# Ellexus: The I/O Profiling Company

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# Fast, Agile and Cloud Ready:
# Taking control of application I/O

## ellexus

The I/O Profiling Company - Protect. Balance. Optimise.
www.ellexus.com

# Ellexus Ltd: The I/O Profiling Company

**Products:** We make tools to help you improve application performance, protect shared storage and manage application dependencies.

**Industries:** Where big compute meets big data!

**Customers include:**

# Why care about storage and I/O?

**Bad I/O is costing you money**
Bad I/O harms shared storage and limits performance.

**Compute is getting faster faster than storage**
We need better visibility into system workings to achieve exascale

**40-50 % of cloud CAPEX and OPEX is wasted \***
Over provisioning of resources.

* Optimize Cloud Costs Through Governance and Collaboration
ENTERPRISE MANAGEMENT ASSOCIATES® (EMA™) White Paper

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# What everyone wants

Fast

Agile

Cloud ready

# What we often get

~~Fast~~

Too easy to abuse resources
Optimization is hard

~~Agile~~

Tied to one environment
Complex legacy systems

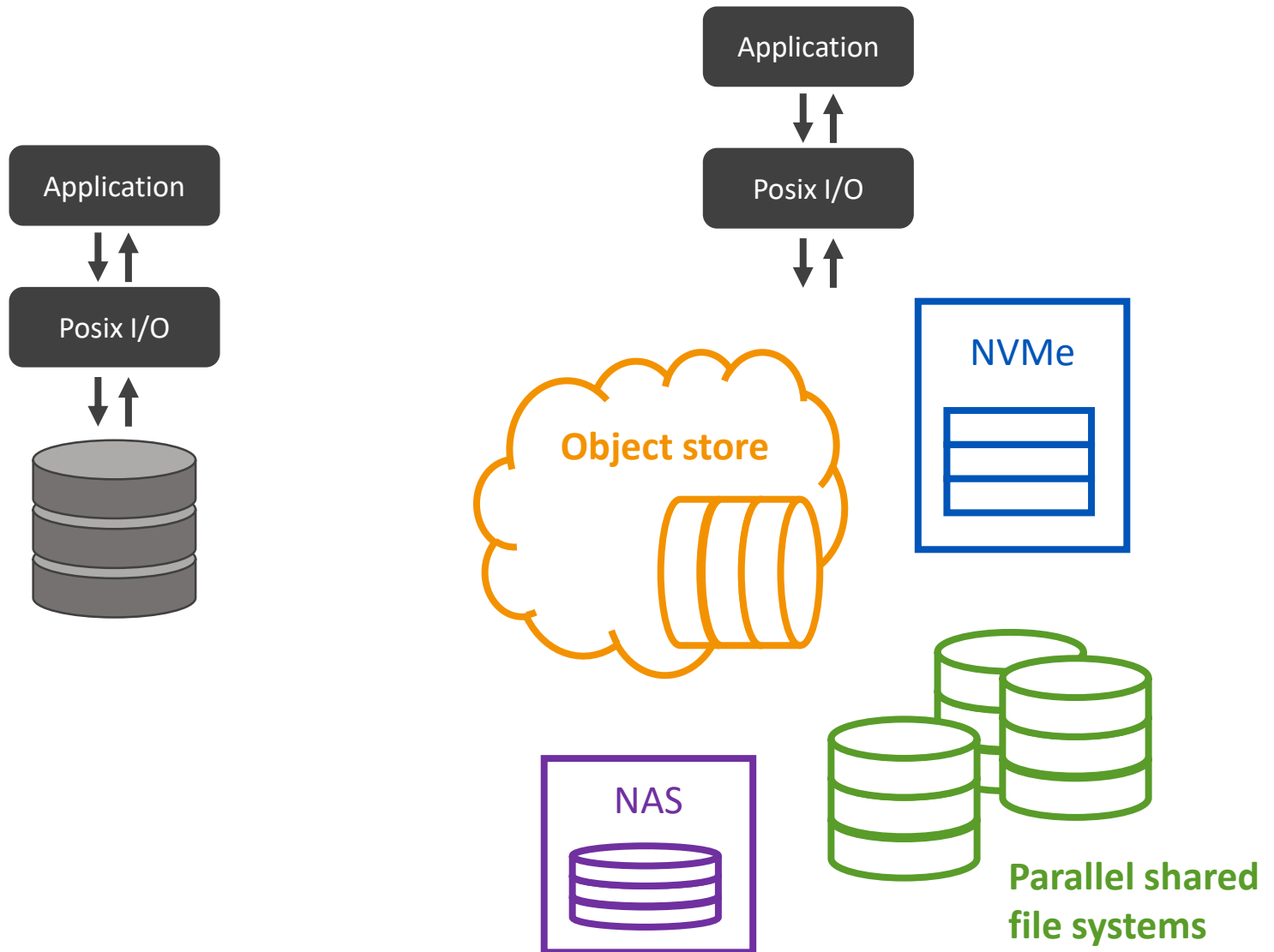~~Cloud ready~~

Dependencies and packaging
Storage sizing

# 1989

C89 is alive and kicking
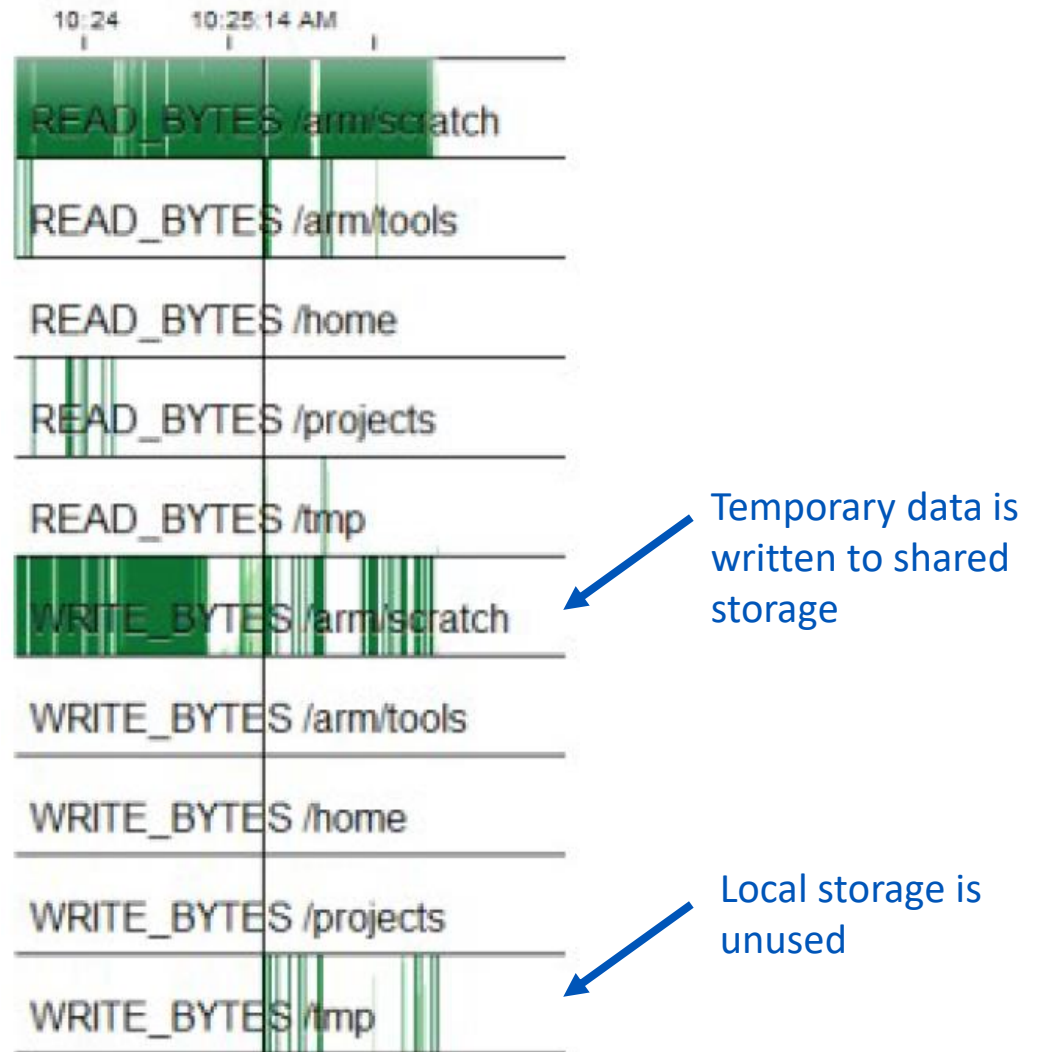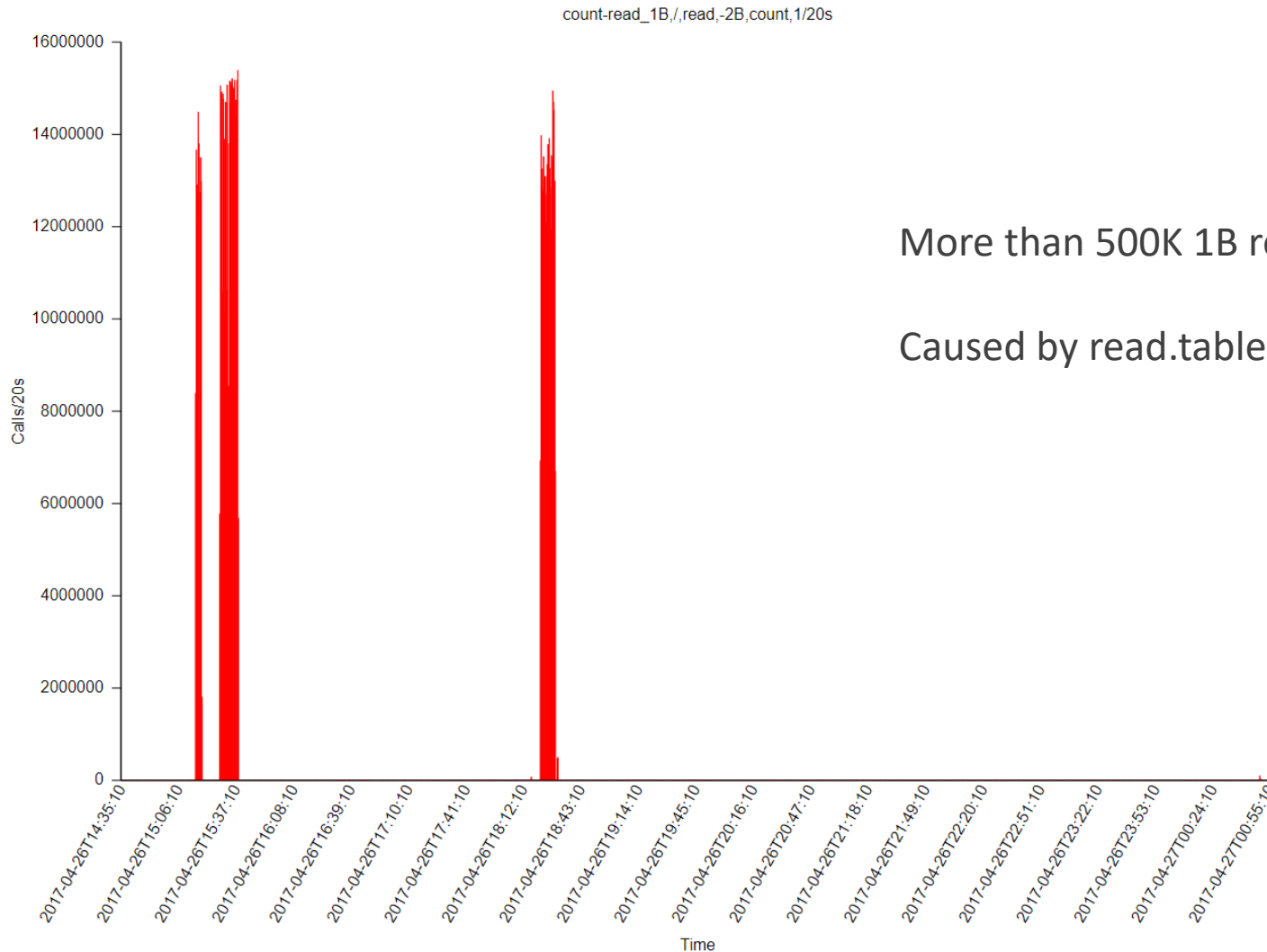POSIX is not a good I/O model for today

# Storage

Application

Posix I/O

Application

Posix I/O

Object store

NVMe

NAS

Parallel shared file systems

# Bad I/O patterns: Reads and writes

This application is putting data in the wrong place.



Temporary data is written to shared storage

Local storage is unused

# Bad I/O patterns: Small I/O



count-read_1B,/,read,-2B,count,1/20s

More than 500K 1B reads per sec!

Caused by read.table() in R library

# Bad I/O patterns: Meta-data

count-access,/,access,all,count,1/20s

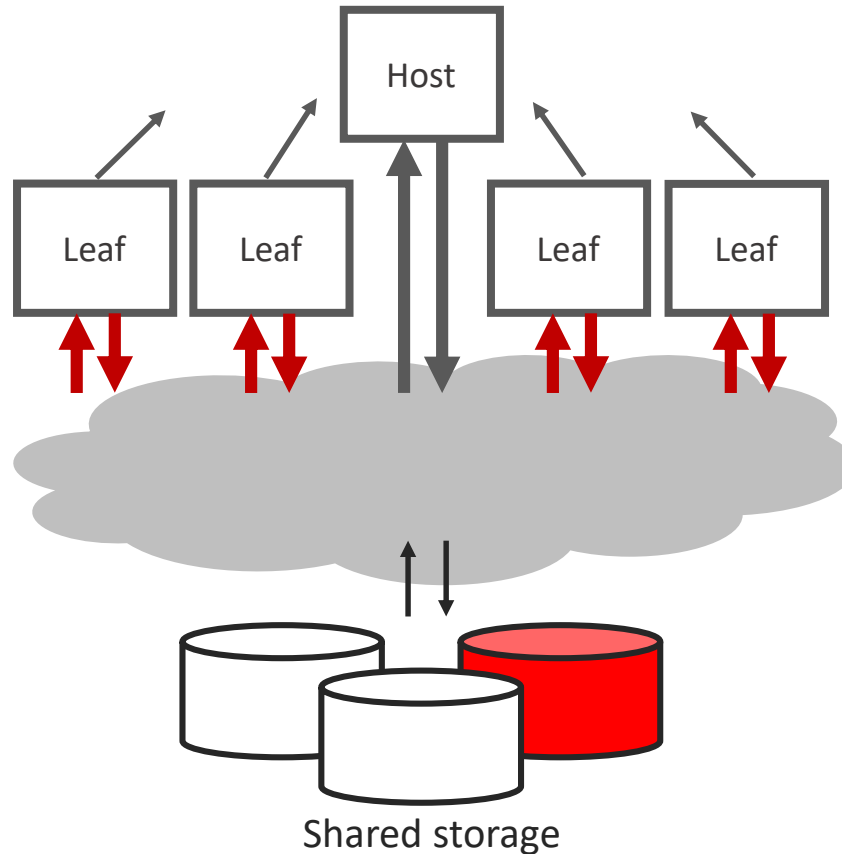10s of thousands of unnecessary
metadata operations
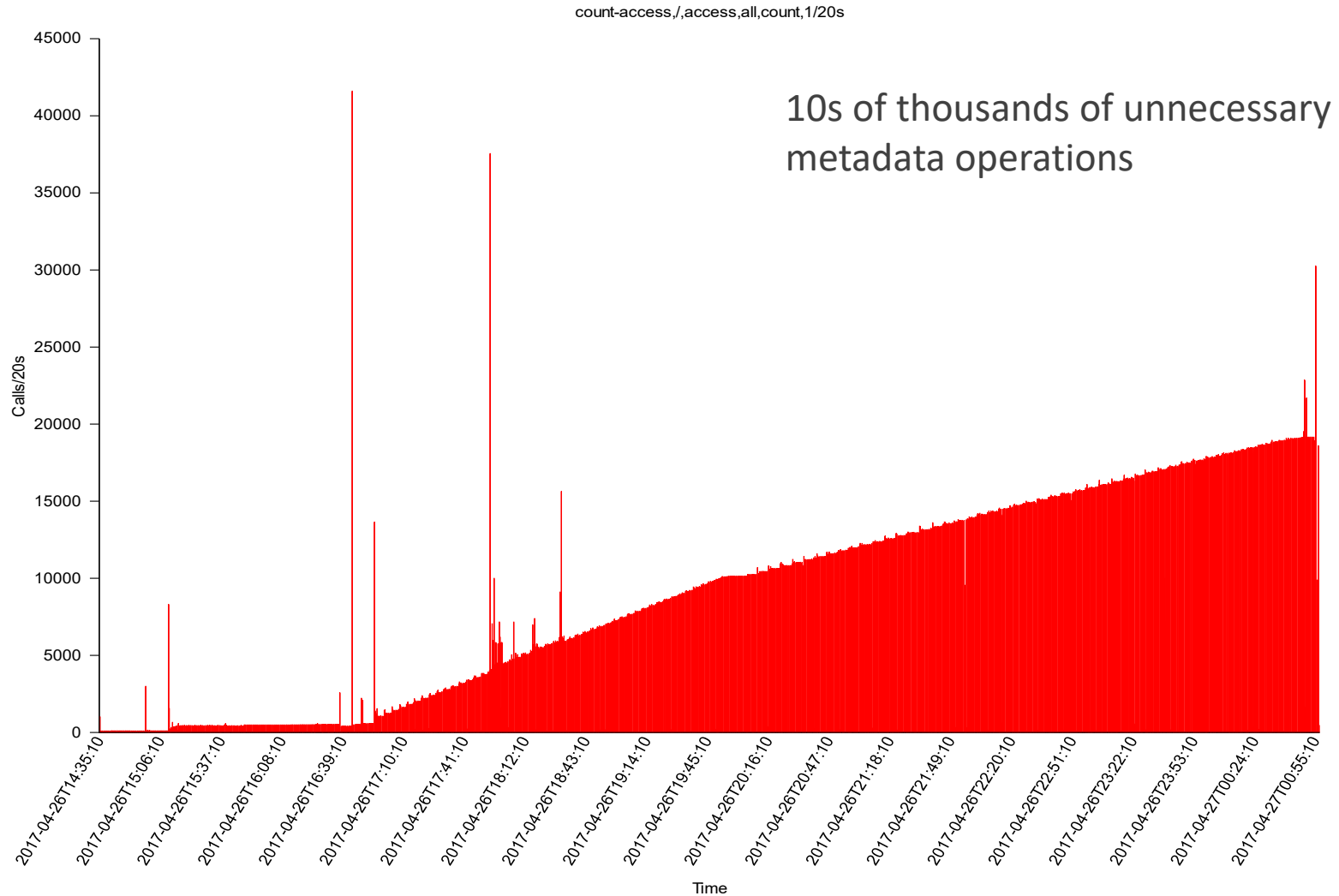
# Bad I/O patterns: Meltdown and Spectre

Customer report:

- Estimated 13+% overall slow down
- Reduction by $15-20M in effective compute capacity

# Bad I/O patterns: the noisy neighbour problem



Host

Leaf    Leaf    Leaf    Leaf

Shared storage

# Quality Assurance
## What you should be doing now

**Take control of the way applications access data:**

- Track and understand dependencies

- Measure I/O patterns

- Design for change

- Accountability: Feed back information to users and groups

# Quality Assurance
## What you should be thinking about for the future

## Good I/O abstraction

- Remove reliance on POSIX I/O

- Fund research into alternative I/O

  frameworks

- Design for test

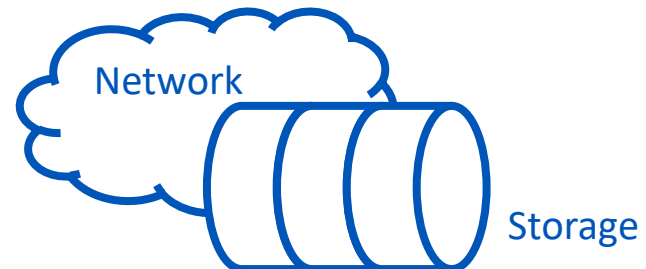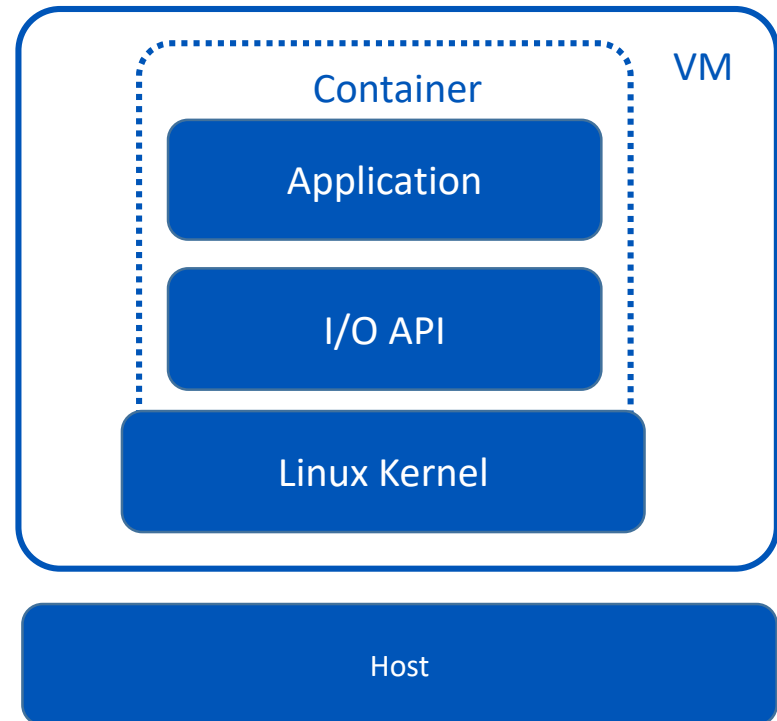- Design for portability and scalability

# Monitoring and Telemetry
## What you should be doing now

Hardware and software battles will be won and lost by the availability of system metrics.

VM

Container

Application

I/O API

Linux Kernel

Host

Network

Storage

# The Future
## We are still trying to invent a better horse

The time is right to shake up the industry in three ways:

- Make it easy to measure applications and compute.

- Stop treating I/O as an after thought.

- Make it easy to understand and act upon the results.

# Thanks for listening

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