

# Konfiguracja jądra Linux w Slackware

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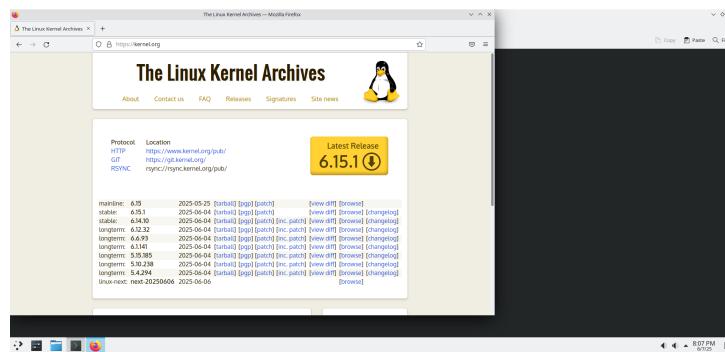
## 1 Wstęp

Ta dokumentacja opisuje proces konfiguracji jądra linuxa w systemie Slackware. Do skonfigurowania używane są dwa sposoby: stary (z użyciem 'localmodconfig') oraz nowy (streamline\_config.pl).

## 2 Przygotowanie przed podziałem na sposoby

### 2.1 Pobranie najnowszych źródeł kernela

Pobieram najnowszą, stabilną wersję kernela ze strony <https://www.kernel.org/>. W moim przypadku jest to wersja **6.15.1**.



Aby pobrać ten plik używam komendy `wget https://cdn.kernel.org/pub/linux/kernel/v6.x/linux-6.15.1.tar.gz` (w skrypcie podane było '.tar.xz', ale z przeoczenią wpisałem '.tar.gz'. Nie miało to wpływu na przebieg zadania), czego wynikiem jest:

```

src: bash - Konsole
File Edit View Bookmarks Plugins Settings Help
New Tab Split View v
Connecting to cdn.kernel.org (cdn.kernel.org)|199.232.17.176|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 245014497 (234M) [application/x-gzip]
Saving to: 'linux-6.15.1.tar.gz'

linux-6.15.1.tar.gz      41%[=====] 96.03M 41.8KB/s in 32m 6s
2025-06-07 20:49:26 (51.1 KB/s) - Read error at byte 108693528/245014497 (Connection reset by peer). Retrying.

--2025-06-07 20:49:27-- (try: 2) https://cdn.kernel.org/pub/linux/kernel/v6.x/linux-6.15.1.tar.gz
Connecting to cdn.kernel.org (cdn.kernel.org)|199.232.17.176|:443... failed: Connection refused.
Connecting to cdn.kernel.org (cdn.kernel.org)|2a04:4e42:41::432|:443... failed: Network is unreachable.
Resolving cdn.kernel.org (cdn.kernel.org)... failed: Temporary failure in name resolution.
wget: unable to resolve host address 'cdn.kernel.org'
ug@slack:/usr/src$ wget https://cdn.kernel.org/pub/linux/kernel/v6.x/linux-6.15.1.tar.gz
--2025-06-07 20:50:48 (6.42 MB/s) - 'linux-6.15.1.tar.gz' saved [245014497/245014497]

linux-6.15.1.tar.gz      100%[=====] 233.66M 5.89MB/s in 36s
2025-06-07 20:50:48 (6.42 MB/s) - 'linux-6.15.1.tar.gz' saved [245014497/245014497]
u@slack:/usr/src$ 

```

## 2.2 Rozpakowanie pliku archiwum z źródłami kernela

Komenda:

```

src: bash - Konsole
File Edit View Bookmarks Plugins Settings Help
New Tab Split View v
u@slack:/usr/src$ tar -xvf linux-6.15.1.tar.gz.1

```

Wynik:

```

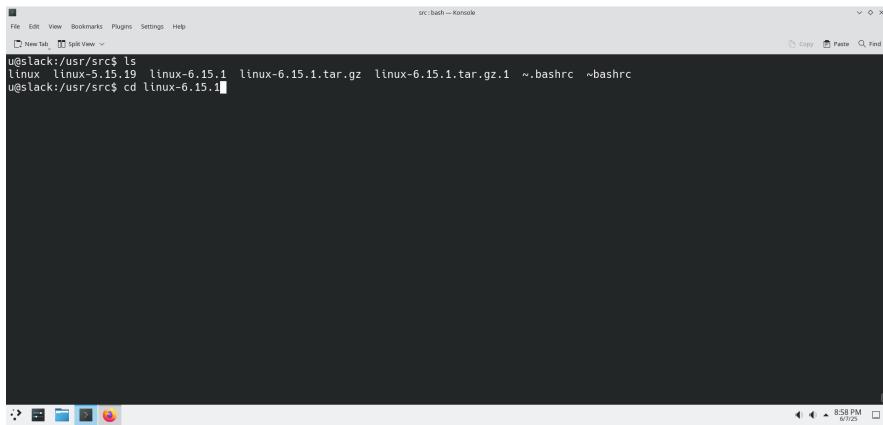
src: bash - Konsole
File Edit View Bookmarks Plugins Settings Help
New Tab Split View v
linux-6.15.1/usr/include/Makefile
linux-6.15.1/usr/include/headers_check.pl
linux-6.15.1/usr/include/nramfs_data.S
linux-6.15.1/virt/
linux-6.15.1/virt/Makefile
linux-6.15.1/virt/kvm/
linux-6.15.1/virt/kvm/Kconfig
linux-6.15.1/virt/kvm/Makefile.kvm
linux-6.15.1/virt/kvm/async_pf.c
linux-6.15.1/virt/kvm/balloon.c
linux-6.15.1/virt/kvm/binary_stats.c
linux-6.15.1/virt/kvm/coalesced_mmio.c
linux-6.15.1/virt/kvm/coalesced_mmio.h
linux-6.15.1/virt/kvm/dirty_ring.c
linux-6.15.1/virt/kvm/eventfd.c
linux-6.15.1/virt/kvm/guest_memfd.c
linux-6.15.1/virt/kvm/irqchip.c
linux-6.15.1/virt/kvm/kvm_main.c
linux-6.15.1/virt/kvm/kvm_mm.h
linux-6.15.1/virt/kvm/pfnCache.c
linux-6.15.1/virt/kvm/vfio.c
linux-6.15.1/virt/kvm/vfio.h
linux-6.15.1/virt/lib/
linux-6.15.1/virt/lib/Kconfig
linux-6.15.1/virt/lib/Makefile
linux-6.15.1/virt/lib/irqbypass.c
u@slack:/usr/src$ 

```

## 2.3 Konfiguracja jądra

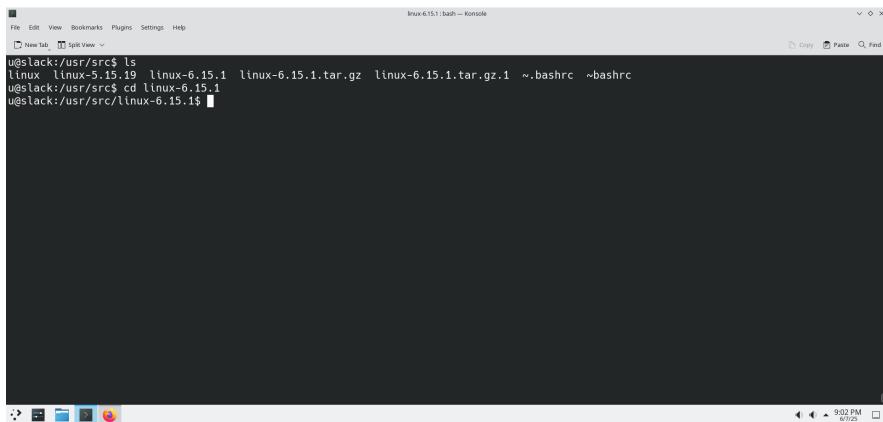
### 2.3.1 Przejście do folderu z rozpakowanym kernelem

Komenda:



```
src bash - Konsole
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/usr/src$ ls
linux linux-5.15.19 linux-6.15.1 linux-6.15.1.tar.gz linux-6.15.1.tar.gz.1 ~.bashrc ~bashrc
u@slack:/usr/src$ cd linux-6.15.1
```

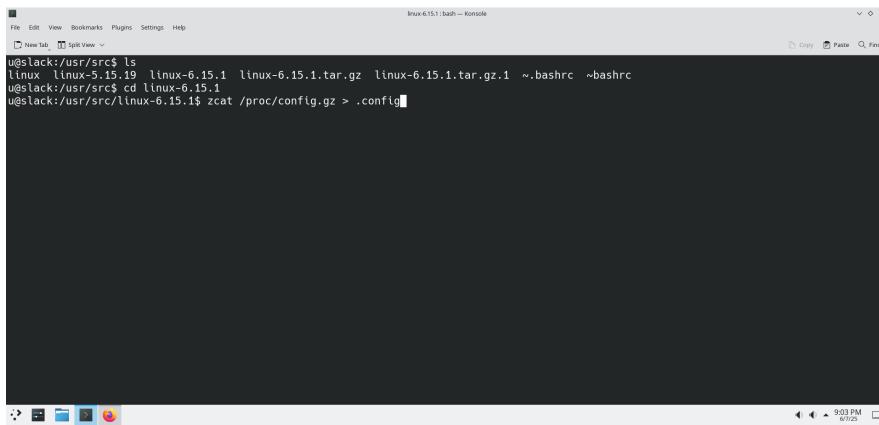
Wynik:



```
linux-6.15.1 bash - Konsole
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/usr/src$ ls
linux linux-5.15.19 linux-6.15.1 linux-6.15.1.tar.gz linux-6.15.1.tar.gz.1 ~.bashrc ~bashrc
u@slack:/usr/src$ cd linux-6.15.1
```

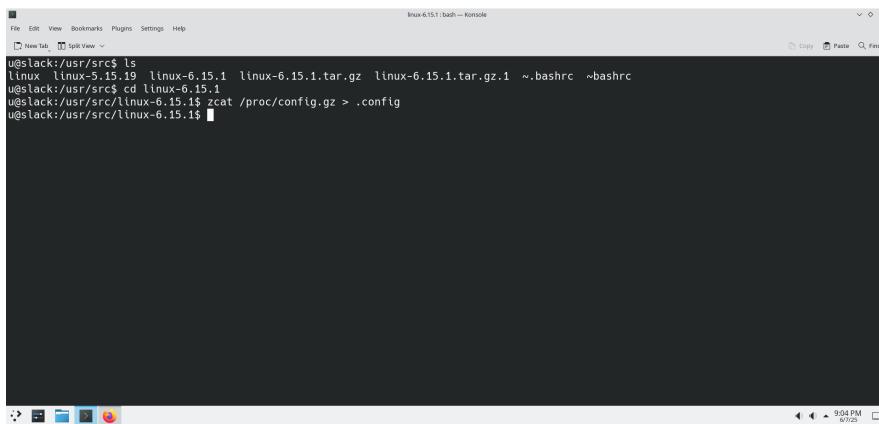
### 2.3.2 Skopiowanie konfiguracji z starego jądra

Komenda:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
ug@slack:/usr/src$ ls
linux linux-5.19 linux-6.15.1 linux-6.15.1.tar.gz linux-6.15.1.tar.gz.i ~.bashrc ~bashrc
ug@slack:/usr/src$ cd linux-6.15.1
ug@slack:/usr/src/linux-6.15.1 zcat /proc/config.gz > .config
```

Wynik:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
ug@slack:/usr/src$ ls
linux linux-5.19 linux-6.15.1 linux-6.15.1.tar.gz linux-6.15.1.tar.gz.i ~.bashrc ~bashrc
ug@slack:/usr/src$ cd linux-6.15.1
ug@slack:/usr/src/linux-6.15.1 zcat /proc/config.gz > .config
```

### 3 Stary sposób

#### 3.1 konfiguracja jądra w starym sposobie

##### 3.1.1 Wywołanie polecenia do utworzenia pliku config tylko z tymi modułami co używamy (stara metoda)

Komenda:

```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View Copy Paste Find
u@slack:/usr/src$ ls
linux linux-5.15.19 linux-6.15.1 linux-6.15.1.tar.gz linux-6.15.1.tar.gz.1 ~.bashrc ~bashrc
u@slack:/usr/src$ cd linux-6.15.1
u@slack:/usr/src/linux-6.15.1$ zcat /proc/config.gz > .config
u@slack:/usr/src/linux-6.15.1$ make localmodconfig
```

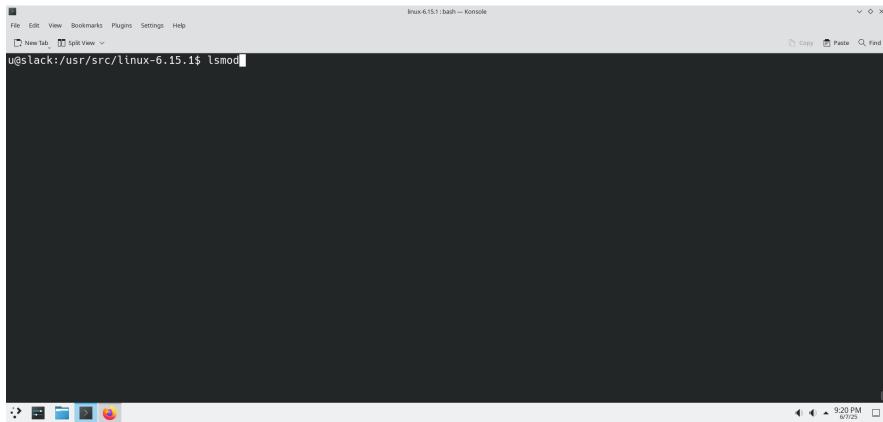
## Wynik:

```
File Edit View Bookmarks Plugins Settings Help  
New Tab Split View Copy Paste Find  
  
using config: '.config'  
crc32_pclmul config not found!!  
crc32_idif_pclmul config not found!!  
WARNING: FB_SYS_COPYAREA is required, but nothing in the  
current config selects it.  
WARNING: FB_SYS_PAGEMBLIT is required, but nothing in the  
current config selects it.  
WARNING: FB_SYS_FILLRECT is required, but nothing in the  
current config selects it.  
WARNING: FB_SYSMEM_FOPS is required, but nothing in the  
current config selects it.  
module fb_sys_fops did not have configs CONFIG_FB_SYSMEM_FOPS  
.config:838:warning: symbol value '0' invalid for BASE_SMALL  
* Restart config...  
*  
* Timers subsystem  
*  
Timer tick handling  
 1. Periodic timer ticks (constant rate, no dynticks) (HZ_PERIODIC)  
> 2. Idle dynticks system (tickless idle) (NO_HZ_IDLE)  
 3. Full dynticks system (tickless) (NO_HZ_FULL)  
choice[1-3?]: 2  
Old Idle dynticks config (NO_HZ) [Y/n?] y  
High Resolution Timer Support (HIGH_RES_TIMERS) [Y/n?] y  
Clocksource watchdog maximum allowable skew (in microseconds) (CLOCKSOURCE_WATCHDOG_MAX_SKEW_US) [125] (NEW) █
```

Pojawiły się WARNING, ale nie są one kluczowe do działania jądra, na zajęciach jak dobrze pamiętam też je zignorowaliśmy.

### 3.1.2 Sprawdzenie aktualnie załadowanych modułów

Komenda:

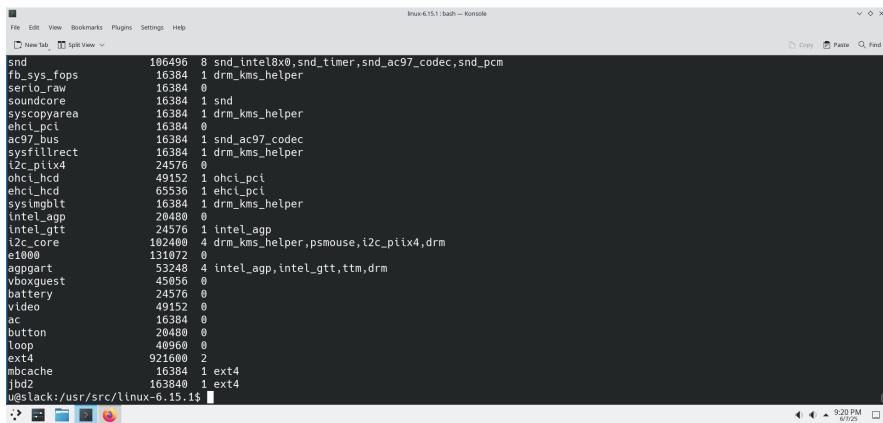


linux-6.15.1 [batch] — Konsole

```
u@slack:/usr/src/linux-6.15.1$ lsmod
```

This screenshot shows a terminal window titled "Konsole" running on a Slackware system. The user has entered the command "lsmod" to list currently loaded kernel modules. The output is displayed in the terminal window.

Wynik:



linux-6.15.1 [batch] — Konsole

```
u@slack:/usr/src/linux-6.15.1$ lsmod
```

Moduł	Wersja	Referencje
snd	106496	8 snd_intel8x0, snd_timer, snd_ac97_codec, snd_pcm
fb_sys_fops	16384	1 drm_kms_helper
serio_raw	16384	0
soundcore	16384	1 snd
syscopyarea	16384	1 drm_kms_helper
ehci_pci	16384	0
ac97_bus	16384	1 snd_ac97_codec
sysfillrect	16384	1 drm_kms_helper
i2c_piix4	24576	0
ohci_pci	49152	1 ohci_pci
ehci_hcd	65536	1 ehci_pci
sysimgblt	16384	1 drm_kms_helper
intel_agp	20480	0
intel_gtt	24576	1 intel_agp
i2c_core	102400	4 drm_kms_helper, psmouse, i2c_piix4, drm
e1000	131072	0
aggart	53248	4 intel_agp, intel_gtt, ttm, drm
vboxguest	45056	0
battery	24576	0
video	49152	0
ac	16384	0
button	20480	0
loop	40960	0
ext4	921600	2
mbcache	16384	1 ext4
jbd2	163840	1 ext4

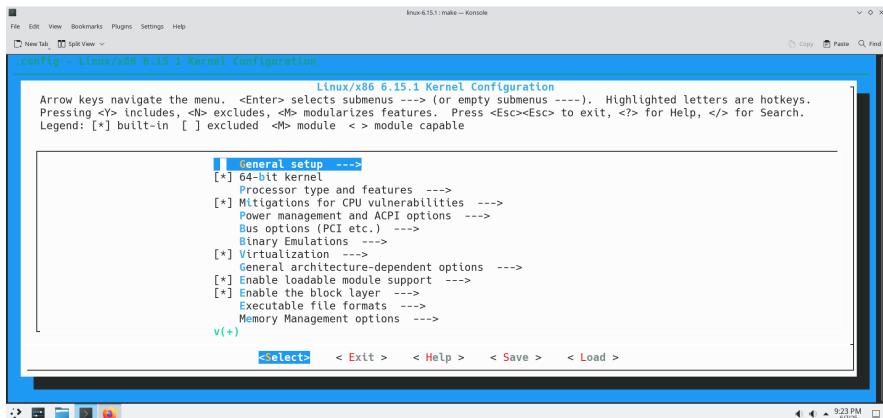
This screenshot shows a terminal window titled "Konsole" running on a Slackware system. The user has entered the command "lsmod" to list currently loaded kernel modules. The output is displayed in the terminal window, showing a table of loaded modules, their versions, and dependencies.

### 3.1.3 Sprawdzenie konfiguracji kernela (tryb tekstowy)

Komenda:

```
File Edit View Bookmarks Plugins Settings Help  
New Tab Split View     
106496 8 snd_intel8x0,snd_timer,snd_ac97_codec,snd_pcm  
sd_fsys_fops 16384 1 drm_kms_helper  
serio_raw 16384 0  
soundcore 16384 1 snd  
sysfs_tea 16384 1 drm_kms_helper  
ehci_pci 16384 0  
ac97_bus 16384 1 snd_ac97_codec  
sysfillrect 16384 1 drm_kms_helper  
i2c_piix4 24576 0  
ohci_hcd 49152 1 ohci_pci  
ehci_hcd 65536 1 ehci_pci  
sysimgblt 16384 1 drm_kms_helper  
intel_agp 26840 0  
intel_gtt 26840 1 intel_agp  
i2c_core 182400 4 drm_kms_helper,psmouse,i2c_piix4,drm  
e1000 131072  
appgar 53248 4 intel_agp,intel_gtt,ttm,drm  
vboxguest 45056 0  
battery 24576 0  
video 49152 0  
ac 16384 0  
button 26840 0  
loop 40960 0  
ext4 921600 2  
mbcache 16384 1 ext4  
jbd2 163840 1 ext4  
u@slack:/usr/src/linux-6.19.1$ make menuconfig
```

## Wynik:



### 3.1.4 Sprawdzenie konfiguracji kernela (KDE)

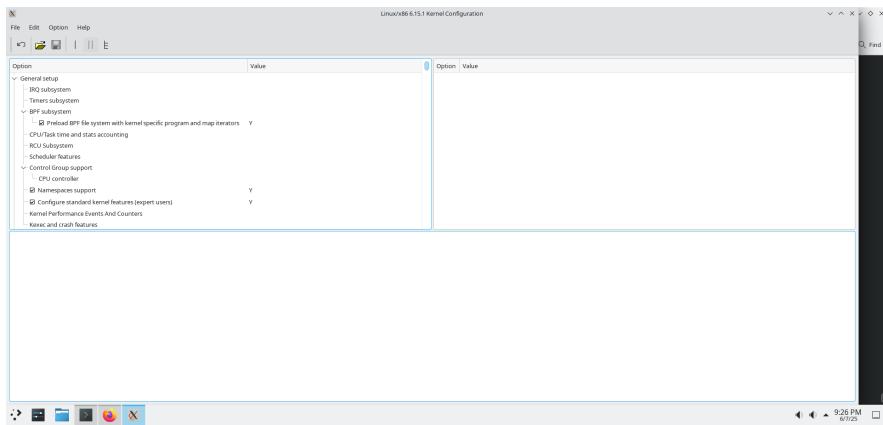
Komenda:

```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View Copy Paste Find
e1000      131072  0
aggpart    53248  4 intel_agp,intel_gtt,ttm,drm
vboxguest   45056  0
battery     24576  0
video       49152  0
ac          16384  0
button      20480  0
loop        49960  0
ext4       921600  2
mbcache     16384  1 ext4
jbd2       163840  1 ext4
u@slack:/usr/src/linux-6.15.1$ make menuconfig
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
HOSTCC scripts/kconfig/mncnf-common.o
HOSTLD scripts/kconfig/mconf

*** End of the configuration.
*** Execute 'make' to start the build or try 'make help'.
u@slack:/usr/src/linux-6.15.1$ make xconfig

```

## Wynik:



### 3.1.5 Sprawdzenie konfiguracji kernela (Gnome)

Komenda:

```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View Copy Paste Find
button          20480  0
loop           40960  0
ext4          921600  2
mbcache        103840  1 ext4
jbd2          163840  1 ext4
u@slack:/usr/src/linux-6.15.1$ make menuconfig
 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/lxdialy/yesno.o
 HOSTLD scripts/kconfig/mconf-common.o

*** End of the configuration.
*** Execute 'make' to start the build or try 'make help'.

u@slack:/usr/src/linux-6.15.1$ make xconfig
 HOSTCC scripts/kconfig/images.o
 HOSTCXX scripts/kconfig/qconf.o
 MOC    scripts/kconfig/qconf-moc.cc
 HOSTCXX scripts/kconfig/qconf-moc.o
 HOSTLD scripts/kconfig/qconf
u@slack:/usr/src/linux-6.15.1$ make gconfig
```

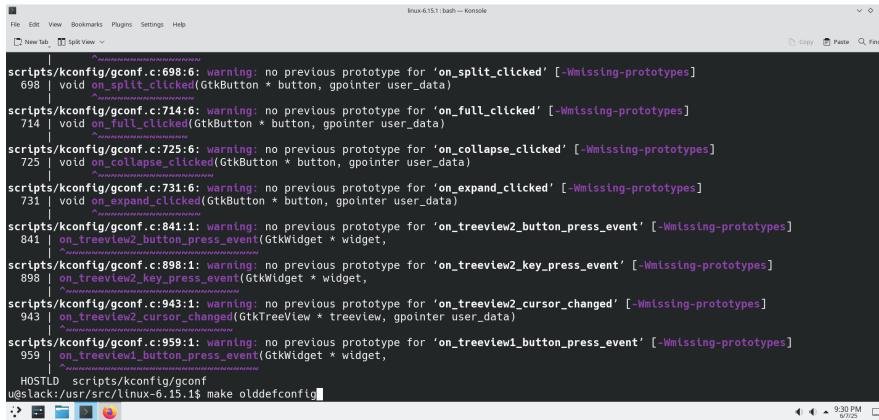
Wynik:

```
File Edit View Bookmarks Plugins Settings Help  
New Tab Split View  
scripts/kconfig/gconf.c:698: warning: no previous prototype for 'on_split_clicked' [-Wmissing-prototypes]  
698 | void on_split_clicked(GtkButton * button, gpointer user_data)  
| ^~~~~~  
scripts/kconfig/gconf.c:714: warning: no previous prototype for 'on_full_clicked' [-Wmissing-prototypes]  
714 | void on_full_clicked(GtkButton * button, gpointer user_data)  
| ^~~~~~  
scripts/kconfig/gconf.c:725: warning: no previous prototype for 'on_collapse_clicked' [-Wmissing-prototypes]  
725 | void on_collapse_clicked(GtkButton * button, gpointer user_data)  
| ^~~~~~  
scripts/kconfig/gconf.c:731: warning: no previous prototype for 'on_expand_clicked' [-Wmissing-prototypes]  
731 | void on_expand_clicked(GtkButton * button, gpointer user_data)  
| ^~~~~~  
scripts/kconfig/gconf.c:841: warning: no previous prototype for 'on_treeview2_button_press_event'  
841 | on_treeview2_button_press_event(GtkWidget * widget,  
| ^~~~~~  
scripts/kconfig/gconf.c:898: warning: no previous prototype for 'on_treeview2_key_press_event' [-Wmissing-prototypes]  
898 | on_treeview2_key_press_event(GtkWidget * widgelet,  
| ^~~~~~  
scripts/kconfig/gconf.c:943: warning: no previous prototype for 'on_treeview2_cursor_changed' [-Wmissing-prototypes]  
943 | on_treeview2_cursor_changed(GtkTreeView * treeview, gpointer user_data)  
| ^~~~~~  
scripts/kconfig/gconf.c:959: warning: no previous prototype for 'on_treeview1_button_press_event' [-Wmissing-prototypes]  
959 | on_treeview1_button_press_event(GtkWidget * widget,  
| ^~~~~~  
HOSTLD scripts/kconfig/gconf
```

Tu również pojawiły się WARNING. Nie są one kluczowe dla działania jądra

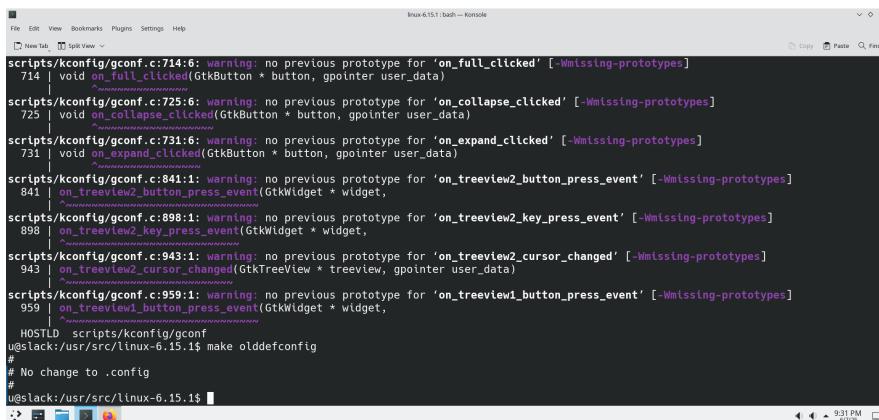
### 3.1.6 Zbudowanie pliku konfiguracyjnego kernela z konfiguracją z poprzedniego kernela

Komenda:



```
Linux-6.15.1 [batch] ~ Konsole
File Edit View Bookmarks Plugins Settings Help
New Tab Split View v
scripts/kconfig/gconf.c:698:6: warning: no previous prototype for 'on_split_clicked' [-Wmissing-prototypes]
 698 | void on_split_clicked(GtkButton *button, gpointer user_data)
   | ^
scripts/kconfig/gconf.c:714:6: warning: no previous prototype for 'on_full_clicked' [-Wmissing-prototypes]
 714 | void on_full_clicked(GtkButton *button, gpointer user_data)
   | ^
scripts/kconfig/gconf.c:725:6: warning: no previous prototype for 'on_collapse_clicked' [-Wmissing-prototypes]
 725 | void on_collapse_clicked(GtkButton *button, gpointer user_data)
   | ^
scripts/kconfig/gconf.c:731:6: warning: no previous prototype for 'on_expand_clicked' [-Wmissing-prototypes]
 731 | void on_expand_clicked(GtkButton *button, gpointer user_data)
   | ^
scripts/kconfig/gconf.c:841:1: warning: no previous prototype for 'on_treeview2_button_press_event' [-Wmissing-prototypes]
 841 | on_treeview2_button_press_event(GtkWidget *widget,
   | ^
scripts/kconfig/gconf.c:898:1: warning: no previous prototype for 'on_treeview2_key_press_event' [-Wmissing-prototypes]
 898 | on_treeview2_key_press_event(GtkWidget *widget,
   | ^
scripts/kconfig/gconf.c:943:1: warning: no previous prototype for 'on_treeview2_cursor_changed' [-Wmissing-prototypes]
 943 | on_treeview2_cursor_changed(GtkTreeView *treeview, gpointer user_data)
   | ^
scripts/kconfig/gconf.c:959:1: warning: no previous prototype for 'on_treeview1_button_press_event' [-Wmissing-prototypes]
 959 | on_treeview1_button_press_event(GtkWidget *widget,
   | ^
HOSTID scripts/kconfig/gconf
ug@slack:/usr/src/linux-6.15.1$ make olddefconfig
9:30 PM 07/25
```

Wynik:



```
Linux-6.15.1 [batch] ~ Konsole
File Edit View Bookmarks Plugins Settings Help
New Tab Split View v
scripts/kconfig/gconf.c:714:6: warning: no previous prototype for 'on_full_clicked' [-Wmissing-prototypes]
 714 | void on_full_clicked(GtkButton *button, gpointer user_data)
   | ^
scripts/kconfig/gconf.c:725:6: warning: no previous prototype for 'on_collapse_clicked' [-Wmissing-prototypes]
 725 | void on_collapse_clicked(GtkButton *button, gpointer user_data)
   | ^
scripts/kconfig/gconf.c:731:6: warning: no previous prototype for 'on_expand_clicked' [-Wmissing-prototypes]
 731 | void on_expand_clicked(GtkButton *button, gpointer user_data)
   | ^
scripts/kconfig/gconf.c:841:1: warning: no previous prototype for 'on_treeview2_button_press_event' [-Wmissing-prototypes]
 841 | on_treeview2_button_press_event(GtkWidget *widget,
   | ^
scripts/kconfig/gconf.c:898:1: warning: no previous prototype for 'on_treeview2_key_press_event' [-Wmissing-prototypes]
 898 | on_treeview2_key_press_event(GtkWidget *widget,
   | ^
scripts/kconfig/gconf.c:943:1: warning: no previous prototype for 'on_treeview2_cursor_changed' [-Wmissing-prototypes]
 943 | on_treeview2_cursor_changed(GtkTreeView *treeview, gpointer user_data)
   | ^
scripts/kconfig/gconf.c:959:1: warning: no previous prototype for 'on_treeview1_button_press_event' [-Wmissing-prototypes]
 959 | on_treeview1_button_press_event(GtkWidget *widget,
   | ^
HOSTID scripts/kconfig/gconf
ug@slack:/usr/src/linux-6.15.1$ make olddefconfig
#
# No change to .config
#
ug@slack:/usr/src/linux-6.15.1$ 
```

## 3.2 Kompilacja obrazu jądra (parametr j)

Komenda:

```

scripts/kconfig/gconf.c:714:6: warning: no previous prototype for 'on_full_clicked' [-Wmissing-prototypes]
714 | void on_full_clicked(GtkButton * button, gpointer user_data)
| ~~~~~
scripts/kconfig/gconf.c:725:6: warning: no previous prototype for 'on_collapse_clicked' [-Wmissing-prototypes]
725 | void on_collapse_clicked(GtkButton * button, gpointer user_data)
| ~~~~~
scripts/kconfig/gconf.c:731:6: warning: no previous prototype for 'on_expand_clicked' [-Wmissing-prototypes]
731 | void on_expand_clicked(GtkButton * button, gpointer user_data)
| ~~~~~
scripts/kconfig/gconf.c:841:1: warning: no previous prototype for 'on_treeview2_button_press_event' [-Wmissing-prototypes]
841 | on_treeview2_button_press_event(GtkWidget * widget,
| ~~~~~
scripts/kconfig/gconf.c:898:1: warning: no previous prototype for 'on_treeview2_key_press_event' [-Wmissing-prototypes]
898 | on_treeview2_key_press_event(GtkWidget * widget,
| ~~~~~
scripts/kconfig/gconf.c:943:1: warning: no previous prototype for 'on_treeview2_cursor_changed' [-Wmissing-prototypes]
943 | on_treeview2_cursor_changed(GtkTreeView * treeview, gpointer user_data)
| ~~~~~
scripts/kconfig/gconf.c:959:1: warning: no previous prototype for 'on_treeview1_button_press_event' [-Wmissing-prototypes]
959 | on_treeview1_button_press_event(GtkWidget * widget,
| ~~~~~
HOSTLD scripts/kconfig/gconf
ugslack:/usr/src/linux-6.15.1$ make olddefconfig
#
# No change to .config
#
ugslack:/usr/src/linux-6.15.1$ make -j2 bzImage

```

Wynik:

```

CC arch/x86/boot/string.o
CC arch/x86/boot/tty.o
CC arch/x86/boot/video.o
CC arch/x86/boot/video-mode.o
CC arch/x86/boot/version.o
CC arch/x86/boot/video-vga.o
CC arch/x86/boot/video-vesa.o
CC arch/x86/boot/video-bios.o
CPUPTR arch/x86/boot/cpustr.h
AS arch/x86/boot/compressed/la57toggle.o
CC arch/x86/boot/compressed/acpi.o
CC arch/x86/boot/compressed/mem.o
CC arch/x86/boot/cpu.o
CC arch/x86/boot/compressed/efi.o
CC arch/x86/boot/compressed/msc.o
LZMA arch/x86/boot/compressed/vmlinuz.bin.lzma
MKPIGGY arch/x86/boot/compressed/piggy.S
AS arch/x86/boot/compressed/piggy.o
LD arch/x86/boot/compressed/vmlinuz
ZOFFSET arch/x86/boot/zoffset.h
OBJCOPY arch/x86/boot/vmlinuz.bin
AS arch/x86/boot/header.o
LD arch/x86/boot/setup.elf
OBJCOPY arch/x86/boot/setup.bin
BUILD arch/x86/boot/bzImage
Kernel: arch/x86/boot/bzImage is ready (#1)
ugslack:/usr/src/linux-6.15.1$ 

```

### 3.3 Zbudowanie modułów jądra (parametr j)

Komenda:

```

CC arch/x86/boot/string.o
CC arch/x86/boot/tty.o
CC arch/x86/boot/video.o
CC arch/x86/boot/video-mode.o
CC arch/x86/boot/version.o
CC arch/x86/boot/video-vga.o
CC arch/x86/boot/video-vesa.o
CC arch/x86/boot/video-bios.o
CPUPTR arch/x86/boot/cpustr.h
AS arch/x86/boot/compressed/la57toggle.o
CC arch/x86/boot/compressed/acpi.o
CC arch/x86/boot/compressed/mem.o
CC arch/x86/boot/cpu.o
CC arch/x86/boot/compressed/efi.o
CC arch/x86/boot/compressed/msc.o
LZMA arch/x86/boot/compressed/vmlinuz.bin.lzma
MKPIGGY arch/x86/boot/compressed/piggy.S
AS arch/x86/boot/compressed/piggy.o
LD arch/x86/boot/compressed/vmlinuz
ZOFFSET arch/x86/boot/zoffset.h
OBJCOPY arch/x86/boot/vmlinuz.bin
AS arch/x86/boot/header.o
LD arch/x86/boot/setup.elf
OBJCOPY arch/x86/boot/setup.bin
BUILD arch/x86/boot/bzImage
Kernel: arch/x86/boot/bzImage is ready (#1)
ugslack:/usr/src/linux-6.15.1$ make -j2 modules

```

Wynik:

```

File Edit View Bookmarks Plugins Settings Help
New Tab Split view
LD [M] drivers/i2c/i2c-core.ko
LD [M] drivers/i2c/i2c-smbus.ko
LD [M] drivers/platform/x86/dell/dell-wmi-ddv.ko
LD [M] drivers/virt/vboxguest/vboxguest.ko
LD [M] drivers/virt/virtio.ko
LD [M] drivers/virt/coco/tsm.ko
LD [M] drivers/virt/coco/sev-guest/sev-guest.ko
LD [M] drivers/powercap/intel_rapl_common.ko
LD [M] drivers/powercap/intel_rapl_msr.ko
LD [M] sound/soundcore.ko
LD [M] sound/core/snd.ko
LD [M] sound/core/snd-timer.ko
LD [M] sound/core/snd-pcm.ko
LD [M] sound/pci/snd-intelx80.ko
LD [M] sound/pci/snd-ac97-codec.ko
LD [M] sound/ac97/bus.ko
LD [M] net/802/80822.ko
LD [M] net/802/psmap.ko
LD [M] net/802/stp.ko
LD [M] net/802/garp.ko
LD [M] net/802/rarp.ko
LD [M] net/ipv6/ipv6.ko
LD [M] net/8021q/8021q.ko
LD [M] net/wireless/cfg80211.ko
LD [M] net/l1c/l1c.ko
LD [M] net/rfkill/rfkill.ko
u@slack:/usr/src/linux-6.15.1$ 

```

### 3.4 Instalacja modułów

Komenda:

```

File Edit View Bookmarks Plugins Settings Help
New Tab Split view
LD [M] drivers/i2c/i2c-core.ko
LD [M] drivers/i2c/i2c-smbus.ko
LD [M] drivers/platform/x86/dell/dell-wmi-ddv.ko
LD [M] drivers/virt/vboxguest/vboxguest.ko
LD [M] drivers/platform/x86/wmi.ko
LD [M] drivers/virt/coco/tsm.ko
LD [M] drivers/virt/coco/sev-guest/sev-guest.ko
LD [M] drivers/powercap/intel_rapl_common.ko
LD [M] drivers/powercap/intel_rapl_msr.ko
LD [M] sound/soundcore.ko
LD [M] sound/core/snd.ko
LD [M] sound/core/snd-timer.ko
LD [M] sound/core/snd-pcm.ko
LD [M] sound/pci/snd-intelx80.ko
LD [M] sound/pci/snd-ac97-codec.ko
LD [M] sound/ac97/bus.ko
LD [M] net/802/80822.ko
LD [M] net/802/psmap.ko
LD [M] net/802/stp.ko
LD [M] net/802/garp.ko
LD [M] net/802/rarp.ko
LD [M] net/ipv6/ipv6.ko
LD [M] net/8021q/8021q.ko
LD [M] net/wireless/cfg80211.ko
LD [M] net/l1c/l1c.ko
LD [M] net/rfkill/rfkill.ko
u@slack:/usr/src/linux-6.15.1$ make modules_install

```

Wynik:

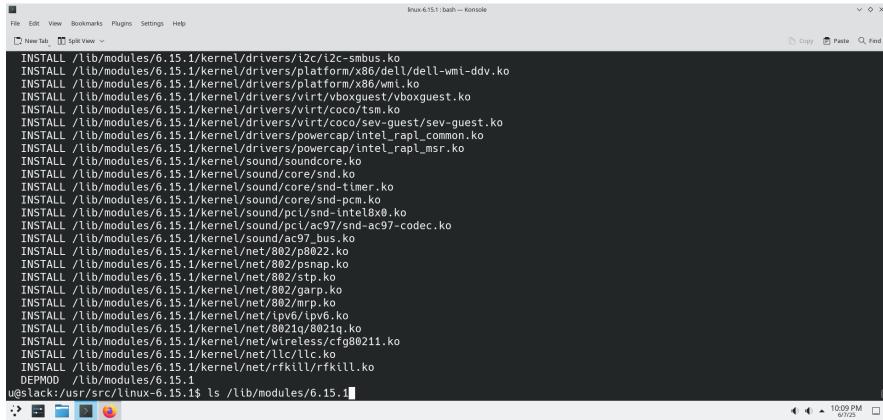
```

File Edit View Bookmarks Plugins Settings Help
New Tab Split view
INSTALL /lib/modules/6.15.1/kernel/drivers/i2c/i2c-smbus.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/platform/x86/dell/dell-wmi-ddv.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/platform/x86/wmi.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/virt/vboxguest/vboxguest.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/virt/coco/tsm.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/virt/coco/sev-guest/sev-guest.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/powercap/intel_rapl_common.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/powercap/intel_rapl_msr.ko
INSTALL /lib/modules/6.15.1/kernel/sound/soundcore.ko
INSTALL /lib/modules/6.15.1/kernel/sound/snd-timer.ko
INSTALL /lib/modules/6.15.1/kernel/sound/snd-pcm.ko
INSTALL /lib/modules/6.15.1/kernel/sound/pci/snd-intelx80.ko
INSTALL /lib/modules/6.15.1/kernel/sound/pci/ac97/snd-ac97-codec.ko
INSTALL /lib/modules/6.15.1/kernel/sound/ac97/bus.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/80822.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/psmap.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/stp.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/garp.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/rarp.ko
INSTALL /lib/modules/6.15.1/kernel/net/ipv6/ipv6.ko
INSTALL /lib/modules/6.15.1/kernel/net/8021q/8021q.ko
INSTALL /lib/modules/6.15.1/kernel/net/wireless/cfg80211.ko
INSTALL /lib/modules/6.15.1/kernel/net/l1c/l1c.ko
INSTALL /lib/modules/6.15.1/kernel/net/rfkill/rfkill.ko
DEPMOD /lib/modules/6.15.1
u@slack:/usr/src/linux-6.15.1$ 

```

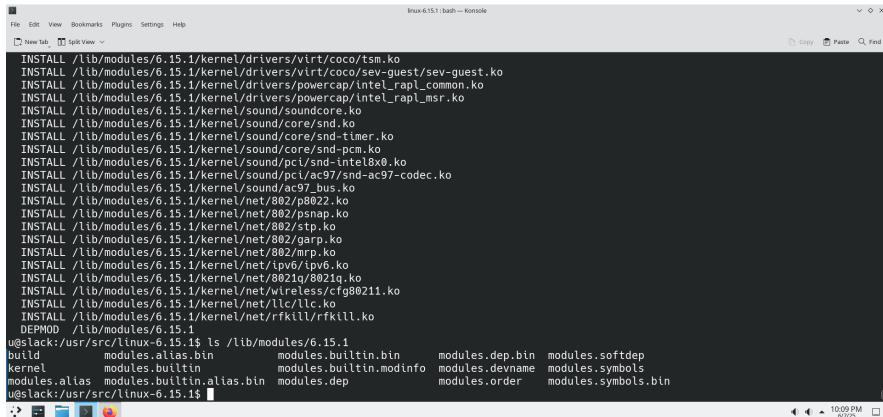
## 3.5 Sprawdzenie zainstalowanych modułów

Komenda:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
Copy Paste Find
linux-6.15.1:bash — Konsola
INSTALL /lib/modules/6.15.1/kernel/drivers/i2c/i2c-smbus.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/platform/x86/dell/dell-wmi-ddv.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/platform/x86/wmi.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/virt/vboxguest/vboxguest.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/virt/coco/tsm.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/virt/coco/sev-guest/sev-guest.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/powercap/intel_rapl_common.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/powercap/intel_rapl_msr.ko
INSTALL /lib/modules/6.15.1/kernel/sound/soundcore.ko
INSTALL /lib/modules/6.15.1/kernel/sound/core/snd-timer.ko
INSTALL /lib/modules/6.15.1/kernel/sound/core/snd-pcm.ko
INSTALL /lib/modules/6.15.1/kernel/sound/pci/snd-intelx8x.ko
INSTALL /lib/modules/6.15.1/kernel/sound/pci/ac97/snd-ac97-codec.ko
INSTALL /lib/modules/6.15.1/kernel/sound/ac97_bus.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/p8022.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/psnap.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/stp.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/garp.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/mpk.ko
INSTALL /lib/modules/6.15.1/kernel/net/ipv6/ipv6.ko
INSTALL /lib/modules/6.15.1/kernel/net/8021q/8021q.ko
INSTALL /lib/modules/6.15.1/kernel/net/wireless/cfg80211.ko
INSTALL /lib/modules/6.15.1/kernel/net/llc/lhc.ko
INSTALL /lib/modules/6.15.1/kernel/net/rfkill/rfkill.ko
DEPMOD /lib/modules/6.15.1
u@slack:/usr/src/linux-6.15.1$ ls /lib/modules/6.15.1
```

Wynik:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
Copy Paste Find
linux-6.15.1:bash — Konsola
INSTALL /lib/modules/6.15.1/kernel/drivers/virt/coco/tsm.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/virt/coco/sev-guest/sev-guest.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/powercap/intel_rapl_common.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/powercap/intel_rapl_msr.ko
INSTALL /lib/modules/6.15.1/kernel/sound/soundcore.ko
INSTALL /lib/modules/6.15.1/kernel/sound/core/snd.ko
INSTALL /lib/modules/6.15.1/kernel/sound/core/snd-timer.ko
INSTALL /lib/modules/6.15.1/kernel/sound/core/snd-pcm.ko
INSTALL /lib/modules/6.15.1/kernel/sound/pci/ac97/snd-ac97-codec.ko
INSTALL /lib/modules/6.15.1/kernel/sound/ac97_bus.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/p8022.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/psnap.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/stp.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/garp.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/mpk.ko
INSTALL /lib/modules/6.15.1/kernel/net/ipv6/ipv6.ko
INSTALL /lib/modules/6.15.1/kernel/net/8021q/8021q.ko
INSTALL /lib/modules/6.15.1/kernel/net/wireless/cfg80211.ko
INSTALL /lib/modules/6.15.1/kernel/net/llc/lhc.ko
INSTALL /lib/modules/6.15.1/kernel/net/rfkill/rfkill.ko
DEPMOD /lib/modules/6.15.1
u@slack:/usr/src/linux-6.15.1$ ls /lib/modules/6.15.1
build modules.alias.bin modules.builtin.bin modules.dep.bin modules.softdep
kernel modules.builtin modules.builtin.modinfo modules.devname modules.symbols
modules.alias modules.builtin.alias.bin modules.dep modules.order modules.symbols.bin
u@slack:/usr/src/linux-6.15.1$
```

## 3.6 Przekopiowanie plików kernela do systemu

### 3.6.1 Przekopiowanie obrazu jądra do katalogu boot

Komenda:

```

File Edit View Bookmarks Plugins Settings Help
New Tab Split View
INSTALL /lib/modules/6.15.1/kernel/drivers/virt/coco/tsm.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/virt/coco/sev-guest/sev-guest.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/powercap/intel_rapl_common.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/powercap/intel_rapl_msr.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/sound/core/snd.ko
INSTALL /lib/modules/6.15.1/kernel/sound/soundcore.ko
INSTALL /lib/modules/6.15.1/kernel/sound/core/snd-timer.ko
INSTALL /lib/modules/6.15.1/kernel/sound/core/snd-pcm.ko
INSTALL /lib/modules/6.15.1/kernel/sound/pct/snd-intel8x0.ko
INSTALL /lib/modules/6.15.1/kernel/sound/pct/ac97/snd-ac97-codec.ko
INSTALL /lib/modules/6.15.1/kernel/sound/ac97/snd-ac97-bus.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/p8022.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/psnap.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/stp.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/garp.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/ip6.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/llc.ko
INSTALL /lib/modules/6.15.1/kernel/net/wireless/tg80211.ko
INSTALL /lib/modules/6.15.1/kernel/net/l1c/llc.ko
INSTALL /lib/modules/6.15.1/kernel/net/rfkill/rfkill.ko
DEPMOD /lib/modules/6.15.1
ug@slack:/usr/src/linux-6.15.1$ ls /lib/modules/6.15.1
build modules.alias.bin modules.builtin.bin modules.dep.bin modules.softdep
kernel modules.builtin modules.builtin.modinfo modules.devname modules.symbols
modules.alias modules.builtin.alias.bin modules.dep modules.order modules.symbols.bin
ug@slack:/usr/src/linux-6.15.1$ cp arch/x86_64/boot/bzImage /boot/vmlinuz-custom-6.15.1

```

Wynik:

```

File Edit View Bookmarks Plugins Settings Help
New Tab Split View
INSTALL /lib/modules/6.15.1/kernel/drivers/virt/coco/sev-guest/sev-guest.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/powercap/intel_rapl_common.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/powercap/intel_rapl_msr.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/sound/core/snd.ko
INSTALL /lib/modules/6.15.1/kernel/sound/soundcore.ko
INSTALL /lib/modules/6.15.1/kernel/sound/core/snd-timer.ko
INSTALL /lib/modules/6.15.1/kernel/sound/core/snd-pcm.ko
INSTALL /lib/modules/6.15.1/kernel/sound/pct/snd-intel8x0.ko
INSTALL /lib/modules/6.15.1/kernel/sound/pct/ac97/snd-ac97-codec.ko
INSTALL /lib/modules/6.15.1/kernel/sound/ac97/snd-ac97-bus.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/p8022.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/psnap.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/stp.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/garp.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/ip6.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/llc.ko
INSTALL /lib/modules/6.15.1/kernel/net/wireless/tg80211.ko
INSTALL /lib/modules/6.15.1/kernel/net/l1c/llc.ko
INSTALL /lib/modules/6.15.1/kernel/net/rfkill/rfkill.ko
DEPMOD /lib/modules/6.15.1
ug@slack:/usr/src/linux-6.15.1$ ls /lib/modules/6.15.1
build modules.alias.bin modules.builtin.bin modules.dep.bin modules.softdep
kernel modules.builtin modules.builtin.modinfo modules.devname modules.symbols
modules.alias modules.builtin.alias.bin modules.dep modules.order modules.symbols.bin
ug@slack:/usr/src/linux-6.15.1$ cp arch/x86_64/boot/bzImage /boot/vmlinuz-custom-6.15.1

```

### 3.6.2 Przekopiowanie tablicy symboli używanych przez kernel

Wynik:

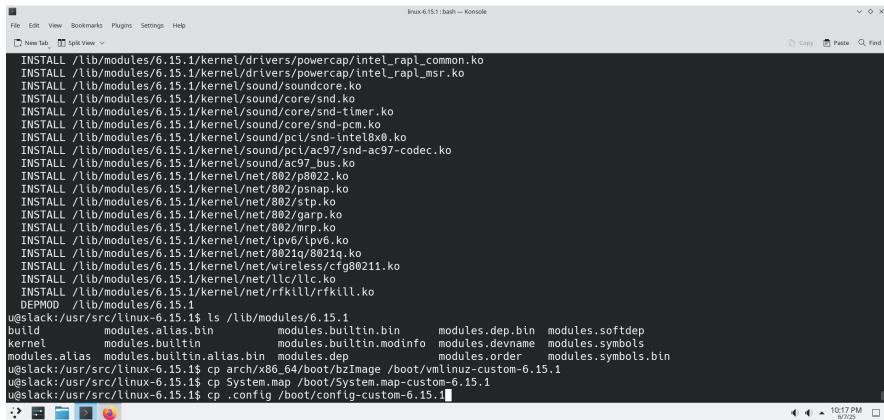
```

File Edit View Bookmarks Plugins Settings Help
New Tab Split View
INSTALL /lib/modules/6.15.1/kernel/drivers/powercap/intel_rapl_common.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/powercap/intel_rapl_msr.ko
INSTALL /lib/modules/6.15.1/kernel/sound/soundcore.ko
INSTALL /lib/modules/6.15.1/kernel/sound/core/snd.ko
INSTALL /lib/modules/6.15.1/kernel/sound/core/snd-timer.ko
INSTALL /lib/modules/6.15.1/kernel/sound/core/snd-pcm.ko
INSTALL /lib/modules/6.15.1/kernel/sound/pct/snd-intel8x0.ko
INSTALL /lib/modules/6.15.1/kernel/sound/pct/ac97/snd-ac97-codec.ko
INSTALL /lib/modules/6.15.1/kernel/sound/ac97/snd-ac97-bus.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/p8022.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/psnap.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/stp.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/garp.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/mpn.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/llc.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/llc.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/llc.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/llc.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/llc.ko
DEPMOD /lib/modules/6.15.1
ug@slack:/usr/src/linux-6.15.1$ ls /lib/modules/6.15.1
build modules.alias.bin modules.builtin.bin modules.dep.bin modules.softdep
kernel modules.builtin modules.builtin.modinfo modules.devname modules.symbols
modules.alias modules.builtin.alias.bin modules.dep modules.order modules.symbols.bin
ug@slack:/usr/src/linux-6.15.1$ cp System.map /boot/System.map-custom-6.15.1
ug@slack:/usr/src/linux-6.15.1$ 

```

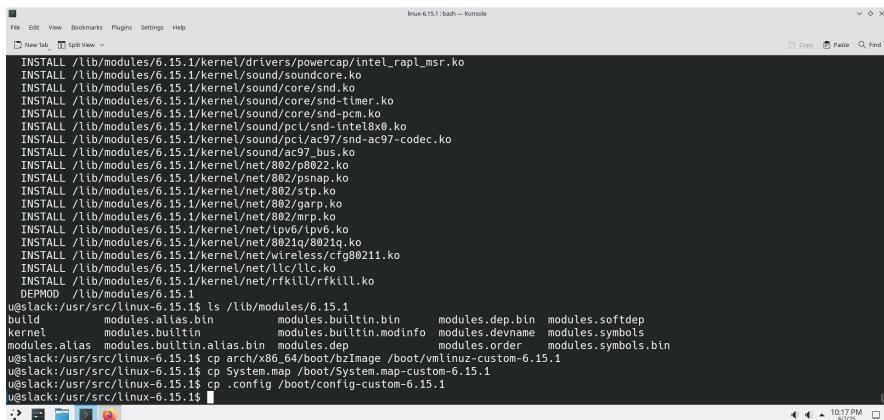
### 3.6.3 Przekopiowanie pliku konfiguracyjnego kernela

Komenda:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View v
Copy Paste Find
INSTALL /lib/modules/6.15.1/kernel/drivers/powercap/intel_rapl_common.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/powercap/intel_rapl_msr.ko
INSTALL /lib/modules/6.15.1/kernel/sound/soundcore.ko
INSTALL /lib/modules/6.15.1/kernel/sound/core/snd_ko
INSTALL /lib/modules/6.15.1/kernel/sound/core/snd-timer.ko
INSTALL /lib/modules/6.15.1/kernel/sound/core/snd-pcm.ko
INSTALL /lib/modules/6.15.1/kernel/sound/pci/snd-intelbx0.ko
INSTALL /lib/modules/6.15.1/kernel/sound/pci/ac97_bus.ko
INSTALL /lib/modules/6.15.1/kernel/sound/pci/ac97-codec.ko
INSTALL /lib/modules/6.15.1/kernel/net/po022.ko
INSTALL /lib/modules/6.15.1/kernel/net/po021q.ko
INSTALL /lib/modules/6.15.1/kernel/net/8021q.ko
INSTALL /lib/modules/6.15.1/kernel/net/8021st.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/garp.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/mrp.ko
INSTALL /lib/modules/6.15.1/kernel/net/ipv6.ko
INSTALL /lib/modules/6.15.1/kernel/net/8021q/8021q.ko
INSTALL /lib/modules/6.15.1/kernel/net/wireless/cfg80211.ko
INSTALL /lib/modules/6.15.1/kernel/net/l1c/l1cc.ko
INSTALL /lib/modules/6.15.1/kernel/net/rfkill/rfkill.ko
DEPMOD /lib/modules/6.15.1
u@slack:/usr/src/linux-6.15.1$ ls /lib/modules/6.15.1
bin modules.builtin modules.builtin.bin modules.dep bin modules.softdep
Kernel modules.builtin modules.builtin.modinfo modules.devname modules.symbols
modules.alias modules.builtin.alias.bin modules.dep modules.order modules.symbols.bin
u@slack:/usr/src/linux-6.15.1$ cp arch/x86_64/boot/bzImage /boot/vmlinuz-custom-6.15.1
u@slack:/usr/src/linux-6.15.1$ cp System.map /boot/System.map-custom-6.15.1
u@slack:/usr/src/linux-6.15.1$ cp .config /boot/config-custom-6.15.1
u@slack:/usr/src/linux-6.15.1$
```

Wynik:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View v
Copy Paste Find
INSTALL /lib/modules/6.15.1/kernel/drivers/powercap/intel_rapl_msr.ko
INSTALL /lib/modules/6.15.1/kernel/sound/soundcore.ko
INSTALL /lib/modules/6.15.1/kernel/sound/core/snd_ko
INSTALL /lib/modules/6.15.1/kernel/sound/core/snd-timer.ko
INSTALL /lib/modules/6.15.1/kernel/sound/core/snd-pcm.ko
INSTALL /lib/modules/6.15.1/kernel/sound/pci/snd-intelbx0.ko
INSTALL /lib/modules/6.15.1/kernel/sound/pci/ac97_bus.ko
INSTALL /lib/modules/6.15.1/kernel/net/po022.ko
INSTALL /lib/modules/6.15.1/kernel/net/po021q.ko
INSTALL /lib/modules/6.15.1/kernel/net/8021q.ko
INSTALL /lib/modules/6.15.1/kernel/net/8021st.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/garp.ko
INSTALL /lib/modules/6.15.1/kernel/net/802/mrp.ko
INSTALL /lib/modules/6.15.1/kernel/net/ipv6.ko
INSTALL /lib/modules/6.15.1/kernel/net/8021q/8021q.ko
INSTALL /lib/modules/6.15.1/kernel/net/wireless/cfg80211.ko
INSTALL /lib/modules/6.15.1/kernel/net/l1c/l1cc.ko
INSTALL /lib/modules/6.15.1/kernel/net/rfkill/rfkill.ko
DEPMOD /lib/modules/6.15.1
u@slack:/usr/src/linux-6.15.1$ ls /lib/modules/6.15.1
bin modules.builtin modules.builtin.bin modules.dep bin modules.softdep
Kernel modules.builtin modules.builtin.modinfo modules.devname modules.symbols
modules.alias modules.builtin.alias.bin modules.dep modules.order modules.symbols.bin
u@slack:/usr/src/linux-6.15.1$ cp arch/x86_64/boot/bzImage /boot/vmlinuz-custom-6.15.1
u@slack:/usr/src/linux-6.15.1$ cp System.map /boot/System.map-custom-6.15.1
u@slack:/usr/src/linux-6.15.1$ cp .config /boot/config-custom-6.15.1
u@slack:/usr/src/linux-6.15.1$
```

## 3.7 Utworzenie linku symbolicznego w systemie dla tablicy symboli kernela

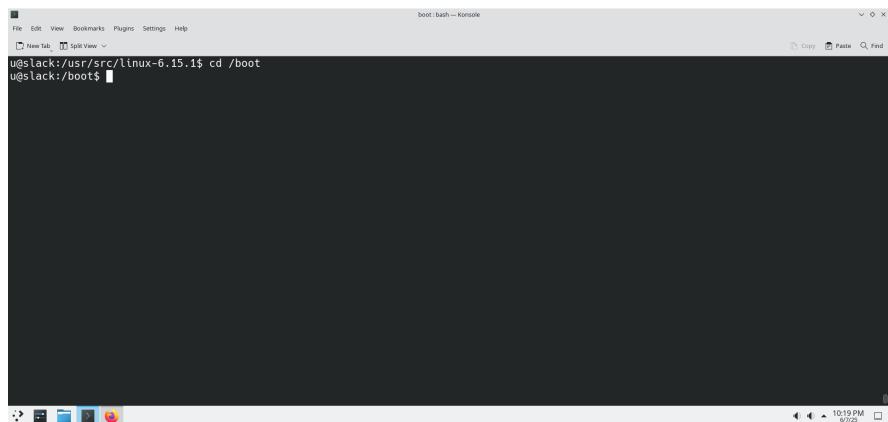
### 3.7.1 Przejście do katalogu boot

Komenda:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/usr/src/linux-6.15.1$ cd /boot
```

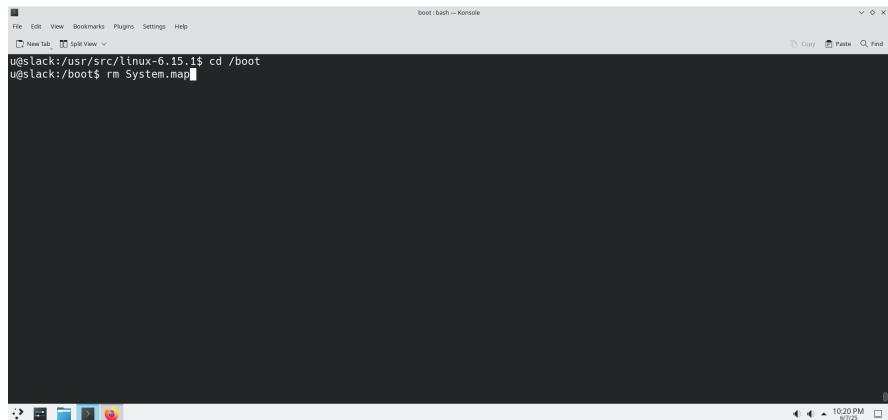
Wynik:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/usr/src/linux-6.15.1$ cd /boot
u@slack:/boot$
```

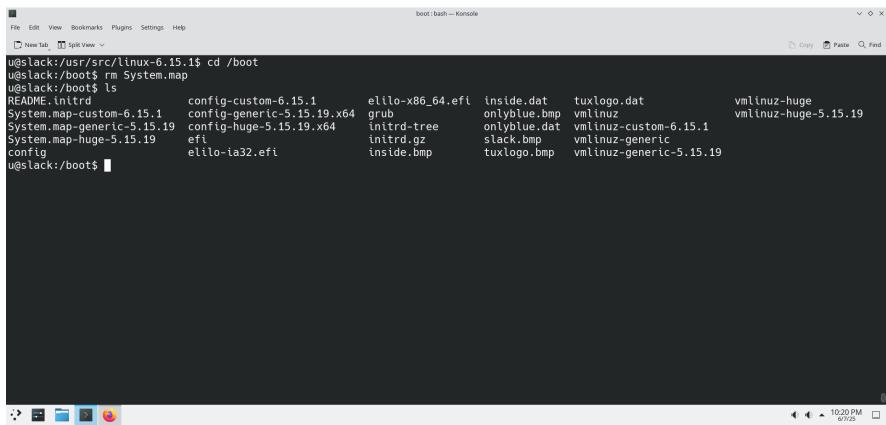
### 3.7.2 Usunięcie starej tablicy symboli

Komenda:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/usr/src/linux-6.15.1$ cd /boot
u@slack:/boot$ rm System.map
```

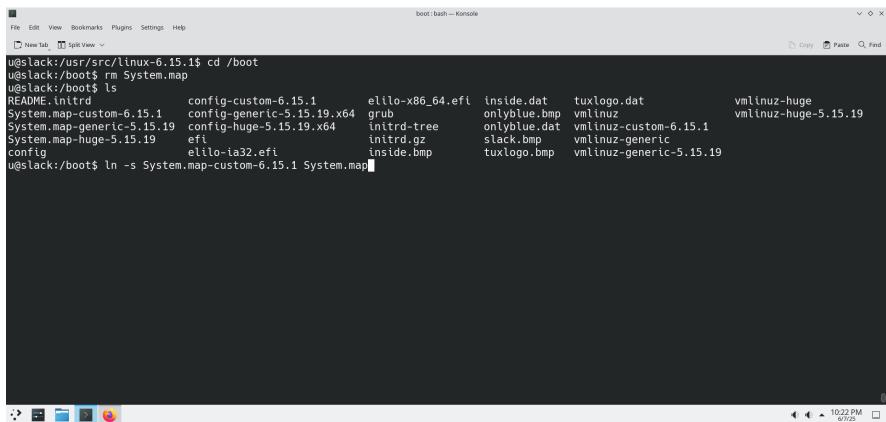
Wynik:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
ug$slack:/usr/src/linux-6.15.1$ cd /boot
ug$slack:/boot$ rm System.map
ug$slack:/boot$ ls
README.initrd config-custom-6.15.1 elilo-x86_64.efi inside.dat tuxlogo.dat vmlinuz-huge
System.map-custom-6.15.1 config-generic-5.15.19.x64 grub onlyblue.bmp vmlinuz vmlinuz-huge-5.15.19
System.map-generic-5.15.19 config-huge-5.15.19.x64 initrd-tree onlyblue.dat vmlinuz-custom-6.15.1
System.map-huge-5.15.19 efi initrd.gz slack.bmp vmlinuz-generic
config elilo-ia32.efi inside.bmp tuxlogo.bmp vmlinuz-generic-5.15.19
ug$slack:/boot$
```

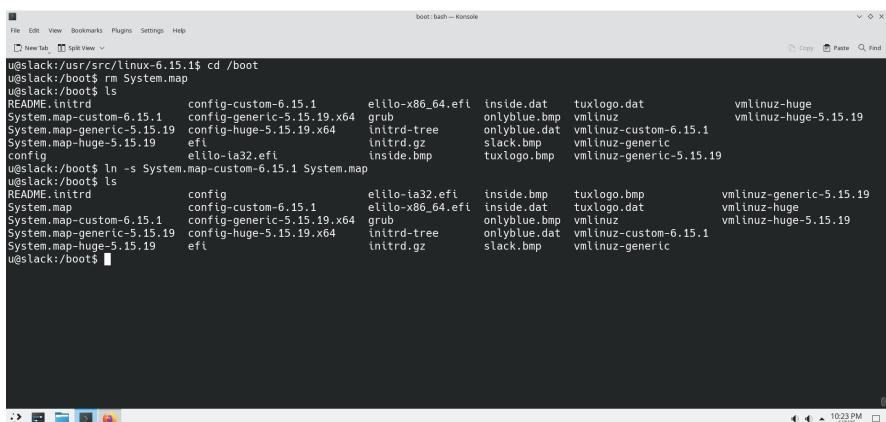
### 3.7.3 Utworzenie linku symbolicznego

Komenda:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
ug$slack:/usr/src/linux-6.15.1$ cd /boot
ug$slack:/boot$ rm System.map
ug$slack:/boot$ ls
README.initrd config-custom-6.15.1 elilo-x86_64.efi inside.dat tuxlogo.dat vmlinuz-huge
System.map-custom-6.15.1 config-generic-5.15.19.x64 grub onlyblue.bmp vmlinuz vmlinuz-huge-5.15.19
System.map-generic-5.15.19 config-huge-5.15.19.x64 initrd-tree onlyblue.dat vmlinuz-custom-6.15.1
System.map-huge-5.15.19 efi initrd.gz slack.bmp vmlinuz-generic
config elilo-ia32.efi inside.bmp tuxlogo.bmp vmlinuz-generic-5.15.19
ug$slack:/boot$ ln -s System.map-custom-6.15.1 System.map
ug$slack:/boot$
```

Wynik:

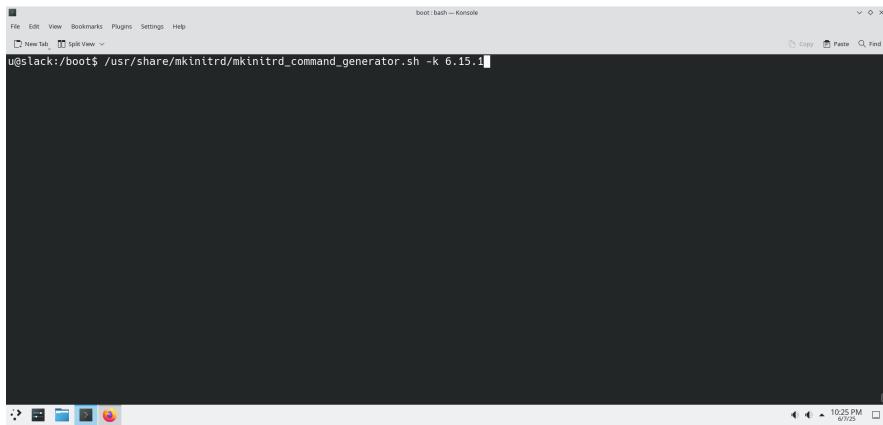


```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
ug$slack:/usr/src/linux-6.15.1$ cd /boot
ug$slack:/boot$ rm System.map
ug$slack:/boot$ ls
README.initrd config config-ia32.efi elilo-ia32.efi inside.bmp tuxlogo.bmp vmlinuz-generic-5.15.19
System.map config-custom-6.15.1 config-generic-5.15.19.x64 elilo-x86_64.efi inside.dat tuxlogo.dat vmlinuz-huge
System.map-custom-6.15.1 config-huge-5.15.19.x64 initrd-tree onlyblue.dat vmlinuz vmlinuz-huge-5.15.19
System.map-generic-5.15.19 config-ia32.efi elilo-ia32.efi inside.bmp tuxlogo.bmp vmlinuz-generic-5.15.19
System.map-huge-5.15.19 efi initrd.gz slack.bmp vmlinuz-generic
ug$slack:/boot$
```

## 3.8 Utworzenie dysku ram

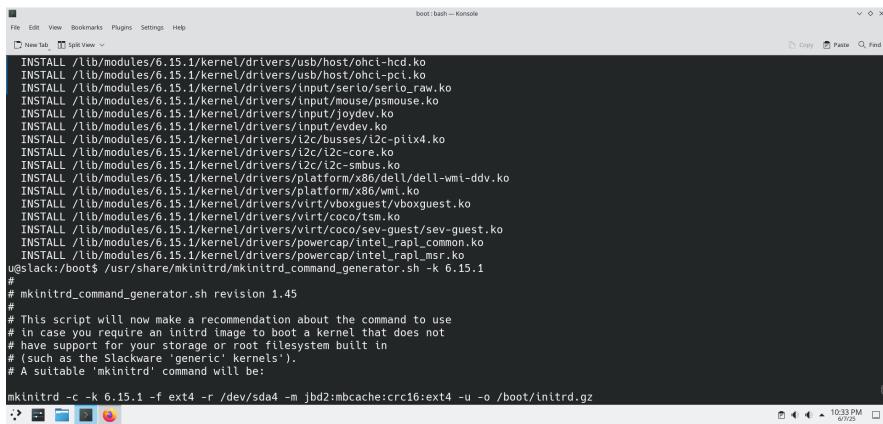
### 3.8.1 Wywołanie skryptu generującego komendę do wykonania

Komenda:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/boot$ /usr/share/mkinitrd/mkinitrd_command_generator.sh -k 6.15.1
```

Wynik:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
INSTALL /lib/modules/6.15.1/kernel/drivers/usb/host/ohci-hcd.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/usb/host/ohci-pci.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/input/serio/serio_raw.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/input/mouse/psmouse.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/input/joydev.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/input/evdev.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/i2c/busses/i2c-pix4.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/i2c/i2c-core.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/i2c/i2c-smbus.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/platform/x86/dell/wmi-ddv.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/platform/x86/wmi.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/virt/kvm.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/virt/coco/tsm.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/virt/coco/sev-quest/sev-quest.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/powercap/intel_rapl_common.ko
INSTALL /lib/modules/6.15.1/kernel/drivers/powercap/intel_rapl_msr.ko
u@slack:/boot$ /usr/share/mkinitrd/mkinitrd_command_generator.sh -k 6.15.1
#
# mkinitrd_command_generator.sh revision 1.45
#
# This script will now make a recommendation about the command to use
# in case you require an initrd image to boot a kernel that does not
# have support for your storage or root filesystem built in
# (such as the Slackware 'generic' kernels').
# A suitable 'mkinitrd' command will be:
mkinitrd -c -k 6.15.1 -f ext4 -r /dev/sda4 -m jbd2:mbcache:crc16:ext4 -u -o /boot/initrd.gz
```

### 3.8.2 Wywołanie skryptu generującego komendę do wykonania

W tym etapie musiałem również utworzyć customowy plik **initrd-custom-6.15.1.gz**, aby móc podać go w komendzie. W późniejszym etapie zostanie on również wpisany w pliku elilo.conf.

Komenda:

```

# A suitable 'mkinitrd' command will be:
mkinitrd -c -k 6.15.1 -f ext4 -r /dev/sda4 -m jbd2:mbcache:crc16:ext4 -u -o /boot/initrd.gz
ug@slack:/boot$ ls
README.initrd          config           elilo-ia32.efi    inside.bmp   tuxlogo.bmp      vmlinuz-generic-6.15.19
System.map              config-custom-6.15.1  elilo-x86_64.efi inside.dat    tuxlogo.dat      vmlinuz-huge
System.map-custom-6.15.1 config-generic-5.15.19.x64 grub           onlyblue.bmp   vmlinuz-generic-5.15.19
System.map-generic-5.15.19 config-huge-5.15.19.x64 initrd-tree   slack.bmp     vmlinuz-generic-5.15.19
System.map-huge-5.15.19 efi             initrd.gz     tuxlogo.bmp   vmlinuz-huge
config                 elilo-ia32.efi    inside.dat    tuxlogo.dat   vmlinuz-huge-5.15.19
ug@slack:/boot$ cp initrd.gz initrd-custom-6.15.1
ug@slack:/boot$ ls
README.initrd          config           elilo-ia32.efi    initrd-tree  onlyblue.dat  vmlinuz-custom-6.15.1
System.map              config-custom-6.15.1  elilo-x86_64.efi initrd.gz   slack.bmp     vmlinuz-generic
System.map-custom-6.15.1 config-generic-5.15.19.x64 grub           inside.bmp   tuxlogo.bmp   vmlinuz-generic-5.15.19
System.map-generic-5.15.19 config-huge-5.15.19.x64 initrd-custom-6.15.1  inside.dat  tuxlogo.dat   vmlinuz-huge
System.map-huge-5.15.19 efi             initrd-custom-6.15.1.gz onlyblue.bmp vmlinuz-huge-5.15.19
ug@slack:/boot$ mkinitrd -c -k 6.15.1 -f ext4 -r /dev/sda4 -m jbd2:mbcache:crc16:ext4 -u -o /boot/initrd.gz
intrad-custom-6.15.1   initrd-custom-6.15.1.gz
ug@slack:/boot$ mkinitrd -c -k 6.15.1 -f ext4 -r /dev/sda4 -m jbd2:mbcache:crc16:ext4 -u -o /boot/initrd-custom-6.15.1.gz

```

Wynik:

```

ug@slack:/boot$ cp initrd.gz initrd-custom-6.15.1.gz
ug@slack:/boot$ ls
README.initrd          config           elilo-ia32.efi    initrd-tree  onlyblue.dat  vmlinuz-custom-6.15.1
System.map              config-custom-6.15.1  elilo-x86_64.efi initrd.gz   slack.bmp     vmlinuz-generic
System.map-custom-6.15.1 config-generic-5.15.19.x64 grub           inside.bmp   tuxlogo.bmp   vmlinuz-generic-5.15.19
System.map-generic-5.15.19 config-huge-5.15.19.x64 initrd-tree   slack.bmp     vmlinuz-generic-5.15.19
System.map-huge-5.15.19 efi             initrd.gz     tuxlogo.bmp   vmlinuz-huge
config                 elilo-ia32.efi    inside.dat    tuxlogo.dat   vmlinuz-huge-5.15.19
ug@slack:/boot$ mkinitrd -c -k 6.15.1 -f ext4 -r /dev/sda4 -m jbd2:mbcache:crc16:ext4 -u -o /boot/initrd-tree
0x0000000000000000 /lib/modules/6.15.1/kernel/fs/mbcache.ko added.
OK: /lib/modules/6.15.1/kernel/fs/jbd2/jbd2.ko added.
OK: /lib/modules/6.15.1/kernel/fs/jbd2/jbd2.ko added.
OK: /lib/modules/6.15.1/kernel/fs/mbcache.ko added.
OK: /lib/modules/6.15.1/kernel/lib/crc16.ko added.
OK: /lib/modules/6.15.1/kernel/fs/ext4/ext4.ko added.
54824 blocks
/boot/initrd-custom-6.15.1.gz created.
Be sure to run lilo again if you use it.
ug@slack:/boot$ 

```

### 3.9 Ponowna konfiguracja GRUB

Komenda:

```

ug@slack:/boot$ cp initrd.gz initrd-custom-6.15.1.gz
ug@slack:/boot$ ls
README.initrd          config           elilo-ia32.efi    initrd-tree  onlyblue.dat  vmlinuz-custom-6.15.1
System.map              config-custom-6.15.1  elilo-x86_64.efi initrd.gz   slack.bmp     vmlinuz-generic
System.map-custom-6.15.1 config-generic-5.15.19.x64 grub           inside.bmp   tuxlogo.bmp   vmlinuz-generic-5.15.19
System.map-generic-5.15.19 config-huge-5.15.19.x64 initrd-tree   slack.bmp     vmlinuz-generic-5.15.19
System.map-huge-5.15.19 efi             initrd.gz     tuxlogo.bmp   vmlinuz-huge
config                 elilo-ia32.efi    inside.dat    tuxlogo.dat   vmlinuz-huge-5.15.19
ug@slack:/boot$ mkinitrd -c -k 6.15.1 -f ext4 -r /dev/sda4 -m jbd2:mbcache:crc16:ext4 -u -o /boot/initrd-tree
intrad-custom-6.15.1   initrd-custom-6.15.1.gz
ug@slack:/boot$ grub-mkconfig -o /boot/grub/grub.cfg
0x0000000000000000 /lib/modules/6.15.1/kernel/fs/jbd2/jbd2.ko added.
OK: /lib/modules/6.15.1/kernel/fs/mbcache.ko added.
OK: /lib/modules/6.15.1/kernel/fs/jbd2/jbd2.ko added.
OK: /lib/modules/6.15.1/kernel/fs/mbcache.ko added.
OK: /lib/modules/6.15.1/kernel/lib/crc16.ko added.
OK: /lib/modules/6.15.1/kernel/fs/ext4/ext4.ko added.
54824 blocks
/boot/initrd-custom-6.15.1.gz created.
Be sure to run lilo again if you use it.
ug@slack:/boot$ grub-mkconfig -o /boot/grub/grub.cfg

```

Wynik:

```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
OK: /lib/modules/6.15.1/kernel/fs/mbcache.ko added.
OK: /lib/modules/6.15.1/kernel/lib/crc16.ko added.
OK: /lib/modules/6.15.1/kernel/fs/jbd2/libjbd2.ko added.
OK: /lib/modules/6.15.1/kernel/fs/mccache.ko added.
OK: /lib/modules/6.15.1/kernel/lib/crc16.ko added.
OK: /lib/modules/6.15.1/kernel/fs/ext4/ext4.ko added.
54824 blocks
/pboot/initrd-custom-6.15.1.gz created.
Be sure to run lilo again if you use it.
ug$slack:/boot$ grub-mkconfig -o /boot/grub/grub.cfg
Generating grub configuration file ...
Found linux image: /boot/vmlinuz-huge-5.15.19
Found initrd image: /boot/initrd.gz
Found linux image: /boot/vmlinuz-huge
Found initrd image: /boot/initrd.gz
Found initrd image: /boot/initrd-generic-5.15.19
Found initrd image: /boot/initrd.gz
Found linux image: /boot/vmlinuz-generic
Found initrd image: /boot/initrd.gz
Found initrd image: /boot/vmlinuz-custom-6.15.1
Found initrd image: /boot/initrd.gz
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
ug$slack:/boot$
```

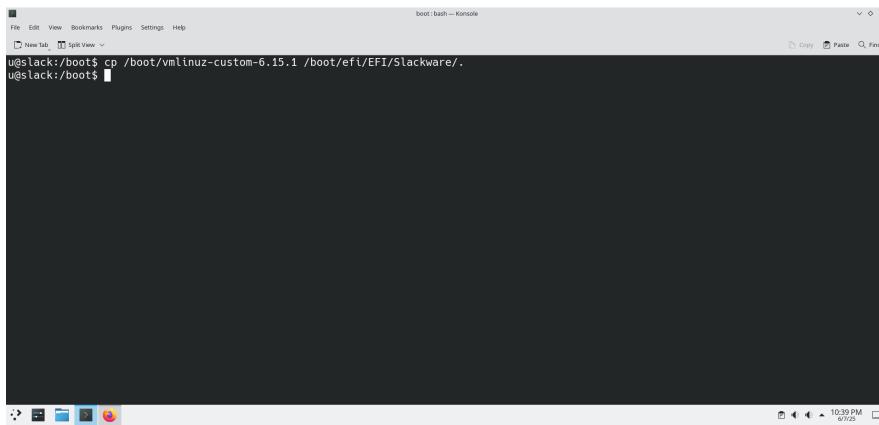
## 3.10 Skopiowanie obrazu jądra oraz ramdisku na partycję EFI

### 3.10.1 Jądro linux

Komenda:

```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
ug$slack:/boot$ cp /boot/vmlinuz-custom-6.15.1 /boot/efi/EFI/Slackware/.
```

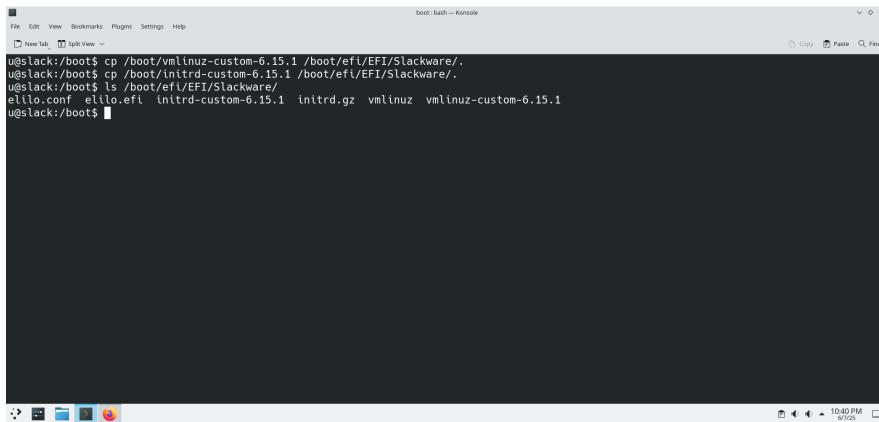
Wynik:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/boot$ cp /boot/vmlinuz-custom-6.15.1 /boot/efi/EFI/Slackware/
u@slack:/boot$
```

### 3.10.2 Ramdisk

Wynik:

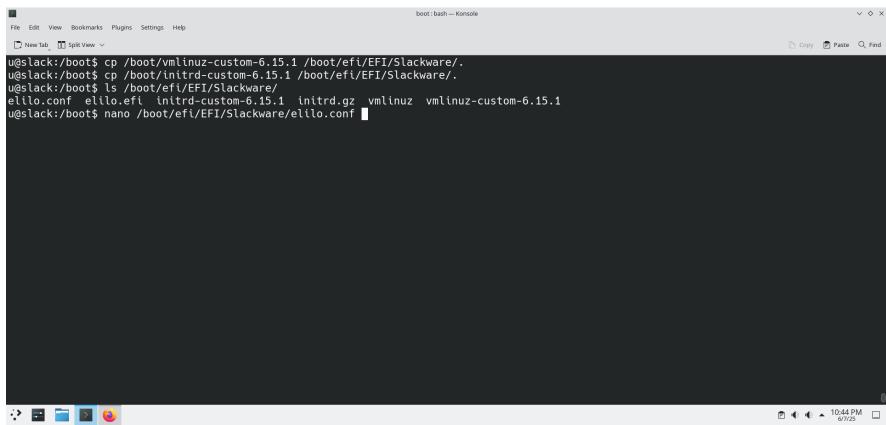


```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/boot$ cp /boot/vmlinuz-custom-6.15.1 /boot/efi/EFI/Slackware/
u@slack:/boot$ cp /boot/initrd-custom-6.15.1 /boot/efi/EFI/Slackware/
u@slack:/boot$ ls /boot/efi/EFI/Slackware/
elilo.conf
u@slack:/boot$
```

## 3.11 Dodanie nowego wpisy do konfiguracji bootloadera elilo

### 3.11.1 Edycja pliku elilo.conf

Komenda:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
ugslack:/boot$ cp /boot/vmlinuz-custom-6.15.1 /boot/efi/EFI/Slackware/
ugslack:/boot$ cp /boot/initrd-custom-6.15.1 /boot/efi/EFI/Slackware/
ugslack:/boot$ ls /boot/efi/EFI/Slackware/
ellilo.conf elilo.efi initrd-custom-6.15.1 initrd.gz vmlinuz vmlinuz-custom-6.15.1
ugslack:/boot$ nano /boot/efi/EFI/Slackware/ellilo.conf
```

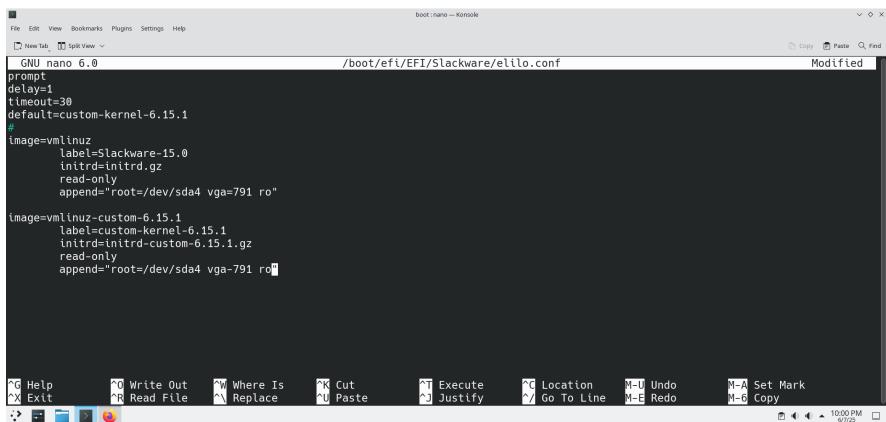
Wynik:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
GNU nano 6.0 /boot/efi/EFI/Slackware/ellilo.conf
choosersimple
delay=1
timeout=1
#
image=vmlinuz
label=vmlinuz
initrd=initrd.gz
read-only
append="root=/dev/sda4 vga=normal ro"
```

### 3.11.2 Modyfikacja pliku

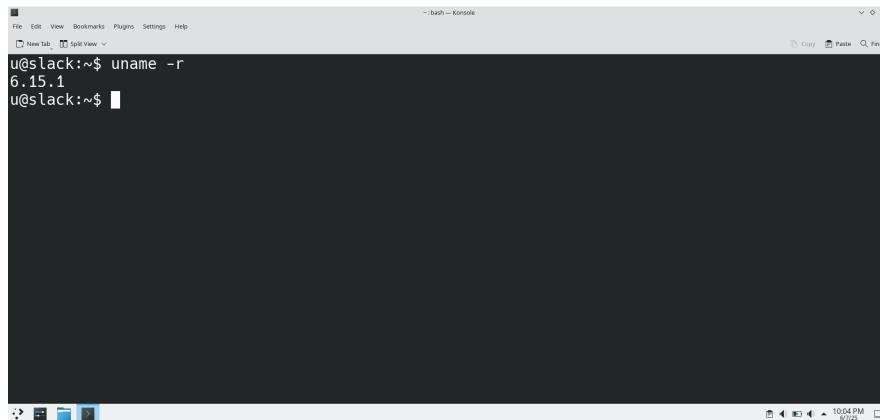
Wynik:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
GNU nano 6.0 /boot/efi/EFI/Slackware/ellilo.conf Modified
prompt
delay=1
timeout=30
default=custom-kernel-6.15.1
#
image=vmlinuz
label=Slackware-15.0
initrd=initrd.gz
read-only
append="root=/dev/sda4 vga=791 ro"
image=vmlinuz-custom-6.15.1
label=custom-kernel-6.15.1
initrd=initrd-custom-6.15.1.gz
read-only
append="root=/dev/sda4 vga=791 ro"
```

### 3.12 Pokazanie zmienonego kernela w systemie

Udało się bez problemu zkonfigurować kernel starym sposobem.



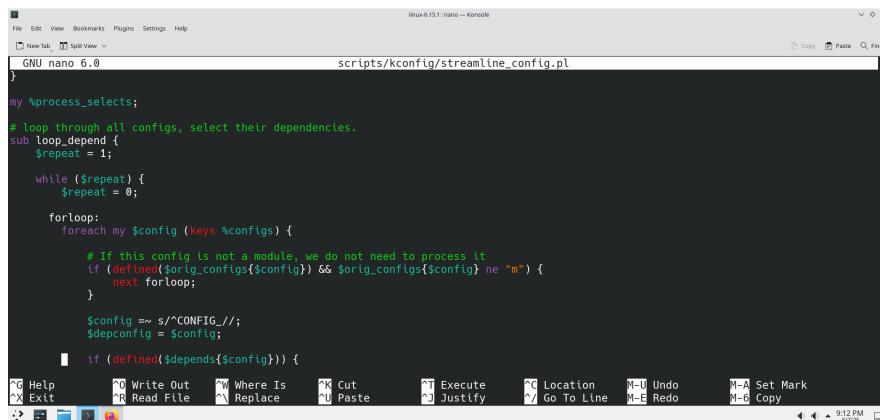
```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View ~ bash -- Konsole
u@slack:~$ uname -r
6.15.1
u@slack:~$
```

## 4 Nowy sposób

### 4.1 konfiguracja jądra w starym sposobie

#### 4.1.1 Sprawdzenie skryptu do tworzenia pliku .config tylko z tymi modułami, które używamy (nowa metoda)

Wynik:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View linus-6.15.1-nano -- Konsole
scripts/kconfig/streamline_config.pl
scripts/kconfig/zconfdump
scripts/kconfig/zconfupdate
scripts/kconfig/zconfupdate-orig
scripts/kconfig/zconfupdate-new
```

Uruchomienie skryptu komendą `./scripts/kconfig/streamline_config.pl`. Powoduje to zapisu nowej konfiguracji do pliku `.config`

```

File Edit View Bookmarks Plugins Settings Help
New Tab Split View
# CONFIG_TEST_LKM is not set
# CONFIG_TEST_BITOPS is not set
# CONFIG_TEST_IODC is not set
# CONFIG_TEST_USER_COPY is not set
# CONFIG_TEST_BPF is not set
# CONFIG_TEST_BLACKHOLE_DEV is not set
# CONFIG_FIND_BIT_BENCHMARK is not set
# CONFIG_TEST_FIRMWARE is not set
# CONFIG_TEST_SYSCTL is not set
# CONFIG_TEST_UDELAY is not set
# CONFIG_TEST_STATIC_KEYS is not set
# CONFIG_TEST_KMOD is not set
# CONFIG_TEST_MEMCAT_P is not set
# CONFIG_TEST_OBJAGG is not set
# CONFIG_TEST_MEMORY is not set
# CONFIG_TEST_HWM is not set
# CONFIG_TEST_FREE_PAGES is not set
# CONFIG_TEST_FPU is not set
# CONFIG_TEST_CLOCKSOURCE_WATCHDOG is not set
CONFIG_ARC_TEST_MENTEST=y
CONFIG_MENTEST=y
# CONFIG_HYPERV_TESTING is not set
# end of Kernel Testing and Coverage
# end of Kernel hacking
module fb_sys_fops did not have configs CONFIG_FB_SYSMEM_FOPS
u@slack:/usr/src/linux-6.15.1$ 

```

#### 4.1.2 Sprawdzenie aktualnie załadowanych modułów

Komenda:

```

File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/usr/src/linux-6.15.1$ lsmod

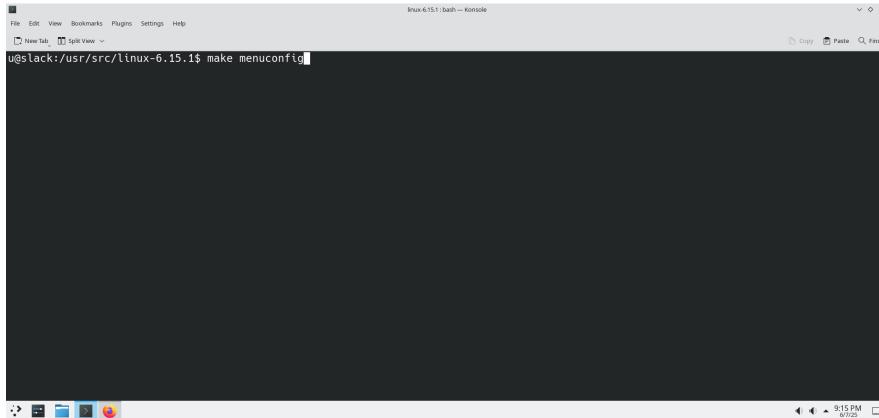
```

Wynik:

Moduł	Adres fizyczny	Wysokość	Opis
fb_sys_fops	106496	8	snd_intel8x0,snd_timer,snd_ac97_codec,snd_pcm
serio_raw	16384	1	drm_kms_helper
soundcore	16384	1	snd
syscopyarea	16384	1	drm_kms_helper
ehci_pci	16384	0	
ac97_bus	16384	1	snd_ac97_codec
sysfillrect	16384	1	drm_kms_helper
i2c_piix4	24576	0	
ohci_hcd	49152	1	ohci_pci
ehci_hcd	65536	1	ehci_pci
sysimgblt	16384	1	drm_kms_helper
intel_agp	20480	0	
intel_gtt	24576	4	intel_agp
laptop	102400	4	drm_kms_helper,psmouse,i2c_piix4,drm
e1000	131072	0	
apparmor	53248	4	intel_agp,intel_gtt,ttm,drm
vboxguest	45056	0	
battery	24576	0	
video	49152	0	
ac	16384	0	
button	20480	0	
loop	40960	0	
ext4	921600	2	
mocache	16384	1	ext4
jbd2	163840	1	ext4

#### 4.1.3 Sprawdzenie konfiguracji kernela (tryb tekstowy)

Komenda:



linux-6.15.1 (bash) — Konsole

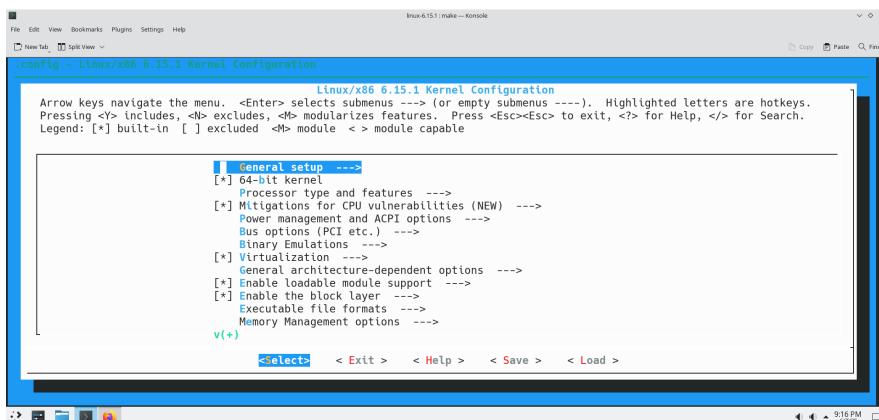
```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/usr/src/linux-6.15.1$ make menuconfig
```

Copy Paste Find

9:15 PM 6/7/25

This screenshot shows a terminal window titled "Konsole" running on a Slackware system. The command "make menuconfig" is being typed into the terminal. The window has standard Linux window controls at the top and a status bar at the bottom indicating the time as 9:15 PM and the date as 6/7/25.

Wynik:



File Edit View Bookmarks Plugins Settings Help
New Tab Split View
config - Linux/x86 6.15.1 Kernel Configuration
Linux/x86 6.15.1 Kernel Configuration
Arrow keys navigate the menu. <Enter> selects submenus ---> (or empty submenus ----). Highlighted letters are hotkeys.
Pressing <-> includes, <>> excludes, <M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </> for Search.
Legend: [\*] built-in [ ] excluded [<>] module < > module capable

General setup --->
[\*] 64-bit kernel
Processor type and features --->
[\*] Mitigations for CPU vulnerabilities (NEW) --->
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 --->

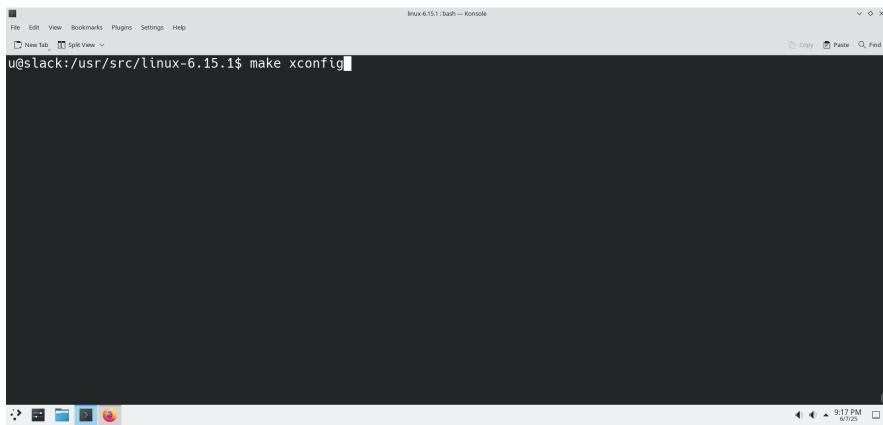
V(+)
<Select> < Exit > < Help > < Save > < Load >

9:16 PM 6/7/25

This screenshot shows the "menuconfig" interface for the Linux kernel configuration. It displays a hierarchical menu of kernel options. The "General setup" option is currently selected, indicated by a blue border around its text. Other options listed include processor type, mitigations for CPU vulnerabilities, bus options, binary emulations, virtualization, and memory management. At the bottom of the screen, there are navigation keys for selecting, exiting, helping, saving, and loading configurations.

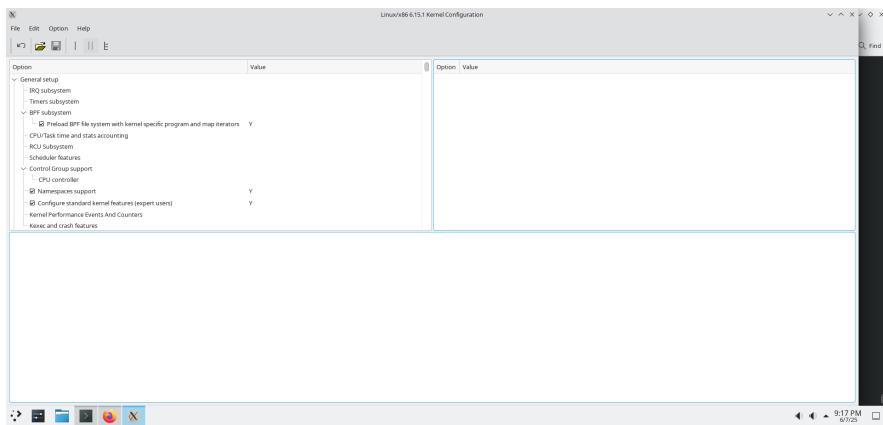
#### 4.1.4 Sprawdzenie konfiguracji kernela (KDE)

Komenda:



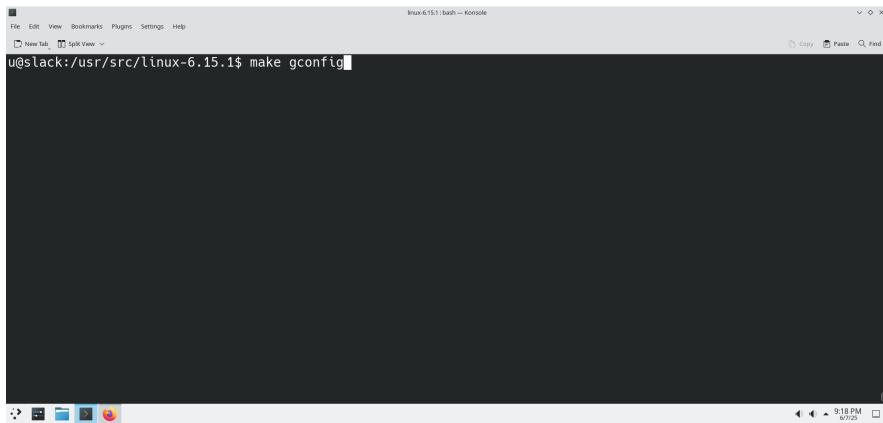
```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@Slack:/usr/src/linux-6.15.1$ make xconfig
```

Wynik:



#### 4.1.5 Sprawdzenie konfiguracji kernela (Gnome)

Komenda:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@Slack:/usr/src/linux-6.15.1$ make gconfig
```

Wynik:

The screenshot shows two windows side-by-side. The left window is a terminal titled 'Linux-6.15.1: make - Konsole' displaying compilation errors related to 'scripts/kconfig/gconf.c'. The right window is titled 'Linux-6.15.1 Kernel Configuration' showing the kernel configuration interface with various options like '64bit kernel', 'Processor type and features', and 'Virtualization'.

```

scripts/kconfig/gconf.c:731:6: warning: no previous prototype for 'on_expand'
    731 | void on_expand_clicked(GtkButton * button, gpointer user_data)
scripts/kconfig/gconf.c:841:1: warning: no previous prototype for 'on_treeview_press_event'
    841 | ~~~~~
scripts/kconfig/gconf.c:898:1: warning: no previous prototype for 'on_treeview_button_press_event'
    898 | ~~~~~
scripts/kconfig/gconf.c:943:1: warning: no previous prototype for 'on_treeview2_cursor_changed' [-Wmissing-prototypes]
    943 | ~~~~~
scripts/kconfig/gconf.c:959:1: warning: no previous prototype for 'on_treeview1_button_press_event' [-Wmissing-prototypes]
    959 | ~~~~~
HOSTLD scripts/kconfig/gconf

```

Tu również pojawiły się WARNING. Nie są one kluczowe dla działania jądra

#### 4.1.6 Zbudowanie pliku konfiguracyjnego jądra z konfiguracją z poprzedniego jądra

Komenda:

The screenshot shows a terminal window titled 'Linux-6.15.1: bash - Konsole' with the command 'u@slack:/usr/src/linux-6.15.1\$ make olddefconfig' entered.

Wynik:

The screenshot shows a terminal window titled 'Linux-6.15.1: bash - Konsole' with the command 'u@slack:/usr/src/linux-6.15.1\$ make olddefconfig' entered. The output shows that there were no changes made to the configuration file.

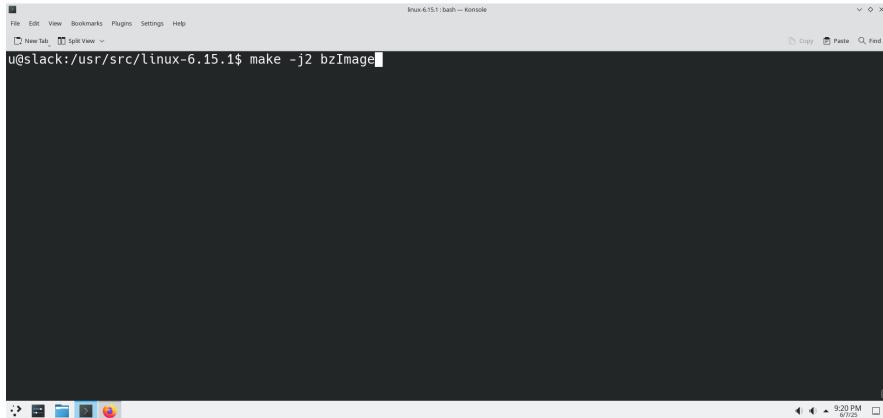
```

u@slack:/usr/src/linux-6.15.1$ make olddefconfig
 HOSTCC scripts/kconfig/conf.o
 HOSTLD scripts/kconfig/conf
#
# No change to .config
#
u@slack:/usr/src/linux-6.15.1$ 

```

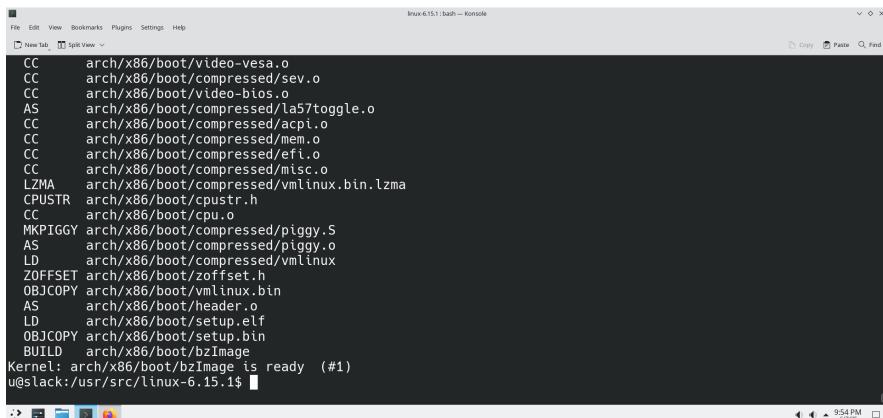
## 4.2 Kompilacja obrazu jądra (parametr j)

Komenda:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/usr/src/linux-6.15.1$ make -j2 bzImage
```

Wynik:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
CC arch/x86/boot/video-vesa.o
CC arch/x86/boot/compressed/sev.o
CC arch/x86/boot/video-bios.o
AS arch/x86/boot/compressed/la57toggle.o
CC arch/x86/boot/compressed/acpi.o
CC arch/x86/boot/compressed/mem.o
CC arch/x86/boot/compressed/efi.o
CC arch/x86/boot/compressed/misc.o
LZMA arch/x86/boot/compressed/vmlinux.bin.lzma
CPUSTR arch/x86/boot/cpustr.h
CC arch/x86/boot/cpu.o
MKPIGGY arch/x86/boot/compressed/piggy.S
AS arch/x86/boot/compressed/piggy.o
LD arch/x86/boot/compressed/vmlinux
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
Kernel: arch/x86/boot/bzImage is ready (#1)
u@slack:/usr/src/linux-6.15.1$
```

## 4.3 Zbudowanie modułów jądra (parametr j)

Komenda:

```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
CC arch/x86/boot/video-vesa.o
CC arch/x86/boot/compressed/sev.o
CC arch/x86/boot/video-bios.o
AS arch/x86/boot/compressed/la57toggle.o
CC arch/x86/boot/compressed/acpi.o
CC arch/x86/boot/compressed/mem.o
CC arch/x86/boot/compressed/efi.o
CC arch/x86/boot/compressed/misc.o
LZMA arch/x86/boot/compressed/vmlinux.bin.lzma
CPUSTR arch/x86/boot/cpustr.h
CC arch/x86/boot/cpu.o
MKPIGGY arch/x86/boot/compressed/piggy.S
AS arch/x86/boot/compressed/piggy.o
LD arch/x86/boot/compressed/vmlinux
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
Kernel: arch/x86/boot/bzImage is ready (#1)
u@slack:/usr/src/linux-6.15.1$ make -j2 modules
```

Wynik:

```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
LD [M] net/openswitch/vport-geneve.ko
CC [M] net/openswitch/vport-geneve.mod.o
LD [M] net/openswitch/vport-igmp.ko
CC [M] net/openswitch/vsock_mod.ko
LD [M] net/vmw_vsock/vsock.ko
LD [M] net/vmw_vsock/vsock_ko
CC [M] net/vmw_vsock/vsock_diag.ko
LD [M] net/vmw_vsock/vsock_diag.mod.o
LD [M] net/vmw_vsock/vsock_diag.ko
CC [M] net/vmw_vsock/vm_vsock_vnet_transport.mod.o
LD [M] net/vmw_vsock/vm_vsock_vnet_transport.ko
CC [M] net/vmw_vsock/vm_vsock_virtio_transport.mod.o
LD [M] net/vmw_vsock/vm_vsock_virtio_transport.ko
CC [M] net/vmw_vsock/vm_vsock_virtio_transport_common.mod.o
LD [M] net/vmw_vsock/vm_vsock_virtio_transport_common.ko
CC [M] net/vmw_vsock/hv_sock.ko
LD [M] net/vmw_vsock/vsock_loopback.mod.o
LD [M] net/vmw_vsock/vsock_loopback.ko
CC [M] net/vmnet/hn.mod.o
LD [M] net/vmnet/hn.ko
CC [M] net/hsr/hsr.mod.o
LD [M] net/hsr/hsr.ko
LD [M] net/qtr/qtr.mod.o
LD [M] net/qtr/qtr.ko
CC [M] net/qtr/qtr_smd.mod.o
LD [M] net/qtr/qtr_smd.ko
CC [M] net/qtr/qtr_tcf.mod.o
LD [M] net/qtr/qtr_tun.ko
CC [M] net/qtr/qtr_mhl.mod.o
LD [M] net/qtr/qtr_mhl.ko
CC [M] vtn/vtn_cryptopass.mod.o
LD [M] vtn/vtn_cryptopass.ko
u@slack:/usr/src/linux-6.15.1$
```

## 4.4 Instalacja modułów

Komenda:

```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/usr/src/linux-6.15.1$ make modules_install
```

Wynik:

```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
File Edit View Bookmarks Plugins Settings Help
Copy Paste Find
linux-6.15.1 bash — Konsole
INSTALL /lib/modules/6.15.1/kernel/net/ieee80215_6_lowpan.ko
INSTALL /lib/modules/6.15.1/kernel/net/ieee80215_6_nci.ko
INSTALL /lib/modules/6.15.1/kernel/net/ieee80215_6_nci_nci.ko
INSTALL /lib/modules/6.15.1/kernel/net/mac802154/nac802154.ko
INSTALL /lib/modules/6.15.1/kernel/net/ceph/libceph_ko
INSTALL /lib/modules/6.15.1/kernel/net/ethernet/broadcom/adrvn7000.ko
INSTALL /lib/modules/6.15.1/kernel/net/nfc/nfc_ko
INSTALL /lib/modules/6.15.1/kernel/net/nfc/nci_nci.ko
INSTALL /lib/modules/6.15.1/kernel/net/nfc/hci_hci.ko
INSTALL /lib/modules/6.15.1/kernel/net/openvswitch/digital_ko
INSTALL /lib/modules/6.15.1/kernel/net/psample/psample.ko
INSTALL /lib/modules/6.15.1/kernel/net/rte/rte_ko
INSTALL /lib/modules/6.15.1/kernel/net/openvswitch/openvswitch_ko
INSTALLED /lib/modules/6.15.1/kernel/net/openvswitch/vport_t_vxlan.ko
INSTALL /lib/modules/6.15.1/kernel/net/openvswitch/vport_geneve.ko
INSTALL /lib/modules/6.15.1/kernel/net/openvswitch/vport_gre.ko
INSTALL /lib/modules/6.15.1/kernel/net/vm_vsock/vsock.ko
INSTALLED /lib/modules/6.15.1/kernel/net/vm_vsock/vm_vsock_qing_ko
INSTALL /lib/modules/6.15.1/kernel/net/vm_vsock/vm_vsock_vml_transport.ko
INSTALL /lib/modules/6.15.1/kernel/net/vm_vsock/vm_vsock_virtio_transport.ko
INSTALLED /lib/modules/6.15.1/kernel/net/vm_vsock/vm_vsock_virtio_transport_common.ko
INSTALLED /lib/modules/6.15.1/kernel/net/vm_vsock/vm_vsock_sock.ko
INSTALL /lib/modules/6.15.1/kernel/net/vm_vsock/vsock_loopedback.ko
INSTALL /lib/modules/6.15.1/kernel/net/nsl/nsl_ko
INSTALLED /lib/modules/6.15.1/kernel/net/hsr/hsr.ko
INSTALLED /lib/modules/6.15.1/kernel/net/qrtr/qrtr_ko
INSTALLED /lib/modules/6.15.1/kernel/net/qrtr/qrtr_tun.ko
INSTALLED /lib/modules/6.15.1/kernel/net/qrtr/qrtr_mhi.ko
INSTALLED /lib/modules/6.15.1/kernel/virt/lib/libqbypass.ko
DEFMOD /lib/modules/6.15.1
u@slack:/usr/src/linux-6.15.1$
```

## 4.5 Sprawdzenie zainstalowanych modułów

Komenda:

```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
File Edit View Bookmarks Plugins Settings Help
Copy Paste Find
linux-6.15.1 bash — Konsole
u@slack:/usr/src/linux-6.15.1$ ls /lib/modules/6.15.1
build modules.alias modules.builtin modules.builtin.alias modules.modinfo modules.dep modules.devname modules.softdep modules.symbols
modules.symbols.bin
u@slack:/usr/src/linux-6.15.1$
```

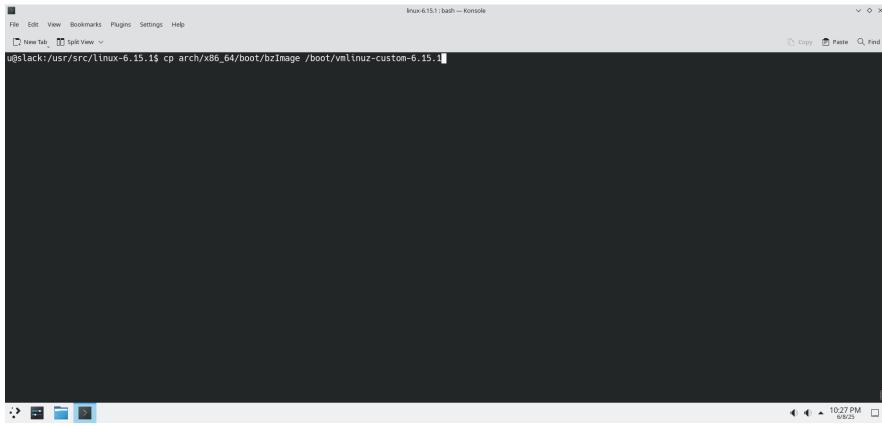
Wynik:

```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
File Edit View Bookmarks Plugins Settings Help
Copy Paste Find
linux-6.15.1 bash — Konsole
u@slack:/usr/src/linux-6.15.1$ ls /lib/modules/6.15.1
build modules.alias modules.builtin modules.builtin.alias modules.modinfo modules.dep modules.devname modules.softdep modules.symbols
modules.symbols.bin
u@slack:/usr/src/linux-6.15.1$
```

## 4.6 Przekopiowanie plików kernela do systemu

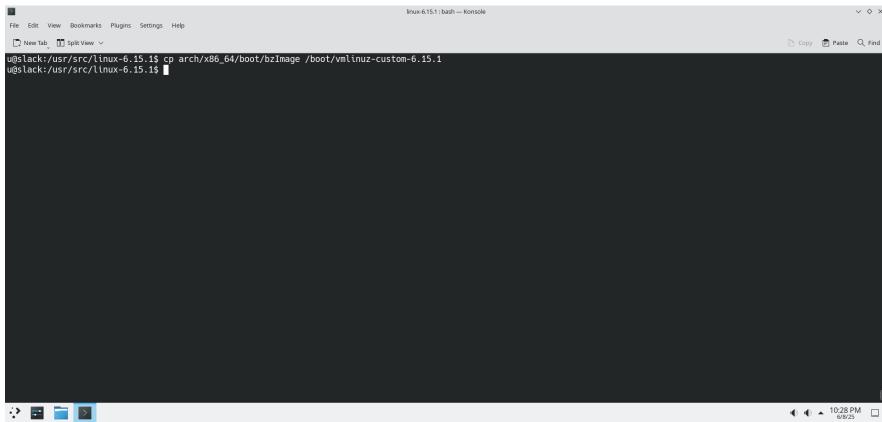
### 4.6.1 Przekopiowanie obrazu jądra do katalogu boot

Komenda:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/usr/src/linux-6.15.1$ cp arch/x86_64/boot/bzImage /boot/vmlinuz-custom-6.15.1
```

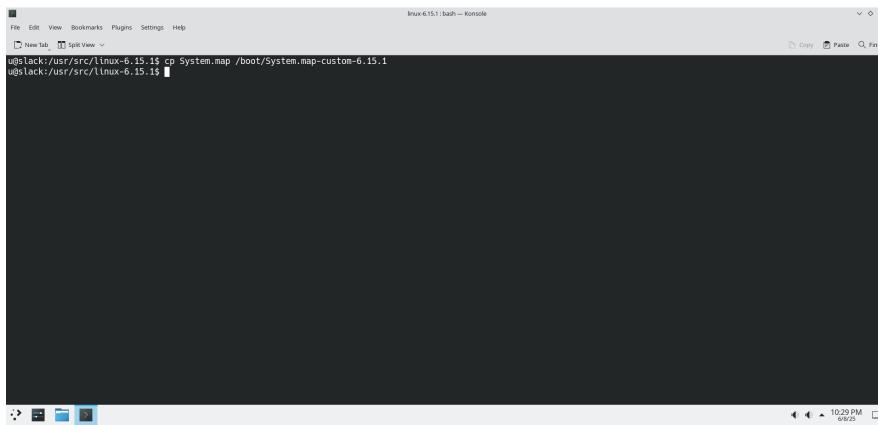
Wynik:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/usr/src/linux-6.15.1$ cp arch/x86_64/boot/bzImage /boot/vmlinuz-custom-6.15.1
u@slack:/usr/src/linux-6.15.1$
```

### 4.6.2 Przekopiowanie tablicy symboli używanych przez kernel

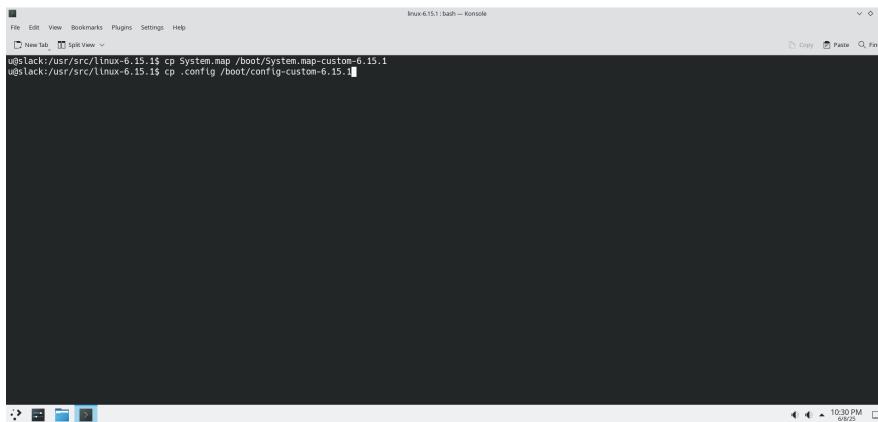
Wynik:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
ug@slack:/usr/src/linux-6.15.1$ cp System.map /boot/System.map-custom-6.15.1
u@slack:/usr/src/linux-6.15.1$
```

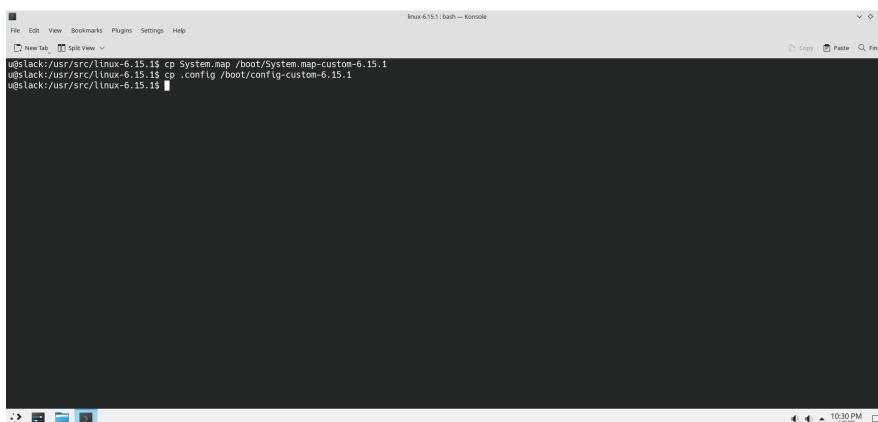
#### 4.6.3 Przekopiowanie pliku konfiguracyjnego kernela

Komenda:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
ug@slack:/usr/src/linux-6.15.1$ cp System.map /boot/System.map-custom-6.15.1
u@slack:/usr/src/linux-6.15.1$ cp .config /boot/config-custom-6.15.1
u@slack:/usr/src/linux-6.15.1$
```

Wynik:

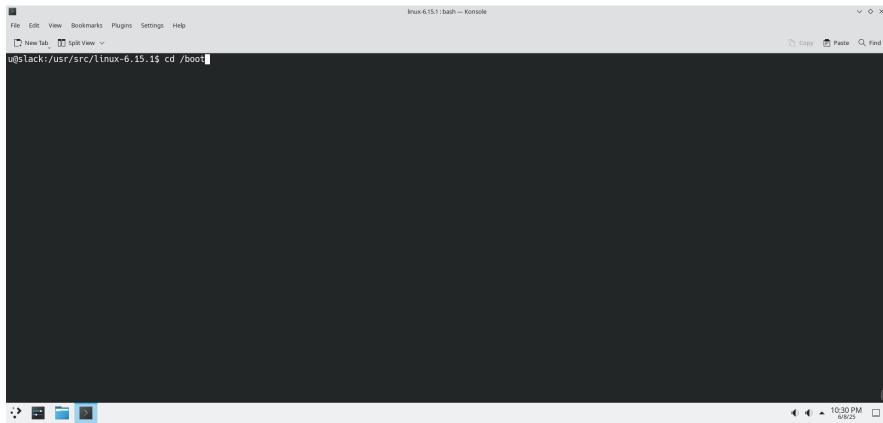


```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
ug@slack:/usr/src/linux-6.15.1$ cp System.map /boot/system.map-custom-6.15.1
u@slack:/usr/src/linux-6.15.1$ cp .config /boot/config-custom-6.15.1
u@slack:/usr/src/linux-6.15.1$
```

## 4.7 Utworzenie linku symbolicznego w systemie dla tablicy symboli kernela

### 4.7.1 Przejście do katalogu boot

Komenda:



```
ug@slack:/usr/src/linux-6.15.1$ cd /boot;
```

Wynik:



```
ug@slack:/usr/src/linux-6.15.1$ cd /boot;
```

### 4.7.2 Usunięcie starej tablicy symboli

Komenda:

```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/boot$ rm system.map
```

Wynik:

```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/boot$ rm System.map
u@slack:/boot$
```

#### 4.7.3 Utworzenie linku symbolicznego

Komenda:

```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/boot$ ln -s System.map-custom-6.15.1 System.map
```

Wynik:

```
ug@slack:/boot$ ls -s System.map-custom-6.15.1 System.map
README.intro           config-huge-5.15.19      grub            inside.dat    tuxlogo.bmp      vmlinuz-generic
System.map              config                    efi             intrepid-tree  onlyblue.bmp   vmlinuz-generic-5.15.19
System.map-custom-6.15.1 config-custom-6.15.1   ellio-lab2.efi  intrepid.gz   onlyblue.dat   vmlinuz
System.map-generic-6.15.19 config-generic-6.15.19.x86_64.efi  tuxcode.bmp   stack.bmp     vmlinuz-custom-6.15.1
vmlinuz-huge
```

## 4.8 Utworzenie dysku ram

### 4.8.1 Wywołanie skryptu generującego komendę do wykonania

Komenda:

```
ug@slack:/boot$ /usr/share/mkinitrd/mkinitrd_command_generator.sh -k 6.15.1
```

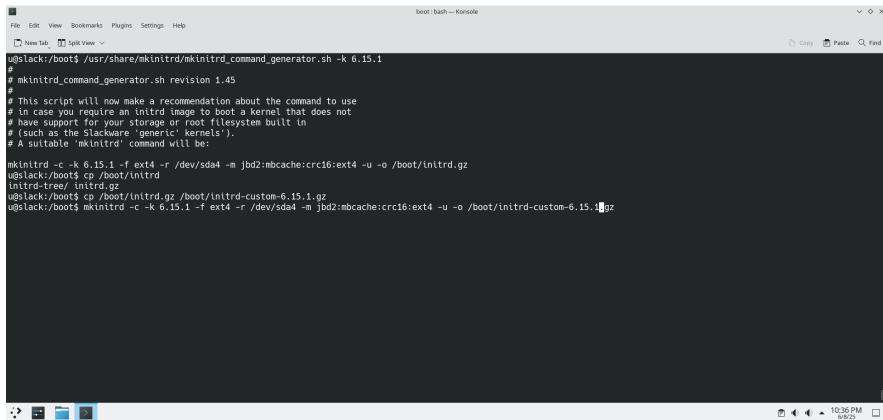
Wynik:

```
#!/bin/sh
# mkinitrd_command_generator.sh revision 1.45
#
# This script will now make a recommendation about the command to use
# in case you require an initrd image to boot a kernel that does not
# have a rootfs on your storage or root filesystem built in
# (such as the Slackware 'generic' kernels).
# A suitable 'mkinitrd' command will be:
mkinitrd -c -k 6.15.1 -f ext4 -r /dev/sda4 -m jbd2:mbcache:crc16:ext4 -u -o /boot/initrd.gz
ug@slack:/boot$
```

#### 4.8.2 Wywołanie skryptu generującego komendę do wykonania

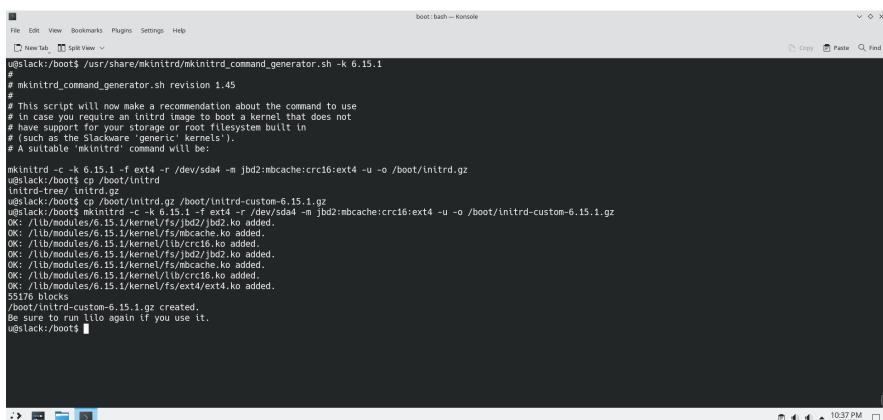
W tym etapie musiałem również utworzyć customowy plik **initrd-custom-6.15.1.gz**, aby móc podać go w komendzie. W późniejszym etapie zostanie on również wpisany w pliku elilo.conf.

Komenda:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
boot:bash - Konsole
Copy Paste Find
u$slack:/boot$ /usr/share/mkinitrd/mkinitrd_command_generator.sh -k 6.15.1
# mkinitrd_command_generator.sh revision 1.45
# This script will now make a recommendation about the command to use
# in case you require an initrd image to boot a kernel that does not
# have support for your storage or root filesystem built in
# (such as the Slackware 'generic' kernels').
# A suitable 'mkinitrd' command will be:
mkinitrd -c -k 6.15.1 -f ext4 -r /dev/sda4 -m jbd2:mbcache:crc16:ext4 -u -o /boot/initrd.gz
u$slack:/boot$ cp /boot/initrd
u$slack:/boot$ cp /boot/initrd.gz /boot/initrd-custom-6.15.1.gz
u$slack:/boot$ mkinitrd -c -k 6.15.1 -f ext4 -r /dev/sda4 -m jbd2:mbcache:crc16:ext4 -u -o /boot/initrd-custom-6.15.1.gz
10:36 PM 6/9/23
```

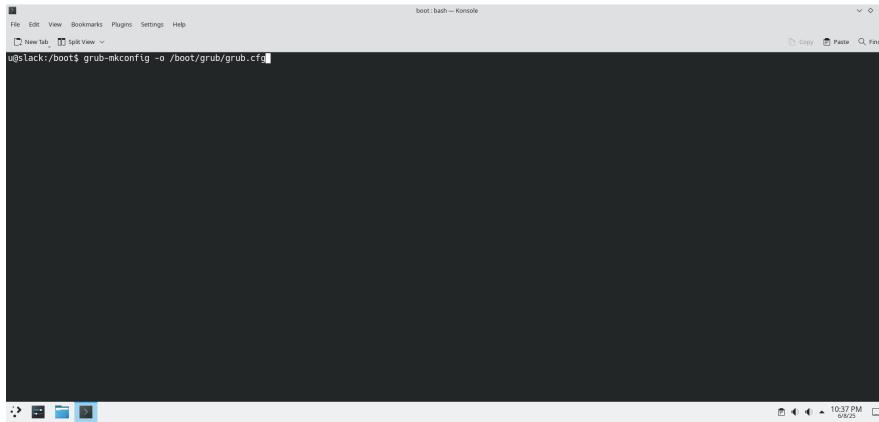
Wynik:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
boot:bash - Konsole
Copy Paste Find
u$slack:/boot$ /usr/share/mkinitrd/mkinitrd_command_generator.sh -k 6.15.1
# mkinitrd_command_generator.sh revision 1.45
# This script will now make a recommendation about the command to use
# in case you require an initrd image to boot a kernel that does not
# have support for your storage or root filesystem built in
# (such as the Slackware 'generic' kernels').
# A suitable 'mkinitrd' command will be:
mkinitrd -c -k 6.15.1 -f ext4 -r /dev/sda4 -m jbd2:mbcache:crc16:ext4 -u -o /boot/initrd.gz
u$slack:/boot$ cp /boot/initrd
u$slack:/boot$ cp /boot/initrd.gz /boot/initrd-custom-6.15.1.gz
u$slack:/boot$ mkinitrd -c -k 6.15.1 -f ext4 -r /dev/sda4 -m jbd2:mbcache:crc16:ext4 -u -o /boot/initrd-custom-6.15.1.gz
Ok: /lib/modules/6.15.1/kernel/fs/jbd2.ko added.
Ok: /lib/modules/6.15.1/kernel/fs/mbcache.ko added.
Ok: /lib/modules/6.15.1/kernel/lib/crc16.ko added.
Ok: /lib/modules/6.15.1/kernel/lib/jbd2.ko added.
Ok: /lib/modules/6.15.1/kernel/fs/mocache.ko added.
Ok: /lib/modules/6.15.1/kernel/lib/crc16.ko added.
Ok: /lib/modules/6.15.1/kernel/fs/ext4.ko added.
55176 blocks
/boot/initrd-custom-6.15.1.gz created,
be sure to run lilo again if you use lt.
u$slack:/boot$ 10:37 PM 6/9/23
```

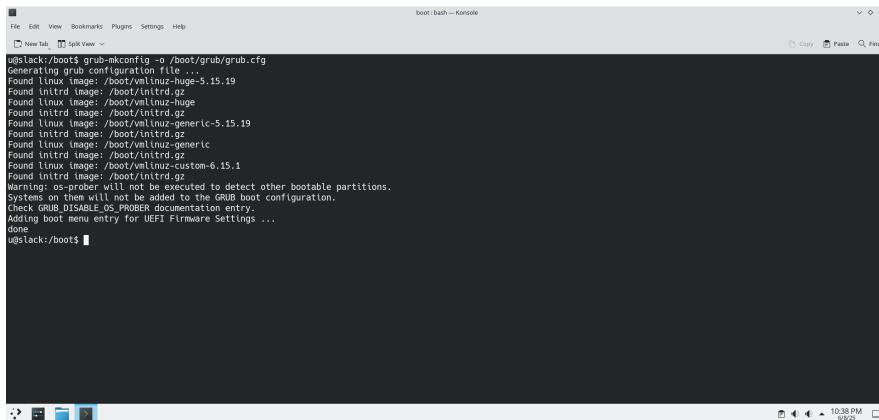
#### 4.9 Ponowna konfiguracja GRUB

Komenda:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/boot$ grub-mkconfig -o /boot/grub/grub.cfg
```

Wynik:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
Generating grub configuration file ...
Found linux image: /boot/vmlinuz-huge-5.15.19
Found initrd image: /boot/initrd.gz
Found linux image: /boot/vmlinuz-generic-5.15.19
Found initrd image: /boot/initrd.gz
Found linux image: /boot/vmlinuz-generic-6.15.1
Found initrd image: /boot/initrd.gz
Warning: os-prober was not executed to detect other bootable partitions.
Systech 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
u@slack:/boot$
```

## 4.10 Skopiowanie obrazu jądra oraz ramdisku na partycję EFI

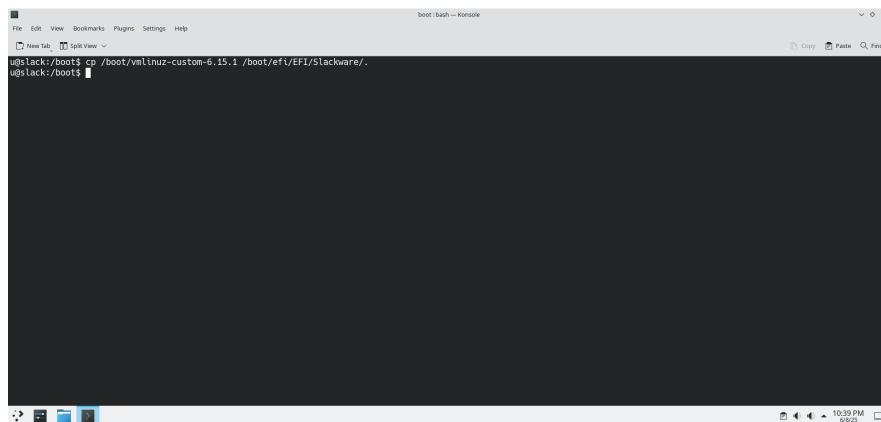
### 4.10.1 Jądro linux

Komenda:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/boot$ cp /boot/vmlinuz-custom-6.15.1 /boot/efi/EFI/Slackware/.
```

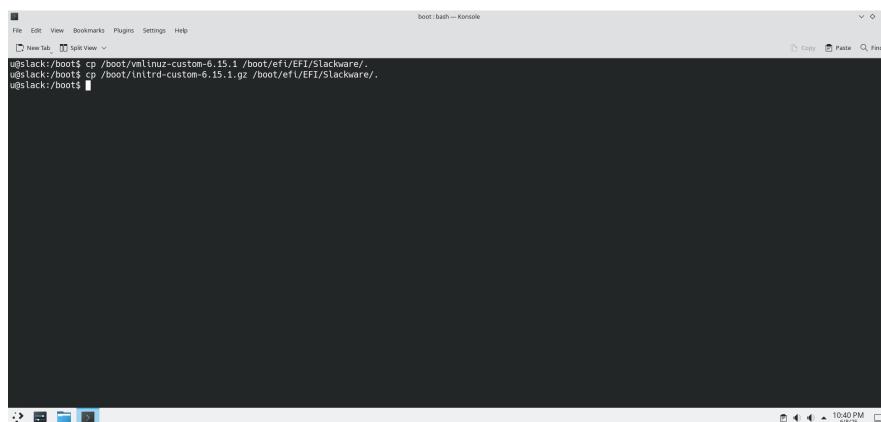
Wynik:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/boot$ cp /boot/vmlinuz-custom-6.15.1 /boot/efi/EFI/Slackware/.
```

#### 4.10.2 Ramdisk

Wynik:

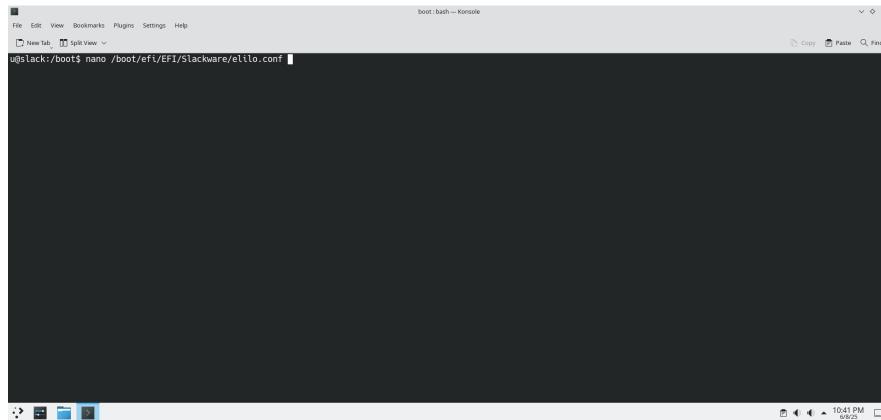


```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
u@slack:/boot$ cp /boot/vmlinuz-custom-6.15.1 /boot/efi/EFI/Slackware/.
u@slack:/boot$ cp /boot/initrd-custom-6.15.1.gz /boot/efi/EFI/Slackware/.
```

## 4.11 Dodanie nowego wpisy do konfiguracji bootloadera elilo

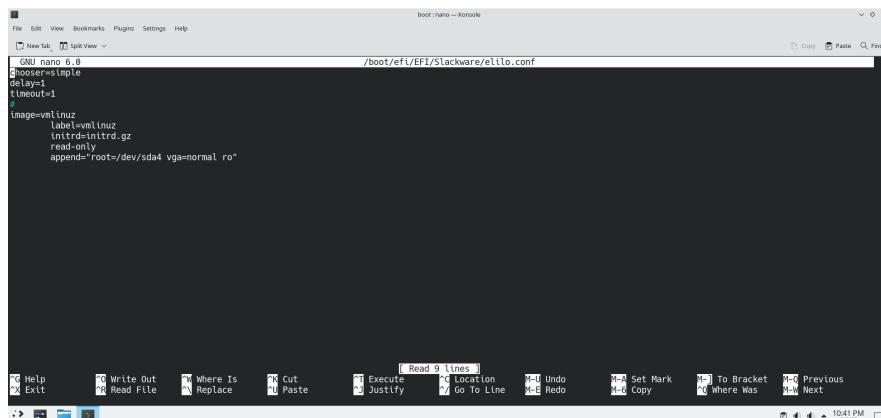
### 4.11.1 Edycja pliku elilo.conf

Komenda:



```
ug@slack:/boot/efi/EFI/Slackware$ nano /boot/efi/EFI/Slackware/elilo.conf
```

Wynik:



```
GNU nano 6.0
# elilo.conf simple
delay=1
timeout=1
#
image=vmlinuz
    label=vmlinuz
    initrd=initrd.gz
    read-only
    append="root=/dev/sda4 vga=normal ro"
```

### 4.11.2 Modyfikacja pliku

Wynik:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
GNOME nano 6.0
/boot/efi/EFI/Slackware/ellilo.conf Modified
Modified
image=vmlinuz
label=slackware-6.15.0
initrd=initrd.gz
read-only
append="root=/dev/sda4 vga=791 ro"
image=vmlinuz-custom-6.15.1
label=slackware-kernel-6.15.1
initrd=initrd-custom-6.15.1.gz
read-only
append="root=/dev/sda4 vga=791 ro"
```

## 4.12 Pokazanie zmienonego kernela w systemie

Udało się bez problemu zkonfigurować kernel nowym sposobem.



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View
~ bash -- Konsole
ug@slack:~$ uname -r
6.15.1
ug@slack:~$
```

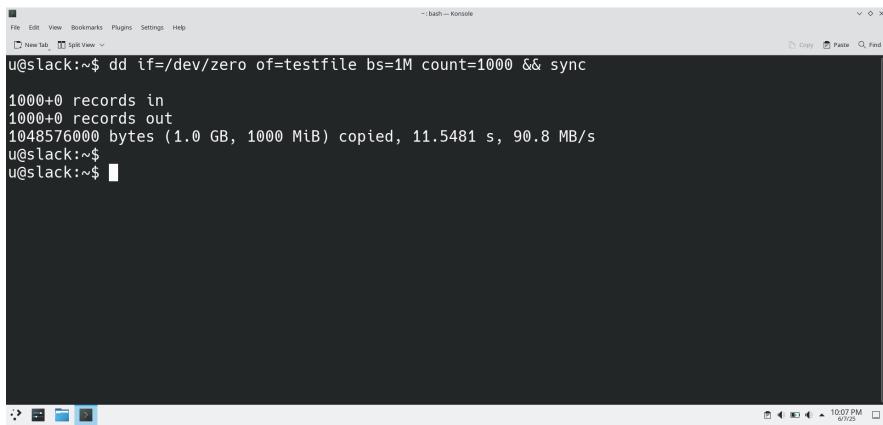
## 5 Testy wydajności

Prędkość dla domyślnego jądra:



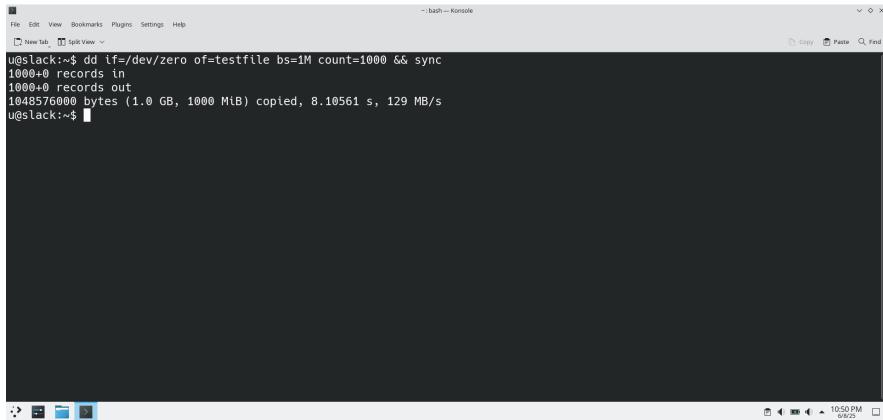
```
bash-5.1# dd if=/dev/zero of=testfile bs=1M count=1000 && sync
1000+0 records in
1000+0 records out
1048576000 bytes (1.0 GB, 1000 MiB) copied, 16.8773 s, 62.1 MB/s
bash-5.1#
```

Prędkość dla jądra utworzonego starą metodą:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View ~ bash -- Konsole
u@slack:~$ dd if=/dev/zero of=testfile bs=1M count=1000 && sync
1000+0 records in
1000+0 records out
1048576000 bytes (1.0 GB, 1000 MiB) copied, 11.5481 s, 90.8 MB/s
u@slack:~$ u@slack:~$
```

Prędkość dla jądra utworzonego nową metodą:



```
File Edit View Bookmarks Plugins Settings Help
New Tab Split View ~ bash -- Konsole
u@slack:~$ dd if=/dev/zero of=testfile bs=1M count=1000 && sync
1000+0 records in
1000+0 records out
1048576000 bytes (1.0 GB, 1000 MiB) copied, 8.10561 s, 129 MB/s
u@slack:~$
```

## 6 Podsumowanie

Proces konfiguracji jądra, dzięki instrukcjom krok po kroku staje się dość prosty. Natomiast pomimo tego nadal należy zwracać uwagę na komunikaty wyskakujące po uruchomieniu poleceń.

Konfiguracja jądra Linux pozwala na przyśpieszenie działania systemu, oraz dostosowania go do swoich potrzeb.

Porównując obie metody, nowsza z nich zajmuje znacznie więcej czasu do ukończenia, przez długi proces tworzenia modułów. Starsza metoda zajmuje mniej czasu do skonfigurowania, ale przez mniejszą ilość modułów jest bardziej okrojona. Z drugiej strony dzięki temu zajmuje mniej miejsca. System na jądrze zkonfigurowanym nowym sposobem jest znacznie bardziej responsywny i akcje takie jak otworzenie przeglądarki zajmują znacznie mniej czasu.