

# Harnessing Data Accelerators For Vector Databases



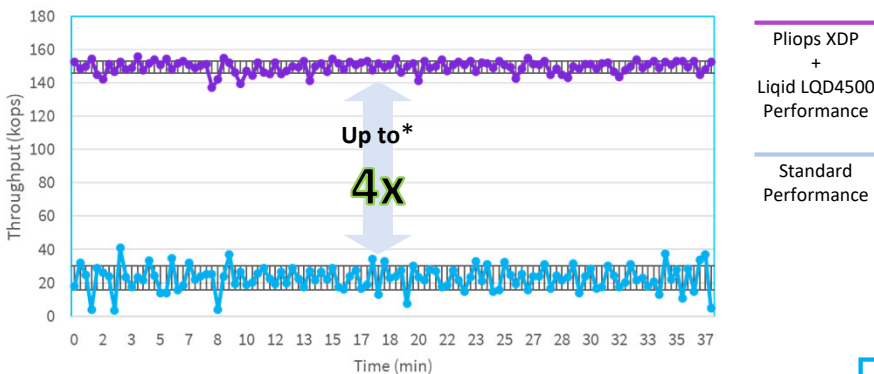
Performance acceleration of vector search operations \*

## Introduction

The evaluation and adoption of generative artificial intelligence (AI) are defining new frontiers across a wide range of industries. The vector databases play a pivotal role in building Gen AI applications and efficiently handling complex, high-dimensional data. Vector databases must meet several critical performances:

## Pliops XDP Accelerated Vector Database Solution

Pliops XDP AccelKV Universal Data Accelerator enhances vector databases' performance, capacity, and efficiency via hardware and software optimizations, addressing the challenges of high-dimensional data and similarity searches



## Key Solution Benefits

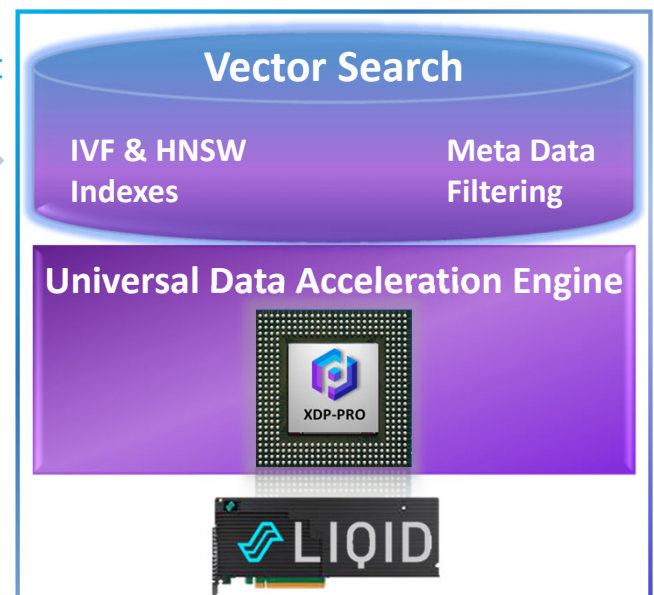
- 3 to 5X Performance acceleration of vector search operations.\*
- Low response time for vector search queries
- Supports Multiple data types (Audio, Image, Text) and its dimensionality
- Built-in Data Protection to tolerate vector storage outages.



User Response



Ingest



Pliops XDP sits between a processor (CPU/GPU/DPU) and the high-speed Liquid NVMe Storage, fundamentally altering the fixed-size access granularity typical of block devices. It empowers applications to access data at any desired granularity with remarkable speed and minimal latency.

## System Configuration & Function

The Vector Database solution was designed on Dell servers with the Liquid LQD4500 NVMe storage and managed by Pliops XDP

<b>Accelerator Card</b>	Pliops Extreme Data Processor (XDP) PCIe x8 Low Profile HHHL (6.6" x 2.536") form factor
<b>Storage</b>	Liquid LQD4500 SSD 15.36TB SSD
<b>Server</b>	PowerEdge R7515 Rack Server
<b>CPU</b>	AMD EPYC 7313P 3.0GHz, 16C/32T
<b>Memory</b>	512 GB DDR4 2667 MT/s
<b>OS</b>	Ubuntu 22.04.2 LTS
<b>Kernel</b>	Linux 5.19.0-50-generic

Pliops AccelKV Universal Data Acceleration Engine serves as Key-Value Storage for vectors. By storing vectors with unique IDs, Pliops facilitates efficient retrieval and management of vector data. This is crucial for applications that rely on quick vector lookup and manipulation. For RAG applications, which involve retrieving documents and generating responses based on those documents, the ability to quickly rerank queries with top K results is vital. Pliops KV Store improves query accuracy by efficiently managing vector computations required for reranking. By enhancing the accuracy and speed of query responses, Pliops KV Store helps to minimize the occurrence of hallucinations, leading to more reliable and coherent outputs in RAG applications. Real-time AI applications benefit from Pliops KV Store's ability to handle concurrent write and read operations efficiently. This capability is crucial for applications that require immediate data processing and retrieval, ensuring that the system can keep up with real-time demands. IO amplification is a challenge in database management, where operations require more data to be read or written than necessary. Pliops KV Store efficient data handling reduces IO amplification, thereby improving query response times and overall system performance.

## Conclusion

By addressing the specific performance, capacity, and resource requirements of vector databases, Pliops AccelKV Universal Data Acceleration Engine enables Vector databases to support a wide range of applications more effectively. It enhances user experiences with instant recommendations to enable complex data analytics, the integration of data accelerators with vector databases represents a critical advancement in the management and utilization of high-dimensional data.

- To schedule your own Vector Database evaluation, please reach out to: [demo@pliops.com](mailto:demo@pliops.com)
- Learn more about XDP and Pliops KV Accelerated solutions at: <https://pliops.com/AccelKV>

## About Pliops

Pliops overcomes storage inefficiencies to massively accelerate performance and dramatically reduce overall infrastructure costs for data-hungry applications. Founded in 2017, Pliops is a winner of the 'Flash Storage Solution of the Year' Award in the Data Breakthrough Awards program and has been named a few times one of the 10 hottest semiconductor startups. Pliops global investors include KDT, State of Mind Ventures Momentum, Intel Capital, Viola Ventures, SoftBank Ventures Asia, Expon Capital, NVIDIA, AMD, Western Digital, SK Hynix and Alicorn.