Oracle ZFS Storage Appliance is flexible multiprotocol enterprise storage that delivers high performance, unmatched efficiency, and superior manageability for many types of workloads. This is evident in Oracle’s high-performance results across multiple benchmarks and at Oracle’s own data centers, where the Oracle ZFS Storage Appliance is used in a variety of database workloads. For Oracle Database online transaction processing (OLTP) workloads, Oracle offers solutions using Oracle ZFS Storage Appliance that provide compelling performance and availability benefits. In addition, unique Oracle hardware and software co-engineering deliver enhanced manageability and automation efficiency. Using Oracle storage with Oracle Database directly empowers database administrators (DBAs) to efficiently manage and optimize the entire stack.

The Correct Tools for the Job
Oracle Exadata is the ultimate platform for Oracle Database from a performance and availability perspective. However, if you have consolidated workloads, heterogeneous vendors to support, requirements for flexible performance or availability, or stringent cost constraints, an alternate solution is sometimes required. Oracle ZFS Storage Appliance, the next-generation application-engineered storage, is just that solution due to its unique co-engineering with Oracle software. This solution delivers special integrations that simplify management, reduce risk, and drive operational efficiencies.

Superior OLTP Performance
OLTP storage workloads are generally characterized by small-block-size random reads and writes in response to transactional commands. From a performance perspective, the key requirement is high transactional frequency as opposed to high bandwidth throughput (that is, IOPS are a priority over MBPS). Oracle ZFS Storage Appliance combines a scalable storage operating system, high-throughput system design, and intelligent caching to deliver extreme benchmark performance for just this type of workload. And, Oracle ZFS Storage Appliance delivers this high performance at a lower cost—enabling better price/performance compared to competitive systems. For large and growing OLTP workloads, this price/performance advantage is critical. For further information, please see Realizing the Superior Value and Performance of Oracle ZFS Storage Appliance.

With its Hybrid Storage Pool architecture, the Oracle ZFS Storage Appliance is able to make the most of standard enterprise hardware and create massive performance
High Availability and Data Protection

Aside from performance, high availability is required in most OLTP environments so that transactions can continue to be served in the event of component failures. Oracle ZFS Storage Appliance offers high availability through dual-controller configurations with controller failover mechanisms, drive failure redundancy, and network redundancy features. Furthermore, the ZFS file system performs end-to-end checksumming and self-healing to ensure data integrity and prevent silent data corruption. Please see the Architectural Overview of the Oracle ZFS Storage Appliance white paper for further details. Additionally, when the Data Guard feature of Oracle Database, Enterprise Edition, is used in conjunction with Oracle ZFS Storage Appliance, a fully synchronous, duplicate instance of the database can be maintained on a redundant system. This offers you the ultimate in-system or site-level outage protection with far less performance impact than traditional storage-based synchronous replication solutions. Oracle has documented best practices for tuning Oracle ZFS Storage Appliance for optimal performance and for availability by ensuring that database hosts do not time out and applications continue running with zero data loss and minimal disruption time.

Simplified Management

Oracle ZFS Storage Appliance offers multiprotocol support for Oracle Database. When Oracle ZFS Storage Appliance is used in conjunction with Oracle Database 11g and higher releases, the preferred protocol is Direct NFS—a high-performance NFS client built into the database. Direct NFS avoids inefficiencies inherent in many OS kernel NFS implementations and achieves FC-like performance but with the simplified high availability and the infrastructure and management cost characteristics of an enterprise Ethernet environment. For more about Direct NFS, please see the Oracle Database 11g Direct NFS Client white paper. With Oracle Database 12c, Direct NFS share tuning can be automated by using Oracle Intelligent Storage Protocol, a unique file-based technology that automatically and dynamically adjusts share settings on the storage, eliminating guesswork and simplifying tuning. See the Oracle Intelligent Storage Protocol data sheet for more information.

While Direct NFS is typically implemented over a 10 Gb Ethernet network, 40 Gb InfiniBand is a connectivity option on Oracle ZFS Storage Appliance, making IPoIB with Direct NFS a high-performance connectivity option. In addition, block protocols including iSCSI and FC are fully supported and widely used in cases when customers have a management preference for LUNs.
Integration with Secondary Oracle Database Storage Workloads

One of the main benefits of using Oracle ZFS Storage Appliance for primary storage use cases is seamless integration with other Oracle Database storage workloads. With built-in low-footprint snapshot and cloning data services, the primary database can be quickly “copied” with little space and minimal overhead requirements to meet development, test, or QA storage needs. Also, with built-in remote replication plus best practices for Oracle Recovery Manager (Oracle RMAN) and Data Guard, Oracle ZFS Storage Appliance offers a number of options for both disaster recovery and for backups integrated with development and test use cases that are fully compatible with the primary database on Oracle ZFS Storage Appliance. Best practices for Oracle ZFS Storage Appliance are available for all of the following secondary workloads:

» Backup using Oracle Database and Oracle RMAN
» Disaster recovery using Data Guard
» Provisioning development and test workloads from production, backup, or DR databases
» Using the Snap Management Utility for Oracle Database feature of Oracle ZFS Storage Appliance to automatically provision dev/test/QA environments on Oracle ZFS Storage Appliance from the database management console (see the data sheet for more information)
» Integrating all of the above along with production database storage
» Using Oracle Enterprise Manager 12c for a single-pane-of-glass into multiple workloads across multiple systems, complete with Database as a Service Snap Clone integration

Conclusion

As application-engineered storage, Oracle ZFS Storage Appliance provides unique integrations with Oracle Database to streamline management, provide superior efficiency, and accelerate OLTP workloads. Furthermore, Oracle ZFS Storage Appliance’s unique combination of a scalable storage operating system, high performance system design, and intelligent caching delivers the performance and availability characteristics needed for demanding mixed workload and OLTP environments. Oracle ZFS Storage Appliance is deployed by companies worldwide and proven in Oracle’s own data centers, where Oracle ZFS Storage Appliance is used for a variety of database storage workloads. See Oracle ZFS Storage Appliance and Oracle IT: Use Cases and Benefits for more information.

With compelling performance, unique Oracle co-engineering, attractive upfront pricing, and reduced operational costs due to simplified management, Oracle ZFS Storage Appliance is the ideal fit for your Oracle Database OLTP storage requirements.