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A Linux/Open-Source Best-Practices Guide: The OS

With the advent of Linux and open source in the enterprise, IS departments must adopt a rigorous method for applying disciplined standards and management of Linux open-source operating-system deployments.

Core Topic
Hardware Platforms: Server Platforms

Key Issue
How will centralized and distributed servers evolve during the next five years?

Linux and open-source integration will demand new processes in the overall development, deployment, maintenance and support of IT infrastructures. These processes can have beneficial and negative consequences. Without a rigorous best-practices approach, IT investment could escalate to higher, unanticipated costs. This framework (see also "A Linux/Open-Source Best-Practices Guide: Applications") is an initial view by Gartner into some of the major focal points that CIOs, architectural planning managers and project developers need to consider in applying discipline to the hybridization of commercial and open-source systems design.

Selection of Supported Hardware (Vendor Configurations): Setting standards on which vendors and hardware configurations will be supported by the IS organization should be guided by the following criteria:

1. Are the drivers and all of the hardware components supported by the operating-system (OS) distribution?
2. Has the vendor of the hardware tested and certified the configurations with the OS distribution desired?
3. Is the vendor providing primary support on the hardware configuration?
4. What is the process by which problem resolution is conducted?
5. Are clear areas of responsibility among the hardware, OS and middleware vendors delineated, and is there one vendor assuming coordination and final resolution responsibility no matter what the cause of the problem may be?

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It is not advisable to have too many acceptable configurations, because the maintenance and support will add to overall costs.

Selection of Supported Hardware (Customization): The IT planning department may wish to make allowance for deviations from standard vendor configurations:

1. Are the configuration variances, such as nonstandard hardware drivers, available from the vendor or on the Internet and compatible with the selected hardware?
2. Can the IT administration compile and change the standard OS distribution to accommodate the drivers and receive technical support (from the hardware vendor and Linux distributor) for changes to the original Linux distribution?
3. Is the hardware vendor and OS distribution technical expertise available to build and support customized configurations, and under what terms and conditions? The contractual terms will be important in terms of future bugs and fixes to standard Linux distributions and their application to customized versions.

Non-X86 Architectures: Although there may arise specific needs for server deployments on a non-X86 architecture (for example, for performance characteristics), in general, it is advisable not to deploy Linux on niche or proprietary processors (other than embedded and specialized systems, such as for high-performance computing). Core Linux development is now done on X86, and applications needed for the specific architecture may not be available or may only be available months after they are on X86. Independent software vendors (ISVs) may be reluctant to port and maintain applications on nonmainstream architectures, either because of the additional maintenance costs, access to the equipment or overall market demand. In general, the open-source community will rarely have access to the resources needed to test specific architectures. Device drivers may not be made available by the vendors on specialized hardware platforms because of the expense of tests.

Linux users are increasingly piloting, testing and moving their most portable code (for example, C or C++) from Unix reduced instruction set computer (RISC) machines to Linux on Intel for the improved cost economy. As long as this code can be deployed to standard hardware under standard Linux distributions, the economic returns in labor in time to port, test and make the transition to production can be minimized. However, these economies are affected to the degree that code dependencies exist with the original hardware, modifications to the code are needed to accommodate new hardware and distributions, and ongoing technical support through the life cycle of the platform and OS is needed for specific driver functions.

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The worst case is going from one platform with high code/architecture dependencies to another platform with similarly established code/architecture dependencies.

Linux Distributions: In general, it is inadvisable to use a proliferation of OS distributions and packages distributed among various hardware configurations. The support and testing increases in complexity and cost, the burden of keeping up with new releases and patches increases administration costs, cross-platform compatibility may be compromised, and documenting kernel versions, release levels, packages and hardware dependencies becomes geometrically more complex. Currently, the two leading Linux distributions are Red Hat and SuSE, but even among these vendors there are alternative distributions, such as Red Hat's Advanced Server and v.8.0. In some cases, you may find that hardware vendors will only support selected distributors or versions, such as Dell Computer's commitment to Red Hat Advanced Server only.

Vendor Support Selection: The primary concern in the selection process is the number and competence of engineering resources by the support provider and the timelines in gaining rapid turnaround when there is a critical problem. If the Linux-based application requires a high degree of technical expertise and responsiveness from the support provider, then enterprises should look for offerings with priority call queuing and access to advanced support resources. The support contract should cover changes to the Linux kernel, where deemed advisable by the IS organization, so as to ensure that incidents will be included in the future updates for the Linux distribution in production. The IS organization should evaluate the connections, partnerships or agreements between the key support provider and the backup resources, such as those from the Linux distributor, if the hardware vendor is designated the lead support contact (see "Linux Support Services: Like Any Other Operating System?").

Linux Standards Base (LSB) Compliance: The LSB (www.linuxbase.org) is a set of interface standards and test suites that are designed to allow applications to run across a variety of Linux distributions that have met the compliance standards. The LSB is a working group under the Free Standards Group (www.freestandards.org), a nonprofit organization whose mission is to promote open-source software. Its charter also includes the Linux Internationalization Initiative applied to language compliance. LSB compliance is essential to the growth and acceptance of Linux within the ISV community. ISVs can test their applications to the common standards and be certified and registered in compliance. Users should become familiar with LSB and understand its working process so that any third-party or new internal applications planned for deployment can be tested

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or certified as compliant. By doing so, the IS organization will create an infrastructure of applications that are binary-compatible among LSB-compliant Linux distributions.

Without LSB compliance, IS organizations could be caught in a web of nonportable applications that break compatibility from distribution to distribution. Even more severe, when applications are linked and integrated through shared libraries, they may set up unique dependencies that cause the system to break. These situations can result from writing applications linked to vendor architectural extensions or application libraries that do not follow the standard Linux conventions of loading, linking, scheduling and execution of programs. A positive outcome of the LSB role would enable a global enterprise to use local distributions in various countries without the fear of creating incompatibilities and interoperability problems.

Bottom Line: A disciplined and carefully considered best-practices process is essential to delivering maximum returns and benefits from Linux and open-source operating-system deployments. The fact that open-source software and Linux standards compliance are still in an early phase of maturity will require active vigilance and engagement on the part of the IS organization in the open-source development and deployment process. Through year-end 2005, 70 percent of large enterprises will neglect to implement formal corporate guidelines and best practices applied to Linux and open source (0.7 probability). Without such practices, 90 percent of these enterprises will unknowingly have deployed some poorly documented, "unauthorized" systems running open-source code or combinations of open-source software and commercial code (0.7 probability).

Recommended Reading and Related Research

"A Linux/Open-Source Best-Practices Guide: Applications"

"Linux Support Services: Like Any Other Operating System?"

Acronym Key

ISV	Independent software vendor
LSB	Linux Standards Base
OS	Operating system
RISC	Reduced instruction set computer

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