Accelerate Development and Modernization with an Integrated Application Platform

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IDC OPINION

Application modernization is high on the priority lists of CIOs who want to accelerate the ability of IT departments to meet the demand for digital transformation. Changing the status quo of how business is conducted has always been important as companies handle disruptive forces from new competitors. The importance of change has been accelerated by the unprecedented convergence of technology, social and regulatory forces combined with the market demand to rapidly adapt to new business conditions.

A major challenge for enterprises embarking on an application modernization journey is to maintain existing applications that must work with new applications built with cloud-native tools. At the same time, enterprises must maintain the highest security standards without interrupting value-added development work while leveraging the latest infrastructure. Enterprise architects strive to connect line of business demands with the needs of developers and operations teams to accelerate the application modernization journey. Applications that deliver cost savings and maximum return on investment value long term by refactoring and replatforming are prioritized over applications that can be left alone.

Balancing the complexities of a modernization effort while maintaining existing applications is the larger challenge facing organizations. A single platform that can simultaneously manage existing applications that have been optimized while allowing developers to create and run new cloud-native applications aligns these diverse goals to deliver value to stakeholders with speed and quality. A common platform also enables governance and security to help enterprises meet compliance and policy requirements. To top off benefits from an application modernization journey, hybrid clouds built with open source technologies with the flexibility of data and application portability give enterprises the ability to avoid vendor lock-in while supporting both legacy and cloud-native workloads.

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Situation Overview

Market Dynamics

The need for organizations to embrace digital transformation initiatives has initiated a cataclysmic shift in the way in which software is produced, distributed and consumed. Organizations face the challenge of shipping code faster without compromising quality and security. Meanwhile, enterprise IT is tasked with immediately developing digital solutions for pressing business problems in addition to modernizing portfolios of legacy applications.

IDC projects that between 2019 and 2023, over 500 million new applications will be developed which represents more applications than were created over the preceding forty years. This acceleration in application development is driven by the conjunction of innovation in development methodologies and tools with an intensified urgency on the part of businesses to digitize to remain competitive with their peers.

The need for organizations to rapidly digitize products and business operations has led enterprises to digitally transform to become primarily producers of software, as opposed to consumers of off-the-shelf, packaged software. This transition of enterprises to software producers comes in response to the need to rapidly create custom digital solutions to pressing business problems. Moreover, the urgency to develop custom software is driven by demands from the business for:
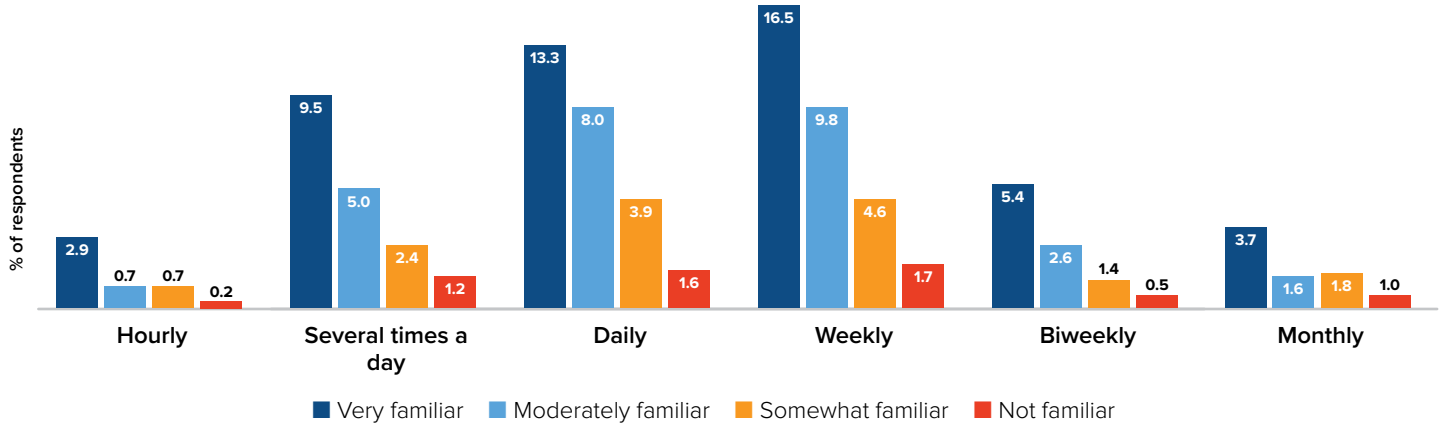
» Increased development-related agility, speed and reliability due to customer expectations

» High velocity development

» Hyperscale development

» Increased automation in the application development lifecycle

» Application portability across distributed infrastructures

» Adding intelligence to applications

The capability to perform high velocity, hyperscale, automated development that produces portable, intelligent applications is enabled by cloud-native development, which IDC defines as development that is optimized for distributed infrastructures. Cloud-native development prioritizes microservices architectures, application portability, automated updates and serverless architectures. The conjunction of these attributes relates to the future of digital innovation because cloud-native development is the modality by which every enterprise will become a software producer.

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According to a recent IDC study, *PaaSView and the Developer 2019*, development teams that used microservices deployed applications to production more frequently than their peers as shown below in Figure 1.

FIGURE 1

Frequency of Deployments to Production by Use of Microservices

Frequency	Very familiar	Moderately familiar	Somewhat familiar	Not familiar
Hourly	2.9	0.7	0.7	0.2
Several times a day	9.5	5.0	2.4	1.2
Daily	13.3	8.0	3.9	1.6
Weekly	16.5	9.8	4.6	1.7
Biweekly	5.4	2.6	1.4	0.5
Monthly	3.7	1.6	1.8	1.0

% of respondents

■ Very familiar ■ Moderately familiar ■ Somewhat familiar ■ Not familiar

Source: Key Considerations for Application Modernization and Transformation Using Microservices (December 2019, IDC #US45714619) and PaaSView and the Developer 2019 N=2500

The larger point here is that the regular use of microservices makes development happen faster.

Cloud-Native Development

Cloud-native development amplifies the acceleration of development enabled by microservices. This acceleration of development is further enabled by the ability of cloud-native development to automate autoscaling, high availability and elasticity for application architectures. As such, cloud-native development enables a seismic leap in digitization that facilitates the creation of an ecosystem of digitized objects such as laptops, mobile devices, automobiles, appliances and wearable devices.

IDC predicts that over the next 3-4 years:

» 35% of new apps produced by means of command line scripting or coding will be cloud native by 2022

» Daily deployments to production will increase from 3% to 40% by 2023

» 80% of apps will be deployed on containers by 2024

To navigate the transition to cloud-native development, enterprises require a best-in-class platform that empowers developers to rapidly develop applications that are optimized for distributed infrastructures. A key component of this platform is its ability to empower developers to focus on the core business logic of their applications as opposed to operational responsibilities such as deployment, monitoring, security and governance.

One way in which platforms can accelerate developer productivity is by empowering enterprise architects to take ownership of provisioning PaaS and SaaS solutions and software stacks, as well as the curation of governance, compliance and security considerations that enhance developer productivity. Platforms empower developers to focus on application development and collaboration with SMEs, other developers, test/QA resources and project sponsors.

A summary of key attributes of a cloud-native application development platform, with respect to net new application development, is as follows:

» Ability to support distributed infrastructures

» Automation of scalability, elasticity and high availability at the level of the application stack

» Support for the development of ecosystems of digitized objects

» Use of key technologies that include microservices, containers and container orchestration frameworks such as Kubernetes and DevOps

» Support for DevOps tooling and culture change

In addition, there are a multitude of adjacent technologies that enrich and inform cloud- native development such as functions as a service, serverless technologies, service mesh, APIs, Knative, Istio, Envoy, Prometheus, Grafana and others.

Application Modernization and Transformation

Another key attribute of a cloud-native development platform is its ability to accelerate and enhance the modernization and transformation of existing applications, inclusive of legacy applications that were built over 30 years ago and were developed using a programming language that is now obsolete. With respect to the modernization of legacy applications, cloud-native development is especially important as it provides guidance and tools for the transformation of those monolithic applications into microservices architectures. This use of microservices architectures accelerates development, enhances developer and operational agility,

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and delivers superior customer experience and business innovation by empowering teams to ship new features faster, iterate continuously and automate the addition of new features to an application.

By providing developers with guidance on how to refactor a monolithic application into a constellation of constituent microservices, a cloud-native development platform provides developers with best practices for identifying discrete application functionalities that are appropriate for microservices architectures. Additionally, intelligent analysis tools that are part of the platform provide architects and developers with insights into dependencies within an application that help developers determine the best strategy for modernizing an application.

Key characteristics of a cloud-native platform for application and modernization include:

» The ability to refactor legacy, monolithic applications into microservices architectures

» The ability to bring modern development practices such as DevOps, modern UI and application performance management capabilities to legacy applications by means of APIs

» Capabilities to analyze dependencies within applications that inform decisions about the selection of applications for modernization initiatives by considering the value, complexity and cost of specific modernization initiatives

» Identification of security vulnerabilities and the generation of automation remediation recommendations

» Support for cloud products and services such as AI/ML, IoT, data analytics and data visualization functionality and datastores

IBM Cloud Pak For Applications

Overview

IBM Cloud Pak for Applications provides an environment that supports application modernization, net new application development, and the optimization of existing applications all in one platform. In addition, customers can run existing applications on the cloud, thereby expanding their footprint and enabling them to leverage the scalability and performance-related benefits of running on cloud infrastructures. The capabilities of IBM Cloud Pak for Applications are depicted in Figure 2 below.

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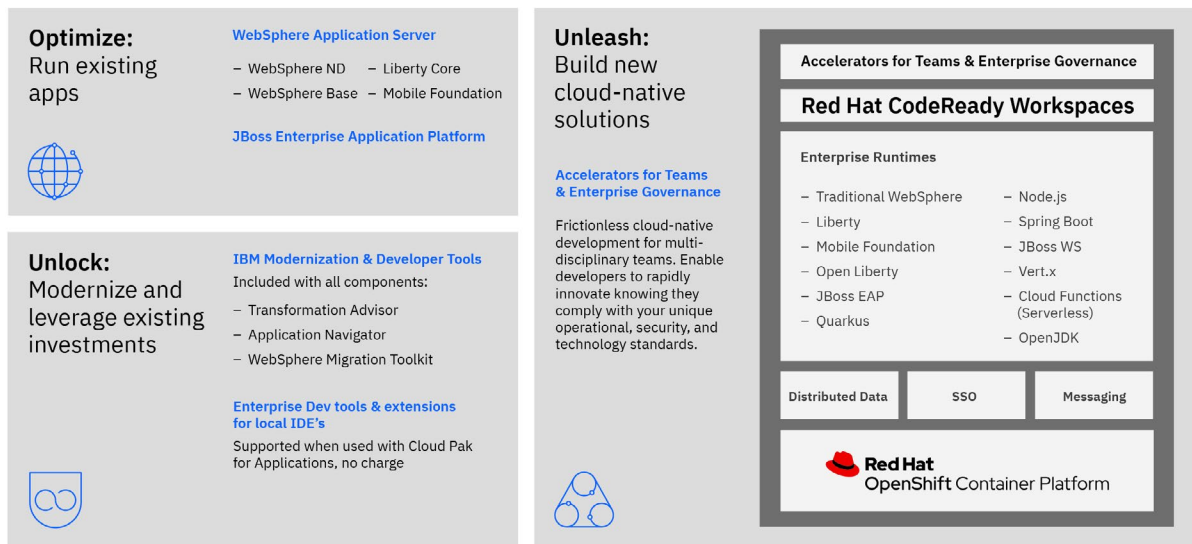
FIGURE 2

IBM Cloud Pak For Applications

Optimize:
Run existing apps

WebSphere Application Server
– WebSphere ND   – Liberty Core
– WebSphere Base   – Mobile Foundation

JBoss Enterprise Application Platform

Unlock:
Modernize and leverage existing investments

IBM Modernization & Developer Tools
Included with all components:
– Transformation Advisor
– Application Navigator
– WebSphere Migration Toolkit

Enterprise Dev tools & extensions for local IDE's
Supported when used with Cloud Pak for Applications, no charge

Unleash:
Build new cloud-native solutions

Accelerators for Teams & Enterprise Governance

Frictionless cloud-native development for multi-disciplinary teams. Enable developers to rapidly innovate knowing they comply with your unique operational, security, and technology standards.

Accelerators for Teams & Enterprise Governance

Red Hat CodeReady Workspaces

Enterprise Runtimes
– Traditional WebSphere   – Node.js
– Liberty   – Spring Boot
– Mobile Foundation   – JBoss WS
– Open Liberty   – Vert.x
– JBoss EAP   – Cloud Functions (Serverless)
– Quarkus   – OpenJDK

Distributed Data   **SSO**   **Messaging**

Red Hat OpenShift Container Platform

Source: IBM, 2020

Key attributes of IBM Cloud Pak for Applications are as follows:

» **Red Hat OpenShift serves as the foundation for the platform.** This means that applications that are developed or transformed on the cloud are deployed on OpenShift's container infrastructure, which enables portability of applications across different environments. Because the platform is undergirded by Red Hat OpenShift, applications deployed on the IBM Cloud Pak for Applications are natively portable and can be deployed on public cloud, off-premise public cloud and off-premise private cloud environments.

In addition, IBM Cloud Pak for Applications:

» Features a multitude of runtime frameworks such as Java, Jakarta EE, Java SE, JavaScript (node.js), Spring Boot and Open Liberty. The availability of these frameworks empowers developers to select from a curated list of widely used development frameworks.

» Supports applications developed using IBM WebSphere Application Server (WAS) and IBM WebSphere Liberty.

» Provides developers with Red Hat's browser-based CodeReady Workspaces IDE that differentiates via its rich collaboration functionality. Built on the Red Hat OpenShift Kubernetes platform, Red Hat CodeReady Workspaces empowers developers to make changes to code deployed in a container-based environment without managing the underlying Kubernetes infrastructure.

» Includes a portfolio of tools for accelerating the development of cloud-native applications. These tools empower developers to focus on developing applications rather than manage operations-centric tasks such as deployment, monitoring and lifecycle management. The platform's tools empower enterprise architects and operations professionals to integrate security, governance and compliance into infrastructure and architecture services so that developers can focus on value-added coding responsibilities.

» Offers streamlined integration with IBM Cloud Paks dedicated to data, security, integration, automation and management.

» Provides the complete set of capabilities to help customers modernize and transform their applications onto Red Hat OpenShift and microservices.

» Streamlines the peformance of vulnerability scans and verifications to guarantee embedded security throughout the development and delivery cycle.

What IBM Cloud Pak for Applications Enables

Application Modernization and Transformation

IBM Cloud Pak for Applications facilitates application modernization and transformation by providing guidance about the refactoring, replatforming and containerization of legacy, monolithic applications onto OpenShift. For example, IBM Cloud Pak for Applications features IBM Cloud Transformation Advisor, which uses static code analysis to deliver insights into dependencies and security vulnerabilities within applications.

Furthermore, developers using IBM Cloud Pak for Applications can leverage tools to manage a multitude of microservices and their associated APIs by means of API gateways or service mesh technologies.

IBM Cloud Pak for Applications offers capabilities to enrich existing functionality by means of APIs and other connectors to cloud products and services. For example, developers can use APIs to IBM Watson to rapidly include image and speech recognition functionality within their applications, thereby minimizing the need to develop net new application functionality and, conversely, harnessing the strengths of best of breed tools and frameworks.

IBM Cloud Pak for Applications facilitates application modernization and transformation by providing guidance about the refactoring, replatforming and containerization of legacy, monolithic applications onto OpenShift.

Another way in which IBM Cloud Pak for Applications facilitates application modernization and transformation involves its ability to enhance the modernization of mainframe-based applications without resorting to a time-consuming, complex and costly decomposition of the entire application into a microservices architecture. For example, mainframe-based applications boast outstanding transactional data processing capabilities yet their antiquated UI/UX needs modernization and applications need to be optimized for consumption on mobile devices.

IBM Cloud Pak for Applications can also be used modernize mainframe-based applications by bringing modern development tools and practices to the mainframe such as cloud deployment, agile development, DevOps, microservices and APIs, modern integrated development environments (IDEs), and observability and monitoring technologies. The availability of these tools on IBM Cloud Pak for Applications means that customers can modernize mainframe-based applications while continuing to leverage the strengths of those applications.

Application replatforming, understood as the migration of applications from an on-premise environment to the cloud, constitutes another key capability of IBM Cloud Paks. Replatforming typically involves minor changes to an application to optimize the use of cloud functionality such as autoscaling and high availability.

IBM Cloud Pak for Applications supports the replatforming of legacy applications by means of tools such as the WebSphere Migration Toolkit. IBM Cloud Pak for Applications provides capabilities to replatform applications built using IBM WebSphere Application Server, IBM Liberty or Red Hat JBoss that enable customers to expand the scale of their applications and automate the operational management of the infrastructure on which the application is hosted.

For many customers, replatforming represents one of the initial steps of their cloud migration journey. Customers stand to benefit from the operational simplicity enabled by using one platform for net new application development, application modernization and transformation and the replatforming of legacy applications.

A summary of the benefits delivered by IBM Cloud Pak for Applications with respect to application modernization and transformation is as follows:

» AI-driven capabilities to refactor monolithic applications onto Red Hat OpenShift

» Specialized tools that provide guidance for selecting applications to containerize by considering application-related dependencies and security-related considerations

» Capabilities to enhance applications by means of cloud-based products and services such as AI/ML, IoT, edge computing and streaming data analytics services

» Tools for modernizing mainframe-based applications such as applications deployed on the IBM Z Platform

» Ease WebSphere deployments, manage configuration and enhance the WebSphere upgrade experience

» Solutions for migrating on-premise applications to the cloud

Net New Application Development

IBM Cloud Pak for Applications accelerates and enhances the development of cloud-native applications by empowering developers to focus on the core business logic specific to their applications. Developers work with a solution architect and SMEs to finalize specifications for provisioning hardware and implementing security, compliance and governance protocols. This means that developers can create cloud-native applications that are automatically deployed to target environments that are appropriate for the application in question. Developers don't need to worry about the minutiae of deploying applications because IBM Cloud Pak for Applications automates provisioning, deployment and application lifecycle management processes such as monitoring and performance management. In addition, IBM Cloud Pak for Applications absolves developers of the task of implementing security by protecting applications with out-of-the-box container vulnerability scanning and verification features.

IBM Cloud Pak for Applications delivers a fully managed platform that empowers developers to focus on developing cloud-native applications. Meanwhile, the platform automates the operational management of the applications that developers develop. Moreover, developers can build cloud-native applications using frameworks, languages and tools with which they are already familiar, thereby reducing the learning curve associated with developing cloud-native applications.

A summary of the benefits delivered by IBM Cloud Pak for Applications with respect to net new application development is as follows:

» Empowers organizations to develop applications faster, without compromising security

» Enriches collaboration between multi-disciplinary teams given the platform's governance functionality and ability to facilitate collaboration between developers, IT operations professionals, compliance professionals and LOB stakeholders

> IBM Cloud Pak for Applications accelerates and enhances the development of cloud-native applications by empowering developers to focus on the core business logic specific to their applications.

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» Provides dedicated modernization and transformation tools

» Optimizes applications to maximize benefits from cloud products and services

» Ensures a consistent application experience across multiple environments with the availability of containerized middleware

» Simplifies the developer experience with respect to containers and Kubernetes

» Safeguards application security by means of the Red Hat OpenShift platform's native security-related functionality
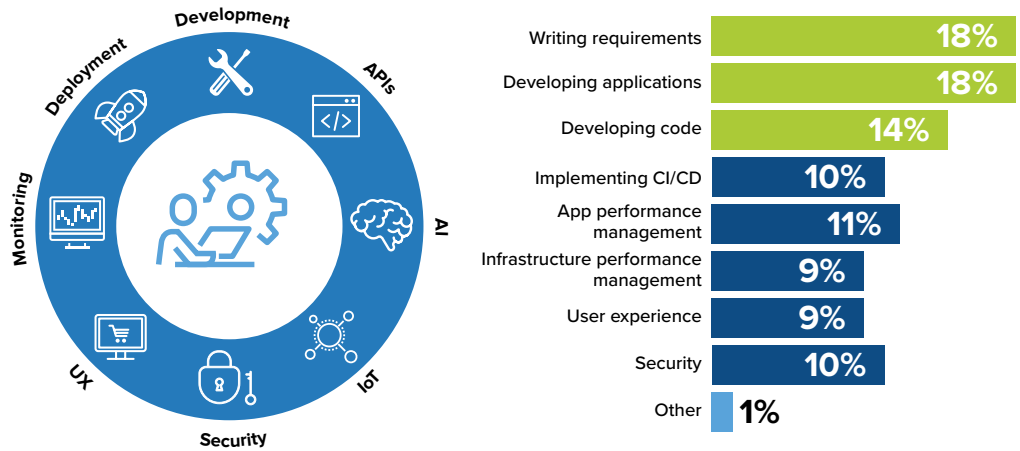
Future Outlook

The celerity of changes to the contemporary business landscape has underscored the need for organizations to develop the ability to rapidly respond to a changing business and socio-economic landscape. For example, organizations need to elastically scale their operations to accommodate the changing requirements of their customers and constituents; consider how medical equipment suppliers must dramatically expand and accelerate their production capabilities., Organizations need to both scale, as well as swiftly transform their business operations by enhancing e-commerce capabilities or implementing new regulatory protocols for employees and customers. While the need to acquire capabilities to scale, pivot business operations and implement updated security and governance protocols predated COVID-19, the pandemic has intensified the urgency for businesses to rapidly acquire capabilities to scale and transform their business operations. An application platform that provides an integrated set of tools for developing net new applications and modernizing existing applications constitutes a key component of any modern organization's digital portfolio.

IBM Cloud Pak for Applications empowers enterprises to leverage an integrated assemblage of development tools for cloud-native development characterized by high velocity development, hyperscale development, increased automation and the ability to add intelligence to applications. As digital transformation initiatives accelerate and intensify, platforms such as IBM Cloud Pak for Applications will be critical to providing enterprises with the development velocity and agility that they need to remain competitive.

Furthermore, IBM Cloud Pak for Applications is of particular relevance to contemporary digital transformation initiatives because it transitions non-development responsibilities to the enterprise architect, thereby enabling developers to focus on their competency in the form of writing code. Figure 3 illustrates how the responsibilities of contemporary developers have expanded to include a cluster of other tasks separate from application development and design.

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FIGURE 3

Developer Responsibilities

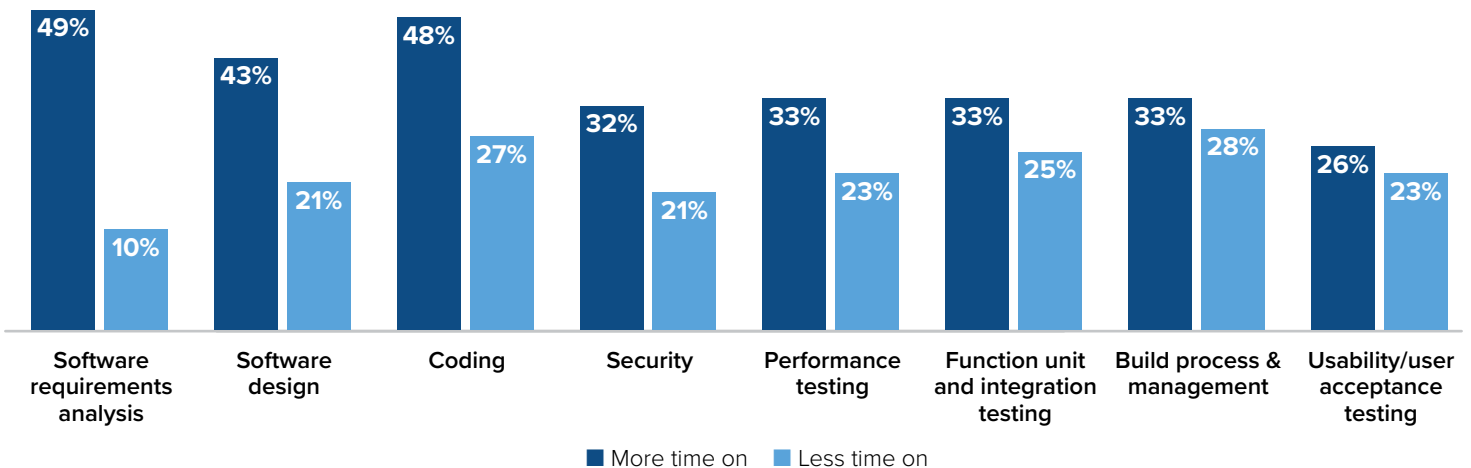|	
Writing requirements	18%
Developing applications	18%
Developing code	14%
Implementing CI/CD	10%
App performance management	11%
Infrastructure performance management	9%
User experience	9%
Security	10%
Other	1%

Source: IDC

The image on the left illustrates the proliferation of developer responsibilities from writing code, to taking responsibility for writing requirements, deployment, monitoring and the implementation of security. Developers spend half of their time writing requirements, developing apps and deploying them. The rest of their time is dedicated to other responsibilities. That said, developers would prefer to spend more time developing applications (see Figure 4).

FIGURE 4

Preferred Developer Activities

K1a: Which development activity do you want to spend more time on in the next 12 months?
K1b: Which development activity do you want to spend less time on in the next 12 months?

Activity	More time on	Less time on
Software requirements analysis	49%	10%
Software design	43%	21%
Coding	48%	27%
Security	32%	21%
Performance testing	33%	23%
Function unit and integration testing	33%	25%
Build process & management	33%	28%
Usability/user acceptance testing	26%	23%

■ More time on   ■ Less time on

Source: IDC

Developers would prefer to spend more time on software requirements analysis, software design and coding in contrast to unit testing, build processes and user acceptance testing. By designating an enterprise architect responsible for pre-configuring hardware and software stacks and implementing governance, security and compliance controls, IBM Cloud Pak for Applications responds to the contemporary need of developers to focus on the core business logic of their applications. As such, IBM Cloud Pak for Applications paves the way for enterprises to benefit from increased developer productivity and accelerated development velocity that is further amplified by the platform's bevy of automation functionalities for both developing net new applications and modernizing existing digital assets Importantly, the platform empowers enterprise architects to maximize development throughput and quality by enabling them to provision and manage digital platforms that feature implementations of governance, security and compliance.

Challenges/Opportunities

In a modernization journey, organizations face multiple challenges regarding architecture, infrastructure and culture. Choosing the right vendor and a common application platform can give organizations a competitive advantage on par with savvy startup competitors. The platform itself is focused on delivering value augmented by a central enterprise architecture that bridges business requirements with development outcomes.

There are numerous challenges and opportunities enterprises must consider during this process.

There are numerous challenges and opportunities enterprises must consider during this process.

Enterprises should choose a platform that allows the coexistence of existing applications along with modern applications and at the same time enabling the refactoring of applications. A common environment can significantly reduce the efforts spent on refactoring and replatforming projects while attaining the long-term goal of lower development and maintenance costs with a cloud-native architecture. Along with a platform, enterprises must embark on in-house training of modern architecture and development methodologies, along with a talent acquisition strategy to fill enterprise skills gaps.

Often, organizations are siloed. Automating the entire software delivery cycle can help to allow the seamless flow of code and policy changes. In addition, leveraging a common platform on a hybrid cloud architecture can give enterprises the flexibility to position workloads to any infrastructure location including the edge to match changing business needs while improving application experience. Finally, enterprises must identify ways to continuously modernize and build new applications while reducing costs and maximizing ROI.

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