

Differencing Disks

A differencing disk is a special type of dynamically expanding VHD file that is related to a “parent” virtual hard disk file as an overlay. For example, if a support engineer needs to troubleshoot operating system issues that involve different update and patch configurations, she can create a virtual machine using a fixed-size or dynamically expanding VHD (the parent VHD) and load a baseline configuration of the operating system in it. In order to create a distinct operating system configuration, she can create a new virtual machine, attach a differencing disk (the child VHD) to it that is related to the parent VHD, and modify the operating system as needed by loading new updates or patches.

When the new virtual machine issues a write operation, an internal data structure in the child VHD (differencing disk) is updated to reflect changes that supersede data in the parent VHD, and the actual data is written only to the child VHD. In the case of a read operation, the same internal data structure in the child VHD is checked to determine whether to read data from the child VHD or parent VHD. Any new or changed data is read from the child VHD while unchanged data is always read from the parent VHD.

Differencing disks can be used to create very simple or very complex parent-child hierarchies. Multilevel differencing disk hierarchy is commonly referred to as a Chain of differencing disks, reflecting that a child differencing disk can have a parent disk that is also a differencing disk. The chain can consist of several levels, but at the root of the hierarchy, there is always either a standard dynamically expanding or fixed-size VHD. This is important since data changes saved in a differencing disk are simply represented as modified blocks in relation to the parent disk. Therefore, a differencing disk is never used independently, but in conjunction with all disks in its hierarchy.

If you examine a Hyper-V host file system, you will see that each parent and child VHD is stored as an individual file.

However, the virtual machine sees only a single disk, independent of how many levels of differencing disks are actually associated with the attached VHD.