

Read Book Embedded Linux Development Using Yocto Project Cookbook Second Edition Practical Recipes To Help You Leverage The Power Of Yocto To Build Exciting Linux Based Systems Pdf For Free

Embedded Linux Development Using Yocto Projects - Third Edition Using Yocto Project with BeagleBone Black Yocto for Embedded Linux Development Primer *Embedded Linux Development Using Yocto Project Cookbook Mastering Embedded Linux Programming Embedded Linux Development with Yocto Project Embedded Linux Development using Yocto Projects Embedded Linux Projects Using Yocto Project Cookbook Embedded Linux Systems with the Yocto Project Embedded Linux Development Using Yocto Project Cookbook Embedded Linux Development Using Yocto Project Embedded Linux Projects Using Yocto Project Cookbook(acorn+PACKT ???) Embedded Linux Projects Using Yocto Project Cookbook Embedded Linux Development Using Yocto Projects - Second Edition Linux: Embedded Development Learning Embedded Linux Using the Yocto Project Yocto for Raspberry Pi Mastering Embedded Linux Programming Yocto Project Development Manual Embedded Linux projects using Yocto project cookbook Using Yocto Project with BeagleBone Black Embedded Linux Primer Hands-On Mobile and Embedded Development with Qt 5 Heading for the Yocto Project Yocto Project Reference Manual Embedded Linux Systems with the Yocto Project Exploring BeagleBone Linux for Embedded and Real-time Applications Building Embedded Linux Systems For Fun and Profit Linux Device Drivers Development Linux Kernel in a Nutshell Exploring Raspberry Pi Mastering Linux Device Driver Development Linux Kernel Programming BPF Performance Tools Intelligent Computing The Art of Readable Code Linux Driver Development for Embedded Processors - Second Edition Linux System Programming Techniques*

Up-to-the-Minute, Complete Guidance for Developing Embedded Solutions with Linux Linux has emerged as today's #1 operating system for embedded products. Christopher Hallinan's Embedded Linux Primer has proven itself as the definitive real-world guide to building efficient, high-value, embedded systems with Linux. Now, Hallinan has thoroughly updated this highly praised book for the newest Linux kernels, capabilities, tools, and hardware support, including advanced multicore processors. Drawing on more than a decade of embedded Linux experience, Hallinan helps you rapidly climb the learning curve, whether you're moving from legacy environments or you're new to embedded programming. Hallinan addresses today's most important development challenges and demonstrates how to solve the problems you're most likely to encounter. You'll learn how to build a modern, efficient embedded Linux development environment, and then utilize it as productively as possible. Hallinan offers up-to-date 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. Linux® is being adopted by an increasing number of embedded systems developers, who have been won over by its sophisticated scheduling and networking, its cost-free license, its open development model, and the support offered by rich and powerful programming tools. While there is a great deal of hype surrounding the use of Linux in embedded systems, there is not a lot of practical information. Building Embedded Linux Systems is the first in-depth, hard-core guide to putting together an embedded system based on the Linux kernel. This indispensable book features arcane and previously undocumented procedures for: Building your own GNU development toolchain Using an efficient embedded development framework Selecting, configuring, building, and installing a target-specific kernel Creating a complete target root filesystem Setting up, manipulating, and using solid-state storage devices Installing and configuring a bootloader for the target Cross-compiling a slew of utilities and packages Debugging your embedded system using a plethora of tools and techniques Details are provided for various target architectures and hardware configurations, including a

thorough review of Linux's support for embedded hardware. All explanations rely on the use of open source and free software packages. By presenting how to build the operating system components from pristine sources and how to find more documentation or help, this book greatly simplifies the task of keeping complete control over one's embedded operating system, whether it be for technical or sound financial reasons. Author Karim Yaghmour, a well-known designer and speaker who is responsible for the Linux Trace Toolkit, starts by discussing the strengths and weaknesses of Linux as an embedded operating system. Licensing issues are included, followed by a discussion of the basics of building embedded Linux systems. The configuration, setup, and use of over forty different open source and free software packages commonly used in embedded Linux systems are also covered. uClibc, BusyBox, U-Boot, OpenSSH, tftpd, tftp, strace, and gdb are among the packages discussed. Elevate your Linux-powered system with Yocto Projects, enhancing its stability and resilience efficiently and economically - now upgraded to the latest Yocto Project version. Purchase of the print or Kindle book includes a free PDF eBook.

Key Features: Optimize your Yocto Project tools to develop efficient Linux-based projects. Follow a practical approach to learning Linux development using Yocto Project. Employ the best practices for embedded Linux and Yocto Project development.

Book Description: The Yocto Project is the industry standard for developing dependable embedded Linux projects. It stands out from other frameworks by offering time-efficient development with enhanced reliability and robustness. With *Embedded Linux Development Using Yocto Project*, you'll acquire an understanding of Yocto Project tools, helping you perform different Linux-based tasks. You'll gain a deep understanding of Poky and BitBake, explore practical use cases for building a Linux subsystem project, employ Yocto Project tools available for embedded Linux, and uncover the secrets of SDK, recipe tool, and others. This new edition is aligned with the latest long-term support release of the aforementioned technologies and introduces two new chapters, covering optimal emulation in QEMU for faster product development and best practices. By the end of this book, you'll be well-equipped to generate and run an image for real hardware boards. You'll gain hands-on experience in building efficient Linux systems using the Yocto Project.

What You Will Learn: Get to grips with Poky workflows. Configure and prepare the Poky build environment. Explore the latest version of Yocto Project through examples. Configure a build server and customize images using Toaster. Generate images and fit packages into created images using BitBake. Support the development process by setting up and using Package feeds. Debug Yocto Project by configuring Poky. Build and boot image for BeagleBone Black, RaspberryPi 4, and VisionFive via SD cards. Explore the use of QEMU to speed up the development cycle using emulation.

Who this book is for: If you are an embedded Linux developer and want to broaden your knowledge about the Yocto Project with examples of embedded development, then this book is for you. Professionals looking for new insights into working methodologies for Linux development will also find plenty of helpful information in this book. Optimize and boost your Linux-based system with Yocto Project and increase its reliability and robustness efficiently and cost-effectively.

About This Book: Optimize your Yocto Project tools to develop efficient Linux-based projects. Practical approach to learning Linux development using Yocto Project. Demonstrates concepts in a practical and easy-to-understand way.

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Style and approach: A clear, concise, and straightforward book that will enable you to use and implement the latest features of Yocto Project. Harness the power of Linux to create versatile and robust embedded solutions.

Key Features: Learn how to develop and configure robust embedded Linux devices. Explore the new features of Linux 5.4 and the Yocto Project 3.1 (Dunfell). Discover different ways to debug and profile your code in both user space and the Linux kernel.

Book Description: If you're looking for a book that will demystify embedded Linux, then you've come to the right place. *Mastering Embedded Linux Programming* is a fully comprehensive guide that can serve both as means to learn new things or as a handy reference. The first few chapters of this book will break down the fundamental elements that underpin all embedded Linux projects: the toolchain, the bootloader, the kernel, and the root filesystem. After that, you will learn how to create each of these elements from scratch and automate the process using Buildroot and the Yocto Project. As you progress, the book will show you how to implement an effective storage strategy for flash memory chips and install updates to a device remotely once it's deployed. You'll also learn about the key aspects of writing code for embedded Linux, such as how to access hardware from apps, the implications of writing multi-threaded code, and techniques to manage memory in an efficient way. The final chapters demonstrate how to debug your code, whether it resides in apps or in the Linux kernel itself. You'll also cover the different tracers and profilers that are

available for Linux so that you can quickly pinpoint any performance bottlenecks in your system. By the end of this Linux book, you'll be able to create efficient and secure embedded devices using Linux. What you will learn

- Use Buildroot and the Yocto Project to create embedded Linux systems
- Troubleshoot BitBake build failures and streamline your Yocto development workflow
- Update IoT devices securely in the field using Mender or balena
- Prototype peripheral additions by reading schematics, modifying device trees, soldering breakout boards, and probing pins with a logic analyzer
- Interact with hardware without having to write kernel device drivers
- Divide your system up into services supervised by BusyBox
- runit
- Debug devices remotely using GDB and measure the performance of systems using tools such as perf, ftrace, eBPF, and Callgrind

Who this book is for If you're a systems software engineer or system administrator who wants to learn how to implement Linux on embedded devices, then this book is for you. It's also aimed at embedded systems engineers accustomed to programming for low-power microcontrollers, who can use this book to help make the leap to high-speed systems on chips that can run Linux. Anyone who develops hardware that needs to run Linux will find something useful in this book – but before you get started, you'll need a solid grasp on POSIX standard, C programming, and shell scripting.

The free and open source software movement, from its origins in hacker culture, through the development of GNU and Linux, to its commercial use today. In the 1980s, there was a revolution with far-reaching consequences—a revolution to restore software freedom. In the early 1980s, after decades of making source code available with programs, most programmers ceased sharing code freely. A band of revolutionaries, self-described “hackers,” challenged this new norm by building operating systems with source code that could be freely shared. In *For Fun and Profit*, Christopher Tozzi offers an account of the free and open source software (FOSS) revolution, from its origins as an obscure, marginal effort by a small group of programmers to the widespread commercial use of open source software today. Tozzi explains FOSS's historical trajectory, shaped by eccentric personalities—including Richard Stallman and Linus Torvalds—and driven both by ideology and pragmatism, by fun and profit. Tozzi examines hacker culture and its influence on the Unix operating system, the reaction to Unix's commercialization, and the history of early Linux development. He describes the commercial boom that followed, when companies invested billions of dollars in products using FOSS operating systems; the subsequent tensions within the FOSS movement; and the battles with closed source software companies (especially Microsoft) that saw FOSS as a threat. Finally, Tozzi describes FOSS's current dominance in embedded computing, mobile devices, and the cloud, as well as its cultural and intellectual influence. This booklet is going to help newcomers to better understand the Yocto Project goals and potential uses. It provide an overview of the project without using technical jargon and going straight to the point on what one should know about Yocto Project before deciding to adopt it. Over 79 hands-on recipes for professional embedded Linux developers to optimize and boost their Yocto Project know-how

- Key Features
- Optimize your Yocto setup to speed up development and debug build issues
- Use what is quickly becoming the standard embedded Linux product builder framework--the Yocto Project Recipe-based implementation of best practices to optimize your Linux system

Book Description The Yocto Project has become the de facto distribution build framework for reliable and robust embedded systems with a reduced time to market. You'll get started by working on a build system where you set up Yocto, create a build directory, and learn how to debug it. Then, you'll explore everything about the BSP layer, from creating a custom layer to debugging device tree issues. In addition to this, you'll learn how to add a new software layer, packages, data, scripts, and configuration files to your system. You will then cover topics based on application development, such as using the Software Development Kit and how to use the Yocto project in various development environments. Toward the end, you will learn how to debug, trace, and profile a running system. This second edition has been updated to include new content based on the latest Yocto release. What you will learn

- Optimize your Yocto Project setup to speed up development and debug build issues
- Use Docker containers to build Yocto Project-based systems
- Take advantage of the user-friendly Toaster web interface to the Yocto Project build system
- Build and debug the Linux kernel and its device trees
- Customize your root filesystem with already-supported and new Yocto packages
- Optimize your production systems by reducing the size of both the Linux kernel and root filesystems
- Explore the mechanisms to increase the root filesystem security
- Understand the open source licensing requirements and how to comply with them when cohabiting with proprietary programs
- Create recipes, and build and run applications in C, C++, Python, Node.js, and Java

Who this book is for If you are an embedded Linux developer with the basic knowledge of Yocto Project, this book is an ideal way to broaden your knowledge with recipes for embedded development. In-depth instruction and practical techniques for building with the BeagleBone embedded Linux platform

Exploring BeagleBone is a hands-on guide to bringing gadgets, gizmos, and robots to life using the popular BeagleBone embedded Linux platform. Comprehensive content and deep detail provide more than just a BeagleBone instruction manual—you'll also learn the underlying engineering techniques that will allow you to create your own projects. The book begins with a foundational primer on essential skills, and then gradually moves into communication, control, and advanced applications using C/C++, allowing you to learn at your own pace. In addition, the book's companion website features instructional videos, source code, discussion forums, and more, to ensure that you have everything you need. The BeagleBone's small size, high performance, low cost, and extreme adaptability have made it a favorite development platform, and the Linux software base allows for complex yet flexible functionality. The BeagleBone has applications in smart buildings, robot control, environmental sensing, to name a few; and, expansion boards and peripherals dramatically increase the possibilities. Exploring BeagleBone provides a reader-friendly guide to the device, 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 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. The following list describes what you can get from this book: Information that lets you get set up to develop using the Yocto Project. Information to help developers who are new to the open source environment and to the distributed revision control system Git, which the Yocto Project uses. An understanding of common end-to-end development models and tasks. Information about common development tasks generally used during image development for embedded devices. Information on using the Yocto Project integration of the QuickEMUlator (QEMU), which lets you simulate running on hardware an image you have built using the OpenEmbedded build system. Many references to other sources of related information. Expand Raspberry Pi capabilities with fundamental engineering principles Exploring Raspberry Pi is the innovators guide to bringing Raspberry Pi to life. This book favors engineering principles over a 'recipe' approach to give you the skills you need to design and build your own projects. You'll understand the fundamental principles in a way that transfers to any type of electronics, electronic modules, or external peripherals, using a "learning by doing" approach that caters to both beginners and experts. The book begins with basic Linux and programming skills, and helps you stock your inventory with common parts and supplies. Next, you'll learn how to make parts work together to achieve the goals of your project, no matter what type of components you use. The companion website provides a full repository that structures all of the code and scripts, along with links to video tutorials and supplementary content that takes you deeper into your project. The Raspberry Pi's most famous feature is its adaptability. It can be used for thousands of electronic applications, and using the Linux OS expands the functionality even more. This book helps you get the most from your Raspberry Pi, but it also gives you the fundamental engineering skills you need to incorporate any electronics into any project. Develop the Linux and programming skills you need to build basic applications Build your inventory of parts so you can always "make it work" Understand interfacing, controlling, and communicating with almost any component Explore advanced applications with video, audio, real-world interactions, and more Be free to adapt and create with Exploring Raspberry Pi. As programmers, we've all seen source code that's so ugly and buggy it makes our brain ache. Over the past five years, authors Dustin Boswell and Trevor Foucher have analyzed hundreds of examples of "bad code" (much of it their own) to determine why they're bad and how they could be improved. Their conclusion? You need to write code that minimizes the time it would take someone else to understand it—even if that someone else is you. This book focuses on basic principles and practical techniques you can apply every time you write code. Using easy-to-digest code examples from different languages, each chapter dives into a different aspect of coding, and demonstrates how you can make your code easy to understand. Simplify naming, commenting, and formatting with tips that apply to every line of code Refine your program's loops, logic, and variables to reduce complexity and confusion Attack problems at the function level, such as reorganizing blocks of code to do one task at a time Write effective test code that is thorough and concise—as well as readable "Being aware of how the code you create affects those who look at it later is an important part of developing software. The authors did a great job in taking you through the different aspects of this challenge, explaining the details with instructive examples." —Michael Hunger, passionate Software Developer Starting with a basic introduction to Yocto Project's build system, this book will take you through the setup and deployment steps for Yocto Project. You will develop an understanding of BitBake, learn how to create a basic recipe, and explore the different types of Yocto Project recipe elements. Moving on, you will be able to customize existing recipes in layers and create a home surveillance solution using your webcam, as well as creating other advanced projects using BeagleBone Black and Yocto Project. Elevate your Linux-powered system with Yocto Projects, enhancing its stability and resilience efficiently and economically — now upgraded to the latest Yocto Project version Purchase of the print or Kindle book includes a free PDF eBook Key Features Optimize your Yocto Project tools to develop efficient Linux-based projects Follow a practical approach to learning Linux development using Yocto Project Employ the best practices for embedded Linux and Yocto Project development Book Description The Yocto Project is the industry standard for developing dependable embedded Linux projects. It stands out from other frameworks by offering time-efficient development with enhanced reliability and robustness. With Embedded Linux Development Using Yocto Project, you'll acquire an understanding of Yocto Project tools, helping you perform different Linux-based tasks. You'll gain a deep understanding of Poky and BitBake, explore practical use cases for building a Linux subsystem project, employ Yocto Project tools available for embedded Linux, and uncover the secrets of SDK, recipe tool, and others. This new edition is aligned with the latest long-term support release of the aforementioned technologies and introduces two new chapters, covering optimal emulation in QEMU for faster product development and best practices. By the end of this book, you'll be well-equipped to generate and run an image for real hardware boards. You'll gain hands-on experience in building efficient Linux systems using the Yocto Project. What you will learn Get to grips with Poky workflows Configure and prepare the Poky build environment Explore the latest version of Yocto Project through examples Configure a build server and customize images using Toaster Generate images and fit packages into created images using BitBake Support the development process by setting up and using Package feeds Debug Yocto Project by configuring Poky Build and boot image for BeagleBone Black, RaspberryPi 4, and VisionFive via SD cards Explore the use of QEMU to speed up the development cycle using emulation Who this book is for If you are an embedded Linux developer and want to broaden your knowledge about the Yocto Project with examples of embedded development, then this book is for you. Professionals looking for new insights into working methodologies for Linux development will also find

plenty of helpful information in this book. Leverage the power of Linux to develop captivating and powerful embedded Linux projects

About This Book Explore the best practices for all embedded product development stages Learn about the compelling features offered by the Yocto Project, such as customization, virtualization, and many more Minimize project costs by using open source tools and programs

Who This Book Is For If you are a developer who wants to build embedded systems using Linux, this book is for you. It is the ideal guide for you if you want to become proficient and broaden your knowledge. A basic understanding of C programming and experience with systems programming is needed. Experienced embedded Yocto developers will find new insight into working methodologies and ARM specific development competence. What You Will Learn Use the Yocto Project in the embedded Linux development process Get familiar with and customize the bootloader for a board Discover more about real-time layer, security, virtualization, CGL, and LSB See development workflows for the U-Boot and the Linux kernel, including debugging and optimization Understand the open source licensing requirements and how to comply with them when cohabiting with proprietary programs Optimize your production systems by reducing the size of both the Linux kernel and root filesystems Understand device trees and make changes to accommodate new hardware on your device Design and write multi-threaded applications using POSIX threads Measure real-time latencies and tune the Linux kernel to minimize them

In Detail Embedded Linux is a complete Linux distribution employed to operate embedded devices such as smartphones, tablets, PDAs, set-top boxes, and many more. An example of an embedded Linux distribution is Android, developed by Google. This learning path starts with the module **Learning Embedded Linux Using the Yocto Project**. It introduces embedded Linux software and hardware architecture and presents information about the bootloader. You will go through Linux kernel features and source code and get an overview of the Yocto Project components available. The next module **Embedded Linux Projects Using Yocto Project Cookbook** takes you through the installation of a professional embedded Yocto setup, then advises you on best practices. Finally, it explains how to quickly get hands-on with the Freescale ARM ecosystem and community layer using the affordable and open source Wandboard embedded board. Moving ahead, the final module **Mastering Embedded Linux Programming** takes you through the product cycle and gives you an in-depth description of the components and options that are available at each stage. You will see how functions are split between processes and the usage of POSIX threads. By the end of this learning path, your capabilities will be enhanced to create robust and versatile embedded projects. This Learning Path combines some of the best that Packt has to offer in one complete, curated package. It includes content from the following Packt products: **Learning Embedded Linux Using the Yocto Project** by Alexandru Vaduva **Embedded Linux Projects Using Yocto Project Cookbook** by Alex Gonzalez **Mastering Embedded Linux Programming** by Chris Simmonds

Style and approach This comprehensive, step-by-step, pragmatic guide enables you to build custom versions of Linux for new embedded systems with examples that are immediately applicable to your embedded developments. Practical examples provide an easy-to-follow way to learn Yocto project development using the best practices and working methodologies. Coupled with hints and best practices, this will help you understand embedded Linux better. Learn how to write high-quality kernel module code, solve common Linux kernel programming issues, and understand the fundamentals of Linux kernel internals

Key Features Discover how to write kernel code using the Loadable Kernel Module framework Explore industry-grade techniques to perform efficient memory allocation and data synchronization within the kernel Understand the essentials of key internals topics such as kernel architecture, memory management, CPU scheduling, and kernel synchronization

Book Description **Linux Kernel Programming** is a comprehensive introduction for those new to Linux kernel and module development. This easy-to-follow guide will have you up and running with writing kernel code in next-to-no time. This book uses the latest 5.4 Long-Term Support (LTS) Linux kernel, which will be maintained from November 2019 through to December 2025. By working with the 5.4 LTS kernel throughout the book, you can be confident that your knowledge will continue to be valid for years to come. You'll start the journey by learning how to build the kernel from the source. Next, you'll write your first kernel module using the powerful Loadable Kernel Module (LKM) framework. The following chapters will cover key kernel internals topics including Linux kernel architecture, memory management, and CPU scheduling. During the course of this book, you'll delve into the fairly complex topic of concurrency within the kernel, understand the issues it can cause, and learn how they can be addressed with various locking technologies (mutexes, spinlocks, atomic, and refcount operators). You'll also benefit from more advanced material on cache effects, a primer on lock-free techniques within the kernel, deadlock avoidance (with lockdep), and kernel lock debugging techniques. By the end of this kernel book, you'll have a detailed understanding of the fundamentals of writing Linux kernel module code for real-world projects and products. What you will learn

Write high-quality modular kernel code (LKM framework) for 5.x kernels **Configure and build a kernel from source** **Explore the Linux kernel architecture** **Get to grips with key internals regarding memory management within the kernel** **Understand and work with various dynamic kernel memory alloc/dealloc APIs** **Discover key internals aspects regarding CPU scheduling within the kernel** **Gain an understanding of kernel concurrency issues** **Find out how to work with key kernel synchronization primitives**

Who this book is for This book is for Linux programmers beginning to find their way with Linux kernel development. If you're a Linux kernel and driver developer looking to overcome frequent and common kernel development issues, or understand kernel internals, you'll find plenty of useful information. You'll need a solid foundation of Linux CLI and C programming before you can jump in. Explore Qt framework and APIs for building cross-platform applications for mobile devices, embedded systems, and IoT

Key Features Build cross-platform applications and deploy them across mobile and connected devices Design 2D and 3D UIs for embedded systems using Yocto and Qt Creator Build machine to machine automation solution using QtSensors, QtMQTT, and QtWebSockets

Book Description Qt is a world-class framework, helping you to develop rich graphical user

interfaces (GUIs) and multi-platform applications that run on all major desktop platforms and most mobile or embedded platforms. The framework helps you connect the dots across platforms and between online and physical experience. This book will help you leverage the fully-featured Qt framework and its modular cross-platform library classes and intuitive APIs to develop applications for mobile, IoT, and industrial embedded systems. Considerations such as screen size, device orientation changes, and small memory will be discussed. We will focus on various core aspects of embedded and mobile systems, such as connectivity, networking, and sensors; there is no IoT without sensors. You will learn how to quickly design a flexible, fast, and responsive UI that looks great. Going further, you will implement different elements in a matter of minutes and synchronize the UI elements with the 3D assets with high precision. You will learn how to create high-performance embedded systems with 3D/2D user interfaces, and deploy and test on your target hardware. The book will explore several new features, including Qt for WebAssembly. At the end of this book, you will learn about creating a full software stack for embedded Linux systems using Yocto and Boot to Qt for Device Creation. What you will learn Explore the latest features of Qt, such as preview for Qt for Python and Qt for WebAssembly Create fluid UIs with a dynamic layout for different sized screens Deploy embedded applications on Linux systems using Yocto Design Qt APIs for building applications for embedded and mobile devices Utilize connectivity for networked and machine automated applications Discover effective techniques to apply graphical effects using Qt Quick apps Who this book is for The book is ideal for mobile developers, embedded systems engineers and enthusiasts who are interested in building cross-platform applications with Qt. Prior knowledge of C++ is required. This book focuses on the core areas of computing and their applications in the real world. Presenting papers from the Computing Conference 2020 covers a diverse range of research areas, describing various detailed techniques that have been developed and implemented. The Computing Conference 2020, which provided a venue for academic and industry practitioners to share new ideas and development experiences, attracted a total of 514 submissions from pioneering academic researchers, scientists, industrial engineers and students from around the globe. Following a double-blind, peer-review process, 160 papers (including 15 poster papers) were selected to be included in these proceedings. Featuring state-of-the-art intelligent methods and techniques for solving real-world problems, the book is a valuable resource and will inspire further research and technological improvements in this important area. If you are an embedded developer learning about embedded Linux with some experience with the Yocto project, this book is the ideal way to become proficient and broaden your knowledge with examples that are immediately applicable to your embedded developments. Experienced embedded Yocto developers will find new insight into working methodologies and ARM specific development competence. Optimize and boost your Linux-based system with Yocto Project and increase its reliability and robustness efficiently and cost-effectively.

About This Book* Optimize your Yocto Project tools to develop efficient Linux-based projects* Practical approach to learning Linux development using Yocto Project* Demonstrates concepts in a practical and easy-to-understand way

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Style and approach A clear, concise, and straightforward book that will enable you to use and implement the latest features of Yocto Project. A practical tutorial guide which introduces you to the basics of Yocto Project, and also helps you with its 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. Over 79 hands-on recipes for professional embedded Linux developers to optimize and boost their Yocto Project know-how

Key Features Optimize your Yocto setup to speed up development and debug build issues Use what is quickly becoming the standard embedded Linux product builder framework—the Yocto Project Recipe-based implementation of best practices to optimize your Linux system

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- Use Docker containers to build Yocto Project-based systems
- Take advantage of the user-friendly Toaster web interface to the Yocto Project build system
- Build and debug the Linux kernel and its device trees
- Customize your root filesystem with already-supported and new Yocto packages
- Optimize your production systems by reducing the size of both the Linux kernel and root filesystems
- Explore the mechanisms to increase the root filesystem security
- Understand the open source licensing requirements and how to comply with them when cohabiting with proprietary programs
- Create recipes, and build and run applications in C, C++, Python, Node.js, and Java

Who this book is for If you are an embedded Linux developer with the basic knowledge of Yocto Project, this book is an ideal way to broaden your knowledge with recipes for embedded development. This book offers readers an idea of what embedded Linux software and hardware architecture looks like, cross-compiling, and also presents information about the bootloader and how it can be built for a specific board. This book will go through Linux kernel features and source code, present information on how to build a kernel source, modules, and the Linux root filesystem. You'll be given an overview of the available Yocto Project components, how to set up Yocto Project Eclipse IDE, and how to use tools such as Wic and Swabber that are still under development. It will present the meta-realtime layer and the newly created meta-cgl layer, its purpose, and how it can add value to poky. The Yocto Project produces tools and processes that enable the creation of Linux distributions for embedded software, independent of the architecture. BeagleBone Black is a platform that allows users to perform installation and customizations to their liking, quickly and easily. Starting with a basic introduction to Yocto Project's build system, this book will take you through the setup and deployment steps for Yocto Project. You will develop an understanding of BitBake, learn how to create a basic recipe, and explore the different types of Yocto Project recipe elements. Moving on, you will be able to customize existing recipes in layers and create a home surveillance solution using your webcam, as well as creating other advanced projects using BeagleBone Black and Yocto Project. By the end of the book, you will have all the necessary skills, exposure, and experience to complete projects based on Yocto Project and BeagleBone Black. Learn to develop customized device drivers for your embedded Linux system

About This Book

- Learn to develop customized Linux device drivers
- Learn the core concepts of device drivers such as memory management, kernel caching, advanced IRQ management, and so on.
- Practical experience on the embedded side of Linux

Who This Book Is For This book will help anyone who wants to get started with developing their own Linux device drivers for embedded systems. Embedded Linux users will benefit highly from this book. This book covers all about device driver development, from char drivers to network device drivers to memory management. What You Will Learn

- Use kernel facilities to develop powerful drivers
- Develop drivers for widely used I2C and SPI devices and use the regmap API
- Write and support devicetree from within your drivers
- Program advanced drivers for network and frame buffer devices
- Delve into the Linux irqdomain API and write interrupt controller drivers
- Enhance your skills with regulator and PWM frameworks
- Develop measurement system drivers with IIO framework
- Get the best from memory management and the DMA subsystem
- Access and manage GPIO subsystems and develop GPIO controller drivers

In Detail Linux kernel is a complex, portable, modular and widely used piece of software, running on around 80% of servers and embedded systems in more than half of devices throughout the World. Device drivers play a critical role in how well a Linux system performs. As Linux has turned out to be one of the most popular operating systems used, the interest in developing proprietary device drivers is also increasing steadily. This book will initially help you understand the basics of drivers as well as prepare for the long journey through the Linux Kernel. This book then covers drivers development based on various Linux subsystems such as memory management, PWM, RTC, IIO, IRQ management, and so on. The book also offers a practical approach on direct memory access and network device drivers. By the end of this book, you will be comfortable with the concept of device driver development and will be in a position to write any device driver from scratch using the latest kernel version (v4.13 at the time of writing this book).

Style and approach A set of engaging examples to develop Linux device drivers

- Master the art of developing customized device drivers for your embedded Linux systems
- Key Features
- Stay up to date with the Linux PCI, ASoC, and V4L2 subsystems and write device drivers for them
- Get to grips with the Linux kernel power management infrastructure
- Adopt a practical approach to customizing your Linux environment using best practices

Book Description Linux is one of the fastest-growing operating systems around the world, and in the last few years, the Linux kernel has evolved significantly to support a wide variety of embedded devices with its improved subsystems and a range of new features. With this book, you'll find out how you can enhance your skills to write custom device drivers for your Linux operating system. Mastering Linux Device Driver Development provides complete coverage of kernel topics, including video and audio frameworks, that usually go unaddressed. You'll work with some of the most complex and impactful Linux kernel frameworks, such as PCI, ALSA for SoC, and Video4Linux2, and discover expert tips and best practices along the way. In addition to this, you'll understand how to make the most of frameworks such as NVMEM and Watchdog. Once you've got to grips with Linux kernel helpers, you'll advance to working with special device types such as Multi-Function Devices (MFD) followed by video and audio device drivers. By the end of this book, you'll be able to write feature-rich device drivers and integrate them with some of the most complex Linux kernel frameworks, including V4L2 and ALSA for SoC. What you will learn

- Explore and adopt Linux kernel helpers for locking, work deferral, and interrupt management
- Understand the Regmap subsystem to manage memory accesses and work with the IRQ subsystem
- Get to grips with the PCI subsystem and write reliable drivers for PCI devices
- Write full multimedia device drivers using ALSA SoC and the V4L2 framework
- Build power-aware device drivers using the kernel power management framework
- Find out how to get the most out of miscellaneous kernel subsystems such as NVMEM and Watchdog
- Who

this book is for This book is for embedded developers, Linux system engineers, and system programmers who want to explore Linux kernel frameworks and subsystems. C programming skills and a basic understanding of driver development are necessary to get started with this book. BPF and related observability tools give software professionals unprecedented visibility into software, helping them analyze operating system and application performance, troubleshoot code, and strengthen security. BPF Performance Tools: Linux System and Application Observability is the industry's most comprehensive guide to using these tools for observability. Brendan Gregg, author of the industry's definitive guide to system performance, introduces powerful new methods and tools for doing analysis that leads to more robust, reliable, and safer code. This authoritative guide: Explores a wide spectrum of software and hardware targets Thoroughly covers open source BPF tools from the Linux Foundation iovisor project's bcc and bpftrace repositories Summarizes performance engineering and kernel internals you need to understand Provides and discusses 150+ bpftrace tools, including 80 written specifically for this book: tools you can run as-is, without programming — or customize and develop further, using diverse interfaces and the bpftrace front-end You'll learn how to use BPF (eBPF) tracing tools to analyze CPUs, memory, disks, file systems, networking, languages, applications, containers, hypervisors, security, and the Linux kernel. You'll move from basic to advanced tools and techniques, producing new metrics, stack traces, custom latency histograms, and more. It's like having a superpower: with Gregg's guidance and tools, you can analyze virtually everything that impacts system performance, so you can improve virtually any Linux operating system or application. LINUX DRIVER DEVELOPMENT FOR EMBEDDED PROCESSORS - SECOND EDITION - The flexibility of Linux embedded, the availability of powerful, energy efficient processors designed for embedded computing and the low cost of new processors are encouraging many industrial companies to come up with new developments based on embedded processors. Current engineers have in their hands powerful tools for developing applications previously unimagined, but they need to understand the countless features that Linux offers today. This book will teach you how to develop device drivers for Device Tree Linux embedded systems. You will learn how to write different types of Linux drivers, as well as the appropriate APIs (Application Program Interfaces) and methods to interface with kernel and user spaces. This is a book is meant to be practical, but also provides an important theoretical base. More than twenty drivers are written and ported to three different processors. You can choose between NXP i.MX7D, Microchip SAMA5D2 and Broadcom BCM2837 processors to develop and test the drivers, whose implementation is described in detail in the practical lab sections of the book. Before you start reading, I encourage you to acquire any of these processor boards whenever you have access to some GPIOs, and at least one SPI and I2C controllers. The hardware configurations of the different evaluation boards used to develop the drivers are explained in detail throughout this book; one of the boards used to implement the drivers is the famous Raspberry PI 3 Model B board. You will learn how to develop drivers, from the simplest ones that do not interact with any external hardware, to drivers that manage different kind of devices: accelerometers, DACs, ADCs, RGB LEDs, Multi-Display LED controllers, I/O expanders, and Buttons. You will also develop DMA drivers, drivers that manage interrupts, and drivers that write/read on the internal registers of the processor to control external devices. To ease the development of some of these drivers, you will use different types of Frameworks: Miscellaneous framework, LED framework, UIO framework, Input framework and the IIO industrial one. This second edition has been updated to the v4.9 LTS kernel. Recently, all the drivers have been ported to the new Microchip SAMA5D27-SOM1 (SAMA5D27 System On Module) using kernel 4.14 LTS and included in the GitHub repository of this book; these drivers have been tested in the ATSAMA5D27-SOM1-EK1 evaluation platform; the ATSAMA5D27-SOM1-EK1 practice lab settings are not described throughout the text of this book, but in a practice labs user guide that can be downloaded from the book's GitHub. Find solutions to all your problems related to Linux system programming using practical recipes for developing your own system programs Key FeaturesDevelop a deeper understanding of how Linux system programming worksGain hands-on experience of working with different Linux projects with the help of practical examplesLearn how to develop your own programs for LinuxBook Description Linux is the world's most popular open source operating system (OS). Linux System Programming Techniques will enable you to extend the Linux OS with your own system programs and communicate with other programs on the system. The book begins by exploring the Linux filesystem, its basic commands, built-in manual pages, the GNU compiler collection (GCC), and Linux system calls. You'll then discover how to handle errors in your programs and will learn to catch errors and print relevant information about them. The book takes you through multiple recipes on how to read and write files on the system, using both streams and file descriptors. As you advance, you'll delve into forking, creating zombie processes, and daemons, along with recipes on how to handle daemons using systemd. After this, you'll find out how to create shared libraries and start exploring different types of interprocess communication (IPC). In the later chapters, recipes on how to write programs using POSIX threads and how to debug your programs using the GNU debugger (GDB) and Valgrind will also be covered. By the end of this Linux book, you will be able to develop your own system programs for Linux, including daemons, tools, clients, and filters. What you will learnDiscover how to write programs for the Linux system using a wide variety of system callsDelve into the working of POSIX functionsUnderstand and use key concepts such as signals, pipes, IPC, and process managementFind out how to integrate programs with a Linux systemExplore advanced topics such as filesystem operations, creating shared libraries, and debugging your programsGain an overall understanding of how to debug your programs using ValgrindWho this book is for This book is for anyone who wants to develop system programs for Linux and gain a deeper understanding of the Linux system. The book is beneficial for anyone who is facing issues related to a particular part of Linux system programming and is looking for specific recipes or solutions. 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 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 If you are an embedded developer learning about embedded Linux with some experience with the Yocto project, this book is the ideal way to become proficient and broaden your knowledge with examples that are immediately applicable to your embedded developments. Experienced embedded Yocto developers will find new insight into working methodologies and ARM specific development competence. The open source nature of Linux has always intrigued embedded engineers, and the latest kernel releases have provided new features enabling more robust functionality for embedded applications. Enhanced real-time performance, easier porting to new architectures, support for microcontrollers and an improved I/O system give embedded engineers even more reasons to love Linux! However, the rapid evolution of the Linux world can result in an eternal search for new information sources that will help embedded programmers to keep up! This completely updated second edition of noted author Doug Abbott's respected introduction to embedded Linux brings readers up-to-speed on all the latest developments. This practical, hands-on guide covers the many issues of special concern to Linux users in the embedded space, taking into account their specific needs and constraints. You'll find updated information on:

- The GNU toolchain
- Configuring and building the kernel
- BlueCat Linux
- Debugging on the target
- Kernel Modules
- Devices Drivers
- Embedded Networking
- Real-time programming tips and techniques
- The RTAI environment
- And much more

The accompanying CD-ROM contains all the source code from the book's examples, helpful software and other resources to help you get up to speed quickly. This is still the reference you'll reach for again and again! * 100+ pages of new material adds depth and breadth to the 2003 embedded bestseller. * Covers new Linux kernel 2.6 and the recent major OS release, Fedora. * Gives the engineer a guide to working with popular and cost-efficient open-source code. This reference manual consists of the following:

- Using the Yocto Project: Provides an overview of the components that make up the Yocto Project followed by information about debugging images created in the Yocto Project.
- A Closer Look at the Yocto Project Development Environment: Provides a more detailed look at the Yocto Project development environment within the context of development.
- Technical Details: Describes fundamental Yocto Project components as well as an explanation behind how the Yocto Project uses shared state (sstate) cache to speed build time.
- Migrating to a Newer Yocto Project Release: Describes release-specific information that helps you move from one Yocto Project Release to another.
- Classes: Describes the classes used in the Yocto Project.
- Tasks: Describes the tasks defined by the OpenEmbedded build system.
- QA Error and Warning Messages: Lists and describes QA warning and error messages.
- Images: Describes the standard images that the Yocto Project supports.
- Features: Describes mechanisms for creating distribution, machine, and image features during the build process using the OpenEmbedded build system.
- Variables Glossary: Presents most variables used by the OpenEmbedded build system, which uses BitBake. Entries describe the function of the variable and how to apply them.
- Variable Context: Provides variable locality or context.
- FAQ: Provides answers for commonly asked questions in the Yocto Project development environment.
- Contributing to the Yocto Project: Provides guidance on how you can contribute back to the Yocto Project. Presents an overview of kernel configuration and building for version 2.6 of the Linux kernel. A practical tutorial guide which introduces you to the basics of Yocto Project, and also helps you with its 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. 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 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 interconnected 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-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. Create unique and amazing projects by using the powerful combination of Yocto and Raspberry Pi About This Book Set up and configure the Yocto Project efficiently with Raspberry Pi Deploy multimedia applications from existing Yocto/OE layers An easy-to-follow guide to utilize your custom recipes on your Raspberry Pi Who This Book Is For If you are a student or a developer of embedded software, embedded Linux engineer or embedded systems in competence with Raspberry Pi and want to discover the Yocto Project, then this book is for you. Experience with Yocto is not needed. What You Will Learn Explore the basic concept of Yocto's build system and how it is organized in order to use it efficiently with Raspberry Pi Generate your first image with Yocto for the Raspberry Pi Understand how to customize your Linux kernel within the Yocto Project Customize your image in order to integrate your own applications Write your own recipes for your graphical applications Integrate a custom layer for the Raspberry Pi In Detail The Yocto Project is a Linux Foundation workgroup, which produces tools (SDK) and processes (configuration, compilation, installation) that will enable the creation of Linux distributions for embedded software, independent of the architecture of embedded software (Raspberry Pi, i.MX6, and so on). It is a powerful build system that allows you to master your personal or professional development. This book presents you with the configuration of the Yocto Framework for the Raspberry Pi, allowing you to create amazing and innovative projects using the Yocto/OpenEmbedded eco-system. It starts with the basic introduction of Yocto's build system, and takes you through the setup and deployment steps for Yocto. It then helps you to develop an understanding of Bitbake (the task scheduler), and learn how to create a basic recipe through a GPIO application example. You can then explore the different types of Yocto recipe elements (LICENSE, FILES, SRC_URI, and so on). Next, you will learn how to customize existing recipes in Yocto/OE layers and add layers to your custom environment (qt5 for example). Style and approach A step by step guide covering the fundamentals to create amazing new projects with Raspberry Pi and Yocto.

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