A Story of Linux

To Become Irreplaceable
Software Fundamental for
Consumer Electronics Products

Satoru Ueda
Sony Corporation

注: irreplaceable → かけがえのない
It is too long story to cover within the given time slot

Please do not hesitate asking me to repeat the presentation which I am happy to!

In Japanese? Yes, I do welcome!
2012:
10 years past after Panasonic and Sony made press announcement to go with Linux

2013:
10 years past after Panasonic and Sony founded the CE Linux Forum, former organization of CE Workgroup, The Linux Foundation
Linux for CE Products
It’s already commonsense!

http://www.sony.net/Products/Linux/

Sony source code publication site based on GPL/LGPL requirement
Intention

- For us, CE industry, who have been using Linux for more than 10 years
  - To review our past activities and aim at our future

- For you, who are going to use Linux for your embedded system
  - Encourage going together with Linux and the community
What was right? During past 10 years

- **DISCARDED** the specification
  - Jumping into the Community and we could learn very important things!
  - “We do something” and “You do something”
  - Efforts especially Japanese engineers to go with global community

- Found out the way of super long term support which only Linux can
What was right? During past 10 years (cont’d)

- Users (Application system providers) oriented initiation of the activities
  - Along with the affiliate industry
- Good balance of top management understandings and grass root efforts
  - Get rid of the hesitation of grass root people
- Started as global initiative from the beginning
What was **wrong?**

During past 10 years

They are too much to mention within this small slide space......
What we have been challenging

- Closer relationship with the community
  - LTSI initiative
  - Community funding project
- Encourage Linux penetration to yet another embedded systems
First of All

Introduction of myself
About me

- **Satoru Ueda**
  - Satoru.Ueda@jp.sony.com

- **Sony corporation**
  - Though *graduated* *engineering faculty*...
    - Sony have *never* taken my great technical skill
    - Product planning, Marketing, Business strategy...
  - 2003, a strange offer came to me
A telephone call

January 21st, 2003
Noon time

“Are you free now?”
Evening
January 21st, 2003

“Yes, I’m free” I told

“We’re going to begin a joint development project of OS for consumer electronics products together with Panasonic. Can you coordinate the project?”

“Together with Panasonic?”

“Yes, indeed. If we choose Open Source Software, it must be possible, as you know.”

“Wow! It means that we are concluded to go with Linux, isn’t it!”

He’s my boss, who brought me such a mysterious offer.
Back to 2001

CE Industry had faced a great turning point of the software development style.
Burst of software scale

- Digital television, Blu-ray recorder…
  - Will become equivalent to top end personal computer
  - Without the face of computer

- Same thing may happen so shortly upon…
  - Digital still camera, video camera
  - Advanced car navigation system
  - Future of cellular phone ... and many more

“We definitely need to renovate our software design style with sophisticated Operating System!”
Operating System for CE products view point

- It was not an easy way to get such ideal software system platform
  - Digital Consumer Electronics embedded system bring hard technical requirements for the operating system
Takes more than one minute to power on

No immediate reaction when you commanded to change the channel

Disturbance of smooth moving picture play caused by lack of CPU resource

Who cares “CPU resource”??
Battery runs out very quickly. Waste electric power

Users always use the products for 10 years or even more

Internet connection increases the risk of security

Super Long Term Support

Products vendor responsibility
A problem has been detected and windows has been shut down to prevent damage to your computer.

The problem seems to be caused by the following file: SPCMDCON.SYS

PAGE_FAULT_IN_NONPAGED_AREA

If this is the first time you've seen this Stop error screen, restart your computer. If this screen appears again, follow these steps:

Check to make sure any new hardware or software is properly installed. If this is a new installation, ask your hardware or software manufacturer for any Windows updates you might need.

If problems continue, disable or remove any newly installed hardware or software. Disable BIOS memory options such as caching or shadowing. If you need to use Safe Mode to remove or disable components, restart your computer, press F8 to select Advanced Startup Options, and then select Safe Mode.

Technical information:

*** STOP: 0x00000050 (0xFD3094C2,0x00000001,0xFBFE7617,0x00000000)

*** SPCMDCON.SYS - Address FBFE7617 base at FBFE5000, DateStamp 3d6dd67c
Can you stand this situation?
3 options

- Home brew
- Buy from others
- Use Open Source Software
The 1st Option
Home Brew

Engineers can do everything

They were engaged by many tasks such as new device support, bug fix, new network architecture support, software tools preparation and many thing more!
The 2nd Option
Buy from others

Fear of “Black Box”

“All right, we have registered your report into our database and recognized it caused by some bug. We will fix it at the next major release expected 3 month later. Thank you very much.”

We have much hesitation to embed any black box into our products which will reduce our customer satisfaction level.
The 3rd Option
Use Open Source

Open Source Software

Only one option left for us to take

No OSS at that timing were not supposed to be used for any kind of embedded systems.

We had never experienced the OSS software license, therefore we have concerned the legal issue and patent issue.
It was **not because** we anticipated to use **just free of charge software**

**We realized it is the most ideal and realistic way to develop the Operating System for our products together with Open Community people**
Anticipation for the “beyond barrier” open collaboration

OSS,
Not a lonely place
Encounter with Panasonic

A happening among two CTOs from Sony and Panasonic

“Are you decided to select Linux for your future OS? We’ve just made the same decision.”

“How about us to collaborate together?”

“That’s great!”

Press announcement in December 2002
Why Sony and Panasonic?

OS is not for product differentiation but common technological fundamental.

Both needed the best software platform.

Open source way. It enables to get rid of the barrier even such companies which are fighting severely in the business arena.
Why not include many companies!

Expansion to the other CE vendors, Semiconductor vendors and Software developers

Founded CE Linux Forum in June 2003
My impressions about the community

Something like

*The Moldau from "My Country"

*Bedřich Smetana*
It begins from a drip of water

Implementation

Originators of the idea
“It’s Cool” phenomenon

People saying “It’s Cool!”

People who ignore

“Stone headed” Managers

People who do not like the idea
People who say “It’s cool!”

Someone may simply reflectively say “It’s Cool”.

But mostly they communicate each other and try to be fully understood the intention, mutually

Try not to be bigotry and listen to the others carefully.

Leave the room to include another intentions or ideas
→ Sometimes intentionally present immature implementation

Whenever they say “It’s cool!” they try to do something for the project.

They do not just say “It’s cool!” but they act.

Through this process, hopeless ideas will be screened and EXTINCT

Project supported by the “It’s cool!” network will get into EVOLUTIONAL status
Merging another ideas

People saying “It’s Cool!”

If both of them are flexible enough it may lead another evolution
Community people always saying
“I like the controversial situation!”
Most of Japanese people hate such condition, though.

Essence of “Dialectic”

*Note:*
Dialectic → 弁証法
Controversial → 喧嘩諤謗

Georg Wilhelm Friedrich Hegel
“Aufheben (German)” … Lift

Thesis

Antithesis

Controversial Situation

Evolution

Evolution

Compete together

Take some superior aspects of the others

Synthesis
Beyond the Chasm

People who ignore

“Stone headed” Managers

People saying “It’s Cool!”

“Implementation”

Chasm

Users

People actually use and enjoy the innovation
“I like Isaac Newton” Linus Trovalds said Why?

“Standing on the shoulders of giants” …each other
If the people are so “narrow” minded
“Narrow” minded people

Will *surely* miss the opportunity to meet and collaborate with community mainstream

People saying "It’s Cool!"

Such complacent idea may have no prospect of evolution together with Community

注: complacent → 自己満足の
“Narrow” minded people
Apart from the community main stream

I know there are some technologies which are required by quite limited people or industry

My impression is they are exceptional and few
Here’s a fact!

“The power management technologies are just what we have been seeking for”

by Blade Server system developers
We have learned many things from our mistakes

Mistake (1)!
Specification!
The first major mistake

The first year activity of the forum:
Embedded Linux Specification

May 2004

“If you are believing that someone will implement such specification and foster Linux for use of embedded systems, YOU ARE MAKING A BIG MISTAKE! Before you write such specification, why you don’t bring your source code to community?”

https://lkml.org/lkml/2004/5/17/149 ← See this thread
http://celinuxforum.org/docs/CELF_Specification_V_1_0_R1-1.pdf ← ruin of the specification
On Mon, May 17, 2004 at 12:05:36PM -0700, Tim Bird wrote:

> I am writing to announce the availability of the first draft of
> the CE Linux Forum ‘s first specification. This specification
> represents the efforts of six different technical working groups
> over about the last 9 months.

If you want my 2 Cent:

- stop these rather useless specifications and provide patchkits instead
- try to actually submit the patches upstream to get a feeling which
  of your ‘features’ are completely hopeless, which are okay and which
  can better be solved in different ways.
“Specification”

- What Linux Community people pointed out were extremely right
  - We changed our mind to “Implementation First” way

- On the other hand, the “Specification” was so useful for our self
  - To define our requirement, difficulties to use Linux four our products and our target
Why Japanese are always so silent

Mistake (2)!

Sound of silence
The first and the most unsuccessful embedded Linux technical conference in Japan, June 13, 2005

Without any question and answer!

Although the session topics was the most advance case study of Linux for use of cellular phone by Panasonic.

"Fools" said I you do not know Silence like a cancer growth
Suggestion of a social psychologist

Professor Toshio Yamagishi (Hokkaido University)

Introduced in my presentation at the Japan Linux Symposium 2009

Why Are We Hesitating to Join the Community?

Satoru Ueda

- CE Linux Forum
- Japan OSS Promotion Forum
- Sony

At Japan Linux Symposium 2009
October 23
from 2:15 at Hall 2
Suggestion of a social psychologist

Professor Toshio Yamagishi (Hokkaido University)

Inspect each other, prevent performing not ideal behavior for the society

Sustaining several hundreds (or more) years of the human relationship

Typical social behavior of Japanese
Facing huge possibilities to encounter “strangers” from the different cultural background

Taking the chance to collaborate and maximize the value with those strangers

Most of the society out of Japan with very limited exception
To deal with "Sound of Silence"

- **“That’s GPL” campaign**
  - “Why you hoard your code? They should be obliged to publicize when you release the products. Release it right now so that some super skilled person may really help you.”

- **Japan Technical Jamboree**
  - It is not technical conference but JAMBOREE

- **“Let’s go to Ottawa” campaign**
  - Jump into the community melting pot

- **Cerebrate our own international conference**
  - Embedded Linux Conference to welcome the community people to our field of interest
It IS Jamboree! Not Conference!

CELF Technical Jamboree

A step toward the global community scene
3 “No” at Jamboree

- No Commitment
- No Obligation
- No Confidential

- In Japanese
- Step to global community
Next Japan Jamboree (#41) is scheduled on 21st June at Nakano Sunplaza

http://elinux.org/Japan_Technical_Jamboree_41
Ottawa Linux Symposium → LinuxCon by the Linux Foundation
For whom proposing crucial technology development

Community Funding
Community Funding

From 2010

- http://elinux.org/Project_Proposals_for_2010
Project Proposals for 2010

Here is a list of project proposals for 2010, submitted by various people.

**Contents**

### Boot Time
- Add bootchart boot logger functionality to busybox

### Boot Technologies
- Add DFU support to U-Boot
- Refactor the Qt lightweight bootloader
- Improve kernelboot
- Add IPv6 support to U-Boot
- Rework ARM architecture support in U-Boot

### Graphics
- Decrease X.org XFree86 server footprint
- Suppress Xnc dependency on C++

### Input devices
- Add pointer visualization to the kernel framebuffer
- Kernel xdev IR support

### Media Handling
- Create Blu-ray decoding library
- Extend DLNA specifications

### Sound
- Complete hardware, use-case handling in ALSA

### File systems
- Add Framfo filesystem to the kernel mainline
- Add LZC compression support to Squashfs
- UBIFS mount time speedups

### Power Management
Linux community scene vs. Products development scene

Convergence and Divergence
LTSI initiative
Double helices structure by two types of the people

Divergence
- Think sustainable evolution
- Ever lasting development
- Fair governance
- Shorter term and limited item support

Convergence
- Clear goal: Product shipment
- Relatively one shot development
- Quality requirement
- Long (super long) term support
- Support for wide range items

Suites
Product developers...

Geeks...

From “Are you really helped by upstream kernel code?” by H. Munakata, LinuxCon Japan 2011
Tragedy

Why they do not provide with patches?

Convergence

Suites
Product developers...

Divergence

Geeks...

Why they can’t provide long term support?

Relation with Community

Let’s start using Linux!
LT ISI Initiative

Provide with patches! and more

Convergence

Suite s
Product developers…

Divergence

Provide with long term support! and more

Geeks…
Support by each company?!  

Yes, it is possible in realistic way.  
It is NOT required huge human resources.  

Assuming pretty matured Linux, based on LTSL.  

Because it is Open Source and Open Community,  
→ you can find someone who knows the technology  
→ you can read the source code.  

If there’re some (not many) community relation skilled developer in your company, it becomes more realistic.
Users always use the products for 10 years or even more.

Internet connection increases the risk of security.

Products vendor responsibility.

Linux and OSS gives answers!

Super Long Term Support.
Tell the value of Community and the way to increase it

Managements’ endorsement
Dealing with “Ish-Atama”!

- Is it your manager?

石頭 = “石: Ishi” means “Stone”
頭: Atama” Atama means “Head”

“Ishi-atama” managers
preventing developers participating community?
From 2008

- Three white papers for corporate executives
  - Sorry but all of them are in Japanese
  - [http://ossforum.jp/embedded_sub](http://ossforum.jp/embedded_sub)
- White paper “2009”
  - “Corporate rule of MAY, not MUST NOT”
    - Say “You may participate in the open community”
- White paper “2010”
  - “Economical reason to go with the community”
    - Raise of “delivery support for the innovation”
- White paper “2011”
  - “Assign community experts in each company”
    - Value of the specialists harmonizing together with the community
Do you think your manager is still “Ishi-atama”?

- We found out some terms to convince them
  - Such as:
    - Economical reason:
      - “Delivery support for the Innovation”
      - “Shared cost”
    - Thanks to James Bottomley
    - What the rule of “May” leads us
    - Advantage of the community specialists

- Many executives in Consumer Electronics industry get to well understand and support the employees to go with the community
What most of all we imagined about 10 years ago come true!

And now
No immediate reaction when you commanded to change the channel.

Takes more than one minute to power on.

Disturbance of smooth moving picture play because of lack of CPU resource.

Who cares “CPU resource”??

Almost Solved!
A problem has been detected and windows has been shut down to prevent damage to your computer.

The problem seems to be caused by the following:

**TON.SYS
PAGE_FAULT_IN_NONPAGED_AREA

If this is the first time you've ever seen this error code, please restart your computer. If this is not the first time you've seen this message, please follow these steps:

Check to make sure that all your drivers are up to date and fully installed. If this is a new computer, you may need to contact your hardware manufacturer for any Windows components.

If problems continue, try to identify any recently added hardware or software. Disable any add-ons or third-party software that might be conflicting or shadowing. If you need to use your computer, press F8 during startup to access the Advanced Startup Options, and then select Safe Mode.

Technical information:

*** STOP: 0x00000050 (0xFD3094C2,0x00000001,0xFBBFE7617,0x00000000)

*** SPCMDCON.SYS - Address FBBFE7617 base at FBBFE5000, DateStamp 3d6dd67c

Almost Solved!
Now no one will be doubtful to use Linux for Consumer Electronics embedded systems!

😊
Software burst crisis is saved by Linux

- Digital television, Blu-ray recorder…
- Digital still camera, video camera
- Advanced car navigation system
- Professional audio visual equipments
- Cellular phone → Android

- And many things more!
What is Community?
My tentative answer is ...

Community is micro cosmos

which is formed by people, not stars
which is tied by human relationship, not gravity

Human relationship,

Share value and respect each other
Act and contribute to the community
Finally

CE industry made desirable OS reality together with the community

However we are regarding that we have much more to contribute and work with community

Keep on challenging of the improvement through such as LTSI initiative

Are you hesitating to use Linux?
Don’t waste your time!

It’s your time to become a part of community!
Great Appreciation!