



Camunda Compared to Alternatives

**Guide to the Process Automation
Landscape**

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Introduction: The Need for Modern Process Automation

Processes are the algorithms that determine how an organization runs. They define how teams work together, how the organization works with partners and suppliers, and how it delivers value to its customers. More and more, organizations are recognizing that in order to deliver better customer experiences, keep up with competitors, streamline operations, and improve their bottom line, they must automate their core, mission-critical business processes. This is the digital transformation imperative: embrace automation today or go out of business tomorrow.

Consequently, the market is crowded with tools that can automate every aspect of an organization's business. However, all automation tools are not created equal. While many tools can automate tasks in isolation, they were not designed to orchestrate a complete, complex business process from start to finish across diverse systems and endpoints. Other tools claim they support end-to-end process orchestration, but they inhibit efficiency and agility by requiring users to adopt their proprietary approach to automating work. Plus, many automation tools lack features that enable collaboration and alignment between the business and IT, which is necessary for sustainable digital transformation.

This paper analyzes popular categories of automation tools and discusses how well they satisfy the qualities that are required for modern process automation.



What matters when choosing a process automation solution?

- **End-to-end process orchestration:** It can orchestrate every human and automated task in an end-to-end business process across components such as systems, APIs, microservices, RPA bots, IoT devices, and AI/ML tools
- **Support for long-running processes:** It has the technical capabilities necessary to effectively manage business processes that run for hours, days, or even weeks
- **Process analytics and optimization:** It provides actionable insights based on real-time and historical process data, with features that help you optimize your processes
- **Standards-based business-IT collaboration:** It uses open standards to facilitate communication and alignment between business stakeholders and IT teams
- **Developer friendliness:** It doesn't require software developers to adopt a vendor-specific way of working, but instead meets developers in their comfort zone
- **Flexible architecture:** It allows teams to choose which parts to use and where, it integrates seamlessly with other IT tools, and it offers on-premise, cloud, and hybrid deployment options
- **Open software:** It provides open APIs for integration, teams can easily try it before adopting, and it allows community-driven extension and improvement
- **Low total cost of ownership:** It enables organizations to get started quickly and to make changes easily, with no proprietary or vendor-specific knowledge required
- **Designed for the cloud:** Built to align with modern cloud engineering practices to support cloud-first process automation initiatives

The Process Automation Landscape

	Traditional BPM Suites	Low-Code Platforms	RPA Tools	Microservice Orchestrators	Enterprise Applications	Camunda
End-to-end process orchestration						✓
Support for long-running processes	✓				✓ ¹	✓
Process analytics and optimization	✓					✓
Standards-based business-IT collaboration	✓ ²	✓ ²	✓ ²		✓ ²	✓
Developer friendliness				✓		✓
Flexible architecture				✓ ³		✓
Open software						✓
Low total cost of ownership						✓
Designed for the cloud		✓		✓		✓

1 Long-running processes are supported with limited functionality and no process versioning.

2 Collaboration features are available, but they are often not based on open standards.

3 Flexibility is limited to microservices and does not include tasks executed by other applications, tools, or systems.

Traditional BPM Suites

When starting to automate business processes, many organizations have historically purchased a traditional BPM suite. This is because they're seeking an all-in-one solution that will allow them to design processes, that will execute those processes, and that will provide monitoring and reporting capabilities.

Traditional BPM suites offer process design features that are easy for business users to adopt, such as a drag-and-drop interface for creating workflows. They also give technical users, such as software developers, some ability to customize the way that a process will run.

However, traditional BPM suites are built on legacy codebases that were originally designed to automate predictable, repeatable, stable back-office processes for operations such as accounting, legal, and HR. They lack the qualities an organization needs to automate the complex, customer-facing processes that are core to digital enterprises. They also struggle to integrate with other applications and legacy technology.

When using a traditional BPM suite, organizations typically encounter the following challenges.

No end-to-end process orchestration

Traditional BPM suites are designed with the assumption that most or all of a process is executed by the suite itself. However, core business processes span many different systems and endpoints: APIs, RPA bots, legacy user interfaces, IoT devices, AI/ML software, and more. Traditional BPM suites cannot effectively automate these processes at scale. Today, customers demand fast, efficient, error-free digital experiences; but a traditional BPM suite that cannot orchestrate all aspects of a business process from start to finish will not be able to deliver those experiences.

High development effort

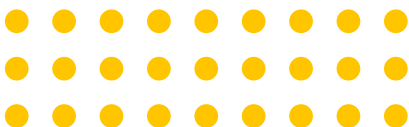
Traditional BPM suites take a proprietary approach to application development, requiring developers to use the suite's specialized framework or integrated development environment (IDE). It takes time and effort to learn how to develop applications in the way that a specific BPM suite requires, and it's a skill that must be continuously maintained, which often leads to a lack of sufficiently skilled developers in the organization.

Closed, monolithic architecture

Traditional BPM suites have a closed architecture with few options for extension, customization, or integration with other tools in the corporate IT landscape. The difficulty of technical integration often means the BPM suite is siloed away from other IT systems and cannot orchestrate or analyze work that happens in those systems. In addition, traditional BPM suites are designed and delivered as monoliths, meaning all parts of the software are tightly integrated and can't be unbundled. It's difficult to use just one component of a monolithic BPM suite, making it hard to gradually adopt the software and forcing teams to take an expensive and risky "rip-and-replace" strategy.

Vendor lock-in

A closed, monolithic architecture locks you into a traditional BPM suite because it requires you to use the suite's built-in tools for all aspects of process automation. Also, a proprietary development approach often means that getting started with the BPM suite, and customizing or extending its functionality, requires the specialized knowledge of the vendor's consultants, resulting in ongoing consulting fees and a high total cost of ownership.



“Camunda’s open platform supports our individual needs in a way that closed BPM suites just cannot achieve. Our BPMN process models are executed directly, which improved communication between business and development, which also shortens development cycles.”

— Marko Lehn, Software Engineering Team Lead,
Zalando

Low-Code Platforms

Low-code platforms offer an appealing promise: enable anyone in the organization to build working business applications without writing code. They include drag-and-drop tools for creating user interfaces and specifying simple workflows, and they offer data storage and limited data processing features. Organizations often adopt a low-code platform so that subject matter experts in the business can create basic applications to support predictable, repeatable internal workflows.

However, while low-code platforms are suitable for simple business workflows that require minimal application logic or interaction with other systems, they lack the capabilities needed to automate and orchestrate complex business processes from end to end. When using a low-code platform, organizations typically encounter the following challenges.

Focus on user interface instead of process automation capabilities

Low-code platforms are, by design, focused on user interface and data storage-oriented applications with limited or no process automation capabilities. They’re designed for simple workflows and cannot handle moderately complex or very complex workflows — that is, workflows that involve many different types of tasks, that span across many different systems and endpoints, and that potentially run for a long time. In addition, many organizations find that low-code platforms can’t scale as they automate more and more of their critical and complex business processes.

Limited options for custom development

Low-code platforms abstract much of the software development process and have few or no options for implementing custom application logic or integrating with other application interfaces. Enterprise-scale business processes are complex and cannot be fully automated without involving software developers who write custom code; but when dealing with a low-code platform, developers have to rely on workarounds, which hurts their efficiency and results in reduced functionality, no process visibility, and high technical debt as workarounds must be maintained over time. While low-code platforms often help business users, they severely constrain developers, which can lead to attrition of valued staff. They also don’t enable effective collaboration between IT and the business.

Inflexible architecture

Like traditional BPM suites, low-code platforms have a closed architecture and are delivered as monoliths, requiring you to use the platform’s integrated tools for creating user interfaces and workflows, rolling out applications to end users, and monitoring and reporting on process activity and performance. The platform acts as a “walled garden”; you can automate tasks within its boundaries, but you cannot go beyond those boundaries to interact with other systems

or automate other tasks in the overall business process.

Vendor lock-in

Because the development options in low-code platforms are limited and proprietary, the processes and applications that are implemented in the platform aren't portable. Adopting a different low-code platform or migrating to a BPM tool often requires teams to learn a new toolset while having to rebuild processes from scratch. Many organizations are locked into the platform they already have, no matter how much it inhibits their digital transformation, because the cost of change is considered too high.

RPA vs. Process Automation

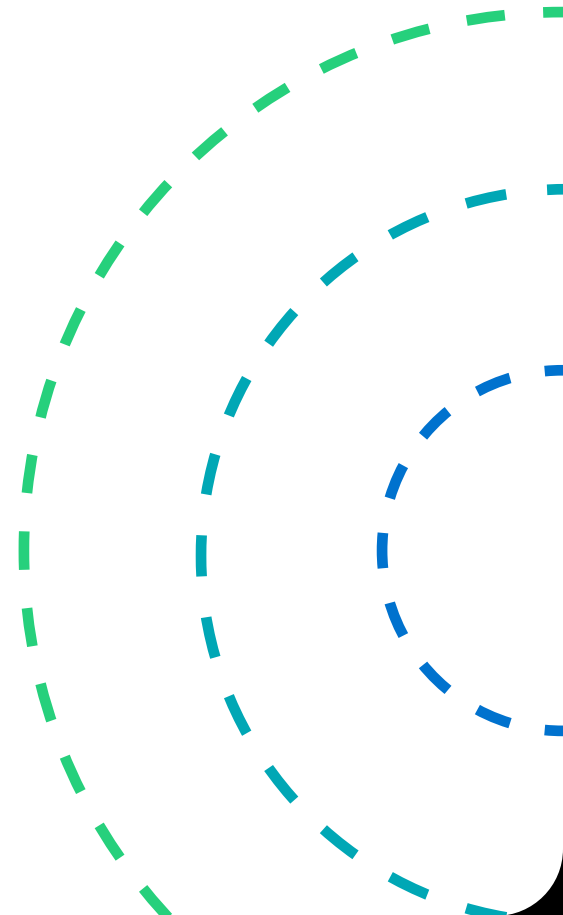
Robotic process automation (RPA) is a popular technology for automating single tasks, often replacing manual keystrokes in software that cannot communicate with other systems or tools through APIs. RPA excels as a tactical solution to automate individual tasks that traditionally have been paper-based or have required manual input. With RPA, teams can selectively automate tasks without significant time investment or too much heavy lifting from IT. In the short term, RPA can provide an organization with measurable benefits, and can allow employees to spend less time and energy on low-value manual work, so they can focus on strategic projects instead.

However, most organizations encounter issues as the number of RPA bots grows and as teams take on increasingly complex automation projects. RPA bots quickly prove to be brittle, requiring a high level of maintenance and contributing to technical debt. Organizations struggle to manage bot security, keep RPA scripts up-to-date, and fix scripts when they break.



“Camunda gave us the balanced ability to deeply integrate with our automation and digital systems, while providing a flexible interface for scientists and other non-programmers to create, update, and execute these complex workflows.”

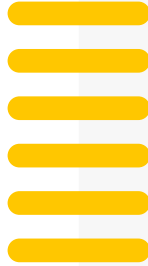
— Aaron Kimball, CTO, Zymergen



Key RPA Challenges

While RPA has its place in the process automation landscape, existing RPA tools have proven unable to orchestrate end-to-end business processes. Organizations face challenges such as:

- Constant RPA bot maintenance as front-end user interfaces change, bot passwords must be updated, and more complex processes must be automated
- Difficulty controlling long-running processes because RPA tools lack capabilities such as timeouts, escalations for stuck processes, and process version migration
- An inability to react to events that happen outside the RPA process, such as a customer cancelling an order while it is being processed by the warehouse
- Lack of orchestration across different types of process steps that involve back-end systems, external tools, human work, and more
- Vendor lock-in resulting from RPA tools' lack of a process layer, which is essential for cross-tool integration
- Growing technical debt as RPA bots grow to be fragile and inflexible over time, costing companies billions and requiring expensive rework



“Camunda enables us to orchestrate the many RPA bots, APIs and other tasks within our automated processes... the catalog for RPA services allows us to more easily integrate existing RPA bots into our processes and eventually completely replace them with more robust APIs.”

— Christoph Anzer, Project Manager
RPA, Deutsche Telekom

The RPA Modernization Journey

Address these challenges by taking a lifecycle approach to designing, orchestrating, analyzing and monitoring your RPA bots as they run today, along with an architectural path toward replacing brittle RPA bots in the future. We call this the RPA Modernization Journey:

Step 1: Get insight into your existing bots by using a process automation platform to monitor, alert on, and analyze RPA bot activities across your organization.

Step 2: Use the BPMN and DMN standards to orchestrate RPA bots in the same end-to-end process flows as other systems and endpoints.

Step 3: Take advantage of the process orchestration you have in place to gradually modernize by replacing RPA bots with APIs or microservices.

Microservice Orchestrators

Microservices are fine-grained, autonomous, loosely coupled services that are organized around business capabilities and work together to achieve specific business goals. Although microservices operate independently, there is typically an implied business process that requires each service to be invoked at the right time and under the right conditions. That's where microservice orchestrators come in; they coordinate work across microservices to ensure that the business goal is achieved, without forcing services to become tightly coupled or dependent on one another.

Microservice orchestrators are suited to environments where all monolithic business applications have been broken down into

discrete services, and the way those services must work together is well-understood. However, microservice orchestrators are not suited to environments where business processes involve a variety of endpoints and components, including legacy systems and human work that cannot be replaced by microservices.

When using a microservice orchestrator, organizations typically encounter the following challenges.

Orchestration for microservices only

Microservice orchestrators are purpose-built to address the challenges of coordinating and managing many autonomous services, especially in high throughput scenarios that require dynamic scaling of resources. However, it's very rare for all of an organization's business processes to be made up of microservices and only microservices. Most organizations have an IT landscape that contains monolithic business applications, legacy systems, multiple user-facing front-end applications, and more.

Microservice orchestrators aren't designed to handle the diversity of systems and endpoints that are involved in core business processes.

Not designed for process visibility or optimization

Microservice orchestrators can only provide visibility into the parts of processes that are executed by microservices, not tasks that are executed by other applications, tools, or systems. Properly designed microservices operate in a loosely coupled way, meaning that the exact flow of work across services should not be defined in a tool such as a microservice orchestrator; that is, the orchestrator is not aware of the various business processes that might invoke a particular service. These limitations affect your ability to understand and optimize your processes because the microservice orchestrator cannot provide performance data in the context of business processes.

“We see Camunda as a valuable component within our new lending platform, which is built using a microservices architecture. To achieve the desired efficiency gains, we needed a much higher degree of automation in our processes, and Camunda's capabilities fit our needs well. It is modern, easy to integrate with, and gives us flexibility when designing our processes.”

— Eric Lind, Chief Information Officer,
Bluestep Bank

No collaboration features

The nature of microservices, including the fact that they operate in a loosely coupled way, means that microservice orchestrators are heavily geared toward the needs of technical users such as software developers and IT operations staff. While many microservice orchestrators take advantage of open standards and modern protocols, they don't offer features that enable collaboration between the teams that build and deploy microservices and the subject matter experts on the business side of the organization.

High learning curve

Although microservice orchestrators are designed with technical users in mind, they are typically closed source products that take time to learn. Finding talented developers who know how to use a particular microservice orchestration tool can be a challenge, and training development teams on a new tool can be expensive and slow down the delivery of process automation projects. As with a traditional BPM suite, adopting a microservice orchestrator can lead to ongoing consulting fees that add up over time.

Enterprise Applications

There are many different types of enterprise applications that support complex business operations at scale: from enterprise resource planning (ERP) and supply chain management (SCM) tools, to customer relationship management (CRM) software, to knowledge management and content management systems (KMS/CMS). Enterprise applications typically have built-in capabilities for automating tasks that are part of back-office functions such as accounting, planning, logistics, regulatory compliance, and inventory management.

However, because enterprise applications are purpose-built for specific business functions, they aren't suited to orchestration of end-to-end business processes — especially complex, customer-facing processes.

When using enterprise applications, organizations typically encounter the following challenges.

No capabilities for end-to-end process orchestration

Although today's enterprise applications can automate a variety of work, they aren't designed to automate or orchestrate complex workflows or complete business processes. Like traditional BPM suites, enterprise applications are best at automating straightforward, repeatable workflows that have a limited scope and that

“Our IT teams have been focused on streamlining customer experiences ranging from buying to support across our product offerings. Using Camunda allows our teams to stay agile, while centralizing business processes and rules with improved end-to-end visibility. This transformation will eventually power our non-technical stakeholders to self-serve their needs as we iterate for optimization and scale. Teaming up with Camunda enables our IT teams to focus on shipping critical business processes with agility, visibility & efficiency.”

— Vinayak Varma, Intelligent Automation
Senior Team Lead, Atlassian

are fully executed within the application itself. While they can manage long-running processes that happen within their scope, they lack the capabilities needed to orchestrate a complex process made up of tasks that are executed by many different tools and systems.

Not designed for process visibility or optimization

Enterprise applications can only provide visibility into the parts of processes that are executed within the application; they provide little to no information about work that is done in other applications, tools, or systems. While an enterprise application might receive data from other systems in the IT landscape, it does not necessarily have the business process context that would make sense to end users. Enterprise applications also lack the type of process-oriented reporting and performance analytics that are important for continuous improvement.

Not built with developers in mind

Closed source enterprise applications are notoriously unfriendly to customization or extension by software developers, despite the fact that they're among the most heavily customized applications in most businesses. Developing for an enterprise application typically requires a combination of vendor-specific tooling and brittle workarounds, increasing the risk of failure and contributing to technical debt. Attempting to extend such systems with a proprietary approach to automation often means that consultants must be brought in to roll out the product and to adapt it over time.

The Camunda Difference

At Camunda, our mission is to enable companies to automate any process, anywhere, helping them overcome legacy roadblocks and gradually transform into a digital enterprise. Our process automation software enables some of the most competitive organizations around the world to orchestrate and automate complex processes. We provide true end-to-end process orchestration by helping organizations design, automate, and improve processes that span across different technologies, systems, infrastructures, people, and devices.

End-to-end process orchestration

Most organizations use hundreds or even thousands of off-the-shelf and homegrown applications to execute core business processes. Therefore, when you map a complete business process from start to finish, it's likely that the process spans multiple systems or services, fragmenting the process into different parts that are executed in isolation. This fragmentation causes a lack of visibility, integration, and control of the end-to-end process, slowing down or even preventing effective troubleshooting, reporting, and analysis.

Camunda orchestrates both automated and manual tasks across end-to-end business processes, no matter how many applications or systems are involved. Because Camunda orchestrates the complete process, we can provide comprehensive monitoring, reporting, and troubleshooting, so you always have a complete picture of your process landscape.

Support for long-running processes

Many organizations have business processes that can run for hours, days, or even weeks. Long-running processes present a variety of technical challenges, such as tracking the state of a process, correlating all activities and data related to the process, and triggering timeouts. Long-running processes also often lead to additional business requirements; for example, if the payment for an online order fails, you might want to give the customer a certain number of days to retry with a different payment method.

Camunda process automation is based on the ISO-standard Business Process Model and Notation (BPMN), which allows you to design processes that are both graphical and executable. BPMN has built-in support for long-running processes; it automatically handles technical challenges such as state persistence, data correlation, and timeouts. BPMN also facilitates monitoring, alerting, and reporting on the process level, which are key features for managing long-running processes.



Process analytics and optimization

Most automation tools provide some level of reporting about the data they collect, often including dashboards with graphs that visualize data. However, these reports are limited to the tasks that the tool executes itself; they lack the context of the end-to-end business process that invoked those tasks, which means you get an incomplete picture of process performance. This incomplete picture makes it difficult or impossible to identify bottle necks and other areas where you can take action to improve processes.

Camunda orchestrates end-to-end business processes, and thus can access a 360-degree view of process execution data. This data results in a deep set of analytics, complete with intuitive visualizations and heatmaps that are useful for both technical and business stakeholders. Camunda can even analyze processes that are executed by other process automation tools, so you can assess the performance of your entire business process landscape from a single view.

Standards-based business-IT collaboration

Bridging the gap between IT and the business is a challenge for every organization, especially with process automation playing a key role in digital transformation. Business and IT stakeholders often have different goals, incentives, and priorities, and these differences tend to slow down communication, prevent alignment on project priorities, and cause implementation errors.

Camunda uses the globally recognized standards of Business Process Model and Notation (BPMN) and Decision Model and Notation (DMN) to bridge the gap between IT and the business. Standards are a common language that all stakeholders can speak, so nothing is lost in translation between business requirements and technical implementation. BPMN and DMN allow business users to create visual process diagrams and decision tables, while also allowing technical users to round out the technical implementation of automated

processes and decisions by editing the underlying code.

Developer friendliness

Many automation tools, particularly traditional BPM suites and low-code platforms, take a vendor-specific approach to application development with the goal of minimizing the amount of code that needs to be written. However, core business processes are complex and require bespoke solutions, so organizations run into trouble as soon as they need to implement requirements that are outside the realm of what their automation tool supports. To work around technical and functional limitations, software developers have to learn the vendor-specific way of automating tasks, which takes time and can lead to implementations that aren't optimized for performance, maintenance, or stability.

Camunda process automation software is designed with developers in mind, so they can quickly start automating processes without learning a vendor-specific development framework or being forced to use a proprietary IDE. Teams can use the type of environment they're familiar with when creating, testing, and operating the applications they develop. For example, they can work in their preferred code editor, program in the language they like, store their code in a version control system, automatically test their code, implement continuous integration, and manage their containerized applications on a platform like Kubernetes. There's no need to adjust to a Camunda-specific way of working.

Flexible architecture

Traditional BPM suites, low-code platforms, and enterprise applications are often provided as a tightly integrated set of tools or components that cannot be unbundled. The idea is that you can use the product to do everything needed to automate your business processes; in reality, this closed architecture approach locks the organization into the vendor's product, reduces deployment options, and hinders integration with other IT systems.



- ▶ To progress on your digital transformation journey, it's imperative that you have the full flexibility to control each part of your automation technology stack. Camunda offers the best of both worlds: loosely coupled components that fully integrate with one another, yet are designed to integrate seamlessly into your technical architecture. For additional flexibility, Camunda components can be deployed to your own infrastructure, to public or private clouds, or in a hybrid configuration. We also offer a hosted SaaS option that is cloud-native and provides fast, massive scalability for high-volume, high-performance use cases.

Open software

Automation tools that have a closed architecture are “black boxes”; you do not have access to the source code, and the way the product actually works is often not transparent to its users, making it hard for teams to try using the product before fully adopting it.

Camunda provides open process automation software that teams can easily experiment with to see if it satisfies their use cases. The Camunda community spans the globe and community members regularly contribute features, improvements, and open-source plugins that extend Camunda components in useful ways. Our community actively collaborates in online forums and meetups where you can ask questions, share ideas, and learn about best practices.

Low total cost of ownership

Many factors contribute to a product's total cost of ownership: licensing, training courses, the initial development period before moving to production, the turnaround time for changes and new developments, hiring consultants for projects that internal teams can't complete, the cost of the infrastructure needed to run the product, and so on. Many automation tools have a reputation for high total cost of ownership due to long ramp-up times (sometimes measured in years), ongoing consulting fees, and high infrastructure costs.

Camunda approaches total cost of ownership from several angles. First, Camunda's developer-friendly approach and use of standards makes it easy to get started and reduces time-to-value because the IT team doesn't have to spend time learning a vendor-specific development framework or proprietary development tools. Second, the open architecture allows you to choose which components to use, so you can use Camunda alongside other tools and systems that your organization has already purchased and integrated. Finally, Camunda is a lightweight solution that requires few infrastructure resources, and that can run on premises or in a public, private, or hybrid cloud.

Designed for the cloud

Cloud-first initiatives continue to be a key strategic focus for both business and IT decision makers. Businesses are looking to take advantage of the cloud to decrease time-to-value while also improving operational efficiencies. With this in mind, organizations need to ensure they can support their need to automate processes anywhere — in private cloud, public cloud, and hybrid cloud environments. To do this effectively, automation solutions need to be purpose built for the cloud while delivering consistent results in any environment.

Camunda recognizes this need and provides a lightweight solution that makes it easy to automate any process, anywhere. Camunda is built with modern cloud engineering practices in mind — making our software available as native Docker images and as loosely coupled building blocks that can be deployed and scaled individually, making it well suited for Kubernetes.



Conclusion

Processes are the algorithms that determine how an organization runs and, now more than ever, automating them is necessary to deliver better customer experiences, keep up with competitors, streamline operations, and improve your bottom line. At Camunda, we take a modern approach to process automation that enables your organization to:

- Deliver better customer experiences by ensuring that all aspects of an end-to-end business process are orchestrated across different systems and endpoints
- Get to value and achieve business goals more rapidly by delivering automation projects faster while relying on an open architecture as a foundation for future growth
- Increase business agility and rapidly respond to changes in your market by continuously improving processes through standards-based business-IT collaboration
- Drive operational cost savings by automating manual tasks, minimizing errors, and optimizing processes with deep insights into process performance

About Camunda

Camunda is the leader in process orchestration software. Our software helps orchestrate complex business processes that span people, systems, and devices. With Camunda, business users collaborate with developers to model and automate end-to-end processes using BPMN-powered flowcharts that run with the speed, scale, and resiliency required to compete in today's digital-first world. Hundreds of enterprises such as Atlassian, ING, and Vodafone design, automate, and improve mission-critical business processes with Camunda to drive digital transformation. To learn more visit camunda.com.