

# OpenSolaris™ NFS Performance

Alain van Hoof

February 3, 2010

# Research Question

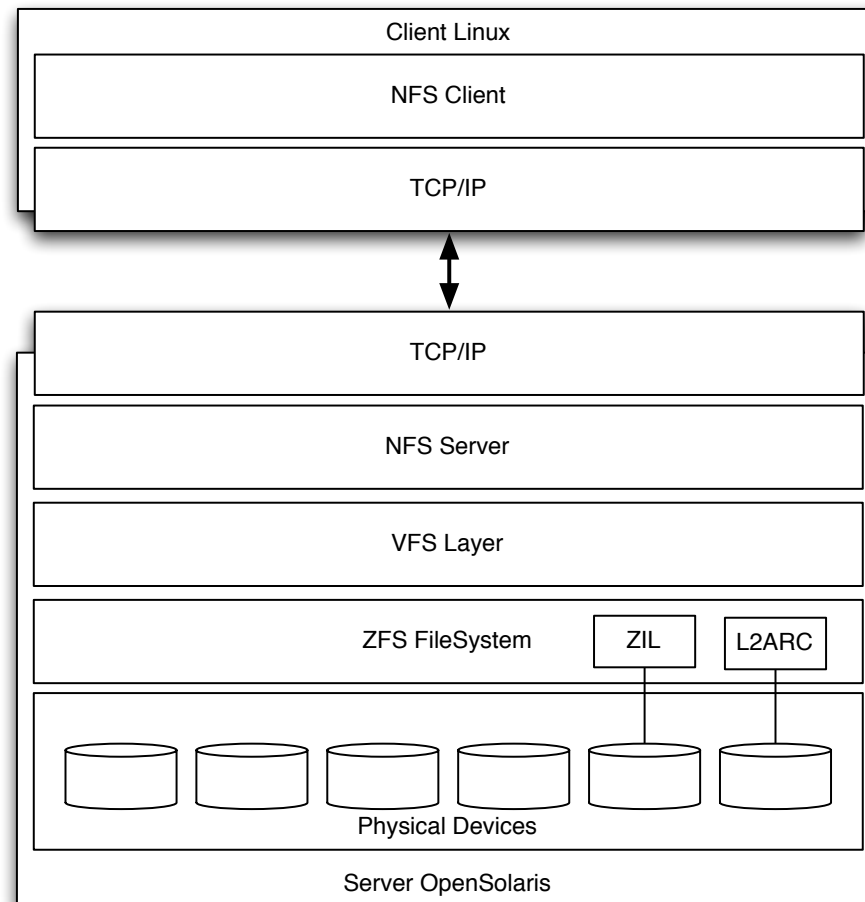
`\begin{quotation}`

How can the performance bottlenecks be monitored and identified on an OpenSolaris OS NFS server.

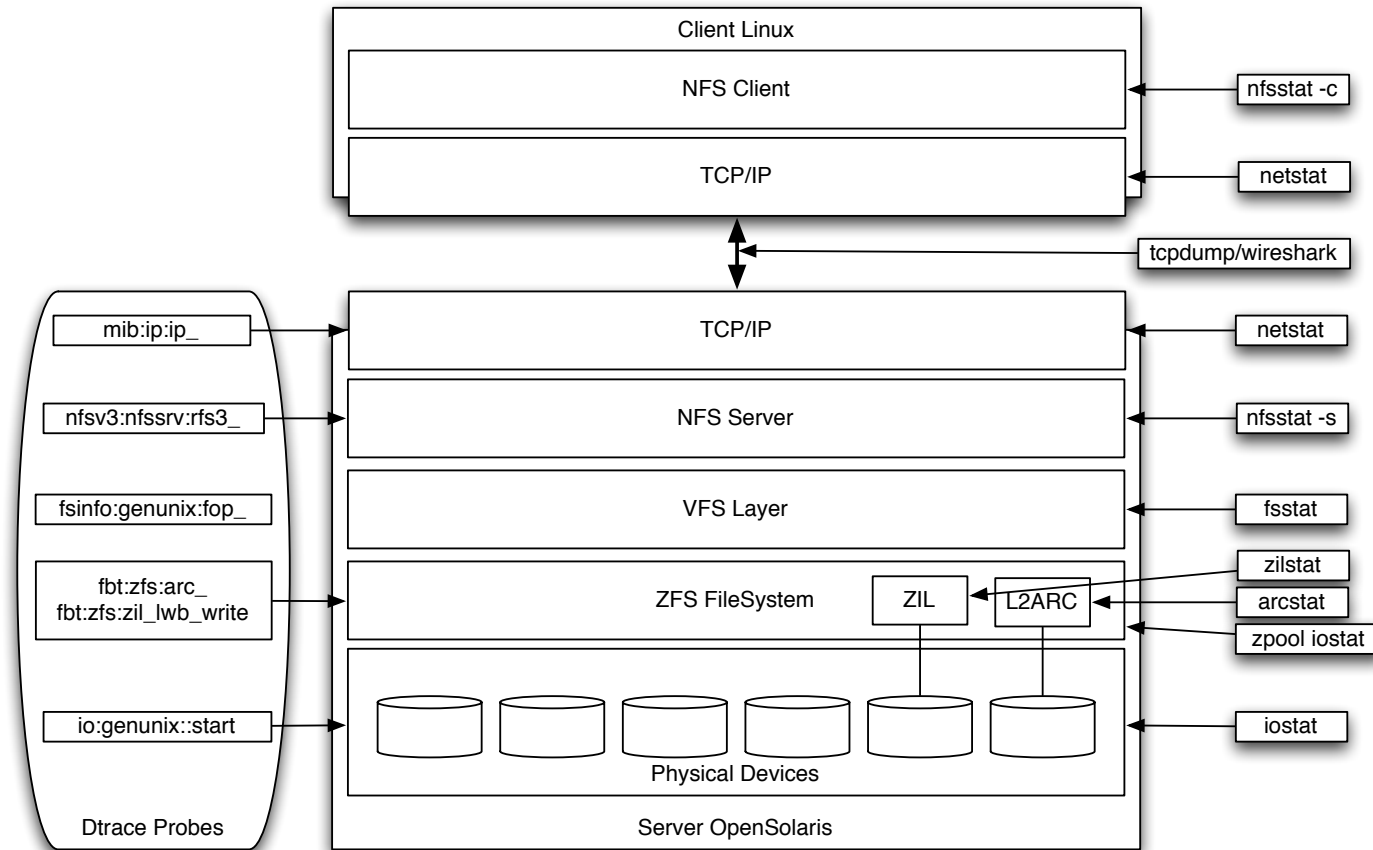
What are realistic load simulations and create a base-line.

`\end{quotation}`

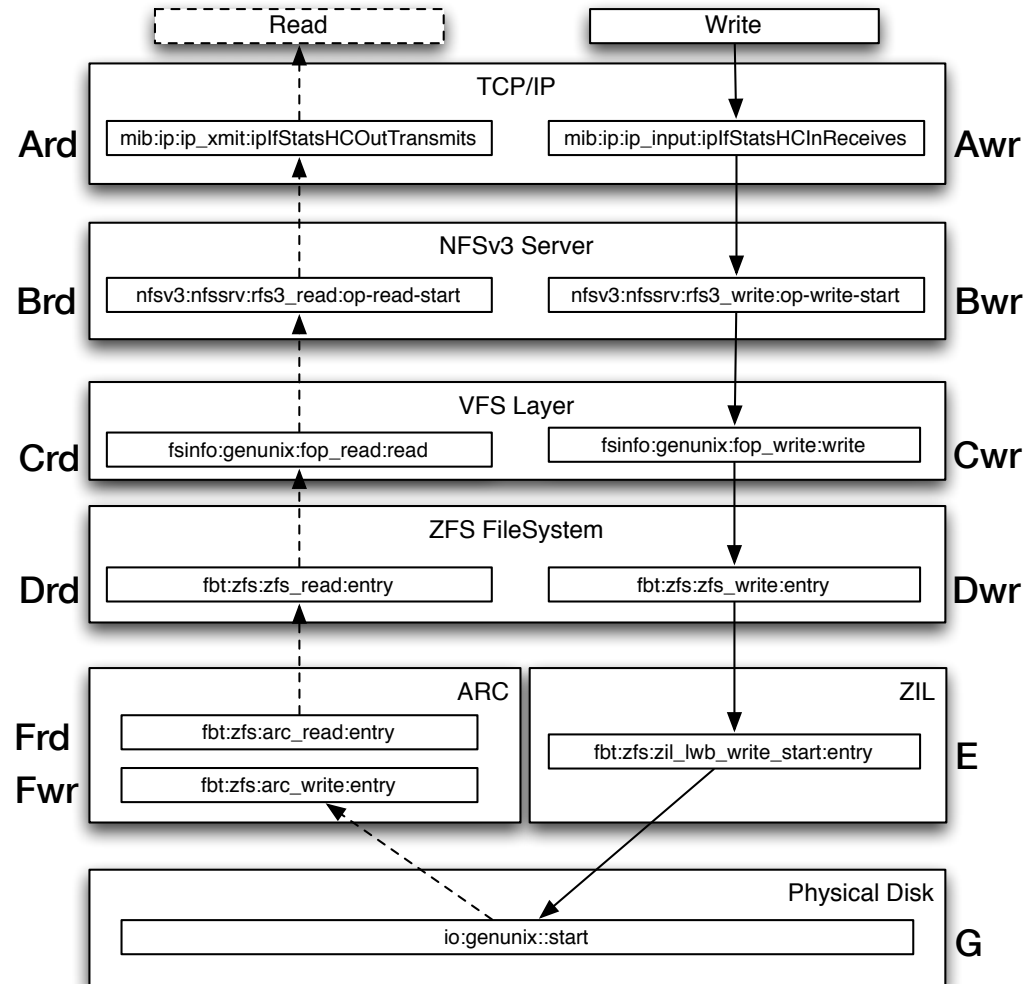
# NFS layer and .....



# Inspecting the layers



# Dtrace Probes



# Benchmarking

Macro benchmarks

*real-world workload*

Trace benchmarks

*replay recorded real-world scenario*

Micro benchmarks

*one or two operations*

# Filebench

Macro benchmark

Supported by SUN<sup>TM</sup>

fileserver: SPECsfs workload

# IOzone

Micro benchmark

A benchmark UvA-IC is familiar with

Random Read/Write

# Auto-pilot

Automate the running of benchmarks

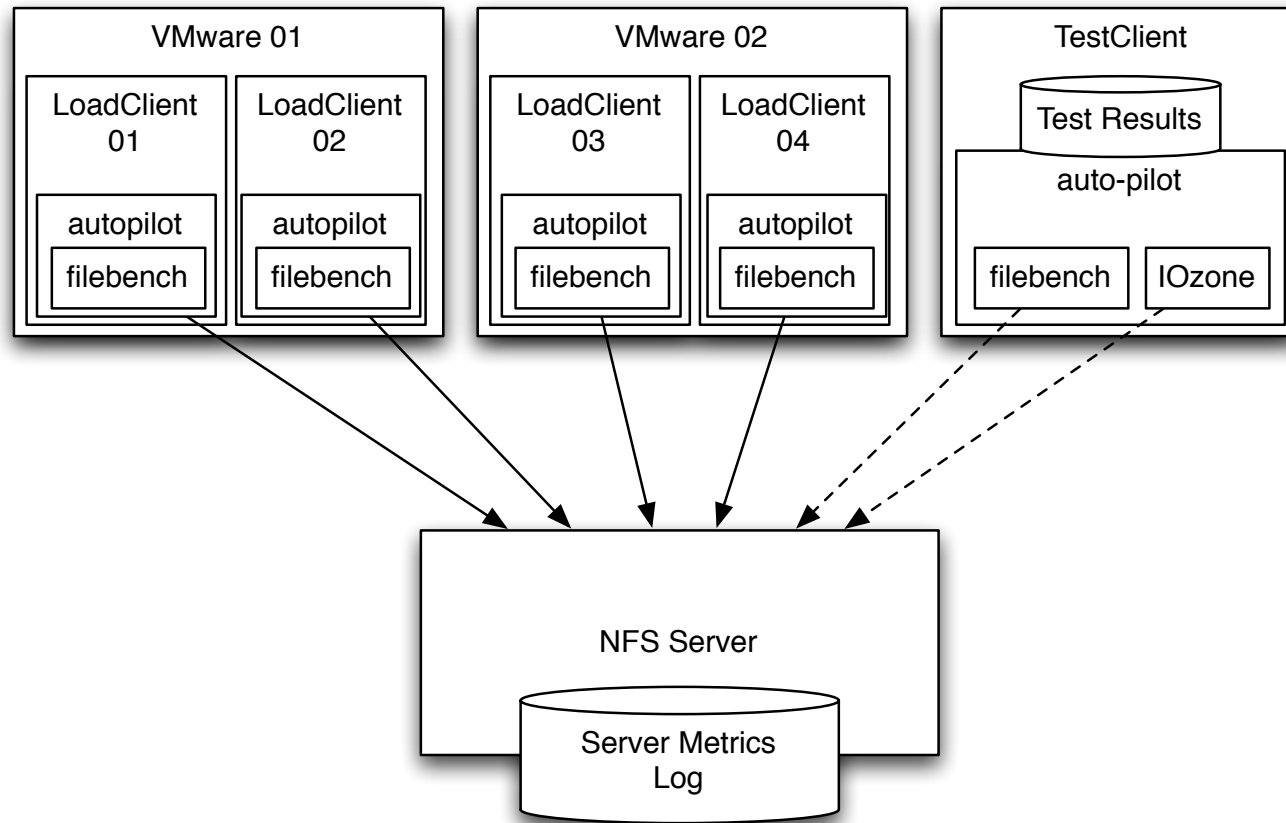
Avoid user errors (typo's)

Automatic mount and unmount filesystems

Calculate confidence level and run more test  
to be more confident



# Test Setup



# Benchmark & loadgeneration

Run benchmark on TestClient while load is generated on LoadClients

Real-world benchmark is also real-world load generator

# Meanwhile on the NFS server

12 Dtrace probes are logged during testing

Output: Every 10 seconds

Probes triggered/second

# Preliminary Test

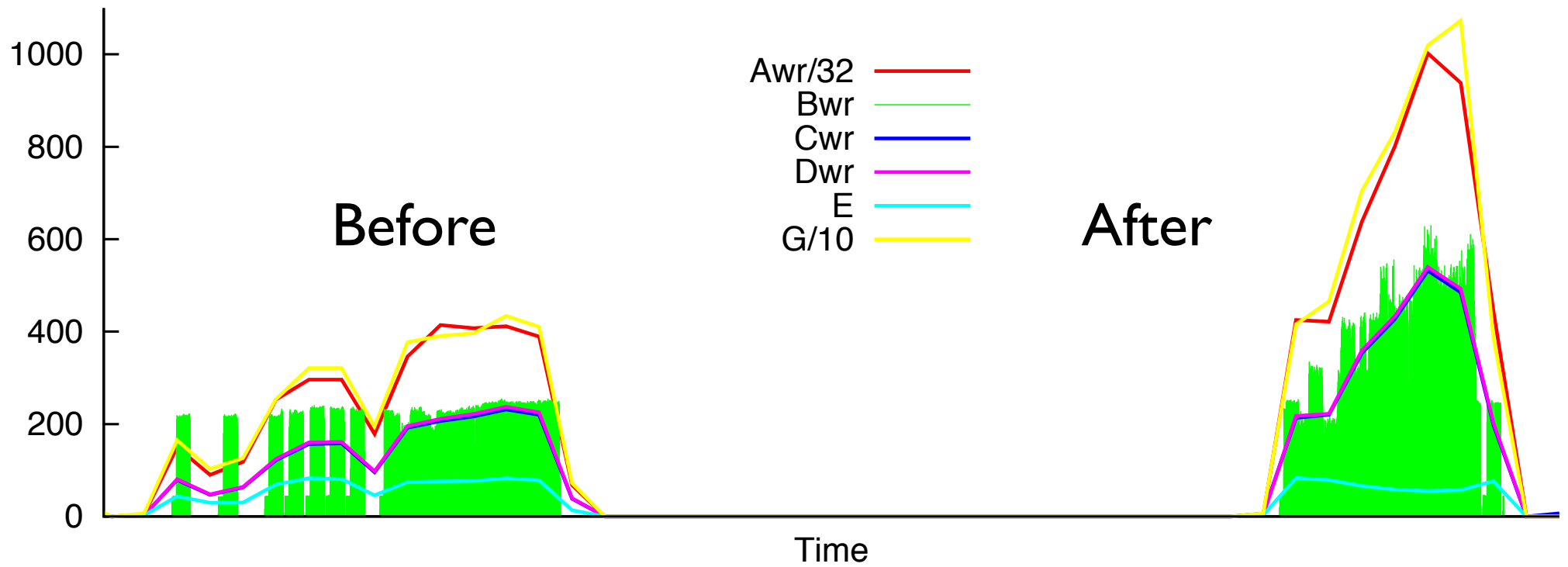
A simple test to learn about behavior of the Dtrace probe

“Accidentally” Identified NFS bottle-neck

Changed number of NFS daemons

Positive result

# Dtrace write probes



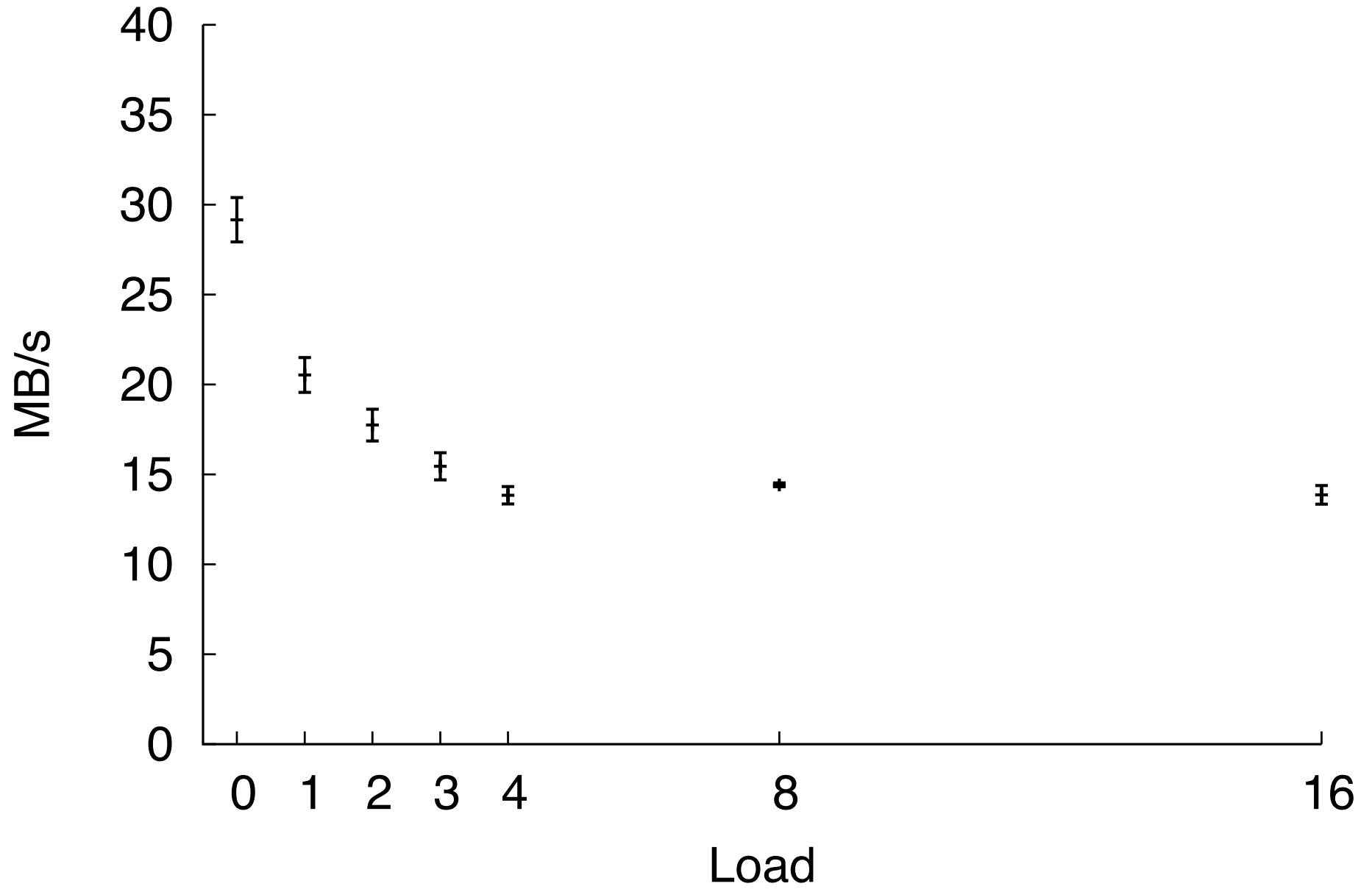
# Results of Test

Filebench and IOzone show performance loss when load increases

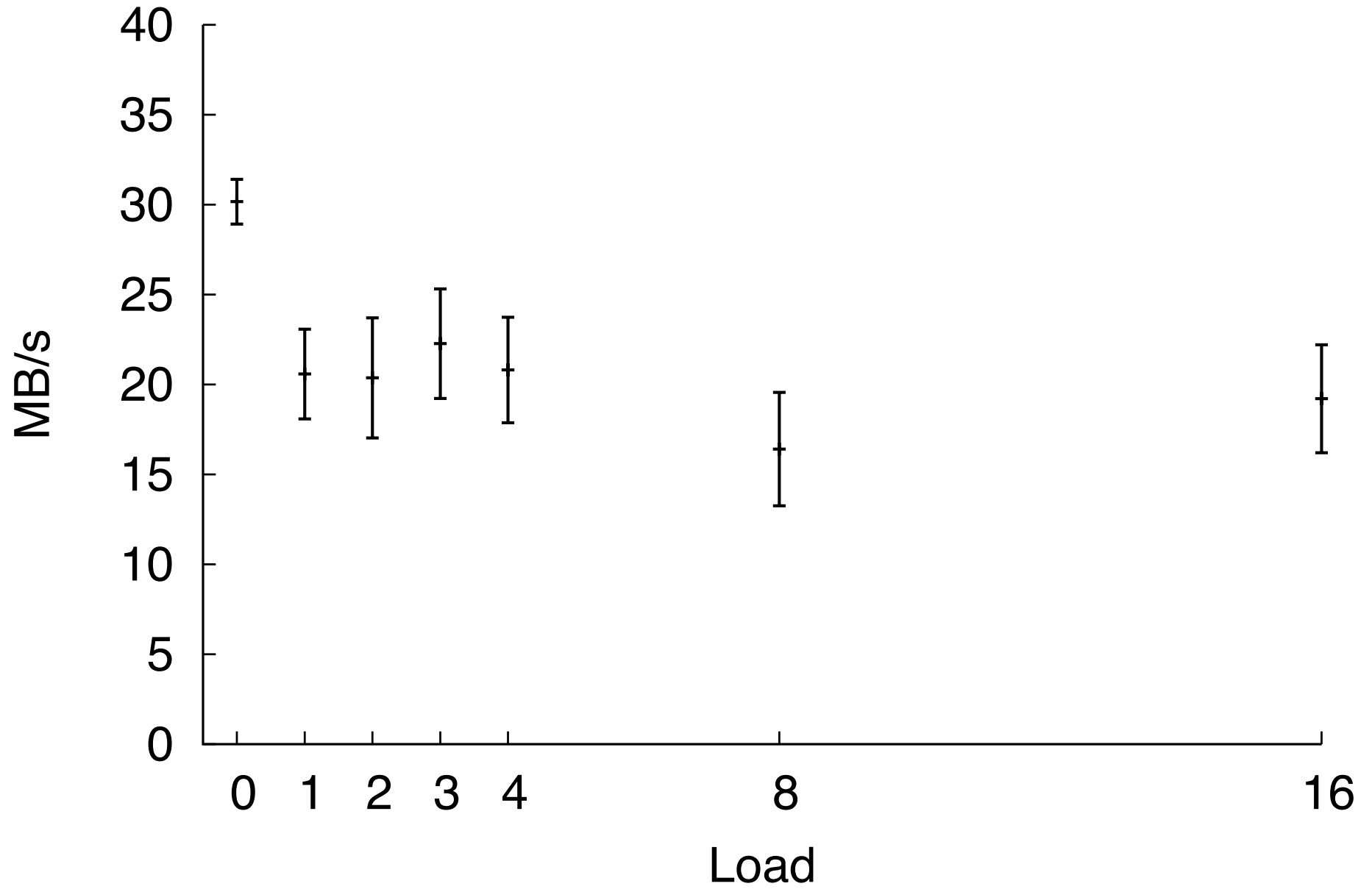
Filebench more close to “user experience”

IOzone tests are not within the confidence interval (95%) after 30 runs

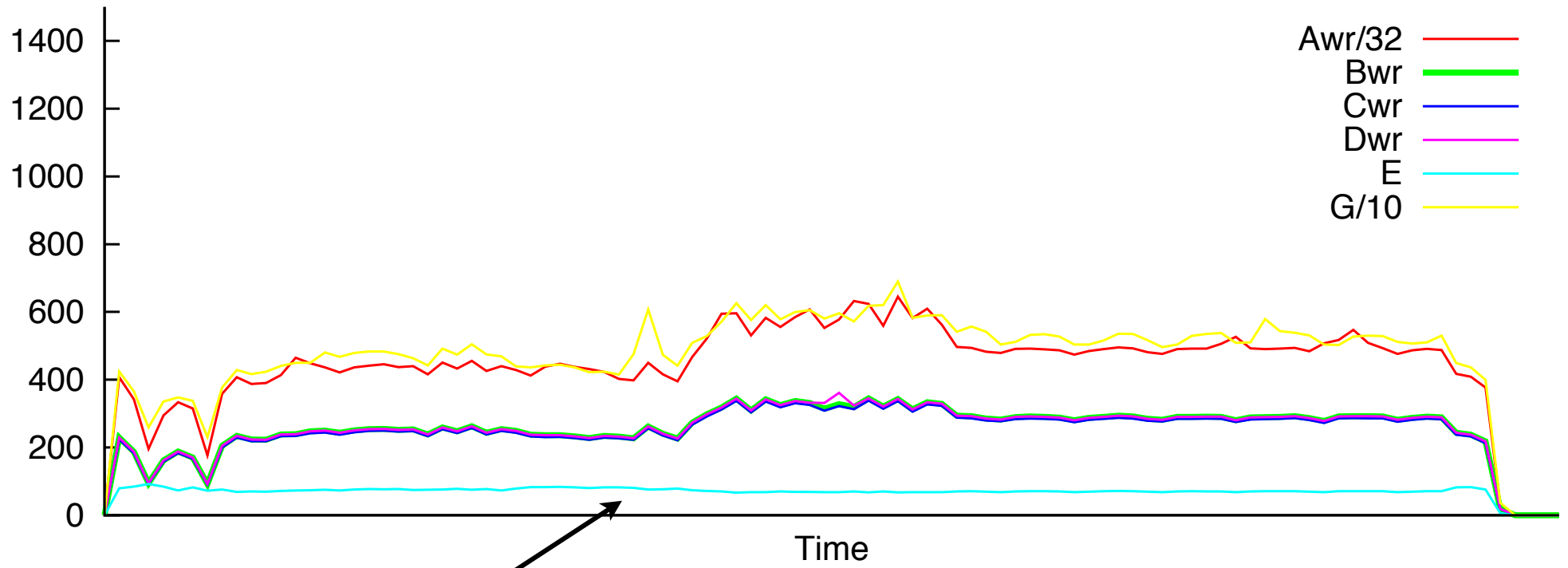
# filebench



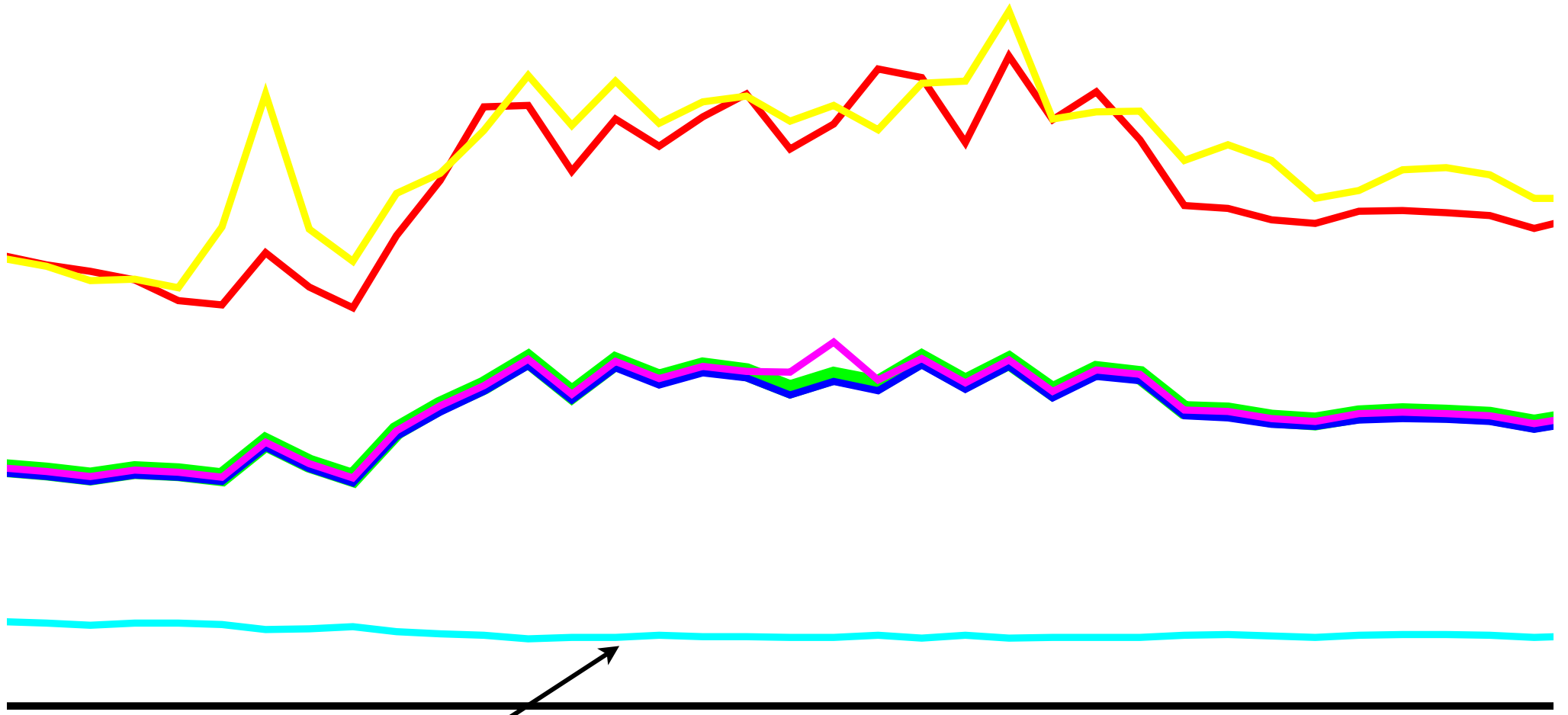
# IOzone Random Write







ZIL write probe

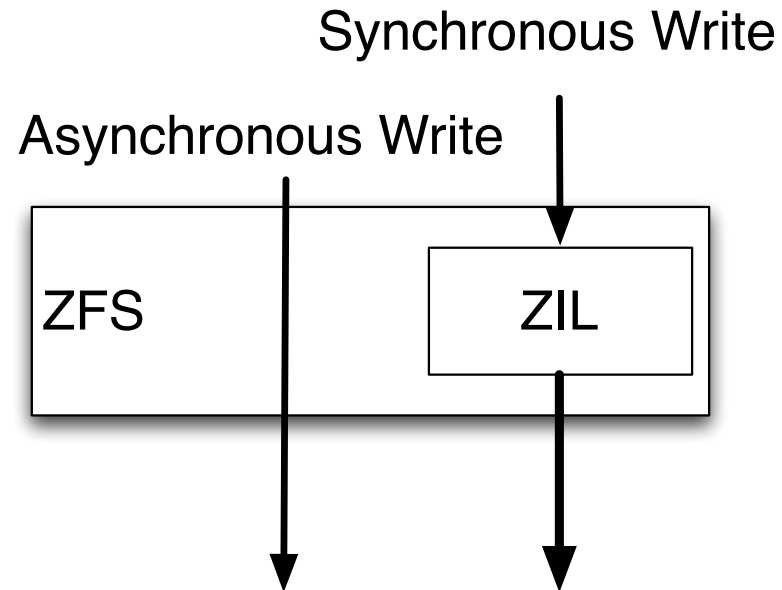


ZIL write probe

Time

# ZFS and ZIL

All NFS writes are  
Synchronous  
and pass the ZIL



# Improve performance

Place ZIL on fast device

Solid State Disk (SSD)

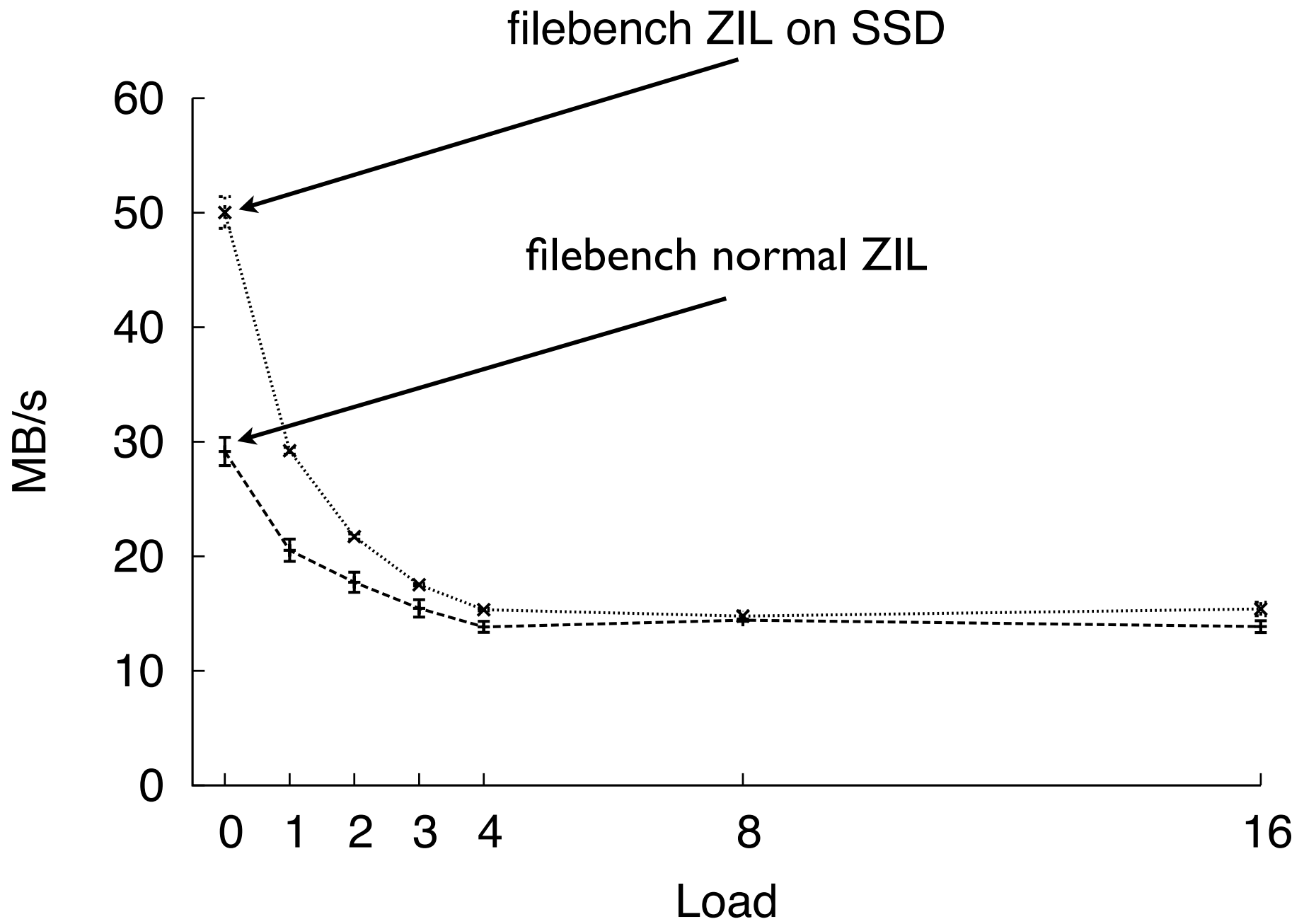
Well known practice

# Results - ZIL on SSD

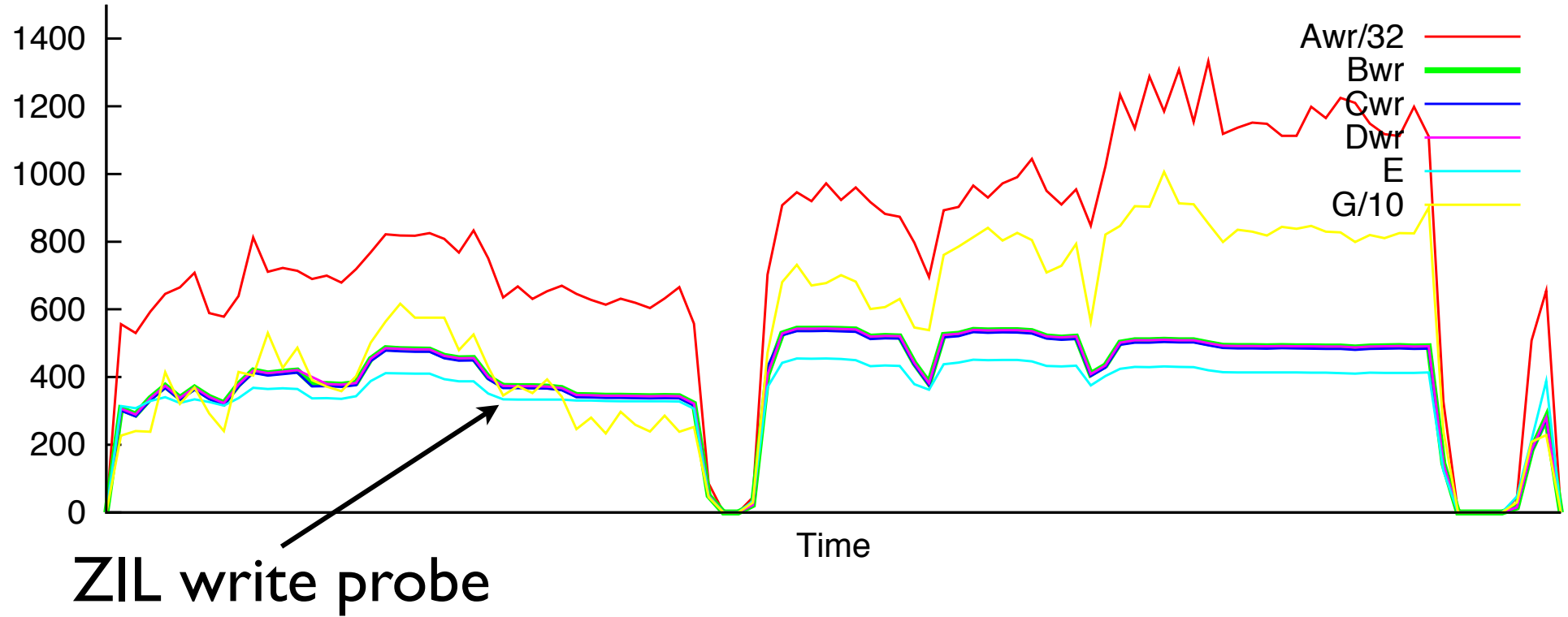
Filebench and IOzone show performance increase

When the load increases performance decreases

IOzone tests are not within the confidence interval (95%) after 30 runs



# Dtrace write Probes



# Conclusion

Using Dtrace probes, performance bottlenecks on the server can be identified, and a baseline can be created.

A realistic load can be generated using the filebench - fileserver personality

Filebench test created a confident baseline (unlike IOzone)



# Questions?

Thanks to:

Jeroen Roodhart

Auke Folkerts