

McKesson mixes SSDs with HDDs for Optimal Performance and ROI

Bob Fine, Dir., Product Marketing



Outline

- **Flash with HDD provides best value**
- **Dell perspectives**
 - Key Hybrid benefits
 - Buying Patterns
 - Real world drive usage
- **McKesson perspectives**
 - Overview
 - Business Problem
 - Flash solution
 - Business Results



Hybrid Arrays Provide Optimal Drive Use

Hybrid Arrays -
Performance

Most data is inactive or secondary, and doesn't require T1 performance

Hybrid Arrays -
Cost

While SSD prices dropping fast, capacity based HDD remain lower cost \$/GB

Hybrid Arrays -
Endurance

Lower endurance, and lower cost SSD can be used effectively w/o wear out

Inactive Data

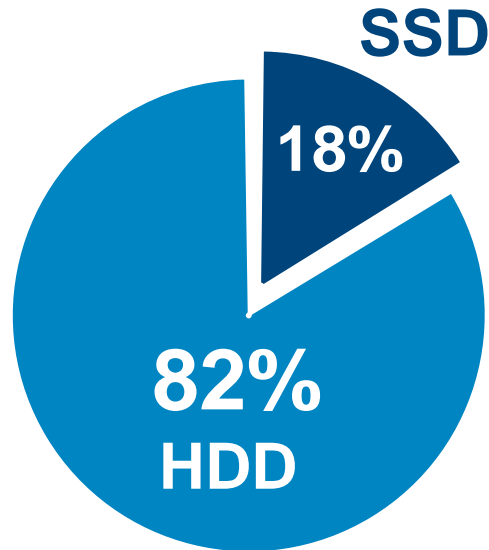
“Enterprises consistently report that only 20-25% of their data is primary while rest is secondary.”



“85% of production data is inactive – 68% not accessed on 90 days”



Customer Buying Patterns



**Percent of drives (units)
as future upgrades after
initial Flash system**

Different SSD meet different requirements

Category: Matching SSD tier with application writes

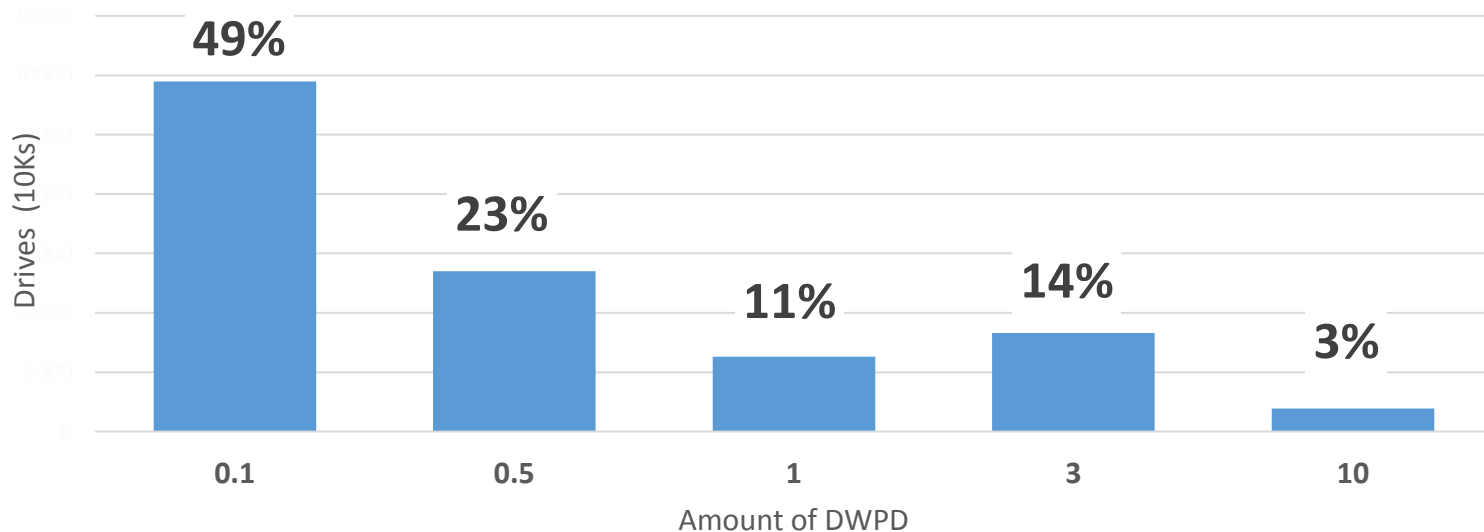
Endurance: Number of program/erase (P/E) cycles that can be applied to a block of flash memory before the storage media becomes unreliable

DWPD: Drive Writes per Day rating while maintaining 5 years useful life. "Drive Write" defines as the bytes of written data up to the drive capacity point.

| Category | Endurance | Cost | Application |
|------------------------------|---------------|--------|--|
| Write Intensive | 10-25 DWPD | \$\$\$ | Mission critical applications: database/OLTP, media editing, server virtualization |
| Premium Read Intensive | 3-10 DWPD | \$\$ | Applications with even mix of read/writes: i.e. data warehousing, read cache |
| Mainstream Read Intensive | 1-3 DWPD | \$ | Applications with seldom writes and mostly reads: i.e. boot, web/file servers, media streaming |

Historical DWPD of Tier 2 Flash Drives

Histogram DWPD



83% are 1 DWPD or less

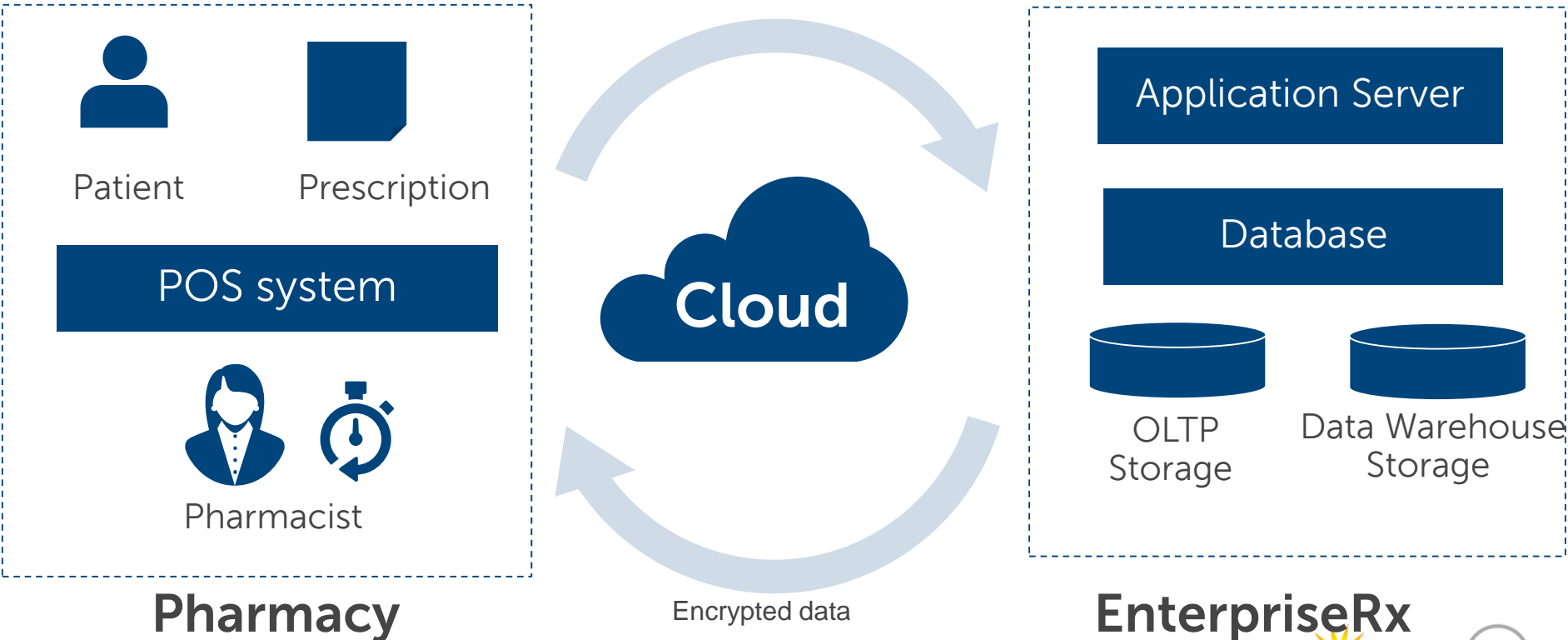
McKesson Overview

- Oldest & largest US healthcare company
- Serves more than 50% of American hospitals, and 96% of the top 25 health plans
- Delivers one-third of all medications used every day in North America
- Key facts
- Founded 1833, #5 in Fortune 500
- Over 76,000 employees

EnterpriseRx Overview

- Used by 4,000 pharmacies ranging from small to large, and hospitals
- Prescription verification, fulfillment and consumer safety
- Cloud based application
- Provides:
 - Real time historical lookup
 - Protects against user errors
 - Images of past prescriptions and medication

Application Overview



Patient



Prescription

POS system



Pharmacist

Pharmacy



Encrypted data

Application Server

Database



OLTP Storage



Data Warehouse Storage

EnterpriseRx



Flash **can't** help with this



Flash **can** dramatically reduce latency



Challenges

Business Challenges

- Need to grow business
- Limited funding
- Needs controlled scale



Storage Challenges

- Existing application, can't rewrite
- 500+ TB spinning disk in use, latency impacting customer experience
- Require 500 ms response (round trip)
- Need fast, consistent response **and** large capacity
- Budgets require use of existing platform

McKesson Storage Architecture

OLTP



Data Warehouse



Disaster Recovery



New prescription



Multiple TB/day



Aged data



Older data



T1 - WI SSD



T1 - RI SSD



T1 - 145 TB 10K



T2 - RI SSD



T3 - HDD TB 7K



T3 - HDD 10K

40% SSD

DB lookup tables

15% SSD

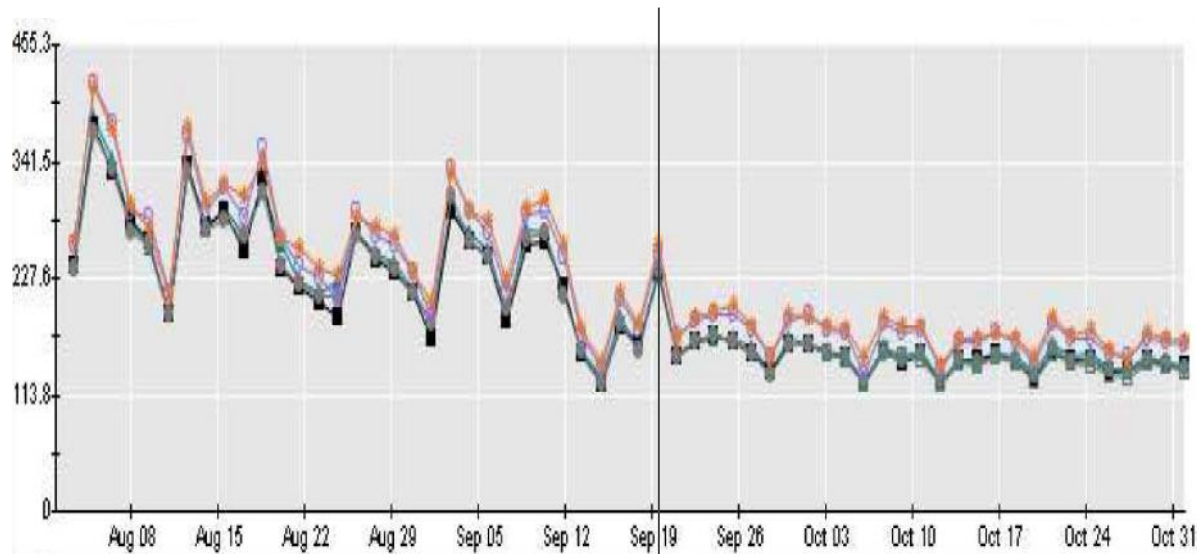
Image repository and
secondary data

0% SSD

WI = Write intensive
RI = Read Intensive



Latency Improvements

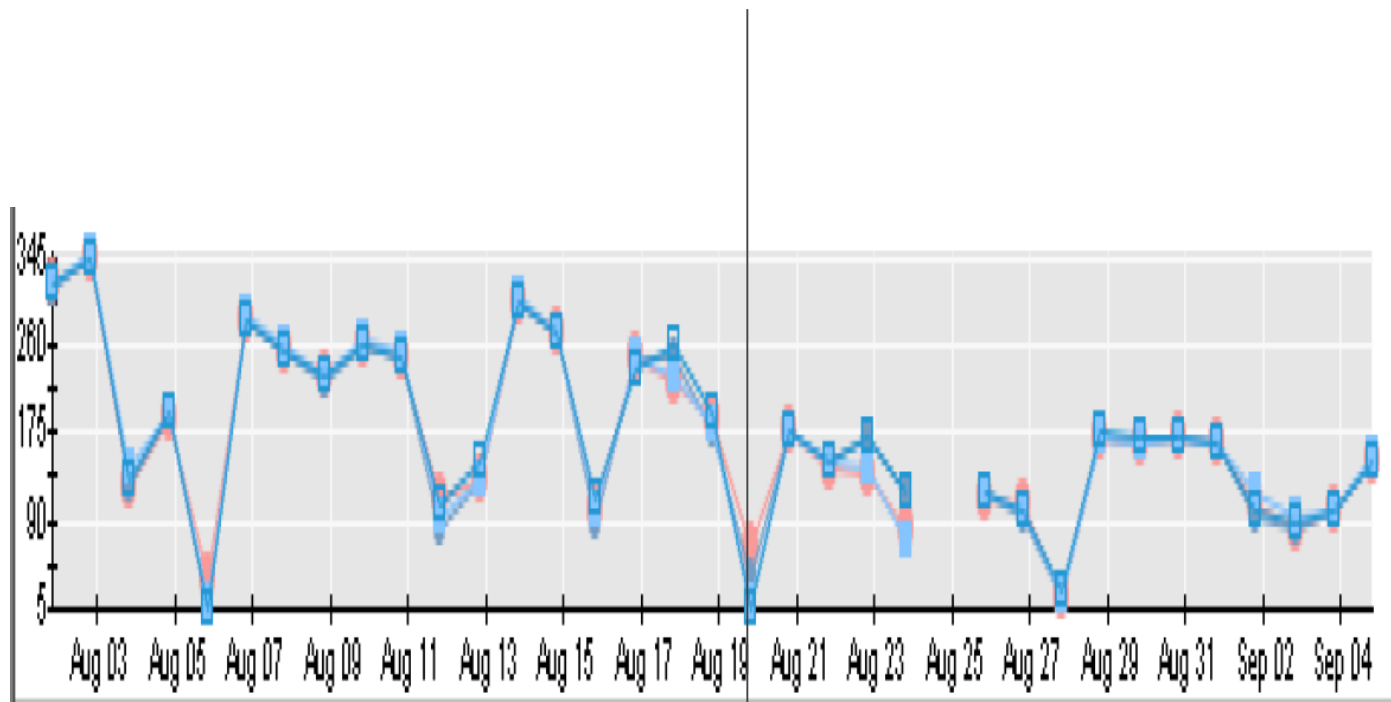


Previous vendor

Current vendor



Latency Improvements

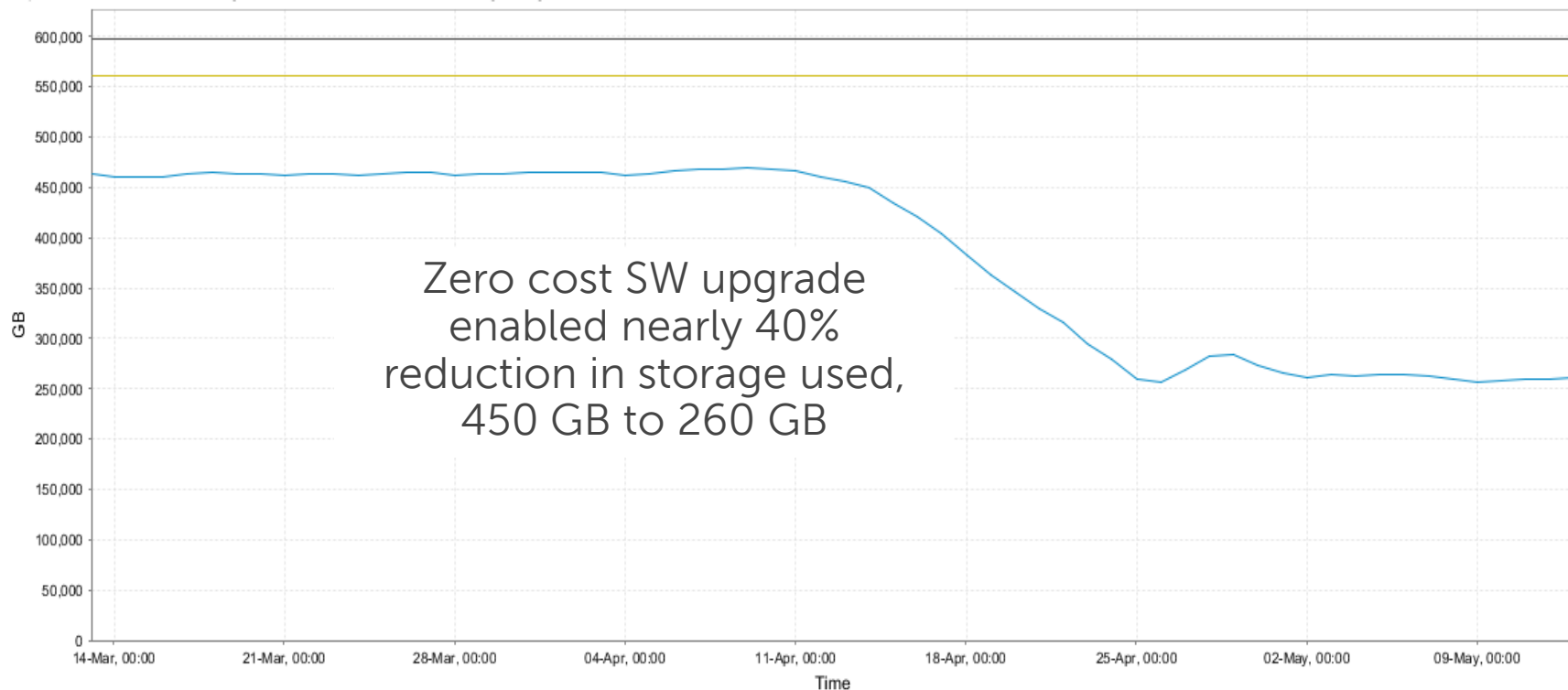


Without flash

With flash



Compression results



Financial Savings with Compression

| Array Name | Reduction TB | Reduction % | Compressed storage | Annual cost savings |
|------------|--------------|-------------|------------------------------|------------------------------|
| QA Test | 60 TB | 13.3% | Snapshots of all volumes | \$66K |
| PT | 700 GB | 11% | Testing purposes (6.4TB) | \$1.5K |
| OLAP | 50 TB | 12.3% | Snapshots of all volumes | \$55K |
| OLTP | 10 TB | 23% | Snapshots of DB archive logs | \$22K |
| DR | 13 TB | 16% | Snapshots of all volumes | \$14.3K |
| | | | | Annual savings = \$158.8K |

Conclusions

- **Technology**

- Flash transforms storage performance
- Provides huge latency reduction
- Ideal configuration mixes SSD and HDD
- Requires intelligent storage tiering to automatically move data to optimal tier tools
- Compression recovers space on HDD today, SSD next



- **Business Results**

- Cloud based application
- Automation reduces management costs
- Innovative storage lowers application costs and provides business results



The power to do more

Intuit Accelerates Payment Processing by 700% with Hybrid Arrays

Bob Fine, Dir., Product Marketing





Intuit Overview

- Started in 1983 with Quicken
- Current customer base of more than 45 million people
- Annual revenue exceeds \$4 billion, over 8,200 employees
- Flagship products – QuickBooks, TurboTax and Mint
- One of the nation's leading payment Processors

Application Overview

- Credit and debit cards speed payments, creates opportunities for fraud
- Merchants must wait for third-party processor to approve payments
- Large OLAP database contains transactions, for reports and analysis to approve merchant funding, reduce risk
- Intuit is financially liable for payment if there's fraud or inadequate funds



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Challenges

Business Challenges

- Electronic payments requires processing as quickly as possible
- Minimize losses due to fraud and financial risk



Storage Challenges

- Legacy iSCSI network shared traffic with others
- Older HDD array couldn't keep up, way too slow
- 10 TB of daily data ingest
- Older generation filers as storage
- Failover time was minutes and crash servers

Intuit Storage Architecture

OLAP / Data cube



38% SSD

Remote System



38% SSD

Data writes



10 TB/day



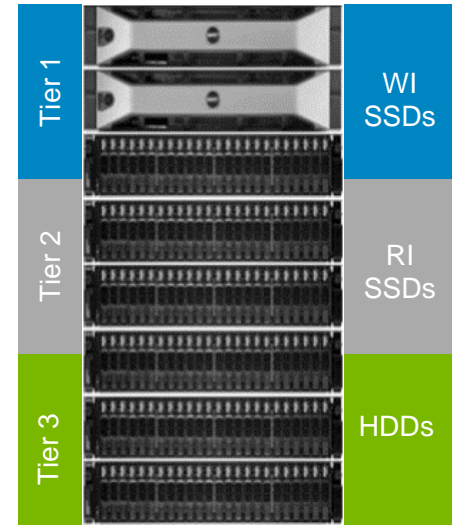
Aged data



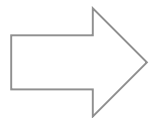
Old reports, Logs

Intelligent Data Tiering across SSD and HDD

| | Write-Intensive (WI) SSDs | Read-Intensive (RI) SSDs |
|-------------------------|---------------------------|------------------------------|
| Workload | Mainstream Usage | Mostly Read 90/10 R/W Mix |
| Capacity | 1.6TB | 3.8TB (~2X increase) |
| Write Endurance | Great | Moderate |
| Full-drive writes / day | 30 | < 3 |
| Random Read | Great | Great |
| Write Performance | Great | Moderate |
| Relative Cost | 4X | 1X |



SC Series Hybrid-Flash Array



Tiering flash across multiple SSD types enables lower cost flash with a superior \$/GB ratio

Conclusions

- **Technology**
 - Dell SC8000 arrays with SSD tiering
 - 100TB total capacity and 60,000 IOPS
 - SSD tiering achieves performance goals at lower cost
 - Controller fail over in seconds
 - Upgrade both storage and network to achieve best results
- **Business Results**
 - With the new solution, read and write latency has decreased from hundreds of milliseconds to low single digits
 - 59X faster read IOPS and 220X faster write IOPS
 - Improves services by speeding processing by 700%
 - Creates reports 7X times faster
 - Reduces risk and achieves one of the industry's lowest loss rates, resulting in better profits.



"By migrating our primary storage to a Dell SC8000 SAN, our risk databases perform as they are designed, with a high degree of stability and predictable performance every day."

*Alex Lancaster, Data Engineering
Manager, Risk Data Analytics
Team, Intuit*





The power to do more