

REVOLUTIONIZING WORKFLOW AUTOMATION

The impact of Pega GenAI™ in Pega Infinity'23



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FOREWORD



In 2015, our team embarked on an exploratory journey to measure the productivity impacts of implementing new business process applications. We compared the use of Pega, a renowned enterprise process platform and one of the leaders on the market already with traditional custom development in Java. The results were ground-breaking: development with Pega was found to be, on average, six times faster than Java. This revelation not only surprised us but also resonated across the process automation industry, setting a new benchmark for understanding productivity in our field.

Fast forward to 2023, we find ourselves at another pivotal moment. The process automation landscape has evolved dramatically, marked by the advent of low code/no code solutions and the rise of citizen developers. These advancements have democratized process automation, bringing forth a wave of innovation and creativity. In this changing landscape, advanced platforms like Pega have integrated generative AI to further enhance process creation, testing, and user interface design. Similarly, custom development has not remained static; Java Enterprise Edition, now supported by generative AI, has also seen significant advancements.

Considering these developments, our team at Capgemini revisited our original study to provide a current and comprehensive comparison. We analyzed the productivity of Java Enterprise Edition with microservices, empowered by generative AI, against Pega's latest platform, Infinity 23, which also boasts generative AI capabilities as Pega GenAI. The insights we've gathered are detailed in this white paper.

I must emphasize that while this paper offers evidence-based conclusions on productivity impacts for a specific process type, these findings may not be universally applicable to all processes. Therefore, we encourage continued research and exploration in this dynamic field. This study is particularly relevant for those deeply invested in the world of business process management, as it sheds light on the evolving impact of technology and platform capabilities in developing applications for new processes.

I invite you to dive into this white paper and explore these ground-breaking findings. Your engagement and insights are invaluable as we continue to navigate and shape the future of process automation.

A handwritten signature in blue ink that reads "Gustaf Soderlund". The signature is written in a cursive style and is enclosed within a light blue oval shape.

Gustaf Soderlund

Global VP Business Process and Augmented Services
Capgemini

ABOUT THE STUDY

Background and Context

In the rapidly evolving arena of application development, the contrast between Low Code Platforms, such as Pega Infinity'23, and Advanced Cloud Development methodologies employing Java EE (JEE) and Microservices is increasingly significant. This distinction is particularly vital as organizations pursue greater agility, efficiency, and innovation in their application development strategies. A thorough understanding of the differences and capabilities of these two approaches is crucial for making strategic decisions in the tech landscape.

Low Code Platforms, with Pega Infinity'23 being a standout example, herald a new era in application development. These platforms facilitate the swift creation of applications with minimal manual coding, thanks to their intuitive visual interfaces and an array of pre-built components. This approach can dramatically shorten development cycles, making it an attractive option for businesses looking to quickly adapt to market changes. In contrast, Advanced Cloud Development using Java EE and Microservices takes a more traditional, code-intensive route. This approach is characterized by providing developers with granular control over every aspect of the application architecture, making it ideal for highly customized and complex application scenarios.

This updated analysis, which incorporates the latest trends and advancements in the field, demonstrates a notable increase in the efficiency of Low Code Platforms like Pega Infinity'23. When compared to previous evaluations of Pega 6.x against JEE, it's observed that Pega's productivity advantage has surged by 33%, despite the evolution in Java tooling and architectures. This increase is indicative of the growing efficiency gap between Low Code Platforms and traditional development methodologies.

Further, it's essential to emphasize the role of 'workflow automation' when discussing the context of these platforms. Workflow automation is a critical component in complex business processes, such as the Loan Origination Process. In our exploration, this process will serve as a real-world benchmark to compare and evaluate the performance and effectiveness of both Low Code and Advanced Cloud Development approaches.

This comprehensive whitepaper aims to dissect and contrast these two paradigms in detail, examining their strengths, limitations, and suitability for various business scenarios. By delving deeper into these methodologies, the paper will offer a nuanced, in-depth perspective on how Low Code Platforms like Pega Infinity'23 stack up against Advanced Cloud Development strategies in the current landscape of



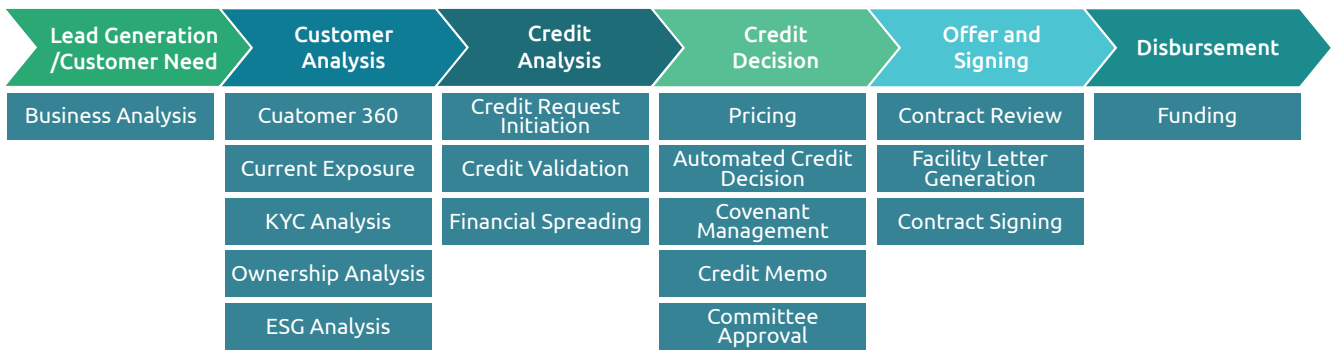
application development, highlighting their roles in driving business agility and technological innovation.

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Use Cases Selected

Loan Origination Process: Loan Origination Process stands as a quintessential business workflow, encompassing critical stages that determine the approval and disbursement of loans.



This use case will serve as the backdrop for our comparative analysis, allowing us to evaluate how Low Code Platforms and Modern Cloud Development handle the intricacies and requirements of a real-world, mission-critical business process.

As we journey through the subsequent sections of this whitepaper, we will delve into the details of each stage,

examining how Pega Infinity'23 and Modern Cloud Development address challenges, facilitate collaboration, and contribute to the overall efficiency and success of the Loan Origination Process. Through this exploration, organizations can make informed decisions when choosing the most fitting approach for their specific needs, striking a balance between speed, control, and adaptability in the dynamic landscape of application development.

Execution Methodology

The study was conducted by a team of experts who employed a mixed-methods approach, combining quantitative data analysis with qualitative expert evaluations to assess the capabilities of both Pega Infinity'23 and custom JEE & Microservices solutions.



PROCESS MODELING AND DESIGN

Process modeling and design are pivotal phases in application development, influencing the structure, efficiency, and adaptability of the final product. This comparison explores the approaches to process modeling and design in applications built using Low Code Platforms like Pega Infinity'23 and those custom-built with Java EE (JEE) and Microservices.

Process Modeling and Design in Pega Infinity'23

Visual Modeling Capabilities

Pega Infinity'23 distinguishes itself with robust visual modeling capabilities. Its low-code nature allows developers to design complex processes through an intuitive visual interface. This accelerates the modeling phase, making it accessible to both technical and non-technical stakeholders.

Pre-built Components and Templates

The platform offers a library of pre-built components and templates for common business processes. This accelerates development by allowing developers to leverage established best practices and easily integrate common functionalities into their applications.

Automated Code Generation

Pega's low-code approach includes automated code generation based on the visual models. This reduces manual coding efforts, minimizes errors, and ensures consistency between the designed processes and the implemented code.

Adaptive and Dynamic Processes

Pega Infinity'23 supports the creation of adaptive and dynamic processes. Applications can respond to changing conditions, allowing for real-time adjustments without extensive re-coding. This adaptability is crucial in dynamic business environments.

Process Modeling and Design in Custom JEE and Microservices Development

Code-Centric Development

Custom development using JEE and Microservices typically follows a code-centric approach. Developers write code to define and implement processes, which can be more time-consuming compared to visual modeling, especially for intricate workflows.

Flexibility and Customization

Custom solutions provide unparalleled flexibility and customization. Developers have complete control over the design and implementation of processes, making it suitable for scenarios where highly tailored workflows are required.

Scalability and Modular Design

JEE and Microservices architectures excel in scalability and modular design. Processes can be compartmentalized into microservices, allowing for independent development, deployment, and scaling. This architecture is advantageous for large scale and distributed applications.

Manual Integration of Components

Unlike low-code platforms, custom development often involves manual integration of components and services. While this offers complete control, it requires meticulous planning and execution to ensure seamless interoperability.



Suggested Approach

Pega Infinity'23 for Rapid Prototyping and Efficiency

When time efficiency and streamlined process modeling are essential, Pega Infinity'23 emerges as the superior choice. Its visual modeling tools, ready-to-use components, and automated coding greatly accelerate the development process. This makes Pega Infinity'23 especially beneficial for projects with strict deadlines or evolving requirements, where traditional custom approaches may struggle with complexity and time consumption.

Custom JEE and Microservices with Laborious Route for Specific Needs

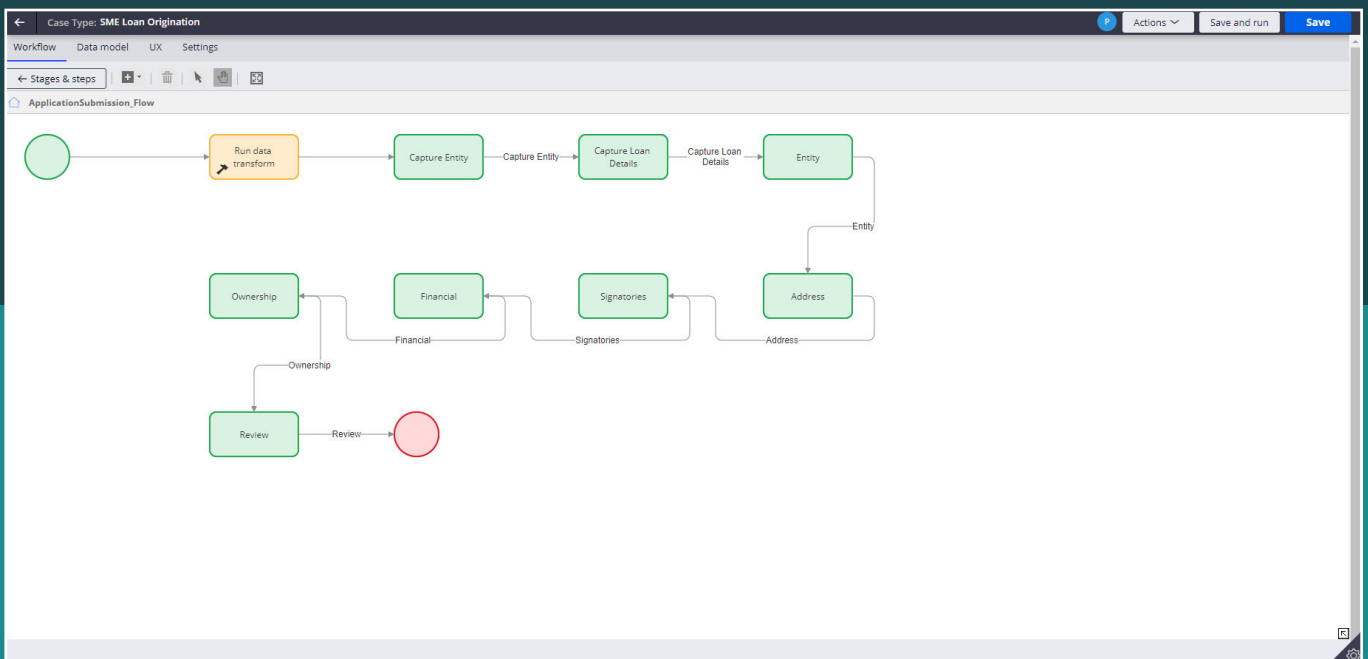
While custom JEE and Microservices development can be ideal for unique scenarios requiring highly specialized workflows, this path often involves more effort and complexity. It allows for complete customization but at the cost of increased development time and resource investment, making it less suitable for projects that can leverage standardized solutions.

Hybrid Approach for Optimal Balance

Consider a hybrid approach that combines the strengths of Pega Infinity'23 for rapid prototyping and standardized processes with custom JEE and Microservices for

components requiring specific customization. This strikes a balance between efficiency and flexibility, ensuring that the application meets both business requirements and technical intricacies.

The process modeling and design phase significantly influence the success of an application, and the choice between Pega Infinity'23 and custom JEE and Microservices development depends on project requirements. Pega Infinity'23 excels in rapid prototyping, efficiency, and standardized processes, making it ideal for scenarios with time constraints or where pre-built components align with business needs. Custom development offers unparalleled flexibility and is suitable for projects requiring tailored complexity and specialized workflows. A hybrid approach provides an optimal balance, leveraging the strengths of both paradigms to ensure efficiency and flexibility within the same project, based on the specific needs of different components or functionalities.



WORKFLOW AUTOMATION

Workflow automation involves the systematic design, execution, and management of business processes to streamline operations. A comparison between workflow automation in low-code platforms like Pega Infinity'23 and custom-built solutions using Java EE (JEE) and Microservices requires an examination of the strengths and considerations of each approach.

Workflow Automation in Pega Infinity'23

Visual Workflow Design

Pega Infinity'23 provides a visual development environment for creating workflows. Users can model workflows through intuitive drag-and-drop interfaces, making it accessible to both technical and non-technical users.

Pre-built Automation Components

Low-code platforms like Pega offer pre-built automation components, allowing developers to leverage existing functionality and expedite development. Frequently used workflows and business processes often have reusable components.

Automated Code Generation

Pega automates code generation based on visual models, reducing the need for extensive manual coding. This feature speeds up development, minimizes errors, and ensures consistency.

Dynamic Process Adaptability

Pega's low-code approach allows for dynamic modifications to workflows. Visual changes are reflected in the underlying code automatically, facilitating swift adaptability to evolving business requirements.

Integration Capabilities

Pega Infinity'23 often comes equipped with built-in integration capabilities, simplifying connections to various systems and services. This is essential for comprehensive workflow automation involving multiple applications.

Workflow Automation in Custom-Built JEE and Microservices Applications

Manual Workflow Implementation

Custom solutions using JEE and Microservices typically involve manual coding of workflow logic. Developers need to create classes, define methods, and manage the intricacies of workflow execution programmatically.

Flexibility and Control

Custom solutions provide greater flexibility and control over workflow design. Developers can fine-tune the automation logic to suit specific business requirements and seamlessly integrate with other custom-built components.

Longer Development Time

Developing workflows from the ground up using JEE and Microservices may extend development timelines compared to low-code platforms. The manual coding involved in workflow implementation adds to the overall development time.

Scalability

Microservices architecture supports scalability by allowing the development of independent, modular services. This is beneficial for workflow automation in large-scale applications with fluctuating workloads.

Integration Challenges

Custom solutions may require more effort for integration, as developers need to manage the intricacies of connecting to different systems and services. This can introduce complexity to end-to-end workflow automation.

Suggested Approach

Opt for Pega Infinity'23 for Comprehensive Workflow Management

Select Pega Infinity'23 as your go-to platform for handling both standard and complex workflows across various business domains. This versatile platform excels in managing a broad spectrum of business processes, from routine tasks to those requiring intricate, customized business logic. Its key strength lies in the fusion of pre-built components with advanced customization capabilities, enabling businesses to swiftly adapt to changing requirements. With Pega Infinity'23, organizations can significantly cut down on development time and effort, traditionally needed in custom-building complex workflows, thanks to its intuitive design and powerful, low-code environment.

Re-evaluate Custom JEE and Microservices for Niche Needs

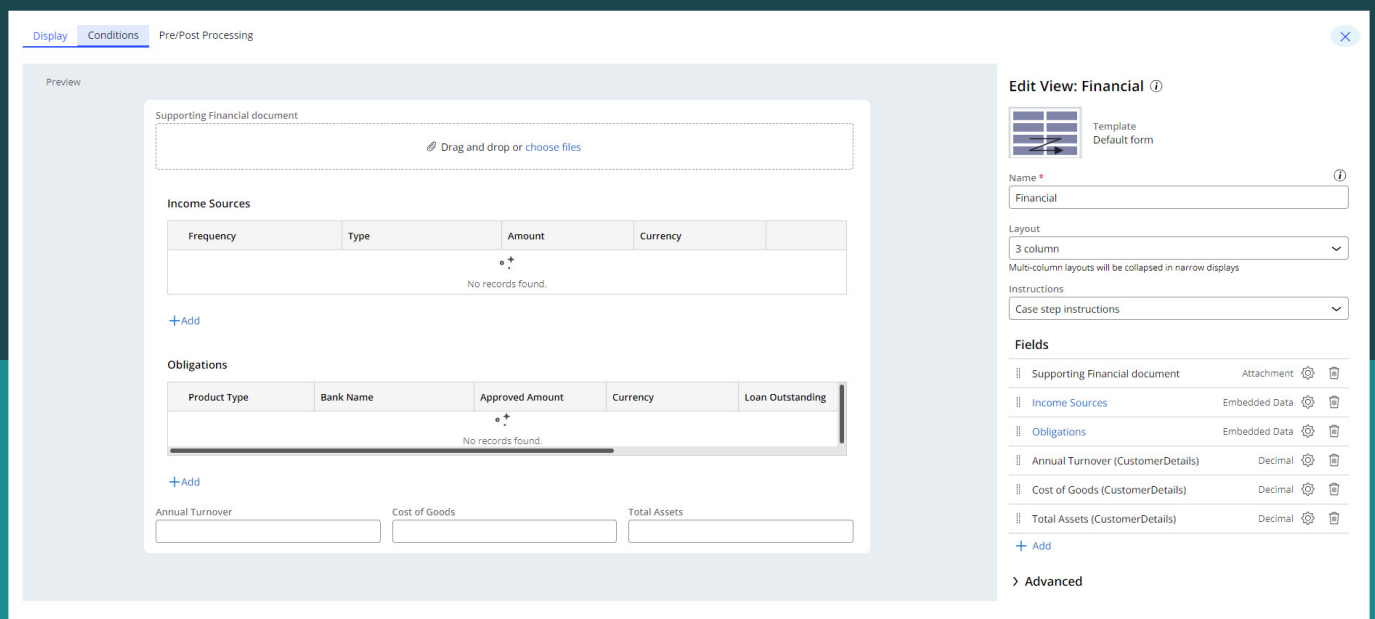
Custom solutions involving JEE and Microservices, while offering granular control and high flexibility, often entail prolonged development cycles and substantial resource investment. In cases where complex workflows are predominant, Pega Infinity'23 offers a streamlined alternative. It brings together the agility and customization that complex processes demand, with the added benefit of a low-code platform, thereby minimizing the dependency on extensive coding and specialized IT resources.

Unified Workflow Strategy with Pega Infinity'23

Embrace a cohesive strategy by deploying both your standardized and complex workflows under the umbrella of Pega Infinity'23. This approach not only consolidates workflow management into a single, efficient platform but also ensures seamless integration and uniformity across different business functions. By doing so, businesses can avoid the complications and overheads of maintaining disparate systems for various workflow types, leading to improved operational efficiency and reduced IT complexity.

Tailoring Workflow Automation Solutions to Business Needs

In deciding between Pega Infinity'23 and custom-built solutions using JEE and Microservices, it's crucial to weigh factors such as development time, resource allocation, and long-term maintainability. Pega Infinity'23 emerges as an all-encompassing solution, apt for managing both straightforward and intricate workflows. It offers the dual benefits of rapid, agile development and sophisticated customization, all within a user-friendly low-code framework. This choice not only streamlines workflow management but also aligns with the goal of reducing the overall time, cost, and effort associated with developing and maintaining bespoke solutions for complex business processes.



INTEGRATION AND API MANAGEMENT

Integration and API Management in Pega Infinity'23

Integration and API management play a crucial role in modern software development, facilitating the seamless connection of diverse systems and services. Pega Infinity'23, as a low-code platform, offers a robust set of features for simplifying integration processes and managing APIs efficiently.



Pre-built Connectors and Adapters

Pega Infinity'23 boasts an extensive library of pre-built connectors and adapters for popular systems and services. These ready-made components significantly expedite integration efforts, allowing developers to integrate with widely used applications without extensive custom coding.

Visual Integration Designer

One of the standout features of Pega Infinity'23 is its visual integration designer. This tool enables developers and even non-technical stakeholders to create integrations through a graphical interface. This visual approach enhances collaboration and accelerates the development process.

Automated Code Generation

Pega automates much of the code generation required for integration by utilizing visual models. This not only speeds up development but also reduces the likelihood of errors, ensuring a consistent and reliable integration process.

API Management and Integration Strategies

API Designer and Manager

Pega Infinity'23 incorporates tools for API design and management. This allows developers to design, publish, and manage APIs efficiently within the platform, promoting a standardized approach to API creation and utilization.

Microservices Integration

Pega Infinity'23 seamlessly integrates with Microservices, offering a modular and scalable architecture. This capability allows for efficient communication between various microservices, contributing to enhanced flexibility in the overall system.

Ease of Third-Party System Integration

Rich Set of Pre-built Connectors

With a rich set of pre-built connectors, Pega Infinity'23 simplifies third-party system integration. This feature is particularly advantageous for projects requiring swift and standardized integration with widely used external applications.

Visual Mapping for Non-Technical Users

The visual mapping features of Pega Infinity'23 cater to non-technical users, making the integration process accessible. Stakeholders from diverse domains can actively participate in the integration efforts, promoting collaborative development.

Integration and API Management in Custom-Built JEE and Microservices Applications

Custom-built applications using Java EE (JEE) and Microservices provide developers with the flexibility to tailor integration logic to specific business requirements. This approach offers extensive control over the integration process, making it suitable for projects with complex or specialized integration needs.

Custom Integration Logic

Custom solutions using JEE and Microservices allow developers to implement integration logic tailored to the unique requirements of the business. This level of customization is beneficial when dealing with intricate integration scenarios.

Extensive Control over Integration Process

Developers have granular control over the integration process in custom-built applications. This level of control facilitates fine-tuning, and optimization based on the specific needs of the application.

API Management and Integration Strategies

Manual API Design and Management

In custom-built solutions, API design and management are typically manual processes. Developers define and implement API endpoints according to the architecture of the application, allowing for a bespoke approach to API development.

Microservices Architecture

Custom-built applications can leverage Microservices architecture, supporting the development and integration of independent, modular services. This architectural choice enhances flexibility and scalability in the overall integration strategy.

Analyzing Ease of Third-Party System Integration

Customized Integration for Unique Requirements

Custom solutions provide the advantage of highly customized integration to meet specific business requirements. However, this customization may require additional development time and effort.

Developer-Centric Integration Process

The integration process in custom-built solutions tends to be more developer-centric, requiring in-depth technical knowledge for seamless integration. This approach is suitable for projects where the development team possesses a high level of technical expertise.

Suggested Approach

Choose Pega Infinity'23 for Rapid and Standardized Integration

Opt for Pega Infinity'23 when the project demands rapid integration with common systems, and standardized connectors align with project requirements. This is especially beneficial for projects prioritizing speed and efficiency in integration development.

Select Custom JEE and Microservices for Complex and Customized Integration

Choose custom-built solutions using JEE and Microservices when dealing with integration scenarios that demand a high level of customization. This approach provides extensive control and flexibility, catering to unique business requirements.

Hybrid Approach for Diverse Integration Needs

Consider adopting a hybrid approach where Pega Infinity'23 is employed for standardized integrations, and custom-built solutions are used for more intricate and customized integration scenarios. This allows for a balanced strategy based on specific integration needs within the same project.

The choice between Pega Infinity'23 and a custom-built solution using JEE and Microservices for integration and API management should align with the specific needs of the project. For standardized and rapid integrations, especially when pre-built connectors align with requirements, a low-code platform is advantageous. For complex and highly customized integration scenarios that demand flexibility and control, a custom-built solution may be more appropriate.

Data Objects and Integrations New

Data Model
Visualize all the data in your application. View

Integration map
Visualize where Data is coming from. View

All systems Search Data Objects... 20 Data Objects

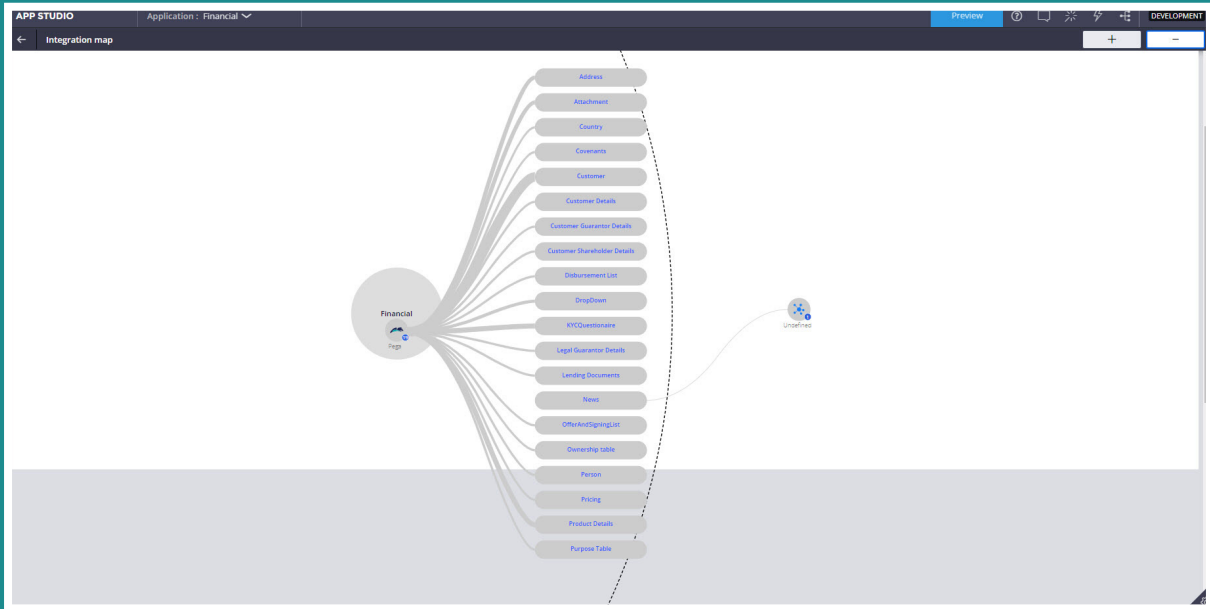
Data Objects	Data Pages	Referenced By	Systems of record
Address	Address	List Address +3 more	SME Loan Origination Pega
Attachment	D_AttachmentList	D_AttachmentsByCategory +2 more	SME Loan Origination Pega
CG-Data-DropDown	CG-Data-DropDown	DropDown +2 more	KYCQuestionnaire Pega
Country	Country	List Country +1 more	Pega
Covenants	Covenants	List Covenants +1 more	Pega
Customer	Customer	List Customer +9 more	SME Loan Origination Pega
Customer Details	Customer Details	List Customer Details +1 more	Pega
Customer Guarantor Details	Customer Guarantor Details	List Customer Guarantor Details +1 more	SME Loan Origination Pega

APP STUDIO Application: Financial Preview DEVELOPMENT

Data model Actions

Search...

- ✓ Case types (1)
- ME Loan Origination >
- ✓ Data objects (20)
- Pricing >
- Purpose Table >
- Lending Documents >
- Ownership table >
- Legal Guarantor Details >
- Person >
- Customer Shareholder Details >
- Customer >
- KYCQuestionnaire >
- Customer Guarantor Details >
- Address >
- Country >
- Covenants >
- Product Details >
- OfferAndSigningList >
- Attachment >
- Disbursement List >
- Views >
- Dropdown >



Edit case type: SME Loan Origination

Workflow Data model UX Settings Test cases

Search... Show system fields

Fields Validations View data model Primary fields Add field

Application Layer

Name	ID	Type	Display as	Picklist options	Choices
Address of Operations	AddressOfOperations	Picklist	Drop-down list	Local	High, Low, Medium
Annual Revenue	AnnualRevenue				
ArticleList	ArticleList				
AuthorizedSignatories	AuthorizedSignatories				
Bankruptcy History	BankruptcyHistory				
BeneficialKYC	BeneficialKYC				
BorrowingEntity	BorrowingEntity				
Business Age	BusinessAge				
Business Location	BusinessLocation				
Business Type	BusinessType				
Case ID	pyID				
CashFlowAnalysis	CashFlowAnalysis				
Collateral	Collateral				
Collect Information	Collect information				
Credit Score	CreditScore	Integer			
Customer Details	CustomerDetails	Query	Customer (List Customer by Customer ID)		
Customer Details by Customer ID(individual)	CustomerDetailsByCustomerIDIndividual	Query	Customer (List Customer by Customer ID(individual))		
Customer Details by Entity Name	CustomerDetailsByEntityName	Query	Customer (List Customer by Entity Name)		

Generated with AI You may modify before submitting.

High Low Medium

+ Add choice Generate with AI

Advanced

Cancel Submit & add another Submit

APP STUDIO Application: Financial

Explore Data > Exploring: Customer

Chat with your data... Generate with AI

AI suggestions

- Count of customers by sector
- Total number of customers
- Average year of incorporation by sector
- Maximum SSN No
- Minimum Tax ID
- Total number of customers created by Create Operator 'John'
- Average Acc Open Date by Entry legal name
- Maximum Year of Incorporation by Doing Business As
- Count of customers by Customer Type
- Total number of customers with Update Time after 2023-11-01T00:00:00.000Z

Customer Record ID	Year of Incorporation	Tax ID	SSN No	Sector	MName	LName	IsExisting
2368DR54K2P8BYG	---	KL78564646YU86793	YV738MD456	---	---	Thomas	Y
335800LXPCOFAC5V79	2007	GH8979723YU8979	---	Retail / General	---	---	Y
5493002FEEZP5VME73	1999	KH8564646YU86788	---	Financial Services	---	---	Y
9845005C98DB9F812F59	2000	RT8564640YU86787	---	Financial Services	---	---	Y
EDUW55CZLQPN6R7KH055	2000	KL78564646YU86792	---	Energy	---	---	Y
43553LR54K2P8YTL	---	r1	YB84RC675	---	Gengxin	Y	---
3455JR54K2P8YWC	---	KL7866766YU86794	BNT38J9687	---	Liyang	Y	---
1256DERVUJ79765	---	r2	AP647H979	---	Denver	Y	---
3358008K7Y8GNDHE593	2004	JH8564646YU86786	---	Energy	---	---	Y
549300QLDFU3ZP9CR50	2014	BJ68564646YU86789	---	Aviation	---	---	Y
c5a5793b-0cfd-46d5-a6f6-fa43d932999f	---	---	---	---	---	---	---
0a76395b-a55d-4064-b0be-a7084d4fbc6b	---	123-45-6789	987-65-4321	---	Doe	Smith	---
6a482264-ccb6-4194-b38c-29a0c610591	---	123-45-6789	987-65-4321	---	Doe	Smith	---
9dfdeebf-230b-415f-90a1-231615f08d3	---	---	---	---	---	---	---

DATA

Display as: Table

Fields

Columns

Available fields

APP STUDIO Application: Financial

Explore Data > Exploring: Customer

Chat with your data... Generate with AI

14 results

Customer Record ID	Year of Incorporation	Tax ID	SSN No	Sector	MName	LName	IsExisting
2368DR54K2P8BYG	---	KL78564646YU86793	YV738MD456	---	---	Thomas	Y
335800LXPCOFAC5V79	2007	GH8979723YU8979	---	Retail / General	---	---	Y
5493002FEEZP5VME73	1999	KH8564646YU86788	---	Financial Services	---	---	Y
9845005C98DB9F812F59	2000	RT8564640YU86787	---	Financial Services	---	---	Y
EDUW55CZLQPN6R7KH055	2000	KL78564646YU86792	---	Energy	---	---	Y
43553LR54K2P8YTL	---	r1	YB84RC675	---	Gengxin	Y	---
3455JR54K2P8YWC	---	KL7866766YU86794	BNT38J9687	---	Liyang	Y	---
1256DERVUJ79765	---	r2	AP647H979	---	Denver	Y	---
3358008K7Y8GNDHE593	2004	JH8564646YU86786	---	Energy	---	---	Y
549300QLDFU3ZP9CR50	2014	BJ68564646YU86789	---	Aviation	---	---	Y
c5a5793b-0cfd-46d5-a6f6-fa43d932999f	---	---	---	---	---	---	---
0a76395b-a55d-4064-b0be-a7084d4fbc6b	---	123-45-6789	987-65-4321	---	Doe	Smith	---
6a482264-ccb6-4194-b38c-29a0c610591	---	123-45-6789	987-65-4321	---	Doe	Smith	---
9dfdeebf-230b-415f-90a1-231615f08d3	---	---	---	---	---	---	---

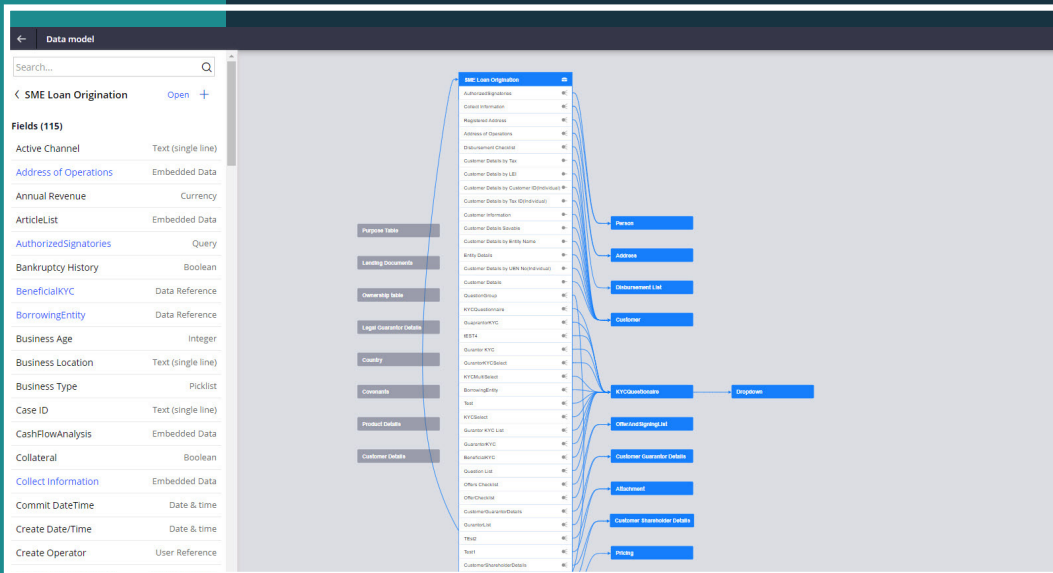
DATA

Display as: Table

Fields

Columns

Available fields





USER INTERFACE AND USER EXPERIENCE

User Interface and User Experience in Pega Infinity'23

In the dynamic landscape of software development, crafting a compelling User Interface (UI) and ensuring a seamless User Experience (UX) are paramount. Pega Infinity'23, as a low-code platform, stands at the forefront of facilitating UI/UX design and development, providing an array of features aimed at enhancing user interactions.

Visual Development Environment

Pega Infinity'23 pioneers a user-friendly visual development environment, democratizing UI design. Through a drag-and-drop mechanism, developers, including those without extensive technical expertise, can actively contribute to the design process.

Pre-built UI Components

Noteworthy is the inclusion of pre-built UI components in Pega Infinity'23. These components serve as accelerators, expediting interface assembly, while their high degree of customization ensures flexibility and swift development.

Responsive Design

A core tenet of Pega Infinity'23 is its commitment to responsive design. Interfaces seamlessly adapt to various devices and screen sizes, guaranteeing a consistent and user-friendly experience across diverse platforms. Pega Infinity'23 takes a proactive stance on responsive design, automating the adjustment of layout and elements. This not only reduces development time but also ensures a consistent and user-friendly experience across diverse devices.

Out-of-the-Box Themes and Styling

To elevate the aesthetic appeal of applications, Pega Infinity'23 incorporates out-of-the-box themes and styling options. This feature empowers developers to create visually appealing interfaces without delving extensively into manual coding.

Elevating UX Design and Development using Constellation

The Pega Constellation design system serves as a robust repository of high-value UX patterns, acting as a foundational toolkit supporting Pega Express and Center-Out methodologies. This innovative system caters to both low-code enthusiasts and front-end developers, providing diverse building experiences that enhance productivity through out-of-the-box solutions.

Comprising numerous components, from fundamental building blocks to intricate layouts, Constellation operates on Pega's cutting-edge Constellation architecture. This architecture incorporates a client-side engine orchestrating Pega Platform application logic and data. Leveraging Constellation's pre-designed UX library ensures the swiftest time to value, consistency throughout the application stack, fewer errors, and reduced reliance on custom code.

Guiding Principles

- Out-of-the-box components and patterns streamline implementation. Fast underlying technology ensures quicker loading times.
- Clear naming standards, iconography, and design elements enhance usability. Familiar interactions and patterns reduce user training time.
- Simplified application creation empowers teams to deliver engaging experiences efficiently.
- Modular design facilitates adaptability for use across multiple devices.
- Encompasses proven enterprise design best practices, including accessibility.
- Empowers organizations to focus on customer problems and user experiences, addressing employee facing UX challenges.

Empowering Design Maturity

The Constellation design system empowers designers and developers to advocate for increased UX design maturity within their organizations. Design maturity involves developmental stages marked by the level of design thinking and iterative processes, allowing for a focus on audience-specific experiences, experimentation, cross-functional collaboration, and time savings on surface-level designs and updates. In the latest update, tables in Pega Platform™ '23 boast enhanced accessibility support with Improved keyboard handling following W3C guidelines, Proper ARIA roles and Enhanced handling of updates and row display for screen readers.

Benefits

- Developers configure outcomes in App Studio, allowing Constellation to generate the UI.
- Shifts focus from designing a particular UI to achieving desired outcomes.
- Eliminates the need to address accessibility and front-end bugs.
- Developers concentrate on business logic and workflow, not reconciling heavy customizations.
- Offers pre-built UX solutions, reducing inconsistencies and minimizing user clicks.
- Enhances end-user experience by reducing fatigue and improving business outcomes.
- Ensures faster performance, seamless upgrades, and integration capabilities.
- Accelerates application development, decreasing overall development time.

Creating User Interfaces in Custom Development with JEE and Microservices

In a custom-built landscape utilizing Java EE (JEE) and Microservices, UI/UX design takes on a hands-on approach, involving manual coding and customization tailored to specific project requirements.

Manual Coding for UI Components

Custom development using JEE and Microservices necessitates manual coding for UI components. This approach, while offering a high degree of control, may be more time intensive.

Custom Styling and Theming

Custom solutions empower developers to implement unique styling and theming, providing flexibility to achieve a distinctive look and feel. However, this customization

demands a more concerted effort compared to leveraging pre-built options.

Responsive Design Implementation

Achieving responsive design in custom development entails explicit coding to ensure interfaces adapt gracefully to different screen sizes. This process demands meticulous attention to detail to maintain optimal usability. In custom-built solutions, achieving responsive design involves meticulous coding to handle various screen sizes. While this manual approach offers control, it may consume more time and necessitate thorough testing to ensure optimal usability.



Suggested Approach

Choose Pega Infinity'23 for Rapid and Standardized UI/UX

Pega Infinity'23 emerges as an optimal choice when the project demands rapid UI/UX development, and standardized components seamlessly align with project requirements. This is especially beneficial for projects prioritizing speed and uniformity in UI design.

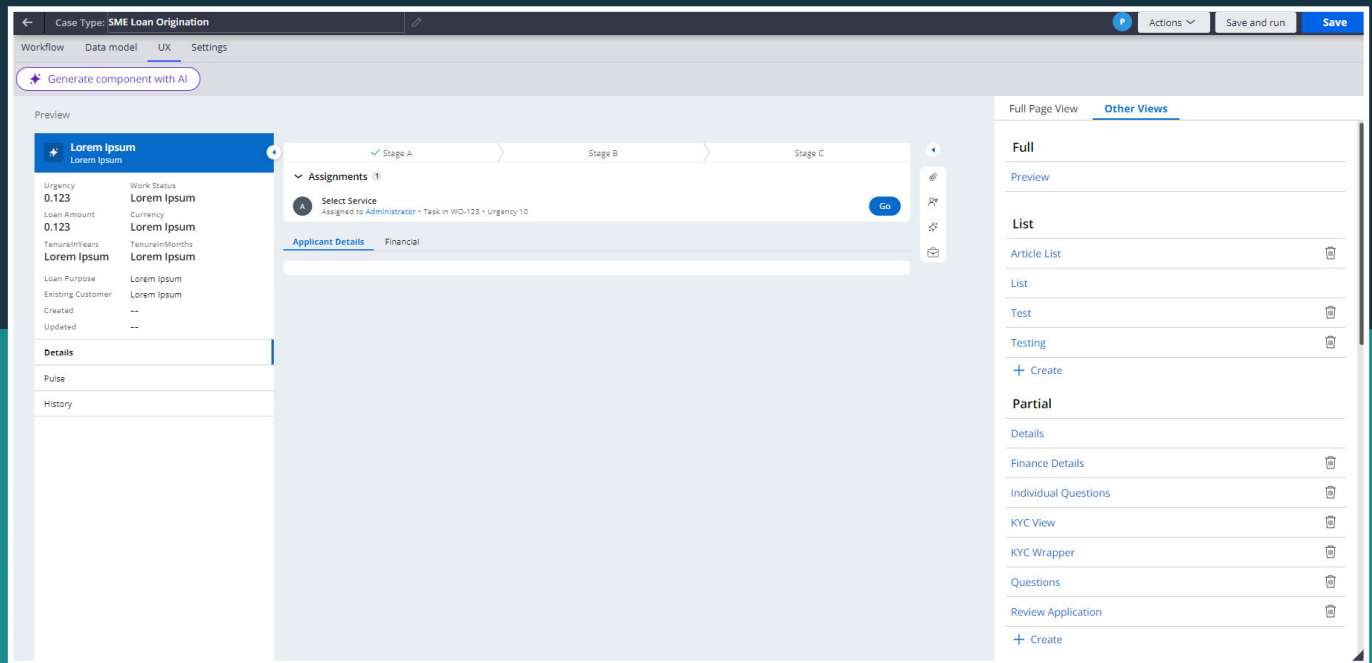
Select Custom JEE and Microservices for Unique and Highly Customized Interfaces

Opting for custom-built solutions using JEE and Microservices is prudent when specific UI/UX requirements demand a high level of customization. This approach empowers developers with extensive control over the design process, accommodating unique project needs.

Hybrid Approach for Diverse UI/UX Needs

Consider a hybrid approach wherein Pega Infinity'23 is employed for standardized interfaces, and custom-built solutions are integrated for more intricate and customized UI/UX requirements. This approach offers flexibility based on specific project needs.

In navigating the nuanced choice between Pega Infinity'23 and a custom-built solution using JEE and Microservices for UI/UX design, the decision hinges on the specific needs of the project. Pega Infinity'23 shines in scenarios requiring standardized and rapid UI/UX development, leveraging its pre-built components and automated responsive design features. On the flip side, for projects demanding highly customized interfaces and an elevated level of control over the design process, a custom-built solution with JEE and Microservices proves advantageous. Pega Infinity'23 caters to projects prioritizing efficiency and uniformity, while a custom-built solution accommodates projects valuing uniqueness and granular control. A hybrid approach, integrating both solutions based on specific UI/UX needs within the same project, offers a nuanced strategy for achieving a successful UI/UX design and user experience.





CASE MANAGEMENT

Case Management Features and Functionalities in Pega Infinity'23

Efficient case management is pivotal for organizations aiming to automate and optimize their workflows. Pega Infinity'23, functioning as a low-code platform, stands out with a comprehensive set of features specifically designed to simplify and elevate the management of cases within an application.

Visual Case Designer

Pega Infinity'23 introduces a visual case designer, providing a collaborative platform for users to model and configure case lifecycles through an intuitive graphical interface. This not only accelerates the case design process but also promotes seamless communication between business and IT stakeholders.

Adaptive Case Management

The platform emphasizes adaptive case management, enabling dynamic and flexible handling of cases. This adaptability ensures that organizations can respond proactively to evolving business requirements, allowing cases to evolve in real-time as needed.

Automated Case Routing

Pega Infinity'23 automates case routing, intelligently directing cases to the appropriate individuals or teams based on predefined rules. This streamlines the workflow by minimizing manual intervention in case assignment, thus enhancing overall efficiency.

Integration with Business Rules

Business rules seamlessly integrate into case management processes, empowering organizations to embed decision logic directly into cases. This integration ensures that cases are handled in alignment with established business policies and guidelines.

Handling Cases in Custom Development Scenarios (JEE and Microservices)

In the realm of custom development scenarios utilizing Java EE (JEE) and Microservices, case management demands a more hands-on approach involving manual configuration and coding to define and execute case lifecycles.

Manual Configuration of Case Lifecycles

Custom development necessitates manual configuration of case lifecycles, requiring developers to define each stage of a case and specify corresponding actions. This approach offers granular control but entails a more substantial development effort.

Custom Workflow Automation

Workflow automation for case management in custom scenarios involves coding to handle case routing, status transitions, and task assignments. This process demands a deep technical understanding and can be time intensive.

Limited Adaptive Case Management

Custom solutions may have limitations in adaptive case management. Adapting to changes in business requirements often involves manual coding and may not match the dynamic capabilities of low-code platforms.

Comparing Dynamic Case Management Approaches

Dynamic Case Management in Pega Infinity'23

Pega Infinity'23 excels in dynamic case management, facilitating real-time adjustments to case processes. The visual case designer allows users to easily modify case lifecycles, making it well-suited for scenarios where agility and adaptability are paramount.

Dynamic Case Management in Custom Development

Custom development approaches may have constraints in dynamic case management. Modifying case lifecycles or adapting to changes often requires code modifications, which can be time-consuming and may not provide the same level of agility as low-code platforms.

Suggested Approach

Embrace Pega Infinity'23 for Streamlined and Flexible Case Management

Turn to Pega Infinity'23 for projects that call for agile and adaptive case management. Its intuitive visual case designer and robust adaptive capabilities are perfectly suited for situations where case processes are subject to frequent updates, ensuring both efficiency and adaptability. This stands in contrast to the more labor-intensive and complex custom-built approaches.

Select Custom JEE and Microservices for Exceptionally Tailored Case Logic

While custom JEE and Microservices can cater to highly specialized case logic needs, they come with added complexity and effort. This route is best reserved for projects with unique, intricate case management demands that necessitate a deeply customized approach and extensive control, often at the expense of efficiency and simplicity.

Hybrid Approach for Diverse Case Management Needs

A hybrid strategy, where Pega Infinity'23 is employed for general or evolving case management tasks and custom solutions are reserved for highly specific needs, can offer the best of both worlds. This approach provides flexibility and efficiency for diverse case management needs within a project.

When choosing between Pega Infinity'23 and custom-built solutions using JEE and Microservices for case management, the decision should be based on the project's specific requirements. Pega Infinity'23 is the recommended choice



for projects that benefit from agile and visually driven case management, highlighting its superiority over more complex, custom-built solutions. Custom-built solutions are more suitable for projects with unique case management needs where detailed customization and control are paramount. A hybrid approach offers a versatile solution, combining the strengths of Pega Infinity'23's streamlined case management with the tailored capabilities of custom solutions, ensuring an efficient and well-suited approach to various case management challenges.

A screenshot of the Pega Infinity'23 Case Designer interface. The top navigation bar shows 'Case Type: SME Loan Origination' and buttons for 'Actions', 'Save and run', and 'Save'. Below the navigation, there are tabs for 'Workflow', 'Data model', 'UX', and 'Settings'. The main area is titled 'Case life cycle' and shows a process flow with stages: 'Application Submission', 'Underwriting', 'Pricing', 'Offer', and 'Disbursement'. Each stage has a list of tasks or steps, such as 'Run data transform', 'KYC Analysis', 'Risk Analysis', 'Verification', 'Ratio Analysis', 'Adverse Media Screening', 'Decision', 'Pricing', 'Prepare loan documents...', 'Subprocess', 'Disburse Funds', and 'Subprocess'. At the bottom, there is a 'Personas & Channels' section with five cards, each representing a persona (e.g., 'Relationship Manager', 'Credit Reviewer') and a channel (e.g., 'Web portal').

DECISION MANAGEMENT AND BUSINESS RULES

Decision Management Features in Pega Infinity'23

The landscape of decision management is a pivotal arena for organizations striving for intelligent automation, and Pega Infinity'23, a robust low-code platform, stands out with an array of advanced features tailored to streamline and elevate this critical aspect of business processes.

Business Rules Composer

Pega Infinity'23 introduces a Business Rules Composer, a visually intuitive environment facilitating collaborative rule definition and management. This sophisticated tool not only expedites the decision-making process but also fosters seamless communication between business and IT teams, ensuring swift adjustments to decision logic based on evolving requirements.

Decision Tables

Decision tables, a prominent feature of Pega Infinity'23, provide a structured and easily analyzable format for complex decision logic. This not only simplifies the management of decision rules but also enhances transparency, making it more straightforward to comprehend and adjust decision-making criteria.

Versioning and Traceability

The platform places a strong emphasis on governance and compliance with robust versioning and traceability features for decision rules. This ensures organizations can systematically track changes, maintain a clear audit trail, and adhere to regulatory requirements, contributing to enhanced decision-making accountability.

Integration with Adaptive and Predictive Analytics

Pega Infinity'23 seamlessly integrates with adaptive and predictive analytics, enhancing decision-making capabilities. By leveraging advanced analytics, organizations can gain real-time insights, influencing decision outcomes dynamically and contributing to a more intelligent and responsive operational environment.

Decision Management Features in Custom Development with JEE and Microservices

In contrast, custom development scenarios utilizing Java EE (JEE) and Microservices necessitate a more hands-on approach to decision management, requiring explicit coding for rule definition and execution.

Custom Rule Definition

Decision rules in custom development involve manual coding, where developers articulate explicit logic to determine decision outcomes. While offering a high degree of flexibility, this approach demands a deeper understanding of programming languages and may present challenges for non-technical stakeholders.

Limited Visual Modeling

Custom solutions may lack the visual modeling capabilities found in low-code platforms, potentially posing challenges for non-technical stakeholders participating in decision rule creation and modification. The absence of visual tools may increase reliance on technical expertise for decision logic adjustments.

Traceability Challenges

Achieving traceability in decision rules can be more challenging in custom development, where the absence of built-in versioning tools requires organizations to implement additional measures for maintaining a clear audit trail. This poses considerations for organizations prioritizing comprehensive traceability.

Integration Challenges with Analytics

Integrating adaptive and predictive analytics into custom solutions may necessitate more effort, as developers need to manually establish connections, handle data integration, and synchronize information for real-time decision-making. This manual integration can potentially extend development timelines.

Real-time Decision Making Capabilities

- Pega Infinity'23 excels in real-time decision-making, integrating seamlessly with real-time data sources and providing built-in decision services. This ensures organizations can make informed decisions instantly, contributing to enhanced operational agility and responsiveness to dynamic scenarios.

- Real-time decision-making in custom development may face challenges related to integration complexity and data synchronization. Achieving instantaneous decision outcomes may require additional effort and meticulous coding, potentially impacting the speed and efficiency of decision processes.

Suggested Approach

Prioritize Pega Infinity'23 for Efficient and Intuitive Decision Management

For projects that demand swift and visually guided decision management, Pega Infinity'23 is the ideal solution. This platform stands out with its low-code environment, cutting-edge visual modeling tools, and effortless integration with adaptive and predictive analytics. These features collectively create an efficient and user-friendly decision-making process, significantly reducing development time and complexity compared to more traditional methods.

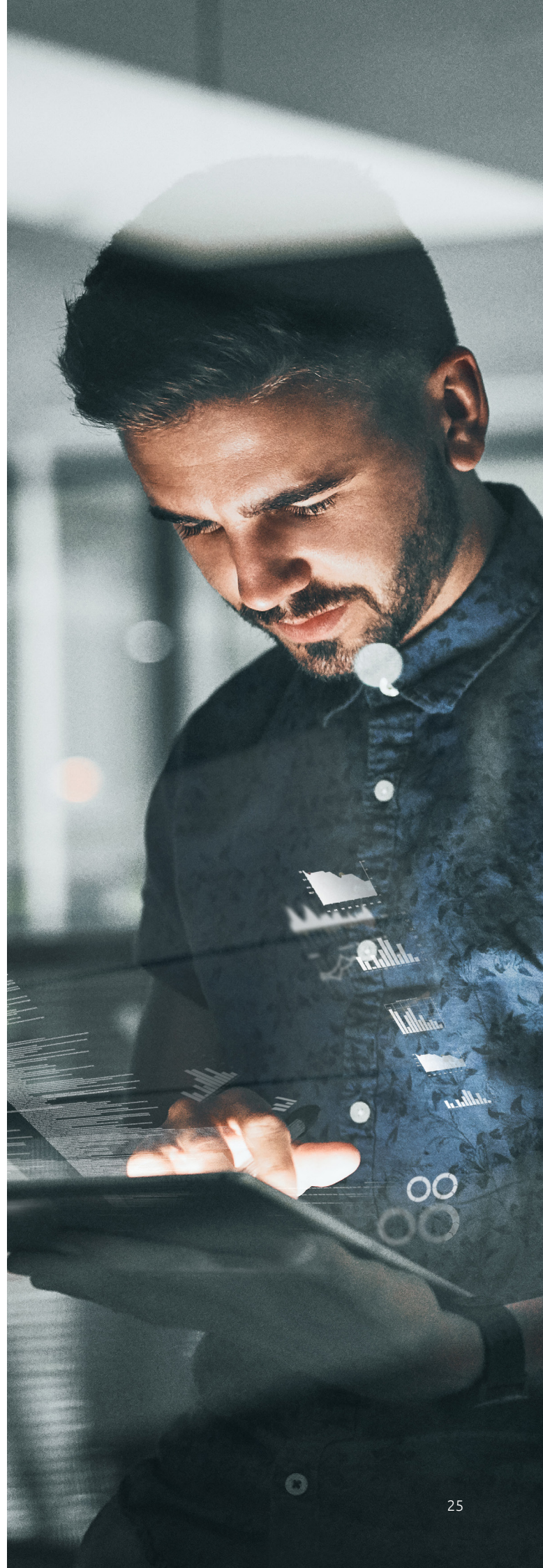
Select Custom JEE and Microservices for Highly Customized Decision Logic

While custom-built solutions using JEE and Microservices are viable for highly specific decision logic needs, they often come with increased complexity and a heavier burden of code maintenance. This route is best suited for projects requiring extremely tailored decision-making processes where the depth of customization and control justifies the additional effort and maintenance demands.

Hybrid Approach for Diverse Decision Management Needs

A hybrid strategy, leveraging Pega Infinity'23 for general or visually driven decision management tasks and integrating custom solutions for specialized decision-making needs, can provide an effective balance. This approach enables flexibility and efficiency, catering to a range of decision management scenarios within the same project.

In the nuanced decision-making between Pega Infinity'23 and custom-built solutions using JEE and Microservices, organizations must weigh project-specific considerations. Pega Infinity'23 excels in scenarios requiring rapid, visual decision management with seamless integration of adaptive and predictive analytics. Custom-built solutions shine when projects demand highly customized decision logic. In intelligent analytics integration, Pega Infinity'23 emerges as a comprehensive solution that seamlessly combines real-time decision-making, adaptive analytics, and predictive analytics. The platform's low-code features, advanced visual modeling tools, and integration capabilities offer an efficient and collaborative environment for decision-making. While custom JEE and Microservices solutions provide flexibility, they may encounter challenges in achieving the same level of integration and agility, especially in real-time decision-making scenarios. The choice between the two depends on the specific needs of the project, with Pega Infinity'23 being the preferred choice for organizations seeking a robust and streamlined approach to intelligent analytics integration.



GENERATIVE AI IMPLICATIONS

Elevating Development Capabilities in Pega Infinity'23 with Pega GenAI™

Pega GenAI™ has been introduced to significantly enhance the capabilities of the Pega Platform™, bringing AI-driven efficiencies to the development lifecycle. By incorporating AI-assisted features, it simplifies and optimizes various aspects of platform interaction, such as form completion and data management, while also supporting multilingual access to cater to a global user base. This facilitates a more intuitive user experience and enables better decision-making through predictive analytics. The core of Pega GenAI™, often referred to as the “brain” of Generative AI, is a sophisticated algorithmic model trained on a vast array of data. This model can generate a wide variety of content, from process flows to data models, streamlining the creation of robust applications.

Pega GenAI™ is instrumental in supercharging product strategy, offering developers a powerful tool to elevate their development process, simplify complex tasks, and produce more efficient and effective applications. It allows for scaling low-code innovation rapidly, transforming creative ideas into fully functional enterprise applications with minimal effort. By automating global functions, it maximizes productivity through AI-driven insights and automations. Moreover, it ensures consistent, personalized engagement across various channels, enabling developers to quickly adapt to customer needs through AI-powered personalization.

Applying Pega GenAI™ within the Pega Infinity'23 platform can significantly elevate implementation productivity through advanced technical enhancements and practical examples, as outlined below:

- **Process Modeling and Design:** Pega Infinity'23's visual modeling is augmented with GenAI™ to provide predictive design patterns. For instance, when designing a loan approval process, GenAI™ might suggest a model that pre-fills steps based on historical data, thereby reducing manual entry and error rates. Automated code generation further streamlines this process, ensuring that developers can implement complex workflows with minimal coding.
- **Workflow Automation:** Workflow automation in Pega Infinity'23 is transformed by GenAI™ through the auto-generation of workflow scripts. For example, it can automatically translate business requirements into process flows, complete with decision rules and exception handling, thus reducing development cycles from week to days.
- **Integration and API Management:** With Pega GenAI™, the platform can suggest optimal integration patterns, like recommending RESTful services or SOAP web services based on the external system's capabilities. If a developer is integrating with a CRM system, GenAI™ might automatically configure the connection strings and data mappings, reducing setup time from hours to minutes.
- **User Interface and User Experience:** In Pega Infinity'23, GenAI™ could propose UI components based on user engagement metrics. For example, if data shows that users frequently access certain information, GenAI™ might recommend placing that data in a dashboard widget. The Constellation framework is utilized to adapt UI elements to user behaviors dynamically.
- **Case Management:** GenAI™ enhances case management by suggesting routing rules and auto-filling properties based on case types. If a user is creating a case type for “Insurance Claims,” GenAI™ might propose a set of steps that include “Document Verification” and “Claim Adjudication” based on industry standards.
- **Decision Management and Business Rules:** GenAI™ can assist in building more sophisticated decision management systems by providing AI-generated decision table templates. For example, it could create a decision table that auto-populates actions based on customer segmentation, thus tailoring offers to individual customer profiles.
- **Analytics and Reporting:** Within Pega Infinity'23, GenAI™ might empower users with pre-configured reporting templates that suggest the most relevant metrics and KPIs. For instance, in a sales application, GenAI™ could suggest a report template that highlights sales trends, conversion rates, and customer acquisition costs.
- **Scalability and Performance:** The platform's scalability is underpinned by GenAI™, which might predictively scale resources in the cloud before peak times, based on usage patterns. For instance, it could analyze the load and auto-scale the infrastructure in anticipation of heavy usage during a marketing campaign.
- **Security and Compliance:** GenAI™ can proactively enhance security protocols by analyzing patterns and suggesting security enhancements. For example, it might recommend stronger encryption methods or more robust authentication mechanisms after detecting potential vulnerabilities in real-time data flow analysis.

Key features of Pega GenAI™ include

- **Workflow Creation:** It accelerates the creation of Stages and Steps in workflows with Generative AI, while also allowing developers to retain control through a “Human in the loop” system for editing, deletion, and reordering. Its current limitation is a restriction to information collection steps and a lack of integration with reusable assets.
- **Data Model:** The platform simplifies data model creation by recommending field options based on user-defined object names and providing suggestions for scalar field types. However, it is presently limited to scalar fields and does not account for existing data models.
- **Picklist Definition:** Pega GenAI™ uses AI to rapidly define picklist options for local and prompt lists, tailoring suggestions to the names of the picklist fields and objects. The limitation is that it is applicable only to local picklist choices.
- **Sample Data Creation:** It streamlines the generation of sample records for testing and validation. Users can regenerate and manually edit sample records, although it is designed to recommend only 3-5 records to stay within token constraints, and there’s a chance of generating redundant data.
- **Persona Suggestions:** The feature offers recommendations for application personas based on the application’s name, complete with descriptions for developers to review and refine. It does not, however, recognize existing personas.
- **Chat with Your Data:** This feature simplifies data exploration through AI-powered insights, allowing users to navigate their data using natural language queries and leveraging AI suggestions as starting points for analysis.
- **Prediction Widget:** It provides explanations in natural language for AI-driven predictions, enhancing chart views and facilitating a rapid understanding of the factors influencing case predictions. This feature supports multiple languages and is accessible through screen readers.
- **Adding New Language Support:** Pega GenAI™ aids in adding new language support to applications, though it is currently limited to traditional UI applications.
- **Mapping with External Data Model:** The AI accelerates the development of integrations by suggesting mappings for external data models, with the caveat that more complex, deeply nested mappings will require manual intervention.
- **Fill Form with AI:** As a key feature, it optimizes development by populating forms with realistic sample data for quick testing, significantly cutting down the time developers spend on form filling during the validation phase. This feature is available solely in non-production environments.

In essence, Pega GenAI™’s technical capabilities are not just theoretical; they provide concrete, actionable suggestions that can be directly implemented into the Pega Infinity’23 platform, resulting in improved efficiency, accuracy, and productivity. By automating and enhancing every aspect of application development and management, Pega GenAI™ acts as a force multiplier for developers and businesses alike. Pega GenAI™ is poised to revolutionize how developers interact with the Pega Platform™, providing a suite of tools designed to enhance productivity and elevate the quality of applications developed within the Pega Infinity’23 ecosystem.



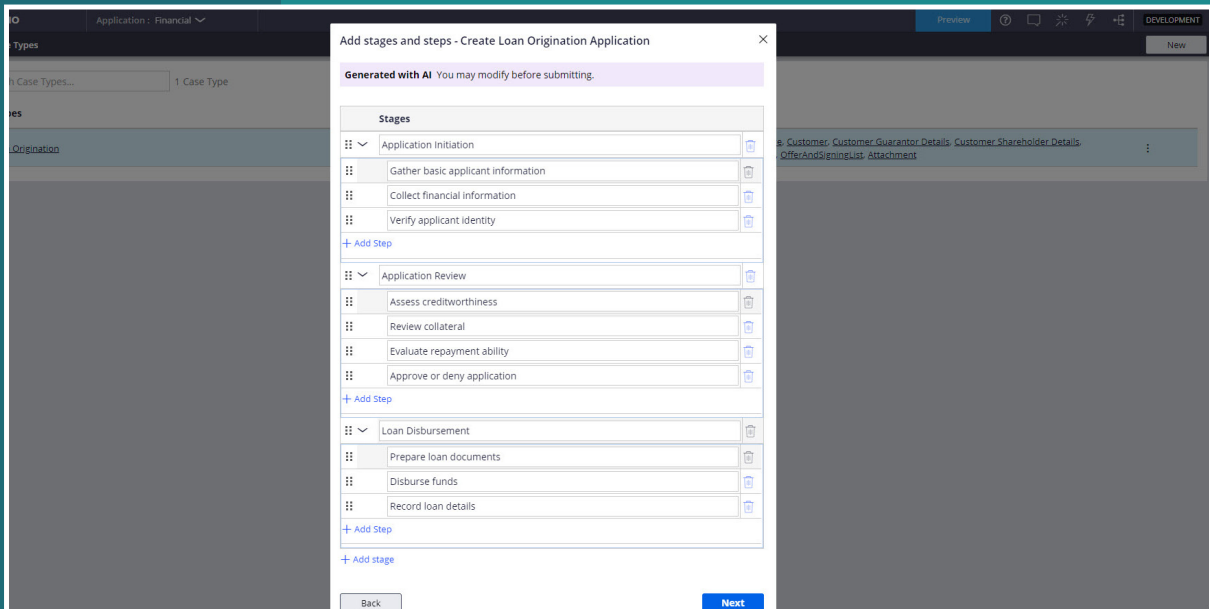
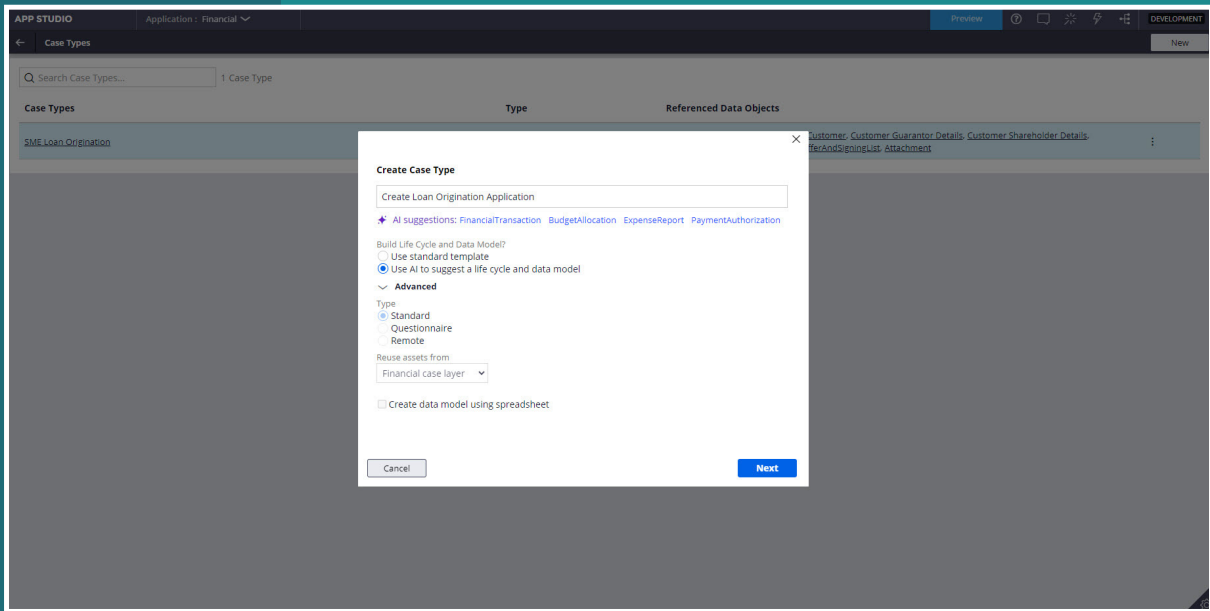
Tackling Complexity in Custom JEE and Microservices Development with Generative AI

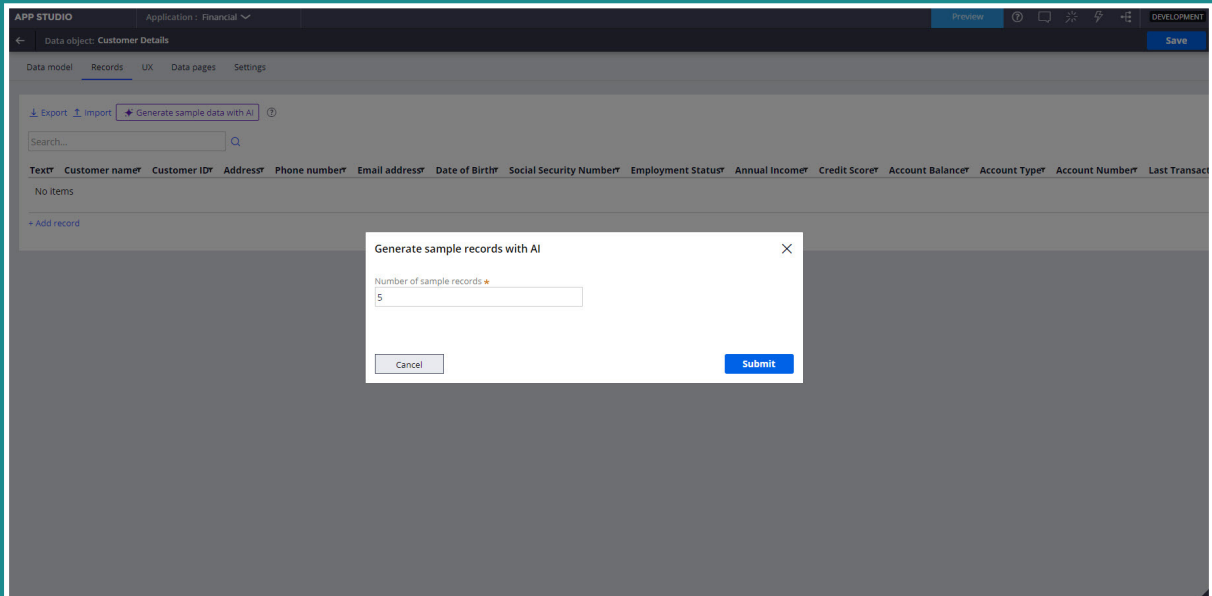
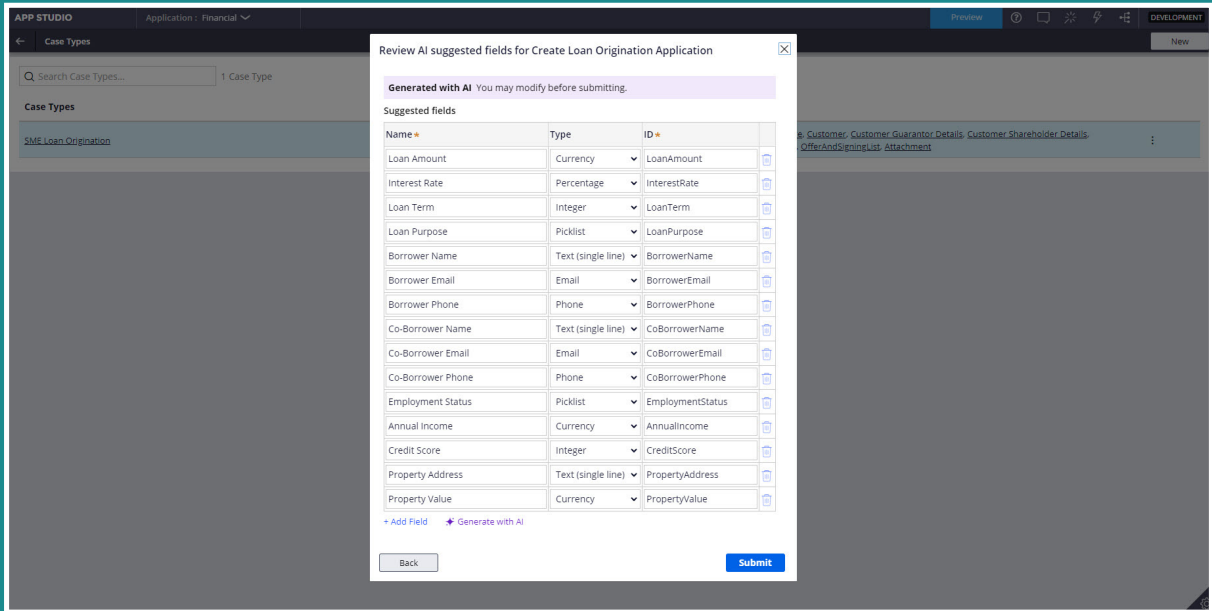
In the ever-evolving landscape of custom Java Enterprise Edition (JEE) and Microservices development, the introduction of Generative AI is a game-changer. This transformative technology is a beacon of hope in the face of the inherent complexities that custom development projects often encounter. It addresses these challenges comprehensively, paving the way for the creation of robust, scalable, and efficient solutions.

- **Process Modeling and Design:** Custom development projects in the JEE and Microservices domains are known for their intricacy. Generative AI brings clarity to this complexity by replacing manual code-centric approaches with intuitive process modeling. This visual representation of intricate processes not only enhances understanding but also streamlines design and development.
 - The complexity of custom projects often demands a high degree of flexibility and customization. Generative AI empowers developers to adapt processes on the fly, ensuring alignment with evolving requirements. It does so by generating diverse process models that cater to the unique needs of each development scenario.
 - Scalability is a perennial concern in custom development, especially when dealing with Microservices. Generative AI champions modular design, making scalability an innate feature. This allows developers to seamlessly integrate new components, adapting to the dynamic nature of business requirements.
 - Integrating components in custom projects can be a daunting task. Generative AI simplifies this complexity by automating integration processes. This not only reduces errors but also accelerates development, a welcome relief in the face of tight project timelines.
- **Workflow Automation:** Custom JEE and Microservices projects often involve intricate workflow implementations. The complexity here is twofold: the need for precision and the demand for flexibility. Generative AI addresses both.
 - The precision required in workflow implementation can be overwhelming. Generative AI automates manual processes, reducing the scope for errors. Developers can now focus on strategic tasks, bringing innovation to the forefront.
 - Flexibility is paramount in custom projects, but it often comes at the cost of longer development times. Generative AI disrupts this equation by accelerating workflow implementation. Quicker time-to-market is a significant advantage in today's fast-paced business landscape.
 - Scalability challenges are another facet of workflow complexity. Generative AI ensures that automated workflows are inherently scalable, capable of handling increased workloads efficiently. This scalability is essential for projects that experience fluctuating demand.
 - Integration complexities in workflows can cause bottlenecks. Generative AI standardizes integration, ensuring a smoother process. The result is a more efficient workflow with fewer hiccups along the way.
- **Integration and API Management:** Custom JEE and Microservices applications often require intricate integration logic. The complexity lies in aligning these integrations with specific application needs. Generative AI empowers developers to create custom integration logic tailored to these requirements. The ability to customize is invaluable in complex scenarios.
 - Extensive control over the integration process is essential to tackle custom project intricacies. Generative AI strikes a balance between automation and manual control, allowing for precise customization and optimization. This level of control ensures optimal integration outcomes.
 - API management and integration strategies must be robust to handle the custom nature of projects. Generative AI enhances these strategies, providing developers with tools to create robust interfaces. It even offers insights into the ease of third-party system integration, ensuring seamless collaboration with external systems.
 - Analyzing the ease of third-party system integration can be a complex task. Generative AI simplifies this analysis by providing compatibility insights, helping developers make informed decisions about integration.
- **User Interface and User Experience:** Custom development often means manual coding for UI components. This complexity can lead to longer development cycles and increased chances of errors. Generative AI flips the script by automating UI component generation, speeding up development and reducing errors.
 - Custom styling and theming are crucial but can add another layer of complexity. Generative AI streamlines this customization process, ensuring that the user interface aligns with branding guidelines and provides a consistent experience.
 - Responsive design implementation is a necessity in today's diverse device landscape. Generative AI ensures that responsiveness is seamlessly integrated into the user interface, regardless of screen size or device type.

- **Case Management:** Case management complexities in custom scenarios often revolve around manual configurations and rigid workflows. Generative AI automates case lifecycle configuration, reducing manual effort and increasing efficiency. This allows developers to focus on high-value tasks.
 - Custom workflow automation is a necessity for tackling case management intricacies. Generative AI empowers developers to create adaptive and dynamic case processes. These processes evolve with changing requirements, eliminating rigidity.
 - Adaptive case management capabilities are essential for custom projects. Generative AI introduces these capabilities, enhancing flexibility and adaptability. Custom applications can effectively respond to dynamic business scenarios and evolving user needs.
- **Decision Management and Business Rules:** Custom projects often demand complex rule definition and decision logic. Generative AI simplifies rule definition, ensuring alignment with specific requirements. This level of customization is indispensable in intricate projects.
 - Visualization of decision-making processes can be challenging in custom development. Generative AI enhances this visualization, providing intuitive representations of decision trees and rule flows. This clarity simplifies understanding and debugging.
 - Traceability challenges often arise in complex projects. Generative AI addresses this by providing clear visibility into decision-making logic, making debugging and optimization more straightforward.
 - Integration challenges with analytics can complicate decision processes. Generative AI mitigates these challenges, ensuring seamless incorporation of analytical insights into decision-making. Data-driven insights enhance decision quality.
- **Real-Time Decision-Making Capabilities:** Real-time decision-making is a must in many custom applications, adding a layer of complexity. Generative AI enables real-time decision-making by leveraging instantaneous insights. This agility is crucial for applications like financial systems and fraud detection.
- **Analytics and Reporting:** Custom projects require tailored analytics logic and data visualization. Generative AI introduces customized analytics logic, allowing developers to define metrics and analysis methods aligned with project goals.
 - Automating data visualization can be complex, but Generative AI simplifies this process. Developers can focus on deriving actionable insights from data, speeding up the analytics and reporting cycle.
- Adaptive analytics capabilities are vital in dynamic custom projects. Generative AI enhances these capabilities, ensuring that analytical models evolve with changing data patterns.
- The integration of Generative AI with predictive analytics enriches applications with foresight, enabling proactive decision-making. Predictive analytics capabilities allow applications to anticipate future trends and make informed decisions based on anticipated outcomes.
- Generative AI addresses integration challenges with predictive analytics, ensuring a seamless incorporation of predictive models into decision processes. This includes optimizing the integration of machine learning algorithms, ensuring efficient model training, and facilitating real-time predictions.
- **Scalability and Performance:** Scalability complexities are ever-present in custom projects. Generative AI optimizes scalability with fine-grained horizontal scaling, essential for microservices-based architectures.
 - Containerization using Docker adds another dimension to scalability. Generative AI harnesses this power, ensuring consistent deployment across environments.
 - Auto-scaling capabilities enhance flexibility but require meticulous handling. Generative AI introduces auto-scaling, dynamically adapting to workloads for optimal performance.
- **Security and Compliance:** Security complexities are paramount in custom development, especially in microservices environments. Generative AI recommends and implements robust security protocols, safeguarding sensitive data.
 - Identity and access management (IAM) complexities are addressed by Generative AI. It streamlines IAM implementation, ensuring secure access control and user authentication.
 - Threat mitigation in distributed systems can be intricate. Generative AI assists in identifying vulnerabilities, implementing intrusion detection systems, and proactively addressing security threats.

Custom JEE and Microservices development projects are inherently complex. Generative AI acts as a guiding light, simplifying complexities across various aspects of these projects. From process modeling to security, it empowers developers to navigate custom development terrain with confidence, efficiency, and innovation. As Generative AI continues to evolve, it promises to unlock new possibilities and redefine the boundaries of custom application development.





Suggested Approach

Elevating development capabilities in Pega Infinity'23 with the integration of Pega GenAI marks a significant advancement in AI-driven efficiencies within the development lifecycle. Pega GenAI, often referred to as the “brain” of Generative AI, is a sophisticated algorithmic model that has been trained on a vast array of data. This model can generate a wide variety of content, from process flows to data models, thereby streamlining the creation of robust applications. The core innovation of Pega GenAI lies in its ability to simplify and optimize various aspects of platform interaction, such as form completion and data management, while also supporting multilingual access to cater to a global user base.

One of the most notable impacts of Pega GenAI is its role in enhancing product strategy. It offers developers a powerful tool to elevate their development process, simplifying complex tasks, and producing more efficient and effective applications. This is particularly evident in its ability to scale low-code innovation rapidly, transforming creative ideas into fully functional enterprise applications with minimal effort. Additionally, by automating global functions, Pega GenAI maximizes productivity through AI-driven insights and automations. Furthermore, it ensures consistent, personalized engagement across various channels, enabling developers to quickly adapt to customer needs through AI-powered personalization.

The implementation of Pega GenAI within the Pega Infinity'23 platform can significantly elevate implementation productivity through advanced technical enhancements and practical examples. For instance, in process modeling and design, Pega Infinity'23's visual modeling is augmented with GenAI to provide predictive design patterns. This can be particularly useful in designing complex processes like a loan approval process, where GenAI might suggest a model that pre-fills steps based on historical data. Similarly, in workflow automation, GenAI transforms workflow automation by auto-generating workflow scripts that translate business requirements into process flows, thereby reducing development cycles from weeks to days.

The integration and API management aspect of Pega GenAI suggests optimal integration patterns, like recommending RESTful services or SOAP web services based on the external system's capabilities. This feature greatly reduces setup time,

enhancing efficiency. In the realm of user interface and user experience, GenAI could propose UI components based on user engagement metrics, using the Constellation framework to adapt UI elements to user behaviors dynamically. Additionally, in case management, GenAI enhances functionality by suggesting routing rules and auto-filling properties based on case types, such as “Insurance Claims.”

Furthermore, Pega GenAI assists in building sophisticated decision management systems by providing AI-generated decision table templates, which could create a decision table that auto-populates actions based on customer segmentation. This tailoring of offers to individual customer profiles significantly enhances the decision-making process. In terms of analytics and reporting, GenAI might empower users with pre-configured reporting templates that suggest the most relevant metrics and KPIs, which is invaluable in applications like sales where understanding trends and customer behaviors is crucial.

Scalability and performance are also key areas where GenAI plays a crucial role. It can predictively scale resources in the cloud before peak times, based on usage patterns, thereby ensuring that the infrastructure can handle heavy usage during critical periods like marketing campaigns. Security and compliance are enhanced by GenAI as well, which can proactively enhance security protocols by analyzing patterns and suggesting security enhancements in real-time.

Key features of Pega GenAI include workflow creation, data model simplification, picklist definition, sample data creation, persona suggestions, data exploration through “Chat with Your Data,” natural language explanations for AI-driven predictions with the Prediction Widget, support for adding new language, mapping with external data models, and form optimization with the “Fill Form with AI” feature.

In essence, the technical capabilities of Pega GenAI are not just theoretical; they provide concrete, actionable suggestions that can be directly implemented into the Pega Infinity'23 platform, resulting in improved efficiency, accuracy, and productivity. By automating and enhancing every aspect of application development and management, Pega GenAI acts as a force multiplier for developers and businesses alike, revolutionizing how developers interact with the Pega Platform™ and elevating the quality of applications developed within the Pega Infinity'23 ecosystem.

ANALYTICS AND REPORTING

Analytics and Reporting in Pega Infinity'23

Pega Infinity'23 stands as a versatile low-code platform, offering an extensive suite of features dedicated to analytics and reporting. This empowers organizations to extract valuable insights and craft compelling data visualizations with remarkable ease and efficiency.

Out-of-the-Box Analytics Tools

Pega Infinity'23 boasts a rich set of out-of-the-box analytics tools, enabling users to craft reports and dashboards with minimal coding requirements. This democratizes the analytics creation process, allowing both technical and non-technical stakeholders to contribute to and collaborate on data-driven decision-making.

User-Friendly Drag and-Drop Interface

The platform features an intuitive drag-and-drop interface for building analytics and reports. This user-friendly design expedites the development process, enabling users to swiftly design, modify, and visualize data without the need for extensive technical expertise.

Integration with Adaptive Analytics

Pega Infinity'23 seamlessly integrates with adaptive analytics, providing organizations with the ability to dynamically adjust analytics criteria based on evolving patterns. This adaptability ensures that analytics remain relevant and responsive to changing business dynamics.

Predictive Analytics Integration

Leveraging predictive analytics, Pega Infinity'23 enhances the accuracy of insights. The platform seamlessly integrates with predictive models, allowing organizations to anticipate trends and make informed decisions based on foresight into future scenarios.

Advanced Insight Extraction

Pega Infinity'23 excels in extracting meaningful insights from diverse data sources. The platform's advanced analytics capabilities facilitate the identification of trends, patterns, and outliers, empowering organizations with data-driven decision-making.

Robust Data Visualization Tools

The platform incorporates robust data visualization tools, providing users with the ability to create visually compelling representations of data. From charts and graphs to interactive dashboards, these tools enhance the communication of insights, making data more accessible and actionable.

Adaptive Analytics

Pega Infinity'23 seamlessly integrates with adaptive analytics, allowing organizations to dynamically adjust decision-making criteria based on evolving patterns and trends. The platform's visual tools enhance the incorporation of adaptive strategies into decision rules, contributing to a more flexible and responsive decision-making environment.

Predictive Analytics

Pega Infinity'23 leverages predictive analytics to enhance decision outcomes, seamlessly integrating with predictive models for anticipatory decision-making. This integration contributes to improved decision accuracy and foresight based on anticipated future events.

Building Analytics and Reports in Custom JEE and Microservices

Custom development scenarios using Java EE (JEE) and Microservices demand a more intricate and manual approach to building analytics and reports.

Customized Analytics Logic

In custom development, crafting analytics and reports involves the creation of customized logic for data extraction, transformation, and visualization. This approach offers a high degree of flexibility but necessitates a deep understanding of analytics and programming.

Coding for Data Visualization

Developers in custom scenarios must code data visualization components, a process that may require more extensive development efforts compared to low-code alternatives. While providing fine-grained control, this manual approach can be time intensive.

Limited Adaptive Analytics

Custom solutions may offer limited support for adaptive analytics, requiring additional manual coding for adjusting analytics criteria based on changing patterns. This lack of built-in adaptability can affect the responsiveness and agility of analytics.

Adaptive Analytics

Custom solutions may need to invest additional effort in implementing adaptive analytics, potentially leading to longer development cycles. The absence of visual modeling tools may add complexity to the integration of adaptive strategies, impacting the agility of decision processes.

Predictive Analytics

Custom development may face challenges in predictive analytics integration, requiring developers to manually integrate predictive models into decision processes. This manual approach may pose challenges in maintaining synchronization with evolving predictive models, potentially impacting decision accuracy.

Predictive Analytics Integration Challenges

Integrating predictive analytics into custom solutions demands complex coding tasks. The absence of seamless integration may result in challenges in maintaining synchronization with evolving predictive models.

Suggested Approach

Choose Pega Infinity'23 for Rapid Analytics Development

For projects where the swift creation of analytics and reports is crucial, Pega Infinity'23 is the recommended choice. This platform stands out for its low-code functionalities, intuitive drag-and-drop interface, and comprehensive built-in analytics tools. These features collectively facilitate a productive and cooperative environment for crafting visualizations, eliminating the need for extensive coding and external integrations.

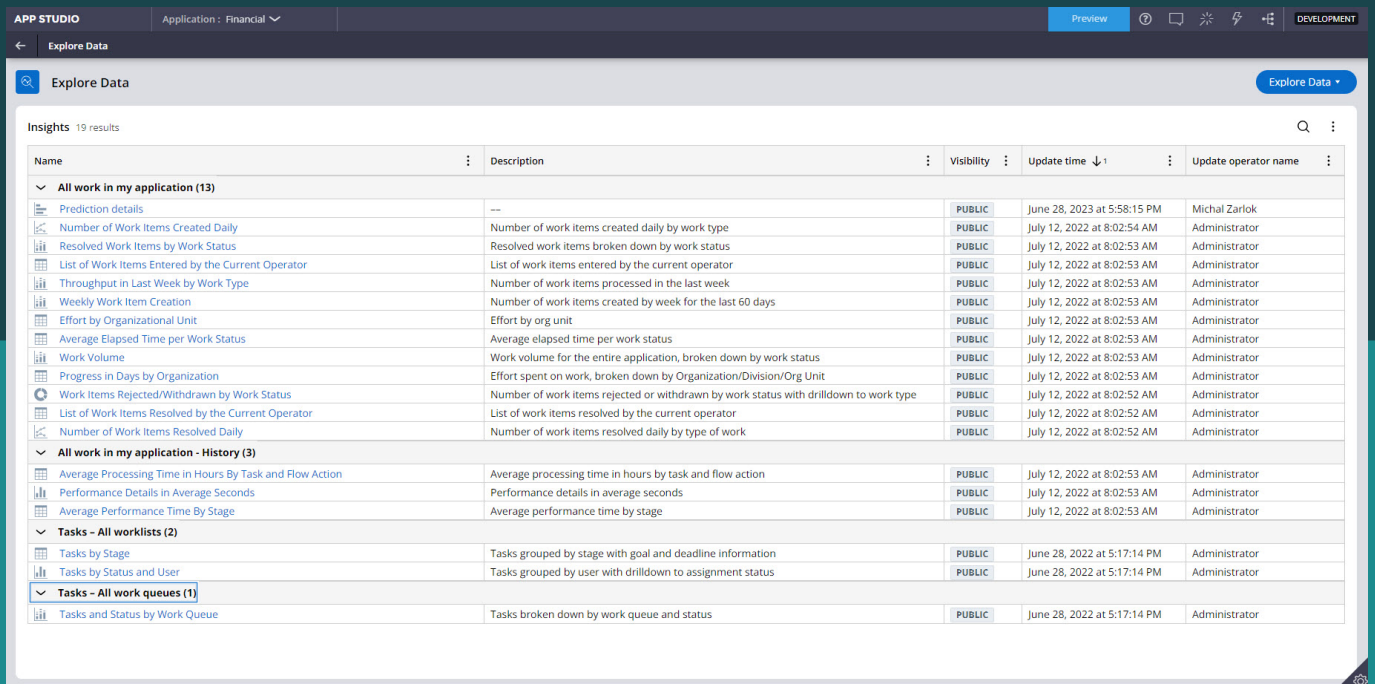
Select Custom JEE and Microservices for Highly Customized Analytics Logic

While custom JEE and Microservices solutions are apt for deeply customized analytics logic, they often involve greater effort and complexity, including the need for third-party tools for integration. This path suits projects with highly specific analytics requirements that necessitate detailed customization and where the depth of control justifies the additional resource investment.

Hybrid Approach for Diverse Analytics Needs

Adopt a hybrid approach that leverages Pega Infinity'23 for general or rapid analytics development and custom solutions for highly specific analytics needs. This strategy ensures flexibility and effectiveness, catering to the diverse analytics requirements of a project by combining the ease of Pega Infinity'23 with the customization potential of bespoke solutions.

Pega Infinity'23 excels in scenarios that benefit from quick, user-friendly development processes and integrated analytics capabilities, providing a stark contrast to the more complex, third-party dependent custom-built solutions. Custom solutions, although offering extensive customization, often lack the seamless integration and streamlined workflow of Pega Infinity'23. For projects where integrated, efficient analytics development is key, Pega Infinity'23 emerges as the more practical and efficient option, mitigating the complexities and integration challenges associated with custom-built alternatives.



SCALABILITY AND PERFORMANCE

Scalability and Performance in Pega Infinity'23

Scalability and performance stand as pivotal factors in the success of enterprise-level applications. Pega Infinity'23, as a low-code platform, and custom-built solutions using Java EE (JEE) and Microservices, address these critical aspects with distinct strategies and features.

Cloud Deployment Excellence

Pega Infinity'23 stands out with its native support for cloud deployment, aligning seamlessly with popular cloud platforms. This ensures organizations can harness the scalability and flexibility inherent in cloud environments, facilitating effortless deployment, resource optimization, and cost-effective scaling.

Robust Load Balancing

A key strength lies in the platform's robust load balancing mechanisms, intelligently distributing incoming traffic across multiple servers. This not only prevents any single server from becoming a bottleneck but also optimizes resource utilization, contributing to enhanced system performance.

Dynamic Horizontal Scaling

Pega Infinity'23 supports dynamic horizontal scaling, enabling organizations to add more instances or nodes to their infrastructure. This flexibility ensures that the system can gracefully handle increased loads, making it well-suited for applications with varying workloads and demand fluctuations.

Scaling Microservices-Based Custom Solutions in the Cloud

Custom solutions adopting a microservices architecture present unique advantages for achieving scalability, particularly in cloud environments.

Fine-Grained Horizontal Scaling with Kubernetes

Microservices, designed for independence, allow for fine-grained horizontal scaling facilitated by container orchestration tools like Kubernetes. This means that specific components of the application can be scaled independently based on demand, optimizing resource usage, and enhancing overall scalability.

Containerization Power with Docker

Docker, a prominent containerization platform, empowers the encapsulation of microservices into containers. These lightweight containers can be swiftly deployed, simplifying the scaling of individual microservices. This approach contributes to an efficient and scalable architecture.

Auto-Scaling for Enhanced Flexibility

Cloud-native features, including auto-scaling, further enhance the scalability of microservices-based solutions. Auto-scaling allows the system to automatically adjust the number of running instances based on predefined criteria such as traffic volume, ensuring optimal performance under varying workloads.

Performance Benchmarks and Considerations

While Pega Infinity'23 excels in scalability, a thorough analysis of performance benchmarks is essential, especially when compared with custom solutions.

Pega's Demonstrated Performance Benchmarks

Pega Infinity'23 typically undergoes extensive performance testing and optimization, showcasing its capability to handle large-scale applications efficiently. These performance benchmarks serve as a valuable reference for organizations evaluating the platform's adequacy for their specific performance requirements.

Navigating Microservices Communication Overhead

In custom microservices-based solutions, the communication overhead between microservices can impact performance. Addressing this challenge involves strategic design considerations, implementing efficient caching strategies, and employing asynchronous communication to mitigate potential bottlenecks and enhance overall performance.

Infrastructure Efficiency as a Performance Contributor

The efficiency of the underlying infrastructure, whether in the cloud or on-premises, significantly influences overall system performance. Custom solutions leveraging cloud-native features, implementing efficient database indexing, employing robust caching mechanisms, and adopting effective load balancing strategies contribute to enhanced performance.

Suggested Approach

Embrace Pega Infinity'23 for Efficient Development and Enhanced Scalability

Pega Infinity'23 stands out as the go-to solution for projects that demand both rapid development and superior scalability. With its inherent cloud-readiness, automatic load balancing, and horizontal scaling capabilities, Pega Infinity'23 simplifies and accelerates the process of scaling applications. This is particularly beneficial for businesses facing fluctuating workloads and needing to swiftly adapt to dynamic market demands, without the intricate complexities associated with custom-built solutions.

Microservices-Based Custom Solutions for Granular Scalability

Microservices-based custom solutions are more suitable when precise, granular scalability is essential. Leveraging the modular nature of microservices and containerization technologies like Kubernetes and Docker, these solutions allow for the independent scaling of specific application components. Although this method offers tailored scalability, it often involves more complexity and effort in implementation and maintenance compared to Pega Infinity'23.

Consideration of Performance Requirements and Optimization Strategies

Regardless of the chosen path, a thorough assessment of performance requirements is crucial. Pega Infinity'23 provides reliable performance benchmarks and efficient resource utilization, making it a less complex option compared to custom solutions, which require careful optimization of inter-service communication and efficient use of cloud-native features.

Choosing between Pega Infinity'23 and custom microservices-based solutions involves a nuanced consideration of factors such as scalability, performance benchmarks, and development speed. Pega Infinity'23 offers a comprehensive low-code platform with robust scalability features, making it suitable for applications with fluctuating workloads. Custom microservices solutions provide fine-grained scalability, especially in cloud environments, allowing independent scaling of specific components. The decision should align with the specific needs of the project, considering factors such as the nature of the application, expected workloads, and the organization's infrastructure preferences.



SECURITY AND COMPLIANCE

Security Measures in Pega Infinity'23

Security and compliance are paramount considerations in application development. Pega Infinity'23, as a low-code platform, and custom-built solutions using Java EE (JEE) and Microservices, approach these critical aspects with distinctive features and strategies.

Built-in Security Protocols

Pega Infinity'23 integrates robust security protocols as an inherent part of its architecture. The platform leverages encryption, secure APIs, and data masking to fortify applications against potential security threats.

Identity and Access Management (IAM)

IAM in Pega ensures secure user authentication and authorization, allowing organizations to manage access rights effectively. Pega's IAM features support industry-standard protocols, contributing to a secure and controlled access environment.

Threat Mitigation Strategies

Pega employs proactive threat mitigation strategies, including real-time monitoring, anomaly detection, and automated response mechanisms. These measures enhance the platform's ability to detect and counteract potential security threats promptly.

Addressing Security Concerns in Custom Cloud Development

Custom solutions based on microservices architecture require specific security measures to address the inherent complexities.

Security Protocols in Microservices

Microservices architectures demand rigorous security protocols. Custom solutions must implement encryption for data in transit and at rest, ensuring end-to-end security. Additionally, secure communication channels, such as HTTPS, are essential for protecting data integrity.

Identity and Access Management (IAM) Implementation

IAM is crucial in microservices environments. Implementing centralized IAM solutions ensures secure user access across microservices, preventing unauthorized entry points and maintaining a granular level of control over service access.

Threat Mitigation in Distributed Systems

Distributed systems, common in microservices, require advanced threat mitigation. This involves deploying strategies such as rate limiting, authentication tokens, and continuous monitoring to identify and respond to potential threats across the interconnected services.

Comparative Analysis of Compliance Features

Pega Infinity'23's built-in compliance features are compared with custom solutions' need to adhere to various regulations like GDPR, HIPAA, etc.

Pega's Built-in Compliance Features

Pega Infinity'23 often incorporates built-in compliance features designed to meet regulatory standards. This includes capabilities to address GDPR requirements for data protection, HIPAA standards for healthcare applications, and other industry-specific regulations.

Custom Solutions' Regulatory Adherence

Custom solutions need to rigorously adhere to regulations, often requiring additional development effort. Organizations must implement measures like data encryption, access controls, and audit trails to ensure compliance with specific regulatory frameworks.

Data Privacy Considerations

Pega's low-code platform often includes features for managing data privacy, allowing organizations to define and enforce data protection policies. Custom solutions must meticulously address data privacy considerations, incorporating encryption, data anonymization, and secure data storage practices.

Suggested Approach

Pega Infinity'23 for Comprehensive Security and Compliance Standards

Pega Infinity'23 is the ideal choice for projects that require robust security and stringent compliance standards with minimal effort and complexity. The platform is designed with integrated security measures that adhere to leading industry standards like ISO 27001, GDPR, and HIPAA, offering a streamlined approach to meeting various regulatory requirements. This reduces the need for extensive custom development and ensures a standardized, efficient compliance process.

Custom Solutions for Specialized Security

For projects with specific industry-related security needs or when navigating complex regulatory frameworks, custom solutions are advisable. They provide the flexibility to tailor security protocols and compliance measures to meet unique industry standards or specific regulations like PCI DSS for the financial sector, offering a high degree of customization.

Hybrid Approach for Optimal Flexibility

A hybrid approach, using Pega Infinity'23 for general security and compliance needs and custom solutions for specialized requirements, offers the best of both worlds. This strategy allows for optimal flexibility, catering to the varied security and compliance demands within a project.

Pega Infinity'23 offers a streamlined, less complex approach with built-in security and compliance features, conforming to key standards and reducing the need for additional development. This makes it an ideal choice for projects where general security standards and compliance with regulations

like GDPR or HIPAA are sufficient. Custom-built solutions, on the other hand, are better suited for projects with unique security challenges or specific compliance requirements, such as those needing to adhere to industry-specific standards like PCI DSS. A hybrid approach provides a balanced solution, combining the standardized security and compliance capabilities of Pega Infinity'23 with the tailored flexibility of custom solutions, ensuring comprehensive coverage of security and compliance needs in a project.



TOTAL COST OF OWNERSHIP (TCO)

Total Cost of Ownership (TCO) in Pega Infinity'23

In the dynamic landscape of application development, navigating the intricacies of Total Cost of Ownership (TCO) is pivotal for strategic decision-making. Pega Infinity'23, heralded as a low-code platform, and custom-built solutions employing Java EE (JEE) and Microservices, each present a multifaceted terrain of considerations in the context of TCO.

Licensing Costs

Pega Infinity'23 engages with licensing fees, constituting a facet of upfront costs that fluctuates based on application features and scale. The low-code paradigm of the platform has the potential to ameliorate licensing expenses by expediting development processes.

Development Time and Effort

The low-code architecture inherent in Pega Infinity'23 significantly truncates development timelines in comparison to traditional methods. This reduction translates into tangible cost savings as development efforts are streamlined, aided by visual modeling that simplifies the creation of intricate applications.

Training and Onboarding

Training costs form a discernible part of TCO, reflecting the necessity to ensure teams are proficient in utilizing Pega Infinity'23 effectively. While low-code platforms strive to minimize training needs, investing in skill development remains a factor in overall cost considerations.

Maintenance and Support

Ongoing maintenance and support expenses constitute another dimension of Pega's TCO. These include costs related to updates, patches, and troubleshooting. The low-code paradigm is anticipated to streamline maintenance tasks, potentially yielding cost reductions over time.

Calculating TCO for Custom JEE and Microservices Development

Development Effort and Time

Custom JEE and Microservices development typically undergoes a more extended development cycle, impacting both upfront and ongoing TCO. The extended development effort and time exert a significant influence on overall project costs.

Infrastructure Costs

Custom solutions necessitate infrastructure investment, with costs varying based on factors such as hosting, server capacity, and scalability requirements. These costs are

subject to the complexity and scale of the application being developed.

Training for Custom Technologies

Teams engaged in custom development may incur training costs for mastering specific technologies. The need for expertise in custom solutions often demands a higher level of training investment, influencing overall TCO.

Ongoing Maintenance

Custom solutions require ongoing maintenance efforts, covering areas like bug fixes, updates, and enhancements. The resources allocated to ensure the application remains robust and up to date contribute to ongoing TCO considerations.

Comparing Licensing, Development, and Maintenance Costs

Upfront Licensing Costs

Pega Infinity'23 may involve upfront licensing costs, while custom solutions necessitate investment in development tools and technologies. The comparison is contingent on the scale and complexity of the project, with cost considerations varying accordingly.

Development Costs

Low-code platforms like Pega Infinity'23 have the potential to reduce development costs due to faster development times. In contrast, custom solutions, with their extensive coding requirements, may lead to higher upfront development expenses.

Ongoing Maintenance Savings

The inherent low-code nature of Pega Infinity'23 can result in ongoing maintenance savings when compared to custom solutions. Streamlined updates and fixes may contribute to reduced resources needed for continuous application support.

Potential for Rapid Prototyping

Low-code platforms facilitate rapid prototyping, potentially minimizing the need for extensive planning and costly changes in later stages. Custom solutions may necessitate more upfront planning, impacting TCO in terms of project flexibility and adaptability.

Suggested Approach

Pega Infinity'23 for Rapid Deployment and Reduced TCO

For projects where quick deployment, minimal licensing complexity, and streamlined maintenance are key, Pega Infinity'23 emerges as the ideal solution. Its low-code framework significantly cuts down on development time and ongoing maintenance efforts, leading to a more favorable total cost of ownership (TCO). For instance, a financial institution might use Pega Infinity'23 to quickly develop customer service applications, reducing both development time and costs compared to a custom-built solution.

Custom Solutions for Tailored Needs and Full Control

Custom-built solutions are preferable when unique business requirements necessitate a high level of customization and control. While this approach might incur higher initial costs, it allows for precise tailoring in both design and functionality. An example could be a healthcare provider needing a bespoke patient management system, which requires specific integrations and functionalities that are not readily available in standard platforms.

Hybrid Approach for Optimal Balance

A hybrid approach, combining Pega Infinity'23's low-code efficiency for standard functionalities with custom solutions for more complex and specific needs, offers an optimal balance. This approach harmonizes speed, flexibility, and control, effectively optimizing the overall TCO. A retail company, for instance, might use Pega Infinity'23 for its inventory management system for efficiency but opt for a custom solution for a unique customer loyalty program.

When analyzing the TCO of Pega Infinity'23 versus custom solutions, it's crucial to consider factors such as licensing costs, development efforts, and maintenance expenses. Pega Infinity'23 offers clear benefits in terms of reduced development time, easier maintenance, and potentially lower licensing fees. In contrast, custom solutions, despite their higher upfront cost and maintenance requirements, provide unmatched flexibility and control. Pega Infinity'23 is recommended for scenarios where rapid deployment and lower TCO are priorities, while custom solutions are better suited for projects demanding extensive customization. A hybrid approach allows organizations to leverage the strengths of both low-code and custom development, tailoring their approach to the specific needs of the project for the most efficient and cost-effective outcome.



COMMUNITY AND SUPPORT

Community and Support in Pega Infinity'23

A robust community and support ecosystem play a pivotal role in the success of any application development endeavor. Comparing the community and support features between Pega Infinity'23, a low-code platform, and custom-built solutions using Java EE (JEE) and Microservices, reveals distinct approaches to knowledge sharing, troubleshooting, and overall developer assistance.

Community Forums

Pega Infinity'23 boasts a vibrant community forum where users, developers, and experts converge to discuss challenges, share insights, and collaborate on problem-solving. These forums provide a valuable space for networking and tapping into collective expertise.

Documentation

Pega offers comprehensive documentation that serves as a knowledge hub for developers. This includes detailed guides, tutorials, and best practices, ensuring that users have access to a wealth of information to navigate the platform effectively.

Official Support Channels

Pega provides official support channels, including ticketing systems and direct communication with support teams. This ensures that users can escalate issues and receive timely assistance from Pega's dedicated support professionals.

Resources for Troubleshooting

Pega's community and support infrastructure include resources specifically designed for troubleshooting. This encompasses knowledge bases, FAQs, and collaborative spaces where users can seek solutions to common challenges.

Available Support Options for Custom JEE and Microservices Developers

Online Communities and Forums

Custom JEE and Microservices development often relies on diverse online communities and forums. These platforms, such as Stack Overflow or specialized developer forums, serve as spaces for developers to exchange ideas, seek advice, and troubleshoot issues collectively.

Vendor Support for Custom Solutions

Developers engaged in custom cloud development can access support from vendors providing the tools and technologies used in their stack. This includes reaching out to database vendors, framework providers, and cloud service providers for assistance.

Knowledge Sharing Platforms

Custom development ecosystems leverage knowledge-sharing platforms where developers document solutions, share code snippets, and discuss implementation strategies. This collaborative environment fosters a culture of shared learning within the community.

Knowledge Sharing and Troubleshooting

- Pega Infinity'23 users benefit from a dedicated platform that encourages knowledge sharing and troubleshooting within the Pega community. The consolidated nature of Pega's resources ensures that users have a centralized hub for problem-solving and learning from shared experiences.
- Custom JEE and Microservices developers rely on diverse platforms for knowledge sharing and troubleshooting. While this decentralized approach offers flexibility, it requires developers to navigate various forums and documentation to find solutions tailored to their specific stack.

Suggested Approach

Pega Infinity'23 for Centralized Support

Opt for Pega Infinity'23 when seeking a centralized support ecosystem. The platform's dedicated community forums, official documentation, and direct support channels create a cohesive environment for knowledge sharing and troubleshooting. This centralized approach simplifies access to resources for developers.

Custom Solutions for Stack-Specific Support

Choose custom JEE and Microservices development when the project benefits from stack-specific support. Custom solutions often leverage the support provided by individual vendors for databases, frameworks, and cloud services. This approach allows developers to tap into specialized expertise for each component of the stack.

Hybrid Approach for Flexibility

Consider a hybrid approach that combines the strengths of both ecosystems. Use Pega Infinity'23 for segments where centralized support is advantageous, and custom solutions for components that benefit from stack-specific expertise. This hybrid model offers flexibility while ensuring access to robust community and support resources.

The community and support dynamics for applications built on Pega Infinity'23 and custom JEE and Microservices development differ in terms of centralization and approach. Pega Infinity'23 provides a centralized, dedicated community with official support channels, simplifying knowledge sharing and troubleshooting. In custom development, the approach is more decentralized, relying on diverse online communities and vendor-specific support. Pega Infinity'23 is recommended for those prioritizing centralized support and custom solutions for projects benefitting from stack-specific expertise. A hybrid approach offers flexibility, allowing organizations to leverage the strengths of both ecosystems based on the diverse requirements of the project.

INNOVATION AND ROADMAP

Innovation and Roadmap in Pega Infinity'23

The innovation trajectory and future roadmap of an application development platform are crucial considerations when choosing between a low-code solution like Pega Infinity'23 and custom-built solutions using Java EE (JEE) and Microservices. This comparison delves into Pega's history of innovation and its forward-looking vision, contrasting it with emerging trends in modern cloud custom development.

Innovation History

Pega has consistently been at the forefront of innovation, demonstrating a commitment to evolving with industry demands. From the inception of Pega Infinity'23, the platform has introduced a spectrum of innovations spanning from user experience enhancements to robust workflow automation and sophisticated integration capabilities.

Integration of Emerging Technologies

Pega Infinity'23 stands out for its proactive integration of emerging technologies. The platform seamlessly incorporates Artificial Intelligence (AI) and machine learning, providing developers with the tools to craft intelligent applications capable of adaptation, learning, and making informed, data-driven decisions.

Future Roadmap

Pega's forward-looking roadmap is marked by a dedication to technological advancement. The platform envisions continual growth in AI and machine learning, predictive analytics, and further enhancements, ensuring that it remains aligned with the evolving needs of businesses in an ever-changing digital landscape.

Emerging Trends and Innovations in Modern Custom Development

Serverless Architecture

A noteworthy trend in modern cloud custom development is the adoption of serverless architecture. This paradigm shift eliminates the burden of server management, allowing developers to concentrate solely on coding. Serverless architectures, recognized for their scalability and cost-effectiveness, represent a significant evolution in custom development.

AI-Driven Development

The integration of AI into the custom development process is gaining prominence. AI-driven development optimizes coding tasks, automates testing procedures, and offers intelligent insights, thereby accelerating the development lifecycle. This trend aligns with the broader industry movement toward enhanced, augmented development experiences.

IoT Integration

Internet of Things (IoT) integration emerges as a prevalent innovation in modern custom development. With the proliferation of IoT devices, custom solutions increasingly incorporate IoT capabilities for real-time data exchange, monitoring, and control. This integration adds layers of sophistication to applications, particularly in sectors like healthcare, manufacturing, and logistics.

Suggested Approach

Pega Infinity'23 for Intelligent Automation

Pega Infinity'23 emerges as the optimal choice when the focal point is intelligent automation, driven by AI and machine learning. The platform's impressive history of innovation and its commitment to integrating emerging technologies position it strategically for organizations aspiring to build applications with adaptive and intelligent capabilities.

Custom Solutions for Niche Requirements

Choose for custom solutions when specific niche requirements, such as a strong emphasis on serverless architecture or specialized AI implementations, take center stage. Custom development allows organizations to tailor solutions precisely to their unique needs, capitalizing on emerging trends that may not be fully realized in a standardized platform.

Hybrid Approach for Versatility

Consider a hybrid approach that combines the strengths of Pega Infinity'23 for its intelligent automation capabilities with custom solutions for specific components requiring niche technologies. This flexible approach provides versatility, allowing organizations to harness the benefits of both paradigms based on the nuanced requirements of the project.

The decision-making process surrounding the innovation and roadmap of applications built on Pega Infinity'23 versus custom JEE and Microservices development hinges on meticulous consideration of the platform's history, its integration of emerging technologies, and the future vision. Pega Infinity'23 shines in its commitment to intelligent automation, with a rich history of seamlessly integrating AI and machine learning. Custom development, in contrast, offers the flexibility to embrace emerging trends such as serverless architecture, AI-driven development, and IoT integration for niche requirements. The suggested approach depends on the specific project needs, with Pega Infinity'23 recommended for organizations prioritizing intelligent automation and custom solutions for those requiring tailored implementations of emerging trends. A hybrid approach provides versatility, enabling organizations to strike a balance based on the diverse innovation needs within the same project, ensuring a comprehensive and future-ready application development strategy.

KEY FINDINGS

Development Efficiency

- Pega Infinity'23 offers a low-code environment for rapid development, reducing time through visual modeling and pre-built components.
- Custom-Built JEE and Microservices: Involves manual coding, potentially leading to longer development times.

Flexibility and Customization

- Pega Infinity'23 balances flexibility and customization within a modular, low-code environment.
- Custom-Built JEE and Microservices allows complete control over the architecture and technology stack for tailored solutions.

Integration Capabilities

- Pega Infinity'23 facilitates seamless integration with external systems and APIs.
- Custom-Built JEE and Microservices requires explicit development and management of integrations.

Scalability

- Pega Infinity'23 scales easily with auto-scaling capabilities.
- Custom-Built JEE and Microservices scalability depends on the design and manual intervention.

Maintenance and Upgrades

- Pega Infinity'23 simplifies maintenance with automatic updates and patches.
- Custom-Built JEE and Microservices manual effort required for maintenance and upgrades.

Cost Considerations

- Pega Infinity'23 provides Low-code environment may result in cost savings.
- Custom-Built JEE and Microservices: Development and maintenance costs may be higher.

Security

- Pega Infinity'23 implements security best practices.
- Custom-Built JEE and Microservices requires manual implementation of security measures.

User Experience

- Pega Infinity'23 leverages Constellation design system for consistent and user-friendly interfaces.
- Custom-Built JEE and Microservices user experience depends on design decisions and may require additional effort.

Community and Support

- Pega Infinity'23 provides benefits from the Pega community and support ecosystem.
- Custom-Built JEE and Microservices relies on in-house expertise with variable community support.

Adoption and Learning Curve

- Pega Infinity'23 is a Low-code environment reduces the learning curve.
- Custom-Built JEE and Microservices requires expertise in chosen technologies with a potentially steeper learning curve.

Compliance and Regulations

- Pega Infinity'23 adheres to industry standards and ensures compliance through regular updates.
- Custom-Built JEE and Microservices compliance measures need manual implementation and monitoring.

Future Proofing

- Pega Infinity'23 commitment to innovation ensures future proofing through regular updates.
- Custom-Built JEE and Microservices future proofing relies on the foresight and adaptability of the development team.

In the dynamic landscape of application development, choosing the right platform is crucial for achieving project success. Pega Infinity'23 and custom-built Java Enterprise Edition (JEE) and Microservices applications represent two distinct approaches to building robust and scalable solutions. This framework aims to provide a comprehensive comparison between these options across various dimensions. From development efficiency to future proofing, each aspect plays a critical role in determining which solution aligns best with specific project requirements.

Pega Infinity'23 stands as a cutting-edge low-code platform that empowers developers with a suite of tools for accelerated application development. Leveraging the Constellation design system, Pega Infinity'23 offers a modular and configurable environment that emphasizes efficiency, flexibility, and user experience. With a focus on reducing development time and simplifying maintenance, Pega Infinity'23 promises to streamline the application development lifecycle.

Custom-built Java Enterprise Edition (JEE) and Microservices applications, on the other hand, represent a traditional approach where development teams have complete control over the architecture and technology stack. This method requires manual coding and meticulous configuration, allowing for high customization and adaptability. However, it comes with the trade-off of longer development cycles and potentially higher maintenance costs.

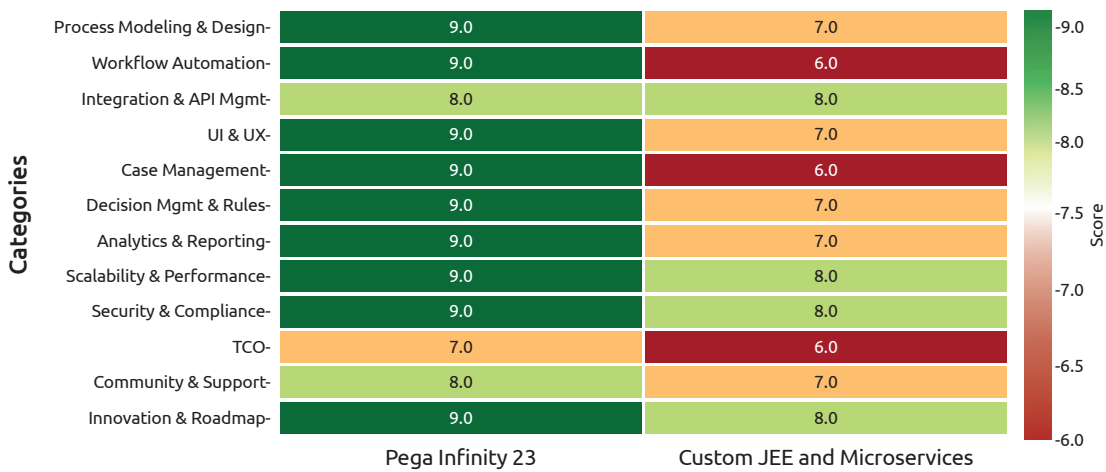


Feature Score using Weighted Scoring Model

#	Main Feature	Sub-Feature	Pega Infinity '23	Custom build using JEE and Microservices
1	Process Modeling and Design	Visual Workflow Design	9	7
		Process Optimization	8	6
		Process Simulation	8	5
2	Workflow Automation	Task Management	9	7
		Event Handling	9	6
		Automated Routing	9	6
3	Integration and API Management	API Creation and Management	8	8
		Service Orchestration	8	7
		Connectors and Adapters	8	7
4	User Interface and User Experience	UI Consistency and Reusability	9	7
		Responsive Design	9	7
		Accessibility Standards	8	6
5	Case Management	Case Lifecycle Management	9	6
		Content Management	8	6
		Collaboration Tools	8	6
6	Decision Management and Business Rules	Rule Engine	9	7
		Decision Analytics	9	6
		Business Policy Automation	9	6
7	Analytics and Reporting	Real-time Dashboards	9	7
		Predictive Analytics	8	6
		Reporting Tools	8	7
8	Scalability and Performance	Load Handling	9	8
		Elastic Scaling	8	8
		Performance Optimization	9	7
9	Security and Compliance	Authentication and Authorization	9	8
		Data Encryption	9	8
		Compliance Standards	9	7
10	Total Cost of Ownership (TCO)	Initial Setup Cost	7	6
		Maintenance Cost	7	6
		Training and Adoption	7	5
11	Community and Support	Vendor Support	9	7
		Community Resources	7	7
		Documentation and Learning Material	8	7
12	Innovation and Roadmap	Future Vision and Strategy	9	8
		Commitment to Research and Development	9	7
		Frequency of Updates	9	7

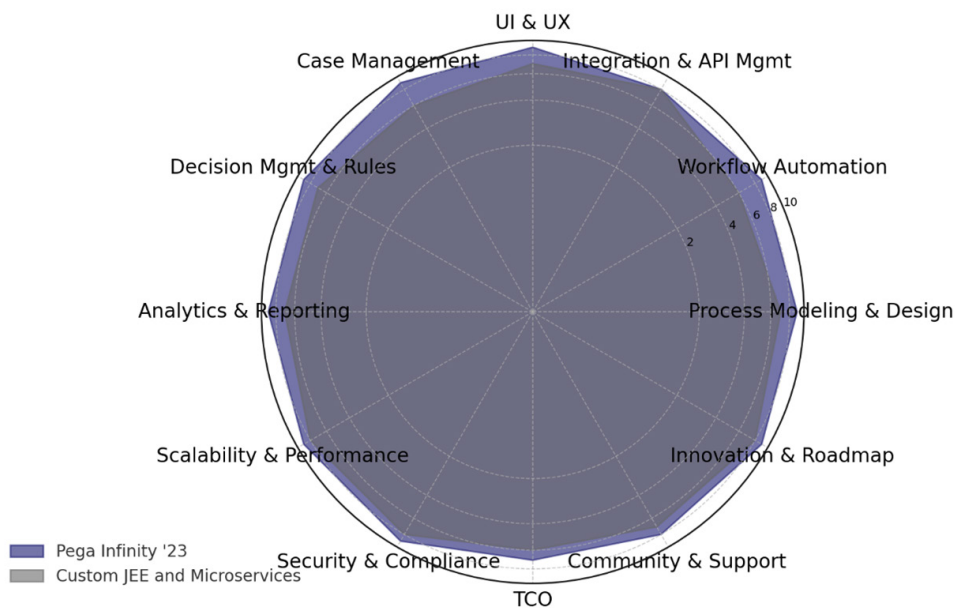
Key Highlights

- Pega Infinity '23 generally scores higher across most features compared to the custom build using JEE and Microservices, which is indicative of its comprehensive, out-of-the-box capabilities for enterprise solutions.
- Both systems score equally high in Integration and API Management and Scalability and Performance, suggesting that they can both be tailored to handle large-scale operations effectively.
- Workflow Automation and Case Management are notably stronger in Pega Infinity '23, reflecting Pega's focus on business process management.
- Custom builds using JEE and Microservices have competitive scores in Community and Support and Innovation and Roadmap, indicating strong community resources and a forward-looking approach.



The radar chart below visually illustrates the comparative evaluation of Pega Infinity '23 and Custom JEE & Microservices across various technical features. Pega Infinity '23 shows higher scores in most areas, with particularly strong performance in workflow automation and case management. Both systems perform equally well in

integration, scalability, and performance. Custom builds show strong community support and innovation potential, although slightly less than Pega. This visual representation helps stakeholders quickly understand the areas of strength and opportunities for improvement for each system.



PRODUCTIVITY MEASURES

Process Modeling and Design

Pega Infinity'23 accelerates process modeling and design through its low-code environment, offering visual tools and pre-built components. This allows for rapid development cycles and streamlines design processes. In contrast, a custom build with JEE and Microservices relies on manual coding, potentially leading to extended development timelines and increased effort in the process modeling and design phase.

Workflow Automation

Pega Infinity'23 stands out in workflow automation, employing built-in automation features and low-code capabilities. This results in a more efficient and streamlined workflow development process. On the other hand, a custom build with JEE and Microservices requires explicit development for workflow automation, potentially increasing the complexity and effort involved in automation implementation.

Integration and API Management

Pega Infinity'23 simplifies integration with external systems and API management by leveraging pre-built connectors and a low-code approach. This reduces the time and effort required for integration tasks. Conversely, a custom build with JEE and Microservices demands manual implementation of integrations and API management, potentially leading to a more labor-intensive process.

User Interface and User Experience

Leveraging the Constellation design system, Pega Infinity'23 ensures a consistent and user-friendly interface, reducing development time for UI/UX design. In contrast, a custom build with JEE and Microservices requires manual design decisions, making the user interface and experience dependent on meticulous coding and potentially requiring additional effort for an appealing and cohesive design.

Case Management

Pega Infinity'23 excels in case management with its robust capabilities and pre-built components, facilitating accelerated case development. Conversely, a custom build with JEE and Microservices necessitates manual configuration for case management, potentially leading to longer implementation times and increased complexity in managing cases.

Decision Management and Business Rules

Pega Infinity'23 seamlessly integrates decision management with built-in business rules and low-code logic, simplifying the decision-making process. In contrast, a custom build with JEE and Microservices requires explicit implementation of decision management and business rules, potentially leading to increased development complexity and effort.

Analytics and Reporting

Facilitating analytics and reporting through built-in tools, Pega Infinity'23 provides insights into application performance. On the contrary, a custom build with JEE and Microservices demands additional effort for implementing analytics and reporting features, potentially extending development timelines, and increasing the complexity of data analysis.

Scalability and Performance

Pega Infinity'23 ensures scalability with a modular and component-based architecture, coupled with auto-scaling capabilities. In contrast, a custom build with JEE and Microservices requires careful design considerations for scalability, potentially leading to a more manual and intervention-dependent scaling process.

Security And Compliance

Pega Infinity'23 implements security best practices and ensures compliance through regular updates, providing a secure and compliant environment. On the other hand, a custom build with JEE and Microservices requires manual implementation and monitoring of security and compliance measures, potentially introducing higher risks and complexities.

Total Cost of Ownership (TCO)

Pega Infinity'23, with its low-code environment, potentially reduces the Total Cost of Ownership through faster development cycles and simplified maintenance. In contrast, a custom build with JEE and Microservices may incur higher development and maintenance costs due to manual coding and longer development timelines.

Community and Support

Benefiting from a robust community and support ecosystem, Pega Infinity'23 ensures a well-supported environment for developers. Conversely, a custom build with JEE and Microservices relies on internal expertise with varying levels of community support, potentially leading to a more isolated development environment.

Innovation and Roadmap

Pega Infinity'23 showcases innovation through a commitment to regular updates, ensuring access to new features and capabilities. Conversely, a custom build with JEE and Microservices depends on the foresight and adaptability of the development team, potentially requiring significant rework for the adoption of new technologies and innovations.

Effort Comparison

#	Activity	Pega Productivity Improvement Factor Over Custom Build
1	Requirement Analysis	1.00
2	Process Modeling and Design	16.25
3	Case Creation and Define Stages	47.68
4	Case Classification and Routing	21.12
5	UI Mockup	10.80
6	User Interface and User Experience	6.49
7	Data Model Creation:	4.07
8	Data Mapping	6.12
9	Data Transforms	3.89
10	Integration and API Management	8.89
11	Work Queues	11.76
12	Workflow Automation	7.04
13	Decision Management and Business Rules	4.10
14	Analytics and Reporting	18.67
15	Scalability and Performance	10.89
16	Security and Compliance	19.70
17	Testing	7.03
18	Deployment	3.09
Overall Productivity Factor		7.8

KEY OBSERVATIONS

- **Overall Productivity (with Disclaimer):** While the study on a specific use case indicates that Pega Infinity '23 is substantially more productive, **with a factor of 7.80 times faster** for this particular scenario, it is important to note that this factor is context specific. It may hold true for other use cases or processes with medium to high complexity that require workflow capabilities, case management, and rules management functionality. **However, this 7.8 times productivity factor is not a universal metric and should not be applied generally across all scenarios.** Further studies are recommended to validate this factor across various other use cases to ensure accuracy and relevance.
- **Pega Infinity '23 Efficiency (with Disclaimer):** In the context of the studied use case, Pega Infinity '23 demonstrates a higher productivity factor across most activities compared to custom development using JEE and Microservices. The observed lower effort percentages for tasks like Process Modeling and Design, and Case Creation and Define Stages suggest that Pega Infinity '23 can be approximately **7.8 times more productive** for this specific scenario. However, it's crucial to acknowledge that this factor of 7.80 is not a generic benchmark and may vary across different projects and contexts. The stated productivity factor should be interpreted with caution and not assumed as a standard for all instances of development. Further analysis and studies are recommended to assess the efficiency of Pega Infinity '23 in other scenarios and to verify the generalizability of this productivity factor.
- **Significant Effort Reductions:** The most considerable effort reductions with Pega Infinity '23 are in areas of Process Modeling and Design, and Case Creation and Define Stages, where the productivity factor is notably high.
- **User Interface and Experience:** For UI Mockup and User Interface and User Experience, Pega Infinity '23 has a lower effort percentage compared to custom development for UI efforts. For API efforts, Pega also shows greater efficiency, which suggests more streamlined API management.
- **Testing:** Testing constitutes the highest percentage of effort in both Pega Infinity '23 and the custom build approach, but Pega Infinity '23 demonstrates a more significant productivity factor, indicating reduced effort.
- **Data-Related Tasks:** Tasks related to data, such as Data Model Creation, Data Mapping, and Data Transforms, are more efficiently handled in Pega Infinity '23, as shown by the higher productivity factors for these activities.
- **Deployment:** Deployment represents a smaller effort percentage for both approaches, with Pega Infinity '23 requiring a notably smaller percentage of effort compared to custom builds.

Pega Infinity '23 is positioned as a more efficient tool for application development, offering significant productivity advantages, particularly in areas that traditionally require substantial effort in custom development scenarios. Pega Infinity is known for its low-code development approach, allowing users to build applications with minimal hand-coding. This can significantly reduce development effort and accelerate the delivery of applications. Pega emphasizes rapid application development, enabling quick prototyping and iterative development. This can lead to faster time-to-market for applications. Pega provides a set of pre-built components and features that cover common functionalities. This can reduce the effort required for coding and testing compared to building everything from scratch. Pega facilitates collaboration between business and IT teams through visual modeling and a shared development environment. This can lead to better communication and alignment between business requirements and technical implementation.

CONCLUSION

Pega Infinity'23: A Low-Code Powerhouse

Pega Infinity'23 distinguishes itself with its robust low-code environment, offering an array of tools designed to prioritize efficiency and expedite development processes. Its standout features include visual modeling capabilities, pre-built components, and seamless integration with the innovative Constellation design system. This amalgamation facilitates not only swift process modeling but also streamlined workflow automation and accelerated case management. Pega Infinity'23's commitment to user interface and experience is evident as it leverages Constellation to provide a consistent and user-friendly interface, ultimately reducing overall development time. The platform further excels in decision management and business rules integration, complemented by built-in analytics and reporting tools, contributing to a holistic solution for organizations emphasizing speed and agility in their development workflows. Pega Infinity'23's modular architecture ensures scalability, incorporating auto-scaling capabilities to accommodate varying workloads. The platform boasts robust security measures, with best practices implemented and compliance assured through regular updates. The potentially reduced total cost of ownership is a testament to the efficiency inherent in its low-code nature. Additionally, a vibrant community and support ecosystem enhance the overall developer experience.

Custom-Built JEE & Microservices: Precision with Extended Effort

Conversely, a custom-built solution utilizing Java Enterprise Edition (JEE) and Microservices offers organizations a tailored approach to development, affording complete control over the architecture and technology stack. However, this customization comes at the expense of heightened development effort and potentially prolonged timelines. The intricacies of process modeling, workflow automation, and case management in a custom build demand meticulous manual coding and configuration, contributing to a more time-intensive development cycle. While customization remains a notable strength, the user interface and experience in a custom build heavily depend on manual design decisions, potentially necessitating additional effort to ensure a polished and cohesive design. Decision management, business rules implementation, and the incorporation of analytics and reporting features require explicit development, introducing added complexity to the overall development process. Scalability in a custom build necessitates careful consideration and manual intervention, rendering it less inherently adaptable than the modular

architecture of Pega Infinity'23. Security and compliance measures in a custom build require manual implementation and monitoring, introducing potential risks. The total cost of ownership may be comparatively higher due to extended development cycles and maintenance efforts. While the expertise of the development team remains crucial, the variability in community and support ecosystems may impact the availability of external assistance.

The Choice: Striking the Right Balance

In conclusion, Pega Infinity'23, a low-code platform, significantly enhances development efficiency compared to custom-built Java EE (JEE) and Microservices solutions. **With a calculated productivity factor of 7.8, Pega Infinity'23 demonstrates that it can expedite the development process by nearly eightfold.** This substantial increase in productivity is attributed to Pega's visual modeling tools, automated code generation, and comprehensive pre-built components, which streamline the development lifecycle. Pega Infinity'23 is particularly advantageous for projects that demand rapid prototyping and can benefit from its efficient process modeling, workflow automation, and case management capabilities. Its integration with emerging technologies like AI and adaptive analytics further positions it as a forward-thinking solution that can keep pace with evolving business needs.

Custom JEE and Microservices development offers deep customization and control, suitable for complex applications with unique requirements. It excels in areas where specialized integration and a high degree of customization are necessary, although with a trade-off in development speed and potentially higher costs in terms of time and resources.

Given the productivity factor, organizations should consider Pega Infinity'23 for scenarios where speed and efficiency are paramount. In contrast, custom JEE and Microservices development may be the preferred route when the project's complexity and specific customization requirements outweigh the benefits of rapid development. The decision between utilizing Pega Infinity'23 or embarking on a custom development journey will ultimately hinge on a project's unique demands and the strategic value of speed versus customization. However, the highlighted productivity factor is a compelling argument for Pega Infinity'23 in scenarios where development efficiency is a critical success factor.

For enterprises seeking to maximize development velocity and efficiency, Pega Infinity'23 is the recommended choice, especially where **the productivity factor of 7.8 times** plays a pivotal role in achieving business objectives. However, for projects where customization, control, and specific integrations are paramount, custom JEE and Microservices development may still hold sway. The study suggests that a hybrid approach might be optimal in some cases, leveraging the rapid development capabilities of Pega Infinity'23 for certain components while reserving custom development for areas that require more specialized attention.

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