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BIG DATA IN THE OPEN PRIVATE CLOUD CSC BIG DATA PAAS + RED HAT ENTERPRISE LINUX OPENSTACK PLATFORM

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BIG DATA IS NOT BUSINESS AS USUAL

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Machine Data, Sensors, and the Internet of Things









Source: https://gigaom.com/2013/05/07/with-300m-earmarked-for-tech-innovation-metlife-wants-to-remake-insurance/



The Power of Predictive Analytics



Financial Services

- Fraud detection
- Risk management
- 360° view of the customer



Utilities

- Analysis of weather impact on power generation
- Transmission monitoring
- Smart grid management



Retail

- 360° view of the customer
- Click-stream analysis
- Real-time promotions



Telecommunications

- CDR processing
- Churn prediction
- Geomapping/marketing
- Network monitoring



Transportation

- Real-time route optimization based on traffic and weather
- Maintenance optimization and asset tracking



Health and Life Sciences

- Epidemic early warning system
- ICU monitoring
- Remote healthcare monitoring



Law Enforcement

- Real-time multimodal surveillance
- Situational awareness
- Cybersecurity detection



Manufacturing

- Predictive maintenance
- Real-time parts flow monitoring
- Product configuration planning



Hadoop: The Solution?



- Massive-scale, batch oriented analytical processing Search, Hive, HBase... support for Java, Python, R, etc. H2O, Waterline Data, etc.
- Ultimate scale-out flexibility to add compute and storage • Wide variety of processing frameworks, including Spark, Robust add-on ecosystem, including Pentaho, Datameer,
- Impala and Hive provide interactive data access, but optimized for medium to high latency
- High upkeep for managing table structures and metadata • 3+ replication of data
- Ideal DR is a second cluster with data replication meaning syncing concerns and 6+ total replication of data
- Minimal support for data transactionality
- High maintenance and management overhead

Often an important foundation and hub, but not the analytics silver bullet.



Right Tool for the Job, Often Multiple Tools for the Job





Analytics File Store

- Scale out to petabytes
- Foundation for many data processing frameworks
- Any data format
- Interactive query w/ **Hive and Impala**



In-Memory Analytics

- Fast analytical operations on data that fits in memory
- Rapid data mining
- Real-time apps with fast ad hoc analytic requirements



Row-Oriented Database

- ANSI SQL compliance
- Transactional data (OLTP)
- Frequent complex joins
- Frequent row updates
- Fast, small data business intelligence support



Advanced Analytics Tool

- Tools for executing advanced analytical techniques (statistics, forecasting, simulations, clustering, etc.)
- Can run standalone or in conjunction with inmemory analytics, columnar DB, analytics file store, etc.

elasticsearch.



Document Store

- Real-time data visualization
- Fast, flexible app development
- formats

Business Intelligence Tool

- Tools for combining metrics and visualizing them through reports, dashboards, and interactive visualizations
- Can run standalone or in conjunction with inmemory analytics, columnar DB, row DB, analytics file store, etc.

- JSON/BSON data

pentaho[®] Qlik Q

elasticsearch. Solr

Full-Text Search

- Text searches (e.g. social media, email / chat, claims, contracts, etc.)
- Data exploration, discovery, and indexing

pentaho[•] informatica IBM

Data Integration Tool

- Tools for connecting with databases, file stores, or other systems and transferring data
- Can run standalone or in conjunction with inmemory analytics, stream processing, analytics file store, etc.



Columnar Database

- Scale out to petabytes
- Fast time-series analysis (e.g. web activity, sensor readings, purchases, etc.)
- Fast characteristic or numerical analysis (age, ratings, churn, etc.)



Stream Processing

- Processing event data that is constantly flowing (e.g. sensor data, web log data, user or customer activity, etc.)
- Augmentation, cleansing, transformation, and monitoring of data as it flows to other destinations





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Kibana



In This Landscape, Companies Consistently Struggle with the Same Four Challenges

- Data complexity
- Operational complexity
- Managing varied production workloads to tight SLAs

2. Attracting, managing, and applying big data & analytics skills

3. Integrating insights into their business processes

4. Iterating quickly enough

- benchmarks, not for business ROI

1. Setting up and operating a big data and analytics platform

 Limited infrastructure scalability with hard resource boundaries • Optimized for IT purchase cycle and industry performance



Overcoming These Challenges Requires a New Approach

Complex Data

Provide application developers a platform designed to ingest, integrate, and manage data from any source and in any format

Skills Shortage

Leverage Big Data Platform as a Service to allow your talent to focus on the business application versus platform gymnastics

Scale and Speed

Benefit from the technologies, proven scale, and **cloud operating principles** that underpin Facebook, Twitter, Yahoo, and other businesses that rely on big data

ROI Expectations

Access an environment that can be deployed and operational in days, not months -- and changed in minutes, not weeks



CSC BIG DATA PAAS

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Big Data Platform That Enables Insights from Your Data in Less Than 30 Days



Agile Application Development Environment that is Scalable, Sustaining, Self Healing



Fully Integrated and Managed Big Data Platform-as-a-Service OPACLE KORACLE AND CORACLE KORACLE KORACLE KORACLE KORACLE KORACLE COLUTION CORACLE HUE **Business Intelligence** ETL **Data Transformation Data Mining Advanced Analytics** Geolocation **Big Data Platform as a Service** CSC Ad Hoc **Real-Time Batch CSC Command and Control** Application Center Knowledge Support Center Deployment Center **Operations** Center Center GRAPH INTERACTIVE COLUMNAR ROW DOCUMENT STREAM Hortonworks cloudera PostgreSQL HBase Elasticsearch TitanDB Storm / Kafka Hive w/ Tez Accumulo MongoDB Impala DataStax HDFS, YARN, MapReduce, Spark **Enterprise Grade Security** Audit Perimeter Hardened Activity Malware Compliance Access Encryption Monitoring Logging OS **Protection** Security Control Support **Flexible Deployment Options** Amazon Web **CSC Hybrid Dedicated Hardware CSC BizCloud HC Cloud Services** Services



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Making it faster, easier, and far less costly to develop and deploy big data applications



AN AGILE BIG DATA PLATFORM APPROACH





01 IDEA!

PRODUCTION

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User Queries

LOCAL Push Code WI Git Test WI Jenkins

VM/Sandbox

or "local node" environment or "direct-dev" on BDPaaS

PRODUCTION

DEV / DR

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- ADD OR REMOVE NODES
- RECONFIGURE NODES
- RECONGIFURE OVERALL CLUSTER
- ADD OR REMOVE CLUSTERS
- SCALE UP OR SCALE DOWN CPU, RAM, DISK
- ADD OR REMOVE ENVIRONMENTS

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Why Private Cloud

Private

- Security & Compliance
- Ownership
- Internal Network Benefits
- High Scale Cost Savings

Virtualized w/ Cloud Management

- Higher Resource Efficiency for Increase Savings
- Significantly Greater Workload and Resource Flexibility
- More compatible with software-defined-everything approach
- Shared Services (image service, identity management,
 - object storage, block storage, telemetry, etc.)
- High Scale Cost Efficiency
- Hybrid Cloud Compatibility

CSC BIG DATA PAAS POWERED BY RED HAT ENTERPRISE LINUX OPENSTACK PLATFORM

BDPaaS on Red Hat OpenStack Platform

BDPaaS DevOps Automation

Red Hat Enterprise Linux OpenStack Platform + Dell Reference Architecture

Source: Red Hat + Dell Reference Architecture White Paper

U	Rack1
42	Firewall
41	Cable Mgmt
40	Data Switch 1
39	Cable Mgmt
38	Data Switch 2
37	Cable Mgmt
36	Access Switch
35	Cable Mgmt
34	Management Switch
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23 22	R620 Network Server
22 21	R620 Admin Server
20	
19	R720 General Purpose Compute
18	
17	R/20 General Purpose Compute
16	P720 Conoral Purposo Compute
15	K720 General Purpose Compute
14	R720XD Compute/Storage Server
13	
12	R720XD Compute/Storage Server
11	
10	R720XD Compute/Storage Server
9	
8 7	R720XD Compute/Storage Server
/ 6	
5	R720XD Compute/Storage Server
4	
3	R720XD Compute/Storage Server
2	Power Cabling
1	Power Cabling

LaunchPad

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Firewall Case 25/02/2014 Option 2014 NA: Assumed will conned in its classing network. NA: Assumed will conned in its classing network. Network Agregation Sance - Data Service - Da	Min usable storage	42TB+	10- 28TB (TBC)	1 - 3TB (TBC)
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Switch - Management 7 2 Machael CX 8550 (1006E) 1 × Broade CX 8550 (1006E) NA - Assumed will connect fund cleads calculate	Network Aggregation	Brocade VDX 8770 (Optional if client does not have a suitable	N/A - Assumed will connect into clients existing network	N/A - Assumed will connect into clients existing network
Switch - Management Genoral Purpose Compute Server T & Biocade (CX 8610 (150E)) T & Biocade (CX 8610 (1	Switch – Data	2 x Brocade ICX 6650 (10GbE)	1 x Brocade ICX 6650 (10GbE)	N/A - Assumed will connect into clients existing network
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Provider Dell Dell NA – Covered in General Purpose + Data Nodes Compute Server Model R730xd R730xd R730xd CPU Dual 8 Core CPU Dual / 8 Core CPU Purpose Network 2 * 10Gb Ncs / 2 * 1GB Nics 2 * 10Gb Ncs / 2 * 1GB Nics Storage Storage 50TB (12x4TB 3.5", SATA, 7.2k +2x 1TB 2.5" Near Line SAS) SoTB (12x4TB 3.5", SATA, 7.2k +2x 1TB 2.5" Near Line SAS) Management Server (Network / Admin) Management Server (Network / Admin) NA Virtualization NA OpenStack control: OpenStack-dashboard, glance (api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openvswitch, neutron (server, metadata, I3, dhcp), and potentially swift (proxy, account, container, object) OpenStack control: OpenStack-dashboard, glance (api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openvswitch, neutron (server, metadata, I3, dhcp), and potentially swift (proxy, account, container, object) OpenStack control: OpenStack-dashboard, glance (api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openvswitch, neutron (server, metadata, I3, dhcp), and potentially swift (proxy, account, container, object) Openstack control: OpenStack-dashboard, glance (api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openvswitch, neutron Openstack control: Openstack-dashboard, glance (api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openvswitch	Raw to Usable Ratio	4.5:1	4.5:1	
Model R730xd R730xd CPU Dual 8 Core CPU Dual / 8 Core CPU RAM 128GB 128GB Network 2 * 10Gb Ncs / 2 * 1GB Nics 2 * 10Gb Ncs / 2 * 1GB Nics Storage 50TB (12x4TB, 3.5", SATA, 7.2k + 2x 1TB 2.5", Near Line SAS) Management Server (Network / Admin) Virtualization NA Management Server (Network / Admin) NA Applications Hosted OpenStack control: OpenStack-dashboard, glance OpenStack control: OpenStack-dashboard, glance OpenStack control: OpenStack-capi, OpenStack-dashboard, glance OpenStack control: OpenSt	Provider	Dell	Dell	NA – Covered in General Purpose + Data Nodes Compute Server
CPU Dual 8 Core CPU Dual / 8 Core CPU RAM 128GB 128GB Network 2 * 10Gb Ncs / 2 * 1GB Nics 2 * 10Gb Ncs / 2 * 1GB Nics Storage 50TB (12x4TB,3 5",SATA,7 2k +2x 1TB 2.5" Near Line SAS) 50TB (12x4TB,3 5",SATA,7 2k +2x 1TB 2.5" Near Line SAS) Purpose Management Server (Network / Admin) Management Server (Network / Admin) NA OpenStack control: OpenStack-api, OpenStack-dashboard, glance (api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openvswitch, neutron (server, metadata 13, dhcp), and potentially swift (proxy, account, container, object) OpenStack control: Openstack-api, OpenStack-dashboard, glance (api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openvswitch, neutron (server, metadata 13, dhcp), and potentially swift (proxy, account, container, object) OpenStack control: Openstack control: Openstack-dashboard, glance (api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openvswitch, neutron (server, metadata 13, dhcp), and potentially swift (proxy, account, container, object) OpenStack control: Openstack control: Openstack-dashboard, glance (api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openvswitch, neutron (server, metadata 13, dhcp), and potentially swift (proxy, account, container, object) OpenStack control: Openstack control: Openstack control: Openstack control: Openstack container, object) 2 Maximum Ad Based on requirements and HA option 2 2 2 CPU Dual 8 Core CPU	Model	R730xd	R730xd	
RAM 128GB 128GB Network 2 * 10Gb Ncs / 2 * 10Gb Ncs / 2 * 10G Ncs / 2 * 10	CPU	Dual 8 Core CPU	Dual / 8 Core CPU	
Network2 * 10Gb Ncs / 2 * 1GB Nics2 * 10Gb Ncs / 2 * 1GB NicsStorage50TB (12x4TB 3.5", SATA, 7.2k +2x 1TB 2.5" Near Line SAS)50TB (12x4TB, 3.5", SATA, 7.2k +2x 1TB 2.5" Near Line SAS)PurposeManagement Server (Network / Admin)Management Server (Network / Admin)NAVirtualizationNAOpenStack control: OpenStack-api, OpenStack-dashboard, glance (api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openswitch, neutron (server, metadata, 13, dhcp), and potentially swift (proxy, account, container, object)OpenStack and potentially swift (proxy, account, <b< td=""><td>RAM</td><td>128GB</td><td>128GB</td><td></td></b<>	RAM	128GB	128GB	
Storage 50TB (12x4TB,3.5",SATA,7.2k +2x 1TB 2.5" Near Line SAS) 50TB (12x4TB,3.5",SATA,7.2k +2x 1TB 2.5" Near Line SAS) Purpose Management Server (Network / Admin) Management Server (Network / Admin) Management Server (Network / Admin) Virtualization NA OpenStack control: OpenStack-api, OpenStack-dashboard, glance (abi, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openswitch, neutron (server,metadata,13,dhcp), and potentially swift (proxy, account, container, object) OpenStack control: OpenStack-api, Open	Network	2 * 10Gb Ncs / 2 * 1GB Nics	2 * 10Gb Ncs / 2 * 1GB Nics	
Purpose Management Server (Network / Admin) Management Server (Network / Admin) Management Server (Network / Admin) Virtualization NA OpenStack control: OpenStack-api, OpenStack-dashboard, glance (api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openswitch, neutron (server,metadata,13,dhcp), and potentially swift (proxy, account, container, object) OpenStack control: OpenStack-dashboard, glance (api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openswitch, neutron (server,metadata,13,dhcp), and potentially swift (proxy, account, container, object) NA Minimum 3 2 2 2 2 2 Maximum Add Based on requirements and HA option 2 2 2 2 Model R630 R630 R630 R630 Dual 8 Core CPU 2 * 10Gb Ncs / 2 * 1GB Nics 2 * 10Gb Ncs / 2 * 1GB Nics 2 * 10Gb Ncs / 2 * 1GB Nics 2 * 10Gb Ncs / 2 * 1GB Nics 2 * 10Gb Ncs / 2 * 1GB Nics 2 * 10Gb Ncs / 2 * 1GB Nics 2 * 10Gb Ncs / 2 * 1GB Nics 2 * 10Gb Ncs / 2 * 1GB Nics 2 * 10Gb Ncs / 2 * 1GB Nics 2 * 10Gb Ncs / 2 * 1GB Nics 2 * 10Gb Ncs / 2 * 1GB Nics 2 * 10Gb Ncs / 2 *	Storage	50TB (12x4TB,3.5",SATA,7.2k +2x 1TB 2.5" Near Line SAS)	50TB (12x4TB,3.5",SATA,7.2k +2x 1TB 2.5" Near Line SAS)	
VirtualizationNANAOpenStack control: OpenStack control: OpenStack-capi. OpenStack-dashboard, glanc (api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openswitch, neutron (server, metadata,13,dhcp), and potentially swift (proxy, account, container, object)OpenStack control: OpenStack-dashboard, glanc (api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openswitch, neutron (server, metadata,13,dhcp), and potentially swift (proxy, account, container, object)OpenStack control: OpenStack-dashboard, glanc (api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openswitch, neutron (server, metadata,13,dhcp), and potentially swift (proxy, account, container, object)OpenStack control: OpenStack-dashboard, glanc (api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openswitch, neutron (server, metadata,13,dhcp), and potentially swift (proxy, account, container, object)OpenStack control: OpenStack-dashboard, glanc (api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openswitch, neutron (server, metadata,13,dhcp), and potentially swift (proxy, account, container, object)OpenStack control: OpenStack-dashboard, glanc (api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openswitch, neutron (server, metadata,13,dhcp), and potentially swift (proxy, account, container, object)OpenStack control: OpenStack-dashboard, glanc (api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openswitch, neutron (server, metadata,13,dhcp), and potentially swift (proxy, account, container, object)ModelR630222<	Purpose	Management Server (Network / Admin)	Management Server (Network / Admin)	Management Server (Network / Admin)
Applications HostedOpenstate-api, openstate-api, opensta	Virtualization	NA OpenStack control: OpenStack ani, OpenStack daebboard, glance	NA OpenStack control: OpenStack opi OpenStack dechboard glappe	NA OpenStack control: OpenStack ani OpenStack daebboard gland
Minimum322MaximumAdd Based on requirements and HA option22ProviderDellDellDellModelR630R630CPUDual 8 Core CPUDual 8 Core CPUNational S GB128 GB128 GBNetwork2 * 10Gb Ncs / 2 * 1GB Nics2 * 10Gb Ncs / 2 * 1GB NicsStorage9.6TB RAW 10K RPM SAS 6Gbps 2.5in9.6TB RAW 10K RPM SAS 6Gbps 2.5in9.6TB RAW 10K RPM SAS 6Gbps 2.5in	Applications Hosted	(api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openvswitch, neutron (server,metadata,l3,dhcp), and potentially swift (proxy, account, container, object)	(api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openvswitch, neutron (server,metadata,l3,dhcp), and potentially swift (proxy, account, container, object)	(api, registry), keystone, nova (api, cert, conductor, console-auth, novncproxy, scheduler), openvswitch, neutron (server,metadata,l3,dhcp), and potentially swift (proxy, account, container, object)
MaximumAdd Based on requirements and HA option22ProviderDellDellDellModelR630R630R630CPUDual 8 Core CPUDual 8 Core CPUDual 8 Core CPURAM128 GB128 GB128 GB128 GBNetwork2 * 10Gb Ncs / 2 * 1GB Nics2 * 10Gb Ncs / 2 * 1GB Nics2 * 10Gb Ncs / 2 * 1GB NicsStorage9.6TB RAW 10K RPM SAS 6Gbps 2.5in9.6TB RAW 10K RPM SAS 6Gbps 2.5in9.6TB RAW 10K RPM SAS 6Gbps 2.5in	Minimum		2	2
Note:DellDellDellModelR630R630CPUDual & Core CPUDual & Core CPUDual & B Core CPUDual & Core CPURAM128 GB128 GBNetwork2 * 10Gb Ncs / 2 * 1GB Nics2 * 10Gb Ncs / 2 * 1GB NicsStorage9.6TB RAW 10K RPM SAS 6Gbps 2.5in9.6TB RAW 10K RPM SAS 6Gbps 2.5in	Maximum	Add Based on requirements and HA option		
CPUDual 8 Core CPUDual 8 Core CPUDual 8 Core CPURAM128 GB128 GBNetwork2 * 10Gb Ncs / 2 * 1GB Nics2 * 10Gb Ncs / 2 * 1GB Nics2 * 10Gb Ncs / 2 * 1GB NicsStorage9.6TB RAW 10K RPM SAS 6Gbps 2.5in9.6TB RAW 10K RPM SAS 6Gbps 2.5in9.6TB RAW 10K RPM SAS 6Gbps 2.5in	Model	R630	R630	R630
RAM 128 GB 128 GB Network 2 * 10Gb Ncs / 2 * 1GB Nics 2 * 10Gb Ncs / 2 * 1GB Nics 2 * 10Gb Ncs / 2 * 1GB Nics Storage 9.6TB RAW 10K RPM SAS 6Gbps 2.5in 9.6TB RAW 10K RPM SAS 6Gbps 2.5in 9.6TB RAW 10K RPM SAS 6Gbps 2.5in	CPU	Dual 8 Core CPU	Dual 8 Core CPU	Dual 8 Core CPU
Network 2 * 10Gb Ncs / 2 * 1GB Nics 2 * 10Gb Ncs / 2 * 1GB Nics 2 * 10Gb Ncs / 2 * 1GB Nics Storage 9.6TB RAW 10K RPM SAS 6Gbps 2.5in 9.6TB RAW 10K RPM SAS 6Gbps 2.5in 9.6TB RAW 10K RPM SAS 6Gbps 2.5in	RAM	128 GB	128 GB	128 GB
Storage 9.6TB RAW 10K RPM SAS 6Gbps 2.5in 9.6TB RAW 10K RPM SAS 6Gbps 2.5in 9.6TB RAW 10K RPM SAS 6Gbps 2.5in	Network	2 * 10Gb Ncs / 2 * 1GB Nics	2 * 10Gb Ncs / 2 * 1GB Nics	2 * 10Gb Ncs / 2 * 1GB Nics
	Storage	9.6TB RAW 10K RPM SAS 6Gbps 2.5in	9.6TB RAW 10K RPM SAS 6Gbps 2.5in	9.6TB RAW 10K RPM SAS 6Gbps 2.5in

Usage-Based Auto Insurance Big Data Telematics in the Open Private Cloud

A leading mutual insurance company with more than 18,000 agents servicing 81 million customers in the US and Canada. CSC delivered a cost-effective, big data platform to support high volume telematics data. Solution accelerated time to market and met critical business timelines.

Challenge

- Highly visible board level initiative to close gap with other carriers already offering products in market
- Required a platform to support a high volume telematics based analytic application
- Ability to meet time to market requirements of the business
- Internal technology skills gap
- Current technology platforms were neither capable of supporting, nor cost effective

Solution

- Security and Infrastructure platform/ technologies
- Hosted Big Data Ingestion Engine
- Highly Secure Hosted Network
- million customers)
- High Availability supported by 2 Data Centers for Business Continuity
- Solutions
- 24X7 support

Global Insurance Company

• Robust, Secure and Integrated Platform to enable Telematics Application leveraging best of breed Big Data & Analytics Cyber

• Scaled for High Volume Telemetric Data (6

World Secure Class Security & Monitoring

Results

- Highly Available Platform: Architected and managed to business SLA requirements
- Speed to Market CSC platform enabled the customer to accelerate time to market and meet critical business timelines
- Allows for expansion and rapid scale up as the program is deployed and adopted across the 52 states
- Limited initial outlay to get up and running quickly

Usage-Based Auto Insurance Architecture

Telematics Data Collection

U	Rack1		U	Rack1		U	Rack1	
42	Firewall		42	Firewall		42	Firewall	
41	Cable Mgmt		41	Cable Mgmt		41	Cable Mgmt	
40	Data Switch 1		40	Data Switch 1		40	Data Switch 1	
39	Cable Mgmt		39	Cable Mgmt		39	Cable Mgmt	
38	Data Switch 2	PROD	38	Data Switch 2	AC	38	Data Switch 2	DR
37	Cable Mgmt		37	Cable Mgmt		37	Cable Mgmt	
36	Access Switch		36	Access Switch		36	Access Switch	
35	Cable Mgmt		35	Cable Mgmt		35	Cable Momt	
34	Management Switch		34	Management Switch		34	Management Switch	
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23	R620 Network Server		23			23	R620 Network Server	OpenS
22	R620 Admin Server		22			22	R620 Admin Server	Opens
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20	R720 General Purpose Compute	ר CSC C&C	20			20	R720 General Purpose Compute	CSCך
19		PostgreSQL	19			19		Post
10	R720 General Purpose Compute	RabbitMQ	17			10	R720 General Purpose Compute	Rabi
16		Hadoop NN	16			16		Hade
15	R720 General Purpose Compute	_ Hadoop RM	15			15	R720 General Purpose Compute	
14			14			14		-
13	R/20XD Compute/Storage Server		13	R720 General Purpose Compute	LSC L&C	13	R720XD Compute/Storage Server	
12	P720VD Compute/Storage Server		12		PosigreSQL	12	D720VD Compute/Storage Server	
11	R720AD Compute/Storage Server		11	R/20 General Purpose Compute		11	R120AD Compute/Storage Server	
10	R720XD Compute/Storage Server		10	R720 General Purnose Compute		10	R720XD Compute/Storage Server	
9		Hadoon DNs	9	R720 General Purpose Compute		9		Had
8	R720XD Compute/Storage Server		8	R720XD Compute/Storage Server		8	R720XD Compute/Storage Server	Tiaut
6	P720XD Compute/Storage Server		6			6	P720XD Compute/Storage Server	
5	KIZUND Compute/Storage Server		5	KIZUAD Compute/Storage Server	Hadoop DNs	5	KIZUND Compute/Storage Server	
4	R720XD Compute/Storage Server		4	R720XD Compute/Storage Server		4	R720XD Compute/Storage Server	
3	Power Cabling		3	Power Cabling		3	Power Cabling	
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Stack Mgmt Stack Mgmt Stack Mgmt C C&C stgreSQL bbitMQ doop NN doop RM

loop DNs

FOR MORE INFO: csc.com/bigdata

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