
Optimising Healthcare Computing with Hybrid Edge-to-Cloud Solutions



Healthcare organisations must optimise their computing resources to support innovative clinical workflows. Hospitals' primary objective is to provide optimal patient care, but recent years have seen challenges that complicate this goal. Increasing cyberattacks demand heightened cybersecurity measures to protect sensitive patient data, diverting attention from other critical tasks. Simultaneously, decreasing revenue streams and rising labour costs have led to budget constraints, and staffing shortages are leaving clinicians with less time for patients. Despite these difficulties, many institutions are committed to innovating patient care.

Leveraging AI and Hybrid Cloud for Enhanced Patient Care

Investing in artificial intelligence (AI) solutions offers a way to mitigate these challenges while expediting and improving the quality of patient care. However, healthcare organisations often face challenges when deploying AI tools, primarily on how to optimise their use. The goal is to provide clinicians with real-time intelligence at the point of care in a practical, cost-effective, and scalable manner, especially when working with older legacy systems. The solution lies in adopting flexible hybrid edge-to-cloud infrastructures and optimising computing resources to maintain maximum performance and efficiency. This approach allows healthcare organisations to process data at both the edge and in the cloud cost-effectively.

Balancing Data Storage: Edge, Private Cloud, and Public Cloud in Healthcare

Hospitals generate vast amounts of data from patient diagnostics, admissions, billing, and more, which are stored at the edge and in a combination of private and public clouds. Each storage method has its benefits and drawbacks. Edge-derived information comes from devices like MRI machines, X-rays, and ultrasounds, requiring near real-time insights. For example, an AI-enabled ultrasound can assist a technician in locating nerves during anaesthesia administration. However, storage and processing capacity at the edge is limited.

Private clouds offer organisational control and can process AI workloads across various data sets. For instance, a private cloud can highlight areas of concern on an X-ray or MRI to aid radiologists. However, data transfer times can be longer compared to edge processing. Public clouds are beneficial for complex workloads that use public AI training models from de-identified patient populations. Yet, data transmission can be slow, security agreements are necessary, and egress costs can be high.

Implementing Cost-Effective Hybrid Edge-to-Cloud Strategies in Healthcare

A hybrid edge-to-cloud approach, combining on-premises edge and cloud computing, supports all these environments while being cost-effective and flexible. This setup allows hospitals to manage some workloads onsite and transfer others to the cloud, optimising computing resource costs. Hospitals can perform complex onsite processing, providing clinicians with actionable recommendations swiftly, and avoiding some data transfer costs.

Hospitals must optimise their computing resources through a two-step process to implement an efficient hybrid cloud and edge infrastructure. First, they must prioritise data collected by various devices, workflows, and technologies. Many hospitals still rely on legacy solutions that gather valuable data, but these older systems are not equipped to run machine learning algorithms. Hospitals should focus on the most crucial data for their clinical operations, identify the machines producing this data, and extract the information.

The second step involves determining where the data should go. Some data may require only incremental analysis suitable for edge processing, while more complex analysis might need transfer to a private or public cloud. Sometimes, a combination of edge and central processing is necessary. Shifting workloads appropriately can maximise computing resource use, minimise bandwidth and storage bottlenecks, and balance

workload performance with lower costs.

As hospitals continue to adopt AI and real-time analytics, they need a flexible infrastructure that supports these technologies without exceeding their budgets. By embracing a hybrid edge-to-cloud approach and optimising resources, hospitals can effectively leverage these innovations, overcome current challenges, and help clinicians deliver exceptional patient care.

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