

# ACCELERATE YOUR ANALYTICS GAME WITH ORACLE® SOLUTIONS ON PURE STORAGE

An innovative storage solution from Pure Storage can help you get the most business value from all of your data



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## “THE SINGLE MOST IMPORTANT ASSET IN THE DIGITAL ECONOMY IS DATA, AND INFRASTRUCTURE SHOULD BE ENGINEERED TO MAXIMIZE AND EXPLOIT ITS VALUE.”

— Chuck Hollis, Senior Vice President of Cloud Infrastructure, Oracle<sup>1</sup>

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To stay relevant in today’s competitive, digitally disruptive market, and to stay ahead of your competition, you have to do more than just store, extract, and analyze your data — you have to draw the true business value out of it. Fail to evolve, and your organization might be left behind as companies ramp up and speed up their competitive, decision-making environments. This means deploying cost-effective, energy-efficient solutions that allow you to quickly mine and analyze your data for valuable information, patterns, and trends, which in turn can enable you to make faster ad-hoc decisions, reduce risk, and drive innovation.

You need to be able to make correlations across all of your data: both your historical, structured transactional data, and the unstructured data that lives in your systems as audio and video files, Internet of Things (IoT) sensor data, social-media posts, website clicks, documents, and image files. Structured and unstructured data are often stored in separate systems, and the amount of data you need to store is massive — and only getting bigger.

## GET MORE VALUE FROM YOUR DATA

The value hidden in your data comes from being able to perform real-time, ad-hoc analytics, correlate data to various internal and external sources, and create a bridge between your structured and unstructured data stores. To harness this power and derive end-to-end insights across all relevant data regardless of where it’s stored, organizations must examine how to seamlessly use data assets from their traditional relational database-management systems (RDBMSs) and their file-based database-management systems (DBMSs). This analytical capability is a critical part of an organization’s digital transformation and competitive strategy. The question, then, is how do you get more analytical insights out of your unstructured and structured data, and how do you store it all?

## THREE KEY CONSIDERATIONS FOR A DATA-WAREHOUSE ENVIRONMENT

FULFILLED BY PURE STORAGE® FLASHBLADE®



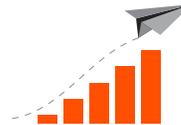
### WRITE BANDWIDTH

determines how quickly your systems can ingest, store, and analyze huge workloads.



### READ BANDWIDTH

determines how quickly your systems can scan and back up data.



### SCALABILITY

enables growth without disrupting operations.

## FOUR PRODUCTS IN ONE

Pure Storage® FlashBlade® is an all-flash data platform that combines four components:

- High performance, software-defined network fabric that is manageable online
- Scale-out converged file and object storage
- Scale-out operating system
- Built-in raw flash, high-performance solid-state drives (SSDs) running on enterprise-class processors



A storage platform based on Oracle® data warehouse and analytics solutions supported by an all-flash storage solution, such as Pure Storage® FlashBlade®, can help you solve the challenges of data warehousing, management, and analysis — no matter where your data is stored.

## A SIMPLE, SCALABLE, AND RESILIENT STORAGE SOLUTION

FlashBlade is an all-flash storage array that makes it easy, fast, and cost-efficient to deploy and effectively run Oracle data warehouses for analytical solutions. In other words, FlashBlade provides a modern solution to efficiently run your transactional RDBMSs and analytics systems on the same platform — without performance loss or downtime.

FlashBlade is a file-based all-flash storage system that can work with any infrastructure you use to support your RDBMSs, like Oracle® Database 11g or higher, and your DBMSs, like Oracle® NoSQL Database. Its automatic load balancing and its web-based management tool make it easy to manage, and the FlashBlade solution's design makes it easy to deploy. If your workloads demand more from your data center, you can easily scale out by connecting multiple FlashBlade instances.

Each FlashBlade chassis:

- Needs less square footage than traditional data-center racks
- Runs on the same wattage as a hair dryer
- Houses 15 blades in a 4 rack-unit chassis
- Boasts bandwidth speeds up to 16 gigabytes per second (GBps) and throughput speeds up to 500K input/output operations per second (IOPS)
- Includes eight 40 gigabit Ethernet (GbE) ports
- Provides for multiple data-warehouse and data-mart consolidation
- Requires no caching or tiering

FlashBlade also acts as a bridge between your various databases and analytics systems, and it creates a single reservoir out of your data assets. It can decrease analytical and reporting query times, and it enables Oracle Database to ingest data more quickly regardless of format or size.

## Interfacing with Oracle® Database

Oracle Database uses network file system (NFS) protocols to allow users to access files over the network. Introduced in a previous version of Oracle Database, Oracle® Direct NFS (dNFS) provides FlashBlade with a direct connection point to your data, essentially allowing you to bypass the operating system for simpler data access and management.

Oracle dNFS also helps you:

- Reduce throughput time
- Provide high availability and resiliency for mission-critical apps
- Use any operating system running on an NFS server
- Simplify network complexity and cost when connecting to network-area storage (NAS) via Ethernet
- Accelerate your ability to make data-driven decisions that will fuel the growth and success of your organization
- Automatically load balance network paths

## PURE STORAGE® FLASHBLADE® BY THE NUMBERS

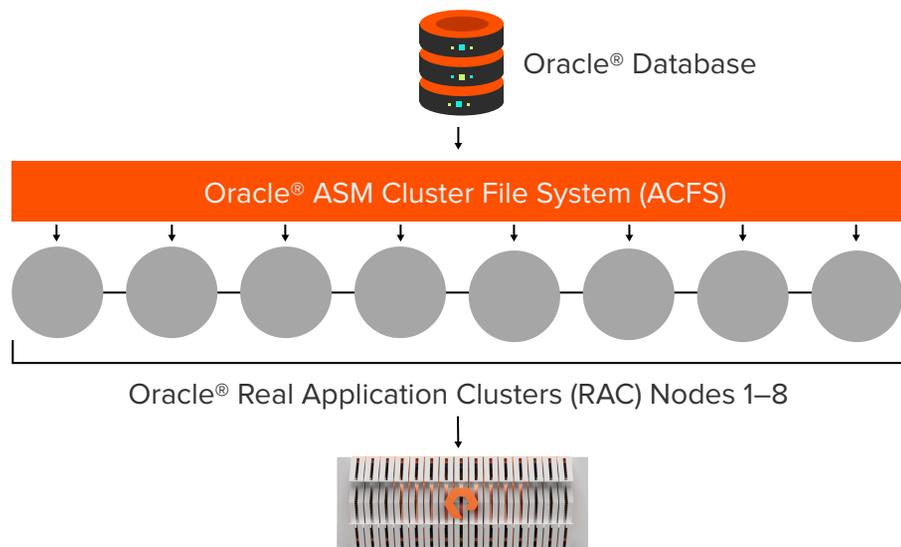
The results of an internal proof-of-concept benchmarking test show that FlashBlade can enable you to:

- Save 10x on space<sup>2</sup>
- Gain 10x in speed<sup>2</sup>
- Use 10x less power and cooling<sup>2</sup>
- Experience bandwidth speeds of up to 16 GBps<sup>2</sup>
- Experience throughput speeds of up to 500K IOPS<sup>2</sup>

# ORACLE® ANALYTICS AND FLASHBLADE® PUT TO THE TEST

To demonstrate the benefits of Oracle dNFS with FlashBlade, Pure Storage designed a data-warehouse environment to run through a standard data-warehouse benchmark, which measures the performance of a system's analytics capabilities by running a read-intensive workload that mimics a commercial online analytical processing (OLAP) database. The goal for the benchmark was to get performance characteristics for:

- **Scan rate:** Simulates a connection to a user performing a query against data-warehouse tables and measures the response time
- **Data-ingestion rate:** Measures the process of obtaining and importing data for immediate use or storage in the database



**FIGURE 1.** Pure Storage used Oracle® Database 12c installed on top of Oracle® ASM Cluster File System (ACFS) running Oracle® Real Application Clusters (RAC), which enabled the database to be installed across multiple servers

## The Setup

In particular, Pure Storage wanted to use a typical customer benchmark to see how FlashBlade influences the read and write performance and scalability of Oracle data warehousing and analytics. The test's results were measured in terms of queries processed per hour. For this test, Pure Storage used Oracle Database 12c installed on top of Oracle® ASM Cluster File System (ACFS) running Oracle® Real Application Clusters (RAC), which enabled the database to be installed across multiple servers.

Pure Storage incrementally increased the number of Oracle RAC nodes, from one to eight, and extracted the following results:

- **Faster query execution:** As Pure Storage added more Oracle RAC nodes, Oracle Database cranked up its ability to run reporting and analytics queries from 3 GBps to 16 GBps.
- **Faster data ingestion:** Using FlashBlade, Pure Storage accelerated data ingestion to up to 13 terabytes (TB) per hour.
- **Flexible scalability:** Pure Storage scaled compute independently and consolidated multiple workloads and Oracle databases within FlashBlade.
- **Always-on encryption:** Even while compressing and encrypting data, the FlashBlade solution can deliver high throughput rates.

**TABLE 1.** Results of the data-warehouse benchmark

Metric	Pure Storage® FlashBlade®
Form Factor (Server-side Storage)	4U
Usable Capacity	1,607 TB*
Data-Reduction Ratio	3:1
Scan Rate	16 GBps
Database Load Rate	13 TB per hour
Maximum Read Throughput	500K IOPS

\*Usable capacity assumes 3:1 data reduction.

## LEARN MORE ABOUT RUNNING ORACLE DATABASE ON PURE STORAGE

Running your Oracle database and analytics on all-flash blade storage with Pure Storage FlashBlade can help improve your organization's valuable insight discovery, mission-critical business decisions, and groundbreaking ideas and innovations.

For full details on test results and configuration details for Pure Storage's testing of Oracle® dNFS on FlashBlade®, read the white paper at [www.purestorage.com/resources/type-a/oracle\\_analytics\\_with\\_dnfs\\_for\\_flashblade.html](http://www.purestorage.com/resources/type-a/oracle_analytics_with_dnfs_for_flashblade.html). Learn more about Pure Storage FlashBlade at [www.purestorage.com/products/flashblade.html](http://www.purestorage.com/products/flashblade.html), or contact your Pure Storage representative.

<sup>1</sup> Oracle. "Building the Foundation for the Modern Enterprise." [www.oracle.com/thought-leaders/chuck-hollis.html](http://www.oracle.com/thought-leaders/chuck-hollis.html).

<sup>2</sup> Pure Storage. "FlashBlade." 2017. [www.purestorage.com/content/dam/purestorage/pdf/datasheets/ps\\_flashblade\\_datasheet](http://www.purestorage.com/content/dam/purestorage/pdf/datasheets/ps_flashblade_datasheet).



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