

Embedded Linux Primer A Practical Real World Approach

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The #1 practical, hands-on guide to developing systems based on embedded Linux - fully updated with extensive new coverage * *Helps programmers rapidly climb the learning curve, maximize productivity, and handle today's most important development challenges. *Contains new chapters on PCI Subsystem, Hotplug and UDEV, USB, and reducing boot time. *Offers practical coverage of Flash-resident filesystem images, the Memory Technology Devices subsystem, and today's hot new multicore processors. Product manufacturers are increasingly turning to embedded Linux - and thousands of software and firmware engineers must now master it for the first time. Embedded Linux Primer has become their #1 resource. Christopher Hallinan offers practical solutions for the real-world challenges embedded developers face - whether they are experienced legacy embedded systems developers moving to Linux or experienced Linux developers moving to embedded systems. Hallinan

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Embedded Linux PrimerA Practical, Real-world Approach

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Build Complete Embedded Linux Systems Quickly and Reliably Developers are increasingly integrating Linux into their embedded systems: It supports virtually all hardware architectures and many peripherals, scales well, offers full source code, and requires no royalties. The Yocto Project makes it much easier to customize Linux for embedded systems. If you're a developer with working knowledge of Linux, Embedded Linux Systems with the Yocto Project™ will help you make the most of it. An indispensable companion to the official documentation, this guide starts by offering a solid grounding in the embedded Linux landscape and the challenges of creating custom distributions for embedded systems. You'll master the Yocto Project's toolbox hands-on, by working through the entire development lifecycle with a variety of real-life examples that you can incorporate into your own projects. Author Rudolf Streif offers deep insight into Yocto Project's build system and engine, and addresses advanced topics ranging from board support to compliance management. You'll learn how to Overcome key challenges of creating custom embedded distributions Jumpstart and iterate OS stack builds with the OpenEmbedded Build System Master build workflow, architecture, and the BitBake Build Engine Quickly troubleshoot build problems Customize new

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distros with built-in blueprints or from scratch Use BitBake recipes to create new software packages Build kernels, set configurations, and apply patches Support diverse CPU architectures and systems Create Board Support Packages (BSP) for hardware-specific adaptations Provide Application Development Toolkits (ADT) for round-trip development Remotely run and debug applications on actual hardware targets Ensure open-source license compliance Scale team-based projects with Toaster, Build History, Source Mirrors, and Autobuilder

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WebRTC, Web Real-Time Communications, is revolutionizing the way web users communicate, both in the consumer and enterprise worlds.

WebRTC adds standard APIs (Application Programming Interfaces) and built-in real-time audio and video capabilities and codecs to browsers without a plug-in. With just a few lines of JavaScript, web developers can add high quality peer-to-peer voice, video, and data channel communications to their collaboration, conferencing, telephony, or even gaming site or application. New for the Third Edition The third edition has an enhanced demo application which now shows the use of the data channel for real-time text sent directly between browsers. Also, a full description of the browser media negotiation process including actual SDP session descriptions from Firefox and Chrome. Hints on how to use Wireshark to monitor WebRTC protocols, and example captures are also included. TURN server

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support for NAT and firewall traversal is also new. This edition also features a step-by-step introduction to WebRTC, with concepts such as local media, signaling, and the Peer Connection introduced through separate runnable demos. Written by experts involved in the standardization effort, this book contains the most up to date discussion of WebRTC standards in W3C and IETF. Packed with figures, example code, and summary tables, this book is the ultimate WebRTC reference.

Table of Contents

- 1 Introduction to Web Real-Time Communications
 - 1.1 WebRTC Introduction
 - 1.2 Multiple Media Streams in WebRTC
 - 1.3 Multi-Party Sessions in WebRTC
 - 1.4 WebRTC Standards
 - 1.5 What is New in WebRTC
 - 1.6 Important Terminology
 - 1.7 References
- 2 How to Use WebRTC
 - 2.1 Setting Up a WebRTC Session
 - 2.2 WebRTC Networking and Interworking Examples
 - 2.3 WebRTC Pseudo-Code Example
 - 2.4 References
- 3 Local Media
 - 3.1 Media in WebRTC
 - 3.2 Capturing Local Media
 - 3.3 Media Selection and Control
 - 3.4 Media Streams Example
 - 3.5 Local Media Runnable Code Example
- 4 Signaling
 - 4.1 The Role of Signaling
 - 4.2 Signaling Transport
 - 4.3 Signaling Protocols
 - 4.4 Summary of Signaling Choices
 - 4.5 Signaling Channel Runnable Code Example
 - 4.6 References
- 5 Peer-to-Peer Media
 - 5.1 WebRTC Media Flows
 - 5.2 WebRTC and Network Address Translation (NAT)
 - 5.3 STUN Servers
 - 5.4 TURN Servers
 - 5.5 Candidates
- 6 Peer

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Connection and Offer/Answer Negotiation6.1 Peer
Connections6.2 Offer/Answer Negotiation6.3
JavaScript Offer/Answer Control6.4 Runnable Code
Example: Peer Connection and Offer/Answer
Negotiation7 Data Channel7.1 Introduction to the
Data Channel7.2 Using Data Channels7.3 Data
Channel Runnable Code Example7.3.1 Client
WebRTC Application8 W3C Documents8.1 WebRTC
API Reference8.2 WEBRTC Recommendations8.3
WEBRTC Drafts8.4 Related Work8.5 References9
NAT and Firewall Traversal9.1 Introduction to Hole
Punching9.3 WebRTC and Firewalls9.3.1 WebRTC
Firewall Traversal9.4 References10 Protocols10.1
Protocols10.2 WebRTC Protocol Overview10.3
References11 IETF Documents11.1 Request For
Comments11.2 Internet-Drafts11.3 RTCWEB
Working Group Internet-Drafts11.4 Individual
Internet-Drafts11.5 RTCWEB Documents in Other
Working Groups11.6 References12 IETF Related
RFC Documents12.1 Real-time Transport
Protocol12.2 Session Description Protocol12.3 NAT
Traversal RFCs12.4 Codecs12.5 Signaling12.6
References13 Security and Privacy13.1 Browser
Security Model13.2 New WebRTC Browser
Attacks13.3 Communication Security13.4 Identity in
WebRTC13.5 Enterprise Issues14 Implementations
and UsesINDEXABOUT THE AUTHORS

A practical tutorial guide which introduces you to the
basics of Yocto Project, and also helps you with its

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real hardware use to boost your Embedded Linux-based project. If you are an embedded systems enthusiast and willing to learn about compelling features offered by the Yocto Project, then this book is for you. With prior experience in the embedded Linux domain, you can make the most of this book to efficiently create custom Linux-based systems.
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Master the techniques needed to build great, efficient embedded devices on Linux
About This Book* Discover how to build and configure reliable embedded Linux devices* This book has been updated to include Linux 4.9 and Yocto Project 2.2 (Morty)* This comprehensive guide covers the remote update of devices in the field and power management
Who This Book Is For
If you are an engineer who wishes to understand and use Linux in embedded devices, this book is for you. It is also for Linux developers and system programmers who are familiar with embedded systems and want to learn and program the best in class devices. It is appropriate for students studying embedded techniques, for developers implementing embedded Linux devices, and engineers supporting existing Linux devices.
What You Will Learn* Evaluate the Board Support Packages offered by most manufacturers of a system on chip or embedded module* Use Buildroot and the Yocto Project to create embedded Linux systems quickly and

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efficiently* Update IoT devices in the field without compromising security* Reduce the power budget of devices to make batteries last longer* Interact with the hardware without having to write kernel device drivers* Debug devices remotely using GDB, and see how to measure the performance of the systems using powerful tools such as `perf`, `ftrace`, and `valgrind`* Find out how to configure Linux as a real-time operating system

In Detail Embedded Linux runs many of the devices we use every day, from smart TVs to WiFi routers, test equipment to industrial controllers - all of them have Linux at their heart. Linux is a core technology in the implementation of the inter-connected world of the Internet of Things. The comprehensive guide shows you the technologies and techniques required to build Linux into embedded systems. You will begin by learning about the fundamental elements that underpin all embedded Linux projects: the toolchain, the bootloader, the kernel, and the root filesystem. You'll see how to create each of these elements from scratch, and how to automate the process using Buildroot and the Yocto Project. Moving on, you'll find out how to implement an effective storage strategy for flash memory chips, and how to install updates to the device remotely once it is deployed. You'll also get to know the key aspects of writing code for embedded Linux, such as how to access hardware from applications, the implications of writing multi-

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threaded code, and techniques to manage memory in an efficient way. The final chapters show you how to debug your code, both in applications and in the Linux kernel, and how to profile the system so that you can look out for performance bottlenecks. By the end of the book, you will have a complete overview of the steps required to create a successful embedded Linux system. Style and approach This book is an easy-to-follow and pragmatic guide with in-depth analysis of the implementation of embedded devices. It follows the life cycle of a project from inception through to completion, at each stage giving both the theory that underlies the topic and practical step-by-step walkthroughs of an example implementation.

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including a crash course in computer engineering. While following step by step, you can: Get up to speed on embedded Linux, electronics, and programming Master interfacing electronic circuits, buses and modules, with practical examples Explore the Internet-connected BeagleBone and the BeagleBone with a display Apply the BeagleBone to sensing applications, including video and sound Explore the BeagleBone's Programmable Real-Time Controllers Updated to cover the latest Beagle boards, Linux kernel versions, and Linux software releases. Includes new content on Linux kernel development, the Linux Remote Processor Framework, CAN bus, IoT frameworks, and much more! Hands-on learning helps ensure that your new skills stay with you, allowing you to design with electronics, modules, or peripherals even beyond the BeagleBone. Insightful guidance and online peer support help you transition from beginner to expert as you master the techniques presented in Exploring BeagleBone, the practical handbook for the popular computing platform.

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guidance on everything from kernel configuration and initialization to bootloaders, device drivers to file systems, and BusyBox utilities to real-time configuration and system analysis. This edition adds entirely new chapters on UDEV, USB, and open source build systems. Tour the typical embedded system and development environment and understand its concepts and components. Understand the Linux kernel and userspace initialization processes. Preview bootloaders, with specific emphasis on U-Boot. Configure the Memory Technology Devices (MTD) subsystem to interface with flash (and other) memory devices. Make the most of BusyBox and latest open source development tools. Learn from expanded and updated coverage of kernel debugging. Build and analyze real-time systems with Linux. Learn to configure device files and driver loading with UDEV. Walk through detailed coverage of the USB subsystem. Introduces the latest open source embedded Linux build systems. Reference appendices include U-Boot and BusyBox commands.

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