SOLID STATE STORAGE TECHNOLOGY CORPORATION

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Improving SQL Server Database Performance with SSDs

What is SQL?

SQL, or Structured Query Language, is a language used to communicate with databases. Specifically, it is used to change or read data from a relational database via service (RDS) or management system (RDBMS). There are multiple SQL commands and RDBMS but the general idea is to store and retrieve information that is organized in tables composed of columns and rows. This eases access to the information and also allows for compressibility, although there can be drawbacks with regard to performance and security. Databases can be hacked, and performance requirements can vary from fast-response to high-bandwidth depending on the application.

Use of Relational Database Service

RDS are used for myriad things including business analytics, decision supports systems, fraud detection, banking and shopping, and much more. Generally speaking, they can be split into two categories: online transaction processing (OLTP) and online analytical processing (OLAP). OLTP, as you would find with online shopping, for example, has a high concurrency of users, which leans towards a need for higher input/output operations per second (IOPS) with a fast response time; this means low and consistent latency. While OLTP tends to engage in random reads and writes, OLAP on the other hand is read-heavy. Sequential performance and bandwidth are paramount for the latter as analytics requires the massive pull-up of historical data.

SSDs for SQL & RDS

SSDs in general bring much-improved performance metrics for databases over their mechanical hard drive (HDD) counterparts. However, performance is only one part of the equation, and the type of RDS can also influence the type of SSD that is desired. For example, as mentioned above, an OLTP database can benefit from the low latency and high IOPS that an NVMe® SSD can bring, but the consistency of performance is also important – the I/O “tail” cannot become so elongated that users past a certain threshold are left in

limbo. The accesses tend to be random and mixed, so the drive must have good steady-state performance and not throttle unexpectedly. An OLAP database, on the other hand, can benefit from the sequential performance that an NVMe® SSD brings over SATA, but since it tends to be read-heavy and less focused on raw response time, the ability to use larger and slower drives is a real possibility.

The balance between capacity and other aspects becomes more important here, depending on the organization's specific requirements. QLC-based SATA SSDs can provide good value per capacity without a significant loss in sequential read performance, for example. Furthermore, the concept of provisioning arises here – databases may be maintained as a service from an allocation of resources, further split across a wider managed storage space. Monitoring and aggregating all of this can be challenging and as such NVMe® drives may be a better choice for scalability in such complex environments. The overall storage footprint, that is the physical space taken, is also an important consideration.

Physical space and efficiency, among other things, bring up the question of the total cost of ownership (TCO). Databases require transaction logs and temporary space, and system resources – CPU time and DRAM – need to be balanced with the amount of storage required. Certainly, databases contain critical data, regardless of type, so there must be redundancy and backups so that there is never a stoppage in operation. For this reason, features like power loss protection (PLP) can be critical, and firmware optimizations can better match the anticipated workload. From the user's end – whether online shopper or company analyst – you want the experience to be seamless at all times, but it's important to approach the storage solution from a cost-efficiency standpoint.

Summary

The hidden online world runs on databases, and these databases are often controlled through SQL. Databases drive everything we do, from shopping on Amazon to calculating our insurance premiums. The cloud and other vast services, including websites, rely on them. When we engage with these services online we hate to wait and hate even more when service is interrupted. For this reason, companies try to make the back-end invisible, creating a seamless experience for the user with no perceptible downtime.

This requires redundancy and backups and also a scalable, potentially massive storage solution. Databases are also often performance-limited as tons of data is accessed from millions of sources, every second of every day. What SSDs perhaps lack in capacity versus HDDs, they make up in performance and efficiency – and ultimately, the TCO. Picking the right SSDs for the job is dependent on many aspects but, ultimately, the ability to provision out slices to many databases at once reinforces the idea that bandwidth and IOPS are king. Whether the answer is SATA or NVMe®, we have you covered at Solid State Storage Technology Corp.

Our SATA SSDs provide an easy advantage over traditional HDDs. This removes performance bottlenecks with respect to latency and IOPS. Moving up to our NVMe® SSDs allows an organization to benefit from up to six times the available bandwidth. The platform may become the bottleneck at this point, so it is crucial to get the right drive for your workload. Contact us for more information so we can help you find the right solution.

Our SSD Solutions

PCIe™ - Our ED1 Series is a powerful, high performance SSD made for edge storage applications. It comes in M.2 and U.2 form factors.

SATA - Our ER2 SSD Series delivers affordability and performance with superior random read/write speeds of up to 90,000/45,000 IOPS. It comes in M.2 and 2.5" form factors.

Please contact our Solid State Storage Technology Corp. expert for more information.

*Specifications and features are subject to change without prior notice. Images are samples only, not actual products.

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A subsidiary of KIOXIA Corporation, **Solid State Storage Technology Corporation** is a global leader in the design, development, and manufacturing of digital storage solutions. We offer a comprehensive lineup of high-performance customizable SSDs for the Enterprise, Industrial, and Business Client markets. With various form factors and interfaces, our SSD solutions help businesses simplify their storage infrastructures accelerating variable workloads, improving efficiency, and reducing total cost of ownership.

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