EMC: The Virtual Data Center

Cisco Expo 2008

Dejan Živanović
EMC Technology Solution Group
Sr. Technology Consultant
High-End platforms & Business Continuity

Business Challenges

- Data growing at 70% annually
  - 80% are files
- Data migrations consume time
  - Independent study of 250 companies
    - 40% say migrations involve more than 5 people
    - 60% say data is migrated weekly, monthly, or end of lease period
    - 82% say migrations performed at night or on weekends to avoid downtime
    - 60% spend more than 2 weeks planning for data migration

      Source: CeBIT
  - Delays effective use of newly purchased storage
- New applications, new versions
- Consolidation, rapid deployment, flexible infrastructures, complexity, costs, and quality of service
- Hardware underutilized or over utilized

Virtualization is not an option, it is a requirement

The IT Infrastructure World is Changing

from
Platform-centric

Static

Procedural

Physical resources

Framework management

to
Service-oriented

Dynamic

Web-based / Orchestration

Virtual environments

Model-based management

Defining Virtualization

Virtualization:

Technology that enables logical representations of physical resources

Virtual Memory
Each application sees its own logical memory, independent of the physical memory

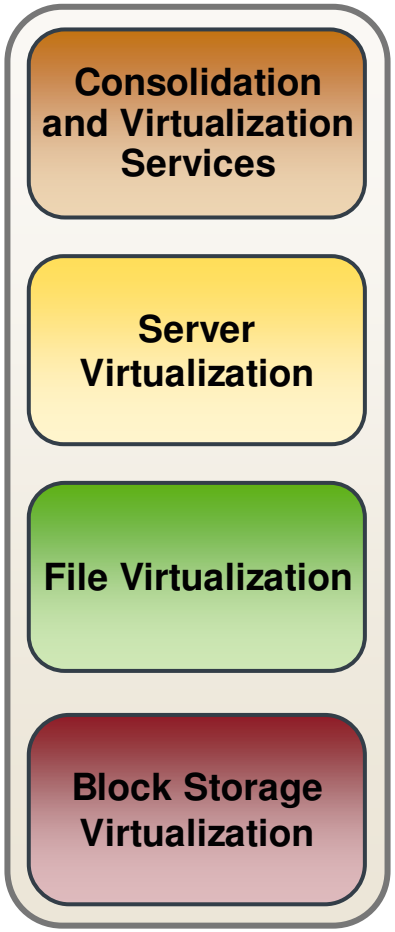
Virtual Networks
Each application sees its own logical network, independent of the physical network

Virtual Servers
Each application sees its own logical server, independent of the physical servers

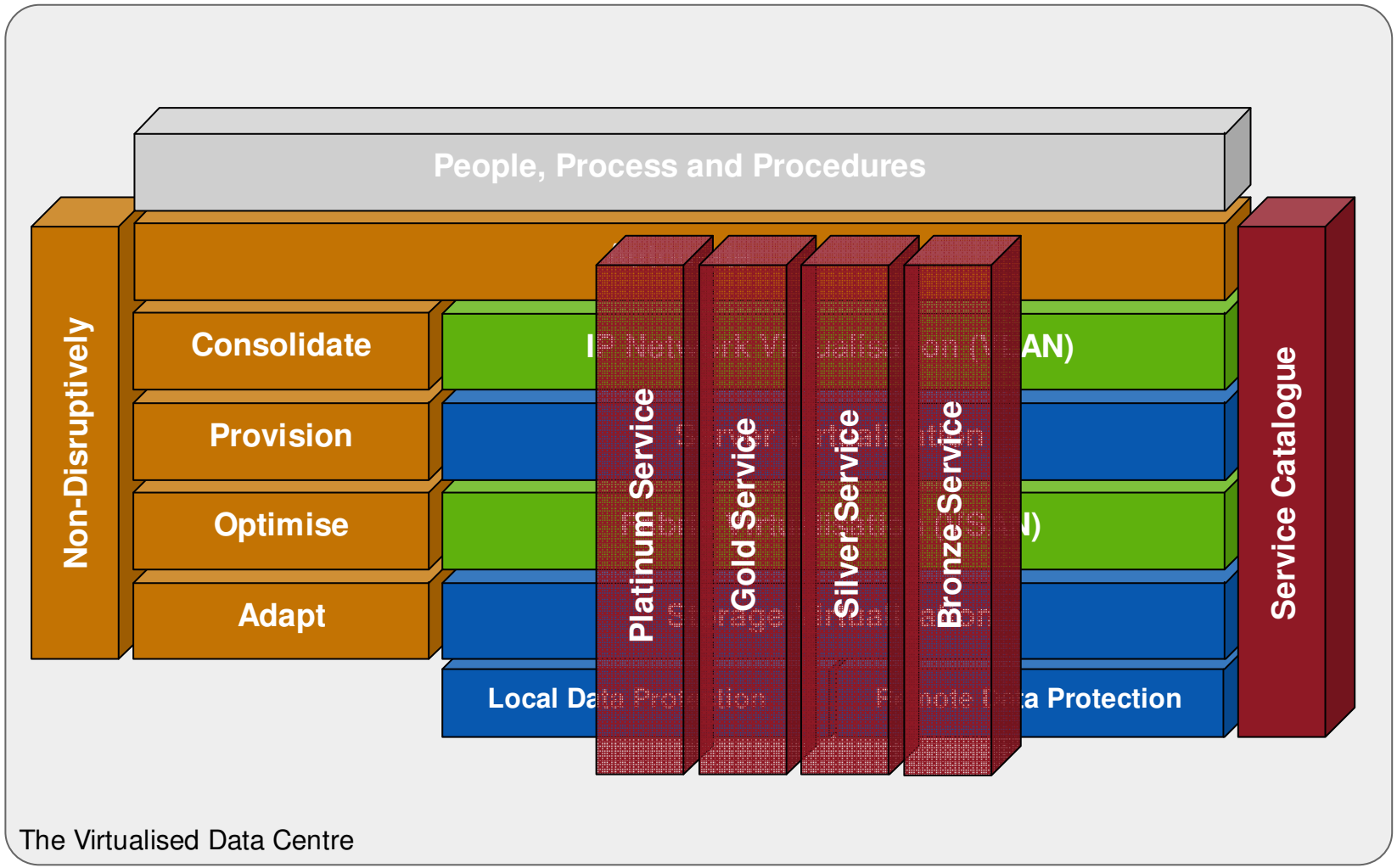
Virtual Storage
Each application sees its own logical volume, independent of the physical disks

EMC's Comprehensive Four Element Virtualization Approach

- Services
  - Design to achieve specific requirements
  - Complete plan, build, and manage support
  - Infrastructure approach that extends the virtualization benefits
- Server (VMware)
  - Lower server costs and operational efficiencies
  - Increased flexibility and availability for servers and applications
  - Speed of provisioning
- File (Rainfinity GFV)
  - Increased NAS flexibility and availability
  - Reduces storage and storage management costs
- Block (EMC Invista)
  - Increased SAN flexibility and availability
  - Non-disruptive migration

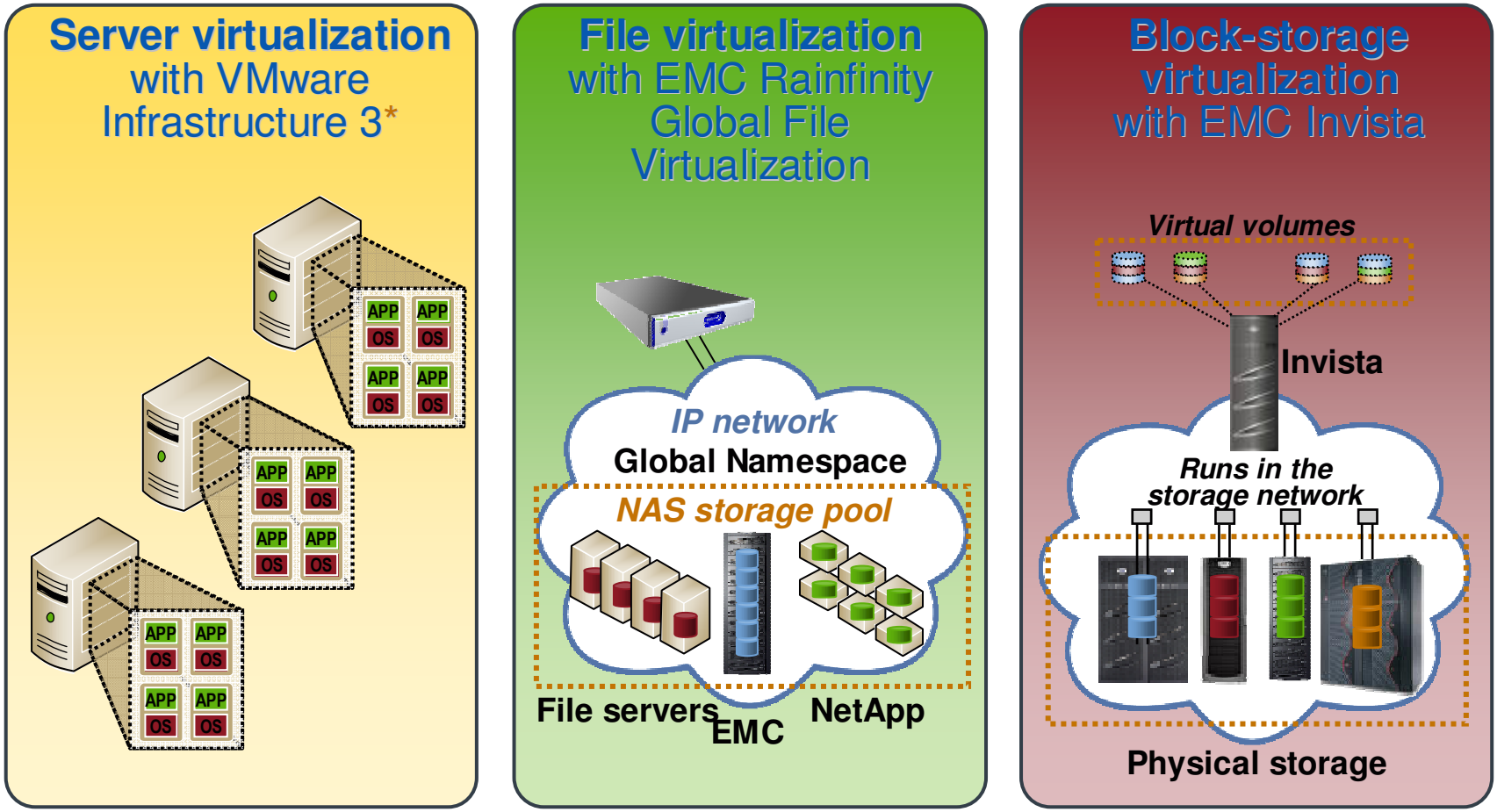


Requirements and Components of the Next Generation Data Centre



The Virtualised Data Centre

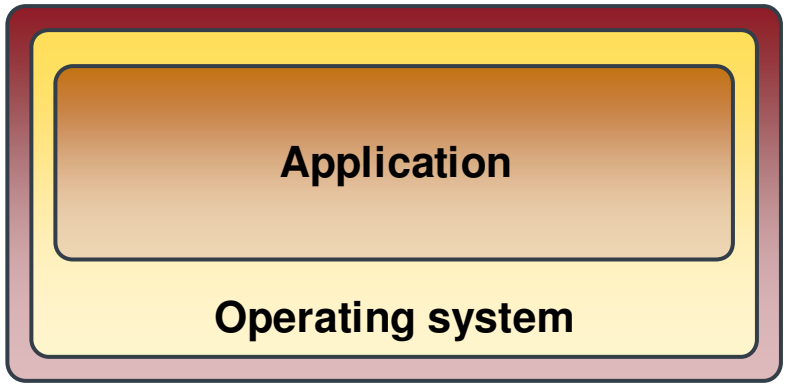
EMC Virtualization Technologies



*Formerly ESX Server

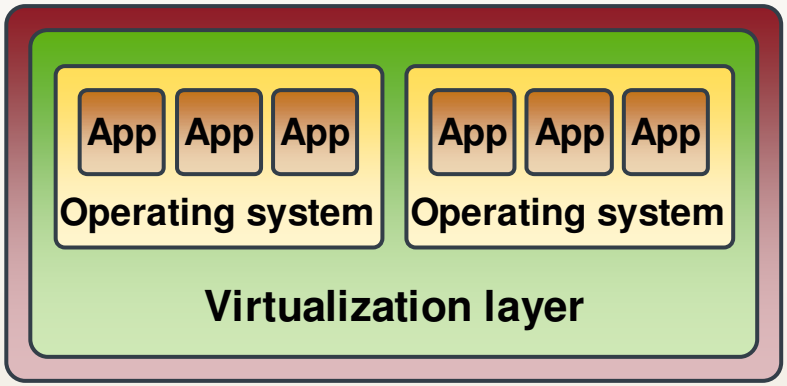
VMware – Server Virtualization Basics

Before Server Virtualization:



- Single operating system image per machine
- Software and hardware tightly coupled
- Running multiple applications on same machine often creates conflict
- Underutilized resources

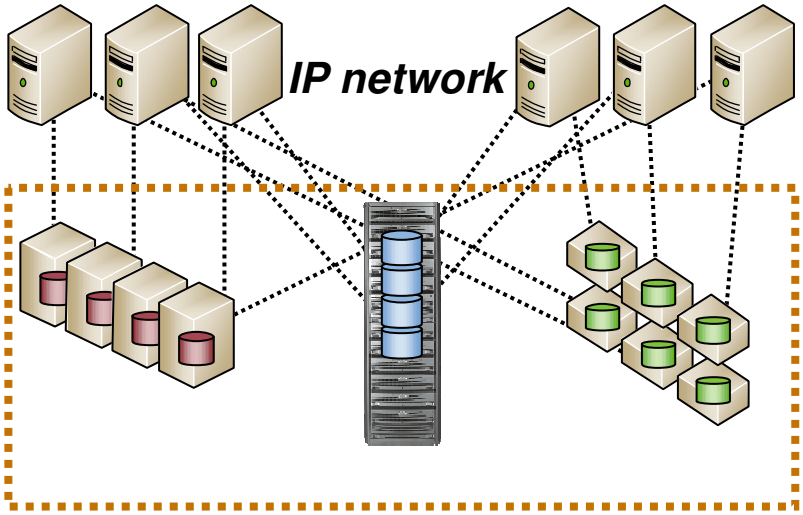
After Server Virtualization:



- Virtual Machines (VMs) break dependencies between operating system and hardware
- Manage operating system and application as single unit by encapsulating them into VMs
- Strong fault and security isolation
- Hardware-independent: They can be provisioned anywhere

File-Level Virtualization Basics

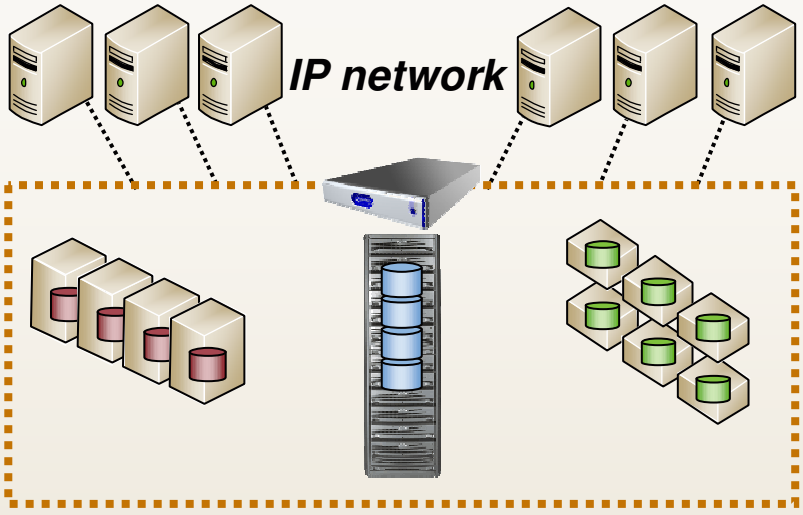
Before File-Level Virtualization



NAS devices/platforms

- Every NAS device is an independent entity physically and logically
- Underutilized storage resources
- Downtime caused by data migrations

After File-Level Virtualization



NAS devices/platforms

- **Break dependencies** between end-user access and data location
- Storage utilization is optimized
- Non-disruptive migrations

Rainfinity Global File Virtualization

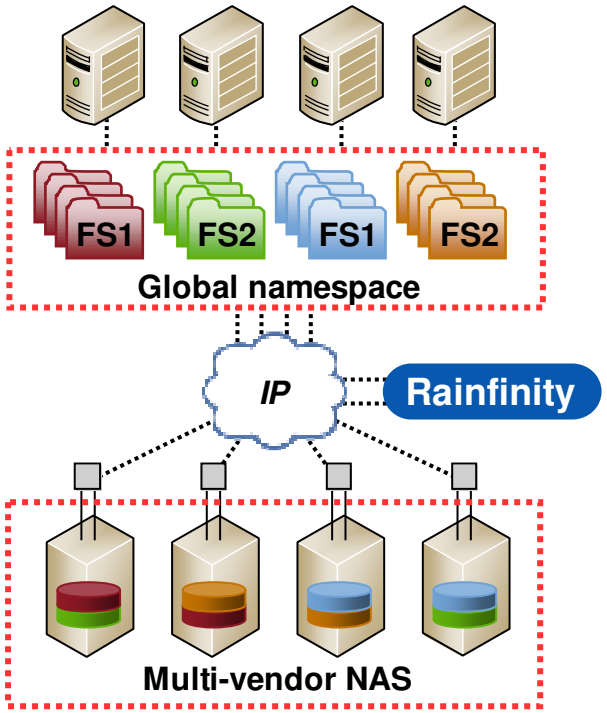
Optimize NAS Devices while Increasing Service Levels

Typical Customer Pain Points

- File servers/NAS device utilization
  - Over-utilization affects performance—under-utilization costs money
- Protecting critical files
  - Are they included in information protection strategy
- Migrations are complex
  - Can be disruptive and time-consuming

EMC Rainfinity Value

- Minimizes system and network bottlenecks
  - Identifies poor utilization and enables rebalancing
  - Integrates file archiving with virtualization
- Simplifies and eliminates disruption during migrations/tech refreshes
  - Provides non-disruptive read/write
- Cost-effectively protect critical files
  - Synchronous file replication over IP networks



EMC Rainfinity Advantages

Standards-based architecture supports heterogeneous, multi-vendor environments

Integrated applications to identify and optimize utilization and performance

Enterprise scalable architecture

Optimizes Network Storage Capacity

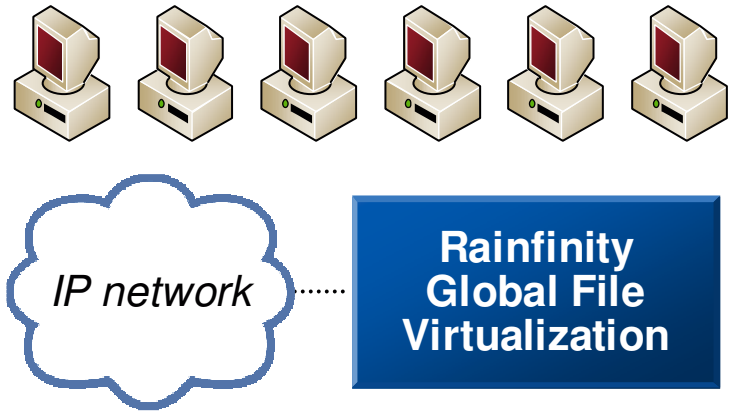
Identifies and Rebalances Poor Utilization

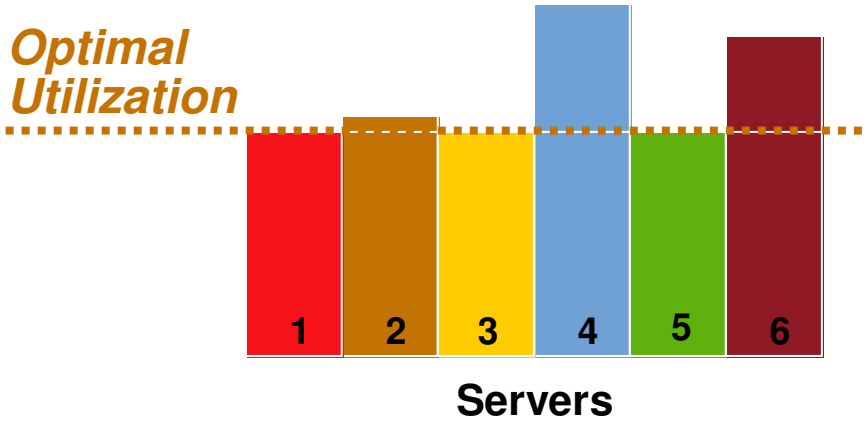
Before:

- Too many servers
  - Buying more servers for additional storage
- Poor resource utilization
  - Overutilization affects performance
  - Underutilization costs money

After:

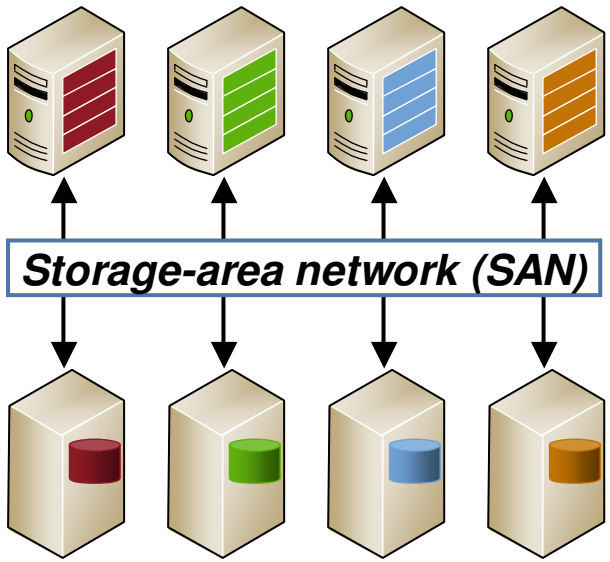
- Identifies areas of poor resource utilization
- Rebalances capacity
- No need to buy more servers for additional storage





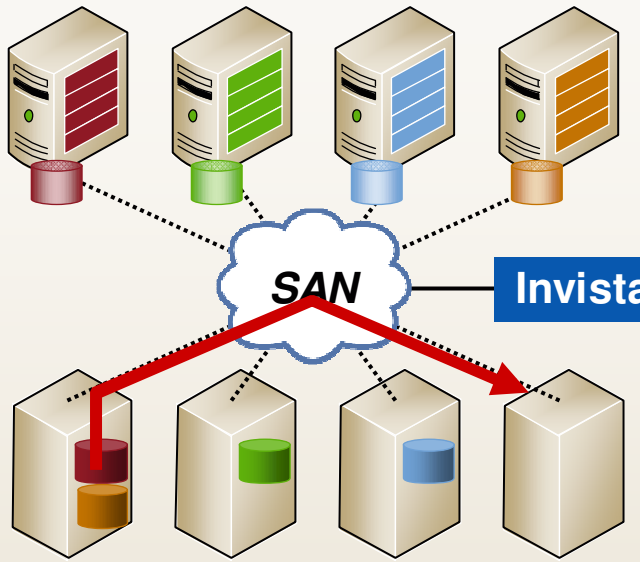
Block-Storage Virtualization Basics

Before



All applications have direct knowledge of storage location

After



- ✓ Simplify volume access
- ✓ Nondisruptive mobility
- ✓ Optimize resources

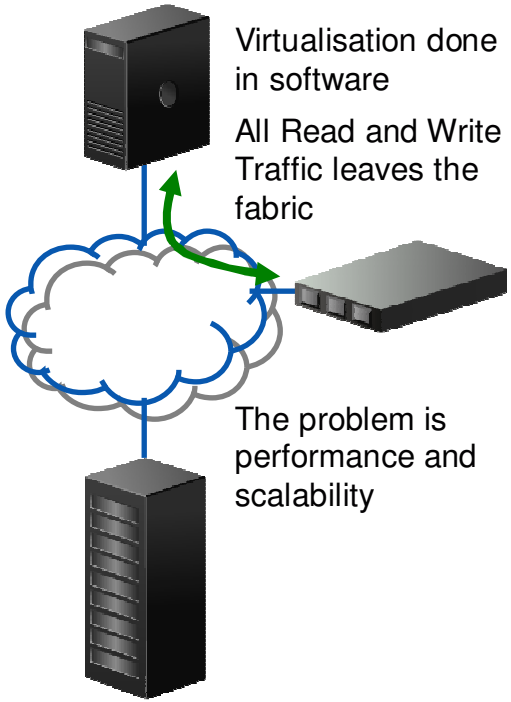
EMC Invista – A 2nd Generation Virtualisation Solution

1st Generation RAID

Parity calculations done in software

The problem was performance and scalability

1st Generation Virtualisation

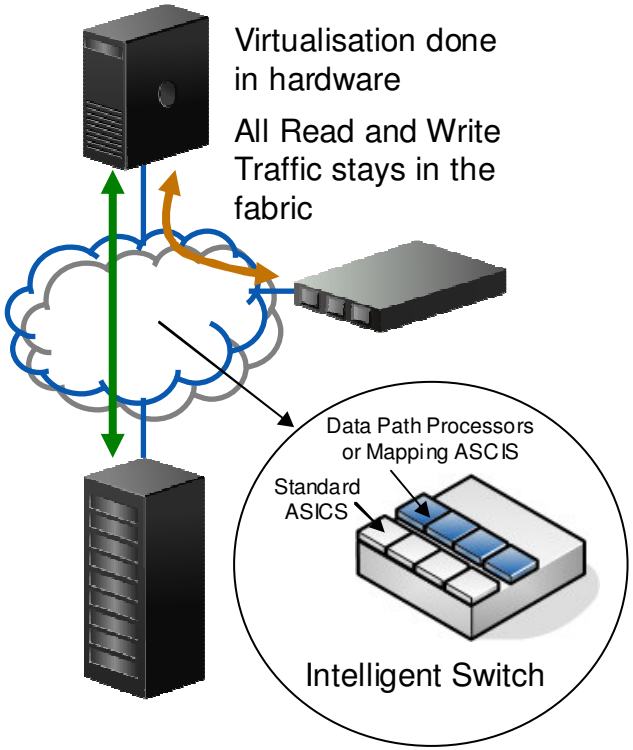


Virtualisation done in software

All Read and Write Traffic leaves the fabric

The problem is performance and scalability

2nd Generation Virtualisation



Virtualisation done in hardware

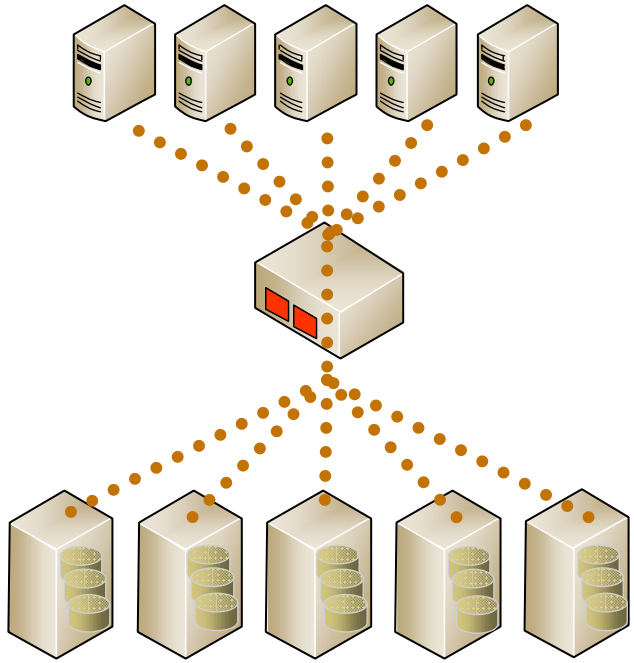
All Read and Write Traffic stays in the fabric

Simplified Fibre Channel Frame

The Network is the Right Place for Storage Virtualization

Appliance and Controller Virtualization

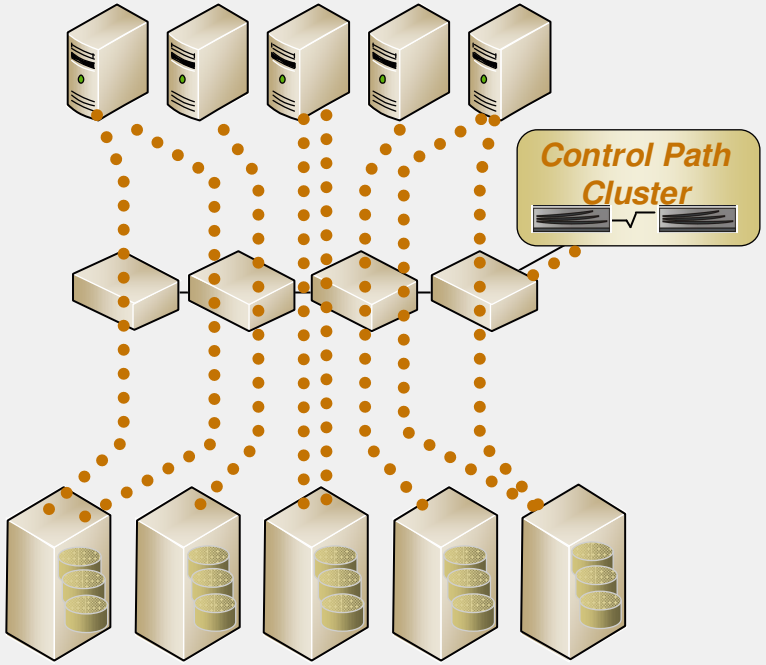
In-Band



- State/cache introduces data integrity risk
- Increased I/O latency
- Limited fabric ports
- Limited performance

Network Virtualization

Split-Path

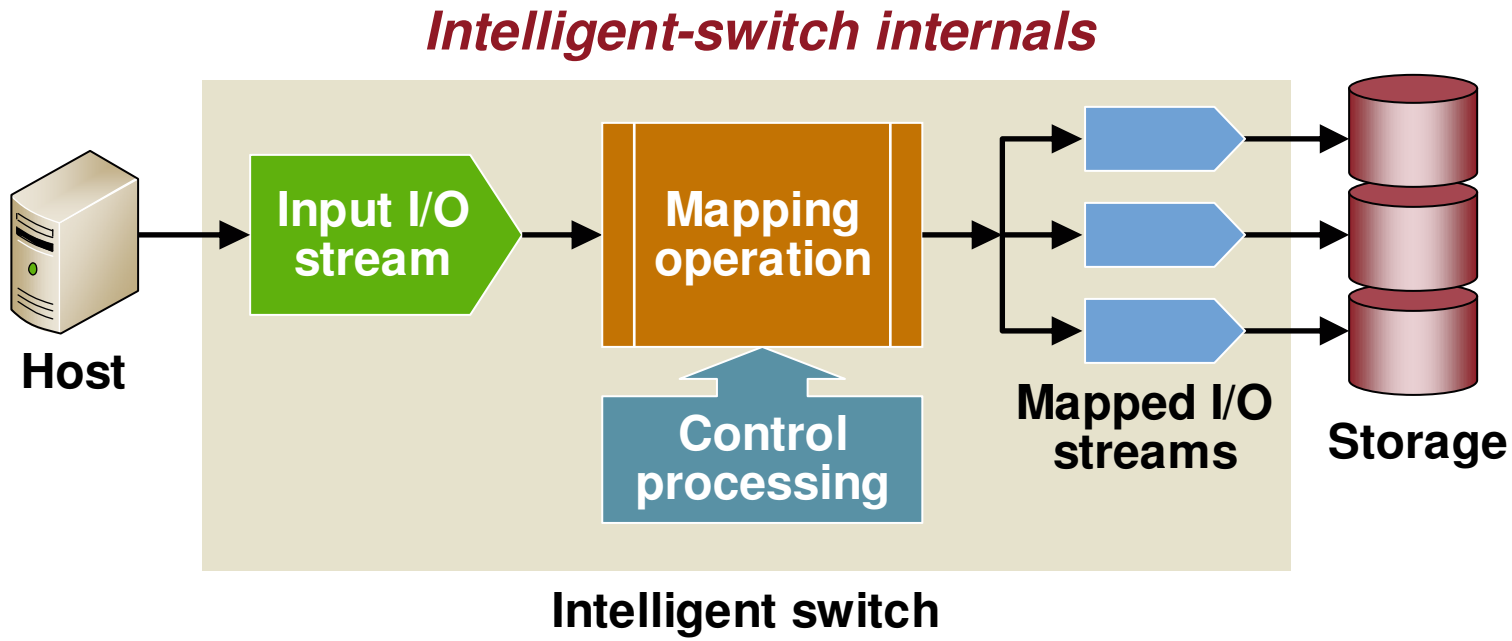


- No state/no cache ensures data integrity
- I/O at wire speed
- Full-fabric bandwidth
- Scalable performance

Invista: Based on Intelligent Switches

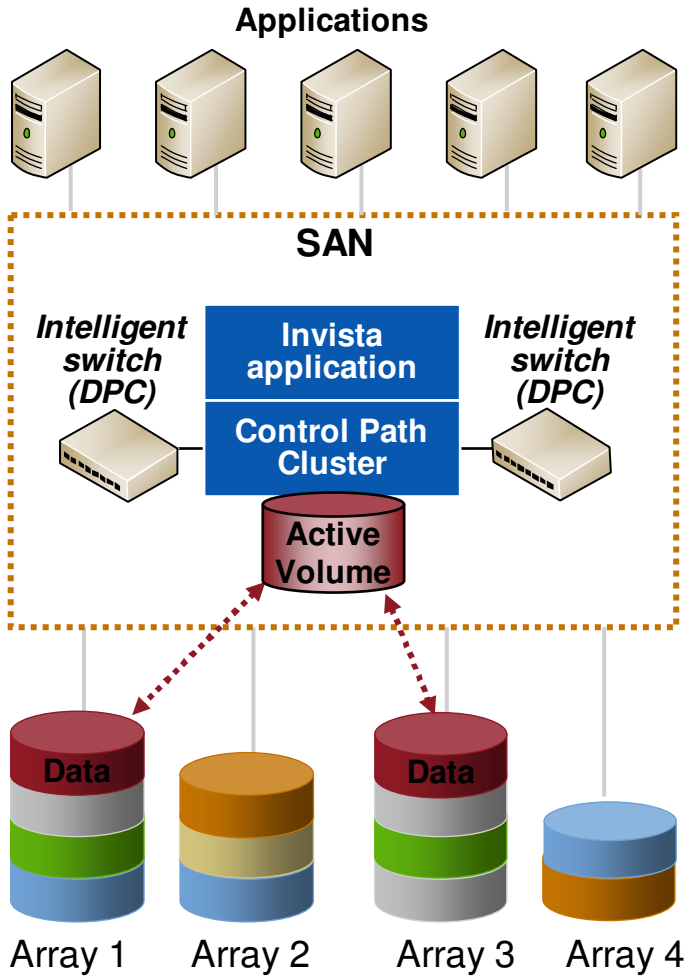
What are "intelligent" switches?

Layer 2 Fibre Channel switches that support ports with enhanced processing power, capable of cracking and modifying data frames based on instructions provided by an external application



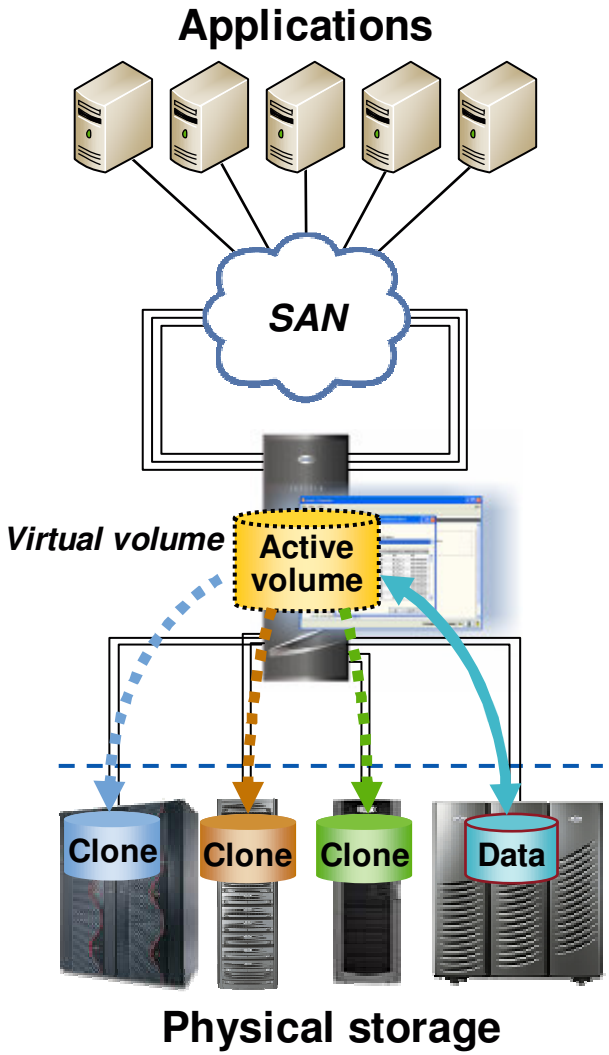
EMC Invista: Dynamic Volume Mobility

- Provide non-disruptive movement of volumes across heterogeneous storage
  - Reduce planned application downtime
- Reduce migration costs
  - Perform lease roll-overs or technology refreshes faster
  - Reduce lease overlap time
- Increase ability to meet service levels
  - Match storage capacity allocation to application performance requirements
  - Integral component to information lifecycle management (ILM)

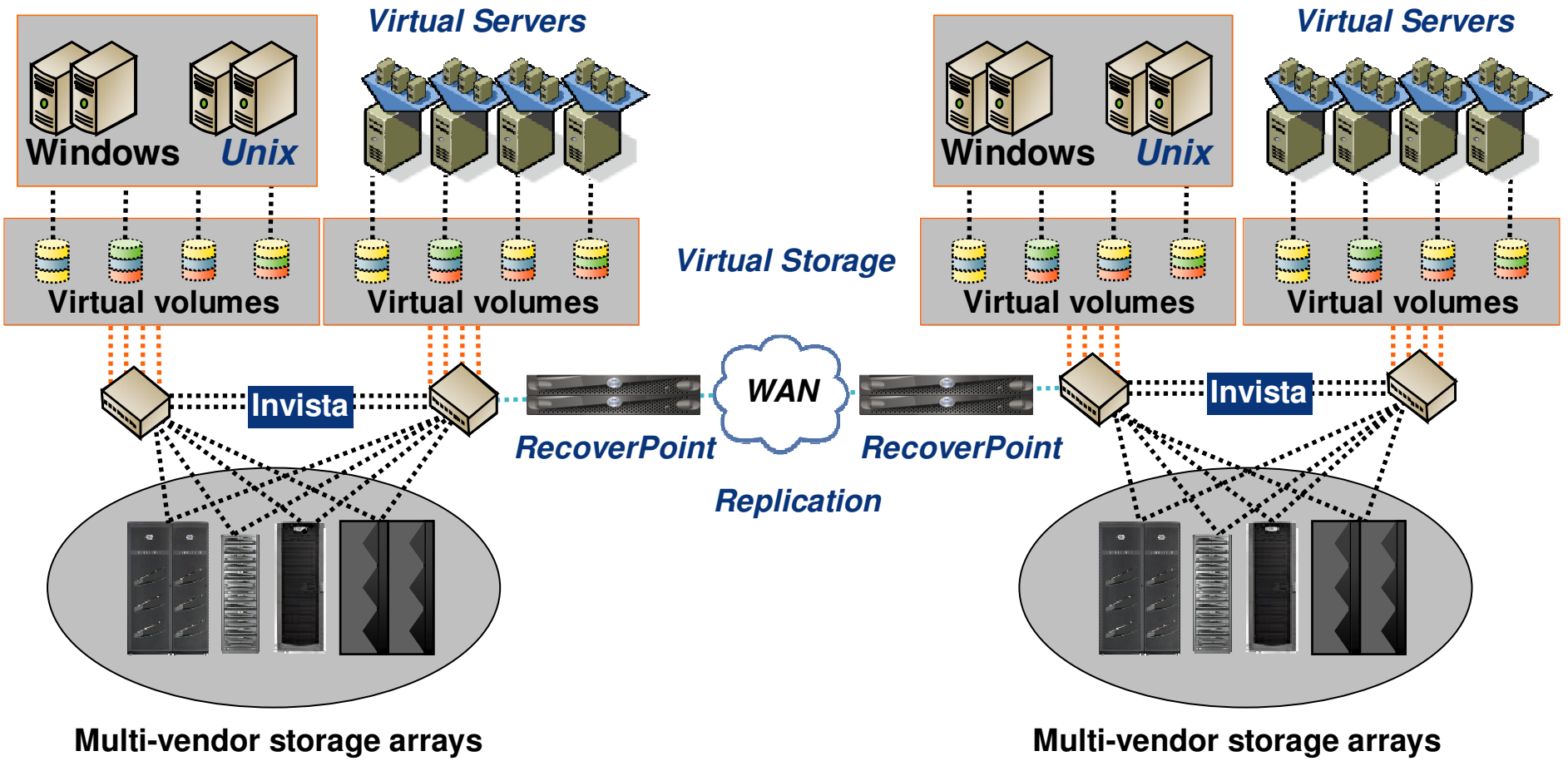


EMC Invista: Heterogeneous Point-in-Time Copies

- Create point-in-time copies
  - Source and clone can be on different, heterogeneous storage arrays
- Enable replication across heterogeneous storage
  - Leverage existing storage investment
  - Reduce replication storage capacity and management costs
- Maximize replication benefits to support service levels
  - Backup and recovery
  - Testing, development, and training



The Virtual Datacenter



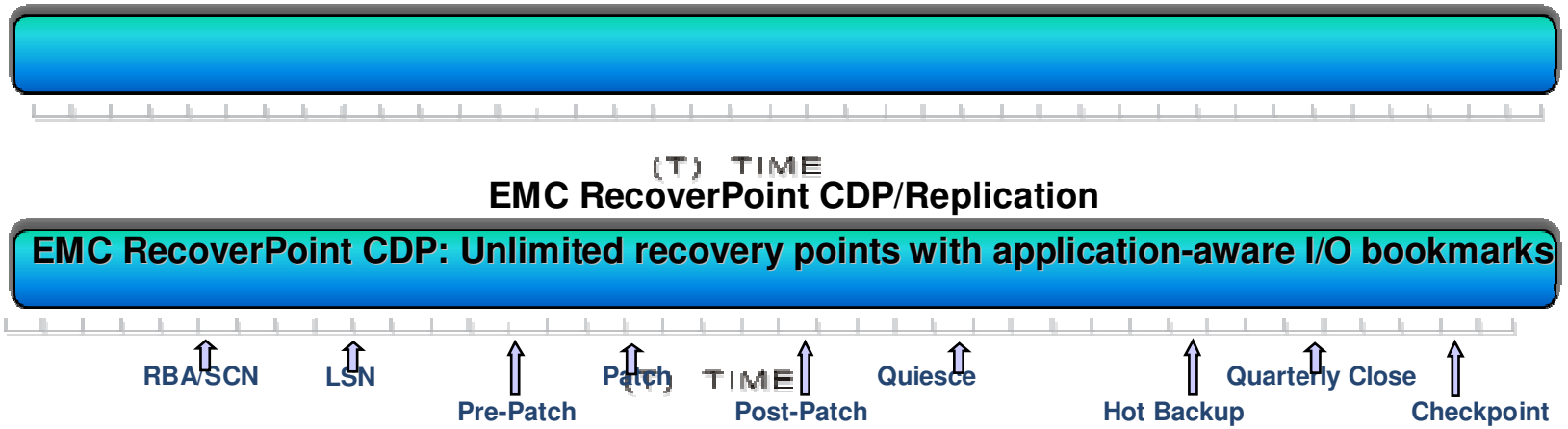
Real Time Recovery Points

Historical Backup: *Recovery Point Every 24 Hrs*

Snapshot Technology: *Recovery Point Every 4-6 Hrs*

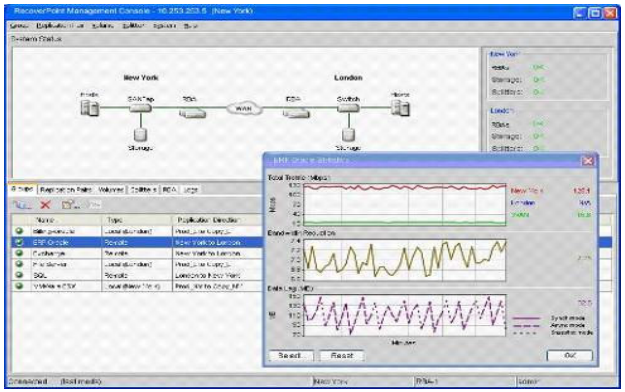
Sync Replication with Gold Copy: *Recovery Point 12- 24Hrs*

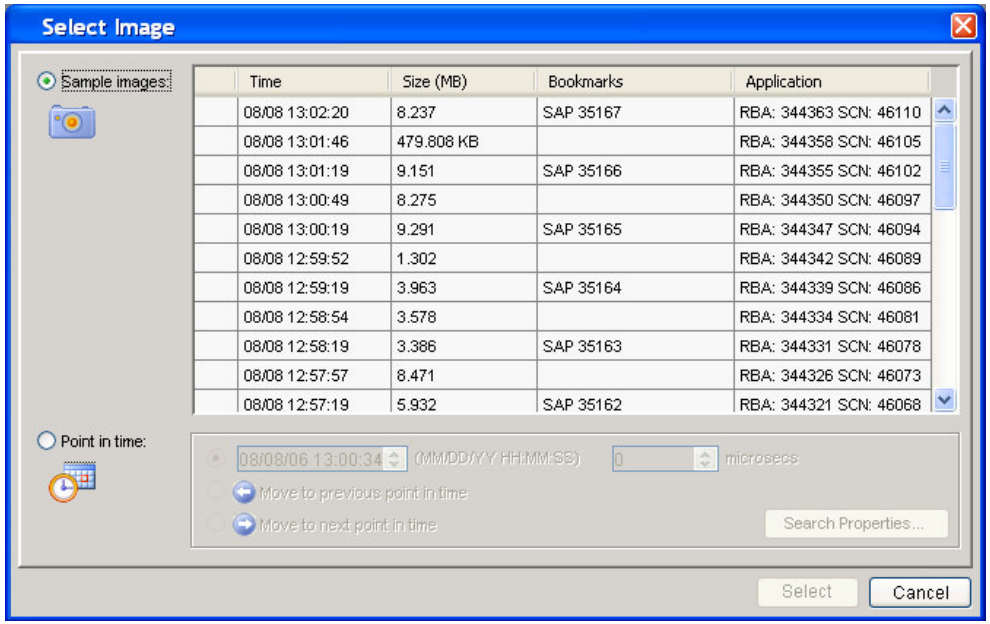
Time based CDP: *Time indexed , but no event driven recovery points*



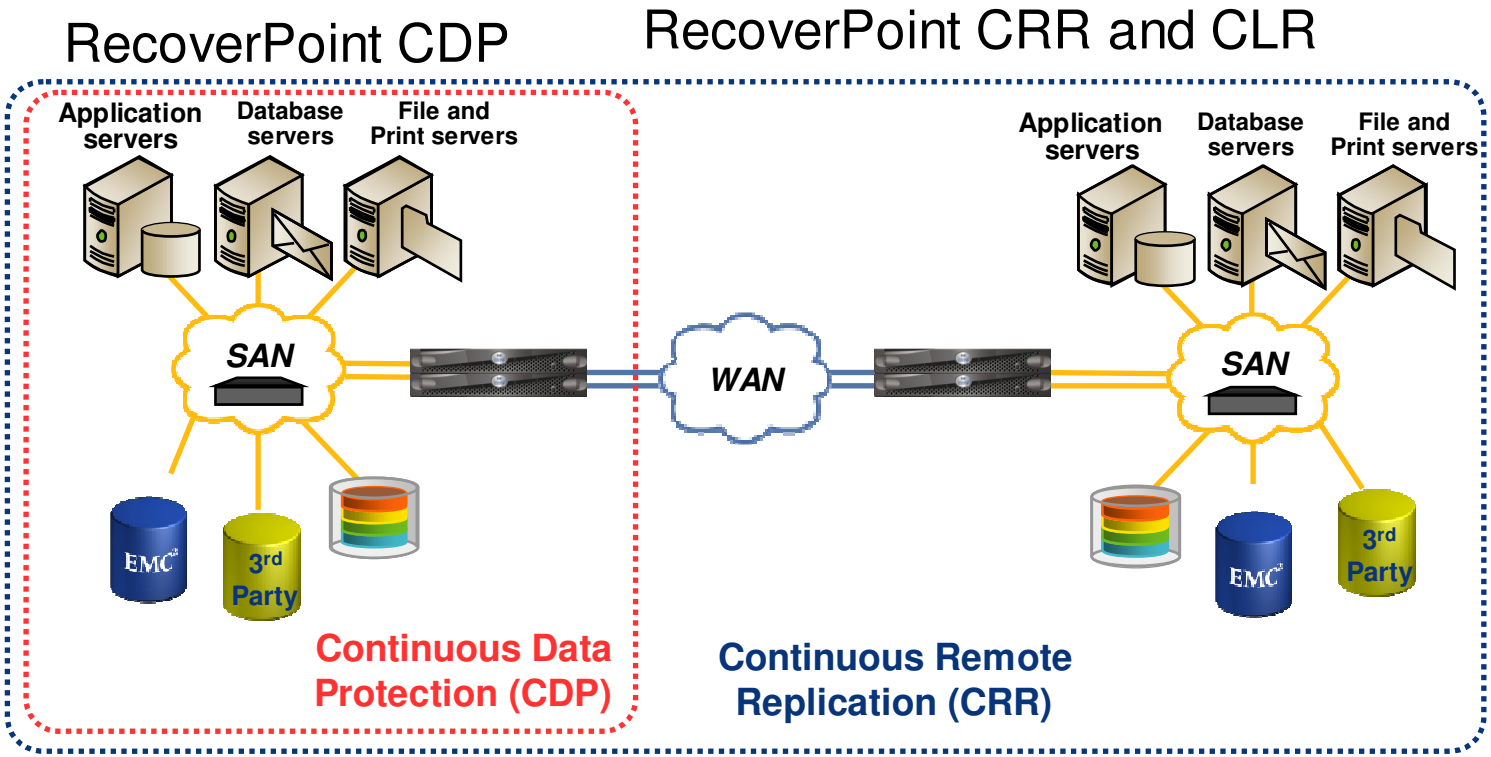
Primary RecoverPoint Use Cases

- **Synchronous (local) and asynchronous (remote) Application Aware Replication**
  - Physical **AND** logical data security
  - Rollback and Roll-forward in the data set
  - Nearly unlimited snapshot granularity (CDP)
  - Highest possible bandwidth and cost savings (CRR)
- **Heterogeneous Storage Support**
  - Produce multiple Snapshots of production data across multi-tiered environment non-disruptively without the need of proprietary software
  - Including Virtual Storage (Invista)
  - Enables V2P or V2V
- **Muliple Data Splitting Technologies**
  - SAN based,
  - Array based (CLARiiON splitter),
  - Host based
  - Out-of-band performance using SAN based splitter





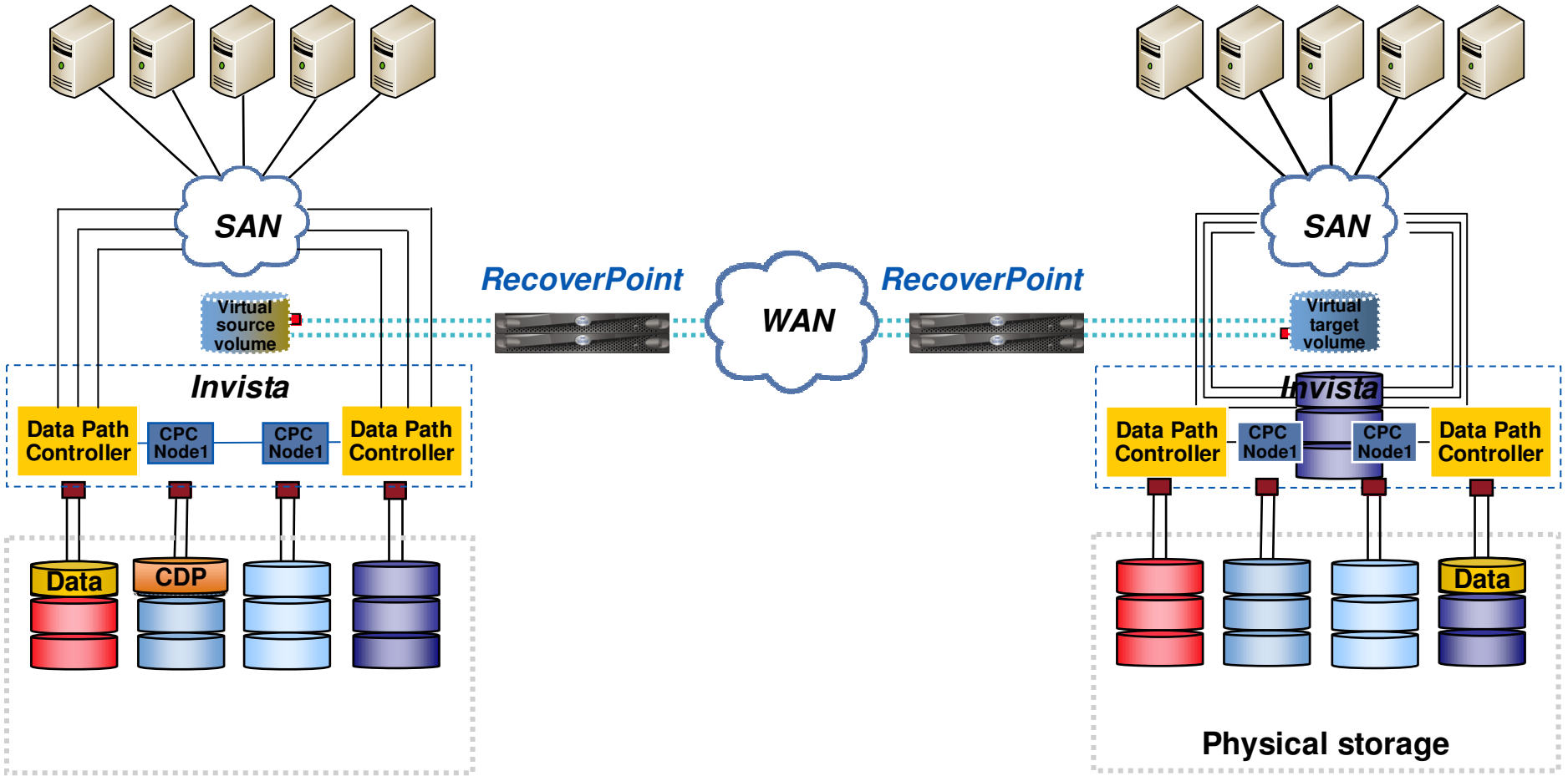
EMC RecoverPoint Overview



- Local, transaction-level data protection
- "True" CDP (Any-Point-in-Time) recovery
- Out-of-band, network based architecture
- Consistency groups with bookmarks
- Remote site disaster recovery
- Roll back of replicated data ("Near" CDP)
- Target Side Processing (TSP) of replicated data
- Policy-based lag and WAN compression

Invista – RecoverPoint : CDP & CRR

RecoverPoint supports heterogeneous storage, enabling virtual-to-non-virtual local CDP and Continuous Remote Replication



Benefits of Virtualization

EMC² where information lives®

Business Flexibility

- Freedom to put your information wherever you want, whenever you want
  …without downtime
- Freedom to consume and release capacity when needed
  …without downtime
- Optimize information infrastructure
  …without downtime
- Enable data mobility
  …without downtime
- Reduce hardware with data consolidation
  …without downtime


EMC²
where information lives®