

Analysis and Optimization of an OrangeFS Block Driver for QEMU/KVM

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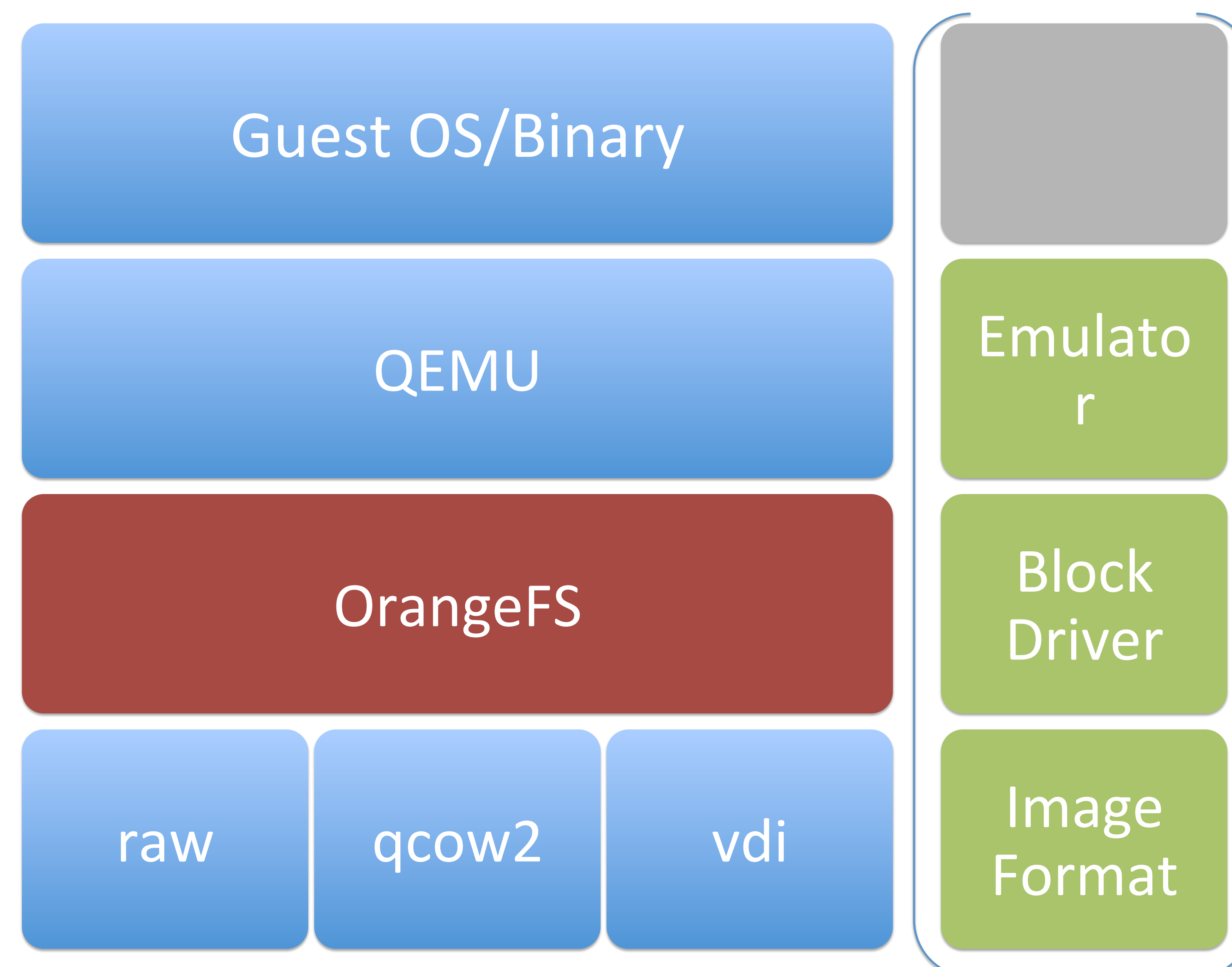
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Background and Motivation

Project was designed to meet two critical goals:

- Enhance usability of OrangeFS as a platform for serving images to OpenStack
- Provide a proof-of-concept use of the user interface library libofs

OpenStack is a critical infrastructure provider in the cloud computing space and increased integration between OpenStack and OrangeFS can offer huge benefits for OrangeFS adoption across the cloud computing space.



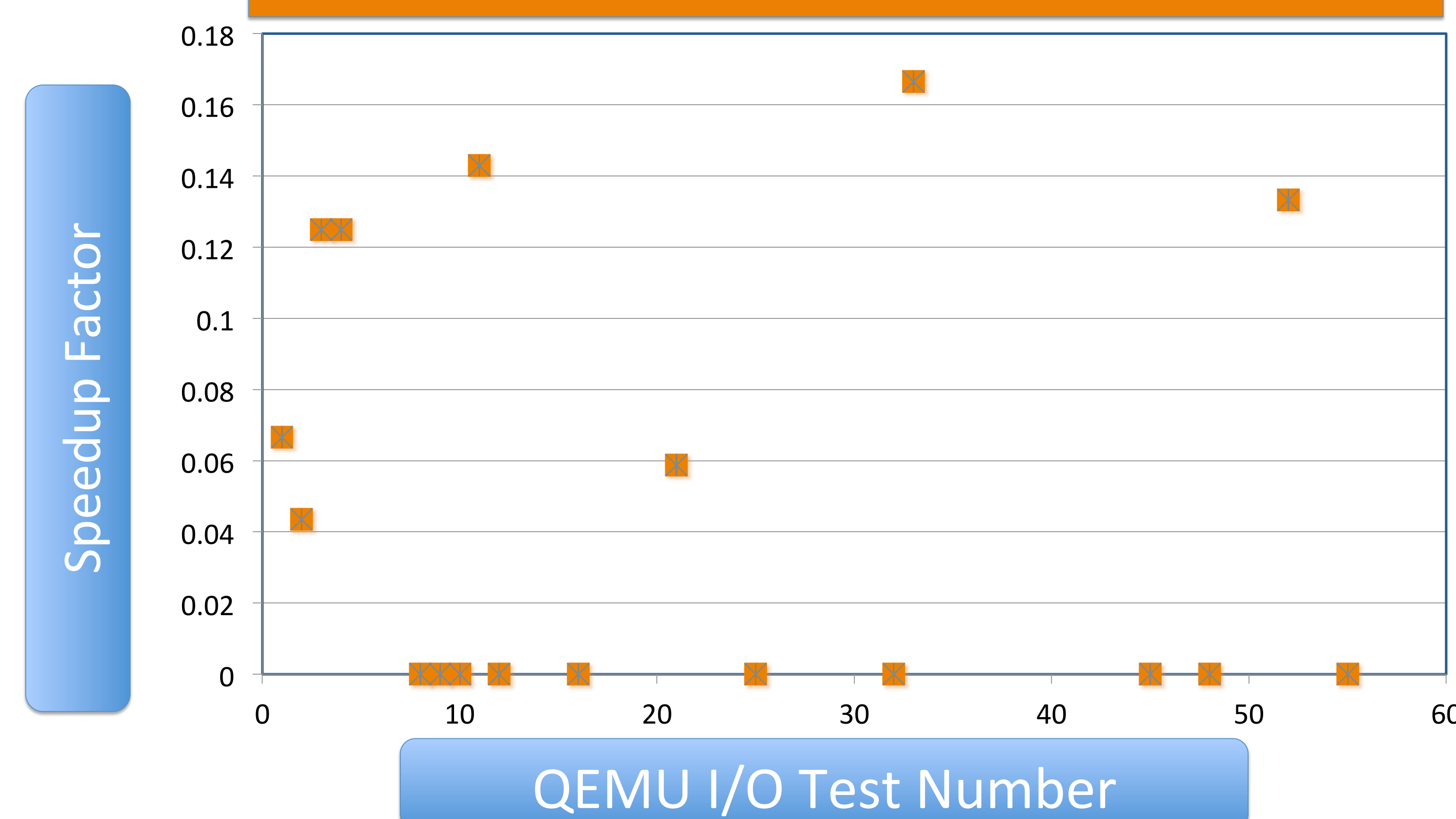
Future Goals

- Gain upstream acceptance of block driver in QEMU project
- Generate more case studies to encourage adoption of OrangeFS and *libofs* linking
- Streamline adoption of OrangeFS by OpenStack and other cloud providers
- Develop optimized caching and striping settings for virtual machines managed on OrangeFS backend
- Gather performance testing data on testbed optimized for VM workload (instead of scientific testbed)

Problem Statement and Objectives

- Create block driver for QEMU/KVM to use *libofs* for I/O operations
- Provide proof of concept usage for *libofs* and OrangeFS as VM backend
- Bypasses kernel space to achieve speedup
- Uses more advanced bindings and controls not available through kernel module
- Be plug and play capable with QEMU
- Enable smooth integration with OpenStack

Speedup in QEMU I/O Testing Suite



Testing Methods and Results

- QEMU I/O testing suite
 - Performs random reads and writes, image creation timing, data validation
 - Test synchronous and asynchronous I/O operations
- All tests performed on Palmetto Cluster newscratch (218 TB) on Intel Xeon E5-2665, 60GB ram, 240GB local disk
- Average **1.08** speedup over standard raw image block driver
- Testbed was not optimized for VM systems