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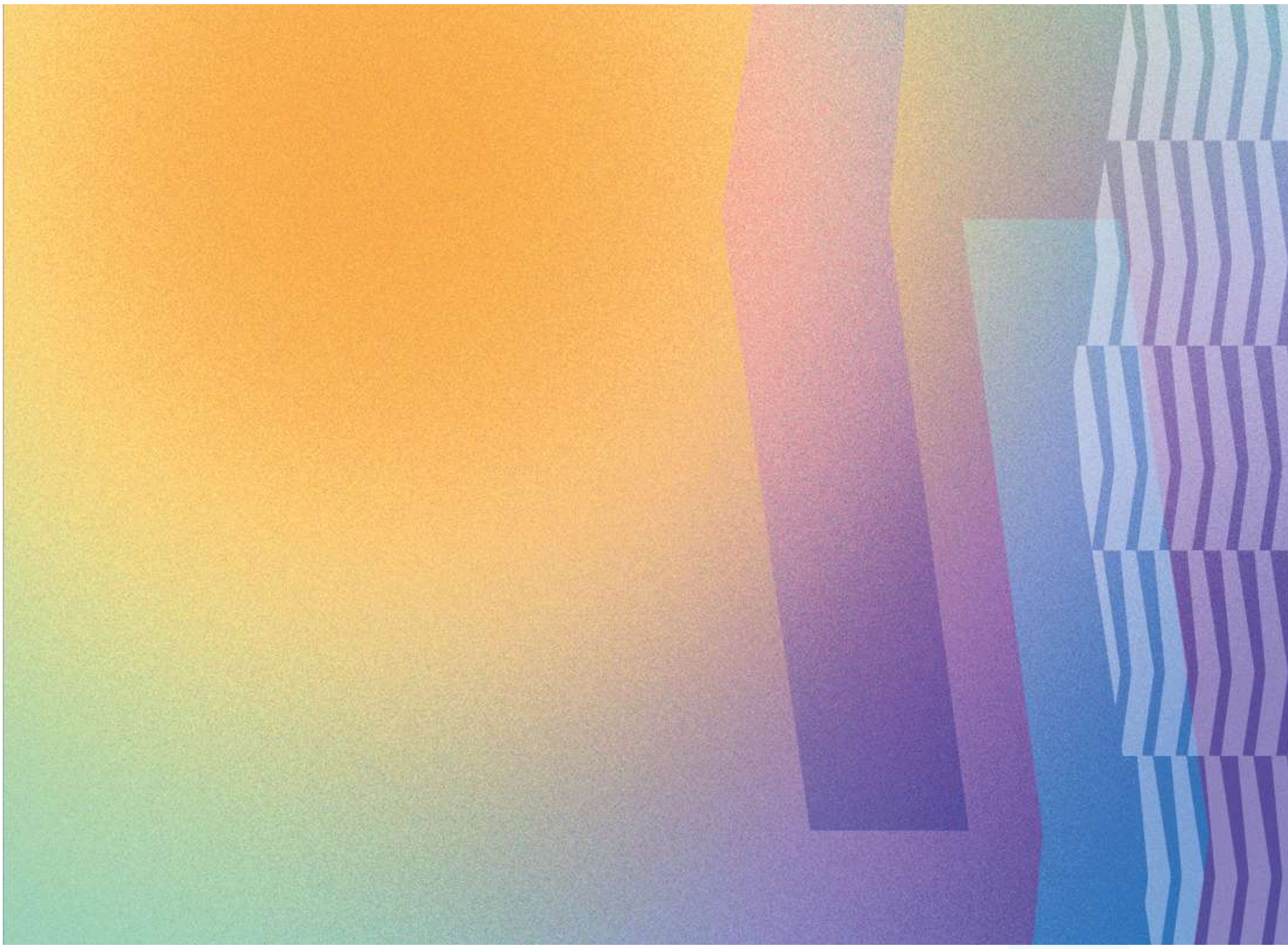

EDGE FINOPS

A Guide to Cost Management for Edge Cloud Systems

Imprint

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Executive Summary

In the context of data-driven applications such as machine condition monitoring or robot-assisted surgery, the importance of systems that rely on both decentralized edge computing resources and centralized cloud computing resources is increasing. These so-called edge cloud systems can contribute significantly to the optimization of processes, the scaling of applications and the efficient use of IT resources. They therefore fundamentally enable companies to tap into new added value or increase existing value. In order to be able to weigh up whether this applies in individual cases, companies may have to make comprehensive cost-benefit considerations. This is often a challenge for them, as edge cloud systems usually significantly increase the complexity of cost management. In addition, practice-oriented process models and tools that facilitate the analysis of the cost structure of edge cloud systems are still lacking.

The aim of this guide is to close the gap described above and enable companies to establish efficient and sustainable cost management for their edge cloud systems at an early stage. The focus here is on expanding the FinOps practice already established in the area of cloud financial management to "Edge FinOps" - i.e. a practice that takes into account both cloud and edge financial management aspects. The guide offers all stakeholders involved in the cost management of edge cloud systems (decision-makers, research and development teams, IT and finance teams) a first quick introduction to the topic of Edge FinOps. It also provides two practical tools for implementing Edge FinOps: a checklist for analyzing the cost structure of edge cloud systems and a four-step process model for applying Edge FinOps in practice with instructions for action.

The cost structure analysis checklist covers the five main cost categories of edge cloud systems: Setup costs, operating costs, performance and efficiency factors, security and compliance costs, and cost risks. For each of these cost categories, it compares the potentially relevant cloud and edge cost factors to be considered - a total of 17 cloud and 13 edge cost factors. Through its interpretation, it supports companies in creating financial transparency and systematically analyzing and managing costs.

The process model for the application of Edge FinOps in practice is divided into four steps: planning and setting objectives, preparation, implementation and accompanying measures. A total of 17 specific items are defined for the steps within the model: Target definition, cost analysis, budgeting, allocation of costs, training and sensitization, technology integration, monitoring the use of resources, monitoring and reporting, optimization of resources, contract management, risk management, and regular review and adjustment. Each of these items is underpinned by clearly formulated instructions in the form of to-dos. This structure is designed to help companies approach the successful application of Edge FinOps step by step, without overlooking any essential aspects.

The creation of both tools involved validation and consolidation with experts from early adopter projects from the technology program Edge Data Economy of the Federal Ministry for Economic Affairs and Climate Action (BMWK).

Contents

1 Introduction

In today's highly digitalized and data-driven business and working world, technologies that help to optimize processes, scale applications or make efficient use of IT resources are playing an increasingly important role. These include, in particular, technologies from the fields of cloud computing and edge computing.

In simple terms, *cloud computing* stands for[1] the paradigm of Internet-based access to computing resources that are provided centrally by large data centers (including hardware such as servers, networks and storage devices as well as software for managing customer data, for example). This model enables companies to outsource computing resources and adapt or expand them flexibly as required. Necessary resources no longer necessarily have to be procured and maintained in-house, but can be subscribed to as part of the use of various typical service models (including Infrastructure-as-a-Service, Platform-as-a-Service, Software-as-a-Service). In addition to simple scalability and rapid implementation, companies benefit from further advantages such as cost savings through usage-based payment for services, simplified maintenance and support and the exploitation of optimization potential at process level

In simple terms, *edge computing* stands for the paradigm of providing and using distributed, decentralized computing resources at the edge of a network[2] - i.e. the level of end devices connected to the network, such as systems, machines, robots or tablets. The resources are located close to the location where the computing requirements arise (e.g., processing of data in the immediate vicinity of the data source or direct processing of sensor data on the sensor itself). By reducing the distance between the location of data generation and the location of data processing, this model contributes to shorter delay and latency times and enables near-real-time analyses and reactions. It also offers companies advantages in terms of strengthening their data sovereignty, the efficiency of their data management and compliance with data security guidelines (see Jahnke and Niehoff 2024 for a comprehensive overview).

Cloud computing and edge computing are not usually an either/or decision for companies. Many modern application scenarios require a combination of functionalities from both paradigms for reasons of effectiveness and efficiency. One example is the predictive maintenance of machines in production plants. Edge computing functionalities enable real-time decision-making and, if necessary, trigger immediate action or intervention. The intelligent models on which the decision-making process is based, on the other hand, are trained using cloud-based computing power and storage capacities. The term *edge cloud continuum* has become established for such combinations. The corresponding components of a company's IT architecture are usually referred to as edge cloud systems. There are various options for the specific implementation of such systems, which can be selected depending on the use case and deployment scenario. For example, edge computing resources can be provided at various points along the continuum, including in devices

[1] ISO/IEC 22123-1 (section 3.1.1) defines cloud computing as follows: Paradigm of network-based access to a scalable and elastic reservoir of shareable physical or virtual resources according to the self-service principle and on-demand administration. In this context, resources include servers, operating systems, networks, software, applications and storage devices.

[2] According to ISO/IEC TR 23188:2020, edge computing refers to the provision of computing capacity and storage close to the edge between the digital and physical worlds.

(on-device edge), in a local environment such as a factory or office building (on-premise edge), in a zone such as an industrial area (far edge) and in regional data centers or nodes of telecommunications providers (near edge) (3DS Outscale 2021; Jahnke and Niehoff 2024).

In order to clarify whether the introduction and operation of an edge cloud system will pay off in the long term, companies must weigh up whether the benefits of the action justify the expense. The design and layout of the system may also depend on cost-benefit considerations. In addition, companies must develop an understanding of the cost structures of their system in order to be able to control and optimize their centralized and decentralized resources in a targeted manner, e.g., in response to changing requirements. All of these tasks pose a major business challenge for companies, as edge cloud systems not only significantly increase the technical and organizational complexity, but also the complexity of cost management in particular. To date, there are no guiding process models that facilitate cost management and integrate both cloud and edge cost aspects.

The aim of this guide is to close this gap and support companies in establishing effective and sustainable cost management for their edge cloud systems. Specifically, it is intended to a) enable companies to manage and optimize both centralized and decentralized resources in a targeted manner through a transparent analysis of cost structures along the edge cloud continuum; b) to facilitate decision-making with regard to resource utilization; and c) to enable them to control costs in an agile and flexible manner. The guideline expands the interdisciplinary FinOps management practice already established in the field of cloud computing with edge computing aspects. In the remainder of this study, this approach is referred to as "Edge FinOps".

The basic principles of Edge FinOps practice are presented in Section 2. As a practical aid for the implementation of Edge FinOps, a structured overview of relevant cost categories of edge cloud systems was developed in the form of a checklist (Section 3) and a process model for the application of Edge FinOps in practice was formulated (Section 4). In addition to literature research, expert interviews with early adopter projects from the Edge Data Economy Technology Program funded by the German Federal Ministry for Economic Affairs and Climate Action (BMWK) were also included in the creation of this model. The cost categories and process model can be flexibly adapted to the different characteristics of individual edge cloud systems.

The guide is aimed at all company stakeholders involved in efficiently managing and optimizing the costs of edge cloud systems, including research and development teams, decision-makers, IT, finance and project teams. It is intended to serve as a first quick introduction to the topic of Edge FinOps and support them in creating financial transparency, systematically analyzing, monitoring and optimizing costs and ensuring the efficient use of computing resources.

The collaboration with the experts from the early adopter projects of the technology program Edge Data Economy has made a significant contribution to integrating practical findings in the area of cost management into the guide and comprehensively addressing the specific requirements of edge cloud systems. The team of authors would therefore like to take this opportunity to thank all the interviewees once again for their valuable insights, their time and their support in the creation of this guide:

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The responsibility for the content of this guide lies exclusively with the authors.

The guide was produced as part of the coordination and support action (Begleitforschung) for the technology program Edge Data Economy of the Federal Ministry for Economic Affairs and Climate Action (BMWK). The program comprises ten projects that are developing new forms of edge cloud systems for important sectors of the German economy.

2 Basic Principles

In this guide, the term "Edge FinOps" refers to a stakeholder-based cost management approach for edge cloud systems. The approach is based on the established cloud financial management practice FinOps and transfers it to edge financial management as an extension.

FinOps stands for the combination of financial management and DevOps practices or the collaboration of business and development teams. It represents an interdisciplinary management practice that has emerged in the wake of the spread of cloud computing offerings to meet new cost management requirements. As a result of cloud computing, for example, variable, usage-based costs for cloud computing resources are replacing the previously fixed costs for a computing infrastructure. In addition, purchasing is often no longer carried out centrally by a higher-level authority, but by different groups or individuals within an organization. Overall, these changes make effective cost management more difficult, especially with regard to optimizing cloud costs and ensuring the efficient use of cloud resources. With FinOps, an operational framework has been developed for organizations to solve these problems (Bryant 2022; Sambaturu 2024; Storment and Fuller 2019). At the center of this operational framework is an iterative procedure model for the application of FinOps and a list of basic principles of FinOps work culture[3] . Both contents can be transferred to edge financial management. By adapting the original literature on FinOps accordingly, the team of authors has formulated Edge FinOps content that takes into account both cloud and edge aspects. This Edge FinOps content is presented below. As the term Edge FinOps is being introduced for the first time with this guide and accordingly no specific literature exists yet, the literature references refer to the original articles on FinOps.

As a cost management approach, Edge FinOps defines the way in which teams in companies manage their edge or cloud costs. Each individual takes responsibility for their edge or cloud usage, but is supported by a central best practices group (Sambaturu 2024; FinOps Foundation 2025). Edge FinOps enables timely data-driven decision making and aims for interdisciplinary financial accountability through collaborative technical, finance and business teams (FinOps Foundation 2025; Sambaturu 2024; Storment and Fuller 2019) . The key difference between Edge FinOps and traditional approaches such as Total Cost-of-Ownership (TCO) analysis is that Edge FinOps promotes a continuous, collaborative process that involves all stakeholders or departments involved in the financial planning and optimization of edge cloud systems in real time. In contrast, a TCO analysis is usually a one-off, isolated assessment of the total cost of a project.

The Edge FinOps process roughly divided into three iterative phases (Sambaturu 2024; Storment and Fuller 2019). In the first phase (inform), transparency is created about the edge or cloud costs, budgets are defined and forecasts are created. The second phase is optimization. It focuses on reducing costs through resource optimization, automation, the use of discounts if necessary, etc. in order to avoid unnecessary expenditure and at the same time provide sufficient computing resources. In the third phase, execution, continuous evaluation takes place. Here, us-

[3] In addition to the phase model and the principles, the FinOps framework also includes other modules (including personas, maturity, domains and skills; see https://www.finops.org/framework/).

age figures and costs are constantly evaluated, processes and guidelines are defined and improved in order to continuously adapt and optimize the use and efficiency of cloud and edge resources.

The implementation of Edge FinOps requires a change in corporate culture, as it is important that all involved teams work together and develop a common understanding of cost optimization (Bryant 2022; Storment and Fuller 2019). This collaboration and focus on edge/cloud costs requires to reconsider company-wide practices and involves not only technical but also cultural changes. Therefore, Edge FinOps is not just a collection of practices and processes, but also a long-term, culture-changing practice that must be ingrained throughout the organization. When implementing Edge FinOps, the following six principles should therefore be observed (based on FinOps Foundation 2025; IT-Business 2024; Sambaturu 2024; Storment and Fuller 2019):

1. *Teams must work together:* All relevant departments must work together in real time to continuously optimize the efficiency and benefits of cloud and edge resources.
2. *Decisions are driven by the business benefits of cloud/edge usage:* Decisions are made based on the business benefits of cloud and edge usage, taking into account the economic impact, business objectives and the balance between cost, latency, availability and speed.
3. *Responsibility for the use of edge and cloud resources:* Every person who has an influence on the costs or efficiency of the overall system is responsible for the efficient use and optimization of resources in the edge cloud continuum. This supports decentralized decision-making in dynamic environments.
4. *Real-time access to Edge FinOps data:* Cost and utilization data must be accessible and transparent in real time to enable quick, informed decisions and drive continuous improvement.
5. *Edge FinOps is driven by a centralized team:* A central coordination team is responsible for implementing and promoting best practices and processes, while responsibility for implementation remains decentralized.
6. *Advantages of the variable cloud cost model and the low-latency edge are utilized:* The possibilities of resource cost optimization of edge cloud systems are actively used, taking into account requirements such as flexibility or reliability of the system. The variable cost model for cloud resources is used in order to be able to act flexibly and cost-efficiently. At the same time, the advantages of edge resources are utilized (e.g. low latency).

3 Cost Structure of Edge Cloud Systems

This chapter presents the five main cost categories of edge cloud systems and their respective associated edge and cloud cost factors that may need to be considered in the context of Edge FinOps: Setup costs, operating costs, performance and efficiency factors, security and compliance costs, and cost risks.

For a better overview, the contents are summarized in the following Table 1 in the form of a structured checklist. This checklist can be used as a practical tool to identify the cost factors relevant to your own edge cloud system and to track or ensure that they are taken into account. For reasons of simplicity and practicability, the checklist only maps the edge cloud continuum based on its two endpoints, the edge and the cloud. It is therefore an ideal-typical representation that does not explicitly differentiate between on-device edge, on-premise edge, far-edge and near-edge components with regard to edge cost factors. Any *ex ante* planning costs for edge cloud systems are not included in the checklist as they are not relevant to the decision (e.g. obtaining information, carrying out analyses). The checklist was created based on literature research and validated, deepened and modified in the course of expert interviews with early adopter projects within the the technology program Edge Data Economy of the BMWK.

Cost category	Edge cost factors	relevant	considered	Cloud cost factors	relevant	considered
One-off costs (setup costs)	– Acquisition costs for edge devices (hardware, server, IoT)	☐	☐	– Setup fees	☐	☐
	– Setup, installation and configuration on site, incl. API integration costs and specific data preparation and formatting costs where applicable – Costs of setting up a local network and other infrastructure	☐	☐	– Installation costs for software in the cloud	☐	☐
	– One-off license costs or costs of in-house development/adaptations for middleware and/or operating system	☐	☐		☐	☐
	– One-off license costs or costs of in-house development/customization for specific applications that process data supplied by Edge/Cloud	☐	☐	– One-off license costs or costs of in-house development/customization for specific applications that process data supplied by Edge/Cloud	☐	☐
	– Training costs/onboarding for users	☐	☐	– Training costs/onboarding for users	☐	☐
	– Necessary induction and training costs for the IT/OT team	☐	☐		☐	☐
Operating costs	– Costs for maintenance, updates and on-site support (personnel costs and, if applicable, hardware costs/repairs)	☐	☐	– Ongoing fees, details on the cloud provider's tariff structure – Costs for software maintenance, updates	☐	☐
	– Costs for the maintenance of the local network infrastructure	☐	☐	– Data transmission costs/costs of the necessary Internet bandwidth etc.	☐	☐
	– Energy costs (power supply and cooling of devices	☐	☐		☐	☐
	– Ongoing license costs (subscription models) for specific software that processes the data supplied by Edge/Cloud	☐	☐	– Ongoing license costs (subscription models) for specific software that processes the data supplied by Edge/Cloud	☐	☐
Performance and efficiency factors	– Potential delay due to limited computing capacity	☐	☐	– Productivity losses due to latency times and possible bandwidth problems	☐	☐

Security and compliance costs	– Costs for on-site security measures, including physical security, cybersecurity and compliance measures	☐	☐	– Costs for security solutions such as firewalls, encryption and compliance measures	☐	☐
	– Costs of ensuring availability on site	☐	☐	– Costs of ensuring availability (e.g. in the event of Internet disruption)	☐	☐
Cost risks	– Scaling costs: Higher costs if additional capacity is required or if the scope of processing or infrastructure changes	☐	☐	– Unforeseen peaks in utilization: Risk of unexpectedly high costs due to sudden increases in resource requirements	☐	☐
	– Technology obsolescence: risk that hardware will quickly become obsolete and need to be replaced					
	– Data security incidents: Potential costs due to security incidents or data breaches	☐	☐	– Data security incidents: Potential costs due to security incidents or data breaches	☐	☐

Table 1. Checklist for the cost structure of edge cloud systems. The checklist can be used to first identify the relevant edge and cloud cost factors of an edge cloud system and then record their consideration in a deeper assessment.

3.1 Setup costs

When setting up edge cloud systems, costs are initially incurred in the setup costs category, which must be taken into account accordingly.

The first edge cost factor is the purchase of the local edge technology, i.e. the edge devices, such as small devices or local servers, depending on the configuration. With the cloud, there are no such acquisition costs, but depending on the provider, a setup fee may apply.

The next step is to set up and install the system. With local edge technology, this can be time-consuming: The edge devices must be brought to their locations and integrated into a network. To do this, a local network must be set up or an existing one adapted. Additional infrastructure may also be required. The edge devices must be installed and configured on site and the software must be installed. API integration costs and specific costs for data preparation and formatting may be incurred. These setup and installation costs mainly consist of personnel costs, possibly also third-party costs if installation work is purchased as a service. With the cloud, these setup costs are eliminated, but depending on the scenario, the installation of special software may be required, which in turn incurs installation costs (personnel costs).

Middleware or an operating system must run on the edge devices. If this is third-party software, one-off license fees are incurred depending on the license model (ongoing license fees, in the case of subscriptions, are included under ongoing costs). In the case of in-house developments, development or customization costs must be included depending on the scenario.

Depending on the scenario, the collected data is stored and processed on the edge or in the cloud. This requires adequate (i.e. specific) software applications that process the data supplied by the sensors, the edge, or the cloud in the right environment. If a one-off payment is required for the software license model, this is also included in the setup costs. The same applies if the specific applications are not purchased but developed in-house, which incurs development or customization costs.

With edge and cloud systems, all employees who interact with the system in their daily work must be trained and familiarized accordingly (onboarding). For edge computing, additional training is required for IT or OT staff[4] , who must be able to maintain, check, repair and adjust edge devices. This incurs corresponding familiarization and training costs.

3.2 Operating costs

Various costs in the operating costs category are incurred in the ongoing operation of edge cloud systems.

When using Edge components, regular maintenance work is required, as well as the installation of updates and on-site support. If these tasks are carried out by your own staff, corresponding labour costs are incurred as well as hardware and repair costs, for example for replacing components. The company's own infrastructure, such as the local network infrastructure, can also incur

[4] IT (Information Technology): Information technology for data processing in the company such as computers, servers, networks; OT (Operational Technology): Hardware and software for controlling and monitoring systems and machines.

ongoing costs, for example for maintenance. If the aforementioned services are provided by external service providers, external service costs are incurred instead of labour costs.[5] In addition, the operation of edge devices and their cooling incur energy costs.

There are no maintenance and repair costs when using cloud services, as these are covered by the cloud provider. Ongoing fees are incurred, the amount and structure of which depend on the provider's respective cost models (e.g. flex or fixed tariffs). Costs for software maintenance or updates are incurred if software is used that is not provided and maintained by the cloud provider. Additional costs may be incurred for data transfer to the cloud and back if this requires an extended internet bandwidth.

Data processing is carried out using specific software for both edge and cloud use. Depending on the system architecture, this can take place either on the edge devices, in the cloud or split between along the edge cloud continuum. In this context, ongoing license costs may be incurred for the applications that handle the data processing.

3.3 Performance and efficiency factors

With edge and cloud components, performance and efficiency factors can indirectly cause costs.

With edge devices, the limited computing capacity can lead to longer processing times, limited functionality or limited parallel processing, among other things. This can affect the overall efficiency of the system and is particularly problematic for more complex tasks. An example of this is predictive maintenance in manufacturing, where insufficient computing power can lead to delays.

With cloud solutions, productivity is lost due to latency and bandwidth problems. Latency is caused by the transmission of data over the internet, which leads to delays, especially in real-time applications. In addition, bandwidth bottlenecks can cause additional delays or performance impairments with large amounts of data, which have a negative impact on efficiency.

3.4 Security and compliance costs

Security and compliance costs are also an important cost category.

On the one hand, edge components incur costs for security measures on site. These include the physical security of the devices, cybersecurity measures and adherence to compliance requirements, which can vary depending on the industry or application scenario. There are also costs for ensuring the availability of edge devices on site. This includes all measures that guarantee that the devices are functional and ready for use at all times - a factor that can vary in criticality depending on the application scenario. For example, in time-critical applications such as industrial manufacturing, continuous availability is essential, while in less urgent scenarios it may be less of a priority.

[5] This also includes scenarios in which, for example, regional edge data centers are connected via third-party Internet connections.

When using the cloud, the cloud provider takes over the security measures for the cloud services. However, security incidents can occur during transmission. This results in costs for security solutions such as firewalls and encryption. In addition, compliance measures must be observed and implemented within your organization. Furthermore, data and applications stored in the cloud may be temporarily inaccessible, for example in the event of internet disruptions. Accordingly, it must be checked whether (at least partial) availability must be ensured in such cases, which in turn incurs costs.

3.5 Cost risks

Cost risks represent the final cost category. While operating costs, for example, are incurred during normal operations and therefore cannot be avoided in principle, cost risks are risks that ideally do not occur but may arise with a certain degree of probability. These are therefore risks that should be minimized by risk management.

If capacity or infrastructure requirements increase, edge applications or edge architectures can incur considerable additional costs (scaling costs). This applies, for example, to expanding the hardware, extending the network or adapting the software to larger data volumes or more complex processes. Another cost risk at the edge is technology obsolescence: Hardware is subject to the risk of becoming obsolete due to technological progress. This can be the case if new standards or protocols are introduced that do not support older devices, or if the existing hardware is no longer compatible with more modern environmental hardware. Replacing such components can be expensive and time-consuming.

A key advantage of cloud resources is their virtually unlimited scalability. However, unforeseen peaks in usage can pose a cost risk if unexpectedly high cloud costs arise due to a sudden increase in resource requirements.

Data security incidents or data breaches can cause high costs, whether through direct damage, such as the loss of sensitive data, or through indirect consequences, such as regulatory penalties, loss of reputation or the need to upgrade security measures. Particularly in the case of edge components that are associated with decentralized data processing, increased attention to physical and digital security is required to minimize such risks. Similar risks also exist when using cloud resources: While the cloud provider usually implements extensive security measures for the infrastructure and operations, the responsibility for data integrity and protection during transmission remains with the user. Security incidents can arise here, for example, due to inadequately secured access rights, errors in encryption or attacks on data transmission. These risks require continuous security checks and, if necessary, additional investment in protective measures

When considering the selection of a non-European cloud provider, in particular one of the major US hyperscalers, it must also be taken into account that different rules for data protection and government access to data apply to companies based outside the EU. The risk and consequential costs of access to personal data or sensitive company information that is incompatible with the European legal framework should also be assessed.

4 Procedure Model

Against the background of the cost structure of edge cloud systems (see Section 3), the Edge FinOps cost management approach can be put into practice. A basic process model for this is outlined below, which is based on the building blocks of the established FinOps framework.[6]

The process model focuses on four essential steps that need to be taken in the context of applying Edge FinOps (see Figure 1):

1. Planning and objectives,
2. Preparation,
3. Implementation and
4. Accompanying measures

These four steps are explained in more detail in the following sections and each is underpinned with items and instructions in the form of to-dos. This structure is intended to help companies approach the successful application of Edge FinOps step by step without overlooking any key aspects. The aim of the presentation is to provide a basic understanding of Edge FinOps as a cost management tool. It therefore deliberately avoids in-depth context-specific details of edge cloud systems.

Figure 1. Process model for the application of Edge FinOps in practice: four steps and their items

[6] These are primarily components of the "Domains" and "Capabilities" modules. For more information on these modules, see https://www.finops.org/framework/.

4.1 Planning and objectives

In this first step, the fundamental aspects are clarified. The aim is to define clear goals for the application of Edge FinOps management of an edge cloud system and to determine the financial framework (costs and budget). Thorough planning forms the basis for the success of the entire Edge FinOps strategy.

Target definition

Edge FinOps follows an integrated approach, therefore the goals are not set top-down, but defined with the involvement of all stakeholders. Start by identifying all relevant stakeholders, such as the IT department, the application team, the finance department and management, to understand their respective requirements and expectations. The stakeholders then define common goals to set a clear direction. The objectives should meet the SMART criteria (specific, measurable, achievable, reasonable, time-bound) and include success criteria and KPIs that can be used as a measure of progress.

Cost analysis

The costs of an edge cloud system can only be managed if the relevant cost factors of the system and their interaction are known. Using the checklist for the cost structure of edge cloud systems (see table 1), identify the cost factors relevant to your system and then collect comprehensive data or information on the respective current or expected costs. Then carry out a detailed analysis of the cost structure in order to identify cost drivers and carry out comparative calculations.

Budgeting

Budgeting must be carried out after the cost analysis. Budgeting involves defining the budget for the desired edge cloud system and forecasting future expenditure. To do this, create a realistic budget taking into account the data and information collected from the cost analysis and forecast future expenditure based on planned projects and expected growth rates. This helps with financial planning and ensures that sufficient funds are available to achieve the set goals.

4.2 Preparation

The second step is to prepare the application of Edge FinOps for the desired edge cloud system. For an efficient application, the costs must be clearly allocated or distributed, the stakeholders involved must be trained or sensitized and the technological prerequisites must be created.

Allocation of costs

The previously identified costs must be clearly allocated to the individual departments or projects. Only with a correspondingly broken down, cause-based allocation of costs is it possible to control costs in line with the Edge FinOps approach. Cost allocation is the basis for implementing a system of transparent, ongoing and up-to-date cost allocation. A showback model (in which usage costs are presented transparently) or a chargeback model (in which the departments pay directly for their usage) can be used to create this transparency about cost usage.[7]

Training and sensitization

In order for the Edge FinOps team to work together, the people involved must be adequately empowered. Organize training for your team to familiarize them with the best practices in FinOps. In addition to teaching the methods and practices, it is important to create an awareness of cost-efficient working in the context of edge cloud systems among those involved. Promote such awareness of cost-efficient working through workshops or information campaigns so that all employees understand how they can contribute to reducing costs.

Technological integration

In order to apply Edge FinOps in practice, the approach and its tools must be integrated into existing systems and processes. Accordingly, care must be taken in the preparation phase to ensure the smoothest possible integration of the Edge FinOps tools used into the existing systems and to design the Edge FinOps system accordingly. Technological integration also includes the selection and analysis of technologies that potentially offer a cost-saving solution before they are integrated into the existing system.

4.3 Implementation

Once the preparations have been completed, the third step is to start implementing the Edge FinOps strategy in practice. As part of this implementation, the use of resources is continuously monitored, reported and optimized in order to achieve efficiency gains.

Monitoring the use of resources

Implement the necessary tools to enable continuous monitoring of your edge cloud system resources. The aim is to track the consumption of computing power, storage and other IT resources in real time. This creates the necessary transparency to identify deviations from the planned budgets at an early stage and take appropriate measures.

Monitoring and reporting

As part of the monitoring process, the financial KPIs are regularly reviewed to ensure that the budget is adhered to and the use of resources remains efficient. Use dashboards to visualize the current use of technology and resources and the associated costs so that everyone involved always has an overview and can take countermeasures during day-to-day business if necessary. Reporting, i.e. regular reporting, ensures that decisions can be made on the basis of precise and up-to-date data in order to continuously manage the Edge FinOps strategy.

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[7] Both models are about transparent consumption-based cost allocation. The difference is that with a showback system, usage is only displayed ("show") to the departments involved, whereas with a chargeback system, the costs are also billed to the departments internally ("charge"). Further details can be found, for example, at https://www.finops.org/assets/terminology/.

Optimization of resources

Based on the ongoing usage recording and analysis, it is now possible to identify inefficiently used resources and optimize resource usage in terms of costs. Unnecessary or oversized resources should be switched off or replaced with smaller solutions. Alternatively, scalable solutions can also be introduced. Consider automating scaling processes to further increase flexibility and efficiency. Depending on the use case, optimizing the resources of edge cloud systems can also mean adjusting the distribution of tasks in the edge cloud continuum, e.g. because certain computing operations are to be performed on local servers instead of in the cloud or new processing levels close to the Edge become more efficient in the course of scaling.

Contract management

Depending on the design of your own edge cloud system in the edge cloud continuum, contract management can contribute to cost optimization. Contract management involves regularly reviewing existing contracts, for example with cloud or service providers, and adjusting them if necessary. Therefore, regularly analyze your contracts with providers for optimization potential in terms of pricing, service level agreements or contract terms in order to achieve better price-performance ratios. Negotiate additional discounts or better conditions for long-term contracts or business relationships in order to achieve additional cost savings.

4.4 Accompanying measures

The accompanying measures of the fourth step include continuous risk management and ongoing adaptation of the Edge FinOps strategy to changing conditions or new findings.

Risk management

Identify potential risks relating to the financial aspects of your edge cloud system at an early stage, e.g. through appropriate risk analyses or workshops with experts from different areas of the company. Develop risk mitigation strategies such as contingency plans or insurance against specific risks.

Regular review and adjustment

The ongoing review and adjustment of the Edge FinOps strategy should be understood by all those involved as an integral part of the company's Edge FinOps culture and, in this sense, should be perceived as a natural component, lived and implemented in a transparent process. Carry out a regular review of your Edge FinOps strategy and make appropriate adjustments. Also take into account changes in the business environment such as new regulatory requirements or technological developments.

References

3DS Outscale (2021): European industrial technology roadmap for the next generation cloud-edge offering. Hg. v. 3DS Outscale, Airbus, Amadeus, Aruba, Atos, Capgemini, CloudFerro, DE-CIX, Deutsche Telekom, Ericsson, German Edge Cloud, GIGAS, Indra, IONOS, IRIDEOS, Leaseweb Glo-bal, Magic Cloud, Nabiax, Nokia, Orange, OVHcloud, Retelit, SAP, Schneider Electric, Siemens, Telefonica, Telecom Italia. Online verfügbar unter https://ec.europa.eu/newsroom/repository/document/2021-18/European_CloudEdge_Technology_Investment_Roadmap_for_publication_pMdz85DSw6nqPppq8hE9S9RbB8_76223.pdf, zuletzt geprüft am 20.02.2025.

Bryant, Jon (2022): Driving into the Cloud: What is Finops? In: *ITNOW* 64 (3), S. 54–55. DOI: 10.1093/combul/bwac097.

FinOps Foundation (2025): The FinOps Principles. Online verfügbar unter www.finops.org/framework/principles/, zuletzt geprüft am 17.01.2025.

IT-Business (2024): Was sind Cloud FinOps? Online verfügbar unter https://www.it-business.de/was-sind-cloud-finops-a-96ffac52169b3cef66fb644a320adc28/, zuletzt geprüft am 17.01.2025.

Jahnke, Nils; Niehoff, Nicolas (2024): Datenwirtschaft und Edge-Computing. Potenziale, Herausforderungen und Handlungsempfehlungen für Unternehmen. Kurzstudie der Begleitforschung zum BMWK-Technologieprogramm „Edge Datenwirtschaft“. Hg. v. iit. Online verfügbar unter https://www.digitale-technologien.de/DT/Redaktion/DE/Downloads/Publikation/EDGE-Datenwirtschaft/20241202_Kurzstudie_Datenwirtschaft_EdgeComputing.html.

Sambaturu, Sravya (2024): Cloud Fin Ops Management. In: *IJSCE* 13 (6), S. 7–9. DOI: 10.35940/ijsce.A3585.13060124.

Storment, J. R.; Fuller, Mike (2019): Cloud FinOps. Collaborative, Real-Time Cloud Financial Management. 2nd Edition. Beijing, Boston, Farnham, Sebastopol, Tokyo: O'Reilly. Online verfügbar unter https://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=2329207.