



Issue #4

Getting creative in the cloud

Why VFX teams of all sizes—from Netflix to independent studios—leverage the scale and flexibility of the cloud

Modernizing audience experiences

How personalization, interactivity, and globalization are transforming viewing habits

Fast to the future

How to keep pace with accelerating innovation for all types of media workloads



Create and deliver personalized consumer experiences anywhere, anytime, on any device with AWS Marketplace.

AWS Marketplace is a digital catalog of third-party software, services, and data that makes it easy for media and entertainment companies to find, buy, deploy, and manage software on AWS. With AWS Marketplace, you can unlock innovation with access to thousands of software listings and improve software governance with streamlined approvals and spend visibility.

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Fast to the future

Welcome to the fourth Issue of *me. Magazine*, created to inspire media and entertainment (M&E) companies by showcasing the work of customers and partners who build on Amazon Web Services (AWS).

Consumer behavior continues to motivate the M&E industry to innovate quickly, create new and engaging content, and deliver personalized viewing experiences. Changes across the media landscape require content producers and providers alike to move fast to the future—and they are increasingly able to do so using the cloud.

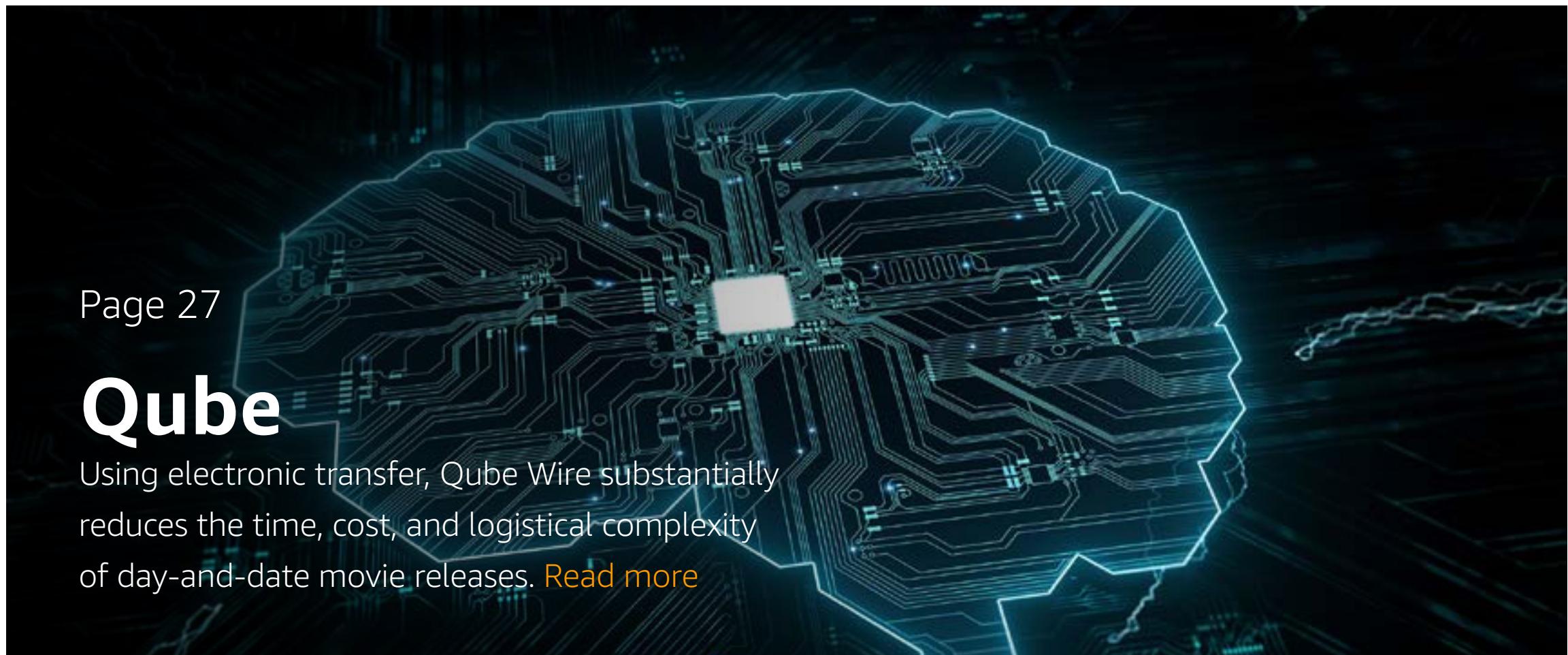
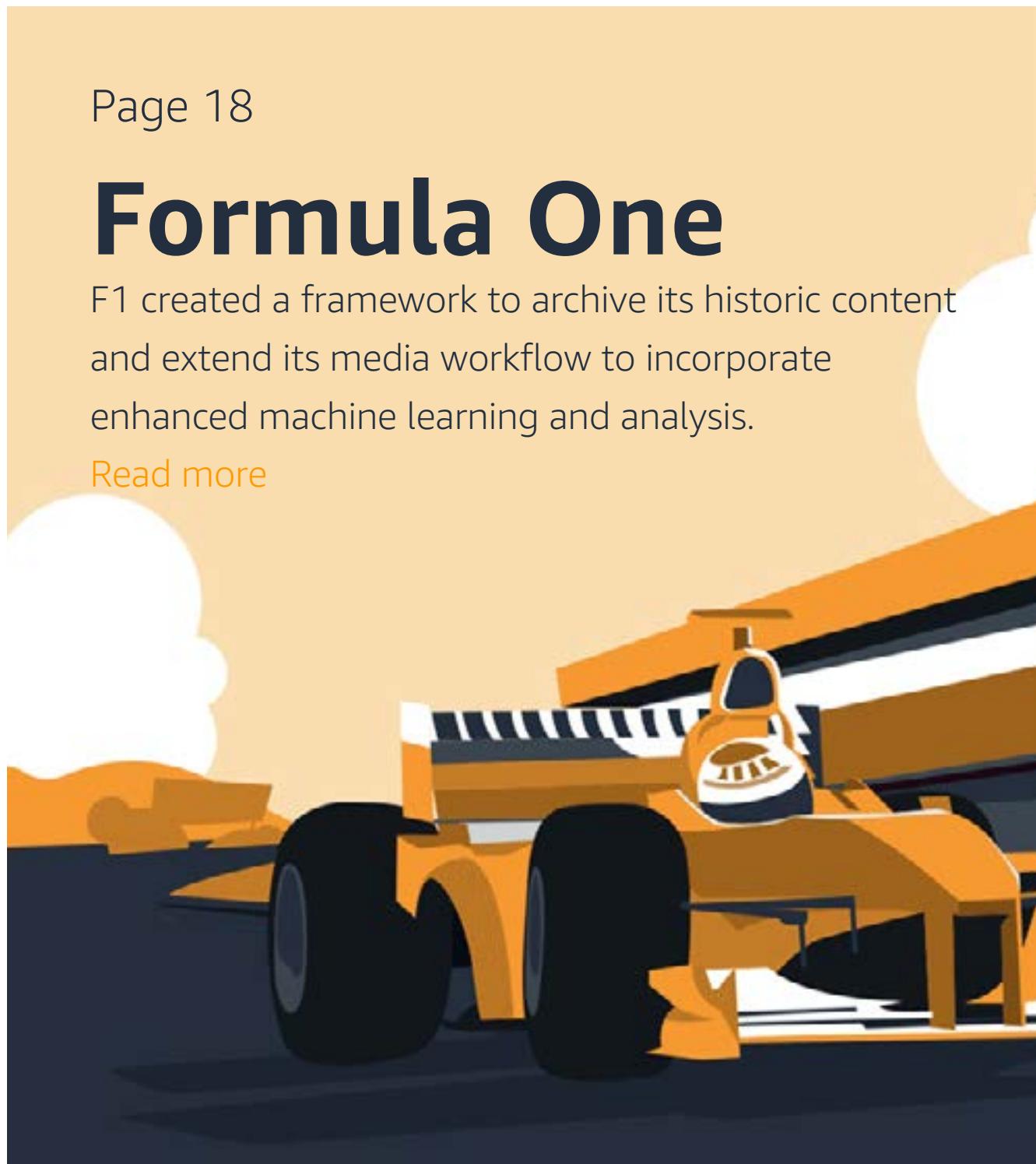
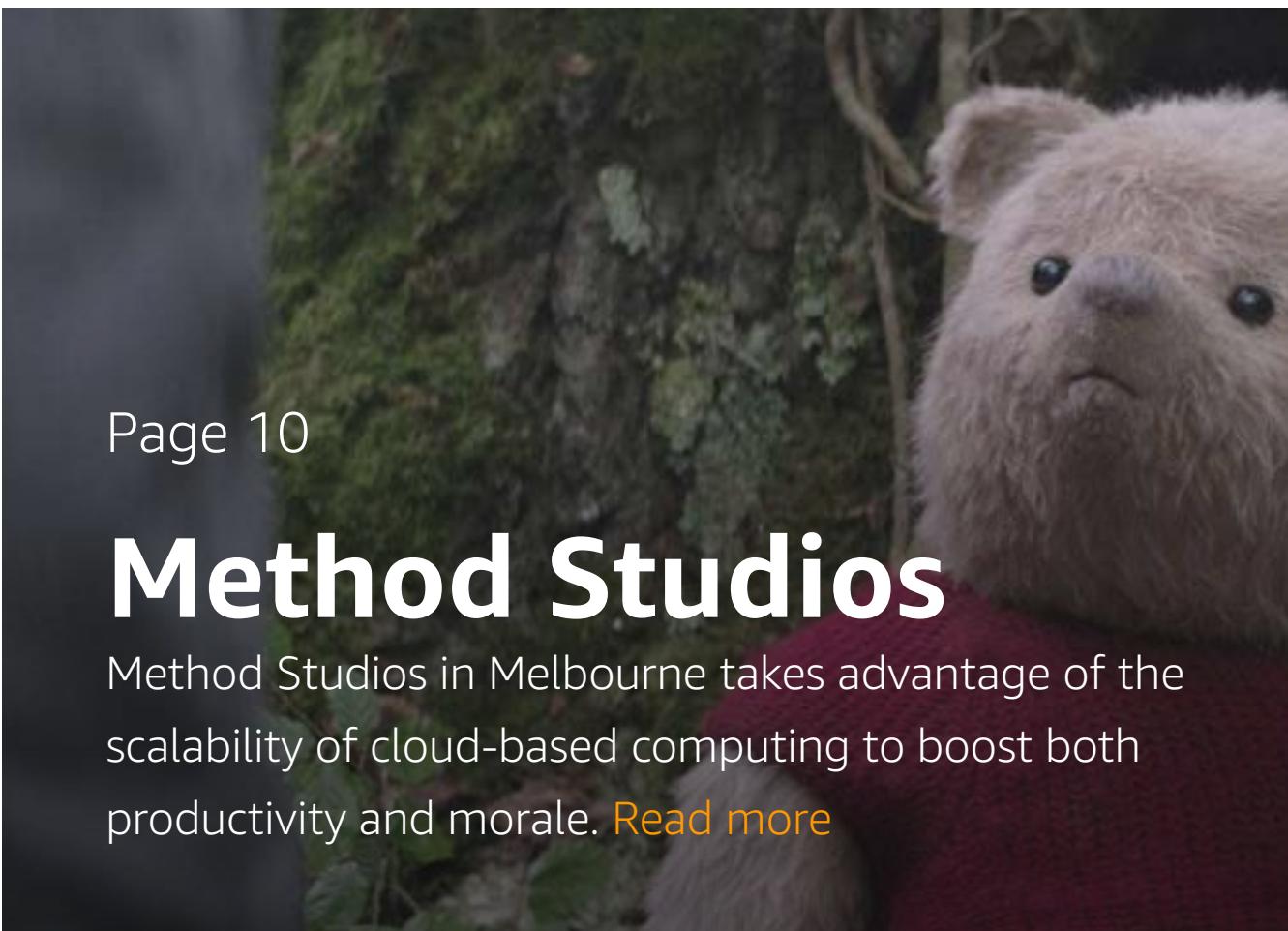
This issue features stories about how every aspect of the M&E industry—from the creation of content to its production and delivery—can benefit from cloud-based media workflows. With media solutions from AWS, companies can collaborate and deliver globally, create an expanded portfolio of offerings, and deepen user engagement.

Read the use cases in this edition and discover how movie production takes place across the world and completely in the cloud. Learn how the agility and reliability of the cloud redefine live events and deliver immersive remote viewing experiences. See what's possible when supply chains apply cloud services to simplify complex logistical processes. You'll also find stories about companies using the cloud to efficiently manage content archives, speed time-to-market for new features, and scale while reducing cost.

We share these stories to illustrate what is possible with AWS. By offering you a look at what's being done today, we hope to assist you in creating the next generation of media and entertainment experiences. With the depth and breadth of services and capabilities available from AWS, infrastructure is no longer an obstacle to innovation. ▶

Contact us

At a glance



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RSI

To adapt to the rapidly changing media landscape, RSI modernized its broadcast infrastructure for streaming content.

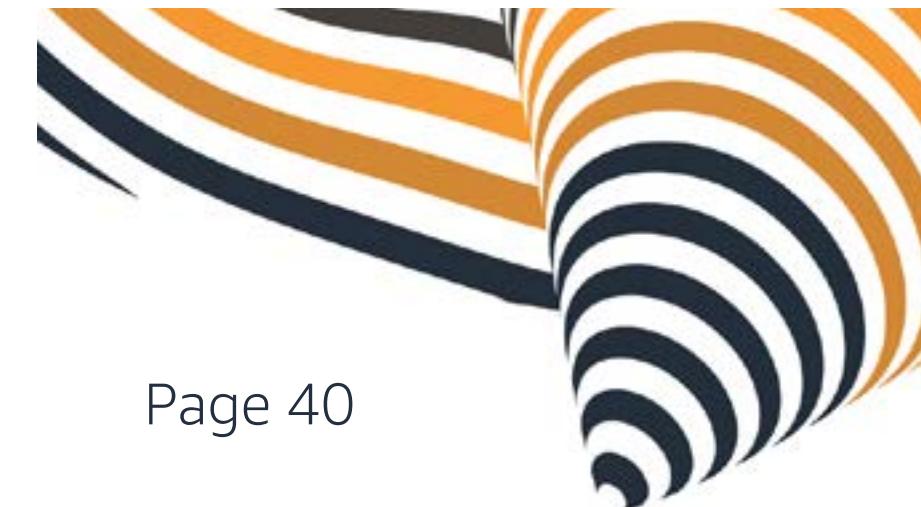
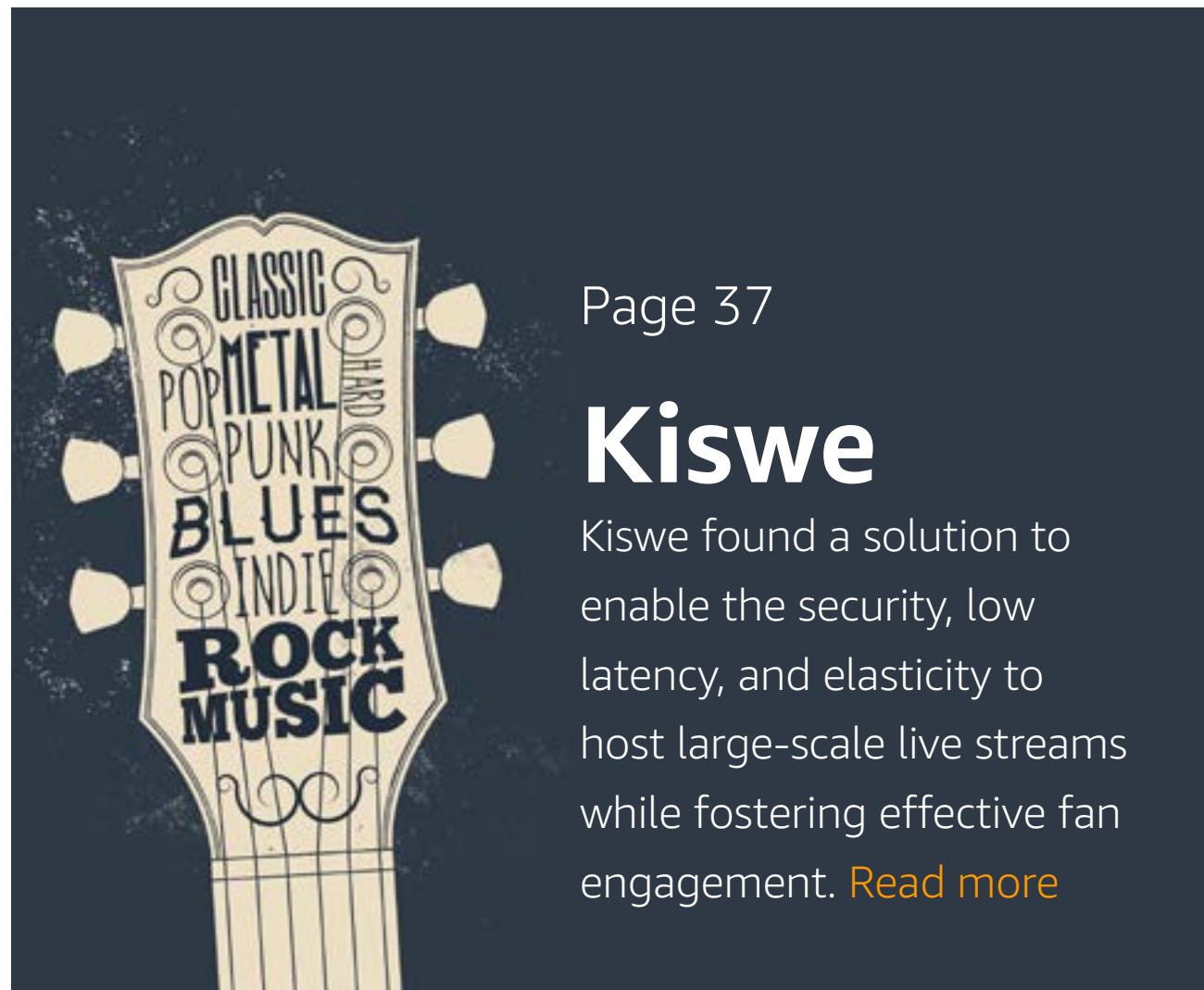
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Kiswe

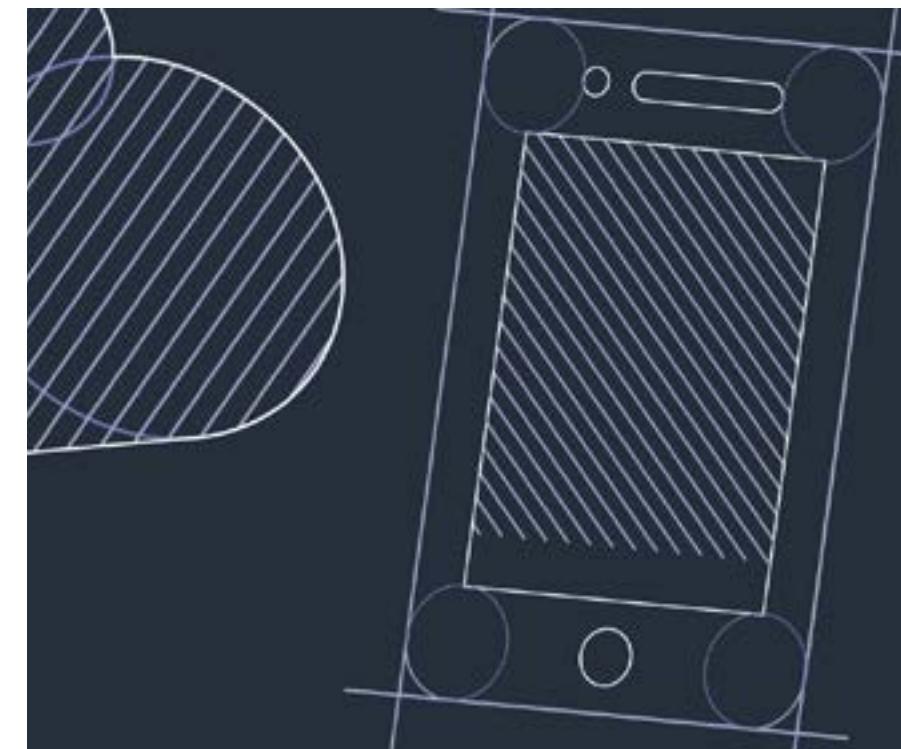
Kiswe found a solution to enable the security, low latency, and elasticity to host large-scale live streams while fostering effective fan engagement. [Read more](#)



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Wynk

Wynk reduced its time-to-market for new features to half a day, down from six days, by increasing automation and use of managed services. [Read more](#)



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ITV

ITV solves delivering high-quality services to a much larger audience while reducing costs.

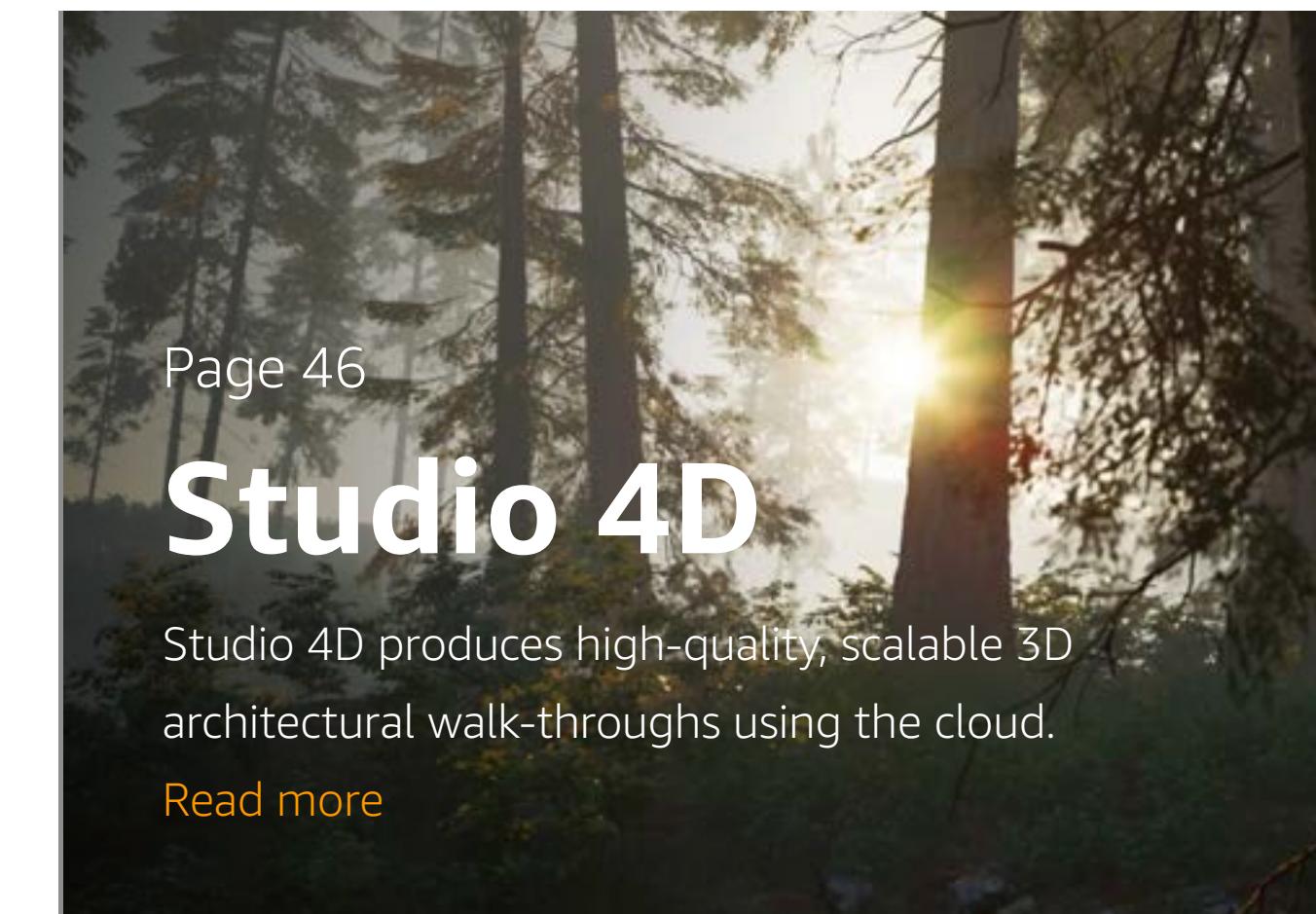
[Read more](#)



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Accedo

Midco Sports Plus allows fans across the U.S. to stay connected with local high school and collegiate sports. [Read more](#)



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Studio 4D

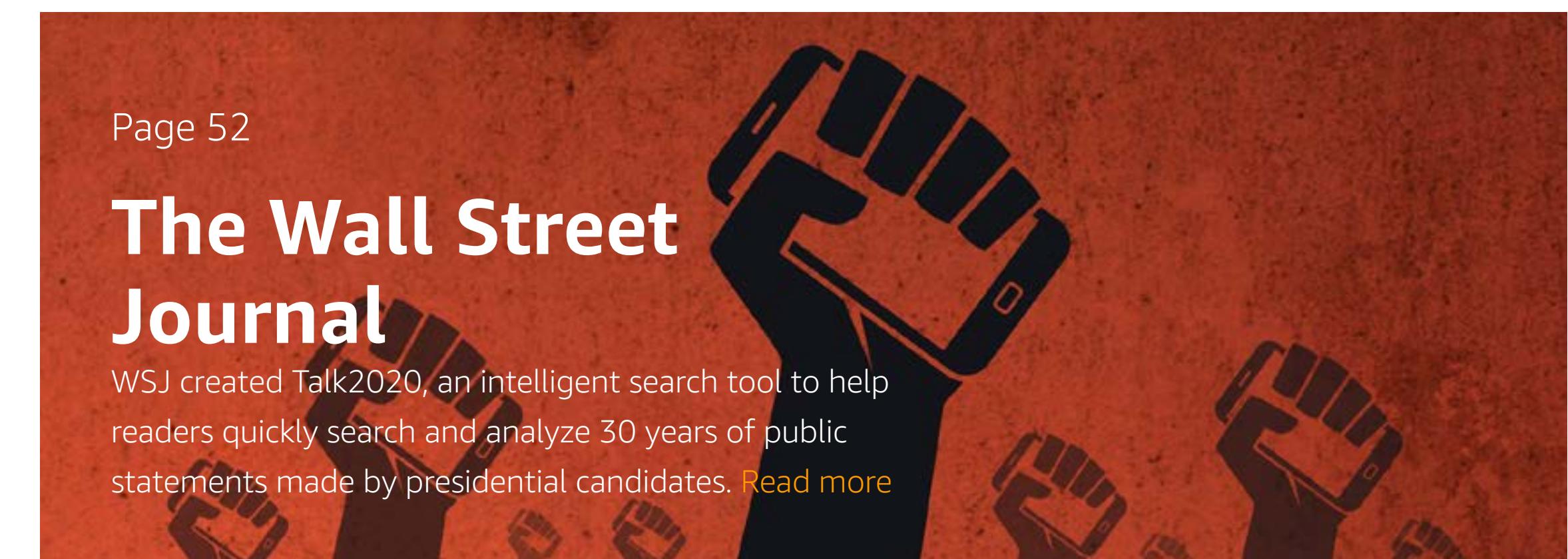
Studio 4D produces high-quality, scalable 3D architectural walk-throughs using the cloud.

[Read more](#)

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Discovery

Discovery used machine learning-powered recommendations to customize the viewer experience and improve the overall customer journey. [Read more](#)



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The Wall Street Journal

WSJ created Talk2020, an intelligent search tool to help readers quickly search and analyze 30 years of public statements made by presidential candidates. [Read more](#)



The Crown, which airs on Netflix and is based on the award-winning play *The Audience*, has delighted viewers and critics alike as it follows the politics, romances and events that shaped the world during the reign of Queen Elizabeth II.

How *The Crown* remotely produced 600 shots in 8 months



Focusing on the latter part of the 20th Century, *The Crown* Season 4 was highly anticipated, with the introduction of Lady Diana Spencer and Margaret Thatcher to the cast. Visual effects are integral in producing the show's exacting period aesthetic, and the soaring popularity of *The Crown* inevitably led to greater demand for VFX shots—a challenge that grew in post-production for Season 4 when the world was plunged into lockdown. So how did the VFX team for *The Crown* complete 600 shots in eight months, remotely?

"With the show's increasing popularity, its VFX needs have grown, and we've expanded our internal team to handle much of the work. We'll contract vendors for shots that require significant CG, animation, or tracking, but keep things like matte painting, set extensions, TV monitor inserts and car green screen in-house, which allows us to work much more quickly and efficiently," said *The Crown* VFX Supervisor Ben Turner.

Turner had already experienced success with a cloud-based workflow for Season 3. For Season 4, an increase in VFX shots meant the team needed to bolster its cloud capabilities. The team also needed to be up and running fast ahead of the plates coming in for Season 4. The setup was ready on Amazon Web Services (AWS) in less than a month. *The Crown* team used AWS Partner Teradici's Cloud Access Software running on Linux-based virtual workstations powered by Amazon Elastic Compute Cloud (Amazon EC2) G4dn Instances. Editing and review were handled on Foundry's Nuke. The team housed assets in Amazon Simple Storage Service (Amazon S3), while enhancing throughput with Amazon FSx, a fully managed service that provides cost-effective, high-performance, scalable storage. Thanks to Amazon EC2 Spot Instances, the team can take advantage of unused EC2 capacity on AWS.



We can work with artists no matter where they are globally and more easily enlist bespoke talent to solve specific problems."

Ben Turner, *The Crown* VFX Supervisor

With everything in place, the team was all set to work once shooting was complete. COVID-19 however, had other plans.

"Before the pandemic, we co-located our team with editorial, so that we could be physically closer to the director and producers throughout post, and further accelerate the creative feedback loop," Turner explains. "We are super fortunate that we were already using AWS, so when all of our artists went home, they each took a NUC and a monitor, and we proceeded with our work as intended, apart from being together for reviews. Everyone was initially based out of London, but as the summer went on, some artists relocated and the transitions were totally seamless, which is one of the real benefits of having an AWS-based pipeline. We can work with artists no matter where they are globally and more easily enlist bespoke talent to solve specific problems."

Delivering an impressive volume of shots, all while working to deadlines and remotely, is no small feat. "Our team doesn't run year-round, only when the season is in post, so we wanted our workflow to be as turnkey as possible," VFX producer Reece Ewing explained. "I didn't want to deal with painful scenarios like running out of storage mid-project and the added stress that comes with scrambling for hardware and space. With all of our media securely on AWS, we have the flexibility and muscle to scale on demand and can turn it off when we don't. Sometimes our artists would need a bigger box to complete a shot and being able to call up more RAM or increase storage as needed to get a shot over the line was invaluable."



Working on AWS allows artists to create in a way that's familiar and close to an on-premises experience, which helps the tech fade away and allows them to focus on creating."

Ben Turner, *The Crown* VFX Supervisor

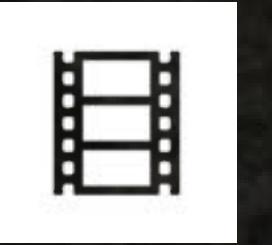


The Crown Season 4 set a new record for US streaming the week of November 16. Turner and Ewing, along with the rest of the VFX team, went on to win the Visual Effects Society (VES) Award for Outstanding Supporting Visual Effects in a Photoreal Episode for their work on *The Gold Stick*, an episode that introduces Lady Diana and Margaret Thatcher and depicts the assassination of Lord Mountbatten. The team was also nominated for a BAFTA TV Award for Special, Visual & Graphic Effects.

With the reduction of operational burdens usually evident in moving to an entirely remote workflow and to maintain the show's creative and artistic integrity, Turner and Ewing made the decision to continue using a cloud-based pipeline on AWS, albeit with the artists hopefully back in the studio.

"In creative industries, it can be tough to quantify things like productivity and artist satisfaction, but the numbers speak for themselves," Turner concludes. "Our team was able to complete an incredible amount of work this season, despite the challenges, and I definitely noticed a jump in happy faces. Working on AWS allows artists to create in a way that's familiar and close to an on-premises experience, which helps the tech fade away and allows them to focus on creating."

AWS helps studio customers reduce operational burdens so they can spend more time creating with the most comprehensive set of cloud capabilities for content production. Explore aws.amazon.com/media/content-production/ to learn more. ▪



Winnie-the-Pooh gets a new lease on life

Created by A.A. Milne, Pooh Bear began life as a 2D figure designed by E.H. Shepard in storybooks. Pooh emerged as a 3D character in 1977 in Disney animated films. In 2018, the lovable bear received a new lease on life as a full-CG character, appearing alongside his real-life companion, Christopher Robin, in the Disney film of the same name.

The team at Method Studios in Melbourne won the bid for *Christopher Robin* in 2017, tasked with the challenge of turning the illustrations from Milne's stories into realistic, fully animated characters. Jon Stanley, Head of Systems at Method Studios commented, "Winning the bid for *Christopher Robin* was thrilling, yet intimidating, as rendering a full-CG bear, often featured in closeup shots, is challenging".

Winnie-the-Pooh, the friendly, honey-loving bear has brought joy to the lives of children and adults alike since his introduction to our world in 1926.

Method Studios is well established in the world of visual effects, with work spanning across major films including *Aquaman* and *Jumanji: The Next Level* and episodic series, including the Emmy Award-winning "Battle of the Bastards" episode from HBO's sixth season of *Game of Thrones*. Disney's *Christopher Robin* proved to be a notable undertaking for Method Studios, a project which would later result in an Asian Academy Creative Award win for the team. It also marked the beginning of its collaboration with Amazon Web Services (AWS).

Method Studios used *Thinkbox Deadline* software to manage its render farm for many years, before Thinkbox Software was acquired by AWS.

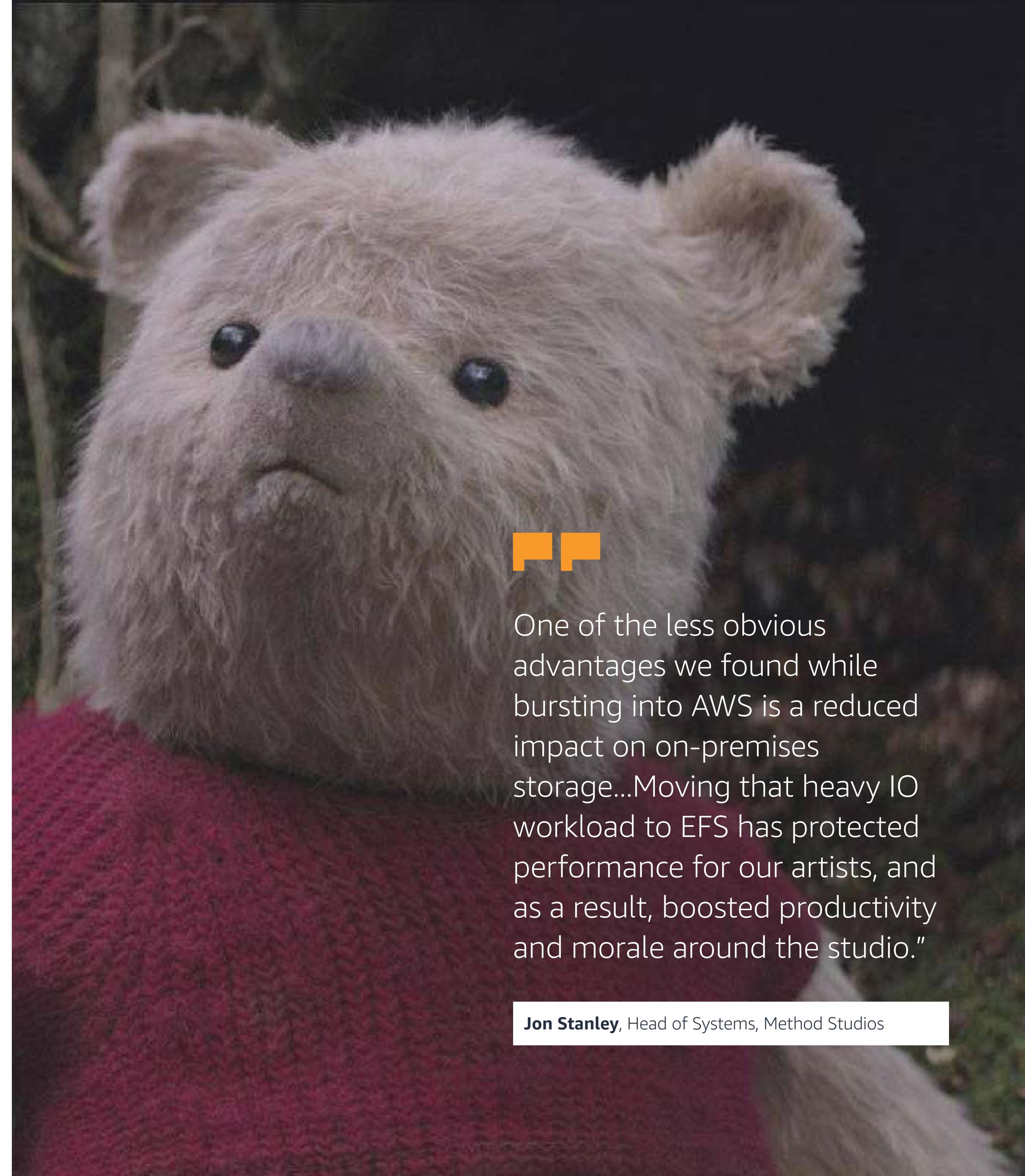
"As we began prepping for *Christopher Robin*, the AWS Thinkbox team assisted setting up a proof-of-concept workflow for burst rendering to the cloud," notes Stanley. "Before starting, we had to think through how we'd present our data to the cloud-based render nodes, where to store the data, and how to integrate cloud-based compute with our existing on-premises farm."

The team considered various options in how to present textures and geometry to the [Amazon Elastic Compute Cloud](#) (Amazon EC2) instances. The selected approach came through presenting its on-premises Network File System (NFS) server directly over its [AWS Direct Connect](#) to the [Amazon EC2 Spot Fleet](#) in the Sydney Region. Stanley added, "That said, we wanted to take advantage of hundreds of instances that would create tens of gigabits of traffic."

In terms of egress traffic, getting that kind of throughput over a virtual private network (VPN) can be challenging and cost prohibitive. Instead, Method Studios opted for [Amazon Elastic File System](#) (Amazon EFS), a cloud-based, managed NFS service. Setup with Amazon EFS is simple, and the default configuration can be scaled back to minimize costs when unused. Through a less automated approach, the team ended up using the provisioned throughput setting for more predictable performance.

Uncovering hidden advantages

Method Studios in Melbourne soon realised the full potential that AWS could deliver. "One of the less obvious advantages we found while bursting into AWS is a reduced impact on on-premises storage," notes Jon Stanley, Head of Systems of Method Studios. Input/output (I/O) requirements from heavy render activity can impact artists significantly since it's hard to stay productive when your storage can't keep up.



One of the less obvious advantages we found while bursting into AWS is a reduced impact on on-premises storage...Moving that heavy I/O workload to EFS has protected performance for our artists, and as a result, boosted productivity and morale around the studio."

Jon Stanley, Head of Systems, Method Studios



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Jon Stanley, Head of Systems, Method Studios

Stanley adds, "Moving that heavy IO workload to EFS has protected performance for our artists, and as a result, boosted productivity and morale around the studio." Alongside EFS, Method Studios added an all-flash [AWS Partner Qumulo](#) cluster to speed up application start-up times.

To ensure that the right data reaches the cloud for renders and returns to artists' workstations as soon as a frame finishes rendering, Method Studios built a system to programmatically generate a list of dependent assets and software required to render any given shot.

"Our toolset could already track dependencies, so it only took two weeks to build the basic infrastructure and software," explains Stanley. "Today, we use a database to track cloud storage files. Before transferring data, we check against that database to see if an asset needs to be synced. Anything not already in the database is added to the queue, which feeds a farm of sync workers that move data to/from cloud storage.

Deadline captures any errors resulting from missing assets, which then automatically sends off a request to retrieve missing files. The failed task then waits for the data to arrive and resumes once the files have arrived in cloud storage."

Stanley continues, "Since we're using the cloud to augment our on-premises render capacity, we needed to be able to scale out quickly without manual intervention, and just as easily scale down so we're not paying for resources one second longer than we need them. To achieve this, we built tools to watch Deadline for queue tasks. Now when our on-premises render capacity is exhausted, we can easily scale up our Spot Fleet and begin rendering in the cloud within minutes. As soon as there are no more queued tasks, Deadline shuts down idle machines, so we only pay for compute in-use.

"We track and monitor spending using dashboards and cost allocation tags. This way we always have visibility into our spend, and a pre-set alert warns us if we're exceeding the forecasted budget."

Using an [Amazon EC2 G4dn \(GPU\) instance](#) that is set up exactly like an on-premises workstation, Method Studios was able to quickly identify problems.

"To ensure renders are turning out as expected, we created a web application that allows artists to preview frames while they're rendering. We take advantage of all the metrics coming out of [Amazon CloudWatch](#) and use Grafana dashboards to track Amazon EC2 metrics, storage, bandwidth, costs, and anything else we can imagine," explains Stanley.

Focusing on the cloud

Reflecting on Method Studios' cloud journey, Stanley says, "we've seen how integral rendering on AWS is to our render farm strategy. We've shifted focus away from capex purchases or hiring equipment and are now focused on the cloud. At this point, we've automated most AWS infrastructure management and are spending far less time racking servers, managing firmware updates, and replacing broken hardware." Stanley concludes, "Our goal is to keep reducing the time it takes to get a finished frame back to artists, so that we can keep raising the bar in terms of quality and turnaround time for clients."

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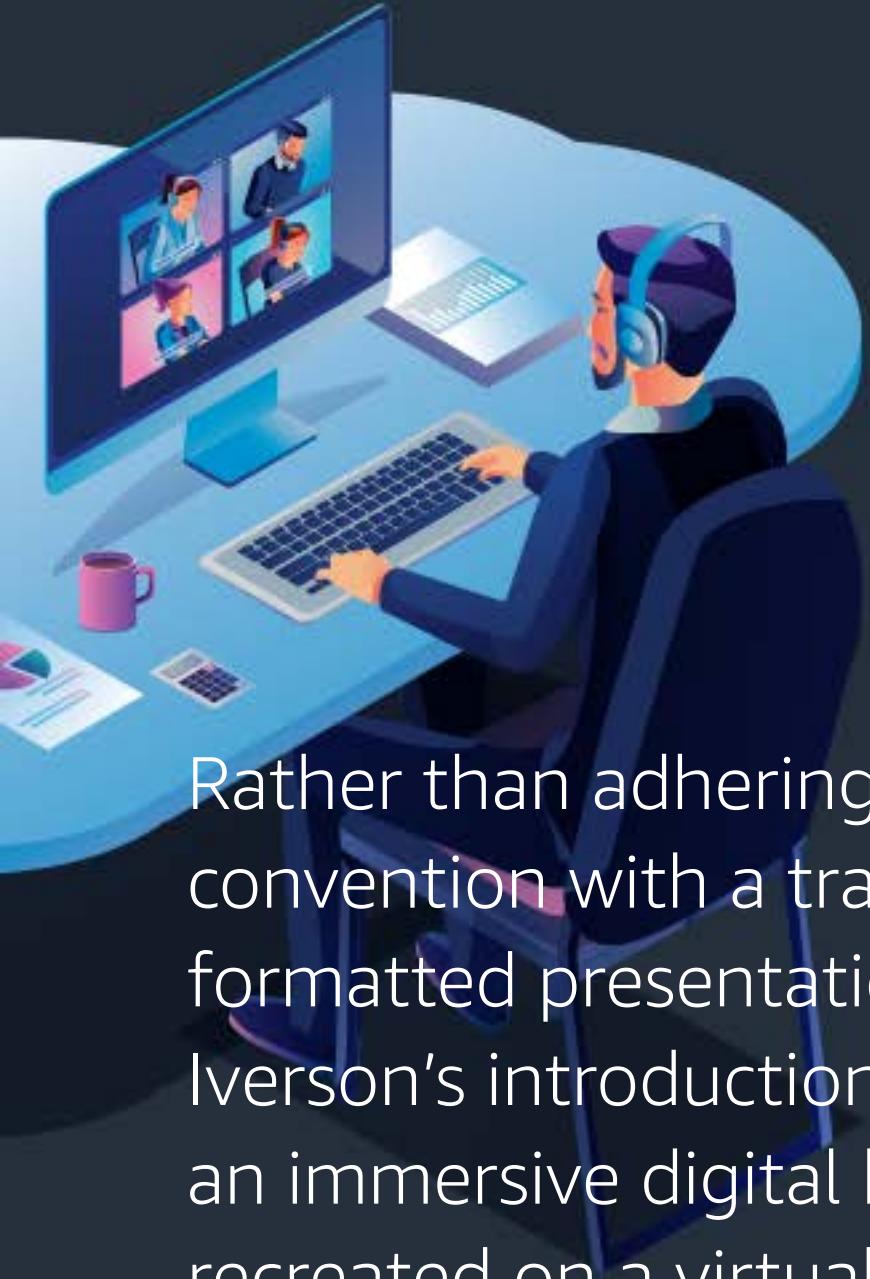
Jon Stanley, Head of Systems, Method Studios



Reimagining virtual speaker sessions at **SIGGRAPH 2021**

With long-standing events either canceled or shifted online due to a global health crisis, organizers of large, in-person conferences and exhibitions need to innovate like never before. Moving events with a large number of attendees into the virtual realm has spurred plenty of interesting workarounds and engaging approaches from which to learn as companies and events reimagine the trade show experience.

SIGGRAPH is a conference and exhibition dedicated to computer graphics and interactive techniques, showcasing inspirational speakers and innovative breakthroughs in research and technology. In 2021, SIGGRAPH celebrated 48 years of development and advancement in computer graphics, digital art, animation, visual effects, machine learning, artificial intelligence, immersive and mixed realities, and scientific visualization. The show is well known for its collaborative ethos. It offers a chance to connect around ideas, recognize achievements, and exchange knowledge – but it is also positioned as a source of entertainment within the industry. Over prior years, the event built up an engaged following and enviable reputation, so it was vital to replicate the community-feel of the event within an online environment and in virtual speaker sessions.



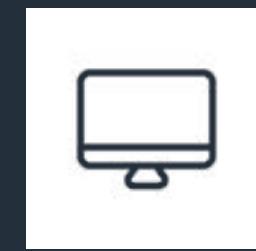
Rather than adhering to convention with a traditionally formatted presentation, Iverson's introduction featured an immersive digital backdrop recreated on a virtual production stage.

Redefining reality for conference presentations

The same technologies that allowed content production to continue safely and remotely throughout the pandemic can be used to deliver more thoughtful and dynamic online presentations. An Amazon Web Services (AWS)-featured speaker session at SIGGRAPH 2021 provided both visual spectacle and thoughtful introspection by making use of the latest virtual production techniques and best practices. In his keynote session *Through the looking glass: the next reality for content production*, Eric Iverson, CTO for Media & Entertainment, AWS, hosted leaders from Netflix, Weta Digital, Company 3, Epic Games, and Amazon Studios. Together, they discussed both the foundation and development of today's computer graphics (CG) technology. Rather than adhering to convention with a traditionally formatted presentation, Iverson's introduction featured an immersive digital backdrop recreated on a virtual production stage. The session took the audience through content production advancements from decade to decade, and then on a virtual stroll through a leafy park.

Participating panelist organizations brought together a unique set of skills that combined to deliver the project. Captured on the XR Stage at 204 Line facility in Pacoima, CA, the presentation was made possible by ICVR and Brendan Bennet Productions. It was directed by Scott Kelley, with ETC Head of Adaptive and Virtual Production Erik Weaver as Executive Producer. The session was filmed with a three-camera setup – an unconventional approach considering most virtual productions employ a single camera. Epic Games' Unreal Engine provided real-time rendering. ICVR created the dynamic digital park environment and leveraged a range of AWS services during production. Using AWS, ICVR was able to iterate on the environment, with a remote team working across different time zones to ensure that the visuals closely matched the physical set. This included foliage, a bench, and dirt flooring. ICVR used AWS solutions to create the background imagery including [Amazon Simple Storage Service](#) (Amazon S3), [Amazon Elastic Compute Cloud](#) (Amazon EC2), and [Amazon Route 53](#). ICVR also used [AWS Fargate](#) serverless compute and [Amazon Cognito](#) for managing its proprietary RendezVu interactive 3D world app.

The shoot's motion tracking technology by Stype created a dynamic experience for the audience, reinventing the often static nature of traditional presentations and panels. The 270-degrees of displayed imagery across more than 35 million pixels delivered a truly immersive feeling for viewers. The stage featured ROE Visual BP 2.8mm LED panels in a curved configuration for linear display and Planar Systems LED panels for ceiling imagery, with LED video processing handled by Brompton 4K Tessera LED processors.



It has been a time of huge upheaval and difficulty for the exhibition and events industry, with travel restrictions and mandatory social distancing impacting the sector.

Charting the beginnings of CG

Along with bell-bottoms and disco, the 1970s gave rise to the CG industry, including the launch of the SIGGRAPH conference, the creation of the first 3D animated hand, and Atari's release of *Pong*. The decade also marked the release of *Star Wars*, inspiring a new generation of creatives. In the 1980s, CG experiences continued to advance alongside the release of the Nintendo Entertainment System and Apple's Macintosh personal computer. Progress continued into the 1990s with the formation of Epic Games and Pixar, the launch of Adobe Photoshop, and the premieres of *Terminator 2* and *Toy Story*.

The session made use of this legacy, with a brief tour through CG history to show the audience significant industry progress in a few short decades. Iverson shared highlights of the digital advancement and visually evaluated the past in his introduction. By showcasing developments that helped democratize CG production, Iverson tapped into audience nostalgia while offering exciting possibilities for the future. With verbal description alone these references could easily have fallen flat, but by using dynamic visuals, the possibilities of the present and future came into focus.

In the present day, the bar for content quality continues to rise and demand from streaming services and studios for compelling visuals is outstripping the pace at which creators can deliver. To ramp up capabilities, Weta Digital has a two-pronged approach – empowering more artists and harnessing infinite compute power. Alongside a shift from on-premises resources to AWS, Weta Digital develops tools that increase creativity by decreasing the time needed for work that can be automated. During the presentation, Weta Digital CEO Prem Akkaraju shared the studio's proprietary tree growth software used on the *Planet of the Apes* films to procedurally generate geographically accurate forests.



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The cloud-based revolution

In the 2010s, cloud-based computing became more widely accepted, with studios offloading burst render workloads as shot complexity and volume increased. Untold Studios was the first fully cloud-based creative studio in 2018, blazing the trail for others to follow suit. Marvel Studios' 2019 billion-dollar blockbuster *Avengers: End Game* featured 2.5 times more VFX shots than *Iron Man*, which was released in 2008. Other ground-breaking projects at the time included Walt Disney Studios' *The Jungle Book* and *The Lion King*. Now the technology has become an intrinsic part of production with the Disney+ streaming series *The Mandalorian*, showcasing the latest iteration of virtual production technology powered by game engines.

In 2020, with the onset of COVID-19, the industry found itself yet again at a tipping point in its evolution. Content creators needed to rethink how to plan, shoot, and edit projects, and in some cases, adopt technology they either had not considered, or had planned to adopt much later. Fortunately, the necessary tools were production-ready, and many studios found that integrating the cloud, whether via hybrid or all-in scenarios, allowed them to not only survive but to capitalize on unprecedented changes.

Although some creative studios chose to move production pipelines to the cloud pre-pandemic, it was rare for a VFX or an animation studio to operate remotely. Due to infrastructure constraints or reluctance to alter decades-long practices, studios preferred artists to be physically present to work on projects. This meant that studios were bound to talent recruiting based on geographic location. Now, newer studios are increasingly opting for a more agile approach to infrastructure, while established facilities are rethinking their hardware roadmap.

Modern content production and connecting with talent

Amazon Studios' Ken Nakada, who serves as Virtual Production Supervisor of Prime Video, and Epic Games Industry Manager David Morin, offered insights on virtual production from differing yet complementary perspectives. Both had significant common ground in terms of the impact and anticipated direction of the technology. Noting the contributions of virtual production pioneers James Cameron and Robert Zemeckis, Morin emphasized that the game-changing capabilities of real-time CG tools have made virtual production a more accessible tool for filmmakers, not just those with multi-million-dollar budgets.



According to Laura Teclemariam, Director of Product, Animation at Netflix, global production is here to stay and companies that don't lean in will be left behind.

Cloud-based remote production workflows also provide access to a larger, more accessible talent pool, allowing studios to benefit from diverse skillsets and perspectives. In turn, artists can choose the projects they want to work on without uprooting their families. Cloud-based pipelines can also be deployed in-studio, providing companies with more flexibility in how they work and eliminating the costly upfront expenditures that come with purchasing and managing on-premises compute resources. Netflix found an incredible benefit to remote work using the cloud, allowing its team to tell more authentic stories and creatives to be more imaginative. Netflix connects with artists globally using its NetFX cloud-based pipeline, which provides the infrastructure needed to create Netflix-caliber projects. Netflix Director of Engineering Rahul Dani, who oversees NetFX, noted that the pipeline has been deployed on 35 productions spanning four continents. According to Laura Teclemariam, Director of Product, Animation at Netflix, global production is here to stay and companies that don't lean in will be left behind.

Company 3 SVP of Technology Robert Keske began investigating cloud-based workflows in 2011 as a cost management solution. He noted that a capex approach to infrastructure had previously hindered the company's growth, but using AWS allows it to scale from a few users to hundreds of users and thousands of render nodes at a moment's notice. Keske highlighted the importance of making infrastructure as transparent as possible to artists and having a "compute from anywhere" approach to bring resources to talent, instead of the other way around. Championing an "artist-first" mindset also inspired Rex Grignon to develop a solution that helps animation and VFX studios move more of their workloads to the cloud. The idea for Nimble Studio sparked when Grignon accessed his office computer from a training room, calling it a "lightbulb moment." Once he realized that a powerful workstation doesn't need to be located under your desk at home, Grignon started learning about the cloud and the pieces came together. As Director of Amazon Nimble Studio Go to Market at AWS, Grignon now works to ensure that it provides a frictionless yet customizable experience for all artists.

The keynote can be viewed on-demand via the SIGGRAPH website:
<https://pages.awscloud.com/siggraph2021>. ▪



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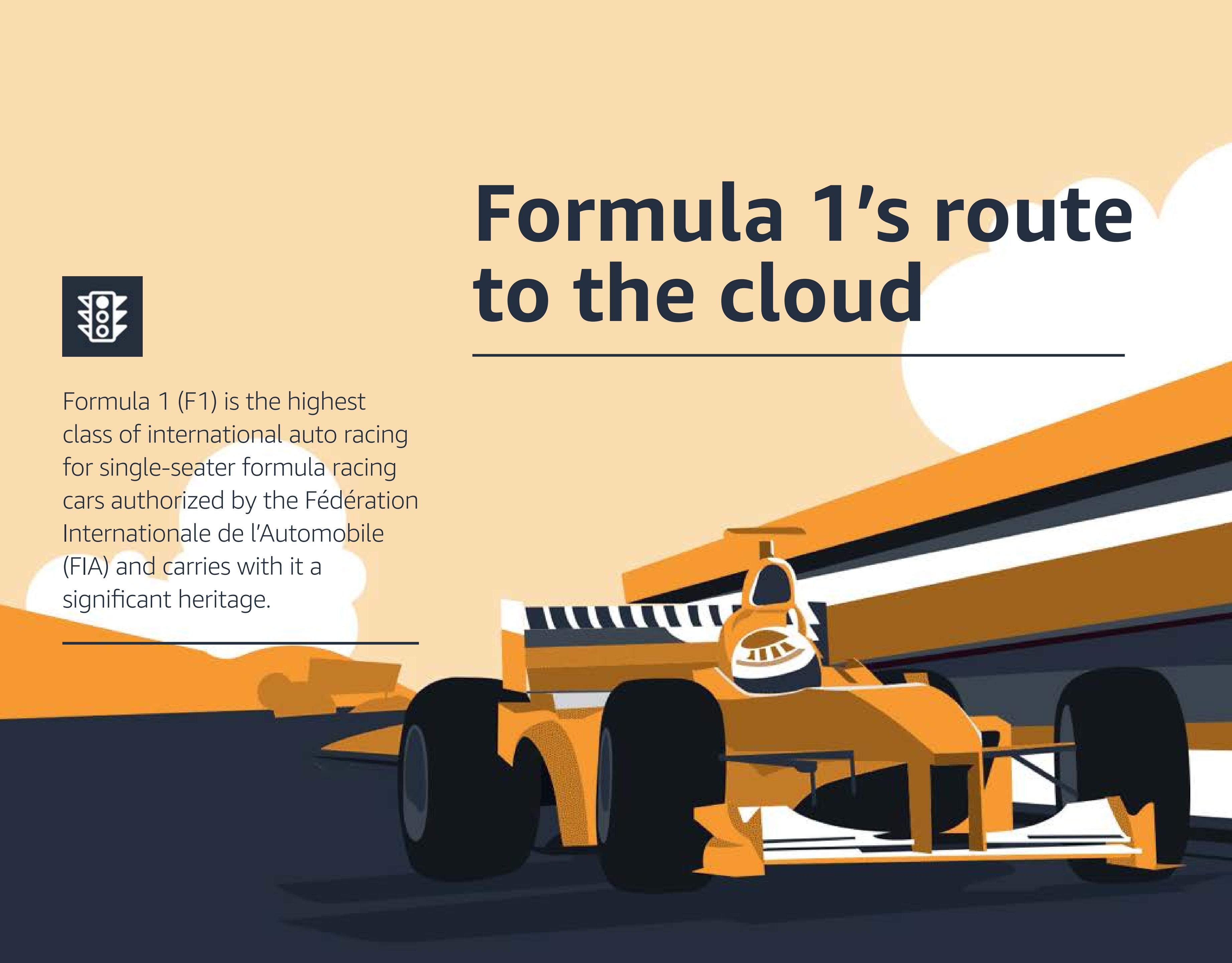


Formula 1's route to the cloud

Formula 1 (F1) is the highest class of international auto racing for single-seater formula racing cars authorized by the Fédération Internationale de l'Automobile (FIA) and carries with it a significant heritage.

The organization known today as Formula 1 originated in 1950 as the The World Drivers' Championship. It subsequently became the FIA Formula One World Championship in 1981. F1 has now taken its place on the podium as one of the leading formats for international racing.

The F1 broadcasting heritage is impressive, and the scale of F1 content in linear tape open (LTO) format collected over decades is immense. Since the early 1980s, source material generated or produced by any broadcaster or production company at Formula One events was put into the F1 library. In the early years, the number of tapes collected ran in the low hundreds, containing just the program as it was broadcasted. This included the F1 race itself and the international recorded house coverage, with both a clean version and a commentary version featuring graphics. All that changed in the early '90s, when F1 owner Bernie Ecclestone put cameras on the cars.





This new approach to filming caused the volume of content requiring storage to increase significantly over time. There are between 40 and 50 cameras around the racetrack during events.

A surge in content volume

This new approach to filming caused the volume of content requiring storage to increase significantly over time. Outputs from individual vehicles capturing action on the track were sent back to the ground via helicopter relay for recording. This meant that F1 could introduce more material into the production for host broadcasters and for features and documentaries. The F1 fleet consists of 25 trackside cameras, multiple RF cameras, a helicam, and a host set. There are between 40 and 50 cameras around the racetrack during events.

The transition

An exponential growth in footage required organization, on-premises storage, and physical maintenance. The F1 team had been using a tape-based Digi-B to Beta S.P., H.D.-Cam and X.D.-Cam- based operation, resulting in a content library of some 100,000 physical assets. In 2013, F1 began digitizing the archive, moving to a file-based workflow over the course of four years. The content, which was held on discs, was put into a tape robot that required continuous upgrades. The team could not keep up with the demand for storage and rising tape costs were significant.

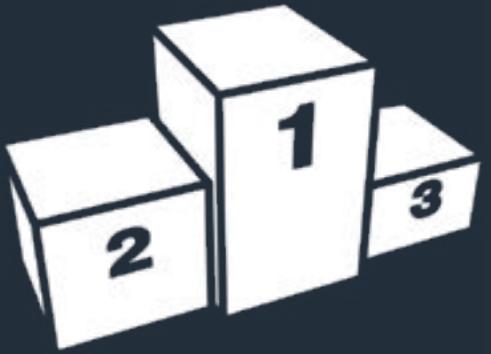
It was time for the sort of dynamic shift that F1 is known for. Enter [Media2Cloud \(M2C\)](#), an [AWS Solutions Implementation](#), which applies a serverless end-to-end ingest workflow to move video assets and associated metadata to the cloud. A workflow to upload three petabytes of content from a reach engine, media asset management system controlled, LTO tape robot, initiated the core engine of transitioning media to AWS.

During migration, M2C uses [Amazon Rekognition](#), [Amazon Transcribe](#), and [Amazon Comprehend](#) to analyze and extract valuable metadata from video and images. The solution provides a standardized architecture that helps accelerate the migration and supply chain process. The F1 team knew M2C would provide the right media management innovations for processing, delivering, and managing its complex content library.

Trevor Turner, Head of Media Systems Development, Formula 1, commented; "The foundation of Media2Cloud was robust and adaptable. We were able to customize the existing reference architecture into something we ended up calling the Media Processing Framework."



[Media2Cloud](#) analyzes and extracts valuable metadata from video and images...The solution is designed to provide a standardized architecture that helps accelerate the migration and supply chain process.



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Trevor Turner, Head of Media Systems Development,
Formula 1

As part of a wider program at F1, AWS signed the team up to [AWS Direct Connect](#), which provided a dedicated 10 Gig link-in. This infrastructure assisted in moving both existing data as well as new content to the cloud. John Bennett, Senior Consultant, M&E Global Accounts AWS, explained; "I think that's very, very important. It's about moving an archive and being able to deal with something that happened three days or three minutes ago - not just three years ago."

Footage at your fingertips

Content ingest and storage was just the first piece of the puzzle. Efficient access to media assets had historically been a real issue for the F1 team as well. Requests piled in from editors keen for a searchable system. Researchers and editors spent up to 50 percent of their time procuring and preparing footage—before they could begin working with it. All told, the team calculated that approximately 8,000 hours per year were spent using the previous MAM set-up.

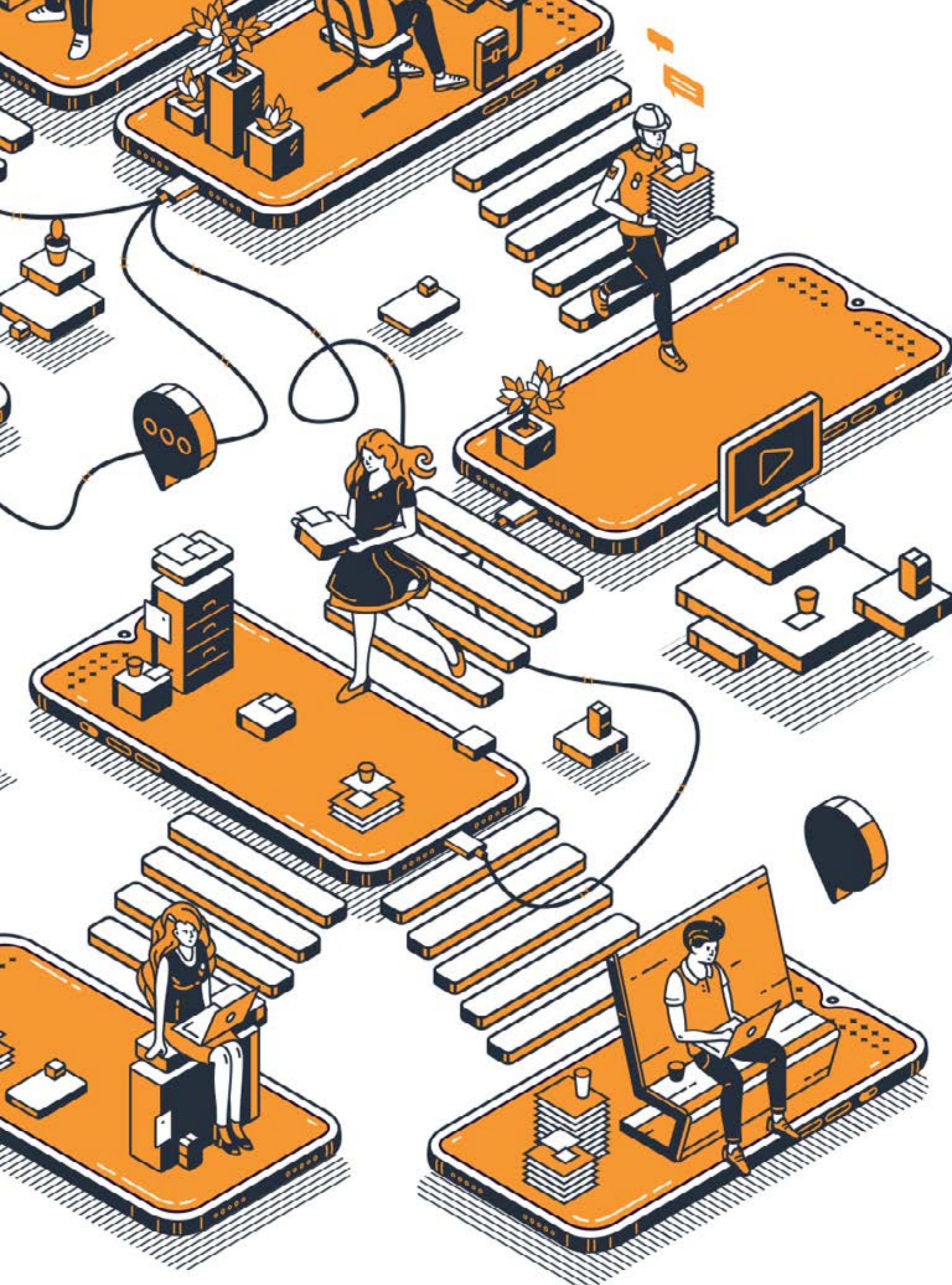
Media2Cloud provided the tools to connect what had previously been silos of footage. This resulted in increased efficiency and a much better experience for editors, who no longer had the frustration of manually searching through physical media. Cross-referencing footage was also significantly easier. Content used in one edit could be traced and used again in new ways. Footage was now available at users' fingertips and editors could really maximise the historical content stored in the F1 archive.

Looking to the future, F1 needed to ensure that its content infrastructure could evolve with requirements. Crucially, the framework F1 now uses is inherently scalable. The team can still use the backbone of the Media2Cloud architecture, but its flexibility means F1 can extend its workflow to enhanced machine learning and analysis. Turner commented, "AWS offered us a guarantee as opposed to us potentially going astray on our own. Having a platform we knew was completely resilient—that was the key for us. We're now covered for the past, present, and future of our media needs." ▀



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Understanding the value of insights and innovations

Audiences around the world demand more content from the media industry.

Complex production workflows were impacted by the pandemic. Some productions had to adapt significantly in order for content creation to continue. Companies turned to technology to close the gap left by social distancing requirements and travel restrictions.

The [HPA Tech Retreat](#) is the pre-eminent gathering for individuals and companies engaged in the creation, management, and dissemination of content, bringing together a world-class roster of well-known and emerging leaders in engineering, technology, creativity, and business to discuss the most compelling topics facing the media and entertainment landscape today. "Found Lederhosen," a thought leadership project at the Hollywood Professional Association (HPA) Tech Retreat 2021, led by Joachim Zell (JZ) was launched to innovate and test filmmaking and creative processes during the pandemic.



Enabling a global project

The project, "La Inquilina," a cinematic short, was created to explore and showcase the innovative technologies available to the industry. The production's cinematographer and producer, Sandra De Silva, explained that this was her first remote project, driven partially by the pandemic and partially by the need to evolve and innovate within the industry.

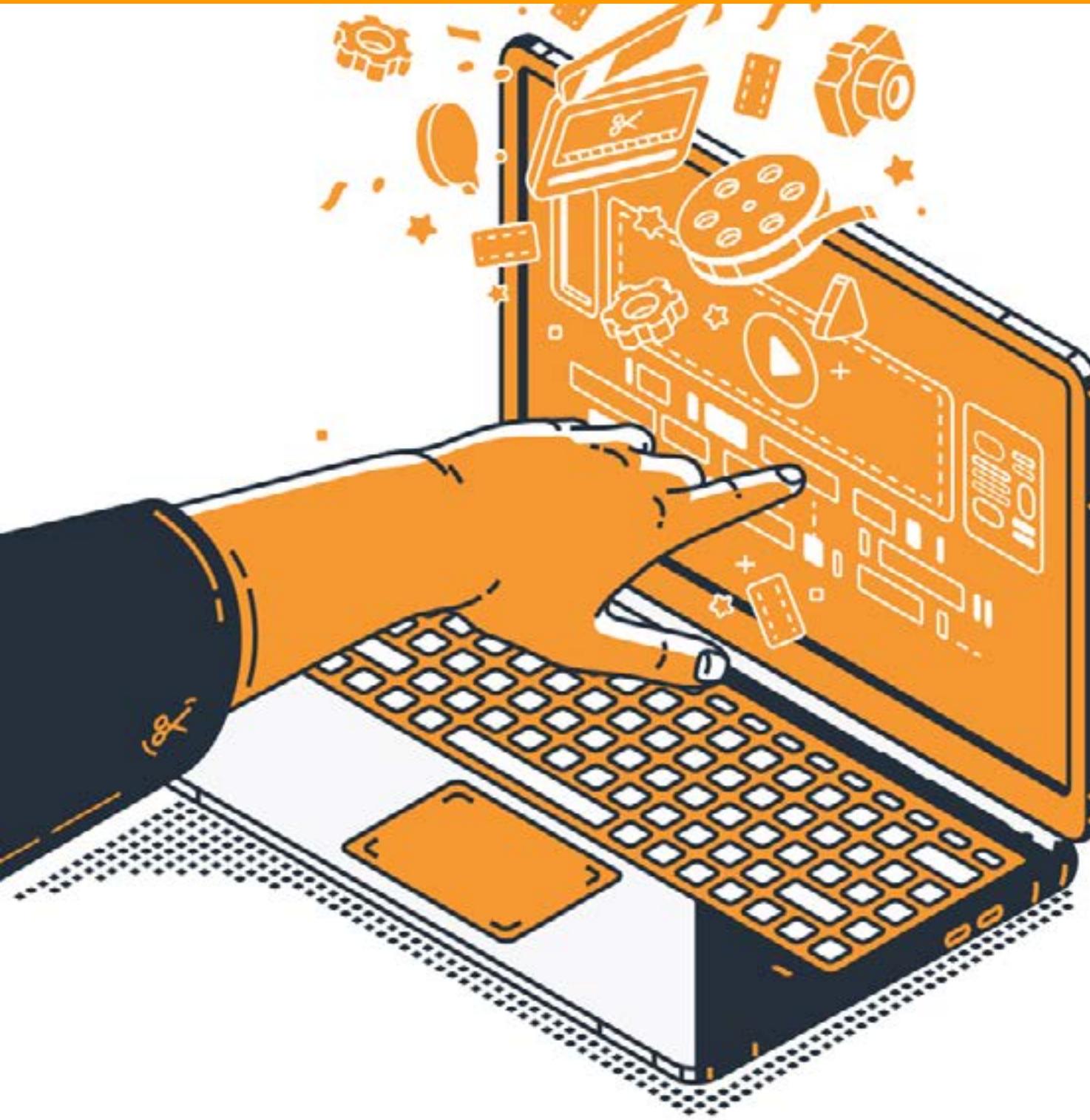
Beyond COVID-19 precautions, on-set production felt regular—although embellished with live feedback from Zell, who had access to a remote live feed. However, the post-production workflow was online using cloud-based services. Although filmed in Mexico City, the production was global; the editor was in Colombia, post-production in Los Angeles, CA, visual effects in Bozeman, MT, and the sound editing in San Francisco, CA.

All content was uploaded to the cloud immediately after filming, allowing workers around the world to access the content and begin the production process. The production required a native Spanish-speaking editor to ensure that the correct timings were maintained. Thanks to the cloud workflows, the editor had technical access in less than 24 hours.

Within this process, AWS supported three distinct capture-to-cloud workflows, four different VFX pipelines, three localization workflows, production edit and sound, two different packaging platforms (IMF/DCP), three different VOD presentation platforms, and a game development environment. AWS worked with partners, creatives, subject matter experts, and other technology companies to build and innovate content production workflows using AWS.

HPA 2021: A Creative's View of Working in the Cloud

[Watch the video](#)



The challenge of managing assets

Any media production must address the challenge of managing large video assets. They filmed this project in 4K, so delivering it to the cloud robustly required significant coordination. The assets were stored on [Amazon Simple Storage Service](#) (Amazon S3), an object storage service built to store and retrieve any amount of data from anywhere. Creating a workflow in which the content sat centrally and was accessible by all team members was crucial to the success of the project. [IBM Aspera](#) was also used to send files and datasets quickly and reliably across the hybrid cloud environment.

The team used [BlackMagic Design](#)'s integration with AWS services to deliver editing tools to its creatives. This integration allowed a fully cloud-based editorial workflow, which enabled users to centralize their editing workload and work collaboratively despite being in different countries. Dubbing and subtitles were applied using an integration with SDI Media.

HPA 2021: Collaborating Globally on a VFX Pipeline

[Watch the video](#)



Streamlining performance to enable creativity

Developing a comprehensive and sophisticated workflow allows productions to include people globally, and it allows those users to work efficiently. Interoperability had to be at the heart of this project, with numerous solutions and products working alongside Amazon S3. With applications working seamlessly together, metadata and other media asset management features were used to reduce the time spent manually searching for and uploading information to content. [CORE](#) by 5th Kind, a secure studio workflow management system, was used for its metadata-based framework, which allowed creatives to search and develop the assets available to the team. Additionally, the project adopted the Movie Lab's VFX sequence naming standard to enhance easy sharing.

[Arch Platform](#) allowed users to spin up content creation facilities on top of AWS in under an hour, reducing the cost to the visual effects team by 60 percent.

With Shotgun and Deadline Nodes automatically built in at the backend, creatives could spend less time completing administrative tasks and more time editing. [AWS Thinkbox Deadline](#), a hybrid administration and compute management tool, was used to manage file rendering. The team used the Teradici XX protocol to deliver high-performance visualization capabilities remotely to the creatives, enabling them to have secure access to content.

Cloud-based working delivers a flexibility previously unavailable to production teams. Workspaces are easy to add and are cost efficient because they can scale up and down as needed. They also used [Amazon FSx](#), a shared scalable shared storage system, with a throughput set at 2GB per second to allow for high performance processing. This provided creatives with a high-quality user experience, allowing them to focus on the job at hand.

HPA 2021: Putting the Pieces Together in the Cloud

[Watch the video](#)



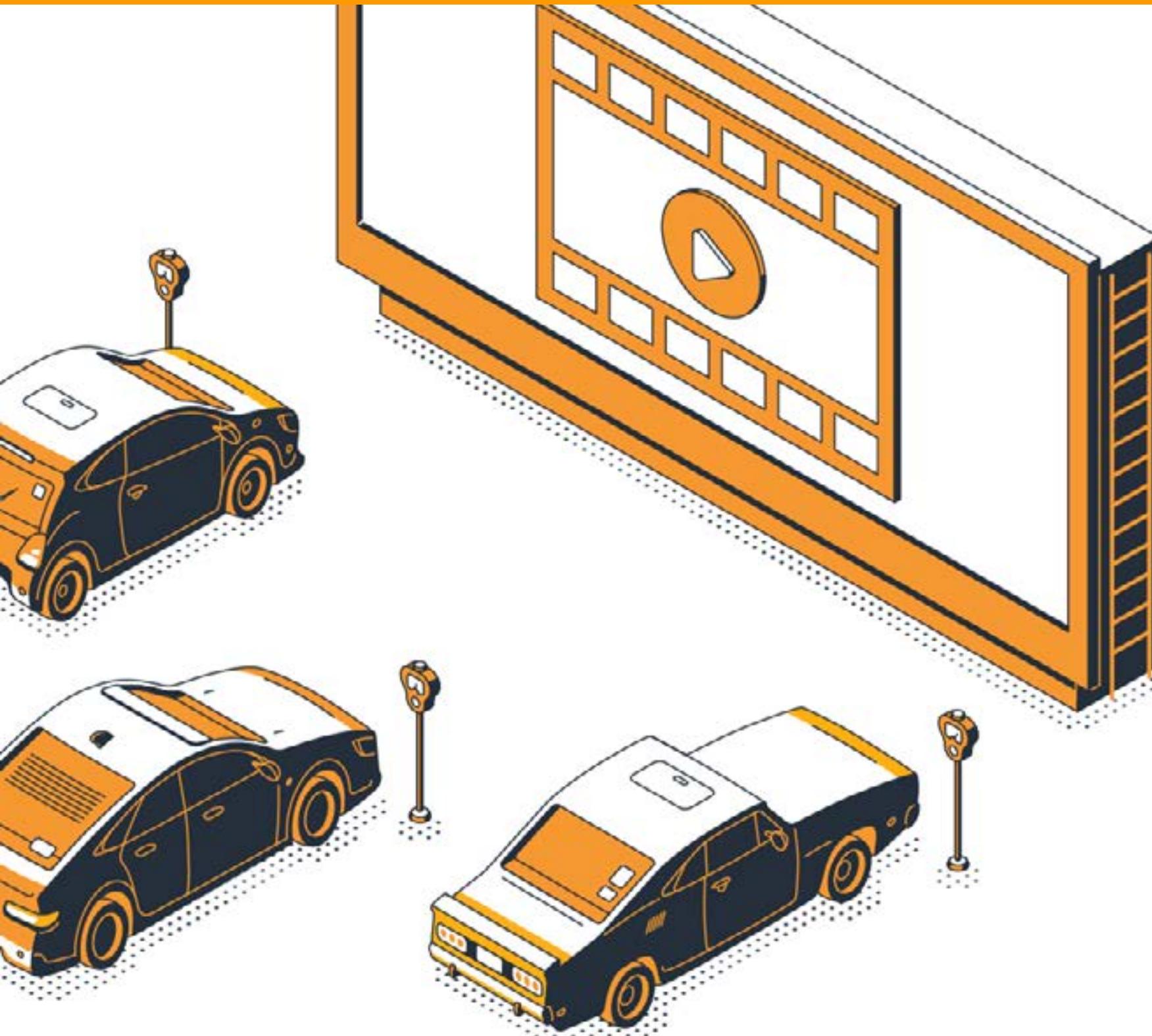
Globalization

As with any media production, globalization was a key focus of "La Inquilina." They addressed the complexities of globalization through sophisticated workflows and solutions. Machine learning (ML) transcription generated the subtitles and the first pass at language translation. However, challenges like dialect and background noises need human input, however ML can massively improve efficiencies.

For this project, one of the largest benefits is that the subtitles have been issued in chains, meaning that they are easy and cheap to extract and overlay on the video content. SDI Media and Haymillian worked to deliver dubbing and subtitling for "La Inquilina" using the remote workflow. When moving content between territories, [AWS Media Exchange](#) was used to provide the secure transfer of data as it provided a low-cost and streamlined service. OWNZONES created the final distribution of IMF files including the integration of multiple audio and localized content playlists.

HPA 2021: Globalizing Content for Local Markets

[Watch the video](#)



This cloud-based proof-of-concept, led by HPA, was a success with "La Inquilina" proving that remote productions can produce content while maintaining quality. It was delivered to audiences via a demo application built using Accedo One, a powerful SaaS platform for building and growing impactful video services. Thanks to a scalable integration layer, Accedo was able to create a best-in-class setup featuring Bitmovin Encoding, which optimizes video quality at the lowest bitrates and Castlabs PRESTOplay, which can automatically detect and choose the right feed depending on the end user device. With the demo application, playback was possible in 4K Dolby Vision, HDR-10, and SDR.

The project highlights the opportunities delivered by remote working within the media industry.

It allows creatives, regardless of their location, to contribute centrally to the post-production ecosystem. Additionally, it demonstrates the hardiness of online production workflows, giving confidence to producers and broadcasts worldwide that projects can continue despite the challenging circumstances being faced globally due to the pandemic.

Learn more about [AWS for Content Production](#) and [AWS for Media Supply Chain & Archive](#). Watch more innovative cloud architectures from AWS Partners and customers on the [This is My Architecture Playlist](#). See more about how AWS media services help video providers build innovative services and deliver top-quality content to engage viewers, drive growth, and unlock new revenue at [AWS for Media & Entertainment](#). ■

Delivering the content to viewers



COVID-19 has had a significant impact on both the home and theatrical entertainment industries, but the result of the pandemic shows opposite trends within each sector.

Globally coordinated movie releases without physical infrastructure

In its annual THEME report covering 2020, The Motion Picture Association (MPA) found that the global home/mobile entertainment market experienced a 23 percent increase compared to 2019, with growth driven by digital content consumption. In contrast, the same report revealed that the global box office market for all films released in each country was down 72 percent in 2020 against the previous year.

The impact of the pandemic coincided with the introduction of new OTT video services that enable more consumers to watch movie content from home, and concerns remain that audiences will not return to theaters. However, many commentators point out that there are few home set-ups that can fully compete with the cinematic experience and many markets where cinema is still an essential source of entertainment.

So how can the owners of movie content protect and maximize its value over the long-term as we move out of a global health crisis?

Protecting the future of cinema

Exclusivity is an important marker for the commercial value of a new release. Theater-goers will be motivated by the same thing as consumers queuing for the latest smartphone – to get there first. This means it is vital for studios to minimize the risk of piracy wherever possible and protect the route to market for new releases.

Day-and-date releases have become standard practice for many Hollywood studios over the past five years. By globally coordinating new releases to occur on the same day, content owners ensure assets are legitimately available in foreign markets at the same time as Hollywood.

This approach combats piracy by reducing the incentive and demand for posting and accessing illegal online studio content. Previously, the day-and-date approach required physical infrastructure in multiple countries and the involvement of numerous individual points of contact, including delivery drivers and shipping personnel. While the process is important for protection of valuable content, it also involves significant cost and coordination. For the film sector to reduce the impact of physical infrastructure requirements, a move away from the standard practice of sending digital media content on hard drives to theaters by mail was needed.

Next-generation digital infrastructure

[Qube Cinema, Inc.](#) is a provider of end-to-end digital cinema technology and solutions. Among its extensive product portfolio is a self-service, single-window system for global theatrical distribution called Qube Wire.

Qube Wire is used to send movie files via electronic transfer from distributors to theaters in 133 countries. This substantially reduces the time and logistical complexity of releasing movies to theater chain partners.

Built on Amazon Web Services (AWS), electronic transfer via Qube Wire saves costs, simplifies the transfer process, and reduces the carbon footprint for transporting digital movie files. Based in India, Qube has its roots in the domestic film industry. It was the first among its peers to enable global day-and-date capabilities for producers in India, so audiences abroad could enjoy same-day Bollywood releases. After achieving dominance in the Indian industry, Qube expanded to Hollywood, where it now serves most major film distributors.



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By connecting theaters to AWS, we can deliver movie files directly to customers globally and avoid regional shipping hubs or hops. This has been invaluable to our customers as they take advantage of increasingly shorter delivery timelines."

Mark Waterson, Senior Vice President, Qube Wire

Physically sending hard drives takes an average of two days, often longer with multiple stops needed to reach theaters in smaller markets. Planning deliveries is also more challenging when dealing with various shipping intermediaries and their unpredictable schedules. But with Qube Wire, movies can ship direct from distributors to theaters in as little as 12 hours.

Mark Waterston Senior Vice President, Qube Wire, explains, "By connecting theaters to AWS, we can deliver movie files directly to customers globally and avoid regional shipping hubs or hops. This has been invaluable to our customers as they take advantage of increasingly shorter delivery timelines."

Cutting both environmental impact and cost, the positive impact of this approach on the environment is huge, as electronic file transfer eliminates the carbon emissions generated in the delivery of hard drives via airplanes and road vehicles.

Many theaters still opt to receive films via hard drives, but even in that scenario Qube can send electronic files over Qube Wire to a local agent, shortening the distance to deliver the drives. Theaters no longer have to store bulky hard disks, and there's a corresponding reduction in non-biodegradable waste—a topic of significant discussion and criticism in the film industry in recent years.

Qube also realized a substantial cost savings by storing and archiving films on AWS. Movies are large digital assets with average file sizes of around 150 GB. Considering that most movies are archived for dozens of years, if not forever, the industry has immense storage requirements. To keep costs down while satisfying long-term storage needs, Qube uses [Amazon Simple Storage Service \(Amazon S3\) Glacier](#) and [Amazon S3 Glacier Deep Archive](#). These services offer fast file retrieval options for efficient access to current movies or those archived in years past.

After a movie is uploaded to Qube Wire, it stays in [Amazon S3](#) for 45 days. This covers the initial delivery period and ensures content is readily available to resend or to send to new locations added later in a movie's release cycle. The film ultimately transitions to Amazon S3 Glacier for archival. With Amazon S3 Glacier and Amazon S3 Glacier Deep Archive, Qube saves 80 percent in storage costs. The company currently stores 2.4 PB of files in Amazon S3 Glacier Deep Archive and 107 TB in Amazon S3 Glacier. For each file sent end-to-end electronically, Qube saves about \$125 on the physical hard drive and protective packaging in addition to shipping costs.

Securing high-value content during storage and transfer

Theaters receiving electronic movie files directly save at least 1–2 hours of work per film, as their employees don't need to receive, load, and transfer hard drives onto local servers.

Less human interaction leads to fewer errors during processing, less risk of file corruption, and little to no risk of files going missing during shipping. Digital transfers are protected with Transport Layer Security (TLS) certificates, which are used to deliver web content securely between distributors and theaters with [AWS Certificate Manager](#) to streamline security.

Qube uses [Amazon CloudFront](#) for electronic file transfer of dynamic movie and ad content from Amazon S3 to theater locations. With Amazon CloudFront, Qube and its customers benefit from advanced security capabilities, including field-level encryption and protection against DDoS and other types of attacks. Qube uses [AWS Identity and Access Management](#) (IAM) and [AWS Single Sign-On](#) (SSO) to maintain fine-grained access control to its infrastructure and stored content.

AWS has unmatched experience supporting the media supply chain from ingest, processing, creation, and distribution to and from the cloud — as well as more than 80 AWS Partners with dedicated tools for media supply chain and archive applications. Explore aws.amazon.com/media/supply-chain-archive/ to learn more. ▀



With Amazon S3 Glacier and Amazon S3 Glacier Deep Archive, Qube saves 80 percent in storage costs...For each file sent end-to-end electronically, Qube saves about \$125 on the physical hard drive and protective packaging in addition to shipping costs.

Adapting infrastructures to reflect media's radical content shift



Trends within broadcasting clearly point to an increasing demand for content, with consumers spending more time on their devices than ever before.

Additionally, customers demand flexibility in how they access content; 72 percent of U.S. homes view video on multiple platforms. Unsurprisingly, this has resulted in broadcasters reevaluating their technologies and infrastructures to adapt to the growing demand for flexible and varied media offerings. Recognizing that its 7-year-old recording system was becoming outdated, Swiss public broadcaster **Radiotelevisione svizzera** (RSI) modernized its infrastructure to adapt to the rapidly changing media industry.

Offering two channels of 24/7 live television, three radio stations, live stream programming, and on-demand content, RSI creates and broadcasts programming in Italian, one of Switzerland's four official languages. Its previous system was specifically designed for broadcast television—there was no way to stream content—and any changes required third-party involvement, making it too slow for a news environment.

Finding the right solution

To explore its options, RSI turned to the experience of another of its branches that had already experimented using [AWS Media Services](#), which make it fast and simple to produce, process, and deliver broadcast and over-the-top video. That served as a proof of concept for RSI. Intrigued by the potential of a cloud-based solution, RSI attended [AWS Summit Switzerland](#), an event that brings together the cloud-computing community to learn about AWS. There it met representatives from [Claranet](#), an AWS Partner that specializes in network transformation and simplifying the management of IT.

Italian-speaking and locally based, Claranet developed a prototype within three weeks that perfectly matched RSI's requirements. "We showed the customer that transcoding only takes four or five minutes on AWS," says Daniele Madama, Claranet Switzerland's managing director of cloud solution architecture.

"RSI has improved scalability, and it's easy to implement machine learning, which is not possible with on-premises hardware."

Perhaps most importantly, those improvements make things simpler for RSI. "The AWS solution was born with the whole workflow in mind," says Massimiliano Babbucci, RSI's head of digital products innovation. "It's focused on our needs. We don't deal with problems ourselves."

Still, costs remained a primary concern for a public broadcaster with budget constraints. "We were worried about the cost," says Ivan Canetti, RSI's head of the online technical team. "As a video management service, we move many gigabytes of content." However, Claranet quickly provided RSI with an affordable AWS solution estimate. "The first time we saw the cost estimate, we were very impressed," says Babbucci.

Modernizing RSI's content quickly

In less than four months, Claranet developed a backend architecture that overhauled RSI's workflow. With the assistance of Claranet, RSI installed two servers featuring [AWS Elemental Live](#), a powerful encoder that processes video in real time for delivery to broadcast televisions or streaming to internet-connected devices. RSI reduced its overall infrastructure costs by 75 percent. Furthermore, RSI no longer needed to enlist an external provider to change a request or add a feature. Additionally, it adopted technologies to allow it to deliver content over internet-based applications. RSI uses [AWS Elemental MediaConvert](#), a file-based video transcoding service with broadcast-grade features, to convert live television broadcasts and previously recorded MP4 video files in preparation for web hosting.

The converted video is then uploaded to [Amazon Simple Storage Service](#) (Amazon S3), an object storage service that offers industry-leading scalability, data availability, security, and performance. The entire process is much faster: video that had taken RSI 20 minutes to transcode now takes five minutes using AWS. The entire timeline—from editing to web publishing—has decreased by 50 percent.



The freedom to produce better content

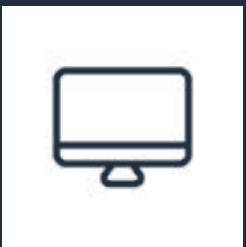
This significant improvement in workflow and increased autonomy has vastly improved the customer viewing experience. RSI's entire prime-time half-hour newscast is available online seven minutes after it ends. Additionally, RSI has been able to expand its single video live stream to four online channels without having to purchase new hardware. With its focus set on improving the viewing experience and delivering inclusivity through improving the accessibility of its website, RSI uses [Amazon Polly](#), a machine learning service that turns text into lifelike speech, in this case a natural Italian voice. "The accessibility of our website is very important," says Antonio Civile, head of digital at RSI. "A key component in our accessibility initiative is to create audio-described content from text." RSI implemented the solution in five days, resulting in increased accessibility to more than 100 new content pieces daily.

As with all broadcasters, giving its reporters and creators the ability to produce high-quality content remains a priority for RSI. RSI built its browser-based interface to manage video and audio workflows. The enhanced user interface provides easier access for journalists who are used to using a browser.

The company also created a short video tutorial series to simplify training for the journalists who create and publish content. Training that previously took a full day now takes just 30 minutes. The intuitive system enables RSI's journalists to focus on delivering thought-provoking, quality pieces to customers while enabling delivery through various modes of media.

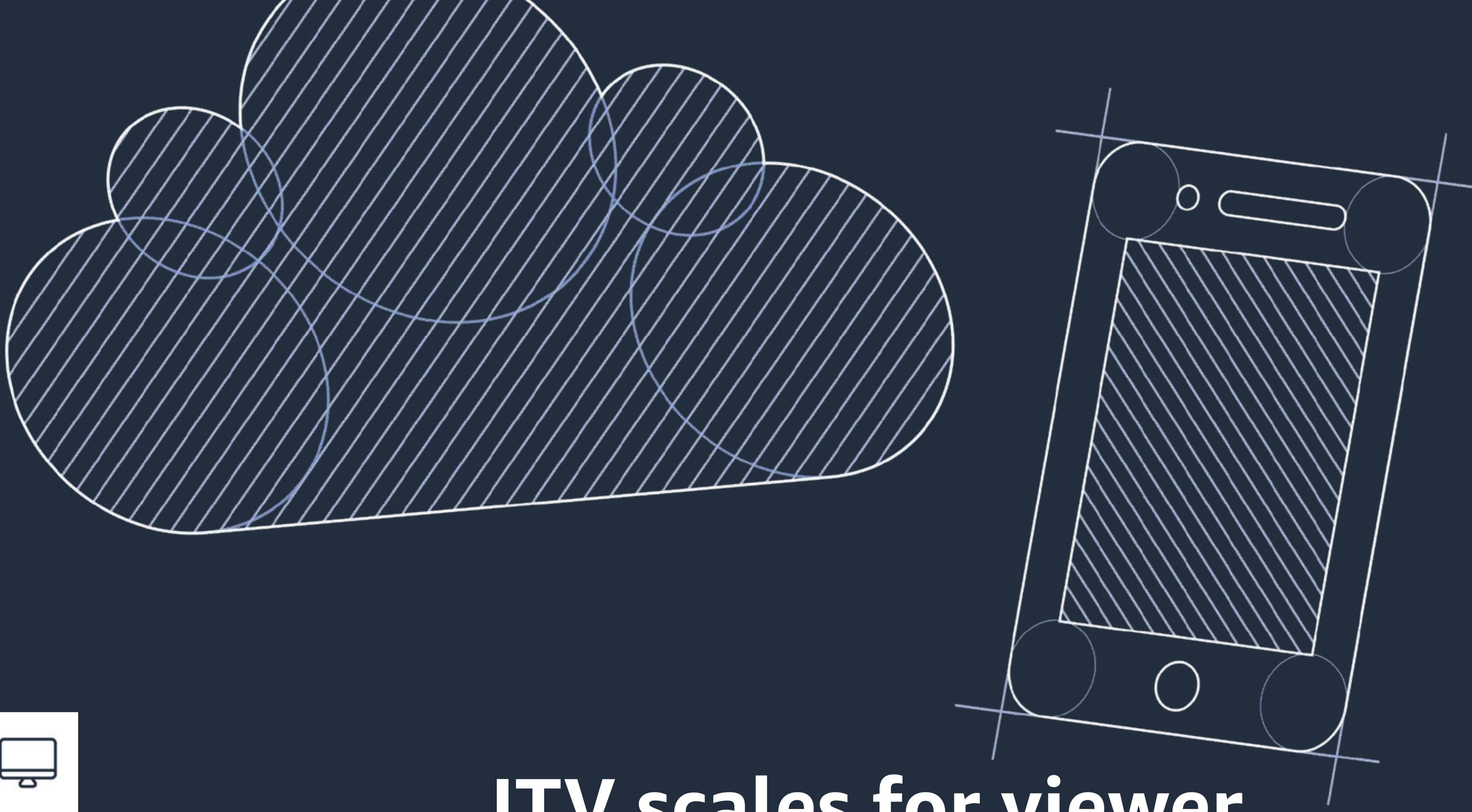
"We implemented these new features in a very short time," Babbucci says. "It's not only a cost benefit and a time benefit—it's also a mindset benefit." In the second half of 2022, an AWS Region will open in Switzerland. The AWS Europe (Zurich) Region will serve end users from local data centers, building the infrastructure to help companies like RSI deliver cloud-powered innovations and lower their IT costs. RSI plans to move forward with its cloud-centred system by examining the possibilities of integrating machine learning and artificial intelligence. Video autotagging, text analysis, and new methods of editing are on the horizon. "We have a new system, new features, and a new interface," says Babbucci. "It's a new way for us to work. We feel the freedom."

AWS helps customers run low-latency broadcast workloads with the most agility, elasticity, scalability, and reliability of any cloud. Explore aws.amazon.com/media/broadcast/ to learn more. ▀



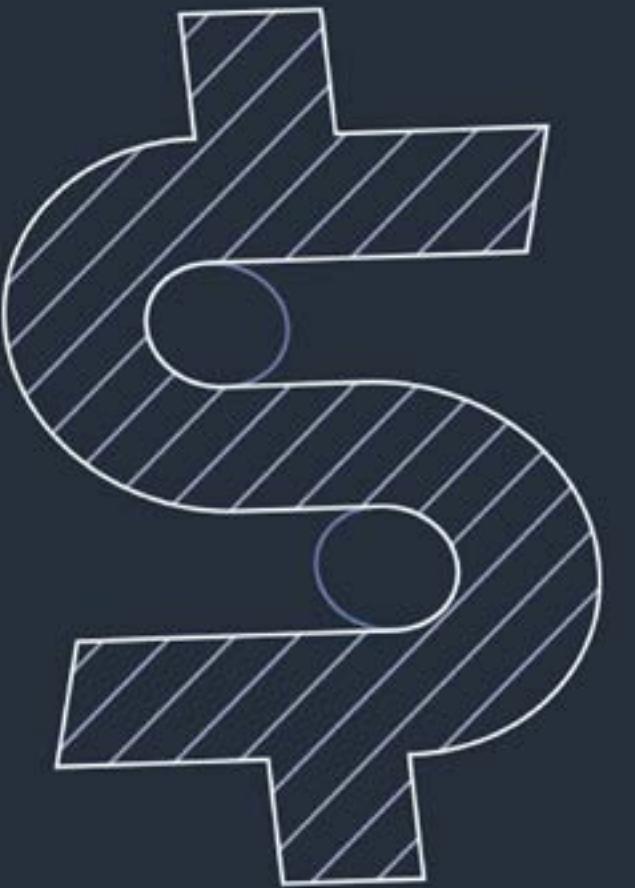
ITV is an integrated producer-broadcaster and the largest commercial television network in the United Kingdom.

ITV scales for viewer spikes while saving \$150,000



ITV creates, owns, and distributes high-quality content on multiple services globally. With the pandemic driving viewers to consume more content than ever before, the broadcaster saw a significant spike in viewership; online viewing alone was up by 13 percent compared to the previous year. At the same time however, advertisers were conserving cash, leading to a drop in ad revenue for the broadcaster—the mainstay of its funding. It needed a way to continue offering the same high-quality services to a much larger volume of end users while optimizing costs to help mitigate the lost advertising revenue.

ITV was already using Amazon Web Services (AWS), including [Amazon Elastic Compute Cloud](#) (Amazon EC2), a web service that provides secure, resizable compute capacity in the cloud, and [Amazon Elastic Kubernetes Service](#) (Amazon EKS), a managed Kubernetes service, to host a wide variety of public and internal systems. "Amazon EKS gives us the flexibility to optimize scaling and takes much of the pain out of cluster management," said Jonathan Harvey, Head of the Common Platform, ITV."



I want a strong relationship between service demands and the number of workloads. Our tech choices on AWS are helping us get there."

Jonathan Harvey, Head of the Common Platform, ITV

Optimizing Scale

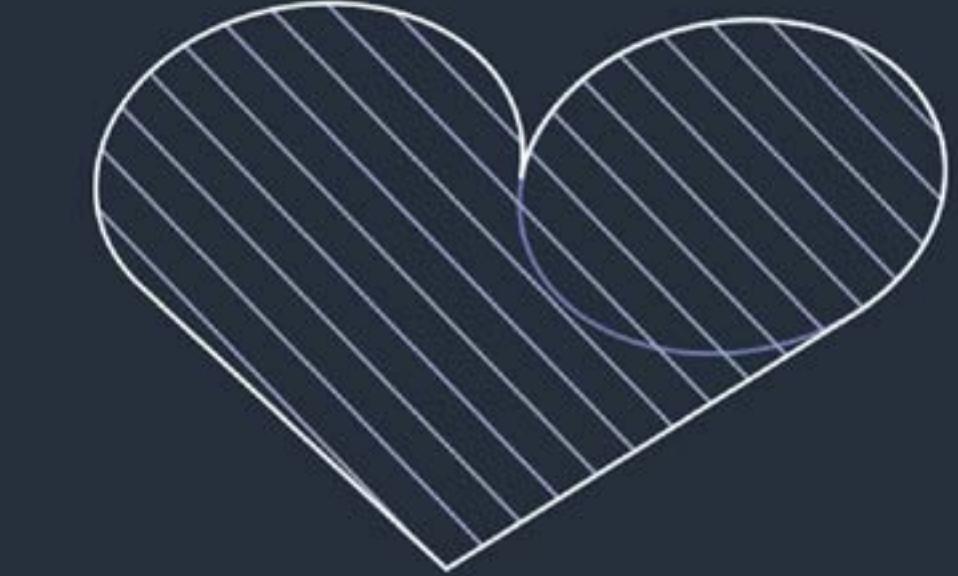
ITV realized that adjusting for future user behavior would mean finding a way to cost-effectively scale its services up and down to meet fluctuating traffic. Harvey said: "We see spikes in daily demand as thousands of people jump on the same video stream for a popular episode. But at 5:00 a.m., few people are online. We need an environment that adapts to both." At the same time, it was vital to maintain a high quality of video for all of those viewers. "We explored how we could run the same AWS services and meet the same or greater level of demand at a lower cost while hitting the same goals for reliability, security, and agility," says Harvey.

ITV's Common Platform is the internal architecture, built on AWS, that hosts applications to support broadcasting, advertising sales, and video on demand. It is managed by a team of engineers who sought to optimize existing services by using [Amazon EC2 Spot Instances](#) and [Savings Plans](#) and by resizing to reduce costs while still maintaining a reliable, scalable, and secure video-on-demand platform for millions of viewers. The process began with migrating Common Platform workloads to Amazon EKS. This was done with close support from the AWS Technical Account Manager teams and AWS Solutions Architects. Now 75 percent of those workloads are in Amazon EKS.

Putting ITV on the spot

Amazon EC2 Spot Instances let customers take advantage of unused EC2 capacity on AWS, which means ITV can make use of capacity as required while keeping costs to a minimum. Spot Instances are available at up to a 90 percent discount compared to on-demand prices. Using Spot Instances for Amazon EKS saved ITV up to 60 percent in costs compared to Amazon EC2 On-Demand Instances and shaved \$150,000 off the company's Amazon EC2 bill in just one year.

"As our understanding of Kubernetes and Amazon EKS has grown, we've taken advantage of more features, such as Spot Instances," says Harvey. "By gaining a better understanding of what happens behind the scenes for Spot Instance terminations, we've built our confidence in running Spot Instances in production." Using Spot Instances also helped ITV significantly cut the cost of its systems management tooling, which monitors, logs, and observes its primary systems. ITV now runs 24 percent of compute on Spot Instances, up from 9 percent the previous year. "If we can put more of our production workloads on Spot Instances, we might take some seasonality out of our costs," explains Harvey. "I want a strong relationship between service demands and the number of workloads. Our tech choices on AWS are helping us get there."



Amazon EKS gives us the flexibility to optimize scaling and takes much of the pain out of cluster management."

Jonathan Harvey, Head of the Common Platform, ITV



We care about the reliability, security, cost efficiency, and speed at which we deploy changes on AWS. Those priorities match up fantastically well with how our workloads run on Amazon EKS and Spot Instances."

Jonathan Harvey, Head of the Common Platform, ITV

Dealing with spikes

Previously preparing for a spike in viewers was a manual process based on expected popularity of certain programming. This often meant that EC2 instances scaled up for much longer than needed to be certain video quality would not be impacted by a large viewership. Now, ITV hosts containerized microservices on Amazon EKS for cost-effective scalability during volume spikes.

ITV also uses spot fleets. A Spot Fleet is set of Spot Instances and optionally On-Demand Instances that is launched based on criteria specified by the user. The team can scale instances across purchase options, [Availability Zones](#) (AZ), and instance families in a single application to optimize performance and cost. "If we run a multinode Amazon EKS cluster," says Harvey, "we can safely put two on Spot Instances, knowing the last in the cluster will remain on an On-Demand Instance and stay up even if there are Spot Instance terminations."

Now ITV can automatically scale the number of instances to meet any demand level and then scale back down afterward without administrator-level users taking advance action. "Amazon EKS gives us enough of Kubernetes that we can use things like the Kubernetes Horizontal Pod Autoscaler feature," says Harvey. "It gives us the flexibility to optimize scaling and takes much

of the pain out of cluster management." Using containerized microservices has also drastically reduced deployment time from around 40 minutes to as little as four minutes from code commit to running in production.

Preparing for future growth

Consumer behavior has changed during the pandemic, but some of those changes are likely to remain well into the future. With the rise of online viewing, ITV has already extended the distribution of its online streaming service, BritBox, which it is planning to roll out to 25 countries worldwide. The company is exploring initiatives using [AWS Media Services](#) to quickly pivot when video consumption changes so it can continue to meet customer demands in the future.

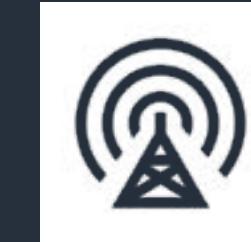
"We care about the reliability, security, cost efficiency, and speed at which we deploy changes on AWS," says Harvey. "Those priorities match up fantastically well with how our workloads run on Amazon EKS and Spot Instances: they are reliable enough, highly available, and quick to deploy. Now we have a service that's awesome to run and comes with a big discount on the cost of running it."

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Trevor Turner, Head of Media Systems Development,
Formula 1



Maximizing fan engagement with live events

Startup **Kiswe** hosts ticketed live streaming events for fans around the world, including concerts, sporting events, and live television. Virtual events face technical challenges with scale, elasticity, and latency, and since Kiswe's events require a paid ticket for each viewer, the company also contends with security and verification challenges.

During a global health crisis, digital experiences offered a way for fans to remain connected to their favorite artists through virtual live performance. Even as live events return, virtual experiences continue to be a key part of event offerings. Hybrid events—which support both in-person and online attendance—maximize revenue opportunities.

Despite the demand for access to live content, virtual events face significant technical challenges with scale, elasticity, and latency. With in-person concerts, festivals, and sports returning, what lessons can be taken from virtual success stories to support the increase in demand for live online content consumption?

Creating interaction and connection

Accessing events remotely means that organizers can foster connections between thousands of people around the world, free from the limitations of physical attendance. Kiswe hosts ticketed live streaming events for fans across the globe. The company focuses on going beyond viewing by transforming the live video experience through fan engagement and two-way interactions.



Due to the scale of these events, for viewers to experience meaningful connections Kiswe creates a digital environment that supports the conversations that might occur naturally between fans.

Instead of randomly grouping audience members by seat or ticket numbers, Kiswe separates pools of fans by shared characteristics. The company places them in smaller chatrooms to prevent a giant, cumbersome chat pool. In these chatrooms, fans can speak to each other, share emojis, cheer for the performance, and even appear on fan walls for audience participation viewable by the artist or other viewers.

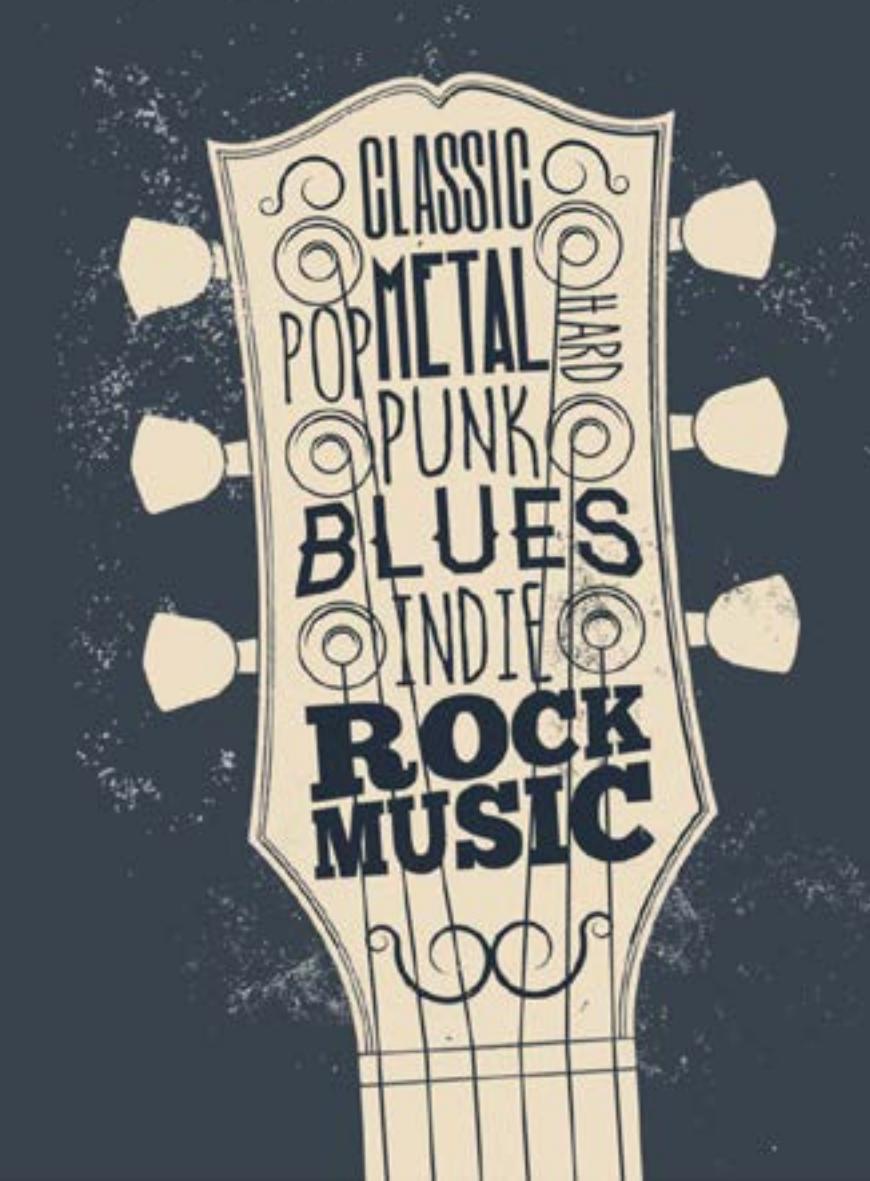
This real-time feedback enables the performer to gauge the excitement of fans as they react to the show, adding another level of engagement to the live streaming experience. These features set Kiswe's events apart from other virtual concerts that lack this functionality, as well as help the audience have a more authentic experience.

Managing virtual scale

Kiswe chose AWS to support its live streaming events based on the customer support team and solutions that AWS provides. In particular, the Kiswe team built on AWS so that it could scale based on demand. This allows for the use of the same infrastructure for 10,000 people or one million people, by enabling scripts involved in deployment to scale up and manage an increase in volume. As a result of its work and use of AWS solutions, the Kiswe team can now rapidly configure the cloud concert solution for large online audiences in any part of the world. Scott Miller, Vice President of Engineering, Kiswe explains, "Early in the year, we were very concerned about mass global scaling. But we reached the point where we could scale globally to handle more online concert viewers for a single paid event than anyone could likely sell tickets to."

With the challenges presented by the COVID-19 pandemic, Kiswe needed to prepare for an increase in demand and be able to scale to unprecedented traffic. In June 2020, Kiswe hosted a live virtual

concert featuring South Korean supergroup BTS, and the concert saw resounding success. It was their first large-scale event globally and it reached more than 190 countries, with 756,000 viewers, setting a Guinness World Record for the largest live streaming ticketed concert. In October 2020, Kiswe hosted two BTS events that served almost one million viewers. During a single weekend of BTS concerts, Kiswe processed 250 million API calls and sent out eight billion chat messages.



Protecting gated content

It can be challenging for companies to achieve the security, reliability, and value protection needed for consumers while live streaming large-scale paid events, such as Kiswe's BTS concert series. It is crucial that only attendees with valid tickets can join the event and that the tickets cannot be shared. A login password could easily be shared among friends, so it is vital to limit the number of active viewing sessions per user.



As Kiswe's events require each viewer to have a paid ticket, the company must also contend with additional security and verification challenges. Kiswe needed a solution that could enable the security, low latency, and elasticity it required to host large-scale live streams while fostering effective fan engagement.

Using [Amazon CloudFront](#), a fast content delivery network service that securely delivers data, videos, applications, and APIs to customers globally with low latency and high transfer speeds is key to the success of Kiswe's events. It enables real-time monitoring, securely delivers low-latency video, and supports Kiswe's existing video processing software. The multiple AWS services that this solution uses work together seamlessly. Instead of a content delivery network pulling from one single centralized site, Kiswe distributes content closer to where viewers will be, using its own software running on [Amazon Elastic Compute Cloud](#) (Amazon EC2) instances set up for video. [Elastic Load Balancing](#) for Amazon EC2 instances handles fan interactivity, logins, chats, and ticket verification.

Seamless virtual events

Using AWS solutions, Kiswe can support immense live streaming events, but as its business model depends on seamless viewing from start to finish, any issue could be harmful.

Scott Miller, Vice President of Engineering, Kiswe explains; "If any bottleneck arises, it's similar to a highway. Traffic's moving at a good pace, but if there's one issue, then everything comes to a halt. And when you're talking about hundreds of thousands of people accessing the event within minutes, that's the biggest challenge—particularly when it's a two-way interaction." Hosting this infrastructure on AWS means that the company can deploy changes rapidly.

Using its combination of AWS services, Kiswe can manage each aspect of its live streaming events more easily, whether the team is adding the monitoring of [Amazon CloudWatch](#)—a monitoring and observability service—onto Amazon CloudFront distribution or performing cost accounting for an individual event. "The great thing about using Amazon CloudFront and



Amazon CloudWatch is that everything is at your fingertips and simple to interlink," says Miller. "If I want to make a new webpage for a concert, and I want Amazon CloudFront in front of it, I could literally do that in two minutes."

Kiswe continues to host large-scale global concerts and other virtual events using Amazon CloudFront and Amazon EC2. As it moves forward, the company hopes to increase interactivity and deliver fans an environment in which they feel like their contributions matter. ▀



The music market in India ranks as the 15th largest globally and could enter the top 10 as soon as 2022.

Wynk slashes big data compute costs by 60%



Due to fast-rising internet penetration and the proliferation of streaming services, many view music as a sunrise sector for the Indian economy. [Wynk Limited](#) launched in late 2015 as an innovation unit of Bharti Airtel Limited, a telecommunications company based in India. Wynk Music belongs to Airtel Digital Limited, along with Xstream Digital, a video streaming service. With 72 million monthly active users and over 14 million songs in its content catalogue, Wynk is the number-one music app on the App Store and Google Play Store in India, with more than 100 million downloads to date. Wynk's mission is to become the preferred destination for entertainment by delivering customized, seamless online experiences.



Amazon EMR is developer-friendly and flexible, which makes it easier to run big data and analytics applications."

Ridhima Kapoor, head of Data Platform at Wynk Music

Data at the core of operations

Wynk was born on Amazon Web Services (AWS). As the company rapidly grew, so did its subscriber base. On a single day, the Wynk Music app generates about 4 TB of data, which includes insights on how long a user has tuned in and what genre of music they listen to most. A few years after launching, Wynk began investing in its employees and technology to transform into a data-driven operation and offer more personalized features to users.

The data team started down the analytics road by building a data lake. For unstructured data, Wynk used Apache Hadoop with Ansible software to perform distributed data processing. However, the company's data infrastructure quickly grew overly complex and compute costs soared. Wynk consulted with the AWS team to find a more manageable solution that could scale in a cost-controlled manner. Wynk switched to [Amazon EMR](#) as its big data platform. Amazon EMR is a cloud big data platform for processing vast amounts of data using open source tools. "Amazon EMR is developer-friendly and flexible, which makes it easier to run big data and analytics applications," says Ridhima Kapoor, head of Data Platform at Wynk Music.

The Wynk data team also implemented [Amazon Redshift](#) as a data warehouse. Redshift enables users to query and combine exabytes of structured and semi-structured data across data warehouses, operational databases, and data lakes using standard SQL. Redshift lets users easily save the results of their queries back to Amazon S3 data lakes using open formats, like Apache Parquet, so that additional analytics can be performed by other services. Additionally, Wynk used [Amazon Simple Storage Service](#) (Amazon S3) as a data lake. Amazon S3 is an object storage service that offers industry-leading scalability, data availability, security, and performance.

Promoting creative development

In a growing tech market, Wynk identified that it needed a system which would allow its workers to develop a high-quality user experience for its customers. As part of AWS Enterprise Support, the AWS Solutions Architect and Technical Account Manager dedicated to Wynk organized multiple training sessions. This empowered Wynk's data team to experiment with and implement an efficient architecture design, as well as fail fast. "AWS has been with us from the start in identifying potential solutions to fit our business use cases," says Hitesh Bhatia, head of DevOps at Wynk Music. The company has had many enablement sessions to help its data team adopt and fine-tune infrastructure components, including optimizing costs on AWS.



AWS has been with us from the start in identifying potential solutions to fit our business use cases."

Hitesh Bhatia, head of DevOps at Wynk Music





PP

The advantage of out-of-the-box services such as Amazon EMR is that we no longer have to worry about deployment, and we can just concentrate on rolling out features."

Ridhima Kapoor, head of Data Platform at Wynk Music

Reducing time-to-market from six days to half a day

Gaining and keeping new and existing customers is challenging in a market where users have access to several competing services at their fingertips. Once the company develops new and innovative features, delivering them quickly to audiences can add value to the user experience and build brand loyalty. Thanks to increased automation and managed services on AWS, Wynk has reduced its time-to-market for new features from six days to half a day. "The advantage of out-of-the-box services such as Amazon EMR is that we no longer have to worry about deployment, and we can just concentrate on rolling out features. As such, we've been able to standardize a lot of code in our data framework using templates and AWS tools," Kapoor says. This allows Wynk to respond quickly to market needs and deliver services its audience values.

Refining a "Spot Strategy" to fit business use cases

To mitigate the rising cost of data processing, Wynk uses [Amazon Elastic Compute Cloud](#) (Amazon EC2) [Spot Instances](#) to run Amazon EMR clusters. Hitesh estimates the company is now saving 60 percent on compute costs by moving to Spot Instances from [On-Demand Instances](#) for its big data framework. Delivering a seamless, premium experience to its customers is paramount to Wynk. To do this, the company provisions capacity across diversified Amazon EC2 Spot Instance pools with a capacity-optimized allocation strategy and leverages Amazon EMR managed scaling to handle spikes and dips in traffic. This configuration delivers website and app stability during peak hours, such as weekday evenings. It also leverages [Spot Instance Advisor](#) to determine which instances have the least chance of interruption across various Spot Instance pools.

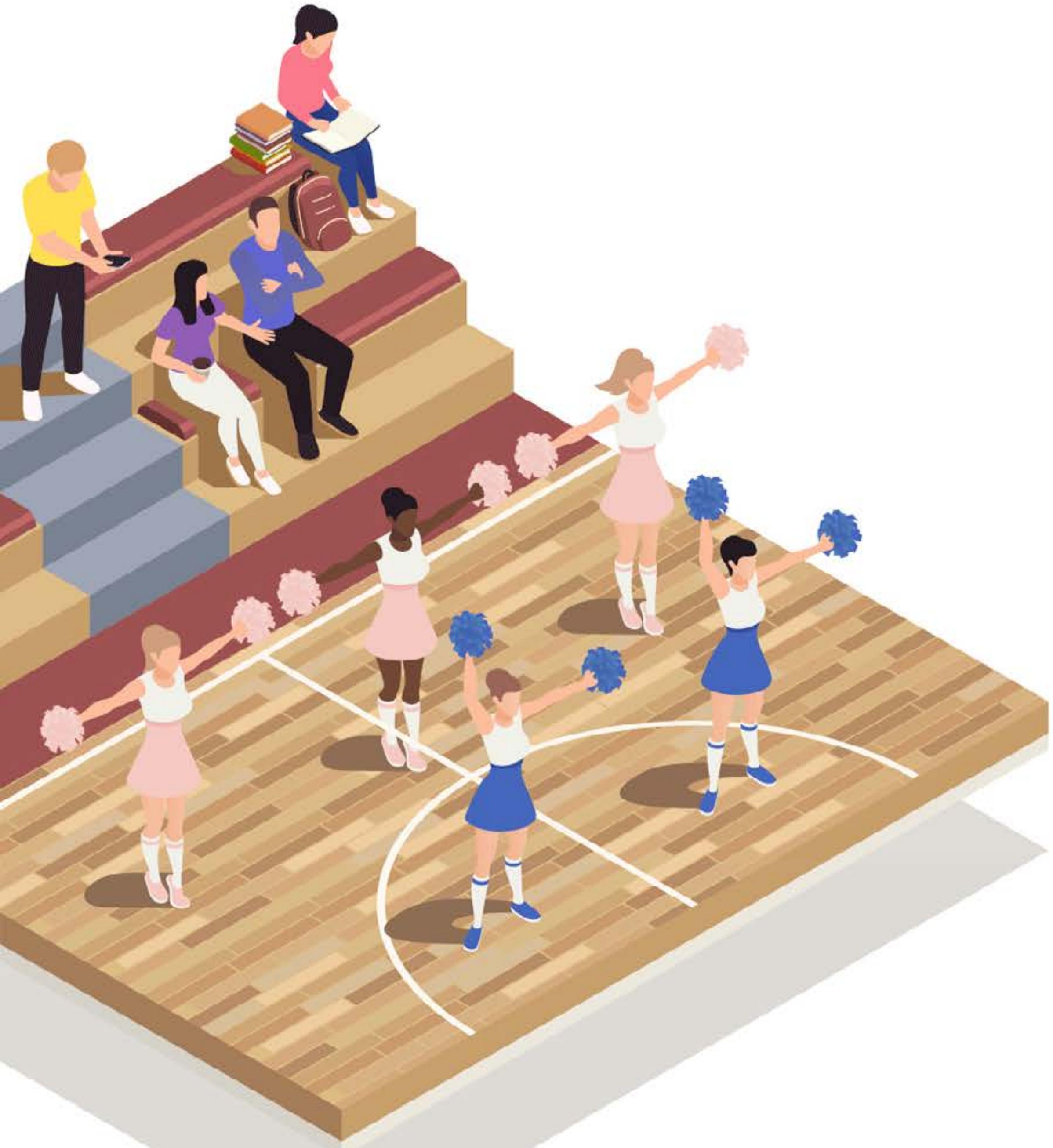
It was important for Wynk to have a firm grasp on its daily spend. Wynk's DevOps team uses customized anomaly detection dashboards to view and analyze daily expenditure. The management team uses similar dashboards to monitor overall infrastructure costs and has monthly reviews with the AWS account team. By using [AWS Cost Explorer](#) and [Amazon QuickSight](#) business intelligence service, Wynk can visualize expenses and understand the reasons for variations in spending. The company's management receives notifications for spending anomalies and can act fast to curb costs if needed.

The building blocks to provide a quality service

Bhatia emphasizes the benefits of integration among AWS services. "We have access to many building blocks on AWS that we can use in multiple combinations. Just like playing Lego, we can put one block on another to customize our data framework, and in turn customize the Wynk experience," he says. AWS has allowed Wynk to take control of its services by enabling it to expand and create new services and features, all while allowing it to keep track of its costs. The flexibility offered by AWS provides Wynk with the tools to adapt and react to data and deliver a high-quality and reliable streaming service to its customers. ▀



Bhatia estimates the company is now **saving 60 percent** on compute costs by moving to Spot Instances from On-Demand Instances for its big data framework.



Delivering collegiate sports for Midco

High school and collegiate sports attract significant online viewing numbers across the U.S. and continue to grow in popularity.

In 2019, the National Football Foundation (NFF) and College Hall of Fame reported that college football was the nation's second most popular sport with 47.5 million fans attending games in 2019 along with 145 million fans viewing at home.

Midco Sports Network (MidcoSN) offers live sports and related on-demand content to thousands of viewers daily, who tune in for extensive local and regional high school and collegiate sports coverage of teams from North Dakota, South Dakota, and Minnesota. MidcoSN was keen to expand viewership while giving fans more ways to engage with its live match coverage, on-demand coverage, and original content across a variety of digital platforms.

Developing an OTT video service that can scale

MidcoSN worked with Accedo to develop a new video service, leveraging the company's SaaS solution, Accedo One, along with several of Accedo's technical partners included in the Accedo One Marketplace. Thanks to Accedo One, MidcoSN gained the flexibility to build, launch, and customize its video streaming applications in one convenient place.

Accedo managed the entire project and worked with MidcoSN to build and launch the over-the-top media service, Midco Sports Plus, which enables viewers to access content directly from the internet, whether at home or on the go.



Midco Sports Plus enables subscribers to stream games live and watch on-demand content such as game-day replays and MidcoSN original programs.

Viewers can access the additional programming directly through the Midco Sports Plus app on mobile devices and web browsers.

Craig DeWit, general manager of MidcoSN, says: "Midco Sports Plus gives our existing fans more flexibility in how they consume our content, as well as attracting new subscribers from across the United States."

Flexibility and scalability were extremely important factors, not least because some sports featured are more popular than others. MidcoSN needed the ability to scale very quickly for higher viewer numbers as required. This is handled seamlessly on AWS, meaning that MidcoSN can instantly scale when viewer numbers peak.

Launching fast and adapting as the service evolves

MidcoSN reduced its time to market significantly because of Accedo's pre-built native app templates ready to be customized according to MidcoSN's needs. Accedo One Marketplace provides easy access to all necessary technology components in the video service ecosystem. Accedo was able to very quickly leverage integrations to connect with partner solutions for Midco Sports Plus.

Consumer preferences change fast and it's essential that video services can evolve once launched. Accedo One's simple-to-use visual editor offers MidcoSN the ability to change the user interface and organize content differently depending on seasons, trends, or user preferences.

"For us, one of the most important factors was to create a simple and engaging user experience that would delight fans and attract subscribers," DeWit says.

MidcoSN started small and can now scale up or down to meet fluctuating business demands. "The ease of integration with other solutions within the media industry, coupled with Accedo's expertise, has been extremely beneficial to this entire process," says Amy DesLauriers, MidcoSN's product manager.



Consistently high quality video

It was important for MidcoSN to maintain high quality video for subscribers, regardless of location or potential spikes in traffic. This is particularly important during live events, when a large number of viewers could have a negative effect on latency and service performance. Midco Sports Plus makes use of AWS services to deliver scalability, performance, and availability around the globe.

MidcoSN delivers content reliably using [Amazon CloudFront](#), a fast content delivery network service that securely delivers data, videos, applications, and APIs to customers globally with low latency and high transfer speeds, all within a developer-friendly environment.



Amazon CloudFront works alongside [Amazon OpenSearch Service](#), a fully managed service that makes it simple to deploy, secure, and run Elasticsearch cost effectively at scale. MidcoSN can scale instantly as demand fluctuates, especially around live games, using [Amazon Simple Storage Service](#) (Amazon S3), an object storage service that offers industry-leading scalability, data availability, security, and performance.

The combination of Accedo One and [AWS Media Services](#) means that MidcoSN is able to deliver content securely with high transfer speeds and quality.

Future expansion

Since its launch in December 2020, Midco Sports Plus has given fans access to an expanding mix of live and on-demand content through its simple-to-use interface. Currently available on Android, iOS and web devices, MidcoSN plans to extend the service to connected televisions in the near future.

With live sports back on and more popular than ever, Midco Sports Plus is likely to see viewership increase. Using Accedo One on AWS means that MidcoSN can continue to deliver high-quality, low-latency video and scale instantly for popular live events that attract many viewers.

"Accedo One has enabled us to launch a compelling and engaging user experience for fans across the country," DesLauriers says. "Because we use AWS, we can simply scale up and down as required." ▀





Studio 4D needed to scale its live video presentations quickly, without sacrificing the immediacy that makes its interactive walk-throughs so successful.

Studio 4D visualizes the future of real estate video

While many people transitioned to remote work with relative ease in 2020, some organizations and job functions carry layers of complexity that mean working from home throws out additional challenges.

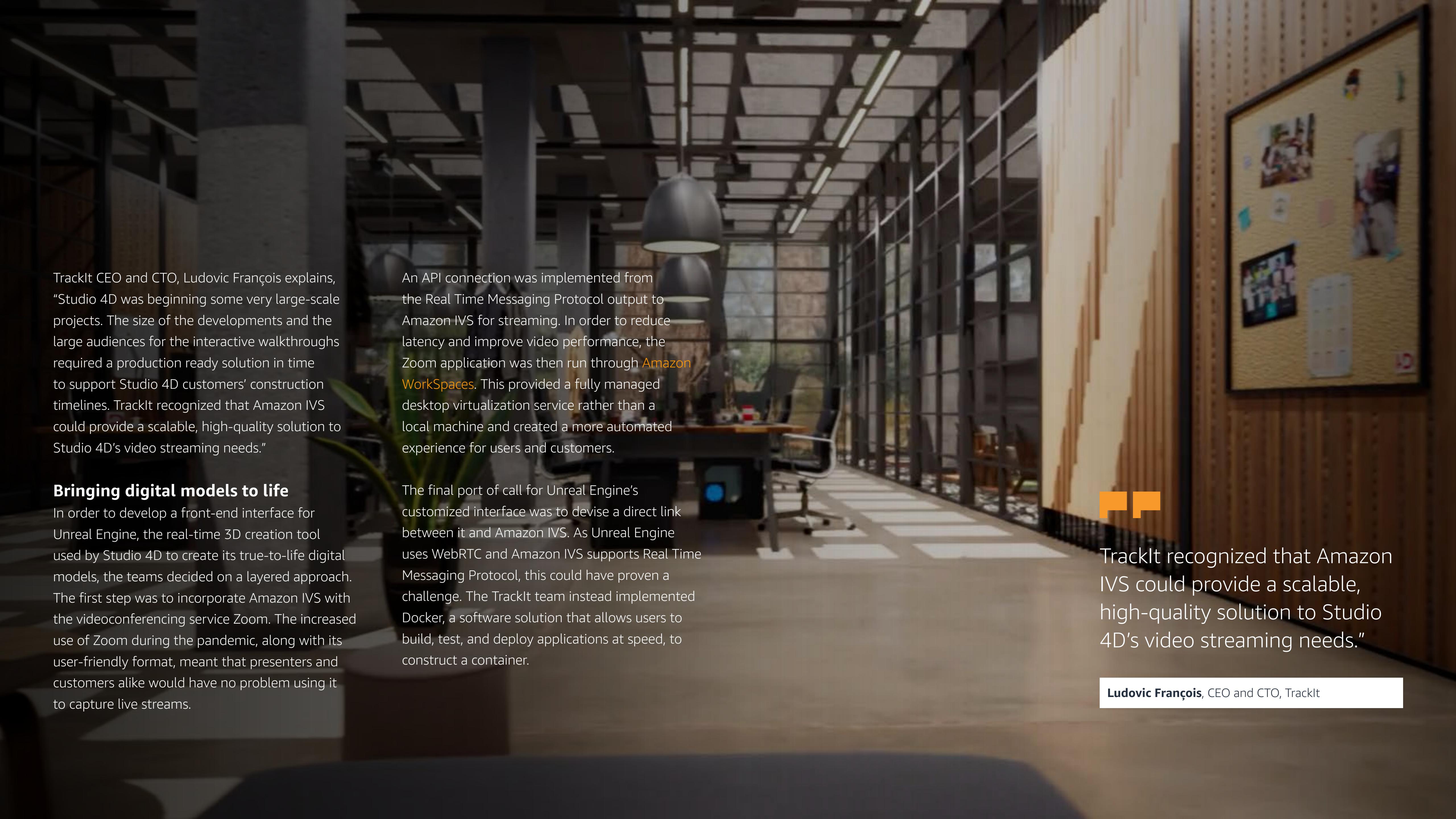
Without the ability to instantly adopt generic remote working tools, these organizations need customized approaches and workflows that help them meet their goals. As companies continue to redefine normalcy, and as a hybrid working future seems more and more likely, organizations are responding by adapting workflows to suit them.

Adapting to the pandemic and beyond

Studio 4D is an architectural visualization company, specializing in the creation of 4D real estate experiences that are simple to view and share. With the majority of its workforce operating remotely during 2020, Studio 4D needed to scale its live video presentations quickly, without sacrificing the immediacy that makes its interactive walk-throughs so successful.

Previously, Studio 4D only needed to stream its live video presentations to a handful of project partners. But as the pandemic progressed, the company found it needed to stream presentations to 500 or more viewers simultaneously.

To manage both the increase in demand and high customer expectations, Studio 4D used [TrackIt](#), an Amazon Web Services (AWS) Partner that has extensive experience in engineering live streaming technology. TrackIt is a cloud-management, consulting, and software development solutions company and, with [Amazon Interactive Video Service](#) (Amazon IVS), provided a managed live streaming solution ideally placed for the creation of interactive video experiences.



TrackIt CEO and CTO, Ludovic François explains, "Studio 4D was beginning some very large-scale projects. The size of the developments and the large audiences for the interactive walkthroughs required a production ready solution in time to support Studio 4D customers' construction timelines. TrackIt recognized that Amazon IVS could provide a scalable, high-quality solution to Studio 4D's video streaming needs."

Bringing digital models to life

In order to develop a front-end interface for Unreal Engine, the real-time 3D creation tool used by Studio 4D to create its true-to-life digital models, the teams decided on a layered approach. The first step was to incorporate Amazon IVS with the videoconferencing service Zoom. The increased use of Zoom during the pandemic, along with its user-friendly format, meant that presenters and customers alike would have no problem using it to capture live streams.

An API connection was implemented from the Real Time Messaging Protocol output to Amazon IVS for streaming. In order to reduce latency and improve video performance, the Zoom application was then run through [Amazon WorkSpaces](#). This provided a fully managed desktop virtualization service rather than a local machine and created a more automated experience for users and customers.

The final port of call for Unreal Engine's customized interface was to devise a direct link between it and Amazon IVS. As Unreal Engine uses WebRTC and Amazon IVS supports Real Time Messaging Protocol, this could have proven a challenge. The TrackIt team instead implemented Docker, a software solution that allows users to build, test, and deploy applications at speed, to construct a container.



TrackIt recognized that Amazon IVS could provide a scalable, high-quality solution to Studio 4D's video streaming needs."

Ludovic François, CEO and CTO, TrackIt



Still images and on-demand videos cannot convey the scope of what our clients are ready to share, or what their stakeholders need to see. But on AWS, and with the help of TrackIt, viewers can truly explore these communities and fully appreciate what they have to offer."

Hilario Canessa, CEO, Studio 4D

The container running on the serverless compute engine [AWS Fargate](#), meant that a connection to Unreal Engine's live stream could be established. TrackIt's link, using FFmpeg, the open-source software for handling multimedia files and streams, could then convert the WebRTC from Unreal Engine to the Real Time Message Protocol ready for streaming.

The close collaboration between the teams meant that Studio 4D was able to adapt and scale its video streaming solution in just four weeks. Delivering all its large-scale projects on time and to as many viewers as needed—all without sacrificing the quality of the stream. Hilario Canessa, Studio 4D CEO, explains, "During the implementation, we went back and forth and discussed complex issues. It was nice to have someone that could understand our concerns and answer the questions we had."

Offering new insights

Studio 4D's success in increasing the delivery of its high-quality video walkthroughs to much larger audiences has meant a successful navigation of the sudden shift to remote work. As such, Studio 4D plans to incorporate Amazon IVS powered experiences into its future community planning projects in order to offer detailed insights into the communities it develops. Working with TrackIt to deploy AWS services has enriched its already impressive digital visualizations.

"Our job is to virtually communicate the richness, complexity, and detail of thoughtfully designed urban cityscapes to any viewer on any screen," Canessa continues. "Still images and on-demand videos cannot convey the scope of what our clients are ready to share, or what their stakeholders need to see. But on AWS, and with the help of TrackIt, viewers can truly explore these communities and fully appreciate what they have to offer." ▀



Enhancing the viewing experience with personalization

Discovery uses customized recommendations to inspire loyalty.

Consumers are spending an increasing amount of time viewing content at home. Time spent watching TV increased when consumers' recreational activities were more limited as a result of lockdowns and social distancing restrictions during a global pandemic.

However, a recent report from Deloitte Insights on digital media trends and consumer habits suggests viewing patterns will not alter significantly as restrictions ease. Watching TV and movies at home was the overall favorite activity for the respondents surveyed, with 57 percent ranking it in their top three out of 16 entertainment activities.



Viewing at home has offered an escape from some of the stresses of the pandemic. With new content limited due to the impact on production, audiences have been discovering a wealth of existing content rather than waiting for the next big show.

With consumers using screens more than ever before, the potential to engage audiences with exciting choices will drive decision making and subscription numbers over the coming months.

It is worth remembering that to engage an audience, content doesn't have to be new – it just needs to be new to the viewer. Despite the slowdown in production, there is still endless content available, particularly for established names with a large back catalog to draw on. With several major players currently jostling for position, it is vital for media companies to present content in a way that is tailored to the viewer.

Ease of use and customized recommendations inspire loyalty, which is crucial for maintaining a strong position in the market as companies battle against growing competition.

The personal approach

Expectations for nearly endless content choices anytime, anywhere, and on any screen, are currently driving business and operational changes for media companies. Multinational mass-media television company Discovery Inc. (Discovery) recognized it needed a service to help its customers find curated content that matched their specific interests, not only to pursue revenue generation through a subscription-based model but also to gain better insights into customers.

[Watch video](#)

These insights would secure loyalty from Discovery's audience but also have the potential to drive content acquisition and production decisions in the future.

Established in 1985, Discovery has a wealth of engaging heritage content to offer, in addition to more than 8,000 hours of original programming each year. Its direct-to-consumer streaming service [discovery+](#) launched in the United States in January 2021 and features television series, movies, and original programming. Through Amazon Web Services (AWS), Discovery built the streaming service [discovery+](#) using [Amazon Personalize](#), a fully managed machine learning service.

Curated user experiences have a significant impact on the way a consumer feels when interacting with a service and in turn increases the perception of value that customer has. Rather than basing recommendations on standardized metadata or basic categories such as genre, Discovery makes suggestions based on how users behave and the content they interact with.

Amazon Personalize goes beyond rigid static rule-based recommendation systems and deploys custom machine learning models to deliver highly customized recommendations to customers.

Discovery has a wide variety of content that appeals to a broad audience base. Instead of offering viewers generic content, Discovery used the machine learning-powered recommendations of Amazon Personalize to customize the viewer experience and improve the overall customer journey.

Responding to consumer demand

By delivering tailored content, Discovery was able to achieve a unique experience for individual viewers.

As the media industry underwent a dramatic shift due to the pandemic and Subscription Video on Demand (SVOD) growth soared, Discovery needed to move quickly. The SVOD Forecasts Update report predicts SVOD revenues for 138 countries will reach \$100 billion by 2025; double from the \$50 billion recorded in 2019.

So, it was vital that [discovery+](#) secure a loyal audience as fast as possible to capitalize on SVOD growth. Rapid deployment through AWS meant that content could easily be delivered against time-to-market goals.

Haris Husain, Vice President Head of Product and Data Science at Discovery explains, "Our goal was to build a product with a very fast time to market and a flexible and scalable solution. Amazon Personalize was a really solid fit." ■



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Haris Husain, Vice President Head of Product and Data Science, Discovery



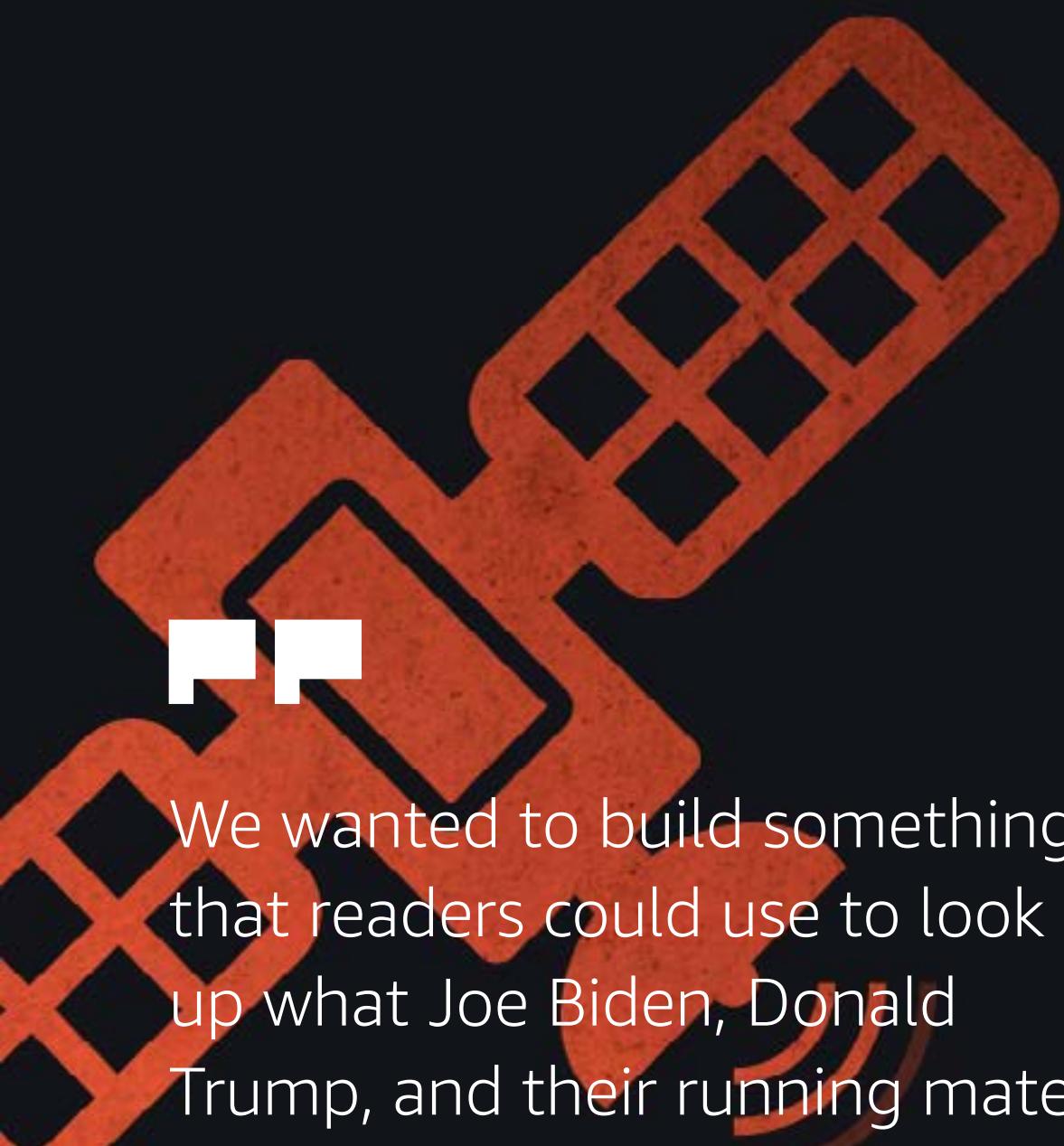
Concern over false information, or fake news, has been rising rapidly over the last decade

Empowering readers with accurate information

With social media acting as a key source for misleading stories and headlines, deciphering truth from lies can be a challenge. Especially as controversial news tends to generate more engagement and subsequent shares, meaning false news reaches more people than the truth.

Likewise, fake news and misinformation in politics has been on the rise over the last two decades, leading to a lack of voter confidence. Open access to both information and content publication means there is a confusing combination of truths and mistruths intertwined in the public domain. Finding the original source of information or a legitimate quote can be challenging.

In order to increase the spread of fact-based political reporting before the 2020 presidential debates, *Wall Street Journal* (WSJ) developed Talk2020, an intelligent search tool that helps readers quickly search and analyze 30 years of public statements made by presidential candidates. Talk2020 enables deeper investigation into issues over time by exploring speech patterns and performing text analyses.



We wanted to build something that readers could use to look up what Joe Biden, Donald Trump, and their running mates said verbatim and draw their own conclusions.”

Dion Bailey, VP, Head of WSJ Technology and Architecture

Facilitating informed decisions

WSJ is a global news organization that provides news, information, commentary, and analysis across print, digital, mobile, social, audio, and video platforms. It includes coverage of U.S. and world news and politics and holds multiple recognitions for outstanding journalism. Building on its trusted reputation WSJ saw an opportunity to deliver functionality and reach new audience members by enabling readers to explore a database of transcripts. Dion Bailey, VP, Head of WSJ Technology and Architecture explains, “We wanted to build something that readers could use to look up what Joe Biden, Donald Trump, and their running mates said verbatim and draw their own conclusions.”

WSJ journalists were already using Factiva, the Dow Jones’s global news database, for research and fact-checking. Factiva aggregates content from more than 32,000 sources and enables users to search using free text, region, subject, author, and metadata. The WSJ’s R&D team worked with journalists in Washington, DC, to build an effective search tool for these transcripts.

With Talk2020, the WSJ wanted to make this tool simpler to use and available to a broader audience to help inform their decision-making during the 2020 presidential election. The publication wanted readers to be able to pose natural language questions—such as “What did Trump say about healthcare?”—and receive results that directly answered them. A well-structured solution would also have the potential to increase site traffic and attract new subscribers.

The WSJ Product and Technology team needed to build a new customer experience through collaboration with a global team of experts from the AWS Digital Innovation program and [AWS Professional Services](#). WSJ implemented [Amazon Kendra](#), a highly accurate intelligent search service powered by machine learning. The WSJ team, which was already using AWS, regularly engaged with AWS Professional Services during the build, through regular meetings and architectural deep dives. “AWS helped us build a solution that met our timelines,” explained Bailey. “Having that direct access to experts enabled us to put the right services around Amazon Kendra and deliver the level of quality that we wanted.”



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Dion Bailey, VP, Head of WSJ Technology and Architecture



AWS Lambda functions trigger requests to cleanse and format the transcripts—identifying quotes, the speaker, and the topic—before sending them to Amazon Kendra and Amazon DynamoDB...[which] means we can shut down the processes when we're not using them, so it's cost efficient.

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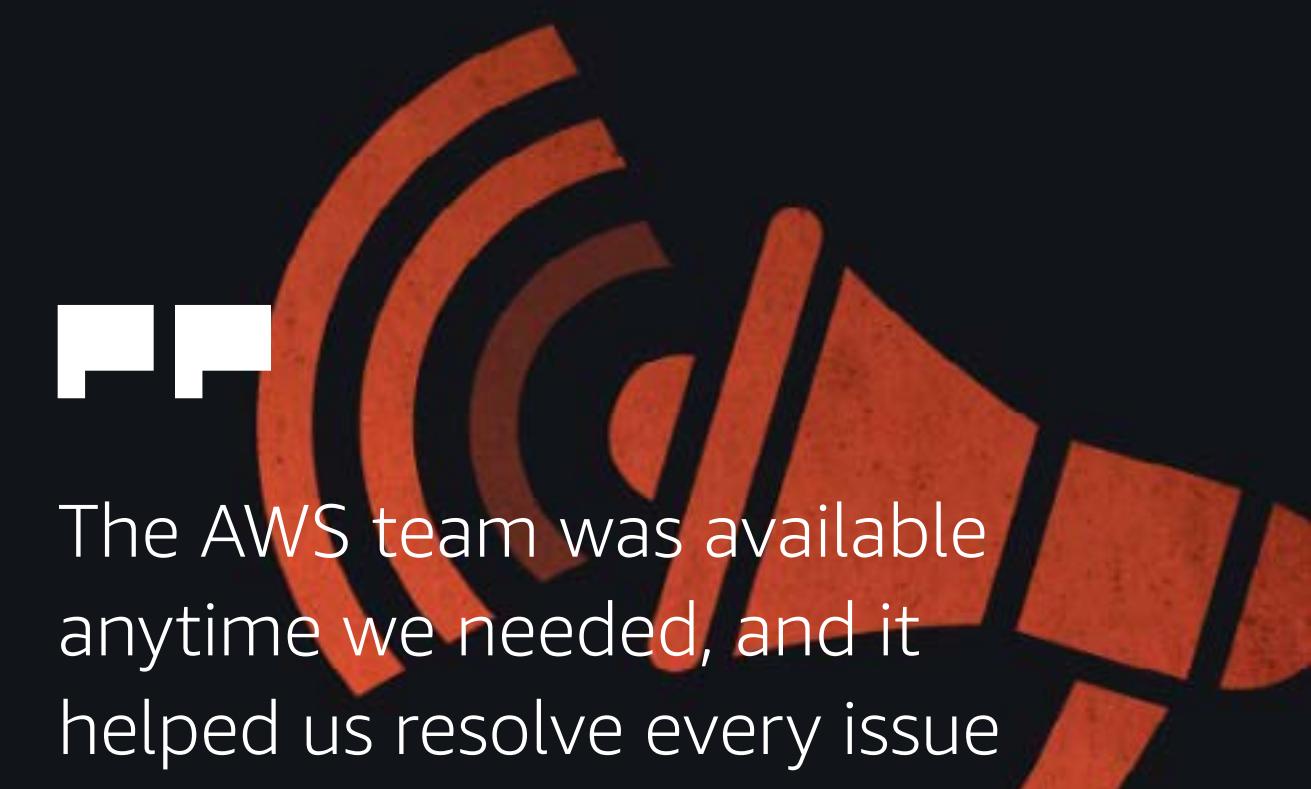
Maximizing efficiency

The solution's front end consisted of an API gateway and [Amazon CloudFront](#), a fast, highly secure, and programmable content delivery network. When users conduct a search, Amazon Kendra returns with an identified topic and related quotes that are then further augmented by cross-referencing the identification with the cleaned Factiva transcripts stored in [Amazon DynamoDB](#)—a NoSQL database service that supports key-value and document data structures. Managing data flow between AWS services is [AWS Lambda](#), a serverless compute service that lets users run code without provisioning or managing servers. "We had to create an ingestion layer between Factiva and the data layer," said Bailey. "AWS Lambda functions trigger requests to cleanse and format the transcripts—identifying quotes, the speaker, and the topic—before sending them to Amazon Kendra and Amazon DynamoDB. Relying on Lambda functions for those tasks means we can shut down the processes when we're not using them, so it's cost efficient."

Checking statements with second screen viewing

Data from the Talk2020 tool showed spikes in usage during and after the presidential debates, the vice-presidential debate, and town hall events. Many people even used the search tool as a second screen during debates to research statements that candidates made in the past. Engagement with Talk2020 was strong, with individual users often asking multiple questions and browsing several topics during the same visit. "That shows us that we created a tool that met our readers' needs, and we have an opportunity to keep experimenting with new ways to engage our users," explained Bailey.

Engaging the AWS team and using innovative services like Amazon Kendra helped WSJ launch Talk2020 in just five months, driving site traffic, encouraging engagement, and attracting new subscribers. "The AWS team was available anytime we needed," explained Bailey, "and it helped us resolve every issue that arose. The ability to search presidential candidate transcripts in future campaigns will help voters make informed decisions based on actual statements." ▀



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Dion Bailey, VP, Head of WSJ Technology and Architecture



Fast to the future

These stories of real-world use cases demonstrate the ways in which AWS can simplify how content creators, rights holders, producers, broadcasters, and distributors use the cloud to build, deploy, and reinvent workloads across many domains—making it easier to select the right tools and partners for high-priority projects, accelerate production launches, and see faster time to value.

We encourage you to reach out to our Sales team to get started in the cloud, or your Account Manager to continue your cloud journey. The following are additional resources to learn more about AWS for M&E:

[AWS for Media & Entertainment](#) - explore the purpose-built AWS services and solutions available for every step of the media value chain.

[AWS Media Blog](#) - a hub for customer stories, technical how-to guides, and service announcements.

[AWS Solutions](#) - pre-built architectures using AWS best practices can immediately accelerate your cloud adoption. Launch a solution starter kit in your AWS account with one click, with the option to expand or customize the solution to fit your needs.

[AWS Partners](#) - learn how AWS Partner solutions built on AWS can help you deploy digital media workflows in the cloud.

[Media & Entertainment Resources](#) - a collection of eBooks, webcasts, and white papers created for Media & Entertainment customers, as well as information about specific workflows and media technologies. ▪

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