

# CE Linux Forum

## The past, present and future

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# History

- Before CE Linux Forum
  - Panasonic / Sony collaboration
- After CE Linux Forum
  - Era of “standardized specifications”
  - Era of “patch archive”
- Now and future
  - Real open source software development community

# Before CE Linux Forum

- December 2002, Panasonic and Sony unveiled the collaboration on Linux development for consumer electronics products
- Why Panasonic and Sony selected Linux?
  - Why not home brew OS
    - Such big software system...
  - Why not commercial available proprietary OS
    - Concern of the “Black box”

# Establishment of CELF

- June 23, 2003
  - Founder: Panasonic, Sony
  - Initial board members:
    - Hitachi, Toshiba, Sharp, Philips, Samsung, NEC, IBM
- About 50 member companies, now

# First and the biggest mistake

- Released “Standardized Specification”
  - April 2004 (Draft version)
    - Just a SPEC almost without implementations
    - Community people said “Who to create the codes?”
- We have learned that it was not ideal way to develop together with the community
- **“Implementation First!”**

# “Sound of silence”

## What happened in Japan

- Many non English speakers exists in the embedded Linux field
- No one dare to speak
- Need to break the “Sound of silence”

# Japan technical jamboree

- Not a technical conference but a jamboree
- Imagine boys and girls around the campfire
  - Talking freely about their future, dream and past story
- In Japanese (a compromise)
  - Speaking Japanese is far better than speaking nothing
- Started October 24, 2004 in Tokyo

# Japan Jam.

- The 1<sup>st</sup> jamboree was all right
  - But the 2<sup>nd</sup> was not so much excited
- Turn key was at the 3<sup>rd</sup>
  - July 15, 2005
  - A staff engineer of Panasonic Mobile talked all about the technology to embed Linux into their cellular phone
  - Every one understood that Jamboree is a very free place to talk about technology



# Japan Jam.

## Now Counted 17 times

- English translation volunteers
  - To put the materials in Japanese into English
- Started the campaign
  - “Let’s join the community!”
  - Encouraging Japanese developers to join CE Linux Forum and Linux Mainline international activities

# Japan Jam.

- We are going to soar to the world of international community
- [http://tree.celinuxforum.org/CelfPubWiki/\*JapanTechnicalJamboreeGuidance\*](http://tree.celinuxforum.org/CelfPubWiki/JapanTechnicalJamboreeGuidance)

# CE Linux Forum International

- Worldwide Embedded Linux Conference
  - Annual event from 2005 in Silicon Valley
  - Scheduled for the next year
  - Soliciting the session proposals

# CE Linux Forum International

- Sponsoring Ottawa Linux Symposium
  - From 2004
  - With CELF Project BoF
  - Increasing the attendee from the domain of the embedded system

# CE Linux Forum International

- Embedded Linux Conference Europe 2007
- The first public activity in Europe



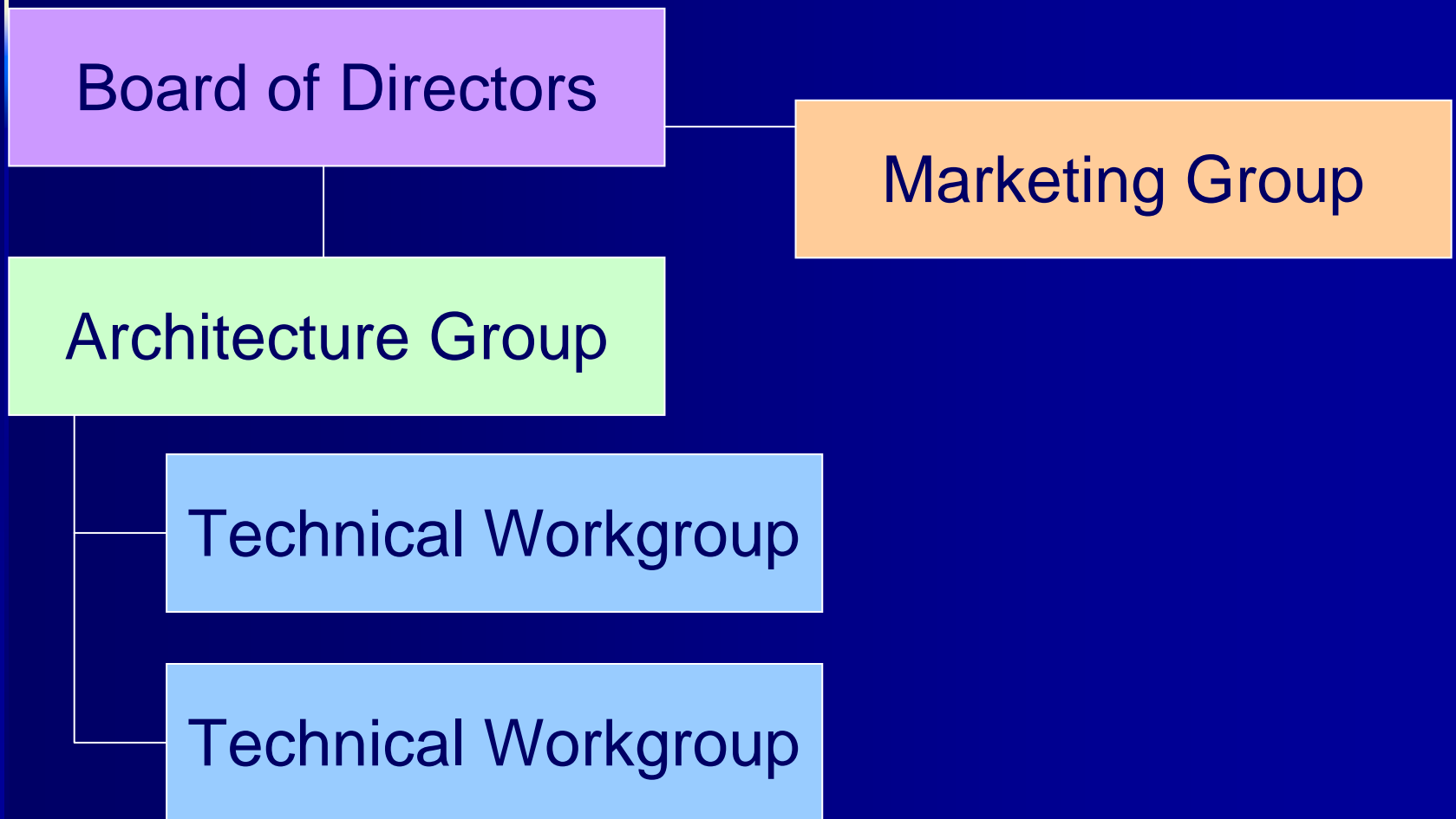
# *CE Linux Forum*

## CE Linux Forum Technical Details

# CE Linux Forum

The CE Linux Forum (CELF) is focused on the advancement of Linux as an open source platform for consumer electronics devices.

# CELF Basic Structure





# AG Role

- Oversee technical working groups
- Manage forum technical outputs
  - Source code
  - Specifications
- Oversee technical projects and special initiatives
  - Test lab, wiki, conferences
- Liaison with the open source community

# AG voting members

- ARM
- ETRI
- Hitachi
- IBM
- Intel
- Mitsubishi
- Monta Vista
- Motorola
- NEC
- NXP
- Panasonic
- Philips
- Samsung
- Sharp
- Sony
- TimeSys
- Toshiba

# Technical Work

- Technical Workgroups
- Contract work
- Conferences
- Technical output
- Special Projects

# **CELF Technical Working Groups**

# Workgroups

- Audio, Video, Graphics
- Boot Technologies
- Digital Television
- Memory Management
- Power Management
- Real Time
- Security
- System Size

# Audio, Video, Graphics

- Mission: Help develop and enhance standard AVG layers for different profiles
  - TV, handheld, etc.
- Recent Projects:
  - Integration of DirectFB and UHAPI
  - GNOME Mobile and Embedded launch
  - DirectFB porting work

# Boot Technologies

- Mission: Reduce boot up time
- Recent Projects:
  - RTC no-synch patches
  - Application pre-linking
  - Miscellaneous bootup time reductions
    - Quick-mounting file systems
    - Different kernel decompression schemes
    - Faster cramfs mounting
    - XIP
    - etc.

# Digital Television Profile

- Mission: Help identify problem areas for DTV products, and fill gaps
- Recent Projects:
  - DLNA open source project evaluation
  - DLNA community developer support
    - Sent DLNA specifications to community project leaders
  - Hosting the DLNA summit on Sunday



# Memory Management

- Mission: Improve memory management systems of Linux, for embedded products
- Candidate Projects:
  - NUMA for small systems
  - Compressed cache evaluation
  - Asymmetric nodes, variable page sizes
  - SLUB/SLOB scalability and node affinity work
  - Support for power-management control of memory extents

# Power Management

- Mission: Help reduce power usage
- Recent Projects:
  - Contract work to produce and mainline Power Management framework elements
  - Hosted PM Summit in 2006
  - Co-Hosted Power Management BOF at OLS
  - PM Quality-of-service feature

# Real Time

- Mission: Enhance Real Time performance of Linux
- Recent Projects:
  - RT-preempt patch validation
  - "Realtime testing best practices" document
  - Realtime test workbench

# RT Testing Results Summary

Company	Platform	Kernel version	Results with RT-preempt
Samsung	Omap 5912, 192 MHz	2.6.10	30 us worst case (irq latency)
IGEL	SH7551R, 240 MHz	2.6.21	<50us worst
ETRI	Via Eden, 1 GHz	2.6.20	415us worst case
Mitsubis	SH4, 240 MHz	2.6.8	1300 us worst
Mitsubis	VIA Eden, 600 MHz	2.6.8	626 us worst
Toshiba	Cell BE, 3.2 GHz	2.6.12	case less variability

# Security

- Projects:
  - Hardware donation to Linux security project
  - Survey of security frameworks which can work with embedded products

# System Size

- Projects:
  - System-wide memory profiling
  - Linux-tiny revival
  - LogFS contract work

# System-wide memory profiling

- Kpagemap
  - Kernel patch and tools to provide detailed and accurate memory utilization for the whole system
- Tools show maps of memory pages on live system
- Written by Matt Mackall
- Currently in the -mm tree
  - Hopeful it will be included in 2.6.25
- Presented at ELC and OLS

# Linux-tiny revival

- Linux-tiny is a set of patches to reduce the size of the Linux kernel
  - Some already mainlined
  - Goal is to mainline rest over time
- CELF recently secured a new maintainer for Linux-tiny
  - Michael Opdenacker
- Patches are available for latest Linux kernel (2.6.23)
- Have automated configuration size test



# Contract Work

# Current Contract Work

- Kpagemap
- Bloatwatch fixes
- Kernel size tuning guide
- Small-config tool for kernel
- Data read-in-place (DRIP)
- Modular printk
- i386 command line
- Kernel Function Trace
- LogFS
- Test Lab software
- Open Embedded
- Embedded wiki management

# Contractors

- Matt Mackall
- Matt Locke
- Dennis Krop (former)
- Bill Traynor
- Marcin Juscziwek
- Michael Opdenacker
- Nicholas McGuire
- Jörn Engel

# Matt Mackall

- General embedded Linux kernel projects
- Represents CELF interests to kernel development community
  - Example: Defending SLOB allocator on kernel mailing list
- Main project this year:
  - Memory instrumentation patches
- In the past: Linux-tiny mainlining

# Conferences

# Conferences overview

- Embedded Linux Conference (ELC)
- Ottawa Linux Symposium (OLS)
- Regional Jamborees
- ELC-Europe
- Japan trade shows

# Embedded Linux Conference

- Held April each year in San Jose, California
- Target audience is embedded Linux developers
- Is CELF's main worldwide conference
- Is an open, community-oriented conference
  - Not a trade show
- First conference with a focus on on embedded Linux
  - Next year will be our fourth year

# ELC 2007 Technical Content

- Very small sample of presentations:
  - Applying User-level Drivers on DTV System
  - System-wide Memory Profiling
  - Porting and Evaluating the Linux Realtime Preemption on Embedded Platform
  - A Generic Parameter Layer for Linux Power Management
  - Deferred Dynamic Loading --- A Memory Reduction Technique



# ELC 2008 Planning

- Conference for 2008 will be:
  - Computer History Museum, Mountain View, CA
  - April 8-10
- Call for sessions will go out soon
  - Deadline will be February 1<sup>st</sup>
- Please come - it will be lots of fun!

# Ottawa Linux Symposium

- Each year, CELF is a sponsor of the symposium
- CELF members gave several presentations and BOFs
- Hand out prizes, do demos, etc.
- Goal is to interact with other (non-embedded developers) and show them our issues

# Regional Jamborees

- Casual, one-day, one-track conferences held in regional areas
- Japan Regional Jamboree
  - Held every other month
  - Presentations and discussion in native language
  - Content is translated to English, after the event
- These have great technical content
  - See <http://elinux.org/Events>

# Technical Output

# Review of technical output

- Presentations and documents
- Patches
- Embedded Linux Wiki

# Documents on Public wiki

Document type	Total	New or updated this year
Wiki page	607	248
PDF	357	117
PowerPoint	97	25
Text file	91	47
Source archive	58	14
Patch file	78	8
Total	1589	508

# Patches

- Goal is always to push patches upstream
- CELF doesn't submit patches itself (except via its contractors)
  - Linux-tiny
  - RTC no-sync patches
  - kpagemap
- Encourage CELF members to submit directly to mainline projects
  - LTTng, Kprobes and SystemTap
  - RT-preempt work
  - Power Management Quality-of-Service
  - Board support

# Special Projects



# Special Projects

- Test Lab
- Embedded Linux Wiki
- Patch and Feature watch list
- Hardware donations

# CELF Test Lab

- Located in San Jose
  - Support for automated and remote operation
  - Power control, serial console, etc
  - Test scheduling via a web interface
- Run regression tests on Linux kernel
- Results published at [testlab.celinuxforum.org](http://testlab.celinuxforum.org)
  - One example: Bloatwatch

# **Embedded Linux Wiki**

<http://elinux.org/>

# eLinux Wiki

## navigation

- [Main Page](#)
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## search




## toolbox

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This is the **eLinuxWiki** for all those interested in Embedded Linux development, personal or professional. This site serves as a repository of information about the use of Linux in embedded implementations and about the Embedded Linux community at large.

Please [help to extend](#) this wiki. Thank you!



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## Development Portals



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[Resource Management](#)



[Toolbox](#)

## Monthly Feature

In this space each month will be featured a topic relevant to Embedded Linux Development.

## Embedded Linux Information



[Products](#)



[Companies](#)



[Vendors](#)



[Processors](#)



[Community](#)



[Experts](#)



[Jobs](#)



[Board and Chip Vendors](#)

To experiment with this wiki try [Sandbox](#). See the [User's Guide](#) for usage and configuration help.

# What [elinux.org](http://elinux.org) Is (and is not)

- A new resource for the whole embedded Linux community
- Mostly technical documents and information, accumulated over years
- Not a CELF-only site
  - Not just for CE companies or for CELF members.
- Not an encyclopedia
  - [elinux.org](http://elinux.org) and Wikipedia are complimentary
- Not a news site

# Site Status - October 2007

- About 490 pages with real content
- ~540 uploaded files
- ~350 registered users
- ~3400 page edits
- 285,000 page views

# Content highlights

- Boot time reduction
- Memory reduction
- Processor docs
- CELF specifications:
  - power management,
  - multimedia
  - etc.
- Hardware hacking
- Real-time
- Toolchains
- Products running Linux
- Companies involved with Linux
  - Vendors, Semi-conductor, CE Product companies
- Events

# elinux Wiki Call For Action

- You can help!
- Create an account and add something today
  - Everyone knows something
- If you don't know anything, correct a typo, or fix a link
  - Wikis get stale, and you can help us



# Technology Watch List

- CELF is tracking a list of features
  - Similar to Linux Weather Forecast
- Maintain the list on a wiki page
  - Anyone can update the status
- Members review the list at meetings and events
- See  
[http://elinux.org/Technology\\_Watch\\_List](http://elinux.org/Technology_Watch_List)

# Hardware Donations

- Architecture Group has small amount of money to use to donate hardware to community developers

**Thanks**

**Questions?**