EBOOK:

Innovate quickly

Faster, smarter, more agile media workflows across the media value chain—from content creation to distribution

Contents

In this eBook, you'll learn why using Amazon Web Services (AWS) is beneficial across each step of the media value chain.

Introduction

Across the Media and Entertainment (M&E) industry, from film and television to music to sports, and even digital publishing, consumers have a similar set of demands:

- Access to content anywhere, any time
- Choice regarding what they consume, in what format and on what device
- Personalization, delivering the content and advertisements that are relevant in a sea of choice

As content creators, you must be cognizant of these end-customer demands—as well as manage the ever-changing and complex production, asset management, and distribution workstreams.

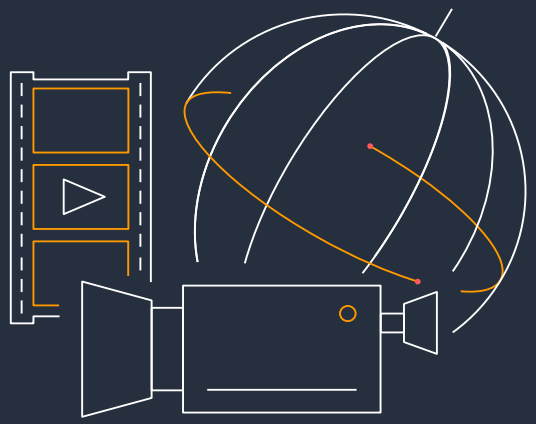
Automating workflows in the cloud accelerates the media value chain and enables the innovation that will keep your consumers coming back.

In this eBook, you'll learn why using Amazon Web Services (AWS) is beneficial across each step of the media value chain. Learn how the cloud accelerates workflows for content creation, asset management and supply chain, and distribution, for all types of media—audio, video, text, and images.

Examine the AWS solutions specifically designed to address each stage of the media value chain.

Step 1 in the media value chain

Content production – Studio in the Cloud



What would more productive artists mean for your studio? What if you could add sought-after talent to your project anywhere in the world, at any time?

Free your production from capacity and geographic constraints by moving your studio to the cloud

What would more productive artists mean for your studio? What if you could add sought-after talent to your project anywhere in the world, at any time

From episodics to feature films to live sports broadcasts to podcasts and beyond, commercial, creative talent is the core strength and differentiator for any creative studio. Artist time is more valuable than machine time. If you're focused on digital content creation (DCC), you can scale your studio by running virtual workstations, rendering, and storage workloads on AWS using controls and a framework approved by Independent Security Evaluators (ISE).

Virtual workstations for VFX and editing

By leveraging virtual workstations that run on Amazon Elastic Compute Cloud (EC2) G3 instances,studios can tap into new talent pools by adding artists to the pipeline for a specific project or time duration, regardless of where they are in the world. Artists work securely on AWS using a streaming application and the studio's existing licensing for their preferred content creation tools such as Autodesk Maya or Avid Media Composer; the content they create, using a file system such as Amazon FSx or a partner solution such as Weka IO, is stored securely on Amazon Simple Storage Service (S3) or Amazon Glacier. When content is created in the cloud you stay closer to your data as it becomes much easier to store, transfer, and render.

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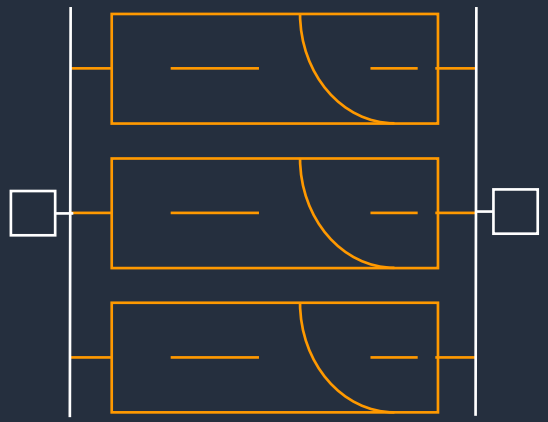
Rendering

Artist (and studio) productivity goes down when you're waiting for renders before you can iterate on a shot or scene. Rendering in the cloud can reduce the wait to as short a time as needed; you can simply add the number of cores to achieve a desired output time. As a result, artists spend less time waiting for rendering results, and more time iterating to improve the overall quality of the project. With AWS Thinkbox Deadline you can manage and scale your workloads for hybrid or full cloud pipelines using the AWS Portal feature-set. This provides a unified artist experience whether you are utilizing on-premises or cloud compute resources. When you extend to the cloud, you can experience near-limitless scale and performance with Amazon Elastic Compute Cloud (Amazon EC2) Spot Instances, providing up to 90% savings compared to On-Demand pricing.



We recommend evaluating your storage options so you can decide which one will best suit your studio's needs.

Storage

In order to run virtual workstations or rendering workloads on the cloud, you need the best solutions for storage. Since content creation is file-based, you need a file-based storage solution in addition to using Amazon Simple Storage Solution (S3) for longer-term storage. Whether your pipeline is hybrid or full cloud, storage is a key ingredient for success. There are a number of options for storage in the cloud. You can use Amazon FSx for Windows File Server or Lustre; you can build your own solution on Amazon EC2 using NFS/CIFS, ZFS, or GPFS; or you can take advantage of solutions created by our partners such as Weka IO (built on top of AWS). We recommend evaluating your storage options so you can decide which one will best suit your studio's needs.

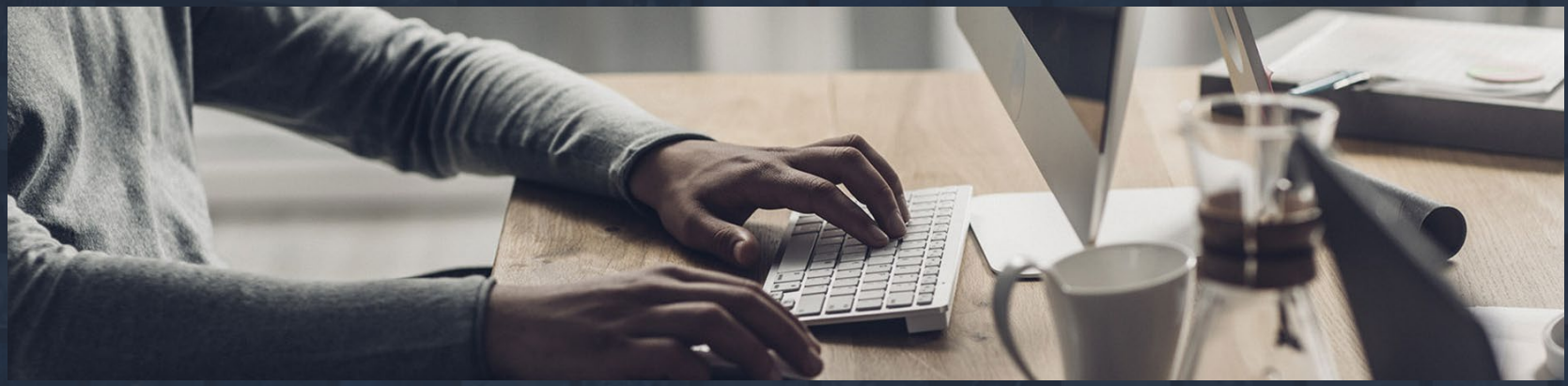
Benefits of having your Studio in the Cloud:

- Scale: add infrastructure and creative talent as needed to iterate faster and meet your deadlines
- Security: ISE-approved infrastructure standards and methodology; grant access and permissions based on tasks and need
- Accessibility: collaborate and share data across continents in near real-time

Read on to learn how real M&E companies are using AWS to enhance:

- Rendering
- Virtual workstations for VFX and editing
- Storage and sharing of assets (data) for content creation

Real use cases



Untold Studios

Use case: virtual workstations, cloud render, and storage for content creation (MAM)

Untold Studios operates completely in the cloud. Founded by veterans of the VFX industry, the studio wanted to take a different approach in setting up a new studio. Like many creative studios, Untold Studios faces seasonal, project-based work, meaning it's not always wise to invest in physical infrastructure and hardware that could sit unused. Untold Studios has virtualized everything—from artist workstations to rendering. Because they have a Studio in the Cloud, they can work with the best talent regardless of location.

Watch the Untold Studios story

Real use cases

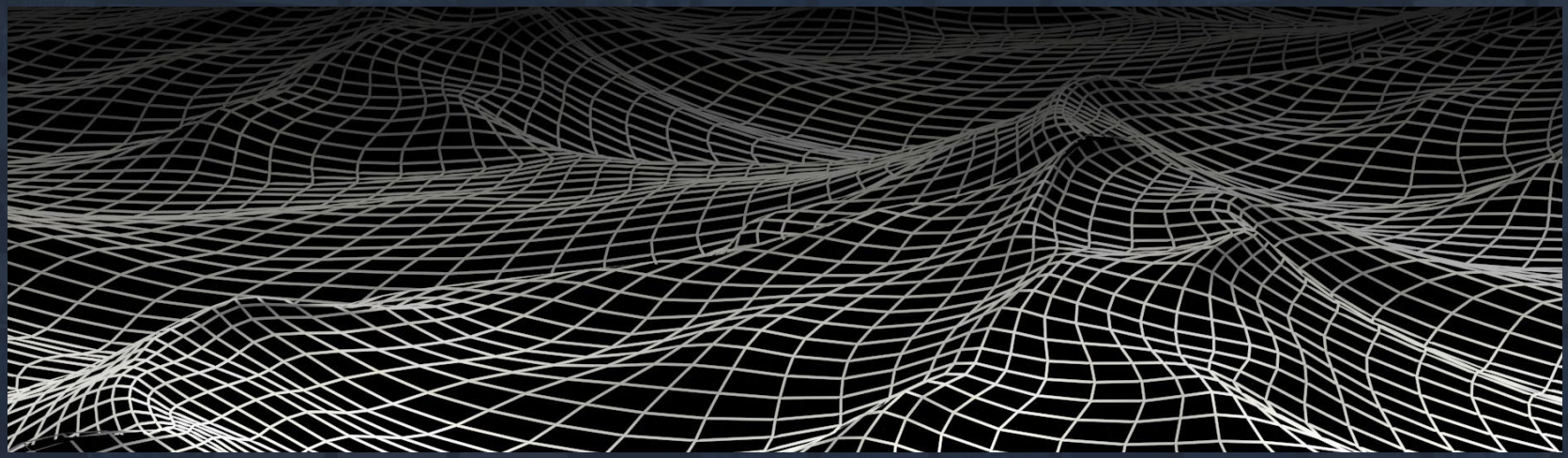
Mikros Animation

Use case: serverless computing, cloud migration, archives

During the two-year production cycle for "Sherlock Gnomes," Mikros Animation artists needed to deliver a full-length animated feature film. By rendering using Amazon EC2 Spot Instances, Mikros Animation elastically scaled its capacity, providing artists more time to increase the complexity of shots to meet the director's vision. At the project's completion, 4.5 million hours were rendered with Amazon EC2 Spot Instances—up to 170,000 simultaneous cores at its peak—using three AWS Availability Zones (AZ). The result enabled 300 artists in London and Paris to create the film.

Read more about Mikros Animation

Real use cases



Milk VFX

Use case: VFX

Milk VFX created the massive ocean and storm simulations for the film "Adrift"—the studio's biggest creative and technical challenge to date. Each fluid simulation required approximately 100 TB per shot. Using AWS, the rendering job was completed in just 10 weeks, averaging 80,000 cores per day, and Milk was able to deliver the project on time.

Learn more about Milk VFX

Real use cases

Meredith and BeBop Technology

Use case: virtual workstations

Learn how a cloud-based production and distribution pipeline—including virtual edit workstations—enables flexibility, agility, and potential for cost savings for Meredith Corporation (formerly Time, Inc.).

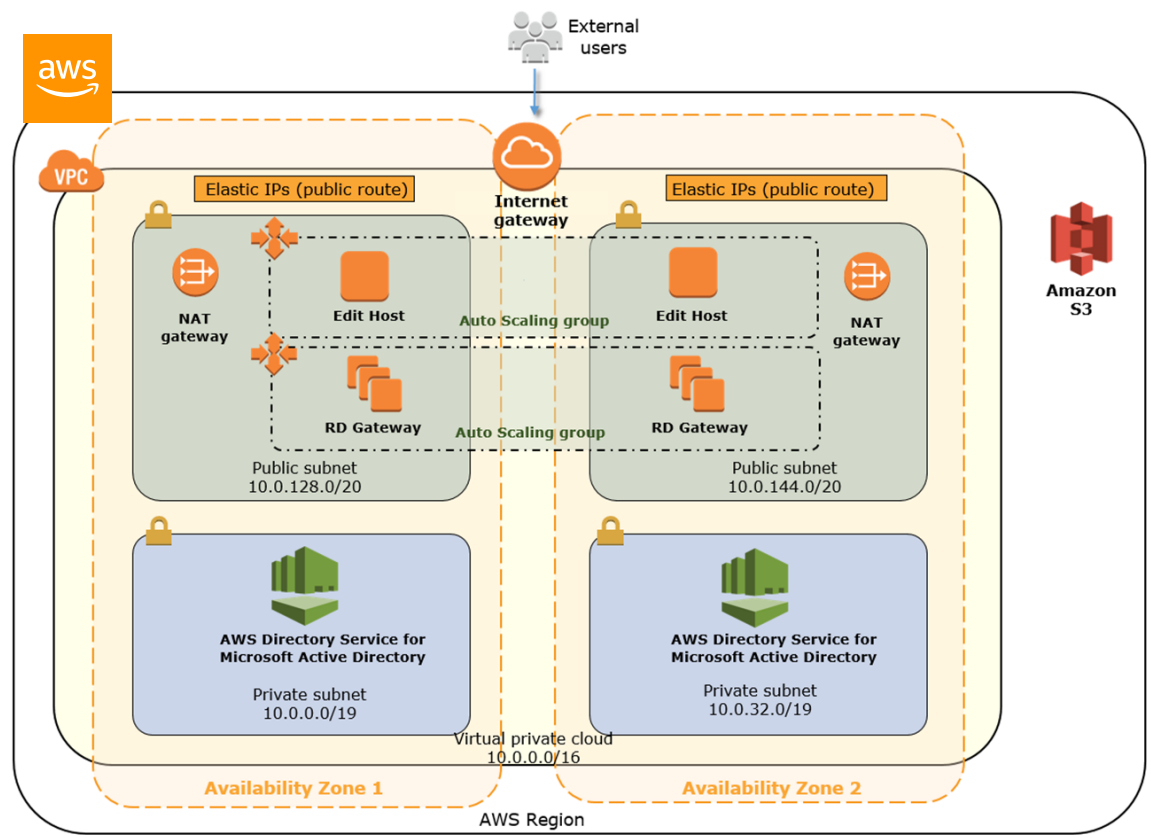
View video about Meredith + BeBop

Using AWS for content creation and production

AWS solutions help creative studios accelerate content creation by getting rid of capacity constraints and geographical limitations, while simultaneously increasing security and operational efficiency.

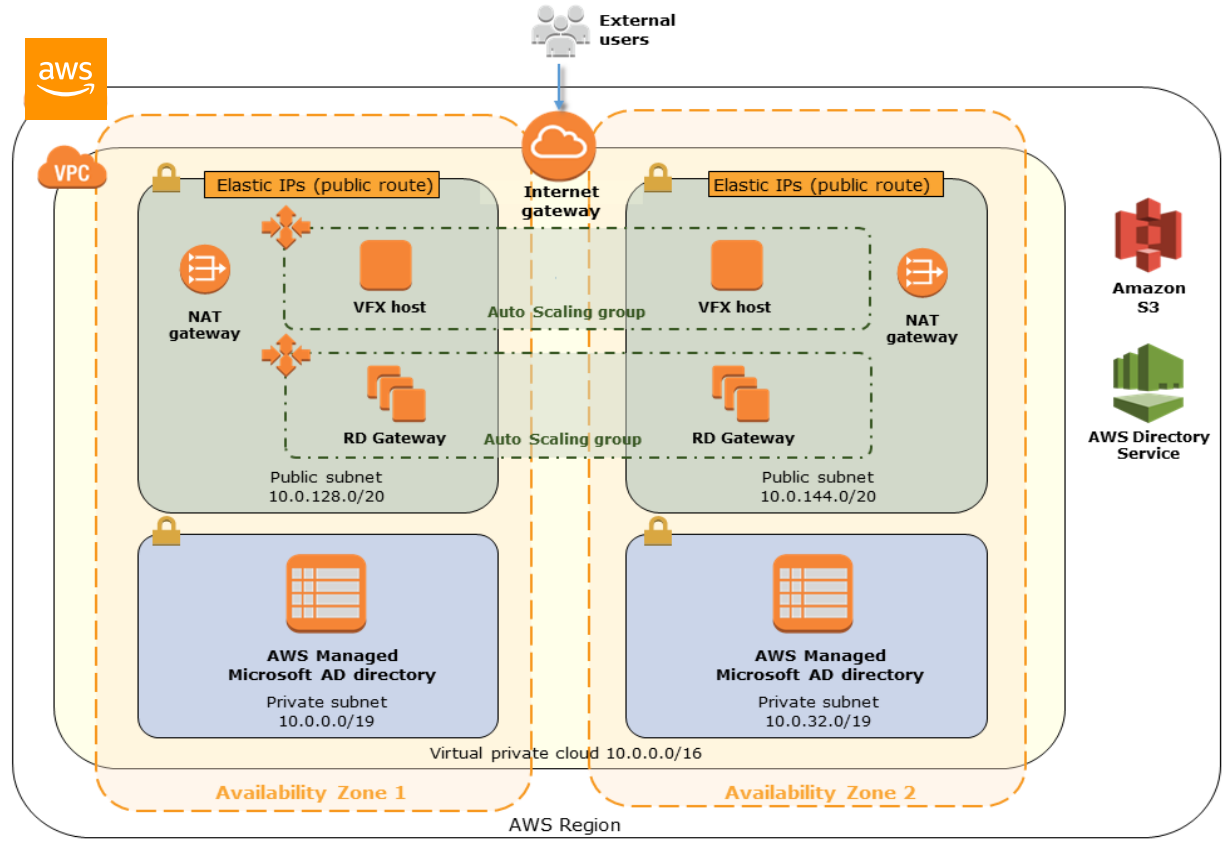
Edit in the Cloud lets you to deploy a highly available architecture for cloud video editing on AWS. Editors can modify content on distributed workstations, collaborate with others, and have a dynamically scalable production environment.

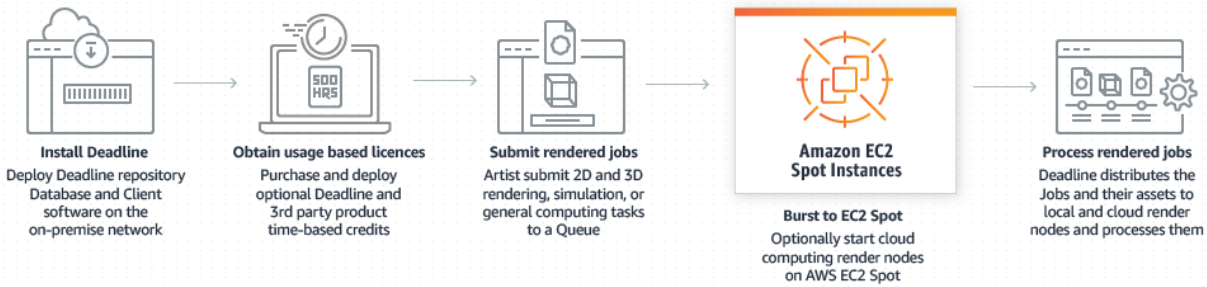
This solution uses **Amazon S3, Amazon EC2, Amazon Virtual Private Cloud (Amazon VPC), AWS Directory Service,** and **Remote Desktop Gateway** instances. Architecture can be automated by **AWS CloudFormation** templates.



VFX Workstation allows studios to scale creative talent up and down without massive capital expenditure on hardware, talent relocation, or new physical locations. Artists can access the studio pipeline securely and utilize existing licensing, and the work they create is stored in the cloud for easy access.

This solution uses **Amazon EC2 G3 (GPU)** instances, **Amazon S3, AWS Direct Connect,** and partner solutions for the streaming application (such as Teradici) as well as high throughput storage (such as WekaIO or Qumulo).





Rendering in the Cloud provides artists with more time to iterate, and since artist time is more valuable than machine time, this leads to better results. It also helps studios get through crunch time to deliver their projects on schedule.

This solution uses **Amazon EC2 Spot Instances, AWS Thinkbox Deadline, Amazon S3,** and **AWS Direct Connect.**

Learn more about

AWS for content creation and production

- **Edit in the Cloud**
- **VFX Workstation in the Cloud**
- **Rendering in the Cloud**
- **VFX Burst Rendering Framework**

Step 2 in the media value chain

Media supply chain and asset management

Once data is created and stored, it must also be made discoverable—lest it become unusable.

Prepare your content to move through the pipeline, from content data lakes to serverless architecture

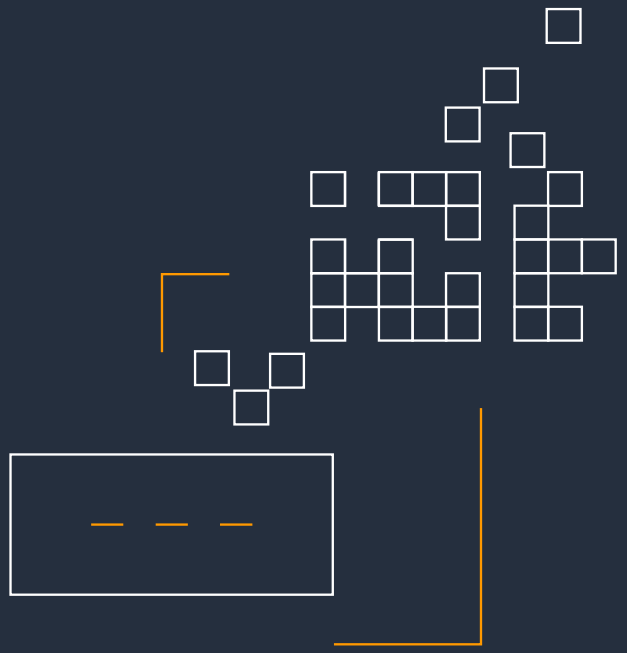
Data is growing at an extraordinary clip. According to Forbes[1] , 90% of the world's data was generated over a recent two-year period. M&E companies are no stranger to this growth, as the typical media cycle generates numerous files and formats over the lifespan of a project, from capture to production to distribution to archive. Throughout each phase, you need to ingest, process, store, and share content, moving assets along the pipeline of the media supply chain. It's common to use different asset management systems and workloads for each use case, too, which can create siloes and an inability to capture a single view of assets, storage of duplicate versions of files across systems, and operational inefficiencies.

1. Forbes, How Much Data Do We Create Every Day? The Mind Blowing Stats Everyone Should Read, May 2018, **https://www.forbes.com/sites/bernardmarr/2018/05/21/how-much-data-do-we-create-every-day-the-mind-blowing-stats-everyone-should-read/#15124c660ba9**

Consider the vast amount and various types of file formats required today: from master files to the variations needed for different resolutions and form factors. You must create and retain these—which can lead to terabyte-size archives. Legacy platforms may struggle to process this much data, experience outages, or may not be flexible enough to meet changing requirements. Once data is created and stored, it must also be made discoverable—lest it become unusable.

Using the cloud, you can scale and even enhance your asset management and supply chain using:

- Content and data lakes
- Serverless media supply chain



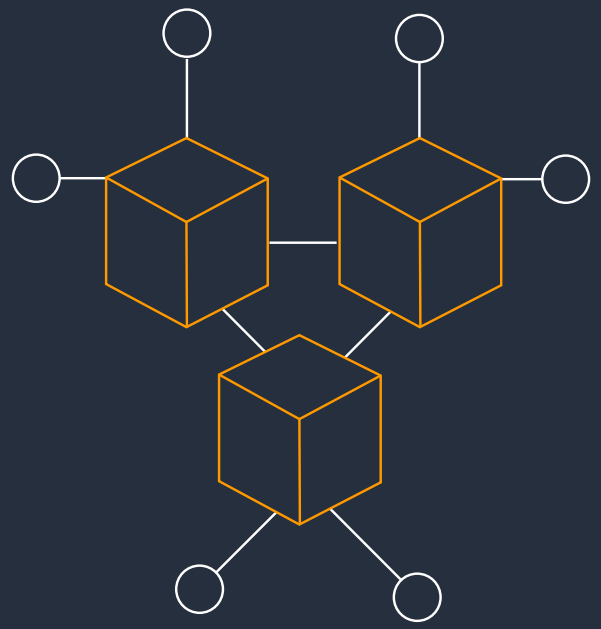
Once data is created and stored, it must also be made discoverable—lest it become unusable.

Content and data lakes

Storing physical assets—from tapes and hard drives to servers—requires immense amounts of resourcing and maintenance. Different versions of various media quickly increase the requisite storage space. Even metadata tagging, which ultimately makes your archives more useful, adds weight to your archives.

By moving your content to cloud-based content lakes, you can scale storage up or down as needed so you use just what you need when you need it. You can enhance the content in your lakes by integrating analytics—for example, track usage and social data, combine it in a data lake, then use the insights to serve personalized content for viewers. You can also automatically apply metadata tags to content using machine learning, enabling users to surface what they're looking for almost instantly. When your archives are more accessible, you can more easily mine them to create new experiences for your audience—opening new monetization opportunities.

Serverless architecture



Because much of M&E work is seasonal or cyclical, there are periods where servers—and human resources—sit idle. The challenge is that these resources must still be maintained and paid for, even when not actively in use.

With serverless architecture, you can shift operational responsibilities to the cloud, including building and running applications and services—without thinking about physical infrastructure. You can move more nimbly, continuously integrate and deliver, and realize both agility and speed for testing. And, you pay only for what you use.

Read on to learn how real studios and media companies are using the cloud for:

- Archiving
- Processing video files

Real use cases

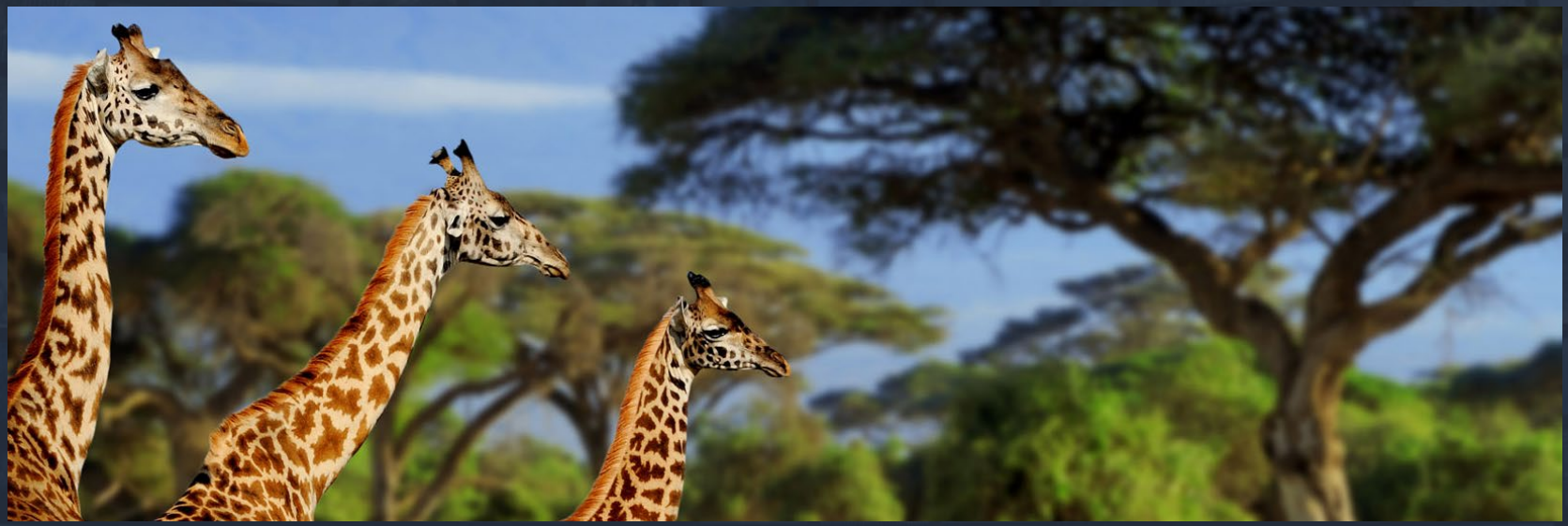
Universal Music Group (UMG)

Use case: archives

UMG produces, distributes, and promotes music on a global scale—creating PB-size archives and different workflows, tools, and vendor solutions. UMG adopted an integrated storage plan built on AWS that ensures its archives are globally accessible by its users. Now UMG can more easily negotiate new distribution deals, expedite content editing in compressed timelines, and govern the policies of its expanding library of video content.

Watch the full story

Real use cases



National Geographic Partners

Use case: serverless computing, cloud migration, archives

National Geographic, renowned for captivating photographs, has an image archive dating back to 1888. By implementing serverless computing and utilizing metadata, National Geographic created a mobile-native app that made its catalog easily accessible.

Read more about National Geographic

Real use cases

20th Century Fox

Use case: archives, serverless architecture

20th Century Fox's archive runs more than eight decades deep. The studio needed to replace aging physical infrastructure with a new system that would be easy to navigate and adaptable to support emerging formats. By applying serverless and cloud-native workflows, 20th Century Fox is set up to scale and continue to evolve its business in the cloud.

Watch the full story

Real use cases

Videofashion + GrayMeta

Use case: archives, metadata tagging

Videofashion holds video footage from four decades of fashion shows, yet finding content within that archive was a chore. By metadata tagging its content library, Videofashion created a searchable platform that enables users to search for clips featuring specific models, designers, and celebrities—and then license directly from the web platform.

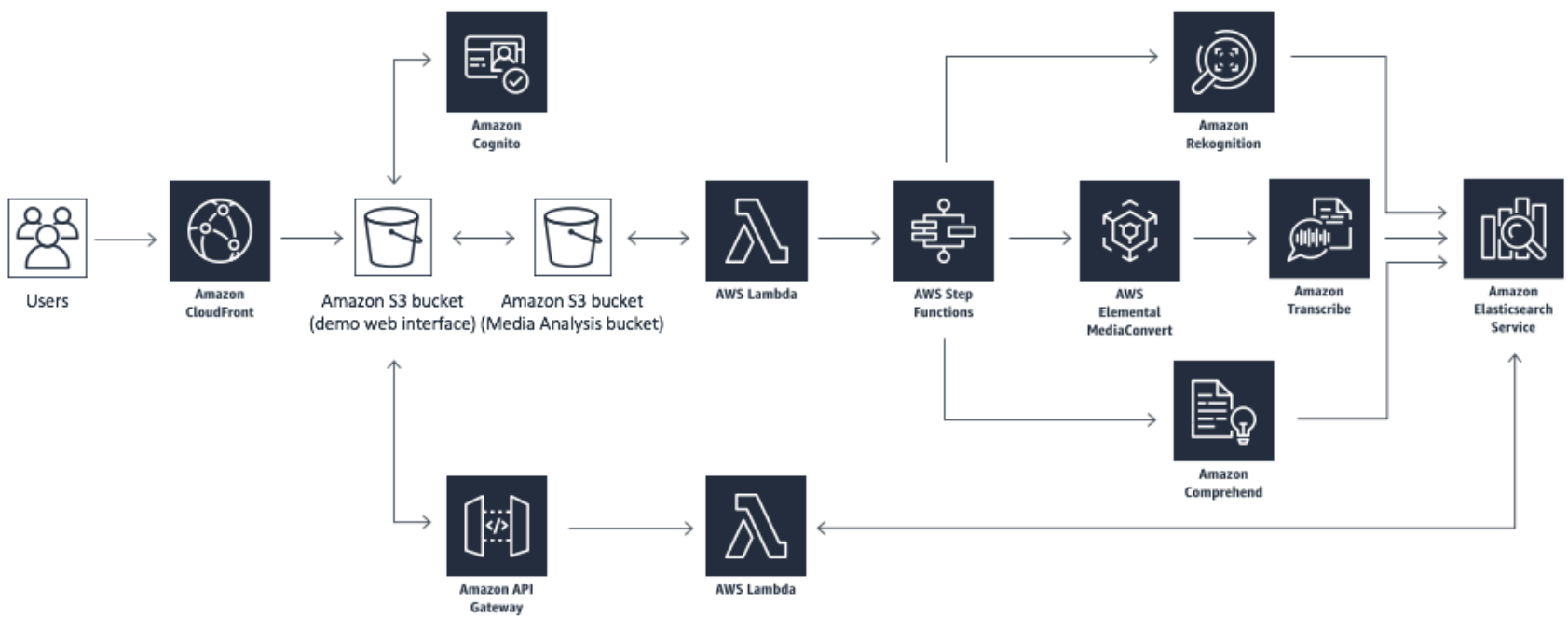
Watch the full story

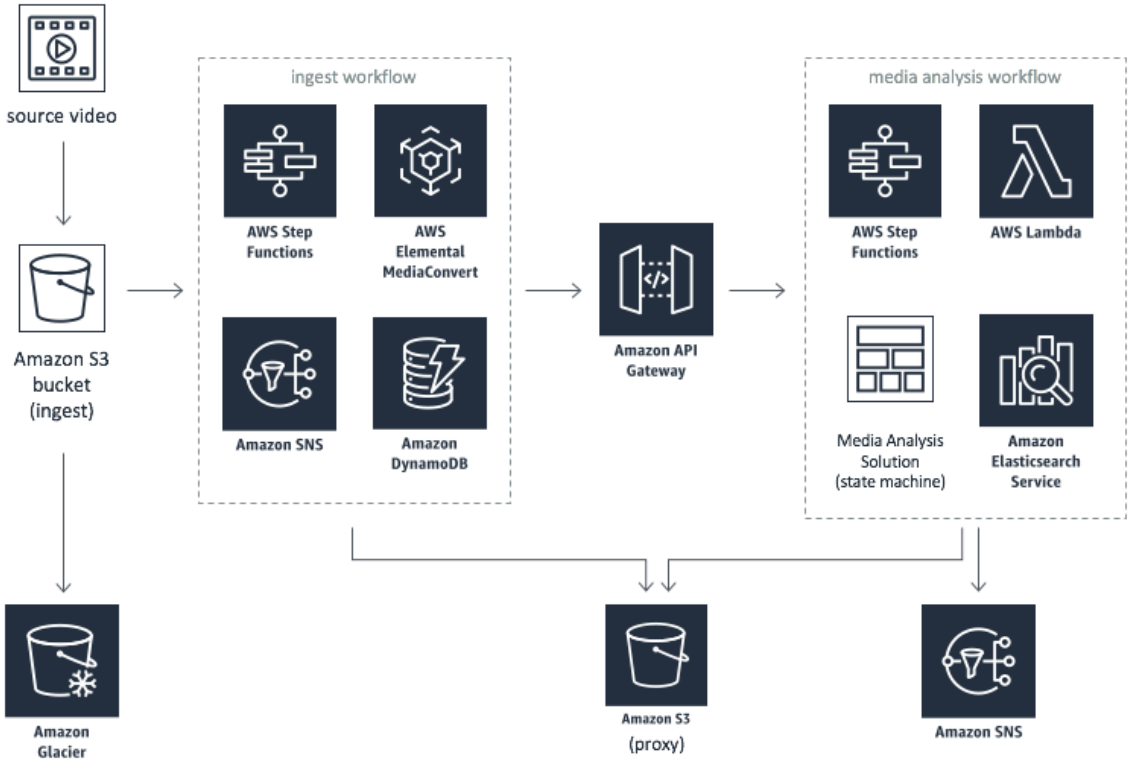
Using AWS for asset management and supply chain

AWS enables you to automate asset management and broadcast supply chains to manage media content more efficiently, with storage and processing that scales.

Using the **Media Analysis Solution**, you can process, analyze, and extract metadata locked in your audio, image, and video files; then upload and search your libraries.

This solution leverages **Amazon S3, AWS Lambda, AWS Step Functions, Amazon Rekognition, Amazon Transcribe, Amazon Comprehend,** and **AWS Elemental MediaConvert.**





Media2Cloud enables you to set up a serverless, end-to-end ingest workflow to move video assets and associated metadata to the cloud using a simple web interface.

This solution uses **AWS Step Functions, AWS Lambda, AWS Elemental MediaConvert, Amazon S3, Amazon S3 Glacier, Amazon DynamoDB, Amazon Simple Notification Services (Amazon SNS), Amazon API Gateway, Amazon Elasticsearch Service, Amazon Cognito,** and **Amazon CloudFront**. The solution leverages the **Media Analysis Solution** to analyze and extract valuable metadata from your video archives.

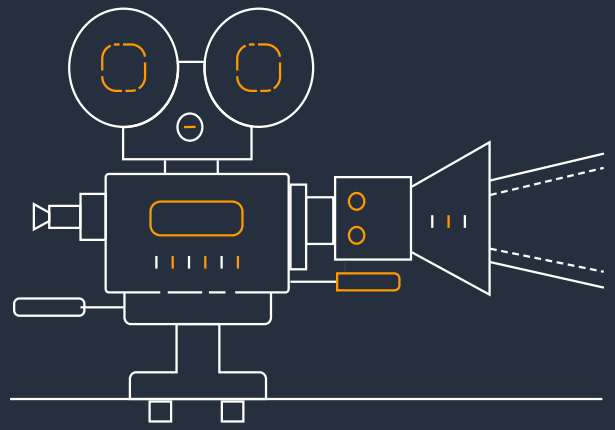
Learn more about

AWS for asset management and supply chain

- **Media2Cloud Solution**
- **Media Analysis Solution**
- **Live Streaming with Automated Multi-Language Subtitling**

Step 3 in the media value chain

Distribution



You must ensure your media comes through smoothly, with no blips or buffering.

Get your content in front of your audience on any screen, at any time—and enhance the experience

Once your content is created and formatted, the final stage is all about your audience. Getting your work out into the world is the most visible part of your media supply chain.

As with development and production, there are challenges to consider in the distribution phase. At the back-end, there are myriad devices, channels, language, and formats to support, and new form factors emerging all the time. From the audience perspective, there are latency and bandwidth considerations; you must ensure your media comes through smoothly, with no blips or buffering.

Using the cloud enhances distribution across:

- Broadcast playout
- Over-the-top (OTT)
- Digital publishing

The cloud also enables a level of personalization not previously possible at scale. For example, real-time feedback is easier to gather and act upon. Machine learning enables developers to create individualized recommendations for customers.

Broadcasting

Today's broadcasters face a complex broadcast playout environment: different broadcast playout formats; different language and formats needed for each distributor; different workflows for traditional TV, live streaming services, or OTT. The common denominator is the need for high-quality content, regardless of format.

Using the cloud, you can deliver reliable, broadcast-quality video workflows. You can create professional-quality media experiences for your audience without the time, effort, and expense typically required to run specialized video equipment in a traditional data center. And, you can increase video quality while reducing bandwidth and storage requirements.

OTT and Direct-to-Consumer (D2C)

OTT takes cues from traditional media delivery but skips to deliver content directly to consumers over the internet; viewers consume content on mobile devices or computers. In many ways, OTT is "cloud native" by design. Yet OTT has its own challenges: OTT providers must be especially cognizant of latency and bandwidth for performance quality, as well as device format and language. And while OTT has enabled content owners new forms of distribution, including D2C, it also requires them to develop new capabilities around supply chain, content lakes, quality of service, and end-user experience, including personalization.

With AWS Elemental Media Services, AWS enables broadcast-quality live and file-based video workflows while handling the underlying infrastructure for global video delivery.

Digital publishing

Traditional publishers know how much physical space it takes to store books, magazines, or scripts, let alone printing equipment and paper. Production time is lengthy as printers are often backlogged. Late-breaking edits or changes to content are nearly impossible to accommodate without stopping the presses—adding time and cost.

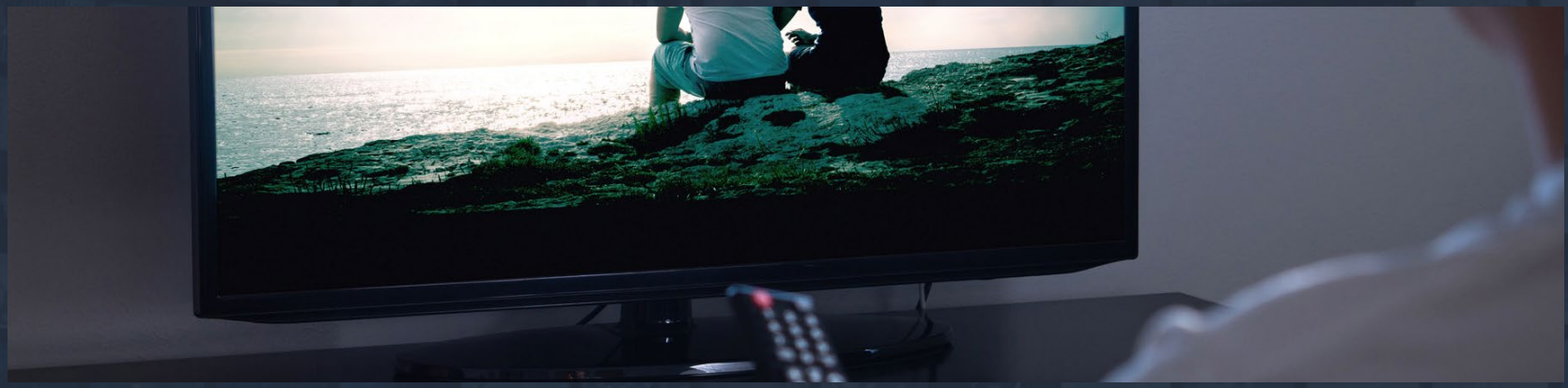
Using the cloud, you can instantly collaborate with contributors—such as writers, editors, and publishing designers—make changes in near-real time, and output digital publications. You can enhance publishing in ways not possible with physical media, too—such as adding video or audio files.

Read on to learn more about using the cloud to:

- Broadcast and stream—across broadcast playout, OTT, live, and on-demand
- Personalize and enhance consumer experiences

Using the cloud, you can deliver reliable, broadcast-quality video workflows.

Real use cases



Netflix, Inc.

Use case: OTT

Netflix has more than 117 million members in over 190 countries. The company needs massive scalability and elasticity for its internet-based entertainment service. Netflix uses AWS for nearly all of its online video servicing, enabling top-quality delivery with near zero downtime. AWS enables Netflix to quickly deploy thousands of servers and terabytes of storage within minutes. Users can stream Netflix shows and movies from anywhere in the world, including on the web, on tablets, or on mobile devices.

Learn more about Netflix

Real use cases

Discovery, Inc.

Use case: broadcast playout, virtualized workflows

As part of its strategy to virtualize its content supply and delivery chain, Discovery, Inc. moved playout of 300 channels around the world to the cloud. "The days of having discrete supply chains for those services are over," said the former Discovery, Inc. Chief Technology Officer, in **Broadcast**[2]. "It is too complicated and doesn't allow us to move fast enough."

Learn more about Discovery

2. Broadcast, Discovery to transition 300 channels to virtual playout, August 2018, **https://www.broadcastnow.co.uk/tech/discovery-steps-up-cloud-move/5131396.article**

Real use cases

Washington Post

Use case: digital publishing

Washington Post created its multi-media publishing platform, Arc, based in the cloud for in-house use. The approach now supports other publishing clients' efforts to manage copy, photos, and videos.

Read more about the Washington Post

(Disclosure: The Washington Post is owned by Jeff Bezos, CEO of Amazon)

Real use cases

Formula 1

Use case: enhanced audience experience

Formula 1 is racing to offer its fans performance stats—and even predicting outcomes—using Amazon SageMaker. Taking hundreds of sensors delivering millions of data points per second, the resultant data gives F1 fans new insights to the on-track experience.

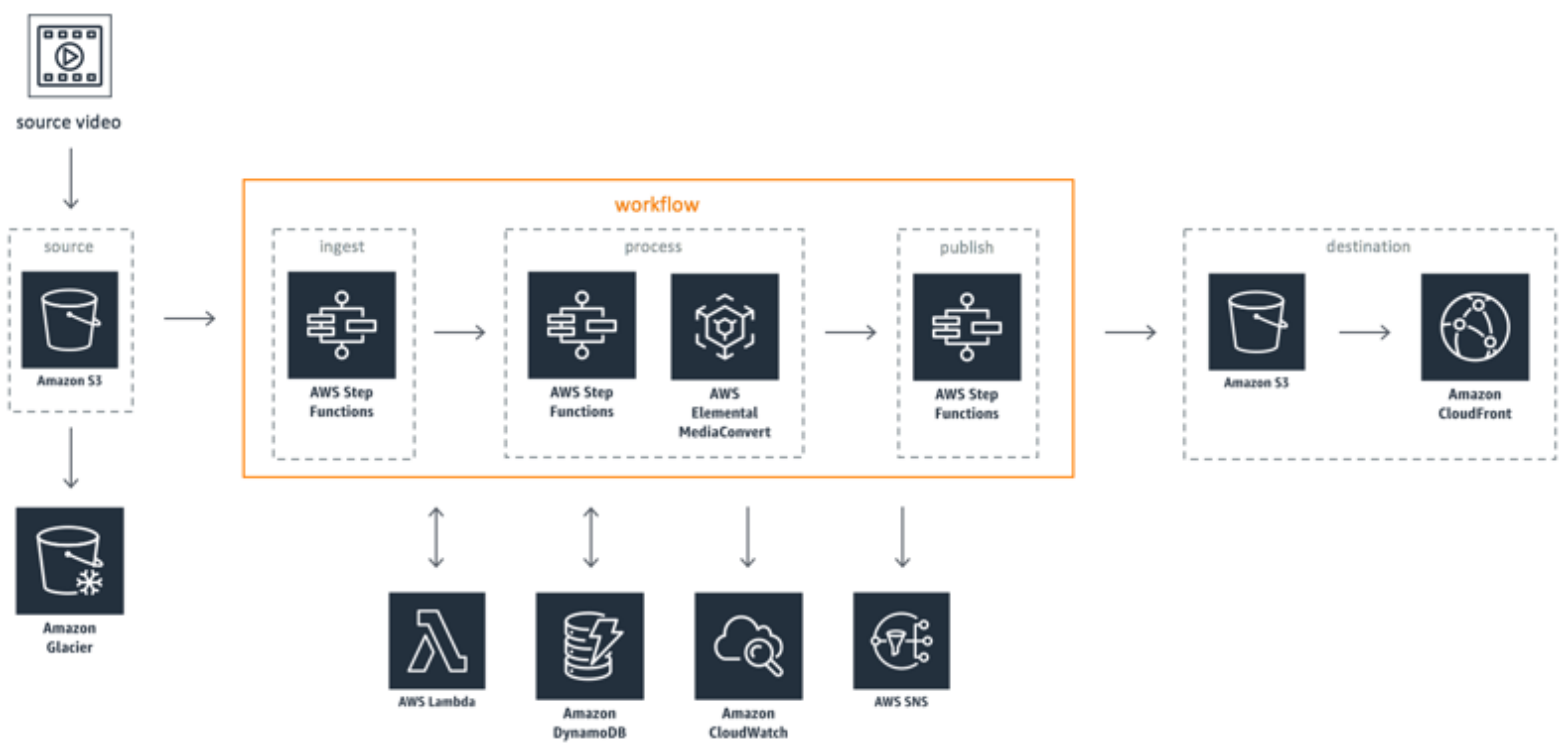
Learn more about Formula 1

Using AWS for distribution

Enable seamless delivery of live, linear, and on-demand content anywhere, any time, to any device for broadcast, OTT, and digital publishing.

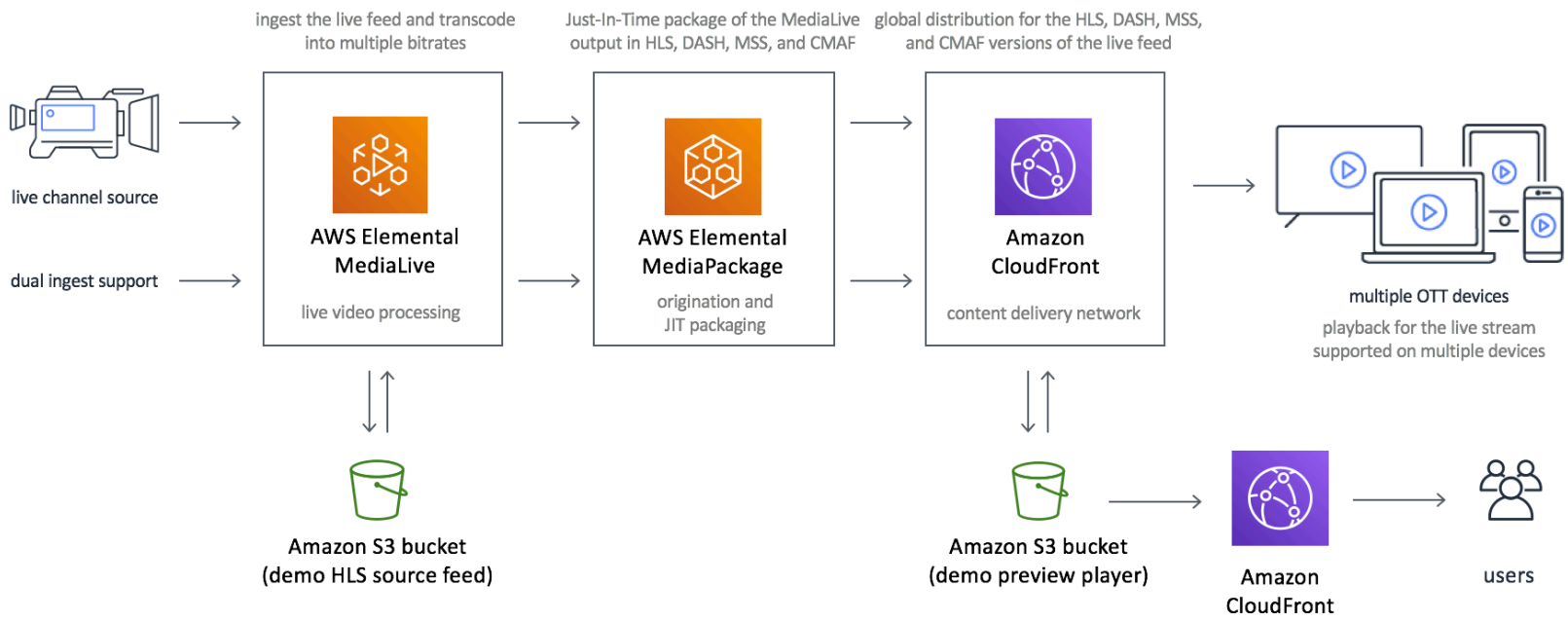
Using the **Video-on-Demand (VOD)** solution, you can deliver on-demand video content to a global audience, cost effectively and with dynamic scaling. This solution enables you to ingest source video, process it for playback on a wide range of devices, and store transcoded media files for on-demand delivery to end users.

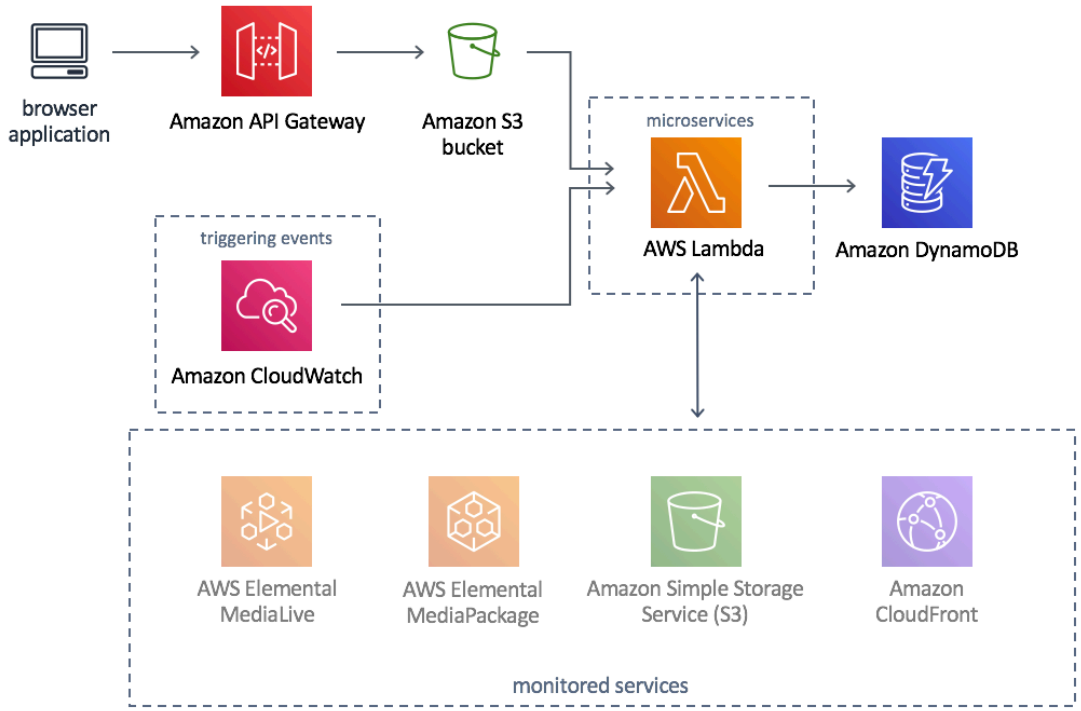
This solution uses **AWS Elemental MediaConvert, Amazon CloudFront, AWS Lambda**, and **AWS Step Functions**. Files can be stored on **Amazon S3, Amazon DynamoDB**, and **Amazon Glacier.**



The **Live Streaming** solution enables you to ingest, transcode, and deliver live streaming video while encoding and packaging your content for adaptive bitrate streaming across multiple screens.

This solution combines **AWS Elemental MediaLive** and **AWS Elemental MediaPackage** with **Amazon CloudFront;** it also includes a demo HTML preview player to test the solution, hosted in an **Amazon S3** bucket.





Media Services Application Mapper enables you to see logical connections between media services, visualizes error messages and counts, and produce a list of confidence-ranked root causes for problematic workflows.

This solution uses **AWS CloudFormation, AWS Lambda, Amazon API Gateway, Amazon CloudWatch,** and **Amazon DynamoDB**. Currently, the solution monitors **AWS Elemental MediaLive, AWS Elemental MediaPackage, Amazon S3,** and **Amazon CloudFront.**

Learn more about **AWS for distribution**

- **Live Streaming Service**
- **Video-on-Demand (VOD) Service**
- **Media Services Application Mapper**
- **Live Streaming with Automated Multi-Language Subtitling**

Get started with AWS for M&E

AWS services enable you to automate workflows in the cloud—reducing constraints, increasing efficiency, and creating opportunities to delight viewers and drive new revenue— across all types of media: audio, video, text, and images.

The AWS solutions discussed in this eBook are bundles of well-architected, vetted AWS services. The solutions are serverless with one-click deployment and designed around specific M&E needs:

- **Edit in the Cloud**
- **VFX Workstation in the Cloud**
- **VFX Burst Rendering Framework on AWS**
- **Media2Cloud**
- **Media Analysis Solution**
- **Media Services Application Mapper**
- **Live Streaming with Automated Multi-Language Subtitling**
- **Live Streaming**
- **Video-on-Demand (VOD)**

From content creation to distribution and everything in between, and for operations of all sizes, AWS solutions are designed to support the myriad M&E workflows that put top notch media in the hands of consumers.

Get started building M&E workflows using AWS

Get more information on the Solutions Page

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