S

T

S

V

H

O

Typically (but not necessarily):
- real T (Target): some hardware
- Virtual V: made in software (running on hardware H, Host)
- Observer O: someone using software (S) originally made for T

Why virtualization
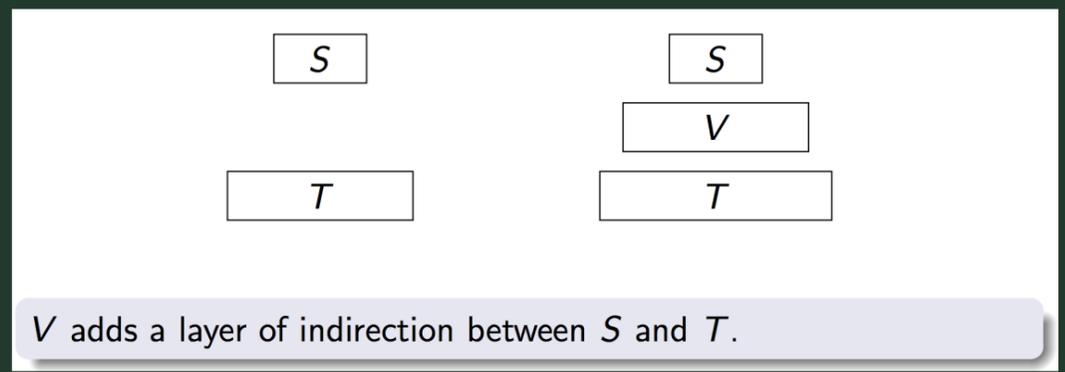
We don't want to change S

one or more of

Hardware T is not available;

V is less expensive than T

V is more flexible than T

V offers a good protection model for S

Useful also when T = H

S

S

V

T

T

V adds a layer of indirection between S and T.

How to virtualize

emulation (Bochs, original JVM)

binary translation (QEMU, recent JVMs)

hardware-assisted (KVM, Virtualbox)

paravirtualization (original Xen)