Top six reasons companies make the move

Second edition
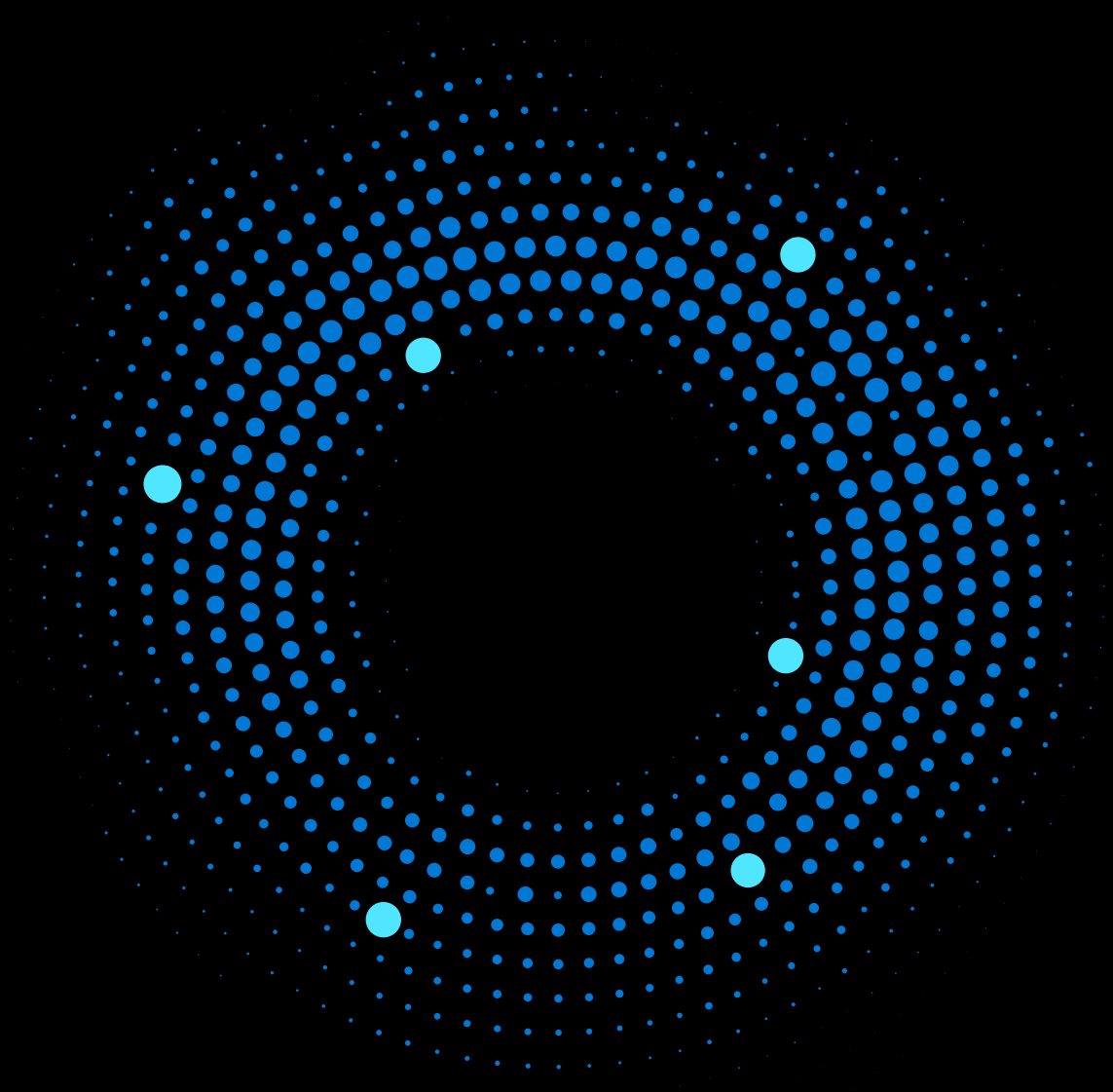
# Table of Contents

Microsoft

Introduction

All data has a story to tell. Whether it's customer behavior or traffic patterns, bird migrations or business growth, you need the skills and the tools to gather the right information and pull the relevant points out of your data. That's where the story lives.

Five businesses, five stories

In this case, we have the experiences of five very different businesses—financial data analytics, IT consulting, software services, cybersecurity, and data warehouse automation—all with the goal of efficiently managing and manipulating their data to maximize value.

Convergent Computing is a strategy and technology consulting firm that has provided innovative technology solutions, round-the-clock technical support, and comprehensive personalized consulting for more than 30 years. Recently, the company needed a way to move second-tier data processing to lower-cost hardware.

dv01 was established in 2014 to provide data management, reporting, and analytics insights to lending markets. As the complexity of **dv01's** platform increased, it began to run slower, with some queries even timing out. The company realized it had to address scalability and performance.

Microsoft
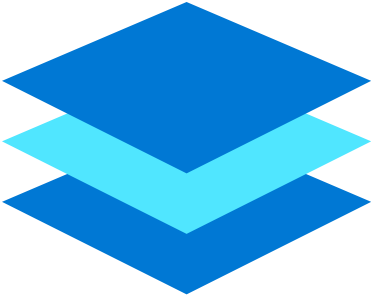
As one of the world's largest ergonomics consulting firms, **Humantech** was trying to standardize its IT environment as part of a strategic transition from in-person consultancy to a software-as-a-service (SaaS) delivery model. But the company needed a solution that could accommodate its preferred Windows database, Microsoft SQL Server, and its production and development environments, which ran on Linux.

International cybersecurity firm **Binary Confidence** focuses on remote security monitoring, threat analysis, and incident response. As the volume of data and devices it monitored grew, the company looked for a database that could scale as well as integrate easily with its existing open-source software.

Australian startup **Ajilius** provides a cloud-native data warehouse automation solution that runs on both Windows and Linux. Facing challenges with system availability, upgrades, and performance with PostgreSQL, the company searched for a solution that would readily connect with business intelligence (BI) tools and allow it to create environments with higher requirements for security, availability, and disaster recovery, without the added complexity and cost of third-party tools.

Spoiler alert: These companies all found what they were looking for.

Why they
made the move

Despite these companies' distinct missions and goals, they all saw the potential benefits of Microsoft SQL Server 2017 in one or more of the following six areas, particularly when factoring in its availability on a new platform choice, Linux:

- **Flexibility**
- **Performance**
- **Security**
- **Cost**
- **Simplicity**
- **Everything built in**

Read on to hear perspectives from these businesses, sourced through interviews and testimonials directly from each company's leadership, and see how your own data ecosystem could benefit from SQL Server 2017.

Microsoft

Flexibility
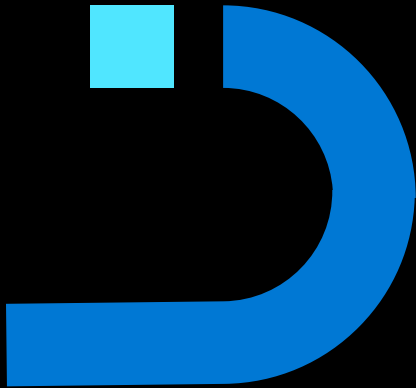
In every story, there's an element of choice: A or B, true or false, to be or not to be. Working with data is the same. Do you want your data on a public cloud, a private cloud, or on premises? Which language should you use to write your applications? What platform do you want to run those apps on?

SQL Server 2017 saves you from difficult choices that can constrain your productivity, giving you the flexibility to use the language of your choice, on the platform of your choice, on premises or in the cloud.

Any language, any platform, any cloud

As a company evolves, a specific technology stack can become baked into its DNA. This was certainly the case for data management firm dv01. As the company's VP of Engineering Dean Chen says, "Our engineers came from an open-source background and we're an open-source shop." This made trying SQL Server 2017 on Linux for many of the company's critical workloads a natural choice. Once dv01 leadership saw that the updated SQL Server platform outperformed previous solutions and competitive platforms, the decision to adopt was easy.

Because SQL Server 2017 runs on Windows, Linux, and Docker containers, you can deploy on the platform—or combination of platforms—that makes the most sense for your business. And whether your engineers are more comfortable with C#, Java, Ruby, or another coding language, they can build apps using the best language and platform for the job and then host the apps on any cloud provider or on-premises server that suits their needs.

Work the way you want

Cybersecurity company Binary Confidence uses a wide range of technologies based on both Linux and Windows to provide multiple layers of support to its customers. Plus, the business works with data in multiple formats on a diverse array of devices. The core analytics and reporting platform includes OSSEC, an open-source intrusion-detection system that collects log data for storage and analysis in Elastic Stack and a relational database.

Microsoft

"

One of the benefits that we had working with SQL Server 2017 is that we didn't have to export data from one database platform to another that required the data to be certified; we actually had the database certified. The migration was easy in that we went from one platform to the other without having to go through a lot of technical stuff.

Rand Morimoto
**President, Convergent Computing**

Microsoft

The flexibility of SQL Server 2017 enabled Binary Confidence to switch from Windows to Linux Ubuntu, and ultimately install SQL Server 2017 on Linux. The result? The new database works seamlessly with the heterogeneous environment. "SQL Server 2017 integrates really well with these open-source technologies," explains Peter Kleinert, Solution Architect. "With our early database, we'd often deal with incompatibilities and badly written articles describing how to make things work together. Honestly, with Microsoft's tools, everything just works."

Binary Confidence typically performs development work on Windows Server 2012 R2 and Windows Server 2016 and runs its production environment on Linux. "I love that SQL Server runs the same on Windows or Linux," says Kleinert. "It's great because I have the flexibility to choose either platform, and it's easier to integrate into our specific environment."

Interoperability you can rely on

Perhaps, like many companies, you take advantage of multiple platforms. Fortunately, SQL Server 2017 supports that, too.

With SQL Server 2017, your data can migrate from one platform to another with minimal downtime using distributed availability groups spanning both Windows and Linux environments. If you have issues with one deployment, you can use Always On availability groups to perform migrations across Windows and Linux or fail over between platforms to avoid downtime.
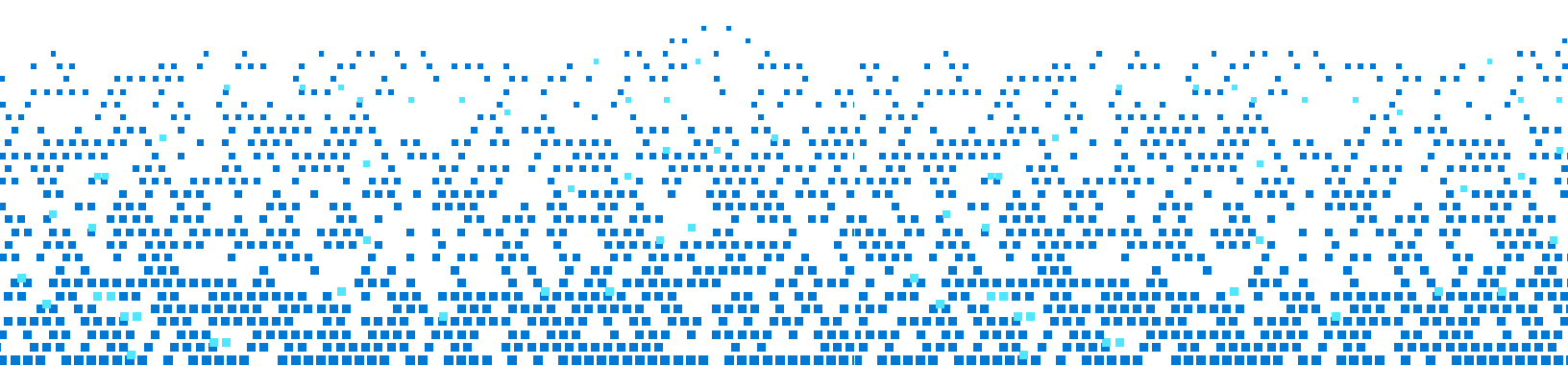
Performance

When working with data, the technology you're using should help you with the task, not get in the way. That's why any loss of query performance can be a huge headache. And the ability of your analysts and engineers to query data quickly can give your business the competitive edge.

Speed is important everywhere, but especially in the world of managing financial data. At dv01, VP of Engineering Dean Chen says, "We have a few queries that are really expensive ... and because these queries are typically longer-running in nature, any speed improvement makes a huge, huge difference." That's one big reason dv01 decided to go with SQL Server 2017 on Linux.

Binary Confidence noticed performance improvements for its cybersecurity services during a proof of concept (PoC), even before the company had done any optimization. Using SQL Server Migration Assistant, the company was able to move data over with the same indexes and reduce its database size by roughly half via page compression. It achieved its first benchmark in about a day and a half. "The magnitude of speed-up was staggering. The problematic queries ran 10 times faster, and the worst ones ran almost 500 times faster. And this was a PoC with no optimization," says Solution Architect Peter Kleinert. Promising initial results like these made the decision to move forward an easy one.

With a full implementation of SQL Server 2017, Binary Confidence used built-in features like SQL Server Profiler to quickly boost performance and optimize index design and selection. Better parallel processing also helped the company run large queries more quickly on existing hardware. "With MariaDB, it didn't matter how many cores I assigned, it would only use three at most," says Kleinert. "We'd have to break them down into smaller queries to run in parallel. With SQL Server 2017, we can run a large single query without any changes and use all the cores on the machine."

For ergonomic consultant Humantech and its 100,000 users, performance is critical to growing the company while maintaining its customer experience. Ken Lupo, Humantech's Director of Technology, cites as one example the ability to comprehensively manage server security from one centralized view. "We have decreased our logging and monitoring time by 50 percent because we've consolidated logging and messaging into a single process," he says. Lupo also appreciates the faster processing of terabyte-scale data sets. "We observed a 22 percent time savings right out of the gate."

Microsoft

"

SQL Server's flexibility around being able to define both types of indexes really made the difference here. We were also hitting some limitations around the size of our data and constantly having to upsize our servers, and in SQL Server's case the query would achieve a double or triple space savings, possibly more.

Rand Morimoto
President, Convergent Computing

Quicker queries mean time and money saved

A number of high-performance features are included with SQL Server 2017 (and available with Linux-based deployments). Among them is columnstore, which provides column-based data storage and processing to achieve up to 10 times the query performance and data compression over row-based storage. Yet another is in-memory online transaction processing (OLTP), which brings transaction processing to memory-optimized tables that can be up to 30 times faster than the speed of disk-based tables. With in-memory columnstore, queries can execute up to 100 times faster than disk. All of which increases the speed of your data-driven applications.

Data warehousing startup Ajilius uses columnstore in SQL Server as part of its automation solution to accelerate queries on its demo and training databases. "There's no equivalent to SQL Server columnstore," explains Ron Dunn, Ajiliius Lead Developer. "Particularly with dimensional data warehouses, columnstore significantly speeds up queries. And by using compression, we can manage more data with less disk, which also benefits I/O. We've seen one of our test cases improve performance by more than 40 percent over PostgreSQL, and star schema disk usage shrink to less than half," he says.

■■ Microsoft

Ajilius employees now have more time for development and customer support because system upgrades are easier and faster. "If I want to upgrade SQL Server on Linux, I have to type maybe 30 characters at a console, and everything happens automatically," Dunn says. "It could not be more simple. We've already done three upgrades and we've had zero problems. The operational and developer maturity of the product is substantial." This predictability translates into greater efficiency and less trepidation. "Just knowing that an upgrade is going to work means that I can plan on having another six hours that same day for product development," he notes.

With clients across the world, Binary Confidence uses built-in capabilities like page and backup compression to improve efficiency and increase performance. "Log collection is faster, and my rough guess is that we're cutting the time in half—most likely because of page compression and better index management," says Solution Architect Peter Kleinert. "But the most obvious performance gain is with large analytic queries, which range from 2 to 500 times faster."

Binary Confidence is also exploring columnstore indexes, which Kleinert expects will make queries even faster. In addition, the company plans to take advantage of SQL Server 2017 for machine learning. With faster, in-database analytics and machine learning, the company can enhance log analysis and its anomaly-detection system.

Analytics and transaction processing, simultaneously

Analytics data is typically stored in a data warehouse or data mart that is dedicated to running analytics queries. However, that can introduce several challenges, including complexity, cost, and data latency. With real-time operational analytics, you can eliminate the need for ETL (Extract, Transform, Load) and a data warehouse.

Real-time analytics uses an updateable columnstore index on a rowstore table. The columnstore index maintains a copy of the data, so the OLTP and analytics workloads run against separate copies of the data. This minimizes the performance impact of both workloads running at the same time.

Since analytics is a cornerstone of its business, this is a big advantage for dv01. "It's a pretty special use case, being able to do these analytics queries in real-time," says Dean Chen, the company's VP of Engineering. "That's typically reserved for the realm of Hadoop or big-data infrastructures that have a lot higher latency. Microsoft was really helpful as part of that process, and it's one of those things that fit our use case really well."

But the most obvious performance gain is with large analytic queries, which range from

2 to 500 times faster.

Microsoft

"

With SQL Server 2017, we don't have to constantly take care of the database and optimize queries and hardware. Instead, we can spend much more time developing our applications.

Peter Kleinert
Solution Architect, Binary Confidence

Efficiency at its best

Finally, adaptive query processing is available to further improve query performance. Adaptive query processing not only designs the query execution plan and then executes it in the most efficient way, it optimizes the plan while the actual query is running—or even after the query execution is completed to benefit later executions. Additionally, query processing is getting smarter all the time. Improvements to adaptive query processing in SQL Server 2017 include batch mode memory grant feedback, batch mode adaptive joins, and interleaved execution.

[1]National Institute of Standards and Technology Comprehensive Vulnerability Database as of January 17, 2017.

Microsoft

Security

Few things are more important to data than how secure it is. If your business relies heavily on data, and that data is vulnerable, it puts the entire enterprise is at risk—potentially including your customers, partners, and employees. Establishing your business on a foundation of high-quality, reliable data means trusting that it can't be tampered with, wherever it lives.

As the security landscape has changed over the years, Microsoft has continued to change with it. With a philosophy of engineering security from the ground up and building in layers of protection, SQL Server stands out with the fewest vulnerabilities of any enterprise database in the National Institute of Standards and Technology (NIST) database over the last seven years.

In particular, SQL Server 2017 on Linux gives Ajilius the confidence to address the security needs of its customers. "I was just talking to a Linux customer ... who was deeply concerned about the potential visibility of credit card details in his warehouse," says Ron Dunn, Lead Developer. "By using SQL Server on Linux, he can address those concerns. Its seamless integration with Active Directory, row-level security, and transparent database encryption provide significant advantages over other database platforms in dealing with personally identifiable information."

Secure at rest and in motion

Large amounts of data lead to plenty of complexity. Data is queried, transmitted, backed up, and replicated nearly constantly. With all that activity, any link in the chain could be a potential vulnerability.

That's why Always Encrypted is critical to protecting your sensitive data stored in SQL Server databases. Always Encrypted enables encryption of sensitive data inside applications and on the wire, while never revealing the encryption keys to the database engine. As a result, Always Encrypted provides a separation between those who own the data and those who manage the data. And Row-Level Security adds another layer of access control by restricting permissions to rows in a database table based on characteristics of the user executing a query.

Protection that's centrally managed

To make security features even easier to manage in SQL Server 2017, you can use Active Directory authentication to centralize the identities of database users and other services in one location. This way, you can simplify permission management and avoid storing passwords.

Microsoft

"

With SQL Server, security is just so well integrated—it's literally something you turn on, and data is encrypted on disk. It's also encrypted in memory, which is pretty big. But the main thing for me is all of that just came free; it was just a flip of the switch and it was super well-integrated.

Peter Kleinert
Solution Architect, Binary Confidence

Microsoft

Cost

Beyond the complex tasks of building and maintaining databases, you're probably also concerned about the shifting costs of data. If queries take more time than they need to, that increases the hours spent troubleshooting by your developers and administrators. And as your data needs scale up, it becomes more expensive to store all that information. Fortunately, SQL Server 2017 on Linux offers a potentially wallet-saving solution, where everything is built in from the start.

"That's where Linux has played in some of our other models," says Rand Morimoto of IT consultancy Convergent Computing. "I can basically do a lot of our work on lower-cost hardware." He's also quick to emphasize that the benefit is more than just financial. It's also performance-based: "It's about what can I put on Linux that will decrease my marginal cost and provide me with the same or equivalent performance, if not potentially better performance."

Don't pay for more than you have to

From additional hardware and software licenses to training and the sheer amount of time required, deploying and maintaining databases can get expensive quickly. But SQL Server offers ways to reduce those costs, or possibly avoid them altogether, as happened for Convergent. "Using SQL Server Management Studio to manage both Linux and Windows environments ... means we don't have to retrain people or certify people on a new platform," says Rich Dorfman, VP of Professional Services at Convergent.

For Binary Confidence, the impact on its cybersecurity business has been significant. In the face of doubling or tripling the number of connected devices each year, and an annual quadrupling of data, the company expects to cut its storage costs at least in half thanks to page compression. "Scalability isn't a problem either," says Peter Kleinert, Solution Architect. "We run SQL Server 2017 on a virtualized machine with just 12 cores and 16 GB RAM. We could increase the resources, but there is just no need to do so."

Following its implementation of SQL Server 2017 on Linux, Humantech saw immediate gains in efficiency. "Right off the bat, we saw a 50 percent reduction in overall support and maintenance costs," says Ken Lupo, Director of Technology. "Plus, by not choosing a traditional Linux database, we saved three to six months of learning curve, and we felt that we gained strong security and reliability."

Microsoft

Our normal return on investment for any of the hardware has typically been about two and a half years. With this current model, we're able to get a return on investment in less than eight and a half months.

Rand Moritomo
President, Convergent Computing

Microsoft

"
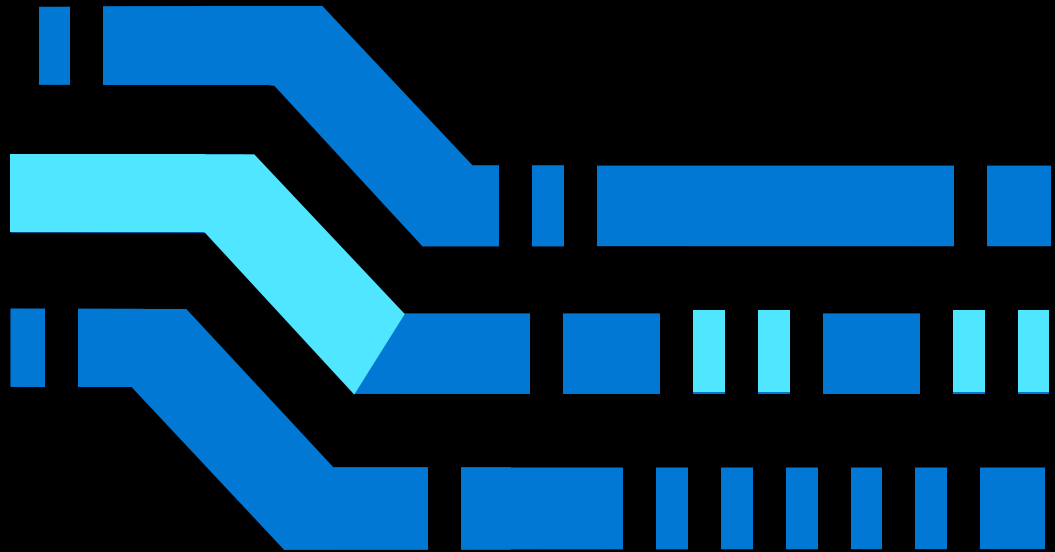
The long-term administration and support costs are higher with other platforms. We also reduced our hosting expenses by more than 30 percent by moving to SQL Server on Linux.

Peter Kleinert
Solution Architect, Binary Confidence

As Humantech's President Jim Good points out, that sort of time savings translates to the bottom line as well. "We're talking about a race to revenue. That three to six months would have been a big cost and a strategic loss," he says.

Get your investment back faster

Of course, your databases and the data that's within them are critical. But that doesn't mean that you should need to break the bank to work with your data. With SQL Server 2017 on Linux, it's possible to realize a lower total cost of ownership (TCO) and fast return on investment (ROI). Avoiding extra licenses, training time, and hardware costs will ensure your initial investment in SQL Server pays off.

Microsoft

Simplicity
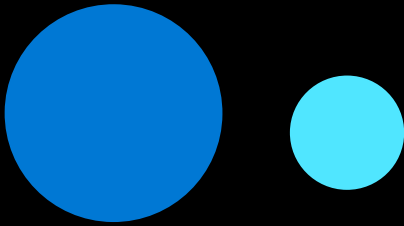
The explosion of data over the past few decades dramatically shifted how we store, analyze, manipulate, and secure information. Databases and datasets can be infinitely complex, but working with data shouldn't be difficult. That's why SQL Server 2017 aims to simplify data management for you and your engineers.

Ease of migration

Although Windows and Linux are significantly different operating systems, the experience of migrating data from one platform to the other isn't as complicated of a process as it might seem. Convergent experienced this firsthand when it migrated three internal applications, including the corporate intranet.

"Moving SQL Server from Windows to Linux was actually one of the easiest migration experiences that we've had," says Chris Amaris, Convergent's Chief Technology Officer and Project Technical Lead. "We took the SQL Server Windows database offline, encrypted it, and moved it across to the new Linux environment with certain keys. When we brought the database up in the new environment, we certified that the keys matched, to confirm the data had not been tampered with."

Rand Morimoto, President at Convergent, confirms, "Because we were moving the SQL Server database from one operating system to another, rather than porting data from one database platform to another, we didn't have to have the data completely recertified," he says. "We only had to show that the database transferred unmodified, which saved us from a very lengthy and costly compliance audit, review, and recertification."

Because the migration process is made simpler, there isn't the need for advanced customizations or third-party solutions, enabling engineers to refocus their work on higher-value tasks.

■■ Microsoft

"

When it comes to just migrating our infrastructure over, it was literally plug and play, and that's how it ended up working out.

Dean Chen
VP of Engineering, dv01

Microsoft
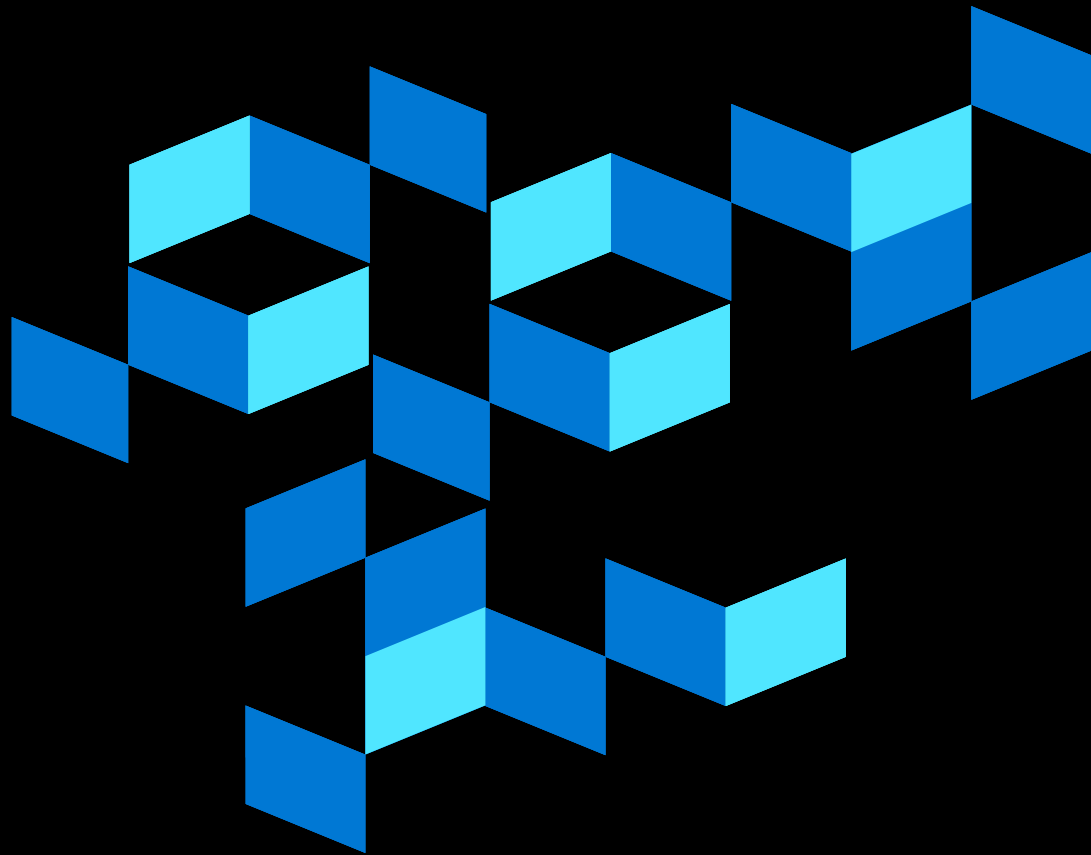
Everything built in

With database management systems, it's no small undertaking to meet the mission-critical needs of modern enterprises. Features that used to be optional are now frequently required by organizations to meet new standards of security, functionality, and usability. Achieving mission-critical readiness by adding options and feature packs can drive up costs quickly. That's why SQL Server 2017 on Linux builds in everything you need from the get-go.

An unmatched TCO with all the features you need

By including everything you need to manage your data and keep it secure, SQL Server helps keep your management costs down. Because everything works "out of the box" when you get started, you save engineering hours not having to set up custom solutions or buy third-party add-ons.

As Peter Kleinert of Binary Confidence relates, "SQL Server 2017 is easier to develop, optimize, and run than MariaDB and MySQL. I spent a lot of time trying to make this or that work well, and we'd have to get additional tools if we needed more capabilities. With the SQL Server ecosystem, I haven't had this problem."

A key factor in reducing your TCO is the inclusion of enterprise-level features with SQL Server, which for comparable database platforms are either available at an additional cost or simply not available, necessitating a third-party solution. With features like data compression, columnstore, partitioning, high availability, and disaster recovery included, your organization can provide robust, data-driven applications to customers for a fraction of the cost of the competition.

As Scott Guthrie, Executive Vice President, Cloud Enterprise Group at Microsoft, shared, "SQL Server on Linux will provide customers with even more flexibility in their data solution, one with mission-critical performance, industry-leading TCO, best-in-class security, and hybrid cloud innovations—all built in."

■■ Microsoft

20

"

With SQL Server on Linux, we gain a world-class database product running in the environment we want. We're no longer limited by the underlying operating system. For us, that is a breath of fresh air.

Ken Lupo
Director of Technology, Humantech

"

With SQL Server, things just came 'out of the box'—it worked; it was super polished. We didn't waste much time trading stuff out."

Dean Chen
VP of Engineering, dv01

Microsoft

"

SQL Server on Linux cuts your costs. It's simple to install and administer. And if you have a Linux-focused development team, which most startups do these days, it's a great product because it guarantees compatibility with more target customers.

Ron Dunn
Lead Developer, Ajilius

Microsoft
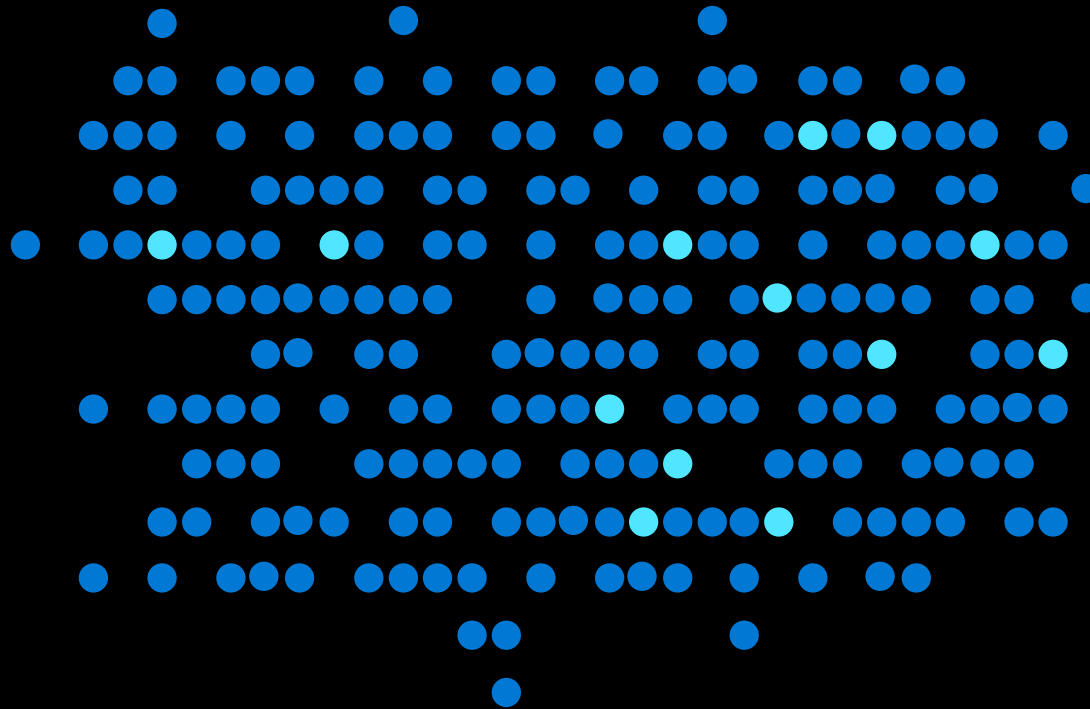
Summary

The data landscape is always changing, so it can be challenging to keep up and do so in a way that makes the most sense for your business. The right database platform can be a future-proof foundation on which you can build the applications and tools your business needs to succeed. Is your data ecosystem holding you back, or driving your business forward?

Get started with SQL Server 2017 on Linux today

Microsoft