Product Brief

Intel® Xeon® Processors
Intel® In-Memory Analytics Accelerator (Intel® IAA)

Enhance Business with Faster Insights

Unlock new business outcomes through faster database queries and analytics with the latest 4th and 5th Gen Intel Xeon processors and built-in Intel In-Memory Analytics Accelerator (Intel IAA).

Accelerate databases

Increase the performance of open source database RocksDB by up to 3.7x using 5th Gen Intel Xeon Platinum 8592+ processors with Intel IAA, compared to 3rd Gen Intel Xeon Platinum 8380 processors using Zstd.[3]

Modern businesses need access to data in the blink of an eye. To gain insights faster, organizations need infrastructure that accelerates database queries and big data analytics. This requires a high-performance computing platform that is responsive and accelerates time to results.

The latest 4th and 5th Gen Intel Xeon processors, paired with built-in Intel In-Memory Analytics Accelerator (Intel IAA), address this need. Intel IAA accelerates fundamental components of database workloads: it scans and filters large datasets within queries to offload work from cores, and it compresses and decompresses data to optimize performance. The result is faster database and analytics workload processing, with greater power efficiency and better price for performance. With Intel tools and implementation resources, developers and architects can quickly build and optimize business applications to take advantage of the workload support that Intel IAA provides.

Intel IAA use cases

Intel IAA can accelerate workloads across popular use cases:

- **Big data analytics**: Run in-memory databases faster to accelerate the analytics used to acquire new customers, plan marketing campaigns, identify risks, innovate products, or optimize supply-chain networks.
- **Business intelligence (BI)**: Accelerate databases to gain insights faster, which can help create a competitive advantage and help organizations respond more quickly to customers.
- **E-commerce**: Speed up databases, allowing websites to respond more quickly to customer interactions. Create a positive customer experience that keeps customers engaged and coming back.

Reduce TCO

By optimizing database and analytics workloads for higher performance, Intel IAA enables organizations to deploy fewer servers to achieve the same level of performance. Deploying fewer servers can contribute to a lower total cost of ownership (TCO). For example, organizations running workloads on open source databases like RocksDB and harnessing Intel IAA can reduce TCO by up to 52 percent because fewer 4th Gen Intel Xeon Scalable processor–based servers are needed to deliver the same level of performance.[1]

Intel IAA functions

Intel IAA performs encryption, analytics, and compression as shown in Figure 1. The analytics pipe contains three sub-blocks: decryption, decompression, and filtration. These functions are tied together so that a developer can use Intel IAA to effectively perform any combination of them. Alternatively, a developer can use Intel IAA to encrypt or compress the input.

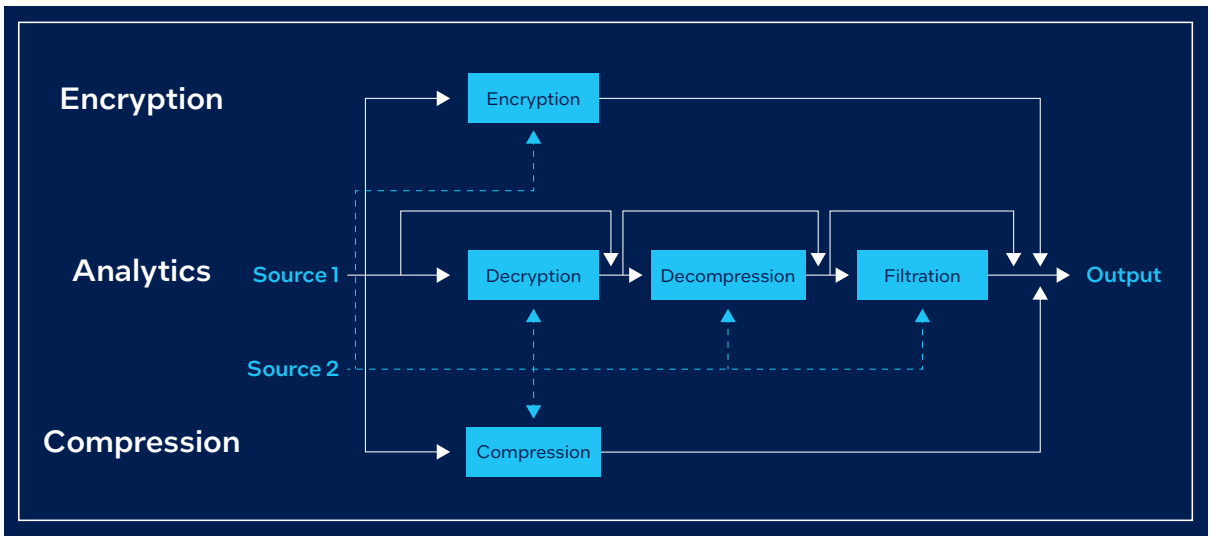

Figure 1. Intel IAA functional blocks include encryption, analytics, and compression

Software support

Intel offers tools and technologies inclusive of security and performance optimizations that can help developers implement Intel IAA. With Intel libraries and middleware like the Intel® Query Processing Library (Intel® QPL), organizations can run in-memory databases and big data analytics faster, with greater performance.

The high compression and decompression capabilities of Intel QPL help accelerate workloads. This technology also helps reduce the cost of computing, save memory bandwidth, and achieve higher query throughput.

As shown in Figure 2, Intel QPL sits above hardware drivers and the operating system. It maps Intel IAA with work queues and virtual machine (VM) access, and it also facilitates the offload of analytics operations from applications to Intel IAA.

Learn more about the performance support that Intel QPL provides to developers to improve the performance of databases, enterprise data, communications, and scientific/technical applications.

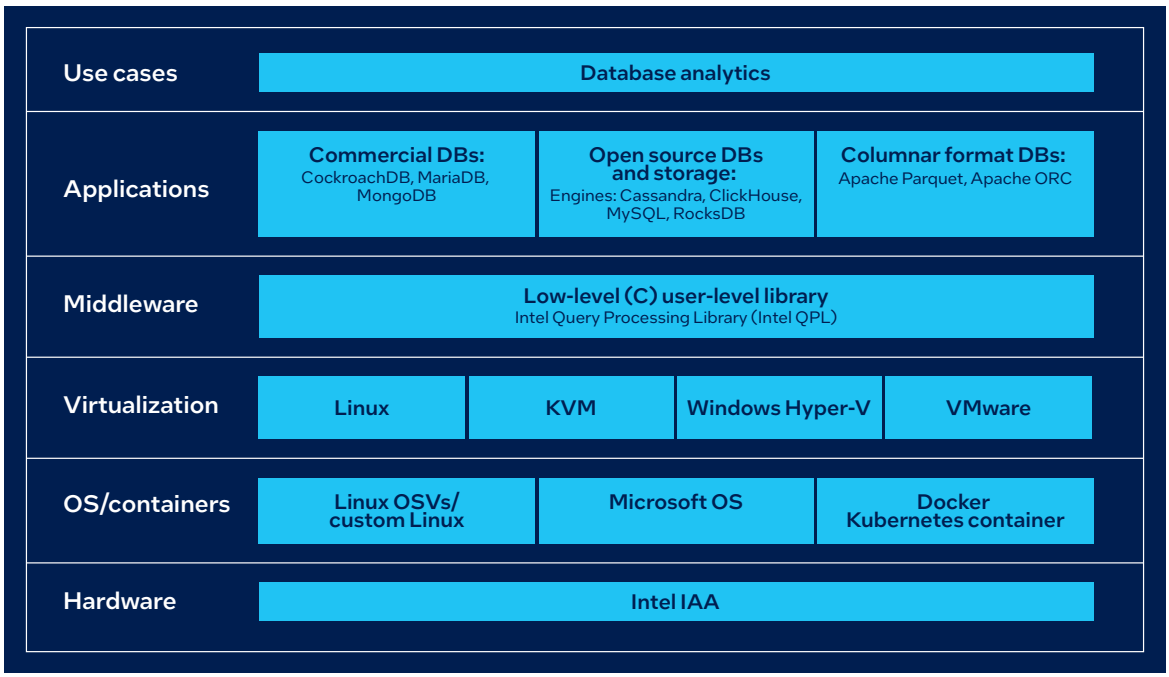

Figure 2. Intel QPL activates Intel IAA advanced data analytical capabilities

Additional developer tools for Intel IAA

Intel makes it easier for developers to build new software applications with the latest 4th and 5th Gen Intel Xeon processors and Intel IAA by providing a wide range of resources and tools:

- Intel® Developer Cloud: Resources for developers to learn, test, prototype, and run workloads on a cluster of the latest Intel hardware
- Intel Developer Cloud for oneAPI: A development sandbox to learn about programming cross-architecture applications
- Intel® Developer Zone: Official source for developing on Intel hardware and accelerators

Enable Intel IAA for key workloads

Intel also provides robust documentation for architects and system engineers who want to enable Intel IAA in current solutions:

- Intel IAA user guide: User guide to seamlessly configure, integrate, and enable Intel IAA for specific workloads
- Intel IAA architecture specification: Intel IAA architecture specification document for enablement and software support
- Intel Xeon processor advisor tool: Advisory tool to explore Intel Xeon processor product options based on deployment environment

General coding resources:

Intel provides libraries, plug-ins, and drivers to integrate and optimize Intel IAA:

- Intel QPL documentation: GitHub source for Intel QPL
- Intel IAA device plug-in for Kubernetes: GitHub source for Intel IAA device plug-in for Kubernetes
- Intel IAA crypto driver core: Intel IAA compression for crypto driver core

Faster databases, better business results

Intel IAA helps accelerate open source databases such as RocksDB and ClickHouse database management system (DBMS).

RocksDB

RocksDB is an embedded persistent key-value store for fast storage. It's a top choice for architects and systems engineers who need low-latency database access for applications. RocksDB is ideal for user-facing e-commerce applications that store viewing history or for big data analytics applications that cache data to support real-time queries.

Intel IAA accelerates RocksDB

Use 4th Gen Intel Xeon Platinum 8490H processors and integrated Intel IAA with support from Intel QPL to:

- Increase RocksDB performance by up to 3x and reduce latency by up to 66 percent, compared to 3rd Gen Intel Xeon Platinum 8380 processors.[2]

Use 5th Gen Intel Xeon Platinum 8592+ processors with integrated Intel IAA and support from Intel QPL to :

- Increase RocksDB performance by up to 3.7x and increase performance per watt by up to 3.08x, compared to 3rd Gen Intel Xeon Platinum 8380 processors using Zstd.[3]
- Achieve up to 1.62x higher RocksDB performance and up to 1.72x higher RocksDB performance per watt, compared to 4th Gen AMD EPYC 9554 processors using Zstd.[4]

Enablement resources:

- Intel IAA for RocksDB: Intel® Optimization Hub recipe for RocksDB on Intel IAA
- RocksDB wiki: GitHub code support for RocksDB
- Tuning guide for RocksDB compression and decompression with Intel IAA and 4th Gen Intel Xeon Scalable processors: Intel IAA tuning guide specifically for RocksDB
- Intel IAA plugin for RocksDB white paper: Learn about performance and cost savings gains that Intel IAA can deliver for RocksDB workloads

Coding resources:

- RocksDB code
- Intel IAA plugin for RocksDB storage engine

ClickHouse DBMS

ClickHouse DBMS is an open source columnar-ordered DBMS for online analytical processing (OLAP). Developers who need a fast, open source database for online analytics choose ClickHouse DBMS to interactively slice and dice data for analysis, reporting, and internal BI applications.[5]

Intel IAA accelerates ClickHouse DBMS

Use 4th Gen Intel Xeon Platinum 8490H processors with integrated Intel IAA and support from Intel QPL to:

- Increase ClickHouse DBMS performance by up to 1.59x and reduce memory bandwidth per query by up to 25 percent, compared to 3rd Gen Intel Xeon Platinum 8380 processors.[6]

Use 5th Gen Intel Xeon Platinum 8592+ processors using integrated Intel IAA with support from Intel QPL to:

- Increase ClickHouse DBMS performance by up to 2.49x, compared to 3rd Gen Intel Xeon Platinum 8380 processors using Zstd.[7]
- Increase ClickHouse DBMS performance by up to 1.15x , compared to 4th Gen AMD EPYC 9554 processors using Zstd.[8]

Enablement resources:

- Intel IAA for ClickHouse DBMS: Intel Optimization Hub recipe for ClickHouse DBMS with Intel IAA
- Intel IAA for ClickHouse DBMS tuning guide: Intel IAA tuning guide specifically for ClickHouse DBMS

Container details:

- Intel-optimized ClickHouse

Coding resources:

- ClickHouse DBMS code: GitHub code support

Accelerate the speed of business

Intel IAA supports open source databases with improved workload performance and reduced latency. Adopt Intel IAA to get insights faster and to respond to customers more quickly. Implement Intel IAA today using tools and resources from Intel.

Learn more about 4th Gen Intel Xeon processors, 5th Gen Intel Xeon processors, and Intel® Accelerator Engines.

intel XEON

[1] See [E8] at intel.com/processorclaims: 4th Gen Intel Xeon Scalable processors. Results may vary.
[2] See [D1] at intel.com/processorclaims: 4th Gen Intel Xeon Scalable processors. Results may vary..
[3] See [D1] at intel.com/processorclaims: 5th Gen Intel Xeon processors. Results may vary.
[4] See [D201] at intel.com/processorclaims: 5th Gen Intel Xeon processors. Results may vary.
[5] ClickHouse. ClickHouse website. Accessed July 2023. https://clickhouse.com/.
[6] See [D2] at intel.com/processorclaims: 4th Gen Intel Xeon Scalable processors. Results may vary.
[7] See [D2] at intel.com/processorclaims: 5th Gen Intel Xeon processors. Results may vary.
[8] See [D202] at intel.com/processorclaims: 5th Gen Intel Xeon processors. Results may vary.

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