Cloud Computing Solutions on IBM z Systems

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Cloud Computing

Digital Solutions for z Systems

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13th of May 2015

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Contents

Mobile, social, cloud, big data and analytics are changing how we live, work and interact

63% of people
expect to be doing more shopping on their mobile devices over the next couple of years

40% of people
socialize more online than they do face-to-face

57% of companies
using cloud to drive competitive and cost advantages

300x growth
of digital content between 2005-2020

80% of all data
is unstructured and growing 15x the rate of structured data

A fundamental change

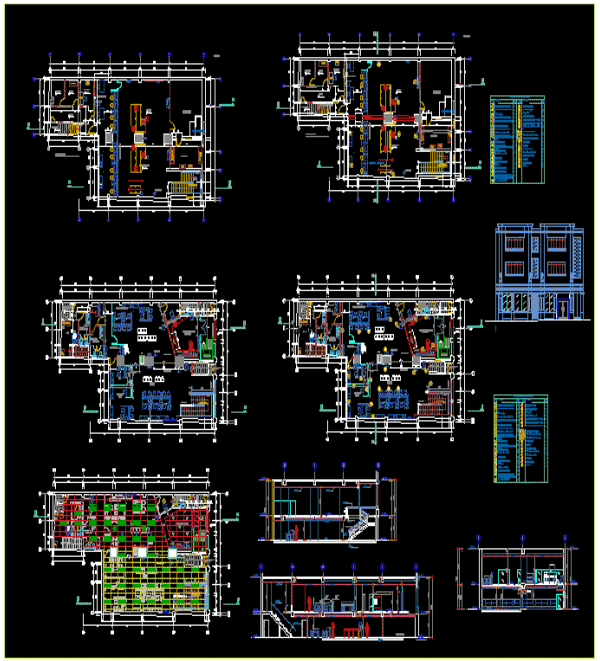
Peole can access centralized services

A service developed in one flavor for all

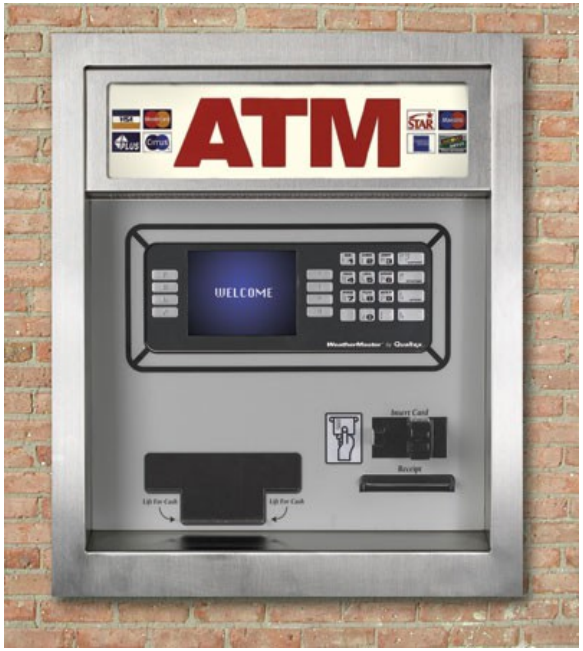
The service can access peole everywhere

A service developed in one flavor for all but capable to adapt

But has all really changed ? Yes and No !



Find & Walk
Wait
Ask for service
Few physical locations
National



Walk & Find
Self-Service
More physical locations
International

Locate
Self-Service
Anywhere
International

New Capabilities in z13 supporting Cloud Computing

Up to 10 TB Memory on z13
Improves consolidation ratios

GDPS for Linux on z Systems
Disaster Recovery solution for mission-critical workloads

SMT-2 technology on z13
Improves performance and throughput of workloads

Increase in # of LPARs on z13
Improves TCO

KVM
New industry-standard hypervisor (SOD)

Cloud Manager w/ OpenStack V4.2
Heterogeneous platform management from z Systems

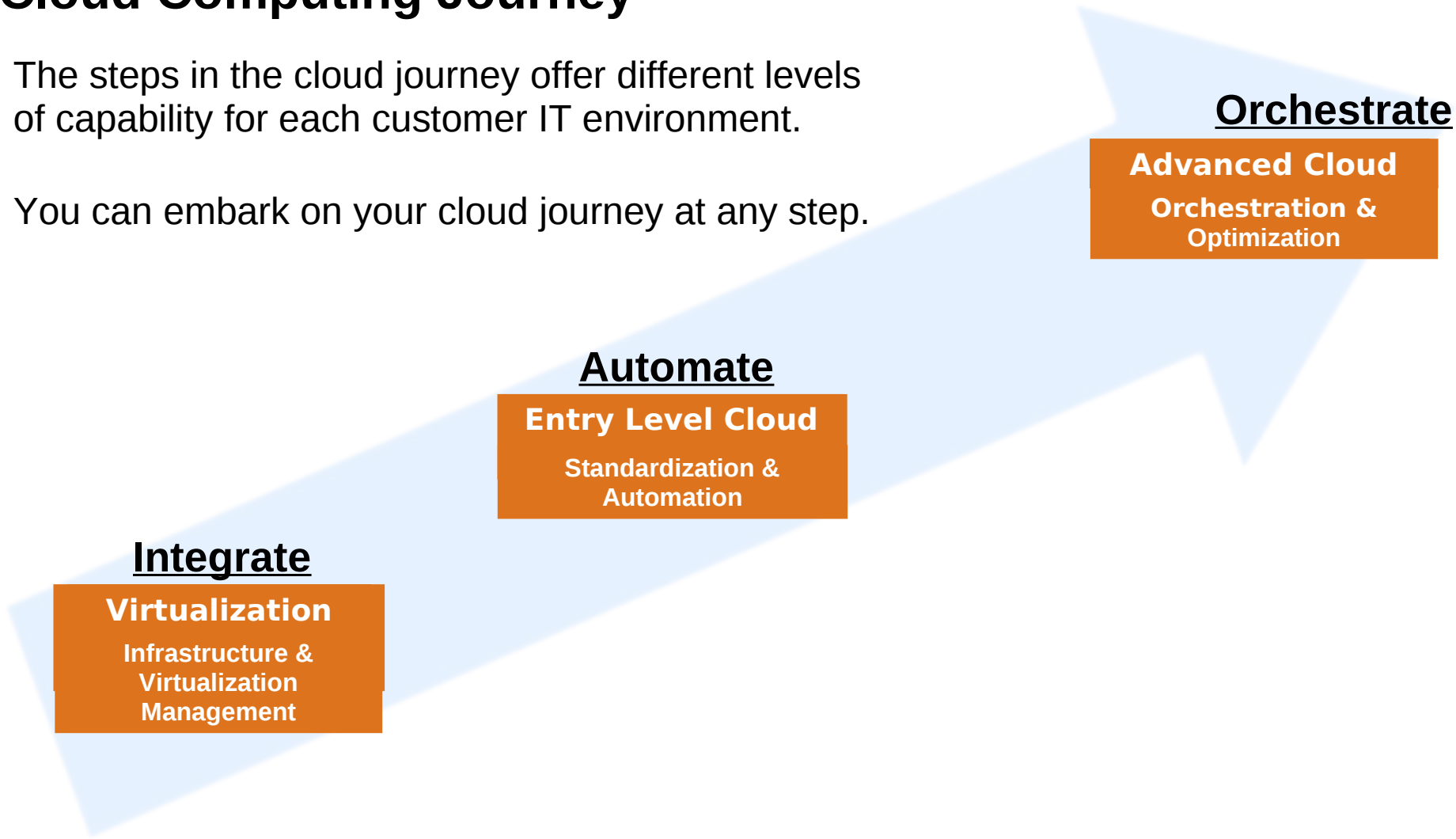
Elastic Storage for Linux on z Systems
Enables new class of workloads

Contents

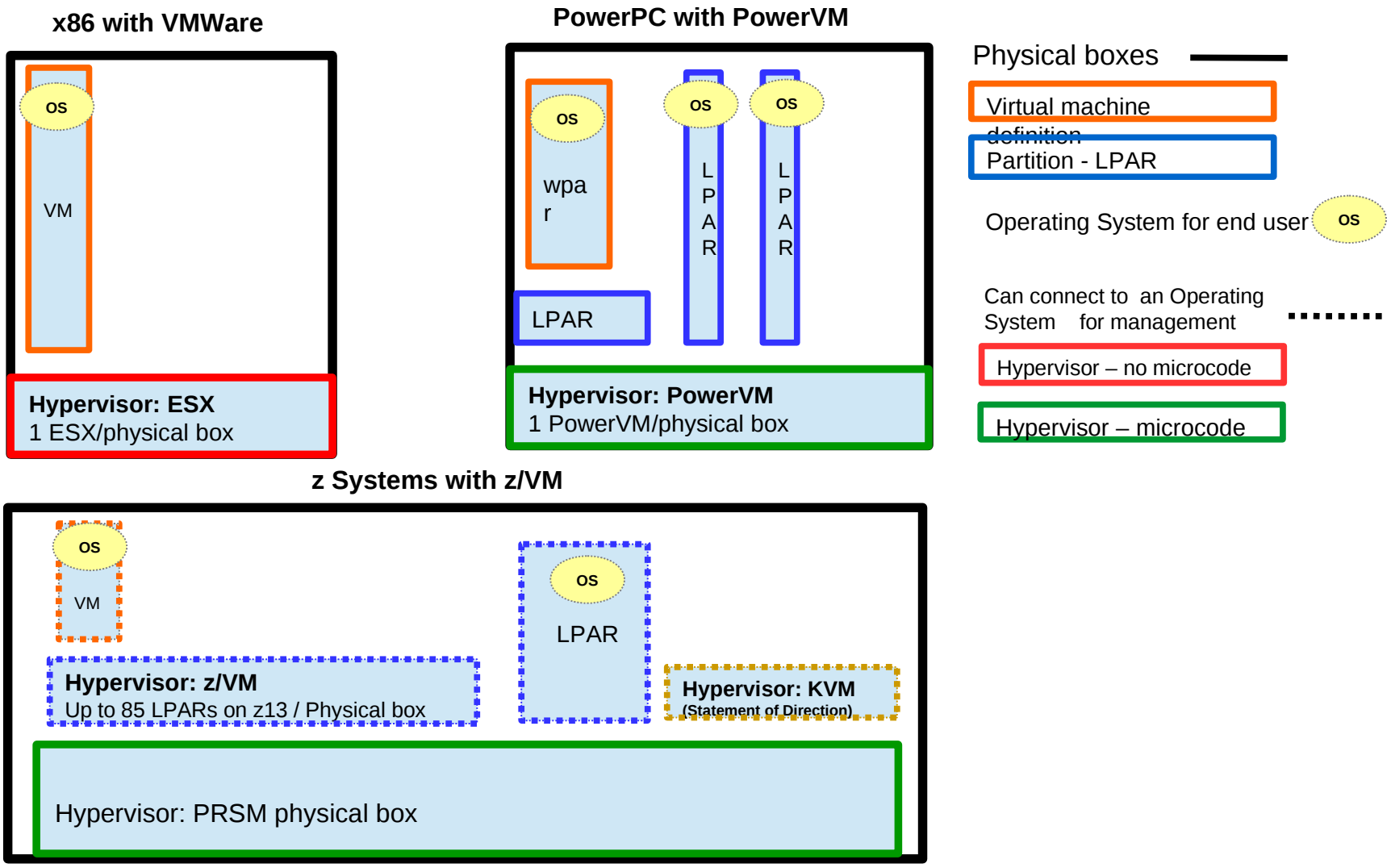
Cloud Computing Journey

The steps in the cloud journey offer different levels of capability for each customer IT environment.

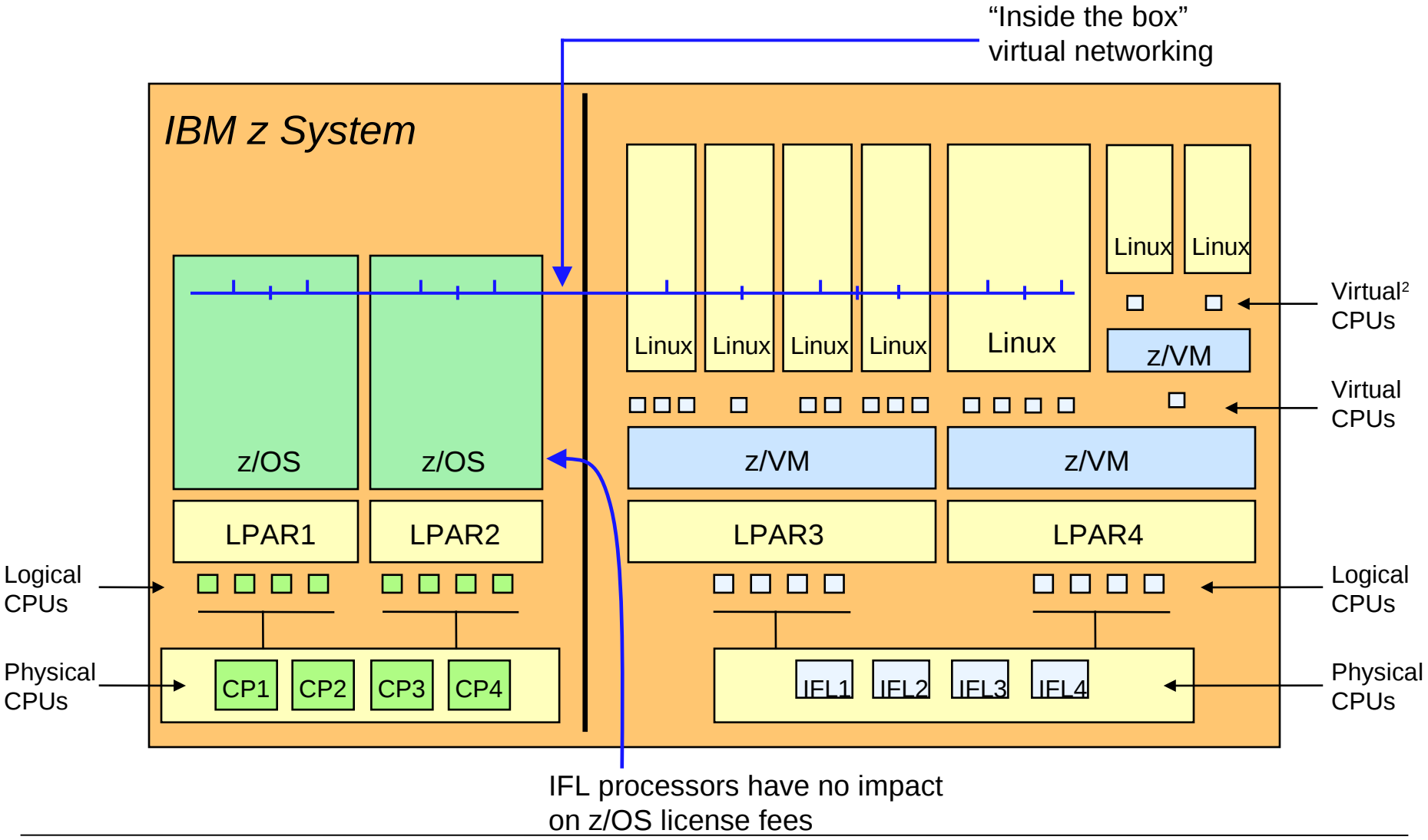
You can embark on your cloud journey at any step.



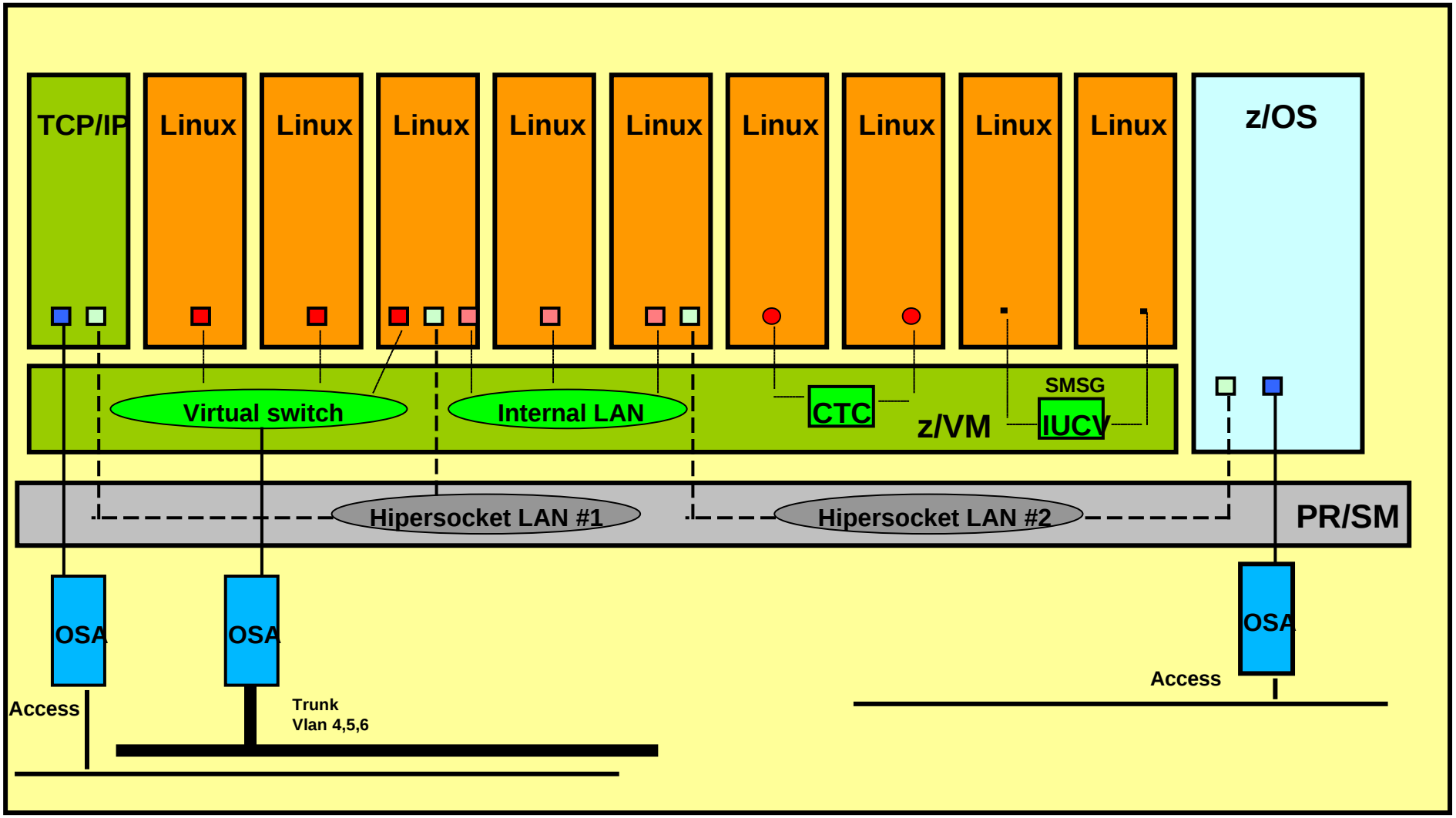
First, some differences: VMware, PowerVM & z/VM



IBM System z Virtualization Leadership
Extreme Levels of Resources Sharing & Agility



IBM System z Virtualization Leadership : Network Options



z System Strenghts for Cloud Computing

z Systems Cloud Blueprint

Orchestrate

Advanced Cloud

Orchestration & Optimization

Automate

Entry Level Cloud

Standardization & Automation

Integrate

Virtualization

Infrastructure & Virtualization Management

This is where z Systems drives differentiation!

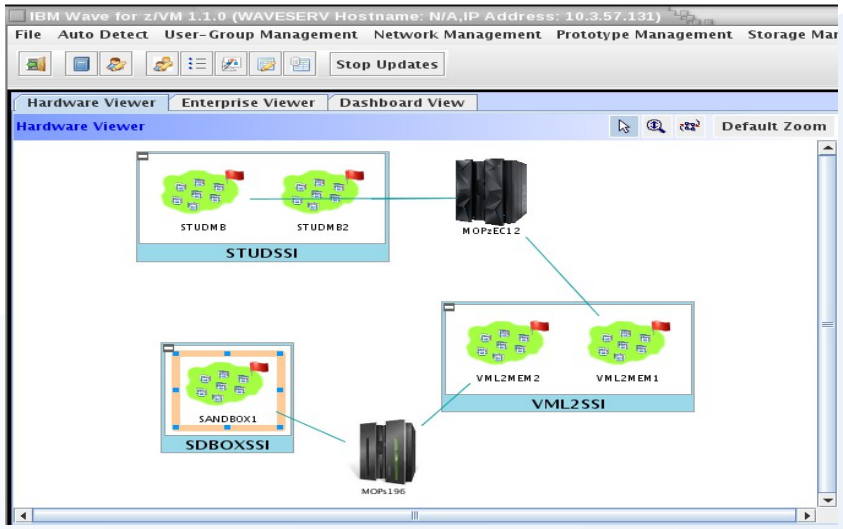
Infrastructure Scalability: Consolidate more workloads per core; elastic scaling using Capacity On Demand

Virtualization Management: More virtual servers in a single footprint

Security: Highest security rating for tenant isolation

Reliability & Availability: Unparalleled in the industry

Virtualisation & Centralized Resources Management



VIRTUALISATION

INTEGRATION

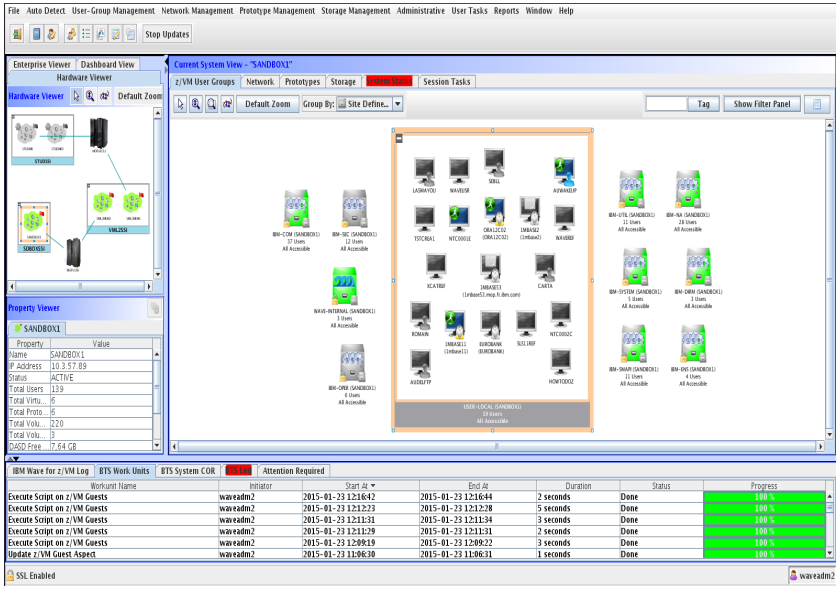
Traditional IT

z/VM 6.3

IBM Wave for z/VM

Helps Simplify and Automate Virtualization Management
For z/VM and Linux virtual servers

- Automate, simplify management and monitor virtual servers and resources-all from a single dashboard
- Perform complex virtualization tasks in a fraction of the time compared to manual execution
- Provision virtual resources (Servers, Network, Storage) to accelerate the transformation to cloud infrastructure
- Supports advanced z/VM® management capabilities such as Live Guest Relocation with a few clicks
- Delegate responsibility and provide more self service capabilities to the appropriate teams

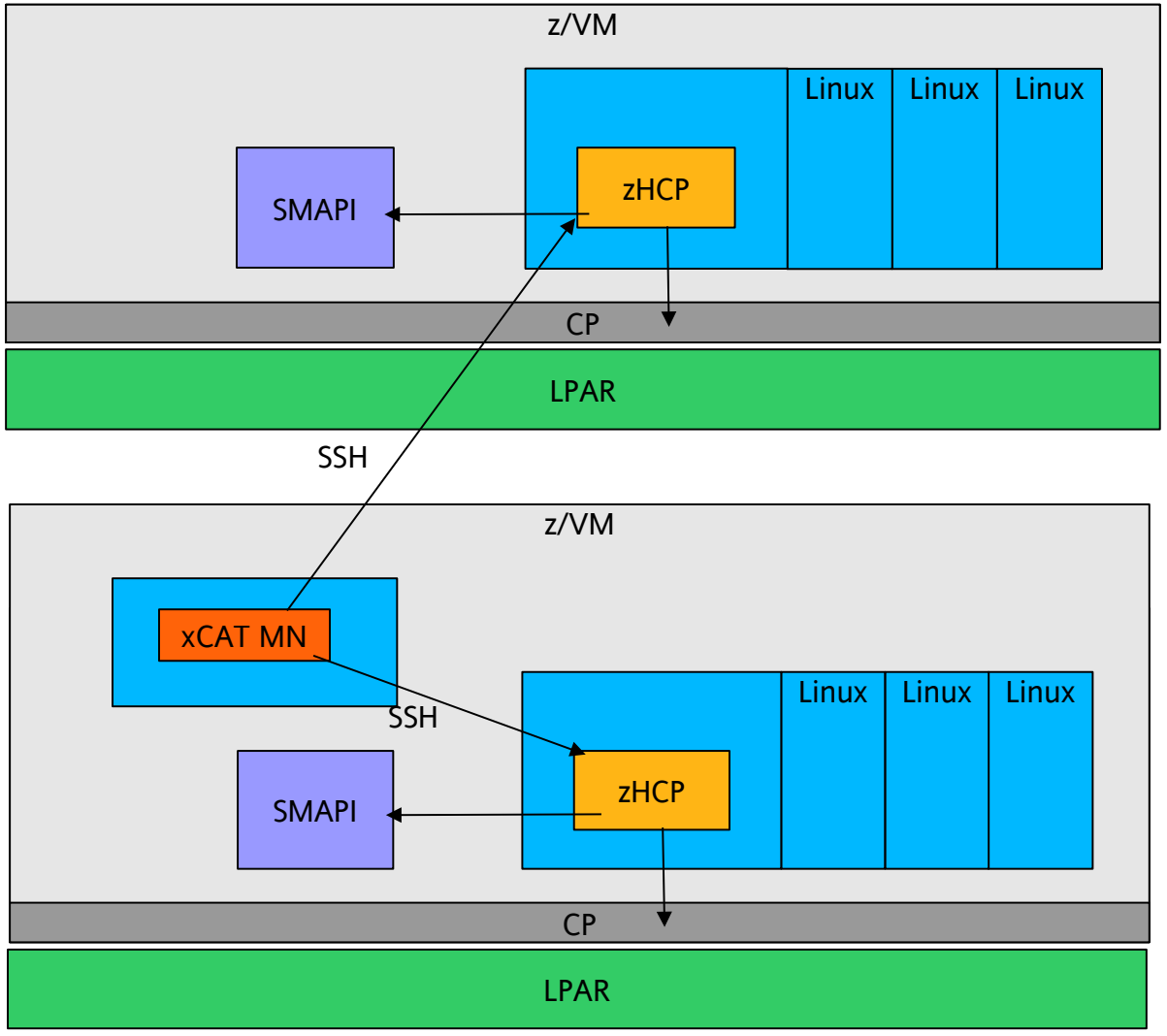


A simple, intuitive virtualization management tool providing management, provisioning, and automation for a z/VM environment supporting Linux® virtual servers

How xCAT Manages z/VM

zHardware Control Point: Manages other VMs via Systems Management APIs and CP Commands.
Each z/VM system needs to have a zHCP

xCAT Maintenance Node: Central management server.
Only one MN is needed for multiple systems.



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z Systems Cloud Blueprint

Orchestrate

Advanced Cloud

Orchestration & Optimization

Automate

Entry Level Cloud

Standardization & Automation

- Customers begin to standardize their environments for faster delivery of services.
- Automation is employed to provision and deprovision virtual guest environments using a shared pool of resources.
- Some customers may choose to allow end-user self service provisioning/deprovisioning.

Integrate

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OpenStack Programs

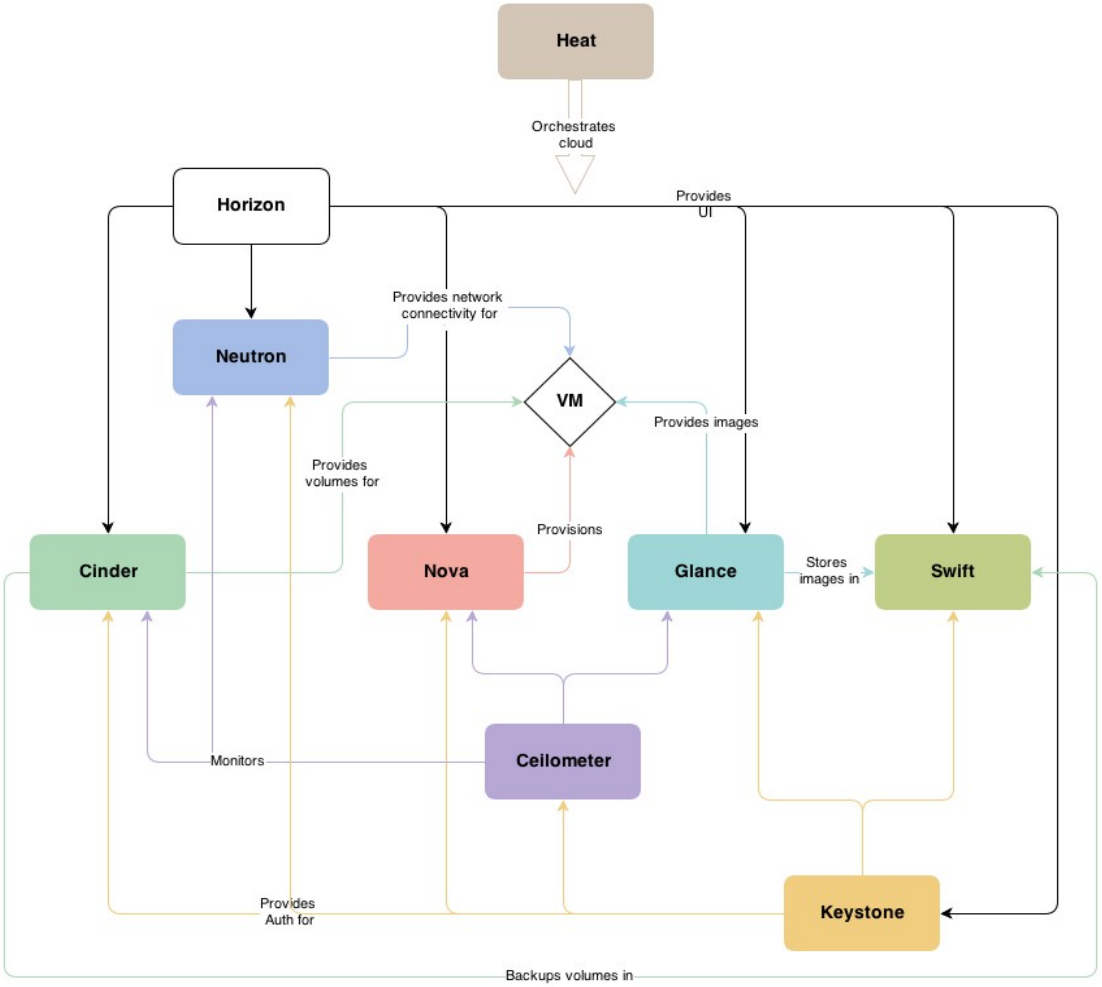


Image Source: http://docs.openstack.org/admin-guide-cloud/content/conceptual-architecture.html

Compute (Nova)

Block Storage (Cinder)

Network (Neutron)
Provision and manage virtual resources

Dashboard (Horizon)
Self-service portal

Image (Glance)
Catalog and manage server images

Identity (Keystone)
Unified authentication and authorization

Object Storage (Swift)
Petabytes of secure, reliable object storage

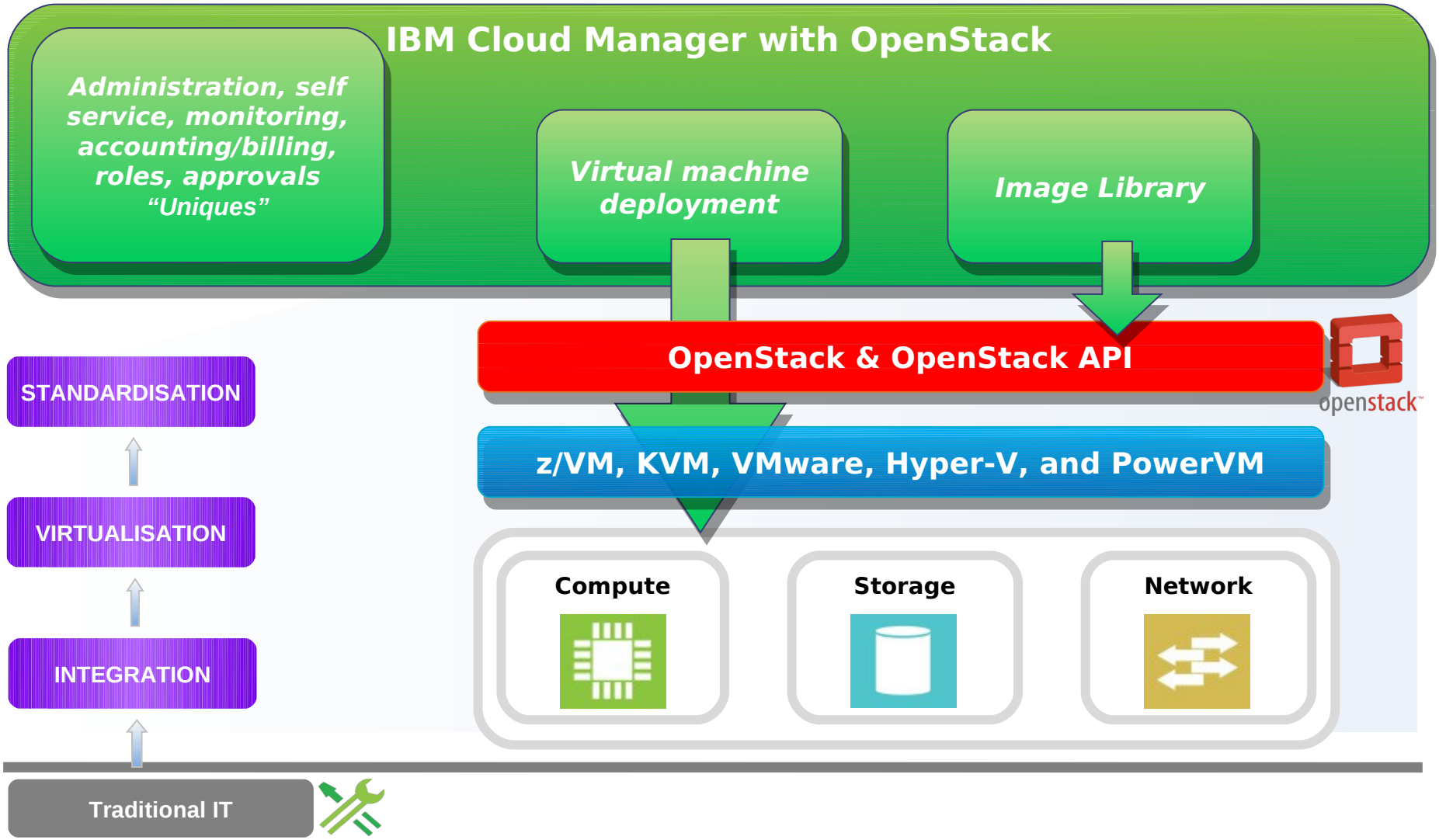
Telemetry (Ceilometer)
Data collection

Orchestration (Heat)
Engine to launch cloud applications based on templates

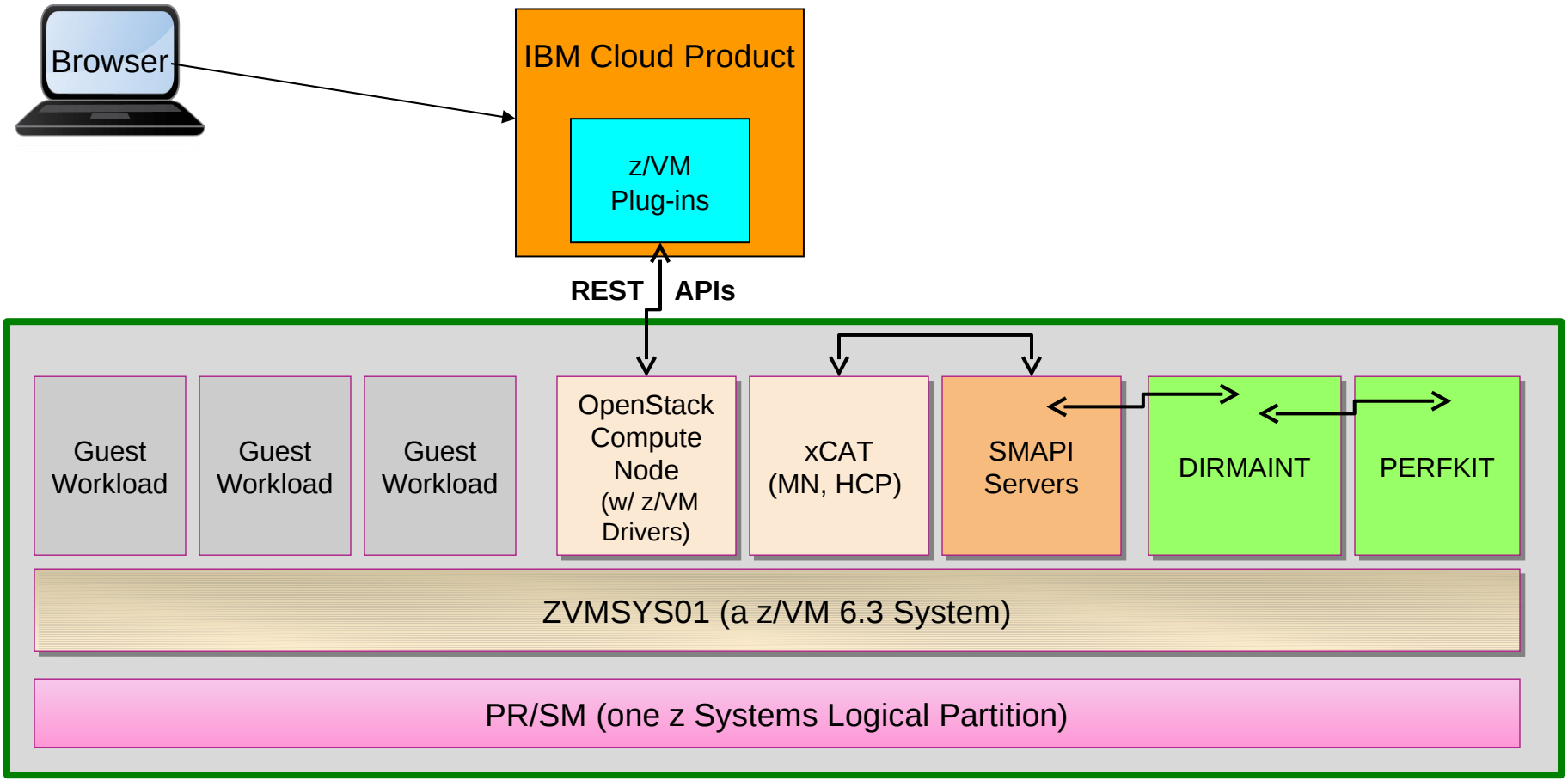
Database Service (Trove)
Cloud Database-as-a-Service

Data Processing (Sahara)
Data processing stack and management

Simplified platform deployment accross multiple platforms



z/VM 6.3 Pre-Installed Systems Management



Everything inside the z/VM LPAR is shipped with z/VM 6.3, up to and including the xCAT interfaces

Versions of DirMaint and PerfKit are included free of charge with the SMAPI server, but these versions of the products only communicate with SMAPI, there is no way to interact with them directly.

z Systems Cloud Blueprint

Orchestrate

Advanced Cloud

Orchestration & Optimization

Finally, some customers will want to evolve and optimize their cloud environment to orchestrate application deployment based on reusable workload patterns in order deliver dynamic cloud services.

Automate

Entry Level Cloud

Standardization & Automation

- Customers begin to standardize their environments for faster delivery of services.
- Automation is employed to provision and deprovision virtual guest environments using a shared pool of resources.
- Some customers may choose to allow end-user self service provisioning/deprovisioning.

Integrate

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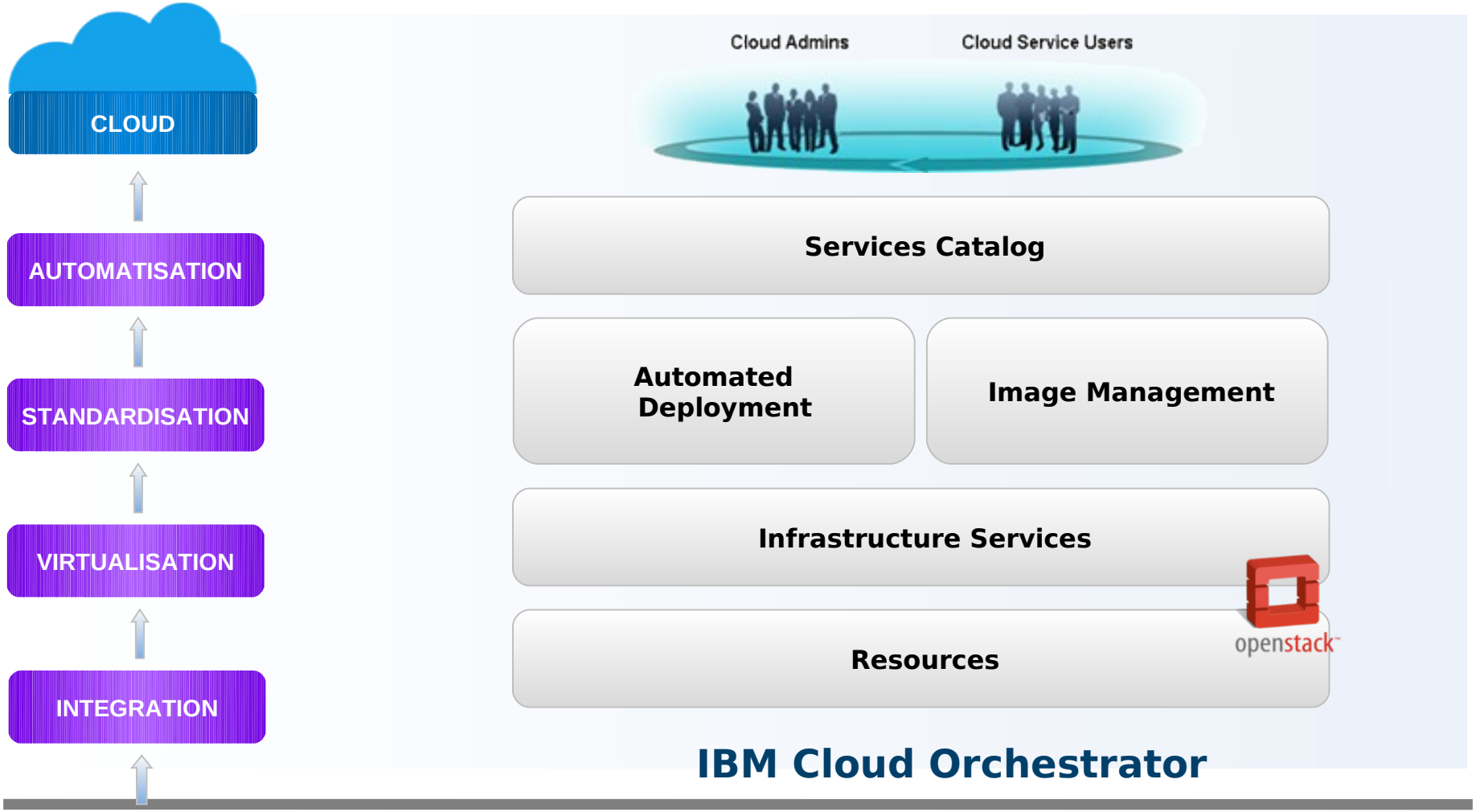
A solution for advanced cloud management



IBM Cloud Orchestrator V2.4 & z/VM

The **z/VM Directory Manager (DIRMAINT)**, or an equivalent, provides a command driven interface to manage z/VM directory entries. 1

The **z/VM Systems Management Application Programming Interface (SMAPI)** provides programmatic access to DIRMAINT and z/VM system functions. 2

A **Security Manager (such as RACF)** provides additional resource protection beyond DIRMAINT and SMAPI authorizations. This is optional, but if it exists it must be configured to support this architecture. 3

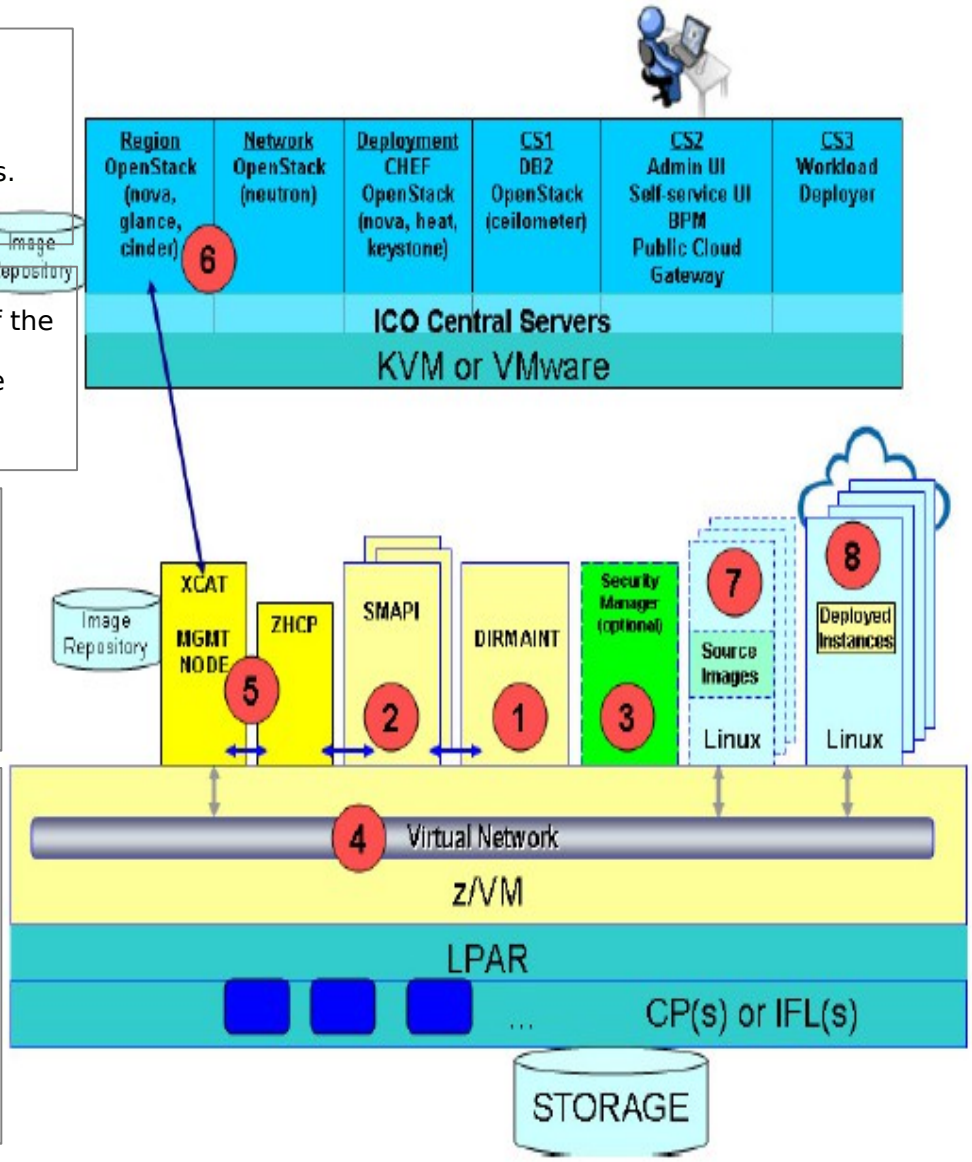
Virtual switches (VSWITCH) provide network connectivity between the management components, to allow command driven requests to come from the z/VM platform or other network connected locations. They also provide the networks on which newly provisioned instances will be connected to. 4

The **Extreme Cloud Administration Toolkit (xCAT)** is an open source product for provisioning virtual machines. 5

The **Region Server** and **Network Server** are part of the IBM Cloud Orchestrator infrastructure and run on the x86 platform. 6

Linux source images are existing Linux guests whose disk images are captured for deployment by IBM Cloud Orchestrator. These guests have specific configuration requirements 7

Linux deployed instances are Linux guests created via deployment requests from OpenStack on the zRegion Server or from IBM Cloud Orchestrator; however, they must be deployed from IBM Cloud Orchestrator to be managed by IBM Cloud Orchestrator. 8



Virtualization and Cloud Portfolio for Linux on z Systems

Virtualization Infrastructure & Virtualization Management	Entry Level Cloud Standarization & Automation	Advanced Cloud Orchestration & Optimization

Servers: z13, zEC12, zBC12

- Massively scalable
- Characterized by great economics / efficiencies
- Highly secure / available

z/VM 6.3

- Support more virtual servers than any other platform in a single footprint
- Integrated OpenStack support

IBM Wave for z/VM

- A graphical interface tool that simplifies the management and administration of z/VM and Linux environments

Differentiation

openstack™

Cloud Manager with OpenStack

- A simple, entry level cloud management stack
- Based on OpenStack
- Formerly known as SmartCloud Entry

Standardization

openstack™

Cloud Orchestrator

- Based on OpenStack
- Builds on functionality of **Cloud Manager with OpenStack** and adds runbook automation and middleware pattern support for workload deployment
- Formerly known as SmartCloud Orchestrator

Service Lifecycle Management

Contents

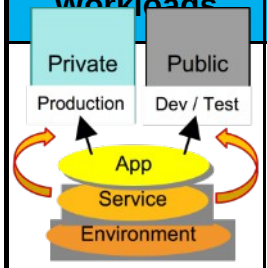
Typical Pros and Cons of Cloud Deployment Models

Cloud Type	Pros	Cons
Public *Multi-tenant environment where compute resources are purchased in desired increments*	Flexible Low cost of entry Rapid deployment Scalable Wide availability of vendors	Security of data Data residency Control DR Regulatory issues SLA
Private *Internally owned, deployed and controlled compute resources*	Control Security DR Data ownership Ability to tune	Time to implement Silo'd approach Acquisition cost Staffing Planning
Hybrid *Uses a mix of private, dedicated IT resources in conjunction with public infrastructure*	Best of both Fit workload for cost and performance Can be single point of control	Initial configuration Network latency Creating controls Management is complex

Hybrid Cloud use cases

Next Gen Hybrid Workloads

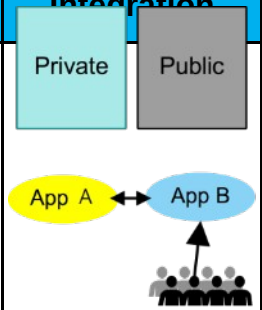
Independent Workloads



Choose private, public or hybrid cloud based on independent workload requirements

Move application DEV to the Cloud

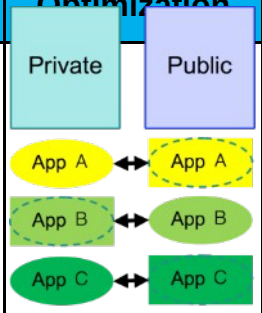
SOE - SOR Integration



Systems of Record on Private and Systems of Engagement on Public

Integration with services & data outside of the deployed workload

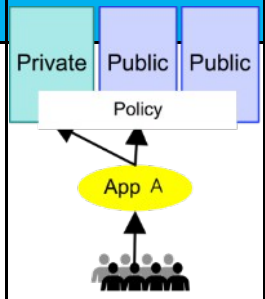
Portability & Optimization



Application and/or data are portable and can go to and from public and private for improved optimization

Workload shifting

Hybrid Cloud Brokerage & Management

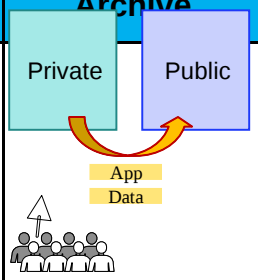


Planned or Policy based Management and sourcing across multiple environments (infrastructure, platform & app)

Partitioning of Workload

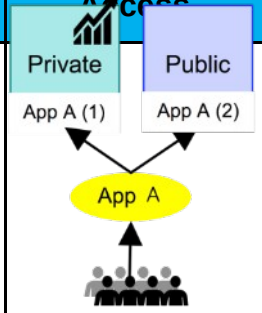
Hybrid Infrastructure Scale Out

Backup and Archive



Leverage off-premise resources for backup and archiving of on-premises resources

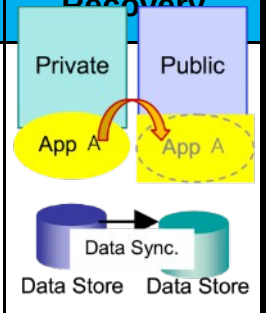
Capacity Access



Opportunistic use of public cloud as additional resource for large jobs (e.g., HPC, BigData, Batch)

Leveraging Cloud for extra capacity
Capacity scaling

Disaster Recovery



Setup and make available a parallel environment off-premises

IBM BlueMix – Enabling Next Generation Cloud Applications

Build hybrid environments. Connect to on-premises systems of record plus other public and private clouds. Expose your own APIs to your developers.

BlueMix brings unparalleled speed to development, deployment and IT operations & cuts the time needed to go from idea to running application to days vs months

100% Open Standards-based scalable platform – *a competitive differentiation*

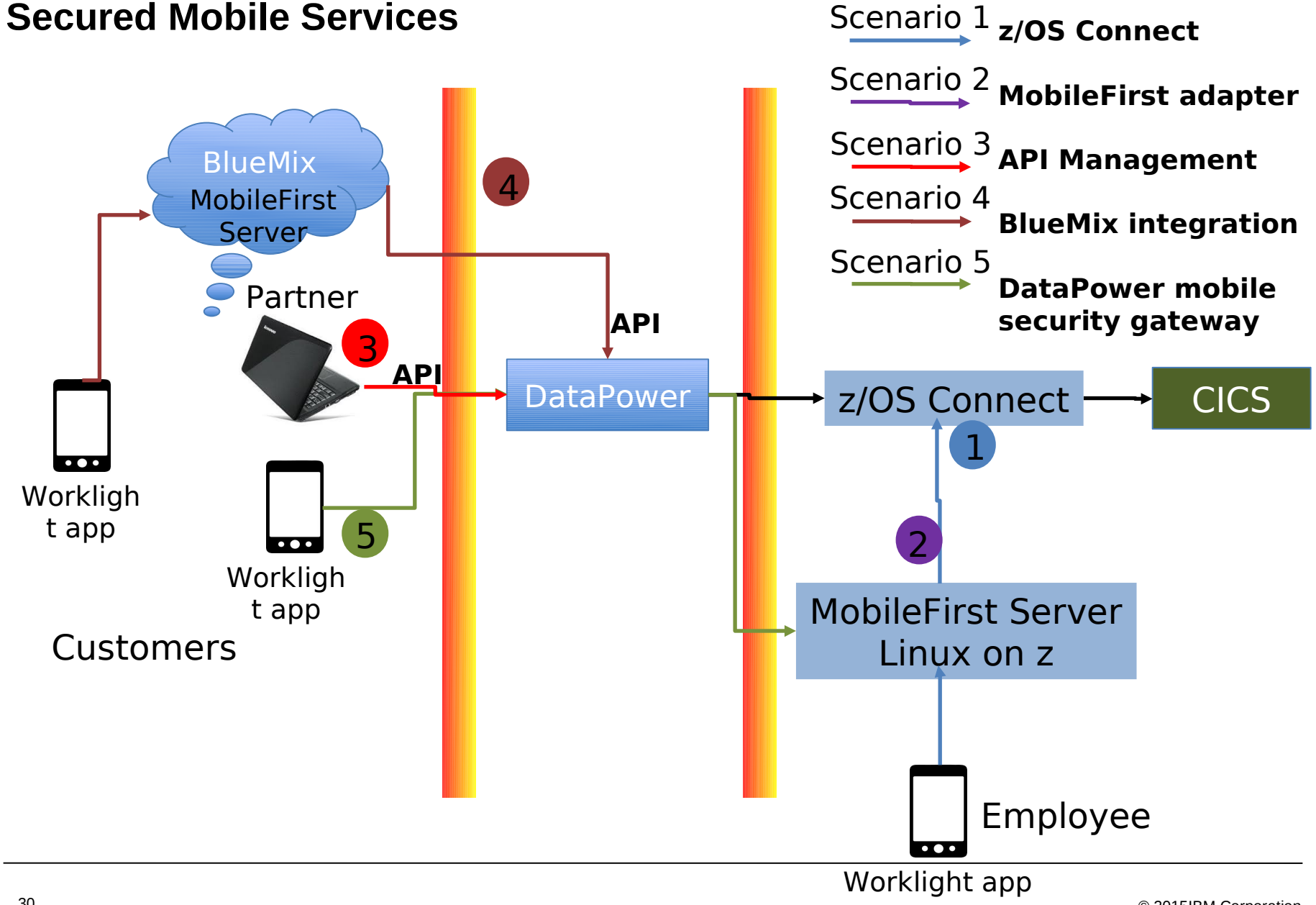
Allows customers to use the same proven API services that they use on-premises, but in a much simplified, easy to consumer and instantly deployed manner

z Systems - BlueMix Integration

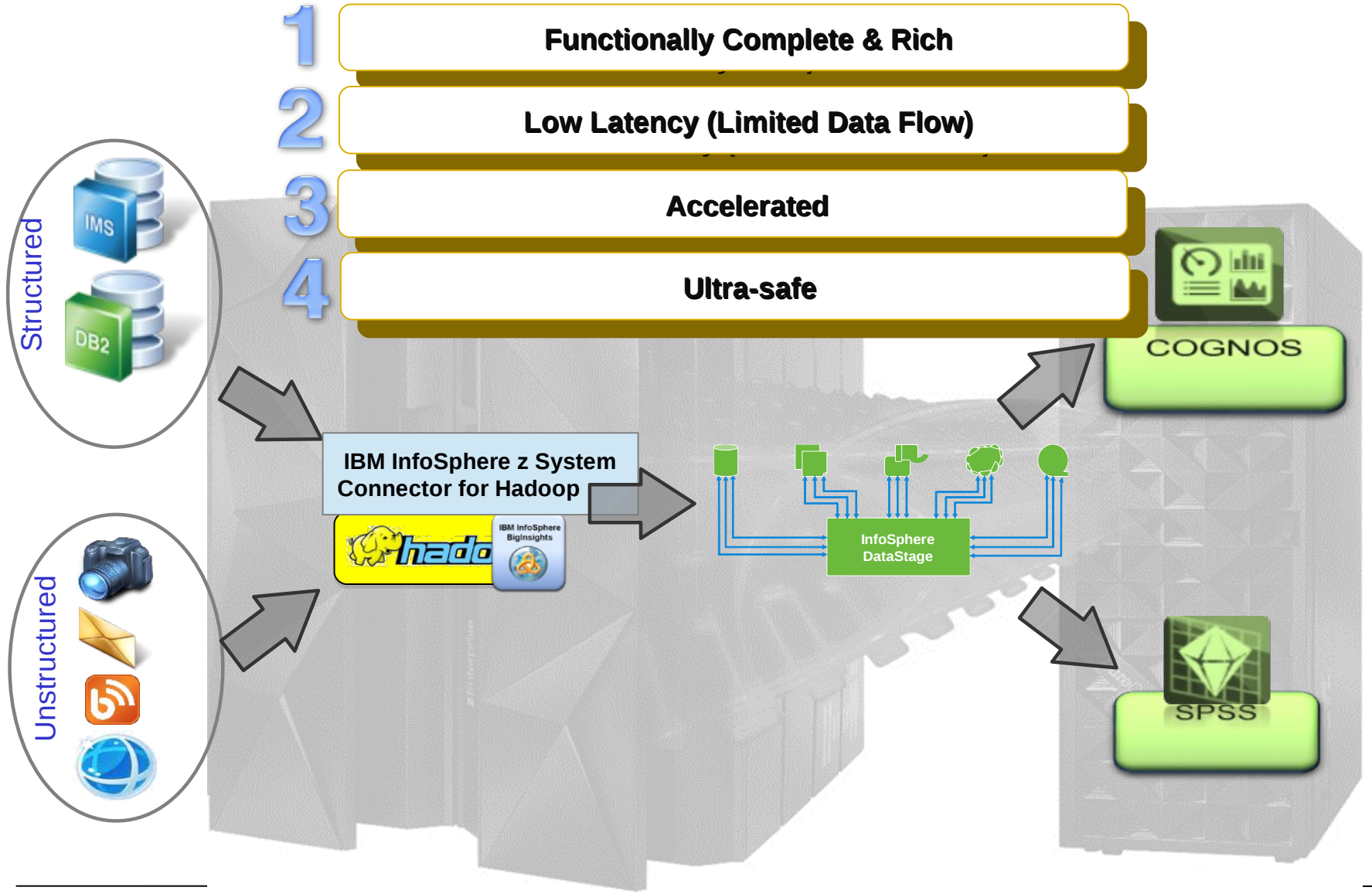
Expose services in a secure manner via zOSConnect to achieve rapid open source based development whilst leveraging mainframe assets

Expose z/OS Data as-a-Service via BlueMix to enable system of record to be called by Dev-Ops driven composable apps

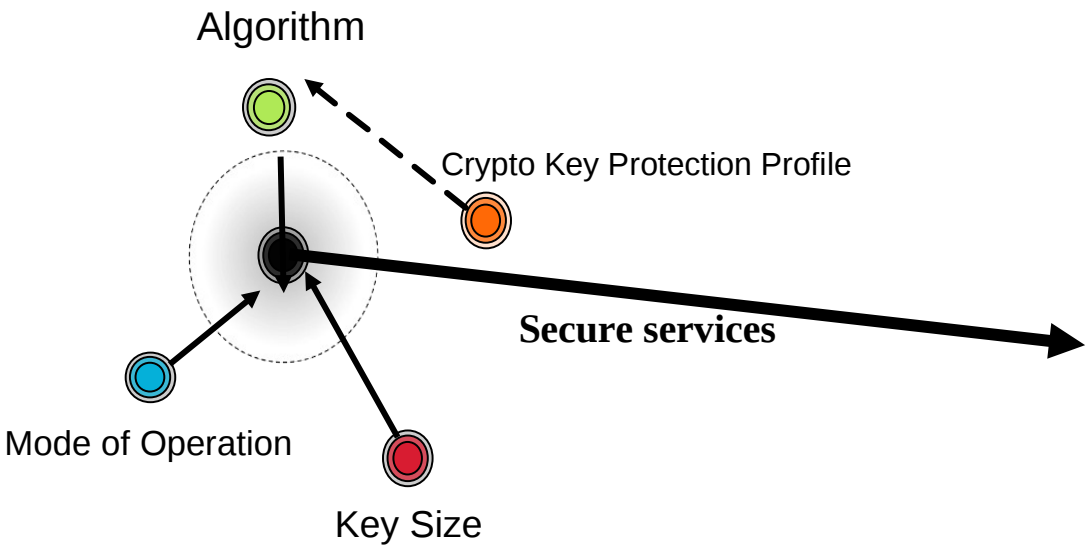
Secured Mobile Services



Secured Analytics Services



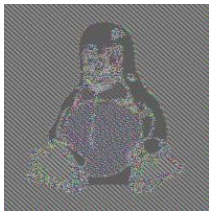
Cloud Services Security improved with z System features



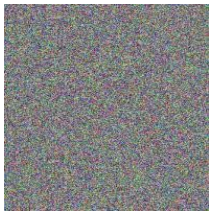
Cloud services data is requiring and will required higher and higher levels of security

z13 Mode of operations

Original Image



Encrypted using ECB mode



Modes other than ECB result in pseudo-randomness

CBC-PCBC-CFB-OFB-CTR

Build your Hybrid Cloud now with z Systems Hybrid Cloud Connect Test Drive

Enabling Frictionless Hybrid Clouds with z Systems

Provides the fundamental capabilities necessary for an enterprise customer to integrate on premise enterprise systems with public cloud offerings.

Reduces time, cost and complexity for implementing a Hybrid Cloud with z Systems while preserving the performance, security and reliability that our enterprise customers need.

Accelerates time to value for z Systems customers by providing free services from IBM that help a customer get started with their hybrid cloud implementation.

GaaS: Gateway as a Service

Agile: *No on premise infrastructure additions required.*

Consistent: *Leverages a cloud offering to support a cloud strategy.*

Services Enablement

Jumpstart: *Overcomes the initial "where do we start" challenges.*

Partnership: *Experts from IBM combined with customer domain experts*

A *hybrid cloud* is a composition of an off-premise public cloud with on-premise private cloud or enterprise systems that remain as distinct entities but are bound together by technology that enables data and application portability.

33

Announcing Custom Patterns for Linux on z Systems

You asked – We delivered!

One dozen patterns covering 50% of Linux on z Systems portfolio revenue

Clear commitment from IBM to pattern-enable middleware products for Linux on z Systems

Organizations will be able to build out complex Cloud workload instances on z Systems in a fraction of the time

Time Savings

Reduces multi-product deployment durations by up to 80%

Reduces deployment error/fix durations

Quality and Efficiency

Reduces need for deep product skills

Improves quality of delivery

Create your private cloud with IBM Enterprise Cloud System

NEW

CRN TECH INNOVATOR AWARDS 2013

LINUX JOURNAL 2013 Readers' Choice

Standard Linux Environment

- *Red Hat/SUSE*
- *3000+ Applications*

openstack

Fully Automated Cloud Orchestration & Monitoring

IBM Deployment Expertise done in the factory with on-site personalization

EC12, BC12 and z13 compute in any config

Storwize V7000 or DS8870 in any configuration

Cloud Orchestrator
OMEGAMON® for z/VM
TSM
Operations Manager
Backup Manager
IBM Wave

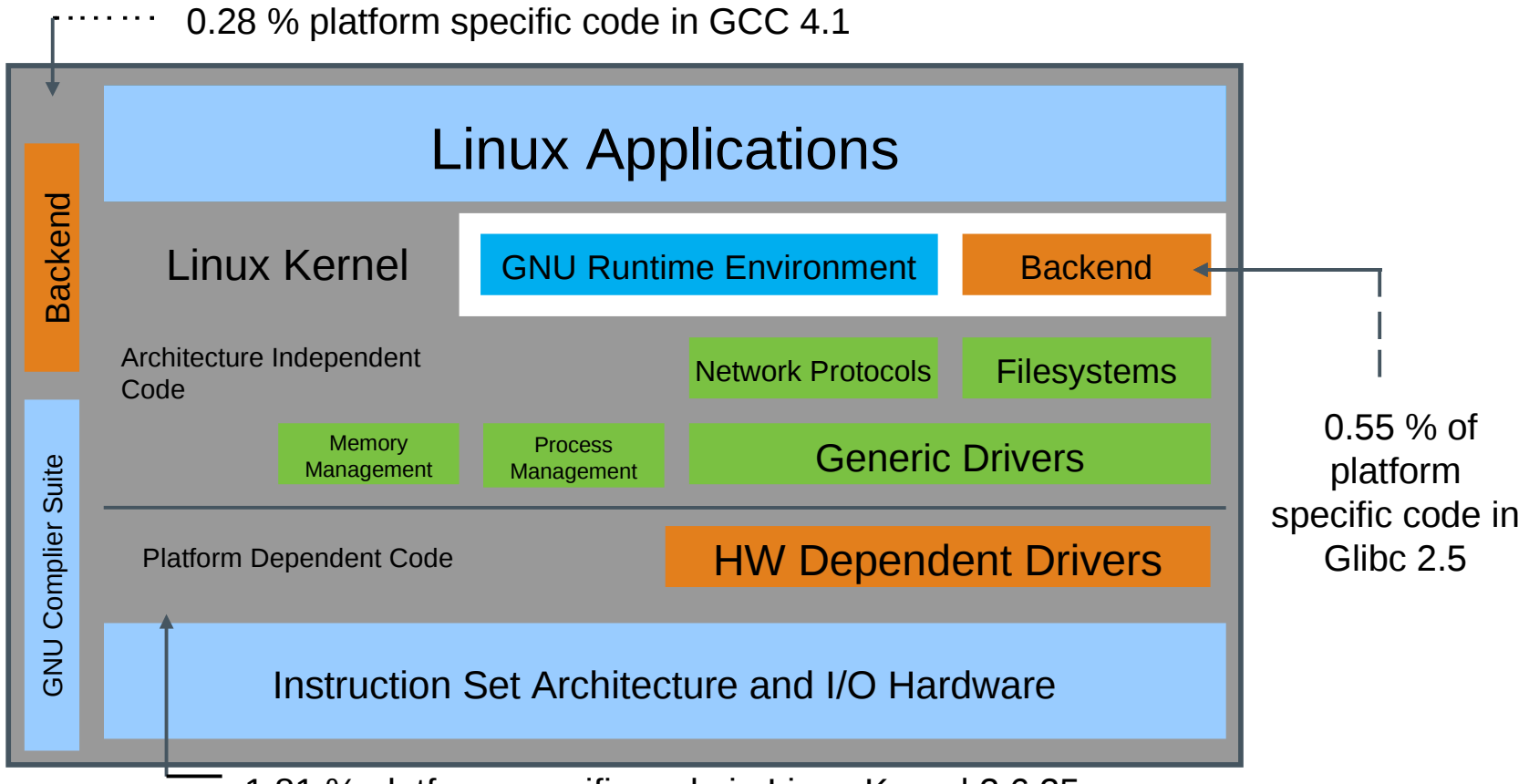
- **Factory Integrated**
- **Delivered in ½ time of other Integrated Systems***
- **Production Ready in HourS**

- **Scale up to 6000 VMs**
- **Industry Leading Availability**
- **Proven Security**

*Based on feedback from V-Block distributor

Contents

Structure of Linux on z Systems



While looks the same on different platforms,

every shows different personalities, qualities, features and options derived from the platform architectures.

What is Different about a Linux on IBM System z ?

Do more with less

- Deploy more servers, more networks, more applications, and more data
- Achieve nearly 100% utilization of system resources nearly 100% of the time
- Enjoy the highest levels of resource sharing, I/O bandwidth, and system availability

Reduce costs on a bigger scale

- Save on software license fees
- Consume less power and floor space
- Minimize hardware needed for business continuance and disaster recovery

Manage growth and complexity

- Exploit extensive facilities for life cycle management: provisioning, monitoring, security, workload mgmt, capacity planning, charge back, patching, backup, recovery, etc.
- Add hardware resources to an already-running system without disruption
- Workload deployment on a “scale up” machine means fewer cables, fewer components to impede growth

More flexibility, minimize lead time for new projects

- Workload deployment to a single System z server offers significant advantages in terms of flexibility
- Rapid provisioning reduces lead time for new IT projects, helping to increase business agility

Linux on z System, ok but which type of workloads ?

Existing major usage patterns

- Oracle Database on Linux on z
- WebSphere (App Servers, Message Broker, MQ, …)
- SAP Application Servers
- Basic Infrastructure Services (HTTP Server, FTP, Apache, Tomcat, Samba, Networking, Tivoli Storage Manager, Domino...)
- Leverage existing ISV Solutions or custom client applications
- DB2 LUW
- Other WebSphere components (Portal Server, Business Process Manager, …)
- ...

New usage patterns

- Mobile on z Systems (IBM MobileFirst Server)
- z/VM Virtualization management (IBM Wave) and Cloud
- Analytics on Linux on z (Cognos, Spss, Infosphere, …)
- OpenSource solutions (Hadoop, PostGreSQL, MariaDB, Docker,...)
- Enterprise Linux Printing (Ubiquitech solution,....)
- Advanced Case Management (FileNet),Document and customer management (Filenet)
- Migrate Oracle to DB2 UDB on Linux on z (incl. InfoSphere Data Replication)
- UNIX based Solutions from competitive platforms (e.g. Solaris, HP-UX)
- ...

Key Takeaways

- Cloud is transforming how service is delivered with efficiency and speed
- z13 delivers a trusted and secure Cloud: Agile, fully virtualized private and hybrid cloud computing now with Enterprise Grade Linux
- z13 Transforms the economics of IT service delivery without the risk

32% lower TCO when consolidating the work of 50 or more cores from x86 or up to 60% lower cost than public cloud alternatives

Thank You

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Digital Solutions for z Systems

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Lower TCO With a Mainframe Cloud

More cases on why Linux on z System:
https://www.youtube.com/watch?v=QeZyGzvM41k&feature=youtu.be&sf34372361=1
here http://www-03.ibm.com/systems/z/os/linux/solutions/zlo.html

Infrastructure Matters

Affordability	Attractive price performance. Offers the lowest TCA for Linux deployment of Oracle database workloads over competition - saving over half the cost[1]. Lower costs through reduced complexity - Simplified management, Reduced environmental costs, Greater flexibility to meet changing needs
Availability	Near zero downtime/continuous availability, even during maintenance of hardware, OS, database and application components. Enhanced disaster recovery responsiveness.
Efficiency	Reduced infrastructure complexity through consolidation, automation and virtualization, saving on energy, labor, software, and more. Management of the end to end applications, fast private network, fewer hops and points of failure. High resource utilization.
Integration	Capability to handle the largest volumes of data, in a day and age when data is booming. Tight integration and simpler management of data and applications on one system. Low latency. Homogeneous system environment.
Scalability	Flexibility and near-linear large scalability, unmatched in the IT world, to grow with your business. Superior virtualization. Unprecedented scale.
Security	Comprehensive protection of critical data from all IT security threats. Private server network. Most secure platform with Common Criteria Evaluation Assurance Level 5 (EAL5).

[1] Based on measurements at a large bank comparing a production workload running on Oracle RAC DB on distributed versus Oracle RAC DB on Linux a Enterprise Linux Server with cores running at 5.5 GHz.