

BRFS Specification

Bruno Filesystem (formerly BOOT-ROOT)

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Abstract

This specification document describes the BRFS filesystem structure used to store data on storage devices. This provides a standard common description of the filesystem for developers to implement freely.

Revision History

Revision	Date	Author(s)	Description
0.1		bruneo32	Created
0.2		bruneo32	Unknown
0.2b		bruneo32, arf20	This document

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1 Introduction

1.1 Scope

This document defines the Bruno Filesystem. As a filesystem it provides a way of structuring data in a block-based (i.e. LBA) storage device. It is meant for embedded systems where a complex filesystem is not needed, this is not a replacement for any modern desktop filesystem such as ext4, because it lacks basic features of journaling. Although BRFS is able to address large volumes, it is not recommended.

1.2 Definitions

Key words will be referred to with a `monospace font`.

- block: Minimum filesystem unit of data
- inode: File or directory entry

1.3 Advantages and disadvantages

Advantages	Disadvantages
TODO when defined	

1.4 Volume layout

- Superblock
- Root inode
- other inodes

2 Superblock

The superblock records properties of the enclosed filesystem, such as the block size, pointer size and attribute size. It is 1 block in size. The remaining block will be padded with zeroes.

2.1 Superblock layout

Size (bytes)	Field (Unsigned integer)	Value
4	Magic number	"BRFS" 0x42524653
1	Block size in LBAs	0-255 (+1)
1	Pointer size in bytes	2, 4, or 8
1	Attribute size in bytes	0-255
Pointer	Available space (RENAME)	
Pointer	First free block	
b-6	Padding...	0x00

2.2 Theoretical limits

Property	Limit
Block size	256
Pointer size	64
Attribute size	256
Addressable blocks	2^{64}
Addressable LBAs	$256 \cdot 2^{64}$
Absolute maximum capacity (512-byte LBA)	$512 \cdot 256 \cdot 2^{64} \approx 2 \text{ YiB}$

The maximum capacity of the filesystem is calculated as follows

$$C = L \cdot B \cdot 2^p \quad (1)$$

Where p is pointer size, B is block size and L is LBA size.

Some examples of reasonable configurations (assuming 512-byte LBA) are $p = 32$, $B = 8$, which gives 16 TiB capacity; or for more efficient storage, $p = 64$, $B = 1$: 8 ZiB; for embedded systems perhaps only a $p = 16$ $B = 1$ is needed, for 32 MiB.

3 inode

Describes inode entry on directory

Size (bytes)	Field (Unsigned integer)	Value
Pointer	First block	
Attribute	Attributes	
undef	Filename (c-string)	

4 Root inode