

# AMPRO EMBEDDED LINUX FREQUENTLY ASKED QUESTIONS

## What is Ampro Embedded Linux?

Derived from Ubuntu® packages, Ampro Embedded Linux is a free, open-source, reduced-footprint Linux® operating system enhanced with device-oriented features such as its default touch-enabled Hildon graphical user interface, plus other selected technologies from the Ubuntu Mobile & Embedded (UME) project.

Ampro Embedded Linux targets OEMs designing the company's highly-reliable single-board computers (SBCs), computer-on-modules (COMs), and system-level products into a wide range of applications in industries such as medical, defense, industrial control, retail point-of-sales/service, avionics, and wired/wireless communications.

With this announcement, Ampro becomes the embedded industry's first board-level embedded computer manufacturer to support its full product line with an embedded Linux OS derived from Ubuntu, today's most popular form of Linux.

The Ampro's reduced-footprint embedded Linux distribution currently includes some 700 packages and offers three kernel options: the standard Ubuntu kernel, plus both standard and real-time Linux 2.6 kernels built from kernel.org sources. On top of this, developers can use the provided APT tools to install a choice among thousands of additional open-source packages from Ubuntu and other repositories. For example, the Fluxbox graphical user interface (GUI) comes preinstalled, but alternatives like GNOME and KDE are easily substituted.

Ampro Embedded Linux supports x86 architecture processors, only. Currently supported CPUs and chipsets include:

- AMD Geode™ LX 800
- Intel® Pentium®/Celeron® M/LV/ULV, Core™ Duo, and Core™ 2 Duo CPUs, with Intel 915GME/945GME/965GME chipsets and IHC6M/IHC7M/IHC8M I/O controller hubs, as appropriate

## Why Ubuntu?

There are hundreds of versions of Linux, including embedded-specific distributions like TimeSys, MontaVista, and Wind River Linux. They're all derived from common core Linux components, such as the standard Linux kernel (freely available from [www.kernel.org](http://www.kernel.org)), several graphical application environments (GNOME, KDE, etc.), various system utilities and tools, both free and proprietary device drivers, and thousands of application programs.

Ubuntu is the most popular free Linux these days; it is very well supported by the world-wide Linux community and is also backed by Canonical Ltd (although not in the embedded market). Ubuntu Linux is available in several variations, including full-blown desktop and server variants, as well as a new version targeting mobile and embedded applications (Ubuntu Mobile & Embedded, aka "UME"). Additionally, Intel has selected Ubuntu to provide embedded Linux support for its new Atom processors and related chipsets (formerly codenamed

“Menlow”), in conjunction with the Intel-sponsored Moblin.org project.

Ubuntu’s meteoric rise in popularity among embedded developers is further evidenced by recent survey data collected by the popular embedded Linux website, LinuxDevices.com. Preliminary results from the site’s 2008 Reader Survey suggest that Ubuntu is the most popular commercially-backed Linux distribution, ranking fourth behind the uClinux, Debian, and kernel.org community projects in popularity, with 8.2 percent of respondents embedding Ubuntu over the last two years, and nearly 10 percent planning to do so over the next two. “This rapid adoption curve is all the more remarkable given that it’s only the second year we’ve asked about Ubuntu,” notes LinuxDevices executive editor Henry Kingman.

Another benefit of Ubuntu is its simple, yet powerful software update infrastructure, APT, which enables quick and easy software installation, updates, and security patches.

Finally, Ubuntu is a completely free and open-source OS, availing developers of easy access to source code and minimizing device costs.

### **What’s included in Ampro Embedded Linux?**

The Ampro Embedded Linux will be offered in two versions, both derived from Ubuntu packages: a Reduced-footprint Version with minimal functionality, and a Full-featured Version that adds complete desktop Linux capabilities.

#### *Reduced-footprint version*

This version was created starting from the Ubuntu 7.10 Alternative CD distribution. It is based on the Ubuntu Linux 2.6.22 kernel. To this Ampro added:

- Selected standard Ubuntu desktop packages
- The Fluxbox (rather than GNOME) graphical application framework
- Selected packages from UME (Ubuntu Mobile & Embedded)
- The 2.6.23.9 and 2.6.23.9-rt Linux kernels, downloaded as source from kernel.org and compiled by Ampro

The Reduced-footprint install comprises approximately 700 total packages. All packages come from standard Ubuntu repositories except for the two extra kernels (as noted above). It installs to just over 1GB for development, but once the desired software configuration is frozen, the static portions can be reduced to less than half that size by converting /usr, etc., to squashfs loopback. Consequently, it’s possible to fit the operating system plus applications in less than a 1GB target drive.

Default packages include:

- apt-get package management
- X Window System from Xorg project
- Ubuntu Mobile/Embedded GUI (as used by the Intel moblin.org project)
- Web browser (small-footprint browser using Mozilla Firefox technologies)

- ssh and sshd support
- Most conventional Unix daemons and system tools
- Automatic kernel driver installation for PCI devices (udev)
- USB hotplug (udev)
- sox (including play command) for audio testing

The system boots (via a user-modifiable GRUB menu) into a “desktop” similar to the one shown on Moblin.org’s UI Framework page.

The system supports touch functionality, allowing a system such as an Ampro ReadyPanel™ to behave like an industrial-strength UMPC (ultra-mobile PC) or MID (mobile Internet device). So, for example, you can use touch to select an on-screen soft QWERTY keyboard and open up a console and type various Linux commands, or click on the Mobile Browser to browse the Web, view Google maps, or play YouTube videos.

### *Full-featured version*

This version is nearly identical to the standard Ubuntu GNOME installation, but with the addition of:

- Any packages common to the Reduced-footprint version that are not part of the standard Ubuntu GNOME distribution
- The 2.6.23.9 and 2.6.23.9-rt Linux kernels, downloaded as source from kernel.org and compiled by Ampro

The Full-featured version of Ampro Embedded Linux can be used as a more complete target OS for OEM embedded applications. It can also be used as a development system for developing and debugging applications targeting boards or systems using the Reduced-footprint version, since it contains the same UME extensions, specially selected Ubuntu packages, and kernel.org kernels that are present in the Reduced-footprint version of Ampro Embedded Linux.

## **How do you install it?**

The user boots the target board from the Ampro Embedded Linux DVD. This DVD provides enough of an OS to write one or many target USB or IDE hard drives. Once the board boots from the DVD, the user types a command to begin the installation of either the Embedded or Full-featured OS onto the target drive, as indicated in readme files on the disk. Incidentally, the initial bootup of the DVD is handled by the “System Rescue CD” code from sysreccd.org.

## **When will it be available?**

Ampro Embedded Linux, currently derived from Ubuntu 7.10 packages, will ship within 30-45 days in the QuickStart Kits for most of Ampro’s single-board computer (SBC), computer-on-module (COM), and system products. *Note: The initial release is limited to the Reduced-footprint version.*

With a next-generation Long Term Support (LTS) version of Ubuntu Linux, version 8.04, due for release soon, Ampro has scheduled an Ampro Embedded Linux update for about two months following the initial release. The update, based on Ubuntu 8.04 LTS packages, will include both the Reduced-footprint and Full-featured versions of the OS.

### **How much does it cost?**

Ampro Embedded Linux is being added at no extra cost to Ampro's SBC, COM, and system QSKs. Additionally, there are no runtime royalties.

### **Where can I get source code?**

Ampro Embedded Linux is free, open source software released under the GPL, LGPL, and other open source licenses. Complete source code is readily available to recipients of Ampro Embedded Linux from the Ubuntu and kernel.org repositories using tools included in the distribution, or in DVD by contacting Ampro technical support.

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