

ABSTRACT

The migration of virtual machines running on legacy platforms is essential to bring many applications to the cloud computing environments. The migration time can vary due to the form of a machine. A machine’s operating system, defined CPU size, disk size, and data written to the disk are just some potential variables that could impact the time of migration.

These variables can have a negligible or significant effect on the time of migration. A solid understanding of the effect of each one could provide sufficient information to plan a migration. A strategy can be developed to mitigate the effects of the large factors of migration, which can become quite important when multiple machines are migrated in parallel.

The Google Cloud Platform allows the creation of virtual machines with large amounts of variance. Google Cloud’s VM Migration Service, powered by CloudEndure, allows virtual machine migration and disaster recovery with relative ease. CloudEndure effectively has two phases of migration: the initial data replication phase which uses block-level data-replication on the source machine bringing it to CloudEndure, and the launch phase where the machine on CloudEndure is launched on the target location.

We have conducted a series experiments by creating virtual machines on Google Cloud of varying types and using CloudEndure to migrate these machines. For the initial data replication phase, the disk size of the virtual machine was found to be a large factor of migration time. Data on disk was also found to impact the migration time. Operating system and CPU size were negligible in their affects. For the launch phase, machine variables had little impact on the operation, with test results being consistent among machines.

PURPOSE

To better understand the Google Cloud Platform and how the timing scales for a virtual machine being migrated with the migration service CloudEndure. This information could be used to create a better migration strategy when migrating a legacy system to Google Cloud.

TECHNOLOGIES

- Google Cloud Platform
  - Google’s cloud computing services
  - Virtual Machine Hosting
  - Data Storage
  - Logging for services
- CloudEndure
  - Migration Service implemented in Google Cloud
  - Live Migration
  - Also provides disaster recovery, which can bring a Virtual Machine back online if it fails

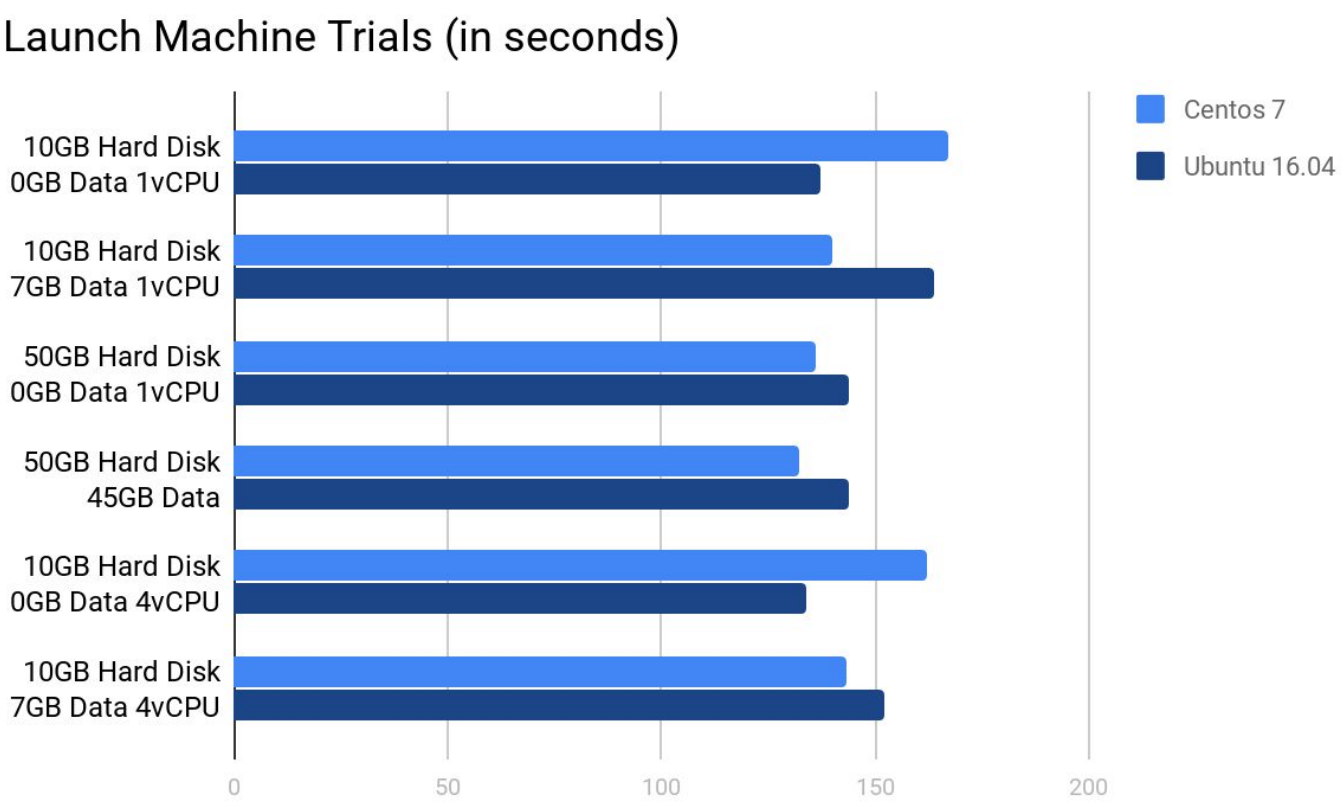
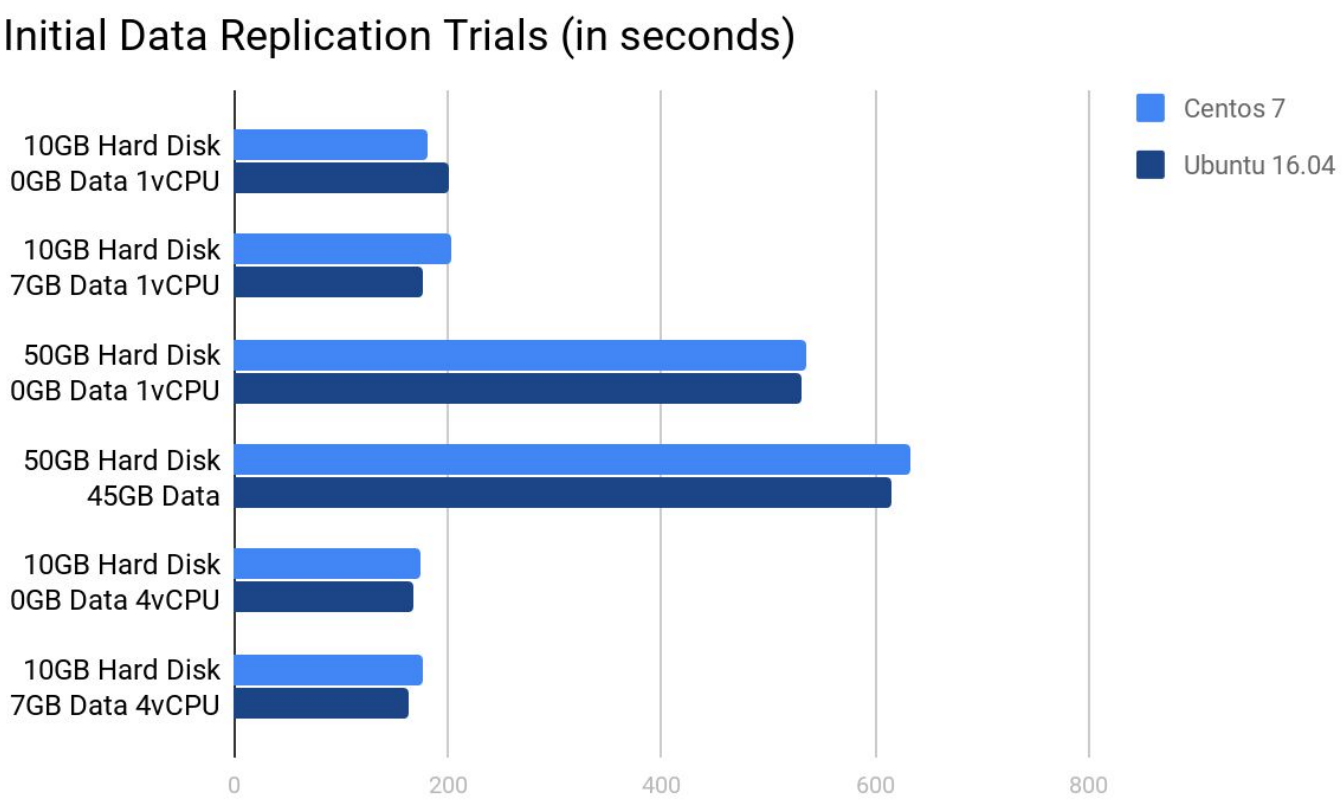


METHODS

- Create a virtual machine in the source project on the Google Cloud Platform
  - Create a virtual machine in Google Cloud’s Compute Engine with a set of variables
  - Use the ‘dd’ command to fill hard drive space if necessary
- Create destination project in the Google Cloud Platform, which will be migrated too
  - This is a separate project that will hold the migrated machines
  - Must create a service account, to connect this project with CloudEndure
- Initial Data Replication Phase
  - Install CloudEndure software onto virtual machine and execute it
  - Migrates virtual machine to CloudEndure
- Launch Machine Phase
  - Launching on CloudEndure will spin up an instance of the virtual machine on the destination project

RESULTS

- The trials were run with each data point being the average of 3 separate results
- The following virtual machine parameters were used in the trials
  - Operating System
    - Centos 7
    - Ubuntu 16.04
  - Hard Disk Size
    - 10 GB
    - 50 GB
  - Data on Disk
    - 0 GB
    - 7 GB (for 10 GB Hard Disk)
    - 45 GB (for 50 GB Hard Disk)
  - Virtual CPU
    - 1vCPU (1 core, 3.75 GB Memory)
    - 4vCPU (4 cores, 15 GB Memory)



CONCLUSION

- Initial Data Replication Phase
  - Hard Disk Size has a large impact on the trial time
  - Data on Disk potentially has an impact on trial time
- Launch Machine Phase
  - Time difference between trials is negligible
  - Since the disks on the destination project are written too during the initial data replication phase, no disk writing occurs when a virtual machine is launched.

The key component to total migration time appears to be hard disk size and data on disk. Operating system and virtual CPU size seem to have a negligible effect on time. The launch machine phase does not write data to the disk, explaining trial results being near identical. The initial data replication phase is primarily a function of hard disk size. A potential strategy to avoid wasted time during migration is too make sure that non-written hard disk space is minimized, as additional disks can be added to a virtual machine on Google Cloud.