

Linux Rapid Embedded Programming

Yocto Project

for embedded and IoT software that are independent of the underlying architecture of the embedded hardware. The project was announced by the Linux Foundation

The Yocto Project is a Linux Foundation collaborative open source project whose goal is to produce tools and processes that enable the creation of Linux distributions for embedded and IoT software that are independent of the underlying architecture of the embedded hardware. The project was announced by the Linux Foundation in 2010 and launched in March, 2011, in collaboration with 22 organizations, including OpenEmbedded.

The Yocto Project's focus is on improving the software development process for embedded Linux distributions. The Yocto Project provides interoperable tools, metadata, and processes that enable the rapid, repeatable development of Linux-based embedded systems in which every aspect of the development process can be customized.

In October 2018, Arm Holdings partnered with Intel in order to share code for embedded systems through the Yocto Project.

Linux kernel

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The Linux kernel is a free and open-source Unix-like kernel that is used in many computer systems worldwide. The kernel was created by Linus Torvalds in 1991 and was soon adopted as the kernel for the GNU operating system (OS) which was created to be a free replacement for Unix. Since the late 1990s, it has been included in many operating system distributions, many of which are called Linux. One such Linux kernel operating system is Android which is used in many mobile and embedded devices.

Most of the kernel code is written in C as supported by the GNU Compiler Collection (GCC) which has extensions beyond standard C. The code also contains assembly code for architecture-specific logic such as optimizing memory use and task execution. The kernel has a modular design such that modules can be integrated as software components – including dynamically loaded. The kernel is monolithic in an architectural sense since the entire OS kernel runs in kernel space.

Linux is provided under the GNU General Public License version 2, although it contains files under other compatible licenses.

Linux

management in general. Linux distributions support shell scripts, awk, sed and make. Many programs also have an embedded programming language to support

Linux (LIN-uks) is a family of open source Unix-like operating systems based on the Linux kernel, an operating system kernel first released on September 17, 1991, by Linus Torvalds. Linux is typically packaged as a Linux distribution (distro), which includes the kernel and supporting system software and libraries—most of which are provided by third parties—to create a complete operating system, designed as a clone of Unix and released under the copyleft GPL license.

Thousands of Linux distributions exist, many based directly or indirectly on other distributions; popular Linux distributions include Debian, Fedora Linux, Linux Mint, Arch Linux, and Ubuntu, while commercial distributions include Red Hat Enterprise Linux, SUSE Linux Enterprise, and ChromeOS. Linux distributions are frequently used in server platforms. Many Linux distributions use the word "Linux" in their name, but the Free Software Foundation uses and recommends the name "GNU/Linux" to emphasize the use and importance of GNU software in many distributions, causing some controversy. Other than the Linux kernel, key components that make up a distribution may include a display server (windowing system), a package manager, a bootloader and a Unix shell.

Linux is one of the most prominent examples of free and open-source software collaboration. While originally developed for x86 based personal computers, it has since been ported to more platforms than any other operating system, and is used on a wide variety of devices including PCs, workstations, mainframes and embedded systems. Linux is the predominant operating system for servers and is also used on all of the world's 500 fastest supercomputers. When combined with Android, which is Linux-based and designed for smartphones, they have the largest installed base of all general-purpose operating systems.

Python (programming language)

supports multiple programming paradigms, including structured (particularly procedural), object-oriented and functional programming. Guido van Rossum

Python is a high-level, general-purpose programming language. Its design philosophy emphasizes code readability with the use of significant indentation.

Python is dynamically type-checked and garbage-collected. It supports multiple programming paradigms, including structured (particularly procedural), object-oriented and functional programming.

Guido van Rossum began working on Python in the late 1980s as a successor to the ABC programming language. Python 3.0, released in 2008, was a major revision not completely backward-compatible with earlier versions. Recent versions, such as Python 3.12, have added capabilities and keywords for typing (and more; e.g. increasing speed); helping with (optional) static typing. Currently only versions in the 3.x series are supported.

Python consistently ranks as one of the most popular programming languages, and it has gained widespread use in the machine learning community. It is widely taught as an introductory programming language.

Linux Foundation

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Windows CE

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Windows CE, later known as Windows Embedded CE and Windows Embedded Compact, is a discontinued operating system developed by Microsoft for mobile and embedded devices. It was part of the Windows Embedded family and served as the software foundation of several products including the Handheld PC, Pocket PC, Auto PC, Windows Mobile, Windows Phone 7 and others.

Unlike Windows Embedded Standard, Windows For Embedded Systems, Windows Embedded Industry and Windows IoT, which are based on Windows NT, Windows CE uses a different hybrid kernel. Microsoft licensed it to original equipment manufacturers (OEMs), who could modify and create their own user interfaces and experiences, with Windows Embedded Compact providing the technical foundation to do so.

Earlier versions of Windows CE worked on MIPS and SHx architectures, but in version 7.0 released in 2011—when the product was also renamed to Embedded Compact—support for these were dropped but remained for MIPS II architecture. The final version, Windows Embedded Compact 2013 (version 8.0), released in 2013, only supports x86 and ARM processors with board support package (BSP) directly. It had mainstream support until October 9, 2018, and extended support ended on October 10, 2023; however, license sales for OEMs will continue until 2028.

LiveCode

cross-platform rapid application development runtime system inspired by HyperCard. It features the LiveCode Script (formerly MetaTalk) programming language

LiveCode (formerly Revolution and MetaCard) is a cross-platform rapid application development runtime system inspired by HyperCard. It features the LiveCode Script (formerly MetaTalk) programming language which belongs to the family of xTalk scripting languages like HyperCard's HyperTalk.

The environment was introduced in 2001. The "Revolution" development system was based on the MetaCard engine technology which Runtime Revolution later acquired from MetaCard Corporation in 2003. The platform won the Macworld Annual Editor's Choice Award for "Best Development Software" in 2004. "Revolution" was renamed "LiveCode" in the fall of 2010. "LiveCode" is developed and sold by Runtime Revolution Ltd., based in Edinburgh, Scotland. In March 2015, the company was renamed "LiveCode Ltd.", to unify the company name with the product. In April 2013, a free/open source version 'LiveCode Community Edition 6.0' was published after a successful crowdfunding campaign at Kickstarter. The code base was re-licensed and made available as free and open source software with a version in April 2013.

LiveCode runs on iOS, Android, OS X, Windows 95 through Windows 10, Raspberry Pi and several variations of Unix, including Linux, Solaris, and BSD. It can be used for mobile, desktop and server/CGI applications. The iOS (iPhone and iPad) version was released in December 2010. The first version to deploy to the Web was released in 2009. It is the most widely used HyperCard/HyperTalk clone, and the only one that runs on all major operating systems.

A developer release of v.8 was announced in New York on March 12, 2015. This major enhancement to the product includes a new, separate development language, known as "LiveCode Builder", which is capable of creating new object classes called "widgets". In earlier versions, the set of object classes was fixed, and could be enhanced only via the use of ordinary procedural languages such as C. The new language, which runs in its own IDE, is a departure from the transitional x-talk paradigm in that it permits typing of variables. But the two environments are fully integrated, and apart from the ability to create new objects, development in LiveCode proceeds in the normal way, within the established IDE.

A second crowdfunding campaign to Bring HTML5 to LiveCode reached funding goals of nearly US\$400,000 on July 31, 2014. LiveCode developer release 8.0 DP4 (August 31, 2015) was the first to include a standalone deployment option to HTML5.

On 31 August 2021, starting with version 9.6.4, LiveCode Community edition, licensed under GPL, was discontinued.

Embedded system

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An embedded system is a specialized computer system—a combination of a computer processor, computer memory, and input/output peripheral devices—that has a dedicated function within a larger mechanical or electronic system. It is embedded as part of a complete device often including electrical or electronic hardware and mechanical parts.

Because an embedded system typically controls physical operations of the machine that it is embedded within, it often has real-time computing constraints. Embedded systems control many devices in common use. In 2009, it was estimated that ninety-eight percent of all microprocessors manufactured were used in embedded systems.

Modern embedded systems are often based on microcontrollers (i.e. microprocessors with integrated memory and peripheral interfaces), but ordinary microprocessors (using external chips for memory and peripheral interface circuits) are also common, especially in more complex systems. In either case, the processor(s) used may be types ranging from general purpose to those specialized in a certain class of computations, or even custom designed for the application at hand. A common standard class of dedicated processors is the digital signal processor (DSP).

Since the embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase its reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale.

Embedded systems range in size from portable personal devices such as digital watches and MP3 players to bigger machines like home appliances, industrial assembly lines, robots, transport vehicles, traffic light controllers, and medical imaging systems. Often they constitute subsystems of other machines like avionics in aircraft and astronics in spacecraft. Large installations like factories, pipelines, and electrical grids rely on multiple embedded systems networked together. Generalized through software customization, embedded systems such as programmable logic controllers frequently comprise their functional units.

Embedded systems range from those low in complexity, with a single microcontroller chip, to very high with multiple units, peripherals and networks, which may reside in equipment racks or across large geographical areas connected via long-distance communications lines.

Euphoria (programming language)

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Euphoria is a programming language created by Robert Craig of Rapid Deployment Software in Toronto, Ontario, Canada. Initially developed (though not publicly released) on the Atari ST, the first commercial release was for MS-DOS as proprietary software. In 2006, with the release of version 3, Euphoria became open-source software. The openEuphoria Group continues to administer and develop the project. In December 2010, the openEuphoria Group released version 4 of openEuphoria along with a new identity and mascot for the project. OpenEuphoria is currently available for Windows, Linux, macOS and three flavors of *BSD.

Euphoria is a general-purpose high-level imperative-procedural interpreted language. A translator generates C source code and the GNU compiler collection (GCC) and Open Watcom compilers are supported. Alternatively, Euphoria programs may be bound with the interpreter to create stand-alone executables. A number of graphical user interface (GUI) libraries are supported including Win32lib and wrappers for wxWidgets, GTK+ and IUP. Euphoria has a simple built-in database and wrappers for a variety of other databases.

Gambas

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Gambas is an object-oriented dialect of the BASIC programming language, and an integrated development environment that accompanies it. Designed to run on Linux and other Unix-like computer operating systems, its name is a recursive acronym for Gambas Almost Means BASIC. Gambas is also the word for prawns in the Spanish, French, and Portuguese languages, from which the project's logos are derived.

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