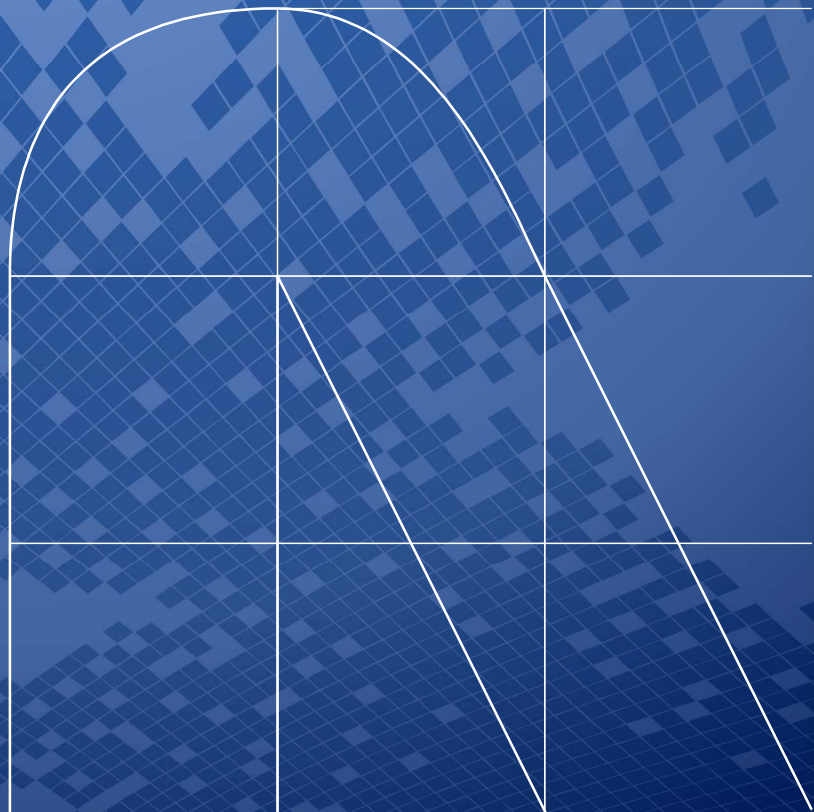


Generative AI: A Transformative Force in Legacy App Modernization

NTT DATA point of view on leveraging Generative AI to Modernize legacy applications and unlocking their potential.

NTT DATA Point of View

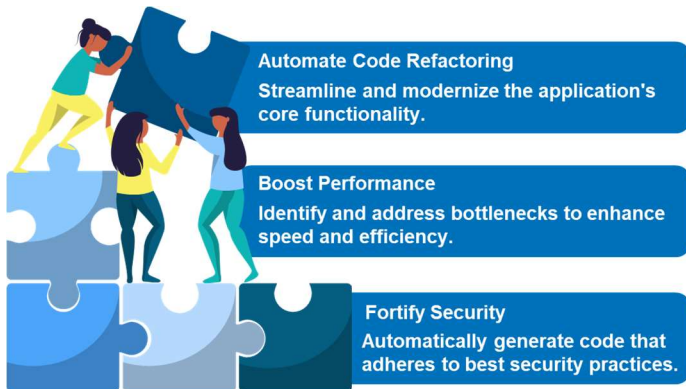


Legacy Apps: Stuck in Reverse

Remember the days when we used to walk around carrying bulky floppy disks, their limited storage capacity and frequent corruption issues a constant source of frustration? Legacy applications are the software equivalent – once groundbreaking, now feel and indeed are inadequate for the demands of the digital age.

These legacy applications, built with outdated technology, are like vintage cars – charming but increasingly impractical. Maintaining them becomes a financial drain. A recent vfunction¹ report estimates the average cost to be a staggering \$361,000 of technical debt for every 100,000 lines of code.

But the bigger challenge lies in their limitations. Built on outdated platforms, these applications are like outdated storage media. Maintaining them is like relying on a dusty box of floppy disks – a slow, cumbersome, and error-prone process. However, now it looks like we have a solution to this issue, enter Generative AI: This revolutionary technology acts as a powerful engine upgrade for your legacy applications. Generative AI offers a similar transformation. It can:



By leveraging Generative AI, businesses can break free from the limitations of legacy systems and shift into high gear. This paves the way for:

- **Increased agility:** Adapt to changing market demands and integrate seamlessly with modern technologies.
- **Enhanced innovation:** Free up resources and developer expertise to focus on new ideas and solutions.
- **Reduced costs:** Minimize the financial burden of maintaining outdated systems.

Generative AI offers a compelling solution to the looming legacy crisis, propelling businesses towards a more efficient, secure, and innovative future.



The Legacy Landscape

Legacy applications, much like untamed wilderness, present a complex and challenging landscape for businesses. This tangled ecosystem is riddled with:

- **Outdated Languages:** Imagine navigating a dense forest with an outdated map. Legacy systems often rely on archaic programming languages like COBOL, making them difficult to understand and maintain. Finding developers fluent in these languages is similar to searching for experienced alchemists.
- **Lack of Documentation:** Imagine venturing into the wilderness without a compass or guide. Legacy applications frequently suffer from poor or non-existent documentation, leaving developers to decipher the system's inner workings through trial and error. This not only hinders maintenance but also creates a knowledge gap as experienced developers retire.
- **Integration Challenges:** Imagine trying to connect a modern highway to a network of dirt roads. Integrating legacy systems with modern applications can be a herculean task due to incompatible architectures and data formats. This creates significant roadblocks in efforts to leverage new technologies and functionalities.

These technical hurdles translate into a multitude of business challenges:

- **Scalability Woes:** Legacy systems, like an overloaded trail, struggle to handle the ever-increasing demands of a growing user base or data volume. This can lead to performance bottlenecks and system crashes, hindering business growth.
- **Security Vulnerabilities:** Outdated security protocols in legacy systems are akin to a crumbling fortress. Cybercriminals exploit these vulnerabilities to gain unauthorized access to sensitive data, posing significant security risks.



The tangled mess of legacy applications not only consumes valuable resources but also stifles innovation and hinders a business's ability to adapt to the ever-evolving digital landscape. This is where Generative AI steps in, offering a machete to clear a path through the thicket and pave the way for a more efficient and secure future.

Generative AI: A Ray of Hope in the Digital Age

Imagine a tool that can analyse and understand complex systems, then utilize that knowledge to automatically improve them. This is the essence of Generative AI, a revolutionary technology poised to transform the way we approach legacy app modernization.

In simpler terms: Generative AI can be thought of as a powerful learning algorithm. It ingests vast

amounts of data, including existing code and best practices, and learns to identify patterns and relationships. This knowledge empowers it to:

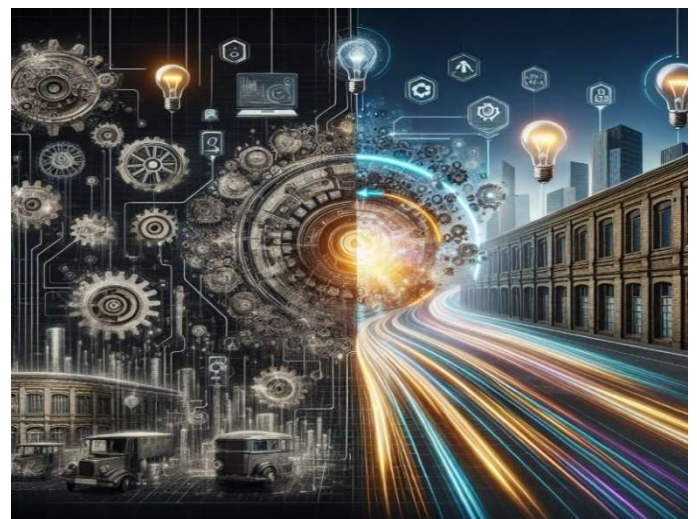
Generate new code: Like how an artist can create a new painting based on their understanding of existing works, Generative AI can automatically write code that adheres to specific functionalities and security protocols.

Technical details: While various approaches exist (e.g., Variational Autoencoders), the core concept remains the same – learning from data to produce creative solutions.

Here's how Generative AI tackles the legacy challenge:

- **Automated Refactoring:** Imagine cleaning up and reorganizing a cluttered workspace. Generative AI can automatically analyze and rewrite existing code, improving its efficiency, readability, and maintainability. This reduces the burden on developers and minimizes the risk of errors.
- **Performance Optimization:** Think of fine-tuning an engine for smoother operation. Generative AI can identify bottlenecks within the application's code and suggest modifications to enhance speed and performance.
- **Security Fortification:** Similar to installing security cameras and alarms, Generative AI can automatically generate code that adheres to best security practices. This helps mitigate vulnerabilities and safeguard the application from cyber threats.

By leveraging Generative AI, businesses can breathe new life into their legacy systems, paving the way for a more efficient, secure, and adaptable future.

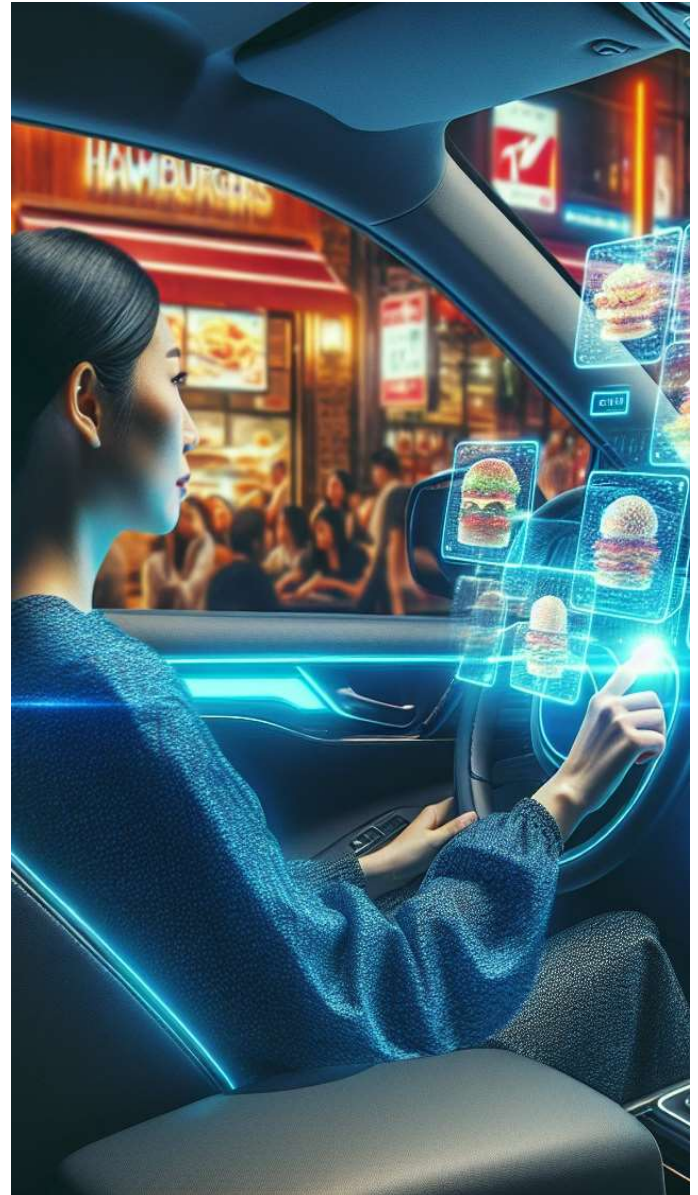


Generative AI Already in Action

Widespread adoption of Generative AI for legacy system modernization is still evolving, making it challenging to pinpoint specific large-scale deployments solely attributable to this technology. However, its potential to revolutionize this domain is undeniable. Here, we delve into the exciting possibilities Generative AI presents:

Industry Embraces Potential: This surge in interest signifies a growing recognition of its potential to address critical challenges across various industries. Leading corporations are actively exploring AI solutions for legacy system upgrades, acknowledging the immense potential for improved efficiency and security.

From Pilot Projects to Widespread Adoption: While large-scale deployments of Generative AI in legacy system modernization may still be in the experimental phase, the journey from pilot projects to full-scale adoption is well underway. Companies can no longer afford to wait. The early movers, in collaboration with trusted partners like NTT DATA, are already seeing the benefits of engaging in modernization projects with Generative AI.



Looking Ahead: A Transformed Landscape

The potential benefits of Generative AI are vast. Imagine a future where:

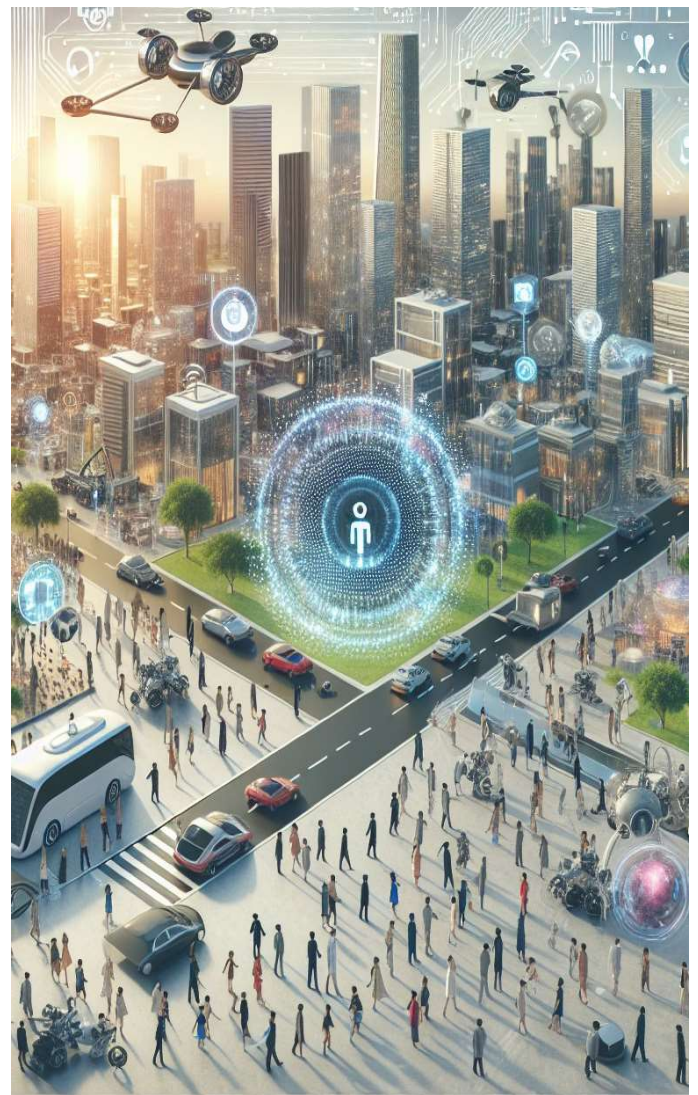


By harnessing the power of Generative AI, businesses can unlock a future where legacy systems become springboards for innovation, not burdens hindering progress. As research and development efforts continue, the potential of Generative AI to revolutionize legacy app modernization is no longer a matter of speculation, but a promising future within reach.

While pinpointing specific large-scale deployments solely attributable to Generative AI in legacy modernization remains an evolving field, the technology's transformative potential is undeniable. Here, we explore the exciting landscape where Generative AI is poised to revolutionize this domain:

Industry Embraces Potential:

Gartner² report says venture capital firms have invested over \$1.7 billion in generative AI solutions over the last three years, with AI-enabled drug discovery and AI software coding receiving the most funding.



Best Practices for Legacy App Modernization with Generative AI:

Embracing Generative AI for legacy system modernization requires a strategic approach. Here are key best practices to ensure successful implementation:

Start Small and Scale Smart:

- **Pilot Project:** Begin with a low-risk, well-defined component of the legacy system. This allows you to test the effectiveness of Generative AI in a controlled environment, identify potential challenges, and refine your approach before tackling larger portions of the codebase.
- **Iterative Refinement:** Adopt an iterative approach. As you progress through the pilot project, continually assess the results, and fine-tune the Generative AI model. This ensures continuous improvement and adaptation to the specific characteristics of your legacy system.



Leverage the Power of Collaboration:

- **Co-pilot for Adoption and Deployment:** Consider employing a co-creation strategy. Partner with AI experts or specialized consultancies that can provide guidance and support throughout the adoption and deployment process. This collaborative approach leverages their expertise and accelerates the learning curve for your internal teams.
- **Forging Strategic Partnerships:** By collaborating with experienced players, businesses can not only adopt Generative AI but also future proof their legacy systems and achieve competitive advantages.
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These platforms can act as accelerators, streamlining the integration of AI functionalities into your existing workflows.

Industry-Specific Focus:

- **Targeted Use Cases:** Identify industry-specific use cases where Generative AI can deliver the most significant impact. This could involve tasks like code refactoring for specific programming languages commonly used in your industry, or security vulnerability detection tailored to the unique threats faced by your sector.

Scaling with Responsibility:

- **AI Safety and Explainability:** As you scale your Generative AI implementation, prioritize AI safety and explainability. Ensure that the AI models are rigorously tested and validated to mitigate the risk of unintended consequences. Additionally, strive to make the decision-making process of the AI transparent and understandable, fostering trust and confidence in its outputs.
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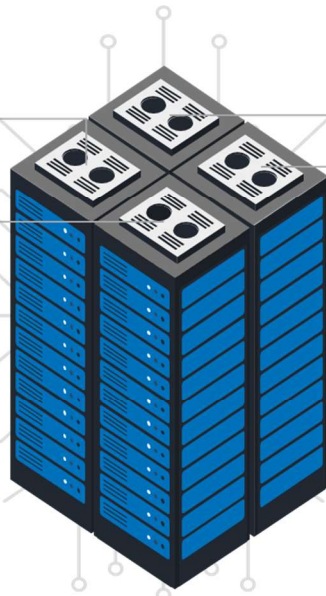
Invest in Your Workforce:

- **Training and Support:** Provide your employees with comprehensive training on Generative AI and its applications within the context of legacy modernization. Empower them to understand the technology, utilize its capabilities effectively, and adapt to the evolving landscape.
- **Change Management Strategy:** Implement a well-defined change management strategy to address potential concerns and ensure a smooth transition as Generative AI is integrated into existing workflows. Open communication, ongoing support, and opportunities for feedback are crucial for successful adoption.

By following these best practices, organizations can leverage the transformative power of Generative AI to navigate the complexities of legacy app modernization. Remember, a successful approach requires a combination of strategic planning, collaboration with experts, a focus on industry-specific needs, and a commitment to responsible AI development and workforce training.

Data Governance Framework
Establishing a comprehensive data governance framework ensures responsible data collection, storage, and usage throughout the Generative AI development lifecycle. This includes implementing robust security measures and adhering to data privacy regulations.

Accountability & Recourse Mechanisms
Establish clear lines of accountability for development, deployment, and use of Generative AI. This includes having mechanisms in place for users to report issues or request redress if they are harmed by a biased or malfunctioning AI systems.



Explainable AI (XAI) Techniques
Utilizing Explainable AI (XAI) techniques can help shed light on the decision-making process of Generative AI models. This allows developers to gain insights into how the model arrives at its outputs and identify any potential issues.

Diverse Training Data
Curating diverse and representative training datasets is crucial to mitigate bias in Generative AI models. This ensures that the AI doesn't simply replicate existing biases present in the data it was trained on.

Challenges and Considerations

While Generative AI holds immense potential for legacy app modernization, it's crucial to address certain challenges and considerations:

Explainability and Bias:

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Regulatory Compliance:

- **Data Privacy:** As Generative AI often involves processing data, it's imperative to ensure adherence to relevant data privacy regulations. Organizations must have robust data governance practices in place to safeguard sensitive information and comply with regulations like GDPR⁴ (General Data Protection Regulation) and CCPA⁵ (California Consumer Privacy Act).



Addressing these challenges is crucial for the responsible and ethical implementation of Generative AI in legacy modernization projects. Here are some potential solutions:

By acknowledging these challenges and actively working towards solutions, organizations can harness the power of Generative AI for legacy

app modernization while fostering trust, transparency, and responsible AI practices.

A Glimpse into the Future: Where Generative AI Takes Us

The future of legacy app modernization with Generative AI is brimming with exciting possibilities. Here's a peek at how this technology is poised to revolutionize the development landscape:

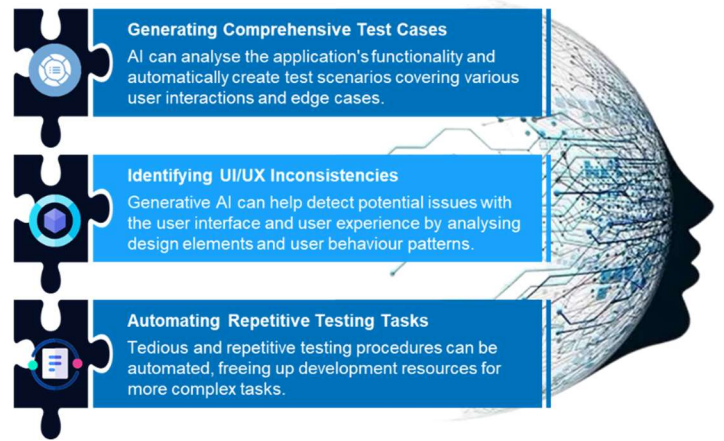
Empowering Citizen Developers: Generative AI has the potential to democratize application development by facilitating low-code/no-code environments. Citizen developers with minimal coding experience can utilize AI-powered tools to create applications or contribute to existing projects. Generative AI can assist them by:

- Automating repetitive coding tasks.
- Suggesting best practices and code snippets.
- Generating user interfaces based on natural language descriptions.

Seamless DevOps Integration: Generative AI can be seamlessly integrated into existing DevOps pipelines, enabling a more continuous and efficient development process. Imagine:

- Automatic code refactoring and optimization as new features are added.
- Generative AI proactively identifying potential security vulnerabilities during the development cycle.
- AI-powered tools streamlining the deployment process for faster time-to-market.

Revolutionizing Software Testing: Software testing is a crucial but often time-consuming aspect of the development lifecycle. Generative AI can significantly transform this process by:



These are just a few glimpses into the future of Generative AI. As the technology continues to evolve, we can expect even more innovative applications that streamline legacy app modernization, empower developers of all skill levels, and enhance the overall efficiency and effectiveness of the software development process.

Leading the Charge: NTT DATA at the Forefront of Generative AI for Legacy Modernization

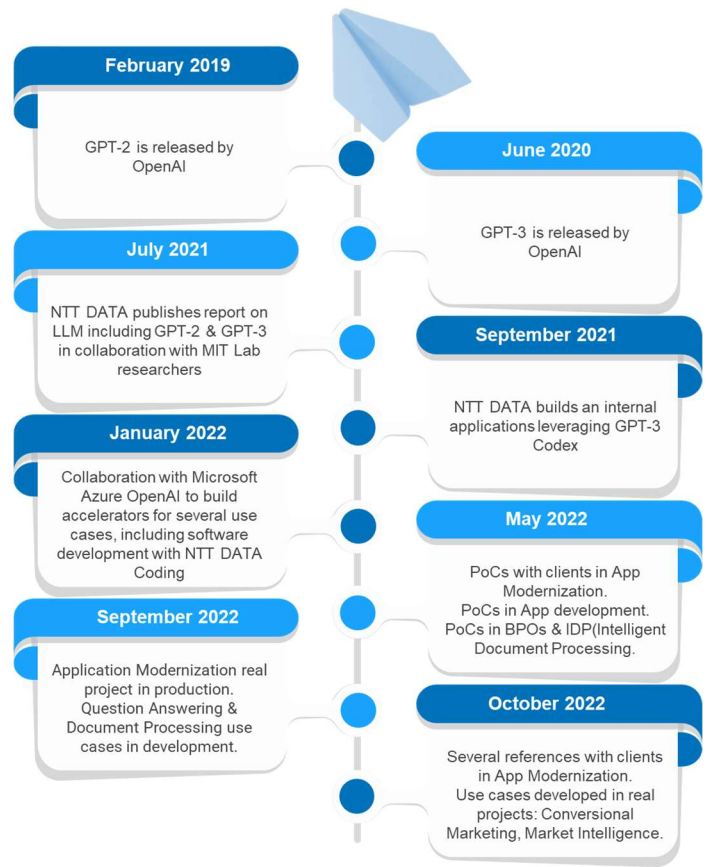
At NTT DATA, we recognize the transformative potential of Generative AI for legacy app modernization. We are proud to be at the forefront of this revolution, actively collaborating with industry leaders to shape the future of this technology.



Real-World Implementation: We haven't simply explored Generative AI's potential; we've actively implemented it with real-world success. Our clients across various industries have benefited from our expertise and our proprietary tool **Coding by NTT DATA** in applying Generative AI to legacy modernization projects. Here are some features:

- Transforming the way custom code is created and modernizing legacy applications. Also, leveraging the power of artificial intelligence to revolutionize the software development process.
- Leverages Azure OpenAI technology and exclusive features to give developers a complete set of tools. Additionally, Coding, empowers developers to tackle intricate projects and deliver custom code that meets clients' requirements with high automation levels.
- Coding also revolutionizes software development and modernizing outdated systems using a combination of automated and manual methods.

This hybrid approach helps developers and delivery teams work more effectively, resulting in outstanding outcomes with less time and effort invested.



Beyond these specific applications, the potential of Generative AI in our collaborations extends to various aspects of legacy modernization, including:

- Automated code refactoring and optimization
- Proactive identification of security vulnerabilities
- Streamlined development processes with AI-powered tools.

Our commitment to innovation goes beyond technology. We understand the importance of human expertise. By combining cutting-edge technology with a human-centric approach, NTT DATA is well-positioned to lead the way in transforming legacy systems into powerful assets that drive business growth and innovation.

A Renaissance for Legacy Apps

Legacy apps, once burdens, are poised for a renaissance. Generative AI offers a powerful toolkit to breathe new life into these systems, unlocking efficiency, security, and adaptability.

This paper explored the potential of Generative AI for legacy app modernization, outlining best practices, challenges, and a glimpse into the future.

Generative AI, used strategically and ethically, can revolutionize how we approach legacy systems. By collaborating, prioritizing responsible development, and embracing continuous learning, organizations can unlock the immense potential of Generative AI and transform legacy systems into springboards for future success.

The future of legacy apps is bright. Generative AI empowers citizen developers, streamlines DevOps pipelines, and revolutionizes software testing. Imagine a world where legacy systems seamlessly integrate with modern technologies, driving agility and a competitive edge.

Let's About the Authors

Tanvir Khan is chief digital and strategy officer focusing on technology direction, go-to-market and offering management. With more than 25

years of experience in the IT industry, he is a thought leader in digital transformation, associated core technologies and value realization. He is also a hands-on IT practitioner with five patents and four pending patents in AI and automation. As a spokesperson for NTT DATA Services, Tanvir shares his insights to clients, media and analysts on topics ranging from Generative AI to emerging global service delivery locations. Prior to joining NTT DATA Services, he held global leadership positions at Dell and Wipro Technologies.

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