SATA III Performance Test Report 2016.2

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/ULTRAZED

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Performance Test Setup

Disclaimer

– Results from this experiment are provided for reference/educational purposes only and may not reflect results observed with other test equipment.

– Many factors can impact disk performance and throughput beyond transmission overhead, including latency and system limitations.

– Actual data throughput typically does not reflect the maximum theoretical throughput.

Equipment Used

– Stock UltraZed-3EG SOM Rev. 1
– Stock UltraZed IO Carrier Carrier Rev. 1
– Micron 1100 SSD
– Micron M500IT SSD
– SATA III Data + Power Cable
– 12V/5V DC 4-Pin Molex 2A Power Adapter

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Test Case 1: Fixed Block Read/Write Operations

Test performed to demonstrate what sort of relationship exists between the file sized used during transfer and the resulting impact upon the overall transfer rate for read/write operations.
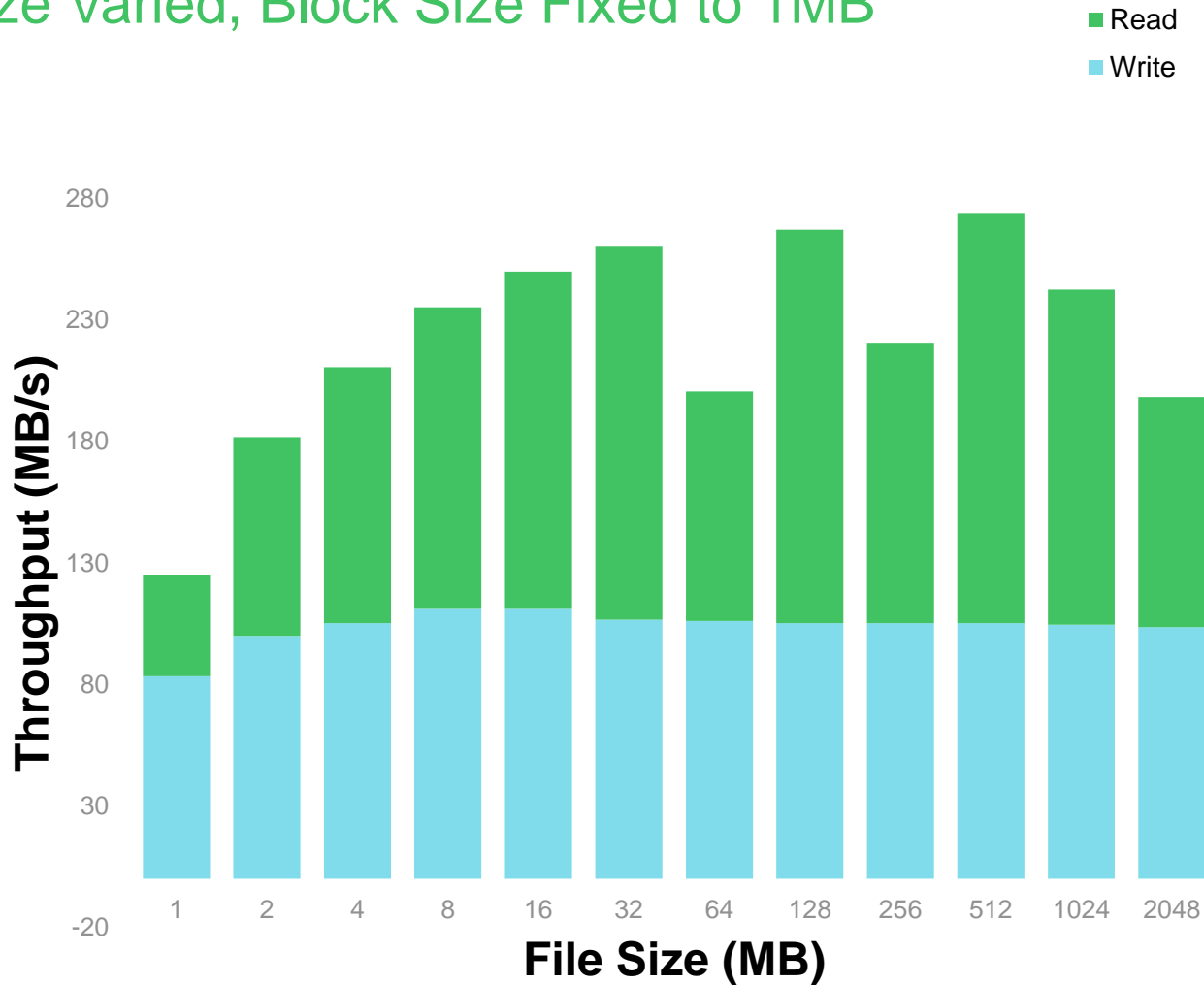
Test Overview

- Avnet UltraZed PetaLinux 2016.2 BSP used along with Linux coreutils **dd** utility to measure transfer time
- SATA interface linked at 6.0 Gb/s rate on Micron 1100 Drive

Test Results

- Throughput performance is slightly dependent upon file size as the performance ranged from 125.0 to 273.8 MB/s for read operations and from 83.3 to 111.1 MB/s for write operations
- Indicates possible overhead involved in setting up the DMA for data transfer to SATA controller interface

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Test Case 1: Fixed Block Read/Write Operations
File Size Varied, Block Size Fixed to 1MB

Legend: ■ Read ■ Write

Y-axis: Throughput (MB/s) — 280, 230, 180, 130, 80, 30, -20

X-axis: File Size (MB) — 1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048

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Test Case 2: Fixed Block Read/Write Operations

Test performed to demonstrate what sort of relationship exists between the block sized used during transfer and the resulting impact upon the overall transfer rate for read/write operations.
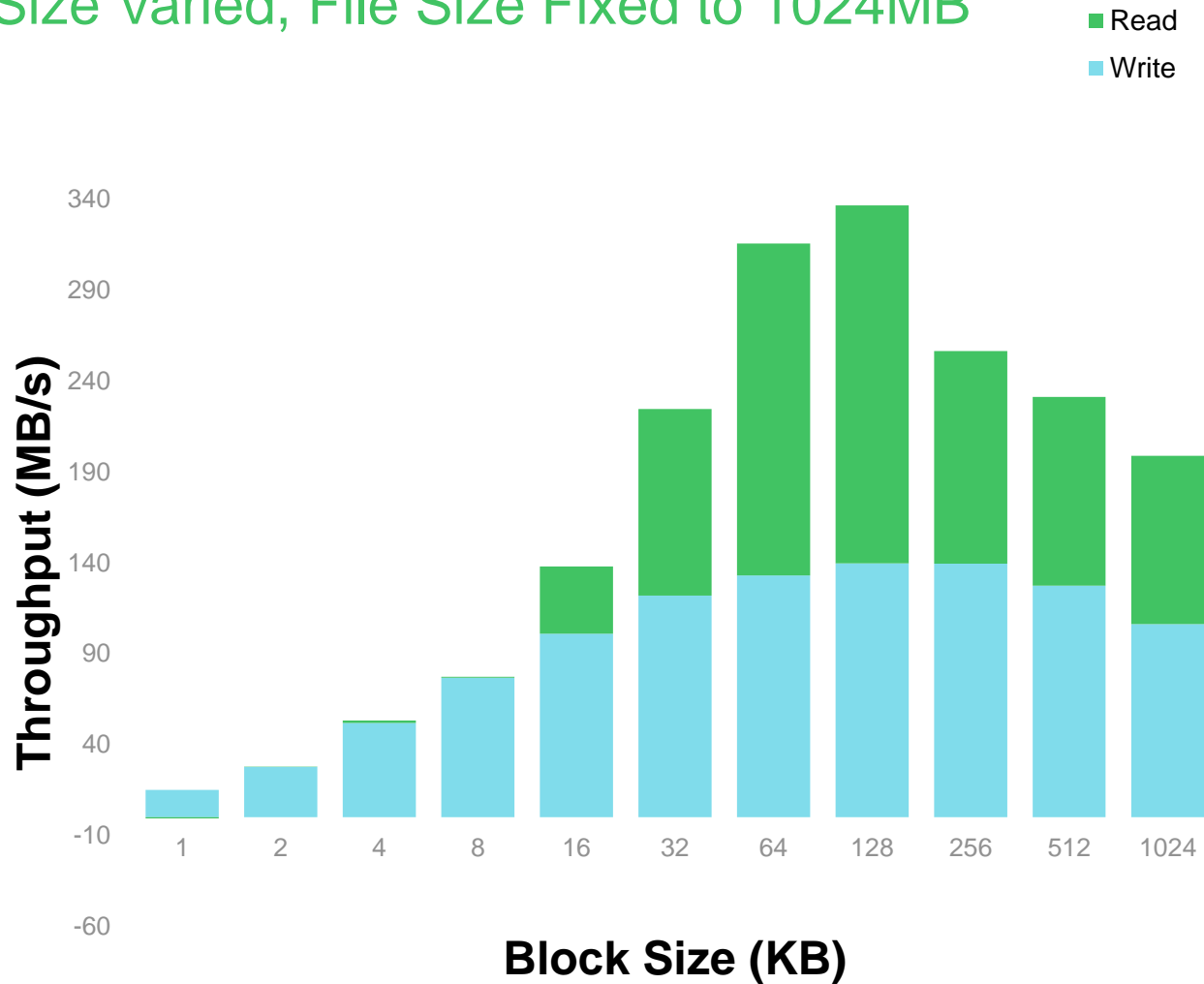
Test Overview

- Avnet UltraZed PetaLinux 2016.2 BSP used along with Linux coreutils **dd** utility to measure transfer time
- SATA interface linked at 6.0 Gb/s rate on Micron 1100 Drive

Test Results

- Throughput performance is very dependent upon file size as the performance ranged from 14.3 to 336.2 MB/s for read operations and from 15.0 to 139.7 MB/s for write operations
- Indicates possible overhead involved in setting up the DMA for data transfer to SATA controller interface

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Test Case 2: Fixed File Read/Write Operations
Block Size Varied, File Size Fixed to 1024MB

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Test Case 3: Fixed Block Read/Write Operations

Test performed to demonstrate what sort of relationship exists between the file sized used during transfer and the resulting impact upon the overall transfer rate for read/write operations.
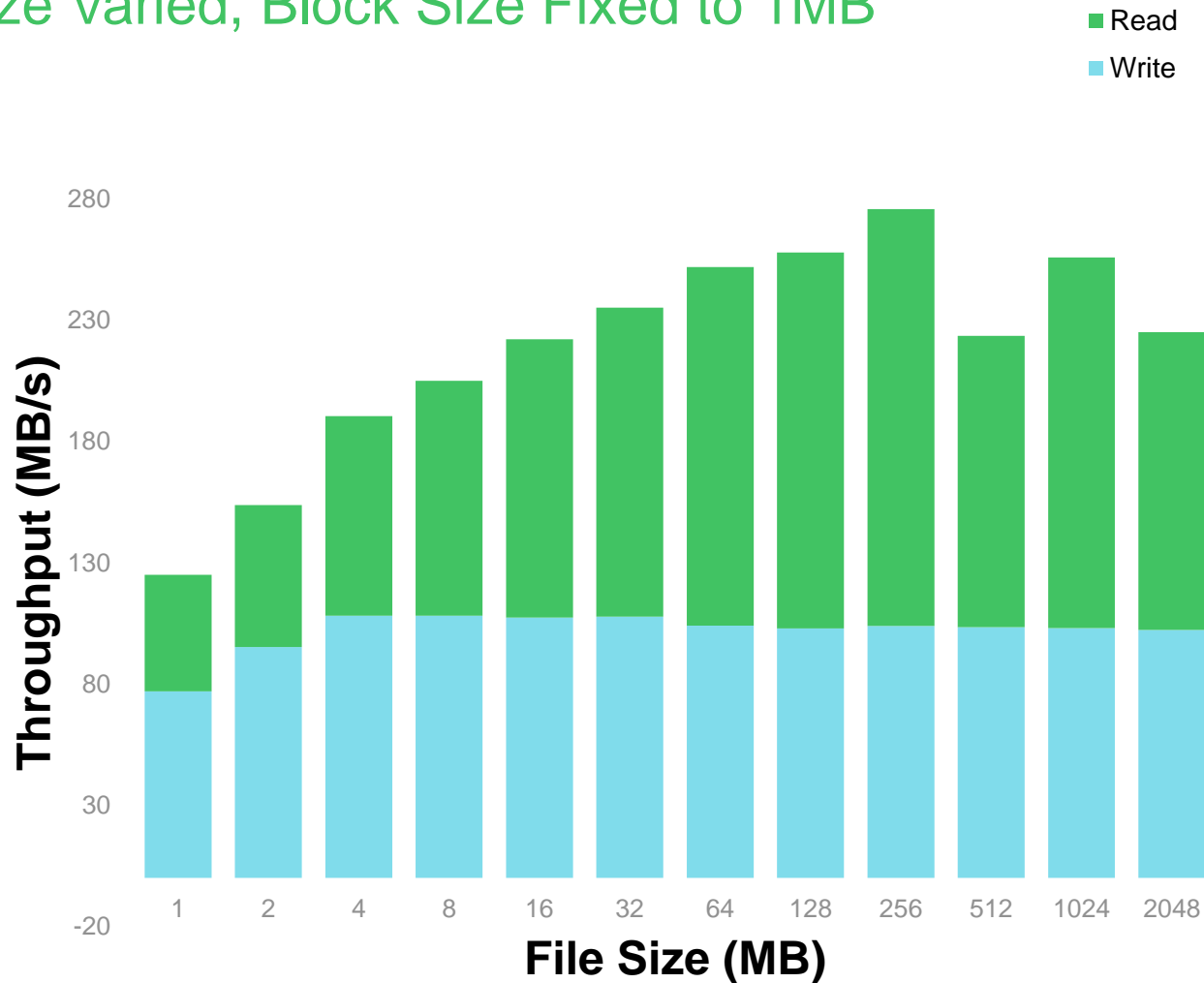
Test Overview

– Avnet UltraZed PetaLinux 2016.2 BSP used along with Linux coreutils **dd** utility to measure transfer time
– SATA interface linked at 6.0 Gb/s rate on Micron M500IT Drive

Test Results

– Throughput performance is slightly dependent upon file size as the performance ranged from 125.0 to 275.9 MB/s for read operations and from 76.9 to 108.1 MB/s for write operations
– Indicates possible overhead involved in setting up the DMA for data transfer to SATA controller interface

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Test Case 3: Fixed Block Read/Write Operations
File Size Varied, Block Size Fixed to 1MB

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Test Case 4: Fixed Block Read/Write Operations

Test performed to demonstrate what sort of relationship exists between the block sized used during transfer and the resulting impact upon the overall transfer rate for read/write operations.

Test Overview

- Avnet UltraZed PetaLinux 2016.2 BSP used along with Linux coreutils **dd** utility to measure transfer time
- SATA interface linked at 6.0 Gb/s rate on Micron M500IT Drive

Test Results

- Throughput performance is very dependent upon file size as the performance ranged from 10.2 to 292.1 MB/s for read operations and from 14.0 to 126.4 MB/s for write operations
- Indicates possible overhead involved in setting up the DMA for data transfer to SATA controller interface

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Test Case 4: Fixed File Read/Write Operations
Block Size Varied, File Size Fixed to 1024MB

Read
Write

Throughput (MB/s)

260

210

160

110

60

10

-40

1 2 4 8 16 32 64 128 256 512 1024

Block Size (KB)

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