

VAA  
Product  
Overview  
and Use  
Cases



## Purpose of this document

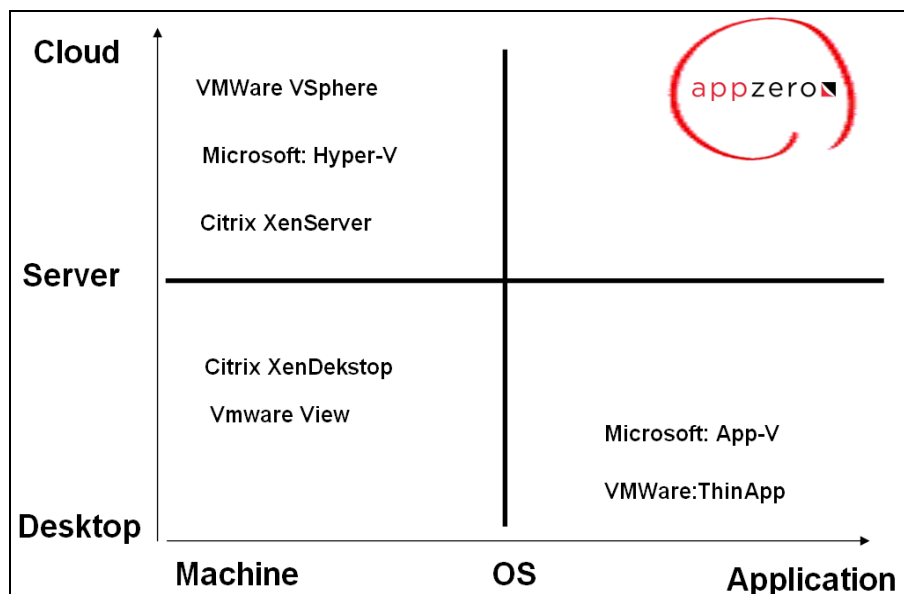
AppZero™ application virtualization software turns Windows and UNIX applications into discrete, movable objects called Virtual Application Appliances (VAA). This document provides a high-level overview of AppZero's product as well as several of the most common use cases and associated benefits.

## What is a VAA?

A VAA is a discrete object that:

1. decouples an application from the operating system (OS) and its underlying infrastructure; and
2. produces a set of files encapsulating an application with its dependencies (executable libraries/services, files, registry entries, configuration, machine, network settings).

The result is an application that is pre-installed and ready to run, but encapsulated with zero OS. VAAs work with server side application stacks and should not be confused with the wide array of desktop virtualizations readily available in the market.



This graphic is intended to depict functionality, not rank or value of solutions. It recognizes the demarcation between several key spheres of influence: desktop/server; server (datacenter)/cloud; machine/OS; OS/application. So, for example, VMware ThinApp is positioned as a desktop application virtualization solution that separates the desktop application from the OS, VMware View is shown as a virtualization solution that separates the OS from the desktop machine. One is only 'better' than the other based on use case and intended results.

The fact that AppZero is alone in the server application virtualization quadrant, at a level suitable for datacenter (physical servers) and the cloud (virtual servers), is a

visual representation of a current market reality: To date, AppZero is the only such solution available if a project calls for separating a server application from the underlying OS.

### What are the Benefits of Using a VAA?

The use of AppZero VAAs for deploying server-side applications delivers a range of cost-savings and business-promoting benefits that are directly attributable to application isolation and mobility.

#### Increased Flexibility and Organizational Responsiveness:

IT isolates applications – usually by keeping a one server to one application ratio – for reasons of performance, management, and security. This approach to application containment requires significant capital and operating resources. The requirement to set up new infrastructure to support new business initiatives hampers IT's ability to be responsive to new scenarios. VAAs speed and ease IT's ability to align with business initiatives. The IT/business alignment made practical by application isolation and application mobility produce both qualitative and quantitative business justifications on their own merit. Taking it a step further, some organizations find this IT nimbleness to be a source of strategic competitive advantage as when a Financial Services firm is able to deploy an opportunistic application before the market opportunity vanishes. The business value of alignment frequently translates into revenue and profitability.

#### Reduced Capital Costs:

Both application isolation and mobility enable higher utilization of computing assets including physical servers, hypervisors, operating systems, and related licenses such as management, monitoring, backup, and anti-virus agents. With application isolation, multiple workloads are easily deployed onto fewer operating systems because it eliminates application conflicts that would otherwise prevent their coexistence. Furthermore, whereas computing capacity is typically provisioned to peak loading – even in virtualized environments – application isolation and mobility means that the peak load can be executed in an on-demand, off-premise "cloud." In this scenario, usage is no longer a capital cost but an operating expense and the cash flow savings can be substantial. Customers report increases in application density of up to 66% using AppZero VAAs, so they require fewer on-premise servers, along with reduced facilities, power, and cooling assets to support their application workloads.

### Lower Operating Costs:

Application isolation and mobility combine to materially reduce operating costs on multiple levels. First, isolation enables sharing and reuse of pre-configured environments at a much finer level of granularity than the legacy method of machine/OS level containment. For example, a common architectural component of the IT infrastructure, such as a database server or an application server, can be reutilized across many servers. With operating costs directly impacted by the number of servers in the infrastructure (Server/Admin ratio), VAA isolation slashes operating expenses by reducing the number of physical or virtual machine environments that must be provisioned and maintained. Increasing an administrator's ability to manage more servers by a factor of 2 or 3 is not uncommon. This productivity boost is achievable since, with VAAs, there is much less to manage. One "gold" database VAA or application server layer becomes a single point of management. At this single point, it is maintained once for use across the tens, hundreds or thousands of servers in the distributed environment.

VAA-enabled mobility enables the savings that come through ready access to a federated external or public cloud for computing and storage resources, in which OpEx replaces CapEx and cash flow is contained. In this case, the infrastructure up to the application layer is managed by a service provider -- generally on a larger scale, and at a much lower cost than the enterprise can achieve on its own. The ability to reduce the number of objects an administrator must manage, and to federate to an external "cloud," where the management costs are built into on-demand usage fees, combine to reduce application life cycle costs by as much as 80%.

### Components of AppZero Software

The AppZero product set contains everything needed to create, run, manage -- and, in some use cases -- dissolve a VAA. AppZero tools apply across an application's full lifecycle.

AppZero Creator is a wizard-based tool for building VAAs. This interactive tool leads the user (typically an application specialist) through the process of capturing the files, registry, user/group, network setting and other artifacts of an application that need to be included in the VAA. VAA creation can be accomplished:

1. through a new installation of an application, or
2. by "scooping and moving" a previously installed application, configured, and running on a machine.

VAAs can range in size and scope from a complete system containing many applications (e.g. MS-Dynamics, SAP-ECC ERP, or Oracle Siebel) to fine-grained components of an application (e.g. a J2EE runtime or just the JVM). Once created, VAAs can be shared and mapped to an application's architecture. Shared VAAs are the foundation of reuse for application provisioning.

AppZero Director is a high performance, light weight VAA runtime for application virtualization and isolation. Acting as an intermediary between a VAA and the OS, the director governs the application's behavior to be identical to a native installation, with zero change to the OS. By design, AppZero's patent-pending technology ensures that the overhead of the Director is minimal. The overhead is less than 3% for most applications that are deployed as VAAs.

AppZero Admin is a tool for administering VAAs. VAAs can be managed with AppZero's console-based utility or through third party management tools. AppZero Admin can be used in an interactive shell mode, GUI, or through a scriptable command line. The GUI console based utility is most often used by developers and QA while on-going operations, elect to fold management of VAAs under the umbrella of existing application management solutions.

AppZero Dissolve removes the VAA's virtualization layer from the encapsulated application. Not the typical use case, the Dissolve capability is used for application diagnostics and support. AppZero Dissolve installs the VAA components back into the underlying operating system ("UOS") of a target machine, with no AppZero software present.

## Speed, Flexibility, and Cost Reduction for SAP™

The fact that VAAs are simple and elegant translates into compelling business value because their use reduces the costs associated with IT complexity. Enterprises and technology services firms that “build their business on SAP,” have seen VAAs radically simplify the otherwise, time consuming and labor intensive tasks that are necessary to maximize value from investments in ERP, SCM, CRM, HCM & EPM software.

Given both the functional and architectural complexity of these enterprise software systems, organizations that implement or adapt these suites enter a never-ending cycle of prototyping, revision, and evaluation. Prior to promoting changes to the production environment, most organizations set up demo, proof of concept, test and development environments in order for business analysts and IT architects to assess production readiness of these configurations.

The problem is that setting up these environments requires both the physical and virtual infrastructure to host them along with a significant amount of time and effort. It is not uncommon to take a week or more for installation of the software needed to evaluate just one scenario. No wonder the implementation costs for these suites can run into millions of dollars.

With the innovation of AppZero VAAs, new scenarios can be evaluated without incurring the traditional costs; a full SAP-ECC6 ERP suite can be provisioned, cloned, and moved to a pay-as-you go cloud environment in minutes. Once in the cloud, it can be accessed for further configuration and development. Through application isolation and mobility it can be readily delivered to a customer’s test lab for user acceptance. Should more development be required, it’s no longer necessary to redo – installing a new baseline system from scratch and waiting a week for the Basis team to complete the effort. Instead, simply provision a new VAA from a standard storage repository and, within minutes, the project moves forward.

The boundary-free nature of VAAs enables them to work identically in a physical, virtual, or cloud environment. This simplicity and flexibility eliminates infrastructure bottlenecks and cost over-runs that so often accompany large scale projects. The instantaneous provisioning of sandboxes and prototypes in any environment eliminates labor bottlenecks. Basis consultants are freed to support rapid innovation rather than repetitive, costly, and time- consuming low value-add installation activities. This high value utilization creates a greater set of opportunities for the enterprise to maximize its significant investment in these application suites.

In the end – the business value of IT is all about the application. With VAAs – every aspect of the application life cycle, even the most notoriously complex SAP, is speedier, more flexible, and less costly than traditional approaches.

## Unique VAA features of AppZero Software

AppZero has a few features which distinguish it from other application virtualization products in the market today. In addition to being the only product that is purposed for server-side applications, VAAs can be shared and combined at runtime for extreme flexibility and reuse. A VAA can be loaded and run from a network drive reducing the complexity of distribution for deployment.

### I. VAA Granularity and Sharing

The versatility of the VAA approach gives IT administrators the flexibility to tailor implementation at a system or application level that is ideally suited to the lifecycle challenges of each particular environment. VAAs can contain a wide range of objects and their granularity can range from multiple applications in one VAA (a "monolith") to the logical subcomponents of a multi-tiered or multi-component application in to separate shared VAAs.

This approach to planning and implementation lets the administrator determine the level of granularity and boundary lines that will maximize the operational benefits of deploying applications as VAAs on a case by case basis. Lines can be defined along natural boundaries such as Server, Component, Runtime and Configure/Policy and Role, or they can be logical separation points.

Applications can be decomposed and mapped into multiple VAAs, which can be shared and combined at runtime via a flexible name-space. Decomposition and mapping of applications into VAA can be done in a number of ways:

- Server boundaries: Applications can map their server components into separate VAAs. For example, a 3-tier application consisting of a Web Server, an Application Server, and a DB Server can be contained in three separate VAAs. Deployment options then range from stacking all three of the server VAAs on one machine, or on separate machines. Many instances of the web server and application server can be provisioned instantaneously for scaling up or down. Encapsulating an application along server boundaries allows for deployment flexibility.
- Component boundaries: Applications can map their "components" into multiple shared VAAs. For example, a J2EE Application Server might be mapped into three different VAAs: application logic, JRE, and JVM. Partitioning application "components" enables granular updates to only the required components, thereby simplifying application life cycle processes for patching and updates, both minor and major. Rollback is accomplished by simply changing the namespace and restarting the VAA.
- Runtime boundaries: Applications can be mapped into VAAs along runtime boundaries. For example, a "gold" VAA can be created containing the application's runtime, while an "identity" VAA shares the artifacts for a particular machine that changes when the application is running. The "gold" VAA can be marked as read-only. Artifacts that change are automatically promoted up from the "gold" VAA to the "identity" VAA. Mapping along runtime boundaries means that all the changeable portions of an application are isolated and captured into a well-defined location. Synchronizing replicated applications or infrastructure servers between the data center and a cloud recovery site is easy and as fast as a simple "copy."

- Configuration/Policy and Role boundaries: Mapping applications to multiple VAAs enables separating configuration and policy from the runtime. Isolating configuration from the runtime allows a runtime VAA to be reused. Separating configuration from runtime makes delineation of the roles/responsibilities in operations clear and enforceable. Mapping application components to the different roles in operations provides for auditing, root-cause analysis, and compliance at a level that is not achievable in today's most common approaches.

Once created, a VAA is a single file, or a small set of files, which can be copied from system to system and stored anywhere; deployed at the click of a mouse; and be running in seconds. Separated and isolated from the underlying infrastructure, VAAs can move among servers – physical or virtual, on-premise or in the cloud. Isolation makes it easy for both legacy and new applications to move error free from old-to-new, same-to-same, or similar-to-similar OS versions.

## II. VAAs Namespace and Attributes:

A VAA namespace controls the order in which file and registry entries are read and written. For example, SQL Server might be contained in two VAAs: 1.) an identity-VAA (machine specific and changing files) and 2.) a gold-SQL Server VAA (all the artifacts that make up SQL Server). The read-namespace could be set to: identity-VAA; gold-VAA; OS and the write-namespace could be set to identity-VAA.

The AppZero Director will read first from the identity-VAA, then from the gold-VAA, and finally from the operating system. If a file or registry needs to be created or updated, the AppZero Director will only write to the identity-VAA with this namespace definition. The application that is run in these VAAs will never change the underlying OS.

If a file that is located in the gold-VAA or OS needs to be updated, it is promoted up to the identity-VAA and then modified in this location. VAA attributes control read and write access to and from VAAs. By marking a VAA as read-only, "gold" application VAAs can be created and paired with "identity" VAAs for deployment.

## III. Where VAAs Reside:

VAAs can reside on a local drive, a network drive, a USB drive, or on any disk. A VAA is typically stored on a network drive and can be run from that location. Running a VAA from a network drive causes the application to load into the isolated memory of a machine, but does not copy the VAA files to the local disk of the machine. By provisioning a VAA from a network drive, applications and workloads can be moved from machine to machine without copying the VAA.



## Enterprise & Cloud Provider Use Cases

Two of the high level benefits of VAAs are application isolation and mobility. The following section presents some of the most common use cases and the associated business value. The benefits derive from the ability to lift and move an application as a single file, separate from the OS, as well as the ability to isolate an application from its OS dependencies.

### Application Mobility

The enterprise is getting proficient at leveraging virtual machines (VMs) in the data center often exposing the dynamic provisioning of compute resources as private clouds. The obvious next question “can I provision my application as simply as I am able to provision my hardware?” is being asked by enterprise architects and answered with AppZero. A simple uniform transparent abstraction layer to encapsulate applications eliminates error prone installation procedures, squashes VMsprawl and now empowers a delivery vehicle for an application to move to the compute platform in minutes.

- Virtual and Physical:

The virtual server market is growing, becoming more diverse with the introduction of Hyper-V, Xen, KVM to the once homogenous VMware landscape. As it grows, many data centers want to have the flexibility to move applications from physical to virtual, to virtual and/or back to physical.

Often, application workloads have Quality of Service (“QoS”) or Service Level Agreements (SLAs), which require the performance level of bare metal or the high availability of VMotion. These mobility patterns are often referred to as P2V (Physical to Virtual), V2V (Virtual to Virtual), V2P (Virtual to Physical) and P2P (Physical to Physical). VAAs support all of these application mobility patterns by provisioning to a destination machine from a network drive or by copying VAAs to the target system. Flexibility and agility are achieved with VAAs, which can be moved across these different environments in a matter of minutes.

- OS & application lifecycle:

The operational tasks of patching and migrating to new versions of OSs are time consuming and error prone. The OS life cycle itself is complicated by the added dimension of application life cycle patching and updates/enhancements. These two life cycles occur concurrently and asynchronously with the added complication that they are usually the responsibility of different groups. The owners of each of these life cycles are required to coordinate their changes to keep everything running smoothly and ensure there is limited downtime or outage.

Application Mobility enables flexibility in provisioning either a new version of an application or updating/moving to a newer version of the operating system. All the state information of an application is contained in a VAA rather than being commingled with the OS. This separation allows for straightforward rollback, if and as required, of either the application or the OS. Provisioning an application is completely automatable, removing the often error prone process of installing or reinstalling. Run book operations can be simplified to a single script.

- “Gold” application image provisioning:

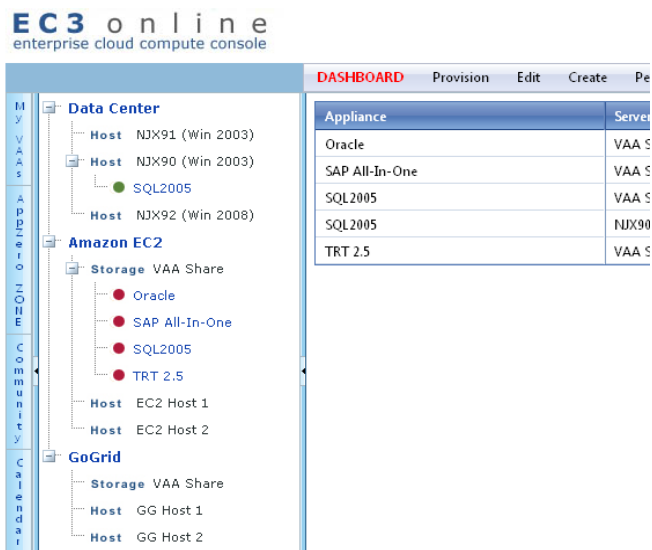
One of the significant challenges facing data centers and cloud providers is the number of running application and infrastructure servers. Each server of the application stack needs to be installed, configured and then run with unique instance data. A data center needs to build processes to manage each step in sequence. The OS and application stacks have files that have been merged. As a result there is not an interface that separates an application from the OS for purposes of management.

A unique benefit offered by VAAs is the ability to have one “gold” image that can be loaded from a shared drive onto many machines. This capability instills confidence, reliability and the security of knowing that hundreds of Web servers (IIS, Apache) can be provisioned and maintained from one place -- all utilizing the identical instance copy. Without VAAs, it’s necessary to install and configure a Web server through cloning, or installing directly to each machine. Updating each one is time consuming, error prone and cost prohibitive. VAAs allow dynamic assembly of the application and OS at runtime by leveraging object-oriented principles to enable reuse of application stacks.

- Clouds and Disaster Recovery:

Enterprises want the ability to move production applications to the cloud to save money, have spare capacity available during peak operations, and have a recovery site available. They want to partition applications across different geographical boundaries. VAAs make moving and replicating an application or set of applications across boundaries simple and error free.

Applications can be composed of multiple VAAs that can be shared. A collection of VAAs make up an application that can be segmented into runtime components, configuration and state. Runtime VAAs can be made read-only. Since the runtime VAA never changes, synchronization processes require only moving the VAAs that have changed. This separation means that distributed, replicated VAAs can be synchronized with very little overhead. The overhead required is an order of magnitude less than is required to replicate an entire VM from site to site.



The design patterns most often associated with moving applications across location boundaries are: D2C (Data Center to Cloud); C2C (Cloud to Cloud); C2D (Cloud to Data Center); and D2D (Data Center to Data Center). Disaster Recovery, Back up and Cloud Bursting is made far simpler with VAAs and is enabled by this architectural approach.

- Dynamic assembly - Stateless Cloud Computing

There is an opportunity today to define an exciting new approach that will result in much greater efficiencies, fewer errors and greater flexibility than the status quo. That next wave is stateless cloud computing, as the deployment application life cycle approach for data centers, private clouds, hybrid clouds and the public clouds.

“Stateless Cloud Computing” locates all of an application’s state information on the network drive. There it can be maintained and available with the associated workload provisioned to a compute resource as needed (e.g. private cloud, public cloud). Decoupling an application or workload from the resource is an essential principle to delivering the dynamic data center and the cost savings it enables.

Encapsulating an application into a VAA is foundational to Stateless Clouds. VAAs enable an application to move, be assigned to, and run on any server. Dynamic assemble of a “gold” OS and “gold” application are the keys to next generation data centers. In this datacenter, Stateless Cloud VMs dynamically provision hardware with VMs and a “gold” base OS. VAAs are provisioned based on the characteristic (resources needed, performance, location, priority, etc.) of the needs of the application. Since a gold OS is provisioned for the duration of the workload, they are in effect cleaned of virus and restored to the standard on a periodic bases. The giant number of unique stacks that are managed by CMDBS are reduced to standardized “images” greatly simplifying the need for complex CMDBS to track all of the machine instances.

VMsprawl, Amazon Image Machine AIMSprawl, software image sprawl .... Sprawl by any name arises because VMs view the entire software stack as one unit. VMs are cloned and customized. The virtual management market has many companies that provide automation to manage the mess created by copying and customizing VM images.

With use of VAAs, cloud operations can now take back control and build stacks from objects, eliminating the mess before it occurs, instead of managing it after the fact. The next generation of deployment (cloud) management will be much more focused on gold image provisioning and workflow management then on managing machine instances.

## Application Density

On the MS Windows platform (Windows Server 2003/2008), data center and cloud providers deploy only one application on one instance of the OS. This ratio of one application per OS is maintained to avoid the conflicts that can occur when multiple applications run at the same time in Windows. DLL "hell," registry conflicts, and failure of an application can render other applications useless. As a result, IT operations run one application per OS. This is in stark contrast to how applications are deployed in Linux/UNIX environments. VMs are much more prevalent in the Windows environment for server consolidation to overcome this expensive short coming.

Since VAAs are self contained and isolated, data center and cloud operations' teams can now stack applications on the Windows platform with the same confidence they have when doing so on Linux/UNIX platforms. Consolidating two applications onto one OS increases application density and reduces the number of instances of the software stack (OS, management, antivirus) by 50%. The well established savings that result from hardware consolidation by using VMs can now be realized for the software stack through VAAs.

## ISV: Virtual Appliances Done Right

The modern virtualization market started with VMware introducing the concept of Virtual Appliances (VA) as a better way for Independent Software Vendors (ISVs) to deliver their applications to customers. Although they were on the right track, they didn't get it quite right.

A Virtual Appliance (VA) is an application that is packaged as a virtual machine (VM) image (application plus OS). Some of the benefits of ISVs using virtual appliances have been promoted as:

- Decreased time-to-market and getting customers up and running faster
- Reduced costs and complexity of developing and testing software
- Simplified deployment and patching and reduced support calls

These high level messages have resonated with many ISVs in the Linux community. A number of shortcomings of the virtual appliance approach have become clear for the ISV community as the market evolved. AppZero's innovative VAA approach takes application virtualization to the next level by overcoming the shortcomings associated with VMware's initial solution. Since the hypervisor in the virtual appliance approach regards everything inside the VM as a black box, there is no ability to separate the different layers of an application, which has a number of drawbacks:

- The ISV is now put in the unenviable position of owning the OS life cycle of the VA, and the need to acquire and absorb the cost of the skill set that goes with it.

- There is no clear management layer insertion point in a VA. Who is to be alerted when the system goes down is not clear. Many data centers do not want to give up control of this part of the operation to their application provider.
- Notwithstanding its shortcomings, this approach is only even possible for non-Windows platforms. For licensing reasons, Microsoft does not allow ISVs to ship copies of the Windows OS as part of a VA.

By contrast, an AppZero VAA is a pre-installed, preconfigured Application Image designed to run on an OS. In the case of a VAA, ISVs and customers realize the same benefits of a VA, but without the drawbacks (which are, in fact, VAA's strengths). To summarize, the benefits of the AppZero VAA approach:

- Decreased time-to-market enabling customers to be quickly up and running
- Reduced costs by reducing the complexity of developing and testing software
- Simplified deployment, patching leading to reduced support calls

PLUS

- Decoupling an application from the OS means separation is also maintained between the OS and application life cycles
- The enterprise can use existing management infrastructure without piercing or compromising the integrity of a VAA
- The VAA approach works, not only on the Linux platform, but also for the Windows environment without the additional cost or restrictions associated with additional copies of the OS.

Many leading ISVs are adopting AppZero VAA as part of their strategy for optimized application distribution. SAP, boasting one of the largest and most complex products available, and other ISVs are working with AppZero software to realize a faster delivery vehicle that reduces installation and configuration efforts, cost, time, and errors.

VAA's are what ISVs envision; VAA containers deliver a clear separation of responsibilities between the application owner, the ISV, and system administrators within the enterprise. ISVs do not want to take responsibilities of system administrator (including no ownership of the OS life cycle) and with the VAA approach they do not have to.

Summary:

Server-side application virtualization decouples the application from the OS freeing the application to move and run isolated from the OS and other applications. Application mobility enables flexibility for provisioning the application stack across boundaries. Today there are boundaries in the data center that have the effect of locking in the application to a fixed model. The business wants the freedom to choose between Clouds, data center, hypervisors, and machines in order to lower costs and increase agility. AppZero's Virtual Application Appliances enable application mobility which extends the server virtualization platforms and physical servers on premise and provides the built-in foundation for the migration of an application to the cloud(s) if and when the business wants.

Hard dollar savings can be attained through error reduction achieved by automating application provisioning as a VAA. Today's template drive or manual application installation processes require expensive resources that can be eliminated via automation. Even more dollars saved on the Windows platform by consolidating applications on fewer operating systems. The VAA protects applications allowing more than one application to run safely on a single OS. By moving an application to a "running" machine, the enterprise only has to buy "running instances," saving money on the many operating systems that are offline or sitting idle.

Buy AppZero now and deliver the freedom and flexibility these times demand while saving real dollars.