



Dell EMC / World

MT41  
VMAX All Flash  
Modernizing Your Infrastructure

@scottdelandy

@kewittmer

# Session Abstract

## Dell EMC VMAX: Modernizing Your Infrastructure with VMAX All Flash

Dell EMC VMAX All Flash continues to modernize, automate, and transform the ways organizations are deploying, provisioning, protecting, and managing storage infrastructure and services.

This informative session will introduce attendees to the latest addition to the Dell EMC VMAX All Flash family to provide enterprise-class capabilities across a wider range of application types and sizes.

Attendees will also learn about the latest VMAX software enhancements and their applied use cases.

# VMAX All Flash for your core business applications

## SCALE UP & OUT

- Affordable economics, from 10s of TBs to multi-PBs
- Start small and easily grow
- Multi-controller array provides performance and availability

## HIGH PERFORMANCE

- Predictable <1ms response times for low latency apps
- Consistent high throughput for very large block I/Os
- Inline data compression



## COPY DATA MANAGEMENT

- Simple, application integrated copies
- Space efficient, zero impact app snapshots managed by DBAs
- Radically reduce time to backup, test and deploy new apps

## PROVEN DR & APP AVAILABILITY

- Multi-site SRDF replication for zero App RPO/RTO
- Proven non disruptive HW and SW upgrades
- Host clustering integration

# VMAX 250F technology refresh example

Legacy 9 bay array (338TB)



10X

MORE  
PERFORMANCE

\$94K

ANNUAL  
SAVINGS

2:1

COMPRESSION  
EFFECIENCY

93%

LESS POWER  
AND COOLING

92%

FLOOR SPACE  
REDUCTION

\*results based on EMC Flash Assessment analysis of 9 Bay VMAX compared to VMAX 250F with similar usable capacity

# VMAX All Flash increases database license ROI

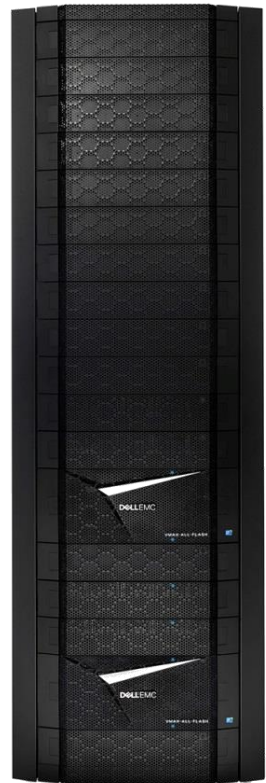
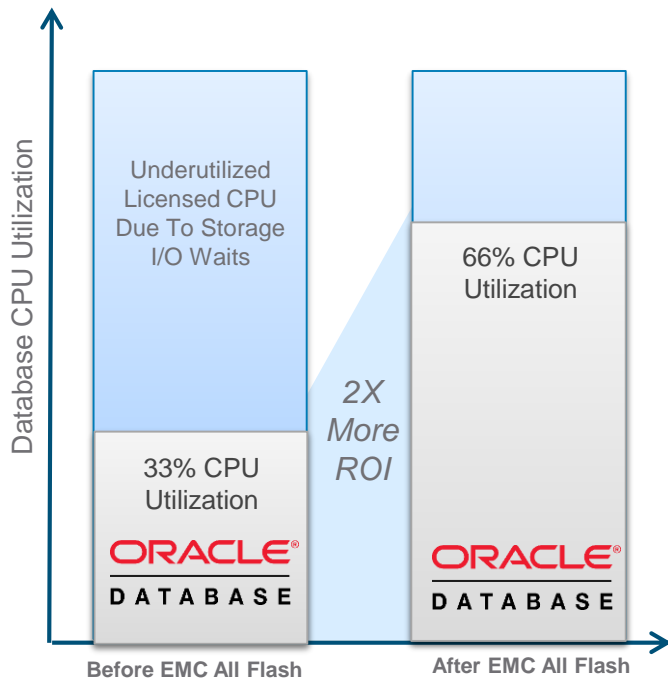
Reduced storage  
latency increases  
CPU utilization

More DB transactions

Higher CPU efficiency

Fewer physical CPU cores

*Lower DB licensing costs*



Source: EMC Customer Case Study

# Flash Assessment

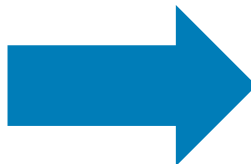
Proposal to Refresh HP3PAR V400 with VMAX 250F

# VMAX 250F Flash Assessment example

## Current Environment

| HP 3PAR V400     |          |
|------------------|----------|
| # of Drives      | 480      |
| Total Capacity   | 189 TB   |
| # of Tiles       | 2        |
| Rack Units       | 64       |
| # of Tiers       | 2        |
| Power            | 12.6 kW  |
| Annual Energy \$ | \$29,731 |
| Workload IOPS    | 14,615*  |
| Response Time    | 5ms*     |

\*Average performance results based on 24 hour workload analysis



## Proposed Environment

| VMAX 250F 1xV-Brick/1TB Cache |           |
|-------------------------------|-----------|
| #Drives/Type                  | 36/3.84TB |
| Total Capacity                | 204 TB    |
| # Tiles                       | 1         |
| Rack Units                    | 10        |
| # of Tiers                    | 1         |
| Power                         | 1.7 kW    |
| Annual Energy \$              | \$3,907   |
| Workload IOPS                 | 300,000** |
| Response Time                 | 0.8ms**   |

\*\*Peak IOPS, Average (RRM 8K blocks) based on Sizer models

Flash Assessments Provide A Highly Accurate Way to Determine Savings and ROI

# Solution Summary – Key Performance Indicators

**16x**



**MORE  
PERFORMANCE**

**94%**



**LESS  
LATENCY**

**2:1**



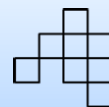
**SPACE  
EFFECIENCY**

**87%**



**LESS POWER  
AND COOLING**

**50%**



**LESS FLOOR  
SPACE**

**\$26K**



**ANNUAL ENERGY  
SAVINGS**

## CURRENT ENVIRONMENT

3PAR V400



2 Rack(s)



189 TB Usable



Cooling: 43K BTU/Hour



Power: 12.6 kW



13 ms Response Time



19,082 IOPS\*



**Operational Management**

- Manual Perf tuning, storage engineering
- No ability for data reduction
- Reactive storage tiering

## EMC VMAX ALL-FLASH PROPOSED

VMAX 250F



1 Rack



204 TB Effective (@ 2:1 Reduction)



Cooling: 6K BTU/Hour



Power: 1.7 kW



< 0.8 ms Response Time



300K IOPS\*



**Operational Management**

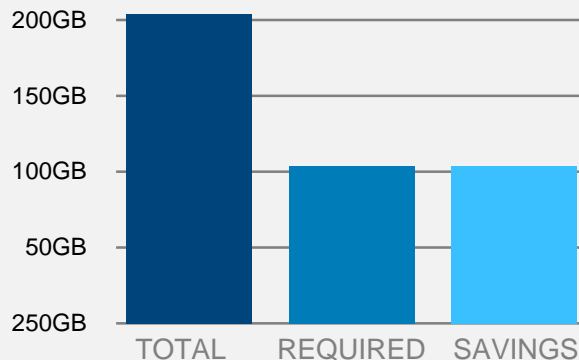
- Zero config work, Zero tuning, Zero engineering
- Always ON and INLINE data services

RRM 8K blocks

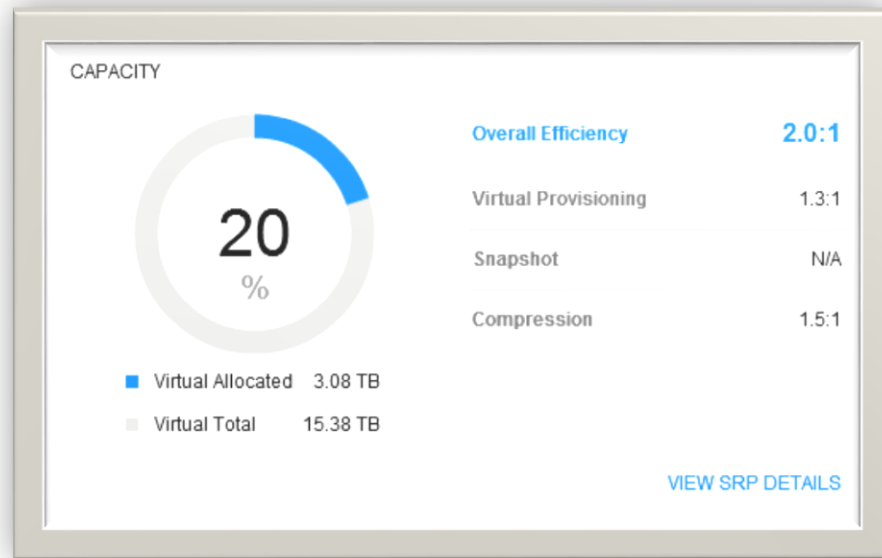
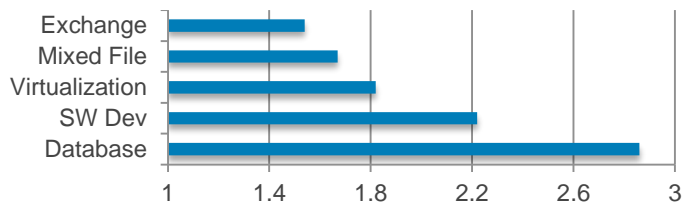
# Solution Summary – Space Efficiency Estimate

## VMAX In Line Compression

2:1 savings based on MiTREND analysis



## Typical compression ratios by app



Total space savings includes  
Compression, Virtual Provisioning,  
and Snapshot pointer based copies

# VMAX Overview

What's behind the white light?

# VMAX All Flash family expands with the 250F

## New Member of VMAX All Flash Family

First in EMC with Intel Broadwell CPUs

First in EMC with 15TB flash drives

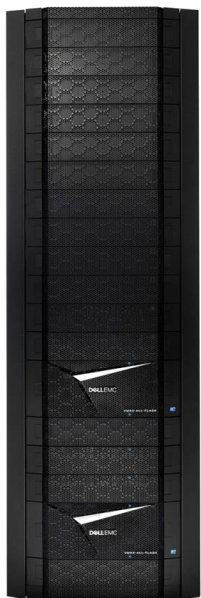
Expand to 4 Controllers 100 SSDs

1PB Effective Capacity in 10U

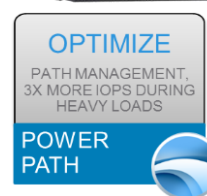


Same HYPERMAX code for all VMAX All Flash systems

# VMAX All Flash – what's inside?



|                     | VMAX All Flash Family          | VMAX 250F                              | VMAX 450F   | VMAX 850F |
|---------------------|--------------------------------|--|-------------|-----------|
| V-BRICKS            | # of V-Bricks                  | 1-2                                    | 1-4         | 1-8       |
|                     | # Cores per System             | 96                                     | 128         | 384       |
| CACHE               | Cache per V-Brick Options      | 512GB, 1TB, 2TB                        | 1TB and 2TB |           |
|                     | Max Cache per Array            | 4TB                                    | 8TB         | 16TB      |
| Ports and Modules   | Max FE I/O Modules per V-Brick | 8                                      | 6           |           |
|                     | Maximum number of ports        | 64                                     | 96          | 192       |
| Drives and Capacity | Maximum Capacity per Array     | 1PBe                                   | 2PBe        | 4PBe      |
|                     | Minimum capacity               | 11TBu                                  | 53TBu       |           |
|                     | Capacity Increments            | 11TBu                                  | 13TBu       |           |
|                     | RAID Options                   | RAID 5 and RAID 6                      |             |           |
|                     | Flash Drives Supported         | 960GB, 1.92TB, 3.84TB, 7.68TB, 15.36TB |             |           |



# VMAX 250F/FX configuration options

- Up to 2 V-Bricks per system
  - Redundant dual director engine design
  - V-Bricks added in single increments
- 2 DAEs per V-Brick (12Gb SAS)
  - 50 x 2.5" flash drives per V-Brick
  - RAID 5 (3+1) or RAID 6 (6+2)
- Port cards in pairs per V-Brick (x4)
  - Each 4x 16Gb FC or 10Gb iSCSI
  - eNAS 1/10Gb options
- 10U per V-Brick
  - 20U per system, 2 systems per rack
  - <600 lb. (w/o rack), <5 kVA



Massive density in 1 rack  
Remainder of rack can be used for another 250F or 4 V-Bricks, 8 controllers  
Up to 184TB in 40U

Get bigger

2 V-Brick, 4 controllers  
~920TB in 20U

Start small

1 V-Brick, 2 controllers  
11TB to ~460TB in 10U

# VMAX All Flash: True NDU

“Thank you VMAX for giving me back my weeks ends”

“VMAX NDU is the gold standard for upgrades”

“Nobody knows its happening, It just works”

- Absolutely no component downtime or data service compromise for a HYPERMAX OS upgrade
- No maintenance windows required, <10 seconds to upgrade OS entire array
- True active-active-active... No Failover or Failback or LUN ownership switching

Source: Enterprise Management Associates

# THE XPECT More Program

Three core user benefits

The image features three vertical panels, each with a blue-tinted background showing EMC VMAX storage hardware. A large, semi-transparent banner with the text "XPECT MORE" in white capital letters spans across the middle of the three panels.

- Left Panel:** Shows a close-up of a VMAX unit. Below the banner, it reads "LIFETIME\*" in blue, followed by "MAINTENANCE PRICE PROTECTION" in white. To the right is a white padlock icon.
- Middle Panel:** Shows a row of VMAX units. Below the banner, it reads "3-YEAR\*" in blue, followed by "MONEY-BACK WARRANTY" in white. To the right is a white calendar icon showing "3 YEAR" and a pile of cash.
- Right Panel:** Shows a VMAX unit with "ALL FLASH" branding. Below the banner, it reads "LIFETIME\*" in blue, followed by "FLASH ENDURANCE PROTECTION" in white. To the right is a white icon representing a grid of SSDs with the text "SSD" below it.

# VMAX All Flash software packages

Enterprise software for the modern data center

## “F” PACKAGE

VMAX 250F / 450F / 850F

- HYPERMAX OS
- Thin Provisioning
- Inline Compression
- Non-Disruptive Migration
- Virtual Volumes
- QOS: Host IO Limits
- Embedded Unisphere, Solutions Enabler, SMI-S, REST APIs
- TimeFinder SnapVX
- AppSync iCDM Starter Bundle



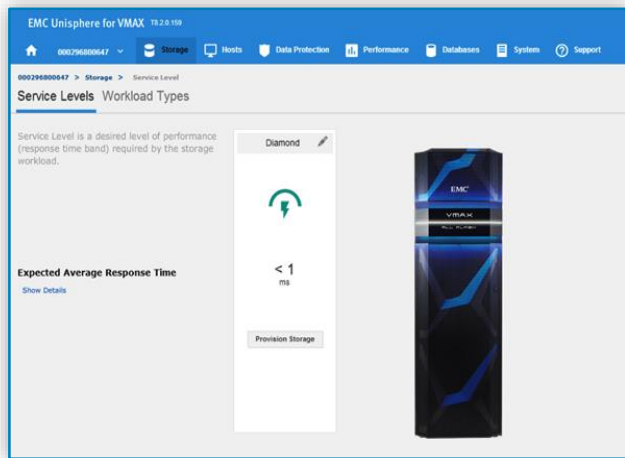
## “FX” PACKAGE

VMAX 250FX / 450FX / 850FX

- All “F” package items, plus:
- Data Encryption (D@RE)
- SRDF/S, SRDF/A, SRDF multi site
- SRDF/Metro
- Embedded NAS (File)
- Unisphere 360
- PowerPath (75 Hosts)
- CloudArray Enabler
- ViPR Suite (SRM and Controller)

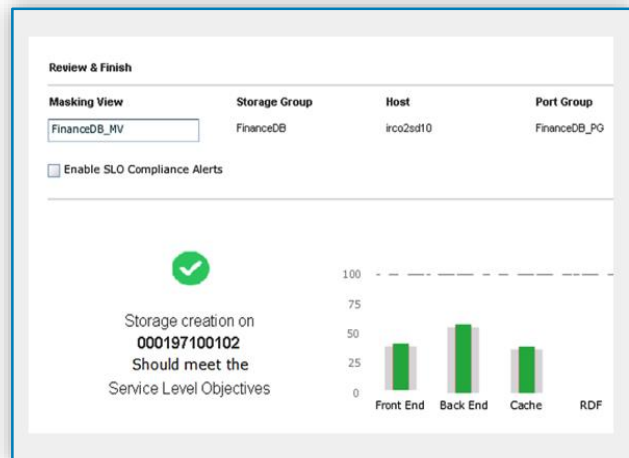
# VMAX All Flash: super simple to manage

## UNISPHERE MANAGER



- Single diamond tier ensures simplicity and performance compliance
- Achieve consistent, predictable <1ms response time for all applications

## WORKLOAD PLANNER



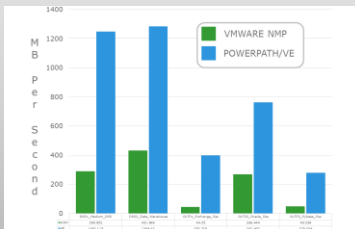
- Easily understand VMAX resource utilization in real-time
- Quickly size future VMAX resource needs with Workload Planner

# VMAX All Flash with PowerPath

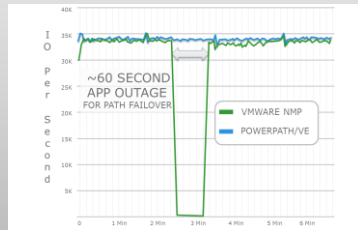
Optimized Path Management With Up To 8x More Performance

Industry's most advanced and trusted path management solution for physical and virtual environments

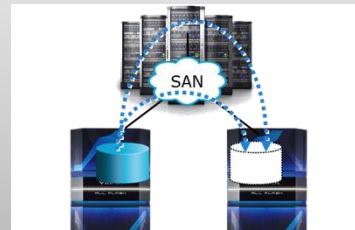
## OPTIMIZED LOAD BALANCING



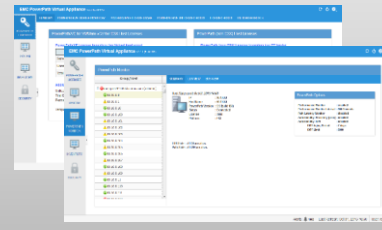
## TRANSPARENT CHANNEL FAILOVER



## MIGRATE VM'S AT MASSIVE SCALE



## AUTOMATION AND DETECTION



VMAX integration to intelligently improve performance and availability vs traditional host based multi-pathing tools

# VMAX All Flash Data At Rest Encryption

Secure data at rest to provide regulatory compliance

a  
module  
vegetation  
want to protect my  
the small dog jumped over the  
technology allows for future  
plants are able to retain more  
long-term planning for major  
indefinite retention terms may  
spider bites may cause various  
swimming under those conditions  
larger capacity flash drives  
security directive  
information  
personal  
to



Encrypts all user data

- Including vault drives

All VMAX data services

- No compromises

Advanced Encryption Standard

- AES-256 encryption

FIPS-140-2 validation

- Validation #2479

Secure key management

- Generation/deletion/...

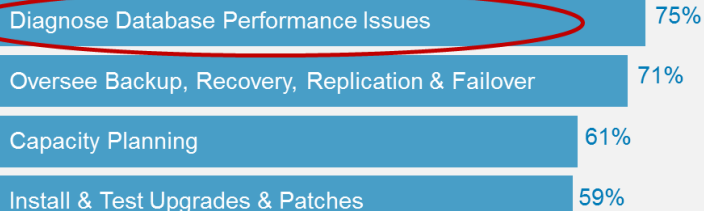
The background of the slide is a dark gray to black color, featuring a repeating pattern of hexagons. Each hexagon has a slight 3D effect, with a darker center and lighter edges, creating a textured, honeycomb-like appearance.

# VMAX All Flash Common Use Cases

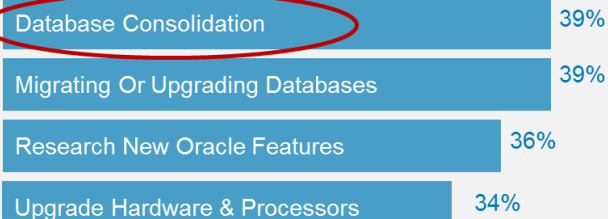
Cool capabilities to simplify the life of the app owner

# Common core database management challenges

## Which Tasks Are Consuming Most DBA Time?

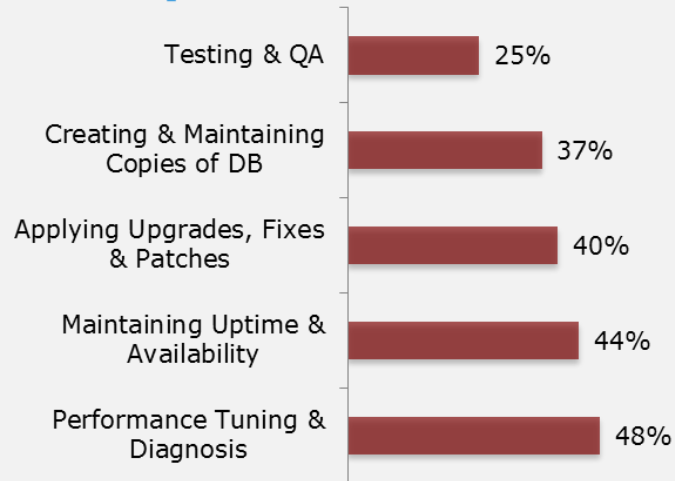


## Which Areas Would You Like To Invest More?



(Source: **IOUG** - DBA Survey)  
independent oracle users group

## Time Spent on Maintenance



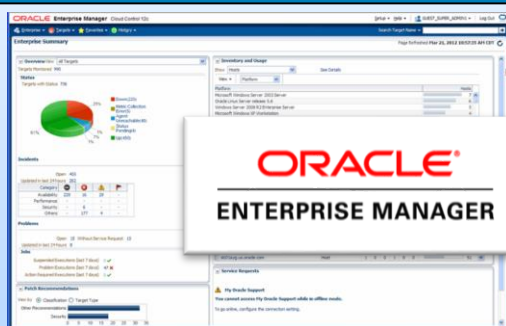
## Top 5 Database Activities

(Source: 2014 IT Resource Strategies Survey)

IT spends a lot of time & resources maintaining core environments

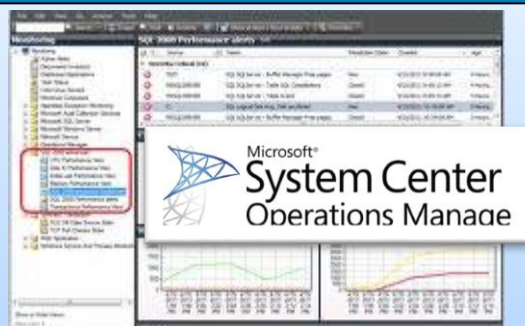
# Aligned insight for databases and VMAX storage

## VMAX Plug-In for Oracle Enterprise Manager



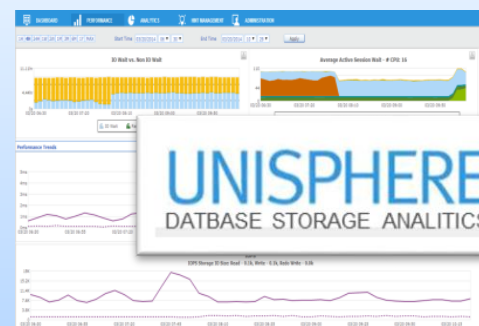
- Extend Oracle landscape view into underlying storage
- Reports DB performance, dashboards, and correlations

## VMAX Plug-In for System Center Ops Manager



- Extend OS, hypervisor and storage view into 1 interface
- Reports end to end state, health, performance details

## VMAX All Flash DSA "Database Storage Analyzer"



- Identify if bottlenecks are on the Database or Storage side
- Reduce Troubleshooting Time and eliminate finger pointing

50% less time troubleshooting database and storage issues

# Simplified diagnostics with VMAX DSA

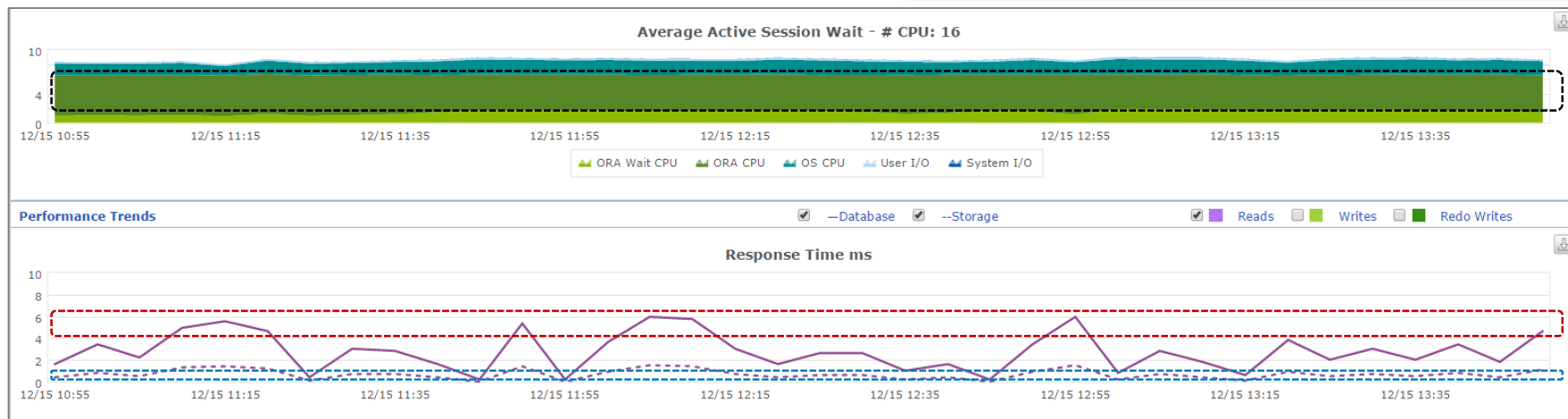
Q: Why is DB response time so high limiting transactions per minute?



# Simplified diagnostics with VMAX DSA

Q: Why is DB response time so high limiting transactions per minute?

DB CPU time in high average (+5ms)



DB response time peaks at +6ms

VMAX All Flash response time <1ms

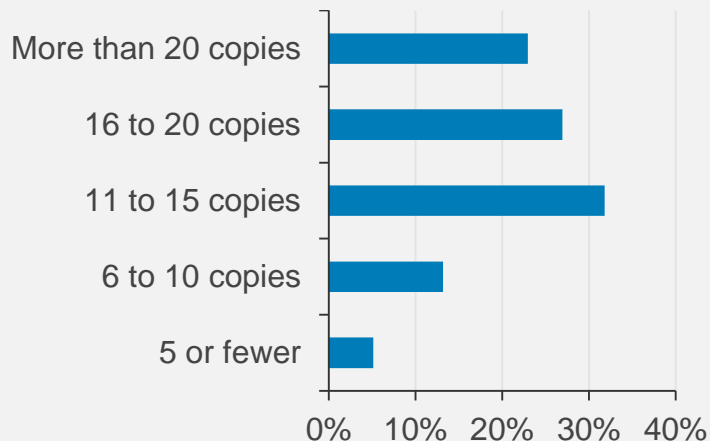
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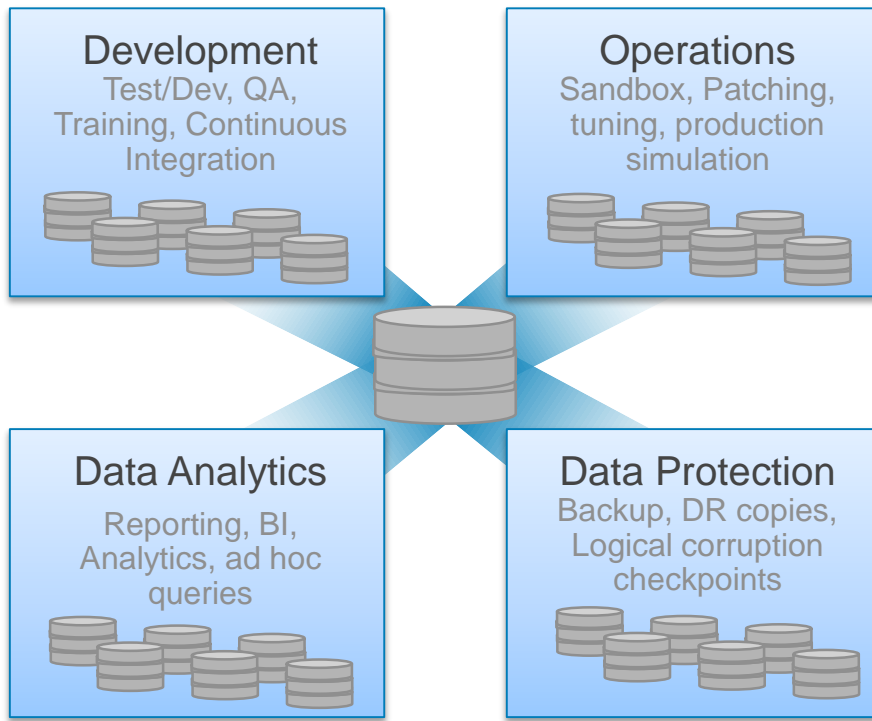
# VMAX All Flash Copy Data Management

“82% of DBA’s maintain more than 10 DB copies”



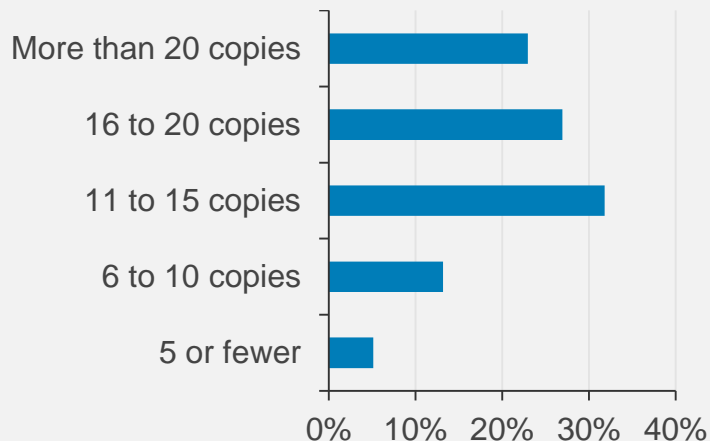
Source: Data Management Survey for EMC, November, 2015

Q: What are the typical number of physical copies of a given production instance that are made for the purpose of test/development, QA, DR testing, data warehouse loading, reporting, etc.?



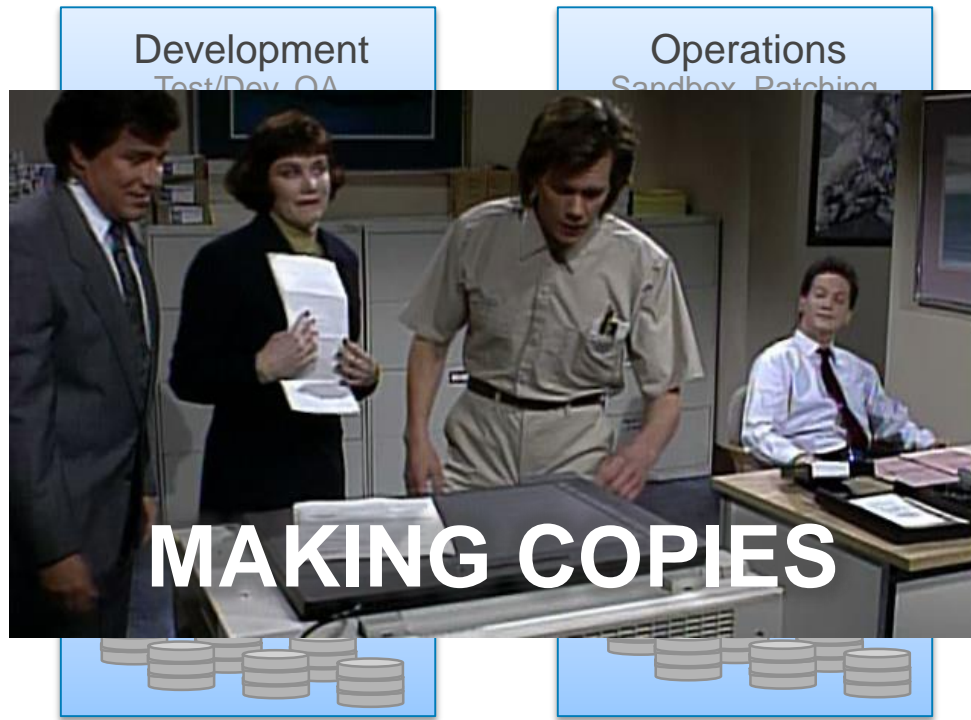
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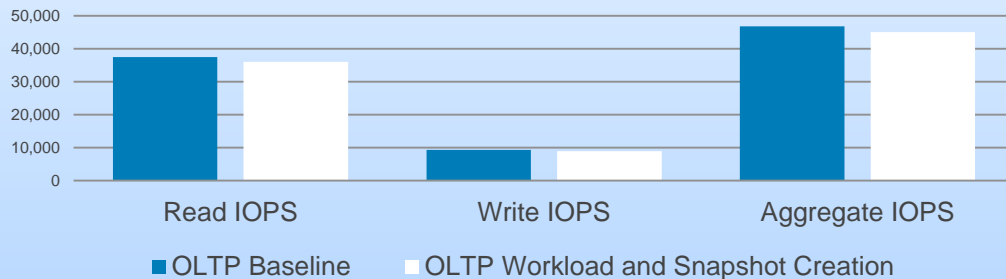
# VMAX All Flash SnapVX for Oracle

NEW LOCAL REPLICATION DESIGNED FOR PERFORMANCE AND SCALE

DB Admin



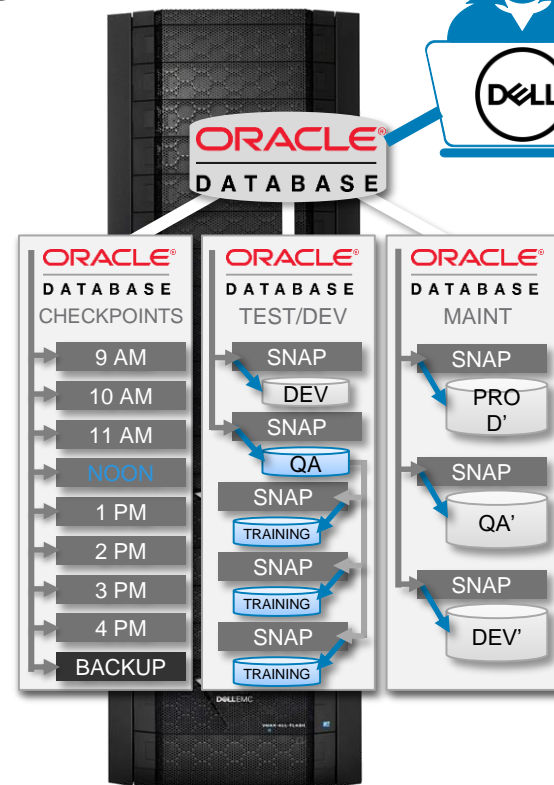
## OLTP Workload Before and After Snapshots Creation



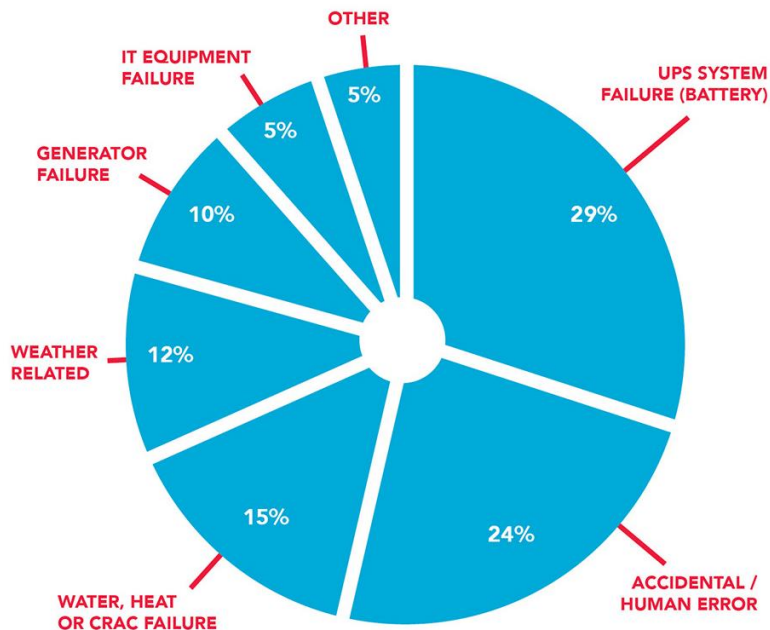
Create 1,000's of copies with minimal additional capacity

Awesome performance enabling read/write access for processing

AppSynch to integrate apps/DB's making copies super easy to use



# Disaster Recovery and Business Continuity



*Primary root causes or reported unplanned outages.*

Source: Uptime Institute  
<https://journal.uptimeinstitute.com/data-center-outages-incidents-industry-transparency/>

THE CAUSE OF  
UNPLANNED OUTAGES

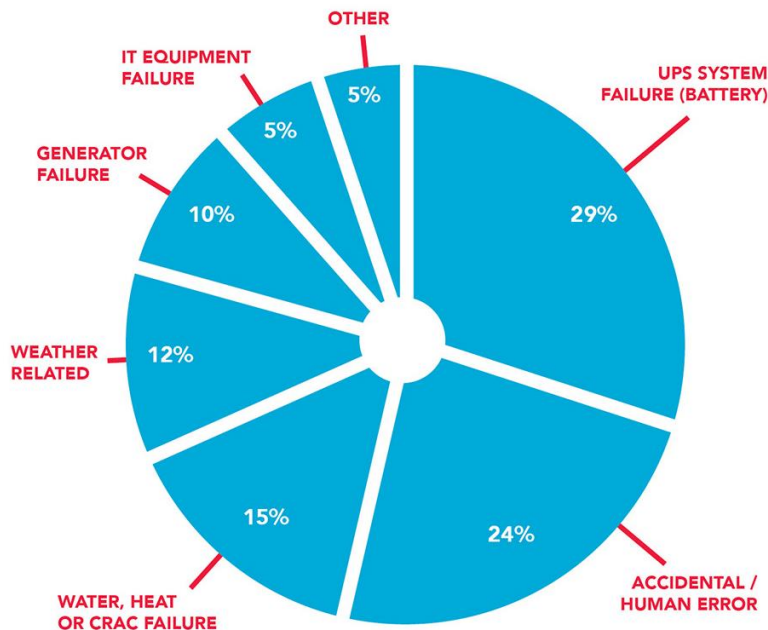
88%

HUMAN & MECHANICAL

12%

WEATHER RELATED

# Disaster Recovery and Business Continuity



Primary root causes or reported unplanned outages.

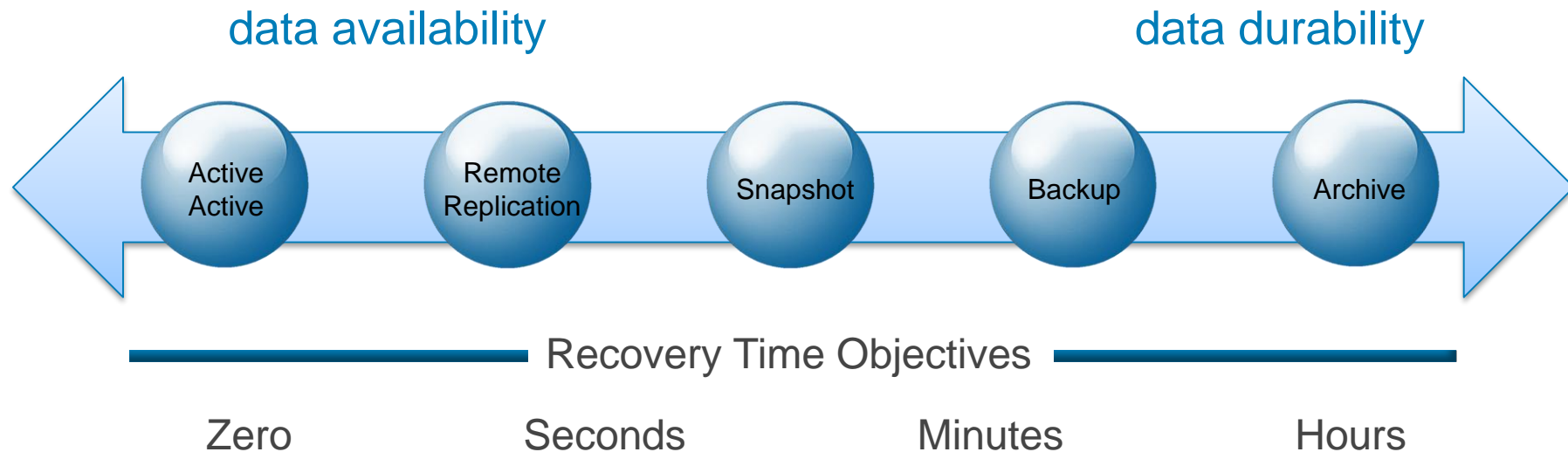
Source: Uptime Institute  
<https://journal.uptimeinstitute.com/data-center-outages-incidents-industry-transparency/>



"As far as we can tell, the system went down because someone stepped on a crack in the sidewalk."

# Dell EMC Data Protection Continuum

Complementary recovery tiers to meet any application's availability requirement



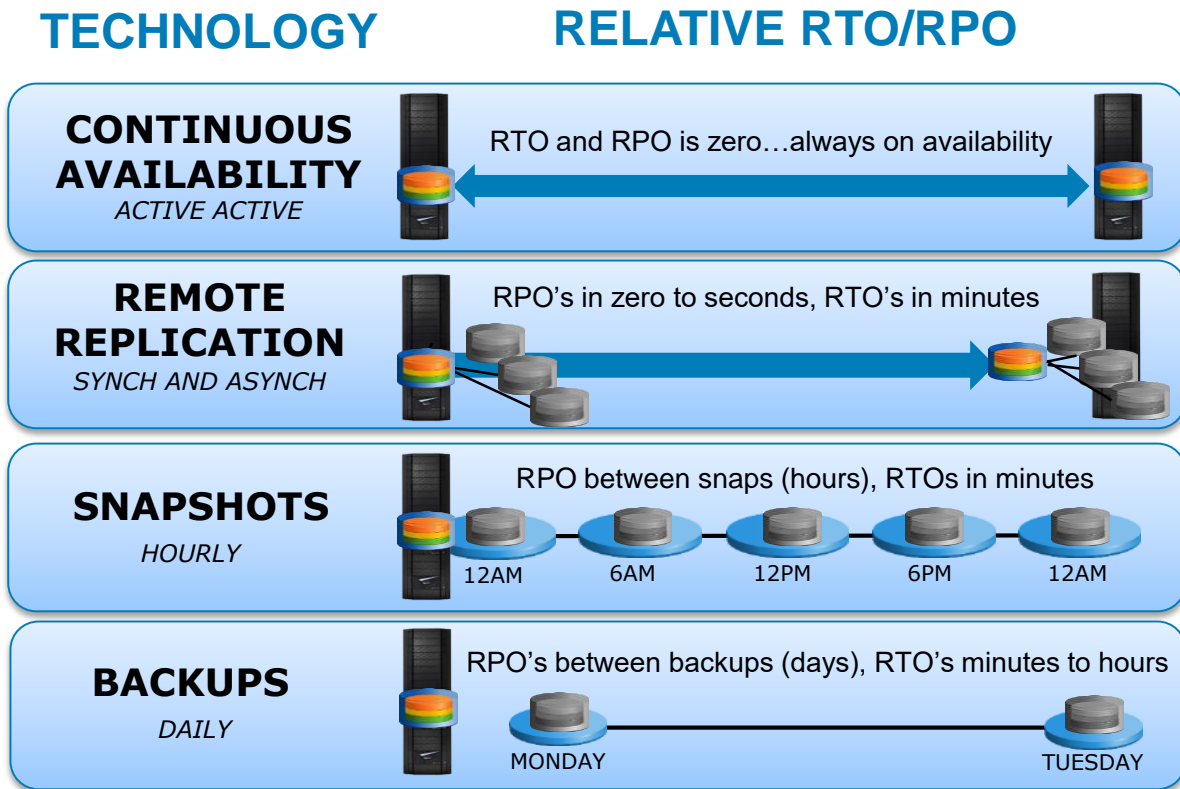
# Understanding RTO's and RPO's

## Recovery Time Objective

the targeted duration of time within which a business process must be restored after an incident

## Recovery Point Objective

the maximum targeted period in which **data** might be lost from an incident



# SRDF: The remote replication gold standard

## SYNCHRONOUS REMOTE REPLICATION



zero data loss  
remote mirroring  
array based with high  
performance and scale  
highly scalable, app  
consistent recovery

## ASYNCHRONOUS REMOTE REPLICATION



extended distance  
remote replication  
tunable multi cycle mode for  
improved RPO  
remote link resiliency to  
minimize network issues

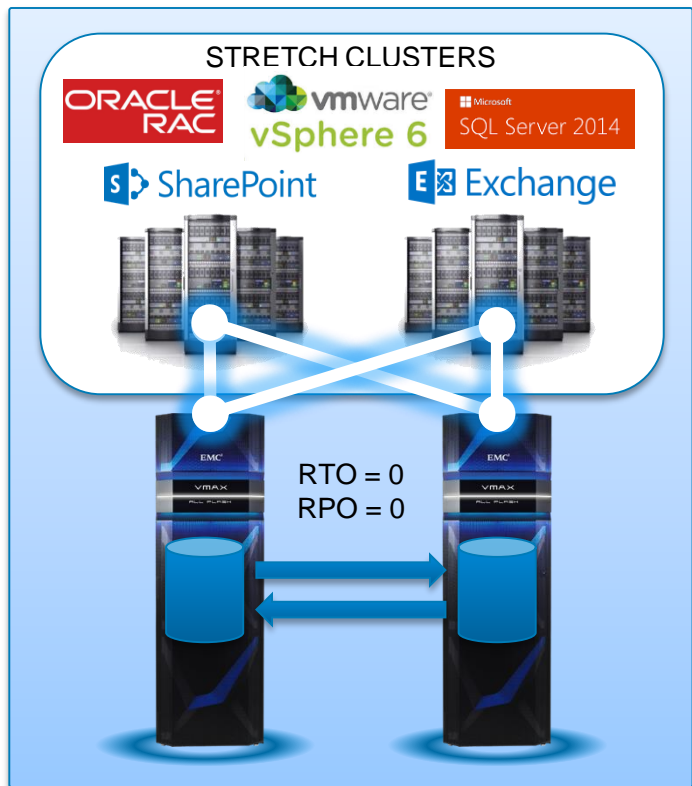
## SRDF METRO ACTIVE ACTIVE REPLICATION



active/active replication  
for transparent RTO/RPO  
app and cluster integration to  
automate failover/back  
enables non-disruptive  
VMX migrations

2 SITE, 3 SITE, AND 4 SITE REPLICATION

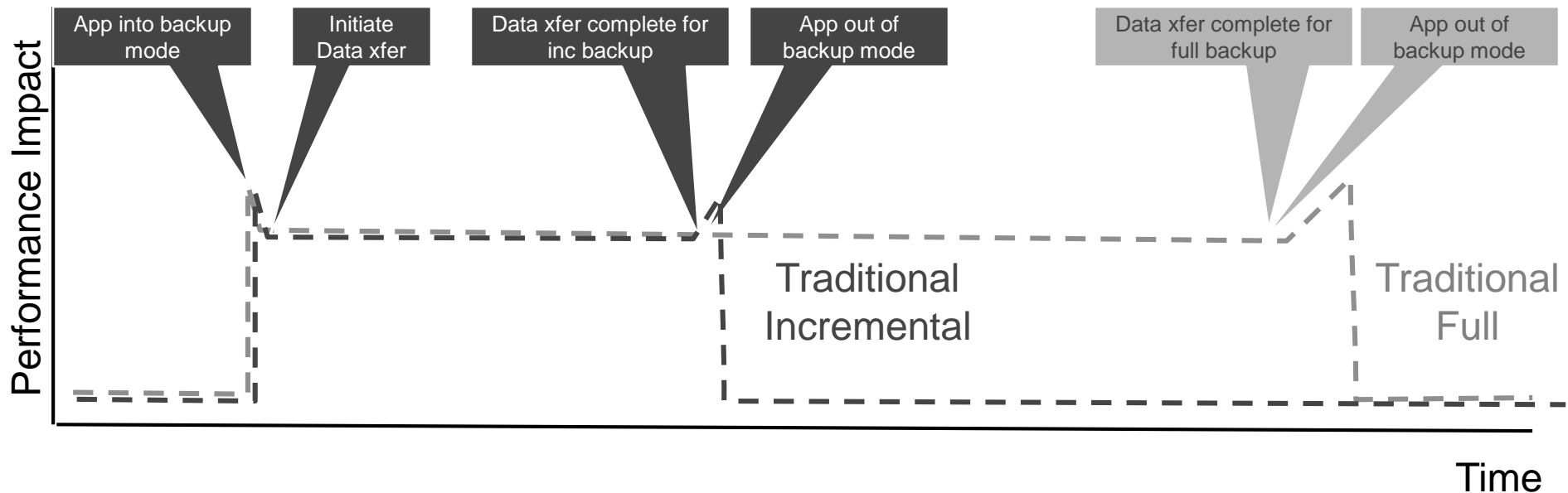
# VMAX All Flash SRDF Metro



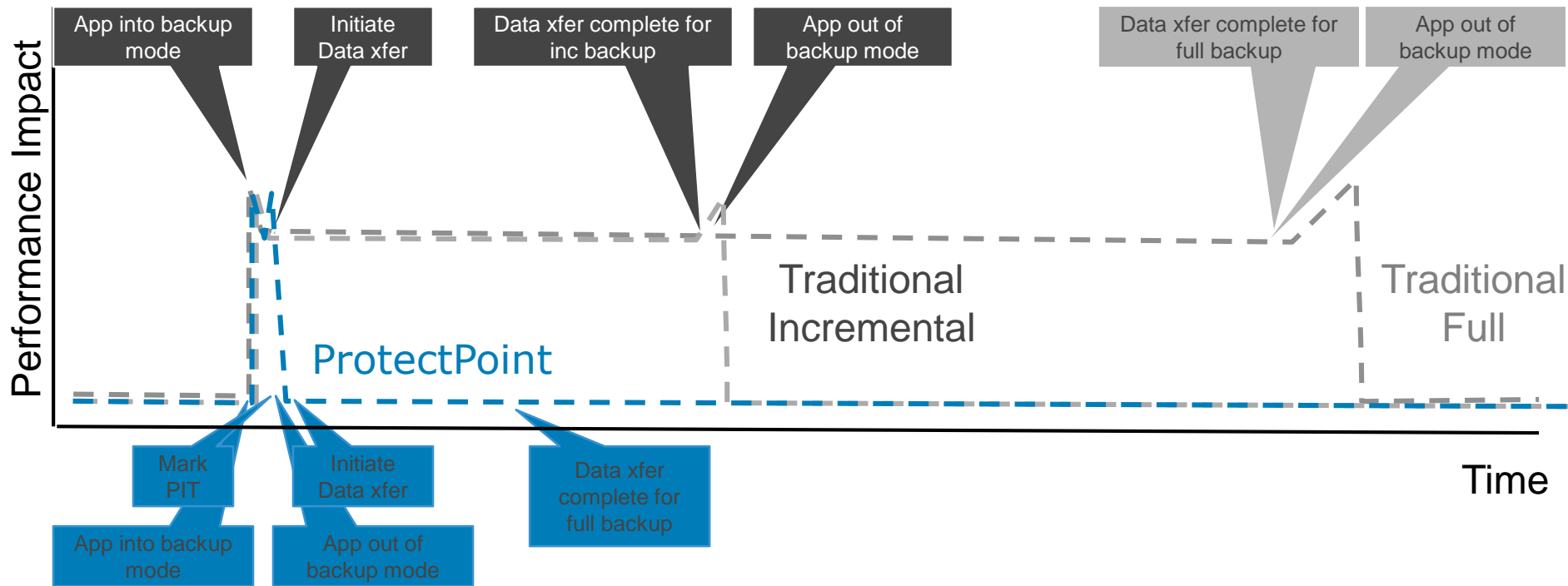
## Active-Active remote replication for HA clusters with zero RTO & RPO

- HA app and cluster integration
  - Automates failover/back
- Delivers always on availability
  - Instant access for failover/failback
- Provides zero data loss
  - Via synchronous replication
- Industry leading ease of use
  - <2 minutes to configure

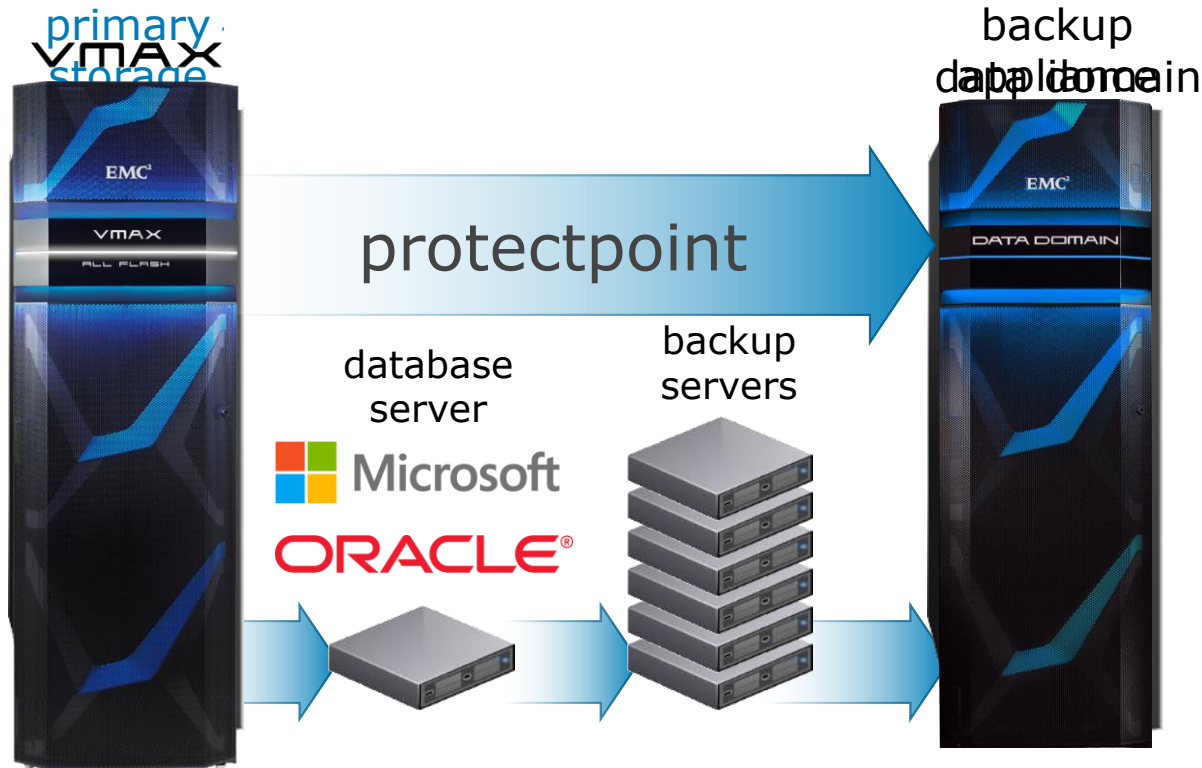
# Traditional Database backups



# Database backups with ProtectPoint



# Database backups with ProtectPoint



**Eliminate**  
infrastructure

**No** application  
**impact**

**Instant**  
access

**Controlled**  
by app team

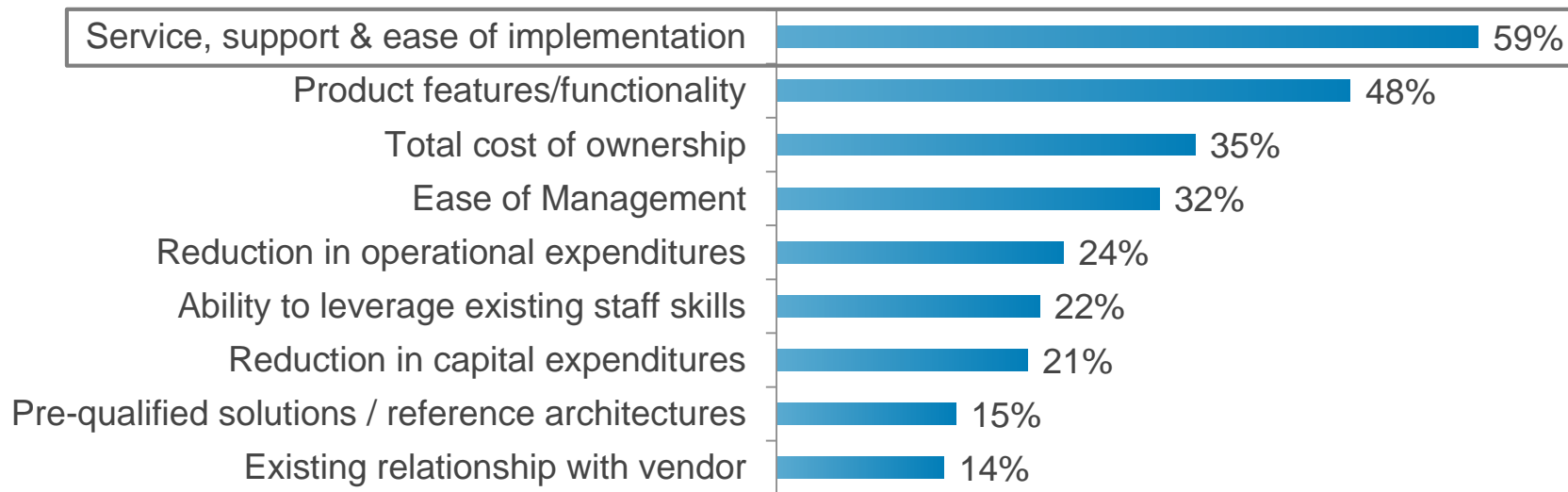
**Eliminates**  
extra copies



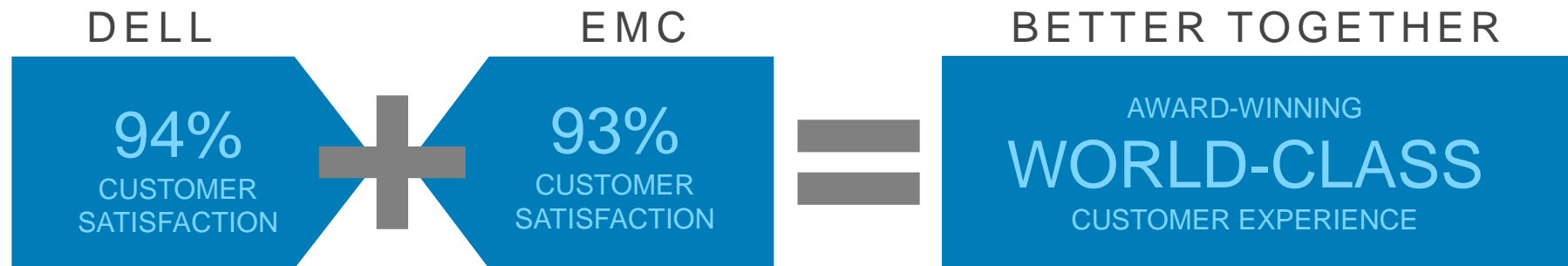
What is the #1 criteria for customers in selecting an infrastructure provider?

# Most important criteria when selecting a data center infrastructure provider

In general, what do you consider to be the most important criteria to your organization when it comes to selecting a data center infrastructure provider? (Percent of respondents, N=201, three responses accepted)



# Dell EMC Services | scale & skill



**60,000+** DELL EMC SERVICES & PARTNER PROFESSIONALS

**165+** COUNTRIES



>30 TSIA STAR AWARDS  
Hall of Fame Award

**Technology Services Industry Association (TSIA)** is an industry leader dedicated to advancing technology services.



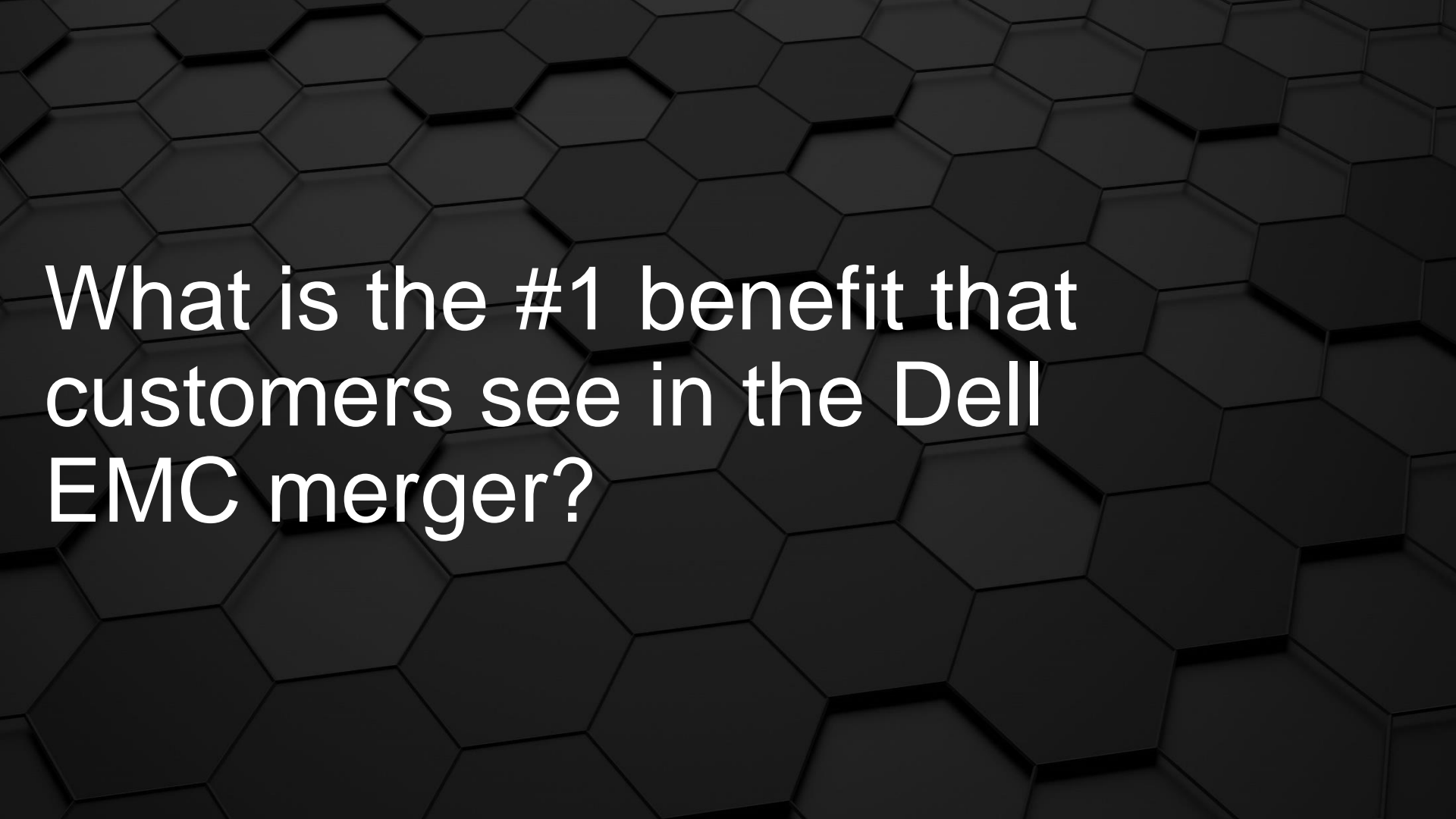
2015 TEMKIN GROUP CUSTOMER EXPERIENCE EXCELLENCE AWARD  
4-Time winner

**Temkin Group** is an independent customer experience research, consulting, and training firm.



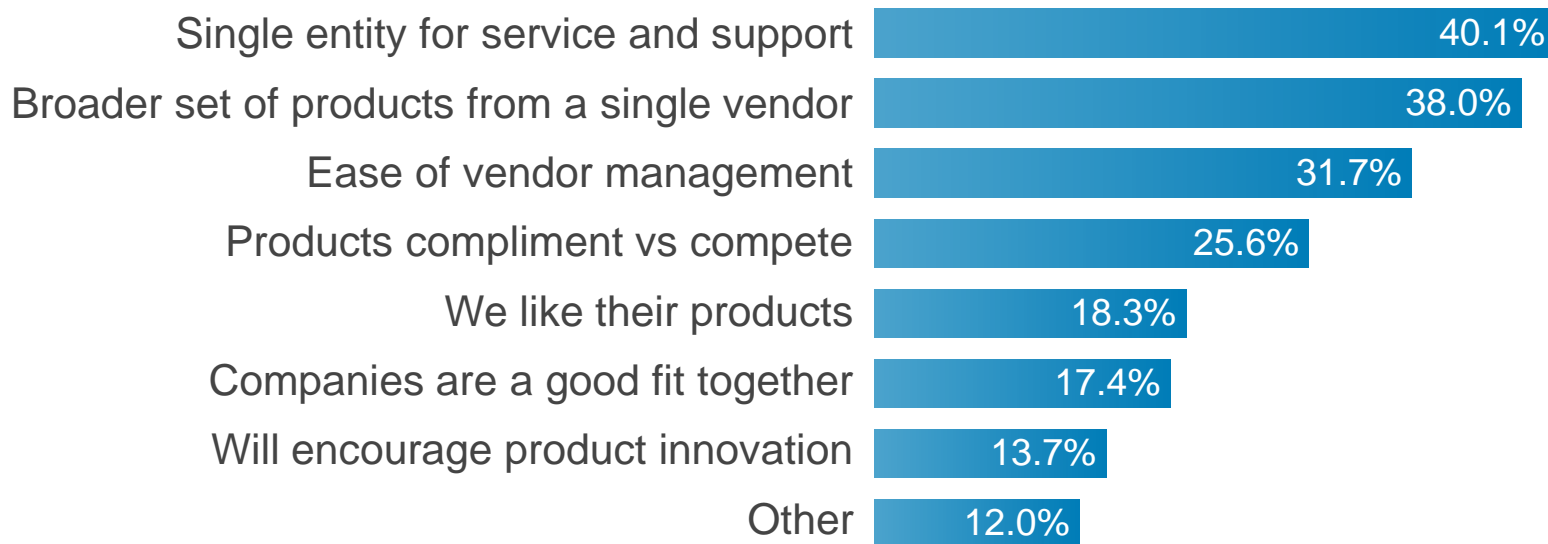
2015 PLATINUM WINNER OF  
LOYALTY 360 CUSTOMER INSIGHTS AWARD

**Loyalty360** is committed to research and best practices relative to building long-term customer relationships.



What is the #1 benefit that customers see in the Dell EMC merger?

# What do you **like** about this deal?



Source: 451 Research, Impact of the Dell/EMC Announcement

# NEXT STEPS



## Check out the booth

Cool people to talk to and cool stuff to see

## Come and play in the HoL

Kick the tires, hang with the geeks, learn something new

## Join our community network

Google “Dell EMC Community Network” and see what’s happening

## Follow us because we ♥ SoMe

@DellEMCStorage @DellEMC @scottdelandy @kewittmer

DELLEMC / World