# How to use Cloud Optimizer to solve resource sprawl

Resource Sprawl for a virtual machine occurs when the virtual machine does not use the resources (like CPU and memory), properly and makes it difficult for the administrator to manage the resources effectively. Resource Sprawl leads to having virtual machines severely overused, underused or not used at all. Cloud Optimizer enables us to view the number of undersized and oversized VMs in all Hypervisor based on CPU and memory utilization. We know undersized VM reduce the application performance and oversized cause wastage of resources. Micro Focus Cloud Optimizer gives right VM recommendations, so that we can make the VM right sized.

Micro Focus Cloud Optimizer performs the VM Sizing analysis as follows:

Undersized VM Analysis

1. VPV obtains the utilization threshold (capacity – headroom). The default headroom is provided by VPV. The user can change this.
2. VPV compares the resource (CPU/memory) utilization against utilization threshold for a specified analysis period.
3. If 75 percent of the time, the resource usage exceeds the utilization threshold, that VM is considered as Undersized.

The following figure illustrates the calculation of an undersized VM.
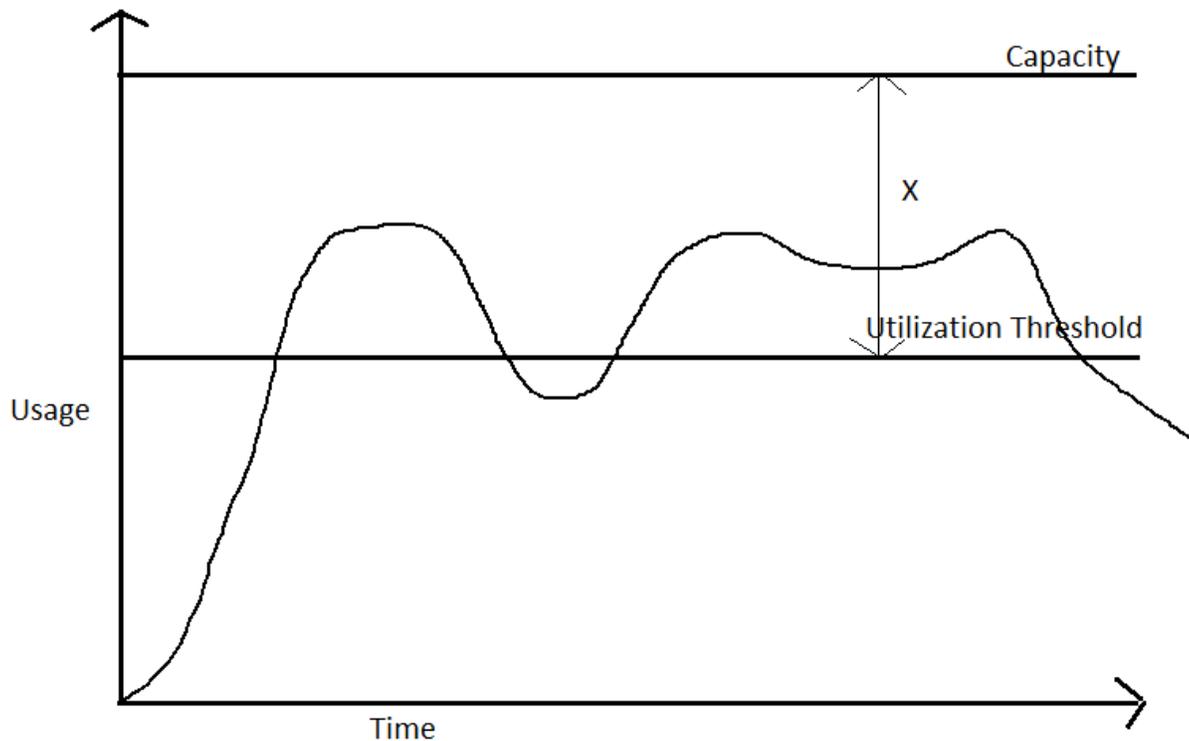
X = Headroom

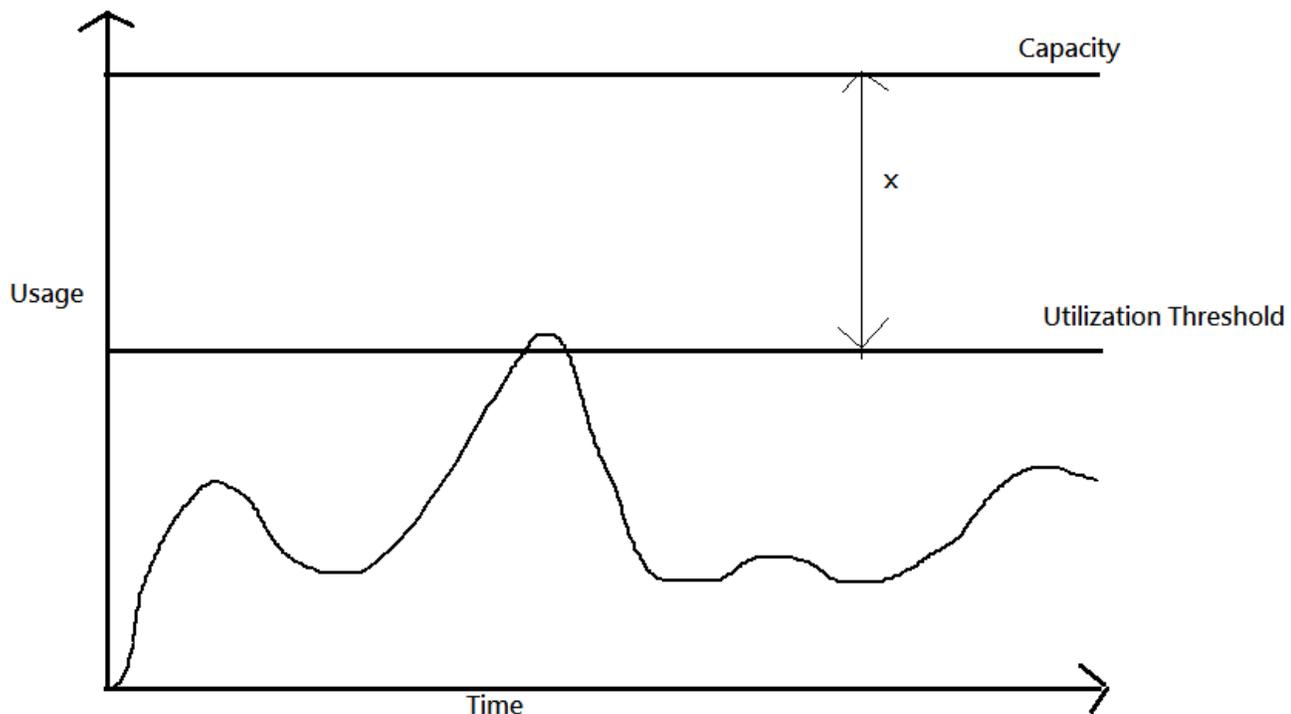Utilization Threshold = Capacity - Headroom

Recommended CPU/Memory = percentile_cont(0.95) of usage + ((capacity * headroom)/100)

Oversized VM Analysis

1. VPV will consider all VMs which are not currently undersized for the oversized calculation.
2. Like the undersized calculation, VPV obtains the utilization threshold.
3. Find the P95 of utilization and calculate the required CPU/memory for that utilization.
4. If the current CPU/Memory is greater than the required CPU/Memory, the Virtual Machine is considered as oversized else right sized.
5. The reclaimable CPU/Memory for an oversized VM is equal to the Recommended CPU/Memory minus the allocated CPU/Memory in VPV.

The following figure illustrates the example of an oversized VM:

X = Headroom

Utilization Threshold = Capacity - headroom

Recommended CPU/Memory = percentile_cont(0.950 of usage + (capacity * headroom /100)

Note: Cloud Optimizer will consider the VMs with high CPU Contention as oversized.

Data Store Analysis

To ensure optimal usage of the existing enterprise resources, the administrator must be able to monitor the VMs that are idle or powered-off for a long time. Cloud Optimizer identifies these VMs that have been idle or powered-off and recommends the resource that the administrator can reclaim from the same. This enables the user to identify and reduce the VM sprawl.

Idle VM Analysis

Idle VMs are those that have very low utilization for a prolonged period of time. Cloud Optimizer identifies the idle VMs base on the 'idle percentage' of the VM. If the idle percentage is greater than 90 percent for most of the time in a specified analysis period, that VM is considered "idle". The administrator can either delete the VM or reclaim the disk allocated for that VM.

Powered-off VM analysis

Virtualization Performance |Viewer monitors all the power consumed from the VMs and calculates the percentage ratio of the total powered off time and compares it against the total analysis time period. If the VM is powered off most of the time, VPV marks the VM as "powered off". If the VM is deleted from inventory the admin can reclaim the disk allocated for powered off VMs.

The following figure illustrates powered-off VM analysis: