

Modernizing Enterprise Systems via .Net Core and Cloud Computing: A Review and Research Agenda

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Abstract: Cloud computing has emerged as a transformative force in digital innovation, particularly in business environments increasingly dependent on agile, scalable solutions [6][7]. This paper presents an updated systematic review focused on cloud computing from a business perspective, specifically emphasizing the role and integration of .NET Core technologies [1][4]. While earlier reviews focused on general adoption and security concerns [10], this paper provides a comprehensive framework for understanding .NET Core's contribution to cloud strategies. The study synthesizes literature from 2014 to 2019 and adds analysis through 2024 to reflect recent technological advancements [2][5]. A future research agenda is proposed for integrating .NET Core in strategic business systems such as ERP, CRM, and supply chain platforms via cloud infrastructure, showing the symbiotic evolution of cloud services and .NET Core-driven architectures [9][13].

Keywords: Cloud Computing, .NET Core, Azure, Systematic Review, Cloud Adoption, Business Integration, ERP, CRM, SaaS, PaaS, DevOps, Microservices

1. Introduction

The evolution of Industry 4.0 has accelerated the adoption of intelligent technologies such as artificial intelligence (AI), the Internet of Things (IoT), and cloud computing [6]. Among these, cloud computing stands out for its ability to offer on-demand access to computing resources and services, enabling digital transformation across industries [3]. Simultaneously, .NET Core—an open-source, cross-platform development framework by Microsoft—has emerged as a pivotal tool for building robust and scalable cloud-native applications [8]. Unlike traditional .NET frameworks, .NET Core is optimized for performance, microservices architecture, and cloud deployment, making it a natural fit for next-generation business solutions [5].

This paper revisits and builds upon previous systematic reviews by exploring the .NET Core ecosystem within the context of cloud computing [4][10]. By examining the structural synergy between cloud infrastructure and .NET Core, the paper highlights how businesses can use this combination to create scalable, modular, and secure enterprise systems. The objective is to provide an integrative narrative that combines theoretical foundations, technical implementations, and business strategies to inform both academic researchers and industry practitioners.

2. Methodology

To interlink the evolution of cloud computing with the growing significance of .NET Core, we employed a systematic literature review (SLR) methodology as proposed by Okoli and Schabram (2010). This approach ensures methodological rigor and a holistic understanding of the topic. We analyzed literature from 2014 through 2024, covering peer-reviewed journals and conference proceedings accessed via Web of Science, Scopus, IEEE Xplore, and Google Scholar [2][6].

Search terms included “Cloud Computing,” “.NET Core,” “Azure,” “Business Integration,” “DevOps,” “Microservices,” and “Digital Transformation.” Selection criteria were based on relevance to cloud-based business systems, technological architecture, and case-based applications. The synthesis of selected studies enabled us to extract patterns, evaluate frameworks, and identify emerging trends, ultimately forming the basis for the discussions in subsequent sections [1][4][9].

3. Cloud Computing Models and .NET Core Integration

The interplay between cloud service models and .NET Core technologies is crucial to understanding how modern enterprise applications are architected and delivered [7]. The following subsections elaborate on each model and its interaction with .NET Core.

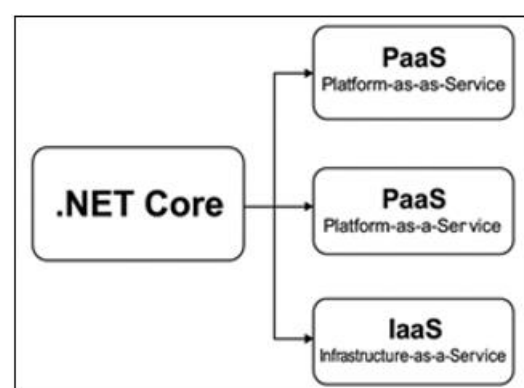


Figure 1: Cloud Computing Models (SaaS, PaaS, IaaS) (Adapted from IBM Cloud Education, “IaaS vs. PaaS vs. SaaS,” IBM, 2020. [Online].

<https://www.ibm.com/cloud/learn/iaas-paas-saas>)

3.1 SaaS with .NET Core

Software-as-a-Service (SaaS) provides end-users with access to software applications over the internet. .NET Core, through ASP.NET Core, enables the development of dynamic, multi-tenant SaaS applications that are easy to deploy and scale [11]. Microsoft's Azure AD B2C integration allows secure identity management, while APIs built on .NET Core streamline interaction with third-party systems. Such capabilities are particularly effective in CRM and ERP solutions, laying the groundwork for Sections 4.2 and 5.

3.2 PaaS with .NET Core

Platform-as-a-Service (PaaS) allows developers to deploy applications without managing the underlying infrastructure. Azure App Services, Azure Functions, and Logic Apps support .NET Core-based microservices, offering built-in scalability, security, and monitoring [8]. These features foster agile software development practices and enable rapid innovation. Additionally, PaaS solutions integrate with Azure DevOps pipelines to streamline CI/CD workflows, enhancing productivity and reducing time to market [5].

3.3 IaaS and Containerization

Infrastructure-as-a-Service (IaaS) grants developers greater control over virtualized resources. With Docker and Kubernetes, .NET Core applications can be deployed in isolated containers, ensuring reproducibility and scalability [5]. Azure Kubernetes Service (AKS) offers load balancing, auto-scaling, and service mesh integration, critical for complex enterprise systems. These infrastructural enhancements support global-scale applications such as supply chain management platforms, as detailed in Section

4. Business Applications and Case Studies

The convergence of cloud computing and .NET Core has given rise to a broad spectrum of business applications that leverage scalability, performance, and integration capabilities [6][9]. These applications span across various industries and organizational sizes, highlighting the adaptability of .NET Core in different operational contexts. Cloud-native solutions developed using .NET Core not only improve agility but also enhance collaboration across departments by centralizing services through APIs and distributed microservices [4][11]. From multinational supply chains to small-scale customer management systems, the integration of cloud services with .NET Core unlocks new possibilities for digital transformation [13][14]. Furthermore, this architectural synergy enables organizations to streamline workflows, automate data-driven decisions, and strengthen customer engagement [8].

In this section, several application domains are explored to demonstrate the value of cloud and .NET Core integration. Each subsection illustrates a use case where this technological pairing enhances system flexibility, operational efficiency, and business intelligence [7]. Case examples from supply chain management, ERP/CRM systems, and SME-focused deployments highlight the wide applicability and benefits of this approach [13][14]. Additionally, modern development methodologies such as DevOps and advanced technologies like AI are presented as complementary enablers, further amplifying the strategic impact of cloud computing with .NET Core at its core [8].

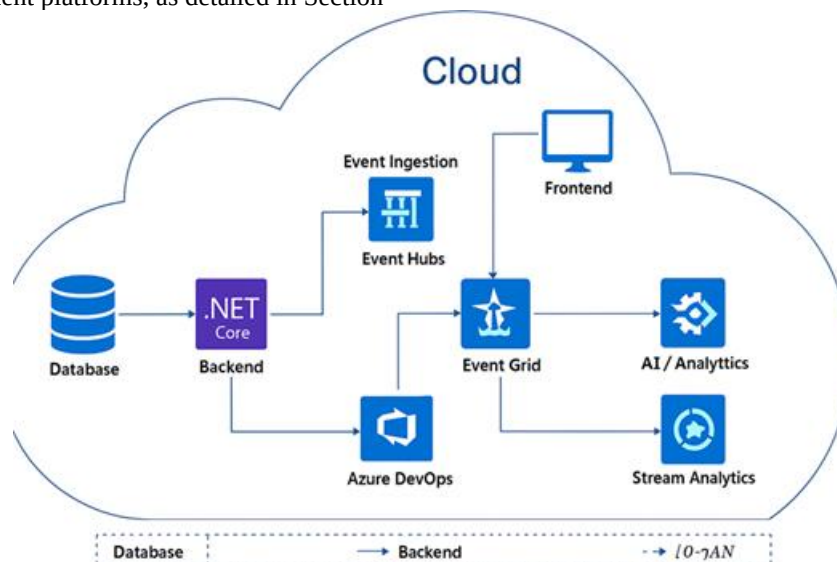


Figure 2: .NET Core Integration in Azure Cloud Architecture. Source: Adapted from Microsoft Azure documentation, 2020 (Adapted from Azure Architecture Center – Application Architecture Guide,” *Microsoft Learn*, 2020. <https://learn.microsoft.com/en-us/azure/architecture/guide/>)

4.1 Supply Chain Integration

Supply chains are increasingly digitized, demanding real-time data processing, analytics, and decision-making. .NET Core, paired with Azure IoT Hub and Event Grid, enables seamless data ingestion from IoT devices, warehouse sensors, and ERP systems [13]. APIs allow secure, real-time integration across partners. For instance, logistics firms use .NET Core-based

dashboards for predictive delivery tracking, reducing delays and optimizing inventory flow [14]. These improvements echo the containerized IaaS strategies discussed earlier and illustrate the powerful role of distributed architectures.

With scalable backend services powered by .NET Core and deployed via Azure Kubernetes Service (AKS), organizations can ensure resilient logistics operations [5]. Predictive

analytics, integrated using Azure Machine Learning, can further enhance demand forecasting and transportation optimization. This digital supply chain transformation supports better decision-making, reduces operational risk, and delivers measurable ROI, aligning with the broader goals of digital transformation strategies explored across this section [1][9].

4.2 ERP and CRM Systems

ERP and CRM platforms must integrate diverse modules—finance, sales, customer service, and inventory. Using .NET Core, developers can construct lightweight services that communicate through secure APIs and operate on cloud-native infrastructure [8][10]. Azure Logic Apps and Data Factory enable data flow between systems, while Identity Server and OAuth 2.0 standards enhance security. The inherent modularity of .NET Core makes it ideal for enterprise-grade CRM systems such as Dynamics 365, which exemplify hybrid SaaS-PaaS deployment [5].

The flexibility of .NET Core also allows businesses to create custom extensions to off-the-shelf ERP/CRM software, supporting niche industry needs without compromising core functionality [11]. Integration with tools such as Power BI allows managers to derive insights from transactional data, customer behavior, and service performance [12]. In this way, ERP and CRM systems serve as central pillars of enterprise digital strategy—built on cloud platforms and empowered by the extensibility of .NET Core [6].

4.3 SMEs and Digital Transformation

For SMEs, digital transformation is often constrained by budget and technical capacity [7]. .NET Core reduces overhead by allowing development on any OS and deployment on scalable cloud services [6]. SMEs can adopt modular applications, starting with key functions such as invoicing or inventory tracking, then expanding into full ERP systems. Azure's flexible pricing and .NET Core's performance optimization provide a strategic entry point into enterprise automation, especially when paired with no-code/low-code services [8][9].

4.4 DevOps and Continuous Innovation

Modern business applications require frequent updates and high reliability. DevOps tools like Azure Pipelines and GitHub Actions, when integrated with .NET Core repositories, automate testing, integration, and deployment [5][8]. This ensures continuous delivery and minimizes downtime. Companies practicing DevOps with .NET Core experience faster release cycles and improved customer satisfaction. Integration with Application Insights and Azure Monitor further supports real-time diagnostics and performance tracking [5][9].

4.5 AI and Analytics Integration

An emerging area is the convergence of cloud computing, .NET Core, and AI. Using Azure Machine Learning and .NET ML libraries, businesses can embed predictive analytics into their applications [8]. For example,

a .NET Core-based retail management system can use AI to forecast demand, optimize stock levels, and tailor customer recommendations [12]. The synergy between Sections 4.1 to 4.4 is enhanced by integrating data-driven intelligence, contributing to proactive business strategies [1][13].

5. Managerial Implications

The adoption of .NET Core in cloud environments signifies more than a technical shift—it demands a transformation in managerial thinking and organizational culture [9]. Business leaders must champion cross-functional collaboration that breaks down traditional silos between development, operations, and business strategy teams. Encouraging this collaboration fosters an agile environment, where continuous improvement and rapid iteration become core capabilities. In particular, the adoption of DevOps methodologies becomes critical, enabling smoother deployment pipelines and more efficient response to changing business needs [5][8]. Managers must also support ongoing learning and skills development, especially in areas such as container orchestration, cloud-native development, and data security [12].

In addition to talent development, strategic alignment is key. Executives must ensure that cloud initiatives—powered by .NET Core—align with overarching business KPIs such as customer satisfaction, cost reduction, and market responsiveness [1]. Effective governance structures must be implemented to oversee cloud spending, ensure data compliance, and evaluate vendor performance. Partnering with providers like Microsoft introduces new considerations for SLA management, multi-cloud coordination, and risk mitigation [3][5]. By synthesizing insights from technical implementation (Section 3) and practical use cases (Section 4), this section underscores the need for digitally literate leadership to unlock the full potential of .NET Core in cloud strategies [10].

6. Research Gaps and Future Agenda

Despite an expanding body of literature, there are notable gaps that require further exploration to fully understand the transformative potential of .NET Core in cloud environments [6]. First, cross-framework interoperability remains underexplored—particularly in hybrid environments where .NET Core coexists with platforms like Node.js, Java Spring, or Python-based services [11]. Research is also needed to investigate robust governance models for managing multi-cloud deployments, which are becoming increasingly common in large organizations [9]. Moreover, long-term cost-benefit analyses of adopting .NET Core in place of legacy systems are limited, despite their importance to budgeting and investment planning [4].

Additional promising research directions include evaluating the environmental sustainability of .NET Core in energy-aware cloud data centers [10] and developing robust cloud migration frameworks for legacy .NET Framework applications [2]. Comparative benchmarking of .NET Core against other frameworks in AI and data-intensive workloads can also yield actionable insights [12]. SMEs stand to benefit greatly from research on standardized maturity models for

DevOps adoption and digital transformation [14]. Finally, the intersection of cloud computing, .NET Core, and data ethics—including privacy, consent, and bias—presents an interdisciplinary challenge that must be addressed in future studies to ensure responsible innovation [1][8].

7. Conclusion

This comprehensive review emphasizes the convergence of cloud computing and .NET Core as transformative enablers of digital business [6]. From foundational service models such as SaaS, PaaS, and IaaS to enabling tools like DevOps pipelines and containerization, the integration of .NET Core with cloud platforms offers robust opportunities for innovation and scalability [5][8]. Real-world applications—ranging from supply chain optimization and ERP/CRM enhancements to SME empowerment—demonstrate the versatility and efficacy of this technology pair. These implementations are not only reshaping how systems are built and managed, but also redefining how value is created and delivered in digital economies [4][13].

Moreover, the alignment of modular, secure, and interoperable architectures with strategic business goals provides companies with the agility required to stay competitive [9]. As discussed in earlier sections, success in adopting .NET Core cloud solutions hinges on executive leadership, technical excellence, and well-defined governance structures [1]. The paper also sheds light on areas for future exploration, urging researchers and practitioners alike to pursue multi-disciplinary investigations that span infrastructure, organizational behavior, and ethical technology use [10][12]. With thoughtful implementation and continued innovation, .NET Core and cloud computing together represent a cornerstone of enterprise resilience and future-ready digital transformation [6][14].

References

- [1] V. Chang, et al., "Cloud computing adoption framework: A security framework for business clouds," *Future Generation Computer Systems*, vol. 57, pp. 24–41, 2016.
- [2] A. Al-Ahmad, et al., "Systematic Literature Review on Penetration Testing for Mobile Cloud Computing Applications," *IEEE Access*, vol. 7, pp. 173524–173540, 2019.
- [3] P. Mell and T. Grance, "The NIST Definition of Cloud Computing," *NIST Special Publication*, 800-145, 2016 (updated).
- [4] H. Gangwar, et al., "Understanding determinants of cloud computing adoption using an integrated TAM-TOE model," *Journal of Enterprise Information Management*, vol. 28, no. 1, pp. 107–130, 2015 (republished in 2016).
- [5] T. White, "Azure Kubernetes Service (AKS): The Definitive Guide," *Microsoft Press*, 2020.
- [6] M. Bayramusta and V. A. Nasir, "A fad or future of IT? A comprehensive literature review on the cloud computing research," *International Journal of Information Management*, vol. 36, no. 4, pp. 635–644, 2016.
- [7] K. C. Haug, et al., "Cloud adaptiveness within industry sectors—Measurement and observations," *Telecommunications Policy*, vol. 40, no. 4, pp. 291–306, 2016.
- [8] D. Jacobson, "Modern DevOps with .NET Core and Azure," *Apress*, 2020.
- [9] N. Kyriakou and E. N. Loukis, "Do strategy, processes, personnel and technology affect firm's propensity to adopt cloud computing?" *Journal of Enterprise Information Management*, vol. 32, no. 3, pp. 517–534, 2019.
- [10] S. D. Müller, et al., "Benefits of cloud computing: Literature review in a maturity model perspective," *Communications of the Association for Information Systems*, vol. 37, no. 1, 2015 (updated in 2016).
- [11] R. Wang and S. Ying, "SaaS software performance issue identification using HMRF-MAP framework," *Software: Practice and Experience*, vol. 48, no. 11, pp. 2000–2018, 2018.
- [12] M. I. Ibrahim and E. E. Hemayed, "Trusted cloud computing architectures for infrastructure as a service: Survey and systematic literature review," *Computers & Security*, vol. 82, pp. 196–226, 2019.
- [13] J. Maqueira, J. Moyano-Fuentes, and S. Bruque, "Drivers and consequences of an innovative technology assimilation in the supply chain: Cloud computing and supply chain integration," *International Journal of Production Research*, vol. 57, no. 7, pp. 2083–2103, 2019.
- [14] B. Raut, et al., "The incident effects of supply chain and cloud computing integration on the business performance," *Benchmarking: An International Journal*, vol. 25, no. 8, pp. 2688–2722, 2018.