Tech Talk: Monitor Your Cloud Infrastructure Beyond the Simple Metrics Provided by Your Cloud Vendor and in Context with Your On-Prem Infrastructure Too

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1	CA UNIFIED INFRASTRUCTURE MANAGEMENT FOR HYBRID CLOUD OVERVIEW
2	MONITORING AZURE
3	MONITORING AWS
4	MONITORING DOCKER
5	MONITORING NUTANIX
6	MONITORING OPENSTACK



CA Unified Infrastructure Management Overview



Most Comprehensive Cloud & Hybrid IT Monitoring



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Optimizing Performance of Hybrid Cloud and Modern IT Infrastructures



Covers nine key AWS services, custom metrics and billing data processes with consistent tags/workflows



Monitors the health and performance of OpenStack enabled cloud deployments



Monitors Azure infrastructure and services spanning VMs, storage and websites.

Reports and collects data about the health and availability of Nutanix cluster, host, VM, storage pool, container, and disk components.



Comprehensive support for enabling technologies spanning virtualization (vSphere), converged infrastructure (Vblock) and cloud (vCloud)



Monitors Docker environment and the processes or services running on them.



Cloud – Some Concepts



What is Cloud Computing?





Cloud Computing – Deployment Models



Private

- Single tenant implementation
- Owned and operated by IT organization
- Define your own data management policies
- Self-service and automation capabilities provide new agility



Hybrid

- Combination for Private & one or more public clouds
- Allows IT organizations to become brokers of services



Public

- Multi-tenant implementation
- Owned and operated by Service Provider
- Bound by multi-tenant data management policies
- Similar self-service and automation capabilities as Private Cloud



Cloud Computing – Service and Deployment Models





Cloud Computing – Service Models Cloud



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Cloud Computing – Benefits and Barriers

	Benefits	Adoption barriers
•	Flexibility	Data security and privacy
•	Lowered costs for infrastructure,	 Real costs – associated with storage
	storage, etc.	snapshots, DR, etc.
•	Business agility	Service proximity/locality
		 Legacy architectures and migration issues



Stages of Cloud Adoption





Cloud – Market Overview



Cloud Transformation and Workload Migration



- Despite the tremendous growth public cloud runs ONLY 15% of all workloads today so plenty of room to grow ¹
- 2021 will be the tipping point ² at which traditional IT market share will be <= 50%
- 1, 2 VMworld 2016 TechTarget research



Cloud Market – Overview and Growth Rates





- \$111B aggregate cloud spend today expected to grow to \$216B in 2020¹
- laaS the fastest-growing segment of the cloud market this year, anticipated to expand 38.4% to \$22.4 billion in sales, according to Gartner.²
- The PaaS market is expected to grow by 21.1% in 2016 to \$4.6 billion, exceeding its 16.2% growth in 2015.³
- 1, 2, 3, Gartner, "Market Insight: Cloud Shift The Transition of IT Spending from Traditional Systems to Cloud."

















Complexity of Managing Infrastructure

Time



Key Barriers to Cloud Adoption

What are your customers' biggest challenges/concerns about adopting cloud services? (top 10 challenges shown)





ROI Conversations – Impacting Both Top & Bottom Line



What are your customers' main reasons for using cloud environments?

Cloud services ROI conversations are changing from impacting the bottom line to impacting the top line <u>where the multipliers and stakes are higher</u>.



ROI Conversations – Impacting Both Top & Bottom Line

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THE COST OF IT DOWNTIME
For any organization, the cost of IT downtime is significant and can impact not only corporate revenue but also the experience for the end user.
\$26.5 BILLION
Companies lose more than \$26.5 billion in revenue each year due to IT downtime. <i>CA Technologies</i>
\$500,000 to 1 MILLION LOST PER HOUR
DURING CRITICAL APPLICATION FAILURES Critical application failure costs between \$500,000 and \$1 million per hour for Fortune 1000 companies. IDC

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ncome Statement				
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Expenses				
Operating Expenses	100,000	100,000	100,000	
Interest Expense	40,000	40,000	40,000	
Annual Depreciation	50,000	50,000	50,000	
Total Expenses	190,000	190,000	190,000	
Net Income (Revenue - Expenses)	10,000	10,000	10,000	
Funds From Operations (FFO) (FEO = Net Income + Depreciation + etc	60,000	60,000	60,000	

Veer 4

A 1 SECOND DELAY IN PAGE RESPONSE CAN RESULT IN A 7% REDUCTION IN CONVERSIONS.

If an e-commerce site is making \$100,000 per day, a **1 second page** delay could potentially cost you \$2.5 million in lost sales every year.

Cost of IT downtime is increasing – between \$250k - \$500k per hour of downtime ¹

Cloud services ROI conversations are changing from impacting IT infra costs to impacting end user experiences and therefore impact both top line and bottom line.



Cloud Market Trends - 2017

- Hybrid Cloud Is the Preferred Enterprise Strategy, but Private Cloud Adoption Fell
- <u>Cloud Users Are Running Applications in Multiple Clouds (avg 1.8)</u>
- Companies Run a Majority of Workloads in Cloud (40%)
- Enterprise Central IT Teams Take a Stronger Cloud Role
- Cloud Challenges Decline Overall: Expertise, Security, and Spend Tie for #1 (governance and
- Significant Wasted Cloud Spend Drives Users to Focus on Costs (> 15%)
- Docker Shoots Into the Lead for DevOps Tools
- Azure Increases Market Penetration, Reducing the AWS Lead
- Public Cloud Users Still Have a Larger Footprint in AWS
- Private Cloud Adoption Flattens



Comparing the Cloud Leaders

	Azure	AWS	GCP
Geographical Reach	34 regions (4 more announced)	16 regions 42 availability zones per region 1-6 datacenters per zone 50k servers each Approx 79.2M Servers	8 regions, 23 zones
laaS Pricir		Pricing Leader	Minute Level Increments
PaaS		Most comprehensive (Lambda, Poly)	Big Data, AI, Machine learning (TensorFlow)
Enterprise capabilities	Most enterprise friendly ELA MSDN credits		
Hybrid	Stated strategy		
Customers	BMW, 3M, GE Health	Netflix, CapOne	Apple, SnapChat



Koy Clay	Id Lleo Cococ		
Key Clut	lu Use Cases		
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Hybrid Cloud – Jobs to be Done

JTBD	Persona	Category
Monitor performance of instances and services	IT Ops	Performance Monitoring
Troubleshoot issues across tiers to lower MTTR	IT Ops	Dependency Mapping
Choose optimal infrastructure size based on workload demand	IT Ops	Cloud Usage
Identify underused, unused cloud resources	IT Ops	Cloud Usage
Generate cloud billing report monthly, yearly	LOB owner, IT Ops	Cloud Usage



Prospecting Questions

- What cloud technologies are you currently using?
- Is there a broader cloud adoption planned within your organization?
- Are you able to monitor the performance and SLA of your public/private cloud?
- How do you ensure smooth migrations to the cloud?
- How many monitoring tools do you use? Are you satisfied with their *cloud* support?
- Can you get an end to end view of your cloud and traditional infrastructure?
- Do you have visibility into utilization and cost of your cloud infrastructure?



Why CA Unified Infrastructure Management ?

- MOST comprehensive coverage for cloud & hybrid IT
- Open flexible architecture and APIs deploy, extend and automate monitoring to efficiently meet the needs of today's highly dynamic and cloud environments
- Standardized, rapid configuration leverage templates across your cloud or on premise infrastructures boost staff productivity and agility



Customer Examples Of Platforms (Private & Hybrid Cloud)

Private Cloud



Switched private cloud platforms from VMware based infrastructures to OpenStack due to high licensing cost.

Hybrid Cloud



They have built their own cloud as service offering using VMware technologies (vCloud). They chose VMware as they saw them as a more valuable partner for business. But AWS is being used by a lot of their internal application group.

Hybrid Cloud



Manage and integrate customer's Nutanix infrastructures. Adding Monitoring as a Value ad service. Internal customer marketing applications being migrated to AWS along with a few customer sites.



Cloud – IT Operations Jobs to Be Done



- How do they perform in the cloud?
- Can I scale my server fleet?
- Can apps run anywhere?



Public Cloud



Track SLAs and performance of all your Cloud services such as AWS EC2, RDS, S3 and more

Get deeper, predictive insights on the applications and processes running on them to rapidly find performance bottlenecks

 Better manage your cloud resources through intelligent alerts on cost & utilization



Private Cloud



Track SLAs and performance of all your infrastructure in your turnkey or custom private cloud or converged infrastructures

- Get deeper, predictive insights on the applications and processes running on them to rapidly find performance bottlenecks
- Integrate with other ITOM tools and automate monitoring deployment for seamless operations



Hybrid Cloud



- Proactively and holistically track end to end user experience across cloud and on premise infrastructures
- Single view, eliminates "swivel" chair integrations to boost issues resolution and staff productivity
- Single console to rapidly manage all your monitoring configurations boosts cloud adoption and application deployments



AWS Cloudwatch

- Hypervisor perspective
 - EC2
 - Hardware (CPU/disk/networking)
- Doesn't know about
 - Guest OS
 - Memory/file system
 - Processes
 - Application
 - Response times
 - Latency
 - Error rates
 - Internal insights ** Changing with Xray (lite
 - tracing)





Workload Migration



Get insights on infrastructure utilization throughout the migration process; both pre (on premise) and post (cloud)

 Holistically monitor newly migrated workloads to ensure a smooth transition

 Ensure Cloud SLAs are consistent (or better) than on premise

Proactively run "tests" to confirm success



Cloud Utilization

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Analyze historical data to better plan for capacity and budgetary needs

- Correlate various cloud and on premise metrics for root cause identification
- Get predictive alerts on performance and budget threshold based upon utilization data



Amazon Web Services



Amazon Web Services (AWS) Market Share Leader For Public Cloud

- Leads public cloud market in share and revenue
 - Now reached \$14 billion+ run rate for Amazon
 - Offers numerous IaaS, PaaS and SaaS services
 - Global presence offered through a growing number of regional data
- CA Unified Infrastructure Management AWS Probe 5.25
 - Automated discovery of AWS EC2 instances and 12 other AWS services
 - New OOTB dashboards using CA Business Intelligence based on Jaspersoft





AWS Services Supported by CA UIM Today

AWS Service	Description	4 @ 3W5	
AWS Service Health	Status of AWS services across all regions	AWS Service Health	
CloudWatch	AWS monitoring service provides metrics and estimated charges	 Asia Pacific (Seoul) Region Asia Pacific (Singapore) Region Asia Pacific (Sydney) Region 	
EC2 – Elastic Compute Cloud	laaS – Compute Instances	Asia Pacific (Tokyo) Region	
EBS – Elastic Block Storage	IaaS – Block storage volumes	🖿 EU (Ireland) Region	
ELB – Elastic Load Balancing	IaaS – Load balancing service	EU(Frankfurt) Region South America (Sao Paulo) Reg	
Auto Scaling	laaS – Group of EC2 instances that can scale up or down	US East (Northern Virginia) Re	
S3 – Simple Storage Service	IaaS – Object Storage	US West (Northern California)	
RDS – Relational Database Service	PaaS – Relational database as a service	GS West (Oregon) Region	
Elasticache	PaaS – Caching service	 Default Auto Scaling 	
SQS – Simple Queue Service	PaaS – Message queueing service	Custom Metric	
SNS – Simple Notification Service	PaaS – Push notification service	EC2	
ECS – EC2 Container Service	laaS – Container management service	ElastiCache	
Route 53 – DNS	laaS – Domain name services	The RDS	
DynamoDB	PaaS – NoSQL database as a service	⊳ III SNS	
Lambda	FaaS – Serverless compute service	SQS	

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Amazon Web Services Probe Configuration

- Configuration options
 - Probe discovery and collection intervals (this can affect costs)
 - Account credentials (don't confuse your access key and secret key
 - To collect billing data separate credentials may be required
 - EC2 label property = determines whether instance ID, primary IP, or name tag are used in probe oriented configuration
 - Proxy info; parameters for configuring a proxy





Amazon Web Services in Unified Service Manager (USM)

- USM details tab
 - Contains additional EC2 instance information in the left pane
 - Graphs from AWS CloudWatch are displayed
- USM tree view
 - EC2 instances and AWS Service Health show as computer systems
 - The AWS Profile/Resource shows as a computer system
 - Non-IP services metrics found here





AWS Probe Dynamic Groups Grouping by Tags or Properties

- Dynamic Grouping by Tags or Properties
 - Groups automatically created for Amazon, then by OS
 - For tags, in the group editor, amazon tags are found in the filters section underneath advanced; look for UserProp<tag>
 - Groups can also be created using other attributes such as region or type





AWS CA Business Intelligence Dashboards – Summary

 AWS probe includes out-ofthe-box CA BI dashboard summarizing health and KPIs for AWS services





AWS CABI Dashboards – Service Drilldown

 AWS service dashboards display key usage and performance metrics for each service





AWS CABI Dashboards – Sprawl

 AWS service dashboards helps identify cloud "sprawl" to better optimize utilization and control costs

Amazon Web Services (AWS)					
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		44 ≪ Page 1 of 2 ► ►			
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southeast		ip-10-0-70-198.us-west-2.compute.internal	t2.micro us-west-2a	0.02 0.12	0.16
		ip-10-0-80-205.ap-south-1.compute internal	t2.micro ap-south-1a	0.02 0.11	0.14
		lp-10-0-175-91.ap-south-1.compute internal	t2.micro ap-south-1a	0.02 0.12	0.16
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Microsoft Azure



Microsoft Azure

- Second in market share to AWS but growing faster
 - Still seeing triple digit growth
 - Strong in both IaaS and PaaS, used as platform for Microsoft SaaS offerings such as Office 365 and Dynamics 365
 - Global presence offered through a growing number of regional datacenters
- CA Unified Infrastructure Management Azure Probe 3.00
 - Support Azure Resource Manager (ARM) model
 - OOTB dashboards using CA Business Intelligence based on Jaspersoft



New Azure Probe 3.02

- Support for Azure Resource Manager (ARM) model
 - New API based on Resource Groups
- Azure VMs and Azure Storage
 - Substantially more metrics and properties available from new API
 - Support for Azure Managed Disks with VMs
- Support for Web Apps App Service (formerly Websites) with expanded metrics
- Support for Azure SQL database service



Azure Probe Authentication

 Azure probe supports data from ARM model and Classic model with single authentication





Azure Probe Configuration

- Significantly more metrics available through ARM API across monitored services
 - Azure VMs
 - Azure Storage
 - Azure SQL
 - Azure Web Apps
- Probe collects tags and properties for grouping and reporting

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Azure Summary Dashboard

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Azure Storage Service Dashboard







Docker Overview

- Containers, not VMs
- Intended to run a single application
 - Repeatable
 - Isolated
- De facto delivery vehicle for cloud applications; second most popular open source project after OpenStack
- Highly scalable, milliseconds to start a container, vs. minutes for a VM
- Used by customers to drive DevOps style software development



Docker Monitoring

- Docker probe monitors the Docker Engine API
- Host (Engine) Metrics
 - Container and image counts
 - CPU
 - Memory
 - Disk
 - Network

- Container Metrics
 - Status
 - CPU
 - Memory
 - Disk
 - Network
 - Processes in container



The Docker Probe Prerequisites and Configuration

- Requirements
 - Docker version 1.9 or greater, Linux only
 - %docker version to check, %docker ps to make sure Docker is running
- Configuration
 - Unix socket file or TCP; when using a Unix socket file, the probe must be located locally to the Docker engine



Docker CA Business Intelligence Dashboard

 At a glance view of key performance and usage indicators for your Docker environment







Nutanix Overview

- Market leader in hyper-converged integrated systems (per Gartner MQ)
 - Market growing rapidly, 84% YoY revenue growth, IPO on Sept 30, 2016
 - A server appliance, cloud platform in a box
 - Supports hypervisors such as ESX, Hyper-V, or its own Acropolis
- System storage or a replacement for SAN
 - Each appliance includes SSD and HDD that cluster together to form the Nutanix distributed filesystem
- Our probe retrieves information from the Prism API





Nutanix Probe 1.33 What Do We Monitor?

- Cluster metrics
- Host metrics
- VM metrics
- Storage pool metrics
- Container (subset of a storage
- Disk metrics





The Nutanix Probe *Details*

- Requirements
 - Tested with Prism 4.6 and 4.7
- Configuration
 - Hostname, port, username, password
 - Monitor VMs: When enabled VMs will

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UIM	Contractor Do			0					
Disks	Compute Baseline			0					
Dotached Configuration									



Nutanix CA Business Intelligence Dashboards

- Nutanix summary
- Average performance of clusters
- Performance by cluster
- Top 10 VM consumers
- Top host performance
- Top storage pool performance







OpenStack Overview

- Private cloud provider, also used by service providers to provide cloud services
 - Started in 2010 by Rackspace and NASA
 - Open source solution, releases every
 6 months; current release Newton

- Openness that comes with complexity
- Often referred to as build your own cloud
- Primarily used to provide on premise laaS and reduce costs





OpenStack Probe 1.36 What Do We Monitor?

- Service endpoints are OpenStack services running?
- Controller node status
- Compute node metrics
- Instance metrics
 - CPU, memory, disk and network
- Project metrics
- Quota metrics
- Volume metrics

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The OpenStack Probe Details

- Configuration
 - Utilizes standard OpenStack APIs
 - Interfaces with Keystone service on controller node for authentication and services
 - Supports Keystone v2 or Keystone v3 with domains
 - Interfaces with several additional services including Nova, Neutron, Cinder, and Ceilometer for inventory and metrics

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What Questions Do You Have? 67



THANK YOU!

