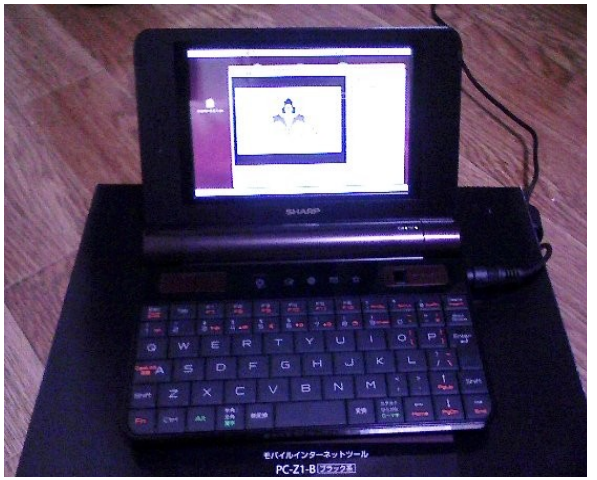
Hacking with ARM devices on Linux

1、Self introduction
2、Introduction with ARM devices
3、Customized of Linux Mobile ARM devices
- ・Customized of Android devices(Nexus7)
- ・x86 Emulation on ARM Mobile devices
- ・Chromebook Crouton & ChrUbuntu

4、Thinclient LinuxOS OpenCocon
5、Customized「End of Life」ARM Devices
- ・Chroot
- ・PKGSRC
- ・Mainline Linux Kernel Compile
- ・NetBSD

About Netwalker



This Presentation:
Slideshare & PDF files
publication of my HP
http://kapper1224.sakura.ne.jp

FOSSASIA 2016/3/18-20 ：
Place：Science Center Singapore

Speaker：
Kenji Shimono
Tokaido Linux Uses Group

Self Introduction

- My name: Kenji Shimono
- Pseudonym(Pen name)：Kapper
- Twitter account：@kapper1224
- HP：http://kapper1224.sakura.ne.jp
- Slideshare: Kenji Shimono
- My Hobby：Linux、*BSD、and Mobile ARM Devices
- My favorite words：Record than experiment important
- Test Model：Netwalker(PC-Z1,T1)、Nokia N900、DynabookAZ、RaspberryPi
  Nexus7(2012、2013)、Hercules eCAFE EX HD、Jetson TK-1、
  OpenPandora、ARM Chromebook、ZTE OPEN C（FirefoxOS）
  Taiwan Android Electronic Dictionary 無敵CD-920、CD-928

- Recent Activity：
  Netwalker on the Linux from Scratch.

  Hacking of Android Nexus7.

  I have recently often use the ARM Chromebook.

Recent test　こんな事やってます

1.Linux distributions on Android

Debian KitとComplete Linux

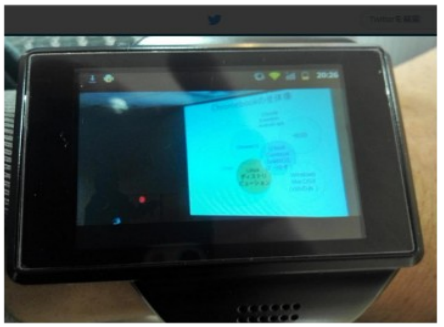
- Android上でchroot環境を構築してapt-getしてパッケージを入れるアプリ。Debian化が出来る。
- Androidをシンプルにサーバ化できる。root化がいるものといらないものと。
- Debian KitはAndroidの親プロセスのルート環境でapt-getが使える仕組みなので、自由度が高い（ハイリスク？）
- Debian Norootが入れられない古い環境向けも

Complete Linux

2. Hacking with SmartWatch

リモートしたり動画やSlideshareとか

- Androidアプリを用いて動画やリモートデスクトップなど
- 実用性はともかく高解像度化すれば、出来る事が増える
- 会議中にこっそりTwitterとかニュース見たり（おい
- 台風情報とか、天気予報とかは便利です
  (使わないとかスマホで十分、とか言う意見は禁句)

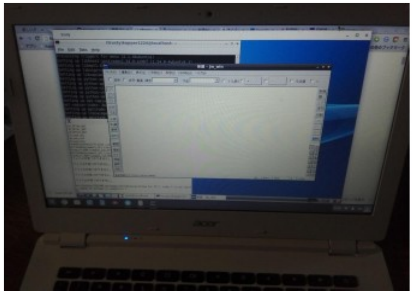


3. Windows and Wine on ARM

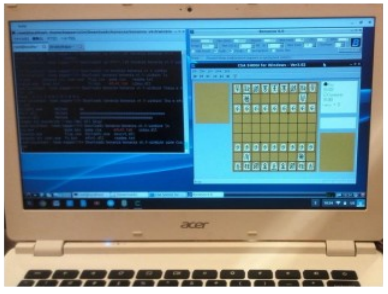
x86 Emulation on ExaGear-Desktop 1 board PC, and ARM Chromebook

- ExaGear-Desktop is 4.5 times faster than qemu.
- i686 Ubuntu12.04LTS on ARMhf Ubuntu 14.04,12.04
- Boinc Benchmarchs:@ ARM Chromebook CB5-311 TegraK-1
  Integer points (ARMhf Base) : 6118 ⇒ (i686): 1800　29.4%
  Flotings points (ARMhf Base) : 914 ⇒(i686): 200　21.9%
  about Pentium4 1.8GHz on ARM.(Qemu =Pentium2 266MHz)
- Windows applications on Wine, on ARM devices.

jw-cad(Wine) on ARM Chromebook



Bonanza(Wine) on ARM Chromebook



4. Plesentations in Asia(HongKong,Taiwan) Opensouce Conference

台湾MOPCON2015 Kapperセミナー

- 今回の通訳さん、Field Pan氏。本職ゲームクリエイター
  通訳とかコーディネーターも出来るハイスキルな方
  台湾でビジネスする人には頼りになるはず
- 視聴者 推定500人前後。
- 日本人の活動の宣伝資料追加。
- 若いエンジニアさん多数。質問多い
  Mainly many young engineer's

東海道らぐとは？
（主催者でないので偏見多数あり）

東京から浜松、豊橋、名古屋、大阪までのらぐ
とにかくゆるいLinuxユーザー会

別名「あひる焼き」ユーザー会
Twitterで「あひる焼き」、~~「鹿焼き」~~とつぶやいて
がっつり焼いて下さいな

あひる氏
@ahiru3net

~~あしか氏~~
~~@hashimom~~

My Activity OpenSourceConference in Japan and Tokaido Linux Uses Group Once it is held in one month

KOF 2015 Nov6~7

Today Session

Easy Application only

Difficult

Mikutter
RemoteDesktop
Debian Noroot
OpenCocon

X86 emu
Windows app

Linux
Distributions
chroot
(root)

OS Change
Root
MultiROM
Pkgsrc
NetBSD

Bootloader
Kernel
SoC

Target Users

Mikutter

Haking

developer
Distributer

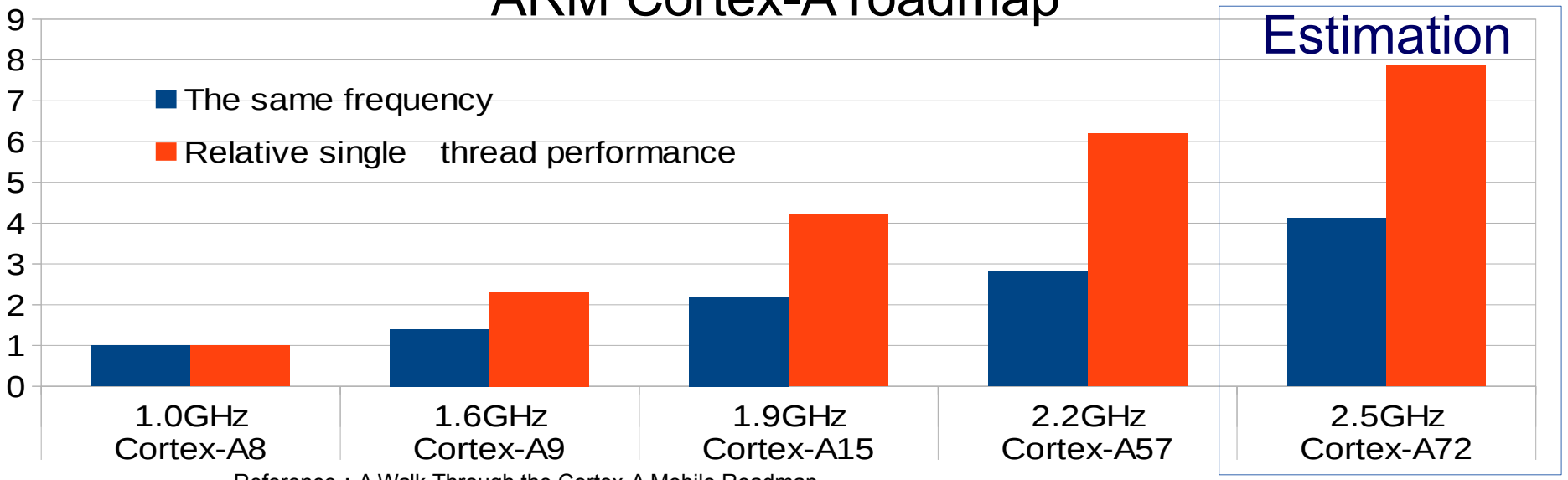
Desktop,server

「End of Life」 extended

Office

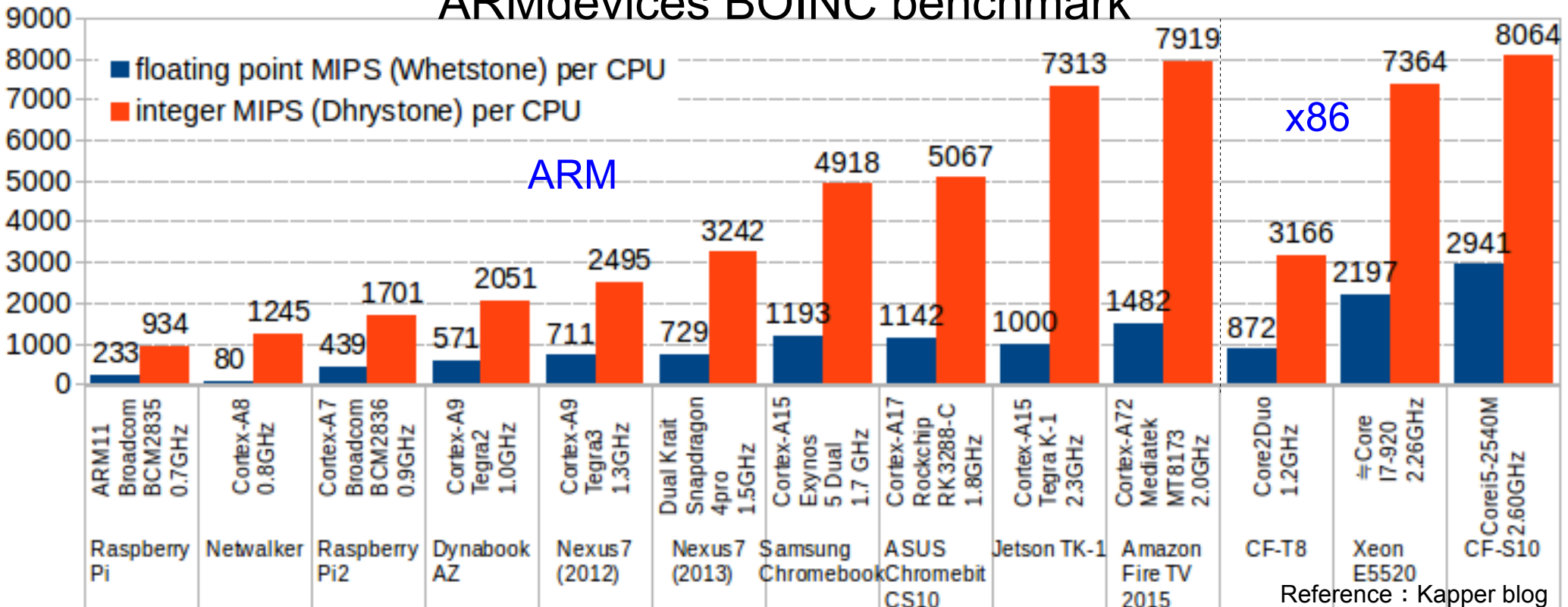
ARM devices Benchmark score

ARM Cortex-A roadmap



Reference：A Walk Through the Cortex-A Mobile Roadmap
http://community.arm.com/groups/processors/blog/2013/11/19/a-walk-through-the-cortex-a-mobile-roadmap

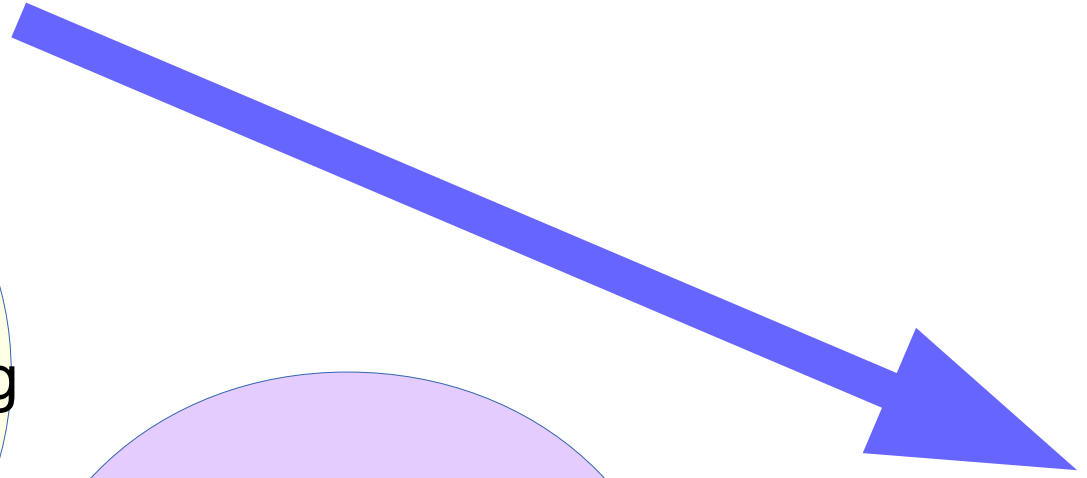
ARMdevices BOINC benchmark



Reference：Kapper blog

Customized Android

Hacking Android easy history



Android～2.3
No root devices
Webkit had security bug
Rooted
↓
hacking

Android～4.2
Nexus7 comming
Bootloader is easy to unlocked
↓
Easy to Root

Android ~4.x
Many Chinese Tablet
Many Rooted app
↓
Only install applications

Difficult

Easy to root everyone

Install app only

Debian Noroot on Android

- Debian Noroot can be installed in a chroot without taking root privileges Android apps Debian
- You can use a Bluetooth keyboard, a simple notebook PC
- Contents to build a chroot environment in the normal user privileges use the fakechroot, are viewing the Xorg in Xserver-SDL
- There are challenges to capacity because storage is based on the premise visceral / sdcard
- The ease popular anyone can be introduced
- Recent Ver corresponding with Android4.0 later
- Difficulties in compatibility that does not move Xserver-SDL with the old OS

Taiwan Electronic Dictionary
無敵CD-920

Debian Kit and Complete Linux

- App to put the package to build a chroot environment on Android with apt-get. Debian reduction can be.
- I can server of the Android simple. and those that do not need as there are root of.
- Debian Kit because it is a mechanism that can be used is apt-get at the root environment of the parent process of Android, has a high degree of freedom (high risk?)
- Also old environment for the Debian Noroot can not be put

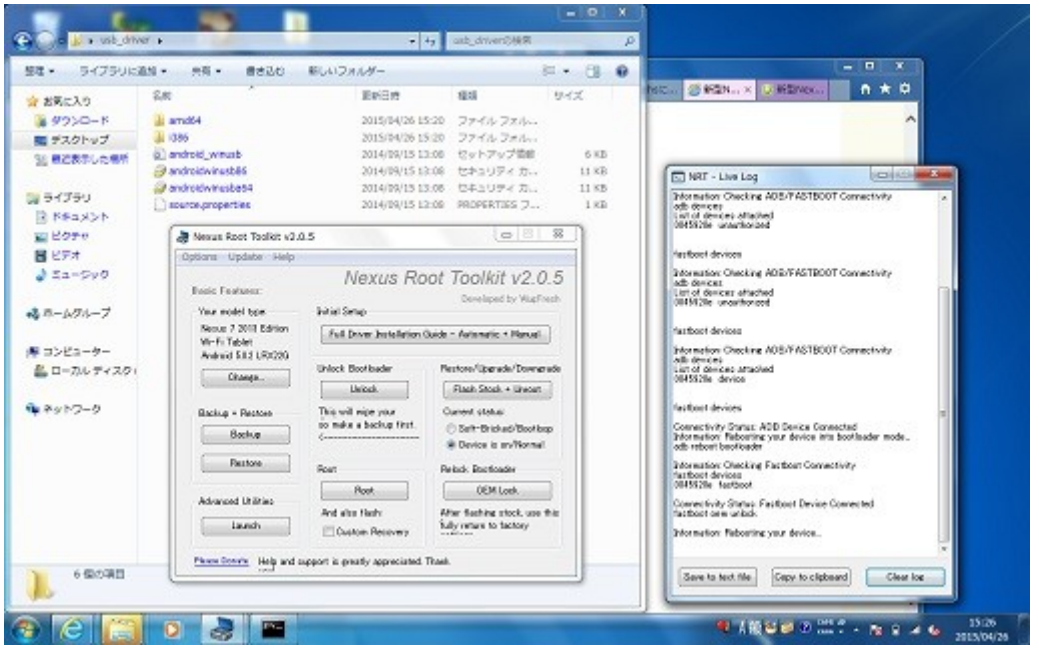
Complete Linux

Nexus Root Toolkit

- Windows GUI application for Nexus7
  easy Unlock and rooted

1、Nexus Root toolkit app download
2、Google USB driver install in Windows
3、Connect USB to Nexus7
4、Only click, Unlock and rooted

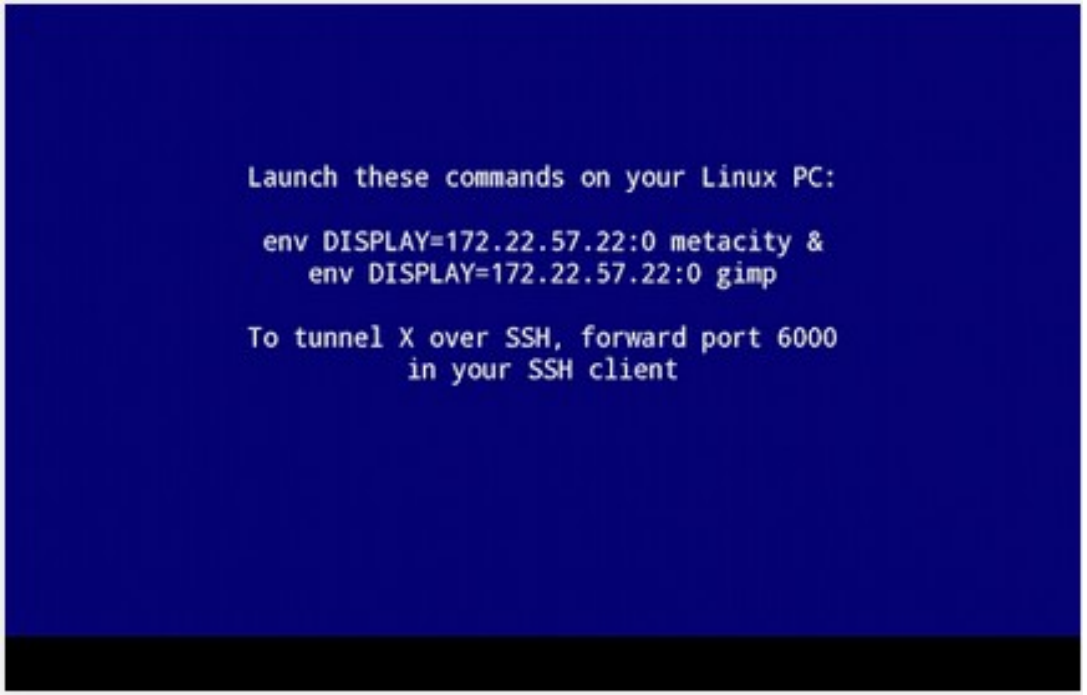
Nexus Root Toolkit



Use Xserver-SDL alone on Android

- It can also be used alone Xserver-SDL, which is also used Debian noroot as an alternative to the Xserver.
- From how to use activates the Xserver-SDL, from the terminal in Chroot environment,
  env DISPLAY=xxx.xxx.xxx.xxx:0 lxsession &
  The activated Show Xserver-SDL again on Android

Xserver-SDL



Complete Linux

Android-own build status

Excerpt because own build of correspondence dozens type and number is too large.

Distributin	version	Installer	Multirom	Root	Compatible models	
Factoryimg	~5.1.0	◎	○	△	Nexus	
CynanobenMOD	~5.1.x	◎	○	○	Many	
AOKP		◎	○	○	Many	
ParanoidAndroid		○	○	○	Many	
ClockworkMOD		○	○	○	Many	
Bodhi Linux	～3.0	○	○	○	Nexus7 2012	
KDE Plazma		○	△	○	Nexus7 2012	
FirefoxOS		○	○	△	Own build	
Ubuntu Touch		◎	○	○	Nexus7(2013) 4、5、10、6	
Tizen		△	△	△	?	
SalfishOS		△	△	△	Nexus7,RaspberryPi	

Internet dogmatic investigation of Kapper (if I wrong I'm sorry. Correct)

◎：Official Support、○：Official reports、△：Users reports

CyanobenMod

- CyanogenMod Inc. and Android4.x to the various devices in one of their own build a number of Android that are customized are developing.
- Include the formal and informal support, corresponding to 220 devices
- Development from the firmware (boot loader) to the OS image.If a device that is official support, it can be installed with one click without taking root.
- Installation has a difficult but also many operations reported to the local device,It has contributed to the aftermarket of older models.
- Since correspond to the regular even Nexus7, it is easy to install.

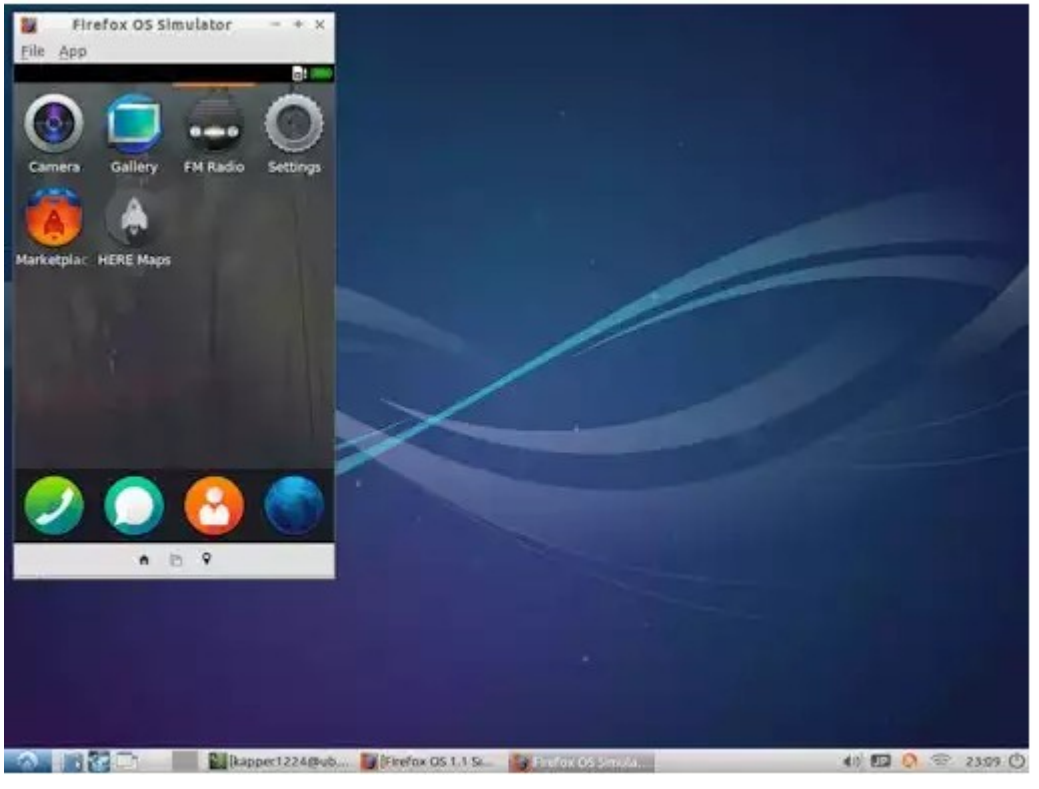
CyanobenMod9

FirefoxOS

- You can install and use FirefoxOS in Nexus7.
- Custom ROM required Since then replacement of FirefoxOS ROM.(supported device)

FirefoxOS

FirefoxOS Simulator



Ubuntu Touch

- Nexus7 2013 is Ubuntu Touch supported now.
- Installer and boot loader set
- The use of Ubuntu touch is Nexus series only.

Ubuntu Touch

Ubuntu Touch

x86 Emulation and Windows applications on ARM Linux Devices

x86 Emulations on ARM Devices

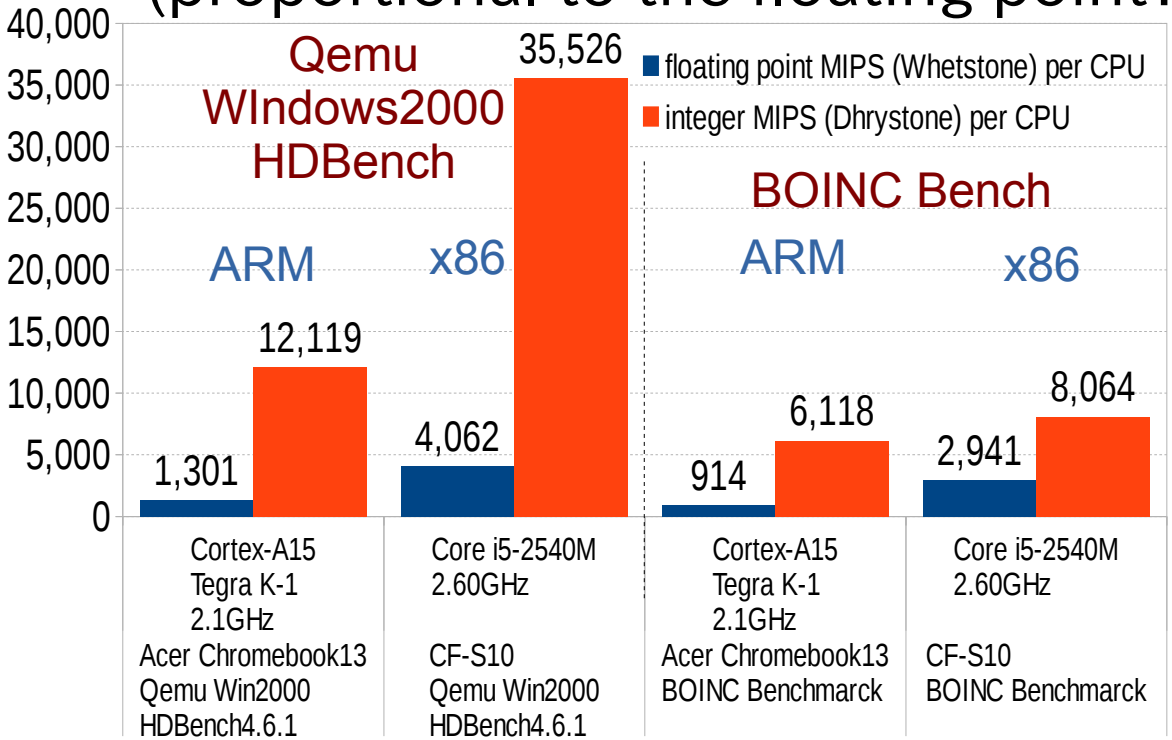
VMWare and Virtualbox are not working on ARM devices.(Only x86)

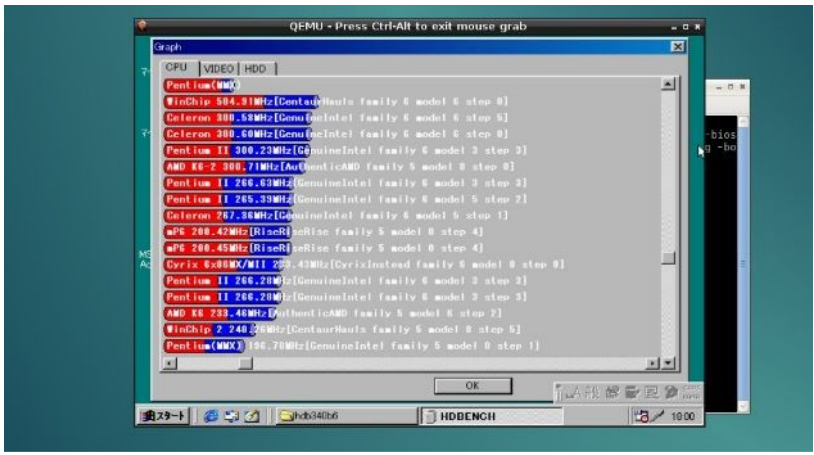
Emulation	OS	Root Device	Emulated OS	Spec	Comment
Qemu	Linux Android RaspberryPi	No	Windows MacOSX? Linux,*BSD	Slow	Tegra K-1 ⇒Pen II 266MHz Ver1.5～(ARM GUI)
Qemu+Wine	Linux Android RaspberryPi	Required	+Windows APP	Slow	Difficult kernel 3G/1G only chroot environment
Exagear-Desktop	Linux RaspberryPi	Required	Ubuntu,Debian	Fast	Tegra K-1 ⇒Pen4 1.8GHz
Exagear-Desktop +Wine	Linux RaspberryPi	Required	Ubuntu+Wine Windows APP	Fast	Tegra K-1 ⇒Pen4 1.8GHz
DOSBox	Linux Android RaspberryPi iOS,DS,PSP	No	DOS, WIndows9x (i386～i586)	Slow	Tegra K-1 ⇒Pen II 200MHz NEON Supports Voodoo1+Glide
Bochs	Linux Android RaspberryPi iOS,PSP	No	Windows～XP (i386～x86-64) Linux,*BSD	Slow	Tegra K-1 ⇒Pen II 266MHz
XNP2 （PC-98 Emulation）	Linux Android RaspberryPi iOS	No	DOS、 Windows95?	Slow	Tegra K-1 ⇒？

Internet dogmatic investigation of Kapper (if I wrong it, I'm sorry.)

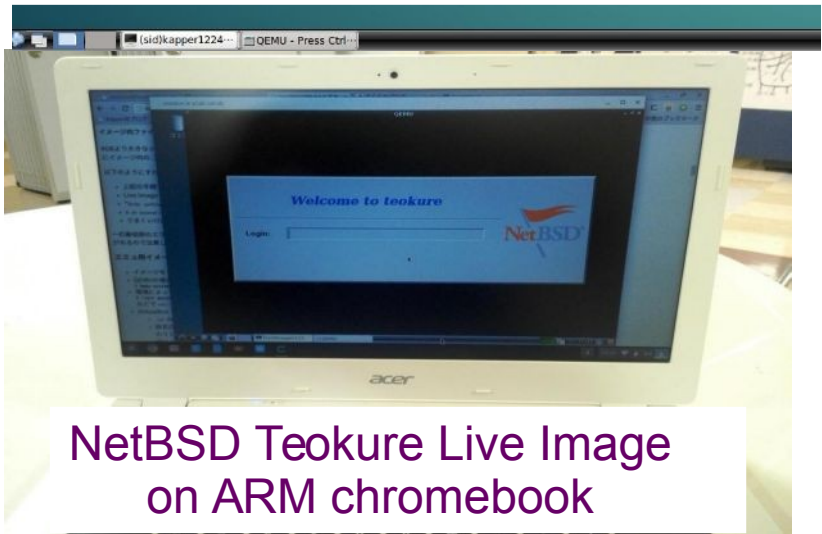
x86 Qemu Emulation on ARM devices

- You can use the x86 emulator will be like can be moved and Wine Windows apps and Steam and Skype.
- The x86 emulator also works such as Windows and NetBSD. TegraK-1 in Using Qemu Pentium2 266MHz equivalent Win98 is in HDBench, it was to use and Pentium4 1.8GHz equivalent to ExaGear-Desktop.
- In ARM Devices,Qemu is x86:ARM=3:1 (proportional to the floating point?)





Windows98、2000 on ARM chromebook

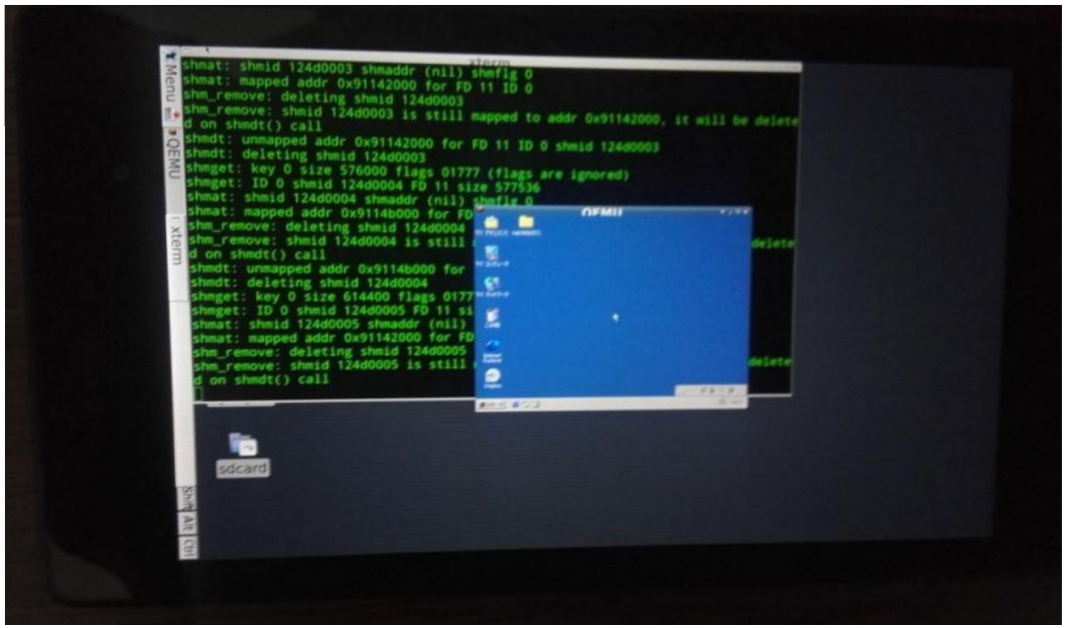


NetBSD Teokure Live Image on ARM chromebook

x86 Emulation on Android

- You can operate the Windows or NetBSD by the use of Android even x86 emulation
- PC: Bochs,Qemu,DOSBox,Limbo PC emulation MAC:vMacMini
- In the case of Qemu、Windows and NetBSD, and the others operation.

Windows9x、2000(Qemu) on Nexus7



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  Integer points (ARMhf Base) : 6118 ⇒ (i686): 1800 29.4%
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  about Pentium4 1.8GHz on ARM.(Qemu =Pentium2 266MHz)
- Windows applications on Wine, on ARM devices.

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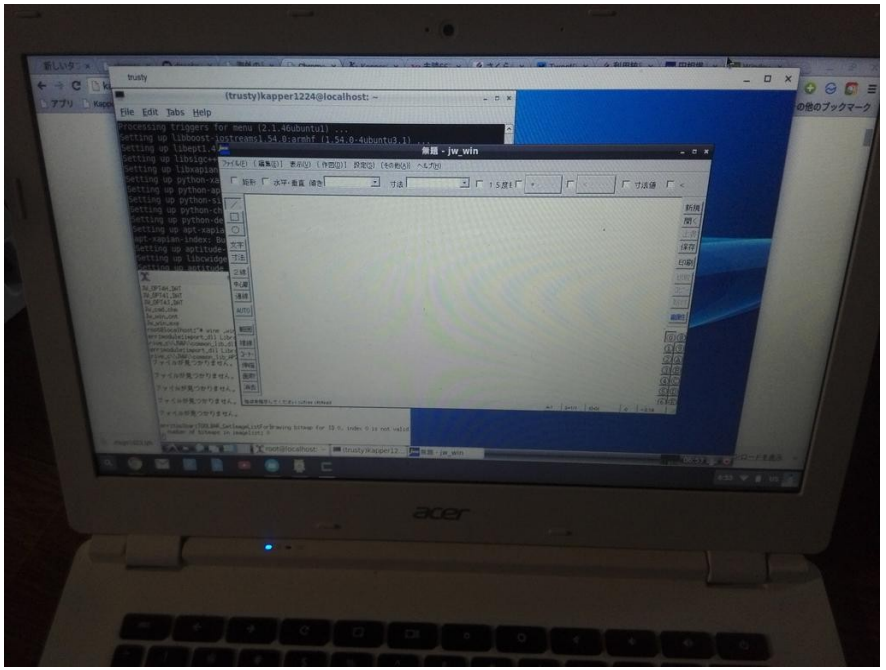
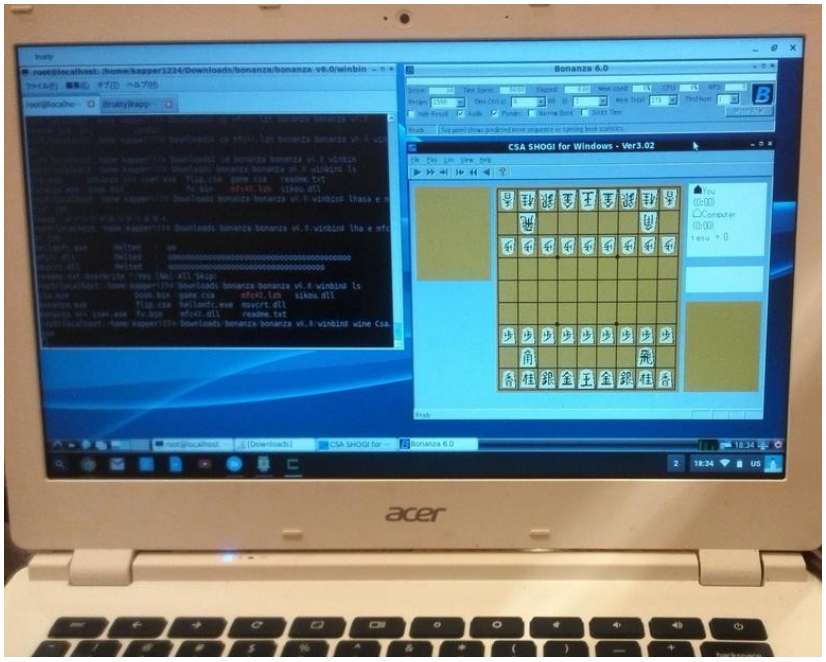


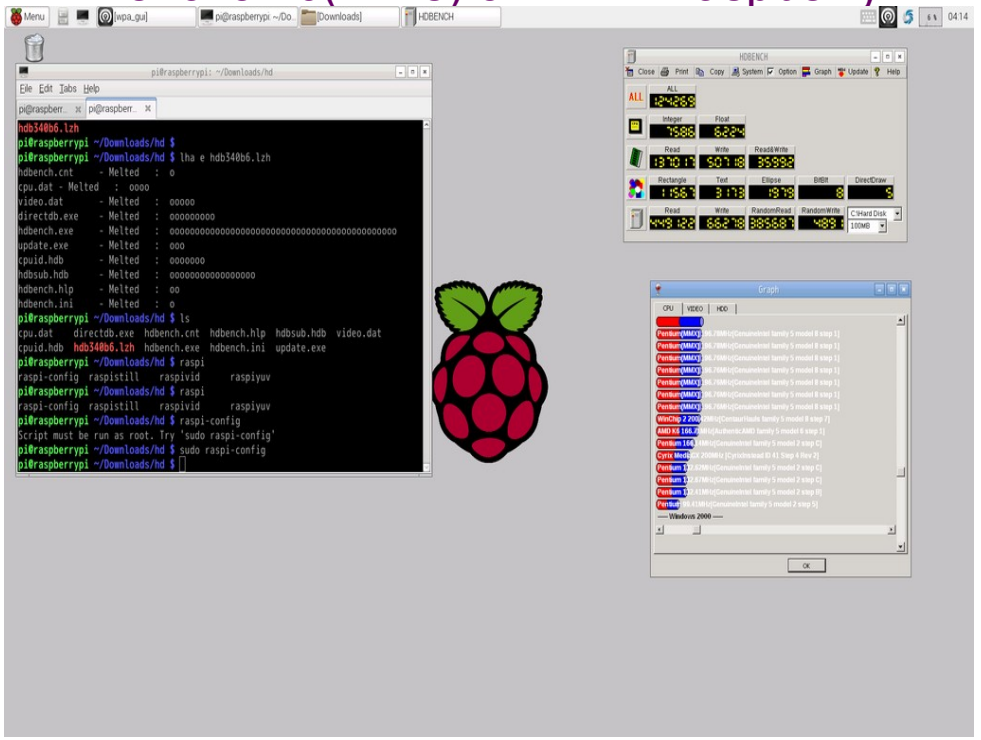
Bonanza(Wine) on ARM Chromebook



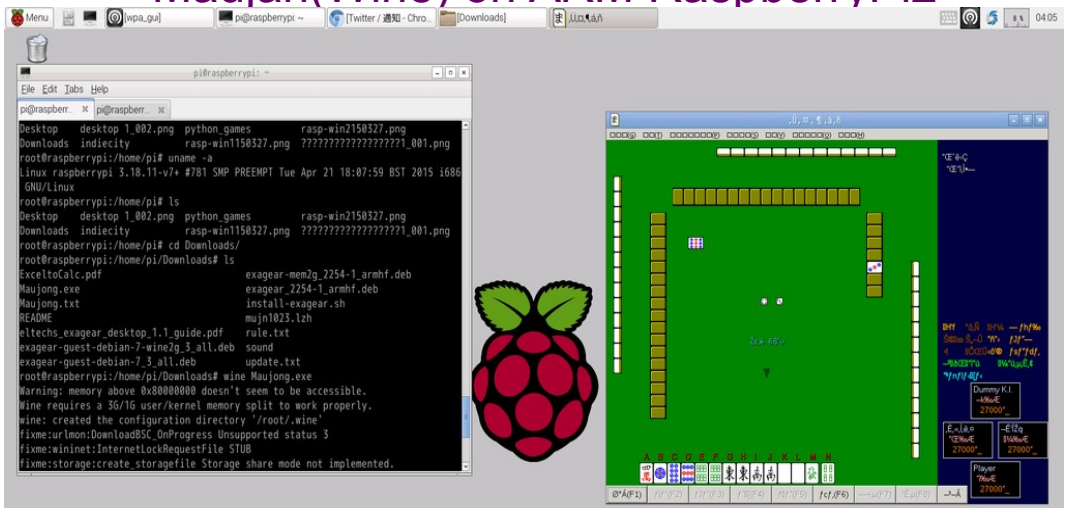
x86 Emulation on ExaGear-Desktop ARM RaspberryPi, RaspberryPi2

- ExaGear-Desktop RaspberryPi is 5 times faster than Qemu.
- i386 Debian7Wheezy on ARMhf Raspbian,Ubuntu14.04,Debian7
- HDBench Benchmarchs:@ ARM Raspberry Pi2
  Integer points (ExaGear i686) : 7586 (Qemu i386: 1999 26.4%)
  Flotings points (ExaGear i686) :6224 (Qemu i386: 384 6.2%)
  about MMX Pentium 200MHz on ARM. (Qemu =Pentium 40MHz?)
- Windows applications on Wine, on ARM devices.

HDBench3.40(Wine) on ARM RaspberryPi2



Maujan(Wine) on ARM RaspberryPi2



Android,iOS and JavascriptDOSBox

- DOSBoxとはi386～i586エミュでWindows9xや色々なアプリが動作
  DOSBox can operate ～Windows9x in the i386～i586 emulator
- DOSBoxは様々なモバイルOSに移植されて動く特徴があります。
  DOSBox has been ported MobileOSs, about Android, iOS, WindowsMobile, Blackberry, PSP, Vita, 3DS and others.
- DOSBoxは独自に進化した高度なUIとドライバがあり、ゲームに最適
  最近はWindows9xゲーム向けに加速的に進化しています。
  DOSBox has its own evolved advanced UI and the driver, the best in the game.Recently, they are accelerating the evolution in for Windows9x game.

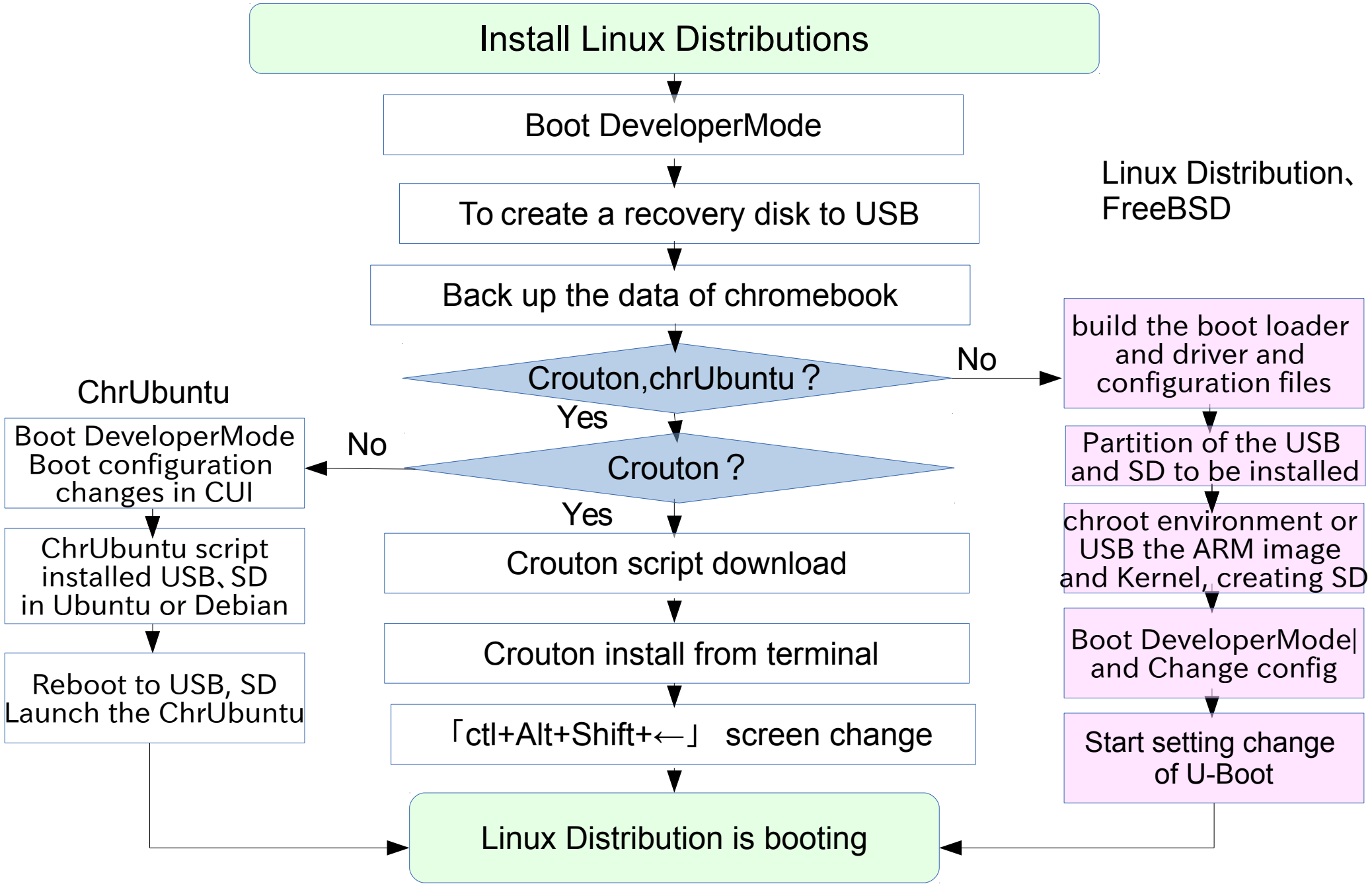
Android
DOSBox Turbo

iOS iDOS

Javascript
EM-DOSBox

Custmized ARM Chromebook

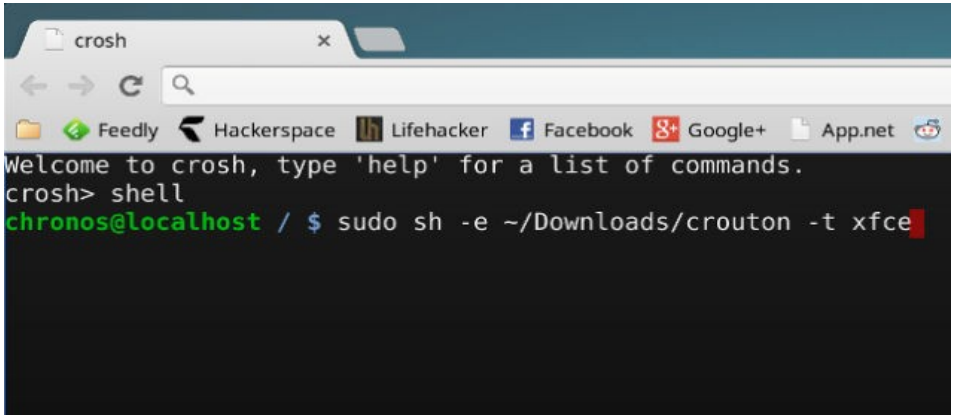
Flowchart of Linux installation on Chromebook



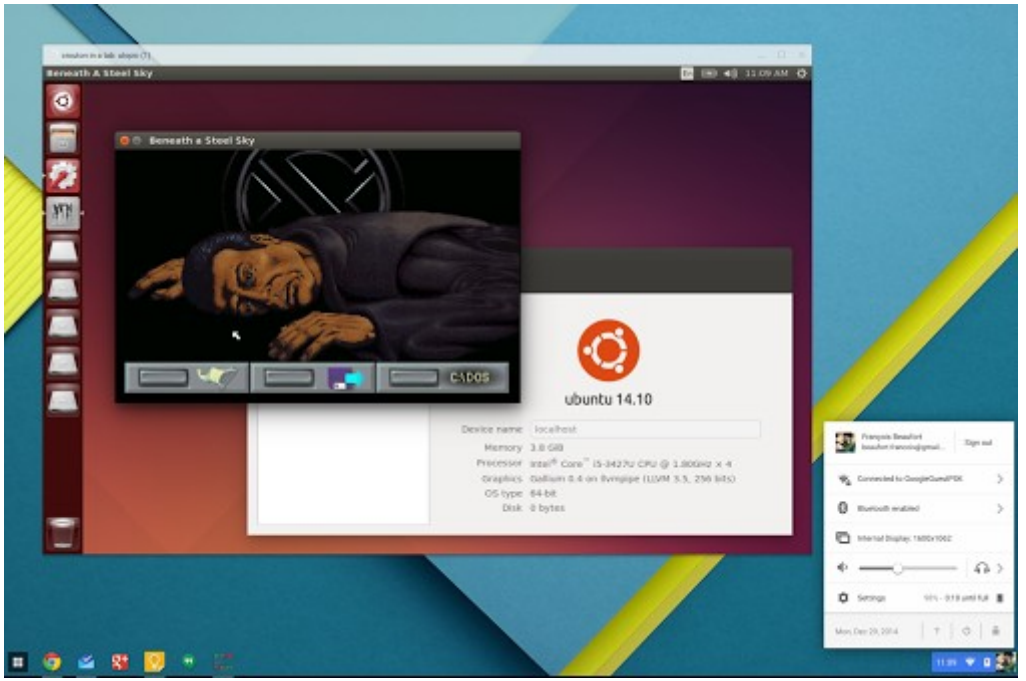
Crouton on Chromebook

- ChRomium Os Universal chrooT envirONment
  The author Google developers, Mr. David Schneider.
- Chroot automation tool for Ubuntu and Debian https://goo.gl/fd3zc
- To display the terminal in the "ctl + alt + t", used from the terminal to activate the "shell"
  sudo sh ~/Downloads/crouton -t xfce
- How to download the chroot environment by dropping the main script from github
  /mnt/stateful_partition/crouton/(Distribution name)

Terminal on Chrome-browser



Crouton Window Extention



Recognized debian releases:
potato* woody* sarge* etch* lenny* squeeze* wheezy jessie sid

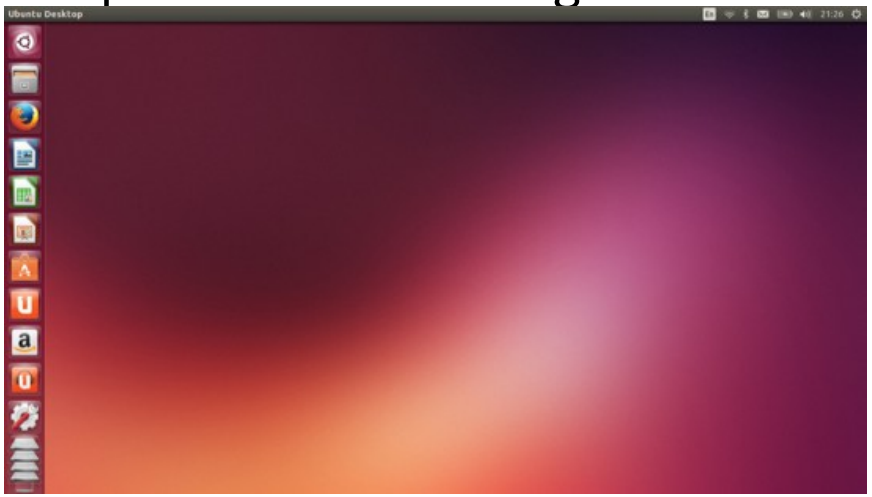
Recognized kali releases: kali

Recognized ubuntu releases:
warty* hoary* breezy* dapper* edgy* feisty* gutsy* hardy* intrepid* jaunty* karmic* lucid* maverick* natty* oneiric* precise quantal* raring* saucy* trusty utopic*

Releases marked with * are unsupported, but may work with some effort.

ChrUbuntu on Chromebook

- Dual-boot & SD USB automated installation tool for Ubuntu.
  The author Google developers, Mr. Jay Lee
  Method to accept the Linux Kernel and driver module of ChromeOS.
  x86 does not officially support the ARM in the corresponding. It notes that there is also not operate models.
- When you press the "ctrl + alt + → key", a mechanism to install the Ubuntu switched to CUI of the screen called Developer Console.
  curl -L -O http://goo.gl/9sgchs; sudo bash 9sgchs（34v87 /dev/mmcblk1）
  change Partition
  curl -L -O http://goo.gl/9sgchs; sudo bash 9sgchs
- Use switch in the "ctl + L" the ChromeOS and Ubuntu the OS when you boot
  How to download the chroot environment by dropping the main script from github
- Although Ubuntu is started normally, a method is somewhat time-consuming in the start-up manual switching.



Reference：Chromebooks and Chrome OS

ThinClient Linux Distribution
OpenCocon

OpenCocon Linux Distribution

- Opencocon is little GNU/Linux distribution optimized for Thin-client purpose.
  - No desktop environment : All desktop environment from host computer
  - No user save-able area
  - Supported late-90′ PCs (x86 Windows 9x generation)
  - Supported RaspberryPi (ARM)
- Development goal is:
  - Utilize old computer with Thin-clients
  - Running at least 32MB of memory, 150MB of Disk space
  - Support x86 PC, PPC Macintosh, Some ARM-based hardware
  - Easy deploy, portable, long-term use

Remote control the Windows 8 and 10 on the old Pentium generations

SHIMADA Hirofumi,
@shimadah

http://opencocon.org/

Customized「End of Life」
ARM Devices

Customized「End of Life」ARM Devices

- What do you think of that「End of Life」with ARM devices?

1, First End of Life: Official Support Out
with Linux Distribution and Android

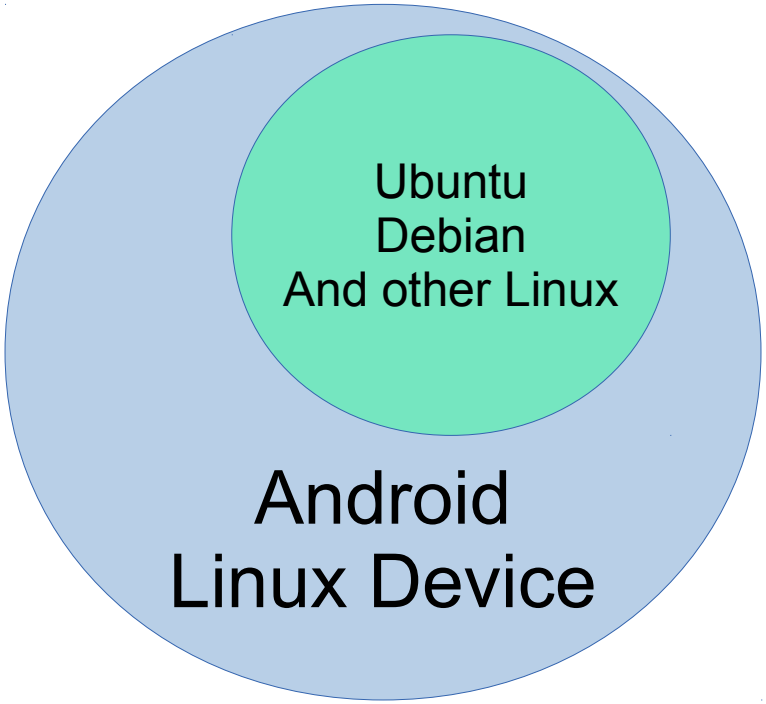
2, Second End of Life: Linux Kernel and libc

libc is demand of linux kernel version.
If it is not supported with Mainline Kernel.
This devices will not supported libc and others.
This distributions will be not able to upgrade.

3, Third End of Life: pkgsrc and NetBSD
Pkgsrc and NetBSD is not restraint Linux Kernel.

Chroot on Old ARM Linux

- Chroot to operate in the Create a new root directory under Linux environment
- Start independently different versions of OS
- It is no longer possible to access the outside of the OS from the Chroot Environment
- Chroot the Root authority only. In general user privileges Fakechroot need
- Since Kernel is a common one, driver or module class is affected by the original Kernel
  → Kernel unsupported features, OS can not be used



PKGSRC on「End of life」ARM Devices

- Try to use the NetBSD of packager pkgsrc even Ubuntu chromebook⇒Why?
  ⇒1, I want to use the latest version of the package.
  I want to use Mikutter at any time the latest version
  2, There is almost no ARM binary latest package in Ubuntu of PPA.
  One by one manually compile required from the source package.
  Very troublesome.
  3,OS and Unix pkgsrc is independent from architecture,
  highly portable enough to use even Unix,Linux,Mac and Win very useful to the ARM environment
  4, I do not want to mixed whether the LTS the Debian Sid Deb development version. I want to be independent latest packages.
  5, If ARM Ubuntu side, I want to use the latest version to continue be Kernel support out. Strongest packager can also be used from the end manufacturers official support.

Mikutter (Ruby based Twitter client)

NetBSD on New and old(End of Life) ARM and others devices

LUNAII@68040 and Twitter

Many New ARM single board PCs

NetBSD on Sega Dreamcast

Zaurs and Netwalker and others

https://www.facebook.com/NetBSD.jp

Conclusion

1,Custmized ARM Linux OS,Applications

⇒x86 Emulator and Multi-platform app incresing.

2,Customized ARM Android and Chromebook devices

⇒Easy install Linux Distributions on Android.

3,Customized Remote desktop client on mobile PC

⇒Easy to use Thinclient on new and old PC.

4,Customized「End of Life」ARM devices

⇒It can be extended「End of Life] if customized

Next My Presentation
OSC Nagoya、Kyoto、Taiwan MOPCON

- OSC Nagoya Kyoto、and Taiwan MOPCON
  my exhibition schedule
- Content:OSC Nagoya:Hacking of Android?
  :OverSea:Hacking with ARM devices
- OSC Nagoya(Japan)　5/28
  HongKong OSC　6/24-25
  OSC Kyoto(Japan)　7/30
  Taiwan COSCUP　8/M?
  OSC Tokyo(Japan)　10/M?
  KOF:Kansai Open Forum(Japan) 11/?
  Taiwan MOPCON　10/E?

- ・・・And Tokaido Linux Users Group