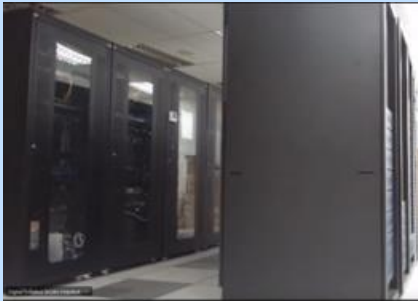


PLUS' Journey to the Cloud

OCTOBER 2021



PLUS' had legacy servers which was on premise and no longer under warranty...



PRIMARY SERVER ROOM (PERSADA PLUS)

Setup of 12 physical blade servers related network components and software to host 59 application systems in 130 virtual servers.

SECONDARY SERVER ROOM (BUKIT BERUNTING TOLL PLAZA)

Smaller setup of 7 physical servers to host replicated critical application systems from Primary Server Room for IT Disaster Recovery.



COMPUTING RESOURCES AVAILABILITY

As at November 2018, the application systems have utilized 90% of the available storages and additional storages is required for data growth.

Recent projects were directly developed in Microsoft Azure Cloud Services to facilitate requirement for high performance, high availability and scalable computing resources.



IT DISASTER RECOVERY COMPLIANCE

DIS is unable to meet the IT Disaster Recovery requirement for the application systems due to slow performance and increased data growth:

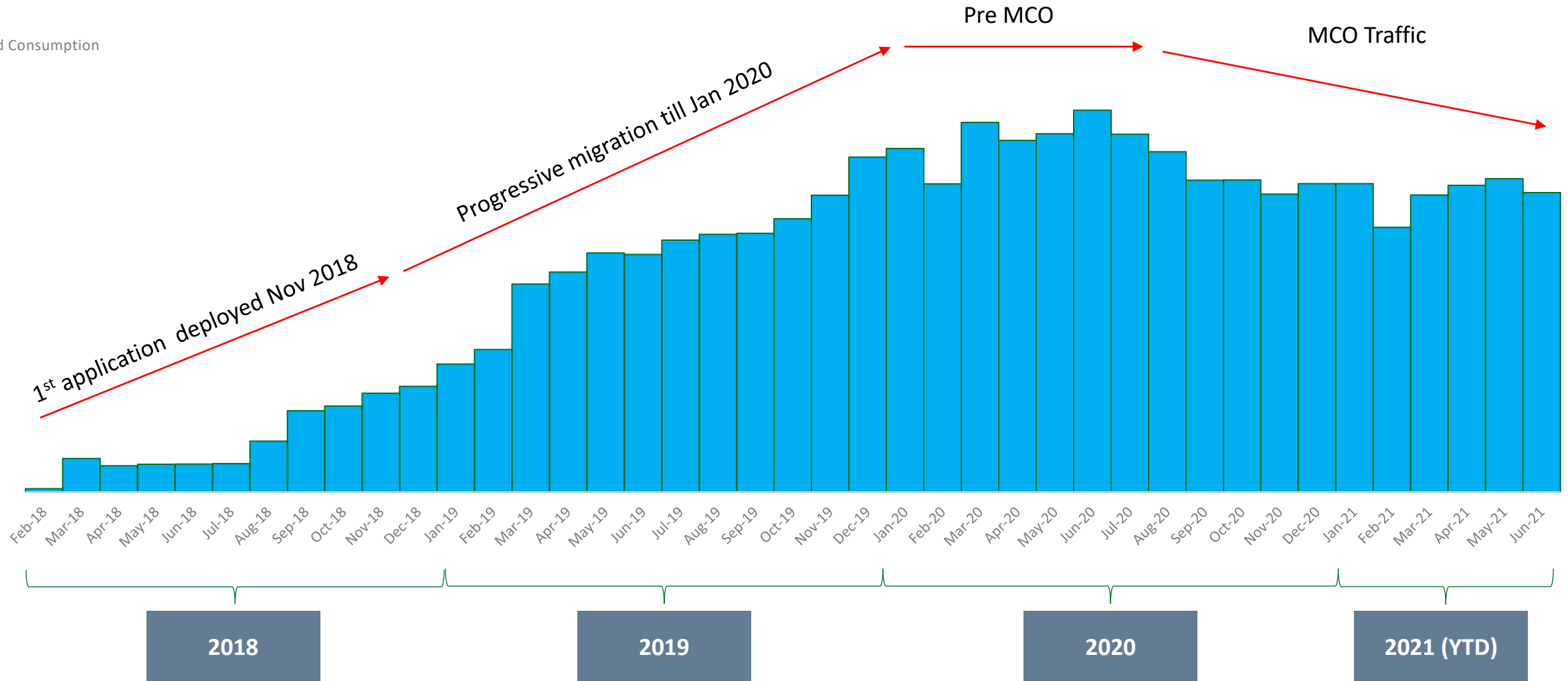
- Daily Backup (achieved only 70%)
- DR Replication (achieved only 57%)
- Tape Backup for Off-site (achieved only 20%)



PLUS' migration to the cloud

The following shows the increase in cloud consumption over the past 4 years

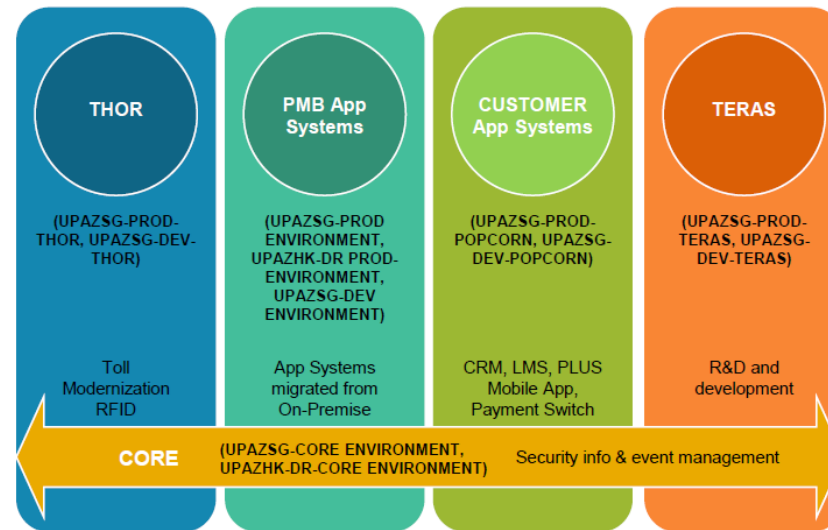
Cloud Consumption





























What does PLUS now have in the cloud?

PLUS now has 5 cluster of applications in Azure and over 250 virtual machines and over 100 databases.



- | | | | |
|---|---|---|--|
|  258
Virtual Machines
(160 running, 98 stopped) |  71
SQL Virtual Machines |  17
Stream Analytics Jobs |  4
Application Gateway |
|  79
App Services |  45
Azure SQL Databases |  4
Dedicated SQL Pools |  9
Load Balancers |
|  5
Kubernetes Service |  4
Cosmos DB |  1
Azure Synapse Analytics |  661
Azure Security Center Assessed Resources |
|  789
Disk |  7
Azure DB for PostgreSQL |  12
Azure Data Factory |  19
Log Analytics Workspace |
|  249
Storage Accounts |  3
Azure DB for MariaDB |  3
Azure Analysis Service |  19
Log Analytics Workspace |
|  12
Recovery Service Vault |  3
Azure DB for MySQL |  4
IoT Hub |  36
Azure Key Vaults |

What benefit does PLUS see in terms of usage of the cloud?

PLUS has invested in a 4 year journey to migrate its applications to the cloud. PLUS should [continue to leverage the cloud](#) due to the following benefits of remaining in the cloud

1



Economic benefits

- Reduced Cost*
 - Real Estate
 - Power and Cooling
 - Infrastructure labour cost
 - Security
- Better handling of capacity

**we compare cost of running workloads in the cloud vs on premise in a later slide*

2



From CAPEX to OPEX

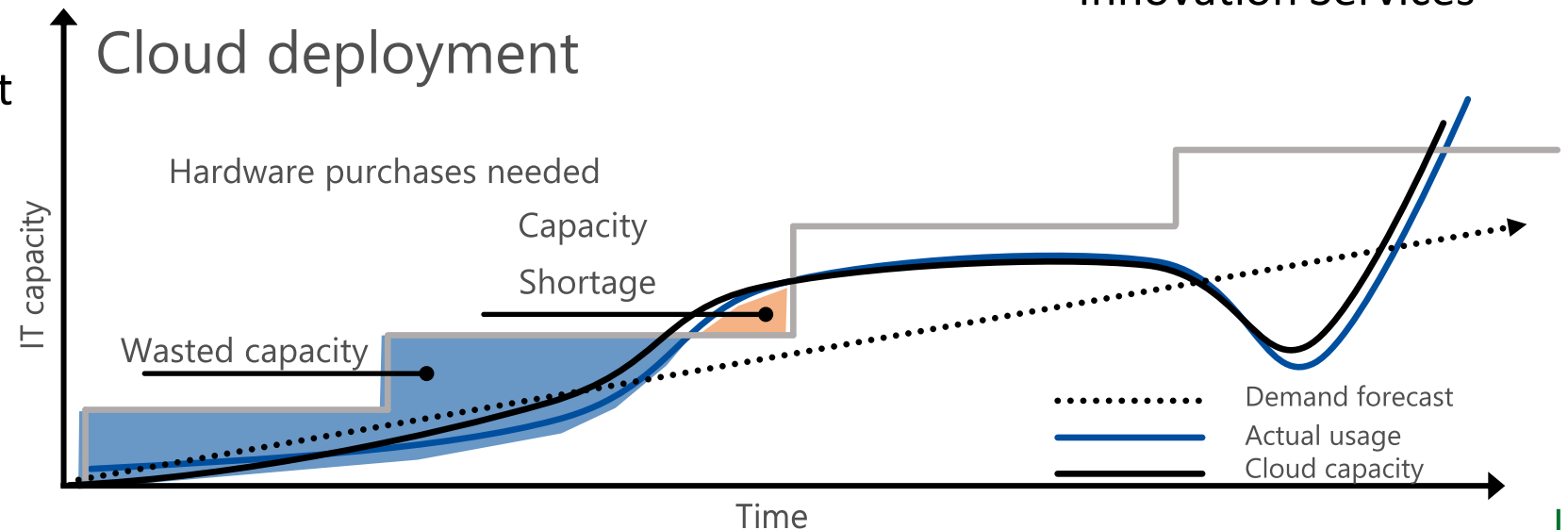
- Lower upfront investment
- Reprioritized capex

3



Agility

- Scalability
- Quicker to Market
- Innovation Services



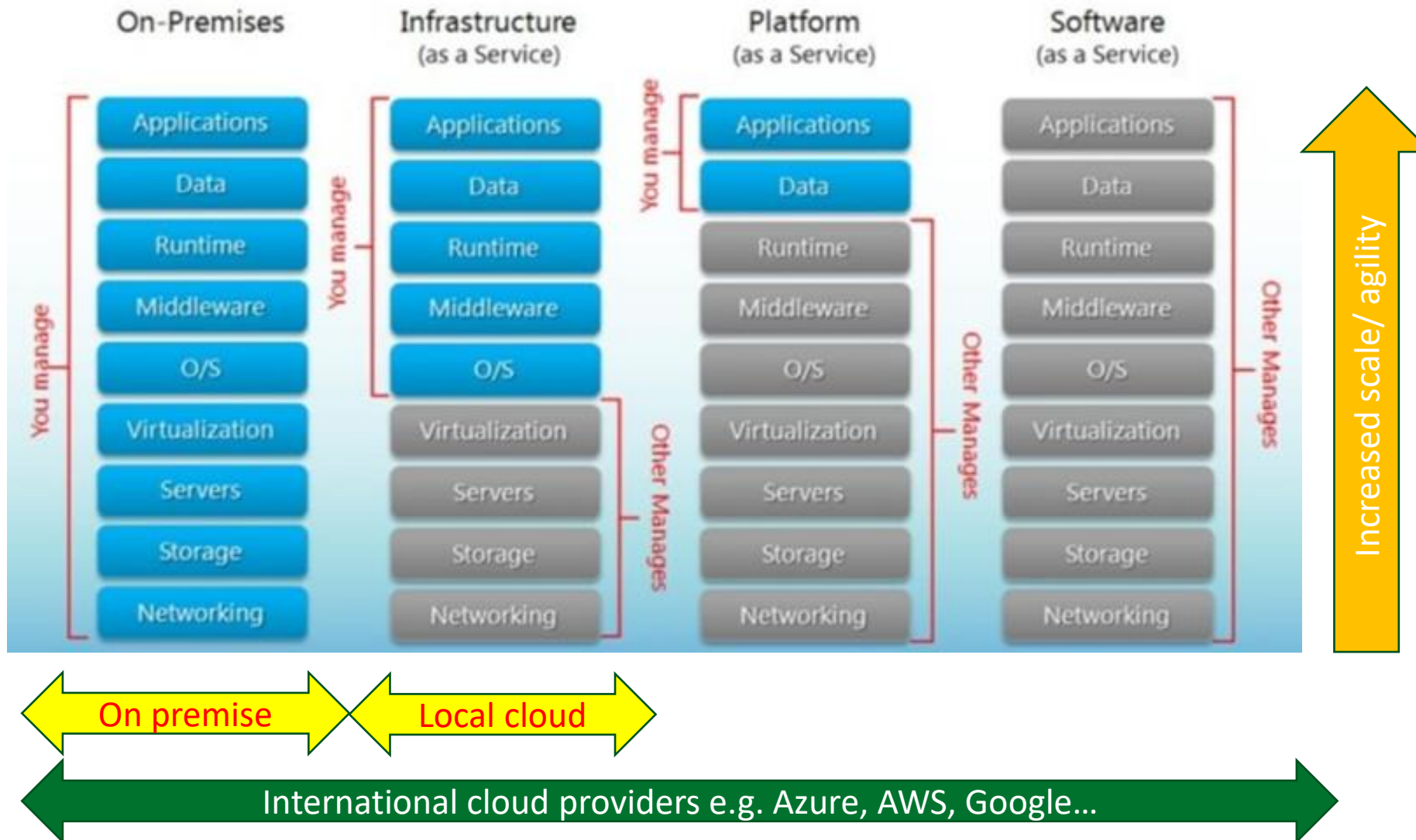
What benefit does PLUS see in terms of usage of the cloud?

60+
regions



How does PLUS utilize the cloud?

Cloud providers typically provide Infrastructure, Platform (PaaS) and Software as a Service (SaaS). PaaS and SaaS offerings from cloud providers enable customers to build capabilities faster. However, **not all PLUS applications utilize SaaS or PaaS nor do they require such cloud flexibility or scalability.** Applications without such need can actually remain on premise or at a local cloud provider to lower cloud costs.



The following is the recommended application deployment strategy moving forward.

On-premise/ Local Providers



Application criteria

- None critical
- Predictable workloads
- No disaster recovery requirement
- Does not use cloud native services or innovative SaaS provided by cloud providers
- No scalability requirement that clouds provide the flexibility
- Local data residency

Cloud

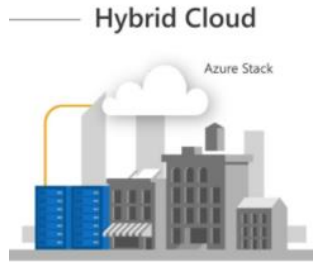


Application criteria

- Critical applications that require cloud elasticity to scale ie the ability to rapidly scale the IT infrastructure (up or down) to match changing requirements
- Utilization of cloud innovative services eg “security as a service,” “backup as a service,” “disaster recovery as a service,” “machine learning as a service” etc., decreases the need for specialized in-house IT skills and can free up internal resources for other priorities
- Pay-as-you-go vs. install-and-own. (OPEX vs CAPEX)
- Automatic, timely vendor updates to software to keep software and infrastructure up to date on features and security patches.

This is a snapshot of the various cloud providers PLUS uses

On-premise/ Local Providers



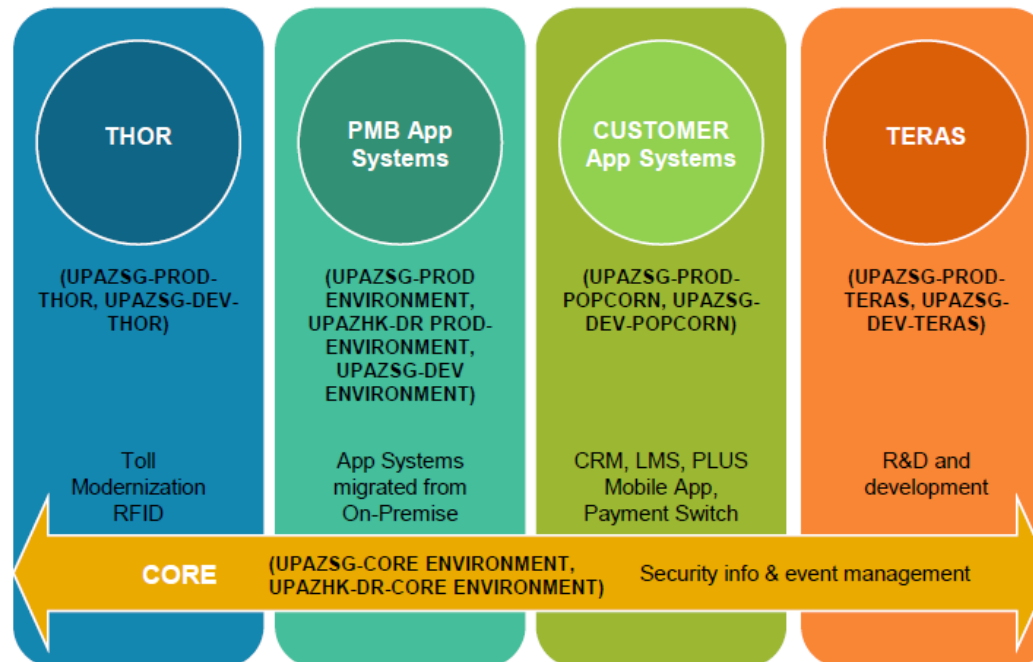
Sample Applications

CCTV Auto Admin System (HQ)
Door Access System
Parking Gate Access System (HQ)
Printer Server
Meeting Room Booking System
Virtual Library Application
Microsoft hybrid solution ⁴

Cloud



- Oracle Fusion ERP/HCM2
- PeopleSoft Payroll processing



Amazon SageMaker
Machine Learning Models for ANPR and VA/VC

THANK YOU

