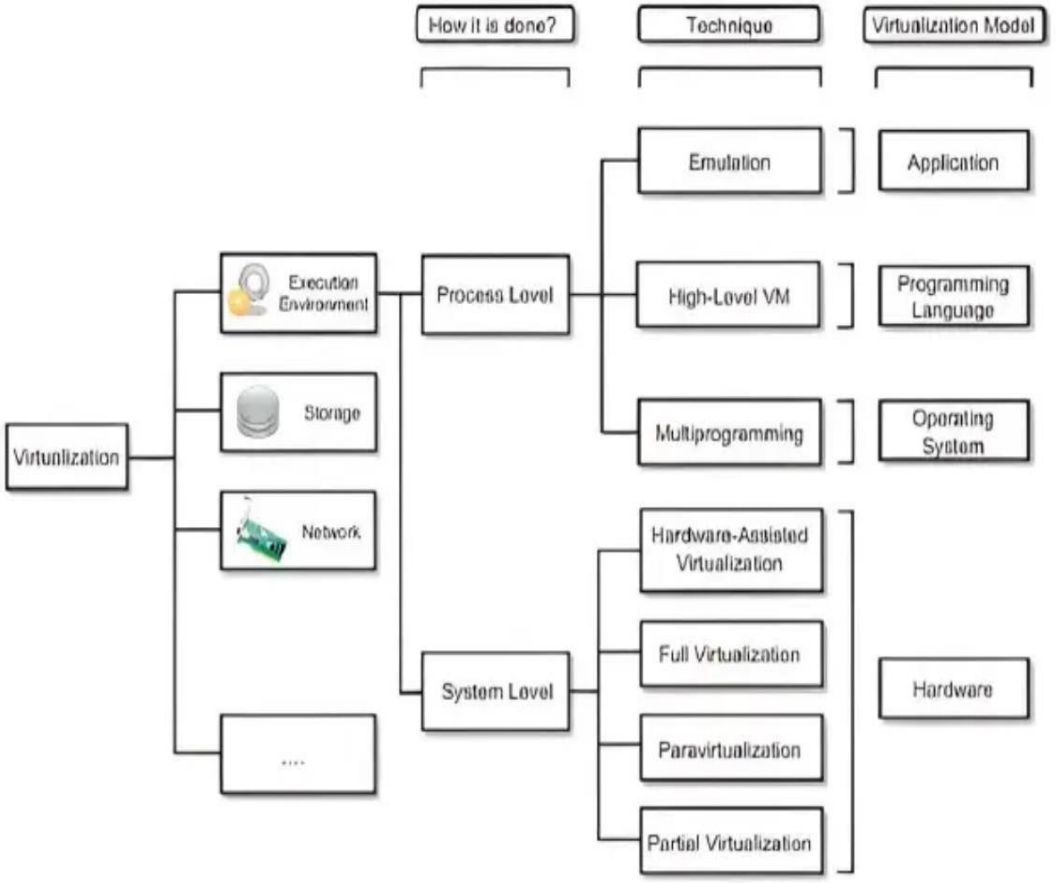
1.1. TAXONOMY OF VIRTUALIZATION TECHNIQUES

- Virtualization covers a wide range of emulation techniques that are applied to different areas of computing.

- A classification of these techniques helps us better understand their characteristics and use.



The first classification discriminates against the service or entity that is being emulated.

- Virtualization is mainly used to emulate **execution environments, storage, and networks.**

- Among these categories, **execution virtualization** constitutes the oldest, most popular, and most developed area. Therefore, it deserves major investigation and a further categorization We can divide these execution virtualization techniques in to two major categories by considering the type of host they require.

- **Process-level** techniques are implemented on top of an existing operating system, which has full control of the hardware.

- **System- leve**l techniques are implemented directly on hardware and do not require-or require a minimum of support from - an existing operating system.

- Within these two categories we can list various techniques that offer the guest a different type of virtual computation environment:

- Bare hardware
- Operating system resources
- Low-level programming language
- Application libraries

Execution virtualization:

- **Execution virtualization** includes all techniques that aim to emulate an execution environment that is separate from the one hosting the virtualization layer.
- All these techniques concentrate their interest on providing support for the execution of programs, whether these are the operating system, a binary specification of a program compiled against an abstract machine model, or an application. Therefore, execution virtualization can be implemented directly on top of the hardware by the operating system, an application, or libraries dynamically or statically linked to an application image.

Hardware-level virtualization:

- Hardware level virtualization is a virtualization technique that provides an abstract execution environment in terms of computer hardware on top of which a guest operating system can be run.
- Hardware-level virtualization is also called system virtualization, since it provides ISA to virtual machines, which is the representation of the hardware interface of a system.
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