

# **Oracle® VM VirtualBox**

## **Release Notes for Release 6.1**



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## Preface

The *Oracle VM VirtualBox Release Notes* provide a summary of new features and changes in this release of Oracle VM VirtualBox.

## Audience

This document is intended for both new and existing users of Oracle VM VirtualBox. It is assumed that readers are familiar with Web technologies and have a general understanding of Windows and UNIX platforms.

## Related Documents

The documentation for this product is available at:

<https://docs.oracle.com/en/virtualization/virtualbox/index.html>

## Conventions

The following text conventions are used in this document:

- **boldface**: Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
- *italic*: Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
- `monospace`: Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

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Oracle is fully committed to diversity and inclusion. Oracle respects and values having a diverse workforce that increases thought leadership and innovation. As part of our initiative to build a more inclusive culture that positively impacts our employees, customers, and partners, we are working to remove insensitive terms from our products and documentation. We are also mindful of the necessity to maintain compatibility with our customers' existing technologies and the need to ensure continuity of service as Oracle's offerings and industry standards evolve. Because of these technical constraints, our effort to remove insensitive terms is ongoing and will take time and external cooperation.



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# Chapter 1 New Features for Release 6.1

This section describes the new features in release 6.1 of Oracle VM VirtualBox.

For a more detailed list of changes, see [Chapter 3, Change Log](#).

## 1.1. Importing of Instances From Oracle Cloud Infrastructure

Oracle VM VirtualBox now supports importing of cloud instances from an Oracle Cloud Infrastructure service. When you import a cloud instance, Oracle VM VirtualBox creates and registers a new VM automatically on the local host. See [Importing an Instance from Oracle Cloud Infrastructure](#).

The `VBoxManage import` command has also been enhanced for this feature. See [Import from Oracle Cloud Infrastructure](#).

## 1.2. Improved Export to Oracle Cloud Infrastructure

The following improvements have been made for exporting a VM to Oracle Cloud Infrastructure:

- **Using Custom Images:** You can export a VM to your Oracle Cloud Infrastructure account and save it as a custom image.

The **New Cloud VM** feature enables you to create multiple cloud instances from a custom image, without having to reupload the image every time.

- **Paravirtualization Support:** You can now export a VM to Oracle Cloud Infrastructure in paravirtualized hardware mode. VMs using paravirtualized devices provide much faster performance, compared to running in emulated mode.

See [Creating New Cloud Instances from a Custom Image](#) for more details.

## 1.3. VBoxManage Commands for Cloud Integration

The following `VBoxManage` commands have been introduced for closer integration with cloud services.

- `VBoxManage cloudprofile`: Enables you to create, edit, and manage cloud profiles. Oracle VM VirtualBox uses a cloud profile to integrate with a cloud service such as Oracle Cloud Infrastructure.
- `VBoxManage cloud list`: Enables you to list resources in your cloud service account, such as instances and images.
- `VBoxManage cloud instance`: Enables you to create and manage instances in your cloud service account.
- `VBoxManage cloud image`: Enables you to create and manage custom images in your cloud service account.

## 1.4. Improved Support for Nested Virtualization

This release adds support for nested virtualization on Intel CPUs. Previously, this feature was only available on host systems that use an AMD CPU.

Intel processors starting with 5th Generation Core i (Broadwell) are supported.

## 1.5. Retirement of Support for Software Virtualization

This release of Oracle VM VirtualBox does not support software virtualization. The recompiler that was supplied in previous releases is no longer available.

The host must have a CPU that supports hardware virtualization.

## 1.6. Soft Keyboard for Guest Character Input

A soft keyboard enables keyboard character input in a guest VM. Select **Input**, **Keyboard**, **Soft Keyboard** on the guest menu bar.

Several international keyboard layouts are supplied by default. Users can modify these to create their own custom keyboard layout. See [Soft Keyboard](#).

## 1.7. Changes to 3D Graphics Support

3D graphics support is no longer available for VMs that use the legacy VBoxVGA graphics controller. This graphics controller can still be used with VMs that only require 2D graphics.

For improved 3D graphics performance, you can use either of the following graphics controllers:

- **VBoxSVGA:** For new Windows guests.
- **VMSVGA:** For other guest platforms, such as Linux.

## 1.8. User Interface Changes

The following list shows the main improvements to the user interface in this release:

- Usability improvements for VirtualBox Manager, as follows:
  - A pin icon enables the Global Tools panel to be pinned in place, to avoid movement during scrolling through large number of VMs.
  - Some VM settings now can be edited directly from the Details panel, by clicking on a link.
  - The Storage settings page now offers a setting for the controller bus type. This page also supports drag and drop for moving attachments between controllers.
- In the Virtual Media Manager you can now create new disk images and also search for a specific disk image.
- Improvements to the VISO Creator dialog.
- Improvements to the Session Information dialog.

## 1.9. Shared Clipboard File Transfers

Experimental support for file transfers using the shared clipboard has been added, for Windows guests running on a Windows or Linux host. This feature is disabled by default and can be enabled using the `VBoxManage modifyvm --clipboard-file-transfers` command option.

## 1.10. vboximg-mount Command Improvements

The `vboximg-mount` command now provides experimental support for direct read-only access to NTFS, FAT, ext2, ext3, and ext4 filesystems.



In previous releases, `vboximg-mount` was only available on Mac OS hosts. The command is also now available on Linux hosts.

## 1.11. virtio-scsi Storage Controller Support

Experimental support has been added for emulating a virtio-scsi storage controller.

Note that for Windows guests you must install additional drivers to use this feature. See [Hard Disk Controllers](#).



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## Chapter 2 Accessibility Features of Oracle VM VirtualBox

This chapter describes the Oracle VM VirtualBox accessibility features:

Documentation is provided in HTML and PDF formats. The HTML format is accessible, but the PDF format is not accessible.

### 2.1. Keyboard Shortcuts

You can use keyboard shortcuts to perform tasks that are specific to Oracle VM VirtualBox. Configure the keyboard shortcuts by using the **Preferences, Input** dialog.

### 2.2. Display Modes and Settings

The Oracle VM VirtualBox product offers the following display modes and settings for VMs:

- **Global display settings for all VMs:** Use the **Preferences, Display** dialog.
- **Display modes and settings for individual VMs:** Use the **View** menu of the VM.

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## Chapter 3 Change Log

This section summarizes the changes between Oracle VM VirtualBox versions. Note that this change log is not exhaustive and not all changes are listed.

Oracle VM VirtualBox version numbers consist of three numbers separated by dots where the first and second number represent the major version and the third number the minor version. Minor version numbers of official releases are always even. An odd minor version number represents an internal development or test build. In addition, each build contains a revision number.

### 3.1. Version 6.1.50 (2024-01-16)

This is a maintenance release. The following items were fixed and/or added:

- VMM: Fixed detection of VT-x being used by other hypervisors (bug #21867)
- Main: OVF Import/Export: Added support for importing and exporting VMs containing NVMe storage controllers (bug #19320)
- Main: OVF Import/Export: Added support for exporting a VM which contains a medium inserted into a virtual CD/DVD drive which is attached to a Virtio-SCSI controller
- macOS Host USB: Added support for newer storage devices
- Linux Host and Guest: Added initial support for RHEL 9.4 kernel
- Linux Guest Additions: Fixed kernel panic on RHEL 8.9 kernel caused by vboxvideo (bugs #10381 and #21911)
- BIOS: Fixed handle number used for DMI OEM table (bug #19781)

### 3.2. Version 6.1.48 (2023-10-17)

This is a maintenance release. The following items were fixed and/or added:

- VMM: Introduced additional improvements in Split Lock Detection feature of recent Intel CPUs on Linux hosts (bug #20180)
- Audio: Fixed switching host audio devices on Windows hosts using the WAS backend (bugs #20431, #21517, #20630 and #20723)
- VRDP: Added general improvements
- Host Services: Fixed Guest Properties service crash under rare circumstance
- Linux Host and Guest: Fixed few "field-spanning write" kernel warnings (bugs #21410 and #21862)
- Linux Guest Additions: Added more fixes for RHEL 8.9 and 9.3 kernel
- Linux Guest Additions: Added more fixes for kernel 6.4
- Linux Guest Additions: Added initial support for OpenSUSE 15.5 kernel
- Linux Guest Additions: Added initial support for kernels 6.5 and 6.6

### 3.3. Version 6.1.46 (2023-07-18)

This is a maintenance release. The following items were fixed and/or added:

- Guest Control/VBoxManage: Fixed parameter "--ignore-orphaned-processes"
- Guest Control/VBoxManage: One can now explicitly specify an executable argument 0 via "--arg0" with the "run" and "start" commands. See VBoxManage documentation for examples
- Audio: Also use the PulseAudio backend when pipewire-pulse is running instead of falling back to ALSA (bug #21575)
- NAT: Adjusted UDP proxy timeout from 18-21 to 21-24 range to respect intended 20 second timeout (bug #21560)
- Linux Host: Added initial support for Indirect Branch Tracking (NOTE: All distributions .run installer and Extension Pack in VirtualBox 6.1.x series do not support this feature, please consider upgrading to 7.0.x) (bug #21435)
- Linux Host: Added initial support for kernel 6.5 (NOTE: Guest Additions do not support kernel 6.5 yet)
- Solaris Host: Introduced general improvements in the installer area
- Linux Host and Guest: Improved condition check when kernel modules need to be signed
- Linux Host and Guest: Added initial support for RHEL 8.8 (bug #21692), 8.9 (bug #21690) and 9.3 (bug #21598) kernels
- MacOS Host and Guest: Introduced general improvements in the installer area
- Windows Host and Guest: Introduced ECDSA support (bug #21621)
- Linux Guest Additions: Fixed issue when kernel modules were rebuilt on each boot when guest system has no X11 installed
- Linux Guest Additions: Added initial support for kernel 6.4
- Windows Guest Additions: Introduced general improvements in graphics drivers area

### 3.4. Version 6.1.44 (2023-04-18)

This is a maintenance release. The following items were fixed and/or added:

- E1000: Fixed possible guru meditation when changing network attachments (bug #21488)
- Linux Guest Additions and host Installer: Improved detection if system is running systemd as the init process
- Linux Guest Additions and host drivers: Introduce initial support for kernel 6.3
- Linux Guest Additions: Fixed vboxvideo build issue with RHEL 8.7, 9.1 and 9.2 kernels (bugs #21446 and #21450)

### 3.5. Version 6.1.42 (2023-01-17)

This is a maintenance release. The following items were fixed and/or added:

- VMM: Fixed reporting POPCNT when Hyper-V is used (bug #21066)
- GUI: Fixed issue when incorrect macOS type was chosen on VM creation (bug #21315)
- VirtioSCSI: Fixed hang when shutting down the VM if the virtio SCSI controller is used (bug #21144)

- NVMe: Fixed VM crashing during startup if there are more than 30 disks attached to an NVMe controller (bug #21084)
- Storage: Fixed I/O errors with the VirtioSCSI controller when the host I/O cache is enabled (bug #19717)
- VBoxManage: Added missing --directory switch for guestcontrol mktemp command
- Mouse Integration: Guest was provided with extended host mouse state (bug #21139)
- DnD: Now shows the current process integrity level for VMs on Windows hosts
- Guest Additions: Introduced generic improvements in Shared Clipboard area
- Linux Guest Additions: Added initial support for kernels 6.1 and 6.2
- Linux Host and Guest: Added initial support for building UEK7 kernel on Oracle Linux 8
- Linux Host and Guest: Added initial support for RHEL 8.7, 9.1 and 9.2 kernels
- Linux Host and Guest: Added initial support for SLES 15.4 kernel
- Linux Host and Guest: Fixed build for Fedora 5.17.7-300 kernel
- Windows Additions: Fixed reporting the last user input time via VBoxTray

### 3.6. Version 6.1.40 (2022-10-11)

This is a maintenance release. The following items were fixed and/or added:

- GUI: Fixed missed machine-items state translation on language change
- USB: Fixed possible crash when the device got detached while the controller is resetting the port
- Main: Provide guest's absolute pointing mouse device with buttons state when mouse integration is ON
- Linux Host and Guest Additions: Prevented build failure on 5.8+ 32-bit kernels
- Linux Host and Guest Additions: Introduced additional fixes for kernel 6.0
- Linux Host and Guest Additions: Introduced additional fixes for Debian specific kernels
- Solaris and Linux Guest Additions: Added better handling of negative screen sizes which some X11 desktop environments are reporting
- Windows Guest Additions: Added fixes related to VBoxTray IPC

### 3.7. Version 6.1.38 (2022-09-02)

This is a maintenance release. The following items were fixed and/or added:

- GUI: Improvements in Native Language Support area
- Main: OVF Export: Added support for exporting VMs containing Virtio-SCSI controllers
- Recording settings: Fixed a regression which could cause not starting the COM server (VBoxSVC) under certain circumstances (bug #21034)
- Recording: More deterministic naming for recorded files (will now overwrite old .webm files if present)

- Linux Host and Guest Additions installer: Improved check for systemd presence in the system (bug #19033)
- Linux Guest Additions: Introduced initial support for kernel 6.0
- Linux Guest Additions: Additional fixes for kernel RHEL 9.1 (bug #21065)
- Windows Guest Additions: Improvements in Drag and Drop area

## 3.8. Version 6.1.36 (2022-07-19)

This is a maintenance release. The following items were fixed and/or added:

- VMM: Fixed possible Linux guest kernel crash when configuring Speculative Store Bypass for a single vCPU VM
- GUI: In the storage page of the virtual machine settings dialog, fixed a bug which disrupted mouse interaction with the native file selector on KDE
- NAT: Prevent issue when host resolver incorrectly returned NXDOMAIN for unsupported queries (bug #20977)
- Audio: General improvements in saved state area
- Recording: Various fixes for settings handling
- VGA: Performance improvements for screen updates when VBE banking is used
- USB: Fixed rare crashes when detaching a USB device
- ATA: Fixed NT4 guests taking a minute to eject CDs
- vboximg-mount: Fixed broken write support (bug #20896)
- SDK: Fixed Python bindings incorrectly trying to convert arbitrary byte data into unicode objects with Python 3, causing exceptions (bug #19740)
- API: Fixed an issue when virtual USB mass storage devices or virtual USB DVD drives are added while the VM is not running are by default not marked as hot-pluggable
- API: Initial support for Python 3.10
- API: Solaris OS types cleanup
- Windows host: Fixed regression in 6.1.32 leading to guest hangs when Hyper-V is used (bug #20787)
- Windows host: Fixed possible issues with saving and restoring VM state when using Hyper-V/NEM mode
- Linux and Solaris hosts: Allow to mount shared folder if it is represented as a symlink on a host side (bug #17491)
- Linux Host and Guest drivers: Introduced initial support for kernels 5.18, 5.19 and RHEL 9.1 (bugs #20914, #20941)
- Linux Host and Guest drivers: Better support for kernels built with clang compiler (bugs #20425 and #20998)



- Solaris Guest Additions: General improvements in installer area
- Solaris Guest Additions: Fixed guest screen resize in VMSVGA graphics configuration
- Linux and Solaris Guest Additions: Fixed multi-screen handling in VBoxVGA and VBoxSVGA graphics configuration
- Linux and Solaris Guest Additions: Added support for setting primary screen via VBoxManage
- Linux and Solaris Guest Additions: Fixed X11 resources leak when resizing guest screens
- Linux and Solaris Guest Additions: Fixed file descriptor leak when starting a process using guest control (bug #20902)
- Linux and Solaris Guest Additions: Fixed guest control executing processes as root
- Linux Guest Additions: Improved guests booting time by preventing kernel modules from being rebuilt when it is not necessary (bug #20502)
- Windows Guest Additions: Fixed VBoxTray crash on startup in NT4 guests on rare circumstances

### 3.9. Version 6.1.34 (2022-03-22)

This is a maintenance release. The following items were fixed and/or added:

- VMM: Fix instruction emulation for "cmpxchg16b"
- GUI: Improved GUI behavior on macOS Big Sur and later when kernel extensions are not loaded
- EHCI: Addressed an issue with handling short packets (bug #20726)
- Storage: Fixed a potential hang during disk I/O when the host I/O cache is disabled (bug #20875)
- NVMe: Fixed loading saved state when nothing is attached to it (bug #20791)
- DevPcBios: Addressed an issue which resulted in rejecting the detected LCHS geometry when the head count was above 16
- virtio-scsi: Improvements
- E1000: Improve descriptor handling
- VBoxManage: Fixed handling of command line arguments with incomplete quotes (bug #20740)
- VBoxManage: Improved 'natnetwork list' output
- VBoxManage: NATNetwork: Provide an option (--ipv6-prefix) to set IPv6 prefix
- VBoxManage: NATNetwork: Provide an option (--ipv6-default) to advertise default IPv6 route (bug #20714)
- VBoxManage: Fix documentation of "usbdevsource add" (bug #20849)
- Networking: General improvements in IPv4 and IPv6 area (bug #20714)
- OVF Import: Allow users to specify a different storage controller and/or controller port for hard disks when importing a VM
- Unattended install: Improvements

- Shared Clipboard: Improved HTML clipboard handling for Windows host
- MacOS host: Fix handling of non-ASCII characters in the guest control functionality (bug #20792)
- Linux host and guest: Introduced initial support for kernel 5.17
- Solaris package: Fixes for API access from Python
- Solaris IPS package: Suppress dependency on libpython2.7.so.\*
- Linux host and guest: Fixes for Linux kernel 5.14
- Linux Guest Additions: Fixed guest screen resize for older guests which are running libXrandr older than version 1.4
- Linux Guest Additions: Introduced initial support for RHEL 8.6 kernels (bug #20877)
- Windows guest: Make driver install smarter
- Solaris guest: Addressed an issue which prevented VBox GAs 6.1.30 or 6.1.32 from being removed in Solaris 10 guests (bug #20780)
- EFI: Fixed booting from FreeBSD ISO images (bug #19910)

### 3.10. Version 6.1.32 (2022-01-18)

This is a maintenance release. The following items were fixed and/or added:

- VMM: Changed the guest RAM management when using Hyper-V to be more compatible with HVCI (bug #20627 and #20694)
- VMM: Workaround for OS/2 guest instability on newer AMD CPUs due to a missing TLB flush in OS/2 (bug #20625)
- GUI: Fixed keyboard focus loss in rare circumstances when using the mini toolbar in fullscreen mode
- Audio: Fixed accidental creation of empty debug log file when the OSS audio backend was configured
- E1000: Fix link status reporting for certain Linux kernels (some Oracle Linux ones, probably more)
- Unattended installation: Fixed regression introduced in 6.1.28, causing partitioning failure for Windows XP to 10 (bug #20769)
- Solaris host: Fixed regression in installer, failed on Solaris 10
- Solaris host: Fix packaging regression, make vboxshell.py executable
- Linux host: Fix access to some USB devices, device class was not correctly handled (bug #20721)
- Guest: Fixed wrong mouse position if guest is in text mode
- Guest Control: Fixed folders copying from host to guest and from guest to host
- Guest Control: Fixes for UNICODE handling
- Shared Clipboard: Improved HTML content exchange between X11 and Windows guests and hosts
- OS/2 Additions: Fixed some issues with extended attributes in the shared folders (bug #19453)

### 3.11. Version 6.1.30 (2021-11-22)

This is a maintenance release. The following items were fixed and/or added:

- VMM: Fixed 6.1.28 regression preventing VMs starting when using Hyper-V mode on Windows 10
- GUI: Fixed inability to complete First Run wizard after browsing for an external image
- GUI: Fixed crash on macOS Big Sur while browsing for an external image from First Run wizard
- GUI: Fixed bug on Windows with inability to save taken screenshot under a folder with native name (bug #15561)
- GUI: Fixed bug on X11 with drag and drop initiated on single mouse click in VM storage settings
- GUI: Fixed settings check on machines not supporting hardware virtualization
- GUI: Non critical media related errors should not cause modal pop-up error messages
- Host-only networking: Fixed crash parsing /etc/vbox/networks.conf
- DVD: Fixed drive lock handling across VM reset
- VBoxHeadless: Fixed crash when running on macOS Monterey (bug #20636)
- VBoxManage: Fixed incorrect help text for "hostonlyif"
- vboximg-mount: Error message if no image is specified
- macOS host: Fix multiple bugs specific to macOS Monterey in installer and startup of kernel extensions
- macOS host: Show message indicating the unsupported CPU on M1 based Macs and abort installation
- Linux host: For all distribution specific packages (deb/rpm format) fix the packaging so that the feature for unattended installation of guest OSes works
- Linux host and guest: Introduced initial support for kernel 5.16
- Shared Clipboard: Improved communication between guest and host when guest has no clipboard data to report
- Linux Guest Additions: Allow running only one VBoxDRMClient instance (bug #19373)

### 3.12. Version 6.1.28 (2021-10-19)

This is a maintenance release. The following items were fixed and/or added:

- VMM: Fixed guru meditation while booting nested-guests accessing debug registers under certain conditions
- UI: Bug fixes for touchpad-based scrolling
- VMSVGA: Fixed VM black screen issue on first resize after restoring from saved state (bug #20067)
- VMSVGA: Fixed display corruption on Linux Mint (bug #20513)
- Storage: Fixed a possible write error under certain circumstances when using VHD images (bug #20512)
- Network: Multiple updates in virtio-net device support

- Network: Disconnecting cable in saved VM state now is handled properly by virtio-net
- Network: More administrative control over host-only network ranges to prevent trouble due to misconfiguration, see [Host-Only Networking](#). Check updated documentation or your VMs may stop working!
- NAT: Fixed not rejecting TFTP requests with absolute pathnames (bug #20589)
- Audio: Fixed VM session aborting after PC hibernation (bug #20516)
- Audio: Fixed setting the line-in volume of the HDA emulation on modern Linux guests
- Audio: Fixed resuming playback of the AC'97 emulation while a snapshot has been taken
- API: Added bindings support for Python 3.9 (bug #20252)
- API: Fixed rare hang of VM when changing settings at runtime
- Linux host: Improved kernel modules installation detection which prevents unnecessary modules rebuild
- Windows Host: Sped up large page allocations on Windows 8 and later
- Windows Host: Fixed VBoxHeadless process sticking around after VM is closed (bug #20574)
- Host Services: Shared Clipboard: Prevent guest clipboard reset when clipboard sharing is disabled (bug #20487)
- Host Services: Shared Clipboard over VRDP: Fixed to continue working when guest service reconnects to host (bug #20366)
- Host Services: Shared Clipboard over VRDP: Fixed preventing remote RDP client to hang when guest has no clipboard data to report
- Linux Host and Guest: Introduced initial support for kernels 5.14 and 5.15
- Linux Host and Guest: Introduced initial support for RHEL 8.5 kernel
- Windows Guest: Introduced Windows 11 guest support, including unattended installation

### 3.13. Version 6.1.26 (2021-07-28)

This is a maintenance release. The following items were fixed and/or added:

- VMSVGA: Fixed VM screen artifacts after restoring from saved state (bug #20067)
- Storage: Fixed audio endianness for certain CUE sheet CD/DVD images
- VBoxHeadless: Running VM will save its state on host shutdown
- VBoxManage: Fixed OS detection for Ubuntu 20.10 ISO with unattended install
- Linux Additions: Fixed mouse pointer offsetting issue for VMSVGA graphics adapter in multi-monitor VM setup (6.1.24 regression)

### 3.14. Version 6.1.24 (2021-07-20)

This is a maintenance release. The following items were fixed and/or added:

- Storage: Fixed starting a VM if a device is attached to a VirtIO SCSI port higher than 30 (bug #20213)
- Storage: Improvement to DVD medium change signaling
- Serial: Fixed a the guest missing interrupts under certain circumstances (6.0 regression, bug #18668)
- Audio: Multiple fixes and enhancements
- Network: Fixed connectivity issue with virtio-net after resuming VM with disconnected link
- Network: Fixed UDP GSO fragmentation issue with missing 8 bytes of payload at the end of the first fragment
- API: Fixed VM configuration for recent Windows Server versions
- Extension Pack: Fixed issues with USB webcam pass-through on Linux
- Host and guest driver: Fix small memory leak (bug #20280)
- Linux host: Support Split Lock Detection feature of recent Intel CPUs (bug #20180)
- Linux host and guest: Support kernel version 5.13 (bug #20456)
- Linux host and guest: Introduce support for SUSE SLES/SLED 15 SP3 kernels (bug #20396)
- Linux host: Installer will not attempt to build kernel modules if system already has them installed and modules versions match current version
- Windows host: Fix DLL signature validation to work better with an invalid certificate
- Guest Additions: Fixed crash on using shared clipboard (bug #19165)
- Linux Guest Additions: Introduce support for Ubuntu specific kernels (bug #20325)
- Solaris guest: Increased default memory and disk sizes
- EFI: Support network booting with the E1000 network controller emulation
- EFI: Stability improvements (bug #20090)

### 3.15. Version 6.1.22 (2021-04-29)

This is a maintenance release. The following items were fixed and/or added:

- VMM: Improved performance of 64-bit Windows and Solaris guests when Hyper-V is used on recent Windows 10 hosts
- VMM: Fixed frequent crashes of 64-bit Windows Vista and Server 2003 guests when Hyper-V is used
- GUI: Fixed regression where user was not able to save unset default shortcuts (bug #20305)
- Storage: Fixed regression in LsiLogic SAS controller emulation caused VM crash (bug #20323)
- Linux Guest Additions: Fixed issue when it was not possible to run executables from mounted share (bug #20320)

### 3.16. Version 6.1.20 (2021-04-20)

This is a maintenance release. The following items were fixed and/or added:

- VMM: Fixed extremely poor VM performance depending on the timing of various actions (regression in 6.1.0)
- VMM: Fixed guest OS hanging under certain circumstances when Hyper-V is present (bug #20141)
- VMM: Fixed Guru Meditation error when using a nested hypervisor under certain circumstances (bug #20175)
- VMM: Fixed a SMAP related host panic affecting Solaris 11.4 systems with Intel Haswell CPUs or later (bug #16068)
- OCI: Add cloud-init support for export to OCI and for OCI instance creation
- GUI: Fixed "Delete all files" leaving behind Logs/VBoxUI.log (bug #20235)
- Audio: Multiple fixes and enhancements
- Audio: Fixed detection of duplex audio devices on macOS (5.0 regression; bug #20171)
- Network: Fixed link status reporting for "not attached" adapters
- Network: Fixed connectivity issues with e1000 in OS/2 guests (6.1.18 regression; bug #20148)
- Network: Fixed VxWorks e1000 driver compatibility issue (bug #20182)
- Network: Fixed GUI checks for port forwarding rules rejecting IPv6 with "Nat Network" (bug #14847)
- DHCP: Don't crash in the presence of fixed address assignments (bug #20128)
- Serial: Fixed possible VM hang when using the a serial port in disconnected mode (bug #19854)
- Webcam: Fixed interoperability with v4l2loopback and fixed a crash under certain circumstances (bug #20176)
- NVMe: Fixed sporadic Windows VM hang or reboot on high CPU load
- VBoxManage: Allow changing network adapter attachment of a saved VM with "modifyvm"
- vboximg-mount: Fix for argument processing to honor the '--root' option (6.0 regression; bug #20073)
- Linux host and guest: Support kernel versions 5.11 (bug #20198) and 5.12
- Linux host: Maximum MTU size increased to 16110 for host-only adapters on Linux kernels 4.10+ (bug #19122)
- Linux Guest Additions: Fix vboxvideo module compilation for kernel version 5.10.x
- Linux Guest Additions: Fixed kernel module build for RHEL 8.4 beta and CentOS Stream (bug #20289)

### 3.17. Version 6.1.18 (2021-01-19)

This is a maintenance release. The following items were fixed and/or added:

- Nested VM: Fixed hangs when executing SMP nested-guests under certain conditions on Intel hosts (bug #19315, #19561)
- OCI integration: Cloud Instance parameters parsing is improved on import (bug #19156)
- Network: UDP checksum offloading in e1000 no longer produces zero checksums (bug #19930)

- Network: Fixed Host-Only Ethernet Adapter DHCP, guest os can not get IP on host resume (bug #19620)
- NAT: Fixed mss parameter handing (bug #15256)
- macOS host: Multiple optimizations for BigSur
- Audio: Fixed issues with audio playback after host goes to sleep (bug #18594)
- Documentation: Some content touch-up and table formatting fixes
- Linux host and guest: Support kernel version 5.10 (bug #20055)
- Solaris host: Fix regression breaking VGA text mode since version 6.1.0
- Guest Additions: Fixed a build failure affecting CentOS 8.2-2004 and later (bug #20091)
- Guest Additions: Fixed a build failure affecting Linux kernels 3.2.0 through 3.2.50 (bug #20006)
- Guest Additions: Fixed a VM segfault on copy with shared clipboard with X11 (bug #19226)
- Shared Folder: Fixed error with remounting on Linux guests

### 3.18. Version 6.1.16 (2020-10-16)

This is a maintenance release. The following items were fixed and/or added:

- VMM: Fixed random memory corruption and XMM register state corruption inside the VM when Hyper-V is used (bug #19695)
- VMM: Fixed VMSVGA 3D support with Linux guests when Hyper-V is used (bug #19884)
- GUI: Fixed some Qt related crashes on macOS Big Sur
- Oracle Cloud Infrastructure integration: Fixed network integration not working behind some proxies
- USB: Mask out remote wake capability to avoid unresponsive devices
- Audio: Fixed issues with audio playback after host goes to sleep (bug #18594)
- Serial: Keep transferring data if the status line monitoring fails
- Serial: Fixed blocking a re-connect when TCP mode is used (bug #19878)
- HPET: Fixed inability of guests to use the last timer
- VBoxManage: Fixed detection of system locale when running 'VBoxManage unattended install' without --locale (bug #19856)
- macOS host: Installer on Big Sur is now reminding user that system has to be rebooted to load the installed KEXTs
- Linux host and guest: Support kernel version 5.9 (bug #19845)
- Linux guest: Workaround to improve resizing of 32-bit VMs with VMSVGA graphics controller, and do not try to use RandR version 1.3 due to bugs causing the X server to hang
- Linux guest: Fixed VBoxService crashing in the CPU hot-plug service under certain circumstances during a CPU hot-unplug event (bugs #19902 and #19903)

- Linux guest: Fixed Guest additions build for RHEL 8.3 beta (bug #19863)

### 3.19. Version 6.1.14 (2020-09-04)

This is a maintenance release. The following items were fixed and/or added:

- GUI: Fixes file name changes in the File location field when creating Virtual Hard Disk (bug #19286)
- VMM: Fixed running VMs which failed to start with VERR\_NEM\_MISSING\_KERNEL\_API\_2 when Hyper-V is used (bug #19779 and #19804)
- Audio: Fix regression in HDA emulation introduced in 6.1.0
- macOS host: Fixed webcam passthrough and audio input on Mojave and newer by requesting authorization from the user (bug #19758)
- macOS host: VBoxHeadless no longer able to start VMs (6.1.4/6.0.18 regression; bug #19706)
- Windows host: Fixes in serial port implementation
- Shared Clipboard: Fixed a potential crash when copying HTML data (6.1.2 regression; bug #19226)
- Linux host and guest: Linux kernel version 5.8 support
- EFI: Fixed reading ISO9660 filesystems on attached media (6.1.0 regression; bug #19682)
- EFI: Support booting from drives attached to the LsiLogic SCSI and SAS controller emulations

### 3.20. Version 6.1.12 (2020-07-14)

This is a maintenance release. The following items were fixed and/or added:

- UI: Fixed Log-Viewer search-backward icon
- Devices: Fixes and improvements for the BusLogic SCSI controller emulation
- Serial Port: Regression fixes in FIFO data handling
- Oracle Cloud Infrastructure integration: Experimental new type of network attachment, allowing local VM to act as if it was run in cloud
- API: Improved resource management in the guest control functionality
- VBoxManage: Fixed command option parsing for the "snapshot edit" sub-command
- VBoxManage: Fixed crash of 'VBoxManage internalcommands repairhd' when processing invalid input (bug #19579)
- Guest Additions, 3D: New experimental GLX graphics output
- Guest Additions, 3D: Fixed releasing texture objects, which could cause guest crashes
- Guest Additions: Fixed writes to a file on a shared folder not being reflected on the host when the file is mmap'ed and the used Linux kernel is between version 4.10.0 and 4.11.x
- Guest Additions: Fixed the shared folder driver on 32bit Windows 8 and newer returning an error when flushing writes to a file which is mapped into memory under rare circumstances



- Guest Additions: Improved resize coverage for VMSVGA graphics controller
- Guest Additions: Fixed issues detecting guest additions ISO at runtime
- Guest Additions: Fixed German translation encoding for Windows GA installer

### 3.21. Version 6.1.10 (2020-06-05)

This is a maintenance release. The following items were fixed and/or added:

- GUI: Fixed crash when using Qt on Xwayland sessions (bug #19583)
- GUI: Fixed mouse pointer doesn't work properly in Windows guests when scaling is on (bug #19597)
- VBoxManage: Fixed crash of 'VBoxManage internalcommands repairhd' when processing invalid input (bug #19579)
- Settings: Disable audio input and audio output by default for new VMs (bug #19527)
- Guest Additions: Fixed resizing and multi monitor handling for Wayland guests. (bug #19496)
- Guest Additions: Fixed VBoxClient error: The parent session seems to be non-X11. (bug #19590)
- Linux host and guest: Linux kernel version 5.7 support. (bug #19516)

### 3.22. Version 6.1.8 (2020-05-15)

This is a maintenance release. The following items were fixed and/or added:

- GUI: Fix several layout and mouse position handling bugs with soft keyboard
- GUI: Fixed crash on last VM removed (6.1.4 regression; bug #19568, #19525, #19506, #19490, #19481, #19397)
- GUI and API: Allow renaming VMs which are in saved state
- Serial: Fixed slow guest output when using the TCP server mode without anyone being connected
- Guest Additions: Restored 'VBoxClient--checkhostversion' functionality (6.1.0 regression; bug #19470)
- Guest Additions: Fixed resizing and multi monitor handling for X11 guests. (6.1.0 regression; bug #19496)
- Guest Additions: Build problems fix with Oracle Linux 8.2 (Red Hat compatible kernel) / Red Hat Enterprise Linux 8.2 / CentOS 8.2 (bug #19391)
- Guest Control/VBoxManage: Fixed handling of multiple environment variables supplied to 'VBoxManage guestcontrol VM run' (6.1.6/6.0.20 regression; bug #19518)
- Guest Control: Implemented support for long(er) command lines
- Guest Control: Various stability improvements

### 3.23. Version 6.1.6 (2020-04-14)

This is a maintenance release. The following items were fixed and/or added:

- GUI: Multiple enhancements including visual elements updates

- Graphics: Fixed monitor resizing and multi-monitor handling bugs on X11 guests with VMSVGA graphics adapter
- Graphics: Enhancements in 2D and 3D acceleration and rendering
- USB: Multiple enhancements improving performance and stability
- Serial port: Improve error handling and fix hang when host port disappears
- VBoxManage: Multiple fixes for guestcontrol operations
- API: Fix for exception handling bug in Python bindings
- Shared clipboard: Multiple fixes including possible crash and HTML data support
- Linux host and guest: Support Linux kernel 5.6 (bug #19312)

### 3.24. Version 6.1.4 (2020-02-19)

This is a maintenance release. The following items were fixed and/or added:

- Virtualization core: Fixed a rare issue with ICEBP instruction causing guru meditations on Intel hosts (6.1.0 regression; bug #19171)
- Virtualization core: Fixed macOS Catalina guests failing to boot after upgrading to 10.15.2 onwards (bug #19188)
- GUI: Recent NLS integration and bug fixes for GUI and Qt translation tags
- USB: Fixed isochronous transfers to the VM for xHCI
- Serial: Fixed buffer handling, avoiding receiving stale data when the receive queue is flushed (bug #18671)
- Serial: Improve host serial port passthrough handling on Windows host
- VBoxManage: Restore old --clipboard option for modifyvm command
- macOS host: Use hardened runtime and request the needed entitlements, meeting latest notarization rules which also required moving VirtualBoxVM executable
- macOS host: Update osxfuse to v3.10.4
- Windows host: Update Italian translation of installer
- Windows host: Improve shared folder compatibility with POSIX append semantic (bug #19003)
- Windows host: Restore the ability to run VMs through Hyper-V, at the expense of performance
- Linux guest: Support Linux 5.5 (bug #19145)
- Linux guest: Shared folder fix for loopback mounting of images
- BIOS: Always report non-ATA disks as ready
- BIOS: Report EFI support through DMI table (bug 19144)
- VGA BIOS: Reduce stack space usage for INT 10h handlers

### 3.25. Version 6.1.2 (2020-01-14)

This is a maintenance release. The following items were fixed and/or added:

- Virtualization core: Fixed performance issue observed with Windows XP guests on AMD hosts (6.0.0 regression; bug #19152)
- Virtualization core: Consistent IBRS/IBPB CPUID feature reporting, avoids crash of NetBSD 9.0 RC1 installer (bug #19146)
- GUI: Fixed updating of runtime info
- GUI: In Display settings, do not show "2D video acceleration" checkbox if it is meaningless for the selected graphics adapter
- Audio: Fixed audio input handling when VRDE is enabled
- Audio: Fixed crash in the HDA emulation when using multi-speaker configurations
- Storage: Fixed use of encrypted disks with snapshots involved (6.1.0 regression; bug #19160)
- Storage: Improve performance of virtio-scsi
- Storage: Read-only support for compressed clusters in QCOW2 images
- Windows installer: Include unintentionally dropped vbox-img.exe utility again
- Windows host: When installing or removing an extension pack, retry the sometimes failing directory renaming (usually caused by anti-virus software accessing the directory)
- Linux host: Support Linux 5.5 (guest additions not yet)
- Windows guest: Accelerate 2D video decoding (scaling and color space conversion) if the VM is configured to use VBoxSVGA with 3D enabled
- Windows guest: Fix guest additions installer to upgrade the mouse filter driver reliably
- Windows guest: When uninstalling older Guest Additions with old 3D support enabled try restoring original Direct3D files
- Linux guest: Improve resize and multi-monitor handling for VMs using VMSVGA (known remaining issue: do not disable a monitor "in the middle", causes confusion)

### 3.26. Version 6.1.0 (2019-12-10)

This is a major update. The following major new features were added:

- Implemented support for importing a virtual machine from Oracle Cloud Infrastructure
- Extended support for exporting a virtual machine to Oracle Cloud Infrastructure, allowing the creation of multiple virtual machines without re-uploading. Also added option to export a VM to the cloud using the more efficient variant "paravirtualized", and to specify free-form tags for cloud images
- Virtualization core: Support for nested hardware-virtualization on Intel CPUs (starting with 5th generation Core i, codename Broadwell), so far tested only with guest running VirtualBox
- Graphics: New style 3D support (with VBoxSVGA and VMSVGA) remains, old style 3D support (with VBoxVGA) has been completely removed

- Shared Clipboard: Implemented experimental support for file transfers (Windows hosts/guests only at the moment). Needs to be enabled via VBoxManage (disabled by default).

In addition, the following items were fixed and/or added:

- Virtualization core: Drop recompiler, i.e. running VMs now needs a CPU supporting hardware virtualization
- Runtime: Works now on hosts with many CPUs (limit now 1024)
- Appliance and Cloud Import: Add field for defining firmware type (not part of OVF spec and thus manual in the Appliance case, for OCI it is automatically taken from the instance information)
- GUI: Improved the VISO creation and file manager dialogs
- GUI: Virtual machine list of VirtualBox Manager was improved. Machine groups are now more obvious visually and VM search functionality has been improved. Global Tools element can now be pinned in place, to avoid scrolling it with rest of machine list
- GUI: Virtual machine details pane is now extended with embedded editors for selected VM attributes, allowing user to edit them on-the-fly by clicking corresponding hyper-links without opening VM settings dialog
- GUI: Details pane provides more complete information
- GUI: Internal medium enumeration routines were optimized to reduce the load and optimize the performance in cases when user have lots of media registered. Also, we again allowed to add existing media (and create new) via Virtual Media Manager
- GUI: More consistent medium selection (both showing known images and allowing to select using the file picker)
- GUI: VM storage settings page was adjusted a bit in usability regard. User is now allowed to change controller bus type and can move attachments between the controllers by using drag and drop
- GUI: Storage and Network settings pages bug-fixes and usability optimization
- GUI: Added a new soft (virtual) keyboard enabling arbitrary keyboard input to guests, including multimedia keys
- GUI: Fixed crash in cloud related wizards when accessibility functionality was enabled
- GUI: Show VM CPU load as part of status bar CPU indicator
- GUI: Improved and extended the Session Information dialog
- GUI: Fixed/improved mouse pointer scaling
- GUI: Some issues related to mouse integration cursor scaling were addressed (bug #14366), more to go
- GUI: Fix and unify geometry save/restore in various dialogs
- GUI: Added the missing restriction options for disabling new functionality such as the VISO creator
- GUI: Popup messages mouse click fix
- Graphics: Remove 3D support for VBoxVGA (old one deprecated with 6.0)
- Graphics: Additional texture format support on Windows host

- Graphics: Improved fix for flickering on Windows host
- Input: Added support for horizontal scrolling in the PS/2 mouse device using the IntelliMouse Explorer protocol. Note that this support is automatically used by Linux guests but not by Windows guests
- vboximg-mount: Experimental support for direct read-only access to NTFS, FAT and ext2/3/4 filesystems inside a disk image without the need for support on the host
- vboximg-mount: Now also available on Linux host
- Storage: Experimental support for virtio-scsi, for both hard disks and optical drives (including boot support in BIOS)
- Storage: For optical drive emulation fix empty host drive crash
- USB: Improvements for EHCI controller implementation
- USB: Filter can now specify port path, uniquely identifying a port in a system
- NAT: Fix TFTP OACK response, send only if request has options
- NAT Network: Use non-blocking sockets on Linux for accepted incoming connections (port forwarding)
- PCnet-ISA: Added new network adapter type, currently CLI only
- Audio: Allow changing the host audio backend while the VM is in saved state
- ACPI: Report NVMe controller
- VGA: Improve hardware and BIOS compatibility
- VBoxSVGA/VMSVGA: Support YUV2 and related texture formats with hosts using OpenGL (macOS and Linux), which accelerates video playback when 3D is enabled by delegating the color space conversion to the host GPU
- VBoxSVGA/VMSVGA: Several drawing fixes for the 3D case
- VMSVGA 3D: Fixed OpenGL compressed textures
- VBoxManage: More cloud functionality coverage, e.g. starting a cloud instance
- VBoxManage: As part of the guest control feature support moving multiple source files/directories to a target directory
- Guest Control/VBoxManage: Added support for specifying multiple sources when renaming guest files
- VBoxManage: Show "unrestricted guest" and "nested HW virtualization" CPU features when listing the host information
- API: Reduce the amount of leftovers from Move VM function
- Shared Clipboard: Implemented experimental support for file transfers for Linux hosts on Windows guests (disabled by default)
- SMBIOS: Store system UUID in little endian format which is the default for new VMs, while existing VMs stick to the old VirtualBox behavior of storing them in big endian format for backwards compatibility to avoid breaking the activation status of Windows VMs
- VBoxSDL frontend: Fixed running on Windows hosts

- macOS host: Fix VM crashes (most visible on macOS Catalina)
- Linux host: Improve vboxweb systemd service dependency information
- Linux host: Drop PCI passthrough, the current code is too incomplete (cannot handle PCIe devices at all), i.e. not useful enough
- Linux host and guest: Support Linux 5.4 (bug #18945)
- Linux host and guest: Force disabling of kernel module signing during build (user can do it afterwards)
- Windows host: When possible, distinguish USB devices by port number; helps with accurate capturing of devices when multiple otherwise identical devices are connected
- Windows Guest Additions: Many fixes for drawing problems in the driver for VBoxSVGA
- Windows Guest Additions: Fixes for legacy VBoxVGA adapter, restore previously working cases
- Windows Guest Additions: Restore VHWA functionality for VBoxSVGA
- Windows guest: DXVA implementation for WDDM driver
- Documentation: Updated supported host operating systems, added few new manual pages (more to come later)
- EFI: Switch to newer firmware code base and add NVRAM support, should improve compatibility with OSes significantly
- EFI: Added support for booting from APFS
- EFI: Added support for non-standard SATA and NVMe boot device paths created by OS X
- EFI: Modified updated EFI code base to support older OS X guests again

### 3.27. Change Logs for Legacy Versions

To view the change log for a legacy version of VirtualBox see the documentation for the relevant Oracle VM VirtualBox release.

Change logs are also available at:

<https://www.virtualbox.org/wiki/Changelog>.