GridLAB-D Cloud Operations

Software Design Implementation
David Chassin and Jonathan Goncalves

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GridLAB-D has been designed to support cloud operations on AWS immediately, and it has been SLAC's intent to support Microsoft Azure and Google Cloud Platform as soon as practicable.

However, during TAC Meeting #4, the stakeholders asked about not being overly reliant on any single cloud hosting platform.

This document summarizes the objectives of the support for GridLAB-D cloud operations, describes the current implementation, and provides an estimate of the effort required to ensure that GridLAB-D can be deployed and operated on the three major cloud hosting platforms.

GridLAB-D Cloud Requirement

GridLAB-D support on cloud operations address the following requirements:

1. Building and releasing GridLAB-D images
2. Running GridLAB-D instances
3. Support cloud storage access from within GridLAB-D simulations
4. Supporting domain names for GridLAB-D resources and APIs.

AWS Support

Amazon Web Services (AWS), amongst many things, allows for creation of *nix flavored VMs. Many of which we know and tested GriLAB-D docker images on.

1. Building and releasing GridLAB-D images is supported
   a. Build and validation of AWS EC2 AMIs for GridLAB-D is supported with docker.
   b. No support for directly releasing AMIs at this time. It has to be done manually or through the aws CLI.
2. No support yet for directly starting AMIs from within GridLAB-D execution environment.
   a. This can be done indirectly using the #aws GLM macro with the aws CLI syntax.
3. GLM parser can directly read inputs from URLs, including AWS S3 buckets.

a. The general file IO system does not support S3 directly. Files have to be sync'd manually using the #aws CLI syntax
4. There are a large number of resources that have assigned canonical domain names. See https://docs.google.com/document/d/1TxnGN43b3HoxNby-rE7ga1gdIpDvNxcLM5GQRe0qihs/edit?usp=sharing for details.
    a. Most resources currently only support http access through S3 bucket redirects
    b. Https support with CloudFront is work in progress.

Support completion estimate as 1 FTE over ~1 month.

Google Cloud Support

Google Cloud Platform (GCP), amongst many things, allows for creation of *nix flavored VMs. Many of which we know and tested GriLAB-D docker images on.

1. Building and releasing GridLAB-D images
    a. GCP Compute Engine instances support docker and therefore can build and validate GridLAB-D.
    b. Release is manual and via the CLI.
2. No support yet for directly starting Compute Engine instances from within GridLAB-D execution environment.
3. GLM parser can directly read inputs from URLs, including GCP Storage buckets.
    a. The general file IO system does not support Cloud Storage directly. Files have to be sync'd manually using the #gcloud CLI syntax
4. Supporting domain names for GridLAB-D resources and APIs is not currently supported. However most resources should be easily accessible through a common URL scheme accessed over HTTP.

Support completion estimate as 1 FTE over ~3 month.

Azure Support

Microsoft Azure, amongst many things, allows for creation of *nix flavored VMs. Many of which we know and tested GriLAB-D docker images on.

1. Building and releasing GridLAB-D images
    a. MS Azure VM instances support docker and therefore can build and validate GridLAB-D.
    b. Release is manual and via the CLI.
2. No support yet for directly starting Azure VM instances from within GridLAB-D execution environment.
3. GLM parser can directly read inputs from URLs, including Azure Cloud Storage buckets.

      a. The general file IO system does not support Azure Storage directly. Files have to be sync'd manually using the #azure CLI syntax

4. Supporting domain names for GridLAB-D resources and APIs is not currently supported. However most resources should be easily accessible through a common URL scheme accessed over HTTP.