

An Observable Network Route Support on Interpretation of Cloud Computing



Pramod Kumar Pandey, Sakshi Chhabra, Ashok Sharma

Abstract: The Commercial cloud computing is appropriate conventional and funding agencies beyond prototyping, and initiated fund Production exercise. An important feature of any technical computing Program is moving production data, inward and outward. By means of the virtual machine performance and cost relatively glowing assumed, Network performance and cost is not. This article provides an authentication in the regions of Amazon Web Services, Microsoft Azure network and between Google clouds platforms, cloud both resources and major DTNs In research platform in the Pacific, including the Federation of OSG data cache Network backbone, cloud inside their own. This article contains both qualitative results of the analysis, as well as latency and throughput measuring. It also includes analysis of the cost of contribution Cloud Based on the network.

Keywords: Cloud Computing, AWS, Microsoft Azure, Computer Network, GCP

I. INTRODUCTION TO CLOUD COMPUTING

The commercial cloud computing gaining popularity in the field of scientific computing. Due it is very flexible nature and large total capacity, which is a great resource and prototype. It makes urgent computing needs a good platform. The fund institution Began to pay attention, explicitly mentioned in some recent grants commercial cloud Use. An important aspect of any major scientific computing project is the data migration. The Scholars and support teams need to understand the basic features Connect to the resources they use, including network latency and throughput also Costs related to the proper use of resources planning decisions under these circumstances Commercial cloud resources, performance and cost calculation illustrations Relatively well documented and understood, the same cannot be said for the network link and Move large data. In the direction of address this deficiency, we had a network characteristics Autumn campaign early in 2019, collecting information on throughput and latency, Amazon Web Services (AWS), Microsoft Azure and Google each area of cloud computing Platform (GCP), were studied between resources and major DTNs Pacific cloud Platform (PRP / TNRP), including the Open Science Grid (OSG) data federation cache Internet to backbone, and between different regions within clouds they themselves.

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Furthermost of the benchmark results were contrasting by the three commercial operating objects store Cloud providers. In place of storage endpoints because it provides an easy Access scalable endpoint, data migration for real life is usually designed for those the service refer to the data movement inside a cloud performance area. The situation delivers information about the network performance between the cloud regions using the Infrastructure-as-a-Service (IaaS) cloud service provider. Moving data between the performance of cloud resources and operating hardware.

II. THE NETWORKING INSIDE CLOUD REGIONS

In the direction of measure the performance of the network in the area, we must choose a scalable Endpoint. In line for to the large pool of distributed storage of all business operations of cloud service providers object storage interface, we thought of as our Lord aims. In accumulation, many scientific computing workloads may access cloud-native objects Storage, also contrasting is very important in its own right performance such measurements to achieve. Test setup is the same service provider for all commercial cloud. We created a set of File size of 1 GB each, and upload them to the cloud object storage in each region for test the commercial cloud service providers, that is, one in AWS, Azure and a one in GCP. At that time a calculation example provisioning, and large quantities of concurrent Download on their way, the timing of the log collected to measure implemented performance. Used to perform the actual download tool is aria2 and workload Management system is HT Condor. We participated numerous tests at each test cloud zone, only in a few cases at the beginning of then progressively increase instance counts. All three test scalability Commercial cloud providers are excellent, shown in Figure 1, we further stop After scaling we exceed the total bandwidth of about 1 Tbps.

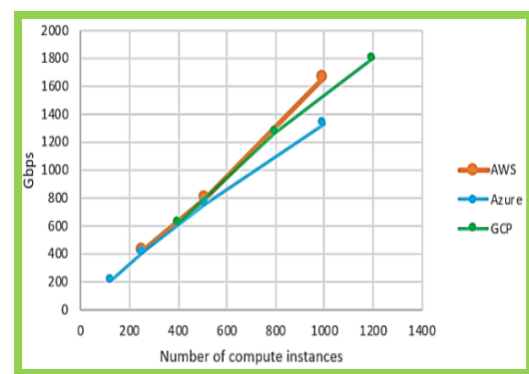


Figure-1: Showing the Highest throughput observed in a Cloud region while downloading from a local object storage instance



III. NETWORKING AMONG THE CLOUD PROVIDERS INSIDE THE REGION

An Observing to high-throughput applications distributed High Throughput Computing (DHTC) paradigm, like OSG those currently running resources, you can easily use multiple cloud area, in order to Maximum scalability Appreciative the characteristics of the network path between Areas is therefore very important. The Test setup similar to that the area we tested for Cloud storage cloud end operations, but reading from a different cloud area. The main function of the network infrastructure is of interest to those operating the cloud Suppliers, rather than exercising on between them and so on. Across the USA have reached several hundred Gbps on network throughput and displays the test Atlantic link, and hit 1 Tbps of Google Cloud Platform (GCP). on no occasion more than about 400 compute instance due to budget constraints, those links, in order to achieve maximum speed Both may be significantly higher in the AWS and Azure. The Transpacific contacts and South America, but also reached a plateau, showing that these links can barely reach 100 Gbps links on AWS and Azure, but in GCP, also reached about 1 Tbps of the observed peak certain ping along time is shown in Table 1&2.

Table 1: Showing the Peak observed throughput and ping times between Cloud regions Inside a commercial Cloud provider of endpoint in the USA West region

	Throughput	Ping
Amazon Web Services (AWS) USA East	440 Gbps	75 ms
Amazon Web Services (AWS) India	100 Gbps	124 ms
Amazon Web Services (AWS) Australia	65 Gbps	138 ms
Amazon Web Services (AWS) Brazil	80 Gbps	184 ms
Microsoft Azure USA East	190 Gbps	70 ms
Microsoft Azure India	110 Gbps	124 ms
Microsoft Azure Australia	88 Gbps	177 ms
Google Cloud Platform (GCP) USA East	1060 Gbps	68 ms
Google Cloud Platform (GCP) Taiwan	940 Gbps	119 ms

Table 2: Showing the Peak observed throughput and ping times between Cloud regions inside a commercial Cloud provider of endpoint in the USA East region.

	Throughput	Ping
Amazon Web Services (AWS) USA West	440 Gbps	75 ms
Amazon Web Services (AWS) Europe Union (EU)	460 Gbps	65 ms
Amazon Web Services (AWS) Brazil	90 Gbps	120 ms
Microsoft Azure USA West	190 Gbps	70 ms
Microsoft Azure Europe Union (EU)	185 Gbps	81 ms
Microsoft Azure Brazil	100 Gbps	118 ms
Google Cloud Platform (GCP) West	1060 Gbps	68 ms
Google Cloud Platform (GCP) EU	980 Gbps	93 ms

IV. RESOURCES NETWORK

A small number of inside the cloud computing provider of all the activities of the scientific community. Mobile Thus out of the cloud data is a normal part of any workflow in any scientific use the amount of commercial cloud resources. Therefore, we have started the characterization three major commercial network service providers and cloud node between the PRP.

4.1. Acquire Data from Cloud Computing Provider

In process increasingly popular cloud objects store to store data, due to its ease of use, Reliability and scalability. The Innovation out how fast data can be retrieved and therefore a top priority.it Explanation that the retrieval result data is calculated Cloud resource returned home institutions have similar characteristics, so the results from this part can be used as a proxy. Due to the limited number of Pacific Research Platform (PRP) hardware, we have designed these tests to measure from the performance management target cloud storage network transmission, to a single node In the PRP period of time. Even with a single client node, a plurality of concurrent.

Table 3: Showing Observed peak throughput while downloading data from Cloud-managed object storage into a single node in Pacific Research Platform (PRP)

	AWS West	Azure West	GCP West	AWS East	Azure East	GCP East
PRP USA West (California)	35 Gbps	27 Gbps	29 Gbps	23 Gbps	21 Gbps	26 Gbps
PRP USA Central (Illinois)	33 Gbps	27 Gbps	35 Gbps	35 Gbps	36 Gbps	36 Gbps



PRP USA East (Virginia)	36 Gbps	29 Gbps		36 Gbps	31 Gbps	
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4.2. Obtaining Data to the Cloud

The Most scientific applications have to come into an extraordinary amount of data to be calculated. Although the data can be arranged in advance to storage media near the computing resources in real time or just the flow of data acquired in time is often a preferred method, the flexibility and reducing the causes of complexity. To measure the performance of the operation mode Cloud According to calculations, we measured the cloud obtaining performance data from the calculation example Xrootd the server, the Open Science Grid (OSG), residing in the PRP hardware operation. Due to budget Limitations, we restrict these tests, AWS and Azure platform. Test setup is very similar to Section 3, can be used to access due xrootd HTTP protocol, so it looks very similar from one customer endpoint object storage. Examples of multiple cloud computing resources using the downloaded file

Table 4: Showing Observed peak throughput while downloading data from OSG-operated Xrootd services on PRP hardware into Cloud compute

	AWS West	Azure West	AWS East	Azure East
PRP West (USA California)	37 Gbps 34 ms	14 Gbps 32 ms	63 Gbps 63 ms	66 Gbps 58 ms
PRP Central (USA Illinois)	21 Gbps 71 ms	18 Gbps 45 ms	21 Gbps 19 ms	20 Gbps 67 ms
PRP East (USA Virginia)	21 Gbps 75 ms	20 Gbps 69 ms	23 Gbps 24 ms	23 Gbps 69 ms

4.3. Comparison of xrootd Grid FTP via HTTP obstruction

The Grid FTP has long been the main force of scientific data movement. But get most of Cloud storage operation is based on HTTP based tools, as already mentioned to switch to the alternate authentication protocol, we measured achievable Cloud instances of Grid FTP about a set of existing client process throughput Server and HTTP server on xrootd. In cooperation are in the same server process running hardware when reading from a single server to a single premise cloud instance, either xrootd not clear Grid FTP domination, along with winning some of Grid-FTP and xrootd win others over HTTP. Because the test run at different times, in sharing by sharing cloud resources and network links, some changes can be expected. Therefore, we Consider two methods of extracting data corresponds in essence performance.

V. THE COMMERCIAL CLOUD NETWORK COSTS

Unlike most on premise network cloud infrastructure, the network is in a billing entity Commercial cloud, the end user is accountable for any and all associated costs Mobile and data. To understand both the cost model itself, who is therefore important when the two end points with a different billing associated with the user? Fortunately, all major commercial cloud service providers have a very similar cost model, with Price between them is only slightly different. At a high level, network traffic can be divided four different categories:

- ✚ Network traffic, which is a cloud stay in the same area.
- ✚ The incoming network traffic, from any of the same cloud provider a cloud region or another from elsewhere, including the public Internet.
- ✚ Network traffic to leave the area to another area of the same cloud service provider.
- ✚ To leave the cloud network traffic to other destinations, including public the Internet.

The first two types of traffic, that is, all incoming traffic, has been free. Import data from the premise into cloud not incur any costs. For the purpose of these tests, we it has imported 30 TB of data, and did not charge anything.

The last two types of traffic is not the only billing, although at different rates. And the exact amount of cloud providers and between geographical areas affected slightly different, Traffic is typically priced between the inner region of the same cloud provider at \$ 10 and \$ 20 TB, traffic leaving a cloud provider's network in the \$ 50- \$ 90 usually charged Per TB.

Note that this means that any and all things related to cloud data export Stored in a different area or any of the outside world has been billing data, rather than Data consumers. However, the researchers do not need to pay any network charges.

Three Cloud service providers must place in agreement with the majority of research and academic institutions Give up 15% of the total cost of network monthly bill. This means that even Outgoing network is free, calculate the heaviest workload. To correct view, a GB cloud provider network leave approximately every 15 CPU hours waved Calculated every 30 minutes, or a method of using the V100 GPU.

VI. CONCLUSIONS

The main cloud service provider's network is what this Paper provides a snapshot of time, That AWS, Azure and GCP, and be able to show that the network is able to Inside and outside the region and to maintain high Different continents. More than 100 Gbps network speed is a common practice,



there are several 1 Tbps network test exceeds the aggregate throughput and on premise cloud service provider's snapshots between nodes of the network throughput Operation is also provided part of the Pacific Research Network. While this throughput generally not a big cloud to observe their own network, but still beyond what most network testing to 20 Gbps. That said, some of the routes have been misconfigured The initial testing found that, although they are very easy to solve, but it does indicate that the conventional network Cloud computing resources to test in this age of cloud is necessary. The cost of moving the data leaves the data cloud resources is certainly every Cloud users should be aware of, but such costs are typically not used for any computing problem Intensive workflows. The incoming traffic is free.

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