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Capacity-Management Discovery, Collection, Analysis and Data Transfer for the Cloud
Environment using a Fault-Tolerant and Scalable Proxy Solution

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Overview

This document describes a solution/system/algorithm for scalable and reliable capacity-
management discovery, collection and transfer using a dynamic proxy solution
administered by a central console. Proxies can be added/cloned to reduce the number of
physical and virtual systems collected at each individual proxy. Discovery is only
performed once at a single proxy. Discovered entities are distributed to multiple proxies.
The work of a non-functional proxy can be redistributed to the existing functional
proxies.

Background

Cloud Environments can consist of a very large number (100s-1000s) of physical systems
each of which running a large number (10s-100s) of virtual machines. Capacity
management deals with performance and throughput (load) of physical and virtual
systems. Discovery, data collection, and transfer of capacity-management data for the
cloud is challenging due to the large number of dynamic elements. A successful capacity-
management system must achieve the following objectives:
- The measurement must not impact what is being measured.
- It takes a small cloud to collect from a large cloud.
- The measurements must be made regardless of whether or not the physical and
  virtual machines are centrally managed.
- The measurement must not be impacted by outages of the collection infrastructure

The challenge is in achieving all of these objectives.

Solution

A Central Capacity-Management Console that controls a list of proxy servers to perform
discovery, collection, and transfer is an approach that effectively addresses the challenges
with achieving the aforementioned objectives. Discovery of Physical Entities is done via

a single proxy. Splitting up the discovered entities among the available proxies is done at the Central Console. Collection Requests for Capacity-Management Data for each proxy are sent from the single proxy. Each proxy issues collection requests independently of the Central Capacity-Management console. Each proxy persists the collected data. Data is sent back to the Central Console for further analysis and long term persistence.

Discovery of physical and virtual systems is executed against the first proxy server on the list. The proxy host contacts either a Central Management Cloud Console (Figure 1) or each individual physical and/or virtual element (Figure 2). If the first proxy is non-functional, the next valid proxy is used. A list of all valid proxies are validated to make sure they are available and configured for collection. The list of valid discovered entities is divided among the available proxies.

The discovery and collection approach insures scalability and reliability regardless of whether or not systems are centrally managed. Spreading out the collection among multiple proxies ensures that the measurement does not impact what is being measured. The ability to distribute the work among multiple proxy hosts ensures reliable data collection. If one or more proxy collection host is down, work is distributed to working proxies.

The collection request is sent to each proxy host with the following:
- List of physical and/or virtual hosts
- Start time
- End time

If the proxy is configured to collect from a central cloud management console (Figure 1), the data is collected from cloud management console. If the proxy is configured to collect from each individual physical and/or virtual host, the data collected data is collected from each individual element (Figure 2). The collected data is persisted on each proxy host for the duration of the collection request. Additional processing may be performed on the collected data and persisted.

After the collection duration has expired, the Collection Central Console issues a data transfer request to each collection proxy host. The persisted data is transferred back to the console and deleted from the proxy. The persistence of data on each proxy ensures scalable data-collection methodology that would not overwhelm the console managing the collection. Data on each console has an expiration date. If data is not transferred by the expiration date, it is deleted. The data expiration on each proxy ensures reliable data collection that will not fill up the available storage at each proxy host.
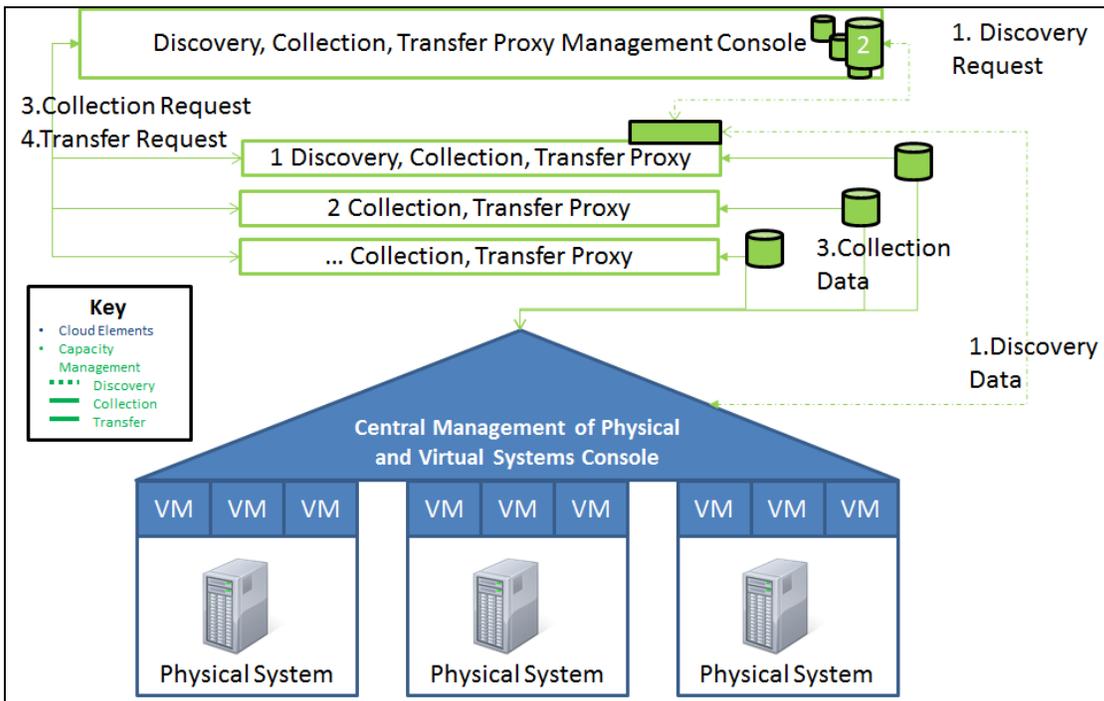
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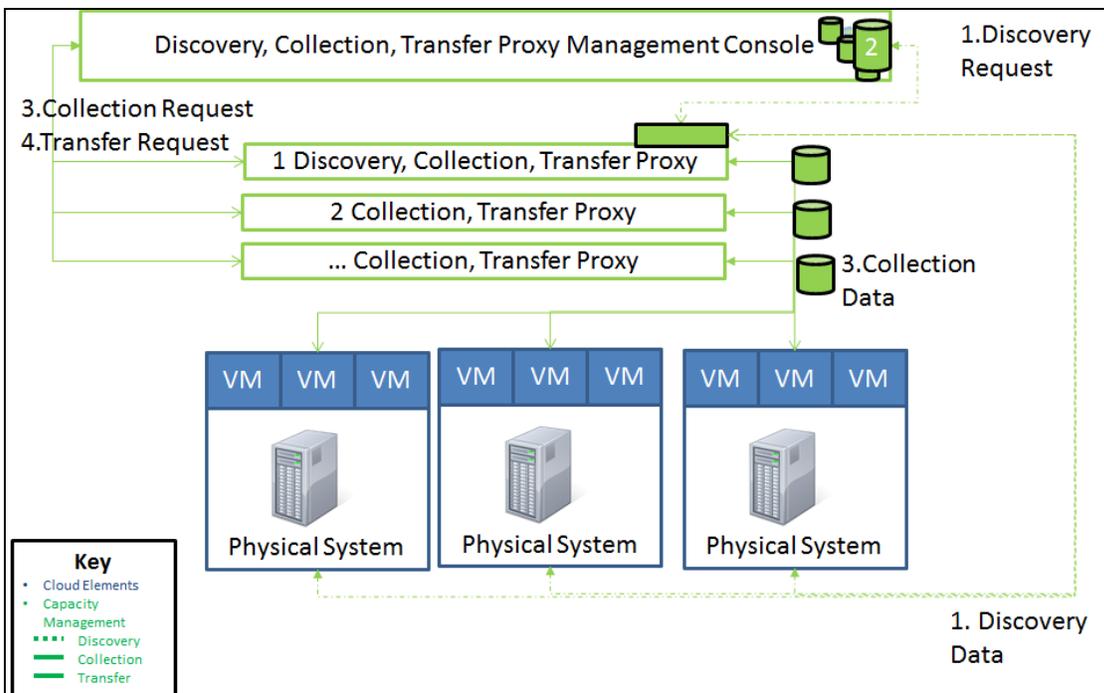

Figure 1: Centrally Managed Cloud Environment Diagram

Figure 2: Non-Centrally Managed Cloud Environment Diagram