

**Open
Telekom
Cloud**

White paper
**OpenStack – the
standard for the
sovereign public cloud**



Connecting
your world.

Introduction:

OpenStack – the independent cloud alternative

Companies that want to use cloud computing essentially have two options: Hyperscalers or open source offerings. Open source software is not a niche topic, but an integral part of the corporate world. Users gain transparency and influence over development as well as advantages in terms of independence and sovereignty. With OpenStack, there is also a powerful open source alternative to the large hyperscalers for the cloud, which is successfully used productively in a large number of public, private, hybrid and multi clouds.

What you can expect: Content and added value

1 Prize question: What is OpenStack?

Overview of the OpenStack platform and details on the structure of the individual modules.

2 Living evolution – how was OpenStack created?

Information about the history of OpenStack and the companies that support the development of this cloud software.

3 Four supporting pillars as the Open- Stack approach: What are the “Four Opens”?

The “Four Opens”: These principles form the working basis for free and equal software development within OpenStack.

4 Data protection and quality assurance: How does OpenStack master the balancing act between open- ness and security?

How this open approach can be reconciled with data protection, quality assurance and, last but not least, sovereignty.

5 Figures and estima- tes from analysts: How widespread is OpenStack?

Analysts have their say: Assessments by experts, market data and survey results provide information about the spread of OpenStack to date and its future prospects.

6 OpenStack vs. hyperscaler: Freedom instead of dependence

Independence: Comparison of OpenStack with hyperscaler offerings.

7 Working seamlessly with Docker, Kuber- netes, Terraform & Co.

Classification of the important tools and terms – as well as presentation of the central tool Kubernetes, which can easily be integrated into OpenStack as open source software.

8 Examples of use and references

Users from the OpenStack community and reference customers of T-Systems demonstrate the advantages of OpenStack in the daily practice of organizations and companies in two case studies.

9 Conclusion and out- look – future-proof and independent with OpenStack

Conclusion and outlook.

1 Prize question: What is OpenStack?

OpenStack is a software platform that is continuously developed by an international community and enables the creation and management of a cloud environment. It provides users with highly scalable computing, storage and network capacities as well as other IT and telecommunications resources.

The **Open Telekom Cloud** is based on OpenStack and uses this “operating system” of the cloud to control several halls full of hardware on a total area of around 6,000 square meters (as of the end of 2024) – in geo-redundant data center locations in Saxony-Anhalt, the Dutch metropolitan region of Amsterdam and in Bern/Zollikofen.

What does OpenStack consist of?

Computing resources, storage and much more

OpenStack consists of a network of core components that were developed independently of each other and interact with each other. Similar to Linux software, components are bundled together into packages.

The central services include the Nova compute module, which is used to manage and control servers and virtual machines (VMs). The Cinder service can be used to provide virtualized block storage, while Swift provides users with object storage. Managing networks and IP addresses is the task of the Neutron network service. The Horizon module provides an easy-to-use user interface (GUI) that can be used to map the most important functions of the OpenStack services.

Manage user rights and control module interaction

The Keystone module is used to manage user rights and ensure secure authentication of clients and users. Among other things, this regulates which modules are allowed to communicate with each other. For example, if the Cinder storage service receives a request to provide storage for a specific user and to link a virtualized hard disk to a server for this purpose, three modules work together: Keystone authorizes, Cinder provides storage space and Nova ensures that the server is set up accordingly.

Numerous services can be used and connected with each other. The services provide practically all infrastructure components or resources such as virtual servers, hard disks, networks and more, which require services based on them. OpenStack can therefore also be understood as the virtual administration of a data center at the infrastructure level.

Strong together: Can be combined with containers, Kubernetes & Co.

In line with the principle of openness, OpenStack can also be combined with many open source systems and tools. These include container solutions such as Docker and frameworks such as Kubernetes (see also chapter 7). Not every user will need everything that OpenStack provides – the Open Telekom Cloud also uses its own supplementary software.

Before new releases of OpenStack components are deployed on the Open Telekom Cloud, they undergo an additional specific test procedure within Deutsche Telekom.



A complete list of services can be found here !

2 Living evolution – how was OpenStack created?

What began in 2010 with a collaboration between the US IT provider Rackspace and the space agency NASA on the coordinated use of Rackspace servers has long since gone beyond this initial project: OpenStack has become a global community and is organized in a foundation that already had around 110,000 members in over 180 countries as of August 2023¹.

The number of OpenStack deployments worldwide has increased, and more than 40 million compute cores are powered by OpenStack. These numbers illustrate the continued adoption and implementation of OpenStack across industries and geographies.

During this time, many companies and members have continuously developed the cloud software platform. Since 2010, two releases have been published each year, with names following the letters of the alphabet. The “Caracal” version released in April 2024 includes improvements in the areas of AI and high-performance computing as well as increased agility, performance and security. “Dalmatian” is planned for October 2024.

In attendance: the who's who of the industry

Many well-known IT manufacturers found and still find the community project so interesting that they join as members, allocate employee resources to OpenStack development and support the foundation. In addition to Deutsche Telekom, other heavyweights in the industry are also involved, including Dell, Cisco, IBM and HP as well as renowned Linux distributors such as Red Hat and Canonical. In total, more than 560 organizations support OpenStack.

Non-profit: openness, transparency and equality

The open and equal organizational principle is a decisive factor in the success of OpenStack: it is not a project dominated by a single manufacturer. Individual developers are just as much on board as large IT groups and cloud providers. In 2012, OpenStack was given its organizational framework with the establishment of the OpenStack Foundation. Since the end of 2020, the foundation has been called the Open Infrastructure Foundation (OIF). The renaming is intended to express that the end of development is far from being reached and that the focus is on open source infrastructure software beyond OpenStack.

After 14 years, OpenStack and its foundation are now an established player - comparable to the Linux and Apache Foundations or the CNCF (Cloud Native Computing Foundation). Professional software development is driven forward on the basis of solid funding and supported by numerous companies. Deutsche Telekom is a gold member of the foundation and also supports its work financially.



3 Four supporting pillars as the OpenStack approach: What are the “Four Opens”?

The open structure and organizational form is expressed in the “Four Opens”, which are both the credo and working basis of the OIF: Open Source, Open Design, Open Development, Open Community. What exactly is behind these principles?

1 Open Source

means that the software developed is actually free to use and scalable for everyone and has no limitations in terms of features, functions and performance. Open source software (OSS) can basically be used for any purpose, offers access to the code and the possibility to modify it. Unlike other open source software, no “Enterprise Editions” of OpenStack are published.

2 Open Design

ensures that the development cycle for a new release takes place in an open process that involves the entire member community - developers, companies, users and project managers. Requirements are collected, specifications written and priorities defined at events and conferences. In this way, the community steers and controls the design process. Everyone involved has the opportunity to influence the development of the software so that it meets their own needs and requirements.

3 Open Development

is made possible by a Git repository, in which the source code is accessible throughout the entire development process. This also includes the infrastructure for building, CI servers such as Zuul, the Gerrit review platform and many other developments. As part of the public code review, every community member has the opportunity to participate in the development and not only write code, but also check and test it from the very first line of code.

4 Open Community

Finally, a lively user community that is open to discussion is essential for successful collaboration: the Open Community. All processes and project meetings are open, transparent and documented – and all participants treat each other as equals: every voice is heard and everyone can be elected to leadership positions in development teams. It is important to define common goals and create strong connections between all participants, because working in silos is poison for a vibrant community and a functioning software ecosystem.



The Four Opens describe a comprehensive approach to software development from the idea to the design and delivery. The Four Opens were developed specifically for OpenStack in the community and at the same time reflect the principles of open source in practice.

4 Data protection and quality assurance

How does OpenStack master the balancing act between openness and security?

The principles of openness and public code review (open development) are compatible with security requirements and offer cyber criminals no gateways to systems and data. First of all, data is strictly separated from code anyway.

The code merely provides the blueprint for the virtual machines (VM) and modules, on the basis of which data is later generated during application operation. If the code of such a system is executed securely, external attackers cannot gain access, even if the documentation is publicly available – comparable to a lock whose mechanism is known, but which offers no external attack surface because it is bolted from the inside. The open and distributed code review therefore does not represent a security risk, but is one of the strengths of OpenStack.

The eyes of the beholder: multi-stage quality assurance

The web-based Git service, which OpenStack uses as a central repository for version management, also contributes to the secure development of the source code. Before the code is packaged for delivery to users, it undergoes a strict quality assurance process. Anyone who submits contributions to code development does not have direct write access to the code that has already been reviewed and approved, which is stored as the current version in the repository. The public review takes place at a preliminary stage below this, in an equally protected server environment: at least two experienced developers must independently review the code contribution and give their approval before new lines of code are included in the current version. The results of these reviews are meticulously stored.

Quality assurance thus follows the test cycle, including load and performance tests, as is customary in software quality management. Once the tests and code review have been successfully completed, the current release is handed over to the distributors, who in turn carry out tests and any necessary adjustments for their respective hardware and software. Finally, organizations and companies such as Telekom, which obtain the hardware and software packages from their distributors, also carry out additional test runs to ensure compatibility with their own specifications.

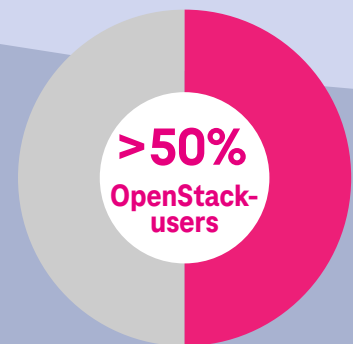


5 Figures and estimates from analysts: How widespread is OpenStack?

Not only is the OpenStack community growing, but the spread of cloud software in companies is also increasing. As early as 2018, market researchers from Forrester wrote:

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“The numbers speak for themselves: more than 50 percent of Fortune 100 companies use OpenStack (...) and a third of corporate decision-makers worldwide consider expanding the use of open source software a business-critical or high priority.”



Growth engine: OpenStack continues to expand strongly

According to recent reports, OpenStack will have over 40 million compute cores in production by 2023, representing a growth of 350 percent since 2018. This figure illustrates the increasing acceptance and implementation of OpenStack in various industries worldwide².

Solid growth forecasted

According to Mordor Intelligence, the global OpenStack service market is growing rapidly³. It is expected to increase from just under 23 billion US dollars in 2024 to over 90 billion US dollars by 2029. Forrester sees open source as an ideal complement to cloud strategies⁴: Companies are increasingly recognizing the major benefits of cloud platforms and see open source as an economical and innovative way forward.

40.000.000

compute cores

OpenStack service market:

90.000.000.000 US \$

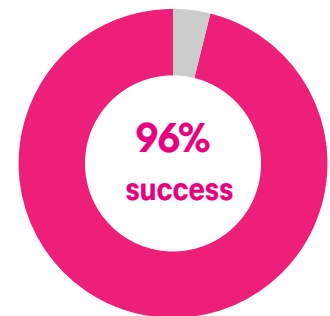
A frequently debated point is whether open source is economically viable or just an academic experiment. However, a study by Harvard Business School shows that the global economy would have to raise hundreds of billions of dollars to replace open source software if it suddenly ceased to exist⁵.

OpenStack underlines this relevance: Companies benefit not only from independence and innovative strength, but also from the collective investment of large technology companies and a strong community. This means that open source is not a niche solution, but a strategic basis for modern IT infrastructures.

Strategic decision: Hybrid and multi-cloud use

A significant proportion of OpenStack users rely on a multi-cloud strategy. The interfaces of the large clouds (Hyperscaler and OpenStack) are not very different from each other conceptually: Terraform or Kubernetes are used, which abstract the implementation-specific characteristics of the clouds and offer overarching interfaces. A survey⁶ shows that 89 percent of companies use more than one cloud, with the combination of AWS and OpenStack being particularly popular. This helps companies to avoid dependencies on individual providers and offers more flexibility and security.

In recent years, OpenStack has established itself as an indispensable component in many companies, especially in the area of network functions (NFV) and edge computing. According to a survey by Heavy Reading, 96 percent of companies pursuing an NFV strategy consider OpenStack to be essential to their success⁷.



6 OpenStack vs. hyperscaler: Freedom instead of dependence

OpenStack offers many of the same functions as the large hyperscalers such as AWS, Microsoft Azure or Google Cloud. But the key difference lies in the control: while proprietary clouds often lead to vendor lock-in, OpenStack gives companies the freedom to design their infrastructure independently – without sudden price increases or restrictions.

OpenStack is becoming increasingly important, especially now that rising license costs and technological change are turning the IT world upside down. It combines the scalability of hyperscalers with genuine independence and economic predictability – an advantage that more and more companies and public institutions are discovering for themselves.

Cloud technologies are an integral part of the digital transformation. Companies are increasingly relying on cloud solutions in order to operate flexibly and scalably. This often raises the question:

Proprietary hyperscalers or open, standardized alternatives?

As an open source solution, OpenStack offers unparalleled independence and sovereignty, enabling companies to manage their cloud infrastructures without being dependent on a single provider.

Why is OpenStack an alternative to hyperscalers?

Proprietary cloud offerings, such as those from AWS, Microsoft Azure or Google Cloud, provide powerful infrastructures, but often lead to vendor lock-in: companies are tied to one provider in the long term, which can limit flexibility and control. OpenStack, on the other hand, is based on open standards and allows a free choice of infrastructure – in both public and private cloud environments.

Another advantage is the transparency of the code. Companies gain full insight into the architecture of their cloud and can better implement security and compliance requirements. OpenStack is also a European alternative that is ideally integrated into the sovereignty strategies of companies and public institutions.



OpenStack in response to rising license costs

The takeover of VMware by Broadcom for 61 billion US dollars (2022) triggered a shock wave in the IT world. Many companies were suddenly confronted with radically changed license models and exploding costs – in some cases, annual fees increased tenfold. Public and academic institutions in particular, which are already price-sensitive, began to look for alternatives.

OpenStack offers exactly that: an open, license-free IaaS solution that allows full control over infrastructure and costs. No vendor lock-in, no unpredictable price jumps – instead, flexibility and predictability. Especially in economically uncertain times, this is an invaluable advantage for companies that want to remain independent in the long term.

The trend towards IaaS – why the IT landscape is changing

The VMware price increases are hitting the market at an explosive time: more and more companies are switching from classic server virtualization to genuine cloud architectures. While VMware primarily provides a virtualization layer, Infrastructure-as-a-Service (IaaS) solutions such as OpenStack offer a much more flexible, scalable alternative.

Connection to Gaia-X: data sovereignty and open standards

Digital sovereignty is a key issue in Europe, and this is where Gaia-X comes in: an initiative for a transparent, interoperable and secure cloud infrastructure. OpenStack fits seamlessly into this vision as it supports the principles of open interfaces, interoperability and data control. Companies that rely on OpenStack benefit from a cloud that can be used in compliance with Gaia-X without having to rely on proprietary technologies.

Clear criteria for digital sovereignty

In the statement by the Conference of Independent Federal and State Data Protection Supervisory Authorities (May 11, 2023), open source was highlighted as a central element for digital sovereignty. Openness and transparency are key criteria that meet the requirements for a secure and trustworthy cloud. OpenStack meets these requirements and offers companies a long-term, secure and future-proof alternative to hyperscalers.

The key difference: OpenStack is technically much closer to the cloud environments of hyperscalers than VMware. Anyone relying on OpenStack today is building an infrastructure that can be easily combined and modernized with public clouds – without getting caught up in proprietary structures.

7 Working seamlessly with Docker, Kubernetes, Terraform & Co.

Containers have long been part of the toolkit of modern IT and cloud-native strategies. Containers allow professionalization and simplification of the use of cloud resources – as well as platform independence. Containerized applications are equipped with a complete runtime environment independent of the operating system and libraries. The most widely used container tools include Docker and Kubernetes.

Conductors in top form

To manage the growing number of containers, it makes sense to use a control tool like Kubernetes. This open-source system automates the provision, scaling and management of containerized applications on distributed hosts. Kubernetes can be used to start many instances of the same container. If a container fails or reports an error, a copy takes over automatically. This offers greater speed and standardization compared to the traditional installation of software, where administrators have to work through package after package and directory after directory and adjust configuration files before a software application can run on a host.

This makes working with cloud landscapes considerably easier and faster – an example is provided by DevOps teams that develop software in an agile way and can quickly move it via containers, for example from a test to a production environment.

DevOps & automation – the key to the modern cloud

Modern IT teams work according to DevOps principles: rapid development cycles, continuous delivery and complete automation are essential to respond flexibly to business requirements.

This is where Infrastructure as Code (IaC) comes into play: tools such as Terraform and Ansible make it possible to automatically define and deliver entire cloud environments instead of manually configuring each one. This automation not only improves efficiency, but also reduces errors and increases consistency.

Continuous Integration & Continuous Deployment (CI/CD) goes one step further: with pipelines that automatically test, integrate and roll out software, new features can be put into productive use in the shortest possible time – without interrupting operations.

OpenStack integrates seamlessly into this modern way of working. It can be combined with DevOps tools such as Kubernetes, Terraform and Ansible to create highly automated, flexible cloud environments. By using OpenStack, you not only ensure technical independence, but also get the tools to make IT processes future-proof and efficient.

Increased speed: faster provisioning, simplified migration

Docker and Kubernetes run on both hyperscalers such as Google Cloud, AWS, and Azure and OpenStack-based clouds. System administrators can either install the tools in the OpenStack cloud themselves or use one of the OpenStack modules such as Magnum or Zun. These modules provide native support for container orchestration and management directly in OpenStack. The Open Telekom Cloud has integrated a Kubernetes variant on the platform with the Cloud Container Engine.



Some specific features and tools for integration are:

Magnum:	An OpenStack project that enables the provision and management of container orchestration tools such as Kubernetes, Docker Swarm, and Mesos on OpenStack.
Zun:	EinAn OpenStack service for managing and orchestrating containerized applications that simplifies the deployment and management of containers.
Kuryr:	A project that integrates OpenStack networking services such as Neutron with container orchestration tools to provide advanced networking capabilities.

Automation and scalability with Terraform and Kubernetes

Terraform enables infrastructure provisioning automation through declarative configuration files and supports seamless integration with OpenStack and Kubernetes. Administrators can use Terraform to deploy and manage Kubernetes clusters on OpenStack. This makes it easier to orchestrate containerized workloads and provides a high degree of scalability.

A specific example: companies can use an OpenStack cloud to run Kubernetes clusters that host both containers and virtual machines (VMs). This allows them to reap the benefits of both virtualization and containerization. Kubernetes handles the automatic provisioning and management of the containers, while OpenStack provides the underlying infrastructure. This enables companies to migrate complete cloud environments with containerized software between OpenStack-based clouds with little effort⁹.

Simplified control through an ecosystem of tools: Rancher, Zuul, Ansible and Terraform

Tools such as the open-source Rancher are suitable for controlling and managing containers and entire Kubernetes clusters across different cloud environments. Even across cloud providers, for example for AWS and Open Telekom Cloud, the software addresses operational challenges as well as security requirements that arise when working with Kubernetes clusters in different environments. This makes Rancher particularly suitable for use in multi-cloud landscapes. Rancher support is also very helpful for DevOps teams working in distributed environments and infrastructures.

CI/CD pipelines with Zuul

The Zuul program is also available to promote DevOps and accelerated software development using CI/CD (continuous integration, delivery, and deployment) methods. Like the OpenStack community, Deutsche Telekom uses the Zuul infrastructure for continuous development and integration.

Ansible for automation

Ansible is an open-source tool for configuration management, IT administration, and software distribution. Thanks to simple YAML syntax and minimal system requirements (only OpenSSH and Python), it enables the automation of recurring tasks without in-depth programming knowledge. For managing cloud resources, Ansible offers advanced collections that are specially optimized for OpenStack.

Infrastructure as Code with Terraform

Terraform is an open-source tool for the automated provision and management of IT resources such as servers, storage and networks. The Infrastructure-as-Code approach (IaC) allows standardized definition, roll-out and management of cloud environments, reducing manual configuration efforts.

Terraform uses the APIs of the respective providers to automatically detect and implement changes in existing configurations. This makes it easier to operate hybrid and multi-cloud environments in particular, by integrating various public clouds, private instances and other IT services within a single workflow. Terraform offers a variety of interfaces for DevOps environments, infrastructure software and cloud platforms.

8 Examples of use and references

Secure workplace based on OpenStack

June 2023. “Unable to work for months? The Helmholtz Zentrum Berlin (HZB) is struggling with the consequences of a surprise hacker attack,” was the headline in the Tagesspiegel. A nightmare scenario for any organization: no email, no Sharepoint – all internal IT systems were paralyzed.

The research institute quickly needed a collaboration alternative for its employees. This group aims to set up IT in a sovereign manner – in line with the federal government's digital strategy.

In the process, HZB came into contact with T-Systems and tested a trial installation of the Open Source Collaboration service, an alternative to the common Microsoft products for collaboration, provided from the OpenStack-based Open Telekom Cloud.

In just two weeks, T-Systems restored collaboration functionality for the 1,200 employees. Nothing changed for the researchers at the front end. They continued to work with their familiar clients – sometimes simultaneously on four different end devices.

By working with T-Systems and using the Open Telekom Cloud, the Helmholtz-Zentrum Berlin has taken an important step towards a future-proof and sustainable IT infrastructure. At the same time, the HZB has gained a greater degree of digital sovereignty, because the backend is based entirely on open source and is provided from a European cloud.

Cloud-based workplace – oneclick

One click – everything is there. The Swiss company oneclick delivers what its name promises: the provider's customers access a fully functional IT environment via their browser within a few minutes, and can access software, platform and infrastructure-as-a-service as needed via a web portal. This means they can get a modern digital workplace with all the necessary data and applications at any time and on any end device with a single click of the mouse.

oneclick provides the entire solution for virtual desktop infrastructure (VDI) via a central platform from the cloud. To do this, the young company relies on the IT resources of the Open Telekom Cloud and encrypted access via an innovative streaming process for its customers in Europe.

Managing director Dominik Birgelen and his team are convinced by the Open Telekom Cloud, not least because of the underlying OpenStack technology. **“This allows us to easily connect our platform to cloud resources via a standard interface. Otherwise, extensive programming work would have been required here.”** In addition, oneclick uses the Open Telekom Cloud's Cloud Container Engine, based on Kubernetes, to build, manage, and update customer environments.

The new oneclick business model was built and scaled using resources from the OpenStack cloud.

Data analysis for public administration

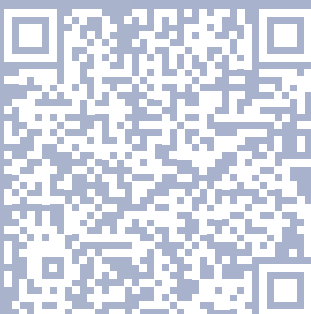
“We are convinced that cities, municipalities and regions can benefit enormously from data analysis. They offer decision-makers in public administration completely new insights and a valid basis for decision-making. Smart cities can be created in which life becomes more sustainable,” explains Tim Cleffmann, Chief Business Development Officer at the Data Competence Center for Cities and Regions (DKSR).

The DKSR's business idea: an open urban data platform (OUP) should be created to enable municipalities to use data analysis as a tool for infrastructure development and control in the long term. It offers its users a central hub for data, data analysis and data-based applications.

Since the business model requires continuously increasing amounts of data and the services offered should be developed just as agilely, the DKSR needed an infrastructure that could keep pace with this dynamic. A high-performance cloud. This is where Deutsche Telekom's Open Telekom Cloud came into play.

“A lot of data can be collected and processed in any old cloud. But to be taken seriously as a partner for public clients, our services must also meet the requirements of the administration – across the entire IT stack,” explains Cleffmann. The DKSR therefore decided to put its business model on a solid footing with a comprehensively certified European OpenStack cloud in order to avoid complications from the outset. At the same time, the European cloud should also enable the company to achieve sustainable growth.

The Open Telekom Cloud meets both requirements. It ensures data compliance and offers all the features of a public cloud.



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9 Conclusion and outlook – future-proof and independent with OpenStack



Why IaaS remains indispensable

For a long time, it seemed as if Platform-as-a-Service (PaaS) with solutions like Kubernetes would push IaaS into the background. After all, modern applications often run in containers and abstract the underlying infrastructure. But reality shows that IaaS is and remains the indispensable basis of any cloud architecture.

The VMware case has made it clear that companies must not only pay attention to platforms, but also to control over their infrastructure. Servers, networks and storage cannot be ignored – they must be efficiently managed, scaled and optimized. OpenStack offers precisely this flexibility: it combines the openness of open source with the scalability of real cloud environments.

Anyone pursuing a technologically and economically sustainable strategy today cannot ignore an open IaaS solution.

Open source has become an important decision criterion for companies. Independence from a specific provider, transparency of the code and the simple options for switching make open source attractive. The large communities behind the open source initiatives offer users future security. Not least because of these arguments, open source also plays a decisive role for the sovereignty strategies of companies and in public administration.

In a world increasingly characterized by digital dependencies, OpenStack offers a clear path to independence and sovereignty. This freedom is not only a technical advantage, but also a strategic imperative for companies and public organizations operating in a dynamic and often unpredictable environment.

If you want to take advantage of open source in the cloud, OpenStack is the way to go. OpenStack-based clouds have long since established themselves as an alternative to the hyperscalers. The number of OpenStack installations is growing continuously. With the Open Telekom Cloud, an OpenStack-based public cloud from Europe for Europe is available. It is rated by various analyst firms as a leading European cloud because of its functionality, security and performance.

Sources

- [1] OpenInfra zwischen lähmendem Erfolg und ungelösten, neuen Aufgaben - Ulrike Ostler, Datacenter Insider, June 2023 (German only)
- [2] OpenStack global footprint exceeds 45 million compute cores as users tackle common obstacles Allison Price, OpenStack Blog, November 2023
- [3] Marktgrößen- und Marktanteilsanalyse für OpenStack-Dienste – Wachstumstrends und -prognosen (2024–2029), Modor Intelligence (German only)
- [4] The Forrester Guide To Open-Source Cloud Projects, Devin Dickerson, Forrester, April 2024
- [5] Harvard Business School, The Trillion-Dollar Open Source Economy, 2024
- [6] 2024 State of the Cloud Report, Flexera, 2024
- [7] OpenStack Adoption, Deployments Surge as Enterprises Increasingly Favor Multi-Cloud Strategies, Robert Cathey, OpenStack
- [8] Run Your Kubernetes cluster on OpenStack in production, Ramon Acedo, Anita Tragler, Franck Baudin, Superuser, March 2021

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