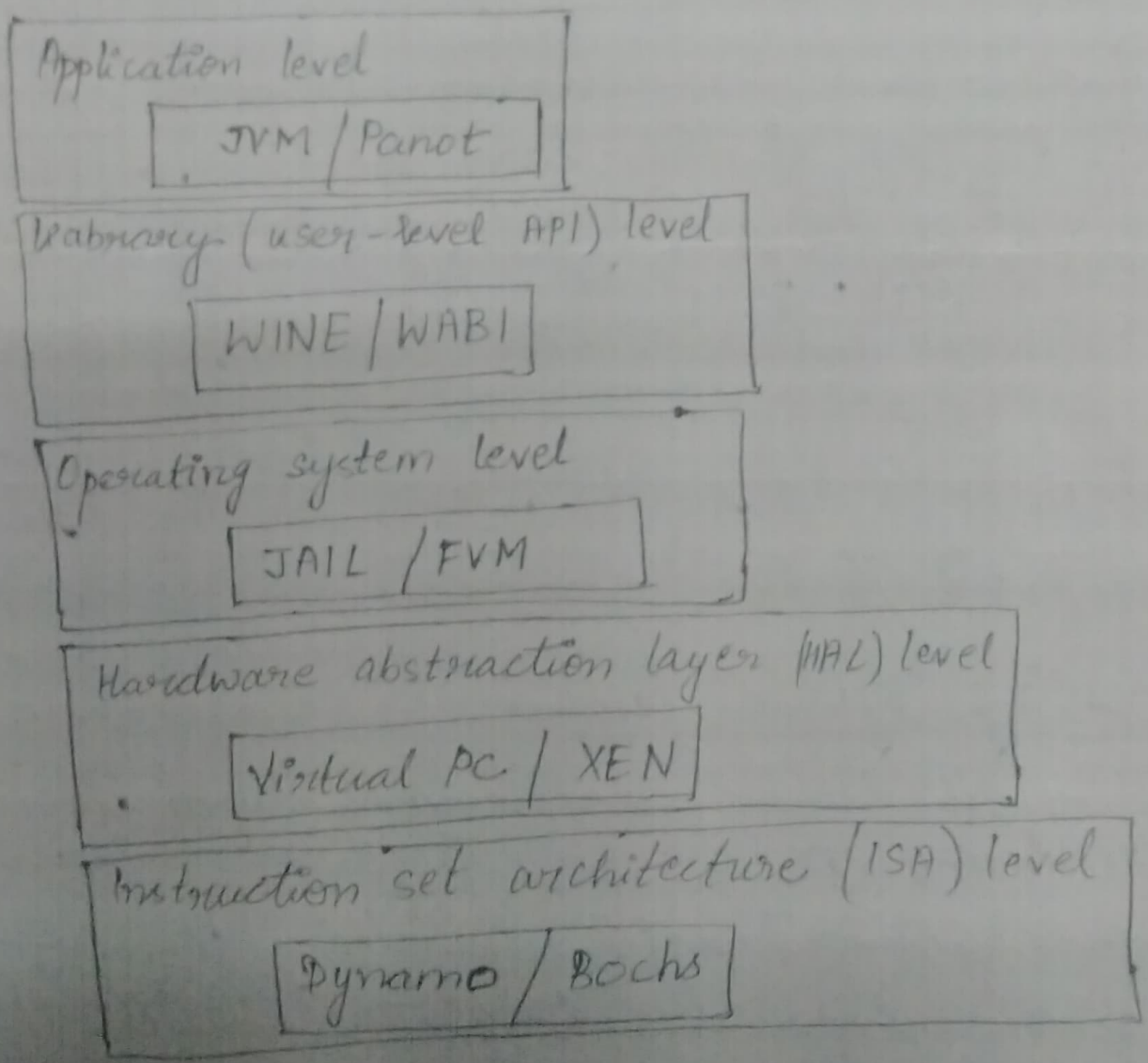
(IV.) Levels of Virtualization Implementation

The virtualization soft. creates the abstraction of VMs by interposing a virtualization layer at various levels of a comp. system. common virtualization layers include the instruction set architecture (ISA) level, hardware level, operating system level, library support level and application level.



Instruction Set Architecture level:

* As the ISA level, virtualization is performed by emulating a given ISA by the ISA of the host mach.

* With this approach, it is possible to run a large amt. of legacy binary code written for various processors on any given new hardware host machine.

Hardware Abstraction level:

* Hardware-level virtualization is performed right on top of the bare hardware. On the one hand, this approach generates a virtual hardware env. for a VM. On the other hand, the process manages the underlying hardware through virtualization. The idea is to virtualize a computer's resources, such as its processors memory, & I/O device.

* Operating system level:

* This refers to an abstraction layer b/w traditional OS & user applications. OS-level virtualization creates isolated containers on a single physical server & the OS instances to utilize the hardware & software in data centres.

Library support level :

Most applications use APIs exported by user-level libraries rather than using lengthy system calls by the OS. Since most system provide well-documented APIs, such an interface becomes another candidate for virtualization. Virtualization with library interfaces is possible by controlling the communication link b/w applications & the rest of a system through API hooks.

* User-application level :

* Virtualization at the application level virtualizes an application as a VM. On a traditional OS, an application often runs as a process. Therefore, application-level virtualization is also known as process-level virtualization.

VI. Virtualization structures / tools & mechanism :

* In general, there are three typical classes of VM architecture.

* Depending on the position of the virtualization layer, there are several classes of VM architectures, namely the hypervisor architecture, para-virtualization, & host-based virtualization.