Reducing Risk and Time-to-Tape-out in EDA

CHALLENGE
Simulation and verification are the most costly phases of chip design

SOLUTION
Improve compute performance and data access for faster simulations

HIGHLIGHTS
10x higher IOPS, 16x greater throughput, and 80% lower cost

Introduction

Modern electronic devices depend on integrated circuits (chips) that continuously grow in complexity due to consumer demand for more features and performance. With each new chip design, engineers wrestle with increasing gate counts, smaller geometries, and shrinking market windows. The resulting growth in complexity means that design simulation and verification become critical to successful first-pass chip tape-outs. The result is tremendous pressure on both Engineering and IT to keep chips on schedule and within budget.

LEGACY STORAGE CONTRIBUTES TO TAPE-OUT DELAYS

Meeting tape-out deadlines requires that more complex simulations be run in less time, but adding more compute and EDA resources may not reduce design verification time because the storage system is a bottleneck. Legacy NAS storage systems were not designed for the diverse workloads found in EDA today—complex directory structures at massive scale, metadata-heavy I/O, large and small files, and random and sequential access patterns. Front-end and back-end chip design processes each have unique storage requirements. Combining both I/O and bandwidth intensive workloads on the same storage system results in huge bottlenecks that delay final tape-out.

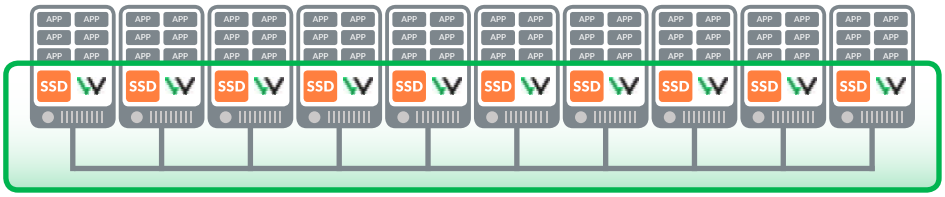

Figure 1 - EDA Application Server Cluster with WekaIO Shared File Storage

BREAK OUT OF THE BOX

NAS appliances worked well for early generation, less complex chips, but the volume of simulations performed and the amount of data being produced today require a radical departure from traditional storage architectures. WekaIO Matrix™ platform includes a distributed, parallel, scale-out file system (MatrixFS), integrated tiering to any S3 or Swift compatible data store, and an intuitive management console for easy system management, visualization, and reporting. The result is a high performance software based storage tier that leverages the application servers and off-the-shelf solid state disks (SSDs) to solve the EDA challenge with zero added footprint in the data center.

INDUSTRY LEADING PERFORMANCE AND DYNAMIC SCALABILITY

EDA workloads are among the most demanding in the industry and require performance levels that can only be accomplished with Flash technology. WekaIO Matrix platform converts your application server clusters into a storage system with extremely high bandwidth and IOPS performance, linear scalability, and sub-millisecond latency. MatrixFS was written from scratch to leverage the power of SSD and NVMe technology; the result is a POSIX compliant file system that delivers the best performance from modern technologies. As performance needs change, the number of processor cores allocated to MatrixFS can be increased or decreased to match the needs of your applications for true dynamic scalability.

ZERO-FOOTPRINT SOLUTION WITH PATENTED DATA PROTECTION

WekaIO Matrix leverages the drive slots within the server infrastructure to deliver capacity that scales independent of performance. As more capacity is needed, more SSDs can be added to the pool. Data is protected to the highest level in the industry with our patented protection scheme that can survive multiple simultaneous SSD or compute node failures with no data loss. When deployed on Amazon EC2 instances, MatrixFS can span multiple availability zones for even greater data protection and resiliency with little impact on performance.

FLEXIBLE DEPLOYMENT AND ON-DEMAND ELASTICITY

WekaIO Matrix can be deployed in a variety of ways to meet the evolving needs of your data center. In hyperconverged mode, Matrix runs as a process alongside existing applications, consuming a fractional amount of resources from each assigned node. As a dedicated storage server, the resources of the entire node are assigned to Matrix, effectively making it a software-based storage appliance that runs on industry standard hardware. Finally, Matrix can be run on EC2 instances in the Amazon cloud for true on-demand elasticity and massive scale.

Side-by-side comparison of traditional Scale-up NAS Filer vs. WekaIO Matrix

	NAS	MATRIX	DIFFERENCE
Hardware	2 NAS Filers (HA)	100 cores	
Performance	295,000 IOPS	3 million IOPS	10x Better
Throughput	2.4 GB/sec	40 GB/sec	16x Better

Conclusion

The pace of innovation required for modern electronic devices is creating unique challenges for chip designers and significantly increasing the risk faced by businesses whose future depends on meeting design schedules and staying within budget. Legacy storage and file system architectures dramatically affect the ability to meet these objectives by delaying tape-out through poor performance and scalability. Storage solutions must deliver more performance during peak simulation periods on-demand without the need to add more capacity.

Leveraging off-the-shelf servers, SSDs, and cloud storage, WekaIO Matrix delivers breakthrough performance at low latencies, limitless scalability in the cloud, and game-changing economics with a zero-footprint, software based storage solution. This unique combination is ideally suited for the data intensive and “bursty” nature of EDA workloads.

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