

# Сборка ядра для x86

## 1. Скачал архив с “git.kernel.org”



## Первая попытка (make defconfig)

```
user@debian:~/Embedded_linux/kernel/linux-6.1$ make defconfig -j2
HOSTCC scripts/basic/fixdep
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/menu.o
HOSTCC scripts/kconfig/parser.tab.o
HOSTCC scripts/kconfig/preprocess.o
HOSTCC scripts/kconfig/symbol.o
HOSTCC scripts/kconfig/util.o
HOSTCC scripts/kconfig/lexer.lex.o
HOSTLD scripts/kconfig/conf
*** Default configuration is based on 'x86_64_defconfig'
#
# configuration written to .config
#
user@debian:~/Embedded_linux/kernel/linux-6.1$ make menuconfig
UPD scripts/kconfig/mconf-cfg
HOSTCC scripts/kconfig/mconf.o
HOSTCC scripts/kconfig/lxdialog/checklist.o
HOSTCC scripts/kconfig/lxdialog/inputbox.o
HOSTCC scripts/kconfig/lxdialog/menubox.o
HOSTCC scripts/kconfig/lxdialog/textbox.o
HOSTCC scripts/kconfig/lxdialog/util.o
HOSTCC scripts/kconfig/lxdialog/yesno.o
HOSTLD scripts/kconfig/mconf
configuration written to .config

*** End of the configuration.
*** Execute 'make' to start the build or try 'make help'.
user@debian:~/Embedded_linux/kernel/linux-6.1$
```

```
Linux/x86 6.1.0TEST.0.5 Kernel Configuration
Arrow keys navigate the menu. <Enter> selects submenus ---> (or empty submenus ----). Highlighted letters are hotkeys. Pressing <Y> includes, <N>
excludes, <M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </> for Search. Legend: [*] built-in [ ] excluded <M> module <-> module
capable

[*] General setup --->
[*] 64-bit kernel
Processor type and features --->
[*] Mitigations for speculative execution vulnerabilities --->
Power management and ACPI options --->
Bus options (PCI etc.) --->
Binary Emulations --->
[*] Virtualization --->
General architecture-dependent options --->
[*] Enable loadable module support --->
--*- Enable the block layer --->
Executable file formats --->
Memory Management options --->
[*] Networking support --->
Device Drivers --->
File systems --->
Security options --->
--*- Cryptographic API --->
Library routines --->
Kernel hacking --->

<select> < Exit > < Help > < Save > < Load >
```

Arrow keys navigate the menu. <Enter> selects submenus ---> (or empty submenus ----). Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes, <M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </> for Search. Legend: [\*] built-in [ ] excluded <M> module <-> module capable

```
--- /dev/agpgart (AGP Support)
[*] AMD Opteron/Athlon64 on-CPU GART support
<*> Intel 440LX/BX/GX, I8xx and E7x05 chipset support
< > SiS chipset support
< > VIA chipset support

<select> < Exit > < Help > < Save > < Load >
```

```
user@debian:~/Embedded_linux/kernel/linux-6.1$ make -j2 && make modules -j2
SYNC include/config/auto.conf.cmd
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/fcntl.h
WRAP arch/x86/include/generated/uapi/asm/ioctl.h
WRAP arch/x86/include/generated/uapi/asm/ioctls.h
WRAP arch/x86/include/generated/uapi/asm/ipcbuf.h
WRAP arch/x86/include/generated/uapi/asm/param.h
WRAP arch/x86/include/generated/uapi/asm/poll.h
WRAP arch/x86/include/generated/uapi/asm/resource.h
WRAP arch/x86/include/generated/uapi/asm/socket.h
WRAP arch/x86/include/generated/uapi/asm/sockios.h
WRAP arch/x86/include/generated/uapi/asm/termbits.h
WRAP arch/x86/include/generated/uapi/asm/termios.h
WRAP arch/x86/include/generated/uapi/asm/types.h
SYSHDR arch/x86/include/generated/uapi/asm/unistd_64.h
SYSHDR arch/x86/include/generated/uapi/asm/unistd_x32.h
SYSTBL arch/x86/include/generated/asm/syscalls_32.h
HOSTCC arch/x86/tools/relocs_32.o
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
UPD include/config/kernel.release
WRAP arch/x86/include/generated/asm/early_ioremap.h
WRAP arch/x86/include/generated/asm/export.h
WRAP arch/x86/include/generated/asm/mcs_spinlock.h
WRAP arch/x86/include/generated/asm/irq_regs.h
WRAP arch/x86/include/generated/asm/kmap_size.h
WRAP arch/x86/include/generated/asm/local64.h
WRAP arch/x86/include/generated/asm/mmio_wb.h
WRAP arch/x86/include/generated/asm/module.lds.h
```

После make и make modules запустил установку ядра  
“make install -j2”

Результат:

завис экран grub;

при сборки по статьи «ядерная физика для домохозяек»

появляется окно загрузки, но зависает курсор.

Вторая попытка (скопировал своё рабочее ядро)

Так же изменил в menuconfig

Результат:

Запустился терминал

```
Save up waiting for suspend/resume device
Save up waiting for root file system device. Common problems:
- Boot args (cat /proc/cmdline)
- Check rootdelay= (did the system wait long enough?)
- Missing modules (cat /proc/modules; ls /dev)
ALERT! UUID=6ea1d575-5186-4000-a1f7-418cb9dced2c does not exist. Dropping to a shell!

BusyBox v1.35.0 (Debian 1:1.35.0-4+b3) built-in shell (ash)
Enter 'help' for a list of built-in commands.

(initramfs) help
Built-in commands:
. : [ [ alias bg break cd chdir command continue echo eval exec
exit export false fg getopts hash help history jobs kill let
local printf pwd read readonly return set shift source test times
trap true type ulimit unalias unset wait
(initramfs) ls
bin conf dev etc init kernel lib lib64 proc root run/sbin scripts sys tmp usr var
(initramfs) _
```

# Сборка ядра под ARM

```
user@debian:~/Embedded_linux/kernel/linux-6.1$ ARCH=arm CROSS_COMPILE=arm-linux-gnueabihf- make multi_v7_defconfig -j2 zImage
HOSTCC scripts/basic/fixdep
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/menu.o
HOSTCC scripts/kconfig/parser.tab.o
HOSTCC scripts/kconfig/preprocess.o
HOSTCC scripts/kconfig/symbol.o
HOSTCC scripts/kconfig/util.o
HOSTCC scripts/kconfig/lexer.lex.o
HOSTLD scripts/kconfig/conf
#
# configuration written to .config
#
SYSHDR arch/arm/include/generated/uapi/asm/unistd-oabi.h
SYSHDR arch/arm/include/generated/uapi/asm/unistd-eabi.h
HOSTCC scripts/dtc/dtc.o
UPD include/config/kernel.release
HOSTCC scripts/dtc/flattree.o
UPD include/generated/uapi/linux/version.h
HOSTCC scripts/dtc/fstree.o
HOSTCC scripts/dtc/data.o
HOSTCC scripts/dtc/livetree.o
HOSTCC scripts/dtc/treesource.o
HOSTCC scripts/dtc/srcpos.o
HOSTCC scripts/dtc/checks.o
HOSTCC scripts/dtc/util.o
LEX scripts/dtc/dtc-lexer.lex.c
YACC scripts/dtc/dtc-parser.tab.[ch]
HOSTCC scripts/dtc/libfdt/fdt.o
HOSTCC scripts/dtc/libfdt/fdt_ro.o
HOSTCC scripts/dtc/libfdt/fdt_wip.o
HOSTCC scripts/dtc/libfdt/fdt_sw.o
```

```
CC arch/arm/boot/compressed/fdt_wip.o
CC arch/arm/boot/compressed/fdt.o
CC arch/arm/boot/compressed/atags_to_fdt.o
CC arch/arm/boot/compressed/fdt_check_mem_start.o
AS arch/arm/boot/compressed/lib1funcs.o
AS arch/arm/boot/compressed/ashldi3.o
AS arch/arm/boot/compressed/bswapsdi2.o
AS arch/arm/boot/compressed/piggy.o
LD arch/arm/boot/compressed/vmlinux
OBJCOPY arch/arm/boot/zImage
Kernel: arch/arm/boot/zImage is ready
user@debian:~/Embedded_linux/kernel/linux-6.1$ file:///ho
```

Сборка .dtb (ARCH=arm make dtbs -j2)

```

DTC      arch/arm/boot/dts/mmp2-brownstone.dtb
DTC      arch/arm/boot/dts/mmp2-olpc-xo-1-75.dtb
DTC      arch/arm/boot/dts/mmp3-dell-ariel.dtb
DTC      arch/arm/boot/dts/imx50-kobo-aura.dtb
DTC      arch/arm/boot/dts/imx50-evk.dtb
DTC      arch/arm/boot/dts/imx51-apf51.dtb
DTC      arch/arm/boot/dts/imx51-apf51dev.dtb
DTC      arch/arm/boot/dts/imx51-babbage.dtb
DTC      arch/arm/boot/dts/imx51-digi-connectcore-jsk.dtb
DTC      arch/arm/boot/dts/imx51-eukrea-mbimxsd51-baseboard.dtb
DTC      arch/arm/boot/dts/imx51-ts4800.dtb
DTC      arch/arm/boot/dts/imx51-zii-rdu1.dtb
DTC      arch/arm/boot/dts/imx51-zii-scu2-mezz.dtb
DTC      arch/arm/boot/dts/imx51-zii-scu3-esb.dtb
DTC      arch/arm/boot/dts/imx53-ard.dtb
DTC      arch/arm/boot/dts/imx53-cx9020.dtb
DTC      arch/arm/boot/dts/imx53-kp-ddc.dtb
DTC      arch/arm/boot/dts/imx53-kp-hsc.dtb
DTC      arch/arm/boot/dts/imx53-m53evk.dtb

```

```

user@debian:~/Embedded_linux/kernel/ARM$ QEMU_AUDIO_DRV=none qemu-system-arm -M v
express-a9 -kernel zImage -dtb vexpress-v2p-ca9.dtb -nographic -append "console=t
tyAMA0"

```

```

[ 5.846840] 010c          65536 ram12
[ 5.846896] (driver?)
[ 5.847534] 010d          65536 ram13
[ 5.847591] (driver?)
[ 5.848745] 010e          65536 ram14
[ 5.848834] (driver?)
[ 5.849527] 010f          65536 ram15
[ 5.849580] (driver?)
[ 5.850196] 1f00          131072 mtddb0
[ 5.850313] (driver?)
[ 5.851528] Kernel panic - not syncing: VFS: Unable to mount root fs on unknown-block(0,0)
[ 5.852857] CPU: 0 PID: 1 Comm: swapper/0 Not tainted 6.1.0-TEST.0.5 #1
[ 5.853734] Hardware name: ARM-Versatile Express
[ 5.855881] unwind_backtrace from show_stack+0x10/0x14
[ 5.858237] show_stack from dump_stack_lvl+0x40/0x4c
[ 5.858848] dump_stack_lvl from panic+0x108/0x328
[ 5.859623] panic from mount_block_root+0x174/0x20c
[ 5.860428] mount_block_root from prepare_namespace+0x150/0x18c
[ 5.861075] prepare_namespace from kernel_init+0x18/0x12c
[ 5.861686] kernel_init from ret_from_fork+0x14/0x2c
[ 5.862393] Exception stack(0xc8825fb0 to 0xc8825ff8)
[ 5.863450] 5fa0: 00000000 00000000 00000000 00000000
[ 5.864304] 5fc0: 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
[ 5.865067] 5fe0: 00000000 00000000 00000000 00000000 00000013 00000000
[ 5.867701] ---[ end Kernel panic - not syncing: VFS: Unable to mount root fs on unknown-block(0,0) ]---

```