

# Embedded Database Use Cases

## Powering IoT Everywhere

The rise of edge computing is fueling demand for embedded devices for Internet of Things (IoT). IoT describes physical objects with sensors, processing ability, software and other technologies that connect and exchange data with other devices and systems over the Internet or other communications networks. Diverse technologies such as real-time analytics, machine learning, and automation tie in with IoT to provide insights across various use cases.

It is not surprising that embedded databases are widely used for IoT given its explosive growth. International Data Corporation (IDC) estimates there will be 55.7 billion connected IoT devices (or “things”) by 2025, generating almost 80B zettabytes (ZB) of data.

Manufacturing, mobile environments, medical devices, high tech, physical security, and gaming are among the top use cases driving the growth of embedded databases.

### MANUFACTURING

In fiercely competitive global markets, IoT-enabled manufacturers can get better visibility into their assets, processes, resources, and products. For example, connected machines used in smart manufacturing at factories help streamline operations, optimize productivity, and improve return on investment. Warehouse and inventory management can leverage real-time analytics to source missing production inputs from an alternative supplier or to resolve a transportation bottleneck by using another shipper. Predictive maintenance using IoT can help identify and resolve potential problems with production-line equipment before they happen and spot bottlenecks and quality assurance issues faster.

## TOP EDGE USE CASES



IoT	Range
Smart manufacturing	20% - 30%
Warehouse/inventory management	15% - 25%
Predictive maintenance	10% - 15%
Smart grid	10% - 15%
Smart cities	5% - 10%
Other	15% - 25%

Mobile/Isolated Environments	Range
Logistics	35% - 45%
Gas/oil infrastructure	10% - 20%
Transportation	10% - 20%
Environmental monitoring	5% - 15%
Smartphones, tablets, laptops	5% - 15%
Other	5% - 15%

Medical Devices	Range
Imaging	15% - 25%
Laboratory equipment	15% - 25%
Other hospital equipment	10% - 20%
Wearables	10% - 15%
Home-based equipment	5% - 15%
Other	15% - 25%

High-tech/IT Edge Computing	Range
Security	20% - 30%
Networking/routers	15% - 25%
SIEM	10% - 20%
DDOS	10% - 20%
Fog computing	5% - 10%
Other	15% - 25%

Physical Security	Range
Security cameras	40% - 50%
Audio monitoring	10% - 20%
Biometric scanners	10% - 20%
Other security sensors	20% - 30%

Gaming	Range
Session store/user profiles	20% - 30%
Personalization	20% - 30%
AR/VR	15% - 25%
Insights	10% - 20%
Messaging	5% - 10%
Other	5% - 15%

## MOBILE/ISOLATED ENVIRONMENTS

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IoT is driving the shift towards connected logistics, infrastructure, transportation, and other mobile/isolated use cases. In logistics, businesses used edge computing for route optimization and tracking vehicles and shipping containers. Gas and oil companies use IoT to monitor remote infrastructure such as pipelines and offshore rigs. In the transportation industry, aviation and automotive companies use IoT to improve the passenger experience and to improve safety and maintenance.

## MEDICAL DEVICES

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Healthcare is perhaps an industry that will benefit the most from IoT given its direct connection with improving lives. IoT is recognized as one of the most promising technological advancements in health care analytics. Medical IoT devices are simultaneously improving patient outcomes and providers' return on investment. The processing of medical images and laboratory equipment maintenance are particularly important use cases. Data from MRIs, CTs, ultrasounds, X-Rays and other imaging machines help medical experts diagnose diseases at earlier stages and provide faster and more accurate results. Edge analytics enables predictive maintenance of laboratory equipment to reduce maintenance costs, but more importantly to help prevent the failure of critical equipment that is often in short supply.

What's possible today was inconceivable a decade ago: tracking medications, their temperature, and safe transportation at any point in time.

## HIGH TECH/IT EDGE COMPUTING

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The size, scope, complexity, and volume of security, network and other IT infrastructure events far exceed the ability of IT departments to keep up with them. Security and monitoring using edge intelligence helps IT more efficiently monitor security threats and the performance and health of their networks so staff can mitigate and minimize the impact of adverse events faster. Using IoT for real-time firewall log analytics delivers security alerts faster. Edge computing in conjunction with security information and event management (SIEM) allows IT to identify newly discovered devices and device vulnerabilities for faster investigation. Real-time network diagnostics and analytics helps IT clearly understand the health and performance of networks and all connected devices.

## PHYSICAL SECURITY

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Physical security refers to the protection of buildings and equipment (and all information and software contained therein) from activities such as theft and vandalism. IoT is frequently used in physical security to collect and share data from cameras, audio monitors and biometric scanners such as fingerprint readers, voice biometrics, and facial recognition technology.

## GAMING

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There are a lot of ways in which IoT benefits the gaming industry. Data collected from gaming devices helps deliver personalized content in the right context and at the right moment. Game designers and developers can analyze user experience data to better understand player activities to improve the player experience and to increase monetization. And, they can monitor assets such as projectors remotely at all times.

We already see the many advances and impact that IoT has introduced, and this is just the beginning.

## ACTION'S EDGE TO CLOUD CAPABILITIES

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Zen is Actian's embedded database solutions for use cases such as IoT, mobile, medical devices for healthcare analytics, and more. Zen is ideally suited to applications that run in branch offices or on edge devices where zero administration and small footprint requirements are common. The Zen product family includes:

- Zen Core, with a footprint as little as 5MB, is ideal for mobile/IoT device applications. Developers use Dynamic Link Libraries to embed Zen in applications and to provide SQL and NoSQL API access.
- Zen Enterprise is a multi-user, zero-administration, embeddable database that runs on Windows and supports thousands of users.
- Zen Edge is designed to be embedded in edge gateways and complex machinery where there is a requirement for full client/server functionality and support for hundreds of users.
- Zen Cloud Server is a cloud-ready version of Zen Enterprise, running in VMs and containers, so that it can be embedded or bundled in SaaS applications and managed services.

Zen combined with [the Avalanche Cloud Data Platform](#) for integration, management, and analysis of edge IoT data provides comprehensive Edge to Cloud capabilities.