

Часть1. Кастомное ядро Linux x86

1. Скачиваем ядро с kernel.org

Protocol	Location
HTTP	https://www.kernel.org/pub/
GIT	https://git.kernel.org/
RSYNC	rsync://rsync.kernel.org/pub/



mainline:	6.18-rc6	2025-11-16	[tarball]	[patch]	[inc. patch]	[view diff]	[browse]
stable:	6.17.8	2025-11-13	[tarball]	[pgp]	[patch]	[inc. patch]	[view diff]
longterm:	6.12.58	2025-11-13	[tarball]	[pgp]	[patch]	[inc. patch]	[view diff]
longterm:	6.6.116	2025-11-02	[tarball]	[pgp]	[patch]	[inc. patch]	[view diff]
longterm:	6.1.158	2025-10-29	[tarball]	[pgp]	[patch]	[inc. patch]	[view diff]
longterm:	5.15.196	2025-10-29	[tarball]	[pgp]	[patch]	[inc. patch]	[view diff]
longterm:	5.10.246	2025-10-29	[tarball]	[pgp]	[patch]	[inc. patch]	[view diff]
longterm:	5.4.301	2025-10-29	[tarball]	[pgp]	[patch]	[inc. patch]	[view diff]
linux-next:	next-20251117	2025-11-17					[browse]

2. Разархивируем исходники ядра.

```
vboxuser@ubuntu:~/kernel$ tar -xf linux-5.4.301.tar.xz
vboxuser@ubuntu:~/kernel$ 
vboxuser@ubuntu:~/kernel$ sudo apt-get upgrade
[sudo] password for vboxuser:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following packages have been kept back:
  libegl-mesa0 libgbm1 libgl1-mesa-dri libglx-mesa0 libxatracker2 linux-generic-hwe-24.04
  linux-headers-generic-hwe-24.04 linux-image-generic-hwe-24.04 mesa-libgallium mesa-vulkan-drivers
0 upgraded, 0 newly installed, 0 to remove and 10 not upgraded.
```

3. Устанавливаем зависимости для компиляции ядра.

```
vboxuser@ubuntu:~/kernel/linux-5.4.301$ sudo apt-get install build-essential libncurses-dev bison flex libssl-dev libelf-dev bc dwaries
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
bc is already the newest version (1.07.1-3ubuntu4).
bc set to manually installed.
The following additional packages will be installed:
  dpkg-dev fakeroot g++ g++-13 g++-13-x86-64-linux-gnu g++-x86-64-linux-gnu libalgorithm-diff-perl
  libalgorithm-diff-xs-perl libalgorithm-merge-perl libdpkg-perl libfakeroot libfile-fcntllock-perl libfl-dev libfl2
  libstdc++-13-dev libzstd-dev lto-disabled-list m4 make pahole zlib1g-dev
Suggested packages:
  bison-doc debian-keyring flex-doc g++-multilib g++-13-multilib gcc-13-doc bzr ncurses-doc libssl-doc
  libstdc++-13-doc m4-doc make-doc
The following NEW packages will be installed:
```

4. Генерируем дефолтный конфиг.

```
vboxuser@ubuntu:~/kernel/linux-5.4.301$ make defconfig
HOSTCC scripts/kconfig/conf.o
HOSTCC scripts/kconfig/confdata.o
HOSTCC scripts/kconfig/expr.o
LEX scripts/kconfig/lexer.lex.c
YACC scripts/kconfig/parser.tab.[ch]
HOSTCC scripts/kconfig/lexer.lex.o
HOSTCC scripts/kconfig/parser.tab.o
HOSTCC scripts/kconfig/preprocess.o
HOSTCC scripts/kconfig/symbol.o
HOSTLD scripts/kconfig/conf
*** Default configuration is based on 'x86_64_defconfig'
#
# configuration written to .config
#
```

5. Компилируем ядро.

```
vboxuser@ubuntu:~/kernel/linux-5.4.301$ make -j 16
SYSTBL arch/x86/include/generated/asm/syscalls_32.h
SYSHDR arch/x86/include/generated/asm/unistd_32_ia32.h
SYSHDR arch/x86/include/generated/asm/unistd_64_x32.h
SYSTBL arch/x86/include/generated/asm/syscalls_64.h
SYSHDR arch/x86/include/generated/uapi/asm/unistd_x32.h
SYSHDR arch/x86/include/generated/uapi/asm/unistd_64.h
SYSHDR arch/x86/include/generated/uapi/asm/unistd_32.h
WRAP arch/x86/include/generated/uapi/asm/bpf_perf_event.h
WRAP arch/x86/include/generated/uapi/asm/errno.h
WRAP arch/x86/include/generated/uapi/asm/ioctl.h
WRAP arch/x86/include/generated/uapi/asm/fcntl.h
WRAP arch/x86/include/generated/uapi/asm/ipcbuf.h
WRAP arch/x86/include/generated/uapi/asm/sockios.h
WRAP arch/x86/include/generated/uapi/asm/termbits.h
MKPIGGY arch/x86/boot/compressed/piggy.S
AS arch/x86/boot/compressed/piggy.o
LD arch/x86/boot/compressed/vmlinux
ld: arch/x86/boot/compressed/head_64.o: warning: relocation in read-only section `.head.text'
ld: warning: creating DT_TEXTREL in a PIE
ZOFFSET arch/x86/boot/zoffset.h
OBJCOPY arch/x86/boot/vmlinux.bin
AS arch/x86/boot/header.o
LD arch/x86/boot/setup.elf
OBJCOPY arch/x86/boot/setup.bin
BUILD arch/x86/boot/bzImage
Setup is 16412 bytes (padded to 16896 bytes).
System is 8857 kB
CRC d612085f
Kernel: arch/x86/boot/bzImage is ready (#1)
```

6. Компилируем модули.

```
vboxuser@ubuntu:~/kernel/linux-5.4.301$ make modules
CALL scripts/checksyscalls.sh
CALL scripts/atomic/check-atomics.sh
DESCEND objtool
Building modules, stage 2.
MODPOST 12 modules
```

7. Устанавливаем модули.

```
vboxuser@ubuntu:~/kernel/linux-5.4.301$ sudo make modules_install
INSTALL drivers/thermal/intel/x86_pkg_temp_thermal.ko
INSTALL fs/efivarfs/efivarfs.ko
INSTALL net/ipv4/netfilter/iptable_nat.ko
INSTALL net/ipv4/netfilter/nf_log_arp.ko
INSTALL net/ipv4/netfilter/nf_log_ipv4.ko
INSTALL net/ipv6/netfilter/nf_log_ipv6.ko
INSTALL net/netfilter/nf_log_common.ko
INSTALL net/netfilter/xt_LOG.ko
INSTALL net/netfilter/xt_MASQUERADE.ko
INSTALL net/netfilter/xt_addrtype.ko
INSTALL net/netfilter/xt_mark.ko
INSTALL net/netfilter/xt_nat.ko
DEPMOD 5.4.301
```

8. Устанавливаем ядро.

```
vboxuser@ubuntu:~/kernel/linux-5.4.301$ sudo make install  
sh ./arch/x86/boot/install.sh 5.4.301 arch/x86/boot/bzImage \  
    System.map "/boot"  
run-parts: executing /etc/kernel/postinst.d/initramfs-tools 5.4.301 /boot/vmlinuz-5.4.301  
update-initramfs: Generating /boot/initrd.img-5.4.301  
W: zstd compression (CONFIG_RD_ZSTD) not supported by kernel, using gzip  
run-parts: executing /etc/kernel/postinst.d/unattended-upgrades 5.4.301 /boot/vmlinuz-5.4.301  
run-parts: executing /etc/kernel/postinst.d/update-notifier 5.4.301 /boot/vmlinuz-5.4.301  
run-parts: executing /etc/kernel/postinst.d/xx-update-initrd-links 5.4.301 /boot/vmlinuz-5.4.301  
I: /boot/initrd.img.old is now a symlink to initrd.img-6.14.0-35-generic  
I: /boot/initrd.img is now a symlink to initrd.img-5.4.301  
run-parts: executing /etc/kernel/postinst.d/zz-update-grub 5.4.301 /boot/vmlinuz-5.4.301  
Sourcing file `/etc/default/grub'  
Generating grub configuration file ...
```

9. Создаем initramfs для нашей версии ядра, обновляем grub и перезагружаемся.

```
vboxuser@ubuntu:~/kernel/linux-5.4.301$ sudo update-initramfs -c -k 5.4.301  
update-initramfs: Generating /boot/initrd.img-5.4.301  
W: zstd compression (CONFIG_RD_ZSTD) not supported by kernel, using gzip  
vboxuser@ubuntu:~/kernel/linux-5.4.301$ sudo update-grub  
Sourcing file `/etc/default/grub'  
Generating grub configuration file ...  
Found linux image: /boot/vmlinuz-6.14.0-35-generic  
Found initrd image: /boot/initrd.img-6.14.0-35-generic  
Found linux image: /boot/vmlinuz-6.14.0-33-generic  
Found initrd image: /boot/initrd.img-6.14.0-33-generic  
Found linux image: /boot/vmlinuz-5.4.301  
Found initrd image: /boot/initrd.img-5.4.301  
Found memtest86+x64 image: /boot/memtest86+x64.bin  
Warning: os-prober will not be executed to detect other bootable partitions.  
Systems on them will not be added to the GRUB boot configuration.  
Check GRUB_DISABLE_OS_PROBER documentation entry.  
Adding boot menu entry for UEFI Firmware Settings ...  
done  
vboxuser@ubuntu:~/kernel/linux-5.4.301$ sudo reboot
```

10. Проверяем версию ядра после перезагрузки.

```
vboxuser@ubuntu:~/Desktop$ uname -r  
5.4.301  
vboxuser@ubuntu:~/Desktop$ █
```

11. Тест ядра, проверяем наличие интернета пропинговав **Google**.

```
vboxuser@ubuntu:~/Desktop$ uname -r  
5.4.301  
vboxuser@ubuntu:~/Desktop$ ping 8.8.8.8  
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.  
64 bytes from 8.8.8.8: icmp_seq=1 ttl=104 time=161 ms  
64 bytes from 8.8.8.8: icmp_seq=2 ttl=104 time=211 ms  
64 bytes from 8.8.8.8: icmp_seq=3 ttl=104 time=235 ms  
64 bytes from 8.8.8.8: icmp_seq=4 ttl=104 time=296 ms  
64 bytes from 8.8.8.8: icmp_seq=5 ttl=104 time=160 ms  
64 bytes from 8.8.8.8: icmp_seq=6 ttl=104 time=195 ms  
64 bytes from 8.8.8.8: icmp_seq=7 ttl=104 time=230 ms  
64 bytes from 8.8.8.8: icmp_seq=8 ttl=104 time=199 ms  
64 bytes from 8.8.8.8: icmp_seq=9 ttl=104 time=179 ms  
64 bytes from 8.8.8.8: icmp_seq=10 ttl=104 time=194 ms  
64 bytes from 8.8.8.8: icmp_seq=11 ttl=104 time=198 ms  
64 bytes from 8.8.8.8: icmp_seq=12 ttl=104 time=296 ms  
64 bytes from 8.8.8.8: icmp_seq=13 ttl=104 time=293 ms  
64 bytes from 8.8.8.8: icmp_seq=14 ttl=104 time=191 ms  
64 bytes from 8.8.8.8: icmp_seq=15 ttl=104 time=193 ms
```