES created by: ECCOX - 16/01/2023 11:59:04	SW01	SHP	2 - ECCOX	0 - Active container	
2-PACKAGE created by: ECCOX - 16/01/2023 11:42:15	SW01	IVP	1 - PLAN01	8 - Container in error	
51-DISP GDG created by: ECCOX - 16/01/2023 11:25:17	SW01	SHP	2 - ECCOX	0 - Active container	
50-DISP GDG created by: ECCOX - 16/01/2023 11:11:59	SW01	SHP	2 - ECCOX	0 - Active container	
49-DISP GDG created by: ECCOX - 16/01/2023 11:02:50	SW01	SHP	2 - ECCOX	4 - Inactive container	
3-DEMO EBK created by: EMERSON.CASTELANO - 16/01/2023 07:27:09	SW01	EBK	3 - EBK0001	0 - Active container	

CASE STUDY: Largest Bank in Latin America

Case Study: Largest Brazilian Bank

The Problem: Hundreds of Dev Squads and Dozens of Core Banking development projects to release and modernize banking services - Mainframe testing process are slow, few fixed releases per year, complex, require skilled people, limited resources and Calendar, only 8 projects can be tested at Functional and Integration testing LPAR, the tables are often updated for each system tests causing rework and a lot of conflicts, errors and standby.

> 600k MIPS; > 100k employees / 10k IT employees,

Dev & Test Environments: LPAR1 (Dev) + LPAR2 (Integration) + LPAR 3(UAT)

1 LPAR for unit testing, 1 LPAR for integration testing (IT) with dozens of IMS regions each, and 1 LPAR for acceptance testing (UAT)

Development Team:

1,150 developers developing more than 50 projects in parallel (such as projects developed in parallel for mainframe transformation, Mobile and Digital Banking services).

Challenges:

Continuous Integration and Continuous Delivery, Increase software quality and deliveries, **Reduce TTM in 20%**

Reasons for APT:

Automate functional and Integration testing with Containers to manage tests in parallel without conflicts, reducing rework, accelerating software testing with quality, and increase software releases per year.

Test Case: 2 IMS Transactions + 5 BATCH JOBS + 240 Db2 Tables + 96 programs



Case Study: Largest Brazilian Bank

The Outcome:



Key-Findings: The bank development team measured a reduction in **more than 60%** of the total mainframe phase for testing dropping the lead time using APT.



Business Outcome: **Reduced in 25% the Time-to-Market** of the project in development using APT to manage the testing environment to delivery.



W/Out APT, the average time for provisioning an isolated Test Environment for functional Test Scenarios involved: **3 technical Resources working for 4 weeks, Total of 480 hours to create the environment.**



With APT, a total lead time of **1h40** to provisioning and complete functional testing stages. **Saving 96%**



With APT , the required HC to accomplish the Test Cycle was **1** (non-mainframe guy, was able to create by his own a fulfilled Containerized environment to test in the environment running consuming isolated data to perform the functional tests to validate the changed module function interoperability in the systems)



Eccox APT Capabilities

Benefits

1. Container Technology enables Application and Data ISOLATION	1. ISOLATION allows Parallel Testing, several projects being tested at the same time.
2. Discovery Technology identifies Test-Case artefacts & dependencies.	2. Discovery allows Impact Analysis, Artefacts Mapping and Dependencies for the Test.
3. Enables INTEGRATION, SYSTEM and UAT tests on z/OS.	3. Enables full cycle Testing, improves code quality, avoids instability in production.
4. Parallel Testing instead of Sequential	4. Parallel Testing improves productivity, reduces Time to Market by 25-50%.
5. Self-service Automated Environment and Artefacts Provisioning.	5. Test Environment and Artefacts being PROVISIONed and Installed in minutes.
6. Full z/OS and Sub-systems support.	6. Affinity with existing UBS z/OS stack, no adoption friction, reduced operational risks.
7. Test Environment similar to production, NO Virtualization, NO Simulation.	7. Provides Higher Accuracy to the Test, reduces Testing footprint.
8. Self-Service Web Browser Interface for the End-Users.	8. Easy and Intuitive End-user interface, accelerates tool adoption and productivity.
9. Auto-install, Reusable test cases; refresh artefacts in seconds.	9. Reduces Test Time by 70-80%, Test Provisioning reduced by 50-60%.
10. Existing LPAR shared. No additional sub-systems and middleware required.	10. No Impact on MIPS/MSU Usage, consolidates several test LPARs in only one.
11. Data Mover feature - Brings data from any LPAR to the Test Environment.	11. Brings PRODUCTION data to the Test Environment, allowing a more realistic test case.
12. Data Snapshot - Saves Point in Time data .	12. Allows Point in Time and Data Regression tests
13. Db2 Alter Table in-place – Db2 Schema modification in the Container	13. Allows DEV to change Db2 table specifications without DBA intervention, faster tests.

Additional Benefits

- | | |
|---|---|
| 1. Brings AGILE development to the Mainframe. | 4. Provides to each DEV/Squad a logical test Sandbox, facilitating E2E testing. |
| 2. Aligned with DevOps Principles. | 5. Provides Management Dashboard and Analytics Governance Information. |
| 3. Improves DORA Metrics. | 6. Provides built-in REGRESSION Test. |

Eccox APT – Wrap-Up

Business Challenges

- Digital Transformation pressure for business results
- Deliver more products at the Speed of the Market
- Speed up Time to Market
- Introduce Innovative Solutions in the Market
- Provide a better Customer Experience (CX)

IT Challenges

- Insufficient Mainframe Dev & Test LPAR availability
- Tightly controlled Mainframe environment
- Inability to run several test scenarios in parallel
- Time consumption to provision a test environment
- Respond to business demands on time
- Inability for Continuous Testing

Eccox APT - IT & Business Benefits

Cost Savings

- Lower cost dev/test LPARS:
- No Extra MIPS required
- No Mainframe Skills required
- Reusable Test cases

Quality

- Improves Code Quality
- Enables Full Test Cycle
- Production Like Infrastructure, sub-systems and Topology
- No MOCK, No STUB, No Virtualization, No Emulation
- Auditing Records

Agility

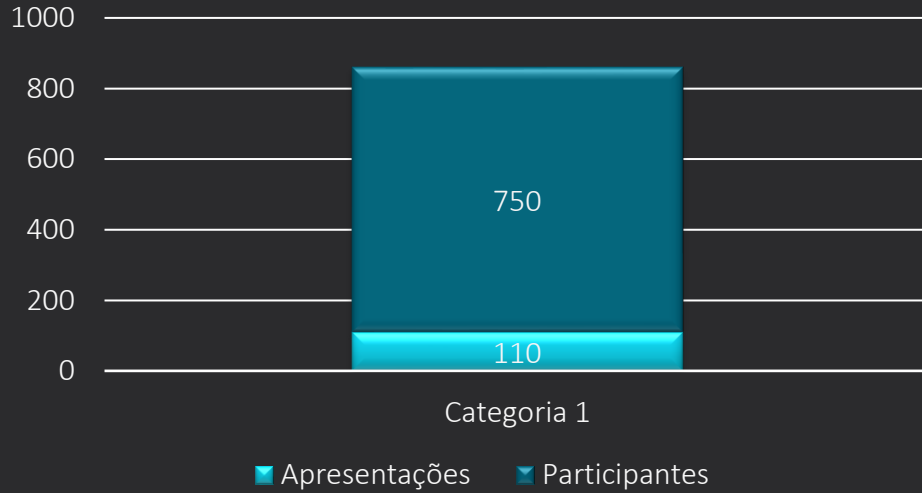
- Speed Up Test Provisioning by 50-60%
- Time to Market reduced by 25-50%
- Test time reduced by 70-80%
- Parallelized vs. Serialized

Thank You

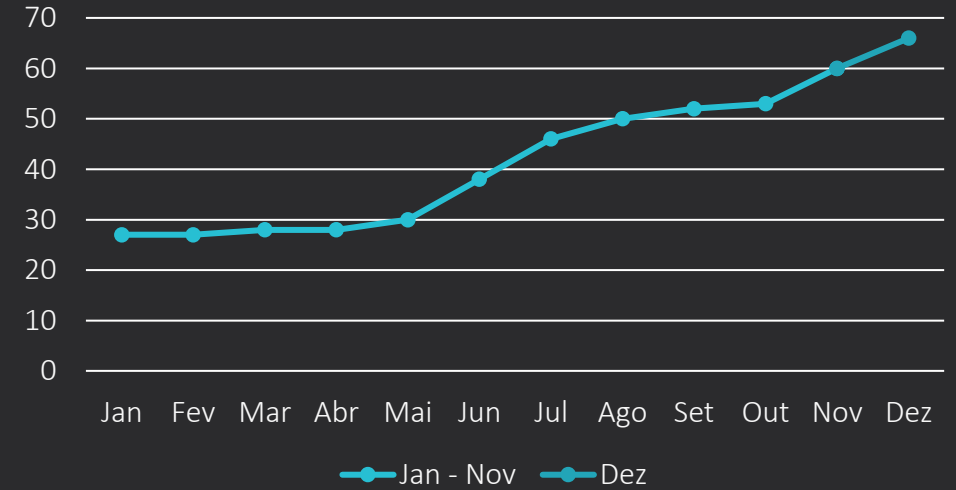
Maake Asante Shukria Dhanyavadagalu
Kiitos Manana Dankon
Mauruuru Biyan
Dank Je Dankscheen Vinaka Suksama
Dank Je Dankscheen Vinaka Suksama
Dziękuję Maake Asante Shukria Dhanyavadagalu
Juspaxar Mauruuru Biyan
감사합니다 Chokrane Diolch i Chi
Ua Tsaug Rau Koj Bedankt D'akujem Grazias Arigato Grazie Terima Kasih
Nirringrazzjak Děkuji Hvala Di Ou Mési Tack Kop Khun Khap Paldies Najis Tuke Matur Nuwun
Rahmat 谢谢 Xвала Hvala Di Ou Mési Tack Kop Khun Khap Paldies Najis Tuke Matur Nuwun
Merci Go Raibh Maith Agat Tingki
Salamat ขอบคุณคุณคุณ

Eccox APT Usage Statistics at Brazilian Bank

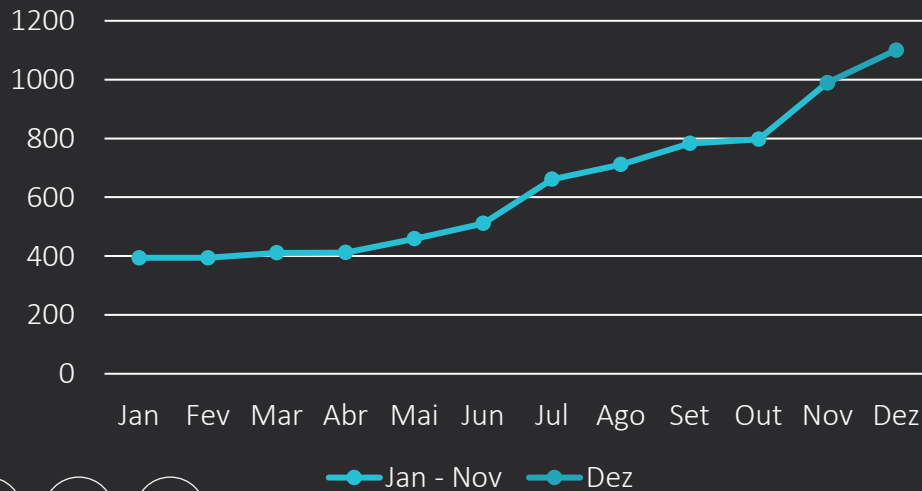
Quantidade de Apresentações



Quantidade de Aplicações



Quantidade de Usuários



Quantidade de Containers

