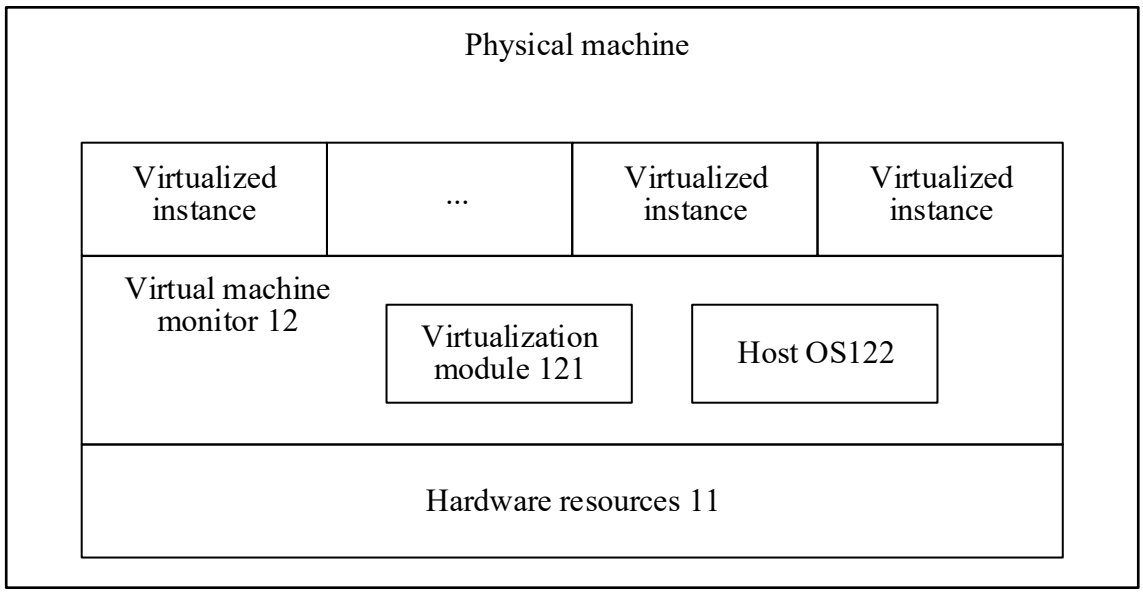

Physical machine
Virtualized instance
...
Virtualized instance
Virtualized instance
Virtual machine monitor 12
Virtualization module 121
Host OS122
Hardware resources 11

FIG. 1a

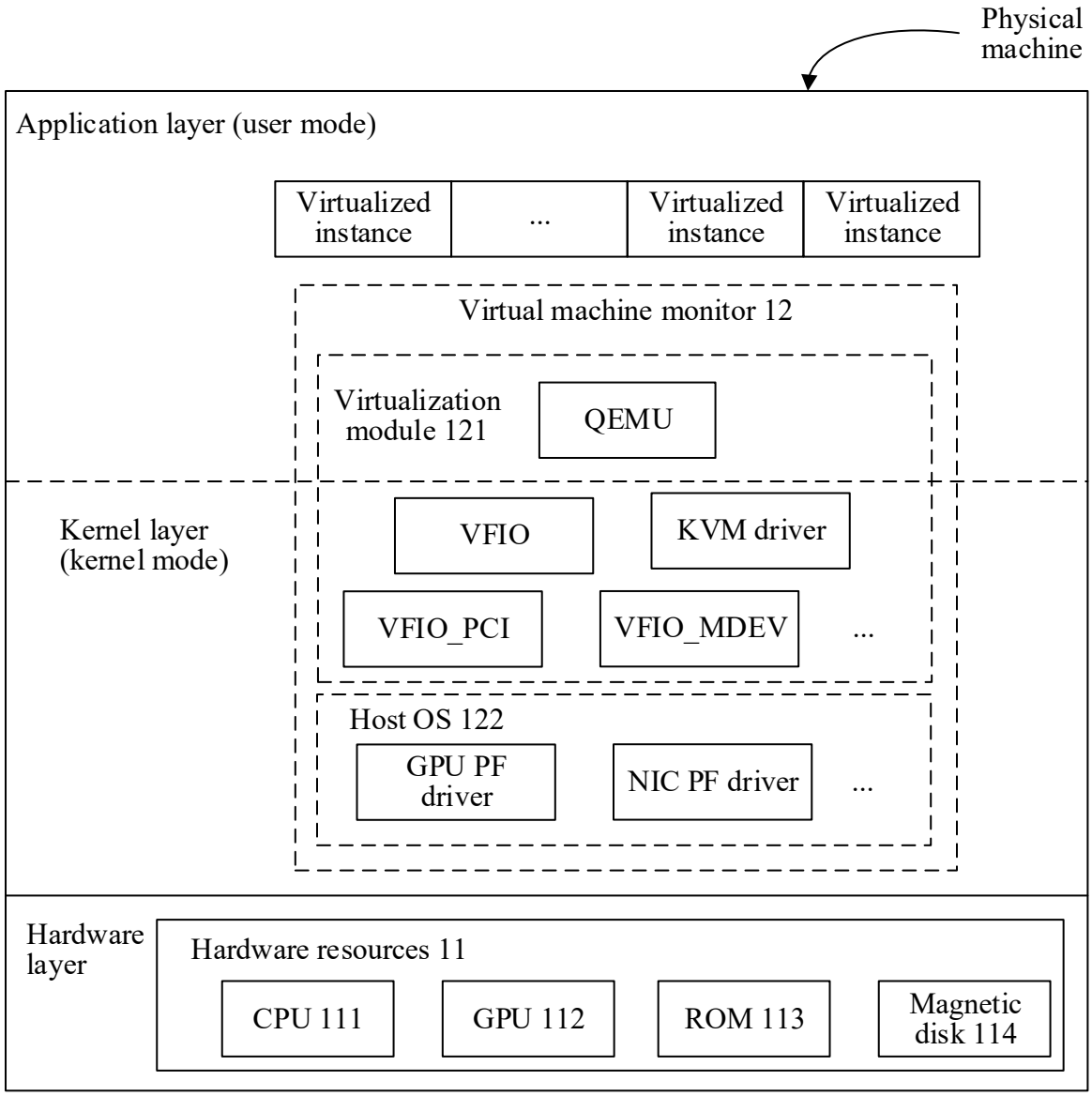

Physical machine
Application layer (user mode)
Virtualized instance
...
Virtualized instance
Virtualized instance
Virtual machine monitor 12
Virtualization module 121
QEMU
Kernel layer (kernel mode)
VFIO
KVM driver
VFIO_PCI
VFIO_MDEV
...
Host OS 122
GPU PF driver
NIC PF driver
...
Hardware layer
Hardware resources 11
CPU 111
GPU 112
ROM 113
Magnetic disk 114

FIG. 1b

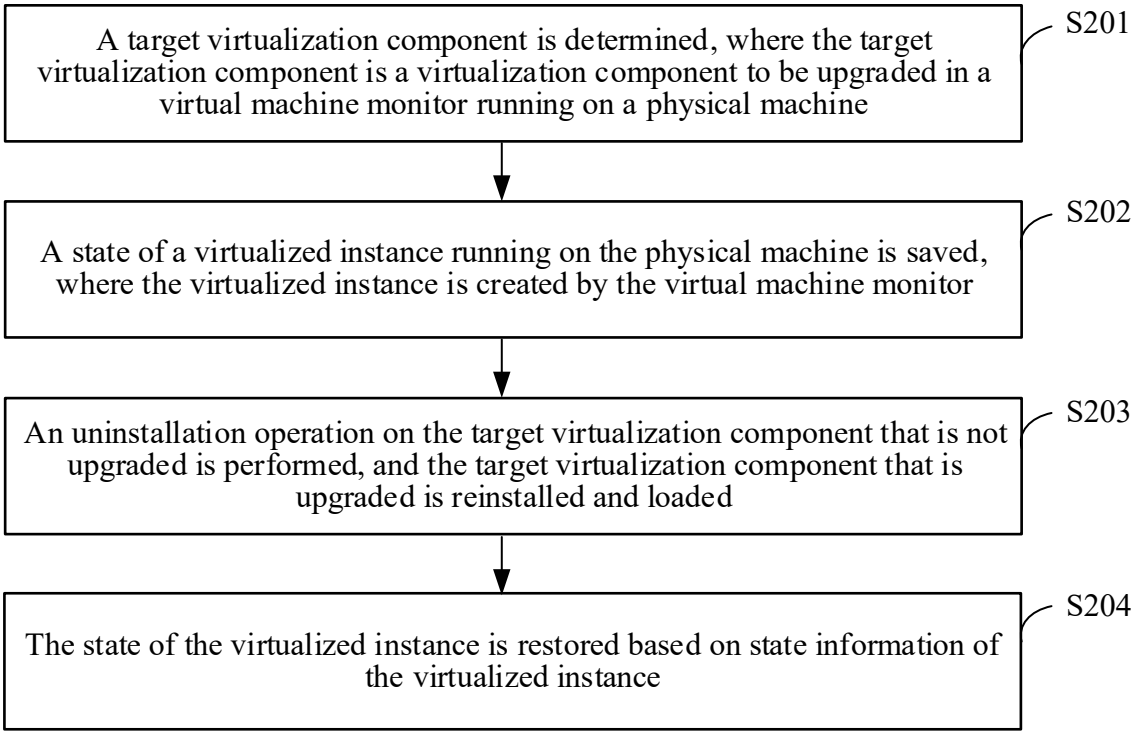

A target virtualization component is determined, where the target virtualization component is a virtualization component to be upgraded in a virtual machine monitor running on a physical machine
S201
A state of a virtualized instance running on the physical machine is saved, where the virtualized instance is created by the virtual machine monitor
S202
An uninstallation operation on the target virtualization component that is not upgraded is performed, and the target virtualization component that is upgraded is reinstalled and loaded
S203
The state of the virtualized instance is restored based on state information of the virtualized instance
S204

FIG. 2

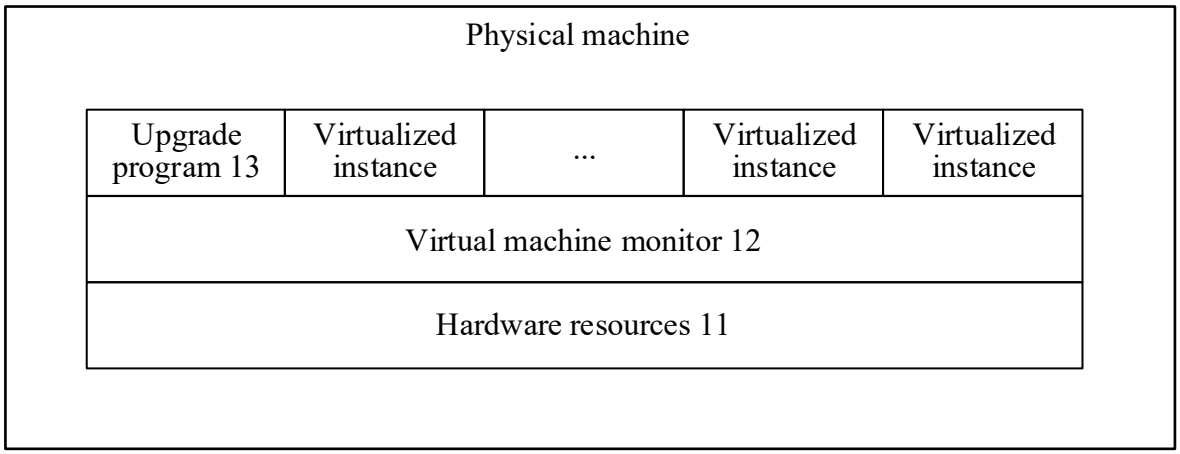

Physical machine
Upgrade program 13
Virtualized instance
...
Virtualized instance
Virtualized instance
Virtual machine monitor 12
Hardware resources 11

FIG. 3a

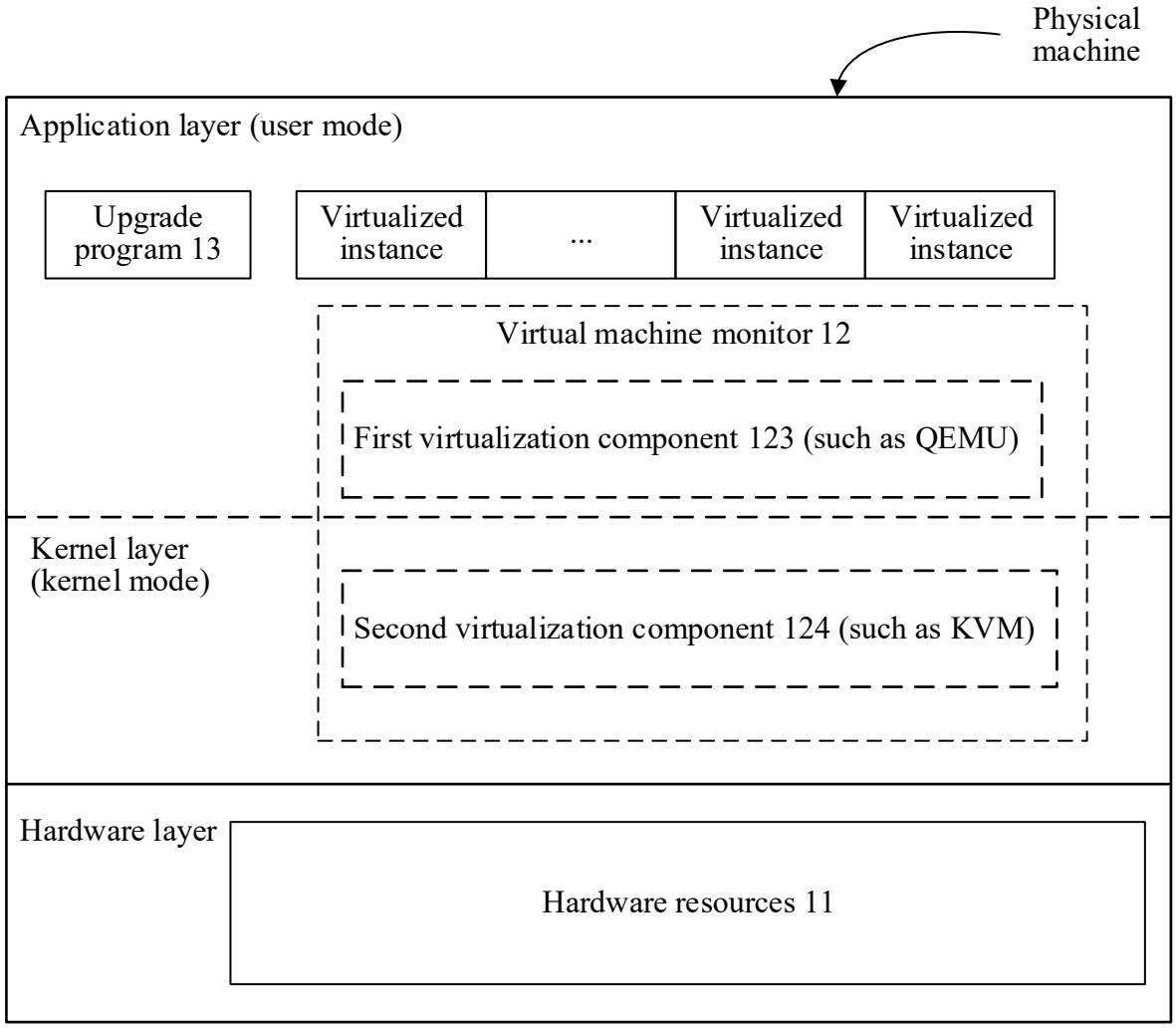

Physical machine
Application layer (user mode)
Upgrade program 13
Virtualized instance
...
Virtualized instance
Virtualized instance
Virtual machine monitor 12
First virtualization component 123 (such as QEMU)
Kernel layer (kernel mode)
Second virtualization component 124 (such as KVM)
Hardware layer
Hardware resources 11

FIG. 3b

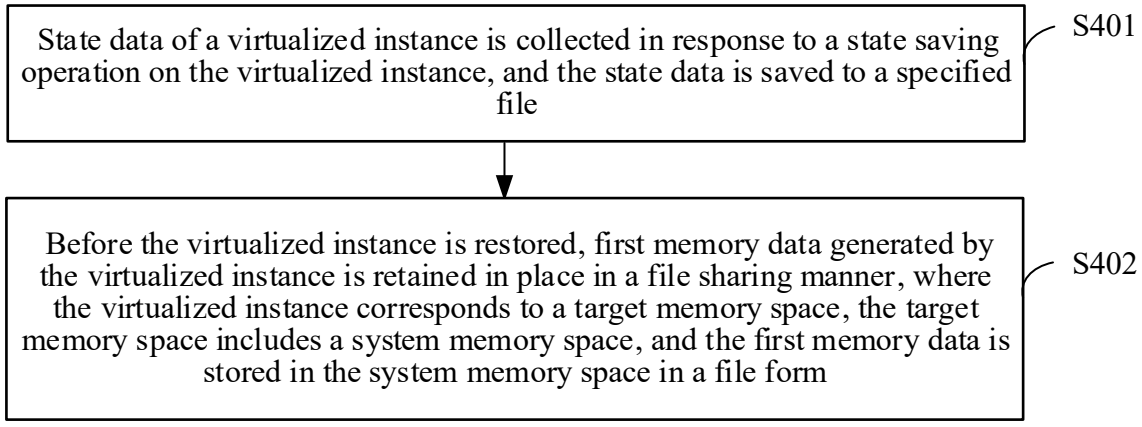

State data of a virtualized instance is collected in response to a state saving operation on the virtualized instance, and the state data is saved to a specified file
S401
Before the virtualized instance is restored, first memory data generated by the virtualized instance is retained in place in a file sharing manner, where the virtualized instance corresponds to a target memory space, the target memory space includes a system memory space, and the first memory data is stored in the system memory space in a file form
S402

FIG. 4

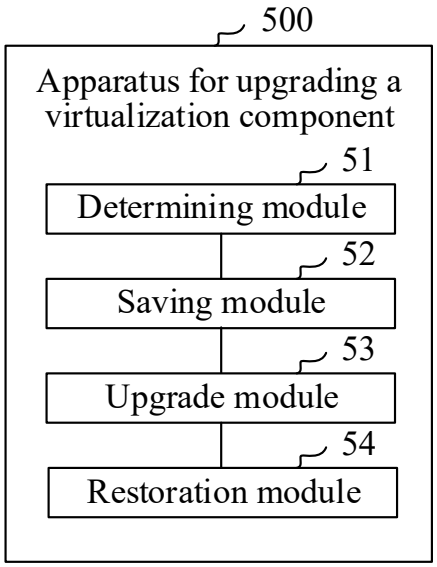

500
Apparatus for upgrading a virtualization component
51
Determining module
52
Saving module
53
Upgrade module
54
Restoration module

FIG. 5

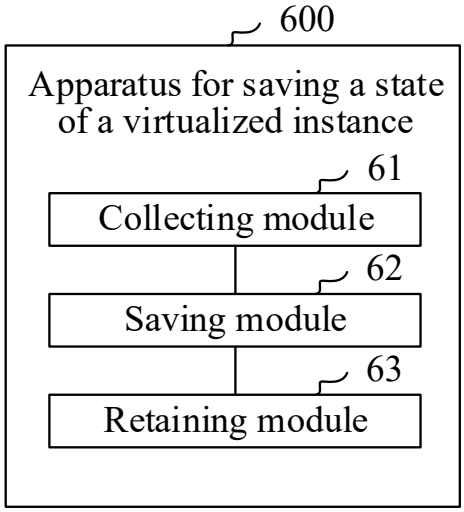

600
Apparatus for saving a state of a virtualized instance
61
Collecting module
62
Saving module
63
Retaining module

FIG. 6

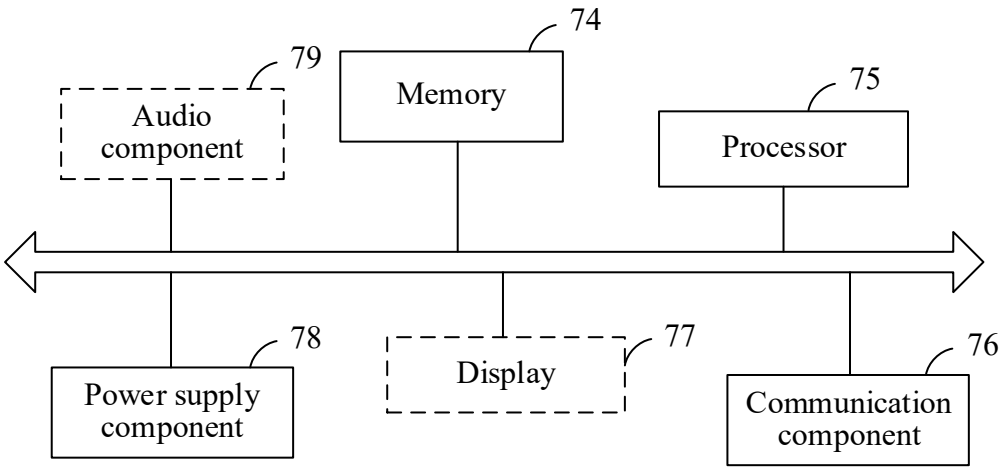

74
79
Memory
Audio component
75
Processor
78
77
76
Power supply component
Display
Communication component

FIG. 7