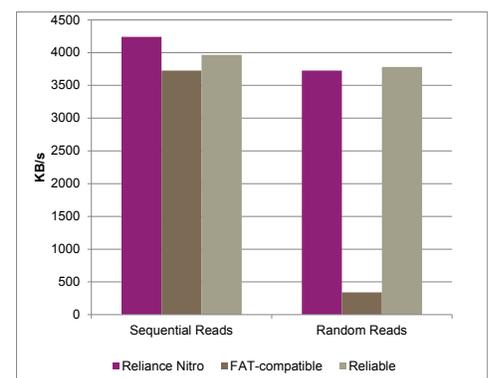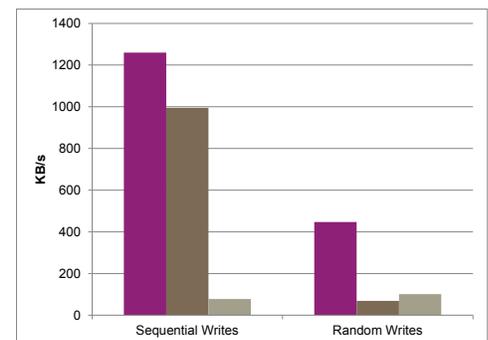# Reliance Nitro™

High Performance Fault-tolerant File System for VxWorks

Datalight Reliance Nitro is a transactional file system created specifically for embedded devices where power loss may occur, protecting critical system and user data from corruption. It ensures rock-solid data reliability while providing the performance needed to create an optimal user experience. Reliance Nitro works with a broad array of storage media – including flash memory, RAM, hard disk, USB mass storage, SD/MMC, and e•MMC. Datalight works closely with Wind River to ensure seamless integration within the VxWorks operating system.
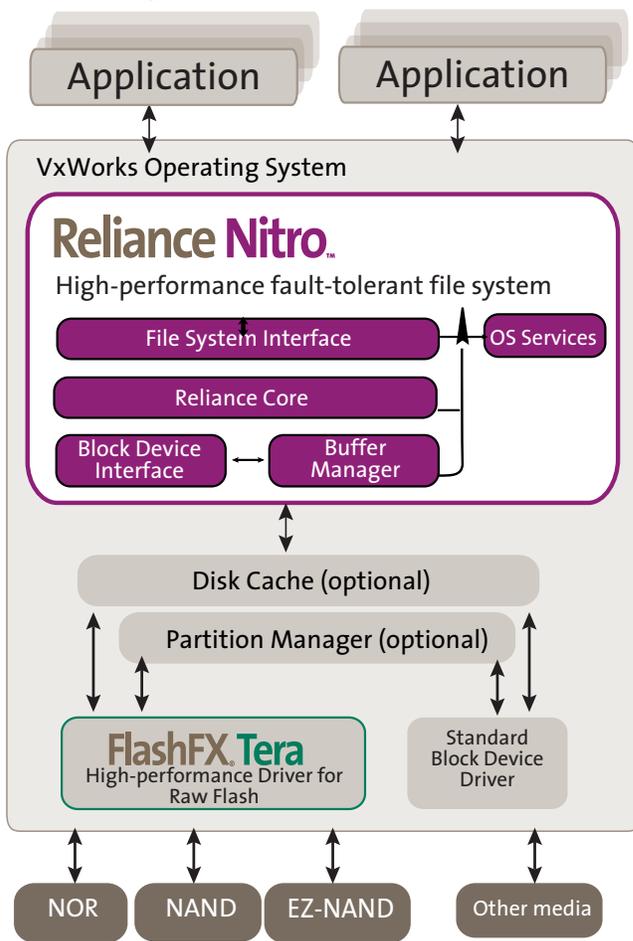
If They Can't Trust Their Data, What Can They Trust?

Embedded developers have choices when it comes to file systems. One simple option is a FAT-compatible filesystem which offers simplicity and solid performance but few safeguards against data loss or corruption in the event of unexpected system shutdown. For some use cases this is sufficient, but in cases where loss of data would be considered catastrophic, a "highly reliable" option is offered but its reliability mechanisms often significantly impact performance.


Feature	Reliance Nitro	Reliable	FAT
Fault tolerant during unexpected shutdown	✓	✓	
Flexible transaction point settings (operation, timed, application-controlled)	✓		
Fast read performance	✓	✓	Variable
Fast write performance	✓		Variable
Mount time performance	Fast*	Slow	Slow
Flash media optimized with discard interface	✓		

DATA SHEET

Datalight®

Faster File System Operations For Superior Responsiveness

Only Reliance Nitro offers complete control over data-at-risk with superior performance. Its tree-based, extent-based architecture provides more efficient file operations, improving overall system responsiveness.The tree-based directory structure enables much faster file operations, particularly when working with many small files. In a side-by-side test creating 1000 small files, then opening and deleting them, Reliance Nitro demonstrated vastly improved operational performance over alternatives. The test also measured the time to create and delete a directory tree. As the results demonstrate, raw throughput is not the only measurement that is important to file system performance. The way a system handles its metadata can be just as important.

Datalight Reliance Nitro Architecture
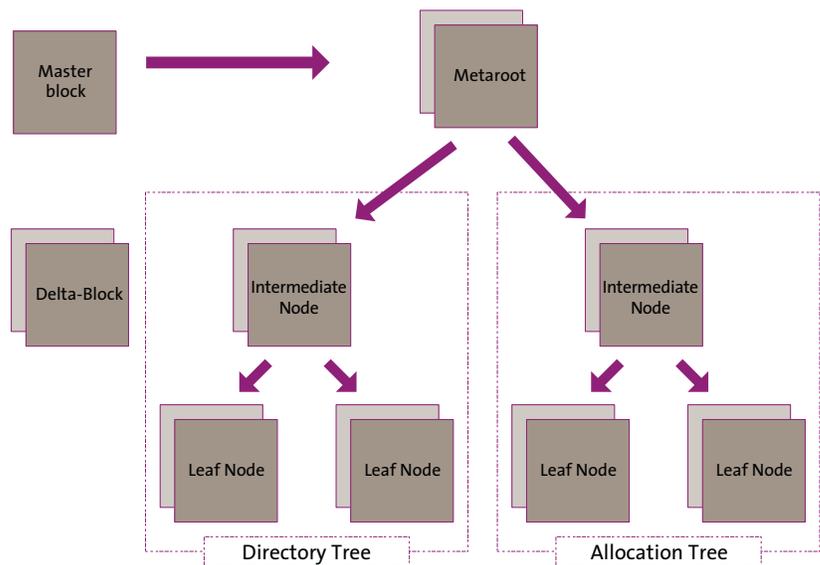
Faster Mount Times

In cases where power failure may occur, Reliance Nitro has a mount time advantage. There is no need to replay a journal or perform any other file system checks; Reliance Nitro always keeps the disk in a known good state. This and other performance features give your customers noticeably faster mount times, especially where there is a random I/O penalty such as on hard disk drives and many types of solid state media, like eMMC.

Time in mm:ss	Reliance Nitro	Basic FAT	Fault-tolerant
Create 1000 files	00:10	00:56	09:34
Open 1000 files	00:01	00:37	00:34
Delete 1000 files	00:02	00:38	10:41
Create dir tree	00:19	01:35	12:11
Delete dir tree	00:14	01:41	26:28

100% Reliability for a Better User Experience

Device reliability is multi-faceted; implications include everything from device corruption to a less than optimal user experience, creating real-world problems ranging from warranty returns to user annoyance, the enemy of customer loyalty. Because Reliance Nitro is a copy-on-write transactional file system, live data is never overwritten, making the system extremely fault tolerant, even after an uncontrolled system shutdown caused by power loss or component failure. True transactional architecture ensures rock-solid data reliability; Reliance Nitro maintains complete metadata and file data integrity while providing the performance needed to create an optimal user experience. Dynamic Transaction Point™ technology gives developers compile-time, mount-time and run-time control.

Reliable Data Exchangeability with Reliance Nitro Windows Driver (RNWD)

RNWD is an installable driver that makes data from devices using Reliance Nitro exchangeable with computers running Windows Vista, Windows XP and now 32-bit Windows 7 desktop operating systems.

Target Configuration	32-bit OS, any CPU, virtually any storage media, 70 KB RAM (typical)
Development System	Windows 32 host; 4 MB of disk space for Reliance Nitro
Supported Media	Flash memory, RAM, HDD, CF cards, USB Mass Storage, SD/MMC, and eMMC
RAM Memory Required	100 KB to 150 KB (nominal)
Media Volume Size	Each partition (or disk) can be scaled from 100 KB to 32 TB (terabytes)
Max File Size/Name Length	Available free space/1,024 UTF-8 bytes (or OS imposed limits)

Dynamic Transaction Point Technology APIs Supported

In addition to APIs common to most file systems, Reliance Nitro supports these Dynamic Transaction Point APIs that provide compile time and run time control over transactions:

```
Transact Now
Get & Set Transaction Mode
Get & Set Transaction Mask
Get & Set Advanced Attribute
Get & Set OEM Attribute
Mount & Dismount
Volume Format
Volume Check
Volume Info
```

Supports All POSIX APIs

Operating system specific implementations for these APIs vary. Please refer to Developer's Guides and API References included with the SDK for the applicable operating system port or visit our website.

Better Design Flexibility

Every file system must balance the tradeoff between data-at-risk and maximum data throughput. Only the Dynamic Transaction Point technology found in Reliance Nitro gives device manufacturers total control to find the ideal balance for any use case. This capability makes field upgrades fail-safe, for example, as these applications must update several files in an atomic fashion. When using other file systems, if a power interruption occurs before the update is complete, the application may not recover. This is easily accommodated with Reliance Nitro's run-time configurable transaction points.

Software Development Kit and Licensing

Reliance Nitro is delivered in ANSI C source and includes a comprehensive Developer's Guide, API reference, and validation utilities. Runtime distribution can be licensed per unit or per project. Consult your Datalight representative for options that are applicable to your project.

Professional Technical Support

Datalight's support for customers is well known in the embedded industry. It's been said that customers come to Datalight for the great products and stay for the excellent technical support. Our technical support team has a strong commitment to making your devices work reliably, from testing to implementation. Our hard-earned reputation for great customer service means that Datalight regularly goes above and beyond to make sure your project performs flawlessly.

Annual support subscriptions are available with a choice of service level options that provide reliable access to responsive Datalight file system experts, ensuring your project stays on schedule.

About Datalight

Datalight is the software expert for reliable data storage on devices. For over 30 years, Datalight has provided trusted solutions that have been deployed across all segments of the embedded industry—from cellphones to satellites to submarines. Our patented products have been proven to speed time to market for development platform and device manufacturers.

Rock-Solid Reliability

"We've successfully completed our test of Reliance Nitro simulating 20 years of product life for our product with over 1.2 billion SQLite database write transactions. I wanted to thank you for the excellent support that you have given us during this selection process. You guys have an excellent product, wonderful engineers, and great support!"

-Engineering Manager, Smart Grid Monitoring Technology Company

Datalight®