

GNU/Linux: coming to a phone near you: Maemo Leste

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Table of contents

Mix of technical and non-technical parts

- ▶ What and Why
- ▶ History of Maemo and CSSU
- ▶ Overview of components
- ▶ Current status, news
- ▶ Future plans, milestones
- ▶ How you can participate/help

What is Maemo Leste?

- ▶ GNU/Linux
- ▶ Mobile OS for phones and tablets
- ▶ Based on Devuan (ascii release - Debian stretch based)
- ▶ Soon to be based on Devuan beowulf - Debian buster
- ▶ No vendor kernels: only mainline linux (with minimal patches)
- ▶ Linux experience: freedom, hackability (want wireguard? no problem. btrfs? got you covered.)
- ▶ Alpha stage

Why Maemo Leste?

- ▶ Need an OS for FOSSers
- ▶ Tired of Android, other mobile OSes, broken promises about openness
- ▶ Open, hackable, not locked down
- ▶ Show that we can have a viable FOSS mobile OS
- ▶ Community developed (!)

History: Maemo Fremantle

Mobile "hacker" OS made by Nokia for the N900. (And previous versions before that for the Nokia 770, Nokia 800, Nokia 810)

Still usable today (still use it today)

- ▶ Uses the debian package manager
- ▶ GNU/Linux
- ▶ Only some parts are open source
- ▶ Still maintained by the community: CSSU (Community Seamless Software Update)
- ▶ https://wiki.maemo.org/Fremantle_closed_packages
- ▶ https://wiki.maemo.org/Free_Maemo

Idea: build on Maemo Fremantle's proven OS

- ▶ Maemo Fremantle got a lot of things right, but hard to port because a lot of components are (or were) closed source.
- ▶ Open source everything, stay mostly compatible on API level with Fremantle (no need to figure out APIs)
- ▶ Big ecosystem of open source applications written for Fremantle, recompile/port it

Userspace components

- ▶ **mce**: Mode control entity
- ▶ **dsme**: Device state management entity
- ▶ **icd2**: internet connectivity daemon (manages wifi, cellular data)
- ▶ **ke-recv**: receive and process kernel events
- ▶ **clockd and alarmd**: clock and alarm
- ▶ **hildon framework**: user interface (gtk, qt)
- ▶ **hildon-desktop and hildon-home**: window manager and main ui
- ▶ **him**: hildon input method framework
- ▶ **PyMaemo**: Python interfaces to most hildon components

Builds on existing standardised daemons/tools (next slide)

Userspace components: standardised daemons

- ▶ dbus (bus for communication), gconf (settings)
- ▶ udev (kernel events), evdev (input events)
- ▶ pulseaudio (audio)
- ▶ upower, udisks (power and storage)
- ▶ hostapd/wpa_supplicant, ofono, lircd, bluez/bluetoothd (connectivity)

Porting older Maemo code

- ▶ Replace HAL with udev, upower, udisks, input devices, gadgetfs
- ▶ Port Maemo widgets and patches to Qt5, gtk
- ▶ Replace or rewrite closed parts/dependencies
- ▶ Maemo CSSU has done a lot of porting and reverse engineering
- ▶ Device specific X drivers

Maemo Leste infrastructure: CI

- ▶ Repository hosted on maemo.org servers
- ▶ Website and build servers hosted at home
- ▶ Jenkins + jenkins-debian-glue builds our packages
 - ▶ <https://phoenix.maemo.org/>
- ▶ Build slaves are KGPE-D16 desktop and a Softiron Overdrive machine (arm64).

Status

Maemo Leste is in an alpha stage now (no longer pre-alpha).

The following mostly just works, with a good UI:

- ▶ Virtual keyboard
- ▶ Wireless
- ▶ 2g/3g/4g connectivity (still work in progress)
- ▶ Audio
- ▶ Charging
- ▶ Basic browsing
- ▶ USB peripheral/otg

Also see <https://leste.maemo.org/Status>

Status: work in progress

The following items are being worked on

- ▶ ofono (data, sms, calls) and connui-cellular - getting there
- ▶ Good UI for calls, contacts and SMS
- ▶ 3d acceleration - looking bright
- ▶ Camera support

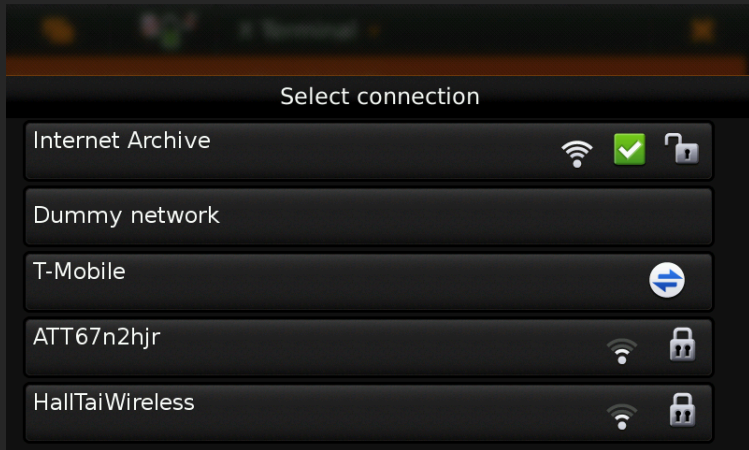
Status: work in progress

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Screenshot time

Status: Wireless UI

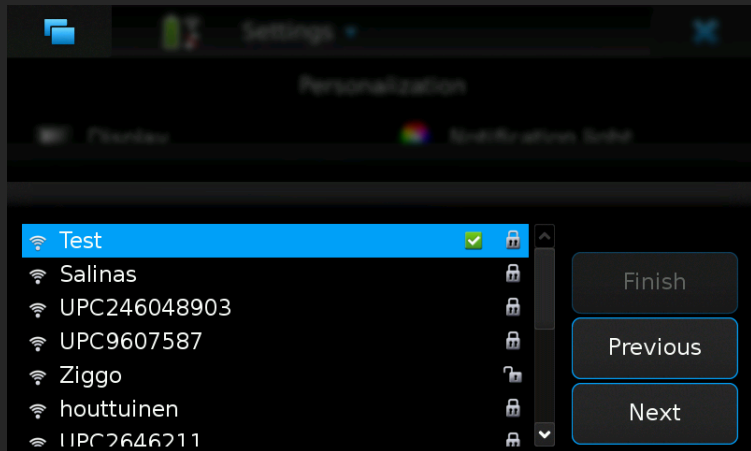


Status: Wireless UI part II

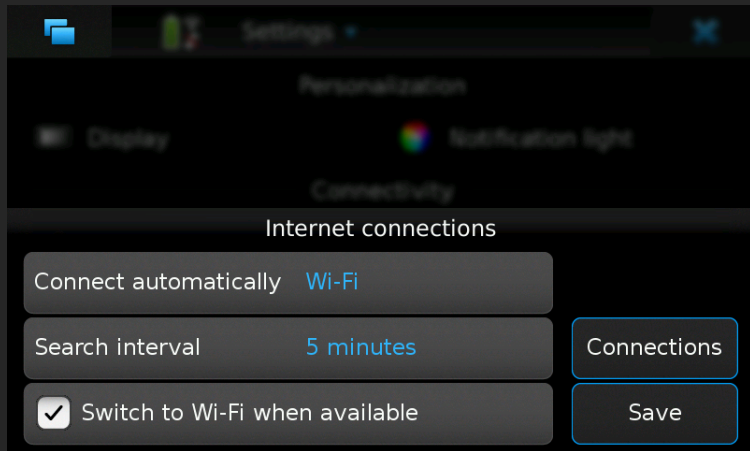
WPA2 EAP works



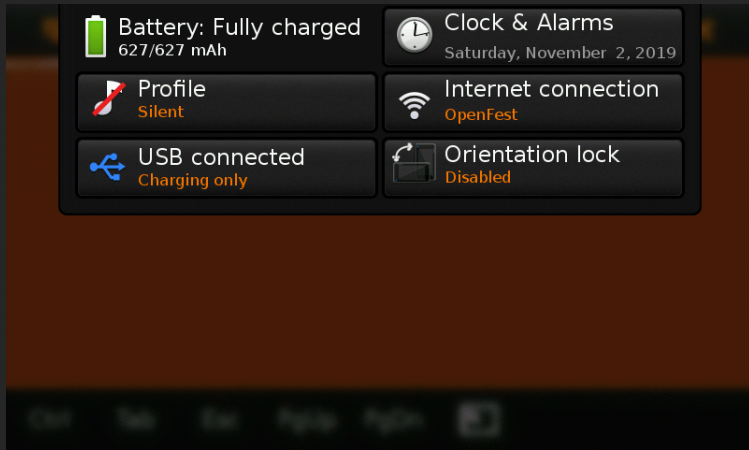
Status: Wireless UI part III



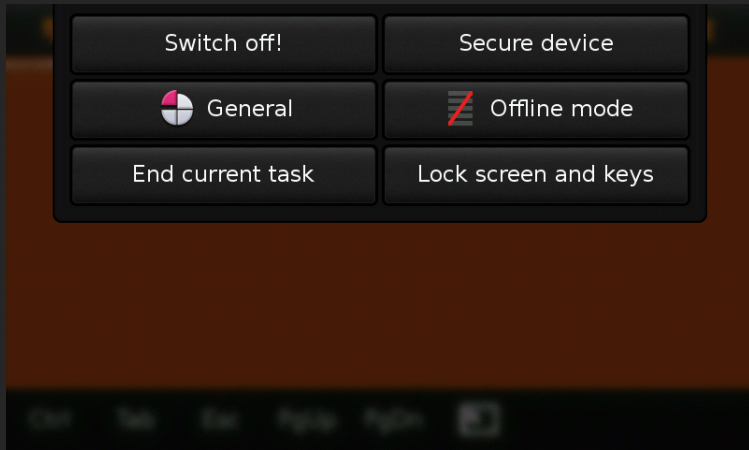
Status: Wireless UI part IV



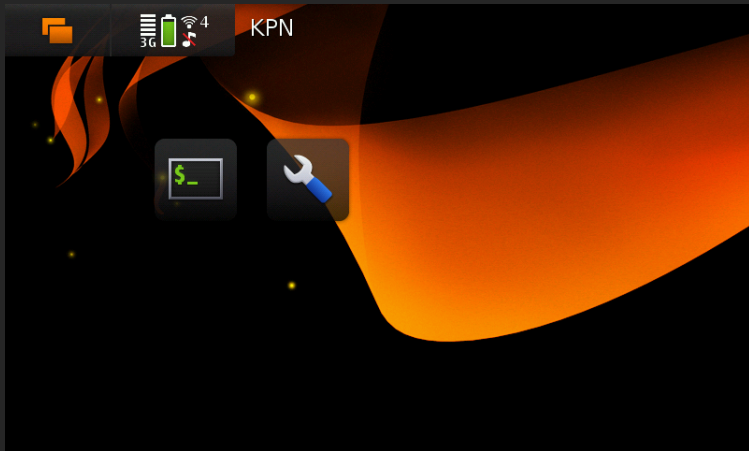
Status: Hildon UI



Status: Hildon UI part II



Status: Hildon UI part III



Status: Hildon UI part IV



```
X Terminal
inet0: 111/120 scope host
      valid lft forever preferred lft forever
2: wlan0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc sq state UP group 0
      valid lft forever preferred lft forever
      link/ether 00:1f:dc:cd:ad:1e brd ff:ff:ff:ff:ff:ff
      inet 172.31.100.207/24 brd 172.31.100.255 scope global wlan0
      valid lft forever preferred lft forever
      inet6 fe80::21f:dc:cd:ad:1e:1e fe80:: scope link
      valid lft forever preferred lft forever
6: phonet0: <POINTPOINT,NOARP> mtu 4096 qdisc noop state DOWN group default qlen 1000
      link/phonet 16 peer 00
7: usb0: <BROADCAST,MULTICAST> mtu 1500 qdisc pfifo_fast state DOWN group default qlen 1000
      link/ether 7a:33:b4:d0:cc:74 brd ff:ff:ff:ff:ff:ff
      inet 192.168.42.2/24 brd 192.168.42.255 scope global usb0
      valid lft forever preferred lft forever
user@hildon:~$
```

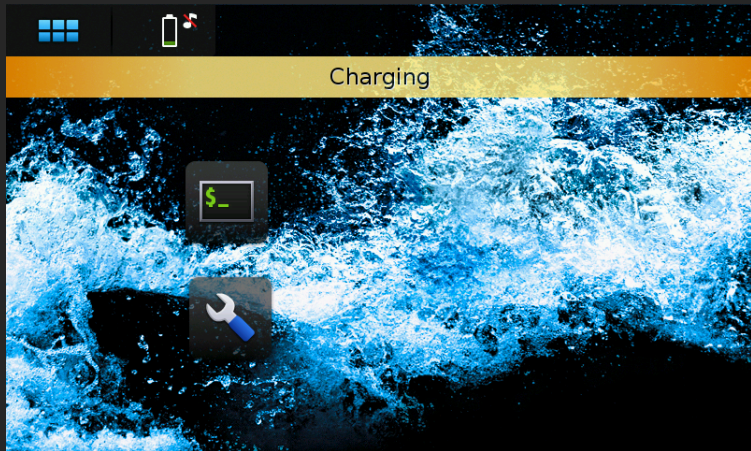
Testing 123

1

3 minutes ago

Hello World

Status: Hildon UI part V



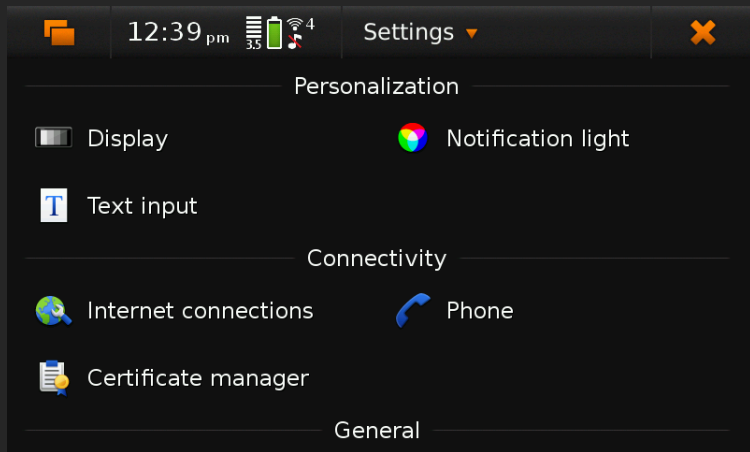
Status: Hildon UI part VI



Status: Hildon UI part VII



Status: Settings



The screenshot shows a mobile settings application interface. At the top, there is a status bar with an orange folder icon, the time 12:39 pm, a battery level indicator at 3.5, a signal strength indicator with the number 4, and the word "Settings" with a downward arrow. To the right of the status bar is an orange "X" icon. Below the status bar, the settings are organized into sections. The first section is "Personalization", which includes "Display" (with a battery icon) and "Notification light" (with a rainbow circle icon). The second section is "Connectivity", which includes "Internet connections" (with a globe icon) and "Phone" (with a blue phone handset icon). Below "Connectivity" is "Certificate manager" (with a document icon). The final section is "General".

12:39 pm 3.5 4 Settings

Personalization

Display Notification light

Text input

Connectivity

Internet connections Phone

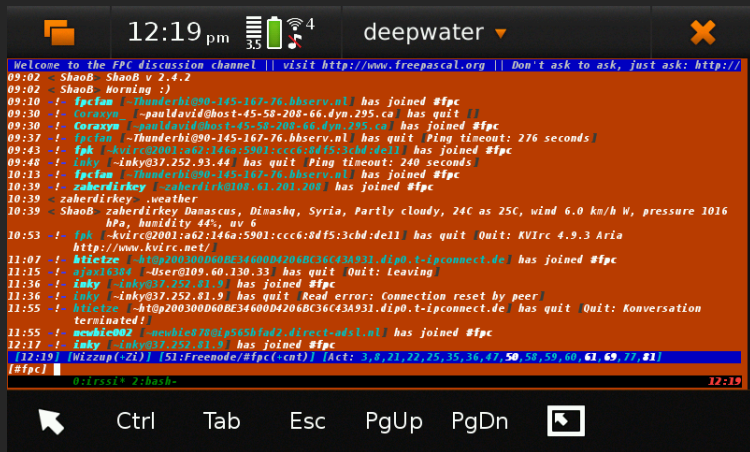
Certificate manager

General

Status: Terminal



Status: Terminal part II



```
12:19 pm 3.5 4 deepwater X
Welcome to the FPC discussion channel | visit http://www.freepascal.org | Don't ask to ask, just ask: http://
09:02 < ShaoB- ShaoB v 2.4.2
09:02 < ShaoB- Morning :)
09:10 -!- fpcfan [-Thunderbi@90-145-167-76.bb.serv.nl] has joined #fpc
09:30 -!- Coraxy [-pauldavid@host-45-58-208-66.dyn.295.ca] has quit []
09:30 -!- Coraxy [-pauldavid@host-45-58-208-66.dyn.295.ca] has joined #fpc
09:37 -!- fpcfan [-Thunderbi@90-145-167-76.bb.serv.nl] has quit [Ping timeout: 276 seconds]
09:43 -!- fpk [-kvirc@2001:a62:146a:5901:ccc6:8df5:3cbd:de11] has joined #fpc
09:48 -!- inky [-inky@37.252.93.44] has quit [Ping timeout: 240 seconds]
10:13 -!- fpcfan [-Thunderbi@90-145-167-76.bb.serv.nl] has joined #fpc
10:39 -!- zaheerdirkey [-zaheerdirkey@104.61.201.208] has joined #fpc
10:39 < zaheerdirkey- weather
10:39 < ShaoB- zaheerdirkey Damascus, Dimashq, Syria, Partly cloudy, 24C as 25C, wind 6.0 km/h W, pressure 1016
hPa, humidity 44%, uv 6
10:53 -!- fpk [-kvirc@2001:a62:146a:5901:ccc6:8df5:3cbd:de11] has quit [Quit: KVirc 4.9.3 Aria
http://www.kvirc.net/]
11:07 -!- htietze [-ht@p200300D06BE34600D4206BC36C43A931.dip0.t-ipconnect.de] has joined #fpc
11:15 -!- ajax16384 [-User@109.60.130.33] has quit [Quit: Leaving]
11:36 -!- inky [-inky@37.252.93.9] has joined #fpc
11:36 -!- inky [-inky@37.252.93.9] has quit [Read error: Connection reset by peer]
11:55 -!- htietze [-ht@p200300D06BE34600D4206BC36C43A931.dip0.t-ipconnect.de] has quit [Quit: Konversation
terminated!]
11:55 -!- newbie002 [-newbie@780Dip565b1ad2.direct-ads.nl] has joined #fpc
12:17 -!- inky [-inky@37.252.93.9] has joined #fpc
[12:19] [Wizzup(-zi)] [51:FreeNode/#fpc(-cnt)] [Act: 3,8,21,22,25,35,36,47,50,58,59,60,61,69,77,81]
#fpc |
0:irssi* 2:hash- 12:19
```



Ctrl

Tab

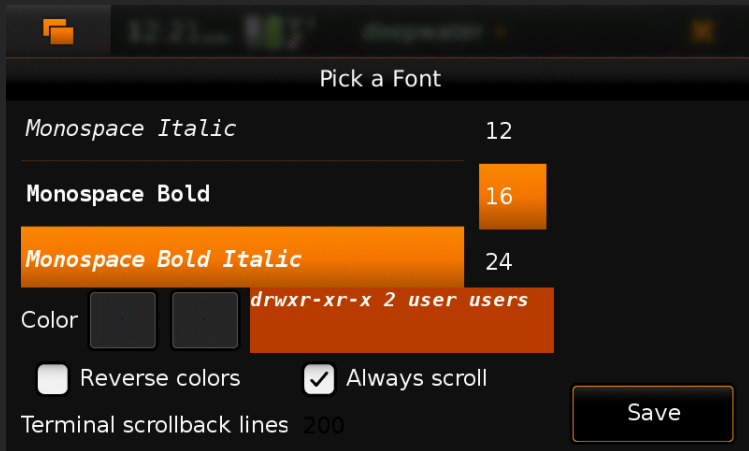
Esc

PgUp

PgDn



Status: Terminal part III



The image shows a terminal settings dialog box titled "Pick a Font". It features a list of font options with their respective sizes. The "Monospace Bold Italic" option is selected and highlighted in orange, with a size of 24. Below the font list, there are two color selection boxes, a checkbox for "Reverse colors" (unchecked), a checkbox for "Always scroll" (checked), and a field for "Terminal scrollback lines" set to 200. A "Save" button is located at the bottom right.

Pick a Font

<i>Monospace Italic</i>	12
Monospace Bold	16
<i>Monospace Bold Italic</i>	24

Color `drwxr-xr-x 2 user users`

Reverse colors Always scroll

Terminal scrollback lines 200

Save

Status: Browser

The screenshot shows a mobile browser interface. At the top, there are icons for a folder, battery level, Wi-Fi signal, and cellular signal strength. The title bar displays "Maemo Leste - Maemo Leste - N..." with a close button on the right. Below the title bar is a menu bar with "File Edit View Navigate Tools Help". The address bar shows "https://maemo-" followed by a search icon and "Search G". The main content area displays the following text:

Welcome to the Maemo Leste website; Maemo Leste continues the legacy of **Maemo**. We aim to provide a free Maemo experience on mobile phones and tablets like the Nokia N900, Motorola Droid 4, Allwinner Tablets and more.

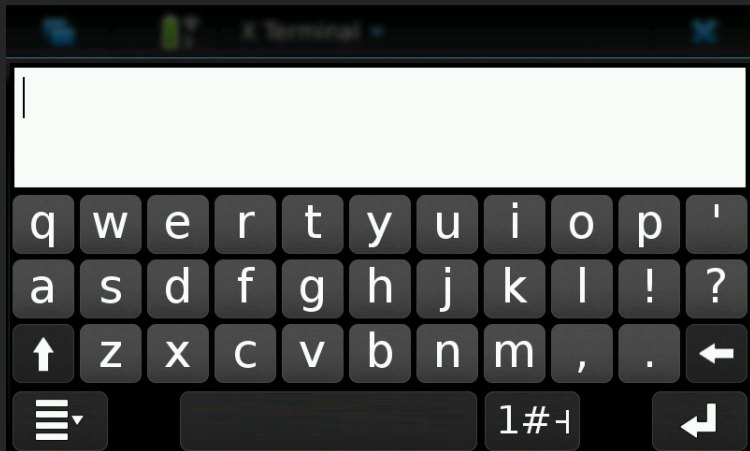
Feel free to join us on [#maemo-leste](http://irc.freenode.net) and also join our [mailing list](#) if you're interested.

Maemo Leste is based on Devuan Ascii (Debian Stretch) and all the "supported" devices ship with recent Linux (mainline-based) kernels. We are also already working towards supporting Devuan Beowulf (Debian Buster) as well.

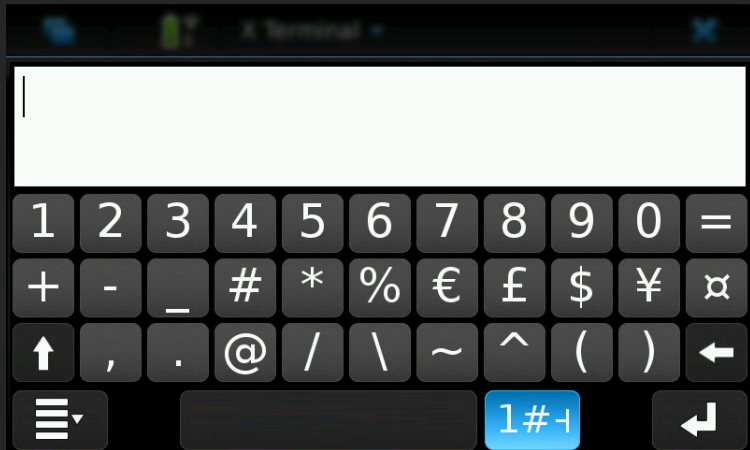
The project is not usable as a daily driver for your device, Maemo Leste is currently in development phase and we are actively searching for developers. For some devices, we have development images available - such as the [Nokia N900](#) - for an impression see [Screenshots](#).

At the bottom of the browser, it says "Done (7.2s)" with navigation arrows.

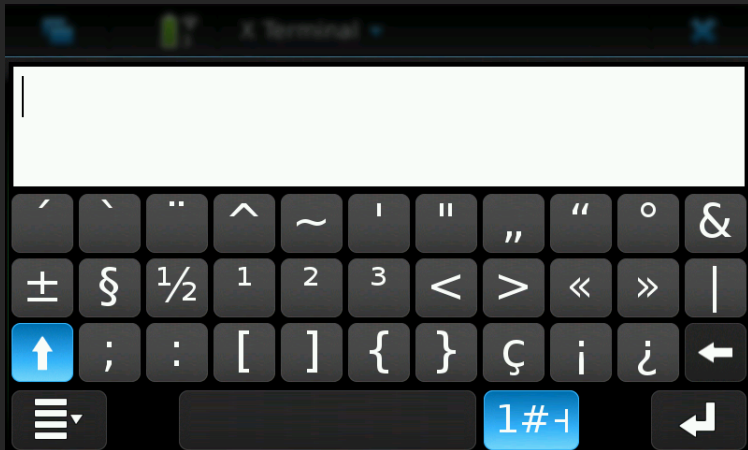
Status: Virtual Keyboard



Status: Virtual Keyboard: part II



Status: Virtual Keyboard: part III



Status: Games: SNES emulator

12:24 pm 3.5 4 DrNokSnes

DR. NOKSNES
Based on DrPocketSNES, PocketSNES, snes9x, OpenSnes9x...

Game not started yet

ROM
Donkey Kong Country (U) (V1.2) [!].zip

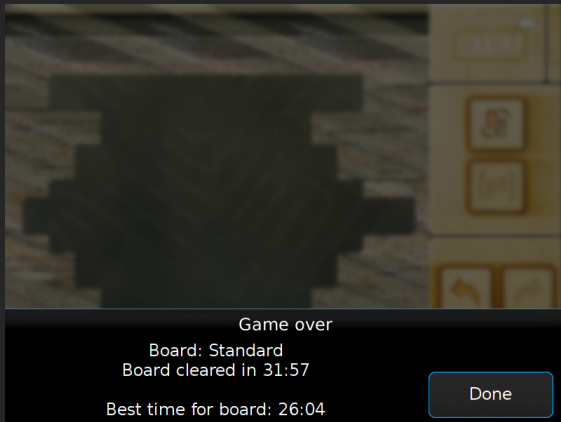
Play Restart

Sound Target framerate **Auto**

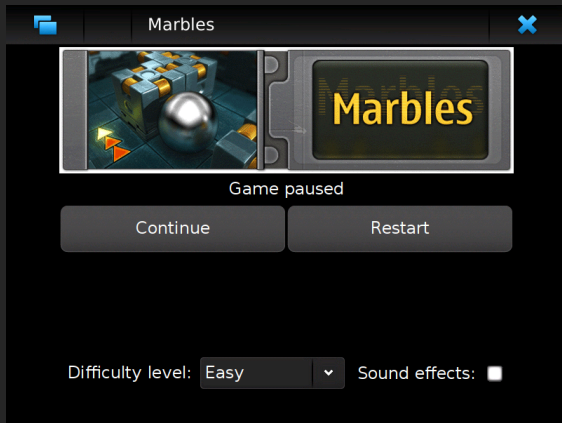
Status: Games: Mahjong



Status: Games: Mahjong part II



Status: Games: Marbles



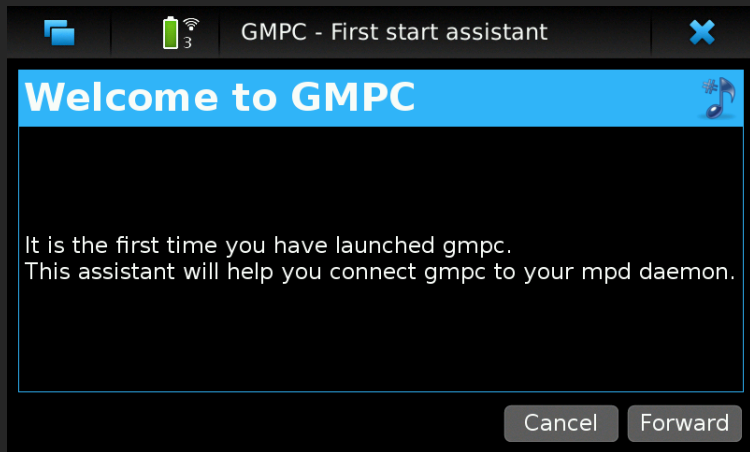
Status: Games: Doom



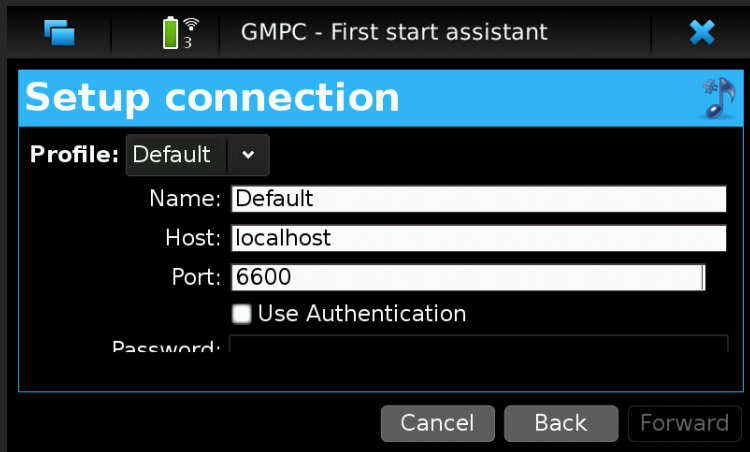
Status: Games: Doom part II



Status: Debian packages: GMPC



Status: Debian packages: GMPC part II

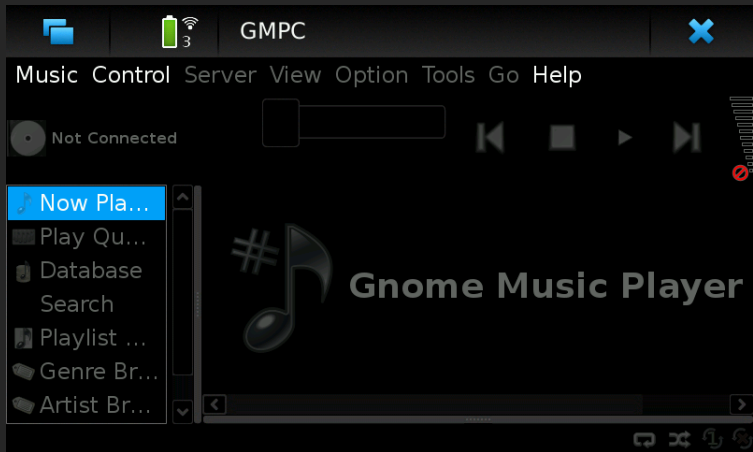


The screenshot shows a window titled "GMPC - First start assistant" with a close button in the top right corner. The window contains a "Setup connection" dialog with a blue header and a music note icon. The dialog has the following fields and controls:

- Profile:** A dropdown menu set to "Default".
- Name:** A text input field containing "Default".
- Host:** A text input field containing "localhost".
- Port:** A text input field containing "6600".
- Use Authentication:** A checkbox that is currently unchecked.
- Password:** A text input field that is currently empty.

At the bottom of the dialog are three buttons: "Cancel", "Back", and "Forward".

Status: Debian packages: GMPC part III



Status: Debian packages: Ekiga softphone



The screenshot shows the Ekiga softphone interface. At the top, the system tray includes a file manager icon, the time 12:29 pm, battery level 3.5, and signal strength 4. The title bar reads "Ekiga" with a close button. Below the title bar is a menu bar with "Chat", "Edit", "View", and "Help". A toolbar contains icons for a camera, a user profile, a keypad, and a microphone. A status bar shows "Available" with a dropdown arrow. Below this is a numeric dial pad with buttons for digits 1-9, *, 0, and #. At the bottom, there is a text input field containing "sip:" and a small green icon.

12:29 pm 3.5 4 Ekiga

Chat Edit View Help

Available

1 2abc 3def

4ghi 5jkl 6mno

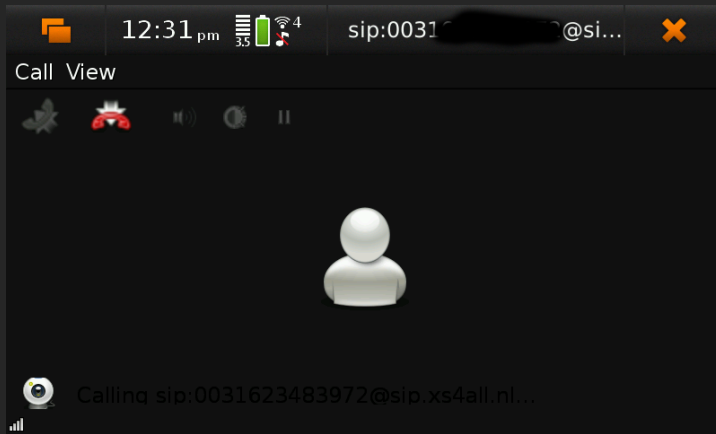
7pqrs 8tuv 9wxyz

* 0 #

sip: 

XS4ALL: Registered

Status: Debian packages: Ekiga softphone: part II



Status: continued

Applied for funding at NLNet in August...



Status: continued

Applied for funding at NLNet in August...



Grant request has been approved!

Device: Pinephone

- ▶ Linux 5.3 plus patches, Alwinner A64 based
- ▶ Hardware kill switches for wifi, mic, modem
- ▶ Worldwide LTE modem, on usb (no DMA)
- ▶ 3D via open source "lima" driver
- ▶ One of the cameras already works, other needs a driver
- ▶ Lots of developers working on support, and it's **cheap!**

Full specifications: <https://www.pine64.org/pinephone/>

Prototypes for developers ready - being shipped now. Can show development kit after talk.

Device: Pinephone part II

Prototype on the left, development kit on the right



Plans to support many mobile OSes: Leste, postmarketOS, UBPorts...

Device: Pinephone part II

Prototype on the left, development kit on the right



Plans to support many mobile OSes: Leste, postmarketOS, UBPorts...

PineTab is also in the works (ask after presentation)

Device: N900



- ▶ Original Maemo Fremantle device, 256MB ram, 600Mhz CPU
- weak!
- ▶ Needs more power management work (8-16 hours of battery life) on 1000mAh
- ▶ Linux 5.1, with PowerVR patches, butter smooth :)
- ▶ Wireless, battery, touchscreen, keyboard, usb peripheral, audio works
- ▶ 2g/3g data works
- ▶ text messages work (phone calls start, need some more work)
- needs a good UI

Device: Motorola Droid 4



- ▶ Linux 5.4
- ▶ Battery life might easily be several days
- ▶ No 3d acceleration yet, but making significant headway (kernel module loads now)
- ▶ Wireless, battery, touchscreen, keyboard, usb host and peripheral work, audio, 3g data, sms, calls with audio routing
- ▶ 3g data, sms and calls integration in ofono is ongoing

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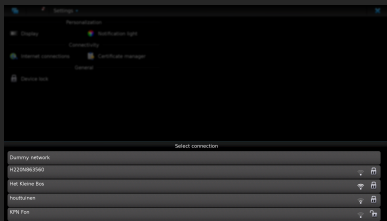
Can hand out devices to experienced and enthusiastic developers!

Device: Allwinner devices



- ▶ OLinuXino LIME2, Allwinner A33 tablets
- ▶ 3d acceleration works with Lima
- ▶ wireless, battery, touchscreen, usb host and peripheral work
- ▶ Mainline hardware video decoding!

Device: Raspberry Pi 2+



- ▶ Working 3d acceleration, wifi
- ▶ Makes for a nice demo platform when connected to a FullHD touchscreen

Device: virtual machine



- ▶ Works with Qemu, Virtualbox, VMware
- ▶ Useful for development
- ▶ QEMU passthrough of hardware (wifi, modem) is very handy

Future

Various milestones yet to reach:

- ▶ Dogfooding (eat your own dog food) - want to switch from Fremantle
- ▶ Community contributed packages/apps
- ▶ Alpha release for the Pinephone
- ▶ Beta releases for N900 (calls), Droid 4 (3d accel)
- ▶ Finish cellular UI and data plugin
- ▶ Working phone/sms/contacts UI
- ▶ Qt5 and Gtk3 port of Hildon (work ongoing)
- ▶ More here:
<https://github.com/maemo-leste/bugtracker/milestones>

Generally:

- ▶ **More community involvement** - we need help!
- ▶ Anything you want...

Future?

- ▶ Mainline without any patches
- ▶ full disk encryption
- ▶ better browser (firefox or webkit based)
- ▶ Android emulation with Anbox

Summary

- ▶ Now in alpha stage; beta follows when calls work and have a UI
- ▶ Mainline linux and devuan/debian makes a lot of powerful things simple
- ▶ Fun to play with
- ▶ Already usable in some form on several devices, more to come
- ▶ No easy phone calls ... yet
- ▶ Need more people to document, test and write code, get more organised in general

Resources

- ▶ Homepage: <https://maemo-leste.github.io/>
- ▶ Wiki: <https://leste.maemo.org>
- ▶ Source: <https://github.com/maemo-leste/>
- ▶ Bugtracker: <https://github.com/maemo-leste/bugtracker>
- ▶ Maemo community: <https://maemo.org>
- ▶ IRC: [#maemo-leste](irc.freenode.net)
- ▶ Mailing list: <https://mailinglists.dyne.org/cgi-bin/mailman/listinfo/maemo-leste>

Demos

- ▶ Virtual machine demo
- ▶ (VOIP/SIP) calls
- ▶ SMS using telepathy framework (empathy UI)
- ▶ Video of Leste on A33 tablets, Nokia N900 phones
- ▶ Live Nokia N900 demo
- ▶ Live droid4 demo (no 3d acceleration yet - mostly painful to watch :))
- ▶ Can show (non-booting, smoked PMU last week) pinephone prototype
- ▶ Find me in the speakers corner after this talk