



# Transforming Education with Open Source Solutions

## Intel and Linux\* Go to School

### Affordable Computing for Enhancing Education

Intel® processor-based PC platforms running the Linux\* operating system bring the power of computing to classrooms around the world and help educators deliver innovative educational ecosystem programs for enhanced learning experiences. Intel is working collaboratively with the industry, the Open Source development community and Intel® Channel Program members to develop cost-effective solutions for global education. A vital part of this effort involves developing a solution stack customized for education that puts well-designed tools in the hands of teachers, students and school administrators. Increasing innovation and growth in this area requires a highly skilled, dynamic Linux developer community and a vibrant computing ecosystem. Intel is working in both these areas—to bring the benefits of technology to a broad range of educational venues and students everywhere.

### Building a Stack Designed for Education

Technology offers substantial advantages for furthering education, but cost factors and other considerations can be a limitation. For this reason, technology solutions that bring down the cost of education while extending learning in new directions are in demand because they contribute to the educational objectives of many different communities around the world. To be effective, a Linux-based solution stack must meet a number of primary challenges, including:

- **Localization.** Applications and the operating system itself should be flexible and adaptable to a wide variety of language requirements and specialized character sets to support diverse cultures and geographies. Open source development simplifies and accelerates the localization of applications and environments.
- **Content availability.** For successful adoption of computing in schools, the solution should provide a good framework for building and delivering content in accordance with school syllabi. This framework should include support for a variety of content formats and a capable client for playback of rich-media content. Combined with applications that help create, catalog and distribute multimedia-based content, the framework will help enhance student learning experiences.
- **Proven educational offerings and solutions.** Educational packages specifically tailored to the requirements of different grade levels, languages, school syllabi and backgrounds are essential to the success of this initiative. The solution should also be able to support the kinds of peripherals specifically used in education—peripherals that produce and play digital media, including digital cameras, camcorders, scanners, graphics tablets, printers and audio devices.

- **Infrastructure support.** Components that equip a computer to network effectively provide a means to link students to resources and enhance communication. Unwired connectivity, through the capabilities of Intel® Centrino™ mobile technology, enables students and teachers take the classroom with them, providing access to educational materials regardless of location.

Together with committed independent software vendors (ISVs), system integrators, educators, standards bodies, and others, Intel is building an ecosystem primed for the computing needs of education. Intel® processor-based PC platforms running the Linux operating system provide a proven, reliable foundation for deploying tools and technologies that advance education.

## Education Solution Stack Components

A *solution*, as referred to in this paper, consists of two or more hardware or software components that meet a business requirement and provide enhanced value when used together. When referring to a *solution framework*, this constitutes a collection of specific components—software applications—that address a market need at a baseline level. Intel encourages developers, system integrators, resellers, and system manufacturers to further extend the capabilities of each solution framework by building integrated solutions that complement and enhance it. The term *solution stack* describes a set of individual applications that work together to provide a complete solution. The Open Source community and vendors are invited to add value to the proposed solution stacks and contribute components to address broader market needs.

The education solution stack (as shown in Figure 1) is under development by Intel and the Open Source community. This solution stack consists of:

- A desktop computer powered by an Intel® Pentium® 4 processor or Intel® Celeron® processor
- A Linux distribution, such as Red Hat\*, Novell\*, Red Flag\* or CS2C\*
- A collection of Linux-based software applications, middleware components and drivers designed to make learning enjoyable through rich-media content and to simplify many learning activities

Among the software applications included are:

- **Learning Management System (LMS).** Features course management, Web portals, online publishing, knowledge sharing, archiving, online testing and distance learning.
- **Student Information System.** Provides tools for managing grades, maintaining student records and performing other administrative tasks.
- **A suite of productivity applications.** Includes a Web browser, email program, chat application, conferencing tools and calendaring utility.
- **A collection of security and manageability tools.** Provides a firewall, virus protection and manageability functionality, such as upgrades, patches and remote system booting.
- **A collection of digital media applications.** Produces and presents still images, digital video and digital audio editing, as well as supporting CD-ROM and DVD burning features.

Intel is also working with key Education Service Providers to explore the possibility of building a content framework.

As shown in Figure 1, the components of the stack range from low-level drivers and hardware components to middleware and productivity applications.

## Proof-of-Concept Solution Stack

Intel has developed a proof-of-concept implementation, available as a demonstration, with OSS components and several ISV applications for the solution stack described previously. The applications included are:

- Learning Management System (Moodle\*)
- Administrative tools (Centre Student Information System\* and SQL Ledger\*)
- Productivity applications (Mozilla\*, Open Office\*, Gaim\*, Evolution\* and Gnomemeeting\*)
- Digital media tools (RealPlayer\*, xine\*, gimp\*, kino\*, dvgrab\* and xcdroast\*)
- Browser Plug-ins (Macromedia Flash\* and Real Player\*)
- Management (Yum\*, Open Country\*, Red Hat Network\*) and Security applications, (ClamAV\*, CensorNet\*, Astaro Gateway\*, Kaspersky\*)

- Linux operating system distributions (Red Hat, Novell, Red Flag and CS2C)
- Platforms based on Intel® Desktop Boards with an Intel Pentium 4 processor or Intel Celeron processor

Intel is currently working with developers in various countries to standardize this solution stack and bring it to the education market. We welcome feedback on the solution stack and encourage collaborative efforts to further developments in this area. Send comments to: [linux.feedback@intel.com](mailto:linux.feedback@intel.com).

### Looking Forward

The solutions described in this paper are based on open software stack architecture—new and improved applications can be incorporated over time. Other Linux distributions can also be supported with minimal development effort. This approach fosters technological innovation and drives advances in educational computing. With an eye to the future,

Intel wants to help create a deep, dynamic ecosystem of components to further education, rich in possibility and enabled by fully integrated, validated open source solutions. We invite you to join in this effort—to improve worldwide education through applied technology.

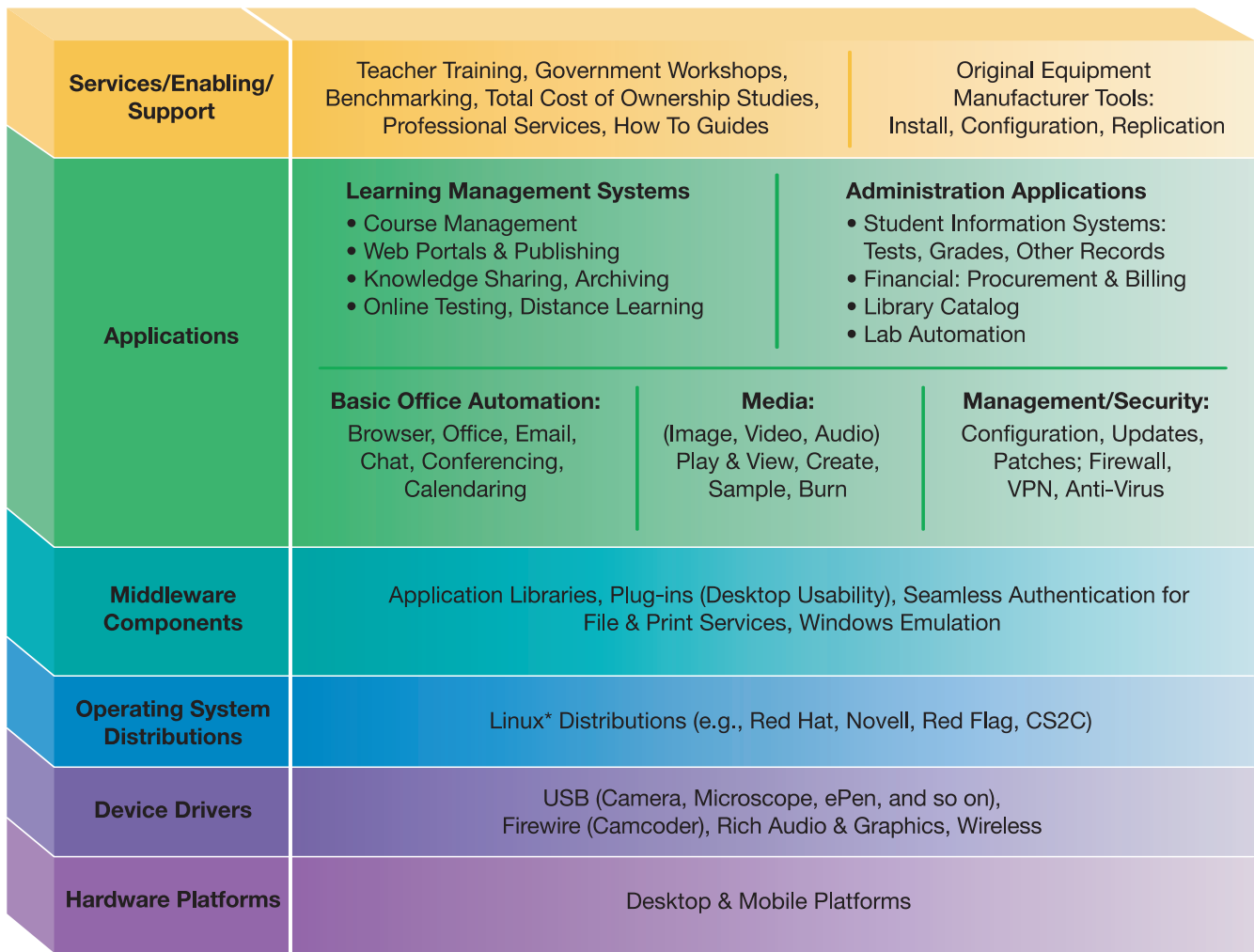


Figure 1. Solution Stack Components for Education

## About Intel Corporation

Intel Corporation is the world's leading supplier of advanced microprocessors used inside PCs, servers and wireless devices, and a leading manufacturer of communication and networking products. The company is a driving force behind the PC and Internet revolutions that have transformed business and society. Founded in 1968, Intel created the first microprocessor in 1971, and today supplies the computing and communication industries with the chips, boards, systems and software building blocks that power computers, servers, communication systems and networks. Intel's mission is to be the preeminent building block supplier to the Internet economy.

## For More Information

For more information about the Intel role in developing the Education Solution Stack, visit [www.intel.com/opensource](http://www.intel.com/opensource).

### Third Party Applications and Components Disclaimer

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