

# Enterprise Virtualization Environment

## What sets Infinitely Virtual (IV) apart from other cloud providers?

One key differentiator is the Enterprise Virtualization Environment™ (E.V.E.), our purpose-built, state-of-the-art infrastructure for cloud application hosting, virtual dedicated cloud servers, file storage and backup, and more. IV designed E.V.E. from the ground up to meet or exceed the requirements of even the most demanding small to medium sized businesses. As a result, our cloud infrastructure consistently delivers 100% uptime, near physical server performance, absolute data protection, and unlimited scalability to keep our customers' business applications running smoothly and successfully.

### Building Blocks for Excellence

E.V.E. consists of three major layers that combine to deliver exceptional availability, reliability, and security:

- Physical Layer
- Network, Server, and Storage Layer
- Virtualization



IV leverages best-in-class solutions and practices in every layer of the infrastructure. As innovation accelerates and customer needs evolve, IV continually invests in advanced technology to optimize the environment. These intentional design choices, combined with a consultative partnership approach, enable our customers to optimize efficiency and productivity while reducing IT costs and boosting employee satisfaction.

### E.V.E. Design Goals

- 100% Customer Uptime
- Near Physical Service Performance
- Absolution Data Protection
- Support for High-Value Custom Services
- Industry Cost Leadership
- Environmental Responsibility

## Physical Layer: Building

### SSAE 18 Type II Audited Data Center

As the first layer of E.V.El., IV maintains primary and secondary data centers, equipped with state-of-the-art fire suppression systems, and housed in facilities built to withstand extremely harsh environmental conditions.

#### Los Angeles Building Layer:

- SSAE 18 Type II Audited
- 424,000+ square feet
- Dual-interlock pre-action dry-pipe sprinkler system with VESDA
- Exceeds Seismic Zone 4 requirements
- Above 500-year flood plain

#### Boston Building Layer:

- SSAE 18 Type II Audited
- 53,000+ square feet
- Dual-interlock pre-action dry-pipe sprinkler system with VESDA
- Hardened exterior designed to withstand 125 mph winds

## Physical Layer: Physical Security

### A Secure Data Center Facility

E.V.E. is housed within data centers that employ state-of-the-art physical security technology. The data centers are staffed by security 24x7. To enter either building, one must first pass through a mantrap, operated by security guards, and managed by both keycard and biometric access control. Entry to each floor and suite is controlled by keycard. All public areas of the building are covered by CCTV surveillance, which is monitored 24x7.

Within the data centers, physical access to E.V.E. is restricted to employees of Ininitely Virtual.

#### Physical Security Layer:

- Exterior and interior cameras, IP-DVR
- 8-foot perimeter fence
- Controlled site access
- 24x7 security guards
- Multiple mantraps

## Physical Layer: Redundant Power

### 100% Uptime Power Protection

E.V.E.'s redundantly powered and backed up by both Uninterruptible Power Supplies (UPS) and generator power. All loads, including the cooling system, are powered by an "A" and a "B" circuit, each of which is robust enough to supply power for the entire load.

E.V.E.'s power configuration is designed to ensure 100% system uptime by eliminating any single points of failure. Circuits follow a diverse path to distinct circuit breaker panels, which are powered by diverse UPSs. Utility power and generators each connect to Automatic Transfer Switches, which feed the UPSs.

#### Redundant Power Layer:

- N+1 uninterruptible power supplies
- 24x7 onsite fuel storage with multiple fallback refueling contracts
- Automatic Transfer Switches
- Redundant load-balancing circuits to all equipment

## Physical Layer: Redundant Cooling

### Efficient Cooling for the Computing Environment

Cooling is as critical for maintaining system uptime as it is for ensuring environmental protection. Servers, storage, networking gear, and other equipment may operate in widely varying temperatures, but rising temperatures in a data center can negatively impact the as the temperature in a data center rises, it can shorten the lifespan of these physical assets and negatively impact power efficiency.

IV's data center cooling is controlled to optimize equipment life and power efficiency. All cooling loads are supported by no less than N+1 cooling systems, meaning that E.V.E. continues to operate properly even if one or more cooling systems are down.

## Redundant Cooling Layer Features:

- Minimum N+1 cooling systems
- Optimized for equipment life and power efficiency
- RF Code readers for pinpoint accuracy of temperature and humidity within customer deployments

## Network, Server & Storage Layer:

### Local Area Network & Connectivity

### Intrusion Detection & Prevention, Anti-Virus, and Anti-Spyware

All traffic entering E.V.E. is inspected and filtered by our industry-leading Intrusion Detection & Prevention (IDP) screens. Our IDPs are designed to identify and block threats before they enter the environment, protecting customers from Volumetric DDOS attacks and a wide range of other threats including:

- Spyware
- Viruses
- DoS and DDoS attacks
- Brute force attacks
- Botnets
- Code execution
- Info leak attacks
- Overflow attacks
- SQL injection
- Phishing

### Redundant, High-Performance Network

Serving as E.V.E.'s nervous system, this layer is composed of redundant 40 Gbps core switches, multiple BGP routed Internet connections to upstream service providers, and multiple IDP and firewall clusters.

At the center of this network are 40 Gbps layer 3 network switches. This configuration provides extreme throughput and low latency connectivity to our entire network, and is intelligent enough to route traffic around outages.

## Network, Server & Storage Layer: Wide Area Network

### Site-Level Protection

E.V.E. spans two data centers connected by a fiber-based QinQ Ethernet network which ensures secure reliable communications and data transfer.

#### Site-Level Protection Layer Features:

- Multiple data centers
- Multiple 10 Gbps QinQ Ethernet interconnects

## Network, Server & Storage Layer: Physical Storage Infrastructure

### Business Continuity

All data is replicated from the primary E.V.E. data center to a secondary data center on an hourly basis. This replication protects all customer data through any catastrophic failures at the primary data center. In the unlikely event of a site outage, virtual machines (VMs) are powered up at the secondary data center to ensure business continuity.

### Industry-Leading Fault Tolerance

E.V.E. uses clustered NetApp filers to deliver fault-tolerance. If one of the controllers fails, the remaining controller will automatically take over the load. This configuration is designed to maintain server availability through any hardware failure.

### Industry-Leading Disk Performance

IV offers four tiers of disk within the E.V.E. infrastructure:

1. All flash volumes based on NetApp All Flash Filer (AFF) systems, which provide industry-leading performance with sub-millisecond latency of up to 85,000 IOPS
2. AFF with 5,000 IOPS limit
3. AFF with 500 IOPS limit
4. 7.2K Near-Line Serial Attached SCSI (NL-SAS) volumes for low-cost archival storage

## Network, Server & Storage Layer: Physical Server Infrastructure

### Raw Performance

To satisfy our stringent requirements for density and power efficiency, our physical server layer leverages Dell PowerEdge servers featuring AMD EPYC processors. Physical servers are connected to the backbone by a redundant, low-latency 10 Gbps switch fabric. This configuration ensures both high performance and network fault tolerance.

### Raw Performance Layer Features

- Dell PowerEdge servers
- AMD EPYC processors
- AMD Infinity Guard Security
- Redundant, low-latency 10 Gbps switch fabric
- Sub 14 watt/VM power consumption

## Virtualization Layer: VMware vSphere

### VMs Delivering Physical Server Performance

E.V.E. uses VMware vSphere, the most trusted virtualization platform in the industry. It has been shown that web servers based on VMware consistently outperform physical servers. In most other applications, vSphere performs comparably to physical servers.

### VMware Hypervisor

The VMware vSphere Hypervisor is the heart of E.V.E. 's virtualization layer. A hypervisor is the software that creates the virtual system board and bios, virtual CPUs, virtual RAM, virtual network cards, etc., for every VM. Accessing hardware through this hypervisor, each VM has its own independent operations system, giving customers complete control over their virtual server.

### VMware vSphere Layer Features:

- VMware vSphere high-performance hypervisor
- Support for many operating systems
- Customer control of the operation system

## Virtualization Layer: Virtual Switch Infrastructure

### Public & Private VLANs

Each virtual port belongs to a virtual LAN (VLAN), which fits into one of the following classifications:

- Publicly numbered, not protected by a carrier class Juniper SRX Firewall cluster
- Publicly numbered, protected by a carrier class Juniper SRX Firewall cluster
- Privately numbered, protected by carrier class Juniper SRX Firewall cluster with NAT
- Privately numbered, protected by VMware NSX Edge Gateway

VMs and their associated firewall or layer 3 switch interface in the same VLAN may communicate among one another regardless of what host they are on. Therefore, customers with multiple VMs may have their load distributed among all available hosts on a dvSwitch. Furthermore, individual VMs may operate from any host in the system.

### Distributed Virtual Switches

VMs are connected to ports on one of E.V.E.'s Distributed vSwitches (dvSwitch) based on VMware vSphere technology. Each dvSwitch is composed of virtual ports connected to individual VMs and redundant 10 Gbps physical uplinks from each VMware host to our redundant 10 Gbps switching fabric.

### Virtual Switch Infrastructure Layer Features

- Distributed vSwitch connections
- Support for private VLANs
- VMs may operate from any host, enabling fault tolerance
- Each dvSwitch is connected to switching fabric with redundant 10 Gbps interfaces



## Virtualization Layer: Virtual Storage Infrastructure

### Data Storage Process

E.V.E.'s virtual storage infrastructure performs a secure backup process with the following steps:

- Instruct the VSS-aware applications on each VM to quiesce all transactions including:
  - Exchange Server
  - Microsoft SQL
  - Windows Server
- Instruct the VM to quiesce all disk transactions, creating a VM-level snapshot
- Take a snapshot of the underlying datastore
- Delete the VM-level snapshot

This snapshot process ensures that IV can restore customer servers from any backup with all data intact. We retain nightly backups for seven days, weekly backups for four weeks, and monthly backups for three months. In addition, we take 12 hourly crash-consistent backups (one every hour) during U.S. business hours.

### Multiple Datastores & Storage vMotion

E.V.E.'s Virtual Storage Infrastructure is composed of multiple VMware datastores on our NetApp Filers. Using Storage vMotion, a component of VMware vSphere, IV can move VMs from one datastore to another "hot" — without shutting down the VM. This allows us to load-balance datastores without disrupting customer uptime.

### Nightly Application-Consistent Backups

Every VM in E.V.E. is backed up nightly by taking an application-consistent, point-in-time snapshot of the entire datastore. Many of our competitors take only crash-consistent snapshots, which may result in some loss of in-flight data.



## Instant Restore & Single File Restore

E.V.E. has the unique ability to restore an entire VM, regardless of size, in minutes. On our competitors' infrastructures, the restoration process can take hours. What's more IV allows customers to choose between restoring an entire VM or a single file.

## Virtual Storage Infrastructure Layer Features

- Storage vMotion, which enables zero-downtime SAN load balancing
- Nightly application-consistent backups
- Instant restores of entire VMs or single files
- Hourly backups during business hours

## Virtualization Layer: vMotion, VMware HA & DRS

### vMotion: Hot Migration

vMotion is the method by which vCenter dynamically load-balances resource utilization among hosts. Sometimes known as hot migration, this feature allows vCenter to move a VM from one host to another without disrupting the VM. vMotion enables us to perform maintenance on any host without shutting down customer VMs.

### VMware Hardware Availability & Fault Tolerance

Another role of vCenter is to monitor the health of the hosts and the VMs within E.V.E. If, for any reason, vCenter detects a host failure, all VMs on that host are immediately unregistered from that host and registered on another host in the cluster. The VMs are then booted up on the new host. This feature gives customers an extremely high level of protection from hardware and other failures on a host. This protection is provided on every host in the customer's environment and is included in their monthly service fee.

IV also offers an option called VMware Fault Tolerance., which creates an active-passive cluster of two VMs. Using a special heartbeat network, vCenter monitors the primary VM, and if it stops responding for any reason, the secondary VM takes over for it.



## Virtual Center & Distributed Resource Scheduling

VMware vCenter Server provides the intelligence behind E.V.E.'s virtualization layer. vCenter monitors the resource utilization of individual hosts and VMs as well as the aggregate of available resources in all host clusters.

Distributed Resource Scheduling (DRS) allows vCenter to dynamically allocate resources to individual VMs and to load-balance VMs among available hosts. This feature ensures that every customer VM in E.V.E. has access to its assigned physical resources and performs consistently over time.


### vMotion, VMware HA & DRS Layer Features:

- vMotion for zero-downtime host maintenance
- VMware Hardware Availability on all customer VMs
- Distributed Resource Scheduling for consistent VM performance
- Optional VMware Fault Tolerance

## About IV

Infinitely Virtual (IV) is the most comprehensive and customer-focused cloud providers for Small and Medium Sized Businesses (SMBs). Since 2007, we've been helping SMBs solve real business challenges with solutions and services that leverage our revolutionary Enterprise Virtualization Environment™ (E.V.E.). When you work with IV, you get a dedicated team of virtualization experts whose sole responsibility is to help you achieve your goals with an efficient, cost-effective cloud solution tailored to your business, application, user, and data requirements.

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