Towards the 5th Decade of Sustainable Wealth for Thais

Cloud & Datacenter

EGA

The Stock Exchange of Thailand

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Materials excerpt from SET internal presentation and virtualization vendor e.g. vmware

SET Virtualization/Cloud Journey

Past
2009 - 2012

Educate Stakeholders to have confidence in Virtualization, and Centralized Infrastructure

Cost Management, Charge-back to Business unit

Current
2013 - 2014

Entering to **BAU phase**, Virtualization and Cloud computing are asset of IT Operation
(In charged by All System & Network Engineer)

Future
2015 - 2017

Continue development of **SET Virtual Data Center** from Hardware Virtualization to Network and Storage Virtualization

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Agenda

Virtualization and Cloud

Cloud Architecture

Proactive Management

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Virtualization and Cloud

Cloud Architecture

Proactive Management

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Everyone is talking about Cloud

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Applications

- Enterprise Architecture framework
- COE (common operating environment)
- Break examples

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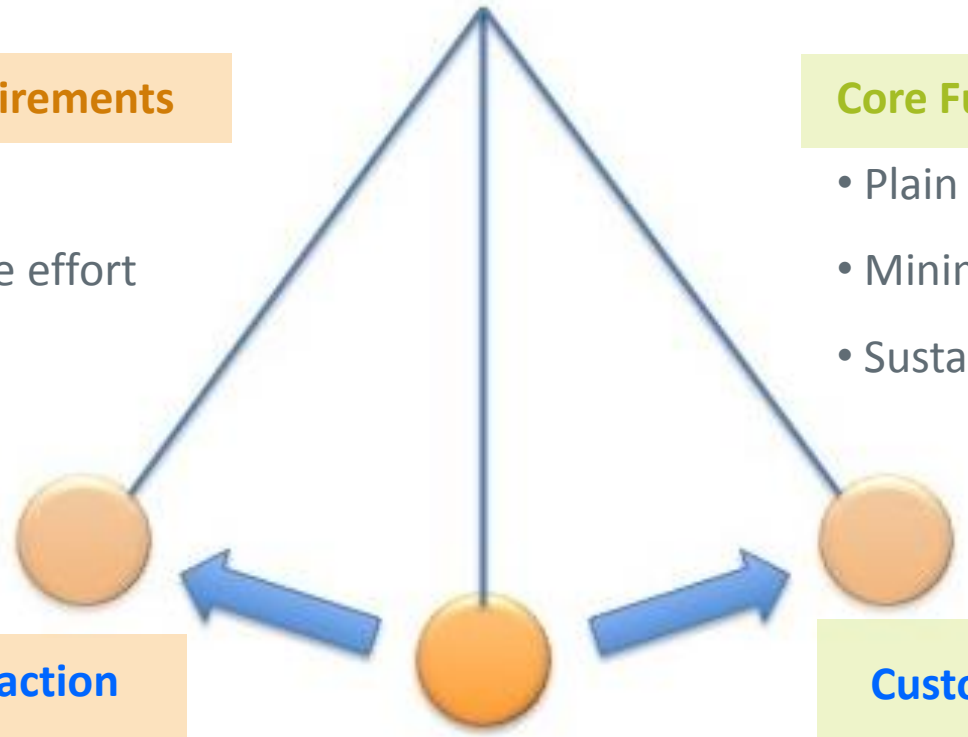
The Pendulum: IT Characteristics

How to Respond to User Requirements

Fully Support Requirements

- Fully Customize
- Huge maintenance effort
- Not sustainable



Core Functions Focus

- Plain vanilla pattern
- Minimum customization
- Sustainable maintenance

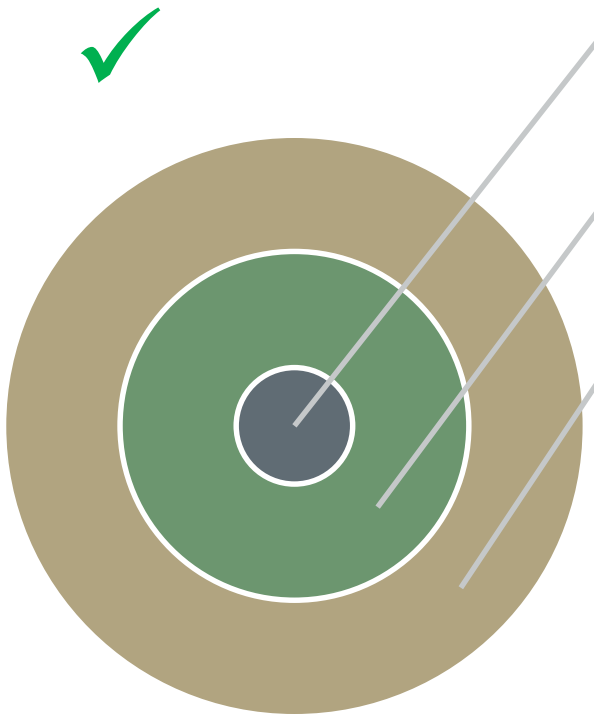
Customer Satisfaction

Short term Long term

Customer Satisfaction

Short term Long term

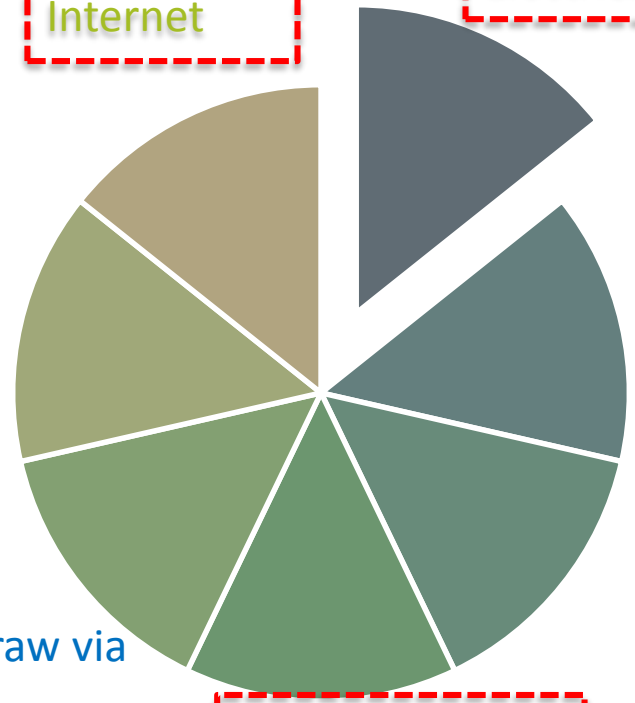
Onion VS Pizza Model (Banking Example)



- Deposit
- Withdraw
- Transfer

- Internet
- Mobile
- ATM

- Utilities Bill Pay
- Electricity Payment



Transfer via Internet

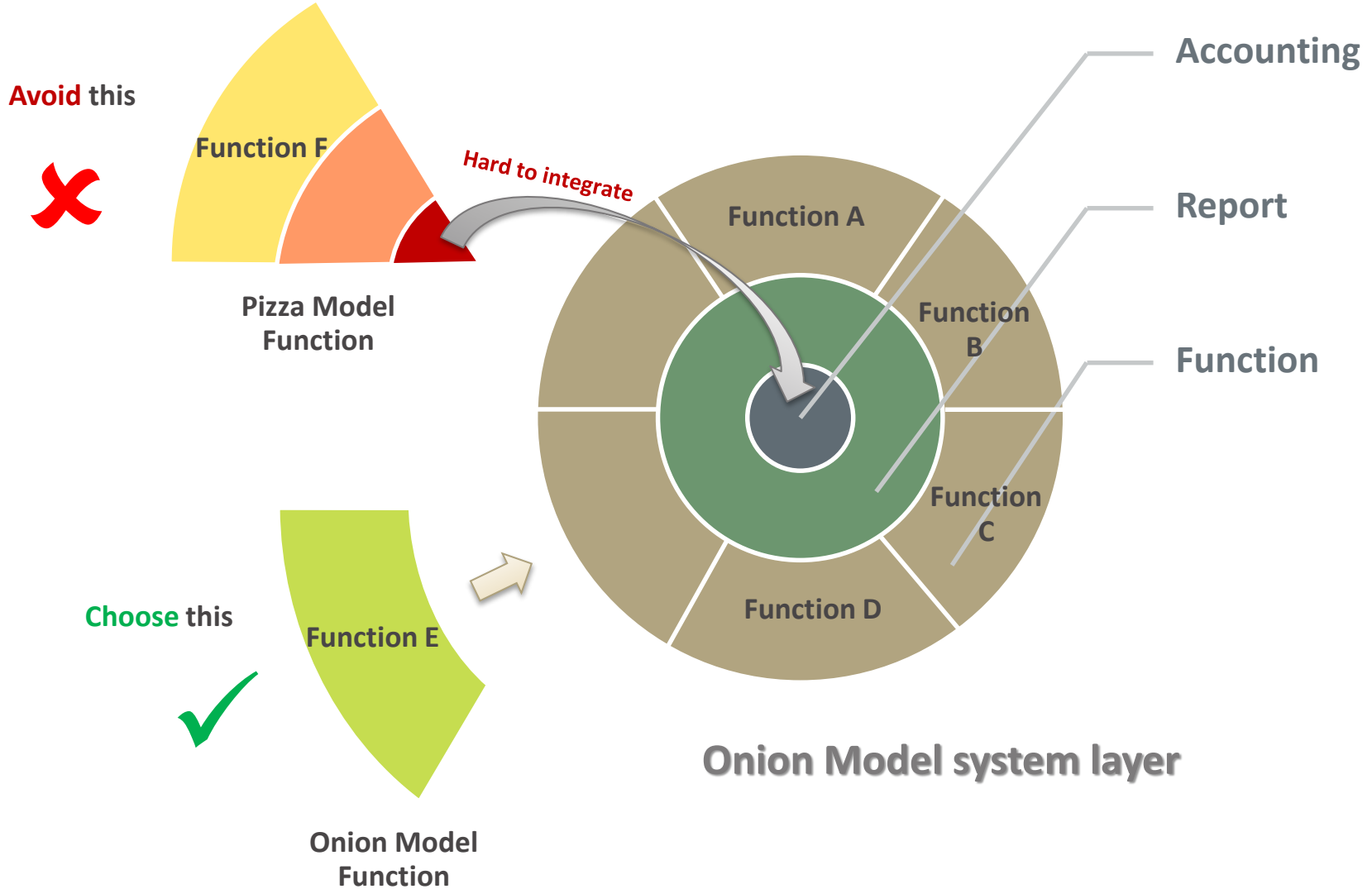
Transfer via Mobile for Electricity Payment

Deposit via ATM

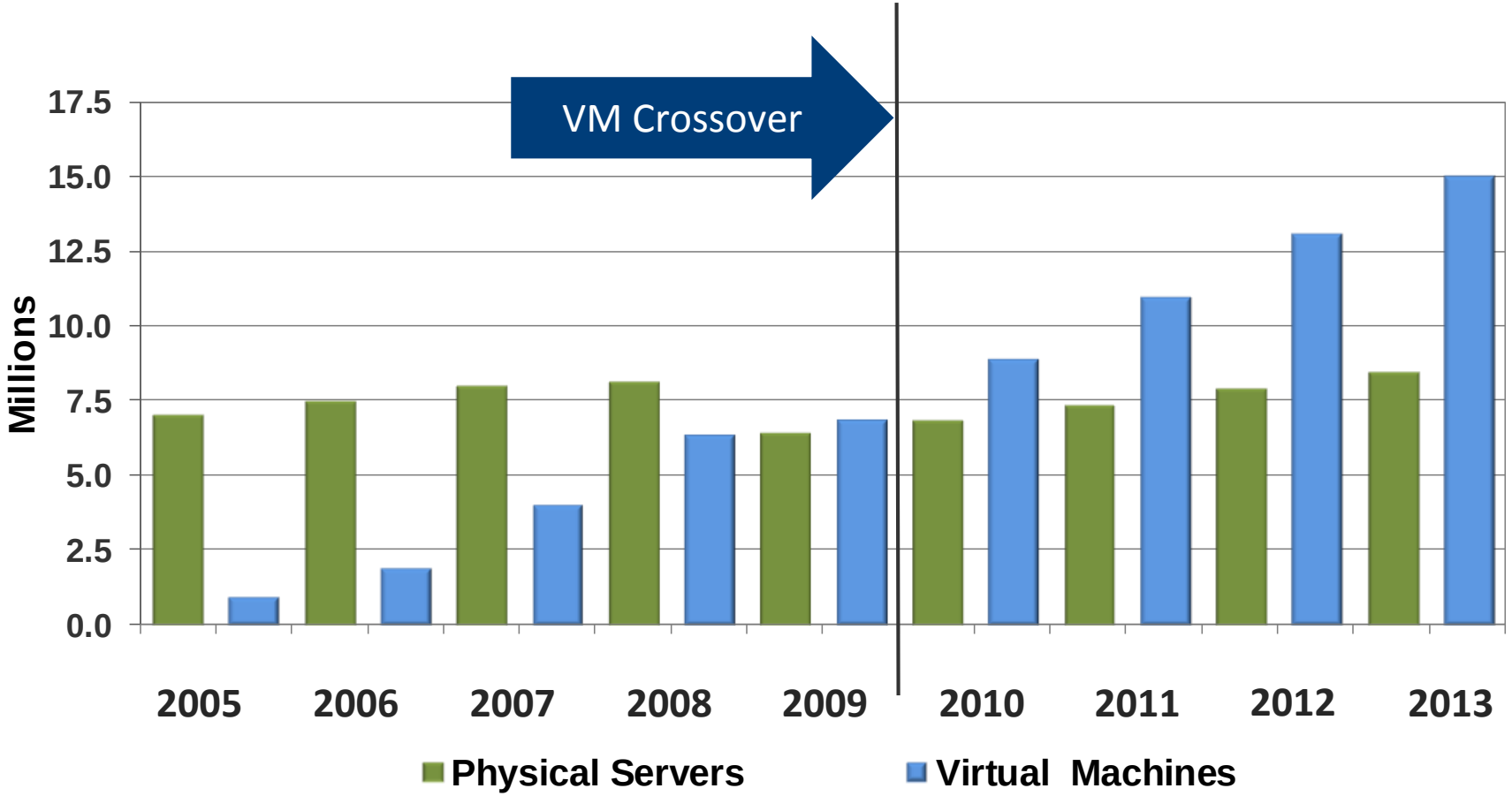
Withdraw via ATM

Transfer via Mobile for Utilities Bill Pay

System of Layers in IT Solution



Aggressive adoption of Virtualization



Source: IDC

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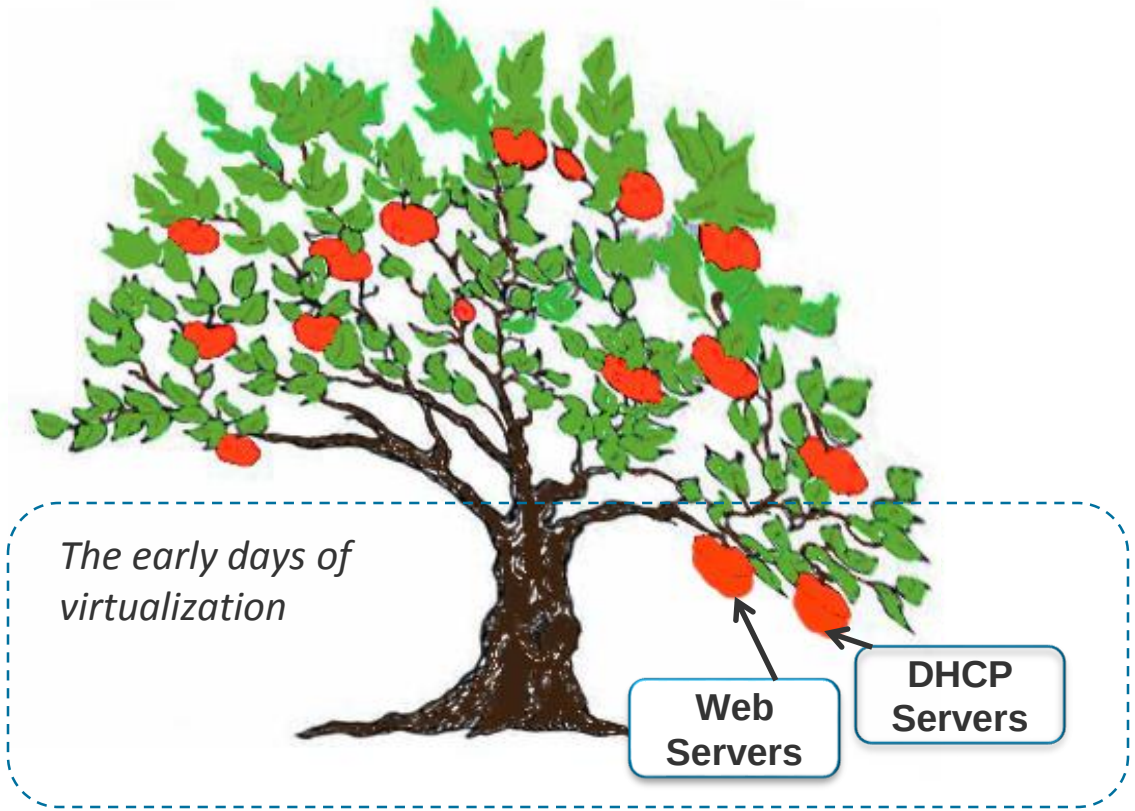
Increasingly Virtualizing Business Critical Appl.



- **More Workloads running Virtualized than Physical (increasing at a rate of 9% year)**
- **Tier 1 Apps Virtualized in high percent and continuing to growing**
  - MS Exchange 42%
  - MS SQL 47%
  - Oracle DB 28%
  - SAP 28%

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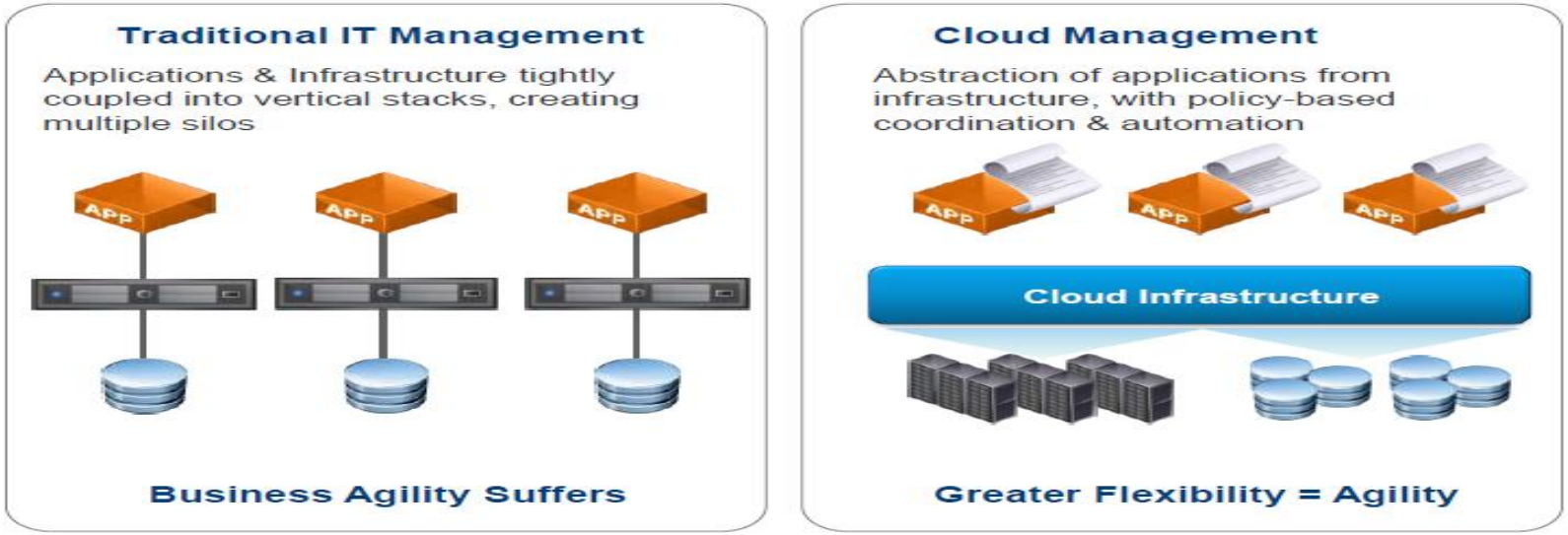
A new approach = “Cloud First”



Drive IT Agility to Increase Business Value

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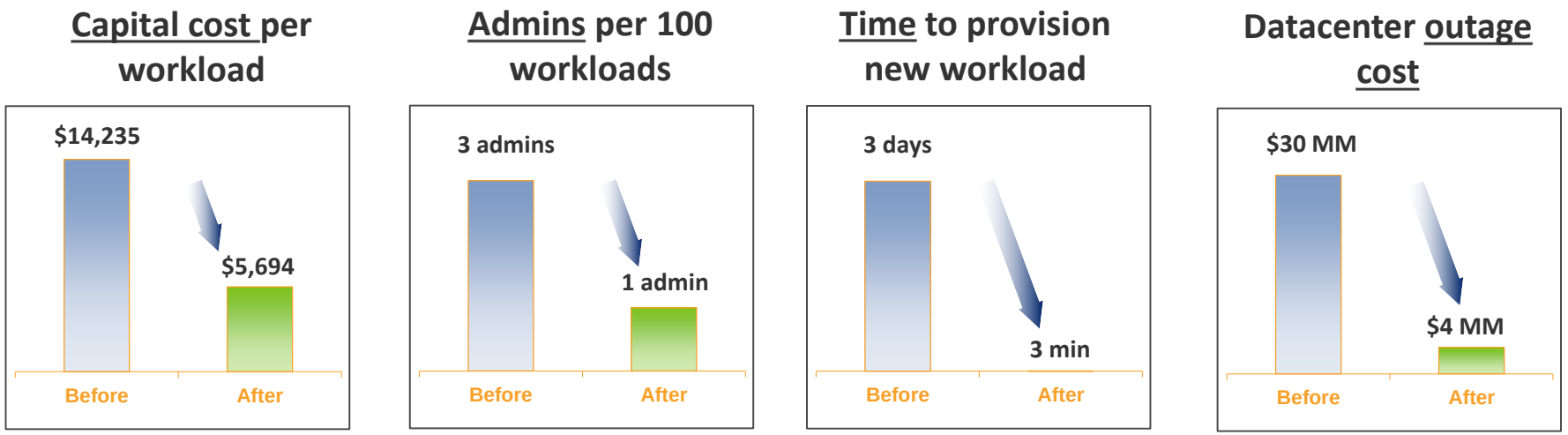
Assessment: Operational benefits of Virtualization



Based on Averages from VMware Customer Operational Readiness Assessments, 2011

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SET's Cloud Roadmap

Long-term Vision: Business Driven IT with Hybrid Cloud

	Consolidation. (2010)	High Availability (2011)	Self-Provisioning (2012)	Business Driven (2013 and beyond)
IT Capabilities	Consolidation Replace old HW Efficient Utilization Greater Flexibility	Reduce Operational Time Better quality of service Higher Performance Reliability	Beginning of Cloud Automated Increases IT agility Self-service	Flexibility On-demand Resources Business Driven
Business value	**CapEx** **OpEx**	CapEx OpEx **Availability**	CapEx OpEx Availability **Responsiveness**	CapEx OpEx Availability Responsiveness **Business Driven IT**

Sources of Sustainable competitive advantage

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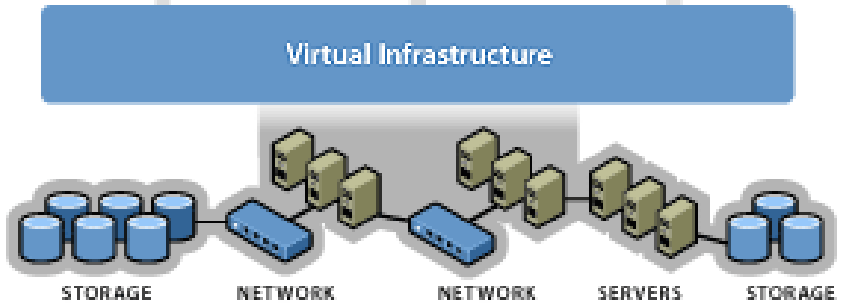
SET's Virtualization Statistics

Impressive Consolidation Ratio
Prod 10:1 , Dev 15:1

SET COE considers VM as first preferred choice
for future HW refreshment and capacity expansion

Overall servers are 75% virtualized



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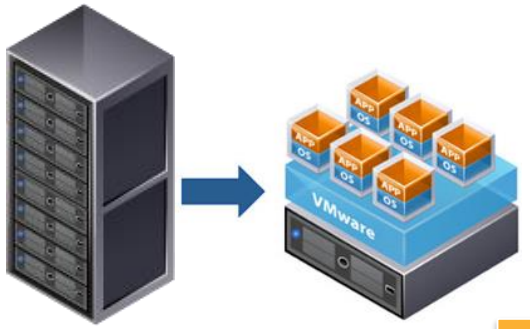
As of Q4/2015

SET Achievements

Consolidate many servers into a single server (resource sharing)



- ❑ Reduce **$$$$$** from h/w requirement, power consumption, cooling requirement
- ❑ Increase business agility

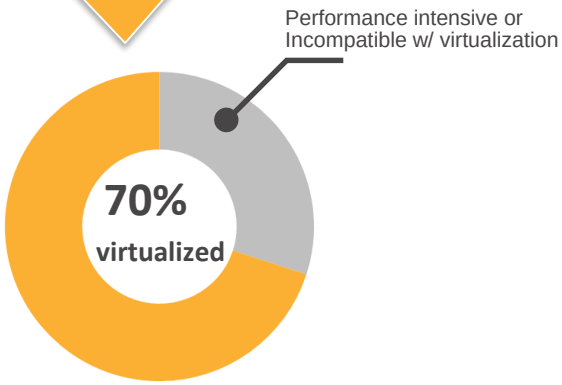
  Reduce time to market (procurement & provision)
- ❑ Reduce human effort to deal with hardware problems
- ❑ Let staffs focus on doing proactive tasks !

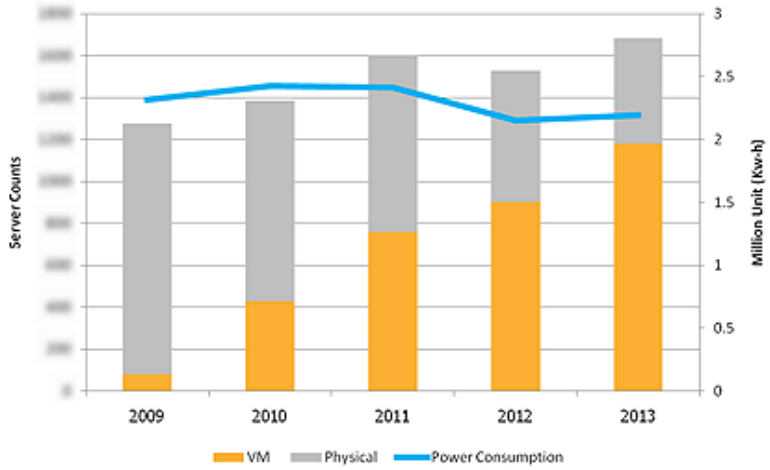
Consolidation 10-15:1

Considered as first preferred choice

Significantly reduce time to provision

~~1.5 Month~~ → 0.5 Day





In 2013, The world's average is 51%; maximum is 80%

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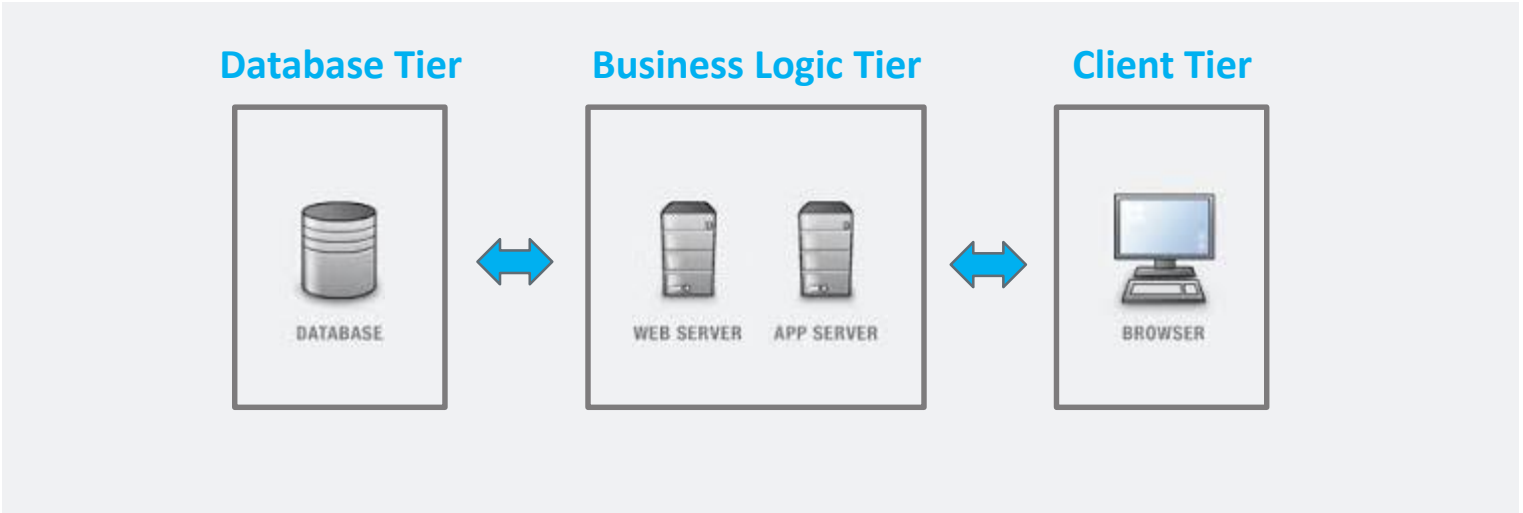
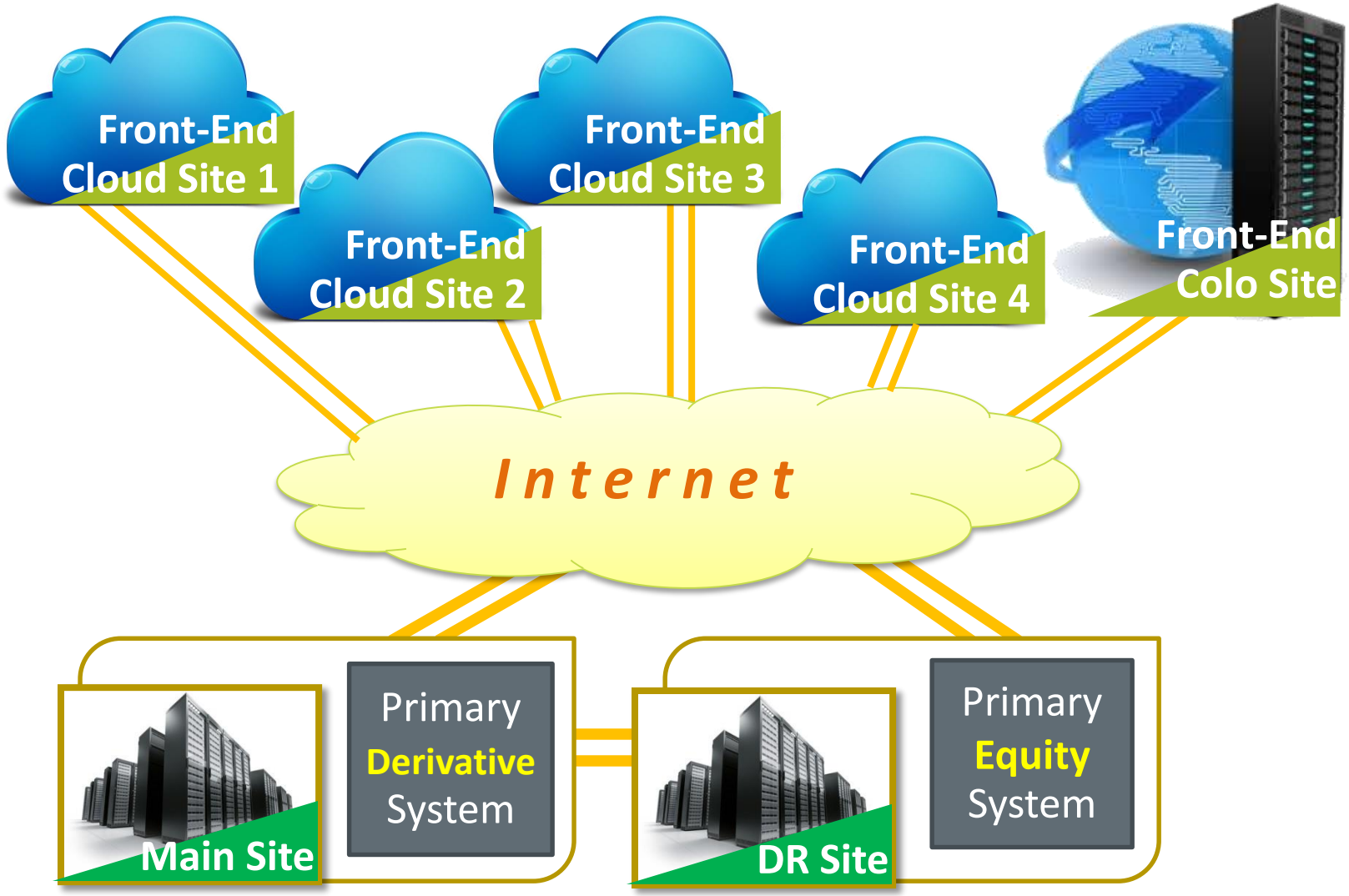
Case Study: SETTRADE Online Trading

- Tier base architecture



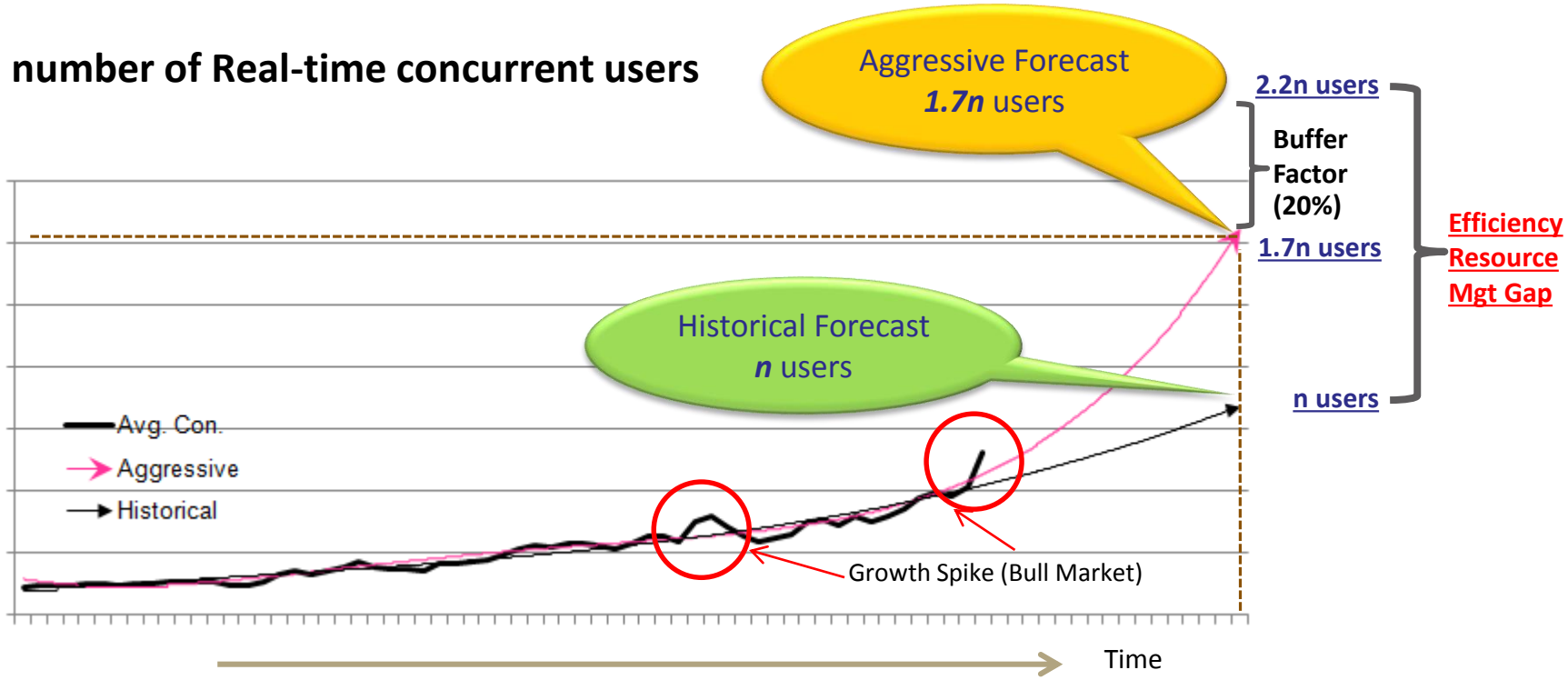
SETTRADE Infrastructure Diagram



Volatile Demand Management with Cloud
(Online Trading Example)

- Front End Supporting all Real-time products: Streaming Pro, iPhone, iPad, Android Device, Customized Real-time Product, etc..

The number of Real-time concurrent users



*** Use the concept of "Burst-able" in Public Cloud Site for Resource Planning**
Planning for Historical Forecast with some room but Burst-able to serve Aggressive Forecast with Buffer
Buying more resource can be done within 1 week – 1 month

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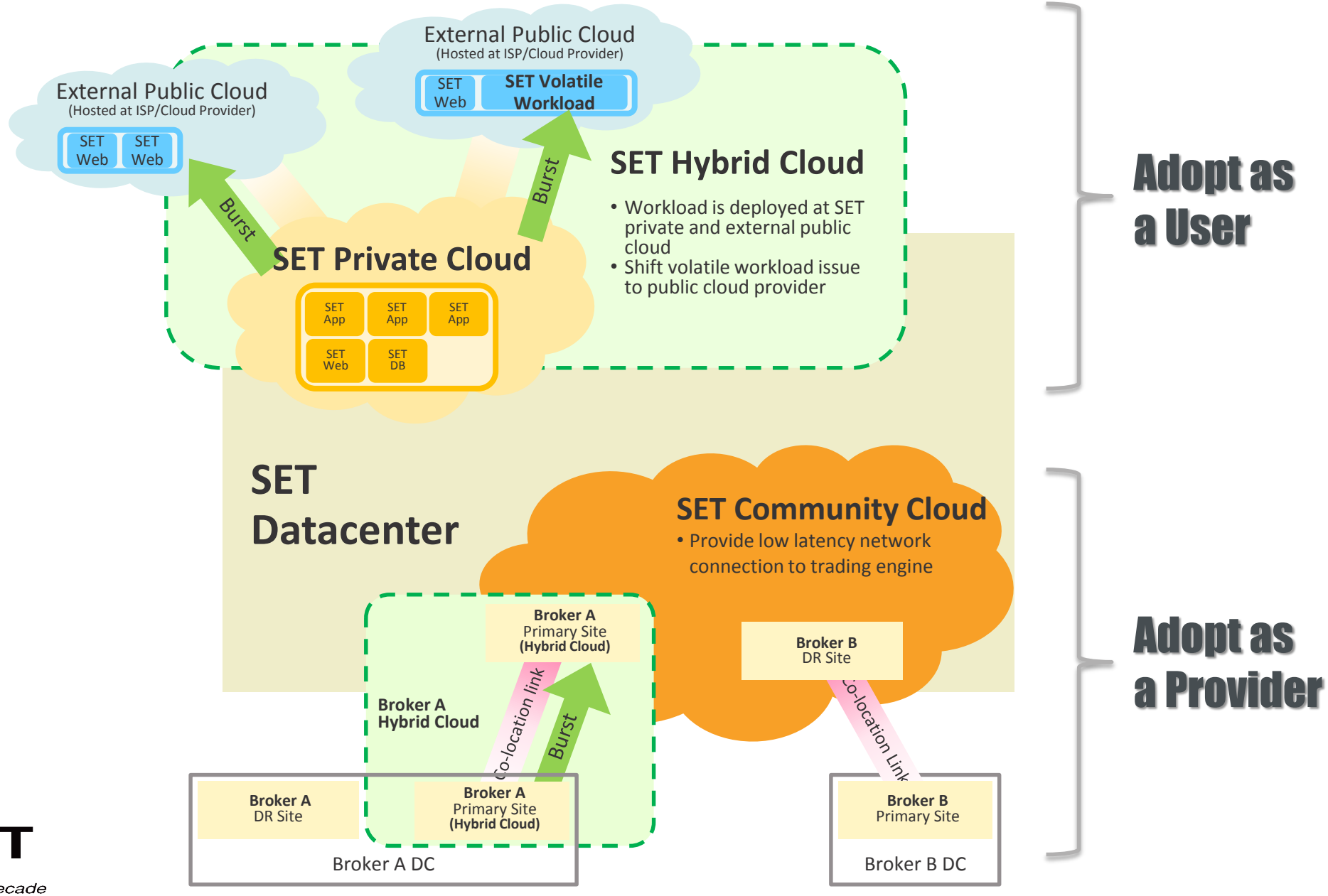
SET IT Cloud Strategy (Feasibility)



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Agenda

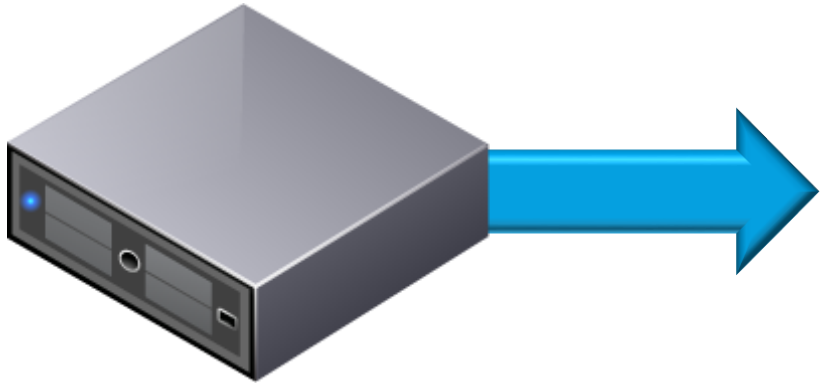
Virtualization and Cloud

Cloud Architecture

Proactive Management

Computing become Software-defined, but…

Past



$10,000
10 weeks

Present

VLAN networks

Firewall

Load Balancer

IDS, security, monitoring

Availability

$300
2 minutes

Creating the VM is fast but still have to wait for other services
There's clearly a mismatch

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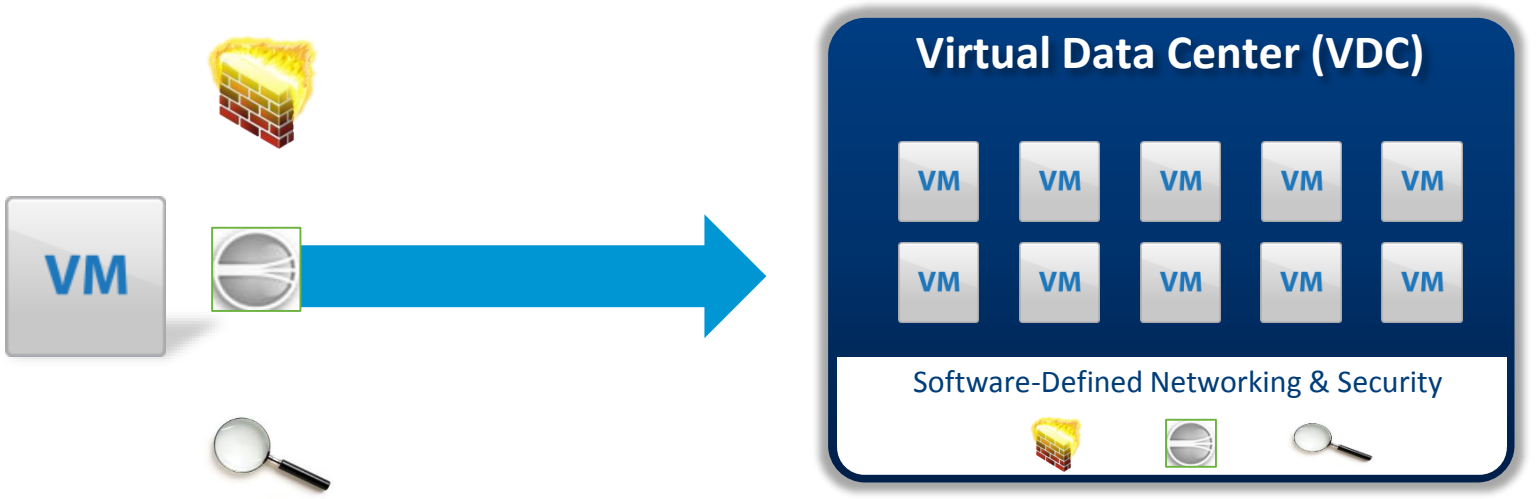
We need Software-Defined Network and Security

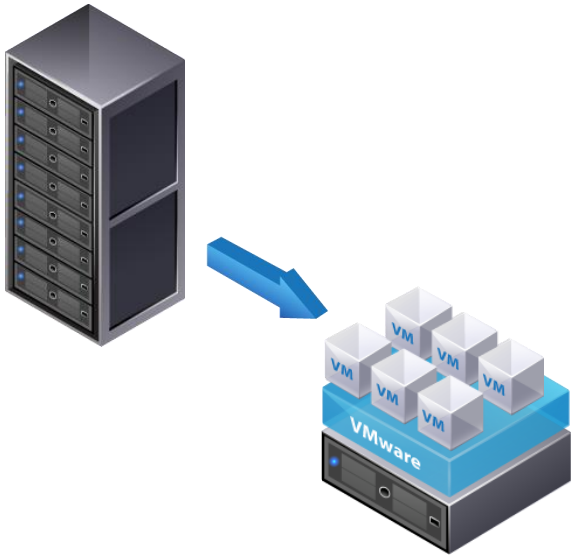


5 days

3 minutes

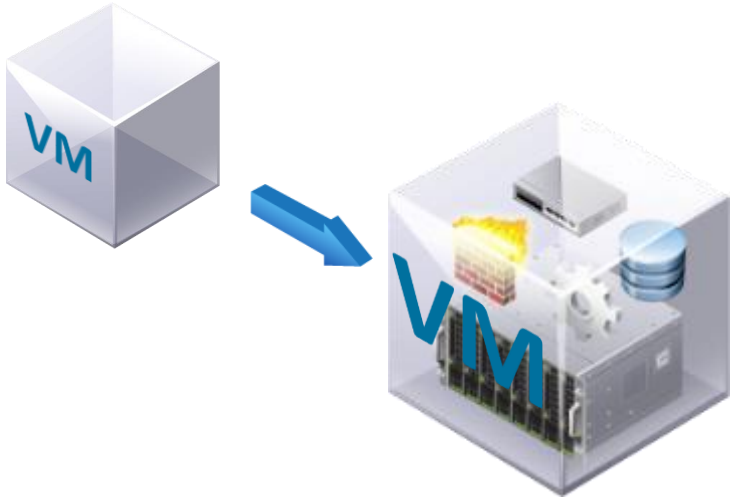
Virtualization's Next Big Thing

THEN



Server Virtualization

NOW



Software-defined Datacenter

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SDDC is Architecture for Cloud Computing

SOFTWARE-DEFINED DATACENTER

ALL INFRASTRUCTURE IS VIRTUALIZED AND DELIVERED AS A SERVICE, AND THE CONTROL OF THIS DATACENTER IS ENTIRELY AUTOMATED BY SOFTWARE

Standardized, Adaptive, Automated, Holistic, Resilient

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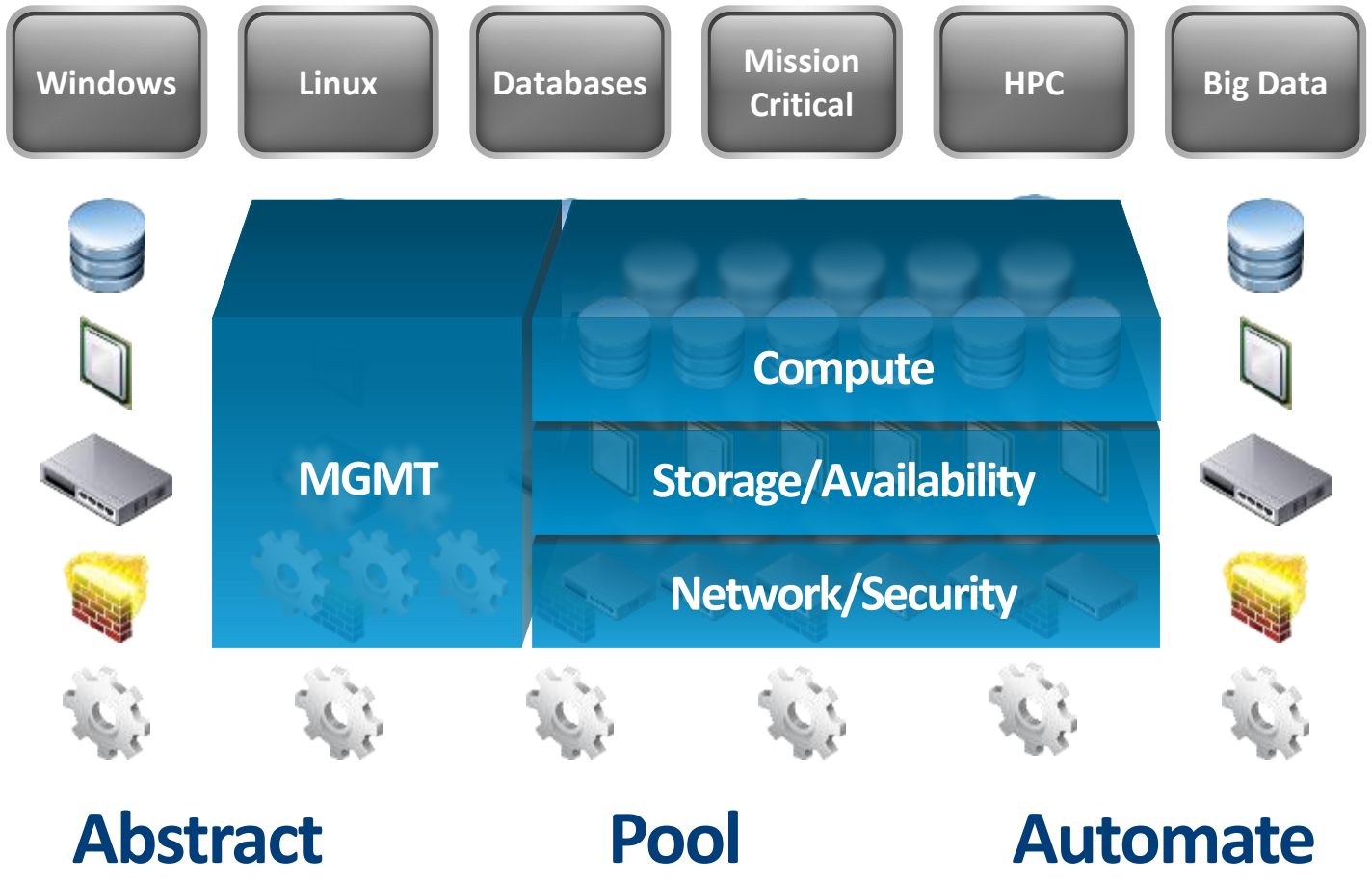
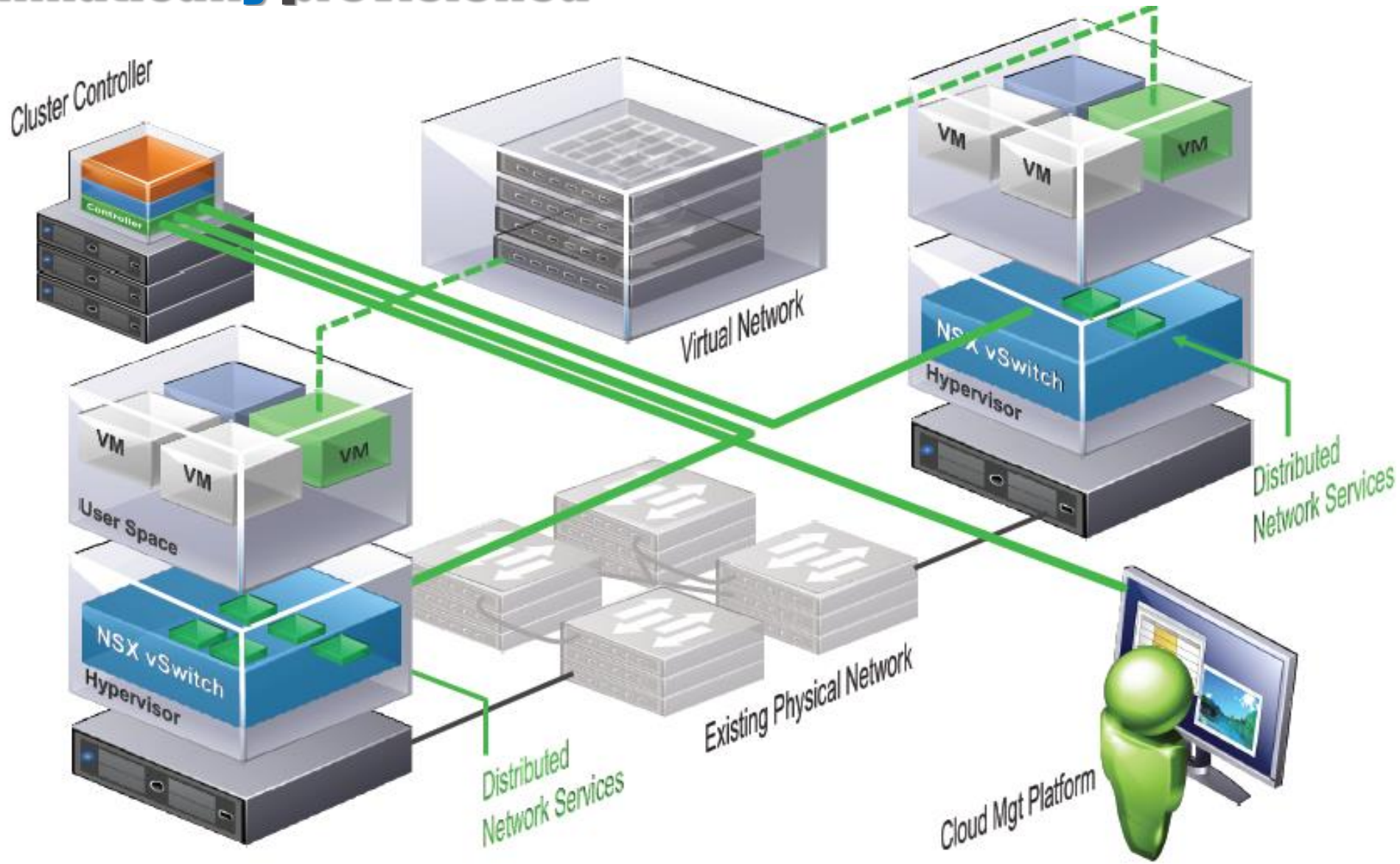
Time for Change, All becomes on-demand service



Programmatically provisioned



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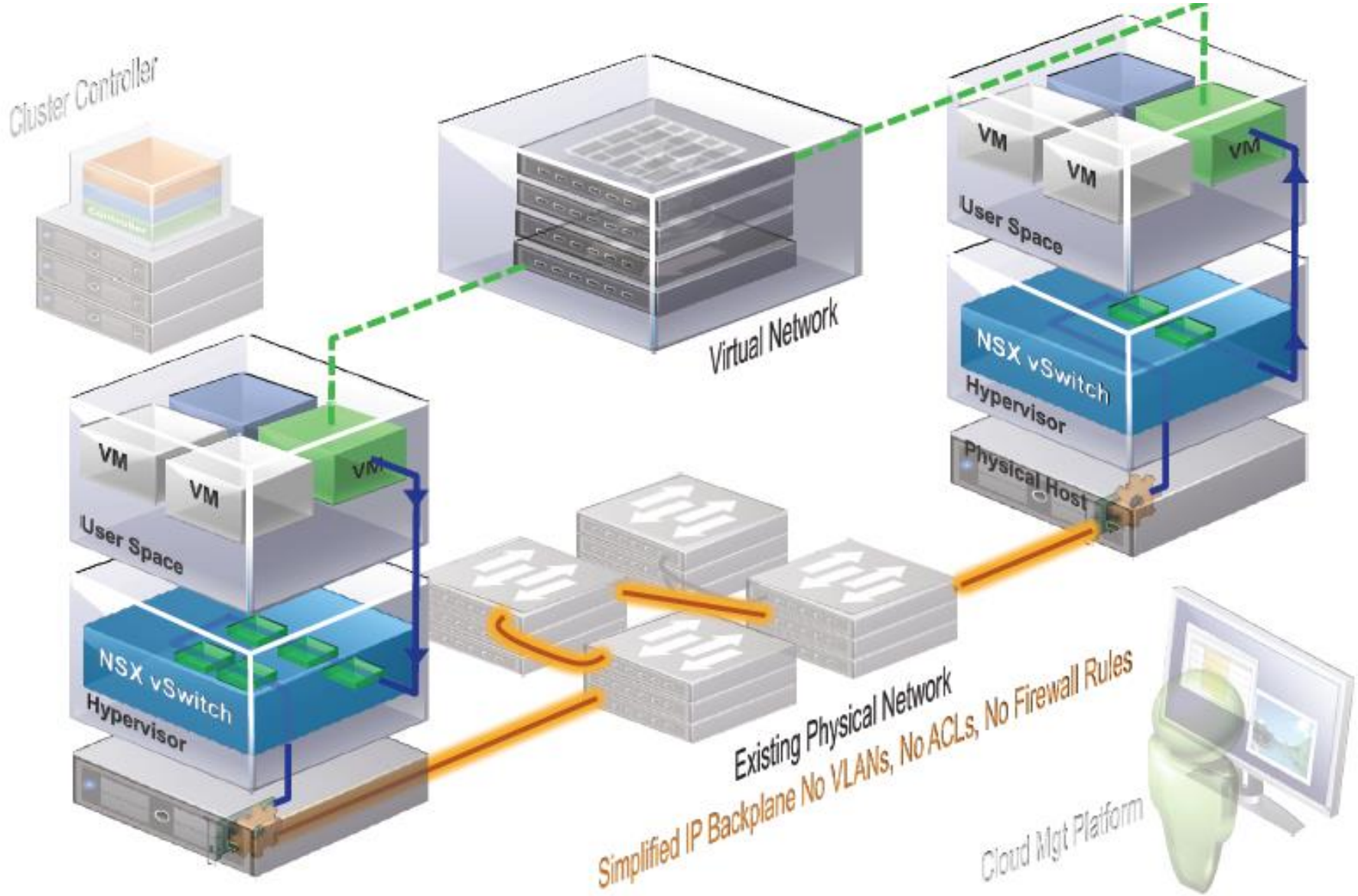
Virtual Networking: Virtual & Real Communication



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Agenda

Virtualization and Cloud

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Issues and Pain point

- **Virtualization system is getting bigger and bigger**
  - Large number of VMs (> 1,000 VM)
- **Operational Complexity**
  - Resource sharing **complexity**
  - Need more effort to do **health check** or diagnose on problem issue
  - **Difficult to predict demand trend**
- **Difficult to ensure performance for most important VM**
  - **No QoS at VM level**
  - High priority VM's performance is affected by less priority VM consuming high I/Os.
- **Difficult to balance workload on share disk volume**
  - A large number of VMs running on share disk.
  - Putting **much effort into balance workload** and eliminate I/O bottleneck
- **High volatile usage needs burst capacity (External Cloud)**
- **High demand on Test & Dev VM**

Issues and Pain point

- **Infrastructure issue**
  - **Firewall capacity**

    Our most network issue comes from Firewall capacity, especially from vShield Edge's Capacity
  - **CPU ready metric**

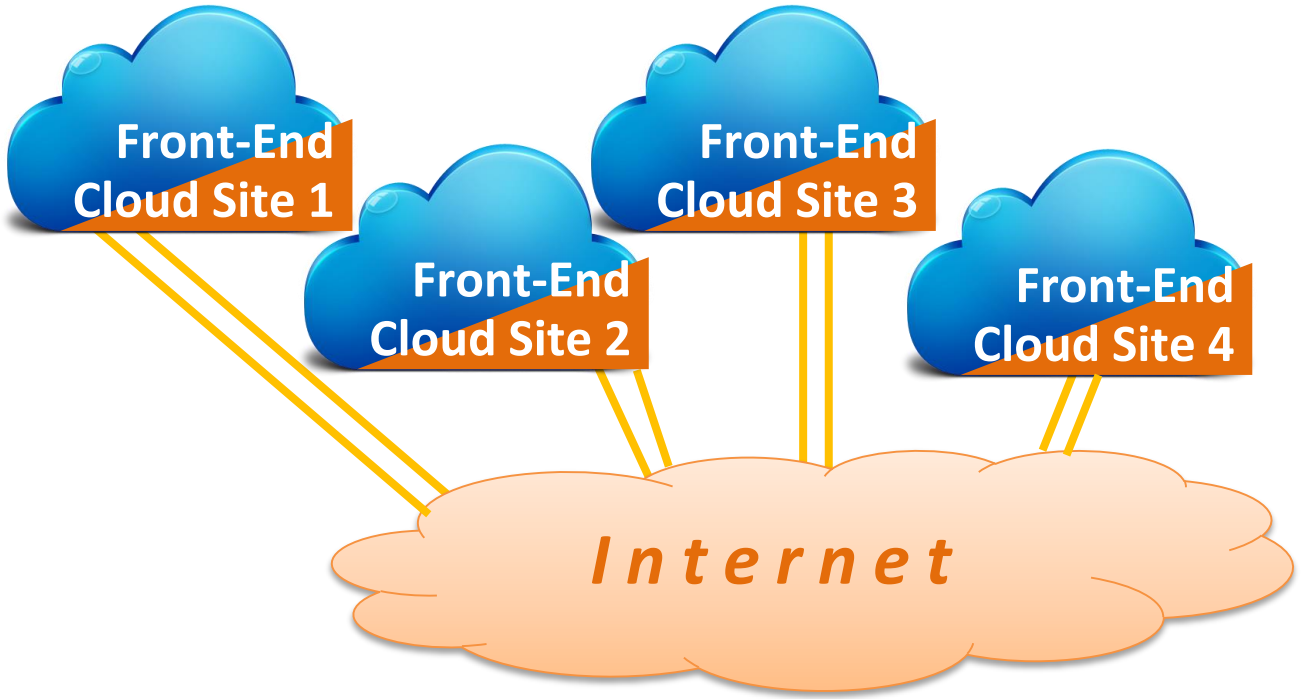
    We unable to control the overall ISP resource, but it can be guaranteed with cpu ready metric

- **Contract : burstable option**
  - Contract with ISP should have Cost and timeframe of extra resource we need to **expand Cloud capability to handle more volatile load**

- **Private – Public Cloud connectivity concern**
  - Internet link **quality and dependency** might caused unpredictable service interruption

Requirement specification : SET Public cloud

- **Data Center**
  - Site Location (Domestic Provider)
  - Certified Standards (ISO27001, etc..)
  - Overall SLA >= 99.90%
  - **Internet link providers >= 2**

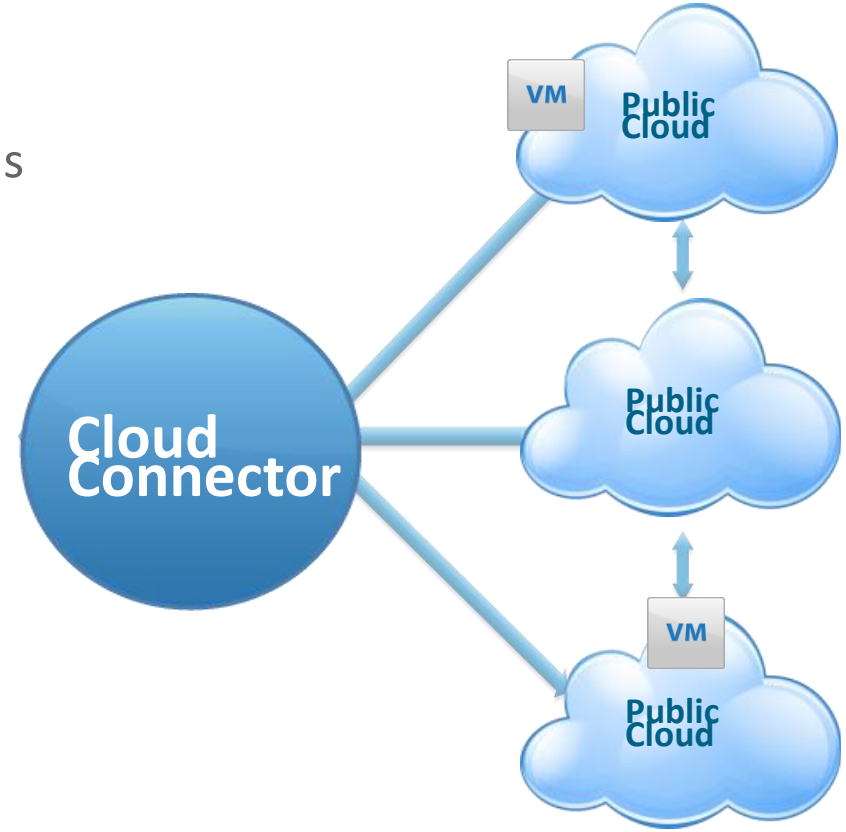


Requirement specification : SET Public cloud

- Software & Networking
  - Dedicated local storage volume.
    - Read/write >=16 MB/s
    - Average latency < 10 ms
  - Usable Computing:
    - Total processor clock (GHz)
    - Dedicated memory (GB)
  - CPU readiness < 1500 ms (avg 20 sec), or less than 7.5% in normal operations
  - Sufficient no of public IP Address
  - Bandwidth for domestic & International
  - NAT, VPN traffic filter support

Requirement specification : SET Public cloud

- **Security**
  - **Dedicated virtual Firewall ,** or sufficient Physical Firewall
- **Operational**
  - **Patch/firmware upgradable**
- **Others**
  - Monthly performance report,
  - **Real-time monitoring alert** < 15 mins
  - **Manageable using Director toc**
  - *Optional, but nice to have*
    - Cloud Connector
    - DDOS solutions



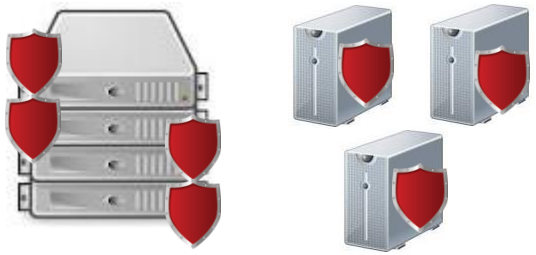
Human Development

- **Top management**
  - Agreed with trend and technology of Cloud First
- **Stakeholders (IT enterprise user, Business user, Customer)**
  - Sharing success story, VM trend update
- **Working staffs**
  - Take official courses, related seminars offered by partners
  - Direct support and technology update with product owner
  - Closely working with implementation partners
  - On the job training, Product Technical Assistant manager weekly support.

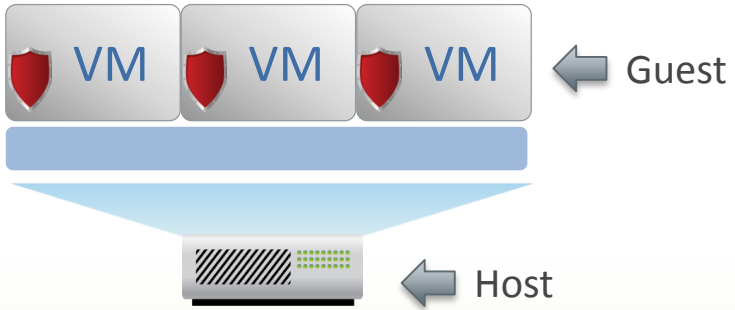
Antivirus on Virtualization

Replace traditional server with VM

Traditional Server



Virtualization Server (with traditional antivirus agent)

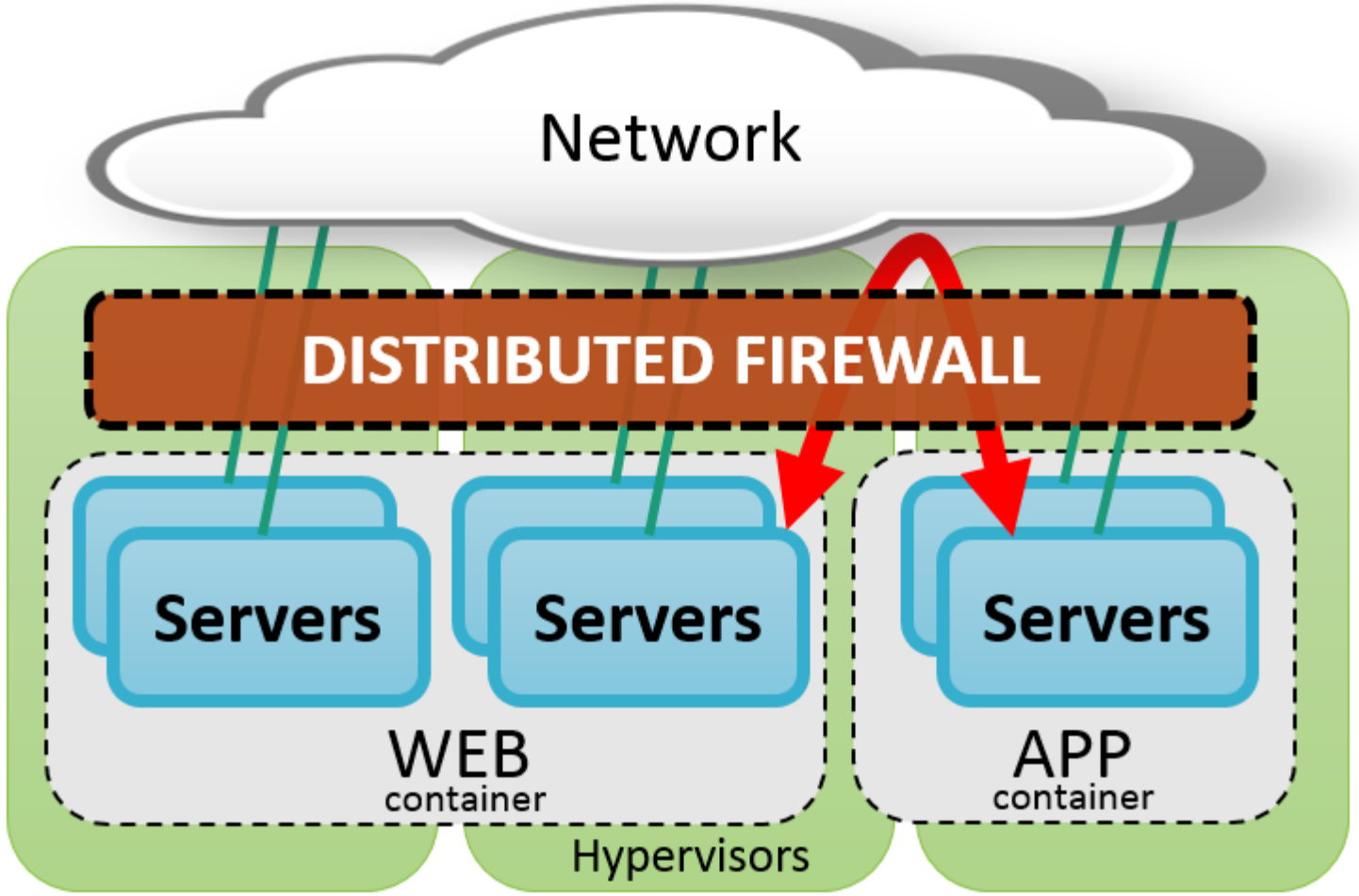


- Agent per physical server
- Multiple security agents on each server
- Use resource per server
- No updates on offline server

- No integration with VM platform
- Multiple security agents on each VM
- Use resource per Guest but effect Host
- No updates on dormant VMs

Network Protection

Distributed Firewall



"ALL YOUR PACKET ARE BELONG TO US"
(you can keep the network)

blogs.vmware.com / networkvirtualization

What is next state or challenge ?

- International Cloud adoption
- Rule and regulation
- The rise of Shadow IT
- How is fast development – Agile?

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