Azure FinOps Essentials

Cost management and optimization strategies

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www.bpbonline.com

First Edition 2025

ISBN: 978-93-65891-133

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Dedicated to

The entire technology community for advancing the cloud technology and financial operations for inspiring us to write this book.

Foreword

The co-authors, Arun Kumar Samayam and Parag Bhardwaj, have provided comprehensive, soup-to-nuts coverage of topics related to Microsoft Azure, with a particular focus on the FinOps framework.

I have had the privilege of knowing both the technical reviewers, Y V Ravi Kumar and Velu Natarajan, for many years as highly regarded technical speakers and mentors in the field of multi-cloud technologies.

As cloud computing continues to transform how organizations operate, manage, and scale their infrastructures, it has become clear that managing cloud costs is not merely a technical challenge—it is a fundamental business imperative. Companies worldwide are embracing cloud platforms like Microsoft Azure for their potential to unlock unprecedented flexibility and scalability. However, alongside this potential comes a new complexity: keeping cloud costs under control while ensuring that cloud investments align with business objectives.

The discipline of FinOps, or Cloud Financial Operations, has emerged as the critical bridge between technology and finance, uniting IT, engineering, finance, and business teams under a common goal—optimizing cloud costs without sacrificing performance or innovation. Azure FinOps is more than just a framework for tracking expenses; it is a methodology that emphasizes real-time visibility, collaboration, and strategic decision-making to maximize the value derived from cloud investments.

I am delighted to introduce this book on Azure FinOps, a comprehensive guide that brings clarity and structure to a challenging, often misunderstood aspect of cloud computing. The author has successfully navigated the intricate landscape of Azure cost management, providing readers with practical insights, strategies, and tools to tackle cost inefficiencies head-on.

The future of cloud computing is not just about technical advancements—it is about mastering the balance between innovation and financial discipline. This book serves as an essential guide for any organization looking to navigate the complexities of cloud cost management and governance while fostering a collaborative culture of financial efficiency.

I strongly believe that readers of this book will come away with a profound understanding of how to optimize cloud costs in Microsoft Azure and, more importantly, how to build a FinOps culture that will serve as the foundation for long-term success in the cloud.

– Swamy Kiran
Senior IT Officer, Data & Information Management
ITS Treasury Portfolio
World Bank Group, United States of America

About the Authors

- **Parag Bhardwaj** is the principal cloud solutions architect for a global airline's cloud and engineering platform. He specializes in deploying optimized, cost-efficient cloud solutions and implementing FinOps practices. Proficient in infrastructure technologies, including Windows/Linux IaaS, security, and networking, Parag ensures sound financial management to maximize business value across various cloud services using DevOps tools like App Services, Containers, and Kubernetes.

  Parag architects collaborate with business development to create complex end-to-end enterprise systems on Azure. His expertise includes Azure Landing Zones, Architectural Design Sessions (ADCs), and setting up Azure Policy configurations for security and compliance.

  Parag is a Cloud Center of Excellence (CCoE) member and influences his organization's cloud transformation. We benefit from his experience with cloud governance and cost optimization to enable better cloud integration into our workflow while controlling costs. Parag also provides helpful speaker sessions on optimizing resources in massive cloud landscapes at FinOps X. Parag also offered great speaker sessions on traditions of how to manage resources at scale in massive cloud landscapes.

- **Arun Kumar Samayam** is a renowned technology architect and author with a focus on cost optimization. As a Principal Cloud Solutions Architect for a leading global airline, he excels in creating efficient, cost-effective cloud solutions and managing databases.

  Arun's career started as a Product Technical Leader for Enterprise Database Services, where he mastered various platforms, including Oracle, MySQL, PostgreSQL, SQL Server, and MongoDB, achieving significant cost savings through performance optimization.

  In his current role with the Cloud Center of Excellence (CCoE), Arun guides cloud transformation initiatives, leveraging his expertise in cloud governance and cost control.

He is a recognized industry expert, having presented at events like Oracle OpenWorld and the MySQL Heatwave Summit. As an author, Arun co-wrote "Mastering MySQL Administration" and reviewed technical content for the Oracle Cloud Infrastructure (OCI) GoldenGate book.

Arun Kumar Samayam remains a leading figure in technology, committed to advancing cost-effective practices and sharing his knowledge with others.

About the Reviewers

❖ **Y V Ravi Kumar** is an Oracle Certified Master (OCM) with 26+ years of experience in the banking, financial services, and insurance (BFSI) verticals. He is an Oracle Certified Professional (OCP) from Oracle 8i to 19c and also an Oracle Certified Expert (OCE) in Oracle GoldenGate, RAC, Performance Tuning, Oracle Cloud Infrastructure, Terraform, and Oracle Engineered Systems (Exadata, ZDLRA, and ODA), as well as Oracle Security and Maximum Availability Architecture (MAA) certified.

He has published over 100+ Oracle technology articles, including on Oracle Technology Network (OTN), OraWorld Magazine, UKOUG, Otech Magazine, and Redgate. He has spoken four times at Oracle Open / Cloud World (OOW), San Francisco / Las Vegas, United States. He has designed, architected, and implemented the core banking system (CBS) database for the central banks of two countries – India and Mahé, Seychelles. He completed Multi-Cloud Certified Architect in Oracle Cloud Infrastructure Architect Professional, AWS Certified Solutions Architect Professional, and Google Cloud Architect Professional (GCP).

He has co-authored the book, "Oracle GoldenGate with Microservices" with BPB Publications and also co-authored several books for other publications. He has also participated in the three technical reviews for BPB Publications' books, 'Oracle 19c AutoUpgrades Best Practices', "End-to-End Observability with Grafana" and "Maximum Availability Architecture (MAA) with Oracle GoldenGate MicroServices in HUB Architecture" and also participated as the technical reviewer for several books for other publications. He has received the EB-1A Extraordinary Ability green card, colloquially known as the 'Einstein visa' from the United States of America (USA). He is also a Senior Member of IEEE (Advancing Technology for Humanity), showcasing his commitment to advancing technology for the betterment of society.

Ravi Kumar is Certified in "FinOps Certified Practitioner" and "Snowflake Pro".

❖ **Velu Natarajan** is a seasoned professional with over 18 years of expertise in delivering scalable analytics solutions across diverse platforms. His passion lies in the relentless pursuit of modernizing data platforms, ensuring they are not only efficient and high-performing but also scalable and durable to meet the evolving needs of the industry. As an industry trailblazer, Velu has been an early advocate for Cloud FinOps frameworks, leveraging them to both elevate business success and achieve notable cost savings.

As a leader in the Database Cloud Center of Excellence (CCoE), Velu plays a crucial role in driving his organization's cloud transformation journey. His deep knowledge of database practices enables him to lead initiatives that ensure seamless migrations, business continuity, and operational efficiency.

Velu's pioneering work with Cloud FinOps frameworks has led to significant business success and cost savings. His application of FinOps framework to control cost to cloud-based data warehouses was recognized with the Discover President Award in 2024. Through effective collaboration with cross-functional teams to understand database usage, optimize performance, manage costs, and establish best practices, Velu developed self-service tools and processes to optimize usage, identified potential issues, and created cost management plans. Additionally, Velu has shared his expertise at prestigious events such as Snowflake Summit 2024, where he discussed strategies for optimizing performance and cost on Snowflake, maximizing business value, reducing budget risk, and improving the user experience with the data tool.

Certified as a "FinOps Certified Practitioner," "Snowflake Pro," and "Snowflake Architect," Velu is renowned for his insights into database products and his commitment to excellence. Outside of work, he enjoys playing soccer and watching epic movies.

Acknowledgements

- To my parents **RS Sharma** and **Daya Sharma** who are always there for me. Thanks from the bottom of my heart to all those who supported and believed in me, starting with my family. I could never truly thank everyone who has contributed to this book.

  To my soulmate and wife, **Anshu Bhardwaj**, our daughter, **Nehal Bhardwaj**, and our son, **Pranshu Bhardwaj**, whose unwavering love and constant support have always been my source of strength. Your belief in me has motivated me to strive for excellence in all I do.

  I would like to thank **Y V Ravi Kumar** and **Velu Natarajan** for their valuable guidance on this project. Their expertise and encouragement are important to the work presented here. I appreciate their commitments and the time they spent helping us ensure that our research is of superior quality.

  It is also a privilege to have **Arun Samayam** as a co-author of this book. His knowledge and collaborative nature have been crucial in developing the content and guiding the direction of our project.

  Many individuals and organizations supported this study. We are forever grateful to the dedicated team at ***BPB Publications*** for their continuous motivation and support while publishing the research.

  I appreciate everyone for playing an important role in this amazing journey.

  — Parag Bhardwaj

- I am forever grateful for the love and support of those who have shaped my life's journey and made this book possible.

  To my parents, **Ram Kumar** and **Lakshmi Sarada**, for nurturing me with unwavering love, kindness, and the freedom to pursue my passions. Your encouragement and support have fueled my determination to chase my dreams.

  To my beloved wife, **Ramya**, and our daughter, **Iraa**, whose boundless love, and unwavering support have been the bedrock of strength in my life. Your belief in me has propelled me forward, urging me to strive for excellence in all endeavors.

  To my mentor, **Y V Ravi Kumar**, for recognizing my potential, guiding me through challenges and opening doors to new opportunities. Your wisdom, dedication, and noble pursuit of knowledge have been a constant source of inspiration.

To my co-author, **Parag Bharadwaj**, and technical reviewers **Y V Ravi Kumar** and **Velu Natarajan**, your technical knowledge, dedication, collaboration, and unwavering support throughout the writing process have enriched this book and made it truly special.

To my publisher, ***BPB Publications*** and team - thank you for entrusting me with the opportunity to share our experience on FinOps. With your support, this book will serve as a guide for many aspiring FinOps enthusiasts and inspire and motivate them, making a significant impact in their FinOps journey.

Thank you all for being an integral part of this incredible journey.

— Arun Kumar Samayam

Preface

This book on Azure FinOps explores into strategies and best practices for optimizing your cloud costs within the technical framework of Microsoft Azure. It explores financial operations in cloud environments with an in-depth look at cost management, monitoring, and governance in Azure. Key aspects of FinOps, such as tagging, budgeting, and alert configuration, are covered to help readers implement effective cost controls and maximize their cloud investments.

This Book includes practical insights on cost optimization through real-world examples and industry best practices, guiding you through Azure FinOps Essentials. It discusses advanced principles like right-sizing, RI coverage, and serverless optimization, facilitating comparisons of different architectures. The program also addresses governance and compliance by guiding and enforcing policies and controls to ensure financial accountability and adherence to guidelines.

The book comprises **12 chapters**, beginning with the basics of cost management in Azure and concluding with sophisticated, real-world FinOps methods explained through detailed case studies. You will gain a comprehensive understanding of developing a FinOps culture, creating dashboards for financial visibility, and identifying future trends in Azure FinOps. Individual chapters provide in-depth guidance on running cloud operations efficiently with CCoE and optimizing Azure spending. The chapters are outlined as follows:

Chapter 1: Introduction to Azure FinOps- In this chapter, readers will learn that FinOps is a financial operations practice essential for modern cloud environments, bridging the gap between finance and tech teams to manage cloud costs effectively. Implementing FinOps in Azure environments offers benefits like enhanced cost visibility, optimized resource utilization, and better financial collaboration across teams. Azure FinOps aids in reducing cloud expenses by providing real-time cost monitoring and aligning business insights to optimize resources efficiently.

Chapter 2: Azure Fundamentals for FinOps- In this chapter, you will learn about Azure services like virtual machines, databases, and storage are crucial components in FinOps practices for managing costs. Organizing these resources into resource groups and using tagging techniques helps streamline cost management, providing better insights and control over spending. Azure Cost Management further supports this by enabling cost tracking, setting budgets, and identifying savings opportunities through its various phases.

Chapter 3: Azure Cost Management and Billing- This Chapter explains how to access the Azure Cost Management and Billing portal to learn about the different ways of navigating financial information, viewing invoices, and accessing financial savings. How to optimize Cost Analysis to get more details on spending ways, create budgets, and monitor them to avoid overruns. Understand the concepts behind the best ways to create and manage Azure subscriptions, considering proper resource segregation and the need to monitor financial data. Learn how to set up alerts and financial notifications to inform users of financial irregularities and flag them whenever budgets are about to be overrun.

Chapter 4: Cost Optimization Strategies- In this chapter, you will learn about the Key considerations for right-sizing resources such as VMs to meet demand and prevent over-provisioning, which results in waste costs. Offers pricing discounts via Azure Reserved Instances and Same Region Capacity Price Offers for well-understood workloads, enabling meaningful savings opportunities over time. This section highlights the cost-saving advantage of utilizing existing on-premises licenses for Windows and SQL on Microsoft Azure through the Azure Hybrid Benefit. A lower-cost approach using unused capacity for non-critical workloads. These options help save money but may experience interruptions.

Chapter 5: Azure Monitoring- This chapter will provide an introduction to using Azure Monitor tools to track the performance of your applications and resource metrics, enabling early detection of inefficiencies for real-time cost optimization. Introduction to the Compelling and Cloud Performance & Cost Management Tools. These tools enable users to analyze data across resources and create rich, interactive reports. This part instructs users on building personalized dashboards for cost oversight, presenting crucial cost metrics in a transparent and accessible layout. This section discusses the various reporting capabilities within Cost Explorer that business units will find particularly useful for showcasing costs with great visuals.

Chapter 6: Cost Allocation and Chargebacks- Implementing and Managing resource tagging to achieve detailed cost allocation by mapping it to departments, teams, or projects. Validates how to leverage cost management APIs and automation services to control expenses, gain insights into all spending, and prevent unexpected charges on cloud resources. Guide on establishing RBAC to regulate permissions regarding cost management, ensuring security and compliance.

Chapter 7: Governance and Compliance- This chapter explains how to utilize Azure Policy to implement cost control strategies, ensuring all resources adhere to the organization's cost optimization guidelines.

This section focuses on leveraging ACS improvements to manage costs effectively while maintaining security during regular operations. This chapter explains how FinOps practices need to meet compliance requirements, such as GDPR laws or industry-related rulings. Considerations for managing costs and maintaining data protection/privacy while remaining compliant with regulatory Standards.

Chapter 8: Advanced Azure FinOps Techniques- This chapter explores how IaC tools like ARM templates and Terraform enable cost savings by automating optimal resource provisioning and usage. It describes how Azure functions using Python can adjust resource allocation based on usage patterns to help optimize costs. Understand serverless architecture with no constant costs, charging users only for actual usage, requiring no fixed compute resources, resulting in highly scalable and efficient operations. Integrate FinOps with DevOps methodologies to ensure that cost optimization remains a focal point throughout the entire software development lifecycle.

Chapter 9: Azure FinOps Best Practices- This chapter outlines existing cloud cost optimization frameworks at a high level, helping teams to align their strategies with established best practices for managing expenses. This chapter outlines how to establish an environment where cloud spending is controlled by the teams utilizing the resources. This highlights the cultural shift needed for finance, engineering, and business units to work together towards a shared FinOps objective.

Chapter 10: Azure Case Studies and Real-world Examples- A detailed case study of how a web application was optimized for cost, including techniques and results. Discuss how a large enterprise implemented effective cost allocation and chargeback models to enhance financial accountability. Showcases how DevOps and FinOps teams can collaborate effectively to optimize operational efficiency and costs.

Chapter 11: Future Trends and Innovations in Azure FinOps- This chapter talks about how managing cloud costs is changing, including the role of AI and machine learning in making things cheaper and more efficient. It discusses the specific challenges and opportunities related to optimizing costs for AI and machine learning workloads in Azure environments.

Chapter 12: Final Thoughts and Next Steps- Summarizes the key takeaways from the book and reinforces the importance of adopting a FinOps mindset. It encourages continuous learning and iteration in optimizing cloud costs and highlights how adopting FinOps practices can lead to long-term financial and operational success in cloud environments.

Code Bundle and Coloured Images

Please follow the link to download the
Code Bundle and the ***Coloured Images*** of the book:

https://rebrand.ly/m1ekl0i

The code bundle for the book is also hosted on GitHub at
https://github.com/bpbpublications/Azure-FinOps-Essentials.
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Chapter 1
Introduction to Azure FinOps

Introduction

FinOps is a domain for cloud financial and operation management. It enables organizations to extract the highest possible business value by encouraging collaboration between engineering, finance, IT, and business teams. The goal is to effectively leverage the cloud platform's flexible and scalable cost structure.

FinOps is the practice that brings a finance accountability culture to the team. FinOps recommends a variable spend model of the cloud by enabling distributed engineering and business teams. Also, the business team decides their cloud architecture and investment decisions by trading cost, speed, and quality.

Cloud spending can be driven through more customer base growth and revenue, enabling product and feature releases. It is all about removing the huddles, empowering the engineering team to deliver new features, apps, and migrations faster, and enabling a cross-functional conversation about where to invest and when.

In simpler terms, FinOps helps companies make the most out of cloud services like *Azure* by bringing different teams together. This collaboration allows them to optimize costs and maximize the benefits of using cloud resources. By working together, engineering teams can make informed decisions about resource usage. Finance teams can allocate costs efficiently, IT teams can ensure compliance, and business teams can align cloud spending with goals.

The following figure outlines the FinOps framework developed to optimize an organization's financial processes. It highlights components of the FinOps lifecycle, including cost analysis, resource allocation, optimization, and ongoing monitoring. This framework enables businesses to manage cloud and IT expenses efficiently, control costs, and make informed financial decisions.

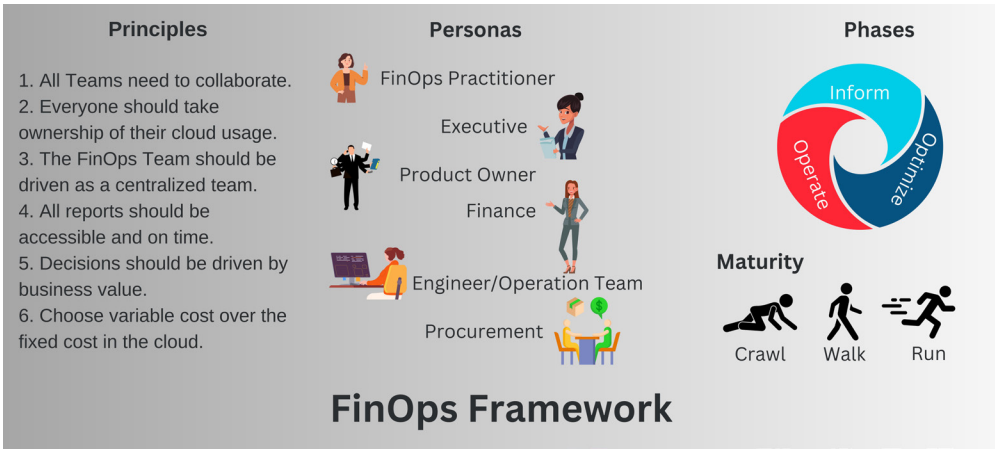

***Figure 1.1**: FinOps framework*

Structure

In this chapter, we will learn the following topics:

- Key points for the Azure cloud
- Understanding FinOps
- Benefits of Azure FinOps
- Azure FinOps manage cloud cost

Objectives

The scope's objective is to educate the reader about the principles and critical points linked to FinOps and how it is applied in cloud management, especially in Azure. After going through this chapter, the reader will learn the principles of FinOps, the benefits of implementing FinOps, understanding FinOps culture, cross-functional collaboration, FinOps framework, performance monitoring and optimization, adaptability, and continuous learning. In summary, this content aims to educate the reader about the principles and practices of FinOps and how they can be applied in the context of cloud management, including Azure. The critical points for Azure relate to specific Azure features and services that can support FinOps practices.

Key points for the Azure cloud

FinOps is built upon three fundamental principles:

- Accountability is one of the crucial principles where we need to encourage a culture where teams take ownership of cloud costs and understand the impact of their decisions on finances.
- Transparency encourages the visibility of cloud costs and usage data, enabling teams to monitor and analyze spending patterns.
- Optimize cloud resources and costs by impacting the right-sizing, reserved instances, and automation strategies.

Implementing FinOps practices can bring several benefits to organizations, including:

- Cost optimization analyzes usage patterns, identifies inefficiencies, and implements cost-saving measures; the company can optimize its cloud spend and reduce unrequired expenses.
- Collaboration and alignment encourage cross-functional cooperation between engineering, finance, IT, and business teams, fostering alignment and enabling better decision-making.
- Increased business agility variable cost model of the cloud allows organizations to scale resources based on demand, providing flexibility and agility to meet changing business needs.

Understanding FinOps

FinOps is a culture that involves progressive discipline culture in cloud financial management, which facilitates organizations in achieving business value through collaboration among engineering, finance, IT, and business teams. FinOps first principle is that every couple needs to collaborate.

FinOps = Finance + DevOps

FinOps is a combination words of 'Finance' and '*DevOps*'. As the name shows, this is based on communications and collaboration between multiple teams, such as Business and engineering.

FinOps culture

The importance of FinOps lies in its culture. It represents a mindset that encourages teams to proactively control their cloud expenditures, enabling a sense of ownership among all stakeholders. This collective responsibility is complemented by a centralized best-practices group, providing guidance and support to optimize cloud usage.

Cross-functional

Coordinated teams comprising various fields, such as engineering, finance, product, and more, join forces to facilitate efficient product development. This collective effort expedites the delivery process and enhances financial oversight and predictability.

FinOps framework

The FinOps framework is a methodical approach to driving cloud costs within an organization. It consists of several vital components and practices to optimize cloud spending while preserving functional efficiency.

Here is a description of the FinOps framework:

- FinOps involves setting budgets and creating projections for cloud spending. This helps organizations plan and allocate resources effectively, allowing better financial management and predictability. Budgeting and forecasting also encourage proactive cost management and support teams to identify and address variations in the intended spending.
- The FinOps framework promotes the adoption of diverse cost optimization techniques. This may include leveraging spot models or low-cost regions, optimizing storage solutions, implementing caching tools, and exploring alternative pricing models cloud providers offer. Organizations are encouraged to identify and implement the most suitable approaches based on their needs and workloads.
- A vital element of the FinOps framework is educating and training teams on cloud cost management best practices. This includes providing resources, teaching workshops, and promoting a learning culture where individuals can enhance their understanding of cloud economics, cost optimization methods, and the tools available to help FinOps practices.
- Organizations establish governance and policy frameworks to provide the valuable performance of FinOps practices. These frameworks describe procedures, benchmarks, and strategies for cloud usage, cost management, and decision-making. They help implement accountability, support compliance, and align FinOps practices with organizational objectives.
- FinOps enables collaboration among diverse stakeholders, including engineering teams, finance teams, product managers, and executives. Organizations can gain various outlooks, align preferences, and drive collaborative ownership of cloud costs by applying all appropriate details in cost management discussions and decision-making processes.

In addition to cost management, the FinOps framework also focuses on performance monitoring and optimization. It enables organizations to follow and analyze cloud implementation metrics, identify jams, and optimize resource configurations to improve overall system efficiency and cost-effectiveness.

The FinOps framework acknowledges that cloud environments and business requirements are involved. It highlights the significance of constant learning, transformation, and growth of FinOps practices to remain aligned with changing technology trends, organizational needs, and evolving cloud provider offerings.

By executing the FinOps framework, organizations can effectively manage their cloud costs, achieve financial visibility, optimize resource utilization, and foster a culture of accountability and collaboration. This framework provides a structured approach to aligning financial and operational objectives, enabling organizations to make informed decisions and drive cost-efficiency in their cloud environments.

FinOps principles

The FinOps framework is created on core principles that guide organizations in effectively handling their cloud costs. These principles provide a foundation for implementing and driving successful FinOps practices:

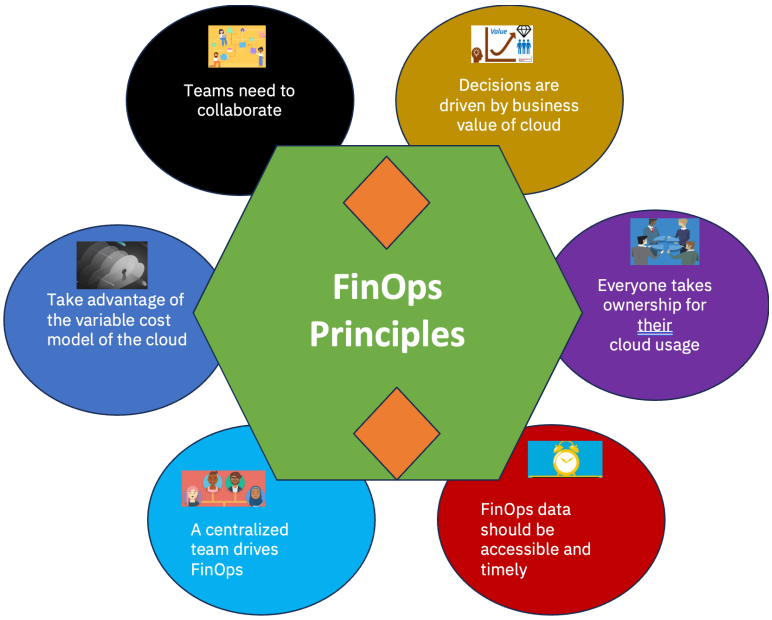

Figure 1.2: *FinOps principles*

The principle of accountability highlights the need for individuals and teams to take ownership of their cloud usage and associated costs. It promotes a culture of responsibility, where everyone involved understands the impact of their actions on the financial aspects of cloud operations. Accountability ensures that cost optimization is a shared responsibility across the organization.

Collaboration is an essential principle of FinOps, highlighting the importance of cross-functional teamwork. It enables collaboration among engineering, finance, and operations