



THE START OF A NEW MEDIA ERA
MORE POSSIBILITIES
THANKS TO CLOUD COMPUTING



LIFE IS FOR SHARING.

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THE START OF A NEW MEDIA ERA MORE POSSIBILITIES THANKS TO CLOUD COMPUTING

“For the film industry, the cloud will be a given,” Sven Bliedung told a journalist at the medientreff 2018 in Babelsberg. His company operates Europe’s first commercial volumetric studio. In the circular room, 32 cameras are placed on the walls and ceiling. The entrepreneur wants to make walk-in films possible in the near future. This requires enormous computing and storage capacities. It would not be commercially viable for Bliedung to provide, operate and maintain these capacities himself. His solution: IT resources from the cloud.

It’s just one of many examples of the direction in which technological development in the film industry is moving: The more possibilities there are, the more resources are required and that’s not something a company will be able to handle with its own IT in the future. That’s why more and more companies in the film industry are turning to cloud resources that can be flexibly scaled and only cost money when they are actually used.

DATABASE FAILURE TRIGGERS CLOUD REVOLUTION

The first signs of this development came from companies like Netflix that now base their entire business on resources from the cloud. For Netflix, the initial impetus was the desire for higher availability. The company began migrating to the cloud in 2008. The reason: a database failure that prevented Netflix from sending DVDs to its members for three days. “That is when we realized that we had to move away from vertically scaled single points of failure, like relational databases in our data center, towards highly reliable, horizontally scalable, distributed systems in the cloud,” Netflix declared afterwards.

DIGITALIZATION DRASTICALLY CHANGES CONSUMER BEHAVIOR

But high availability isn’t the only reason for media companies to use the cloud to run their business: Companies like Netflix also benefit from greater flexibility, a higher margin and growing opportunities for cross-selling and upselling. Consumers also get the content they are interested in faster, more conveniently and any time they want it.

As a result, the audience’s consumer behavior has changed significantly: Over the past 10 years, the number of people who have bought a physical video product such as a DVD or Blu-ray Disc has fallen by around one third (32.5 percent) according to the market research firm, GfK. At the same time, the use of digital

video content is increasing sharply. While digital video products in Germany generated just 8 million euros in sales in 2008, by 2017 the figure was almost a hundred times higher (768 million euros). For 2019, GfK forecasts a further increase in this segment of around 28 percent to more than 1 billion euros through digital film offerings such as Netflix, Amazon Prime Video, iTunes, Google Play and Maxdome.

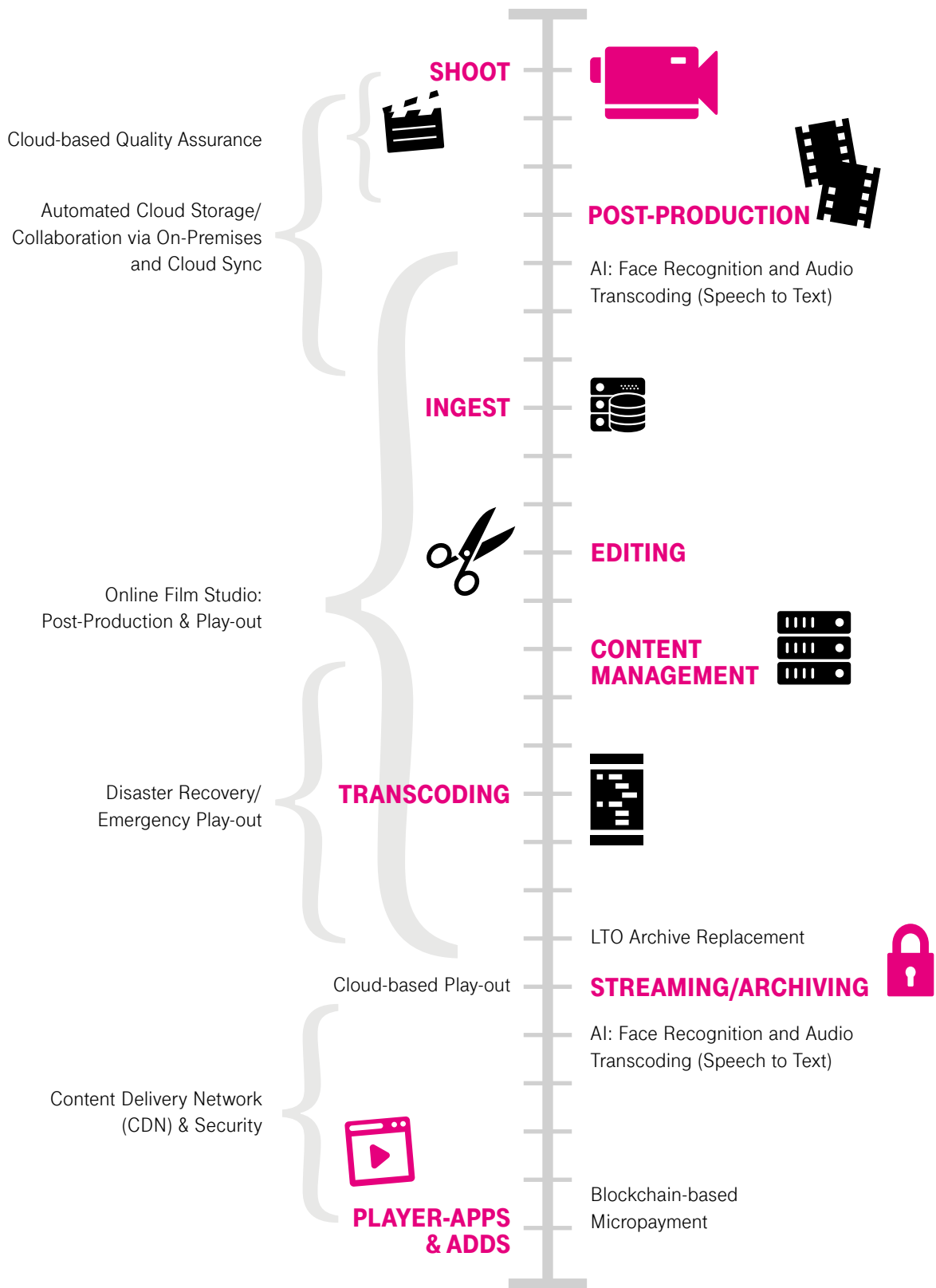
CLOUD COMPUTING REVOLUTIONIZES THE ENTIRE FILM INDUSTRY

In the future, this will involve much more than just streaming content via the Internet. Not just the playback of content, but the entire value chain of film production is increasingly shifting to data centers – from planning, shooting and post-production to transcoding and archiving. It’s a development all market players benefit from. It leads to accelerated processes, more efficient workflows and new applications that are made possible in the first place with the help of the enormous computing and storage capacities from the cloud.

One example is automated data transferring, which eliminates the need for the time-consuming and expensive transport of film material between film locations and production sites. Another is artificial intelligence, which recognizes exactly what people and objects can be seen on film and what was said, automatically marks it and thus simplifies research considerably. A third example is network-based application acceleration, which enables the smooth playback of moving images on mobile devices such as smartphones or tablets even in remote areas.

Companies like Netflix have changed the market. Cloud computing is in the process of revolutionizing the entire industry. That’s because the technology is already enabling applications and business models that were inconceivable just a short time ago.

On the following pages you can read about the possibilities that cloud computing offers the film industry – many of them today already, some in the near future.



The value chain migrates to the cloud: There is hardly any process not handled with the help of the cloud today or in the near future

IT PAYS OFF CLOUD-BASED PROCESSES IN THE FILM INDUSTRY

It's not uncommon for filmmakers to have to meet completely contradictory demands: On the one hand, video productions are becoming ever more complex, comprehensive and data-intensive due to the constantly growing technical possibilities. On the other hand, the market demands more and more higher-quality productions in ever shorter cycles. Cloud computing helps companies master these challenges. The technology scales spontaneously according to business requirements, saves time and money along the value chain, promotes cross-location collaboration and, as a result, often opens up entirely new lines of business.

IT SECURITY AND DATA PROTECTION PARTICULARLY IMPORTANT FOR COMPANIES

However, most companies not only attach great importance to cost-effectiveness, but also to data security and data protection. According to the industry association Bitkom, 97 percent of the German companies surveyed cite a cloud provider's compliance with the General Data Protection Regulation (GDPR) as a "must-have" when selecting a provider. The indicators for this compliance include self-operated German data centers of a German provider, compliance with the cloud IT catalogue of the Federal Office for Information Security (BSI) as well as the Trusted Cloud Data Protection Profile (TCDP) 1.0. TCDP is only given to cloud providers whose cloud enables compliance with the strict requirements of the GDPR.

ALTERNATIVE TO US-BASED HYPERSCALERS

Due to this sensitivity, some companies have concerns about the use of cloud services offered by US-based providers. That's largely because the legal regulations under the so-called CLOUD Act are unclear. With this law, the US government has granted itself the right to, as part of an investigation, demand data from data centers owned by US providers – no matter where in the world these data centers are located. As a result, many companies prefer to use alternatives from German providers such as the Open Telekom Cloud.

CLOUD FROM A NEUTRAL PROVIDER: NO CONFLICTS OF INTEREST

Telekom operates multiple-certified twin-core data centers for its Open Telekom Cloud in Saxony-Anhalt, Germany. Because the provider uses the open cloud architecture OpenStack instead of a proprietary system, users also benefit from a significantly lower vendor lock-in risk compared to other offerings. For all their technical requirements, film production companies also generally prefer to use the public cloud resources of operators who are not active in the same line of business in order to avoid conflicts of interest.

Full cloud workflow

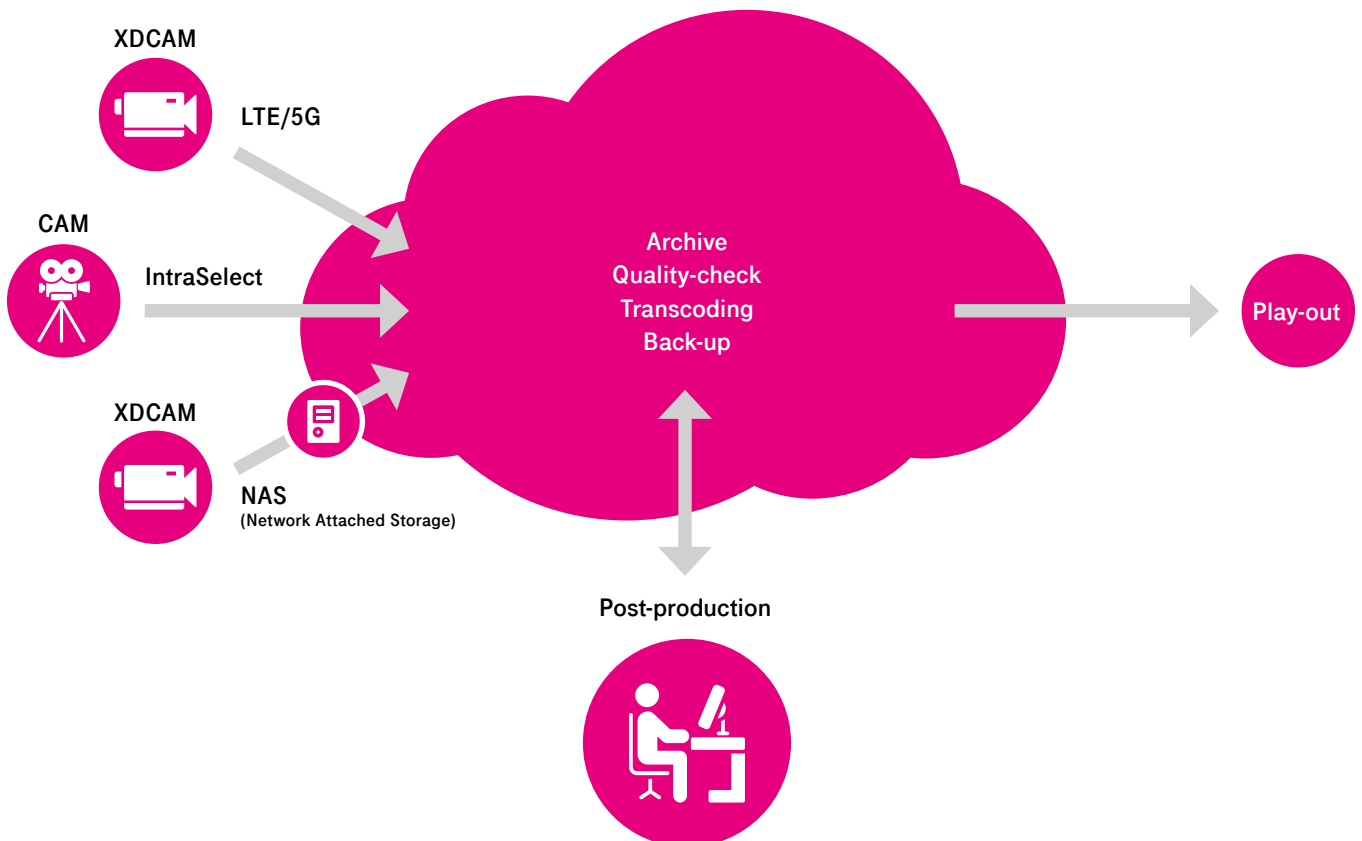
Digital data exchange from production to post-production to archive

It's still standard at many TV production companies for vehicles carrying hard disks to commute daily between different locations in order to supply all the participants in the process chain with the latest film material. It would be much more efficient to automatically distribute video material to all the relevant parties via data networks and cloud computing centers.

This is made possible by automated media storage in the cloud that integrates seamlessly into the production process. And all without having to adapt technology or workflows. An automated workflow synchronizes data with the cloud – whether from NAS storage systems, from production systems in film studios or directly via the mobile network from camera systems, for example on the basis of the XDCAM standard. From there, they are transferred – also automatically – to post-production.

Producers and editors work efficiently and cost-effectively with proxy data and transfer the result to high-resolution data in the cloud. Post-production can always access the latest video material, regardless of its location, and can process it even in areas with poor network quality. And at the end of the process, the final results from post-production are synchronized with the cloud archive. For those cameras that don't generate a proxy, proxy data can be generated in the cloud.

This removes the need for shuttle delivery vehicles that transport hard disks every day between production and post-production.



Digitalize LTO archives

Artificial intelligence analyzes and marks faces and objects



Cloud archives offer more features, a faster response time and higher resilience compared to LTO archives

Linear Tape-Open archive databases (LTO for short) have been standard in the film industry for almost two decades. But the locally operated, tape-based data storage system is reaching its limits – the method is too expensive and too slow: A locally operated LTO archive incurs constantly rising costs, and the speed at which archive data can be read and new data written to LTO tape is severely limited. Experts therefore predict that the technology will soon become obsolete.

In the cloud, on the other hand, companies can store archive data more cost-effectively. For example, they can save on all the costs of maintaining and servicing their own hardware resources. Data that they keep in the public cloud only incurs costs for the resources that they use. The less frequently they access these resources, the cheaper they become. In the Open Telekom Cloud, storage classes are divided into three categories: “cold” for occasional access over one year, “warm” for a maximum of monthly data access and “standard” for more frequent access.

AI EXPANDS METADATA: FIND RELEVANT INFORMATION FASTER

Those who also enrich the archive videos with corresponding meta data benefit twofold: cloud solutions based on artificial intelligence (AI) analyze video material, independently recognize known persons, buildings, objects, sporting events or entire scenes in them and mark them accordingly. An on-premises LTO archive cannot do this without considerable additional effort or technical detours. The speed of write operations is too limited for this.

Cloud-based AI systems are also capable of automatically transcribing the audio track of video material. The resulting database of meta-information with tags and transcribed audio content facilitates and optimizes archive searches using keywords or entire quotations without having to view a single image.

Web-based news production system

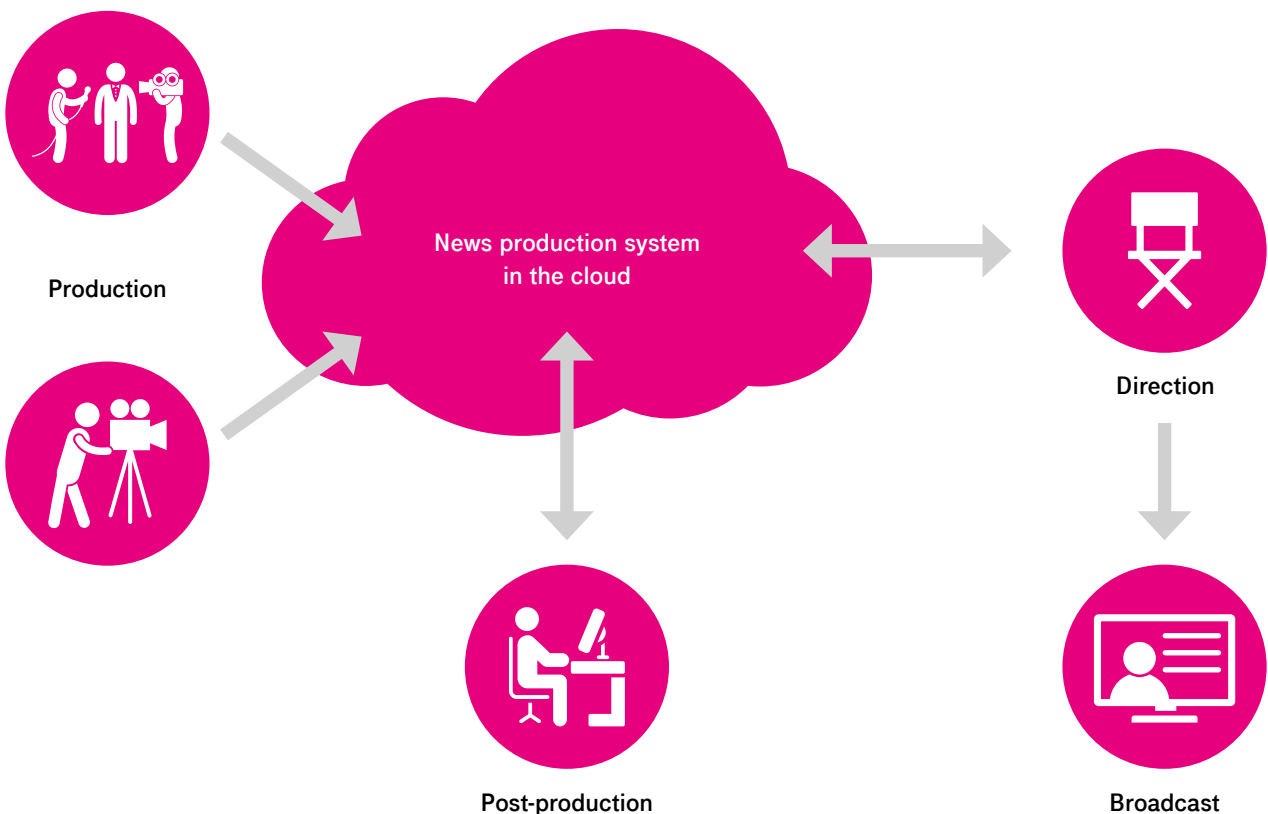
News studio from the cloud

News production is undergoing a transformation in terms of both content and technology: the frequency of news is increasing, while the audience's attention span – and with it the news snippets – is becoming shorter. In this fast-moving environment, decentralized, flexible production is becoming particularly important.

With a web-based news production system from the public cloud, journalists, editors, producers and directors have access to high-performance systems for production, post-production and live reporting anytime, anywhere. If required, they can simply access a platform via a web browser in which video content can be uploaded, edited, played and archived. In this way, other participants in the process such as freelance journalists or editors can be spontaneously integrated at short notice.

LOCATION-INDEPENDENT COOPERATION

Instead of using complex equipment such as broadcast vans, image mixers, editing consoles and playout servers, journalists can create their content directly online in the public cloud without complex workplace requirements and without additional software or plug-ins – the only thing that is required is a HTML5 browser. That goes for TV, mobile devices or social media. Even camera signals can be connected directly via the mobile network if required. In this way, entire live events can be produced with the virtual cloud control studio – without the need for expensive hardware resources of your own. Everyone involved in the process chain can work together regardless of their location and access the same material.

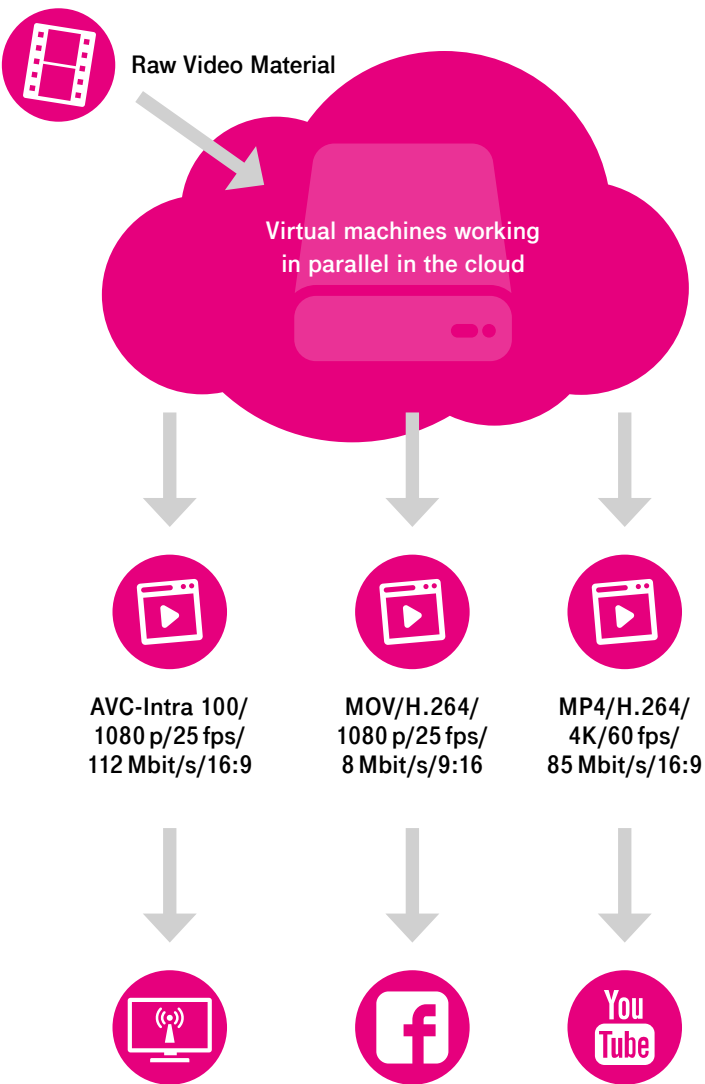


Web-based news production systems from the cloud provide high-performance systems anytime, anywhere

Always the right video format

Transcoding with computing power from data centers

The right format with the correct aspect ratio, a suitable resolution and the appropriate compression rate: There's an ever-growing need to be able to transcode video material tailored to specific stages in (post-) production as well as to playback in particular channels. Because of digitalization and advanced technical development, not only has the amount of data increased, but the number of channels to play it on has also multiplied.



Benefit from endless parallelism: With cloud resources, companies transcode on demand and only pay for what they use

VIRTUALLY UNLIMITED RESOURCES IN THE CLOUD

Furthermore, the transcoding of video material requires enormous IT resources. It can be very costly to have your own corresponding capacities. Resources from the public cloud, on the other hand, are optimally suited for this stage of the process. Why? Because practically unlimited resources are available in the public cloud – spontaneously retrievable at any time, almost infinitely scalable and billable as required. Those who need film material particularly quickly in a certain format use a correspondingly high number of virtual resources in parallel.

GO NEUTRAL TO AVOID CONFLICTS OF INTEREST

This keeps costs under control as companies only pay for the resources they actually use. That leaves the companies' own IT capacities free for more important processes and tasks. It's advisable to use a cloud provider not active in the streaming or video business itself to avoid conflicts of interests. An example is Deutsche Telekom, whose Germany-based public cloud data centers also guarantee the highest possible level of data protection and compliance with the European Union's General Data Protection Regulation (GDPR).

FILM INDUSTRY IN FOCUS

THE OPEN TELEKOM CLOUD BASED ON OPENSTACK

Used correctly, IT resources from the public cloud significantly increase efficiency in film production. This is based on high-performance computing, storage and network capacities that meet the high demands of image processing.

Like, for example, Deutsche Telekom's public cloud offering: the Open Telekom Cloud based on the OpenStack open cloud architecture. Due to the sharp rise in demand, Deutsche Telekom has significantly expanded its data centers in Saxony-Anhalt. Telekom can now offer 150 petabytes of storage capacity and space for up to 100,000 servers on almost 11,000 square meters of IT production space. In the future, the campus can be further expanded to around 40,000 square meters.

Object Storage

Central long-term storage

The Open Telekom Cloud's S3-compatible Object Storage is the ideal long-term storage for companies in the film industry – for example for archive data. The cloud storage functions independently of virtual machines and offers the possibility of storing even very large objects at a low cost. In addition, three performance classes lower the price for rarely used data: "cold", "warm" and "standard". "Standard" can be accessed frequently, for example several times a day. The "warm" storage class is suitable for data that is stored for at least 30 days or longer without processing. And the "cold" storage class is intended for data that is only accessed sporadically over the course of a year. The Object Storage thus grows with the requirements and customers only pay for as much storage space as they occupy. At 99.999999999 percent, the storage durability is very high compared to other storage methods.

Mobile Storage Solution

Quickly transfer archive data to the cloud

As a rule, many companies in the film industry already have their own comprehensive film archive – but mostly only on an LTO basis. This means that in some cases they can only access the stored data very slowly. It's much faster in the cloud. Since video material is often very data-intensive, the transfer of an entire film archive to a cloud data center via network connections can take an enormous amount of time.

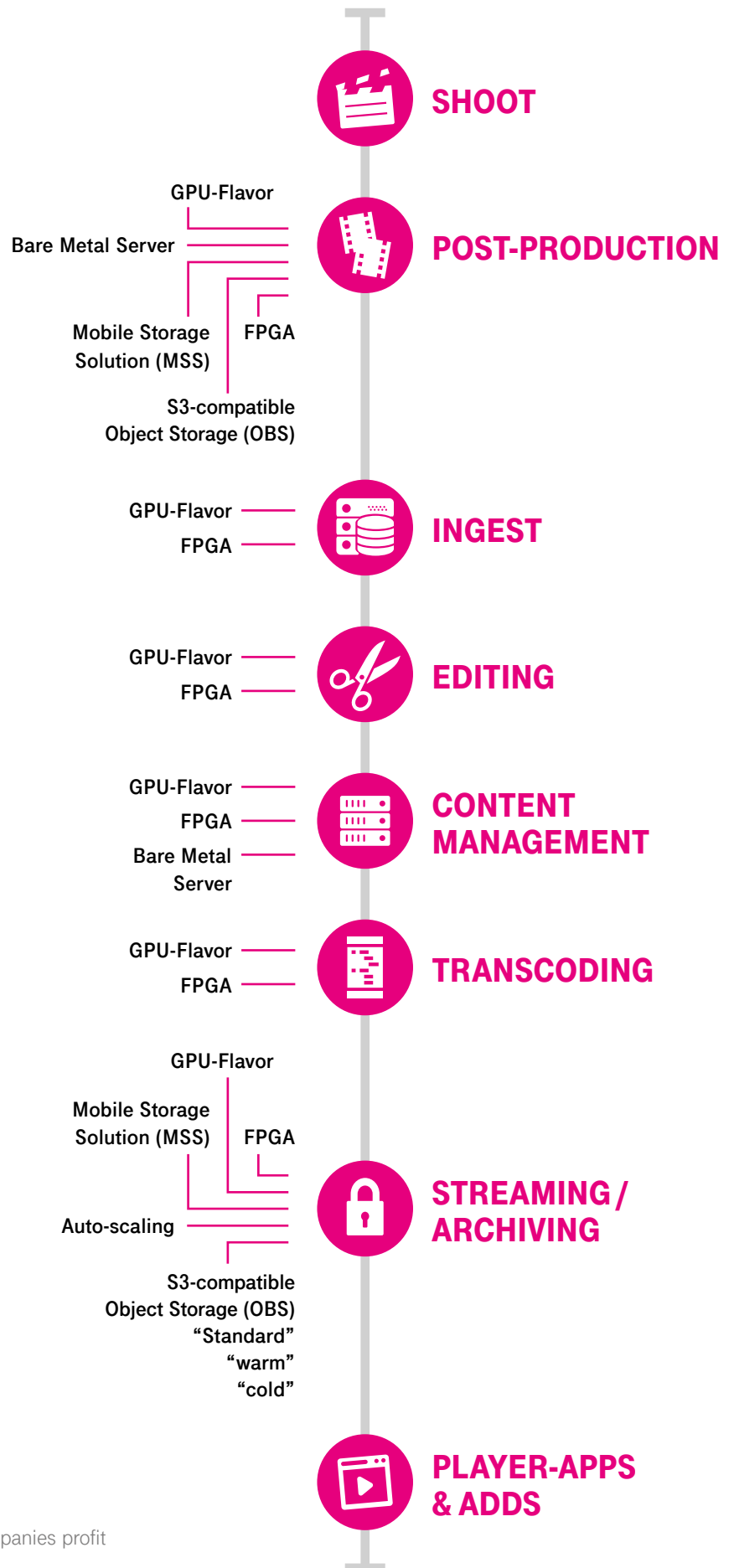
In order to also be able to transfer such large amounts of data to the cloud in adequate time, Telekom recently introduced its so-called Mobile Storage Solution. The information is first copied onto Telekom's secure storage media, encrypted there and then sent by courier directly to the data center in Biere/Magdeburg or imported to suitable network nodes. In this way, even petabyte-sized data volumes – i.e. 1 million gigabytes – can be transferred to the cloud within a little while. Uploading such volumes via a normal data connection would take weeks or even months, depending on the bandwidth.

GPU-optimized flavor

Optimal for image-based processes, AI and big data analytics

Virtual machines with powerful graphics cards and graphics processing units (GPUs) are particularly suitable for processing large-volume graphics and image data. The reason: Their special processor architecture enables particularly fast, parallel processing of a large number of uniform processes. For this reason, they are also ideally suited for applications in the fields of big data analytics and artificial intelligence.

FILM PRODUCTION VALUE CHAIN



The cloud is becoming a given for the film industry: companies profit from the cloud at every point in the value chain

The Open Telekom Cloud offers various so-called flavors – virtual machines with specific combinations of a central processing unit (CPU), main memory (RAM) and graphics card – that are tailored specifically to these needs. For example, the most powerful GPU-optimized flavor offers 32 virtual CPUs, 256 GB of RAM and a Nvidia P100 graphics card with four graphics processors. This allows film material to be rendered within a very short time, even at a very high resolution. The resources required for this are always state-of-the-art technology and only incur costs the moment they are used – and not afterwards. That is in contrast to a company's own resources, which have to be purchased, operated and maintained.

Bare Metal Server

Consistent performance and maximum freedom

Dedicated on-demand hardware that can be freely configured to meet your needs and operated at a particularly consistent and high level of performance: Bare Metal Servers are designed to meet the needs of companies that have the highest demands in terms of performance but don't want to use a shared environment with a virtualization layer. One of the reasons may be that these companies are using software that is not designed for virtualization. Just as scalable as virtual machines, Bare Metal Servers can be billed on an hourly basis if required; just like all the other resources from the Open Telekom Cloud. This saves companies the expense of purchasing their own hardware, while offering them the same options – but with a significantly higher level of security.

Field Programmable Gate Arrays (FPGA)

Hardware acceleration makes processes up to 100 times faster

With the individual cloud turbo via FPGA, applications such as machine learning for image recognition can be accelerated more than tenfold. Data analysis speeds are 50 times faster than regular CPUs. And when it comes to genome sequencing, the cloud FPGA even increases the speed by a factor of 100. That means that, for example, a genome analysis that would otherwise take 33 hours could be carried out in less than 20 minutes.

The Open Telekom Cloud is thus offering a solution from the public cloud to address a fundamental IT problem: processor architectures will soon reach their physical limit. Moore's Law, which stipulates that the number of transistors within an integrated circuit doubles every 18 to 24 months, was valid for decades. Now the feasible seems to be exhausted and the end of this development is approaching because, in future, it will not be possible to make transistors any smaller. As things stand now, FPGAs will soon be the only way to accelerate processes further. That is why in the future this technology will likely become a prerequisite for software manufacturers. Companies can, however, already take advantage of it today in the Open Telekom Cloud.

Auto-scaling function

Always the right resources, exactly according to need

Availability is a top priority in the film industry: IT systems must therefore be protected against failures at all times and ideally redundantly. The Open Telekom Cloud guarantees a 99.95 percent availability of its services. The redundant twin-core data centers in Biere and Magdeburg ensure this.

SCALING ACCORDING TO NEED

However, profitability is at least as important as availability for companies. The Open Telekom Cloud offers the auto-scaling function in order to ensure the optimum utilization of IT systems at all times while at the same time ensuring the highest possible availability. As a result, the IT resources used by companies in the Open Telekom Cloud always scale exactly as they are required. For example, when the number of users of a streaming service increases sharply within a few minutes at around 8 p.m. because it's prime time.

AUTOMATED START-UP AND SHUTDOWN

The so-called Cloud Eye Service monitors the capacity of the vCPU and RAM resources. If previously defined parameters are exceeded, additional virtual machines are activated and the load is automatically distributed among the machines. If the load falls below the threshold values, the virtual machines are automatically shut down. In this way, the infrastructure always scales with demand. This not only guarantees availability, but also optimum cost efficiency because unused capacities are shut down reliably and automatically.

KNOW WHAT'S GOING ON CLOUD APPLICATIONS FOR EVEN MORE SECURITY AND EFFICIENCY

Due to its technical and commercial concept, cloud computing always offers the greatest possible advantages when it comes to speed, short-term requirements or recurring but time-limited use. This results in the many application scenarios already described. However, it won't stay that way: The possibilities of IT resources from Open Telekom Cloud data centers are far from exhausted. They offer countless possibilities for further applications, some of which are already a reality today.

Disaster Recovery Not giving hackers a chance

In the film industry, availability is one of the most important attributes of overall value creation. And for good reason: the consequences of insufficiently secured IT systems were immediately felt by TV5 Monde, the French-language international TV channel, back in 2015. With a targeted attack, hackers caused millions of euros worth of damage when they paralyzed the channel and hijacked its website and all its social media channels. The entire broadcasting operation was down for several hours. The attackers spread Islamist propaganda messages on the website as well as on the TV channel's Twitter and Facebook profiles.

REDUNDANCY ALONE IS NOT ENOUGH

It's a misfortune that the international TV station shares with many other companies: According to a recent survey by the industry association Bitkom, German companies have, as a result of data espionage and sabotage, suffered losses of 43 billion euros over the past two years: These are threats that media companies must also counter, as the example of TV5 Monde shows. It is true even if they operate their systems redundantly. Potential attackers have no problems with redundancies as long as they can be disabled with the help of the same attack vectors.

BROADCASTING SYSTEMS ON STAND-BY IN THE CLOUD

If redundant systems are operated on-premises in the same way, it makes things easy for potential attackers because they only have to carry out the same attack with double the capacity. However, maintaining broadcast systems both on-premises and in the cloud makes it much harder for attackers to jeopardize operations. Then, the hackers would not only need double the resources, but also two completely different concepts for their attack.

Furthermore, because IT resources in the cloud are operated professionally by a provider with certified data centers that monitor the systems around the clock, they generally offer a higher level of IT security than conventional, self-operated resources. And last but not least, redundant broadcasting systems in the cloud are financially attractive for companies because they are only activated in the case of an emergency – and otherwise only incur low costs when in stand-by mode.

Demand-driven production Enormous resources on demand that scale according to need

In film production, IT systems are often subject to extreme fluctuations in capacity utilization. This can be seen, for example, in post-production. Whether for editing, rendering or transcoding – high-performance IT systems are usually required for the individual process stages. However, far from being permanently in use, for much of the time only a fraction of their potential capacity is needed. When companies maintain highly specialized systems that they don't need permanently it's an expensive waste of resources.

Cloud computing resolves this conflict. For example, in event production: Just as production companies nowadays rent all the

resources for on-site use, from hardware to personnel, depending on the order situation, they can also benefit from the pay-as-you-go principle in the IT sector: use what you need and only pay for what you use.

TECHNOLOGY SHIFTS ROLES IN THE FILM INDUSTRY

But the potential advantages go far beyond that. If in future the entire value chain in film production is carried out with the help of the cloud, the distribution of roles within the industry will also shift. In a world where, for example, a satellite connection is no longer necessary to transmit a live picture in HD quality, but where the mobile network enables bandwidths that transmit television pictures live and smoothly, anyone with the right skills will be able to become a broadcaster. The technology will recede into the background. Because in the future it will become ubiquitous thanks to high performance wireless networks. Provided from the cloud.



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