



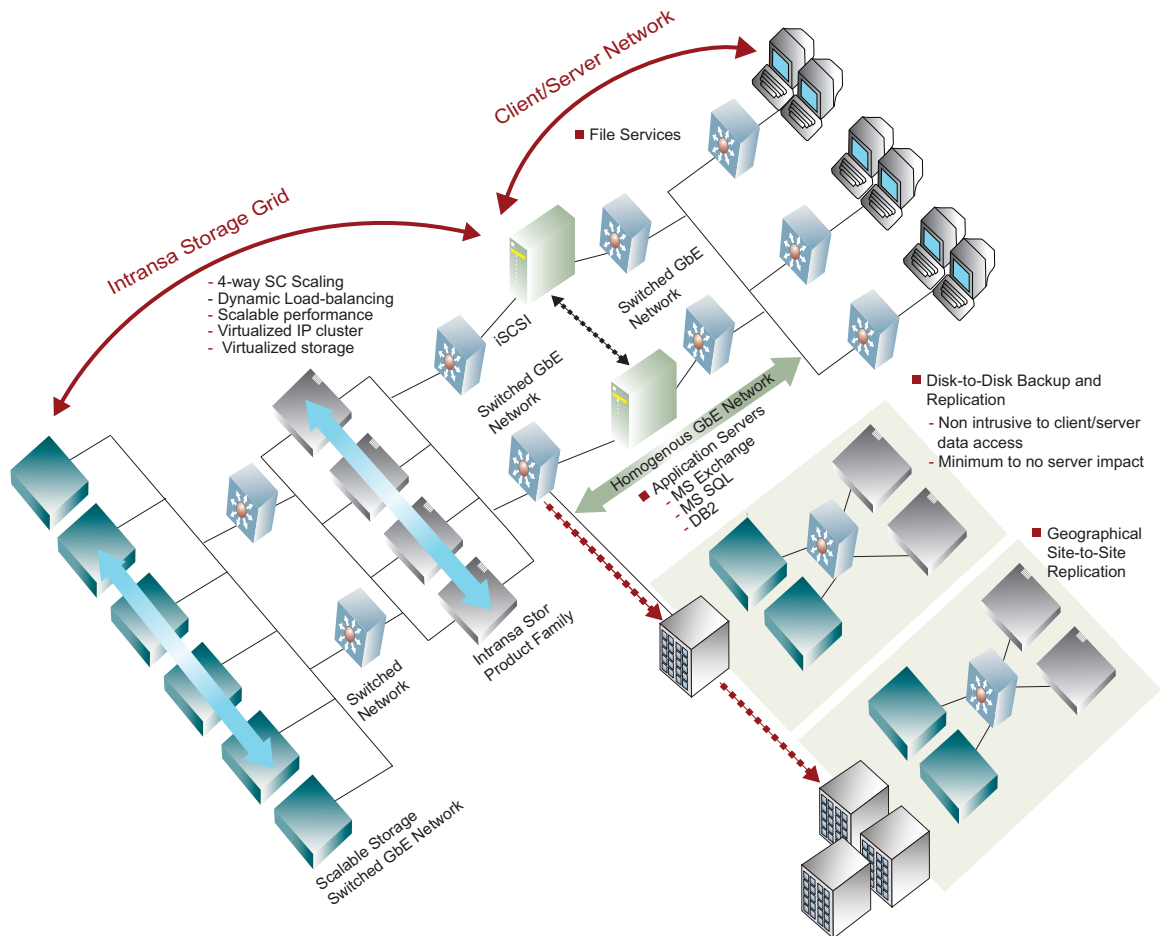
Intransa StorStac Architectural Overview

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White Paper

The Intransa StorStac Storage System Architecture – An Overview

Intransa delivers a scalable Storage Network solution by leveraging existing Ethernet and IP network infrastructure, and extending the architecture into independently scalable performance and capacity Storage. Thus a scalable, and flexible, infrastructure, with Ethernet and IP as the base technology, is created. Using a tiered network approach a scalable storage can be built, similar to the way that organizations build client/server networks.



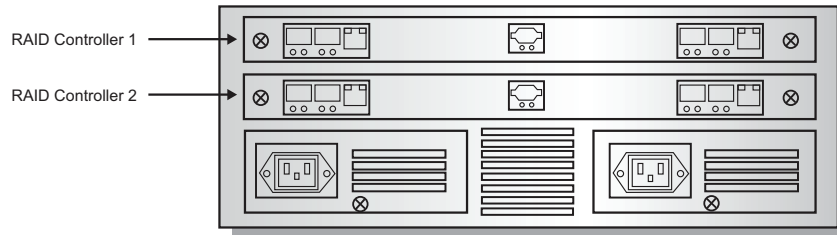
Intransa's independently Scalable Storage Architecture

Intransa implements a separation-of-function storage array architecture in which there are dedicated hardware resources that provide dedicated functionality. In order for the benefits of the architecture to be seen, one needs to examine traditional storage array architecture.

Traditional Storage Array Architecture:

The traditional storage array houses all functionality (RAID and disks) in a single enclosure. The storage arrays consist of an enclosure, supporting a certain number of disk drives, and either a single or dual RAID controller. The RAID controllers present the disks in the array as volumes (LUN's) to a host computer (application server) that connects via Ethernet (iSCSI protocol) or Fibre Channel (FC) ports on the storage array.

Storage Array – RAID Controller(s) and Disk Drives

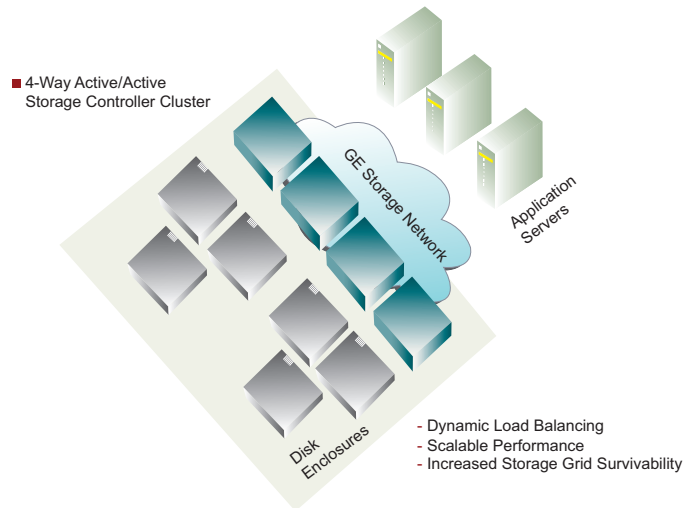


Each controller in the array is normally responsible for half the disks in the array, and should one controller in the array fail; the surviving RAID controller assumes all responsibility and ownership of all the disks/volumes in the array. If one controller fails, the surviving controller must assume 100 percent of the load on the storage array, resulting in performance degradation due to load on the RAID controller.

Intrinsa StorStac System Separation-of-Function Architecture

Intrinsa has separated the functionality of the traditional storage array into two (2) discrete components:

Intrinsa Architecture – Separation-of-Function



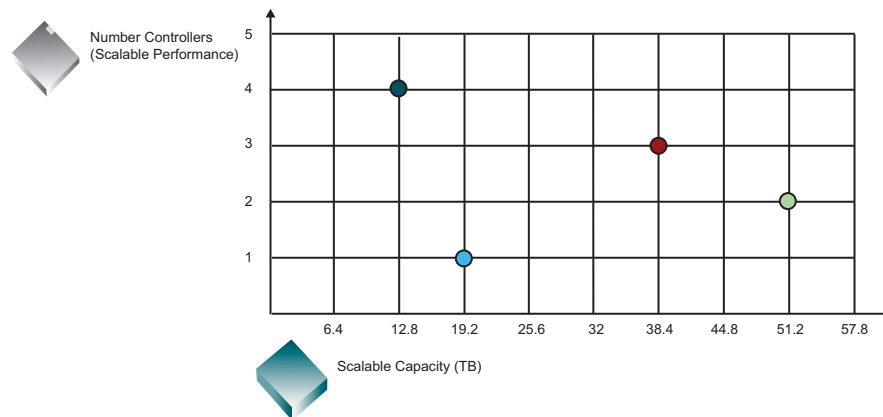
Performance Controller Unit (PCU)

- A 1U Performance controller Unit provides RAID functionality to the storage arrays (Storage Capacity Enclosures) that connect to the PCUs
- The PCU provides Ethernet connectivity to the application server(s) as well as Ethernet connectivity to the storage arrays
- The PCU supports the iSCSI protocol for both application server and storage array connectivity
- The PCU can be scaled up to four (4) in an active cluster

Storage Capacity Enclosure (SCE)

- A 3U disk enclosure houses the disk drives
- The Intransa disk enclosure does not contain any RAID controllers – the SCE's only contain the disk drives and the Ethernet interfaces that connect back to the PCU's
- 3rd party iSCSI storage arrays may be connected to the Intransa PCU's enabling the 3rd party arrays to take advantage of the scalability that Intransa provides in its PCU's

The separation-of-function architecture provides Intransa with the ability to deliver a multidimensional model that allows performance (PCU's) to be scaled independently of the capacity (SCE's) of the storage grid. The end result is that Intransa empowers organizations to build an independently scalable storage solution that meets their business and application needs.



Benefits of the Intransa Architecture

Separating the RAID controller functionality from the storage array allows Intransa to deliver an independently scalable storage solution that employs a cluster of up to a four (4) Performance Controller Units in a clustered solution/architecture. The benefits of the 4-way storage controller cluster means that organizations are able to implement:

4-way Performance Controller Unit scaling

- Provides a scalable performance solution
- The aggregate performance (throughput) of the cluster is increased by adding additional PCU's to the cluster

Dynamic load balancing across the 4-way Performance controller Unit cluster

- The load from the application servers is dynamically load balanced across all the PCU's in the StorStac System
- A single PCU is not loaded down with requests – requests are distributed across the entire controller cluster

Virtualized Performance controller Unit

- All PCUs in the 4-way cluster are addressed, and known by, a single, virtualized IP address to the application servers

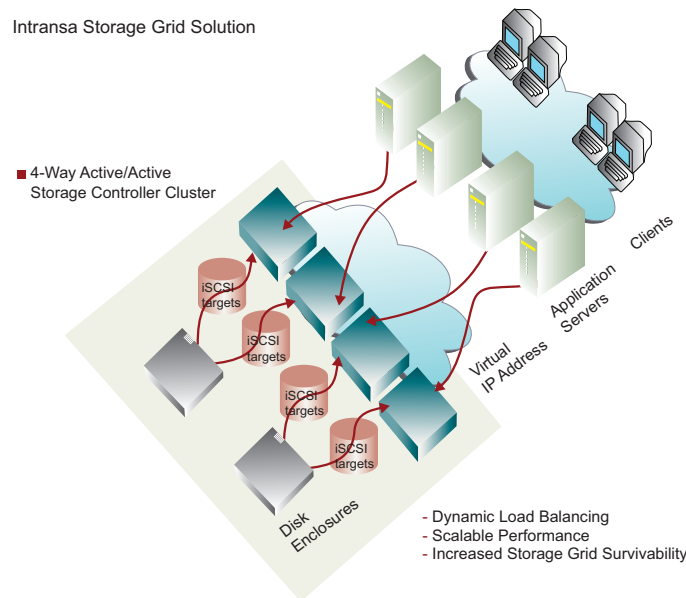
Storage virtualization

- All storage (Storage Capacity Enclosure) behind the controller (PCU) cluster is virtualized across the cluster
- Storage can be added to the grid independently of the controllers
- As storage is added to the grid, the new storage is also virtualized across the grid
- All storage arrays in the grid benefit from the scaling of the storage controllers
- Leading to storage consolidation and effective use of all storage in the storage grid

Increase the survivability of the storage grid

- As a result of 4-way controller clustering, and dynamic load balancing, should a controller in the cluster fail, the impact of the failure is far less than in the traditional environment
- Should a controller fail, the load of the failed controller (roughly 25% of the cluster load), is dynamically re-distributed across all remaining PCU's in the 4-way cluster – no single PCU is impacted as a result the failure of a single PCU
- The 4-way controller cluster is able to withstand multiple failures and still continue to deliver service to the application servers. Three (3) out of the four (4) controllers can fail, and service still provides access to the application servers

Intrinsa Storage Grid Solution



Benefits of Leveraging Existing Ethernet/IP Infrastructure

A major benefit that Intrinsa offers is the ability to leverage organizations' existing Ethernet and IP network infrastructure. The Intrinsa PCU can provide advanced functionality such as asynchronous replication (AR) that can use the existing infrastructure without requiring any additional or separate data circuits for the functionality.

The Intrinsa Asynchronous Replication (StorAR) service provides asynchronous replication at the PCU level – replication that is totally transparent to the application servers. Because the PCU's communicate over the Ethernet/IP network, the PCU's can replicate the data to any location, worldwide, that has IP connectivity and an PCU. Benefits include:

Reduced cost

- No requirement to have a separate replication circuit or dark fiber between locations
- Ability to implement a converged network infrastructure for data, voice, and storage

