

HOW TO CHOOSE THE BEST OS FOR YOUR POINT-OF-SALE



EXPLORING THE MERITS OF LINUX

As retailers look to replace their aging POS solution, they will inevitably face the need to choose a new operating system. No single solution is right for everyone because the right decision will be made when the specific environment and business goals are taken into consideration. This paper will guide the reader through the decision process and criteria and describe the merits of Linux.



EXECUTIVE SUMMARY

Today, the two viable operating systems for use in store systems are Windows variants (e.g. Windows 2003, Windows XP, Windows Embedded for Point of Service (WEPOS)) and Linux distributions (e.g. Novell/SUSE, Red Hat). Since both have strengths and weaknesses, each retailer must take into account their situation and environment to determine the right selection for them.

Selecting an operating system is an important decision that will impact operations for years to come, so it should be given due consideration. The main factors that drive the operating system decision are cost, supportability, software compatibility, hardware compatibility, security, and expertise.

Novell is the only established company that offers a distribution of Linux targeted specifically for the retail environment. Among the retailers that have adopted Linux, Novell's SUSE LINUX is the preferred distribution because it offers the most functionality out-of-the-box for store systems. Retailers considering their next generation store systems will benefit from the openness, low total cost of ownership (TCO), and reliability that Linux offers.

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INTRODUCTION

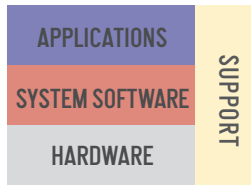
Choosing the right operating system for your POS is an important decision that you will live with for the next decade, so it deserves careful consideration. There are more choices today than ever before, including variants of Windows, 4690, Unix, MacOS, and Linux. Making the right decision can decrease operating costs and provide a base for your POS software that will continue to evolve. Making the wrong decision may involve a costly redeployment.

No single operating system is universally best for POS, so each retailer will need to take key situational factors into consideration. This paper lays out a decision-making process and the criteria for selecting the best operating system to advance your stores into the future. To exercise the process we will focus on the merits of Linux.



OPERATING SYSTEM LANDSCAPE FOR RETAIL

Replacing an aging POS system involves many decisions and tradeoffs. What hardware can be reused? Does the network need to be upgraded? In what language should the software be written? How can proprietary interfaces to backend systems be preserved? Another important question to be answered is which operating system should be used. This decision will have a direct impact on the TCO for your solution, and may create opportunities and limitations in other key areas.



Key factors that contribute to TCO

Once the decision is made that a POS upgrade or replacement is needed, it is important to choose a solution that will effectively support the business at the least cost. The main drivers for cost are the hardware, system software (e.g. operating system, middleware, database, software distribution, monitoring), business applications, and support/maintenance. The operating system decision will impact or influence all of these cost factors, and ultimately, your total cost of ownership.

The hardware and application decisions can limit the choices of an operating system and impact the choices for other system software and applications. You need to consider all the factors together and find the “sweet spot” instead of looking at single factors in isolation. This sounds easier than it actually is.

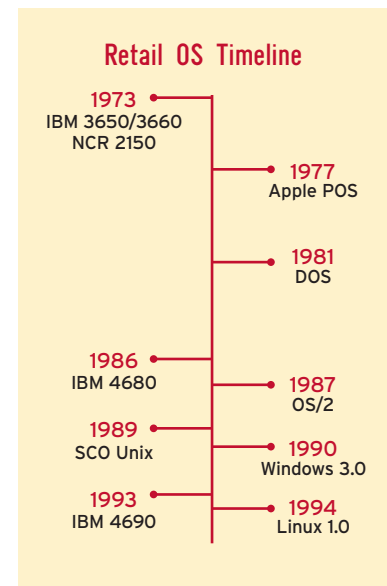
HISTORICAL OVERVIEW

The first computer-based POS systems debuted in 1973 when IBM released their 3650 and 3660 products and NCR released the 2150. Both were based on proprietary operating systems and software. The first use of a PC for POS occurred in 1977 when Gene Mosher used his Apple II to take orders in his restaurant. He went on to create the first touch-screen POS using an Atari in 1985.

When DOS was released in 1981, low-cost PC-based POS solutions were within reach. Further momentum was created in 1986 when IBM released its 4680 retail-focused operating system and in 1989 when SCO released its version of Unix for the i386. IBM followed in 1993 with the 4690 OS, which is still popular today.

When OS/2 and Windows 3.0 were released in 1987 and 1990 respectively, the idea of a graphical POS, which was pioneered by Mosher, was becoming a possibility.

In 1991, Linus Torvalds decided to write his own Unix-like operating system for use at home. He focused his efforts on developing his own kernel, the core of the operating system that deals with resources, using GNU's tools to fill in the rest. The first viable version was released in 1994 and it has been gaining market share ever since.





TODAY'S NEW CLASS OF SOLUTIONS

Today, there are really only two viable operating system choices for POS registers. Windows, in its many versions, and Linux, in its many distributions, are the two best options on the market today. IBM's 4690 OS, which is very mature and full-featured, is being phased-out in favor of IBM's Linux platform based on Novell's SUSE LINUX – IBM Retail Environment for SUSE (IRES). IRES includes management tools, as well as necessary drivers and scripts to run SUSE LINUX on IBM hardware.

>> WINDOWS OFFERINGS

Windows 9x and ME have been replaced by Windows XP on the client, and Windows NT and 2000 are better suited for the server OS (plus they have been supplanted by Windows 2003). The full-blown Windows OS was more than what was actually required for some single-purpose applications, so Microsoft created XPe, an embedded version of their popular desktop OS. It allowed OEMs to pick and choose the parts of the operating system to include so that the footprint was reduced, was more secure, and was easier to support. But this created its own problems since each OEM created their own OS, and ISVs did not have anything consistent against which to test. So Microsoft created Windows Embedded for Point-of-Service (WEPOS), a specific version of XPe targeted at the retail segment. WEPOS on registers and Windows 2003 on the in-store-server (ISP) is a good combination for those retailers that run Windows-based software.

REGISTER/CLIENT MARKET SHARE

POS OS	Share
DOS	15%
IBM 4690	12%
Windows 9x/ME/CE	14%
Windows NT/2000/XP	35%
Windows XPe/WEPOS	6%
Linux	7%
Other	11%

Source: IHL Consulting Group/RIS News
"The Year of the Store?" Jan. 2005

>> LINUX OFFERINGS

Technically, Linux refers to the OS *kernel*, the "engine" that allows software to interact with hardware resources such as the CPU and memory. But the OS is composed of many other pieces including a graphical user interface, file system, and tools. These pieces vary slightly by *distribution*, the packaging of the Linux kernel, GNU tools, and other value-add components. There have been around a dozen different distributions, but the most popular distributions are Red Hat and Novell SUSE LINUX. (Novell acquired SUSE in 2004.)

Retailers such as Burlington Coat Factory, KB Toys, and SteinMart have been using enterprise Linux for a while, such as SUSE LINUX Enterprise Server, but in some cases it was necessary to tailor the Linux distribution for retail. This can be a time-consuming process and add support costs to the overall solution. Novell has solved these problems by providing a Linux distribution specifically targeted to the retail industry - Novell Linux Point of Service (NLPOS). NLPOS addresses the point-of-service terminals, branch (in-store) servers, and host servers.

Market share for WEPOS and Linux will continue to rise at the expense of the other available OS's. According to researcher IDC, Linux share of the server market will climb from 24% today to 33% in 2007 and from 3% to 6% in the desktop market.² A similar trend is occurring in the retail industry.

EVALUATING THE CHOICES

There are many factors to consider when evaluating operating systems. Note that functionality is not one of those factors, as today's operating systems may do things in a different manner; but they all get the job done one way or another. We believe the following are the six key differentiators between Linux and Windows.

1. COST

For many retailers, the factor with the most weight is cost. The total cost includes licensing, maintenance, and support. For example, let's consider a fictitious retailer named Acme that has 200 stores each with three registers. Let's assume the license cost for the register's OS is \$35 with annual maintenance of \$32, and Acme has one full-time employee (FTE) at \$80k/year assigned to support the OS on all the registers. If the OS is expected to last 7 years, then the total cost per register is \$1,192, not \$35!

$$\begin{array}{r} \text{Example} \quad \$35 \\ \text{TCO} + \$32 \times 7 \\ \quad + \$80,000 \times 7 / 600 \\ \hline \$1,192.33 \end{array}$$

The point of this exercise is to show that the TCO amount is quite different from the original license cost. Most of the TCO comes from the ongoing support, so it is reasonable to focus research there and fully understand what it takes to support the OS.

2. SUPPORTABILITY

Regardless of which operating system you choose, a systems administrator will be needed to perform routine maintenance and support. If you are going to pay the annual fee to get patches and upgrades, you must have someone capable of testing and applying them. Not only are stores distributed all over the country, but the bandwidth connection to those stores may not accommodate a single chain-wide distribution. In many cases, it is necessary to either stage upgrades or perform them in waves.

And there can be glitches such as the OS wasn't shutdown properly, a file was corrupted, a peripheral stops working, or a virus is detected, just to name a few. While in most cases the support tasks can be scripted so that all the registers are treated the same, there are also exceptions to the rule, which can be difficult and expensive to address. For example, a small subset of registers using a new graphics card will require one-off drivers. Given the proposed configuration, and the store environment, will the OS be supportable?

HERE ARE A FEW QUESTIONS TO CONSIDER REGARDING SUPPORTABILITY:

- >> How often are patches and upgrades released by the vendor?
- >> Is there an easy way to distribute patches?
- >> Can grand openings and relocations be automated?
- >> Can problems be easily detected and diagnosed?
- >> Is there a reasonable supply of expertise available in the market?
- >> Does the vendor supply a knowledge base for research?
- >> How long is a release supported before an upgrade is required?

Today's modern solutions will meet these challenges in different ways, so it is important to dive into the details and understand how the solutions differ.



■ 3. SOFTWARE COMPATIBILITY AND RANGE OF CHOICES (AVAILABILITY)

Of course if the POS solution you have chosen only runs on one type of OS, then the choice has been made for you. However, store systems include more than just POS, so taking stock of all the applications is important. A fairly standard approach these days is to implement Web-based solutions for non-essential applications and locate them at corporate where they can be more easily maintained. Then, those applications which must be available regardless of the wide area network (WAN) status are deployed in the store. Of course this approach is completely dependent on reliable bandwidth to corporate, which is not always an option.

Of the applications currently deployed in the store, what are the OS requirements and compatibility? If, for example, you have standardized on Java applications, then your options are open, otherwise, your scope of choices may be narrowed. Consider whether your future choices for store-based applications would be limited based on your selection of an OS.

■ 4. HARDWARE COMPATIBILITY AND RANGE OF CHOICES (AVAILABILITY)

By the same token, hardware compatibility is a factor, although its importance has decreased over the years. Assuming your registers are PC-based, your choice of operating systems should be wide, but the peripherals also need to be considered. Are there drivers available for the receipt printer, scanner, cash drawer, etc.? As adoption of USB-connected devices increases, this becomes less of an issue, but today most retailers have at least some legacy devices.

Is there also a version of the OS that can be used on the in-store server and, if applicable, the corporate servers that support the store? Homogeneous systems will be easier to support and may offer distinct TCO advantages through volume-based discounts and skills consolidation among support staff. Also, if 64-bit processors are used or are on the horizon, make sure there are mature 64-bit versions of the OS available.

And just as no one wants to get locked into a particular hardware vendor, how easy will it be to move to a different OS later, should the need arise? Some solutions tend to be very proprietary making it difficult to change the OS in the future. Other vendors and solutions take a more open approach that allows easier migrations.

■ 5. SECURITY

While security may be considered part of the functionality, it is so important in retail that it merits its own category and additional scrutiny. The financial integrity of your store systems will depend to some degree on the security of your solution, including the operating system used. While modern operating systems can all be said to be secure, their ability to react to emerging threats, the frequency of security patches, popularity with hackers, and the configurability of security parameters are all differentiating factors. Linux was designed from the ground up with security as a priority, erecting a strong wall of separation between the kernel and users. Each layer of Linux has limited access to the others, which reduces the risk of unauthorized access to your system and data.

A secure solution goes beyond just the operating system and includes other infrastructure components such as the directory server. Retailers are getting on the LDAP bandwagon and



centralizing store systems authentication information so it is more easily maintained and has the potential to support single sign-on. It is important to understand the cost of integrating the selected operating system with a directory server and how loosely or tightly coupled the solution will be.

Depending on the likelihood of the OS being attacked, other complimentary products are needed to secure the solution and will likely increase the total cost. Are there cost-effective measures for virus protection, software firewalls, intrusion detection, and desktop lockdown to protect your registers and servers? The trust established with customers and shareholders will be irreparably damaged at the first breach of security regardless of the actual damage done.

■ 6. EXPERTISE

The OS expertise acquired over the years can sometimes be leveraged for the stores' benefit. For example, if a retailer has used Unix for quite some time, adapting to Linux would be easier. Learning a new way to do things takes time, and therefore money, so it should be factored into the TCO. On the flip-side, it is quite unlikely that an IT department of any reasonable size uses just one OS. Most likely, several operating systems are in use and this diversity is expected to continue since it is often driven by the applications that ride on the OS. Visual Basic applications almost always run on Windows, and X-Window applications almost always run on Linux, for example.

LINUX IN THE STORE

To exercise this decision framework, let's see how Linux stacks up.

TCO is tough to quantify because it is not completely objective. That is why both the Linux and Windows camps claim their solutions have the lowest TCO. To make this judgment, it's important to

Proven in Retail:

*A Sample of Retailers
Using Linux*

- » Ahold
- » Bass Pro Shops
- » Batteries Plus
- » Boscov's
- » Burlington
Coat Factory
- » Circuit City
- » Hannaford
- » Lowe's
- » Papa John's
- » Pep Boys
- » Starbucks Coffee
- » Urban Outfitters

base the calculation on your specific environment, and not just accept the numbers used in someone else's formula. A simple search on the Web will yield many opinions with relevant facts from Aberdeen Group, IBM, IDC, META Group, and Microsoft. Unfortunately, most of that information is typically targeted toward enterprise servers, or desktop systems, not retail store systems specifically. But retailers are beginning to provide anecdotal evidence. For example, Harry Roberts, CIO for Boscov's Department Store LLC, stated that moving to Linux saved Boscov's \$1 million in the first two years, with ongoing annual savings expected to be about \$500,000. That figure could rise to \$1 million per year by 2007 as the retailer continues to port technologies to Linux.³

It is fairly clear that the upfront and recurring maintenance costs for Linux are lower than standard Windows pricing. The question then becomes, does your organization have the expertise to implement and support a Linux solution cost-effectively? The odds of being able to answer this question with an unqualified "yes" increase dramatically if you select a Linux distribution created specifically for retail, like Novell Linux Point of Service or IRES.



Supportability has been a key concern of Unix administrators since its inception back in 1969, and Linux has not forgotten those roots. Linux up-time without reboot is discussed in terms of months, not days, and patches are infrequent and easy to install.

In addition to supporting software from major vendors like IBM, Oracle, and SAP, there is a large amount of no- or low-expense open source software available on Linux. And since Linux has been adopted as the development platform of choice for open source projects, there continues to be a great deal of innovation for Linux.

Support from hardware vendors such as IBM, Ultimate Technology Corp, and Wincor Nixdorf have made Linux-based POS complete with peripheral drivers a reality.

In late 2004, *The Register*⁴ performed a study of 40 security patches for Red Hat Enterprise Linux AS (application server) and found that only 10% were classified as critical, which is very good relative to competing operating systems. The report goes on to explain why Linux is inherently more secure than its competition due to conceptual differences and lineage.

LINUX IN ACTION

In 2004, Pep Boys looked to IBM to supply its new platform, including the use of Novell SUSE LINUX. According to the press release from Pep Boys:

“The new technology system will take advantage of the open-source Linux operating system in the stores, and is designed to significantly strengthen the flexibility and reliability of Pep Boys’ store operations. The project will also enable Pep Boys to more easily deploy new applications to the store, which will allow quicker responses to today’s dynamic business needs, and position the Company for future growth.”⁵

As of this writing, the Pep Boys new POS platform running on Linux is fully rolled out and supporting stores.

After switching from an architecture that included Windows XPe on the register and Windows 2003 on the server, Circuit City said the following in their press release:

“By employing the IBM Retail Environment for SUSE LINUX at the point of sale, Circuit City will have the flexibility and reliability of open standards, enabling Circuit City to adapt quickly to changes in the retail marketplace and to cost-effectively institute future upgrades to the platform.”⁶

Retail IT organizations are embracing Linux because it is seen as both an enabler as well as cost-efficient. Linux is ready for retail.



NOVELL SOLUTION

Novell Linux Point of Service 9 is the only enterprise-class Linux operating system tailored specifically for the enterprise retail industry. It is customized for point-of-sale terminals, kiosks, self-service systems and reverse-vending systems and includes the following features and benefits.

FEATURES

Novell Linux Point of Service includes the following features.

(Features new to Linux Point of Service 9 are marked with an asterisk.)

- » New operating system base: SUSE LINUX Enterprise Server 9 SP1 and Novell Linux Desktop 9 SP1*
- » Five Linux images that have a small footprint and are tuned for running the point-of-service application
- » Centralized administration and deployment tools
- » Support for network boot and diskless operation
- » Combined branch server/point-of-service image for small stores*
- » Support for retail point-of-service hardware
- » Backward compatibility for operating system image deployment*
- » Easier image creation through an XML interface*
- » Improved installation for Novell Linux Point of Service servers*
- » Enhanced multimedia support for checkout-lane advertising*
- » Popular Firefox browser option for Web-based applications*
- » Multilanguage support

BENEFITS

WITH NOVELL LINUX POINT OF SERVICE 9, YOU CAN:

- » Improve profit margins through a low total cost of ownership
- » Utilize its strong security to prevent data loss on the system
- » Enjoy high reliability to keep the point-of-service systems up
- » Explore all vendor options; Novell Linux Point of Service is highly compatible, virtually eliminating vendor lock-in
- » Rely on Novell's extensive, global, 24/7 technical support to ensure your success

360COMMERCE SOLUTION

360Commerce has been developing store systems solutions since 1994. Their Java products have been developed or deployed on more database, application server, operating system, and hardware platforms than any other point-of-sale vendor in today's market. Their experience with large retailers using various environments has positioned them to be experts in integration and implementation of store systems.

360Commerce partners with Novell because the SUSE offering is designed to meet the needs of retailers. The combination of standards-based Java software and open source Linux provides retailers with a flexible solution that will serve their needs far into the future.



CONCLUSION

The operating system landscape for store systems has evolved over the years and as older operating systems are retired, there are two main choices for registers: Windows and Linux. Either option is viable so the decision always comes down to the specific retail environment. Selection of the register OS will often drive the decision for the store server as support is usually more effective in a homogeneous environment.

Novell Point of Service 9 allows retailers to choose the Linux footprint that fits their business, so hardware can be sized correctly. They provide a complete solution that takes the register, in-store server, and corporate configuration server into account, tying them together for easier maintenance. Registers can be thin, trim, or thick. Support for remote boot and image distribution are built-in.

Retailers looking to refresh their store systems should give Linux a close look.

360Commerce

360Commerce's proven and flexible store and workforce management optimization applications empower retailers to achieve profitable differentiation by enabling a superior shopping experience and providing a lower total cost of ownership and rapid time to ROI. 360Commerce's applications embody the best-practices functionality of customers such as Apple, Circuit City, The Home Depot, Gap Inc., KB Toys, FedEx Kinko's, and Rite Aid. Applications include Point-of-Sale, Back Office, Inventory Management, Central Office, Returns Management and Workforce Management.

Novell.

Novell, Inc. is a leading provider of infrastructure software and services to over 50,000 customers in 43 countries. Novell's Linux solutions for Retail help retailers take advantage of the TCO benefits of Linux, while improving the security and scalability of their retail infrastructure. Novell offers Novell Linux Point of Service – the only Linux OS optimized for retail – and SUSE LINUX Enterprise Server 9 for today's back office and head quarter servers. By providing enterprise-class software and support for commercial and open source software, Novell delivers retailers increased operating flexibility and choice at a lower total cost of ownership.

More information about Novell's retail solutions can be found at: <http://www.novell.com/retail>.

¹ <http://www.gnu.org>, GNU is a recursive acronym for "GNU's Not UNIX."

² Linux Inc., in *BusinessWeek* Online, January 31, 2005.

http://www.businessweek.com/magazine/content/05_05/b3918001_mz001.htm

³ Enterprises Tout Linux's Cost, Performance Benefits in *eWeek*, May 30, 2005.

<http://www.eweek.com/article2/0,1759,1821322,00.asp>

⁴ Security Report: Windows vs. Linux in *The Register*, October 22, 2004.

http://www.theregister.co.uk/security/security_report_windows_vs_linux/

⁵ http://www.pepboys.com/about/media/company_pr/pr_info_systems_pby.pdf

⁶ <http://investor.circuitcity.com/ReleaseDetail.cfm?ReleaseID=141393>

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