Software Perspective on e•MMC

August 23, 2012

Thom Denholm

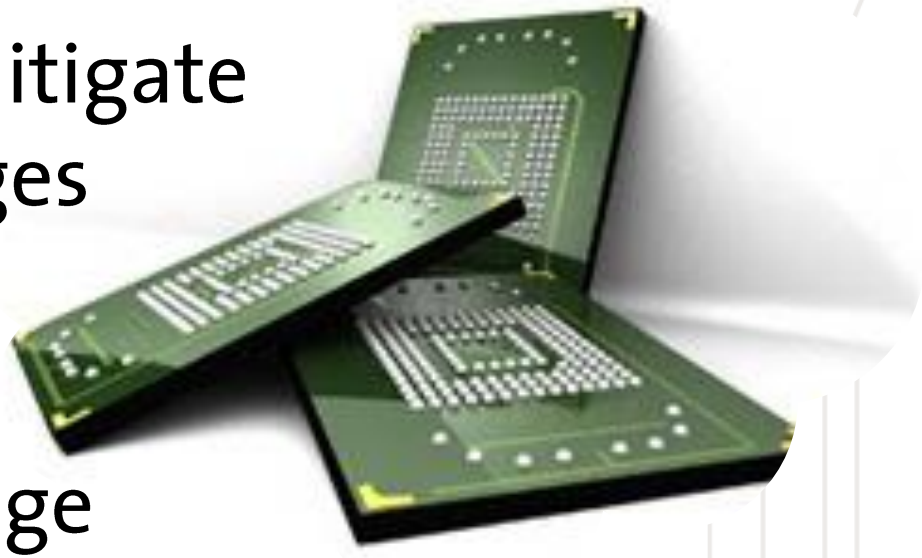
Technical Product Manager, Datalight

Datalight®

Software for Risk-free Mobile Data

Agenda

- Embedded industry embraces *e*•MMC
- How software can mitigate unexpected challenges
- Retaining & enhancing your competitive advantage



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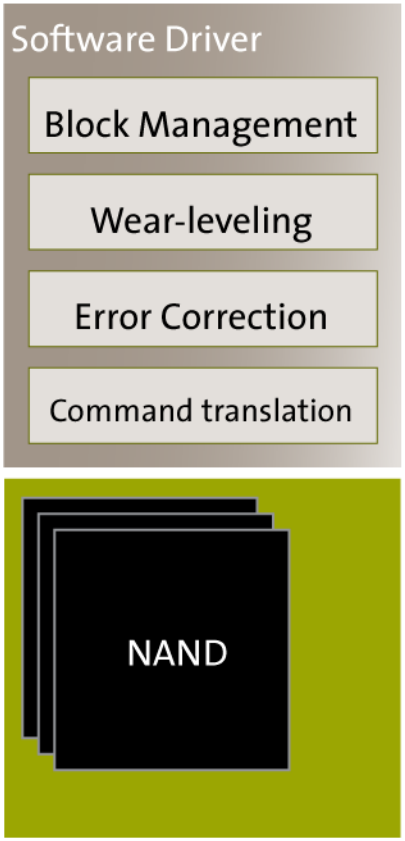
Flash Options are Diverging

NAND Technology Options

Raw NAND



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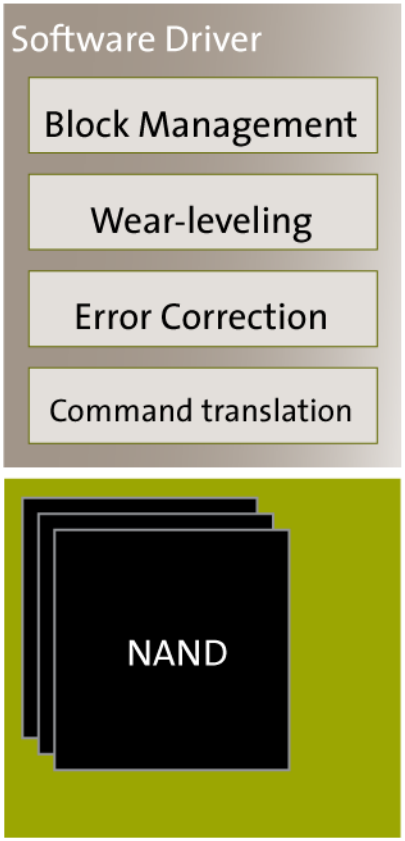
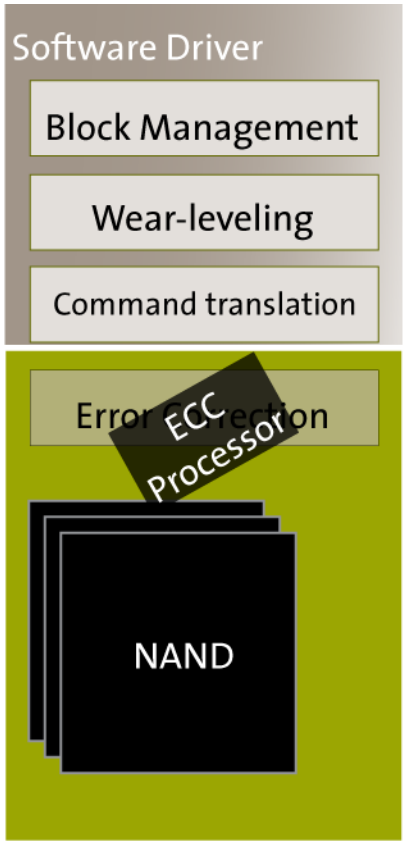


EZ NAND



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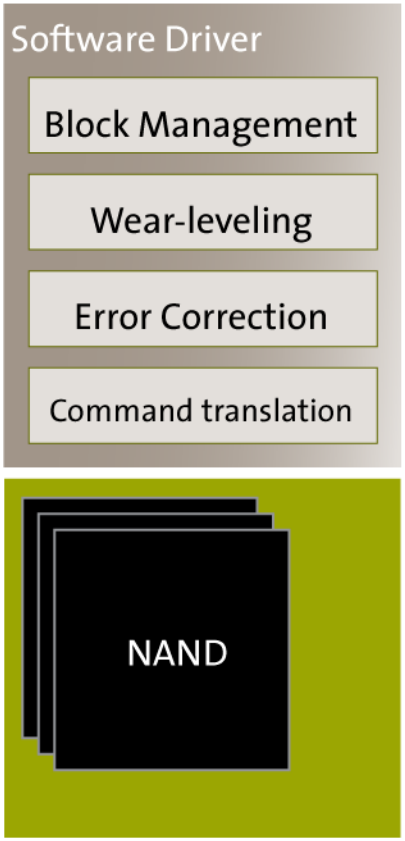

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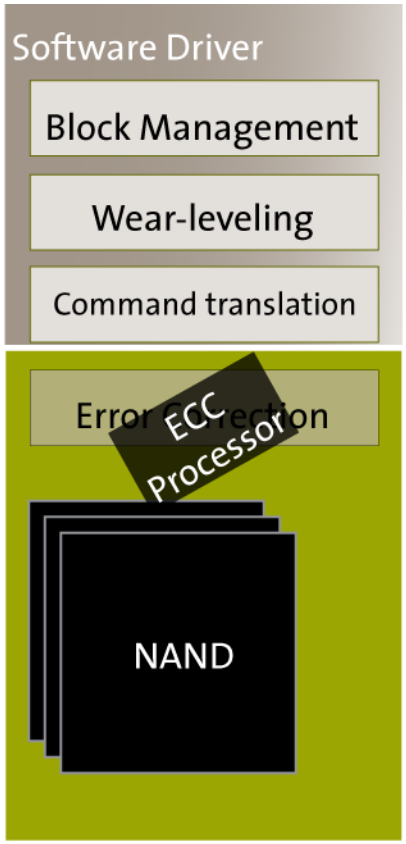
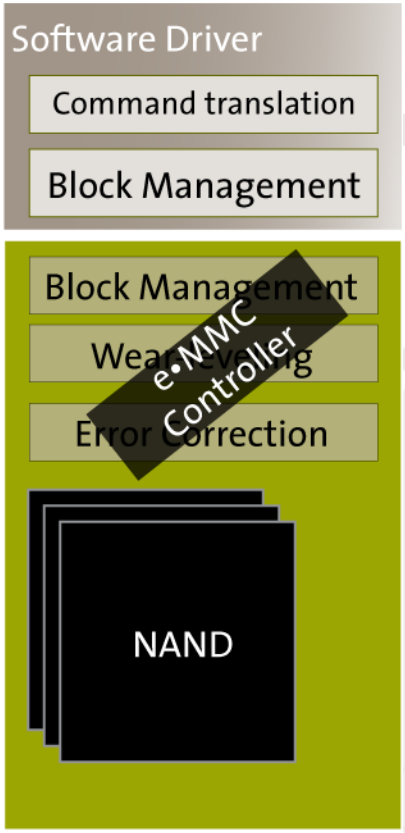


e•MMC



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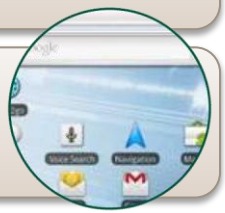
How do hardware features reach the user and improve their experience?

User

Application



Operating System

RTOS WIND RIVER

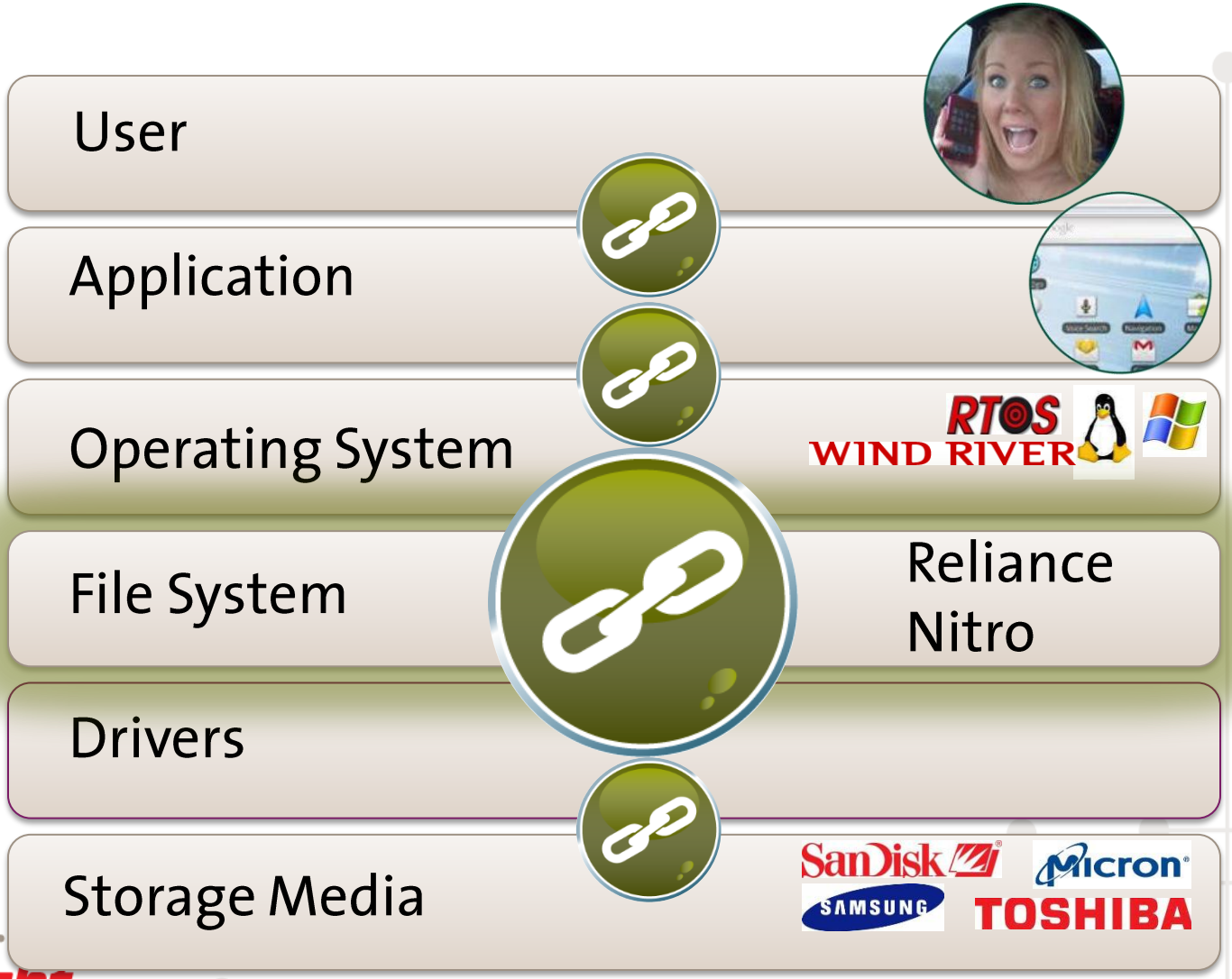
File System

Drivers

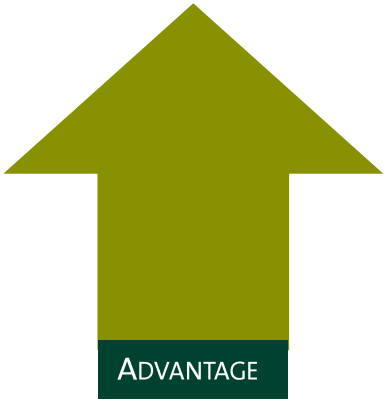
Storage Media

SanDisk Micron SAMSUNG TOSHIBA

Top to Bottom Communication



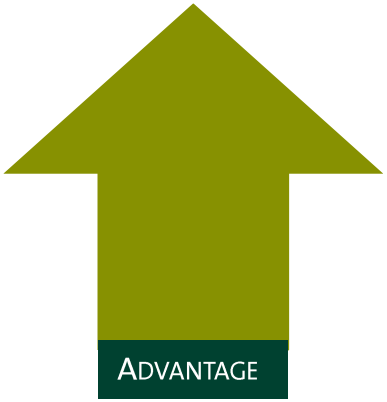
e•MMC: Advantages & Challenges



Performance (ECC in package)
Identical Form Factor
Fast Development Time

Bootable Partitions
Advanced Features

e•MMC: Advantages & Challenges



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Wonder if I have software support for all of this? Do my competitors?

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e•MMC Specification Features

4.2

Read/Write

Discard

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- Sleep mode
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- Dynamic device capacity
- Non-persistent partition
- Context-management
- Sanitize
- Real-time clock

Linux Driver Support

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Linux File System Support

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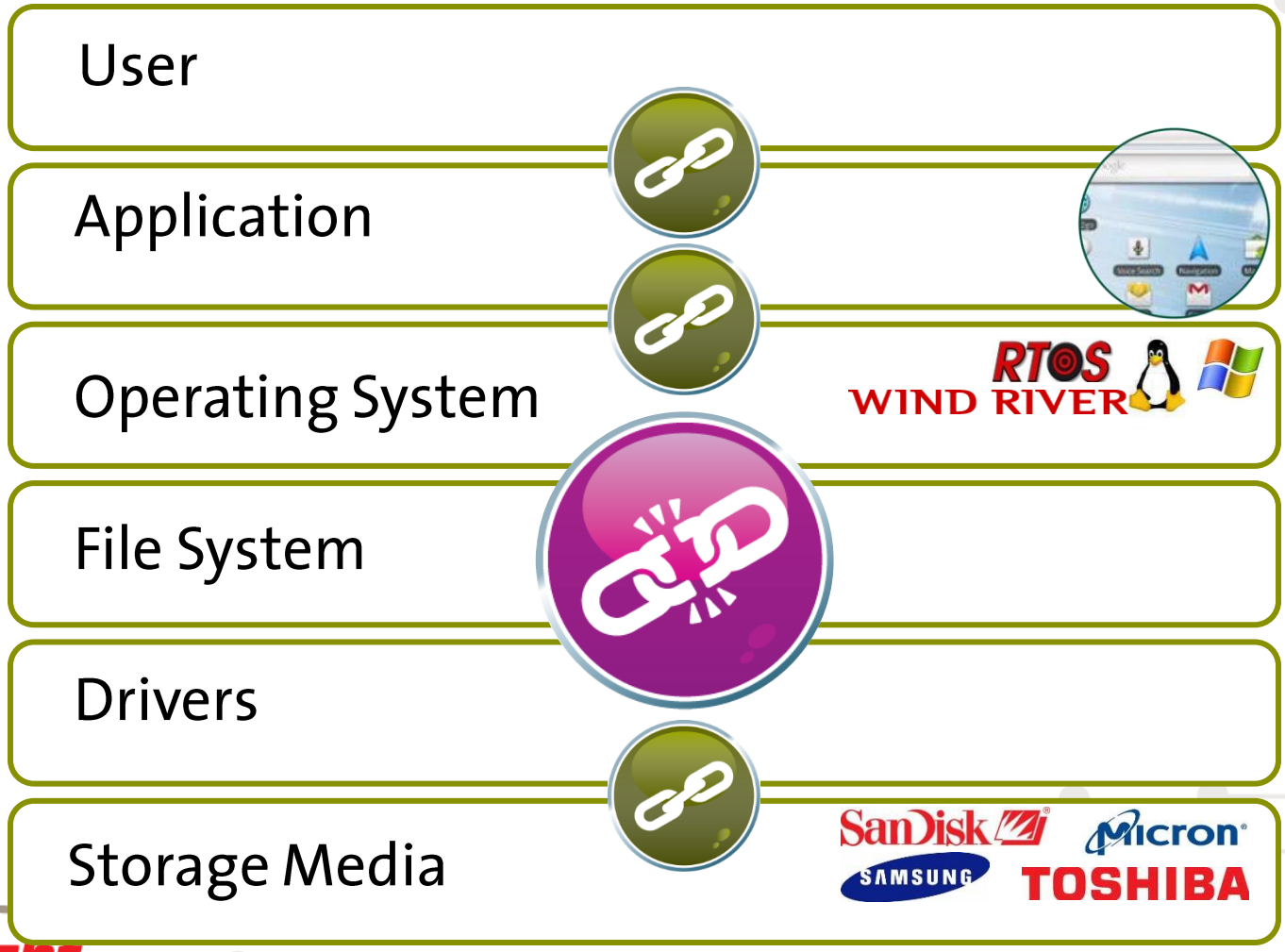
Hardware disconnected from the user



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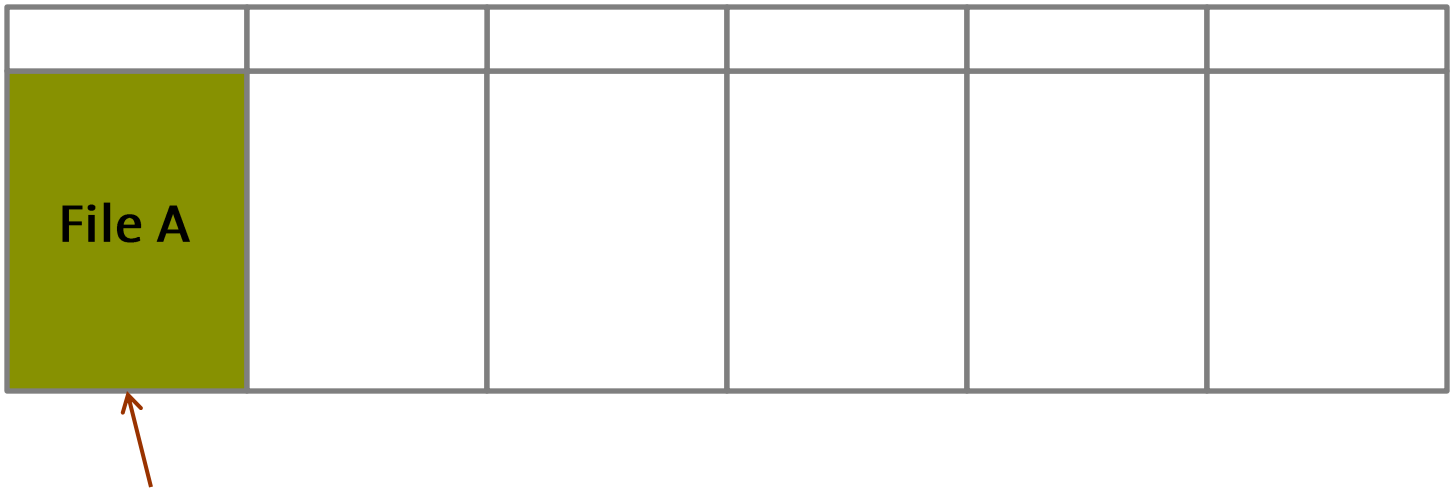
Secure Delete



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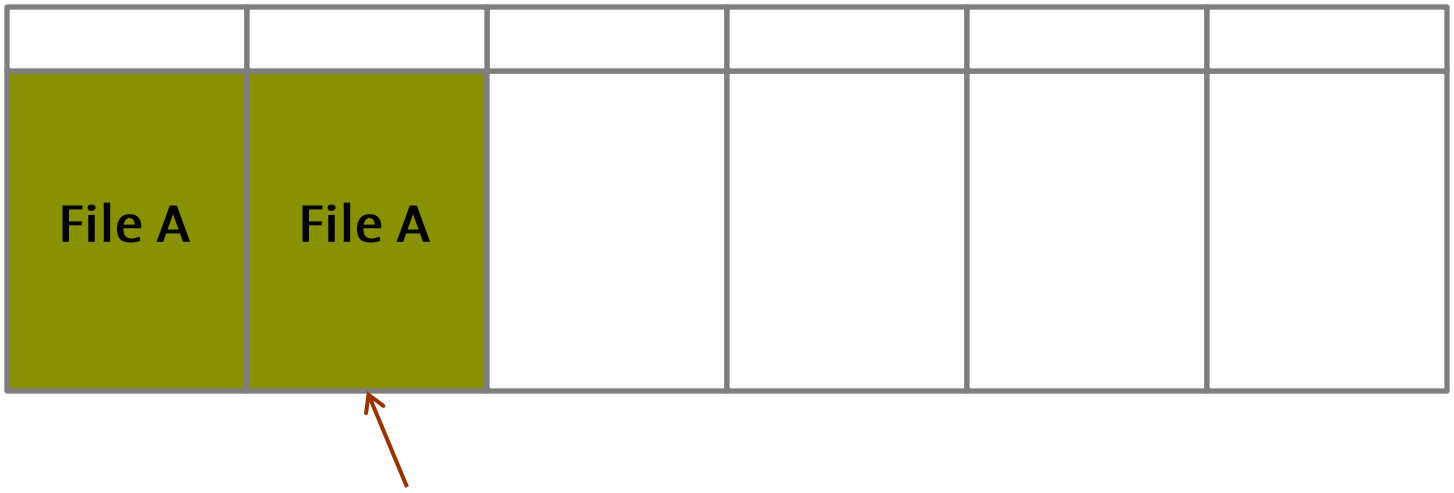

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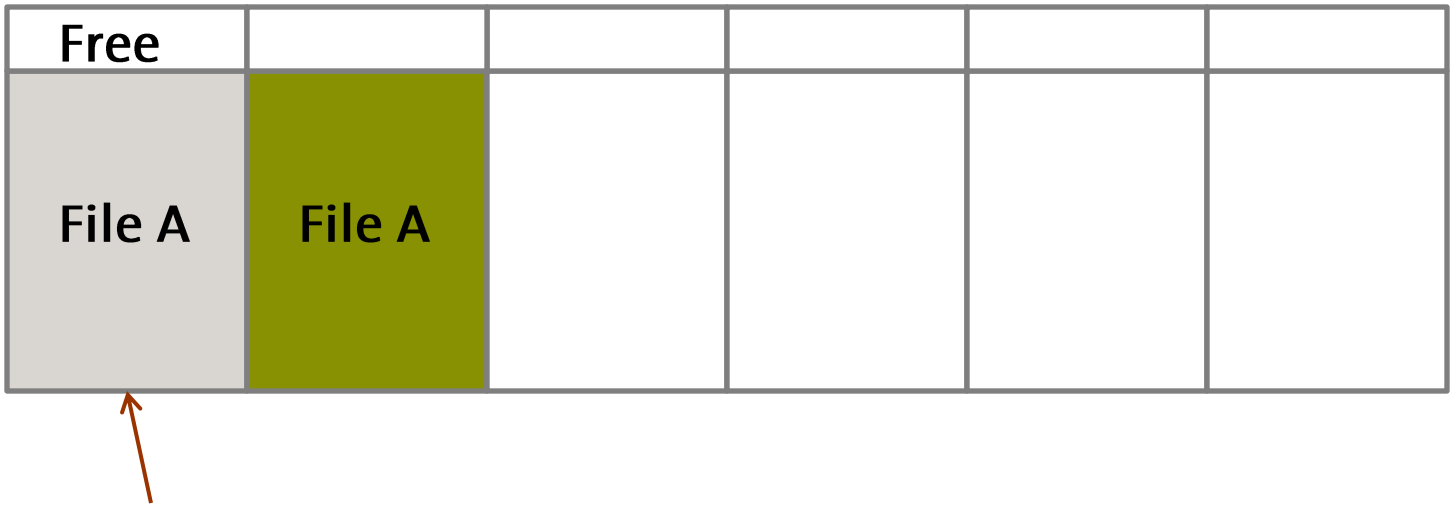
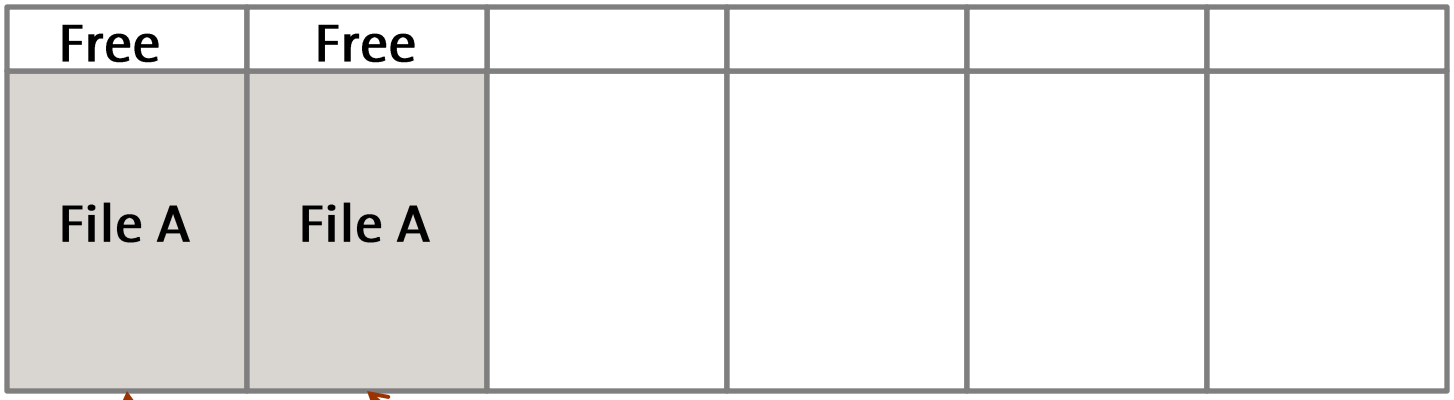


Original location is marked “free”, but copy of File A remains until free block is erased

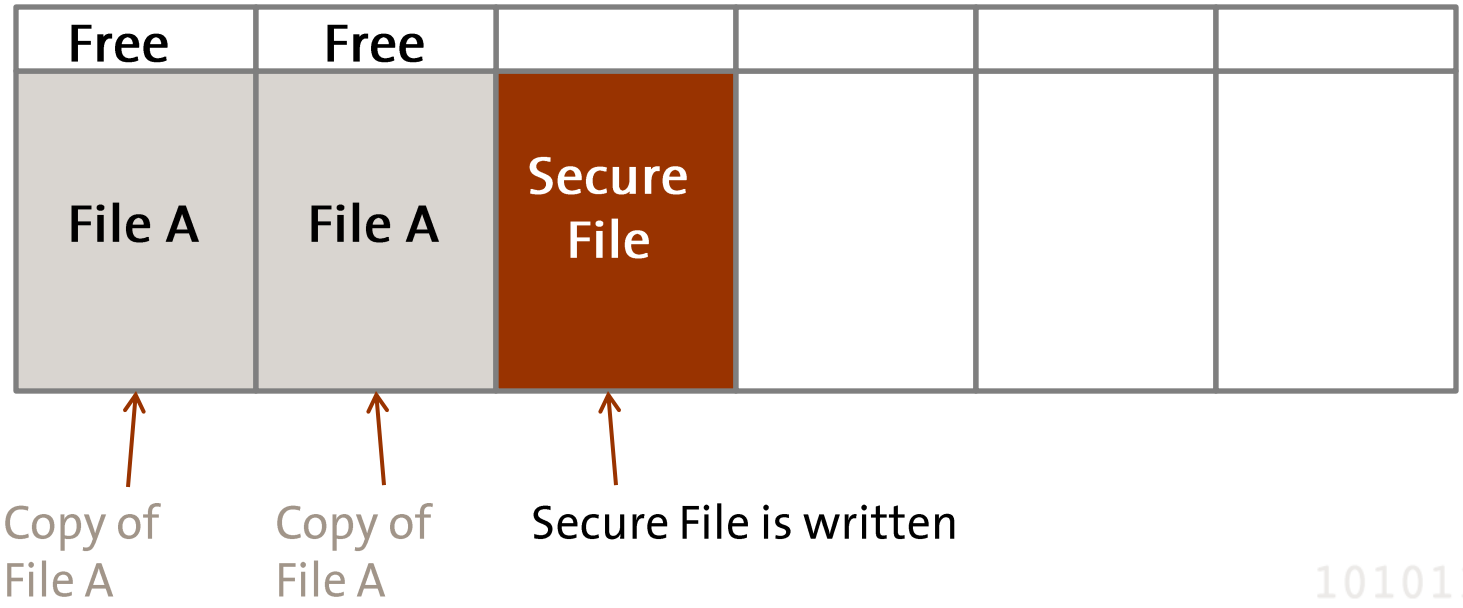
Secure Delete



Copy of File A remains until free block is erased

Delete File A: Marks block as “free” but leaves a copy to be erased later

Secure Delete



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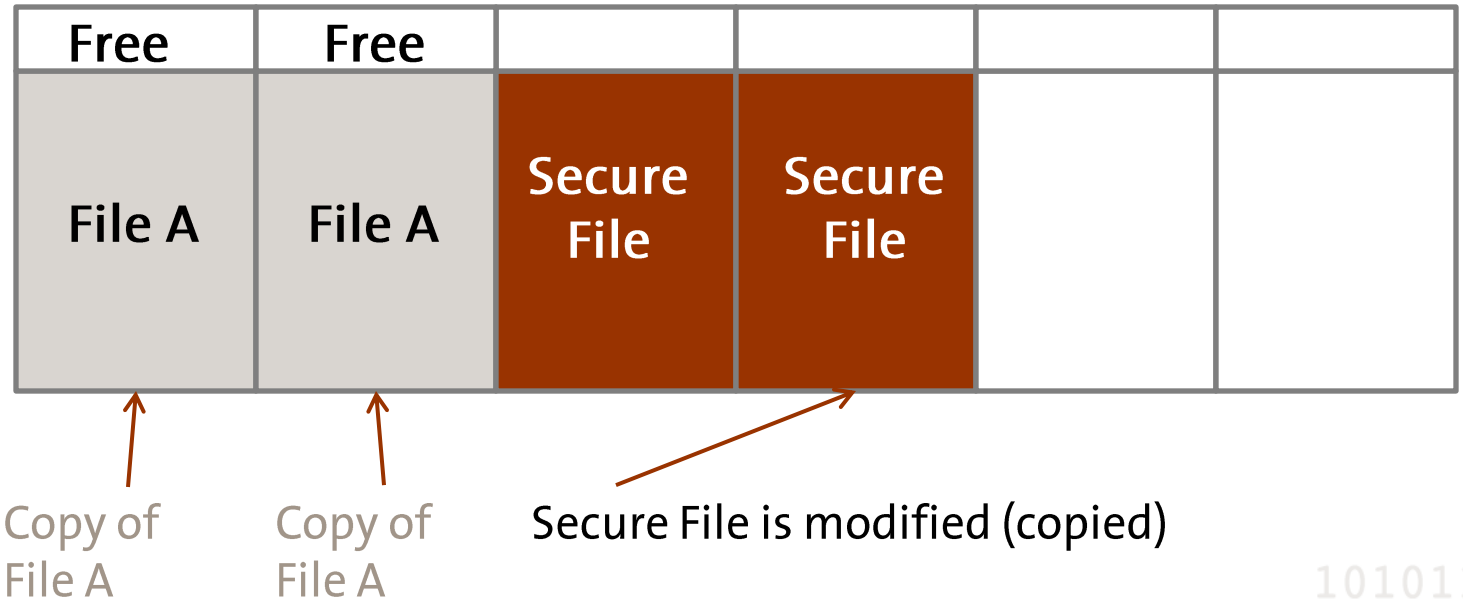

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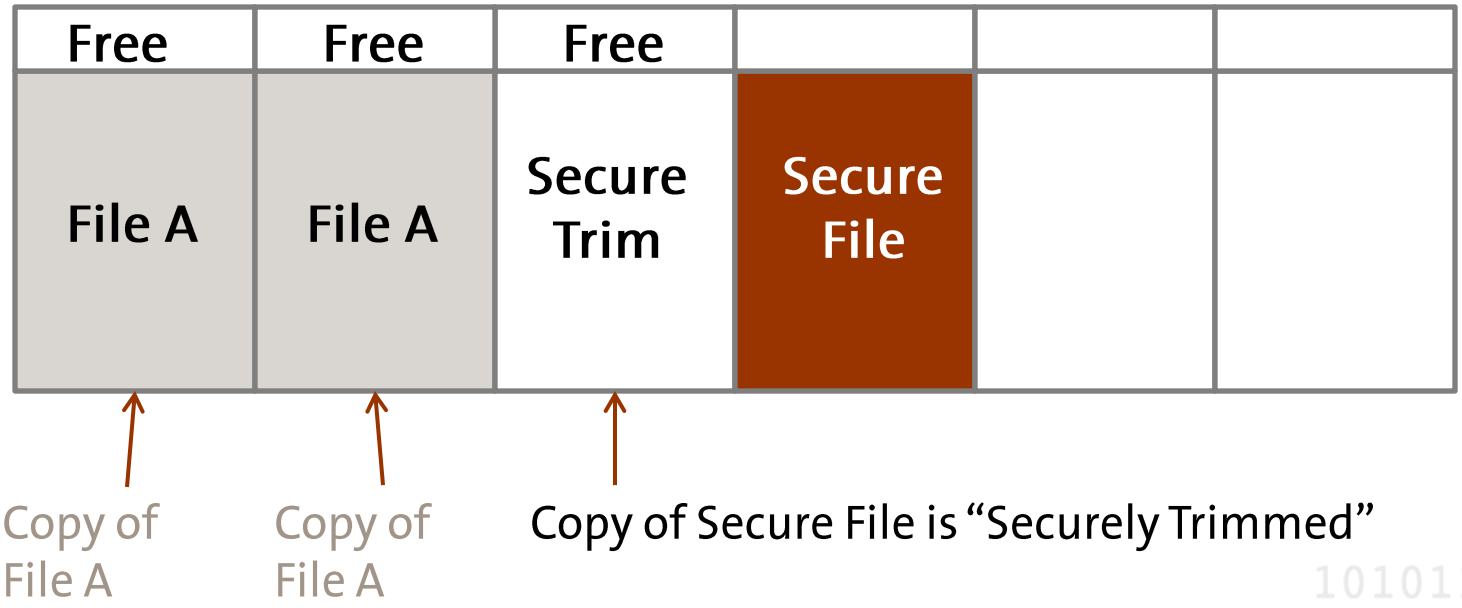

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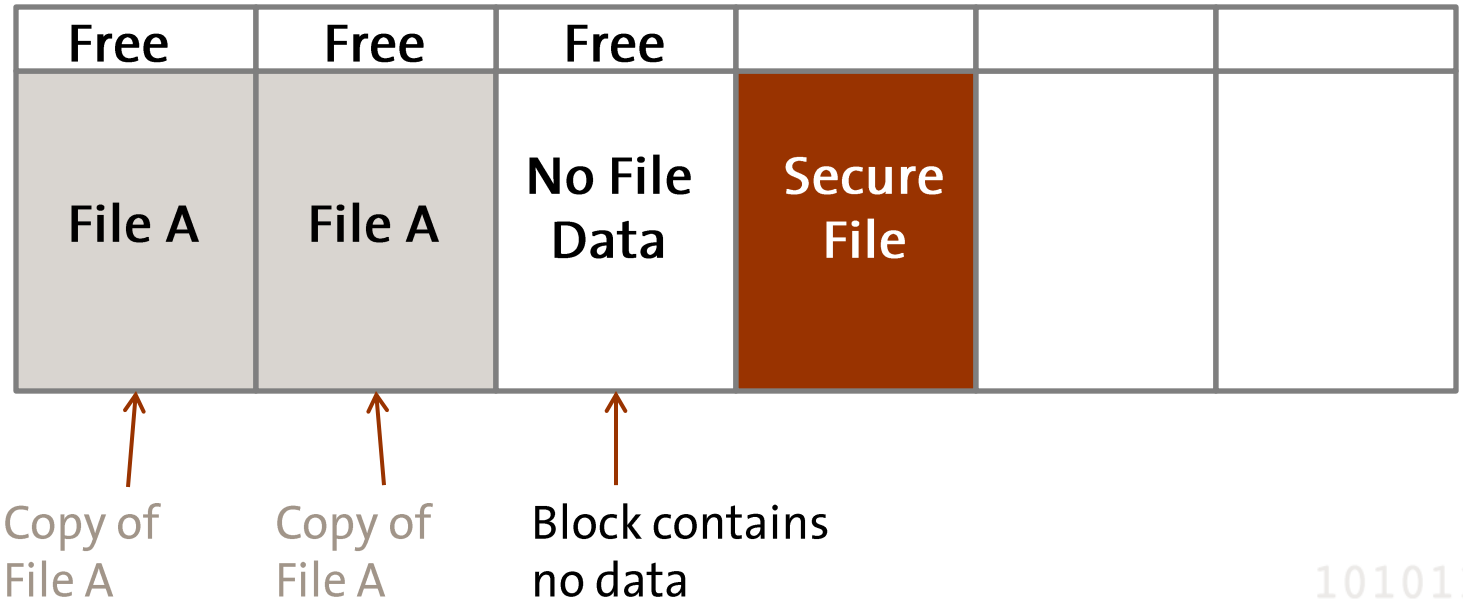

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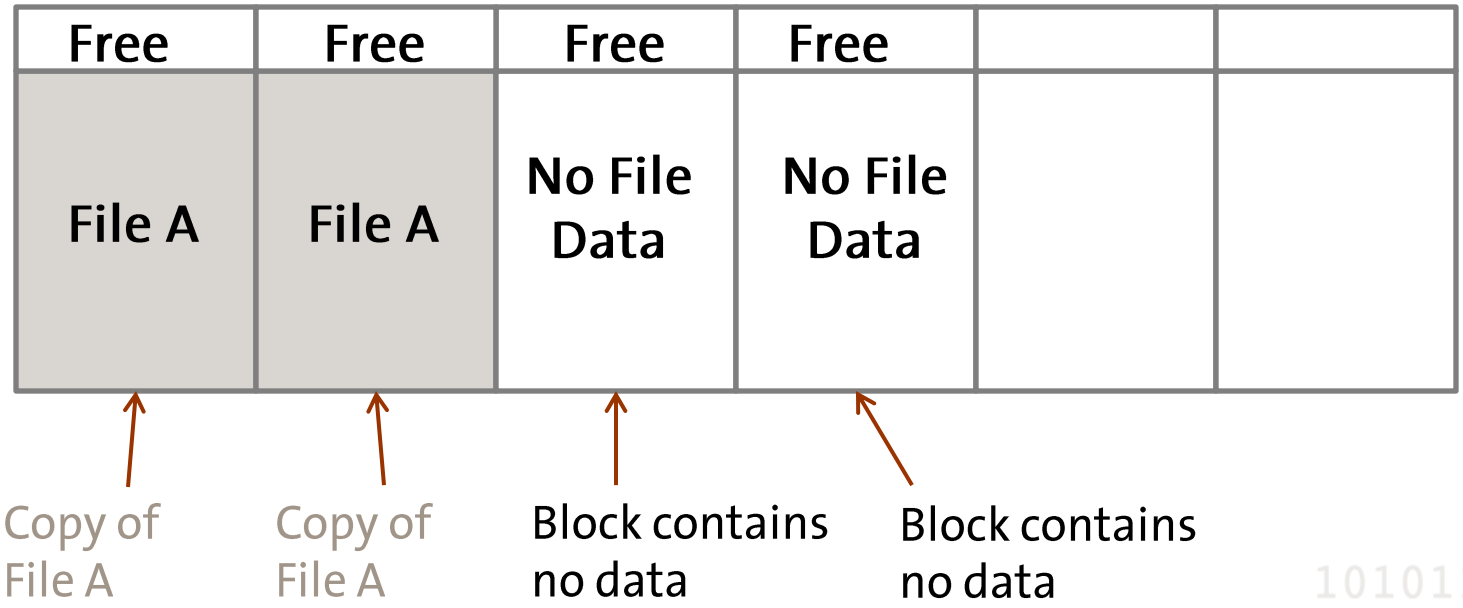

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Limited Software Support
Optional Features
Variable Implementation
Write Amplification Factor

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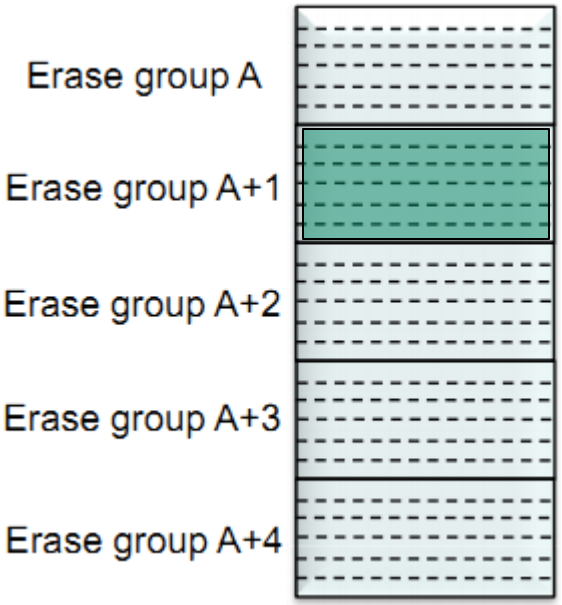
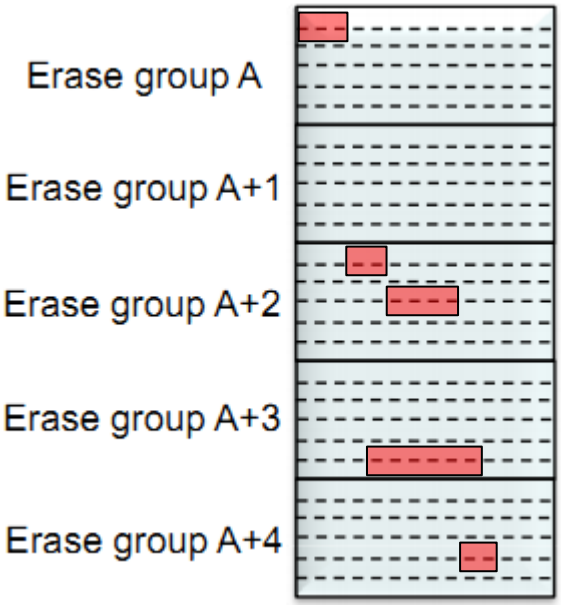
Open Groups



- Write only open groups
- Open Group count limited
- When Group Limit reached, one whole group must be written to media

Open Groups



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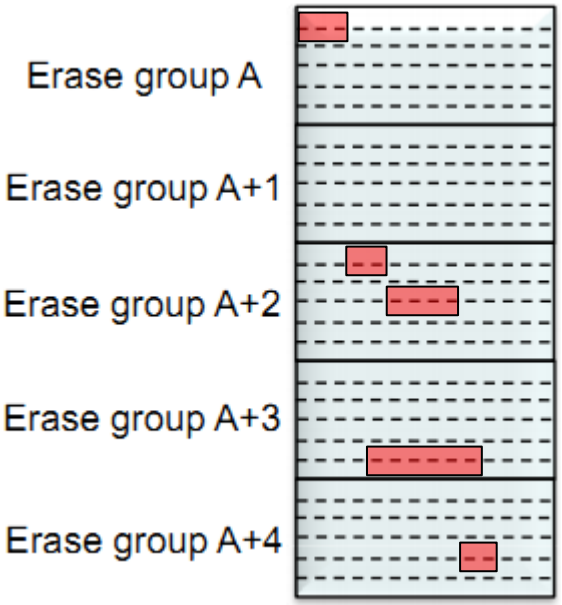
Open Groups



- Random I/O writes to multiple groups
- Different Devices have different Open Group characteristics

What is Write Amplification Factor?

$$\text{Write Amplification Factor} = \frac{\text{Minimum Write Block}}{\text{Size of File Written}}$$

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$$\text{Write Amplification Factor} = \frac{\text{32KB Page}}{\text{2KB File}} = 16$$

What is Write Amplification Factor?

$$\text{Endurance} = \frac{\text{Erase Cycle Endurance}}{\text{Write Amplification Factor}}$$

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$$\text{Endurance} = \frac{1000}{16} = 62$$

Reliance Nitro 2.5 Paves the Way

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Resources

www.datalight.com/solutions/technologies/emmc

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Technical Product Manager

– thom.denholm@datalight.com