RoweBots Limited

Software Data Sheet

Unison RTOS version 5.3

Ultra tiny embedded Linux™ or POSIX™ compatible RTOS

Unison and File Systems

There is a broad set of choices for media and each media type is generally suited to a specific type of file architecture. For this reason, there is a number of file systems which are part of the Unison Operating System to provide a file system which is ideally suited to the media. These file systems include:

- Fsys maximum storage disk and RAM file system
- Fsys-Nor maximum storage for Nor flash chips for standard applications
- FAT 12, 16 & 32 file system for USB mass storage, µSD, and other removable media
- FAT 32 file system for NAND and NOR flash
- Secure encrypted file systems
- Solé File System for Nand/Nor flash chips for power and failure safe applications

All file systems are done in such a way to provide minimal error rates on files regardless of failure time and mode. Two main failure times are considered: with 500msec to flush the cache and immediate power failure.

The two main modes are: data consistency checked and no data consistency check.

Two main choices exist: protection against immediate failure which assumes no power down time and maximum pre failure prevention. This choice includes data integrity checking. The second choice of protection assuming a power down transition which may or may not include data integrity checking.

Individual file systems provide other types of protection. These protections are covered under the various sections on the file systems.

Fsys Maximum Storage

Fys is a file system that has the following features:

- POSIX compatible, extent based file system
- POSIX compatible directory structure
- 1 bit per block for extremely efficient encoding
- Block cache with optional disable
- Rebuild of file system from block table at initialization
- Immediate flush of block table updates
- Entry addition before old entry removal (for file system integrity protection)
- Tiny memory footprint at an 8.2K flash requirement

FAT File System

- POSIX compatible, FAT file system
- POSIX compatible directory structure
- 12, 16 and 32 bit support
- Standard FAT format for removable media compatible with Windows, Linux and more
- Small memory footprint with 13.5K flash requirement

Network File System (NFS)

- Compatible with a broad set of operating systems
- Implements NFS v2
- 2GB file limitation
- Requires RPC and XDR which in turn requires UDP/IP
- Stateless operation
- Any POSIX limitations from the remote server are passed through to the calling application. For example file name or path name lengths are determined by the remote computer and may generate errors depending upon the Unison configuration and the remote server.

FAT-NAND

This is an enhanced version of FAT to support greater reliability and support for NAND flash operations. It has the following features:

- Dynamic write levelling
- Static write levelling
- Block verification and replacement (Bad block elimination)
- Error correction support
- Separate pages within blocks
- Cache size minimization
- Performance features minimizing block erase features
- Small RAM and Flash foot print

Fsys-NOR Maximum Storage

This is an enhanced version of Fsys to support greater reliability and support for Nor flash operations. It has the following features:

- Dynamic write levelling
- Static write levelling
- Separate pages within blocks
- Cache size minimization
- Performance features minimizing block erase operations
- Small RAM and Flash foot print
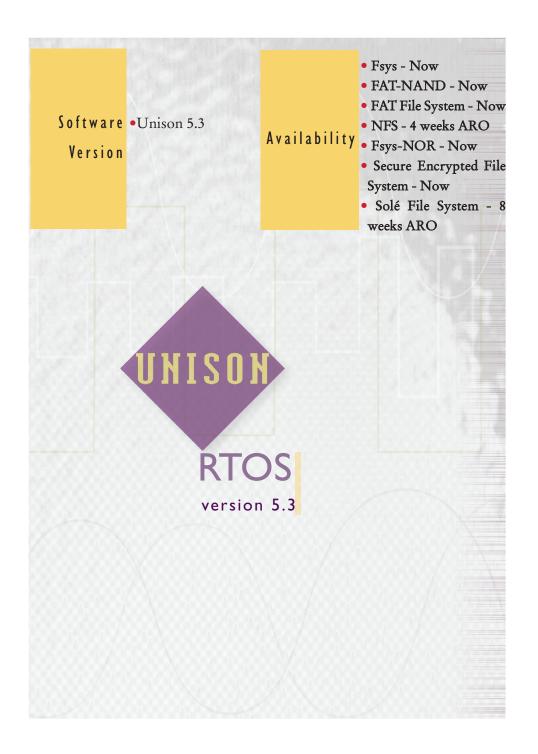
Secure Encrypted File System

In addition to having a FAT compatible file system, the file system may also be secure. In the case where the device is stolen or lost, this option ensures that sensitive data is not at risk.

A critical issue for a secure file system is layered security enabling different security aspects to secure features which are in turn used to secure the file system. Using a public key, private key cryptographic system, the data can be completely encrypted and never put at risk. Using layers of security the private keys are not exposed, and without a private key, the data is not recoverable.

Solé File System

The Solé file system is a derivative of the original Unison-Reliant file system offering power safe features for over two decades. It offers the following features:

- Power safe file system in that the file system is readable regardless of when and how suddenly the power is turned off.
  - Complete preservation of file system structural or meta data
  - Unique system level approach
  - Data protection with logical checkpoints
  - POSIX implementation
    - Long file names
    - Multiple volumes
    - Directory structure
    - Multiple open files
    - Standard error reporting
  - Multiple media types
  - Further details are available from the factory
- NAND/NOR Flash support
  - Dynamic write levelling
  - Static write levelling
  - Separate pages within blocks
  - Cache minimization
  - Small RAM and Flash foot print
  - Error correction codes
  - Bad block handling
  - Performance features to minimize block erasures

Software Version

- Unison 5.3

Availability

- Fsys - Now
- FAT-NAND - Now
- FAT File System - Now
- NFS - 4 weeks ARO
- Fsys-NOR - Now
- Secure Encrypted File System - Now
- Solé File System - 8 weeks ARO

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Other seperately available RoweBots files for Unison OS:

- System Security
- Wireless
- USB
- IoT or M2M Communication
- Internet Protocols
- Remedytools
- Unison for Specific Processor Families

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