August
2017

What's Up MAK

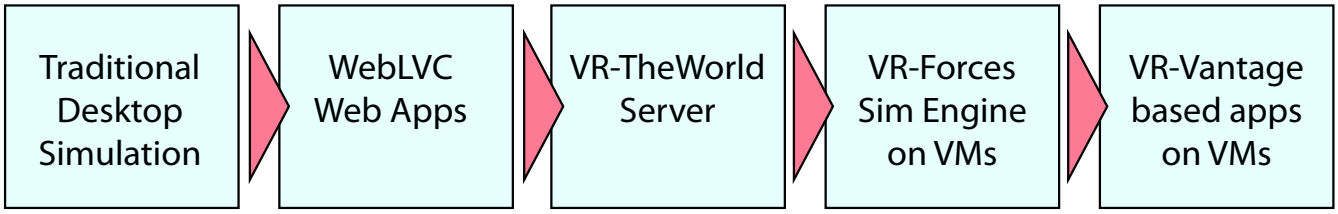
Bringing High-Performance Graphics to Virtual Machines

We see a push to migrate more computing power to virtual machines (VMs), even in the modeling and simulation industry. By doing so, businesses are finding efficiencies in hardware costs, maintenance, and software flexibility. Those efficiencies translate into winning bids for system integrators, more flexible prototyping laboratories, and more effectiveness across the project life cycle.

At MAK, we continually push the limits of our software, in search of new, flexible, and efficient solutions for our customers. One of the foundations of MAK is the concept of interoperability, and that value has helped us find and incorporate cutting-edge technology to empower the modeling and simulation community. Years ago, we introduced WebLVC, which allows users to control simulations via easy-to-use browser-based apps. Next, we took advantage of centralized data services, with VR-TheWorld Server, which allows

users to stream terrain data to simulators and visual applications on their network. Finally, we found ways to move the VR-Forces simulation engine onto virtual machines, bringing scalable computing power for larger simulations.

Today, we take another step forward, with the migration of our VR-Vantage-based visually intensive applications to VMs – VR-Forces GUI, VR-Vantage, and VR-Engage.



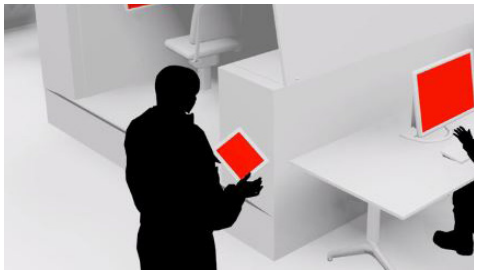
System engineers have many choices in how they configure their network, computing, and graphics resources to achieve their simulation designs. An initial challenge is ensuring that all the needed applications can be hosted on, and connected within, the chosen architecture. Yet, mastery of the system design comes when each component truly takes advantage of architectural specifications. MAK is uniquely positioned to maximize the scalability that virtual machines bring to distributed simulations.

MAK prioritizes architectural flexibility. As such, VR-Forces is developed as a two-part application so that users can take maximum advantage of their system architecture. The front-end provides a graphical user interface (GUI) to input commands into the system and receive 2-D and 3-D visual feedback. The back-end is the simulation engine itself, which conducts all the computing to simulate the entities and interactions within a scenario. This architecture allows users to scale either the number of users interacting with a simulation or the number of entities controlled by a single user. This architecture extracts maximum value from VM systems, where scaling the number of machines or computing power used for a task is a straightforward task.

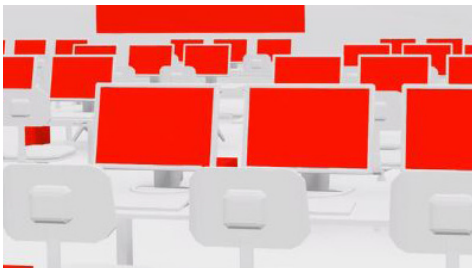
VR-Forces' scalability doesn't end with its two-part design. For many years customers have been using VR-Forces' ability to automatically distribute the load of large scale scenarios to many back-end simulations. They have done this by deploying VR-Forces back-ends on a network of computers, servers hosting VMs, and VMs hosted by cloud service providers. This chart lays out the benefits of each architecture:

Deployment Architecture	Benefits		
	Simulation Scale	Centralized Installation & Management	Inexpensive Scalable Hardware
Network of computers	✓		
Virtual machine server	✓	✓	
External cloud provider	✓	✓	✓

Front-end graphics, on the other hand, present a different challenge. How does one scale the number of front-end users? Let's have a look at some situations: In a classroom, many students may need a fully capable GUI to interact with the simulation – to place units on tactical maps or within dense 3D terrains. For this, they will each need a reasonably powerful graphics computer and access to, often large, terrain databases. On the other end of the graphics power-spectrum, Instructors and role players might have a variety of specialized interfaces to visualize the ongoing training, modify plans, and inject threats or faults.



The latter example could take advantage of the ever improving graphics capabilities within web browsers and networking technologies like the MAK WebLVC Server, to remotely control and influence the simulation. To demonstrate this concept, MAK has been hosting a VR-Forces simulation continuously for the past three years. You can experience it through web clients on mak.com/testbed.



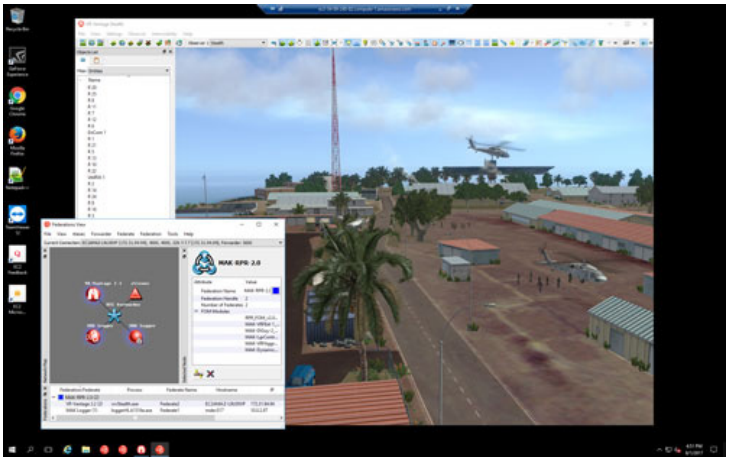
The classroom example, however, needs a more powerful graphics capability. When the GUI is hosted on a physical machine for each student, the local graphics card can handle the load of manipulating and rendering 3D scenes, and the network can distribute commands to the back-end simulations, regardless of where they are hosted. Virtualization of the back-end has been effective for many years, but technology to effectively virtualize the front-end graphics has until now been limited. MAK's flexability to take advantage of new technology changes that.

In order to make the leap and distribute visual scenes from VMs, we are taking advantage of NVIDIA's new GRID technology. GRID is a graphics virtualization platform that extends the power of NVIDIA's GPU technology to virtual desktops and apps. GRID allows users to tap into a powerful graphics-accelerated cloud solution to centralize apps and data, with virtual workspaces that offer improved security, productivity, and efficiency. By utilizing the advantages of the GRID architecture, the visual experiences customers have come to expect from VR-Forces and VR-Vantage can be hosted on virtual machines and served to thin clients.

To determine whether it was practical, we experimented with running VR-Vantage on virtual machines hosted by a commercial cloud services provider. While our customers typically use internally managed VMs, we were able to experience the benefits of instancing as many virtual machines as we needed for very little cost.

First, we set up a local machine running VR-Forces GUI and sim engine, the MAK Data Logger, and the MAK RTI. We then used a cloud provider to acquire the use of a VM equipped with GRID technology, and installed VR-Vantage and the MAK RTI. Both systems were connected with HLA, and the connection was confirmed by the MAK RTI assistant, which gives users a

visual representation of their network.



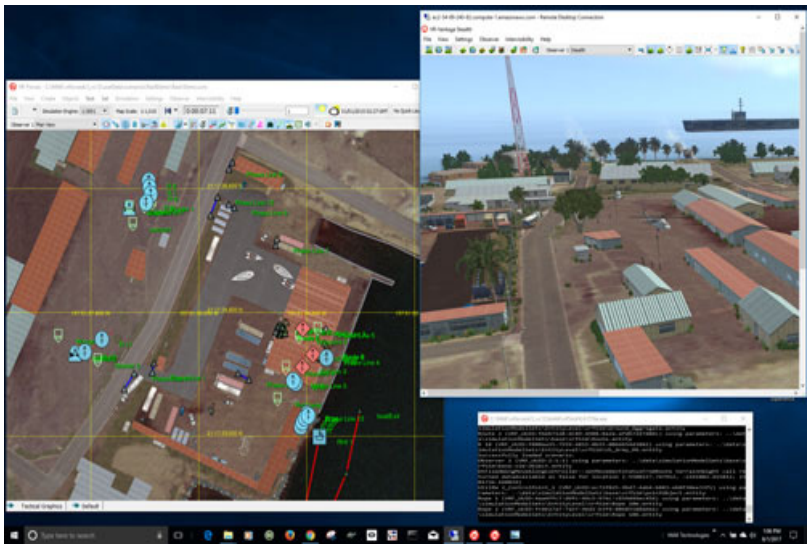
We used the MAK Data Logger to play a recorded scenario on the local machine and we were able to view the simulation in VR-Vantage running on the Virtual machine. This proved that we had simulation interoperability between the local machine and the hosted VM.

We then ran VR-Forces on the VM and used a thin client machine to conect to the VM and control the VR-Forces scenario.

The success of this test shows that MAK users can, under the right circumstances, shift the need for graphics-intensive computing to VM architectures, minimizing the hardware needed locally.

This development paves the way for new simulation industry benefits, from simple cost-savings, to new dynamic classroom arrangements, and even opens the doors for system integrators to prototype and test systems before making financial commitments to specific hardware architectures.

We expect to continue to see an increase in utilization of virtual machines as the simulation applications become more accessible with VMs. Now with the availability of high-performance graphics systems, designers have even more flexibility to deploy VR-Forces, VR-Vantage, and VR-Engage through thin clients, making it easier than ever to explore simulation options.



Interested in learning how your system can be taken to the next level with virtual machine architectures?

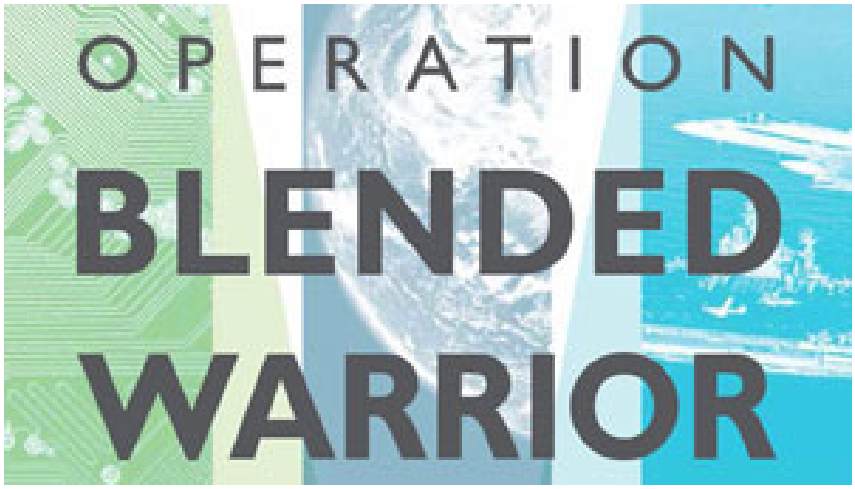
Contact us for a demonstration today.

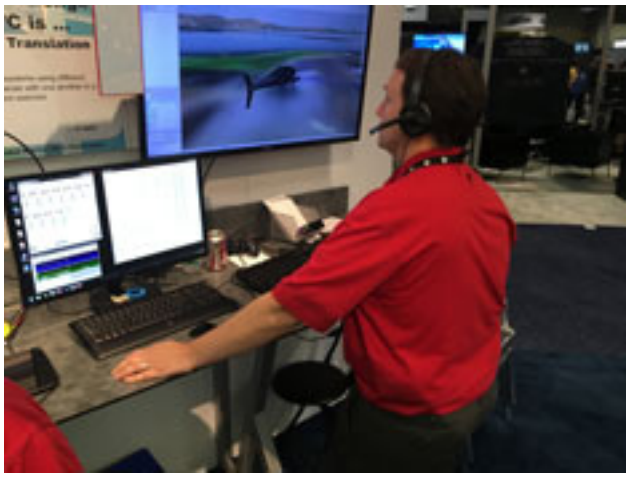
MAK begins preparations for Operation Blended Warrior 2017!

For the past two years, MAK has participated in Operation Blended Warrior (OBW), a special event at I/ITSEC that runs throughout the week with input from all over the show floor. We are happy to announce that MAK will be participating again this year, and preparations are already underway. Led by Brian Spaulding, Director of Engineering Services, MAK has played a large role in making OBW a success.

Operation Blended Warrior is a multi-year exploration of Live, Virtual, and Constructive capabilities organized by the NTSA, with a focus on developing ways to revolutionize training, education, and testing for the defense and security sectors. Each year, a different service is the primary sponsor, and this year, the event will be backed by the US Army.

For LVC capabilities to be successfully used, a robust and secure network environment is crucial to bring them together in a smooth, consistent way. MAK has played a big role in making this happen by making VR-Exchange available to all participants, ensuring that everyone can connect to the network regardless of the protocol of their system. VR-Exchange also is used by federates as a way of isolating a simulation from network traffic that might be harmful or flood it with messages, a key for maintaining high levels of performance in large simulations. Over the past two years, we've seen roughly one-third of all participants plug VR-Exchange into their system and enjoy the benefits of its stability and flexibility as a COTS product.





For more information on Operation Blended Warrior and how MAK participates, check out the latest episode of MAK Radio, an interview with Brian Spaulding.

NewsMAKers

We're attending the Australian Simulation Congress in Sydney From August 28th-31st! Dan Brockway and Steve Peart will be manning the MAK booth (#37), so make sure you stop by and say hello!

Ivan Diaz attended the Cyber-co 2017 workshop in Bogotá, and posted a blog with pictures from the event. Check out his blog post here!

The MAK product training schedule has been updated with classes in Cambridge for VR-Forces and VR-Vantage. Head to our MAK Assist training page to get the details.