AGILE
STORAGE

REFERENCE

ARCHITECTURE

STORAGE ARCHITECTURE FOR DEVOPS TEAMS

CITRIX PLATFORM

Executive Summary

For any company, Developer productivity is critical. For hardware and software companies, however, Developer productivity is paramount. Yet lack of adequate storage performance and storage backup reliability can easily restrict the entire development organization. Since predictable and reliable storage performance is a key feature of AGILESTORAGE's architecture, companies with development organizations have been requesting a reference architecture that can handle the needs of multiple development departments on a single physical storage array.

This document outlines a reference architecture that is based on a Citrix virtualization architecture composed of Citrix CloudPlatform, CloudStack, and XenServer. The hardware architecture can be a wide range of x86 server blades attached to JBOD enclosures via direct SAS connect. Storage, even for multiple departments, for around 200 VMs can begin with a modest number (around a dozen) SAS drives. As the x86 server blades are configured in a High Availability layout, Developers can expect high reliability and availability. As workload ramps, performance can be increased non--disruptively simply by adding more SSD drives for caching and by adding more components to the existing configuration.

In summary, this reference architecture provides the following benefits:

Development Cycle Accelerated

The productivity of each Developer is significantly enhanced through consistent, predictable development process execution. Further, by eliminating the possibility that a single "noisy neighbor" development operation such as a build would compromise an entire storage array and by adjusting storage resources "on the fly" to respond to development needs, Developer team and department productivity is maximized. Taken as a whole, AGILESTORAGE helps accelerate the overall development cycle.

Very high VM density

On just a handful of physical drives, this reference architecture supports approximately 200 development Virtual Machines. This very high VM density is a highly cost-efficient solution for a development team or for an entire development organization with multiple departments and/or development teams.

Developer Code Protection

With backup granularity at the VM level, critical development work is better protected at the VM level than ever before. As backups are VM-consistent and aligned with the server VM, AGILESTORAGE ensures that precious development work is protected and that rollbacks are convenient.

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Design Objectives

Typically, the Developers IT team will provide infrastructure to multiple internal departments for their development and test environments. This leads to the following issues with existing storage architectures:

Noisy Neighbors

To avoid a single "noisy neighbor" development run (such as a compilation of a release) slowing down all development, each department typically requests a dedicated storage array.

Quality of Service

Yet, even within a department dedicated array, a single development run could consume the array's resources and slow down other development jobs.

Agility of Storage

While storage workload demands vary greatly based on the development cycle, legacy storage arrays are not dynamically reconfigurable and therefore have slow overall workcycles.

Data Availability

As the granularity of legacy storage arrays are typically at the volume or LUN level, VM-consistent backups are not reliably attainable. This exposes critical development work to potential loss in the event of a disaster or need for a code rollback.
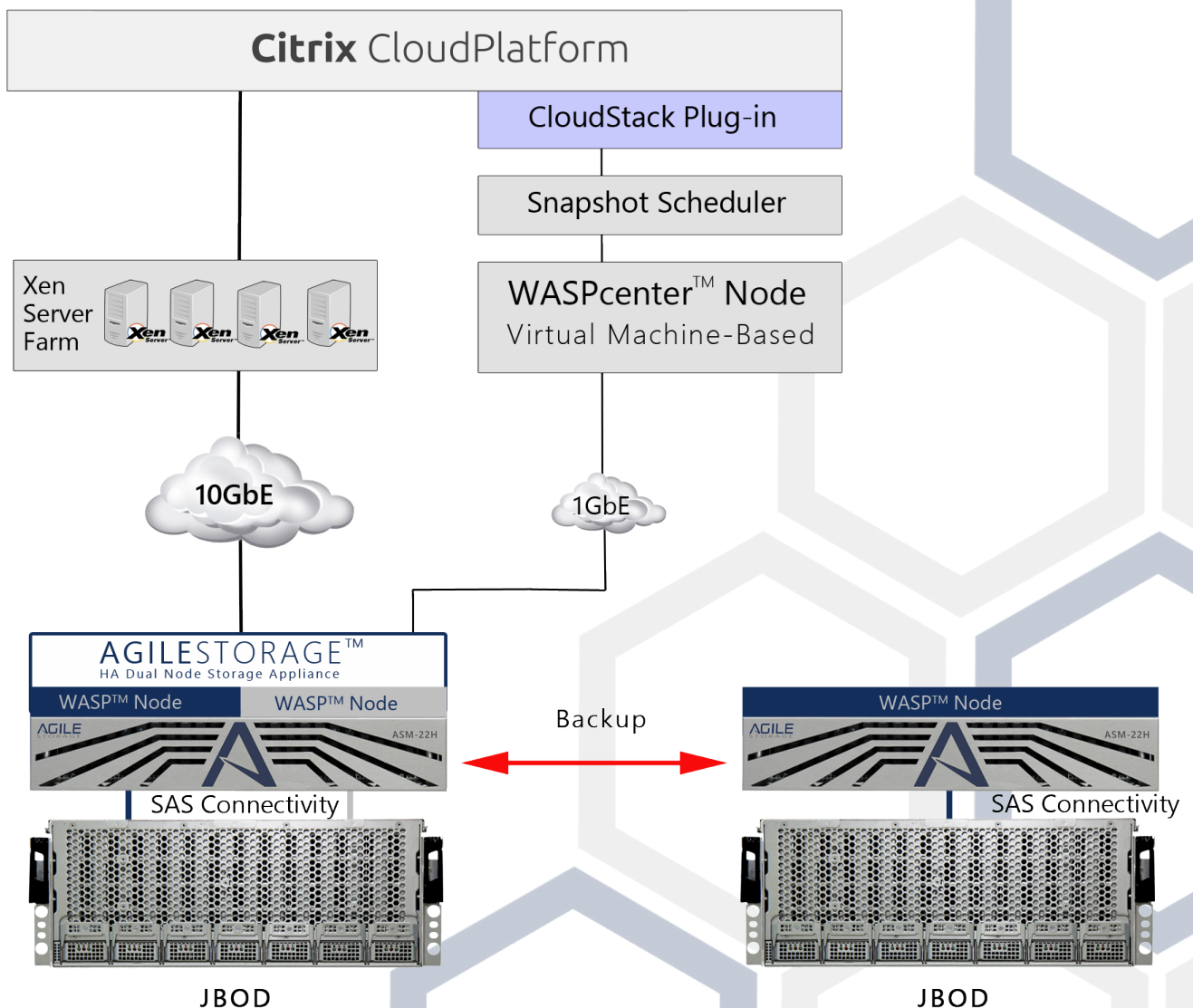
Solution Architecture

Overview

Running on commodity hardware, AGILESTORAGE products are the perfect fit for development private clouds. With AGILESTORAGE, IT teams can provide a multi-tenant shared storage infrastructure with guaranteed performance, VM consistent backups, and flexible provisioning options tailored to each of their internal customers developer departments.

From a hardware perspective, AGILESTORAGE storage nodes run on standard x86 server blades. A WASPcenter™ management node can run on a standard x86 server blade or in a Virtual Machine. Storage JBODs are attached to the server blades via standard SAS cables. The primary and backup JBODs each contain a total of only 12 physical drives. Standard Ethernet switching is used to interconnect among all components.

From a software perspective, there is seamless compatibility with the Citrix CloudPlatform framework, Cloud Stack, and the Citrix XenServer virtualization platform. Requests for VM snapshots are made from the CloudPlatform framework via the AGILESTORAGE CloudStack Plug-in to the ElastiCenter management system. Storage requests for each VM are made from Citrix XenServer and then relayed via the CloudPlatform to ElastiCenter.

This configuration is laid out in the diagram below.

Developer specific Functionality

This reference architecture provides the following major functionality and features of primary significance to development teams:

High VM density: The storage requirements of multiple development departments (approximately 200 VMs) can be met from a single platform with around a dozen physical drives.

VM- consistent Backups: One key capability of AGILESTORAGE is granularity of backups by Virtual Storage Machine (VSM). Each VSM's backup parameters (hourly, daily, etc.) can be specified independently of others. When aligned with a corresponding Development Virtual Machine, this provides Developers with the capability to roll back to any previous version. This ensures that critical development productivity is maximized.

Discrete virtual arrays: The solution provides storage isolation among departments both for compiler job integrity and for security.

Operational Functionality

This reference architecture provides the following major functionality and features that enhance operational convenience and reduce operational cost:

Empowered IT: IT teams are able to access all management functionality including performance analytics via AGILESTORAGE's easy to use GUI called WASPcenter.

Flexible provisioning: Administrators can dynamically provision IOPS, throughput and latency for any development process or testing workload.

Self Service: Developers can also safely adjust some storage parameters themselves. This self-service model enables the IT team to focus on overall system planning and performance.

Core Storage Functionality

This reference architecture provides the following major core storage functionality and features:

Storage Resilience: With VM-consistent snapshots, replication to a backup array, and protection against data corruption, this reference architecture meets the resiliency requirements of IT teams. This solution utilizes CloudByte asynchronous replication to maintain a disaster recovery ElastiStor node separate from the production node. Should a disaster strike the primary node, then the backup node can easily be put into production, thereby avoiding disruption to critical development work.

Full storage functionality: Enterprise grade storage functionality such as RAID, compression, and protection against data corruption are provided.

Flexible Scalability: The solution provides the ability to scale capacity (via adding JBODs and drives) and performance (adding more WASP™ controller nodes) independently.

No vendor lock-in: Performance and capacity can be independently scaled with industry standard hardware. With AGILESTORAGE, resources can be seamlessly added to an existing storage array in a non-disruptive manner.

HA Dual Node Storage Appliance

AGILESTORAGE High Availability Dual Node Appliances can be configured in a variety of ways:

Active / Active: In the event of a failure, the load is served by the remaining active nodode. This configuration ensures storage service availability if one node fails. In this configuration, performance can be impacted by a node failure. Depending on the overall load, performance may not be impacted even at a node failure.

Active / Passive: In this configuration, one node is on standby until the primary node fails. Then, the active node's load fails over to the passive node. Performance is typically not impacted by a node failure.

Active / Active Group: Up to four nodes can be configured to carry load. In the event of a failure, the load is distributed among the remaining active nodes. This configuration can offer protection against even three node failures. In this configuration, performance is typically not impacted by a single failure. Depending on the overall load, performance may not be impacted by up to three node failures.

For this reference architecture, two controllers will be configured in an Active / Active pair. As the total estimated controller load is minimal, on node will handle the workload. This provides very good protection against the failure of a single storage node. Further, there is significant headroom for growth in terms of VMs and in storage capacity.

Control and Data Traffic

In this configuration, AGILESTORAGE control and data traffic flows over separate paths:

- Control traffic flows over 1 Gigabit Ethernet links
- Data traffic flows over 10 Gigabit Ethernet links

Since control traffic does not consume any data bandwidth, this configuration maximizes performance and throughput for data traffic. Further, by using lower-capacity links for control traffic, cost is minimized.

WASP™ Software Components

Citirix Specific Component

WASP plugins provide integration and interoperation with virtualization environments and cloud stacks.

Apache CloudStack™ Plugin: This allows storage provisioning and management in real time right from CloudStack and/or Citrix CloudPlatform.

AGILESTORAGE WASP™ OS

WASP™ is AGILESTORAGE's fully featured storage operating system. It enables dynamically selectable performance to each application or VSM as well as continuously realtime monitoring. Based on WASP's embedded analytics capabilities, application performance needs can be adjusted dynamically by the administrator for highest agility and ultimate flexibility. AGILESTORAGE WASP™ leverages the Zettabyte File System (ZFS) hybrid storage pool providing unified storage for file, block. This technology eliminates storage silos and enables almost limitless scale-out growth.

AGILESTORAGE appliances are built on industry standard x86 hardware, which massively cuts storage hardware costs. WASP™ empowers SMB to Enterprises and Service Providers getting ahead of data growth and increase hardware utilization dramatically by defining the exact performance needed for each application.

WASPcenter™

WASPcenter™ is a web-based centralized management framework for distributed storage deployments. It simplifiesmanagement of worldwide storage environments and scales from a single site to many geographically dispersed clusters.

WASPcenter™ enables the definition of minimum selectable performance levels across Datacenters and allows allocation of excess cycles to particular applications and provides efficient setup, customization, and tuning, all from a single interface. Also delegated admin feature is available which enables any organization to move authority for changes and updates close to the groups or customers that need support.

BENEFITS

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About AGILESTORAGE

Targeted to the needs of SMB Enterprises Service private and public Cloud AGILESTORAGE products deliver leading edge storage agility through dynamically selectable performance down to the application and/or tenant level. Providing unified storage for block, file, multi-cloud and object-stor. AGILESTORAGE eliminates expensive and inefficient storage silos.

AGILESTORAGE provides seemless scale out growth from samall singlesite to distributed multi PB cloud environments without disruption. Established in 2018 and managed by technology and sales executives from companies such as HP, NetApp, DataDomain, and EMC[2].

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