Jekyll & Hyde: Linux or Windows 2000?

Interview by
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The process of choosing a platform has become more interesting since the introduction of Linux. Windows 2000 now seems to have some serious competition—or does it? How are companies making the choice between Windows 2000 and Linux? Here, Kenneth "Kenbo" Brunsen (representing Linux) and Joe Linehan (representing Windows 2000) discuss the major differences and similarities between the two platforms, the way Domino works with both systems, and the Domino/Windows 2000 and Domino/Linux plans for Rnext, the code name for the next major release of Notes/Domino.

*And for the month of May, you can ask Kenneth and Joe questions in the **Developer Spotlight forum**.*

Can you tell us a little about Linux—its beginnings, who uses it, and why?
Kenneth Brunsen
The Linux operating system is composed of the Linux kernel and the GNU subsystems to go with it. So when you say Linux, it's actually more than just the Linux kernel. It's a huge group of programs. Linus Torvalds started the Linux kernel back in the late 80s I believe. He decided he wanted to have a UNIX kernel on the PC platforms. The GNU corporation wanted compilers and other utilities for these UNIX platforms. They wanted to have things that were out there on other commercial UNIX systems that they couldn't get, so they started making them. And they did this GNU "copyleft" so that nobody can own the code, which was also adopted in the Linux kernel source as well.

Linux is a free, UNIX-like operating system that was created to give us something we did not have to pay an arm and a leg for—because when UNIX first came out it was something that a normal person could not afford. A normal person was perhaps able to afford a PC but could not afford to put UNIX on it. People now use Linux as an alternative to Microsoft products. It gives them UNIX stability and security on a PC.
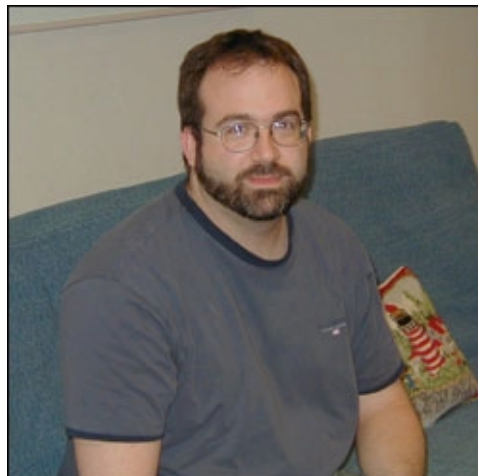
Kenneth Brunsen

What are some of the major differences between Linux and Windows

2000?
Kenneth Brunsen
Since Linux is a UNIX-based kernel, it has reliability and a security that comes with UNIX. I won't say Linux is better than Windows 2000 because there are some things that Windows 2000 does do better. There are some things that Linux does better. One huge advantage Linux has is that it is free. Windows 2000 has big licensing. When we did our presentation at Lotusphere, we put up the numbers for a 5,000 user Windows network, and it was something like millions of dollars for Windows 2000, as I recall.

Linux is getting to the point where it is getting close to compatibility with Windows platforms. It has large memory support now. It has a large file system support. It is starting to get all those features that are server class. And on top of that, it is also starting to get the client things that a lot of people like. The line is starting to get a little fuzzy. It's just that Linux is free and Windows is Microsoft.

Joe Linehan
Windows has been around for quite a while. So despite what you might hear, Windows has some mature aspects to it, where Linux is still getting up to speed. Linux, although it is based upon the 30-year-old basic operating principals of UNIX, has still only been around about 10 to 12 years as an operating system itself. Windows has been around a little bit longer than that.

With that in mind, there are a lot of ease-of-use features in Windows and administrative things in Windows that far outpace Linux today. Those things are coming up to speed in Linux, so this argument won't hold water for too long. But those more user-friendly aspects make Windows much more attractive for widespread deployment on desktops and servers. Also, you have to remember a lot of the administrators out there today are Windows oriented, so although there are a lot of differences between Windows 2000 and NT, it is a lot easier for those administrators to understand the concepts.

Joe Linehan

Are there many people out there who know Linux?
Kenneth Brunsen
There are more and more people doing Linux training so that is going to help. If I'm a person fresh out of college, then odds are I'm going to have a basic knowledge of both of them. I'm likely to have more knowledge of Linux than of Windows 2000 because of the cost. I may know Windows 98, but I am not going to know Windows 2000. If I'm coming out of college with a little bit of Linux and a little bit of Win 9x, then I already know Linux. A person going into a first computer class will have, I think, the same ramp up whether or not they choose Linux or Windows.

Can you give some examples of the types of industries or users who are taking on Linux systems?
Kenneth Brunsen
Actually, a better question is who isn't. If you look out there, everybody except for Microsoft is looking at Linux. And then you've got IBM doing a big push. Their new version of AIX is called AIX 50L because they are trying to do the Linux API so that you can take Linux binaries and run them on AIX. Sun has started doing all their Java stuff and their initial ports whenever they get a new job, to Linux. Hewlett Packard has started talking about Linux support as well. The only people who are not doing anything are Microsoft. They look at it as a threat to their customer base, because Linux runs on X86 machines and that's Microsoft's customer base. Now with NT and Windows 2000, they are trying to get the server market, and that's one area that Linux has the potential to control on X86.

Do you feel more and more customers will begin using Linux in the future? Why or why not?
Kenneth Brunsen
I think more and more people are going to start adopting Linux. Linux has started to get a lot more scalable and more feature-rich. I think that with the new Microsoft licensing coming out, people are looking for alternatives. People are always going to look at how they can lower their bottom line, and if Linux turns out to be a viable option at a huge price difference, they are going to go for it.

Joe Linehan
Nothing is free. Sure when you compare the number of dollars you pay for the OS itself, Linux is a hands down winner. However, that cost is not the total cost of adopting an operating system. Any organization currently NT-based and looking to move to Linux should not only factor in the licensing cost (or lack thereof) but also other costs, such as hiring new skilled employees or retraining existing administrative personnel. Also the company will need to re-engineer existing applications, perform infrastructure upgrades, and consider the availability of Linux-based drivers and vendor support for Linux. And that's just the server and infrastructure aspect. If an organization is going to change its user base over from Windows to Linux, there are other expensive factors to consider. For example, increased traffic to the help desk, resulting in increased staffing and the cost of retraining people. When those people are retrained, the organization will experience a loss of productivity during the training and until users get up to speed with Linux. So sometimes the cost may not be easy to quantify, but it will have an impact.

From the total cost perspective, an organization has to weigh whether it will be more cost-effective in the long run to upgrade from Windows 9x/NT to Windows 2000 or to migrate to Linux. An existing UNIX-based infrastructure will be much easier to migrate to Linux, but it will have its costs as well. Having said all that, we definitely have to acknowledge that Linux has come a tremendous way, just in the past couple of years. I am sure it won't be long before today's cost-prohibitive hurdles in moving to Linux become minor inconveniences.

Does Domino take advantage of any new features in Windows 2000?
Joe Linehan
One of the things we have to realize is that Domino R5 was released about a year before Windows 2000 became generally available on the market. So bearing that in mind, we don't have native integration. However we have lots of integration points with Windows NT 4.0 and those do continue to carry forward to Windows 2000. Those work fine where those features are applicable.

As far as our plans for Rnext, we are providing some hooks into the Windows 2000 operating system. For example, there's the Microsoft Management Console or MMC, which is a centralized Windows management console for

managing various applications on your server. We'll provide a little twistie for Domino administration and then some basic functionality within the MMC. One thing we have to make clear is that our Domino Administrator client is not going away. The MMC just has a small subset of features that you would find in the Administrator client. It also provides not only the ability to manage from within the MMC but also as you register users, for example, you have the ability to synchronize user registration between the Domino Directory and Windows 2000 Active Directory. And this is something new and specific to Windows 2000 that did not exist before.

We are also going to be doing more in terms of larger memory support. For example, by using what is known as the 3 gig switch, we will use more memory that Windows will assign to us by booting with the /3GB parameter as it is known in the NT world—this also applies to Windows 2000. And that allows for applications such as Domino to use more memory. Typically on a 4 gigabyte system, only 2 gig is allocated to the application and 2 gig is allocated to the operating system. Using this switch, 3 gig is assigned to the application, however the application has to be compiled to recognize that and that is an objective for Rnext.

When did you begin developing Domino for Linux? I hear there was initially a grassroots effort involved in getting support for this.
Kenneth Brunsen
Yeah, it was what we call a skunkworks project—a project that does not have approval really, but someone does it because they want to do it. What happened was, I had been working here for a while on the Domino product and I was wondering why we did not have Linux.

When I would talk to people they would say "Oh, Linux we are never going to do that" and I thought, "Well, I don't see why we can't." So in my spare time, I started porting the Domino code to Linux. At one point, I actually had the Domino server up and running in the 5.0 code stream. And about the time I had it running, someone said, "Oh, maybe we ought to look at Linux." And I said, "Oh, here it is." Then we had to do some fine-tuning and get some of the add-ins to work right and hash out all the bugs, but basically in my own spare time, on my own, I did the initial port. As we started getting more and more approval, we started getting more people like Hugo Curbelo and Steve Lyons to help with it. So when they finally said, "We want this," we had something ready.

When did the first Domino for Linux go to market? How have customers responded?
Kenneth Brunsen
The first official ship was in 5.0.2. A year before last at Lotusphere Berlin, we actually had a sneak preview based on the 5.0x code stream, but then 5.0.2 was the first official ship. Initially it was a "we-are-just-going-to-try-this-out," but because of the Linux momentum, more and more people have started doing it. We do have customers running Domino on Linux in production.

The response from customers has been good. Most people say "Cool, this is exciting." They find bugs for us; because of course the first port is going to have bugs. Everybody likes it. Nobody has complained. Actually, the complaint has been "Why isn't there a client on Linux?" And some people ask when the other Lotus products, such as Sametime and iNotes Web Access, will run on Linux.

When did the first Domino for Windows 2000 go to market? How have customers responded?
Joe Linehan
Domino for Windows 2000 was officially declared supported in Release 5.0.3, which was about a year ago November. We began supporting the Notes Client on Windows 2000 Professional and Domino server on the Windows 2000 server. Release 5.0.7, which we just put out the door a few weeks ago,

begins official support of Windows 2000 Advanced Server and Windows 2000 Data Center server flavors. So as of 5.0.7, all flavors of Windows 2000 are officially supported.

As far as the reception goes, we have customers who have deployed it and find that it isn't so bad. All their deployment issues tend to focus around deploying Windows 2000 itself. As far as Domino on Windows 2000, we have not really heard a lot in the way of hiccups or major issues. But one thing we have to remember is that 2001 is the year in terms of deployment of Windows 2000. In talking to a lot of customers and taking informal surveys, a lot of hands went up when I asked if there were organizations that were going to deploy Windows 2000 this year.

One comment from customers that comes to mind is that they find the Windows 2000 server far more stable than NT. In fact, I have to emphasize that. Because as much as people like to begrudge Microsoft and how long it took them to ship Windows 2000, they did a bang-up job in terms of delivering on their commitment to provide a much more stable server platform and client.

Can you discuss some of the major issues surrounding the cost of operating a Domino/Linux system?
Kenneth Brunsen
You could look back and you could say that when Linux first came out, it was a pain in the neck to set up and to administer because it was all from the command line. It was all individual packages. Since then, the vendors have worked really hard at making it so that setting up a system is easy. For example, there is this concept of a Linux kick-start server, wherein a user boots a new machine off a floppy that connects to this kick-start server and installs a "default" Linux system on the new machine. And because Linux has remote administration, our system admins can remotely administer those machines as well. Additionally, one of the things they have done is added these nice GUIs to do the administering. So it's come a huge way.

Now compared to Windows 2000, each platform has its own tools to do things and each one has remote administration. A new user who has never done administration is going to have about the same learning curve. However, if I'm a Windows administration person and I'm moving over to Linux, it's going to be a pain. But it's the same way going from Linux to Windows because everything is hidden and there's not one place to go for administration. There is the control panel, but then there's also system management, and so on. There's not one, single thing for administration. Linux has some of these same issues, so it's very similar. I actually see them as similar products in their administration nowadays.

Another issue of cost is support. One advantage that Linux has over other operating systems is the vast pool of knowledge on the Internet. Be it through newsgroups, forums, or company sites, there are literally thousands of people out there working on GNU/Linux development of one type or another. So, instead of having to go to one company for help, and then relying on their release schedule for fixes, you have the ability to actually go to a multitude of people for help. Sometimes you can even go to the author of the program/software you are having an issue with; once the issue is resolved, you have the ability with Linux to immediately implement the fix if you want. After all, you have the source code for everything. I know that this concept of support may worry some people, and I believe that is part of why some of the big vendors, such as IBM, are getting involved and offering support for Linux through retail levels. So, if it makes you uncomfortable to be working in the trenches, you can now get a support contract, have someone else work it for you, and be assured that the fix they come up with, if a good fix, will also make it into the mainstream codebase.

How does that cost compare with the cost of operating

Domino/Windows 2000?
Joe Linehan
I think you have to look at the organization before responding to that. For smaller organizations that are more reactive and nimble and can quickly acquire other resources (for example, contractors), the cost of administering a Linux server as opposed to a Windows server is not going to be a big deal. When you get into the larger ones, where you have much bigger enterprise systems with architected environments, the cost of administration is a very real consideration. It involves not only getting the personnel and having the cost of people but also all the support systems that are in your environment. For example, if you go over to Linux and you are using a particular set of hardware, you have to consider whether those drivers are available on Linux and if not, what kind of headaches you're going to have to go through to get them. When you have issues, whom do you turn to for support on those types of things? Enhancing the operating system is another interesting paradigm that the world is still grappling with in Linux.

Right now Linux is still in the honeymoon phase where people think it's cool—they can toy around with it, and it's open source so they can fix it themselves. Well the reality is, companies are not interested in fixing it themselves. They want to take it to another company and say, "Here, you fix it." So with Linux you do not have one company that can put the fix into the operating system and make sure it's available in all subsequent releases and distributions. Good or bad, even IBM can't guarantee that.

Overall, can you sum up some of the issues involved in migrating from Domino/NT to Domino/Linux?
Kenneth Brunsen
If you are just taking a server and you are going to put it on a Linux box—if you are going to name the Linux box the same as the Windows box, and you've got LotusScript in the databases and you've got Java servlets, there is no problem there. However, if you've got add-in programs that you're using or if you've got back-end libraries, such as an LSX library, you are going to have to port those to UNIX—just like you would to Solaris or AIX. And although they've made a lot of improvements in making it easier to develop on Linux, it's still not as GUI-oriented as Windows. The tools are still not as GUI-based on Linux as Windows, so it is going to be tougher. There's a learning curve because there are a lot of things you are going to do from the command line. You're not going to be pointing and clicking to do your stuff. However, this is a known issue and many teams in GNU/Linux-land are already working on it with such tools as **KDE Kdevelop**, **IBM VisualAge for Java**, and **ActiveState Komodo**, for example.

How much work is entailed in a Domino/NT to Windows 2000 upgrade?
Joe Linehan
Virtually none. It's nothing more than a typical upgrade of your operating system. There really isn't anything you have to do, from the beginning anyway, to prepare your applications or your servers. As far as Domino is concerned, it is just another flavor of Windows and continues to operate accordingly. Upgrading Windows itself from NT to 2000, on the other hand, is a whole other ball of wax.

Does moving to either of these platforms require you to do anything to your existing Notes applications?
Kenneth Brunsen
As I was saying, it just depends on what you have. If you have a Java class object, Java runs anywhere. If you have C code or C++ code that you build into a library or standalone, you are going to have to port that to UNIX. If you have already ported to AIX or Solaris, it's not going to be that tough to do it to Linux because Linux is very UNIX. You will have to change the compilers and some of the options to certain things, but it's not going to be a huge effort.

Joe Linehan
In the beginning the applications will work fine. I don't want to say
categorically that everything is going to work absolutely smoothly. It depends
on your application. To use an example, anything done in the Domino space
using @formulas and commands is going to work fine. If you have created an
application that uses programmatic interfaces—for example, using the C++
toolkit or using IOP—you might want to do a review of your programs. In
theory, they should work fine going from NT to 2000 as part of the operating
system's backward compatibility. But when you get into the programmatic
realm like that, it doesn't hurt to take a quick look at what is running and if
there are any operating system considerations. But as far as the core
infrastructure of Domino, you don't have any worries there.

**What hardware would you recommend for a Domino on Linux
installation? For a Windows 2000 installation?**
Kenneth Brunsen
For Linux and Windows 2000, we have this in the **Release Notes** for 5.0.7 [
*Here are direct links to the system requirements for **Linux** and **Windows
2000**.*] It all depends on what you are going to do with your Domino server. If
you're only going to do 10 or 20 users, you do not need a huge, beefy
machine, but if you want a few hundred users you need a big machine.

Joe Linehan
Also, when you are talking about the Notes client environment, you could look
at the minimum systems requirements. But when you are considering a
server, you typically would not run with the base minimum
requirements—unless you are talking about a small workgroup of about five
people. If you want to exercise the Domino server in any way, you should be
going above the minimum requirements. And that would be true of all
platforms.

**How does Domino best leverage a Linux system. In other words, what
are the main benefits of using Linux with Domino? What about the
drawbacks?**
Kenneth Brunsen
You get a Domino server on Linux. That's the main benefit. If you are saying
versus another platform, say AIX or Solaris, you don't have the cost of the
hardware or the operating system. The biggest benefit, if you compare
Domino/Linux, is the cost.

As far as drawbacks, if you are comparing performance then Linux (with the
2.2.x kernel) does not compare well with the other UNIX systems. It also does
not compare very well with Windows 2000 right now because Linux is still
maturing as an enterprise-class operating system. The reality is that Linux as
an enterprise-class server is only now starting to come into its own. We are
still in testing with the Linux 2.4.x kernel distributions, so I can't tell you how
much better the performance is or how well it will compare to Windows 2000.

**And what about Windows 2000? Highlight some of the benefits and
drawbacks of using it with Domino.**
Joe Linehan
Obviously, the immediate benefit we gain from Windows 2000 environment is
much better stability than Windows NT. We also have the benefit of
increased processor capabilities. You can get up to eight processors with the
Advanced Server flavor of Windows 2000 and the Data Center version goes
up to 32 processors. We don't have any empirical data in terms of our
processor utilization on a Data Center environment, but we have customers
who are going to be deploying, so we are keeping an eye out.

Another benefit of the Windows environment is that much of our Windows
integration in both the Notes client and the Domino server still exists and
continues to work fine in Windows 2000. So there is the seamlessness

aspect of it, combined with the benefit of integration points such as single point of registration. You register once in Domino, and it automatically registers to Windows. We are doing more work with that in Rnext, to work with Active Directory; but if you continue to use an NT Domain type infrastructure, then our current mode of integration works fine. Things like the integrated Internet Explorer within the Notes client continue to work fine. Single sign-on in the client also works fine.

Another thing on the Domino side is for scalability. We have this technology within Domino called threadpools, which is supported by the operating system with I/O Completion Ports. We designed that for NT, and it's great because it boosts Domino's scalability and a little bit on the performance side as well. And that continues to work fine in the Windows 2000 environment.

For drawbacks, we don't have native integration with Active Directory—if you want to call that a drawback. But also, one more thing on the plus side, is that Domino does not rely on Active Directory. If you wanted to upgrade your Domino server's operating system from NT to Windows 2000, but you don't want to swallow the Active Directory pill, which is a big one, that's fine as far as Domino is concerned. We are finding that a lot of customers are doing just that, because there is a lot to implementing Active Directory correctly.

Would customers ever consider running Domino on *both* Windows 2000 and Linux?
Kenneth Brunsen
Yes, because they will have some administrators who are better with Windows and some who are better with Linux. The other thing is, say I have a smaller company. Well, I'm going to run Linux, because it has the lowest price. If I grow and find that I can afford more, but Linux still is not scaling to that extent yet—say I have 2,000 users—I may have to go to Windows for that.

I think some of what people choose to use depends on personality. We run all flavors here.

Joe Linehan
Absolutely. Again, it depends on the size of the company and the expertise they have in-house before they make that decision. There are certainly benefits to both platforms that justify having them both exist in the same organization. For example, Linux has the association of being a great workgroup server. So for that satellite office where you don't have administrative personnel on site and you want to put up a quick server, you can set up a Linux machine out there. It will do a good job of taking care of itself and servicing a small workgroup. You would not do that if you wanted to support a few hundred users at a remote location. To paint a picture of both Windows 2000 and Linux coexisting: In the corporate headquarters you may have Windows 2000 servers; in the remote branches, you may have Linux machines.

With the release of the 2.4 kernel, once it starts proving itself, I think we are going to see the Linux servers making their way into enterprise organization's data centers.

What's in store for future Windows 2000 and Linux Domino releases?
Kenneth Brunsen
Linux is a primary platform. Every Domino release will be on Linux, Windows, Solaris, and AIX at the same time. For Linux, the extension products may not happen with every release, but the Domino server will always be supported on those platforms I mentioned. One thing that would help speed up that process is if people said they wanted these extension products for Linux and told their customer reps.

Joe Linehan

I mentioned the MMC integration at the beginning of the interview. One other area we are trying to get into is the use of the Windows installer, which has a lot of benefits to both the Notes client and the Domino server. It has not only ease of installation and clean removal of any program, but it also offers the repairability option. So if you suspect you have a corrupt installation, you could run the repair option of this new Windows installer. It will only install the files it considers corrupt or missing, which can be a big consideration in a low bandwidth environment.

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About Kenneth Brunsen
Kenneth is a principal software engineer at Iris Associates. He has been working on the Domino product since the beginnings of the R4 client/server, and his major responsibilities concern Domino server platforms and Domino core services. In his spare time, he does such things as porting the Domino server to Linux and creating and maintaining his own LAN at home. When he is not working on these things, he can either be found with his wife Susan doing various leisure- or home-oriented stuff or playing Everquest.

About Joe Linehan
Joe is a Domino product manager at Lotus. He came to Lotus seven years ago in the Support organization and joined Product Management three years ago where he was responsible for Release Management, primarily on the Notes and Domino Quarterly Maintenance Releases (QMRs). About a year ago, he transitioned to the Domino Platforms team within Product Management where he focuses on Lotus Domino for the Windows 2000 platform as well as the Linux platform.

About Laura Rutherford
Laura worked as a user assistance writer for Lotus until she had her daughter, Kate, in January, 1999. Since then, she had another daughter (!) Maggie, born in September, 2000. Now Laura spends most of her time taking care of her two daughters, two dogs, and one husband (basically in that order). In her free time, she loves to read, run, and, believe it or not, write articles for *Iris Today*.