

Aeron[®]

Low-latency messaging and high-availability
clustering for electronic trading systems.

aeron.io

What is Aeron?

Aeron is the **global technology standard** for 24/7, high-throughput, low-latency, fault-tolerant applications, used by capital markets firms and technology vendors globally to build sophisticated electronic trading systems.

It can handle large volumes of transactional data with **microsecond latency** whilst providing a high level of **fault tolerance**, resilience and **strong data consistency**.

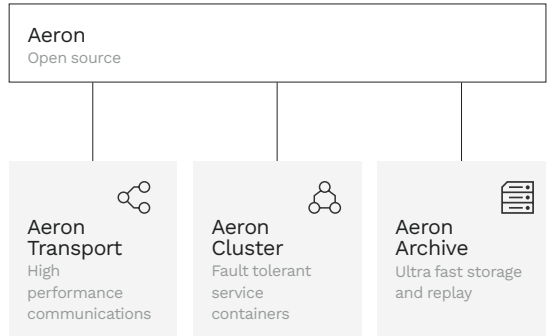
Aeron is a suite of software components consisting of:

- + Aeron Transport
- + Aeron Archive
- + Aeron Cluster

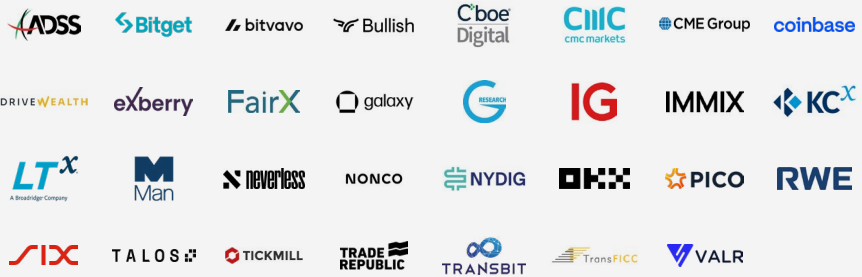
Open source,
 sponsored by Adaptive
 and free to use.

Aeron enables:

- On-prem, cloud native and hybrid applications
- 24/7 availability with zero downtime
- Reliable and predictable microsecond performance
- Fault tolerance and data consistency using Raft consensus
- Unicast and Multicast support for flexible communication patterns



Trusted by the industry:



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 Community



Aeron
 Documentation



Aeron Transport

Aeron Transport is the leading **low-latency** message transport system for performance, **reliability** and **observability**.

- Secure streams for unicast and multicast on prem and on the Cloud.
- IPC message transport for messaging on a single host.
- Java, C/C++ and .NET.
- Predictable latency in single digit microseconds.

Key Features

Predictable Low Latency

- Reliable message delivery over UDP for low latency and consistency without the fanout overhead of TCP.
- Predictable round trip time (RTT) in single digit microseconds.

Runs Anywhere

- On-prem, in the cloud and at co-location facilities.
- Suitable for hybrid cloud setup and WAN communication.

Brokerless

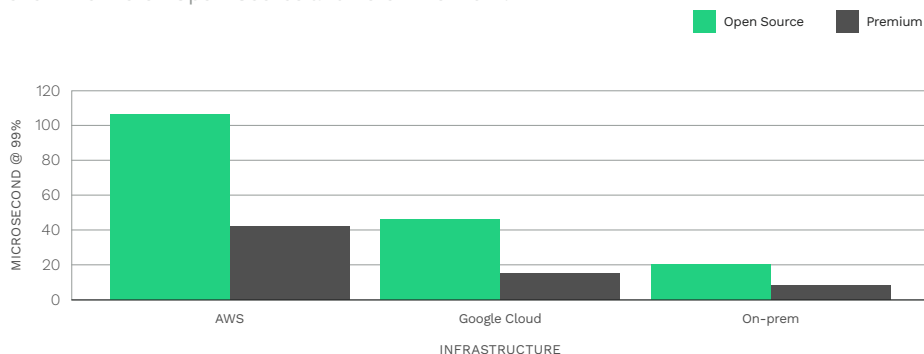
- Better performance compared to a brokered messaging solution.
- Minimise costs: reduce hardware and OPEX costs typically associated with broker based systems.

Integration with...

- Aeron Archive to store and replay streams.
- Aeron Cluster for fault tolerant, transactional and strongly consistent applications.

Performance Results

Aeron Transport round trip latency in the cloud and on-premises - shown for Aeron Open-Source and Aeron Premium.

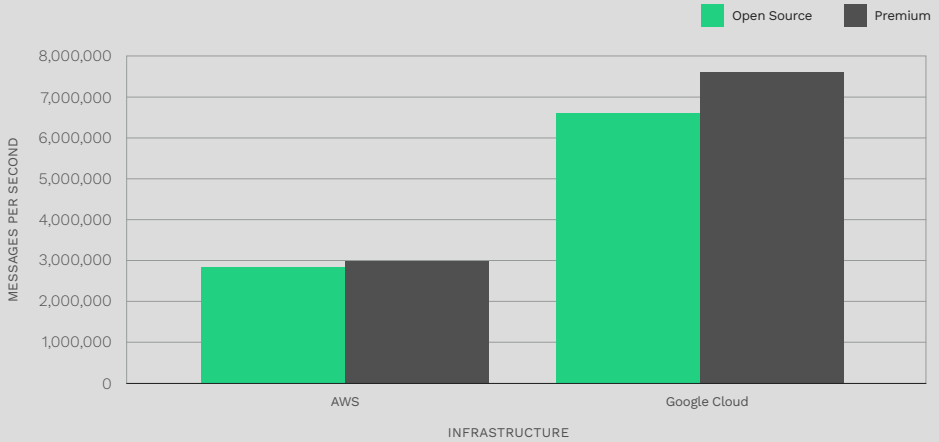


* Throughput of between 2.8M - 6.5M mps for Aeron OS and 3M - 7.5M mps for Aeron Premium.

* Results shown are for 288 byte message and 100k msg/sec at 99th percentile.

Performance Results

Aeron Transport max reasonable throughput in the cloud and on-premises - shown for Aeron Open-Source and Aeron Premium.



* 'Max Reasonable Throughput' defined as the 99th percentile throughput at less than 1ms latency.

* On-Prem numbers for throughput are not included as we are upgrading our perf lab.

* If you are interested in On-prem testing, get in touch.



Aeron Archive

Aeron Archive allows message streams to be persisted to disk at full message rate, for **replay in real-time or at a later date**. This allows any service that may become disconnected to reconnect and **reliably recover without message loss**.

Key Features

Record

Record with or without an active subscription.

Replay

Replay from a position in a recording: either direct from an archive or started from an archive and merged with a real-time stream.

Manage

Spy on an active publication, purge, truncate or apply CRC checks to archived data for maximum flexibility.

Replicate

Replicate recordings from a source process to a destination process; useful for near real-time backup of data.



Aeron Cluster

Aeron Cluster is the world's leading framework for **high-performance**, in-memory, **fault-tolerant** transactional services. Aeron Cluster enables resilient 24/7 workloads to be created in the cloud, on-prem or in a hybrid environment. Automatic failover with **zero data loss** takes less than a second, minimising the impact on your business and ensuring critical data is retained.

- Fault-tolerant, strongly consistent, and 24x7 with zero downtime upgrades.
- Throughput of over 1 million messages per second with predictable latency as low as 18 microseconds on prem and sub 100 microseconds on the cloud.
- Sequences and reliably replicates transactional messages at massive scale.
- Used for capital markets systems that demand 24/7 uptime and stateful recovery with no data loss.
- Runs Exchanges, RFQ, IOI or similar workflows.

Key Features

Fault Tolerance

- Based on the Raft consensus.
- Consistent fault tolerance for event driven applications.
- Automatic failover with zero state loss.

In-Memory State

State and application logic are co-located for optimal performance leading to a more elegant programming model than other distributed or actor based programming patterns.

Extreme Performance

Over 1 million msg/sec with response times as low as 18 microsecond allows Aeron Cluster to be extremely efficient and keep hardware footprint to a minimum.

Hot System Upgrade

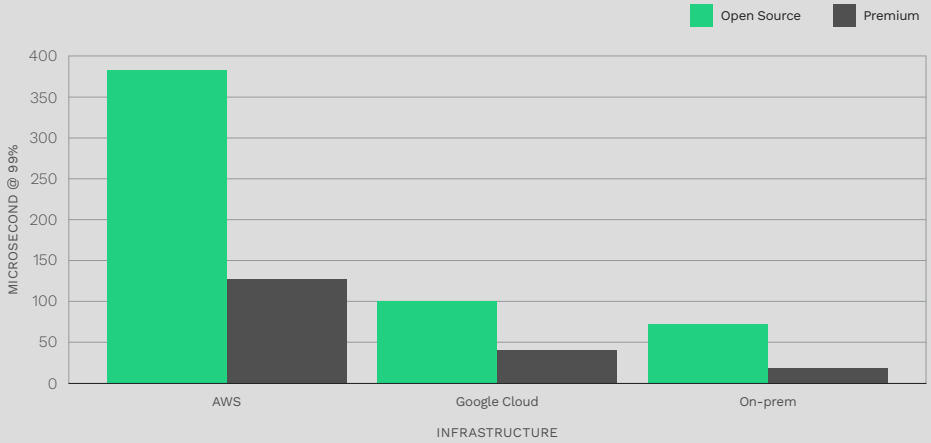
Snapshotting and rolling upgrades allow for 24x7 operational models, enabling upgrades with zero downtime.

Cluster Recovery

- Aeron Archive records snapshots for local and remote replay, avoiding the need for a distributed file system.
- Reliable distributed timers, inter-service messaging and remote data centre backup.

Performance Results

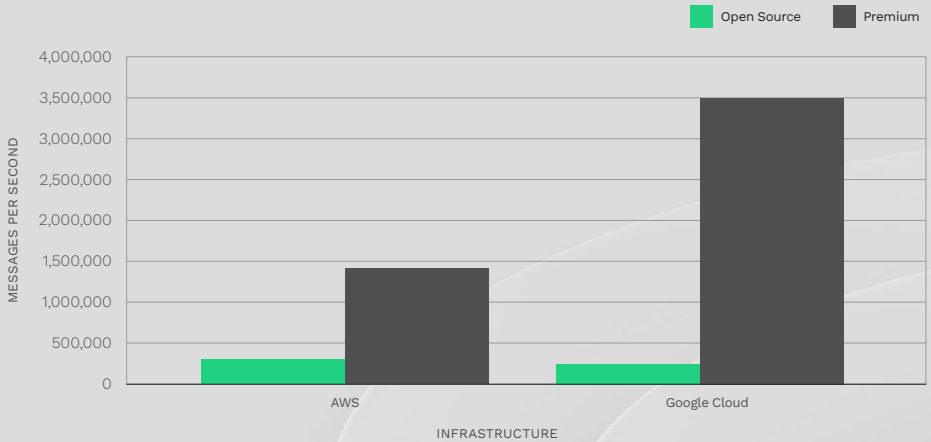
Aeron Cluster round trip latency in the cloud and on-premises
- shown for Aeron Open-Source and Aeron Premium.



* Throughput of between 250k - 1M mps for Aeron OS and 1.4 - 3.5M mps for Aeron Premium.
* Results shown are for 288 byte message and 100k msg/sec at 99th percentile.

Performance Results

Aeron Cluster max reasonable throughput in the cloud and on-premises
- shown for Aeron Open-Source and Aeron Premium.



* 'Max Reasonable Throughput' defined as the 99th percentile throughput at less than 1ms latency.
* On-Prem numbers for throughput are not included as we are upgrading our perf lab.
* If you are interested in On-prem testing, get in touch.

Aeron Open Source Community



Stay up to date with the latest enhancements and innovations.

Join the [Aeron Community MeetUps](#) in New York, London, Chicago!

- Learn about the latest Aeron features
- Listen to use cases and applications
- Network with other Aeron users



Subscribe to the [Aeron Mailing list](#)

Aeron Premium



More Resilient, Better Performance, Faster to Market.

Built on top of Aeron open source, Aeron Premium helps firms speed up their build and boost performance.

Key Features:

- Support with enterprise-level SLA
- Architectural design consulting
- Additional software components
- Discounted rates for training courses & professional services
- Developer resources

Aeron Sequencer



Build your trading platform on the world's best trading infrastructure.

Aeron Sequencer brings proven **State Machine Replication** architecture to capital markets, delivering the availability, consistency, low latency, and throughput guarantees your trading systems need.

Technical Features:

- **Microsecond latency:** Engineered to provide the latency performance required by today's capital markets
- **Globally ordered log:** Highly available log processing millions of messages per second with platform-wide ordering guarantees

- **State Machine Replication:** Supports building replicated state machines resulting in high availability, consistency, low latency, and high throughput at scale
- **Deterministic replay:** Complete reproducibility for debugging, backtesting, and analysis
- **Automatic failover:** Fast recovery through snapshots and intelligent state management
- **Simple programming model:** Single-threaded, deterministic applications without complex distributed systems code

Get more info:

<https://aeron.io/aeron-sequencer/>

Adaptive Financial Consulting is the company behind Aeron.

Adaptive builds and operates bespoke trading technology solutions across asset classes for financial services firms wanting to own their technology stack to differentiate and compete in the long-term.

[Aeron.io](https://aeron.io) | info@aeron.io | weareadaptive.com

By **Adaptive**