

## Utilizing Amazon's AWS GovCloud for High Performance Computing

### An HPC Strategy that Fits The Need

Our client wanted to utilize several CFD codes developed by NASA to analyze ducted-fan designs for the cold section of a turbine-engine. They did not have an HPC strategy, but were interested in utilizing the cloud.

### Developing AWS Framework

#### At A Glance

- Created set of IAM users, roles, and policies for secure operation
- Created necessary AMIs on EC2
- Developed comprehensive framework for submitting, monitoring, and retrieving jobs

To utilize the cloud, we developed an interface with Amazon's GovCloud using HPC resources. A suite of programs and scripts allowed the user to launch, monitor, and retrieve HPC jobs. This framework was general and allowed several CFD codes to be used. In addition, the framework was also used as a basis for commercial off-the-shelf codes.

We developed a custom machine image (AMI) and an extensive set of IAM roles and policies for specific users, so that we could ensure the proper security required by export regulations to run the codes, in addition to securely transporting the data.

### Conclusion

Finally, IES facilitated understanding of the improved overall framework. We also helped the client set up and implement a structure on Amazon's S3 object storage architecture that included data replication.

**Important:** During the initial stages of the project, we helped the client identify parallel computing problems in ADPAC, one of the programs they intended to use. Because we understand these codes, we were able to quickly and efficiently replace ADPAC's parallelization routines with an Open-MPI implementation.

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