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A TECH MAHINDRA COMPANY



# VRITTI

A P R I L 2 0 2 4

THE DIGITAL FINANCIAL  
SERVICES GUIDE

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# Blurb



Dear All,

I bring to you our latest version of quarterly newsletter, **Vritti**.

This edition of Vritti showcases our recent accomplishments and delves into leading industry trends, meticulously analysed by our esteemed in-house experts. We trust you will find it both informative and engaging.

## **Leaders in Mobile Money & Innovation:**

Comviva's unwavering commitment to product excellence has been recognized. The latest GSMA Mobile Money Deployment Tracker 2024 confirms mobiquity® Pay's position as the undisputed global leader, surpassing the combined deployment figures of our next three competitors. This achievement not only validates the strength of our solution but also underscores the valuable partnerships we foster with our esteemed clients. The report also highlights the surging adoption of mobile money, particularly in Africa, reflecting the growing global acceptance of digital payment solutions.

Your continued trust and support have been instrumental in this journey. To each and every one of our valued clients, I extend my heartfelt gratitude. You inspire us to continuously push the boundaries of innovation.

## **This Issue of Vritti features:**

- **Low-Code/No-Code Revolution** - Explore how low-code/no-code platforms are transforming software development with faster turnaround times and broader accessibility. Industry experts at Forrester forecast a market value of **\$50 billion by 2028**, with **87%** of developers already leveraging these tools. Discover how low-code platforms can accelerate development tenfold, empower business experts, and optimize operational efficiency.
- **Mobile Money Trends** - Delve into a comprehensive analysis of the latest GSMA Mobile Money report by one of our product experts. Gain insights into the booming adoption of mobile money solutions and their impact on the financial landscape.
- **Conquer Your Fear of Code Reviews** - We address the common apprehension developers experience when showcasing incomplete work. This issue offers strategies to overcome this fear and foster a collaborative development environment that leads to higher code quality and features aligned with team goals.
- **Kafka: Powering Real-Time Data** - Discover how Kafka's high-performance, scalable, and fault-tolerant architecture empowers building real-time data pipelines and stream processing applications.
- **Enhanced Operational Visibility with OAM** - Learn how operational alert monitoring (OAM) tools empower early issue detection, proactive system monitoring, and faster incident response, ultimately leading to improved system reliability and minimized downtime.

As the industry evolves, Comviva remains at the forefront of innovation fuelled by our unwavering commitment to exceeding client expectations.

*Thank you once again for being a part of the Comviva family!*

## Srinivas Nidugondi

EVP & COO,  
Digital Financial Solutions,  
Comviva

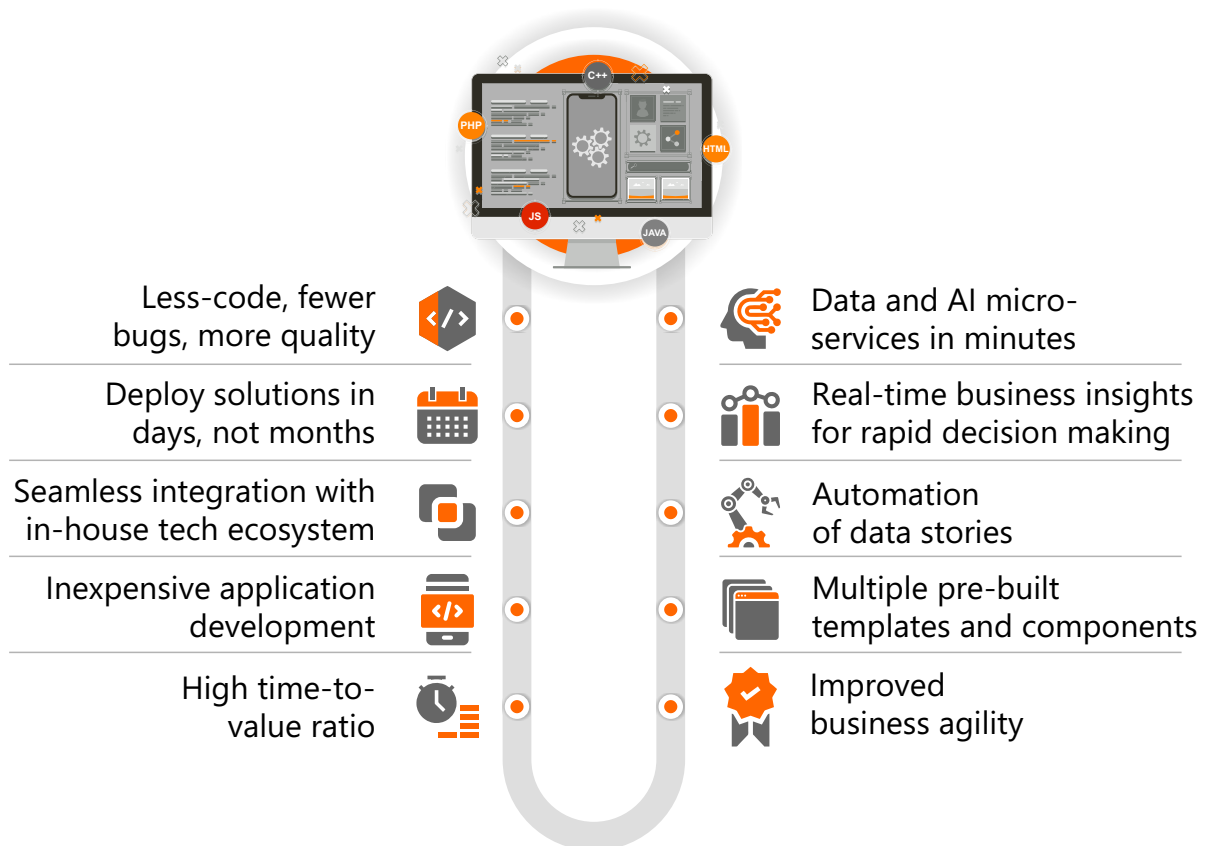
# BANKING UNCHAINED

## Low/No Code ignites digital banking transformation like never before

In today's rapidly evolving digital banking landscape, agility and innovation are key to staying competitive. Traditional development processes often struggle to keep pace with the demands of modern banking, leading to delays in feature delivery and increased costs. However, a new approach is gaining traction – low-code development platforms. These platforms empower digital banking providers to accelerate their innovation cycles, reduce time-to-market, and deliver exceptional customer experiences.

**History of low code** has its roots from early 2000's with the rise of rapid application development (RAD) platforms. These platforms aimed to provide a more visual, drag-and-drop approach to application development, allowing users to build applications faster and with less coding. By the mid-2010s, low code had become a mainstream technology, embraced by organizations of all sizes for its ability to speed up development and reduce costs. Low-code application development platforms have made programming easier and more efficient than ever before. Instead of typing out hundreds of thousands of lines of code to create an application, these platforms have made it simple with visual workflows, drag-and-drop features, and more.

## 10 Reasons why Enterprises need Low code platforms



## Insights

As per Forrester “Low-code platforms can help development teams work faster and increase enterprise-wide software production by empowering “citizen” developers”. The Low-Code Market Could Approach \$50 Billion By 2028. Based on the most recent survey data (Jan 2024), 87% of enterprise developers use low-code development platforms for at least some of their development work.

### Low-code platforms help advance digital business in three major ways:



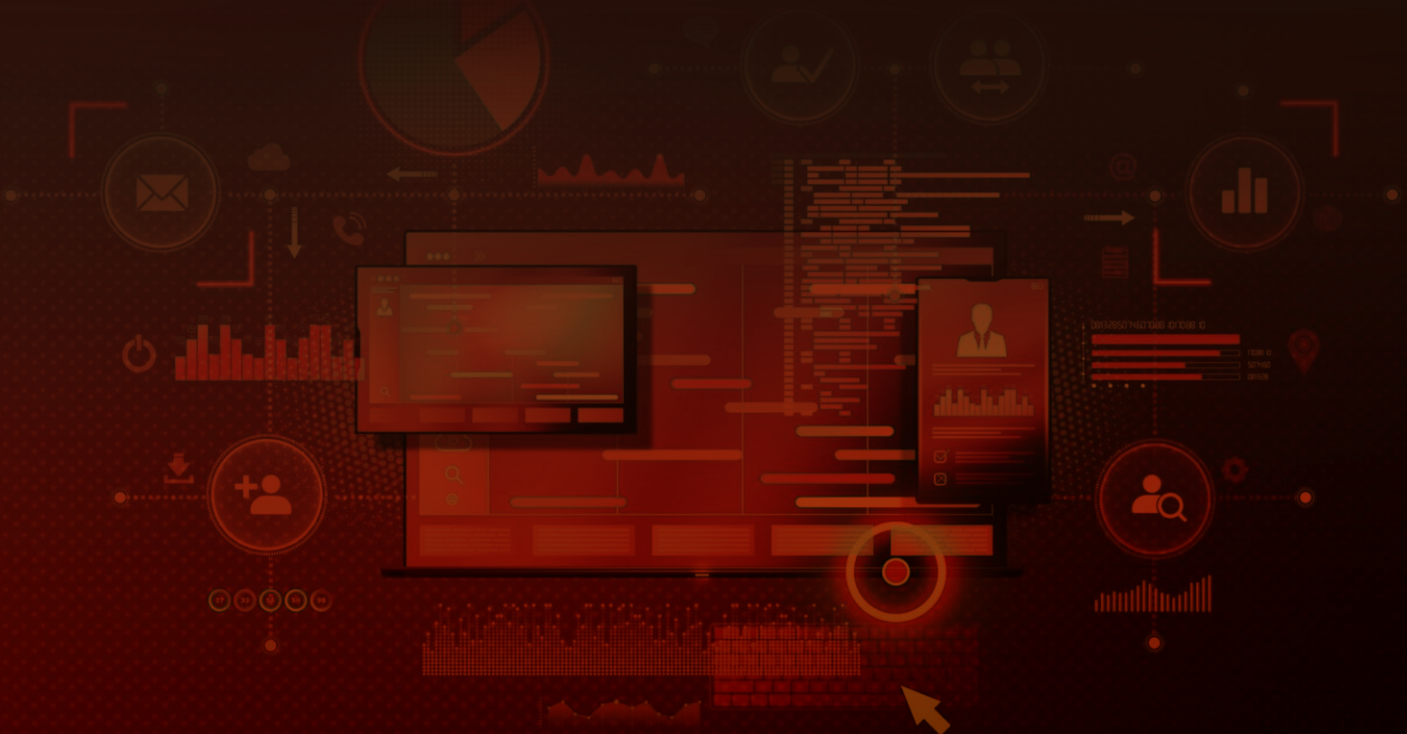
They have the potential to greatly decrease the time needed to meet business requirements. Current usage indicates that these platforms can propel software development to 10 times the speed of traditional processes. Faster development means more leeway to focus on design.



They harness the forces of shadow IT for good, not evil. To deal with gaps in app portfolios, tech-savvy business experts have long been known to take the issue into their own hands — often doing more harm than good. Low-code can harness these “rogue IT” activities by hosting them on managed platforms and adding guardrails to expand software delivery capacity.

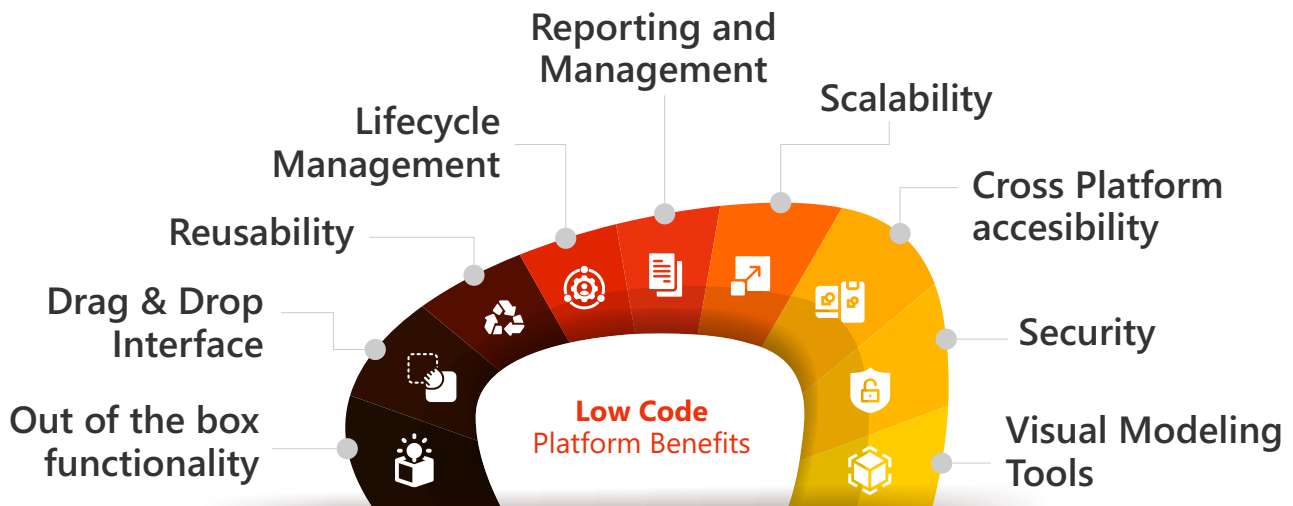


They play a vital role in automating operational processes. The key challenge in digital transformation: Automate the hundreds or thousands of operations crucial to customer experiences. Low-code platforms with strong business process features can accelerate these projects and empower business experts.



## Various benefits of Low code platforms

Low code platforms are designed to make the software development process more agile, user-friendly, and scalable. Few benefits are mentioned below:



### Benefits

### Description

**Out-of-the-box functionality**

Low code platforms come with pre-built modules, eliminating the need to build core application modules from scratch.

**Drag-and-drop interfaces**

Simplifies development by allowing users to drag and drop application components, benefiting both amateur and professional developers.

**Reusability**

Allows repeated use of pre-configured modules and components, speeding up application development by leveraging common core functions.

**Lifecycle Management**

Streamlines development stages from testing to deployment, providing access to application information and version control.

**Reporting and Monitoring**

Enables process and workflow monitoring, tracking app effectiveness, performance, and analytics throughout the development cycle.

**Scalability**

Allows apps to adapt easily to changing business needs, catering seamlessly to different user loads.

**Cross-platform accessibility**

Supports multi-device compatibility, enabling use on various operating systems and building apps compatible across platforms and devices.

**Security**

Ensures app and platform security through adequate security protocols, safeguarding against threats and vulnerabilities.

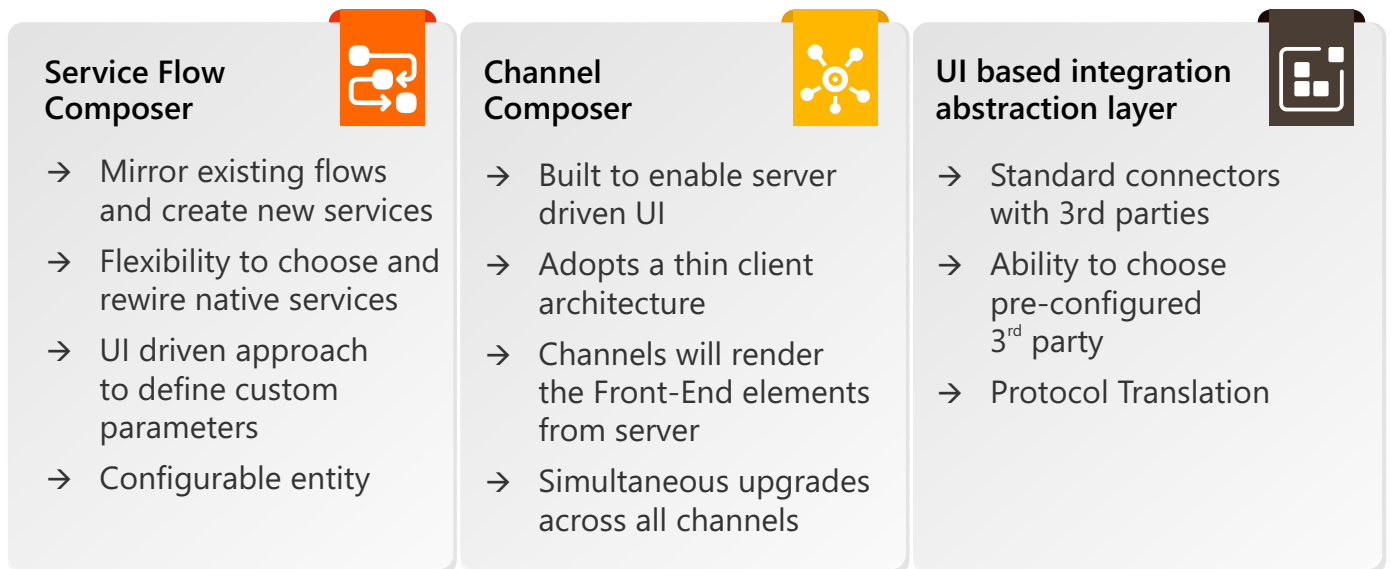
**Visual Modeling Tools**

Equips anyone with developer abilities and speeds up software application creation through comprehensible visual tools and methods.

## mobiquity® Banking Suite: Comviva's low code platform

The solution will take care of 3 parts of software development steps:

- Our composable platform enables building and customizing services with modular components, reducing coding complexity.
- Rapid creation and modification of business solutions cater to evolving customer needs, market trends, and regulations.
- Upgrades incorporate a UI-driven channel flow composer, instant API integration, and personalized features for themes and campaigns.
- Seamless connectivity with external entities is facilitated through an in-house UI-based integration abstraction layer.



In this fast-paced world of digital banking, agility and innovation are non-negotiable. Low-code development platforms offer a transformative solution, empowering banks to accelerate their digital transformation journeys, deliver exceptional customer experiences, and helps in staying ahead of the curve in an increasingly competitive market.



### About the Author

**Santosh** possesses more than 15 years of experience in Product Management, fuelled by a passion for crafting exceptional products within the competitive Banking and Fintech sectors.

Prior to joining Comviva, Santosh honed his expertise in process and product management across the financing domain at some esteemed organizations. Most notably, his 8-year tenure with a housing credit organization in India and Indonesia saw him spearhead product profitability while managing the entire product lifecycle – from concept and launch to stabilization and monetization – for key lending products.

# THE RISE OF MOBILE MONEY

## Powering Financial Inclusion and Economic Growth in a Digital Age

Mobile money has emerged as a transformative force in recent years, reshaping the financial landscape in developing economies. State of the Industry Report on Mobile Money 2024, recently published by the **GSMA Mobile Money program** delves into the impact of mobile money services globally, highlighting its role in financial inclusion, economic growth, and progress towards the UN Sustainable Development Goals (SDGs). The report includes both supply-side data from the Mobile Money Deployment Tracker and qualitative insights from the GSMA Mobile Money program's engagement with the industry.

### Growth and Impact

The report paints a promising picture of the mobile money industry. In 2023, there were a staggering **1.75 billion** registered mobile money accounts globally, representing a **12%** increase from the previous year. Sub-Saharan Africa continues to be the frontrunner in mobile money adoption, with over **70%** of the growth in registered accounts originating from this region. West Africa, particularly **Nigeria, Ghana, and Senegal**, has emerged as a key player, with the number of registered accounts doubling between 2013 and 2023. In the 10 years to 2022, mobile money contributed **\$600 billion** to the GDP of countries with a mobile money service. The rise of non-mobile-network-operator (MNO)-led mobile money services in West Africa has further diversified the mobile money ecosystem thus enabling a vibrant and competitive market.

#### GROWTH IN AFRICA IN 2023

Live Services	Registered accounts	Active (30-day) accounts	Transaction volume	Transaction value (\$)
<b>169</b>	<b>856 Mn</b> +19%	<b>237 Mn</b> +13%	<b>62 Bn</b> +28%	<b>919 Bn</b> +12%



## Beyond Account Ownership: Usage on the Rise

Mobile money usage continues to rise which is evident in the significant increase in active mobile money users, with the number of women using mobile money services showing a notable rise. Notably, transaction volumes grew faster than transaction values in 2023, indicating an increased frequency of mobile money use for smaller transactions. International remittances and merchant payments which **expanded by 14% to reach nearly \$74 billion in 2023**, were among the fastest-growing use cases, reflecting the expanding role of mobile money in facilitating cross-border transactions and cashless payments.

Additionally, mobile money providers are expanding their service offerings to include credit, savings, and insurance products. Mobile money usage is maturing as users move beyond basic transactions and embrace a wider variety of services. This trend is further underscored by the **40%** increase in average revenue per user between September 2022 and June 2023, even amidst a slowdown in account and transaction growth rates. These developments clearly demonstrate the expanding commercial potential of mobile financial services.

## Empowering Women and Unlocking Potential



# 63%





of beneficiaries, approximately, were women, who received more money than men.

The gender gap in mobile money ownership is narrowing, with a significant **rise from 9% to 19%** ownership among women between 2022 and 2023. While further progress is needed, this signifies a positive shift towards financial equality. Yet, it is important to note that **there was a significant gender gap in mobile money adoption in all countries surveyed except for Kenya. The widest gender gap was observed in Pakistan, followed by India and Bangladesh.** Women were less likely to use mobile money compared to men due to barriers such as limited access to mobile phones, lack of financial literacy, cultural norms, and limited awareness of the benefits of mobile money. Efforts are being made to address this gender gap through initiatives that promote digital inclusion and financial literacy among women. For example, in India, **Airtel Payments Bank partnered with Frontier Markets and Mastercard in 2023 to support 100,000 women-owned small businesses with resources, tools and opportunities to grow and diversify their incomes.** The country's rapidly growing uptake of the United Payments Interface (UPI) has also been a key driver of women's adoption of digital payments. Most recently, its new 123Pay solution for feature phones allows women without smartphones to use digital financial services.

## Evolving Use Cases and Expanding Services

Mobile money usage is extending beyond basic transactions. International remittances which grew by almost **\$29 billion** in 2023, a one-third increase compared to 2022. This growth was driven by West Africa. Merchant payments expanded by **14%** in 2023, reaching around **\$74 billion**. Many customers now use mobile money to pay for goods and services, with two in every ten dollars circulating in the mobile money ecosystem being spent on merchant payments. Transaction volumes are increasing, even as average transaction values decrease, indicating a shift towards more frequent use for smaller-value purchases. Example being bill payments which saw higher transaction volumes, growing by **23%** between 2022 and 2023, despite a drop in transaction values. Bulk disbursement volumes grew by **10%** in 2023, indicating an increase in the use of mobile money for large-scale payments. Several mobile money providers are beginning to offer microinsurance. In 2023, **23%** of services offered insurance, compared to **14%** in 2022. While insurance is the least offered adjacent service, it grew the fastest. Many mobile money users are taking out productive credit to access loans for business purposes as-well. This versatility is further enhanced by the rise of services like mobile credit, savings, and insurance.

### Global adoption survey respondents who offered an adjacent service by year

 Year	 Credit	 Savings	 Insurance
2022	41%	39%	14%
2023	46%	44%	23%

## Agents: The Backbone of the Ecosystem

A robust network of agents (growing by **22%** in 2023) forms the backbone of mobile money, providing critical access points for cash-in, cash-out, and other services, particularly in rural areas.

## Policy Reforms, Regulatory Landscape and DPI

While taxation remains a challenge, positive developments like reduced mobile money levies and increased transaction limits in certain regions signal a move towards a more supportive regulatory environment. The impact of regulatory changes, as seen in the **12%** drop in bulk disbursement values in East Africa due to reintroduced bank charges, underscores the need for balanced regulations that promote growth while safeguarding consumer interests.

Per GSMA, **Digital Public Infrastructure** (DPI) is a concept that is likely to become more central to mobile money policy trends in the future. DPI refers to the digital platforms that allow countries to provide essential services to citizens, including payment infrastructure and data exchange solutions. The UN High Impact Initiative on DPI promotes the development and implementation of DPI in **100 countries** by 2030, with the goal of ensuring that DPI is safe, inclusive, and future-ready. Some countries, such as **Ethiopia, Senegal, and Togo**, have already piloted DPI technologies like the **Modular Open-Source Identity Platform** (MOSIP), which enables interoperability. DPI is expected to become more widespread in the future, with collaboration between various sectors. For example, in Togo, the government launched Novissi, a DPI-based solution that facilitated emergency digital cash transfers using mobile money during the COVID-19 pandemic. This platform increased access to economic resources for vulnerable individuals in Togo, and it is expected to become a long-term DPI solution. DPI has the potential to accelerate progress towards the Sustainable Development Goals (SDGs) and promote digital inclusion.

**Beyond Africa - Global Impact:** Mobile money's impact extends beyond Africa. It contributes to achieving various UN Sustainable Development Goals (SDGs) such as poverty reduction, gender equality, and responsible consumption and production. It facilitates financial inclusion for women, empowers individuals to manage their finances, and supports businesses of all sizes. **Mobile money contributes to 15 of the SDGs, including SDG 11 (Sustainable cities and communities) and SDG 12 (Responsible consumption and production).**











## Unveiling Untapped Potential - Opportunities for All

The mobile money ecosystem holds immense power to unlock the full potential of connectivity. It can foster a thriving business environment and drive positive societal change. Beyond basic transactions, mobile money is evolving to encompass a wider range of services, empowering users with greater financial freedom. Expanding these services to underserved regions and populations presents a remarkable opportunity to bridge the financial inclusion gap and fuel economic growth across the board.

- **Accelerating Inclusion:** By focusing on the underserved, we can empower more people to participate in the digital economy, unlocking a wave of financial inclusion and economic opportunity.
- **Connectivity for Progress:** Leveraging the power of mobile technology can enable individuals, industries, and societies to flourish, driving innovation and prosperity.
- **Policy and Progress:** Developing sound policies and tackling societal challenges are crucial for fostering a sustainable and inclusive mobile money ecosystem.
- **Interoperability for Impact:** Seamless interoperability between mobile money providers and banks will streamline transactions and unlock new possibilities.
- **A Global Platform for Change:** Mobile money offers a unique platform to convene industry stakeholders, fostering collaboration and accelerating growth.

## Challenges and Collaboration

Despite the remarkable progress, the report acknowledges some lingering challenges. The gender gap in mobile money ownership and usage remains a concern, with women in many countries less likely to own a mobile phone, be aware of mobile money services, or possess a mobile money account. Addressing this gap through targeted initiatives is crucial to promote financial inclusion for all. Policy reforms and regulatory frameworks also play a critical role. Taxation remains an issue for some mobile money services, although positive developments like reduced mobile money levies and increased transaction limits in certain regions are creating a more favorable environment. Additionally, improving financial literacy and consumer protection measures are essential for building trust and ensuring the secure use of mobile money services.

 Unclear government regulations	 Limited network coverage	 Low device ownership	 Short donor funding cycle	 Low literacy rate
 High cost of mobile service (voice/data)	 Content not relevant nor localised	 High cost of delivery platform	 Lack of consumer trust	 Don't see the business case

## Overcoming Obstacles, Achieving Impact

- **Bridging the Digital Divide:** Expanding mobile network coverage and addressing low device ownership, especially among women and rural populations, are crucial steps towards universal access.
- **Financial Literacy for All:** Promoting digital financial literacy empowers users and fosters trust in the mobile money ecosystem. Addressing barriers like limited access to relevant content and high costs of delivery platforms is critical.
- **Regulation for Growth:** Supportive policies and regulations are essential for fostering a thriving mobile money ecosystem while safeguarding consumer interests.

## Looking Forward Building a More Inclusive Financial Future

By addressing remaining barriers, particularly the gender gap and limitations to digital literacy, mobile money can reach a wider audience and unlock its full potential as a tool for financial inclusion and economic empowerment. Efforts to expand Digital Public Infrastructure (DPI) hold further promise for increasing digital inclusion and bridging the digital divide. Overall, the GSMA report paints an optimistic picture of mobile money as a powerful driver of financial inclusion, economic growth, and progress towards a more sustainable future.

## Some of the keypoints from the report

- Between 2013 and 2022, the total **Gross Domestic Product** (GDP) in countries with a mobile money service was **\$600 billion** higher than it would have been without mobile money.
- Registered accounts grew to **1.75 billion** in 2023, a **12% year-on-year increase**.
- By the end of 2023, there were around **435 million** active mobile money accounts, a **9%** annual rise.
- Agent networks continued to grow, with registered agents reaching **18.6 million** and active agents reaching **8.3 million** in 2023.
- International remittances and merchant payments were among the fastest-growing mobile money use cases in 2023:
  - Transaction values for international remittances grew to almost **\$29 billion**, a one-third increase compared to 2022.
  - Merchant payments grew by **14%**, reaching around **\$74 billion** in 2023.
- Interoperable transactions grew by **15%** year-on-year to **\$210 billion** in 2023.
- Bill payment transaction values fell by **11%** to **\$75 billion** in 2023 with a **23%** increase in transaction volumes.
- Bulk disbursement values dropped by **1%** to **\$83.6 billion** in 2023.
- More mobile money providers are offering credit, savings, and insurance compared to 2022.
- Mobile money has enabled more women to access financial services.
- Many mobile money providers have seen an increase in average revenue per user.
- Taxation remains an important regulatory challenge for many mobile money services, though some countries are beginning to abolish mobile money taxes.
- Mobile money now contributes to **15 of the United Nations' Sustainable Development Goals** (SDGs).
- West Africa has emerged as a key driver of mobile money's success, with the number of registered mobile money accounts doubling between 2013 and 2023.
- West Africa has seen more non-mobile-network-operator (MNO)-led mobile money services emerge to compete with MNO-led providers.
- Mobile money transaction volumes grew faster than transaction values in 2023, leading to a drop in average transaction values.
- Mobile money adoption in West Africa accounted for over a third of new registered and active 30-day accounts globally in 2023.
- The value of money circulating in the mobile money ecosystem grew by **9%** in December 2023 compared to December 2022.
- The growth rate of incoming transactions in December 2023 was **4%**.
- The growth rate of outgoing transactions in December 2023 was **3%**.
- In 2019, **\$1 in every \$10** circulating in the mobile money ecosystem was spent on merchant payments, while in 2023, **\$2 in every \$10** circulating in the mobile money

- ecosystem was spent on merchant payments.
- Inward international remittances rose by **1%** in December 2023 compared to the previous year.
- The proportion of outgoing cash-based transactions rose by **2.5%**.
- Overall transaction values grew by **14%** in 2023, slower than in 2022 (**22%**) and 2021 (**27%**).
- Transaction volumes grew at a slower rate in 2023 (**23%**) compared to 2022 (**27%**).
- The average value of mobile money transactions fell from **\$18.6** in 2021 to **\$16.4** in 2023.
- The average transaction values of all mobile money use cases shrunk in 2023, except for airtime top-ups and cash-outs.
- Active mobile money users have been transacting more often annually and at higher values every year since 2020.
- The combined value of bank-to-mobile and mobile-to-bank transactions was **\$210 billion** in 2023, an increase of **more than 250%** since 2020.
- The average revenue per user (ARPU) for mobile money providers rose by **40%** from **\$2.2** in September 2022 to **\$3.2** in June 2023.
- Agent commissions grew by **15%** between September 2022 and June 2023.
- Customer fees were the major source of revenue for around **75%** of survey respondents in 2023.
- Several policy reforms launched in 2023 have had positive impacts on mobile money markets, such as reduced mobile money levies and the removal of mobile money taxes in certain countries.
- Once women own a mobile money account, they are nearly as likely as men to have used it in the past 30 days, except in Bangladesh and Pakistan where women's use is substantially lower.
- Women are less likely than men to have performed three or more different types of transactions over the past seven days in all surveyed countries.
- The most frequently reported barriers to mobile money account ownership are a preference for cash and a lack of knowledge and skills.



### About the Author

**Protim** is an experienced Product professional having 18 years of international experience. He has a strong track record in creating strategy for growth, converting vision and concepts into real products and businesses and ensuring revenue generation and enhanced profitability. Strategic Business Analysis is his key strength and he has helped companies conceptualize and implement new ideas, products and open new business opportunities. He has experience of working with diverse cultures across the globe, like US, Eastern Europe, South East Asia, India, Bangladesh, Middle East, LATAM and Africa. Protim aims to use his experience and skills to build products and platforms that help companies achieve their strategic goals. He is also passionate about sharing his knowledge and experience with others.

# POWER OF EARLY FEEDBACK IN SOFTWARE DEVELOPMENT

by *Sawagta Acharyaa*

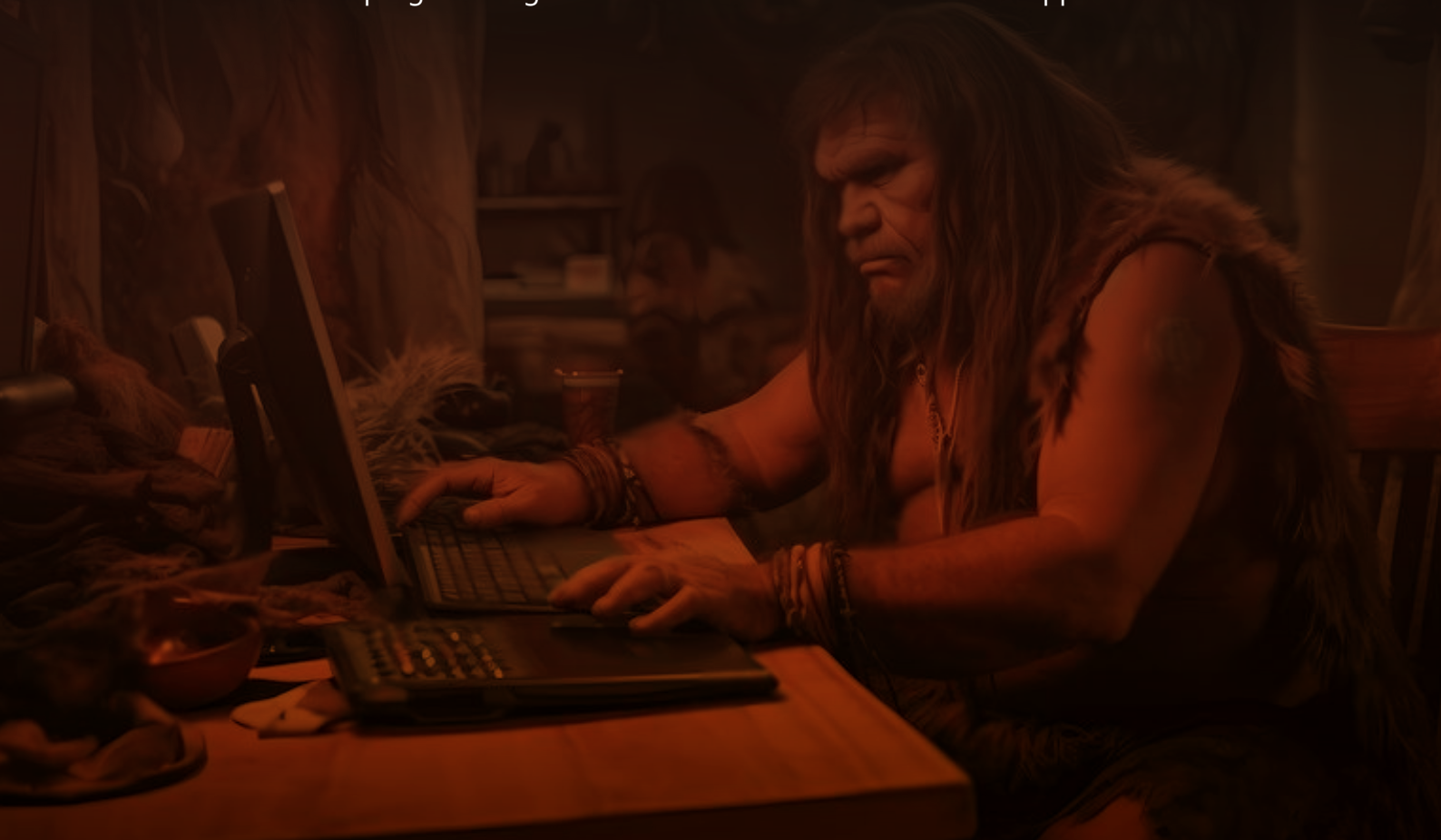
In the world of software development, there's a silent yet quite popular practice that often goes unnoticed until it's too late. It's the habit of programming in isolation, a phenomenon I like to call "**cave programming**." This approach seems efficient at first glance but often leads to significant pitfalls in the later stages of development.

Take the case of Bob, a talented developer in a mid-sized tech firm. Bob is known for his dedication and the ability to churn out large chunks of code. However, he tends to work in isolation, only emerging from his 'coding cave' after days or even weeks of solitary work. This habit, though born out of a desire for focused productivity (and other some other factors, we will discuss), often backfires.

Recently, Bob spent weeks developing a complex feature for the company's flagship product. When he finally presented his work, it became evident that his understanding of the requirements had diverged from what the team had envisioned. The code, while brilliantly written, was misaligned with the project's goals and required significant rework. This not only demoralized Bob but also set the project timeline back by several weeks.

Do you know any Bob around you? Even better, are you the Bob yourself? Then you are at the right place. Read on.

Bob's story is not unique. It's a scenario that plays out in many software teams across the globe, leading to rework, missed optimization opportunities, and a significant drain on time and resources. This article aims to find out why this happens and also to shed light on the importance of early feedback in the software development process, advocating for a shift from 'cave programming' to a more collaborative and iterative approach.



## Why (many) people prefer working in silos?

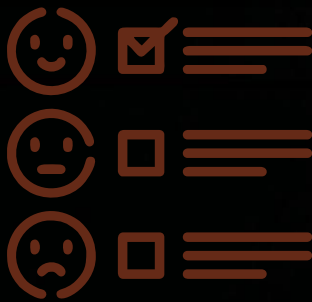
Multiple factors drive one individual to get involved in cave programming.

Many developers choose to work alone because they think great work needs a lot of quiet time. This way of thinking, where someone works alone and creates something great, is often seen in how companies work.

Some think that if you are busy and quiet, you are doing a good job. This makes developers wait to show their work until they think it's perfect.

Also, some are scared to share early because they don't want to seem like they don't know enough. In some teams, people don't trust each other much, or they only give/receive negative feedback. This makes developers not want to share their work early.

In all these scenarios, developers end up working alone, which can lead to the problems they want to avoid.



## What are the implications?

In today's world, we work as a team. Hardly any significant work (i.e. work that matters) is done by a single person. So, it is important to ensure the code being written by someone goes well with the work of other people in the team.

When developers like Bob work in isolation for extended periods, their code often becomes an island by itself. Integrating such code with the rest of the project can be a nightmare. The longer the isolation, the greater the integration challenges, often leading to complex merge conflicts, incompatibilities, and sometimes, complete rewrites.

Isolated development can lead to blind spots in code quality. Without regular peer oversight, code may not adhere to best practices or team standards, leading to inconsistent quality in different modules. Issues like poor readability, lack of proper documentation, and technical debt can increase, making maintenance a Herculean task.

Like what happened to Bob, working alone can mean we make something that's not what the team wanted. Without regular check-ins, developers might build features based on outdated or misunderstood specifications, leading to irrelevant or incorrect implementations.

Working with others can make your code better because you get new ideas and help.

Collaboration and peer review are not only to find fault in some work, but they are also about enhancing and optimizing code together.

Working alone can also have psychological effects. Developers may feel disconnected from the team, leading to a sense of isolation and ultimately decreased job satisfaction. Additionally, the pressure of having to deliver large chunks of code perfectly the first time can lead to burnout.

The longer the feedback loop, the harder and more costly it is to make changes. When developers work in isolation, feedback on their work is delayed, often leading to significant rework that could have been avoided with earlier intervention.

## Techniques to break the silence

So far, we have seen what programming in a cave mentality is and what are some of the reasons behind developers exhibit such behaviour. At Comviva, we follow a holistic approach to reduce this effect as much as possible. It is given that it is often not eliminated, but we keep looking for scenarios and amend our process to create a truly collaborative team that works well together.

### Regular Code Reviews

Our review starts as soon as there is some small but meaningful code available for any feature. A WIP (Work in progress) merge request is created to a feature branch and people are informed about the merge request. Interested people subscribe to the changes. One peer reviewer is assigned to it. Instead of an after-development big bang review, we prefer reviewing in chunks and smaller quantities, ensuring the quality of the review and the code is maintained properly.

The human aspect of the code review is given equal weightage.

### Open and encouraging team environment

We believe it is OK to fail if we fail fast and then learn from it. Our reviews are focused on the artifact, and not the person. The comments given are aimed at making the solution better. Review is considered a two-way communication between the reviewer and the developer with only one goal in mind and that is to improve the quality of the artifact.

### Continuous Integrations

Continuous Integration and code pipelines are set up within the development lifecycle. We want to ensure the newly committed code does not break the build or existing tests.

### Regular Showcases and Feedback Cycle

We have established a regular showcase cycle with the product owner and other stakeholders to get early feedback on the feature being developed. Doing this regularly and with small chunks of sub-features enables us to check if we are building things as per market need and correct the course quickly if we deviate.

Similarly, when a requirement is demonstrated as a solution in front of the stakeholders, they get a visual on the feature and it becomes easier to validate the thoughts quickly.

## Use of proper tools in correct scenarios

With a mindset of automation first, this is important to have proper tools in place to promote faster feedback. Below are the tools we use for increased collaboration and to promote a faster feedback cycle.

**Jira:** Our user stories are tracked in Jira, and the team is encouraged to keep the sprint board updated. This gives some data on the capabilities of the team and provides visibility.

**Gitlab:** Our code is maintained in Gitlab. We follow an efficient branching strategy that helps us move things faster.

**Peer Reviews:** To ensure the code being written is seen at least by one pair of extra eyes, the concept of peer reviewer is introduced. As the person is at peer level, the environment is friendly and there is no judging of a person whatsoever. This ensures thorough discussions on the simplest changes to make it performant.

**Lint Tools:** As we work mostly on mobile technologies, we use Detekt and Swiftlint and integrate them into our workflows to ensure the code written is free of simple errors.

**AI Code Review:** Instead of an AI code reviewer, it is more like a code companion. We have set up one in-house portal that leverages the capabilities of Open AI's GPT-3.5 Turbo and developers can get quick validation of their logic while doing development.

**Slack:** Slack is used as the primary communication medium. Sufficient slack bots are set up for gathering updates from the team. We strive to reduce meetings until they are really necessary and when we hold meetings, we ensure the attendees are adequately prepared.

We are also exploring remote pair programming tools to enable people to work together. This is under experimentation.

In summary, we strive to ensure people are not working within silos and the environment is collaborative enough to get early feedback. For an organization that is shifting from a closed to an open environment, the changes can seem to be a little overwhelming, but with small and steady steps this mindset can be achieved.

This has several benefits, like better team collaboration, better product quality, quick feedback, and iteration cycle, and finally, a situation where everyone learns and moves forward.



### About the Author

**Swagata** is passionate Solution Architect with a rich experience of 16 years. He has been instrumental in designing and delivering innovative mobile solutions across diverse sectors like Fintech, Cabin Innovation in aviation, Entertainment etc. His love for mobile platforms has led him to acquire expertise in areas such as architecture, modularization, Server Driven UI, and SDK development.

He is a problem solver who thrives in challenging, fast-paced environments. He has a knack for quickly learning and adapting to new technologies, and have a proven track record of developing well-structured, clean solutions using the same.

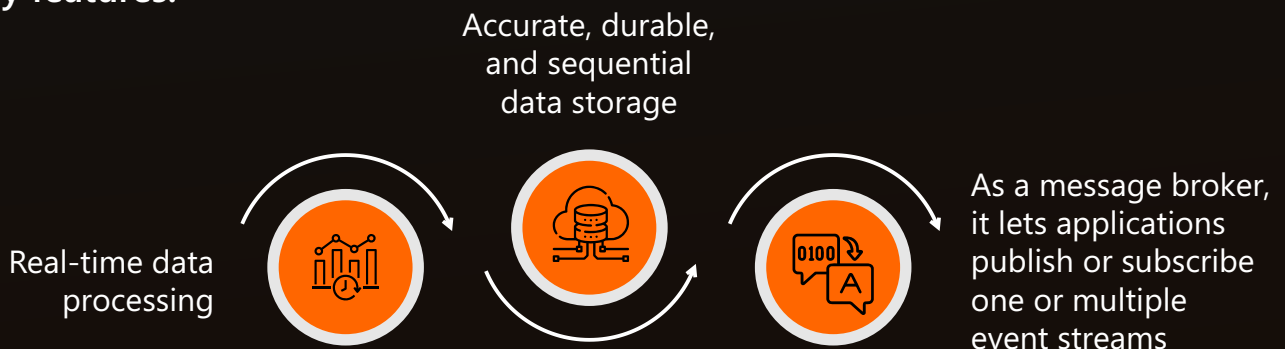
# UNVEILING KAFKA: THE HIGH-PERFORMANCE ENGINE FOR REAL-TIME DATA STREAMING

by *Abhijeet & Divashree*

## What is Kafka?

Kafka is an open-source distributed event streaming platform originally developed by LinkedIn used to build real-time streaming data pipelines and real-time streaming applications.

### Key features:



**Publish-Subscribe Model:** producers publish data to topics, and consumers subscribe to topics to receive the data.

**Stream Processing:** Allowing developers to build real-time applications that can process and react to data as it is ingested.

**Connectors:** Framework for building and running connectors that move data in and out of Kafka.



## Why is kafka so popular?

### High throughput, Low Latency

Kafka is optimized for high throughput and low-latency data streaming. It can handle millions of events per second and provide low-latency access to the data, making it suitable for real-time applications.

### Highly scalable

More brokers can be added to handle a large volume of data at high speeds and even distribution of msgs across partitions.

### No data loss even in failures

Durability because of data replication.

### Replay of data

Reprocessing or consuming past messages or events.

### High data availability and fault tolerance

Data replication in cluster helps in this.

### A powerful set of APIs

Kafka Connect and Kafka Streams.

### Supported data formats

Text, JSON, Avro and Protobuf.

### Security

Through authentication and encryption.

## Where are we using it?

### Event-Driven Architecture:

Data is processed as soon as it is generated, rather than in batches. This enables real-time data processing and analytics.

Creating topics which end user can use directly for AI-ML applications.

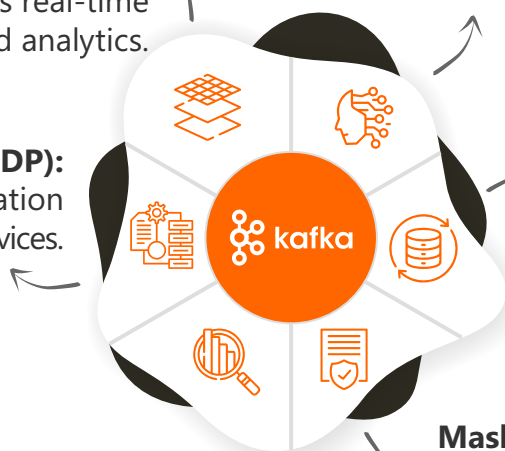
### Event data pipelining (EDP):

Is used for communication between different micro-services.

Data is synched between different databases.

**Limited data exposure:** Topics with specific columns are made available for end user so that only relevant information is accessible.

**Masking data:** Applying techniques to protect sensitive information within Kafka messages.



## Kafka components

### Broker

Kafka brokers form the core of the Kafka cluster. Brokers store data, handle client requests, and participate in the replication of data across the cluster. A Kafka cluster typically consists of multiple brokers.

### Topic

These are logical channels or feeds into which producers publish messages, and from which consumers consume messages.

### Partition

Each topic is divided into partitions, and each partition is an ordered and immutable sequence of messages. Partitions allow Kafka to horizontally scale and parallelize the processing of data.

### Offset

An offset is a unique identifier assigned to each message within a partition. Consumers keep track of their progress in a topic by storing the offset of the last consumed message.

### ZooKeeper

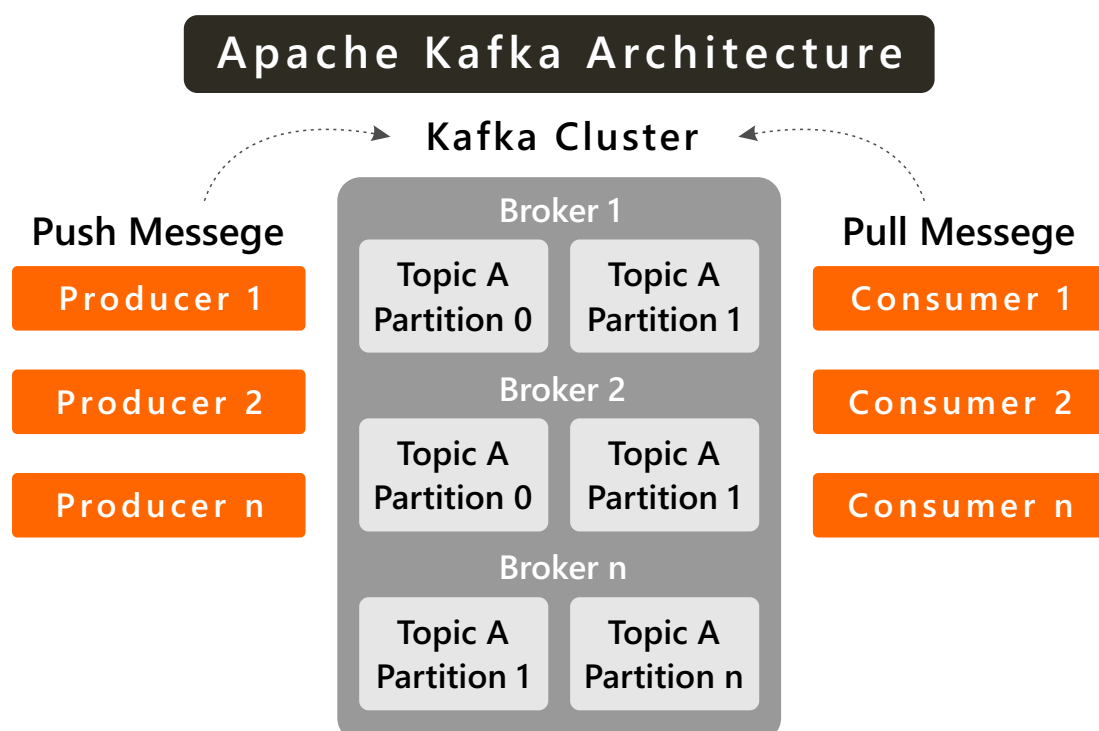
ZooKeeper is used for managing and coordinating the Kafka broker nodes. It is used for tasks such as leader election, configuration management, and maintaining the metadata of the Kafka cluster.

### Producer

It is responsible for publishing messages (events) to Kafka topics.

### Consumer

Consumers subscribe to topics and process the messages produced by the producers.



## Best practices for HA Kafka cluster

S. No.	Parameter type	Best Practice
1.	Topic partitions	Partitions allow users to parallelize topics. Following formula can be considered for deciding partition no. for different topic: <b>No. of Partitions = Desired Throughput / Partition Speed</b>
2.	Number of threads (num.network.threads)	3 is fine but in case of too many simultaneous requests we can increase it. Adjust this based on the <b>number of producers + number of consumers + replication factor</b>
3.	Number of threads for I/O operations (num.io.threads)	This value should be at least the number of present processors
4.	Socket buffers for high speed ingestion (socket.receive.buffer.bytes)	<ul style="list-style-type: none"> <li>For bandwidth networks &gt;= 10 gbps with latencies of 1 ms: 8 or 16 MB</li> <li>For limited memory consider 1 MB</li> <li>To allow OS tune buffer size based on network: -1</li> </ul>
5.	Default replication factor for topics (default.replication.factor)	for n no. of nodes cluster default.replication.factor n is preferred. This will make sure topics created without specifying replica factor will be replicate on all nodes.
6.	Replication factor for internal Kafka topic (offsets.topic.replication.factor)	for 3 node cluster offsets.topic.replication.factor 3 is preferred or default it will be set to 1 it may cause problem for consumption when 1 node or 2 nodes are down
7.	Acknowledgement for Kafka producer (Acks)	<p>acks=0 producer won't wait for acknowledgement from broker node</p> <p>acks=1 producer will wait for acknowledgement only from leader node</p> <p>acks=ALL producer will wait for acknowledgement only from leader node and all ISR nodes. This proper is used with min.insync.replicas</p>

## Applications where Kafka can be used



### About the Authors

**Abhijeet** has 8+ years of experience with reporting/BI tools, database migration, data engineering and data analysis. He has worked on more than 10 data migration projects and continues to drive innovation through his skills and approach.

**Divyashree**, a Senior Engineer, excels in configuring and implementing High Availability setups for Kafka. Her expertise in designing reliable and scalable Kafka solutions has significantly contributed to the smooth operation of mobility® systems.



# FROM REACTIVE TO PROACTIVE: HOW OAM REVOLUTIONIZES APPLICATION MONITORING & MANAGEMENT

by *Varad Sharma*

## Introduction

In the dynamic realm of IT infrastructure management, the need for robust monitoring and alerting solutions is paramount. Comviva, a global leader in providing mobility solutions, addresses these challenges with **OAM – a Monitoring and Alerting Solution** that is making a transformative impact on incident reduction and production platform maintenance.

## The Challenge

The management of IT infrastructure comes with the constant demand for high availability to avoid financial losses and reputational damage. Striking the right balance between proactive incident management and routine maintenance poses a challenge that organizations like Comviva are poised to address.

## Enter OAM

OAM, developed by Comviva, has emerged as a comprehensive solution to the complex needs of monitoring and alerting in IT operations. This article delves into how OAM, backed by Comviva's expertise, effectively addresses challenges, reduces incidents through proactive monitoring, and streamlines production platform maintenance. OAM consisting of various monitoring and alerting tools quickly integrated into IT operations, enhancing visibility, and facilitating swift incident response.



## Incident Reduction Through Proactive Monitoring

OAM, as part of Comviva's suite of solutions, stands out by providing real-time insights into the health and performance of production platforms. Continuous monitoring of key metrics enables early detection of potential issues, resulting in a substantial reduction in incidents. Proactive alerts empower IT teams to take swift corrective actions, ensuring a reliable user experience.

## Efficient Production Platform Maintenance

OAM plays a pivotal role in streamlining maintenance activities by providing actionable insights and supporting data-driven decision-making. Routine maintenance can be conducted with minimal impact on production services, thanks to historical data analysis that enables trend identification, capacity planning, and implementation during low-traffic periods.

## Custom Metrics for Project-Specific Insights

OAM allows for the creation of custom metrics tailored to specific projects and services. Addressing unique challenges, OAM assists Comviva in optimizing operations. An illustrative example is the use of custom metrics and alerts for a third-party legacy non-performant API service, resulting in improved client assistance and minimized disruptions.



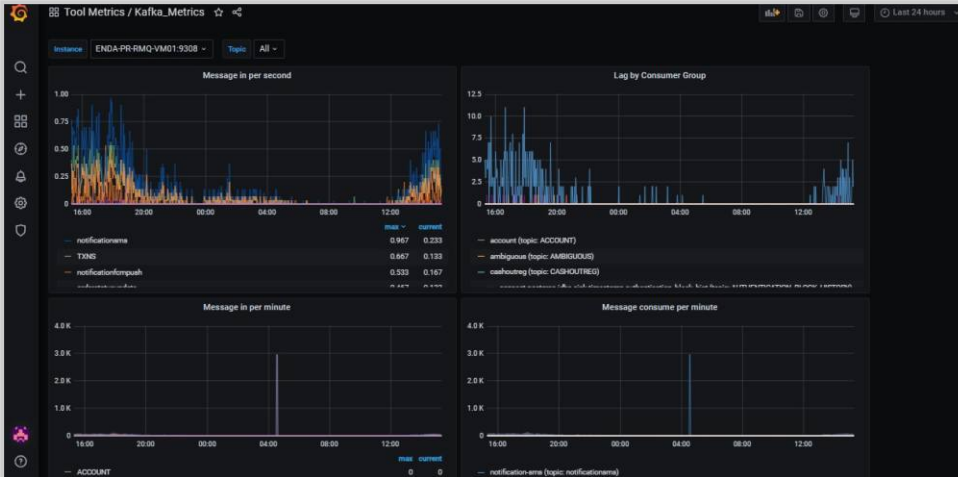
## System Metrics

- System metrics in MAAS provide real-time insights into CPU, memory, and disk usage for proactive performance monitoring.
- You can visualize network traffic patterns and detect potential bottlenecks.
- You can track system metrics over time to identify trends and make data-driven decisions for resource optimization.



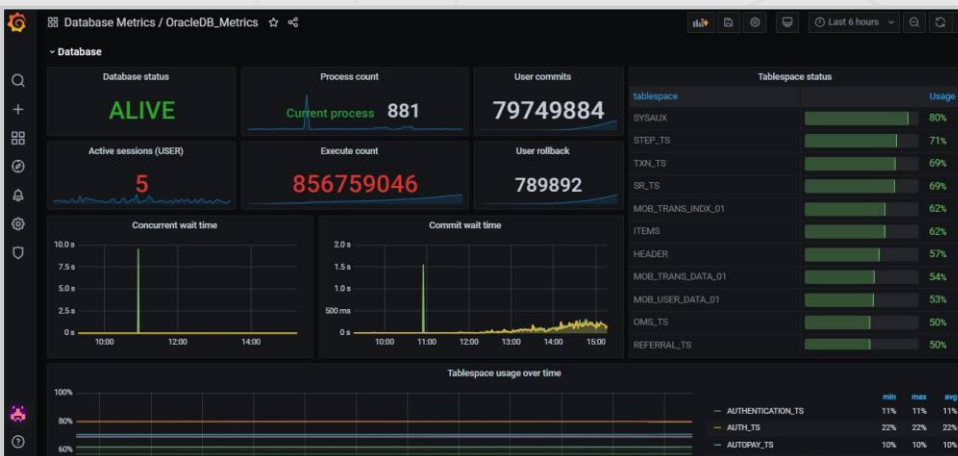
## Kafka Metrics

- Kafka metrics enable monitoring of key performance indicators such as message throughput, lag, and consumer group offsets.
- You can detect anomalies, optimize resource allocation, and ensure efficient message processing.
- Kafka dashboards provide insights into cluster health, broker performance, and topic-level statistics for proactive maintenance and troubleshooting.



## Oracle DB Metrics

- Oracle DB metrics offer visibility into database health, query performance, and resource utilization for proactive optimization.
- You can detect slow queries, analyze wait events, and improve overall database efficiency.
- You can visualize Oracle DB metrics such as buffer cache hit ratio, table scans, and locks to identify and resolve performance bottlenecks.



## Real-time Challenges Faced

### 1. Accidental VM Restart

- **Incident:** Unplanned restart of a critical virtual machine by a client.
- **Impact:** Disruption of essential services and applications.
- **OAM Detection:** Immediate detection through continuous monitoring.
- **Remediation:** Swift alerts and notifications via email, enabling the team to respond promptly.
- **Without OAM:** Potential outage and extended downtime, with delayed information until reported by the client.

### 2. Tablespace Utilization and Resource Monitoring

- **Incident:** Monitoring tablespace utilization and resource metrics for efficient database management.
- **Impact:** Potential performance degradation, resource constraints, and operational challenges.
- **OAM Detection:** Real-time monitoring of tablespace and resource metrics.
- **Remediation:** Proactive planning for database purging during optimal periods.
- **Without OAM:** Undetected performance issues and potential cascading failures, leading to increased Mean Time To Repair (MTTR) and manual monitoring overhead.

### 3. Custom Metrics for Legacy API

- **Incident:** Monitoring a third-party legacy non-performant API.
- **Impact:** Disruptions in services and client assistance.
- **OAM Detection:** Custom metrics and alerts for pending and failed transactions.
- **Remediation:** Timely alerts and notifications, enabling swift client communication.
- **Without OAM:** Increased downtime for API services, with limited visibility into transaction status and potential client dissatisfaction.

## Conclusion

In conclusion, the integration of OAM has brought about a paradigm shift in incident response and platform maintenance. The tangible benefits include reduced incidents, more efficient maintenance practices, enhanced operational efficiency, and improved service reliability. As organizations, including industry leaders like Comviva, navigate modern IT environments, the adoption of robust monitoring solutions becomes crucial for fostering proactive incident management, optimizing maintenance processes, and delivering a more resilient and responsive production platform.



### About the Author

**Varad** is a Product Development Engineer and has been with Comviva since August 2023. He started his career as an intern in February 2023 and found his interest in DevOps, Application Monitoring and their significance. He likes to read about technological advances made in the industry in his areas of interest.

## IN THE MEDIA



Srini shares his views on the AI revolution in Finance in the new edition of "**Digital Money Movers**".

Read the full story [here](#).

### Awards

- ☆ **BIG Innovation Awards – Financial Services**
- ☆ **Future Digital Awards – Telco Innovation**
- ☆ **MENA Fintech Awards – Banking Tech of the Year**
- ☆ **iBS Intelligence Awards**
  - Best Retail Payments System Implementation
  - Most Innovative Digital Wallet Deployment

### Analyst Mentions

- ☆ **ISG – Digital Banking Technology & Platforms Report - mobiquity®**  
Banking Suite gets recognised as:
  - "*A modular and cloud-native platform enabling banks to be market relevant.*"



## About Comviva

Comviva simplifies business complexity. Our innovative portfolio of digital solutions and platforms brings greater choice, faster time to market and flexibility, to better meet the evolving needs of our customers as they drive growth, transform, and bring efficiency. From maximizing customer lifetime value to enabling large-scale digital transformation, we partner globally with organizations in the communications and financial industry to solve problems fast and transform for tomorrow.

Comviva solutions have been deployed by over 130 Communication Services Providers and Financial Institutions in more than 90 countries and have delivered the benefits of digital and mobility to billions of people around the world. Comviva is a completely owned subsidiary of Tech Mahindra and a part of the Mahindra Group. For more information, visit us at [www.comviva.com](http://www.comviva.com)

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