# Task 4 : Research on industrial use cases of AWS SQS and create a blog/article for the same.

# AWS Partner Story: NASA

## About NASA

Established in 1958, the National Aeronautics and Space Administration (NASA) has been working around the world—and off of it—for almost 60 years, trying to answer some basic questions: What’s out there in space? How do we get there? What will we find? What can we learn there, or learn just by trying to get there, that will make life better here on Earth?

## Exploring Space: No Rocket Science Degree Needed

Have you ever looked up at night and wondered about the mysteries of space? Or marveled at the expansiveness of our galaxy? You can easily explore all this and more at the NASA Image and Video Library, which provides easy access to more than 140,000 still images, audio recordings, and videos—documenting NASA’s more than half a century of achievements in exploring the vast unknown. For NASA, providing the public with such easy access to the wonders of space has been a journey all its own.  
  
NASA began providing online access to photos, video, and audio in the early 2000’s, when media capture began to shift from analog and film to digital. Before long, each of NASA’s 10 field centers was making its imagery available online, including digitized versions of some older assets.  
  
Therein was the challenge: “With media in so many different places, you needed institutional knowledge of NASA to know where to look,” says Rodney Grubbs, Imagery Experts Program Manager at NASA. “If you wanted a video of the space shuttle launch, you had to go to the Kennedy Space Center website. If you wanted pictures from the Hubble Space Telescope, you went to the Goddard Space Flight Center website. With 10 different centers and dozens of distributed image collections, it took a lot of digging around to find what you wanted.”  
  
Early efforts to provide a one-stop shop consisted of essentially “scraping” content from the different sites, bringing it together in one place, and layering a search engine on top. “In large part, those initial efforts were unsuccessful because each center categorized its imagery in different ways,” says Grubbs. “As a result, we often had five to six copies of the same image, each described in different ways, which made searches difficult and delivered a poor user experience.”

In 2011, NASA decided that the best approach to address this issue was to start over. By late 2014, all the necessary pieces for a second attempt were in place:

• The Imagery Experts Program had developed and published a common metadata standard, which all NASA’s centers had adopted.  
  
• The Web Enterprise Service Technologies (WESTPrime) service contract, one of five agency-wide service contracts under NASA’s Enterprise Services program, provided a delivery vehicle for building and managing the new site.  
  
• The Federal Risk and Authorization Management Program (FedRAMP), which provides a standardized approach to security assessment, authorization, and continuous monitoring for cloud products and services.

“We wanted to build our new solution in the cloud for two reasons,” says Grubbs. “By 2014, like with many government agencies, NASA was trying to get away from buying hardware and building data centers, which are expensive to build and manage. The cloud also provided the ability to scale with ease, as needed, paying for only the capacity we use instead of having to make a large up-front investment.”

## Decades of NASA Achievements – All in One Place

Development of the new [NASA Image and Video Library](https://images.nasa.gov/#/) was handled by the Web Services Office within NASA’s Enterprise Service and Integration Division. Technology selection, solution design, and implementation was managed by InfoZen (acquired by and now operating as ManTech International), the WESTPrime contract service provider. As an Advanced Consulting Partner of the AWS Partner Network (APN), ManTech International chose to build the solution on Amazon Web Services (AWS). “Amazon was the largest cloud services provider, had a strong government cloud presence, and offered the most suitable cloud in terms of elasticity,” recalls Sandeep Shilawat, Cloud Program Manager at ManTech International.

NASA formally launched its Image and Video Library in March 2017. Key features include:

• A user interface that automatically scales for PCs, tablets, and mobile phones across virtually every browser and operating system.  
  
• A search interface that lets people easily find what they’re looking for, including the ability to choose from gallery view or list view and to narrow-down search results by media type and/or by year.  
  
• The ability to easily download any media found on the site—or share it on Pinterest, Facebook, Twitter, or Google+.  
  
• Access to the metadata associated with each asset, such as file size, file format, which center created the asset, and when it was created. When available, users can also view EXIF/camera data for still images such as exposure, shutter speed, and lens used.  
  
• An application programming interface (API) for automated uploads of new content—including integration with NASA’s existing authentication mechanism.

## Architecture

The NASA Image and Video Library is a cloud-native solution, with the front-end web app separated from the backend API. It runs as immutable infrastructure in a fully automated environment, with all infrastructure defined in code to support continuous integration and continuous deployment (CI/CD).

In building the solution, ManTech International took advantage of the following AWS services:

• [Amazon Elastic Compute Cloud (Amazon EC2)](https://aws.amazon.com/ec2/), which provides secure, resizable compute capacity in the cloud. This enables NASA to scale up under load and scale down during periods of inactivity to save money, and pay for only what it uses.

• [Elastic Load Balancing (ELB)](https://aws.amazon.com/elasticloadbalancing/), which is used to distribute incoming traffic across multiple Amazon EC2 instances, as required to achieve redundancy and fault-tolerance.  
  
• [Amazon Simple Storage Service (Amazon S3)](https://aws.amazon.com/s3/), which supports object storage for incoming (uploaded) media, metadata, and published assets.  
  
• [Amazon Simple Queue Service (Amazon SQS)](https://aws.amazon.com/sqs/), which is used to decouple incoming jobs from pipeline processes.  
  
• [Amazon Relational Database Service (Amazon RDS)](https://aws.amazon.com/rds/), which is used for automatic synchronization and failover.  
  
• [Amazon DynamoDB](https://aws.amazon.com/dynamodb/), a fast and flexible NoSQL database service, which is used to track incoming jobs, published assets, and users.  
  
• [Amazon Elastic Transcoder](https://aws.amazon.com/elastictranscoder/), which is used to transcode audio and video to various resolutions.  
  
• [Amazon CloudSearch](https://aws.amazon.com/cloudsearch/), which is used to support searching by free text or fields.  
  
• [Amazon Simple Notification Service (Amazon SNS)](https://aws.amazon.com/sns/), which is used to trigger the processing pipeline when new content is uploaded.  
  
• [AWS CloudFormation](https://aws.amazon.com/cloudformation/), which enables automated creation, updating, and destruction of AWS resources. ManTech International also used the Troposphere library, which enables the creation of objects via AWS CloudFormation using Python instead of hand-coded JSON—each object representing one AWS resource such as an instance, an Elastic IP (EIP) address, or a security group.  
  
• [Amazon CloudWatch](https://aws.amazon.com/cloudwatch/), which provides a monitoring service for AWS cloud resources and the applications running on AWS.

## An Image and Video Library for the Future

Through its use of AWS, with support from ManTech International, NASA is making its vast wealth of pictures, videos, and audio files—previously in some 60 “collections” across NASA’s 10 centers—easily discoverable in one centralized location, delivering these benefits:

• Easy Access to the Wonders of Space. The Image and Video Library automatically optimizes the user experience for each user’s particular device. It is also fully compliant with Section 508 of the Rehabilitation Act, which requires federal agencies to make their technology solutions accessible to people with disabilities. Captions can be turned on or off for videos played on the site, and text-based caption files can be downloaded for any video.  
  
• Built-in Scalability. All components of the NASA Image and Video Library are built to scale on demand, as needed to handle usage spikes. “On-demand scalability will be invaluable for events such as the solar eclipse that’s happening later this summer—both as we upload new media and as the public comes to view that content,” says Bryan Walls, Imagery Experts Deputy Program Manager at NASA.  
  
• Good Use of Taxpayer Dollars. By building its Image and Video Library in the cloud, NASA avoided the costs associated with deploying and maintaining server and storage hardware in-house. Instead, the agency can simply pay for the AWS resources it uses at any given time.

While NASA’s new Image and Video Library delivers a wealth of new convenience and capabilities, for people like Grubbs and Walls, it’s just the beginning. “We now have an agile, scalable foundation on which to do all kinds of amazing things,” says Walls. “Much like with the exploration of space, we’re just starting to imagine all that we can do with it.”