IDC
Analyze the Future

WHITE PAPER

Linux and Open Source Software as a Desktop Platform

Sponsored by: Red Hat Inc.

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IDC OPINION

Several industry trends are converging that are likely to change how organizations deploy information technology — on both clients and servers. These trends, although separate in many ways, are often discussed using a single, vendor-specific catchphrase, such as utility computing. IDC believes that these trends will change the nature of what organizations deploy as their desktop application environment in one or more of the following ways:

☑ The use of client-side technology that is automatically managed from a configuration and provisioning perspective. This configuration lowers the total cost of ownership for client-side technology and reduces the number of IT staff required to support a large installed base of client systems.

☑ The use of different form factors in client-side computing, where, for instance, a client system may actually be a blade that is provisioned dynamically for a user based on the user's role and his or her specific application requirements. The user may be accessing this device using some form of virtual access software.

☑ A return to centralized applications that are cost-effectively provisioned, administered, and managed through their life cycle. This type of system configuration reduces the dependency upon locally provisioned and managed applications aboard client hardware. Server-centric computing combined with virtual user interface technologies can enable disparate clients access to applications not originally intended for use aboard these devices.

IN THIS WHITE PAPER

This IDC White Paper examines the major technology shifts illustrated by IDC's model of utility computing infrastructure software and the role of client technology in next-generation computing infrastructures. This document also discusses IDC's model of desktop software use and the increasing adoption of new approaches to helping workers use information technology effectively. IDC then compares Red Hat's offerings to these models.

SITUATION OVERVIEW

Several trends are coming together at this time that will have a strong impact on the application access requirements for knowledge workers, transactional workers, and developers. Some of these trends are.

☑ Organizations are seeking ways to lower their overall costs. This includes hardware and software acquisition costs and staff-related costs.

☑ An increasing need for robust, reliable systems that also support an organization's ability to respond rapidly to the dynamics of a changing environment or business needs.

☑ An increasing need to protect the organizations' IT infrastructure from outside intrusion or misuse. This is seen as both a security issue and a cost management issue. There are costs associated with preventing intrusions. There are lost opportunity costs when the preventative measures fail and it is necessary to take reactive measures to banish viruses, worms, and other malicious software.

☑ Organizations are attempting to reduce hardware acquisition costs by deploying inexpensive, industry-standard systems where possible. This often means harnessing the power of several systems using utility computing infrastructure software and hosting applications that, in the past, could only be deployed on midrange or mainframe systems.

☑ Organizations are attempting to reduce software acquisition costs by deploying software in new ways. This includes the use of open source software, such as Linux and OpenOffice.org, and examining other software licensing models. This includes long-term contracts that may include software acquisition fees or, more likely, software maintenance contracts to support open source products. The evaluations of new "pay-as-you-go" or "software as a service" models are seen as part of these activities.

☑ Organizations are seeking ways to reduce their staff-related costs of system administration, operations, development, and support.

☑ Organizations want to use the newest technology when and where it is appropriate — but without abandoning investments in older technologies.

Red Hat's announcement of its Red Hat Desktop (RHD) operating environment products and its strategy for embedded Linux demonstrates that the company is well aware of these trends and is carefully positioning itself for success in this evolving market.

The Role of Utility Computing Infrastructure

As organizations follow the trends described above, their IT infrastructure will evolve into a highly distributed architecture using low-cost industry-standard systems. This approach allows organizations to host functions or whole applications in the environment best suited for that purpose. Although the actual configuration becomes even more complex, it can increasingly be seen and managed as an "IT utility."

The software making this possible is not new. It can be traced back to research efforts conducted in the late 1960s and continues to evolve. IDC describes this stack of infrastructure software as virtual environment software (VES). The goal of this software environment is to create and deliver an image of a single computing resource to the end user — even though the actual computing environment may be made up of distributed systems housed in datacenters all over the globe.

VES breaks the link between a given function and the underlying systems. This means that functions become abstracted from a single piece of hardware, and these functions often can survive the loss of their original host system. In case of a failure or slowdown, some forms of virtual environment software will either start the function on another system or pass the request to another instance of that application or function. In the end, this allows organizations not only to protect their investment in hardware and software but also to optimize this investment. A completely virtual environment allows established applications or functions to access features of newer systems and be more reliable, more powerful, more scalable, or enhanced in some other way.

As this software is deployed, applications can be increasingly seen as a "Web service." User facing systems can be seen as a view into this network-centric world rather than as standalone devices.

IDC has developed a model describing how the functional layers of software work together to create this distributed computing environment, called the virtual environment (see Figure 1).

FIGURE 1

IDC's Virtual Environment Software Model
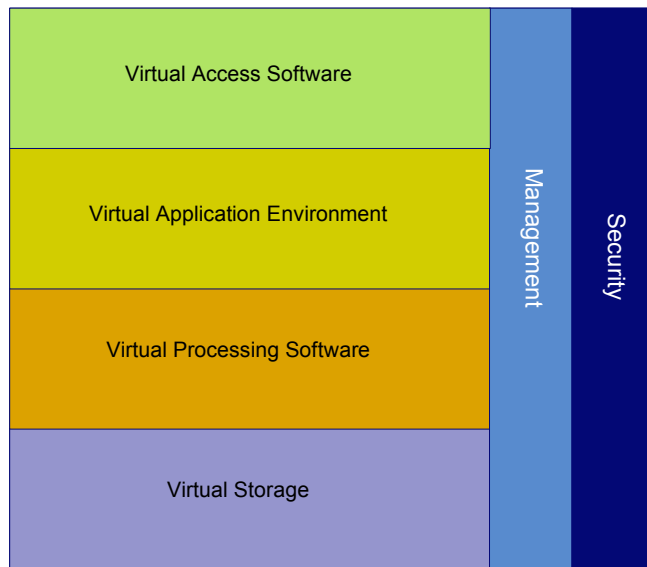
Source: IDC, 2004

The following bullets describe each of the segments of the model.

☑ **Virtual access software.** This software makes it possible for applications to be accessed from nearly any intelligent access point device over just about any network without the application having to be architected to support that device or network.

☑ **Virtual application environments.** This software creates an application development and deployment environment that makes it possible for properly developed applications to be not only more robust and reliable but also to be increasingly unaware of the underlying operating environment and hardware platform.

☑ **Virtual processing software.** This category of software creates the illusion of a highly scalable, reliable, powerful environment that may or may not be really a single system.

☑ **Virtual storage software.** This software makes it possible for applications to be largely unaware of where and how application and data files are actually stored.

☑ **Server provisioning and management.** This software makes it possible for operators and administrators to load, manage, and operate multisystem configurations regardless of whether any of the other virtual environment software categories are present.

⊡ **Security.** As applications are decomposed into components (sometimes called services), identity management and access control become increasingly important. Without a strong security layer, "black hats" could pick apart the distributed architecture and commandeer application components or functions to an organization's detriment.

Red Hat has positioned itself to address the requirements of this utility computing infrastructure model. Red Hat launched its Open Source Architecture (OSA) in October 2003 to address many of the lower layers of the VES model. Red Hat works with the open source community to address virtual application environment software and virtual access software. Red Hat Network also offers a number of client and server provisioning and management functions.
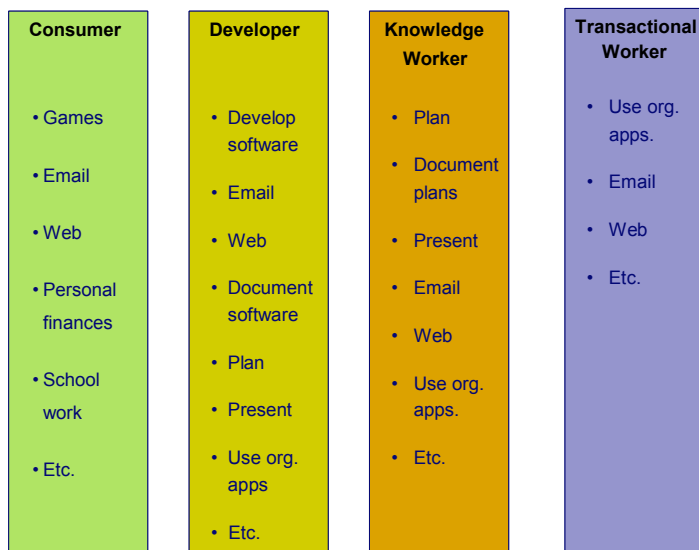
IDC's Model of Desktop Use

IDC has determined that there are four major types of users of desktop systems and other access point devices (see Figure 2). Software resources provided by an organization's systems must be accessible by all of these user groups because they represent customers, partners, employees, and so forth. Each group has its own needs, and a platform that is robust enough for a developer or flexible enough for a knowledge worker may be significantly more costly and complicated than is needed to support the work of a transactional worker. Likewise, the local software needs for each group will differ considerably.

Users within organizations must be able to access knowledge management and transactional systems that their organizations use as well as personal productivity, network access, and analysis tools that may reside on their local systems.

FIGURE 2

IDC's User Model

Consumer	Developer	Knowledge Worker	Transactional Worker
• Games	• Develop software	• Plan	• Use org. apps.
• Email	• Email	• Document plans	• Email
• Web	• Web	• Present	• Web
• Personal finances	• Document software	• Email	• Etc.
• School work	• Plan	• Web	
• Etc.	• Present	• Use org. apps.	
	• Use org. apps	• Etc.	
	• Etc.		

Source: IDC, 2004

Consumer Selection Criteria

Consumers select a system based upon their needs for certain applications and what is available in the retail or online store that they visit. If a store offers only systems preloaded with one operating environment or if an application is available only on one operating environment, people purchasing systems will use that operating environment. This means that other operating environments, no matter how powerful, will not be considered.

Consumers planning to use their systems to access Web sites, electronic mail, and Web-based applications would find their needs met by any operating environment that provides a Web browser, a Java virtual machine, plug-in software allowing access to Web-based content, and a reliable electronic mail agent. The personal productivity software that is available in the open source world is likely sufficient to satisfy the needs of this class of user. Where open source solutions may fall short is when it comes to the availability of game software and personal finance software. Likewise, consumers that already have a significant investment in such software products may find it difficult to justify abandoning those investments to save some money on the acquisition of a new system.

What may be changing this historical scenario, however, are concerns about security and the related issues of management. Consumers have seen what appears to be a never-ending stream of stories about viruses, worms, and other intrusions. Shortly thereafter, they have received messages from their software suppliers informing them that they must install critical updates to protect themselves from harm. If an alternative supplier could present an environment that supported the applications consumers needed and that would also reduce the impact of this security issue, then consumers might be interested.

Developer Selection Criteria

Developers select an application development and deployment platform first. Operating environment selection is driven by that first choice. Furthermore, developers are likely to select a desktop operating environment based upon their application deployment targets. Thus, developers of Windows applications are very likely to select Windows. Developers of Unix or Linux applications are just as likely to select Linux.

Developers of platform-neutral applications will select the lowest cost environment that allows development of those applications using appropriate tools. These developers often consider Linux. The personal productivity software that is available in the open source world is very likely to be sufficient to satisfy the needs of this class of user.

This user segment is also concerned with the overall security and manageability of their desktop environments. They are looking at it from another perspective. Each security problem and resulting requirement for patching and retesting the environment translates to additional work. Because these people are often overscheduled as it is, anything that offers to reduce their workload, in all likelihood, would be welcomed.

Transactional Worker Selection Criteria

Transactional workers use a limited and special-purpose stack of application software, and the supporting operating environment is selected for them by their organizations. Because their work is only supported by the computer, but not really focused on the computer directly, they use whatever their organizations provide.

As more and more knowledge management, content management, and transactional applications are Web based, these workers' needs would be met, and they would be happy with just about any operating environment that provides a Web browser, a Java virtual machine, plug-in software allowing access to Web-based content, and a reliable electronic mail agent. The personal productivity software that is available in the open source world is very likely to be sufficient to satisfy the limited needs of this class of user.

Security and management, once again, are issues that may cause organizational planners to consider a different approach to providing this class of user with a platform to access network-based applications. Organizational planners see the value of not burdening the transactional workers with downtime due to reimaging systems for the removal of worms or viruses.

Knowledge Worker Selection Criteria

Knowledge workers often see their computer and their own personal selection of personal productivity software, data gathering and analysis tools, as well as knowledge and content access software as a critical part of their work. They are tied to their own selection of software, processes, and procedures. Although much of what they do could be supported by open source software today, the possibility of incompatibility — either at the application or data level — means that these users are likely to stay with the platform they are comfortable with today.

As the threat of viruses, worms, and other security attacks intensifies and as the adoption of utility computing grows, it is possible that organizations will encourage some or all of these workers onto another platform. This group, however, is likely to resist change because of the impact it has on day-to-day productivity during any conversion.

The Impact of Utility Computing on Desktop Use

As consumers and organizations start to adopt a highly distributed, utility computing model, the requirements for desktop platforms change. Today, desktop operating environments are often seen as being the host of all application functions needed for personal productivity and access to organizational knowledge management and transactional applications. IDC expects the desktop operating environment to become a "serverstation" operating environment (see Figure 3). That is, the desktop system will evolve from directly supporting all of the applications an end user needs to supporting a few applications needing special input, display, storage, or computational performance features and synchronizing content access from a constellation of fixed function, intelligent devices that support the majority of the day-to-day needs of the end user.

Evolution of the Serverstation Environment

Historical Desktop
- Personal productivity
- Knowledge management
- Access to transactional
  applications

**Serverstation
Environment**
- Knowledge management
- Access to transactional
  applications

IT Utility

- Personal productivity
- Entertainment

Linux

Source: IDC, 2004

As this evolution occurs, many consumer and organizational applications are likely to run "somewhere in the network" rather than on the local desktop system. This means that end users will require a device having network access either through a direct connection or via some form of wireless media. This device will be capable of supporting local fixed-purpose applications as well as a Web browser, Java or other platform-neutral applets, and optional plug-in software allowing local display of content (e.g., video, voice) to provide access to organizational applications. Users will likely use multiple devices — often mobile — that offer varying degrees of local functionality to access these resources.

Another trend is the movement to consumer applications that are available as "pay-as-you-go" network services. This computing model opens up new and attractive choices for customers. It is quite possible that many consumers will select an "information appliance" rather than a complex PC if these devices are readily available, portable, and priced correctly.

As utility computing emerges in organizations, they will have more choices. It will no longer be necessary to select a common device for all users. Organizations will be increasingly able to deploy the desktop, mobile, or handheld platform best suited for a particular user's work environment and access needs rather than having to use a "one-platform-fits-all-needs" strategy. Organizations can then rely on provisioning and management software to manage this diverse access environment. Red Hat Network is Red Hat's approach to answering these requirements.

Although the desktop computer is still the platform for applications that are highly computational, highly storage intensive, or have a requirement for a very large display, it will spend a great deal of its time working with this constellation of smaller devices. The smaller devices will view the desktop system as their connection to the organizational network and a repository for both applications and data.

This evolutionary change will have a large impact on the required features and functions of a desktop operating environment.

RED HAT'S CLIENT SOFTWARE

In October 2003, Red Hat announced two desktop-focused products — Red Hat Enterprise Linux Workstation (RHEL WS) and Red Hat Professional Workstation. RHEL WS is based upon the same code base as the Red Hat Enterprise Linux family of server operating system products, combined with a full-featured desktop environment that includes GNOME, Mozilla, Evolution, OpenOffice.Org, Bluecurve, and other open source software. Red Hat Professional Workstation is a subset of RHEL WS that is focused upon the needs of technical developers and "single-task" use. Both of these desktop operating environments can be provisioned and managed using Red Hat Network.

Red Hat has recently announced the next step in its client strategy, the release of a pure client side–focused product in the RHD product. The following bullets review that announcement:

☐ Red Hat intends to address the evolving needs of organizations using open source software and partner-certified solutions. Red Hat's plans include focusing on security and management first, interoperability and productivity, and then "thin client" software for smart access devices.

☐ Red Hat announced RHD, a companion product for RHEL WS that shares the following features:

❑ Both RHD and RHEL WS will share the same 12- to 18-month release cycles, allowing organizations time to test and deploy this platform without having to worry about the rapidly changing open source world.

❑ RHD releases will be synchronized with Red Hat Enterprise Linux and will share the platform operating system, utilities, management tools, and independent software vendor (ISV)/original equipment manufacturer (OEM) certifications.

❑ RHD, like Red Hat's other Linux products, is open source software. The source will be available on Red Hat's Web site. The binary images, documentation, maintenance, and support will be delivered under license only.

❑ Red Hat will support these products for five years from the date that Red Hat Enterprise Linux was first delivered (October 2003).

❑ All RHD features are included in all Red Hat Enterprise Linux products.

- Support for x86, AMD64, and Intel® Extended Memory 64-bit Technology (EM64T) is included.

- Red Hat has lined up ISV partners to help extend the desktop capabilities. ISVs include Adobe Systems, Citrix Systems, Macromedia, and RealNetworks.

☑ RHD is delivered as a multiunit solution, bundled with Red Hat Network Proxy or Satellite Server, and is not available for individual sale.

☑ The starter pack bundle includes either Red Hat Network Proxy or Red Hat Satellite Server plus 10 RHD entitlements. This package includes 30 days of telephone help desk support for installation and configuration. It also includes one year of Web-based help desk support. This package has a list price of $2,500. The Satellite starter package has a list price of $13,500.

☑ Additional desktop entitlements are available as a 50-unit extension pack, which is listed at $3,500 and includes desktop management modules for each desktop entitlement.

Table 1 shows how Red Hat positions its desktop and server operating environment products.

TABLE 1

Positioning Red Hat's Desktop and Server Operating Environments

Red Hat Operating Environment	Maximum Processors Supported	Maximum Memory Supported	Target Market	Processor Architectures Supported
Red Hat Desktop	1	4GB	Volume deployments, transactional workers	x86, AMD64, and EM64T
Red Hat Enterprise Linux Workstation	2	Maximum supported by system architecture	Developers, knowledge workers, technical or high-performance computing	x86, AMD64, Itanium 2, and EM64T
Red Hat Enterprise Linux ES	2	8GB	Entry to midlevel servers, file/print services, Web services, electronic mail	x86, AMD64, Itanium 2, and EM64T
Red Hat Enterprise Linux AS	Maximum supported by system architecture	Maximum supported by system architecture	Large servers, enterprise applications, database services	x86, AMD64, Itanium 2; and EM64T; IBM iSeries, pSeries, and zSeries systems

Source: Red Hat and IDC, 2004

A n a l y s i s

While many open source and Linux proponents have anxiously awaited the "big bang" of Linux client operating environment adoption, IDC has long maintained that Linux as a client operating environment would see gradual adoption. We believe there is significant difficulty associated with displacing an entrenched product such as Windows, for which customers have a significant investment in application software.

We believe there is opportunity for Linux to compete with Windows client products by carefully selecting market niches where the capabilities of Linux desktop software best meet the use requirements. Today, transactional desktops represent the best fit for Linux, although in some instances, consumer desktops could find Linux to be an appropriate solution. Likewise, professional software developers and content developers, who in many cases have previously used Unix workstations, are another viable segment.

IDC notes that Red Hat is taking a careful, conservative approach to Linux-based desktop platforms. It is targeting end-user segments that are likely to find success using Linux today — the developer and transactional workers. In each case, the features and functions of the desktop environment, the personal productivity software (OpenOffice.Org), the Web access environment (Mozilla and Java), and software necessary to access organizational Exchange-based electronic mail systems (Evolution) fit the user segment profile well. Furthermore, Red Hat Network allows organizations to easily provision and manage the Desktop and Server Linux installations within organizations.

We believe that Red Hat will ultimately target knowledge workers and consumers when open source tools and applications become available to fit those user segments.

When this announcement is considered in conjunction with the joint Red Hat/ Wind River announcement to develop a strong embedded Linux environment, it becomes clear that Red Hat intends to be well positioned for both today's desktop market and for the emerging markets for both serverstations and smart devices.

FUTURE OUTLOOK

IDC forecasts show that Linux client operating environment new license shipments are increasing at a 2002–2007 compound annual growth rate of 25.4%, which takes Linux from a 2.7% share of client operating environment paid new license shipments in 2002 to a 6% share in 2007. This growth represents an increase from 3.4 million paid license shipments in 2002 to in excess of 10 million shipments in 2007.

Red Hat has the name recognition and geographic reach to address this growing opportunity, although the landscape shows numerous companies that are likely to compete vigorously.

Organizations that are seeking ways to reduce complexity and cost will examine every layer of their IT infrastructures to see if they can find improvements. This is likely to lead these organizations to a more network-oriented computing model (sometimes called server-centric computing). Organizations, IDC believes, are likely to consider and then deploy platforms proven to offer a reliable, secure, and manageable platform for the applications they require.

CHALLENGES/OPPORTUNITIES

☒ Microsoft is improving Windows capabilities, management including patch management and deployment, as well as security with each new release. Organizations that are familiar with Microsoft's approach might continue to utilize Microsoft's software.

☒ Although many ways exist to provide Linux Desktop users with access to Windows applications, the installed base of Windows application software is expected to continue to be a hurdle for Linux vendors for the following reasons:

❑ Customers that depend on Windows application software might continue to find Linux problematic due to the challenge of porting applications — or the cost of repurchasing applications for use on Linux.

❑ Emulation of a Windows environment aboard Linux is not a solution that will receive broad use by most businesses because of the potential for support problems and complexity that such a solution could introduce. Suppliers of Windows-based applications might be unwilling to offer support when their applications are not hosted on Windows.

❑ Organizations could deploy virtual access software, such as Citrix's MetaFrame Access Suite or Tarantella's Enterprise 3, that would allow Desktop Linux users to access Windows applications running on a Windows-based server. Desktop Linux users would then be able to run Linux and Web-based applications directly from their desktop environments and access Windows applications running on Windows when those applications were a necessary part of their work.

❑ Another approach that may be promising is for organizations to deploy virtual machine software from VMware to allow Windows and Linux to run on the same desktop system. The increase in memory, storage, and processor power for this solution may be problematic if organizations selected a Desktop Linux solution to lower hardware acquisition costs and complexity.

☒ Approaches offered by HP, IBM, or Sun might also be attractive to organizations that see these vendors as "senior vendors" in their IT infrastructure. These suppliers may or may not specifically recommend a Red Hat–based solution. However, because these suppliers are all Red Hat partners, Red Hat is more than likely to be on their short list.

☑ The field for the Linux client operating environment market is becoming more crowded. Novell is offering a technically sophisticated solution based upon technology it obtained in the acquisition of Ximian and SUSE. Novell, which has worldwide reach and is better funded than Red Hat, is likely to be increasingly seen as a direct competitor to Red Hat.

☑ Beyond Novell, smaller vendors and regional players will present challenges. The field includes players such as Xandros, which has been working specifically on client-optimized versions of Linux; MandrakeSoft, which has historically had a larger percentage of its business aboard client systems; and strong regional players such as Red Flag Software and Turbolinux in the Asia/Pacific market.

☑ The introduction of Linux adds another platform that IT departments must support. It is critical that any use of Linux as a client operating environment be configured in such a way that it does not add to the support burden that IT departments face today. If Red Hat's managed environment is able to deliver a near-zero support configuration, this challenge may not be difficult to overcome.

CONCLUSION

Red Hat is offering a step-by-step, reasonable approach to the adoption of open source and Linux desktop and embedded technology. Because Red Hat is the leading supplier of Linux worldwide, IDC believes that organizations would be wise to consider the approach Red Hat is offering as they plan their future network infrastructures.

Although IDC does not advocate a total replacement of Windows client operating environment installations due to the reasons noted in this paper, we believe there are users that can leverage a Linux desktop environment as a next-generation solution and that Linux should be considered as one of the potential answers to challenges IT departments face.