

# WHITE PAPER

HigherGround in-depth  
analysis and review



## VIRTUALIZATION AND HIGHERGROUND



Learn about Virtualization and optimization  
of network resources.

## VIRTUALIZATION AND HIGHERGROUND



The HigherGround interaction recording platform can be utilized in a virtual environment, which provides several time and cost-saving benefits for the customer.



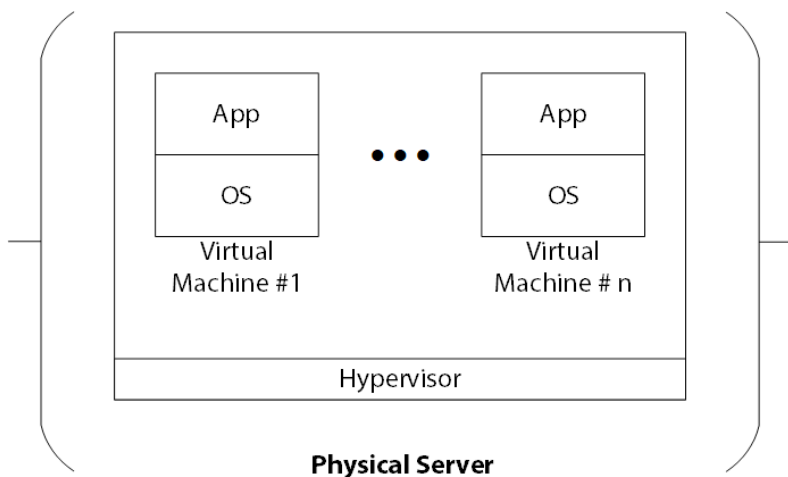
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## INTRODUCTION

Hardware virtualization or platform virtualization refers to the creation of a virtual machine that acts like a real computer with an operating system. Software executed on these virtual machines is separated from the underlying hardware resources<sup>1</sup>.

In hardware virtualization, the host machine is the actual machine on which the virtualization takes place, and the guest machine is the virtual machine. The words **host** and **guest** are used to distinguish the software that runs on the physical machine from the software that runs on the virtual machine. The software or firmware that creates a virtual machine on the host hardware is called a hypervisor or **Virtual Machine Manager**<sup>2</sup>. The system can be configured with either a Type 1 or Type 2 hypervisor. The following overview diagram provides a visualization of Type 1 Hypervisor:



Virtualization platforms have two principal areas of functionality:

- Virtual machines/application hosting (provides an environment where Windows Server and HigherGround Windows applications can be installed)
- Virtual environment management (tooling and automation for turning on or off virtual machines as needed)

The predominate Virtualization hosts are:

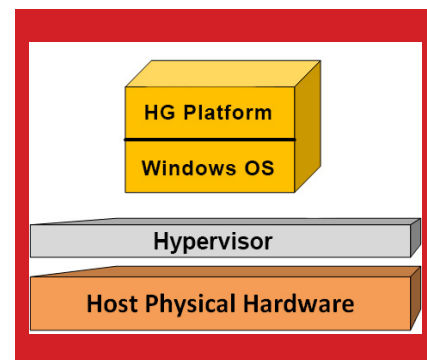
- VMware (ESXI)
- KVM (Red Hat)
- OpenStack (Open Source)
- EC2 (Amazon)
- Azure (Microsoft)

The difference between the above virtualization hosts is in their management functions. Whereas they all can perform tasks such as create a virtual machine, delete a virtual machine, allocate disk space, etc., these tasks are executed differently within their proprietary applications.

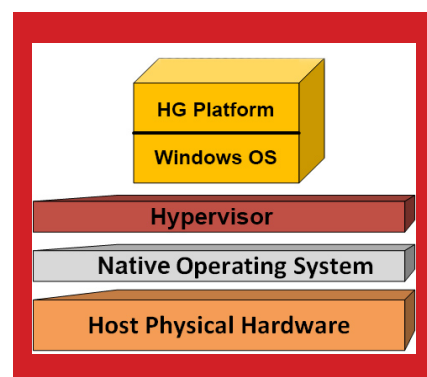
<sup>1</sup> Wikipedia: <https://en.wikipedia.org/wiki/Virtualization>

<sup>2</sup> Wikipedia: Virtualization

## Hypervisor Configurations



Type 1 Hypervisor



Type 2 Hypervisor

## WHY VIRTUALIZATION?

Organizations are constantly looking for greater efficiencies and cost savings. One of the key areas of focus is IT and server utilization. Virtualization is a strategy executed to achieve the efficiencies and cost savings desired. There are several advantages associated with migrating to virtualization:

- Reduced overhead: physical servers, ancillary support equipment
- Faster deployment/redeployment
- Lower operating costs
- Increased flexibility: hardware /software separation
- High availability



## HOW DOES HIGHERGROUND WORK WITH VIRTUALIZATION?

As a rule of thumb, the HigherGround platform and the Windows Server OS that it runs on are compatible with virtual machines that support the server OS. The HigherGround platform currently does not interoperate with any Hypervisor management APIs; since independent operation within each virtual machine is a key component of virtualization, interoperability with the management functions is not necessary.

The matrix below gives a quick interoperability review:

S/W	Source	HG Deployed	HG Interoperate with Management APIs <sup>1</sup>	Compatible with TAP <sup>2</sup>	Location
VMware	ESXI	Y	N	N	On-Prem/Cloud
KVM	Redhat	N	N	N	Cloud
OpenStack	Open Source	N	N	N	Cloud
EC2	Amazon	Y	N	N	Cloud
Azure	Microsoft	N	N	N	Cloud
Hyper-V	Microsoft	?	N	N	On-Prem
VirtualBox	Oracle+ Open Source	Y	N	N	On-Prem
Xenserver	Citrix	Y	N	N	On-Prem
"Bare Metal" <sup>3</sup>	Hardware Vendor	Y	Y <sup>4</sup>	Y	On-Prem

<sup>1</sup> Management APIs from the Hypervisor

<sup>2</sup> Analog or Digital TAP card

<sup>3</sup> Physical Server with PCI slots

<sup>4</sup> Windows Server OS APIs

For completeness, here are the storage and database compatibility matrices:

Storage	Source
S3	Hitachi
S3	Amazon
Direct Attached	RAID; SCSI/SATA Rotating or Solid State drives
Network Attached	NAS; SMB
Storage Area Network	SAN; iSCSI

Database	Source
PostgreSQL	OpenSource
RDS	Amazon
Aurora	Amazon

## WHY IS THIS IMPORTANT TO OUR CUSTOMERS?

The market is moving towards platforms separated from hardware as well providing Software as a Service (SaaS). Whether the customer wants to virtualize their own environment, run on a hosted application, or go full SaaS, they can benefit from virtualization by:

- Cost Savings
- Focus on key business elements - not ancillary elements
- Remaining flexible and current with technology growth

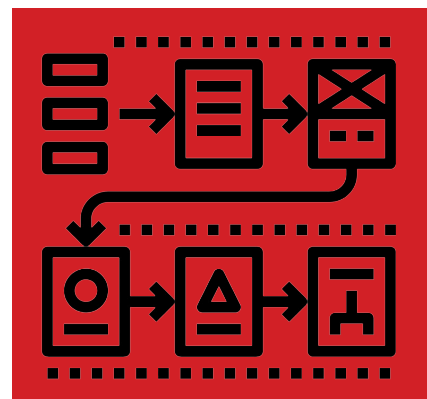
From a strategic perspective, when our customers are ready to migrate to Hosted Applications, our knowledge in virtualization allows the customer to progress to a Hosted Application in the Amazon Web Services Cloud (AWS) environment with confidence. For an overview of our AWS cloud deployment please see the Appendix.

## FACTORS TO CONSIDER WITH VIRTUALIZATION OF THE HIGHERGROUND PLATFORM

As customers and HigherGround move towards more virtualization and hosted applications, there are some differences to consider between “bare metal” (single server) and virtualized environments. Here we discuss a few advantages of a virtualized environment.

### Capacity Planning

One of the advantages of virtualization is the elasticity of resources that provides fast deployment and redeployment as well as quick scalability. It is also possible to create a High Availability application by enabling a virtual machine to be spun up on any available host. In a virtualized environment, it is possible to quickly allocate additional storage, processor cores, NICs and memory.



It is also possible to share these resources between virtual machines. In general, recorders do not perform well when any of these resources are shared with other virtual machines. Achieving optimal performance requires sufficient capacity planning and monitoring to ensure that the recording and database applications have the proper resources to operate efficiently. This means that resources must be reserved for the virtual machine (s) running these applications. In Hosted Applications like AWS, customers can choose to purchase dedicated resources, which enables the host environment to function more like the “bare metal” environment.

## DISTRIBUTED RESOURCES

If the virtualized environment was a Hosted Application such as AWS, then an additional layer of flexibility is introduced. The HigherGround platform has three major components:

1. The main processing software
2. The database
3. The media storage

In a “bare metal” environment these three components coexist and are factored in the capacity planning for the server. In the hosted environment, these components are distributed to different resources

### AWS:

Main processing → EC2

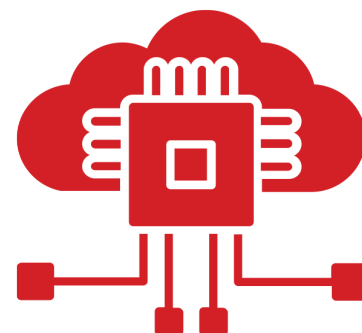
Database → RDS

Media storage → S3

The different components distributed among resources will adjust the capacity requirements of the system. This resource allocation will factor into the capacity planning and must be considered to ensure the platform will run efficiently and properly.

## CONCLUSION

HigherGround software can run in a virtual Windows environment and thus exempt customers from the necessity of operating and running a dedicated server, on or off premise. This saves customers overall operating costs. The application works well on a hosted environment such as Amazon Web Services, but careful capacity planning must be executed to ensure that the different components of the software will work correctly together.







## ABOUT HIGHERGROUND

HigherGround® provides best-in-class recording solutions for incident reconstruction in public safety and performance monitoring in contact centers. Our full-featured products transform data into actionable intelligence, enabling decisions with confidence to enhance agent performance, optimize operations, improve customer satisfaction and reduce costs, which ultimately increases revenue. We customize solutions that integrate seamlessly with client applications. HigherGround — a proven industry standard — is the OEM recording product of choice for several major companies.

Visit [www.higherground.com](http://www.higherground.com) for more information.

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