Microsoft Azure

Transform your infrastructure your way with Azure Local

Innovate with an adaptive cloud approach on a flexible and trusted infrastructure

The pressure of today's fast-moving business environment makes rapid transformation crucial for businesses. Organizations can no longer just react to market shifts—they must actively rethink their operational models to stay competitive. Whether facing supply chain disruptions, regulatory changes, or evolving consumer demands, businesses must remain agile and ready to adapt.

Technology is driving much of this change. Cloud platforms are now the default for innovation, enabling faster scaling and development of new solutions. AI has also become a core business necessity, transforming industries across the board. Yet as businesses rush to adopt these technologies, many find themselves overwhelmed by complexity. Fragmented systems, information silos, and technical debt often slow down operations, making it harder for businesses to efficiently respond to market demands.

Edge computing further contributes to this complexity by distributing data processing across cloud and local infrastructures. While this shift enables faster insights and responsiveness, it also introduces new challenges in managing decentralized IT systems. The need to seamlessly integrate cloud and edge environments adds pressure to already complex operations.

As a result, businesses are at a critical juncture; piecemeal solutions are no longer enough. Companies need a unified, adaptable approach to technology that simplifies operations while positioning their businesses for future innovation. This is where the Microsoft Azure adaptive cloud approach comes in, offering a solution that bridges the gap between the cloud and the edge, and providing a scalable foundation for growth.

By addressing the challenges of distributed infrastructure, organizations can streamline their operations, reduce complexity, and unlock new opportunities. The Azure approach—Azure Local—integrates cloud and edge capabilities, enabling businesses to stay flexible, respond quickly to change, and position themselves for long-term success. This new, innovative offering provides a balance of agility, scalability, and simplicity, which is essential for navigating today's rapidly evolving landscape, allowing businesses to stay ahead in a world defined by constant change.

The solution: Embracing an adaptive cloud approach

To navigate today's business challenges, organizations like yours need a flexible, hybrid cloud approach that integrates resources from the cloud to the edge. Powered by Azure and Azure Arc, the adaptive cloud approach provides this agility. By unifying the management of distributed systems, Azure Arc enables centralized control while maintaining flexibility, allowing businesses to anticipate market shifts and respond proactively.

This adaptive cloud approach empowers leaders to make smarter, data-driven decisions while maintaining operational efficiency. With AI-enhanced management, businesses can improve security and streamline processes, overcoming the complexity of siloed systems. The modular architecture of Azure allows for rapid development and scaling, supporting quick, secure deployments across regions and markets.

The Azure adaptive cloud approach integrates centralized management and built-in security. These capabilities help ensure that businesses can operate efficiently and securely. With AI-driven tools for configuration management, organizations can use real-time threat detection and role-based access control (RBAC) to optimize workflows and reduce risks. Full-stack visibility enhances resiliency, which helps ensure high availability and performance across environments.

The modular Azure architecture empowers developers to build and scale applications quickly—across both hybrid and multicloud environments. With simplified Kubernetes, businesses can deploy container-based applications seamlessly. At the same time, hyperscale Azure cloud services extend capabilities to the edge. Finally, streamlined DevOps integration helps ensure continuous deployment with security and observability standardized across all locations.

Azure provides a unified data foundation. This foundation consolidates diverse resources and enables businesses to derive actionable insights from operational data via AI. Centralized workflow orchestration automates processes, which helps ensure consistency and responsiveness across environments.

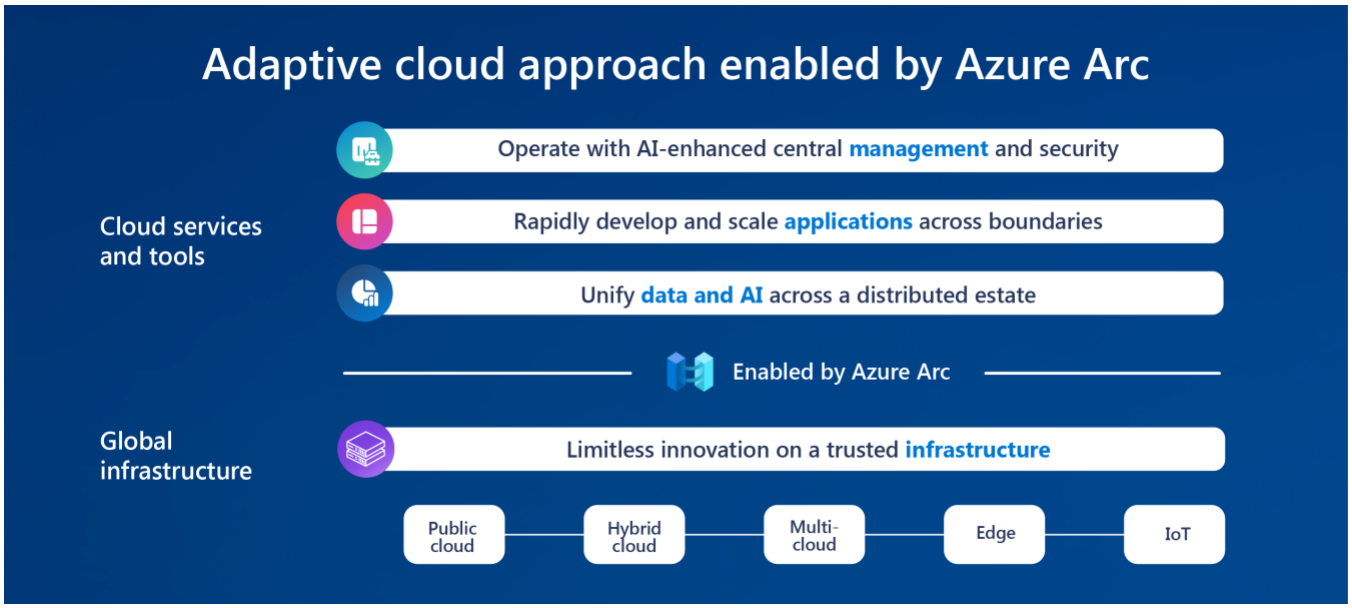


Figure 1. Overview of the Azure adaptive cloud approach

Data plays a critical role in the adaptive cloud approach, because it makes it possible for the integrated AI and analytics capabilities of Azure to turn operational insights into actionable strategies. By making use of these capabilities, organizations can optimize operations, enhance customer experiences, and stay ahead of

competitors. Whether an organization is managing a cloud or edge environment, the Azure adaptive cloud approach equips the business to thrive in today's interconnected world, ensuring it remains flexible, secure, and ready to grow.

From cloud to edge: Expand the reach of the adaptive cloud with Azure capabilities

Azure extends the adaptive cloud's reach across your entire operational landscape, from centralized datacenters to the farthest edge environments. This unified approach enables businesses to manage resources seamlessly, scaling workloads and applications across cloud and on-premises environments with consistent control and flexibility.

At the core of this approach is the flexible Azure architecture, which integrates cloud-native tools like containers and data services with local infrastructure. For example, Azure Kubernetes Service (AKS) provides a scalable platform for managing containerized workloads in any environment, whether centralized on-premises in a datacenter, in the cloud, or distributed at the edge. This consistency allows organizations to modernize applications without sacrificing performance or security, ensuring agility and responsiveness across varied operational sites.

The versatile, cloud-to-edge capabilities of Azure also improve operational efficiency by enabling real-time data integration from distributed locations. By consolidating data into a unified, secure fabric, businesses can gain holistic insights into their operations, supporting smarter, faster decision-making. Whether optimizing supply chains or managing remote infrastructure, the ability to make use of data across environments is critical to staying competitive. With Azure, organizations can transcend the limitations of legacy systems, embracing a future-ready infrastructure that unifies cloud and edge environments into a single, cohesive strategy for growth.

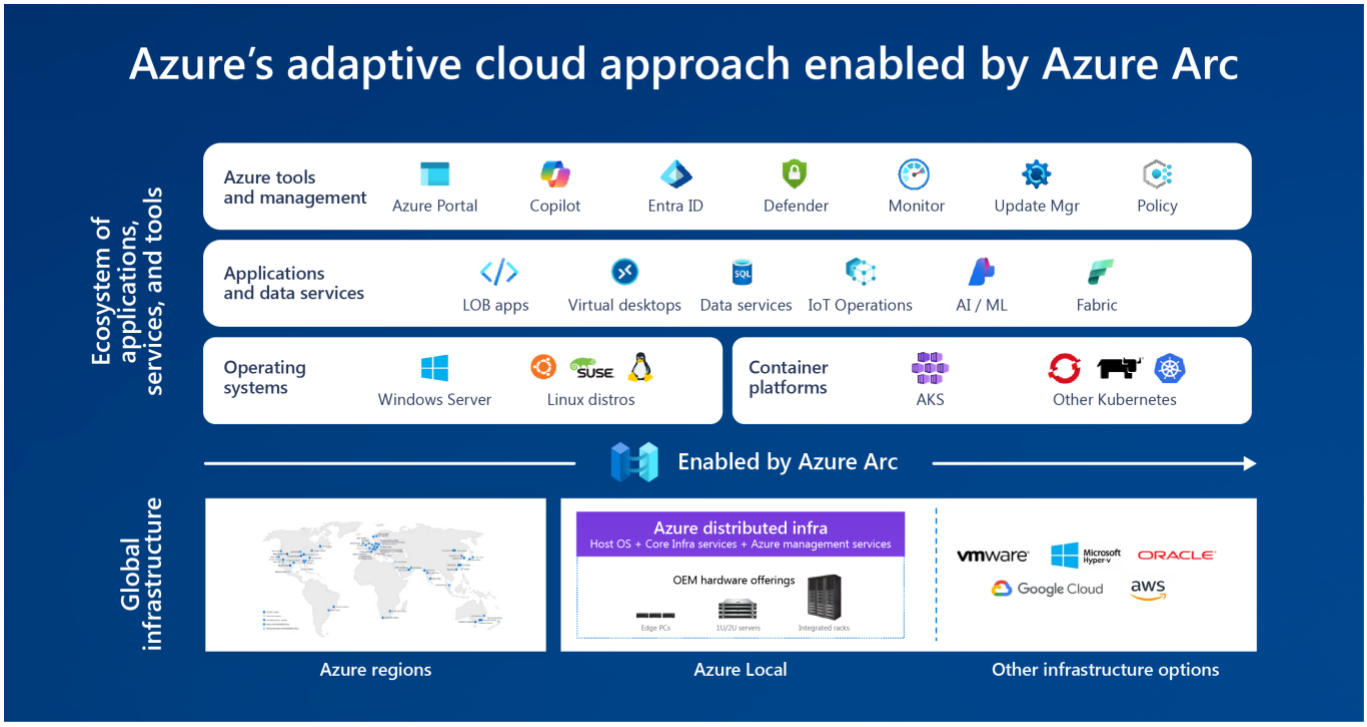
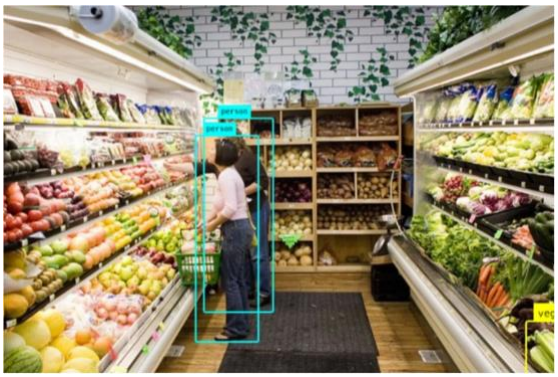


Figure 2. Overview of Azure Local integration with Azure services

Distributed hybrid infrastructure as you need it: Azure Local

Azure Local enables organizations like yours to use their dynamic, distributed Azure architecture to meet the evolving needs of their businesses, and it can provide the tools necessary to deploy and manage applications across diverse environments. By integrating the power of Kubernetes and a comprehensive data-management approach, Azure Local enables organizations to achieve unparalleled operational efficiency and scalability. This robust infrastructure supports a wide array of use cases, from optimizing supply chains to enhancing customer experiences, ensuring that businesses can respond swiftly and decisively to the demands of the modern marketplace. The following scenarios can help illustrate these uses cases.

Local AI inferencing



Local AI inferencing, particularly for video, enables organizations to process data at the source. By conducting real-time analysis directly within an environmental context, companies can respond faster and more accurately to emergent situations. This AI capability is particularly important for companies in retail. Some typical usage scenarios include:

- **Loss prevention in retail environments**: Implementing real-time surveillance and predictive analytics can help reduce theft and retail shrinkage, leading to increased profitability and improved security.
- **Smart self-checkout systems**: Advanced AI-powered self-checkout systems streamline the customer experience, reducing wait times and operational costs while minimizing errors and fraud.
- **Pipeline leak detection**: Using AI and Internet of Things (IoT) sensors, companies can detect and address leaks in industrial pipelines swiftly, preventing environmental damage, minimizing downtime, and reducing repair costs.

Mission-critical business continuity across dispersed locations

Azure Local helps ensure that operations can continue seamlessly even in the face of power or network failures for industries ranging from retail to manufacturing. This resilience is vital for maintaining operational integrity, particularly in:

- **Warehouse management**: Making use of AI and IoT technology in warehouse management can enhance inventory accuracy and help optimize storage space, leading to reduced operational costs and increased efficiency.
- **In-store infrastructure**: Implementing advanced in-store infrastructure, including smart shelving and real-time customer analytics, can improve the shopper experience and drive higher sales through targeted promotions.
- **Ticketing at theme parks**: AI-driven ticketing systems streamline entry processes and manage crowd control effectively, ensuring a seamless guest experience and maximizing park capacity utilization.

Control systems and near-real-time data processing

For industries that require immediate data processing with minimal delays, such as manufacturing, Azure Local infrastructure can meet these low-latency demands with precision. Usage scenarios include:

- **Quality assurance (QA) processes**: Making use of real-time data and AI-driven insights, Azure Local enhances QA processes, helping ensure that products meet high-quality standards and safety protocols, and ultimately reducing defects.
- **Live data feeds**: The low latency of Azure Local supports live data feeds, enabling businesses to make quick, informed decisions and swiftly respond to market changes, thus maintaining a competitive edge.
- **Real-time applications**: Azure capabilities support real-time applications, providing instant data processing and feedback. This results in improved user experiences and enhanced operational efficiency, as businesses can act on live data without delay.

Sovereignty, regulatory, and dedicated data infrastructure layer (DDIL) connectivity

Azure Local addresses the need to keep data and control local, complying with sovereignty and regulatory requirements in industries ranging from energy to manufacturing. This is particularly important for scenarios such as:

- **Remote wind turbine management**: With Azure Local, remote wind turbine management becomes more efficient and reliable. This improvement helps ensure optimal performance, reduces downtime, and enhances overall energy production.
- **Threat analysis**: Advanced threat-analysis capabilities in Azure Local enable comprehensive security solutions that actively monitor and mitigate risks. This proactive approach helps safeguard sensitive data and helps maintain the integrity of your operations.
- **Regulated industrial plants**: Azure Local supports regulated industrial plants by helping ensure compliance with stringent industry standards. This adherence to regulations not only enhances safety and reliability but also streamlines operations and reduces costs.
- **Disconnected operations**: A new feature in preview allows Azure Local to run solutions without an internet connection. This capability ensures uninterrupted service and data processing in remote or offline environments.

Azure Local features

Azure Local offers a comprehensive suite of features designed to enhance operational efficiency, security, and scalability for diverse IT environments. Key functionalities include:

- **Cloud-based operations**: Use Azure tools and APIs for consistent infrastructure provisioning and lifecycle operations across distributed locations.
- **Multi-node clustering**: Increase resilience and uptime with high availability and robust software-defined storage.
- **Cost-effective migration**: Reduce costs by moving workloads from on-premises virtualization platforms, including VMware by Broadcom.
- **Central management and visibility**: Monitor, update, and secure Azure Local infrastructure directly from the Azure portal using familiar Azure services.
- **Cloud-based virtual machine (VM) management**: Extend cloud practices with VM extensions, Azure Marketplace images, templates, and RBAC.
- **Hardened security by default**: Safeguard workloads with a strong security posture and with advanced capabilities like Trusted Launch and network segmentation.
- **Support for diverse workloads**: Run containers, VMs, and select Azure services—including Azure Virtual Desktop and Azure IoT Operations—side by side.
- **Integrated AKS experience**: Simplify Kubernetes management and enhance developer productivity with AKS built-in.
- **Small-scale deployment option (in preview):** Deploy Azure Local on cloud-managed, zero-touch provisioned industrial PCs optimized for small-footprint, local workloads.
- **Disconnected operations (in preview)**: Meet the strictest data residency regulations with a locally hosted control plane that works fully disconnected.

Microsoft recognized once again as a Leader in the 2024 Gartner® Magic Quadrant™

Microsoft has been recognized as a leader for the second consecutive year in the 2024 Gartner Magic Quadrant for Distributed Hybrid Infrastructure, and it is noted to be at the top of the Ability to Execute and Completeness of Vision axes. This leadership stems from the Azure adaptive cloud approach and Microsoft's extensive infrastructure services, including Azure Local. Read the full report: https://aka.ms/Azure_DHI_Gartner_Report.

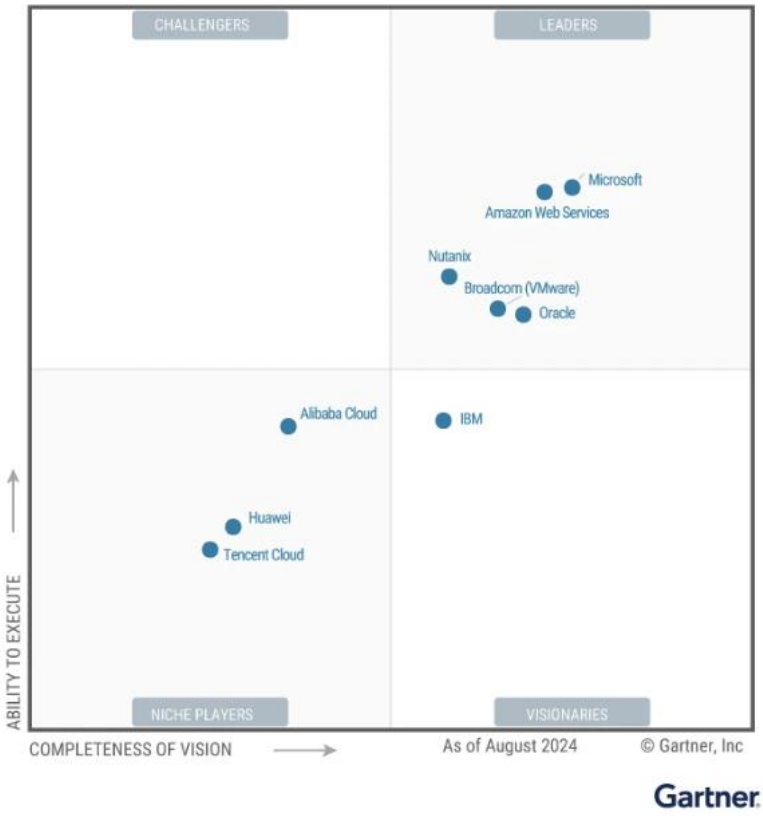


Figure 3. Gartner Magic Quadrant for Distributed Hybrid Infrastructure with Microsoft at the top of the Ability to Execute and Completeness of Vision axes

Azure Local as part of an adaptive cloud approach

Azure Local forms an integral part of the adaptive cloud approach:

- **Operate with central management**: Enhance governance, security, and compliance of IT assets with AI assistance and automation—all from the Azure portal.
- **Secure distributed assets**: Improve security with cloud-based threat detection, responsiveness, and analytics.
- **Scale apps across boundaries**: Set up and maintain a continuous integration and continuous delivery (CI/CD) pipeline from cloud to edge.
- **Deploy and manage all Kubernetes**: Manage, secure, and modernize Kubernetes in different environments with Azure Arc.
- **Cultivate data and insights**: Centralize operational data for cross-departmental decision-making with Azure Arc–enabled data services.
- **Control remote infrastructure**: Administer distributed environments centrally from the Azure portal.

Azure Local in action

The following example shows how Azure Local in action can help you implement the Azure adaptive cloud approach.

The retail industry, along with manufacturing and energy, is an industry vertical that needs the capabilities of Azure Local. Consider Contoso Supermarkets, a hypothetical large retail chain modeled after an actual, early deployment of Azure Local. This hypothetical organization can demonstrate the power of Azure Local in real-world scenarios, particularly in managing diverse infrastructure across both superstores and convenience stores. Contoso Supermarkets deploys different hardware and operating systems in its larger superstores compared to its smaller, more agile convenience stores. However, with the adaptive cloud approach, Contoso Supermarkets is able to overcome these hardware and operating system variations through a unified management system powered by Azure as a part of Azure Local.

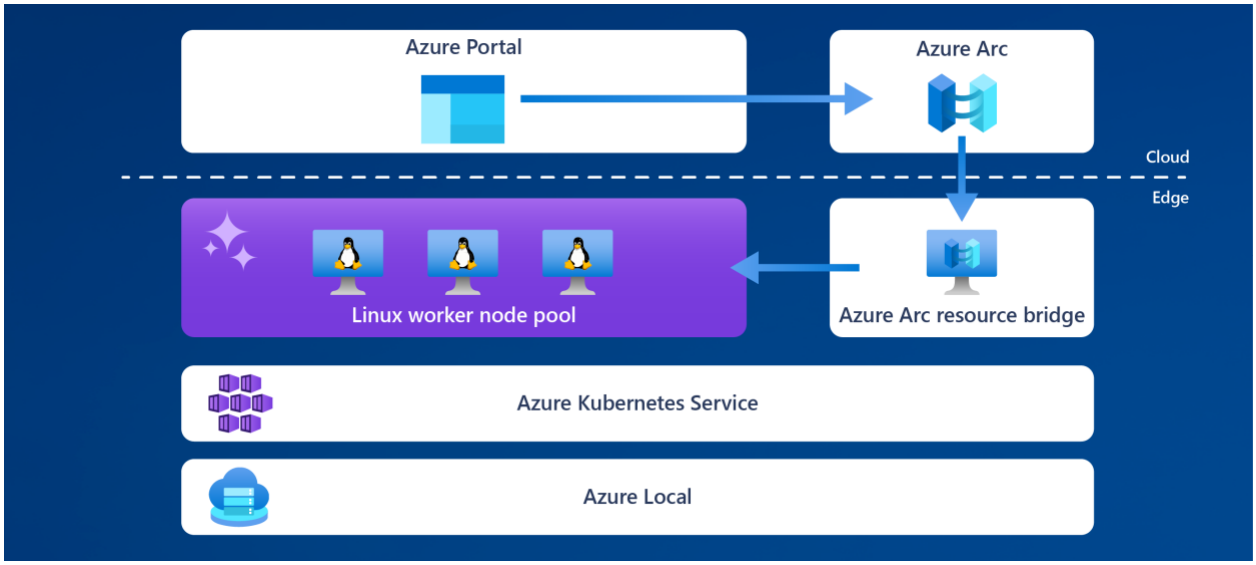


Figure 4. Simplified diagram of Azure Local and its place in the Contoso Supermarkets deployment

Azure Local is deployed at both types of Contoso Supermarkets' locations—superstores and convenience stores—despite the differences in hardware specifications. In superstores, Contoso Supermarkets uses higher-capacity servers and advanced operating systems to handle the increased scale of operations, while in convenience stores, more lightweight and agile hardware solutions are deployed. Regardless of these differences, Azure Local, coupled with the central management capabilities of Azure, ensures a consistent infrastructure environment that allows for seamless management and scaling.

Azure Arc integration time

At the core of Contoso Supermarkets' adaptive cloud strategy is Azure Arc, which integrates directly with Azure Local to provide a unified management experience. This integration enables Contoso Supermarkets to apply familiar Azure tools and services, such as update management, Azure Monitor, and Microsoft Defender for Cloud, across all of its infrastructure, regardless of the hardware variations between locations. With Azure Arc, Contoso Supermarkets' IT team can manage its infrastructure in both superstores and convenience stores through a single, unified portal, ensuring that all systems are updated, secure, and monitored in real time.

Azure Arc also provides Contoso Supermarkets with complete visibility into its distributed infrastructure. This visibility includes hardware details, operating systems, and information about the types of Azure Local instances deployed across different locations. This comprehensive view enables the Contoso Supermarkets IT team to monitor and manage resources consistently, even when variations exist between locations. From machines to networking, and even Kubernetes clusters, Azure Arc delivers a consistent management experience, simplifying operations and ensuring that Contoso Supermarkets' diverse environments are always in sync.

Cloud-controlled management via Azure

One of the key benefits Contoso Supermarkets derives from using Azure Local is cloud-controlled management. This cloud-based management streamlines and secures Contoso Supermarkets' infrastructure across all locations. Azure Arc plays a pivotal role in ensuring that the infrastructure remains up-to-date and secure. This is particularly important because Contoso Supermarkets operates different hardware and operating systems in superstores and convenience stores. The unified management capabilities of Azure Arc ensure that the company's infrastructure, whether it's physical machines or Kubernetes clusters, remains managed consistently, regardless of the underlying differences.

The cloud-controlled nature of Azure Local also simplifies update management across Contoso Supermarkets' entire environment. Azure Arc handles updates for hardware and operating system variations with ease, allowing the company to push critical updates across its infrastructure efficiently. Kubernetes clusters, which differ between locations based on hardware limitations, are also managed seamlessly, ensuring that each environment operates at optimal performance levels without sacrificing security or efficiency.

Security posture management

Security is paramount for Contoso Supermarkets, and Azure Local helps ensure that the company's infrastructure remains secure across all touchpoints. The adaptive cloud approach integrates security features directly into the management interface, enabling the application of default security configurations across all host machines. Azure Arc automatically applies the Edge Secured-core settings, ensuring that all machines—regardless of their hardware configurations or operating systems—adhere to Microsoft's security best practices. (For more information about these Edge Secured-core settings, refer to the Edge Secured-core documentation.)

In addition, Azure Local enhances security through the Secured-core server specification, which strengthens the security posture of Contoso Supermarkets' distributed environments. This approach ensures that each piece of hardware, from superstore servers to convenience store machines, operates within the same stringent security framework, protecting Contoso Supermarkets' infrastructure from potential threats while enabling the company to maintain a secure and agile retail operation across all locations.

Customer success story: Coles retail

Coles, one of Australia's largest retailers, has transformed its operations using Microsoft technologies to enhance both efficiency and customer experience. By implementing Azure Stack HCI (now part of Azure Local), Coles built an intelligent edge system that manages devices, cameras, and workloads across more than 500 stores. With Azure Machine Learning, Coles integrated AI and computer vision for applications such as product recognition, streamlining the checkout process and optimizing store operations.

This technology overhaul has significantly boosted Coles' agility. By extending Azure to its local environments, Coles can deploy and scale new applications six times faster without disrupting store operations. Additionally, automated machine learning with Azure reduced data annotation time by 50%, accelerating AI model training. These improvements enable Coles to focus on delivering seamless customer experiences while maintaining flexible and scalable operations across its vast retail network.

Azure Local: Flexible deployment options

Azure Local provides broad choice of hardware components. This breadth of choice is most apparent with the range of size options that it provides for small-scale and 1U/2U server-scale deployments.

Small-scale (in preview)

The small-scale Azure Local option can be deployed on industrial PCs for local workloads. These devices incorporate zero-touch provisioning, are cloud managed, and provide an optimized footprint tailored to small spaces. They offer a much lower barrier to entry to run Azure Local. Examples of small-scale Azure Local deployments include small retail locations or remote locations such as wind turbines.

1U/2U server-scale

Server-scale Azure Local runs on integrated systems and validated nodes. Example use cases for server-scale Azure Local deployments are similar to those traditionally filled by Azure Stack HCI deployments, such as large retail or manufacturing locations. Azure Stack HCI customers will be upgraded to Azure Local on November 20, 2024.

Consolidate server workloads

Azure Local can also provide a great alternative for customers who want to move off of their existing hypervisors. Customers seeking workload consolidation without the additional cost of hypervisor licensing can move their virtualized workloads directly to Azure Local.

Secure and govern applications across environments

As organizations scale their operations across diverse environments, the need for robust security and governance becomes even more critical. The expansion of infrastructure across both global and local environments inherently increases the attack surface, exposing systems to potential vulnerabilities. To help address these risks, Azure Local uses AI-enhanced management and multilayered security features that provide proactive threat detection and mitigation.

Azure Local built-in layered security

Azure Local ensures security by default across its infrastructure. It applies settings associated with Edge Secured-core automatically to all host machines, regardless of the operating system. This includes both Windows Server and Azure Linux (in preview in the first half of calendar year 2025 for server-scale) host operating systems.

Microsoft Defender for Cloud

One of the cornerstone features of the Azure Local security framework is Microsoft Defender for Cloud. This advanced tool offers unparalleled threat protection and security management capabilities specifically designed for Azure environments. By making use of AI and machine learning, Microsoft Defender for Cloud can detect and respond to security threats in real time, thereby safeguarding data and applications against cyberattacks and vulnerabilities.

Secured-core servers

The Azure Local security infrastructure also includes Secured-core servers. These servers use a silicon-based root of trust to ensure that the hardware and firmware remain free from tampering. This adds an additional layer of security, making it significantly more challenging for attackers to compromise a system.

Azure Local applies settings associated with Edge Secured-core automatically to all host machines, regardless of the operating system. This automatic security for the Windows Server and Azure Linux host operating systems helps ensure a consistent security posture and management experience.

Azure Local ensures security by default across the infrastructure

Azure Local delivers a robust security approach by default that helps safeguard organizations' infrastructure through Trust Launch and segmented networks. Trust Launch protects VMs by establishing a secure boot environment, which verifies that only trusted software is loaded during startup. This secure boot environment for VMs helps prevent attacks on the system at the firmware level.

Azure Local also uses segmented networks to help isolate different workloads. This segmentation of networks administered by Azure Local reduces the risk of lateral movement in the event of a breach, which helps ensure that even if one network is compromised, attackers are unable to access other critical parts of an organization's infrastructure.

Flexibly meet regulatory and connectivity needs

Today's complex regulatory landscape is only growing more challenging, forcing organizations like yours to navigate a host of compliance requirements. Such requirements can be particularly challenging when it comes to data residency and sovereignty. Azure Local enables businesses to meet regulatory needs with flexibility, ensuring that data is stored and processed in accordance with local laws and regulations. Azure Local provides customizable infrastructure that supports compliance without compromising performance or scalability. This customization ensures that businesses can confidently handle sensitive data while adhering to the strictest data-sovereignty requirements.

Additionally, Azure Local simplifies the infrastructure required for edge computing, which can provide organizations with a streamlined solution that can be deployed and managed across distributed locations. By reducing the complexity typically associated with edge deployments, Azure Local allows businesses to process data closer to the source, improving latency and connectivity while maintaining seamless integration with cloud-based systems.

Conclusion

Organizations like yours face myriad challenges that span from global to local scales. More than ever, these challenges are not static but continuously evolve and push businesses to adapt and innovate to stay competitive. As your business goals evolve, so too must your infrastructure technology strategy.

The Microsoft Azure adaptive cloud approach is designed to meet these unique challenges head-on. It uses the power of Azure so businesses can harness a flexible, scalable, and integrated cloud infrastructure that adapts to their specific needs. This approach ensures that you can remain agile, responsive, and ahead of the curve, no matter the industry or market conditions.

Azure Local extends the capabilities of Azure into customer-owned and operated hardware, which provides a seamless and unified management experience. Extending Azure into your own, distributed hybrid infrastructure allows businesses like yours to deploy and manage applications across diverse environments with ease and helps ensure operational efficiency and scalability. With Azure Local, you can confidently navigate the complexities of modern business, knowing that your infrastructure is robust, secure, and ready to meet the demands of the future.

To learn more about Azure Local, visit https://azure.microsoft.com/en-us/products/local/.