

Putting the Reins on VM Sprawl

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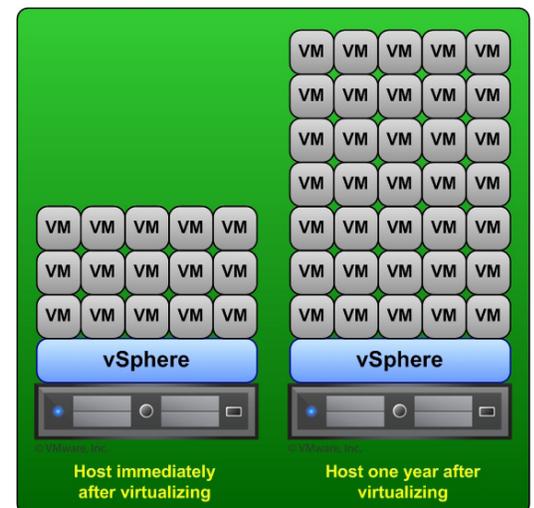
If you're involved with virtualization, you have probably heard the term "VM Sprawl" at some point. Because it's a general term, you may not know what it means exactly — is it even real? And does it exist in your environment? VM sprawl is a very real problem that can occur in any virtual environment, and if not dealt with, it can end up costing you money, time and resources. VM sprawl is not always an obvious problem, and since it doesn't occur over night, it can be difficult to recognize when it occurs. Dealing with VM sprawl can be challenging as it is not a purely technical problem with clearly defined symptoms that can be solved by changing some settings or by applying a patch. In this expert guide, we will explain what VM sprawl is and how to recognize it. We will also cover how to prevent it from occurring and how to deal with it when it does occur.

What is VM Sprawl?

In simple terms, VM sprawl is the uncontrolled growth of virtual machines in a virtual environment. Star Trek fans can relate to this from the popular "Trouble with Tribbles" episode where the tribbles reproduce so quickly that they threaten to overwhelm the host ship's food supplies. VM sprawl is similar because many administrators often create VMs without any regard for the resources that they consume or the possibility of overwhelming the host server's resources.

Sprawl is defined as haphazard growth or extension outward typically as the result of development. In a virtual environment, VM sprawl occurs as the result of the creation of unplanned virtual machines. Typically, when virtualization is implemented at a company, existing physical servers are converted into virtual machines as part of a consolidation project plan. Once the implementation phase ends and a company becomes virtualized, the mindset changes because you no longer have to buy new hardware to create servers. A new virtual machine can be created within minutes with just a few clicks of the mouse. As a result, requests for new virtual machines typically meet little resistance and your hosts start filling up with more and more virtual machines.

Because this happens over time, the growth of virtual machines on your host is not completely obvious, until one day, you realize that the hosts that used to have 15:1 consolidation ratios now have twice the number of virtual machines running on them. The end result is VM sprawl as your virtual environment continues to grow larger and larger.



The unchecked growth of virtual machines is not the only cause of VM sprawl. It is also caused by over-allocation of resources to virtual machines. Virtualization is all about making the most of all your resources and not wasting them. If you start allocating more resources to a VM than it actually needs, you are defeating the purpose of virtualization. Again, a mindset change is needed with virtualization compared to traditional physical servers that often have way more resources than actually needed. In order to maximize your investment in virtualization, you need to right-size your VMs and only give them the resources they need to support the workloads that run on them.

Virtual Machines are Not Free!

In a non-virtualized environment, if a new server is needed, you typically have to go through a process similar to the steps below before you can start installing an operating system on it:

1. Determine server specifications and requirements
2. Fill out a purchase requisition
3. Document justification to get approval
4. Place order with hardware vendor
5. Wait for server to arrive
6. Un-pack server, assemble hardware and install in rack
7. Connect to networks and storage devices

The entire process from start to finish can take weeks and cost many thousands of dollars. In addition to the cost of the server, you also have associated infrastructure costs: power, cooling, rack space, network and storage connectivity. Because of all this, new physical servers almost always require adequate documentation to prove that the resources and money being spent for it is justified. In addition, most IT departments have budgets that they must stick to and new servers cannot be purchased unless they have been budgeted for.

When it comes to virtual machines, many consider them as "free" servers since they do not have a physical presence, and creating them is fast and easy. Compared to physical servers, creating a VM takes minutes instead of weeks, and there is no money that has to be paid out. Virtual machines are not free though, and they do have a cost that is measured by the resources that they consume on the host, network and storage devices. While this cost is not as obvious as writing a check -- it is still very real. The hardware for a virtual host costs much more than that of single-use physical server because it must scale to support many running virtual machines. Virtual hosts typically have multiple multi-core CPUs, large amounts of RAM, many network adapters, expensive fibre-channel adapters and large amounts of storage. In addition, the hypervisor software (such as VMware vSphere) and the management products needed to operate it also have an additional cost.

While virtualization can help reduce costs by the increased density of servers that it provides, a virtual environment is expensive and has a limited set of resources. Every virtual machine that is created consumes part of the limited set of resources, and therefore, does have a cost associated with it. Once the resources of a host are exhausted, in order to keep feeding your virtual machines, you have to spend more money.

In addition, by allowing unchecked VM proliferation, you also risk incurring additional costs for operating system and application licensing. Each VM will need licenses in order to maintain software licensing compliance, and every click of a mouse that creates a VM is like pushing buttons on a cash register as licensing costs continue to add up. If you fail to keep up with your licensing needs and you get audited, VM sprawl can end up costing you even more money because of all those extra VMs that exist that are not properly licensed.

The bottom line is that VMs are not free even though they may appear that way, and you should use the same justifications that you would use when new physical servers are requested to ensure that they are needed.

How to Recognize VM Sprawl

VM sprawl has no clearly defined symptoms, but there are some characteristics of it that can help you identify it. Your first incline when it comes to VM sprawl might be denial - you couldn't possibly have VM sprawl in your virtual environment. But once you take a real good look around, you might start to see the signs. Because VM sprawl happens over time, it is not easy to recognize as the growth of your virtual environment is typically a gradual one.

Most of us are oblivious to gradual changes as they don't stand out; much like a person who slowly gains weight, we don't notice the change on a daily basis until one day we look in the mirror and it becomes obvious. You may not notice your virtual environment growing on a daily basis, but if you looked at the size of your virtual environment at two different points in time, VM sprawl becomes much more apparent.

Analyzing growth trends is one of the best ways to recognize VM sprawl, but there are certain statistics that are related to VM sprawl that can help you identify it as well. Looking for the over-allocation of resources can help you right-size VMs so you can free up wasted host resources and reduce the size of your environment. Another important area is to identify VMs that are no longer needed or have not been powered on in quite some time. Here are some of the important areas to look at that are related to VM sprawl:

- Virtual machines with old snapshots
- Virtual machines with large snapshots
- Stale VM — no recent user logins
- Stale VM — files not modified
- Stale VM — not recently powered on
- Orphaned and un-used files
- VM Memory right-sized
- VM CPU right-sized
- VM Storage right-sized
- VMs that are idle
- VMs that are un-registered
- VM creation date

Hunting for VM sprawl can be challenging, especially in larger virtual environments with thousands of virtual machines. Looking for over-sized, stale or zombie VMs can be very time consuming and difficult. To be effective, you can't just look at it from the virtualization level. It's obvious that VMs that are not powered on have not been used, but you also need to look inside the guest OS to see if there is any activity occurring. Additionally, you have to look over a period of time to ensure that the VM is truly not being used anymore.

SolarWinds Virtualization Manager comes equipped with built-in dashboards that can do all the work for you to track the key metrics related to VM sprawl. With SolarWinds Virtualization Manager, you can tell at-a-glance where you have wasted resources, so you can take action to right-size or eliminate virtual machines that are no longer needed. SolarWinds Virtualization Manager also has dozens of built-in trend reports that can show you how your virtual environment is growing over time. Reports can be customized to meet your exact needs so you can arm yourself with the information needed to fight VM sprawl. SolarWinds Virtualization Manager can even calculate how much money is being wasted in your virtual environment by the over-allocation of resources. With SolarWinds Virtualization Manager, you can make VM sprawl visible so you can take back your valuable host resources that are being wasted. And SolarWinds Virtualization Manager Sprawl Alerts also provide proactive notification or "early warning signs" of when sprawl could be occurring in the environment.

How to Prevent and Deal with VM Sprawl

VM sprawl is inevitable in medium to large virtual environments unless strict controls are put in place to prevent it from happening. Implementing measures to deal with VM sprawl should be done early on before uncontrolled VM proliferation occurs. Prevention methods for VM sprawl are mainly focused on implementing discipline, processes and reporting to control VM creation and usage. Here are some common methods for preventing VM sprawl:

- Implement a formal process for requesting new virtual machines that requires justification for requests for any new VMs. And have an approval process to get users to think twice about if they really need another VM.
- Utilize resource pools to segregate a host's resources to allocate a fixed amount of resources to different groups and departments. Limiting the amount of resources available on a host will help control how many VMs are created.
- Implement a chargeback/showback application that can provide metrics on host resource usage so you can help the business understand the cost of virtual machines.
- Limit access to who can create virtual machines. The less people that can create them the better which makes it easier to regulate VM creation. Make sure the people assigned to create VMs act as a group to avoid "Dad said no, so ask Mom" situations.
- Monitor VM lifecycles so VMs can be deleted when no longer needed. Often times, VM are only needed for a certain period of time as the applications that they run are replaced by newer ones on other VMs or are retired.
- Make sure you document the who, what, why and when of a VM when it is created so you have the information on its owner, purpose and lifecycle without having to play detective all the time.

- Actively monitor VM resource usage. Workloads can change over time, and a VM may not need the resources it has today to handle the job tomorrow.
- Don't get too aggressive when assigning resources to a new VM, you can always add more if needed. Adjusting a VMs virtual hardware is a simple task that can be done at any time.

SolarWinds Virtualization Manager can't help you establishing processes and discipline within your virtual environment, but it can help you with monitoring, reporting and chargeback. You need to attack VM sprawl from multiple angles and SolarWinds Virtualization Manager can help you identify and deal with VM sprawl as well as help you prevent it from occurring. Combating VM sprawl is an ongoing job, and you need to stay vigilante so you don't get overwhelmed by it. SolarWinds Virtualization Manager provides with you all the tools that you need to keep VM sprawl out of your virtual environment.

Summary

If you don't control VM sprawl, you may use up all your host resources before you know it and also create bottlenecks that may reduce the performance of all your VMs. Tight control of your virtual environment is the key to limiting the growth of virtual machines. Don't make the mistake of thinking that VM sprawl will not cost you money. If left un-checked, you will end up paying for it as you have to continually add resources to your virtual environment. Dealing with VM Sprawl is never easy, but SolarWinds Virtualization Manager has you covered and can do all the hard work for you. With VM sprawl, you are already wasting host resources, so why waste time and effort as well trying to locate VM sprawl in your environment when SolarWinds Virtualization Manager can do it for you?