Abstract

The pandemic has brought to light the ways technology can transform healthcare and make it more connected, predictive, and efficient. Healthcare organizations are now more open to adopting cloud computing as the crisis has reinforced its benefits and put to rest most fears related to privacy, security, implementation, and adoption. With cloud computing, healthcare organizations can achieve increased data security, assured system scalability, and enhanced flexibility to manage billings and streamline claims for significant cost savings. The increasing popularity of cloud-enabled healthcare services is driving the healthcare cloud computing market, which is predicted to grow at CAGR of 23% to USD 25.54 billion during 2020-2024\(^1\).

This whitepaper explores how cloud can play a vital role in redefining healthcare in the future.

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Cloud Computing: Game changer in healthcare

With the pandemic accelerating the need for remote healthcare services, there is an evident increase in the appetite for cloud computing within the healthcare industry. Healthcare providers are leveraging cloud technologies for diagnostics, monitoring, testing, consultations, and other cloud-enabled vertical solutions and offerings. Telehealth, wearables, remote monitoring, interoperability, AI, machine learning, and cybersecurity are fast emerging as key healthcare trends. Both providers and payers are tapping into the power and scalability of cloud solutions to access and share data as healthcare becomes more collaborative, patient-centric, and data-driven.

Here’s a look at the ways cloud computing is changing the rules of the game across the healthcare ecosystem:

For Providers

Cloud computing offers healthcare providers the agility to modify their business models, develop new cost-effective capabilities rapidly, and share information with more flexibility along the value chain. Providers can enable healthcare without walls by accessing cloud-based medical data from anywhere. By leveraging electronic health records (EHRs) and telehealth, providers can connect, collaborate, and share patient information across the system, allowing doctors to offer better treatments by understanding ailment history.

Some use cases include:

- **Telehealth for on-demand, remote critical care**
- **Data Analytics/AI and ML for predictive analysis and disease prevention**
- **AR, VR, and Robotics for Lab and Diagnostic tests, remote surgeries/rehabilitation, and training doctors**
- **Digital Twins for drug testing and understanding implications**
- **IoT (wearables) for analyzing patient vitals and providing preventive remote care**

For Payers

Cloud computing provides better insights into cash flow, payments, and revenue management for payers.

Use cases:

- **Data Analytics combined with AI and ML for providing personalized care**
- **Claims and Denials value stream automation and optimization**
- **Bringing transparency with an integrated stakeholder network**
For pharma companies and drug makers

Major pharmaceutical companies and drug manufacturers are increasingly relying on cloud computing to allow their worldwide R&D teams to collaborate on clinical trial executions. Cloud adoption facilitates a holistic Drug Utilization Review (DUR) process for any patient to analyze patient data for drug/vaccine discovery.

Use cases:
- Real-time logistics tracking
- Predictive analysis for optimizing order fulfillment
- Data analytics to understand drug demand

Challenges and opportunities to cloud adoption

As with all new technology cloud adoption too has its own share of challenges. The overall technology overhaul is restricted by aging legacy platforms, untrained resource pools, and data security concerns, loss of sensitive protected health information (PHI), and regulatory non-compliance.

Realizing that healthcare involves unique, industry-specific security concepts, cloud computing can help healthcare organizations manage new threats and regulatory developments with analytics-driven security systems. Sensitive PHI data can be self-protected by incorporating security and authorization access into the metadata, thereby limiting data access across devices and networks to authorized users only. Cloud computing also safeguards data shared between different stakeholders while facilitating interoperability, collaboration, and improved patient care in today’s hyper-connected healthcare ecosystem.
Benefits of cloud adoption

- **Flexibility and scalability**: Cloud adoption helps offer infrastructure and allows healthcare organizations to upsize or downsize their IT requirements according to business needs.

- **Security**: Most of the leading cloud service providers like Amazon, Azure, and Google are HIPAA and GDPR compliant and offer cost-effective, best-in-class privacy and safeguard mechanisms like network firewall, data encryption, log analytics, etc. for utmost security of medical data.

- **Cost**: Cloud service providers offer enormous data repository at a minimal cost with pay-as-you-use and subscription models. By transferring IT budgets from Capex to Opex, cloud computing significantly reduces in-house infrastructure and other operational costs.

- **Better collaboration**: Cloud adoption ensures better collaboration among stakeholders by eliminating information silos and ensuring transparency. Confidential healthcare information can be shared among stakeholders in real-time for remote conferencing and access to patient medical data anytime, anywhere.

- **Automated disaster recovery and software updates**: The pandemic exposed the weaknesses of on-premises disaster recovery strategies and highlighted the challenges of recovering from unexpected data center outages. In contrast, cloud-based disaster recovery solutions offer cost-effective, pay-per-use environments to support agile recovery requirements. Gartner predicts that by 2023, 50% of enterprises will increase their cloud-based disaster recovery budgets. Cloud-based disaster recovery will be preferred by an additional 20% organizations as it guarantees less downtime, increased productivity, lower costs, and a reduced credibility loss risk.

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1. [https://www.gartner.com/smarterwithgartner/7-workloads-that-should-be-moved-to-cloud-right-now/](https://www.gartner.com/smarterwithgartner/7-workloads-that-should-be-moved-to-cloud-right-now/)
Cloud Computing: Service Levels in Healthcare

The success of cloud adoption largely depends on selecting the right cloud type and that includes private, community, hybrid, and public cloud services. Healthcare organizations must consider the unique benefits and risks associated with each cloud type to set realistic expectations with service providers. There are also different models of service delivery to consider:

- **Software as a Service (SaaS)** - a pay-per-use business model preferred by small healthcare organizations with low IT strength. The capital expenses associated with operating systems, hardware, and software is eliminated as data is hosted on the cloud and can be accessed via web browsers.

- **Platform as a Service (PaaS)** - a favored option for large healthcare organizations with in-house capability for developing cloud-based solutions. PaaS offers an environment for custom application development and a rapidly evolving software development lifecycle to support continuously changing needs. Focused more on app development with readily available SDKs, PaaS can be used in IoTs and healthcare wearables.

- **Infrastructure as a Service (IaaS)** - suitable for large healthcare organizations with big IT teams requiring scalable infrastructure and cost-effective turn-key solutions. It includes physical servers and VMs and grants end users control over the cloud. IaaS provides scalability with security, and flexibility to work with cloud infrastructure, built-in backup, and data protection.

- **Database as a Service (DBaaS)** - a highly scalable and secure solution that offers holistic support at lower TCO to healthcare organizations. It helps improve operational efficiency and interoperability through a highly accessible, centralized, and secured database environment.

- **Business Process as a Service (BPaaS)** - most useful for healthcare payers as it offers web-enabled service for managing business processes that results in transparency, cost savings, and automation on plans and upgrades. BPaaS ensures operational agility and faster go-to-market while avoiding upfront technology and infrastructure costs.
Healthcare Cloud: Migration Approach

For successfully migrating to the cloud, healthcare organizations need to follow a three-step approach:

1. **Analyze Cloud Migration Impact on:**
   - Customer ROI
   - Security/privacy and regulatory needs
   - Data storage/retrieval, encryption techniques

2. **Conduct Cloud Assessment for:**
   - Migration path, patterns, and target architecture
   - Finalization of move plan (rehost, re-architect, rebuild, re-purchase or no-migration)
   - Defining migration streams and connectivity to on-prem

3. **Execute Cloud Migration Process:**
   - Migrate to cloud through continuous deployment
   - Integrate with on-prem applications
   - Validate the applications are working correctly through continuous monitoring
   - Notify users once cloud migration is successful

**Conclusion**

The advantages of cloud adoption are too compelling to ignore. When it comes to agile implementation, upscaling services for unknown demand (like the pandemic), and data integration, cloud-based technologies score over on-premises solutions. Healthcare organizations that want to gain competitive advantage and increase market share through value-driven and patient-centric offerings must consider moving to the cloud. The road to the healthcare of the future goes through the cloud.
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Kamini Bhargava has 21+ years of industry experience in technology, solutions, and consulting. She has a vast experience in Banking and Finance (BFS), Insurance and Healthcare, and technology and domain-focused solutioning for various customers in the US and Europe.
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