

# The Application Progress and Problem of Debian Distribution for SH Architecture

LinuxCon Japan / Tokyo 2010

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09/29/2010

# Who am I ?

- Nobuhiro Iwamatsu (岩松 信洋)
- Linux kernel engineer.
- U-Boot/SH maintianer.
- Debian Developer.

- 1 Introduction
- 2 Why port to SH?
- 3 Why Debian?
- 4 Problem and solution
- 5 Request from costmer and user
- 6 Future plan
- 7 Help
- 8 Q&A

# Outline

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Port Debian on Renesas SH(SH4).

- 1 Building Speed.
- 2 New architecture support.
- 3 Package size (Request from customer).

Talk about what kind of problem solved these.

# What's SH?

- SH → SuperH. 32bit RISC CPU.
- Embedded CPU of Renesas Electronics.
- Many CPU....  
SH1,SH2,SH3,SH4,SH4 etc....  
ABI is different.
- Current mainstream is SH4 and SH4A.
- SH4 and SH4A is compatible.  
( Except Instruction set of memory cash. )



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## Story in a company...

- Whenever make a new board, engineer makes BSP (Board Support Package).
- Linux kernel image, Cross compiler, Userland image...
- Because they don't automate work, they take a lot time for maintenance.
- Version and the patches to apply are different every BSP....

were such situation...



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## Story in a certain company...

- Customer/User: Is not there sh4 binary of foo?
- Engineer: Please wait for one week. We compile it now.....
- They repeated this.
- What an inefficient work!
- They think that we need Linux distribution of SH at any time.
- However, nobody did it.

# But...

There are the people who ported SH with a source of specific distribution before.

- However, they failed.
- Not port. They forked from distribution of base.
- Did not give back to upstream.
- They was not able to maintain a patch with oneself.
- This was too bad. This was bad example of OSS.

- I start trying to port Debian on Renesas SH(sh4) CPU in October 2009.  
Not office work, it was my hobby.
- Of course I have distribution cooperate and do not do the same mistake.



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# Why Debian?

- Debian has much architecture supporting.  
12 architecture + 2 OS.
- Good policy for package, DFSG(guidline) and infrastructure . Package system, License check, BTS, package pool, ML etc.
- Support embedded (emdebian)。
- Development of cummunity base.
- Cooperation with upstream.

# Why Debian?

- Many many package(about 25000 packages)
  - Package auto build system.
  - Build package is test.
- [debian-ports.org](http://debian-ports.org)  
There are infrastructure to support the new architecture in Debian.

- Other distribution?  
Difficult to add the new and minor architecture.
- Gentoo, buildroot and other?  
The source base distribution is difficult for the beginner user. (building package , update etc...)  
I wanted the distribution that was able to be used easily.

# The kind of SH to support in Debian?

- SH1 is not already produced.
- SH2 is non-mmu. A native is powerless to build.
- There is the user with SH3, but I don't have machine.
- SH4 is mainstream in SH.
  - The binary optimized in SH4 works in SH4A.
  - But the binary optimized in SH4A does not work in SH4.
  - Debian support to SH4 only.
  - SH5?

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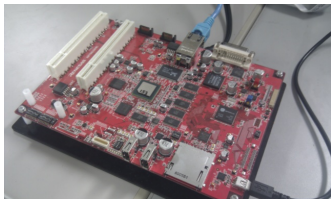
# Problem1:machine

- Machine was slowly, and machine was insufficient for building package.
- Debian needs to build package on machine.
- CPU:266MHz,  
Memory:64MB
- Build of gcc is completed in about 3 week.



# Problem1:machine/countermeasure

- Renesas Solution do the sponsor of the machine.
- CPU: 600MHz Memory: 512MB , SATA, Gigabit ether, USBx2 and other.
- Build of gcc is completed in about 5 days.
- Replace build machine, and re-started in April 2009.





## problem2 - Not support software

- Some package did not support Renesas SH.  
About 130 package. All send report/patch to Debian/BTS.
- OpenJDK, Boost, xulrunner, Firebird, PostgreSQL etc...

### Debian Bug report logs: Bugs tagged sh4

- [Outstanding bugs -- Important bugs; Patch Available](#) (10 bugs)
- [Outstanding bugs -- Important bugs; Unclassified](#) (3 bugs)
- [Outstanding bugs -- Minor bugs; Unclassified](#) (1 bug)
- [Outstanding bugs -- Wishlist items; Patch Available](#) (5 bugs)
- [Outstanding bugs -- Wishlist items; Unclassified](#) (3 bugs)
- [Forwarded bugs -- Important bugs](#) (1 bug)
- [Pending Upload bugs -- Important bugs](#) (1 bug)
- [Pending Upload bugs -- Wishlist items](#) (1 bug)
- [Resolved bugs -- Serious \(policy violations or makes package unfit for release\)](#)
- [Resolved bugs -- Important bugs](#) (73 bugs)
- [Resolved bugs -- Normal bugs](#) (1 bug)
- [Resolved bugs -- Wishlist items](#) (55 bugs)

## Problem2 - Not support software/countermeasure

- Package maintainer took patch in upstream.
- Package maintainer and developer gave comment and opinion to me.
- Debugging participation of package maintainer and other developer.
- There are company and group supporting porting.
- There is support of haskel as remaining big problem. SH4 not support. Now porting.

## problem3 - ABI Issue

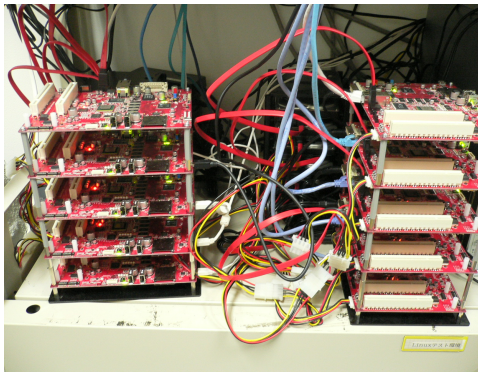
- Problem: ABI of the SuperH is not decided strictly.
- `__fpscr_values`
- Currentry this value resovled by `ld-linux.so`.  
But this is `GLIBC_PRIVATE`.
- `__fpscr_valus` into `glibc` of Debian. → debian specific issue.  
This add `GLIBC_VERSION` to this.  
If this patch applied this value resovled by `libc.so`.
- Incompatible with the binary to which the patch is not applied.
- Some user are using compiler of CodeSourcery.

## Problem3 - ABI Issue/countermeasure

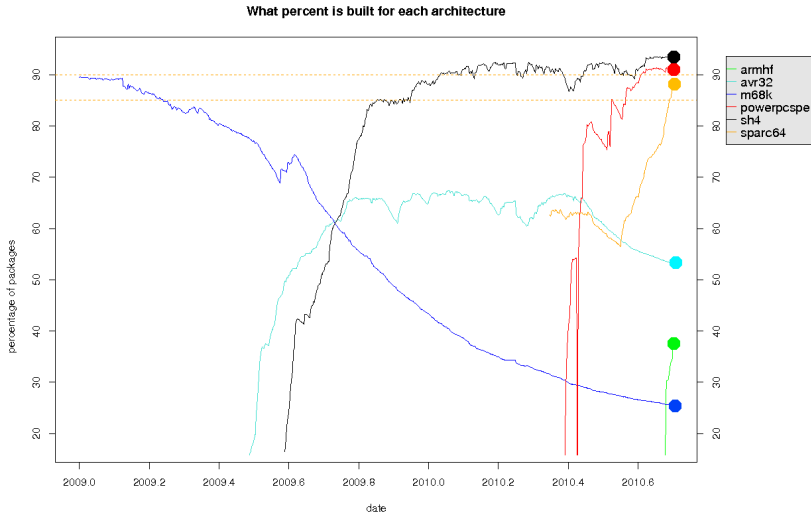
- Already sent and negotiations this patch to eglibc.
- Applied this patch in CodeSourcery.
- Standardize compiler that we use and provide to Debian or CodeSourcery.
- Send patch for the project that supported sh4.  
Openembeddeed, Gentoo (yet).

# Current state of porting

- The number of patches and Bug report which I sent about 130.
- About 8,600 source package → about 8,000 builds and are completed. Total 94%



# Graphs of number of built packages



# An effect after porting of Debian

- Changed userland and cross compiler of all BSP in Debian / unstable.
- For customer request 1 week → 1 minute (Other than haskell).  
We and customer and user got possible to use the latest package of Debian immediately.
- About Test
  - Before: Software build → Test → Bug and patch management in office.
  - After: apt-get install → Report to Debian BTS.  
Open bug of sh4 package. We are easy to have come to get cooperation in developer and user.

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## For custmer and user

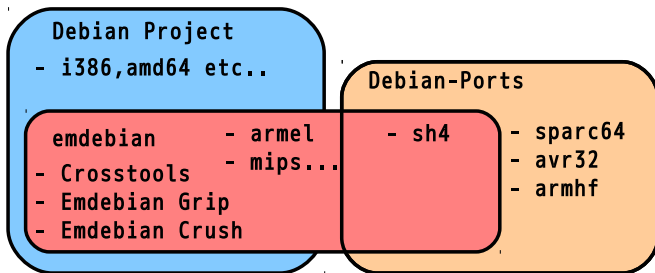
- The environment for which the user was able to use sh4 easily was able to be done.
- The user needs optimized binary and small package.

# How do you lower package size and optimize?

- dpkg and deb is good pakcaging system.
- But deb package is too large for embedded system.
- Include docments, messagefile(mo), manpages etc.
- When user used the SH4A architecture, user had better optimize it for SH4A.

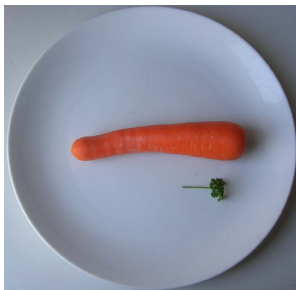
# Emdebian/Grip

- Debian Official sub-project for embedded.
- Convert for embedded from current binary package.
- The package after the conversion is compatible with it if before conversion.
- User can mix these packages.



## Convert size?

- e.g. Size after the conversion of apt package 2180kB  $\rightarrow$  840kB. strip about 1/2.
- base userland  
Before about 180 MB  $\rightarrow$  80 MB. (Not compress)



# Emdebian Crush

- Cross compile debian package with uclibc and busybox.
- Source code from Debian
- Too small.  
180MB → 29MB

# Openembedded support

- Use cross compile.
- Easy optimization.  
Support both sh4 and sh4a.
- Already support some SH4 board.
- image size not check.



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- Create collect up(plot out) ABI/SH and document.
- To a smaller binary set. The support of the package and binary.  
Emdebian / Crush, and other.
- Include for the squeeze +1 release (Codename: Wheezy).  
SH4 does not include next Debian release (Codename: squeeze) :-(.



- Please participate in porting of Debian/SH4.  
Haskell Hacker etc..
- SH4 does not have a board for hobbies.  
Current reference board only...  
We need this! Please make sh4 board for hobbies!

# Q&A

Thank you.

Question?

# Used image

- [http://farm1.static.flickr.com/22/41415099\\_e3de17b2ac\\_o.jpg](http://farm1.static.flickr.com/22/41415099_e3de17b2ac_o.jpg)  
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