

Learn How To Implement Cloud on System z

CloudReady evolving to SmartCloud



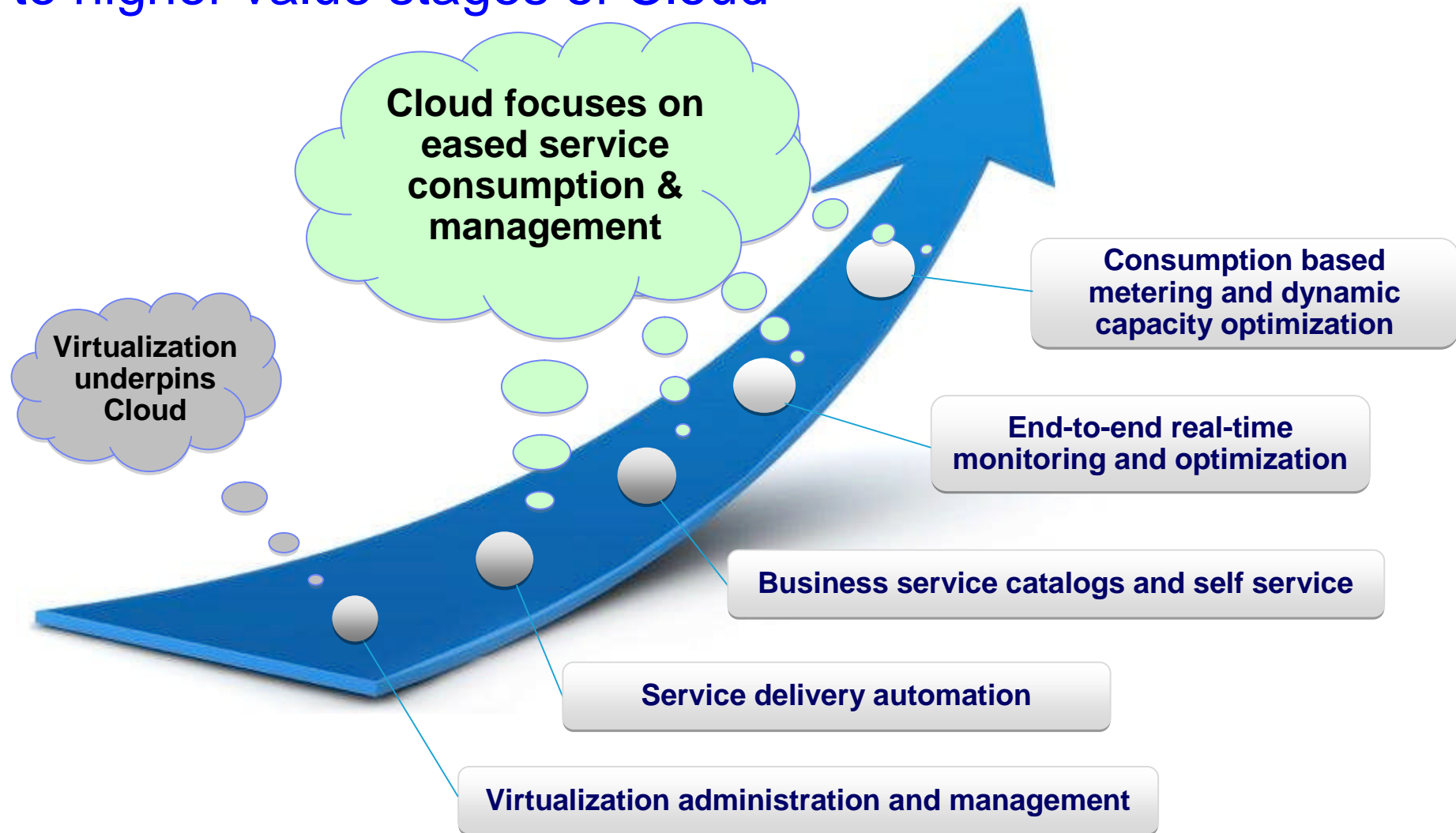
Mike Baskey, Distinguished Engineer, Tivoli z Architecture

Cloud Computing for Linux for System z providing customer value today

- zEnterprise (z196) represents world's most powerful and scalable processor
- System z represents both the lowest TCO coupled with industry leading Qualities of Service for deploying private and/or hybrid clouds
 - Coupled with advanced virtualization features (like new Live Guest Relocation) in z/VM
- Automate provisioning and provide broad spectrum of key cloud capabilities
 - Focus today on new CloudReady offering
 - Roadmap in place and delivering key product support for z/VM 6.2
- System z on Smarter Computing roadmap
 - Migration paths from today's products to tomorrow's portfolio

Deploy a cloud solution for **50-70% less**

Organizations are now moving beyond virtualization to higher value stages of Cloud



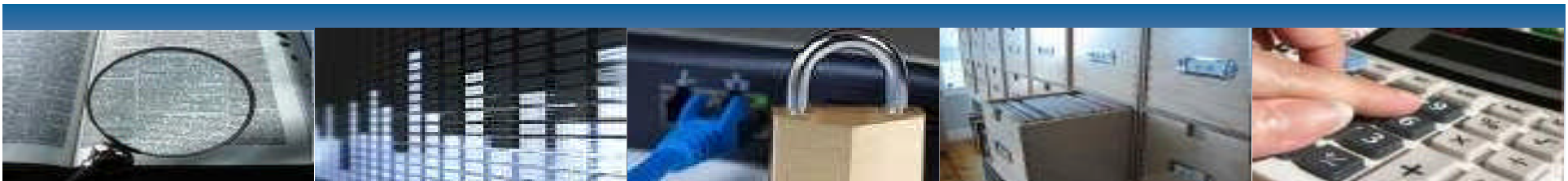
Cloud on System z provides significant new customer value along with IT challenges

Value

- Elastic scalability
- Rapid provisioning
- Advanced virtualization
- Image management
- Multi-tenancy & Isolation
- Flexible pricing
- Better user experience

Challenges

- Compliance/Audit
- Software licenses
- Availability
- Data Protection/Integrity
- Transaction integration
- Analytics/capacity planning



System z ideal platform for private cloud focused on provisioning LOB, Development and Test

Create maximum Business flexibility while maintaining System z required integrity and performance

LOB Workloads

- Identify Application components
- Create Workflow to provision
- Define Security and SLAs
- Assign LPAR or Virtual Machines
- Isolate with ability to share resources and report on utilization

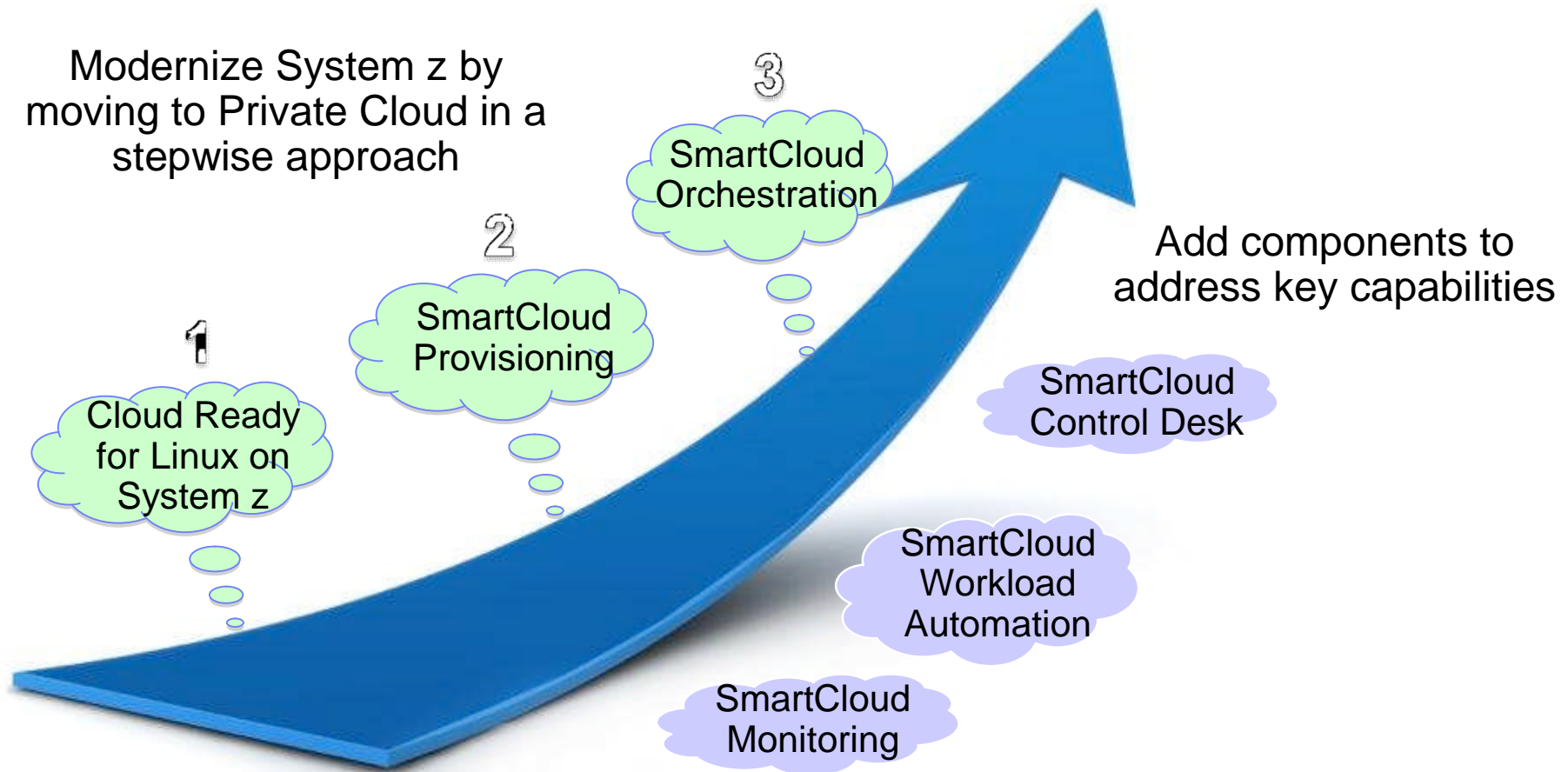


Development and Test

- Create Standardized Image
- Dynamically allocate resources
- zVM supports 1000's VMs with rapid provisioning
- Most efficient use of energy and software licenses
- Reclaim resources when done

Start small and grow cloud capability over time with IBM Linux on System z tools

Modernize System z by moving to Private Cloud in a stepwise approach



Get started quickly with Cloud Ready for Linux on System z

- **Image/SW-based Cloud Service Delivery** with integrated provisioning, monitoring, service catalog & service desk, storage management, and HA
- **Services** to have cloud service management solution up and running quickly

Business value addressed:

- Reduce high administration and capital cost
- Remove inefficiencies due to image sprawl and maintenance
- Move away from manual management of disparate environments
- Centralize cloud administration including service catalog
- Run workloads with superior reliability, security, auditing, privacy, data integrity, automation and full isolation



Cloud Ready provides delivery and service management to achieve business value quickly

- Provides infrastructure to create and deploy standards in virtualized and mixed environments
 - Image Management: OS, Applications, Releases
 - Standards Management: Performance, Backup, Security
- Reduces cost to delivering services
 - Process Automation: Streamline manual procedures
 - Resource throttling: Automated de-provisioning of resources
- Establishes Common Service Delivery Model for deployment
 - Services rendered through a common Service Catalog
- Includes Plug-n-Play Service Management Infrastructure
 - Automated validation of assets prior to deployment
 - Integration with incident management



Cloud Ready supports quick and easy provisioning of images and applications

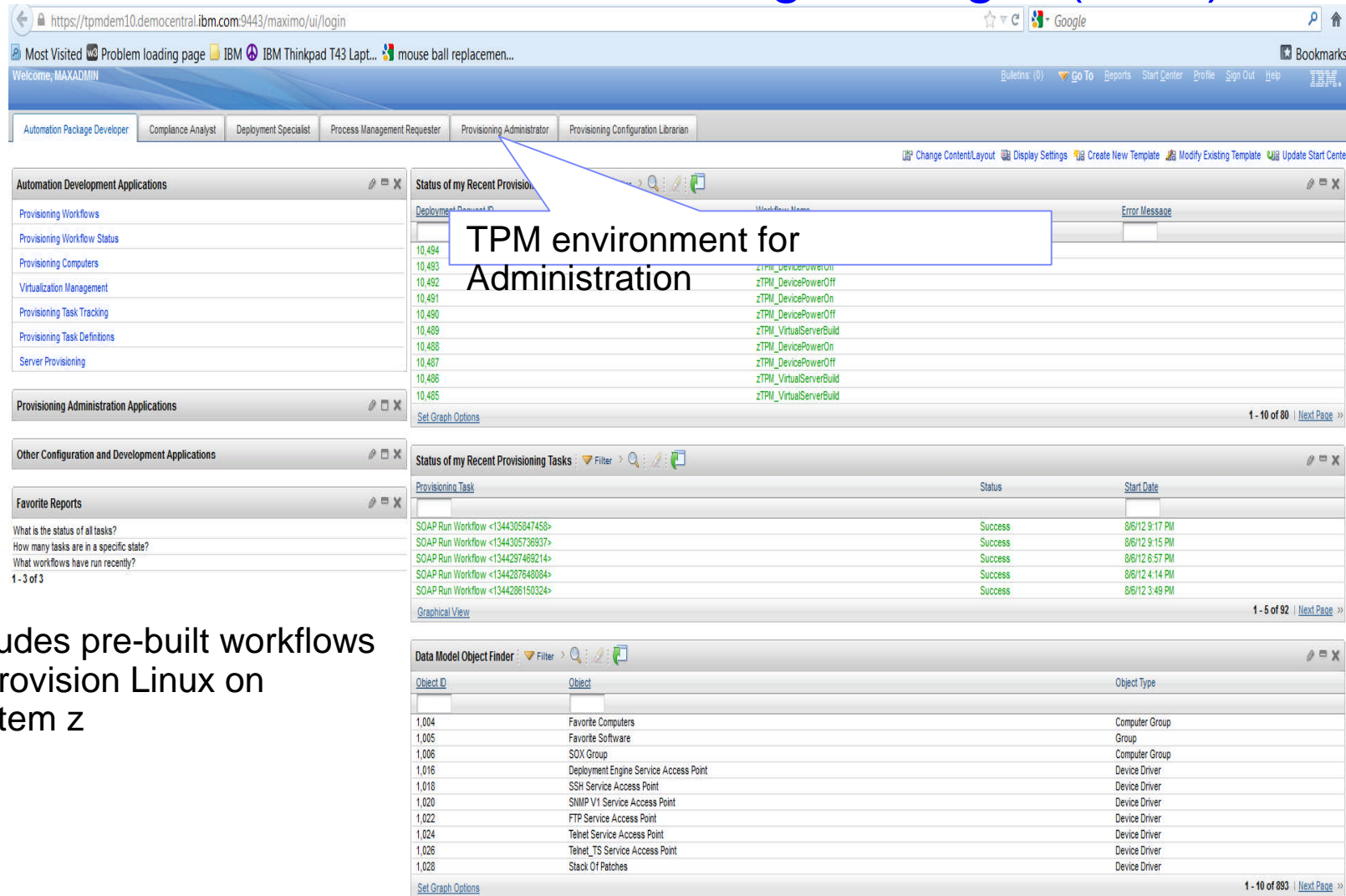
- Automated provisioning from simple VMs to clustered infrastructure applications
- Automated and integrated server lifecycle management for physical and virtual machines across platforms and hypervisors
- Pre-built automation that can be leveraged by customers existing tools



Benefits:

- Client turnaround time reduced per service request from 2 months down to 4 hours
- Build simple to complex VMs consistently and fast in an automated fashion
- Ensures standardized VM rollout at large volumes according to enterprise best practices
 - 24/7 highly available with highest security standards

Easy to use administration capability for implementing Cloud on z with Tivoli Provisioning Manager (TPM)



TPM environment for Administration

Status of my Recent Provisioning Tasks

Deployment ID	Work Item Name	Error Message
10,494		
10,493	zTPM_DevicePowerOn	
10,492	zTPM_DevicePowerOff	
10,491	zTPM_DevicePowerOn	
10,490	zTPM_DevicePowerOff	
10,489	zTPM_VirtualServerBuild	
10,488	zTPM_DevicePowerOn	
10,487	zTPM_DevicePowerOff	
10,486	zTPM_VirtualServerBuild	
10,485	zTPM_VirtualServerBuild	

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Status of my Recent Provisioning Tasks

Provisioning Task	Status	Start Date
SOAP Run Workflow <1344305847458>	Success	8/6/12 9:17 PM
SOAP Run Workflow <1344305736937>	Success	8/6/12 9:15 PM
SOAP Run Workflow <1344297469214>	Success	8/6/12 6:57 PM
SOAP Run Workflow <1344267648084>	Success	8/6/12 4:14 PM
SOAP Run Workflow <1344266150324>	Success	8/6/12 3:49 PM

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Data Model Object Finder

Object ID	Object	Object Type
1,004	Favorite Computers	Computer Group
1,005	Favorite Software	Group
1,006	SOX Group	Computer Group
1,016	Deployment Engine Service Access Point	Device Driver
1,018	SSH Service Access Point	Device Driver
1,020	SNMP V1 Service Access Point	Device Driver
1,022	FTP Service Access Point	Device Driver
1,024	Telnet Service Access Point	Device Driver
1,026	Telnet_TS Service Access Point	Device Driver
1,028	Stack Of Patches	Device Driver

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Includes pre-built workflows to provision Linux on System z

Load pre-defined standardized system and application images quickly for user deployment with TPM

tpmdem10.democentral.ibm.com/cgi-bin/deploycgi3

Most Visited Problem loading page IBM IBM Thinkpad T43 Lapt... mouse ball replacemen...

Demo Central - System z Server Deployment on z/VM - Inventory

TPM Server: tpmdem10.democentral.ibm.com:8777

Refresh PowerOn PowerOff Reboot Delete DeleteEntry Deploy a New Server

Number of systems in use: 7 Available unused systems: 0

Add new pre-defined Linux images quickly

Pre-Defined Images

Select	Status	Hostname	IP Address	Requestor	Date Deployed	Deployment Request ID	INCLUDE	Master	Host Platform
<input type="checkbox"/>	Active	tpmdem1.democentral.ibm.com	9.39.68.46	curl@us.ibm.com	Mon Aug 6 14:41:17 CDT 2012	1088	tpmlinux	SLES 11 SP 1 64-bit Linux [s11sp1]	testzvm.democentral.ibm.com
<input type="checkbox"/>	Active	tpmdem2.democentral.ibm.com	9.39.68.47	epat@us.ibm.com	Mon Jul 9 13:50:42 CDT 2012	1032	tpmlinux	RHEL 6.1 64-bit Linux [rh61]	testzvm.democentral.ibm.com
<input type="checkbox"/>	Active	tpmdem3.democentral.ibm.com	9.39.68.48	epat@us.ibm.com	Mon Aug 6 15:19:44 CDT 2012	1089	tpmlinux	SLES 11 SP 1 64-bit Linux [s11sp1]	testzvm.democentral.ibm.com
<input type="checkbox"/>	Active	tpmdem4.democentral.ibm.com	9.39.68.49	curley@us.ibm.com	Wed Jul 11 11:29:27 CDT 2012	1053	tpmlnwas	SLES 11 SP 1 64-bit Linux with WebSphere [s11sp1]	testzvm.democentral.ibm.com
<input type="checkbox"/>	Active	tpmdem5.democentral.ibm.com	9.39.68.50	epat@us.ibm.com	Mon Aug 6 15:45:43 CDT 2012	1092	tpmlinux	SLES 11 SP 1 64-bit Linux [s11sp1]	testzvm.democentral.ibm.com
<input type="checkbox"/>	Active	tpmdem6.democentral.ibm.com	9.39.68.51	epat@us.ibm.com	Fri Aug 3 18:15:14 CDT 2012	1081	tpmlinux	SLES 11 SP 1 64-bit Linux [s11sp1]	testzvm.democentral.ibm.com
<input type="checkbox"/>	Active	tpmdem7.democentral.ibm.com	9.39.68.52	epat@us.ibm.com	Mon Aug 6 21:17:24 CDT 2012	1097	tpmlinux	SLES 11 SP 1 64-bit Linux [s11sp1]	testzvm.democentral.ibm.com

Linux monitoring of deployed images via Enterprise Portal ensures successful deployment

Navigator View to Situations

Linux Guests Deployed

Severity	Status	Owner	Name
Warning	Open		NT_Log_Space_Low
Warning	Open		NT_Log_Space_Low
Warning	Open		NT_Log_Space_Low
Warning	Open		KM5_CPU_Loop_Warn
Critical	Open		KM5_CPU_Loop_Warn
Critical	Open		OGW_DCODE1_MESSAGE
Warning	Open		TDS Total Free Space
Warning	Open		N3T_Device_Status_Inactive
Warning	Open		N3T_Conn_Byte_Rate
Warning	Open		N3T_TCP_In_Errs
Warning	Open		N3T_Connection_Count
Warning	Open		N3T_Conn_Datagram_Rate
Critical	Open		KRN_Alias_Remain_Critical
Warning	Open		N3T_Conn_Rnd_Trip_Variance
Warning	Open		KRN_Cat_Hit_Pct_Warning
Critical	Open		N3T_Conn_Rnd_Trip_Time
Critical	Open		KRN_Vol_Pct_Full_Critical
Critical	Open		KRN_Vol_Pct_Full_Critical

Open Situation Counts - Last 24 Hours

My Acknowledged Events

Severity	Status	Owner	Name	Display Item	Source	Impact	Opened	Lo
	Closed		Sysplex_Workloads_Perfdx_Warn					
	Open		MS_Offline					
	Open		Sysplex_Workloads_Perfdx_Warn					

Message Log

Status	Name
Open	Sysplex_Workloads_Perfdx_Warn

Ability to monitor specific Linux guest resources of provisioned machine for performance

The screenshot displays the IBM Disk Usage monitoring interface for a Linux guest. It includes a file navigator, performance charts, a data table, and a disk space chart.

Image Performance: A callout box points to the 'Space Used Percent' chart, which shows that the root filesystem (/dev/dasda2) is using approximately 93% of its space.

Inodes Used Percent: A callout box points to the 'Inodes Used Percent' chart, which shows that the root filesystem (/dev/dasda2) is using approximately 51% of its inodes.

Disk Usage Table:

Mount Point	Disk Name	Size (MB)	Disk Used (MB)	Disk Free (MB)	Total Inodes	Inodes Used	Inodes Free	Disk Used Percent	Inodes Used Percent	File System Type	Disk Free Percent
/	/dev/dasda2	3662	3215	261	238560	119857	118703	93	51	ext3	7
/proc	proc	0	0	0	0	0	0	0	0	proc	100
/sys	sysfs	0	0	0	0	0	0	0	0	sysfs	100
/sys/kernel/d...	debugfs	0	0	0	0	0	0	0	0	debugfs	100
/dev	devtmpfs	499	1	499	0	0	1	0	0	devtmpfs	99
/dev/shm	tmpfs	499	0	499	127667	1	666	0	1	tmpfs	100
/devpts	devpts	0	0	0	0	0	0	0	0	devpts	100
/sys/fs/fuse/c...	fusectl	0	0	0	0	0	0	0	0	fusectl	100
/sys/kernel/s...	securityfs	0	0	0	0	0	0	0	0	securityfs	100

Disk Space: A callout box points to the 'Disk Space' chart, which shows that the root filesystem (/) is using approximately 3,215 MB of space, leaving only 261 MB available.

Need to increase disk space?: A callout box points to the 'Disk Usage' table, highlighting the high usage of the root filesystem.

Manage overall Health of entire z machine with OMEGAMON XE for z/VM and Linux

CPC - dem17lnx.democentral.ibm.com - IBM *ADMIN MODE*

File Edit View Help

Navigator View: Physical

- CP Owned Devices
- DASD
- LPAR
- Network
- Real Storage
- System
- TCP/IP
- Workload

dem6lnx.VL

- z/VM Linux Systems
 - Channel
 - CP Owned Devices
 - DASD
 - LPAR
 - Network
 - Real Storage
 - System
 - TCP/IP
 - Workload

Physical

LPAR Performance

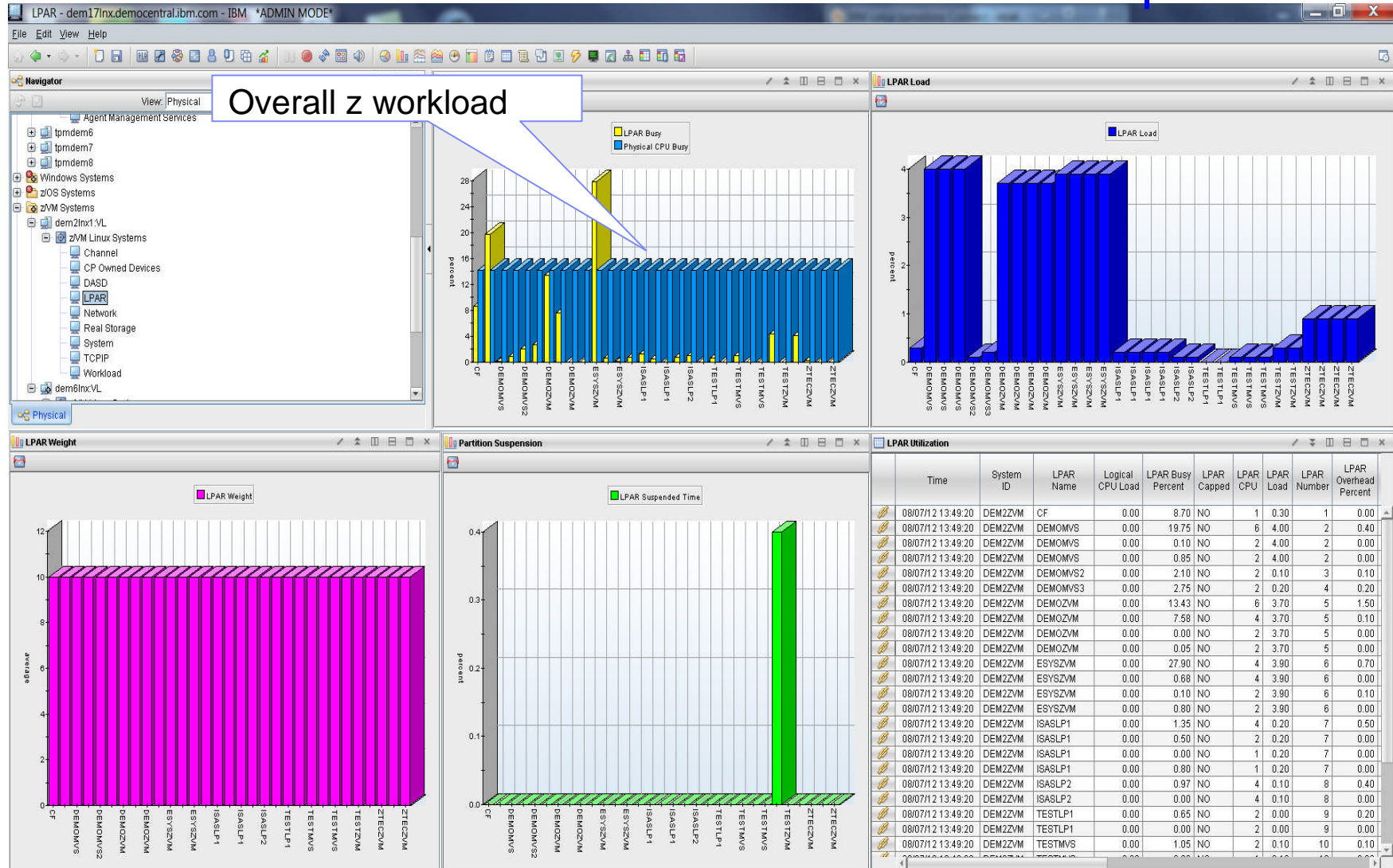
Scaled Overall LPAR Busy Percent

Processor Busy by Count of Processors

Processor Utilization by CPC and Processor Type

Time	System ID	LPAR Name	Processor Type	Number of Processors	Total LPAR Weight	Dedicated Processor Count	LPAR Busy Percent	LPAR Overhead Percent	Overhead not Charged to an LPAR Percent	Overall LPAR Busy Percent	Scaled LPAR Busy Percent	Scaled LPAR Overhead Percent	Scaled Overhead not Charged to an LPAR Percent	Scaled Overall LPAR Busy percent	Available CPU Capacity	System Name
08/07/12 13:08:52	DEMOZVM	DEMOZVM	CP	14	120	0	406	6	11	423	29	0	0	30	977	dem6lnx.demopkg.ibm.com:VL
08/07/12 13:08:52	DEMOZVM	DEMOZVM	zAAP	3	60	0	4	0	0	4	1	0	0	1	296	dem6lnx.demopkg.ibm.com:VL
08/07/12 13:08:52	DEMOZVM	DEMOZVM	IFL	10	70	0	35	0	1	36	3	0	0	3	964	dem6lnx.demopkg.ibm.com:VL
08/07/12 13:08:52	DEMOZVM	DEMOZVM	zIIP	3	60	0	0	0	0	0	0	0	0	0	300	dem6lnx.demopkg.ibm.com:VL

OMEGAMON view all LPARs running on z/OS hardware allows view of health of entire zEnterprise



Use Cloud Ready to get up and running quickly, and supports moving to SmartCloud as needs grow

Cloud Ready for Linux on System z

SmartCloud

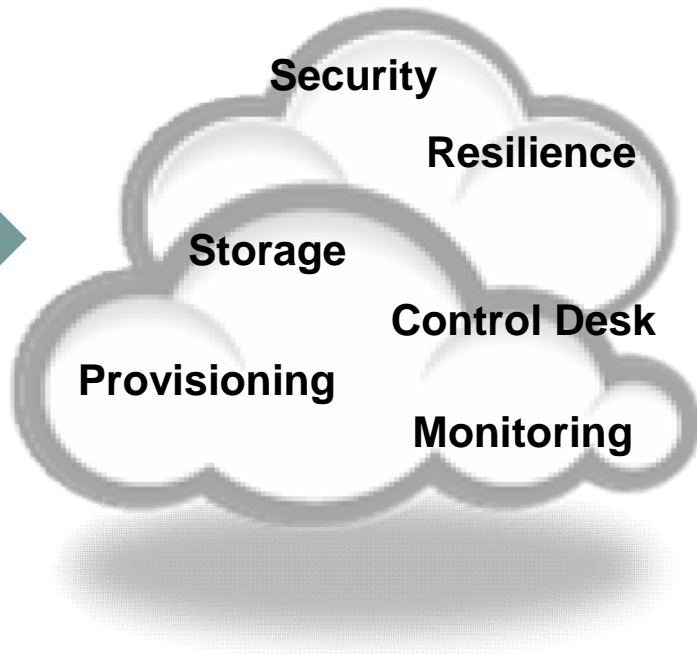
Automation with Cloud
System Automation for Multiplatform

Cloud Backup/Recovery
Tivoli Storage Manager

Cloud Monitoring
ITM (OMEGAMON for z/VM & Linux)

Service Lifecycle Management
SC Control Desk (TSRM)

Automated Provisioning
Tivoli Provisioning Manager



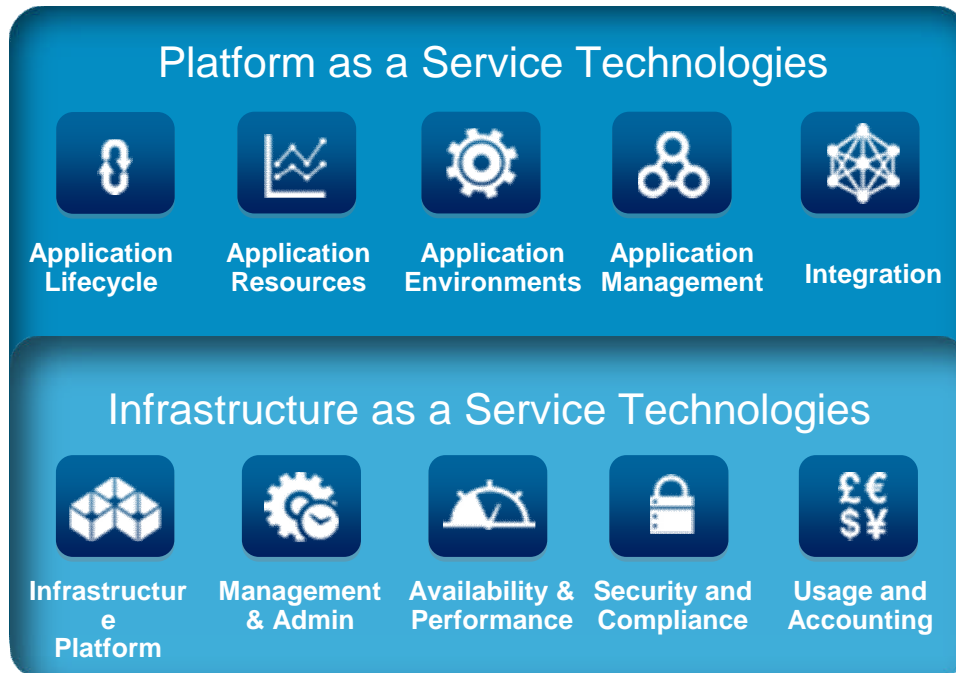
- Services for all stages of Cloud on z design & implementation
- Knowledge Transfer & on-going support, as needed.

ITM – IBM Tivoli Monitoring
SC – SmartCloud

Accelerate business transformation with capabilities from IBM cloud offerings

SmartCloud – IBM’s vision for cloud computing

IBM SmartCloud Foundation



System z an obvious choice for cloud computing:

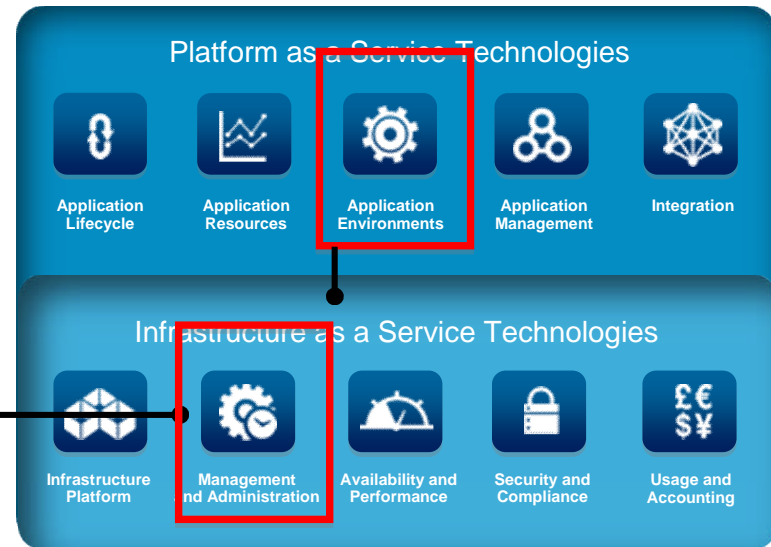
- Leading virtualization capabilities, massively scalable
- Superior user experience
- Great economics

SmartCloud Provisioning adds automated provisioning for applications

AUTOMATE OPTIMIZED WORKLOADS

- Exploit patterns for standardized middleware and application deployment
- Manage advanced image lifecycle and analytics
- Supports multiple (pluggable) hypervisor on heterogeneous platforms

IBM SmartCloud Foundation



Benefits:

Time to market - Demonstrated **35x** improvement for deploying new applications

Smart Cloud Orchestration adds control and automation to private Cloud

CONTROL

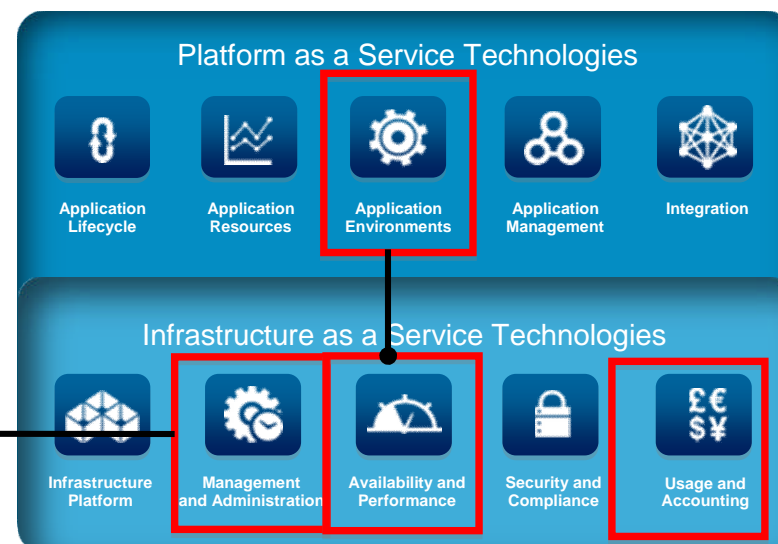
Tivoli Service Automation Manager

Advanced cloud delivery including service orchestration and runbook automation

IBM Service Delivery Manager

Advanced cloud delivery including service orchestration, runbook automation, monitoring, usage and accounting

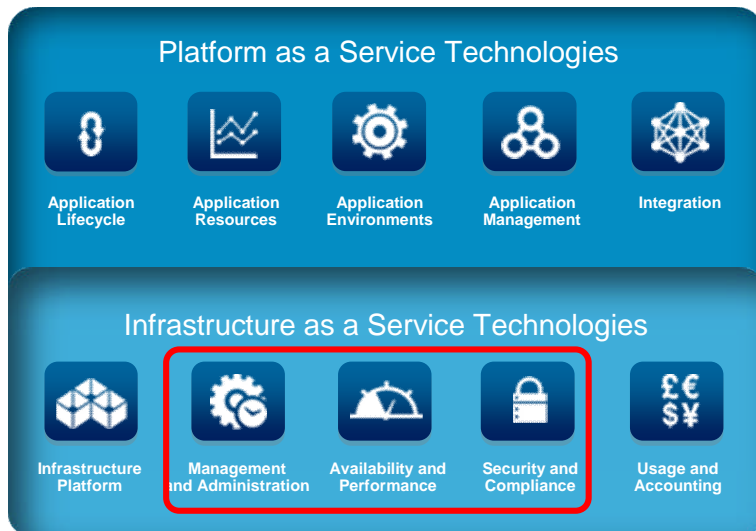
IBM Smart Cloud Foundation



- Benefits:**
- **40% - 60%** reduction of admin costs, through extensive automation of service delivery
 - Achieve standardization of services, resulting in **50%** manual labor reduction

SmartCloud Control Desk provides IT Asset and Service Management across entire enterprise

IBM SmartCloud Foundation



Comprehensive IT Service Management solution

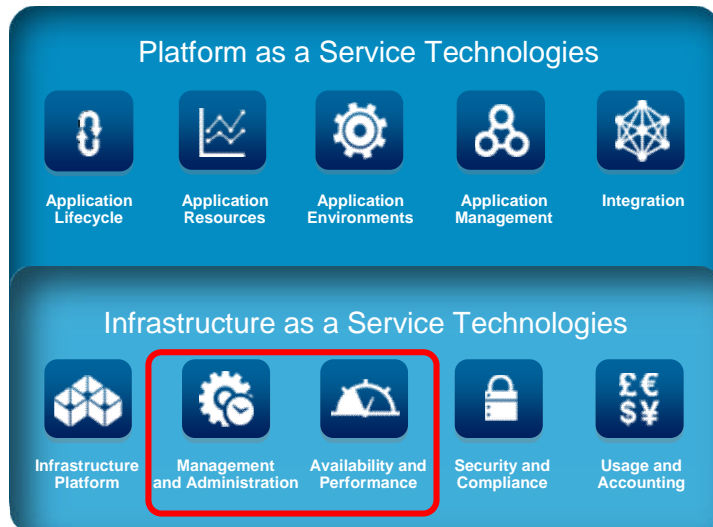
- Reduce cost and minimize service disruptions
- Automated service request handling
- Efficient change management,
- Optimized asset lifecycle management
 - Integration of Assets, CIs, Tickets

Benefits:

- Minimize outages related to changes within IT Operations by up to 70%
- Increase Process Speed and Efficiency by up to 40%
- Increase Service quality and responsiveness by up to 60%
- Optimize Software license usage and bring savings back to the business

Smartcloud Monitoring includes capability planning and analytics

IBM SmartCloud Foundation



Cloud Health Visibility and Optimization:

- Performance and availability metric integration for end to end cloud health visibility, optimization and assurance recommendations

Foundation for an Extensible Cloud Environment:

- Capacity trending and analytics ensure room for business expansion

Performance & Capacity Analytics:

- Rich capacity optimization recommendations improve resource utilization and cost

Client Success

- Major cloud service provider **consolidates 59 development & test labs into 6** centralized labs.
- Utilizing SmartCloud Monitoring, able to increase utilization significantly, **increasing VM density by 58%**

Cloud Ready for implementation today moving to SmartCloud as business requirements change



- **Get started quickly with Cloud Ready**
 - Add SmartCloud capability over time
- **Lots of value from Private cloud on z:**
 - Automated Provisioning leading to DevOps Integration
 - Workload aware monitoring and capacity management
 - Automated compliance and reporting
- **System z and zEnterprise designed to support Cloud:**
 - Automated HA and DR at workload level
 - Workload level accounting and analytics
 - Secure isolation across smarter infrastructure

<http://www-03.ibm.com/systems/z/solutions/cloud/index.html>

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