Compilación del Kernel

MCC Gerardo Contreras Vega puntog@gmail.com

Kernel de GNU/Linux

El Kernel Linux es el núcleo tipo Unix del Sistema Operativo GNU/Linux.

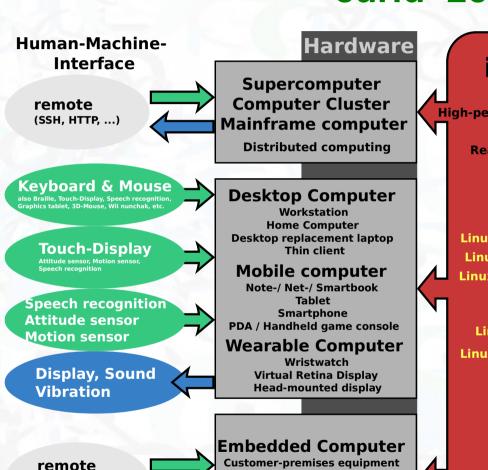
Fue desarrollado por Linus B. Torvals en marzo 1991.

I'm doing a (free) operating system (just a hobby, won't be big and professional like qnu) for 386(486) AT clones. This has been brewing since April, and is starting to get ready. I'd like any feedback on things people like/dislike in minix, as my OS resembles it somewhat (same physical layout of the file-system (due to practical reasons) among other things). I've currently ported bash(1.08) and gcc(1.40), and things seem to work. This implies that I'll get something practical within a few months [...] Yes - it's free of any minix code, and it has a multithreaded fs. It is NOT portable (uses 386 task switching etc), and it probably never will support anything other than AT-harddisks, as that's all I have :-(. [...] It's mostly in C, but most people wouldn't call what I write C. It uses every conceivable feature of the 386 I could find, as it was also a project to teach me about the 386. As already mentioned, it uses a MMU, for both paging (not to disk yet) and segmentation. It's the segmentation that makes it REALLY 386 dependent (every task has a 64Mb segment for code & data - max 64 tasks in 4Gb. Anybody who needs more than 64Mb/task - tough cookies). [...] Some of my "C"-files (specifically mm.c) are almost as much assembler as C. [...] Unlike minix, I also happen to LIKE interrupts, so interrupts are handled without trying to hide the reason behind them

Kernel Linux

- En septiembre 1991 Linux ver 0.01 10,239 líneas
- Febrero 1992 Linux adopta la licencia GPL
- 14 de Marzo 1994, version 1.0 150,867 líneas
- 3 de noviembre 2009, versión 2.6.32, 9'771,588 líneas
- Versión 4.5.4 16'980,546 líneas
- Funny Statistics for the Linux Kernel;
 https://www.linuxcounter.net/statistics/kernel, visitada noviembre 2016

By Shmuel Csaba Otto Traian, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=28506087



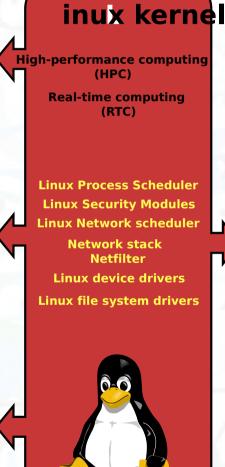
(SSH. HTTP.

Serial, I²C, ...)

Measurement Equipment

Laboratory Equipment

Layer3-Switches other embedded systems



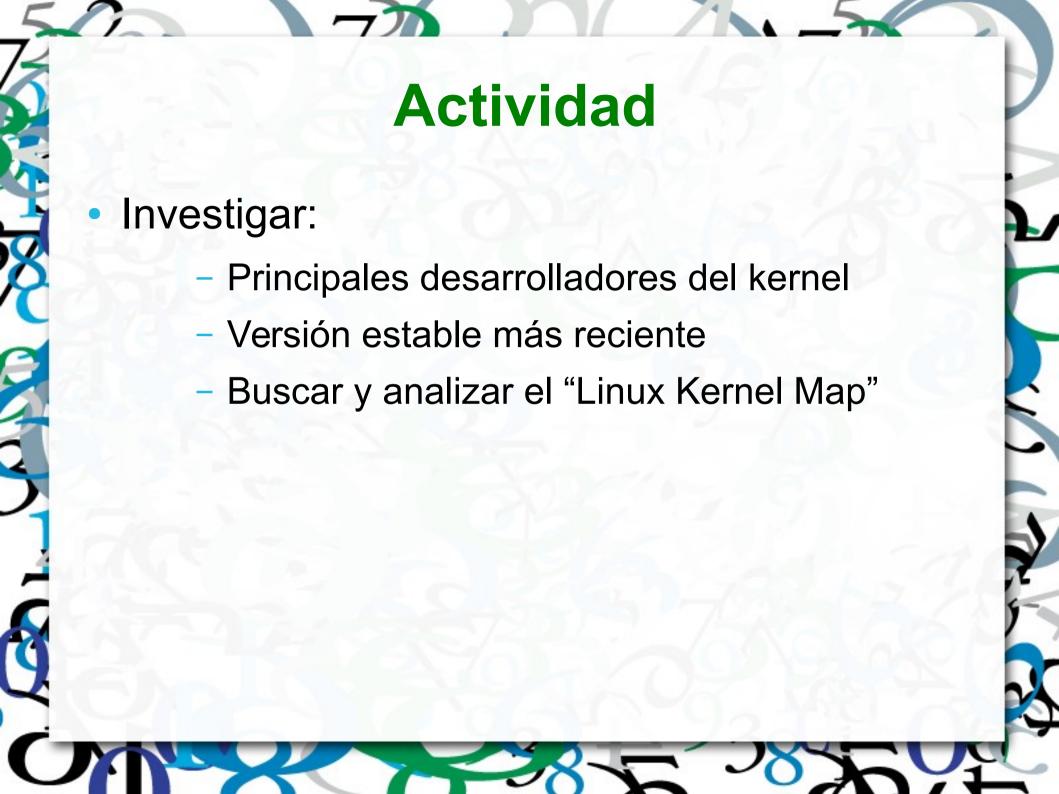
Web server solution stacks (LAMP) **Distributed Computing** Routing daemons O Software Development Package management systems CAD, CAM & CAE Software Office Image Processing Desktop Publishing (DTP) **Desktop UI** Touch UI Wearable UI Video processing software 3D computer graphics **Computer animation** Motion graphics **Digital Audio Workstation DJ Mixing Software** Video games Home cinema solutions Debian software archives: 37,000 software packages

Características

- Kernel Monolítico
- Escrito en lenguaje C
- Módulos cargables en el núcleo
- Portable
- Version Vanilla
- Version A.B.C[.D]
 - A Versión
 - B Revisión mayor
 - C Revisión menor
 - D Error grave

¿Por qué compilar?

- Suporte hardware mas reciente
- Personalizar
- **Optimizar**
- Seguridad
- Aprendizaje



Compilación del kernel, Debian way

- Instalar:
 - kernel-package
 - git
 - libncurses-dev
 - fakeroot
 - wget
 - bzip2
 - build-essential
 - xz-utils
- Tiempo
- Al menos 10Gb espacio



- Descargar kernel http://www.kernel.org
- Descomprimirlo en /usr/src
 - tar xvJf kernel-version.tar.xz
- Crear enlace simbólico (opcional)
 - In -s kernel-version linux

Compilación del Kernel

- Aplicar parches (opcional)
 - bzip2 -dc /usr/src/parche.bz2 | patch -p1
 - patch -p1 < archivo.patch</pre>
- Configurar el kernel
 - make-kpkg clean
 - Si se quiere cargar las opciones del kernel actual
 - cp /boot/config=`uname -r` ./.config
 - make menuconfig

Explicación de elegir opciones del Kernel

```
Linux/x86 4.2.0 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> to exit, <?> for Help, </> for Search.
Legend: [*] built-in [ ] excluded <M> module < > module capable
    [ 64-bit kernel
        General setup --->
    [*] Enable loadable module support --->
    [*] Enable the block layer --->
        Processor type and features --->
        Power management and ACPI options --->
        Bus options (PCI etc.) --->
        Executable file formats / Emulations --->
    [*] Networking support --->
        Device Drivers --->
        Firmware Drivers --->
        File systems --->
        Kernel hacking --->
        Security options --->
    -*- Cryptographic API --->
    [*] Virtualization --->
        Library routines --->
                                   < Help >
                                                          < Load >
```

Después de configurar

- fakeroot make-kpkg —initrd \
 --append-to-version "-minucleo" \
 kernel_image kernel_headers
- En /usr/src se crean dos archivos .deb
- Instalarlos
 - dpkg -i linux-image-version.deb
 - dpkg -i linux-headers-version.deb
- grub se actualiza automáticamente
- Reiniciar el sistema

Compilación del Kernel a la manera tradicional

- Instalar
 - kernel-package
 - libncurses5-dev
 - fakeroot
 - wget
 - bzip2
 - build-essential

Compilación del Kernel

- Descargar Kernel de www.kernel.org
- Descomprimir código en /usr/src
- Aplicar parches al Kernel (opcional)

```
- bzip2 -dc /usr/src/parche.bz2 | patch -p1
```

- bzip2 -dc /usr/src/parche.bz2 | patch -p1

Compilación del Kernel a la manera tradicional

- Configurar el Kernel
 - make clean
 - make mrproper
 - cp /boot/config-`uname -r` ./.config
 - make menu config
- Construir el kernel
 - make all
 - make modules_install
 - make install

Compilación

- Después de instalar
 - depmod version-kernel
 - apt-get install yaird

Después de configurar

- mkinitrd.yaird -o
 /boot/initrd.img-version
 version
- Actualizar grub
 - update-grub
- Reiniciar el sistema

Ejercicio

 Obtener información del hardware de la máquina con hwinfo (si no se encuentra, instalarlo)

Compilar un Kernel al estilo Debian