Exercise 3: rebuilding the FreeBSD kernel
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This is an example of a very large C program!

You must be *root* for this exercise.

Configure the kernel

The kernel configuration file sets various options about how the kernel is
built. The easiest way to create this is to copy the GENERIC kernel
configuration and modify it.

```
# cd /usr/src/sys/i386/conf
# cp GENERIC AFNOG2005
# vi AFNOG2005
```

Things you should change:

*   Change the "ident" line to the name of your new kernel

*   For maximum efficiency, you can remove the "cpu" lines for processor
    types which you don't need. You can do this by deleting the lines, or
    by prefixing them with a hash (which turns them into comments)

```
        machine         i386
        #cpu            I486_CPU
        #cpu            I586_CPU
        cpu             I686_CPU
        ident           AFNOG2006
```

*   You can remove the line "options INET6" to remove IPv6 support from
    the kernel

*   You can safely remove "device eisa" (but don't remove "isa" or "pci")

For now, that's all we'll change. In real life you could remove all the SCSI
controllers (but leave scbus and da, as they're needed for USB memory cards);
you could remove all the network card drivers you don't need; and so on.

Once this is done, and still in the /usr/src/sys/i386/conf directory, you
need to run the following command:

```
   # /usr/sbin/config AFNOG2006
   Kernel build directory is ../compile/AFNOG2006
   Don't forget to do a ``make depend''
```

Build a and install the kernel

This is very straightforward, as it's all controlled by 'make'

```
   # cd /usr/src/sys/i386/compile/AFNOG2006
   # make depend
   # make
   # make install
```

The first pre-processes the C programs to work out what the dependencies are
(this is extra information used by the next stage). You then build the
kernel, then install it. The original kernel directory, */boot/kernel*, is
renamed to */boot/kernel.old*. The whole kernel build takes less than 10

minutes on modern hardware, but can take a lot longer on older systems.

Now reboot to make your new kernel active:

```
# reboot
```

After rebooting, login and issue this command to check your kernel version:

```
# uname -a
```

Finding out about kernel configuration options

In the directory /usr/src/sys/i386/conf directory you will find a file called 'NOTES'. This contains a lot of the options which aren't used in the GENERIC kernel, complete with comments.

You can also generate a list of all possible configuration options (but without comments):

```
# cd /usr/src/sys/i386/conf
# make LINT
# less LINT
```