E2E Customer Testing To Synthetic Monitoring

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SREcon23 APAC

AGENDA

SRE @ PayPal

Why Synthetic testing ?

Synthetics - Introduction

Synthetics - Design

E2E Testing Platform

Architecture

Insights

Feature Take Aways

Q&A

What is at stake ?

Business – Q1 2023

- 5.8 billion transactions
- $354.5 billion in total payment volume
- 433 million active accounts
- Connects people and businesses in > 200 markets

Platforms

- On both cloud & on-premises
- Distributed across several availability zones
- Hardware and software components
- 1000s of VMs

Applications

- Over 3200 applications and services
- Database & data warehouse
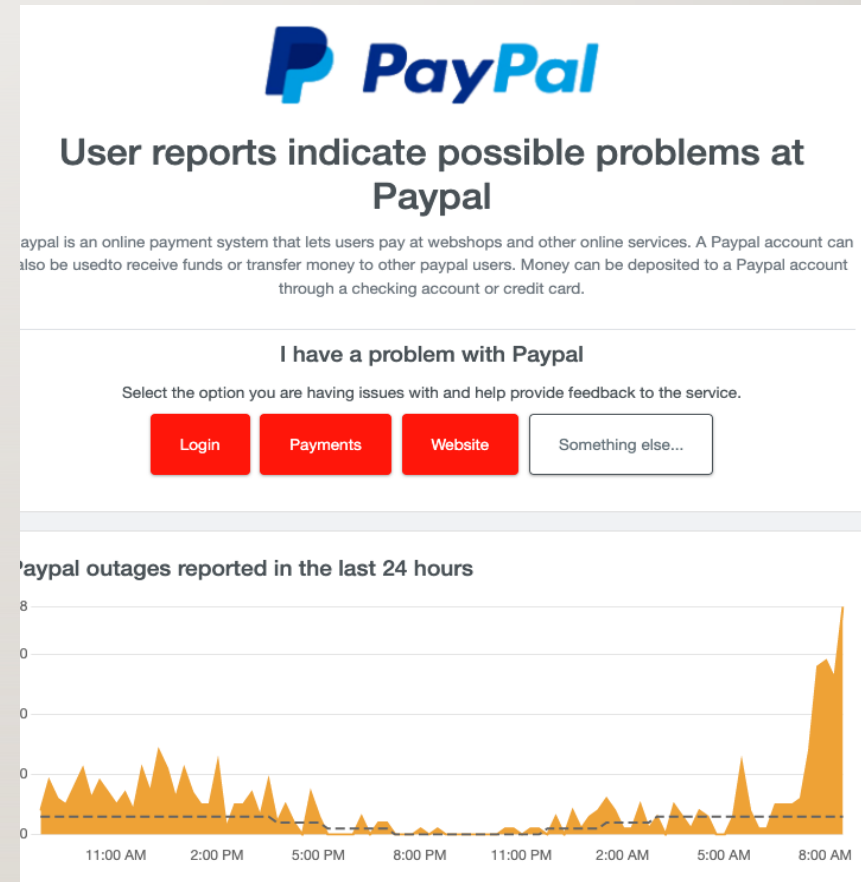- Multiple programming languages
- Web, mobile & API offerings

Merchants

Consumers

SRE @ PAYPAL

VISION : Create the most reliable payment platform on the planet.

MISSION : Build & democratize an AI driven reliability engine that builds trust by powering highly reliable customer experiences.

Why Synthetic Monitoring ?

- Proactively identify performance problems

- Reduce mean time to resolution (MTTR)

- Launch in a new market

- Meet performance goals (SLOs or other benchmarks)

- Partner and Merchant Communications

User reports indicate possible problems at Paypal

Paypal is an online payment system that lets users pay at webshops and other online services. A Paypal account can also be used to receive funds or transfer money to other paypal users. Money can be deposited to a Paypal account through a checking account or credit card.

I have a problem with Paypal

Select the option you are having issues with and help provide feedback to the service.

Login | Payments | Website | Something else...

Paypal outages reported in the last 24 hours

11:00 AM | 2:00 PM | 5:00 PM | 8:00 PM | 11:00 PM | 2:00 AM | 5:00 AM | 8:00 AM

What Is Synthetic Monitoring ?

Synthetic monitoring is a monitoring technique that is done by using a simulation or scripted recordings of transactions.

Behavioral scripts (or paths) are created to simulate an action or path that a customer or end-user would take on a site, application, or other software (or even hardware).

Those paths are then continuously monitored at specified intervals for performance, such as functionality, availability, and response time measures.

This type of monitoring does not require actual traffic, thus the name synthetic.

Synthetics - Requirements

Requirements	Details
Scope	Support all Business Units, GEO locations, API, Web and Mobile Applications & Support all Environments
End to End Flow coverage	Partners & High-Volume Merchant Flows, Major TPV coverage, New Market or Product Launches, Third Party APIs/Endpoints
Web Vitals – (loading, interactivity, and visual stability)	Largest Content Paint (LCP), First Input Delay (FID), Cumulative Layout Shift (CLS), First Contentful Paint (FCP), Apdex (Application Performance Index)
User Experience Measurements	DNS Time, Connection Time, SSL Handshake time, Total Download Bytes, Trending Over Time, Web Performance long Tails versus the Average
NFRs and Others	Manual Runs, Re-runs, In Built Performance Measurements, Session Replays, Avoid Dependency, Security Requirements, Audit Logs, Credential Rotation, Reliability and Observability, Changelog, Alert Management and User Privileges.

PRIMARY USE CASE

- The Product shall offer support for using multiple Synthetic Monitor Types in a test, like combining API Monitoring with Website/Mobile Application Monitoring.

- A typical PayPal use case would involve both and the idea is to port the existing E2E tests suites into the Product.
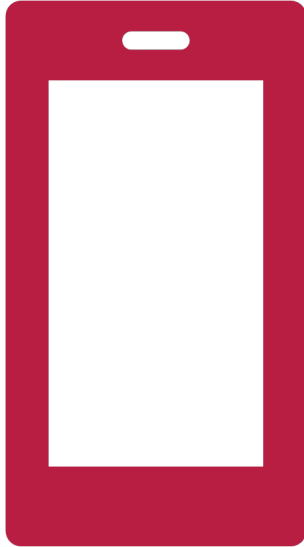
Synthetics - Design
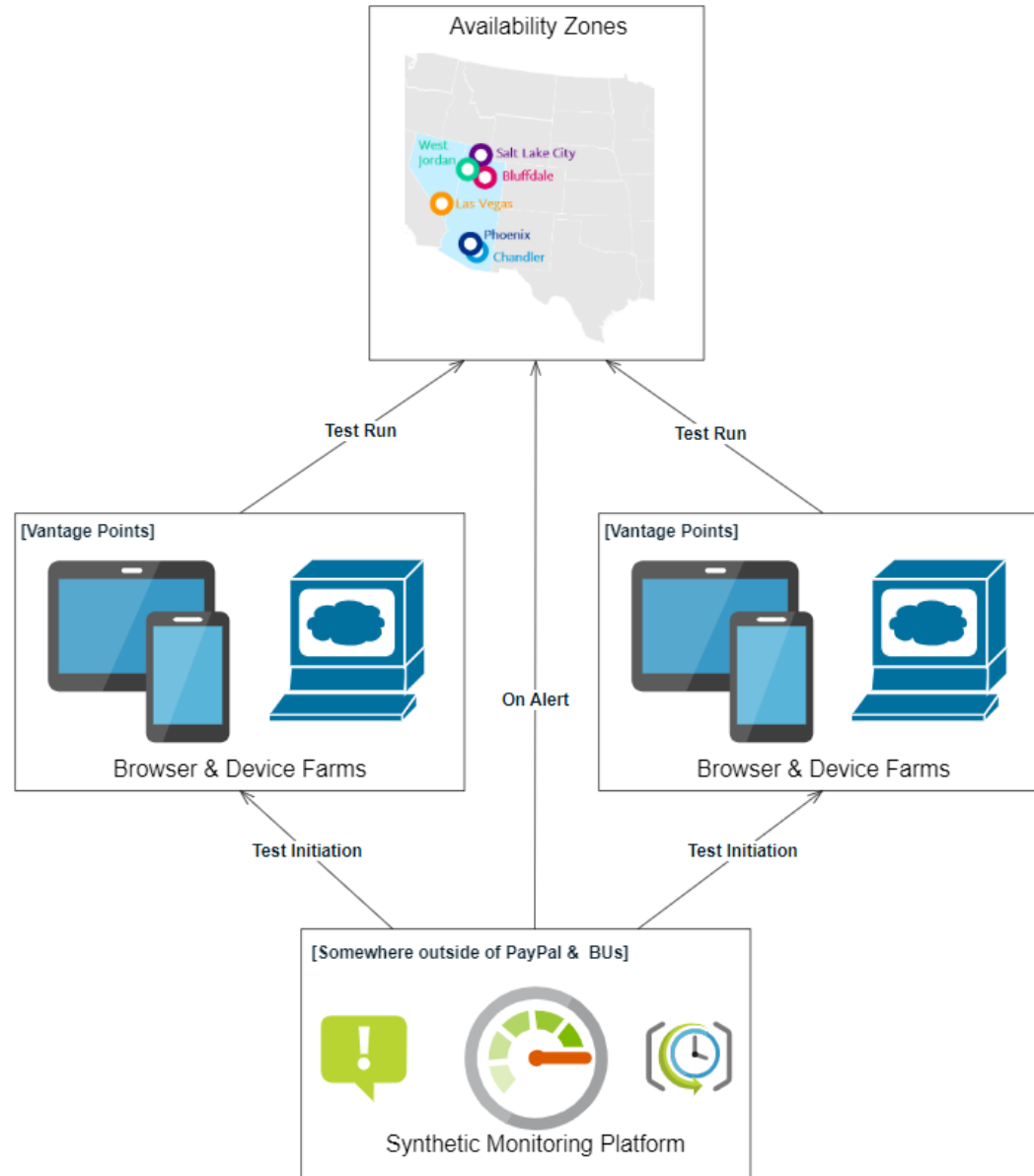
Synthetics – Vendor Evaluation

API Monitoring	Multiple Step Transactions and Monitoring the Performance at each step	Test Automation Frameworks supported (Java TestNG, WebdriverIO, Cypress etc.)	Multiple Devices, OS and Browsers	Native Mobile Application Testing
In-Built Performance Measurements	Testing From Global Locations	Benchmarking Website Availability and Performance	Testing in Pre-Production	Manual Test execution
		Dashboard /Visualization to view various metrics /results		

Synthetics – Security Constraints with Cloud Set up

Safe Transfer of Code Artifacts from PayPal Repository

Security of Data (Credentials and Auth Tokens, etc.) involved for testing Customer flows.

Application Ownership to Scale

Alerting and Monitoring of the Application & Infrastructure Maintenance

E2E Testing Platform

An in-house product, including a **Test Runner, Framework, and Production AZ** that allows product teams to author, publish, run, and debug end-to-end (e2e) tests with the **confidence** that their code will work in production and their customers will have the quality experiences they expect from the product.

E2E Testing Platform – Key Features

Test from Customer Point of View

Vet Releases in an N+1 environment

Gate to Delivery - Render Go/No Go decision

Re-Certify a previously live AZ / New AZ

Continuous Functional Monitoring in live AZ

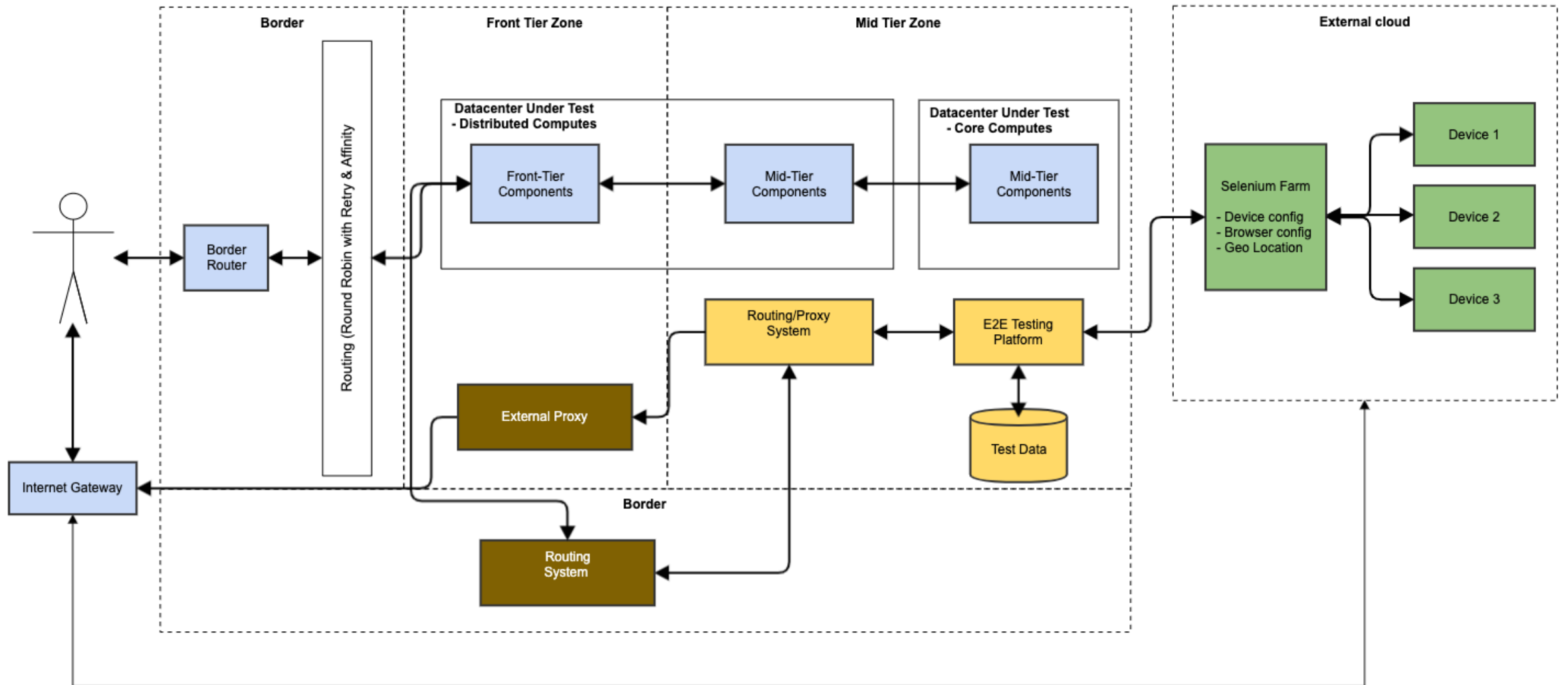# E2E Testing Platform – Release Vetting Routing Architecture
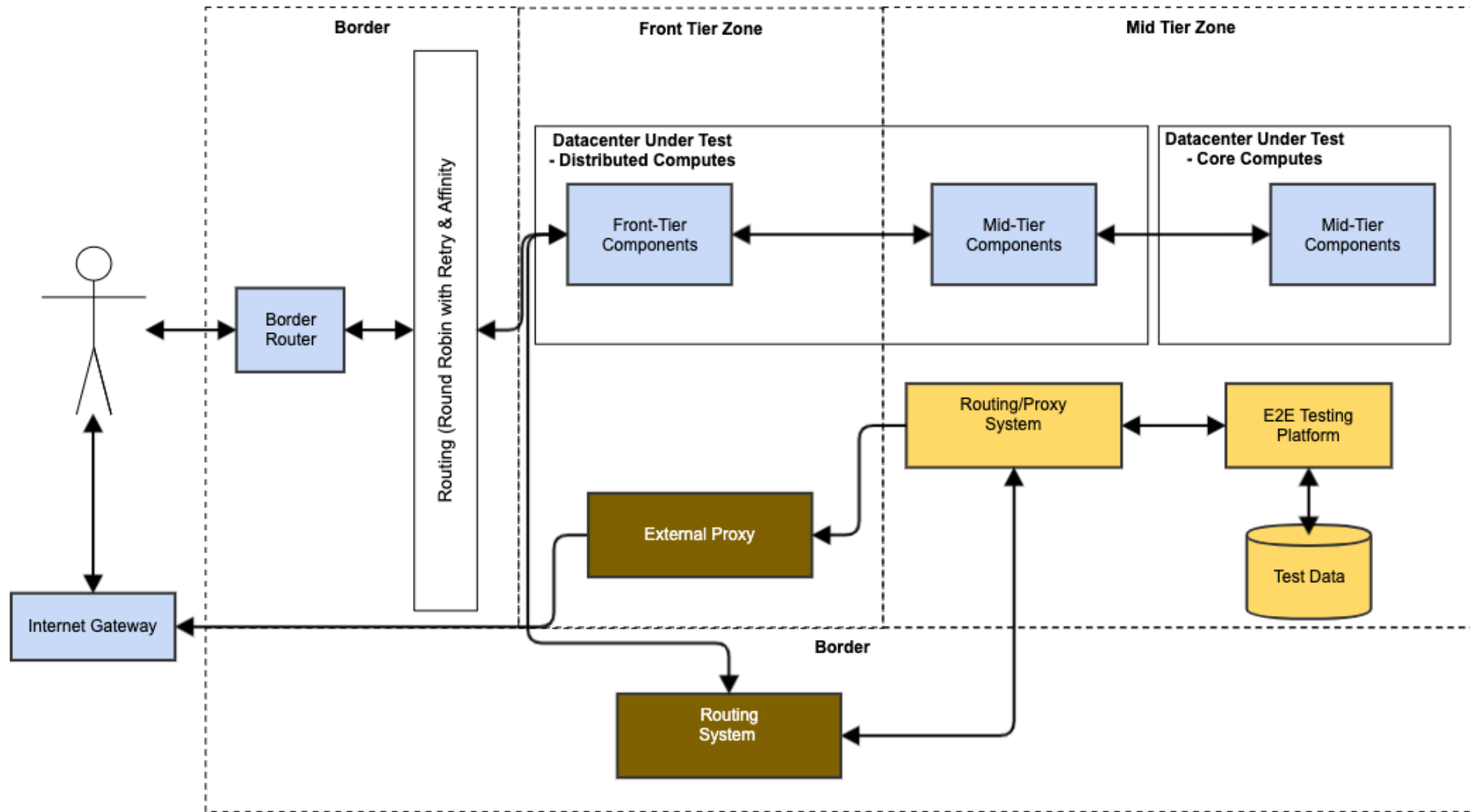
Test Execution Design
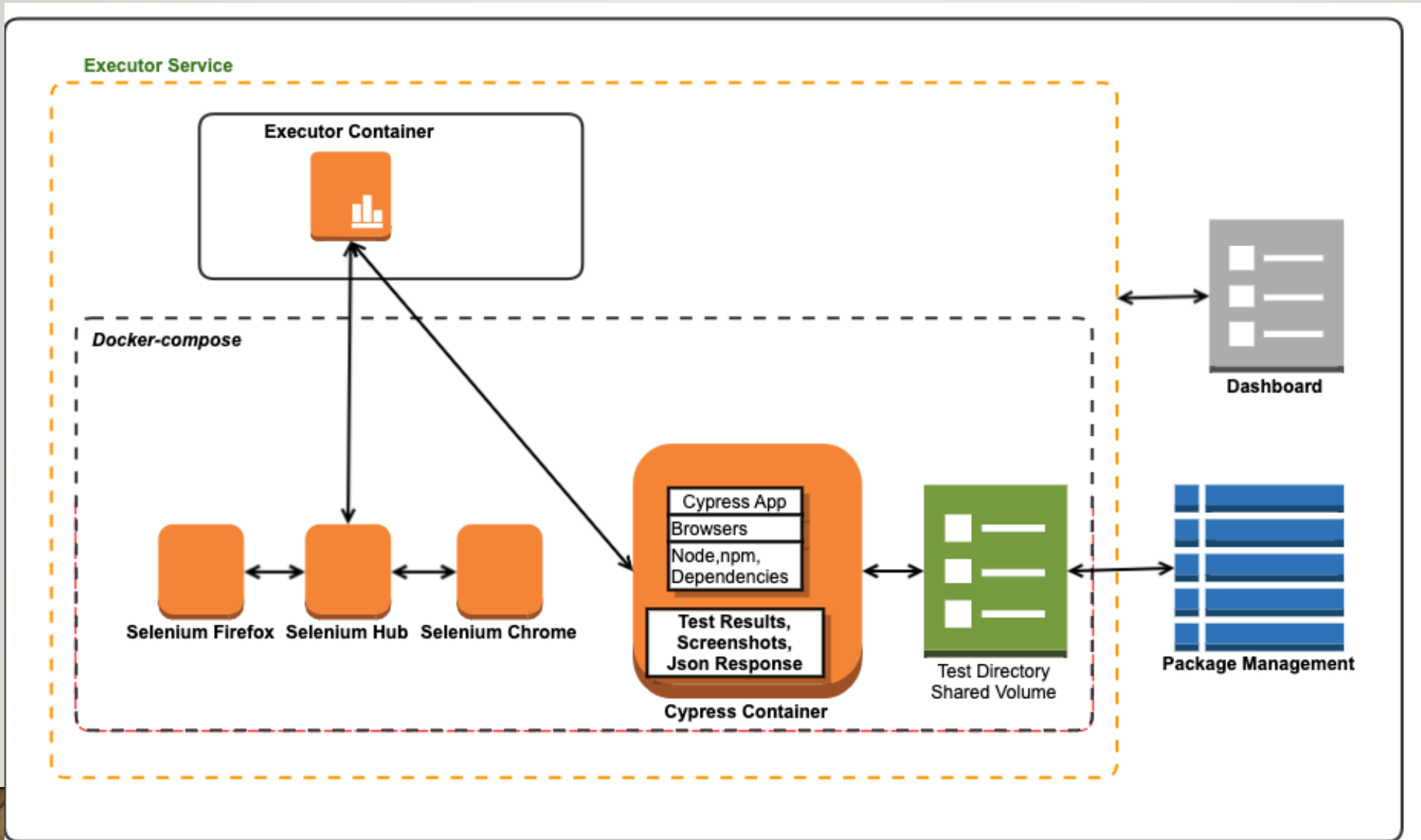
Test Authoring and Framework support
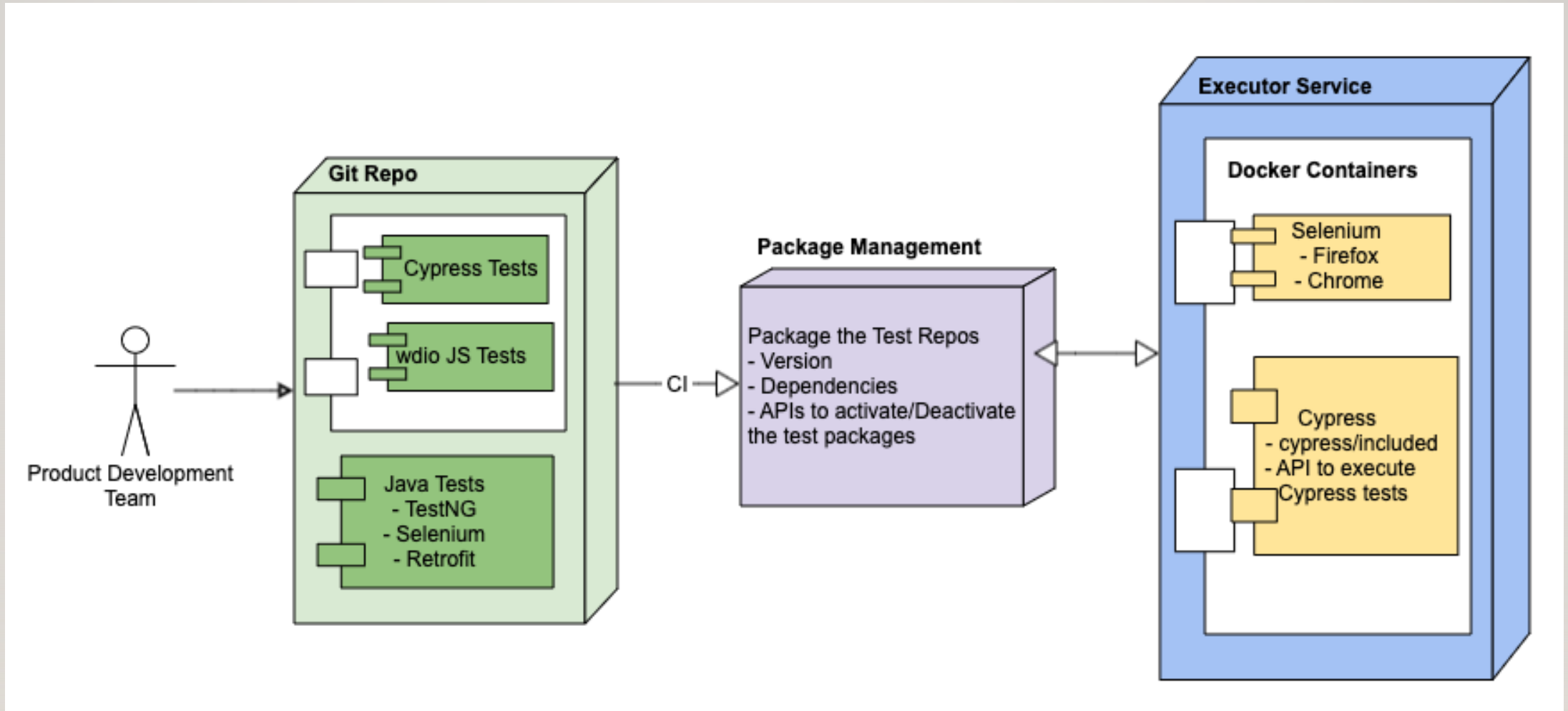
Synthetic Monitoring – Architecture

Synthetics - Platform Capabilities
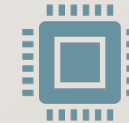
Dynamically distributed Tests across servers.

Tests and Accounts are Isolated for parallel execution.

Scheduled Job runs for Continuous Monitoring.

Real-Time view of Execution in Dashboard

Results are stored in Database with Logs, Screenshots, etc.

API Request/Response details persisted.

Synthetics - Sample Execution

Synthetics - Sample Execution

Test Name: Ebay Synthetic Test

PayPal Checkout Synthetic Testing of BUYER EXPERIENCE. Used for eBay continuous monitoring

Time of Execution	**Browser**	**Status**	**Duration**	**Remediations**
06/11/2023 11:30 pm PDT	🦊 Firefox	Pass	2m 4s	➕ 📓

Step Results   Step Performance

Step #	Step Name	Step Result	Reason	Attachments
1	GetAccessToken	**Success**		View Details
2	CreateOrder	**Success**		View Details
3	Login	**Success**		View Details
4	PayPal Login Password Entry	**Success**		View Details
5	Review payment	**Success**		View Details
6	Payment successful. Redirect to Home	**Success**		View Details
7	GetOrder	**Success**		View Details
8	CaptureOrder	**Success**		View Details
9	RefundOrder	**Success**		View Details

Insights

- Proactive signals for major **Incident detection and Customer experience degradation**.

- Critical E2E Flows for each Product are Identified with the help of Automated **TPV (Total Payment Volume) Report** that provides Key Data and Analytics.

- We are focusing to leverage **AI** to generate automation test scripts so that any E2E flow can be on-boarded into Platform with ease.

- Latency measurements across various **GEO's** are constantly benchmarked.

Features & Take Aways

- Change Reliability through End-to-End Customer Flow validation
- Synthetics, a customer experience feedback
- Elucidating Requirements for E2E testing
- Building Synthetics as a Platform capability
- Synthetics, one of the signals for proactive incident detection

Q & A

Thank you !!

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