Embedded Linux* has demonstrated its value as an extremely versatile, cost-effective solution that powers everything from consumer electronics and networking devices to retail point-of-sale and industrial applications. That very breadth, however, creates a diversity of business needs that leads embedded solution developers to build customized Linux distributions to meet their specific requirements.

As a result, the embedded Linux world is fragmented, and developers have traditionally been forced to go to various silicon suppliers for board support packages (BSPs) and tools. To make matters even more complex, those components are typically developed in different formats. While there are hundreds of embedded Linux distributions available, each is highly custom, which leads to tremendous duplication of effort as many developers create generic versions of Linux on which to base their value-added features and capabilities.

The ability to freely modify Linux to create custom embedded versions is both an excellent example of the value of open-source software and an illustration of the complexity that can arise from it. Creating a home-grown distribution carries significant overhead for development, integration, testing, and validation. Because the value-add for most solution developers resides higher in the stack, that effort may not be cost-effective. BSP integration is also generally complex and difficult, which can add significantly to project cost and risk.

The Yocto Project* addresses these challenges with an open-source collaboration project that provides templates, tools, and methods to streamline custom Linux development. Involvement from across the commercial and open-source ecosystems involves a broad spectrum of participating organizations, from a diversity of silicon vendors to large OS vendors and independent consultants.

The Linux Foundation, which hosts the Yocto Project, continues to accept new participation and has devised a scaling membership to include entities of all sizes. The project fosters innovation across application and device types, on any hardware architecture, including x86 (32-bit and 64-bit), ARM*, PPC, and MIPS. The continued growth of hardware BSP support available and the standardization of BSP formats provide tremendous value.

“"The Yocto Project has moved well beyond its roots as an R&D effort. It’s a very robust paradigm for building custom versions of embedded Linux.""  
— Steve Yates, President, ADI Engineering
The Yocto Project provides resources for embedded developers, using OpenEmbedded-Core as its upstream distribution. An active community continually refines, tests, and updates the Yocto Project kernel and other components.

The project website offers comprehensive documentation, the build system (based on the OpenEmbedded architecture), cross-build tools, an agnostic packaging system, and an application developer SDK. Core components delivered by the Yocto Project include the following:

- **x-Architecture.** The Yocto Project extends the build system’s capabilities by providing extensively tested and up-to-date metadata for the Yocto Project kernel and for three build profiles: minimal, sato, and LSB builds.

- **BSPs.** A number of tested BSPs are included to ease porting among hardware architectures, together with the source recipes and their resulting Yocto Project reference runtime images.

- **SDK.** The Yocto Project tools automatically create an SDK or application developer kit with Eclipse® and Anjuta plug-ins available, which can be used to develop applications suitable for use with that particular custom runtime image.

Accelerating the Development of Embedded Linux

Intel plays a key role in the Yocto Project, which provides templates, tools, and best practices to streamline development of custom Linux for embedded applications. Through the use of the Yocto Project, ADI’s Engineering and its customer, Ingerence, created three, fully-functional building-automation and energy-management product prototypes in just three months. Intel’s contributions to the Yocto Project helped ADI efficiently support the latest Intel® platform features, while focusing effort on value-added activities further up the stack.
BENEFITS OF WORKING WITH
THE YOCTO PROJECT

The Yocto Project represents a significant step toward reducing Linux fragmentation in the embedded industry. Collaboration and strategic planning by a coalition of silicon, OS, and device providers is helping to create broad, uniform industry support. As a result, providers have the ability to base commercial OSs and other offerings on the Yocto Project kernel, and silicon vendors are able to supply hardware BSPs. Overall, the project offers the following benefits to the ecosystem:

• **Robust build system.** The Yocto Project enables simple migration from other popular build systems to a proven environment that is also easy to keep fresh with new versions of software.

• **Flexible customizability.** Developers are free to select the general footprint or to refine specific components, including specific versions of those components.

• **Simple transition to commercial OS.** The Yocto Project is explicitly designed to enable the use of a “roll-your-own” OS or to transition to a commercially supported one, with no loss of optimizations or functionality. Moreover, commercial OSs can use the Yocto Project as their upstream source, ensuring maximum reuse of the code.

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Intel Contributions to the Yocto Project

As one of the founding members of the Yocto Project, Intel is collaborating with a diverse community under the auspices of the Linux Foundation to create a common, shared development environment and tools for embedded developers. Intel also participates on the requirements steering committee, helping the technology to continue to advance. And Intel provides key technical contributions to the Yocto Project kernel and its build environment, including BSPs, helping deliver optimal synergies between Intel® architecture and the Yocto Project.

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Learn more about the Yocto Project at
www.yoctoproject.org

Learn more about what Intel is doing in open source at
www.intel.com/opensource
www.intel.com/opensource/yoctoproject
Intel takes pride in being a long-standing member of the open-source community. We believe in open source development as a means to create rich business opportunities, advance promising technologies, and bring together top talent from diverse fields to solve computing challenges. Our contributions to the community include reliable hardware architectures, professional development tools, work on essential open-source components, collaboration and co-engineering with leading companies, investment in academic research and commercial businesses, and helping to build a thriving ecosystem around open source.

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