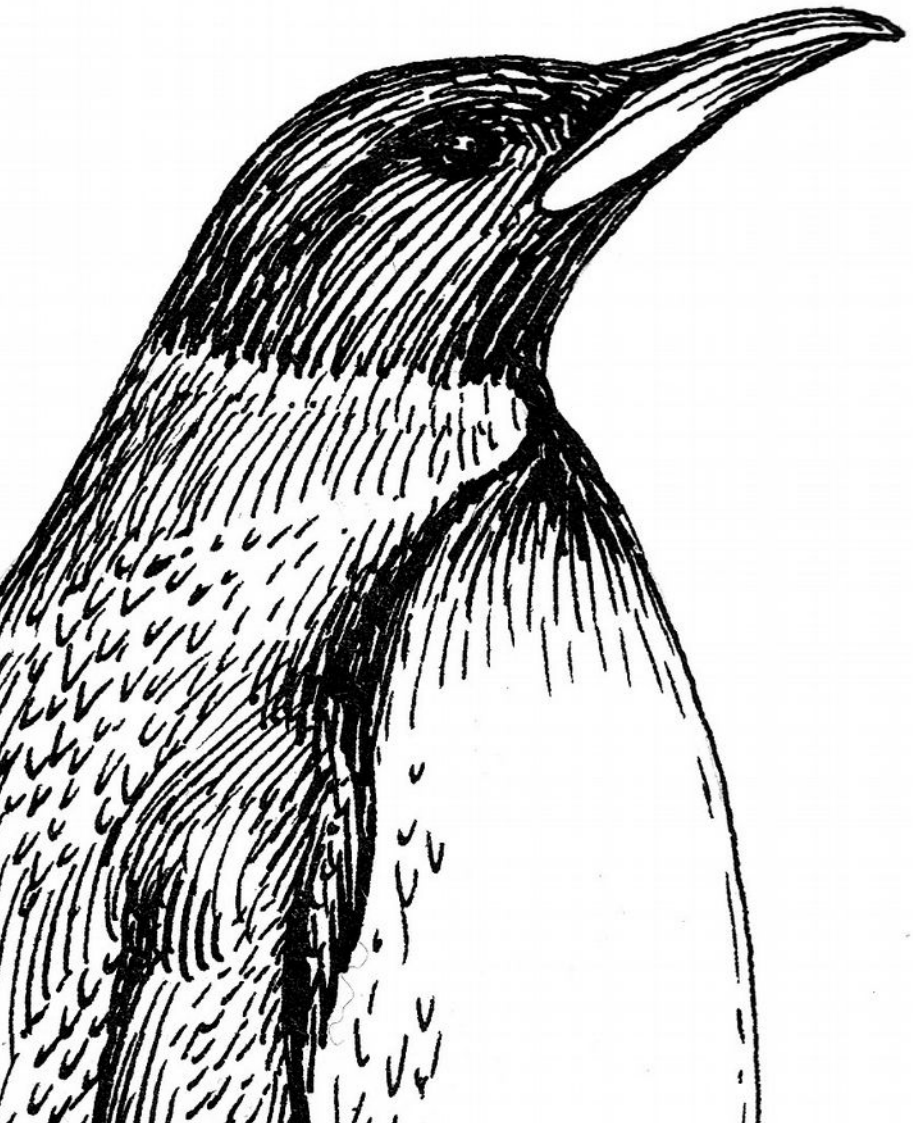
The role of free software in education



An introduction to GNU/Linux

LIGATUS

ual: university of the arts london
camberwell
chelsea
wimbledon

Software

- Source code (humans can read and write)

Software

- Source code (humans can read and write)
- Compiler

Software

- Source code (humans can read and write)
- Compiler
- Binary (computers can read and write)

UAL software

- Hidden source code

UAL software

- Hidden source code
- Privacy concerns
  - Confidentiality
  - NSA

UAL software

- Hidden source code
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- Antivirus

UAL software

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- Privacy concerns
  - Confidentiality
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- Antivirus

- No confirmed confidentiality - ethics

Search and rank

- Google etc.

Search and rank

- Google etc.
- Library catalogue software
- Archive databases

Search and rank

- Google etc.
- Library catalogue software
- Archive databases
- Sharepoint and intranet

Search and rank

- Google etc.
- Library catalogue software
- Archive databases
- Sharepoint and intranet

- No academic rigour

Image processing

- Apply filters
- “Develop” raw images

- No academic rigour for photographers
- Fixed options - limiting creativity

Students must be creative with:

- Photoshop
- Illustrator
- InDesign
- ...

Students must be creative with:

- Photoshop
- Illustrator
- InDesign
- ...

- Prescriptive - limiting creativity

Long-term preservation

- Closed formats will always require a license

- Preservation not achievable

Summary

- Limiting creativity - originality
- Ethical considerations - ethics
- Unknown methodologies - rigour
- Preservation - long-term access

Summary

- Limiting creativity - originality
- Ethical considerations - ethics
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Richard Stallman

From CSvax:pur-ee:inuxc!ixn5c!ihnp4!houxm!mhuxi!eagle!mit-vax!mit-eddie!RMS@MIT-OZ
From: RMS%MIT-OZ@mit-eddie
Newsgroups: net.unix-wizards,net.usoft
Subject: new Unix implementation
Date: Tue, 27-Sep-83 12:35:59 EST
Organization: MIT AI Lab, Cambridge, MA

Free Unix!

Starting this Thanksgiving I am going to write a complete
Unix-compatible software system called GNU (for Gnu's Not Unix), and
give it away free(1) to everyone who can use it.
Contributions of time, money, programs and equipment are greatly
needed.

To begin with, GNU will be a kernel plus all the utilities needed to
write and run C programs: editor, shell, C compiler, linker,
assembler, and a few other things. After this we will add a text
formatter, a YACC, an Empire game, a spreadsheet, and hundreds of
other things. We hope to supply, eventually, everything useful that
normally comes with a Unix system, and anything else useful, including
on-line and hardcopy documentation.

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What is free?

- £0,00 = Shared
  - must distribute original or modified

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- Open source as development model
  - developed by the community

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  - examples to learn from

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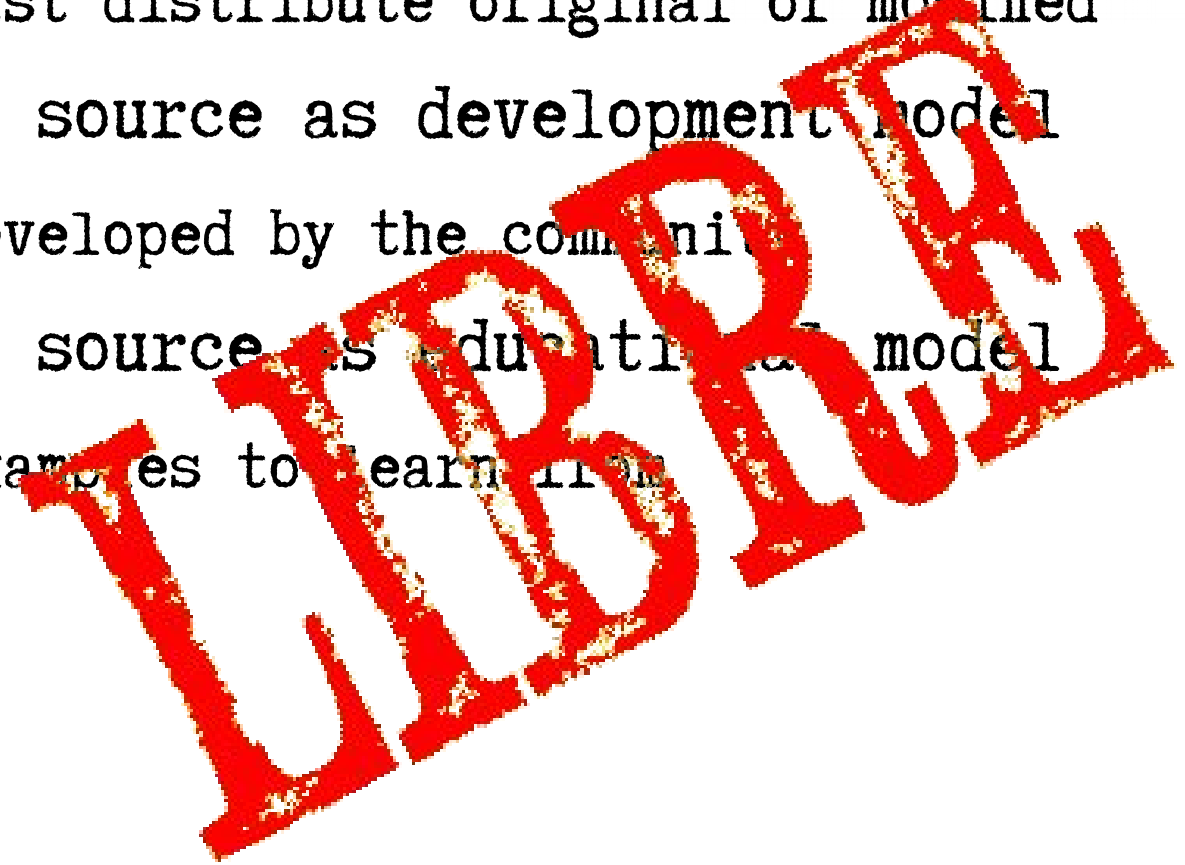

Richard Stallman

From CSvax:pur-ee:inuxc!ixn5c!ihnp4!houxm!mhuxi!eagle!mit-vax!mit-eddie!RMS@MIT-OZ
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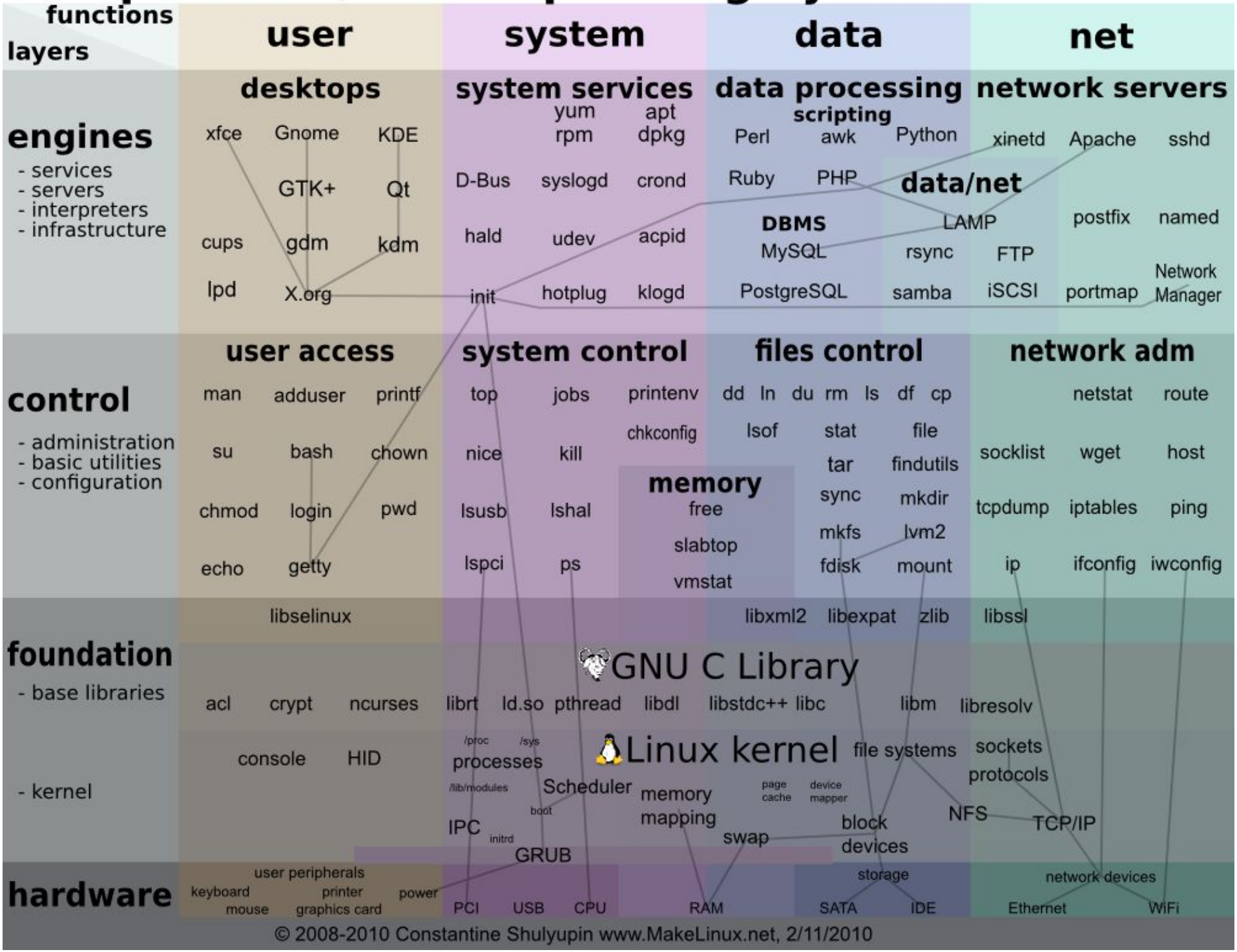
GNU

- GNU = “GNU's Not Unix”
- Kernel + software

Map of GNU/Linux Operating System Internals



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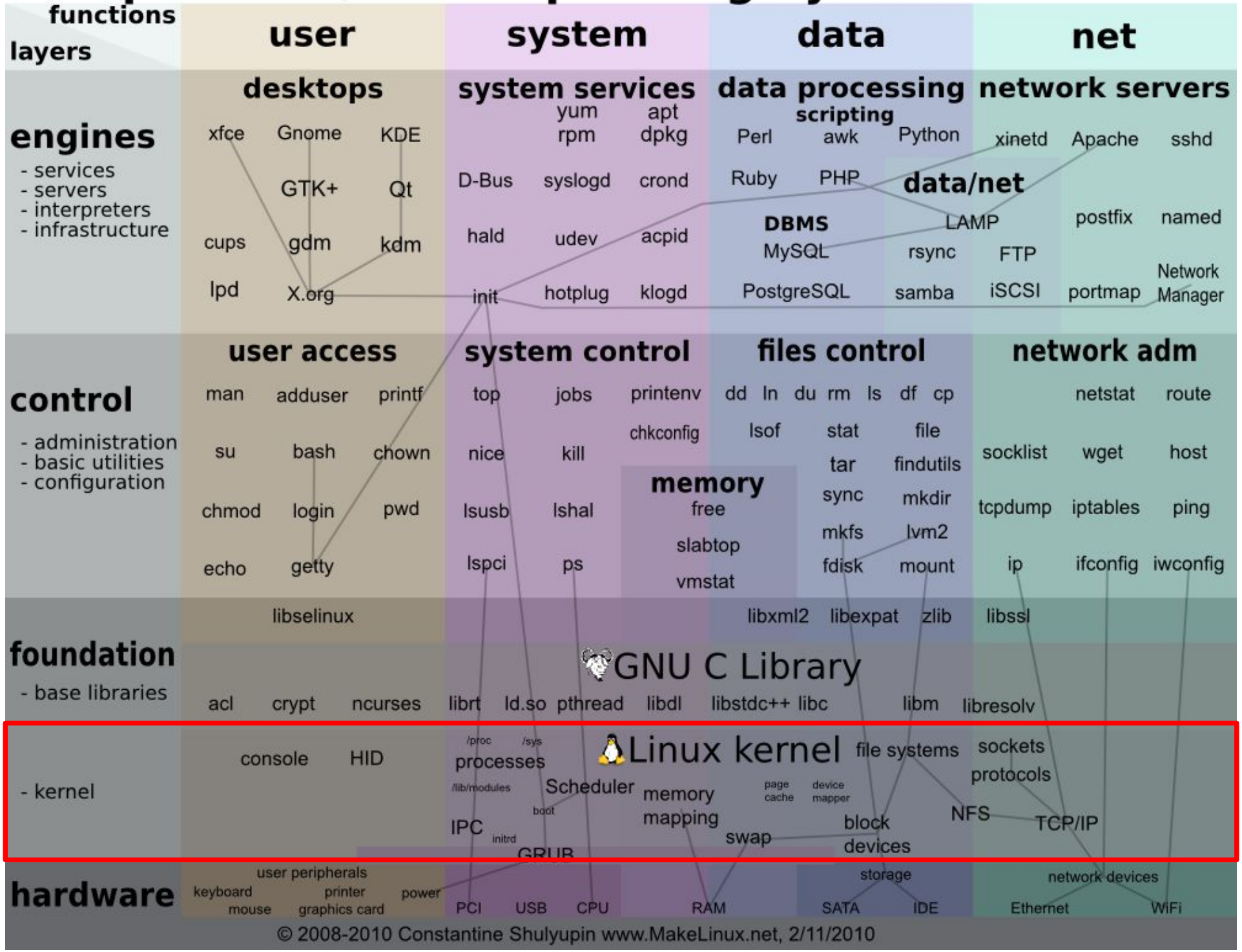
Map of GNU/Linux Operating System Internals



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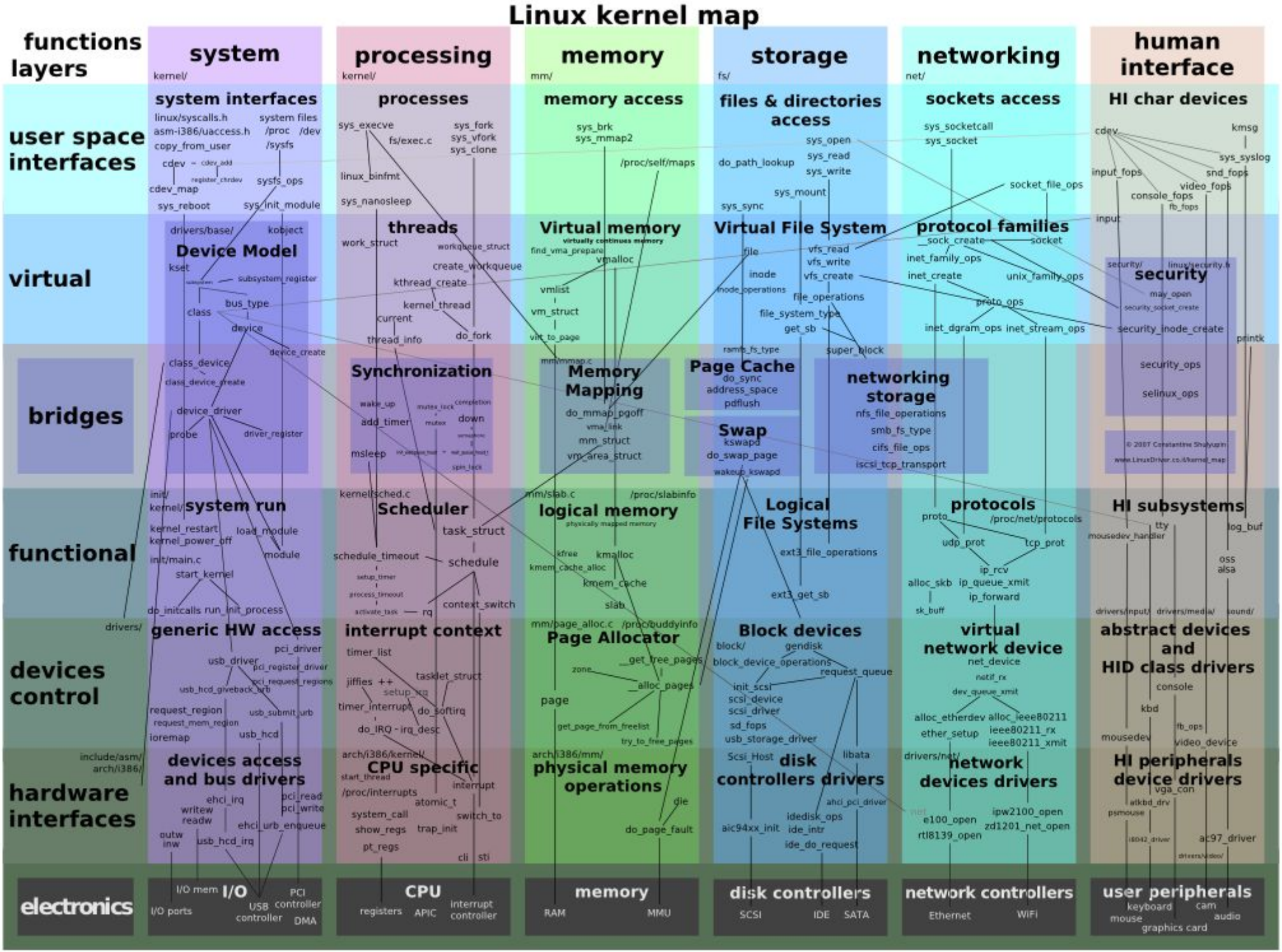
GNU

- GNU = “GNU's Not Unix”
- Kernel + software
- Linux kernel most popular

Linux


Linux kernel map
functions
layers
system
kernel/
processing
kernel/
memory
mm/
storage
fs/
networking
net/
human
interface
user space
interfaces
system interfaces
linux/syscalls.h
asm-i386/uaccess.h
copy_from_user
system files
/proc
/dev
/sysfs
cdev
cdev_add
register_chrdev
cdev_map
sysfs_ops
sys_reboot
sys_init_module
processes
sys_execve
fs/exec.c
sys_fork
sys_vfork
sys_clone
linux_binfmt
sys_nanosleep
memory access
sys_brk
sys_mmap2
/proc/self/maps
files & directories
access
sys_open
sys_read
sys_write
do_path_lookup
sys_mount
sys_sync
sockets access
sys_socketcall
sys_socket
socket_file_ops
HI char devices
cdev
kmsg
sys_syslog
input_fops
snd_fops
video_fops
console_fops
fb_fops
input
virtual
drivers/base/
kobject
Device Model
kset
subsystem_register
bus_type
class
device
device_create
threads
work_struct
workqueue_struct
create_workqueue
kthread_create
kernel_thread
current
thread_info
do_fork
Virtual memory
virtually continuous memory
find_vma_prepare
vmalloc
vmlist
vm_struct
virt_to_page
mm/mmap.c
Virtual File System
file
inode
inode_operations
vfs_read
vfs_write
vfs_create
file_operations
file_system_type
get_sb
ramfs_fs_type
super_block
protocol families
_sock_create
socket
inet_family_ops
inet_create
unix_family_ops
proto_ops
inet_dgram_ops
inet_stream_ops
security/
linux/security.h
security
may_open
security_socket_create
security_inode_create
printk
security_ops
selinux_ops
bridges
class_device
class_device_create
device_driver
probe
driver_register
Synchronization
wake_up
add_timer
mutex_lock
mutex
completion
down
msleep
spin_lock
Memory
Mapping
do_mmap_pgoff
vma_link
mm_struct
vm_area_struct
Page Cache
do_sync
address_space
pdflush
Swap
kswapd
do_swap_page
wakeup_kswapd
networking
storage
nfs_file_operations
smb_fs_type
cifs_file_ops
iscsi_tcp_transport
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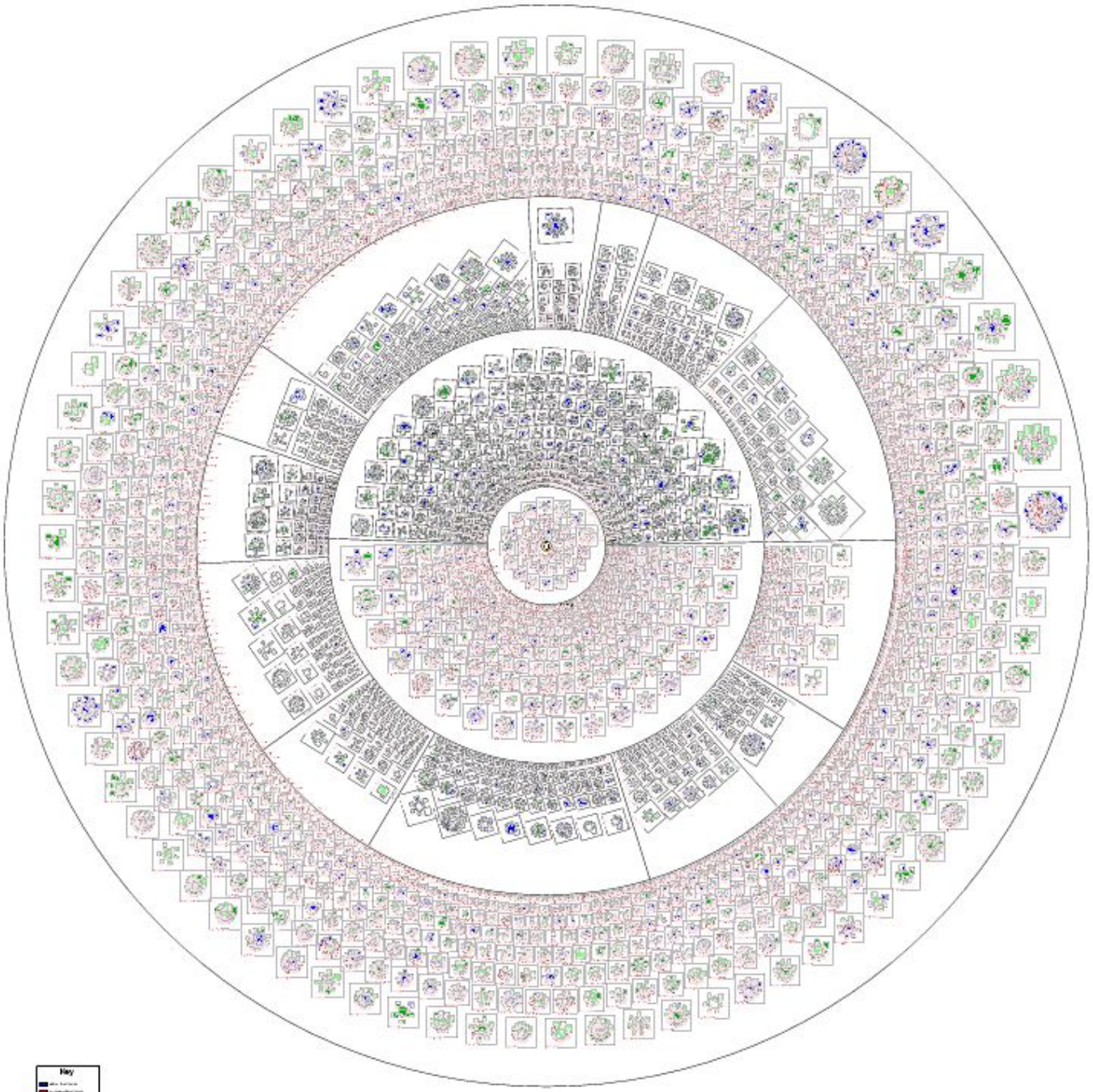
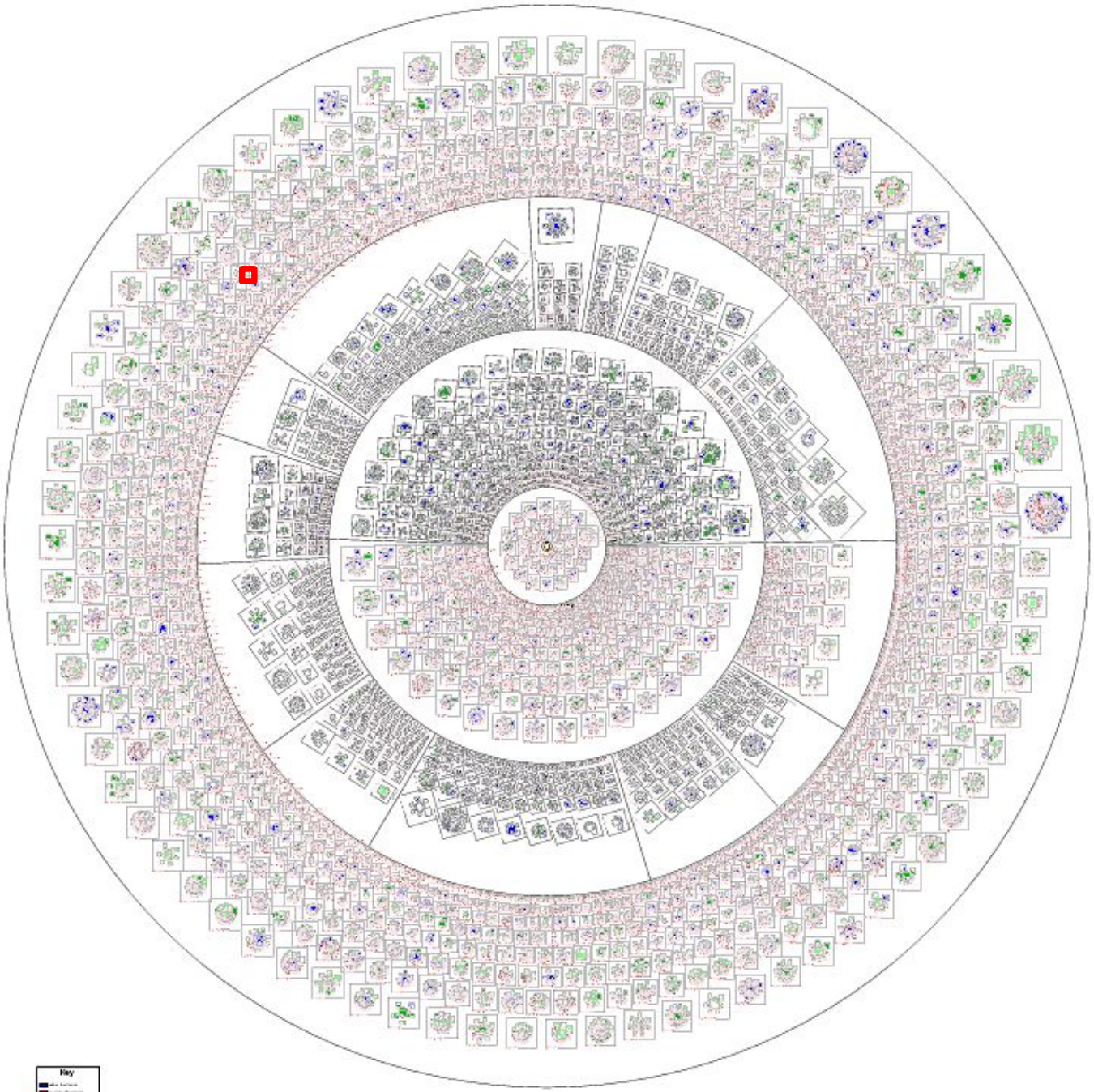
www.LinuxDriver.co.il/kernel_map
functional
init/
kernel/
system run
kernel_restart
kernel_power_off
init/main.c
start_kernel
load_module
module
do_initcalls
run_init_process
kernel/sched.c
Scheduler
task_struct
schedule_timeout
schedule
setup_timer
process_timeout
activate_task
rq
context_switch
mm/slab.c
/proc/slabinfo
logical memory
physically mapped memory
kfree
kmalloc
kmem_cache_alloc
kmem_cache
slab
Logical
File Systems
ext3_file_operations
ext3_get_sb
protocols
proto
/proc/net/protocols
udp_prot
tcp_prot
ip_rcv
alloc_skb
ip_queue_xmit
ip_forward
sk_buff
HI subsystems
tty
mousedev_handler
log_buf
oss
alsa
drivers/input/
drivers/media/
sound/
devices
control
drivers/
generic HW access
pci_driver
usb_driver
pci_register_driver
pci_request_regions
usb_hcd_giveback_urb
request_region
request_mem_region
ioremap
usb_submit_urb
usb_hcd
interrupt context
timer_list
jiffies ++
tasklet_struct
setup_irq
timer_interrupt
do_softirq
do_IRQ
irq_desc
mm/page_alloc.c
/proc/buddyinfo
Page Allocator
__get_free_pages
zone
__alloc_pages
page
get_page_from_freelist
try_to_free_pages
Block devices
block/
gendisk
block_device_operations
request_queue
init_scsi
scsi_device
scsi_driver
sd_fops
usb_storage_driver
virtual
network device
net_device
netif_rx
dev_queue_xmit
alloc_etherdev
ether_setup
alloc_ieee80211
ieee80211_rx
ieee80211_xmit
abstract devices
and
HID class drivers
console
kbd
mousedev
fb_ops
video_device
hardware
interfaces
include/asm/
arch/i386/
devices access
and bus drivers
ehci_irq
writew
readw
outw
inw
usb_hcd_irq
pci_read
pci_write
ehci_urb_enqueue
arch/i386/kernel/
CPU specific
start_thread
/proc/interrupts
interrupt
atomic_t
system_call
switch_to
show_regs
trap_init
pt_regs
cli
sti
arch/i386/mm/
physical memory
operations
die
do_page_fault
Scsi_Host
disk
controllers drivers
libata
ahci_pci_driver
idedisk_ops
aic94xx_init
ide_intr
ide_do_request
drivers/net/
network
devices drivers
e100_open
rtl8139_open
ipw2100_open
zd1201_net_open
HI peripherals
device drivers
vga_con
atkbd_drv
psmouse
i8042_driver
ac97_driver
drivers/video/
electronics
I/O mem
I/O
PCI
I/O ports
USB
controller
controller
DMA
CPU
registers
APIC
interrupt
controller
memory
RAM
MMU
disk controllers
SCSI
IDE
SATA
network controllers
Ethernet
WiFi
user peripherals
keyboard
cam
mouse
audio
graphics card

Linux Kernel v2.4.0



LINUXCARE

Linux Kernel v2.4.0



LINUXCARE

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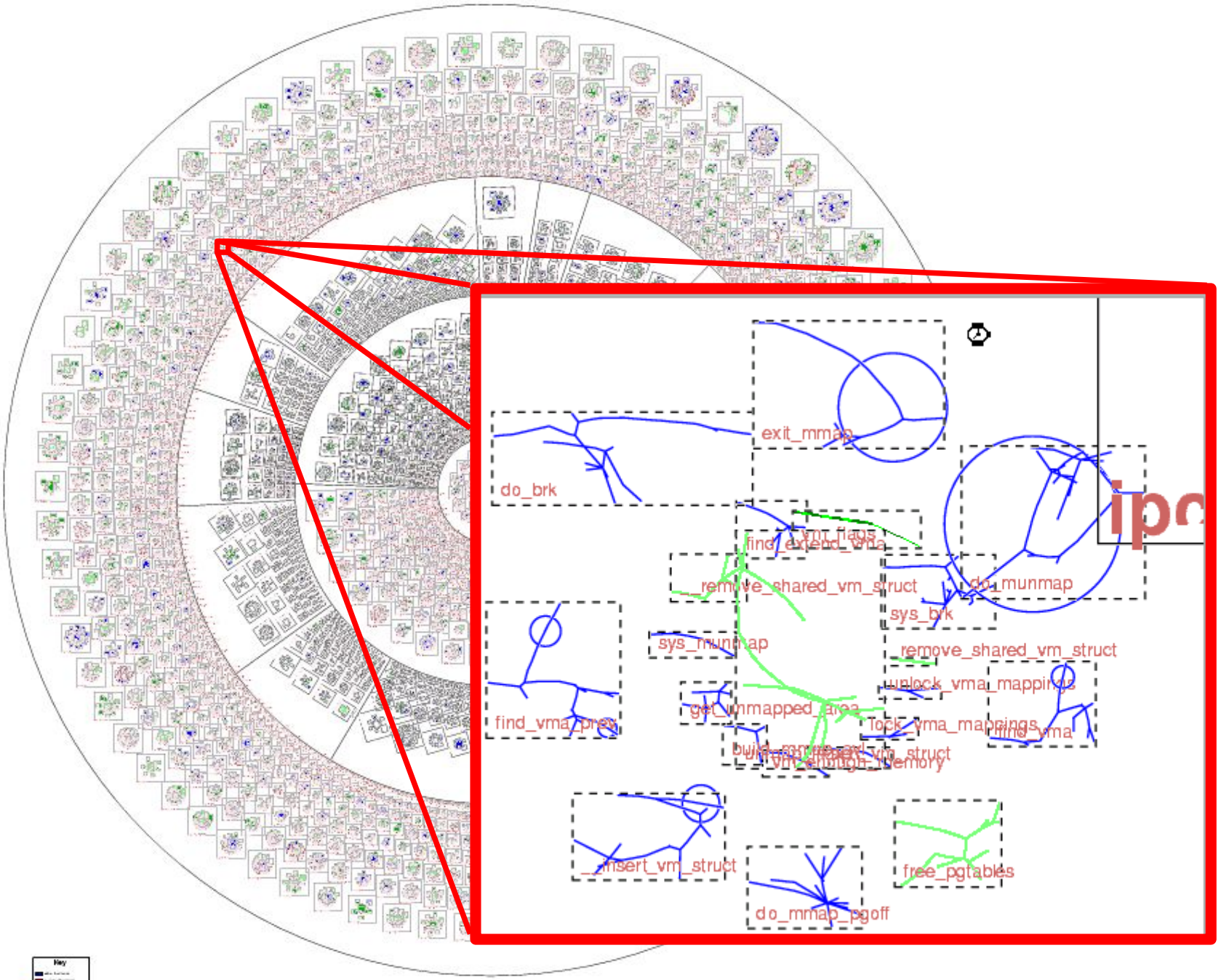


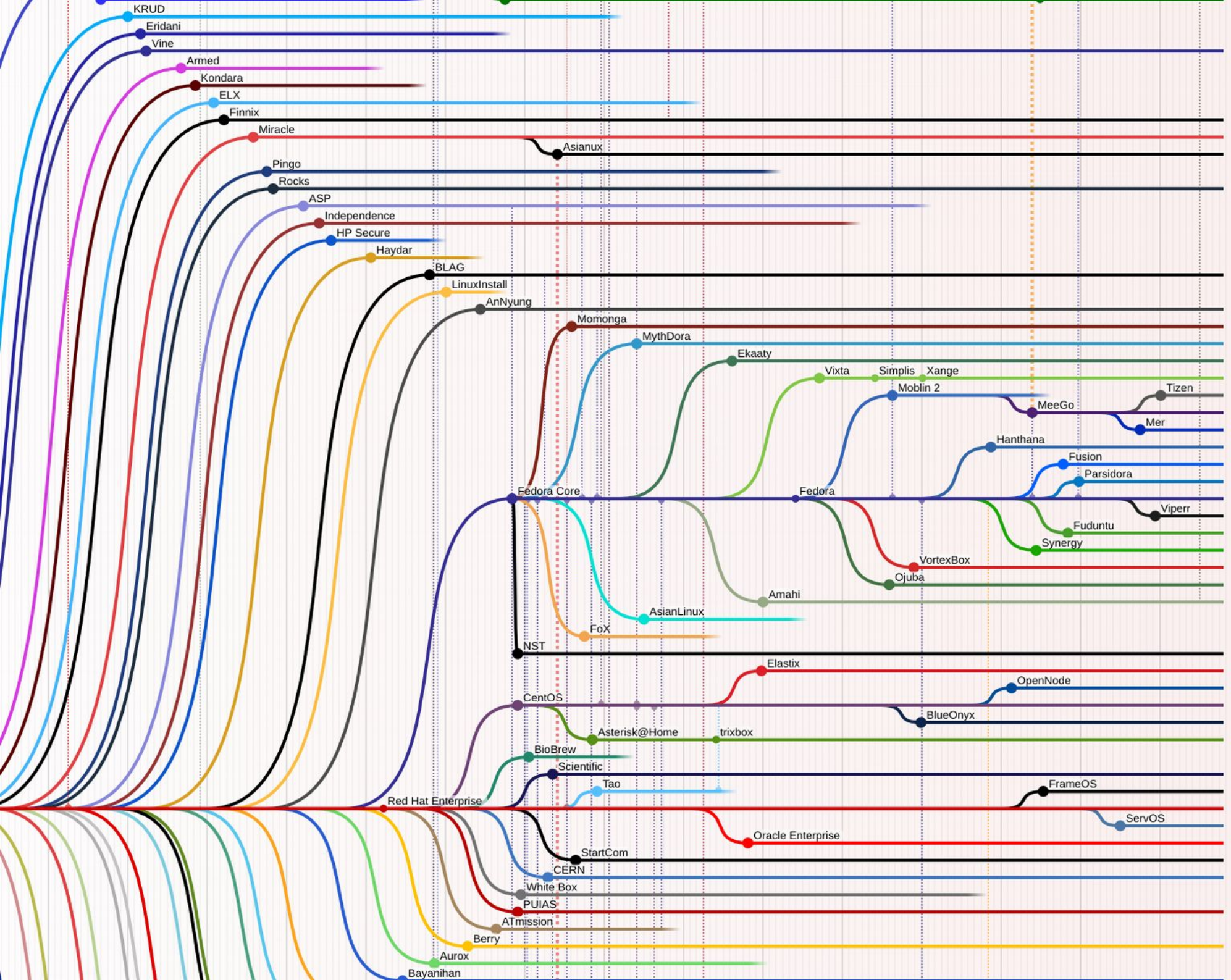
LINUXCARE

GNU/Linux

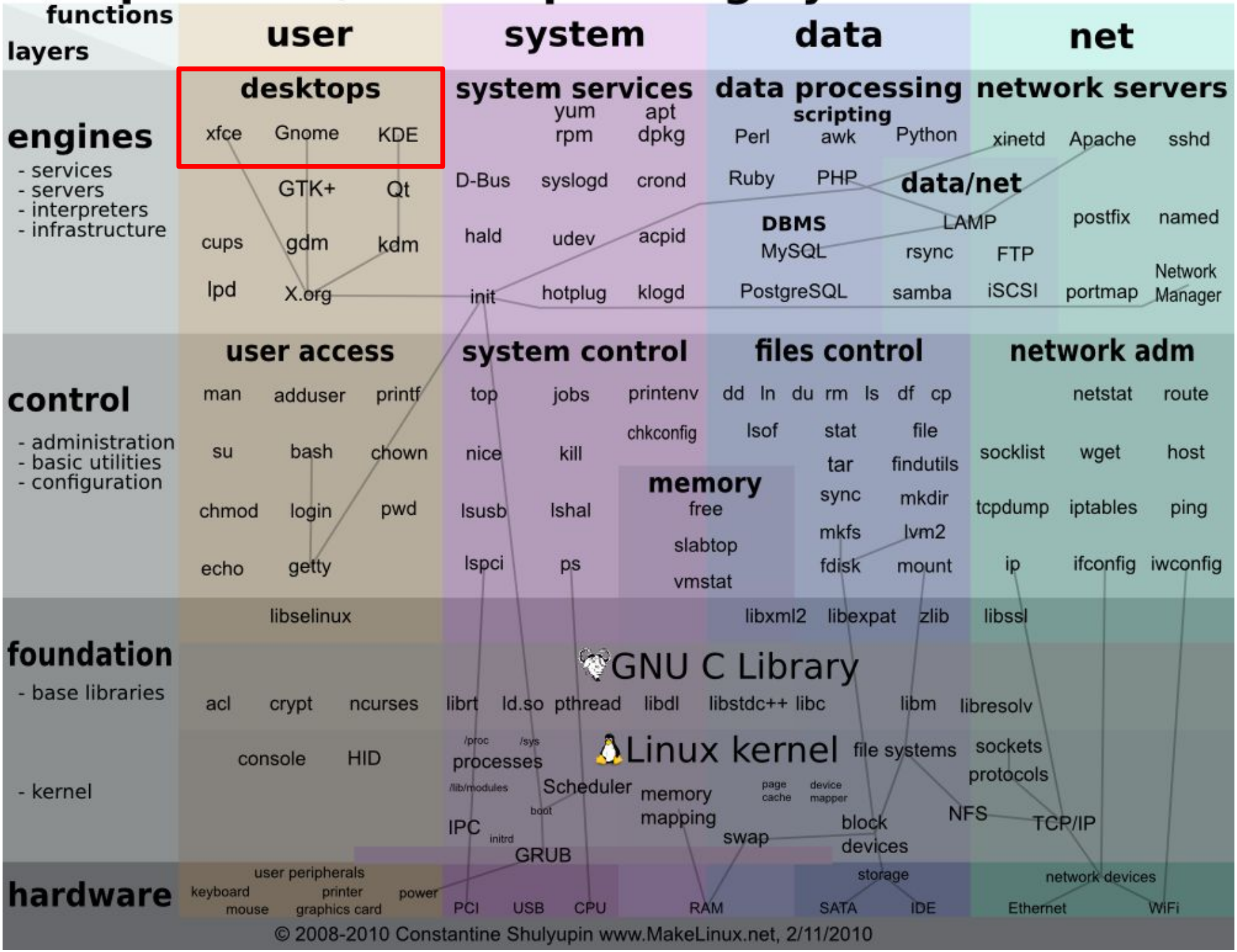
- GNU = “GNU's Not Unix”
- Kernel + software
- Linux kernel most popular

GNU/Linux

- GNU = “GNU's Not Unix”
- Kernel + software
- Linux kernel most popular
- Thousands of flavours


KRUD
Eridani
Vine
Armed
Kondara
ELX
Finnix
Miracle
Asianux
Pingo
Rocks
ASP
Independence
HP Secure
Haydar
BLAG
LinuxInstall
AnNyung
Momonga
MythDora
Ekaaty
Vixta
Simplis
Xange
Moblin 2
MeeGo
Tizen
Mer
Hanthana
Fusion
Parsidora
Viperr
Fuduntu
Synergy
VortexBox
Ojuba
Amahi
AsianLinux
FoX
NST
Fedora Core
Fedora
Elastix
OpenNode
CentOS
BlueOnyx
Asterisk@Home
trixbox
BioBrew
Scientific
Tao
FrameOS
ServOS
Red Hat Enterprise
Oracle Enterprise
StartCom
CERN
White Box
PUIAS
ATmission
Berry
Aurox
Bayanihan

Map of GNU/Linux Operating System Internals



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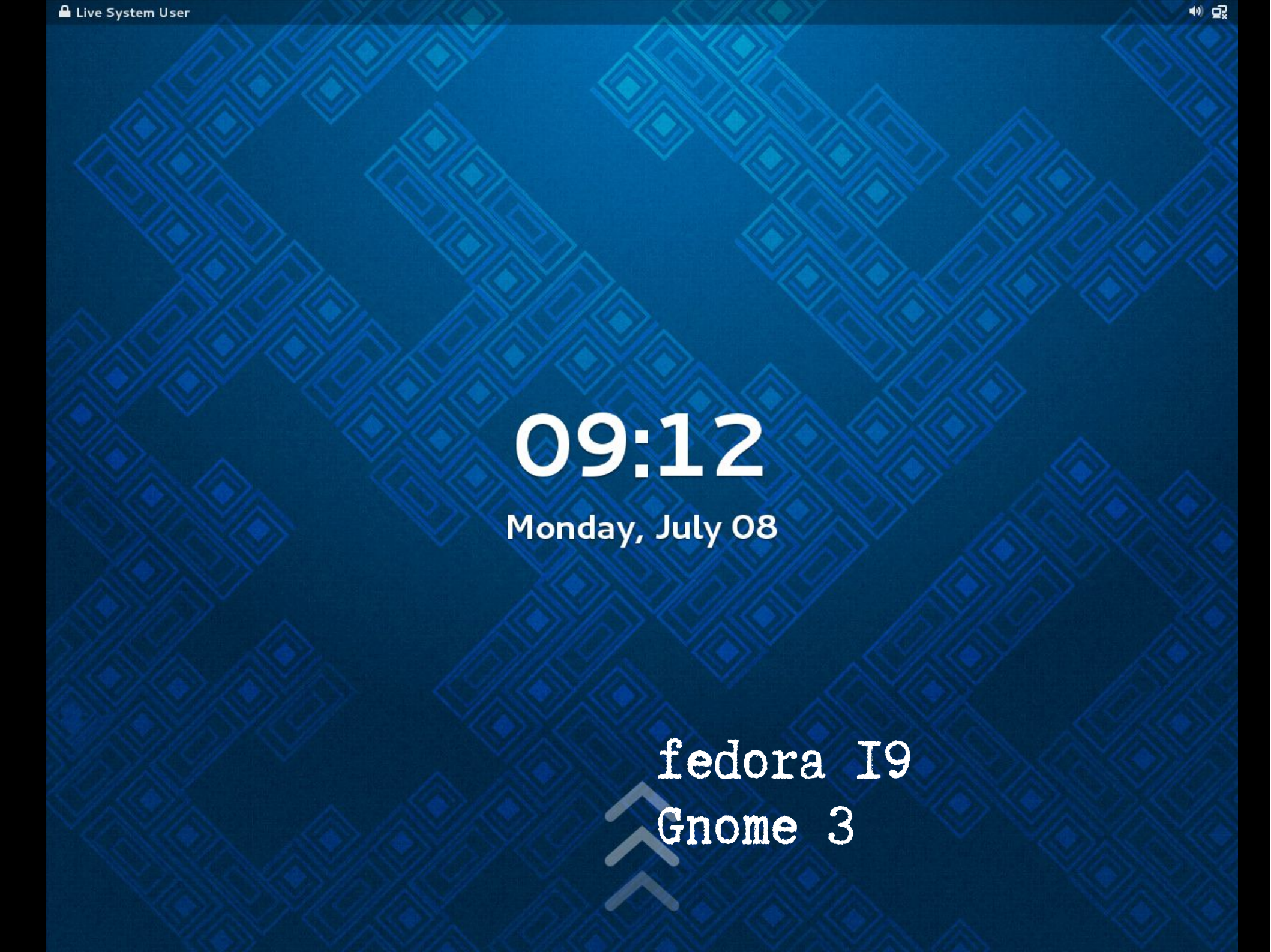
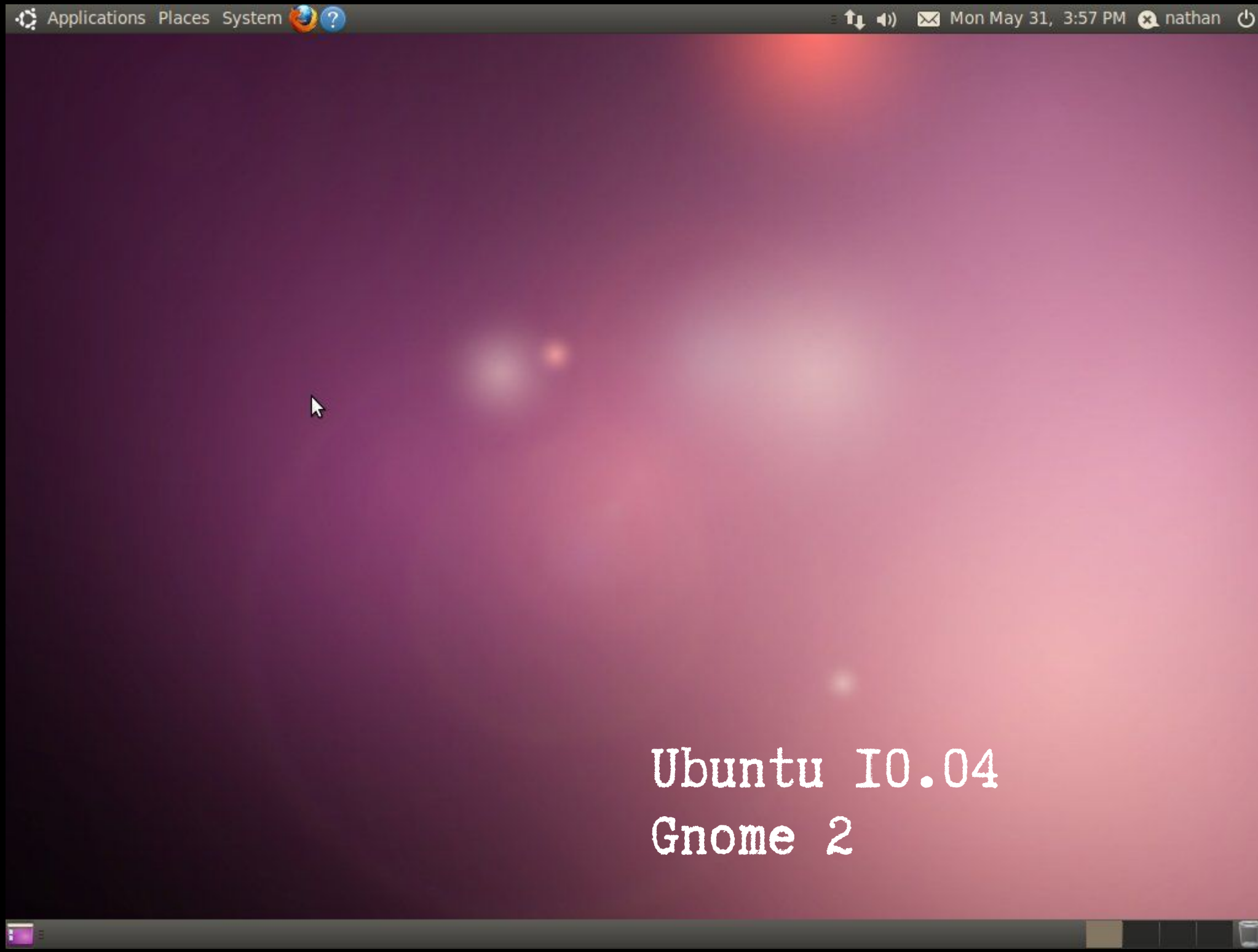
Applications
Places
System
Fri Feb 13, 6:23 PM
Computer
sbilbeau's Home
Trash
Debian 5.0 (Lenny)
Gnome 2

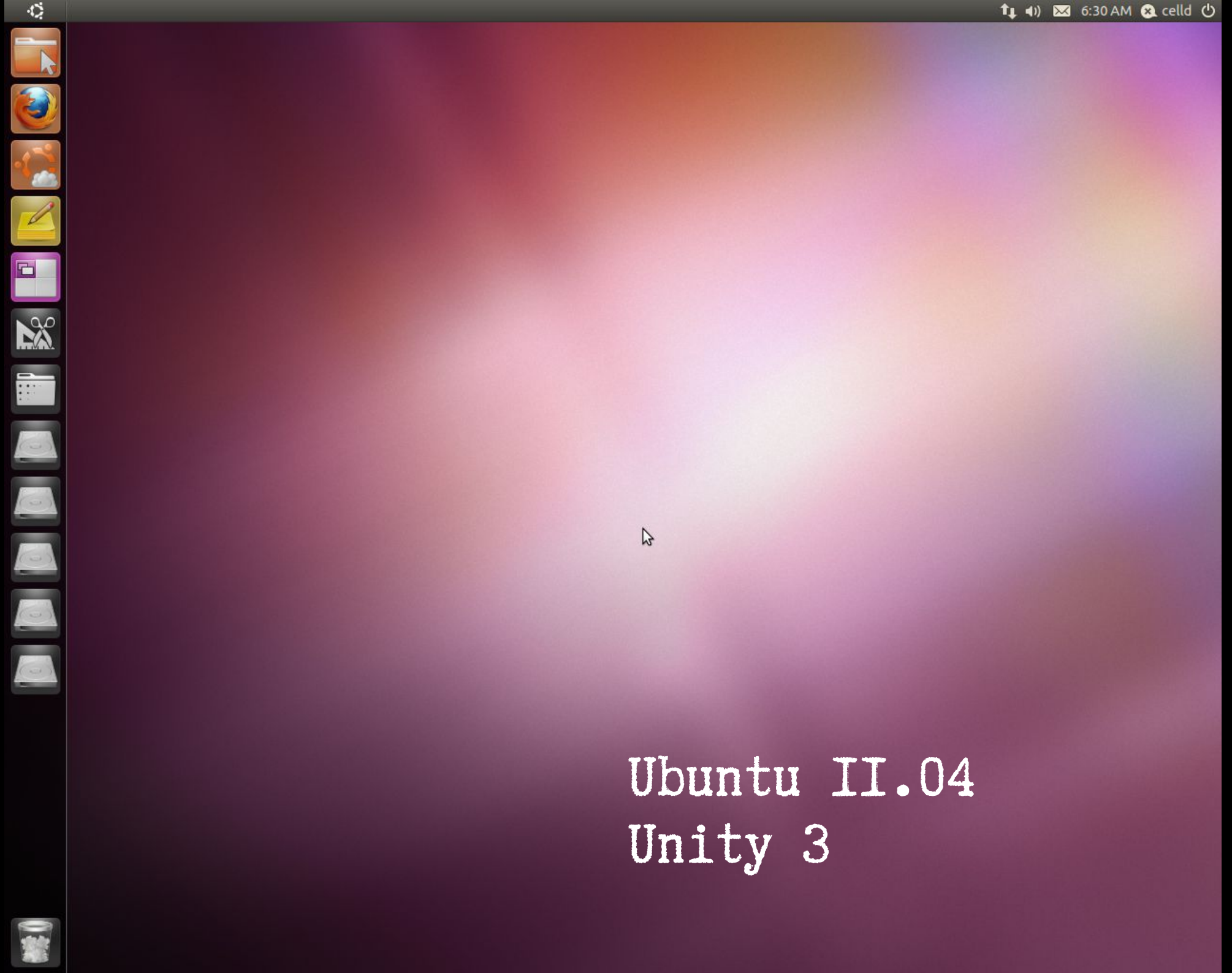
Activities
Tue 05:17
Live System User
Debian 7.0 (Wheezy)
Gnome 3


Live System User
09:12
Monday, July 08
fedora 19
Gnome 3

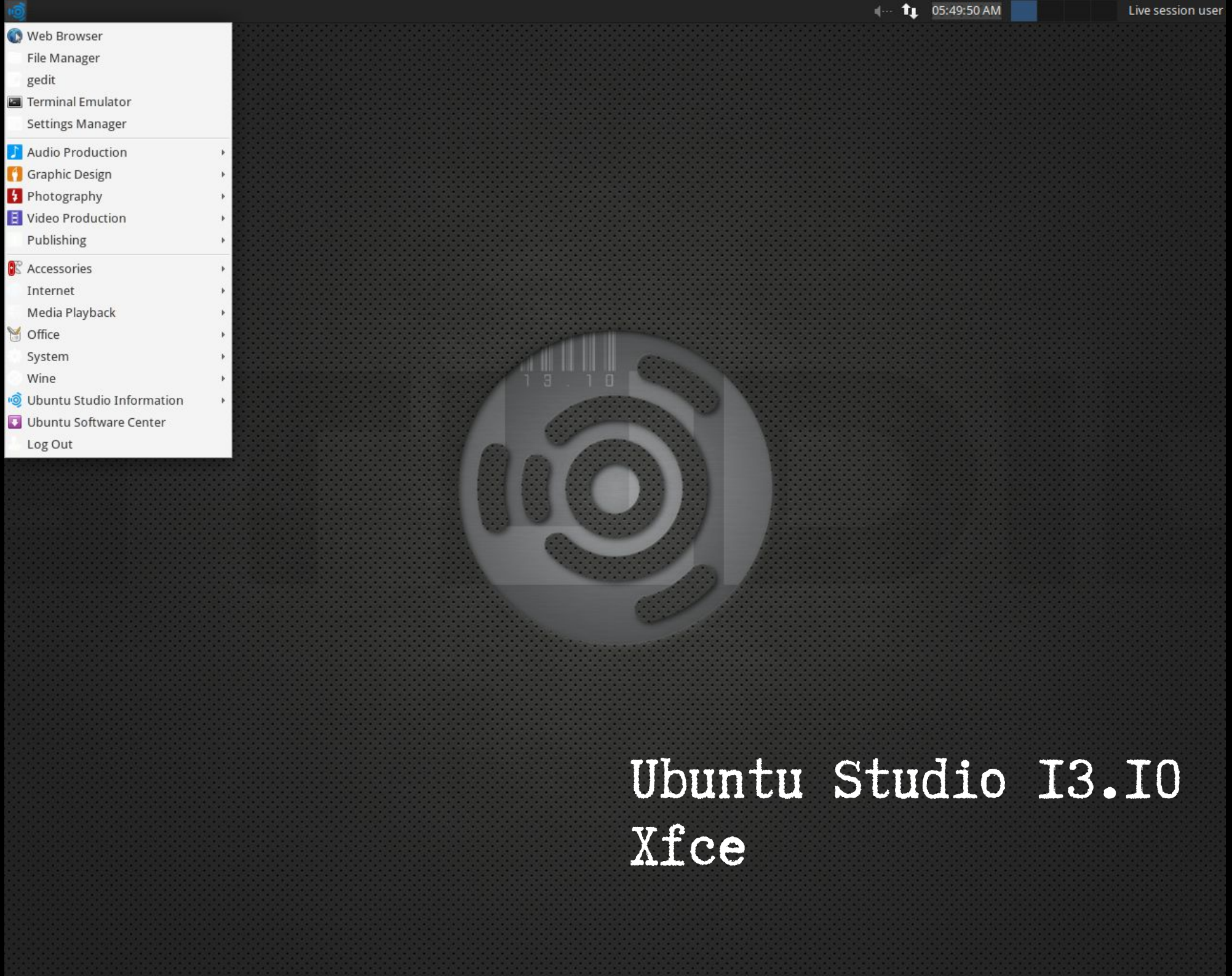
Wastebin
Firefox
Office
openSUSE
Online Help
My Computer
Printer
Search:
Web Browser
Firefox
Personal Information Manager
Kontact
Word Processor
OpenOffice.org Writer
Audio Player
Amarok
Photo Management
digiKam
Personal Files
Home
Configure Desktop
Control Centre
Help
KDE Help Center
Terminal Program
Favourites
Applications
Computer
History
Leave
User tester on opensuse
openSUSE
1
2
21:24
OpenSuse I0.3
KDE 3

Arbeitsflächen-Ordner
Arbeitsplatz
Büro
Firefox
Online-Hilfe
openSUSE
TurboPrint Control
TurboPrint Monitor
OpenSuse I2.2
KDE 4
12:15


Applications Places System
Mon May 31, 3:57 PM nathan
Ubuntu 10.04
Gnome 2


6:30 AM
celld
Ubuntu II.04
Unity 3

ArtistX User Home
Network Servers
Trash
Install ArtistX 13.04
Accessories
Education
Games
Graphics
Internet
Office
Other
Programming
Science
Sound & Video
System Tools
Universal Access
Wine
Ubuntu Software Center
Recent Documents
Applic
ArtistX Linux


05:49:50 AM
Live session user
Web Browser
File Manager
gedit
Terminal Emulator
Settings Manager
Audio Production
Graphic Design
Photography
Video Production
Publishing
Accessories
Internet
Media Playback
Office
System
Wine
Ubuntu Studio Information
Ubuntu Software Center
Log Out
13.10
Ubuntu Studio 13.10
Xfce

AV
LINUX
AV Linux 6.0
LXDE
Accessories
Audio
Audio Utilities
Graphics
Internet
Office
Soundcard Utilities
System Tools
VST Plugins
Video
Video Utilities
Preferences
Run
Logout
23:15

h o r m i g a
1
2
12:10
Trash
JACK Control
Home
Hydrogen Drum Mac...
Audacious
Ardour GTK2
Rosegarden
zynaddsubfx
QSynth
System
Rakarrack
XChat IRC
Iceweasel Web Brow...
K3b
Musix-2.0
Musix GNU+Linux
Music GNU+Linux
IceWM

GNU/Linux

- GNU = “GNU's Not Unix”
- Kernel + software
- Linux kernel most popular
- Thousands of flavours

- Let's chat and try a few flavours, but first...

Remember

- Using free/libre sofware is not about quality - it is about principles

Remember

- Using free/libre sofware is not about quality - it is about principles
- Never complain about free/libre software - share and be nice to volunteers