An Introduction to Linux and Open Source

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9200 – An Introduction to Linux and Open Source

- **Linux and Open Source continue to see substantial growth around the world**
- **This session will provide an overview of Open Source and an introduction to Linux (including concepts and terminology)**
- **Jim will also provide an overview of Novell's SUSE Linux Enterprise (SLE) 10 and Red Hat Enterprise Linux (RHEL) 5**

Topics

- Introduction to Open Source
- Introduction to Linux
- Novell SUSE Linux Enterprise 10
- Red Hat Enterprise Linux 5
- Linux and Open Source on the Web at IBM

Introduction to Open Source

http://ibm.com/developerworks/opensource

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What is Open Source technology?

http://www.opensource.org

- **In a word, Open Source is collaboration – more specifically, it's public collaboration on a software project**
- **According to the Open Source Initiative (OSI), it can be defined this way:**
  - *"Open source promotes software reliability and quality by supporting independent peer review and rapid evolution of source code. To be OSI certified, the software must be distributed under a license that guarantees the right to read, redistribute, modify, and use the software freely."*
- **Open source can also apply to the popular movement of individuals, organizations, and companies that seek to put such software into mainstream usage**

What guides Open Source licensing?

http://opensource.org/licenses

- **According to the Open Source Initiative, Open Source consists of 10 points, which are reproduced below**

1. Free redistribution
2. Source code
3. Derived works
4. Integrity of the author's source code
5. No discrimination against persons or groups
6. No discrimination against fields of endeavor
7. Distribution of license
8. License must not be specific to a product
9. License must not restrict other software
10. License must be technology-neutral

Why is Open Source technology important?

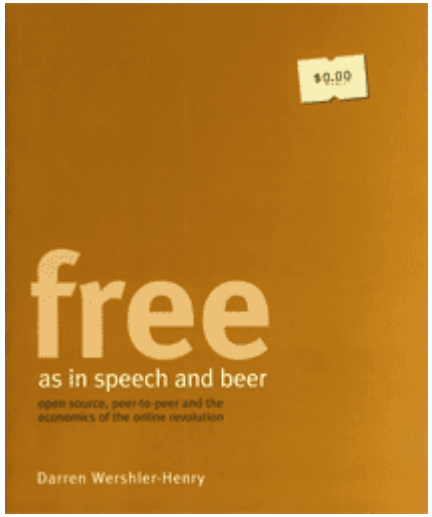
- **Can be a major source of innovation**
  - Innovation can happen anywhere – any time
  - Development through “open communities” leads to potentially broad ideas and creativity
- **Community Approach**
  - The Internet has changed how we address technical innovation
  - Shapes technical leaders thinking and approach to broad collaboration
- **Good approach to developing emerging standards**
  - Popular Open Source projects can become de facto / open standards
  - Wide distribution/deployment
- **Enterprise customers are asking for it**
  - Increase choice and flexibility – adoption/use of Open Source can reduce time to market

What is FOSS?

- **FOSS stands for Free and Open Source Software**
  - Sometimes referred to as FLOSS (Free/Libre and Open Source Software)
- **This term is used for software that satisfies either the definition in free or the definition in Open Source, when there is no need to make a distinction**
- **For an excellent study of Open Source Software and Free Software see David Wheeler's paper**
  - *http://www.dwheeler.com/oss_fs_why.html*

What does Open Source have to do with “free beer” and “free speech”?

- The English word “free” is tricky in that it can mean either freedom or gratis, as in no-cost to the taker
- When Open Source proponents speak, they often have to preface their remarks so the listener knows if the speaker is referring to “free” as in “free speech,” which is a matter of policy, or “free” as in “free beer”
- As any college student can report, someone needs to bear the cost of creating the beer (or software) while others consume the beer (or software) and enjoy it with no out-of-pocket costs



http://freeasinspeechandbeer.com

How may I get started with Open Source?

- **The decision to start developing Open Source software is a political and licensing decision and less so one of technology**
- **See the OSI list of approved Open Source licenses and make your selection according to your needs and plans for your project**
- ***"Open source licensing, Part 1: The intent"***
  - *http://ibm.com/developerworks/opensource/library/os-license/*
- ***"Open source licensing, Part 2: Academic v. reciprocal"***
  - *http://ibm.com/developerworks/opensource/library/os-license2/*
- **You may want to consult with an attorney specializing in intellectual property if you find the terms of the existing licenses confusing or if you have questions**

What is LAMP?

http://ibm.com/developerworks/edu/wa-dw-wa-lamp-i.html

- **LAMP stands for Linux, Apache, MySQL, and PHP**
  - However, depending on who you talk to, the P can stand for Perl or Python, but in general, P is assumed to be PHP
- **LAMP has a bigger meaning, too**
  - LAMP represents a nonproprietary, flexible way to create a server-based application
  - Each of the programs comprising the term can be replaced with an alternative that best suits the needs of the application
  - Each component can be upgraded independently, although this is usually done with care and planning
  - Best of all, each program in LAMP is free, or almost free in both meanings of the word

What language is Open Source written in?

http://gcc.gnu.org/

- **All of them**
- **The technology behind Open Source is not the most important element of Open Source**
- **The important element is the decision of the author or authors to release the software as Open Source and use one of the many Open Source licenses**
- **Also, there are a great many Open Source compilers or languages**
  - The GNU Compiler Collection includes front ends for C, C++, Objective-C, Fortran, Java, and Ada
  - PHP, Perl, Python
  - Many, many more (just Google this subject!)

Is Open Source software legal?

http://www.llrx.com/features/opensource.htm

- **Yes, and almost everyone who uses e-mail or surfs the Web is an Open Source software user**
  - Most e-mail passes through an Open Source server during its travels across the Internet
  - Most Web servers rely on Open Source software
  - Google is based on Open Source
  - As OSI points out, the running gears of the Internet, including the mail transports, Web and FTP servers, are virtually all Open Source-based
- **Open source software is not warez, which is software distributed without permission of the copyright holders or a proper license**
- **There have been many discussions about Open Source violating patents or copyrights, but this is almost certainly true (if unintentionally so) of most "private source" software**
  - Talk to an Intellectual Property Lawyer if you have concerns

What are IBM's Open Source efforts?

http://ibm.com/developerworks/views/opensource/projects.jsp

- **In a nutshell, IBM is a significant force supporting Open Source innovation and collaboration**
  - The company participates in more than 175 collaborative projects contributed to the Open Source community, including Eclipse, Derby, Geronimo, and Globus
  - IBM contributed 500 patents into a “patent commons” for development and innovation
  - IBM has invested more than $1 billion in Linux development
  - IBM has Open Source licenses – the Common Public License and the IBM Public License
    - IBM also releases under many other licenses, including GPL

9+ years of community innovation with IBM

1999 – 2001	2002 – 2003	2004 – 2005	2006 – 2008
▪ IBM forms Linux Technology Center ▪ Leads Apache projects Xerces (XML4J), Xalan, SOAP ▪ Creates OSI-approved IBM Public License ▪ Strategic participation in Mozilla ▪ IBM becomes founding member of OSDL ▪ Founder of Eclipse.org and Eclipse Consortium ▪ Creates internal bazaar using OSS methodology	▪ Linux contributions to scalability (8-way+), reliability (stress testing, defect mgmt, doc) ▪ Leads Apache projects: Web Services (WSIF and WSIL), Pluto (Portlet API) and WSRP4J (Remote Portal) ▪ Leads Eclipse projects GEF (editing), EMF (modeling), XSD (XML Schema), Hyades (testing), Visual Editor, AspectJ, Equinox rich client ▪ Globus Toolkit contributions for OGSA, OGSI	▪ IBM and Novell/SUSE achieve security milestone (EAL4+ and COE compliance) ▪ Eclipse becomes independent as Eclipse Foundation, Inc. – IBM contributes UML2, Voice Tools, Aperi, COSMOS, Ajax Tools Platform ▪ Globus Toolkit 4 is WS-I compliant ▪ Pledged 500 patents to open source ▪ Partner with Zend PHP ▪ IBM enhances Apache partnership	▪ IBM contributes accessibility code to Firefox ▪ IBM becomes founding member of Eclipse Aperi project ▪ Leads Open AJAX initiative ▪ Leads Apache Tuscany project and Perl PHP SOA ▪ IBM donates code for user-centric security management to Eclipse Higgins ▪ IBM donates code for medical record management to Eclipse Open Healthcare Framework (OHF) ▪ IBM announces support for Eclipse.org version of Eclipse ▪ IBM contributes to Apache Lucene project and announces OmniFind Yahoo! Edition
More than 1000 IBM developers involved in OSS projects	**IBM leads 80+ OSS projects**		**IBM contributes to 175+ OSS projects**

Introduction to Linux

http://ibm.com/developerworks/linux

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So, what is Linux, anyway?

- In the simplest terms, Linux is an operating system
- It was created in October 1991 by a University of Helsinki student named Linus Torvalds (Linux stands for Linus's UNIX)
- Linux itself is actually just the kernel; it implements multitasking and multiuser functionality, manages hardware, allocates memory, and enables applications to run

Do I care about the Linux kernel?

http://ibm.com/developerworks/linux/library/l-linux-kernel/

- **The average user will never be interested enough in any operating system to want to know about things like kernel internals**
- **Only the truly dedicated – those who have no personal lives, or those who are being paid to do this kind of work – are going to want to explore these intricacies**
- **But even if you never descend to the giddy depths of kernel hacking yourself, it is reassuring to know that you can easily hire a contractor or firm to do this work for you; to commission such modifications for a proprietary system is very often a more difficult and more costly undertaking**

Linux distributions and GNU

- **A typical Linux distribution includes the Linux kernel, but it also contains many application programs and tools**
- **Many system- and user-level tools found in a Linux distribution come from the Free Software Foundation's GNU project (GNU standing for "GNU's Not UNIX")**
  - *http://www.gnu.org/*
- **Both the Linux kernel and the GNU tools suite are released under the GNU General Public License, or GNU GPL**
  - The GNU GPL is a way of setting computer code free so that the people who use that code may meddle and experiment with it to their hearts' content

What is in a Linux distribution?

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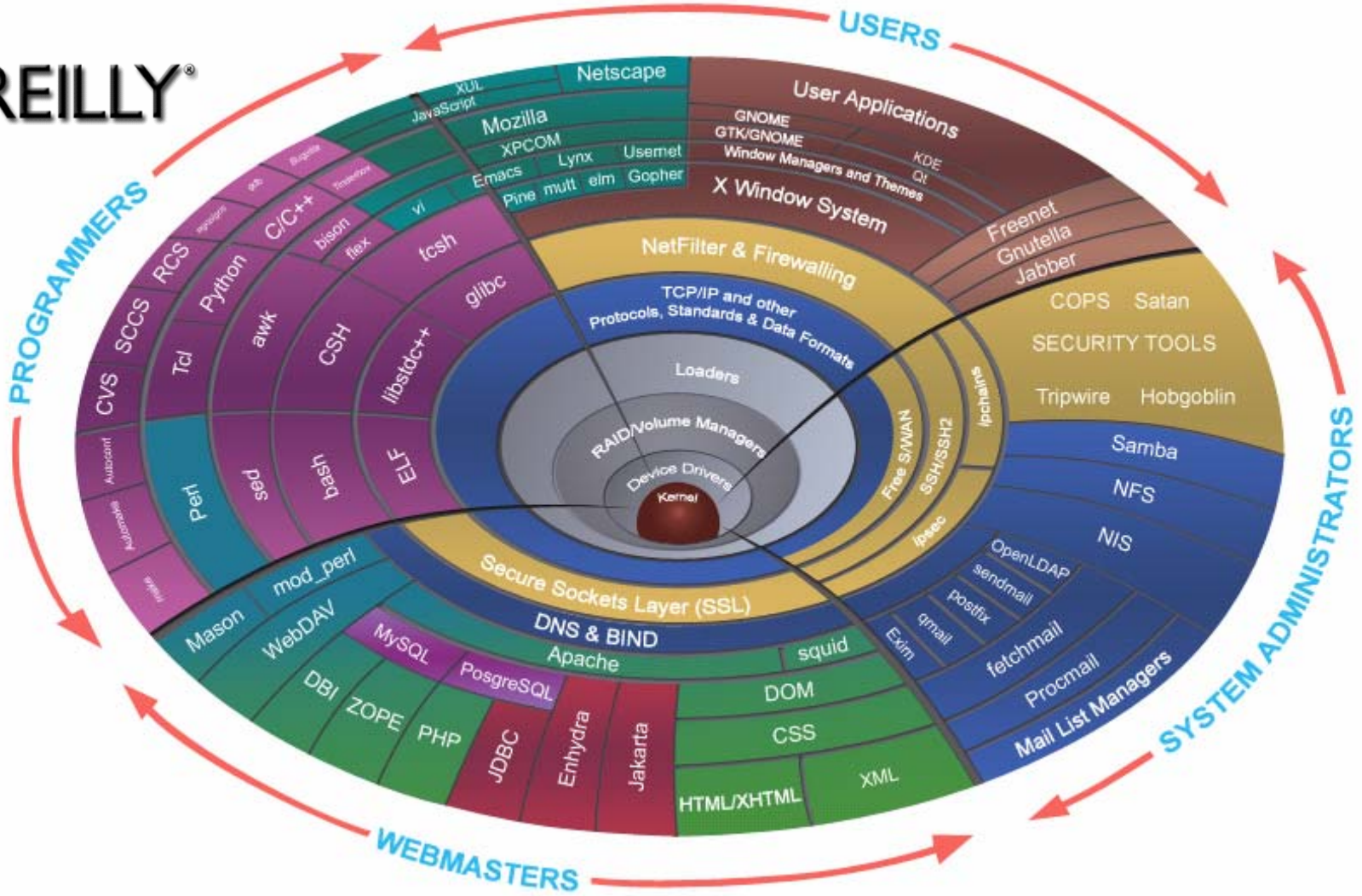
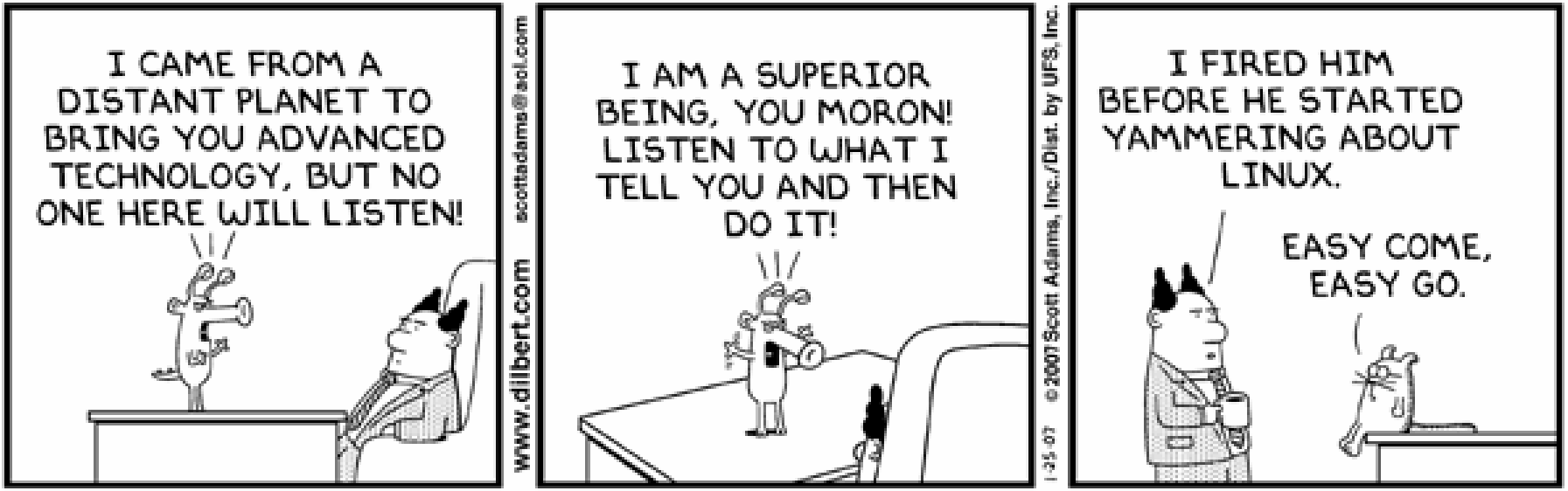


What is the difference between UNIX and Linux?

- **Invented at AT&T Bell Labs in 1969, UNIX (the name is a play on the earlier "Multics" operating system) is a robust, flexible, and developer-friendly computing environment**
- **Written originally for the Digital Equipment Corporation (DEC) family of PDP microcomputers, UNIX has taken over roles in all areas of computing**
- **Some twenty-odd years into its history, UNIX began to be eclipsed – in some of its roles, anyway – by Linux**
  - Linux is not UNIX; it is merely very UNIX-like
  - For some jobs, you want Linux – for others, you still want UNIX
- **UNIX and Linux play very well together, and well-written programs are extremely easy to port between the two systems**

Why is Linux important?

- Because it is free software, licensed under the GNU General Public License, Linux obviates the need for programmers to keep reinventing the operations layer with each new project
- The GNU family of tools provide royalty-free bricks and mortar with which to begin building independent projects
- Critics of free software often voice fears that the freedoms and low cost of free software will lead to economic disaster for the computing sector
- However, it is just as likely – if not more likely – that free software will do for the world of computing what Gutenberg's printing press did for the world of Letters



What can I do with Linux?

- What you want out of your Linux system will determine which Linux system you want and how many layers of complexity you need to understand before you begin to work with it
- Linux is an excellent learning platform to do kernel hacking, to learn UNIX, or to learn programming; many tools and applications are available to play games, to do desktop publishing, or just to hang out doing e-mail and Web browsing
- Linux is a popular platform for everything from middleware to embedded computing and clusters, to mainframes, supercomputers and gadgets

How do I get started with Linux? …

http://ibm.com/developerworks/linux/newto/

- **If you are completely new to Linux, or if you are using Linux as a desktop operating system, you need to learn at least some basics about system administration and security**
- **Linux does not promise to hold your hand or to clean up after you: you have to take care of the system yourself**
  - Luckily, basic maintenance and basic security are pretty easy
- **In many ways, Linux and UNIX administration is today much easier than administration for popular commercial personal operating systems because it is much more transparent**

… How do I get started with Linux?

http://ibm.com/developerworks/linux/newto/

- **While Linux does have several windowing environments that allow you to perform administration, the most straightforward way to control the system is at the command line**
  - Built in to the structure of the command-line environment are dozens of commands and several text-based help systems.
- **There are a great many resources on the Web and in the real world to help you get started with Linux**
  - There are Web sites, articles, and books devoted to the subject, and Linux User Groups (also known as LUGs) meet in cities and countries around the world – and are well-known for being very friendly even to very new users

How can I use Linux in application development?

- **Linux includes the GNU Project's suite of programming and debugging tools – absolutely free**
- **The Eclipse foundation's very large set of development tools are available for Linux**
  - *http://www.eclipse.org/*
- **Many commercial programming packages are also available**
- **If you are using Linux as a development platform, do not skip first learning administration and security**
- **Linux is by nature standards compliant**
  - Linux developers as a rule place very high importance on keeping the operations layer, as well as those built atop it, open, interoperable, and standards friendly

What programming languages can I use on Linux?

- **In addition to steadfast stalwarts like Fortran and C/C++, many scripting and other computer languages are at home on (or were even designed to work best with) Linux**
  - The most popular include Perl, Python, and PHP
- **Technologies such as Java and XML run great on Linux, as do any number of more esoteric programming languages, from Logo and Rebol to Smalltalk and many more**

How can I continue to improve my Linux skills?

http://ibm.com/developerworks/linux/ then click on Training

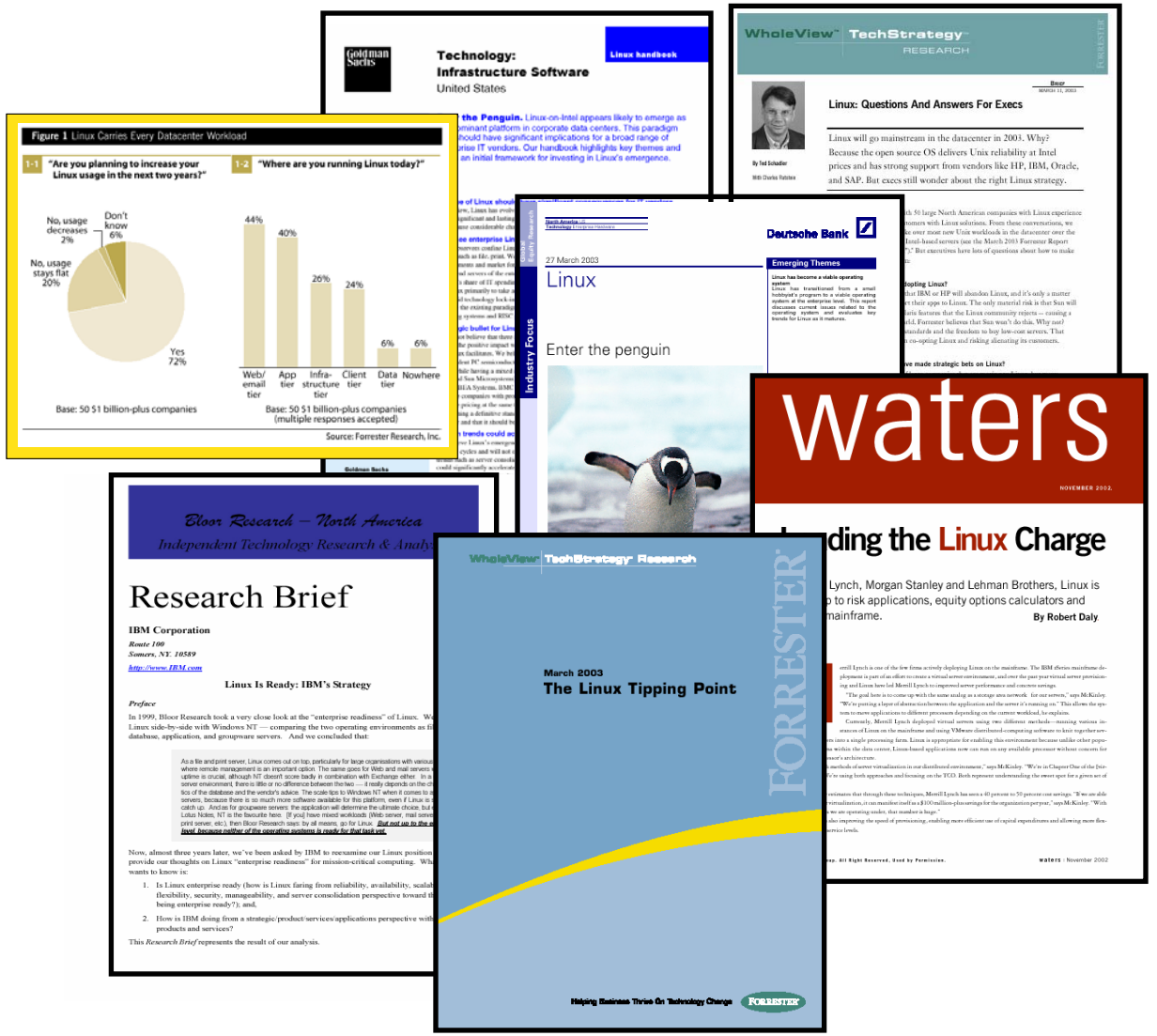
- **If you want to use Linux as a platform for a very advanced application or application set, you will be interested in aspects of the system such as kernel hacking, the differences between various filesystems, and other nitty-gritty details**
- **Another skill set that is often needed for high-end applications (or games) is fine-tuning a Linux machine, cluster, or network for optimum performance – this includes expertise in things such as multiprocessing, threading, clusters, and other arcane but sophisticated points of system administration**
- **Understanding these aspects of Linux aren't quite as gritty as actual kernel hacking, but can nonetheless get pretty hairy**

What IBM tools are available for Linux?

- **Linux is a superior operating system on which to run standard applications – from office applications such as word processors and spreadsheets; to database systems; to Web publishing and serving environments**
- **IBM software products such as DB2, Lotus, Tivoli, Rational and WebSphere all run on Linux, and IBM is not the only industry leader to recognize that Linux is an excellent platform for middleware**
- **Though misunderstood and very often maligned – at least, among the self-proclaimed digerati – middleware is an essential (and for many computer users, the essential) reason for having computers around in the first place**
- **The open nature of Linux allows middleware vendors to fine-tune solutions to meet users' needs in ways that no closed system allows**

What do the analysts say about Linux?

- **Reports from :**
  - Gartner
  - Deutsche Bank
  - Forrester
  - IDC
  - DH Brown
  - Goldman Sachs
  - Bloor Research
  - Wall Street
  - IBM
- **Articles in :**
  - Business Week
  - Financial Times



Analyst reports abound – pick wisely!

What lies ahead for Linux?

http://apcmag.com/7012/linus_torvalds_talks_about

- **Linux's openness and flexibility lend its use to work in laboratories and other research facilities on the bleeding edge of revolutionary technological change**
- **Linux can easily be clustered or customized for highly original experiments or prototypes, simulations, or tests; and the vast array of free software tools that Linux was created to work with can be used in the same creative way**
- **Even with all of the exciting new technologies that are being developed today – from Grid computing and wireless voice applications to artificial intelligence and Quantum computing – the potential and promise of the computing age in which we live is still largely untapped**
- **Linux's robust and open flexibility means that it will remain at the forefront of the development frontier for years to come**

Novell SUSE Linux Enterprise 10

http://www.novell.com/products/server/

http://www.novell.com/partners/ibm/mainframe/

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Major package versions

- **Kernel 2.6.16 + IBM updates**
- **s390-tools 1.5.3**
- **gcc 4.1.0**
- **binutils 2.6.91.0.5**
- **glibc 2.4**
- **Apache 2.2.3**
- **Samba 3.0.22**
- **IBM Java 1.4.2**
- **Check IBM developerWorks for info on restrictions**
  - http://ibm.com/developerworks/linux/linux390

New features

- **Accurate CPU time accounting**
- **Support for OSA-Express 2 OSN – Open Systems Adapter for NCP**
- **3590 tape device driver now Open Source**
  - No remaining OCO modules!
- **SCSI over FCP n-port ID virtualization (NPIV)**
- **zcrypt replaces z90crypt**
  - Support of PCICC, PCICA, PCIXCC, CEX2C, CEX2A
  - Support for clear key and secure key functions

New features

- **Collaborative Memory Management Stage II**
  - z/VM 5.3 function enabled in Linux with cmma=on option
- **Support for Parallel Access Volumes (PAV)**
  - New for Linux in an LPAR (z/VM already provided this)
- **Support for z9 CPACF Pseudo Random Number Generator**

What's not in SLE 10

- **JBoss – The JBoss code is not included in SUSE Linux Enterprise, but can be downloaded and is still supported through additional subscription from Novell or JBoss**
- **GFS – Storage stack from Red Hat**
  - The High-availability Storage Foundation ships with SUSE Linux Enterprise
- **Reiser4, Samba v4 – Not enterprise ready for this release**
- **SELinux – Novell provides AppArmor which is easier to configure and deploy than SELinux and provide the same level of security**

Deprecated features

- **31-bit operating system**
  - 31-bit applications are supported via the 31-bit emulation layer
- **CLAW**
- **CTC (virtual and real)**
- **IUCV network device**
- **Native FBA DASD devices**
  - Virtual FBA and FBA emulated on SCSI devices supported

Red Hat RHEL 5 Overview

http://www.redhat.com/rhel/server/

http://www.redhat.com/rhel/server/mainframe/

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9293 What's New in Red Hat Enterprise Linux 5

- **Speaker: Brad Hinson (Red Hat)**
- **Times: Tue, 8:00am, Disney's Coronado Springs Resort, 1st Floor, Coronado N**
- **This presentation highlights the new System z specific features in the newest version of Red Hat Enterprise Linux (RHEL). RHEL 5 has been generally available since April, 2007. We highlight the significant changes from RHEL 4, as well as what's coming in the first update and beyond.**

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http://ibm.com/linux

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Unleash the power and flexibility of community innovation in your business

Why IBM

IBM is one of the top commercial contributors to Linux, bringing over 15,000 Linux customer engagements and over 3,000 Sun Solaris migrations to Linux an unparalleled wealth of technical expertise, flexibility, and business performance.

Why Linux?	Why IBM:
Flexibility, choice, and TCO with a world class enterprise operating system.	IBM supports Linux on all IBM servers, storage and middleware, offering the broadest flexibility to match your business needs.
Community innovation integrates leading edge technologies and best practices into Linux.	IBM is a leader in the Linux community with over 600 developers in the IBM Linux Technology Center working on over 100 open source projects in the community.
Linux offers a future-proof, long-term strategic platform. All major server and middleware vendors support the Linux platform.	IBM offers the broadest range of server and middleware products for Linux in the industry.

We're here to help

Ask the experts

Get answers to your questions and expert advice about Linux solutions from IBM.

Linux device drivers

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http://ibm.com/software/linux

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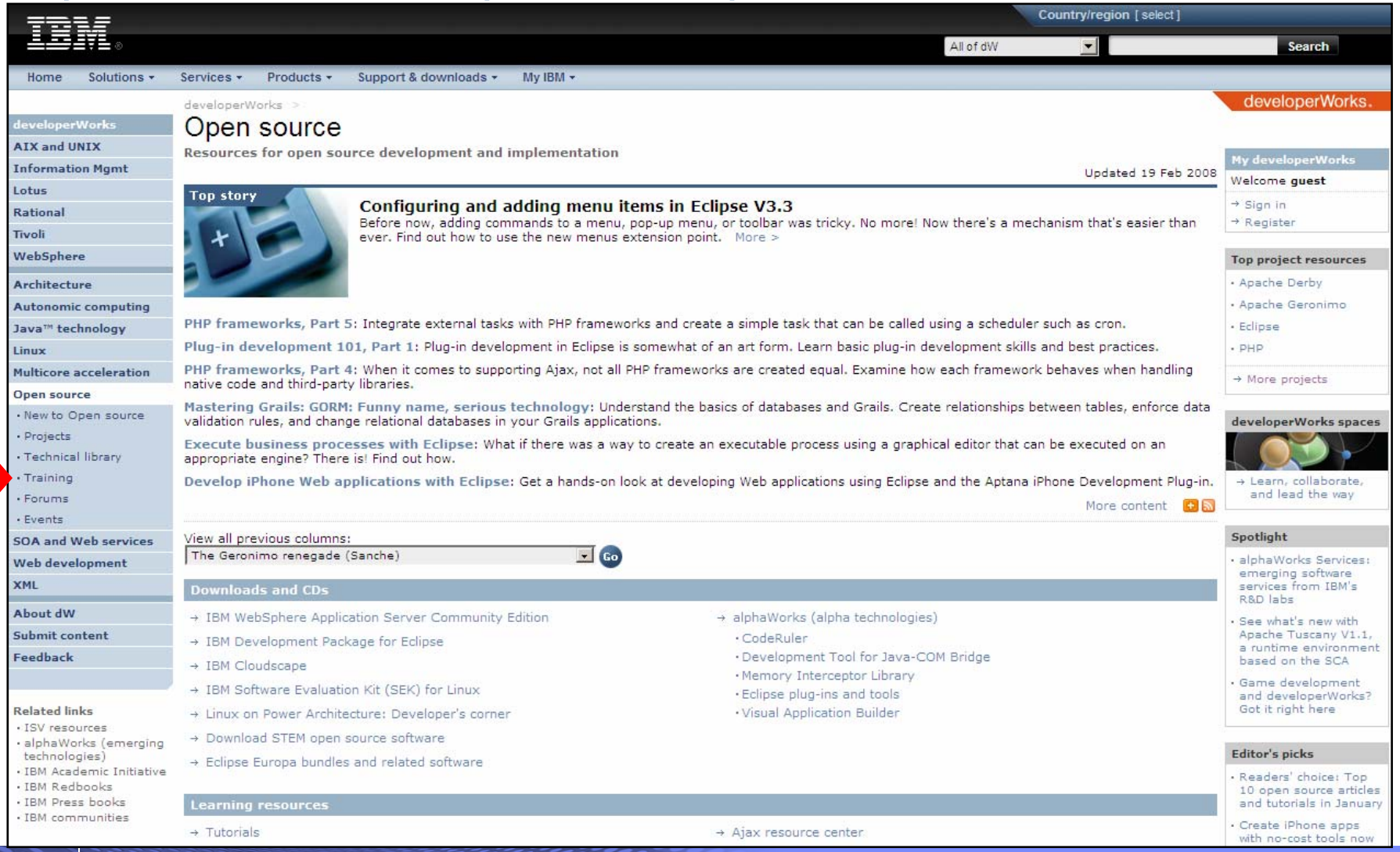

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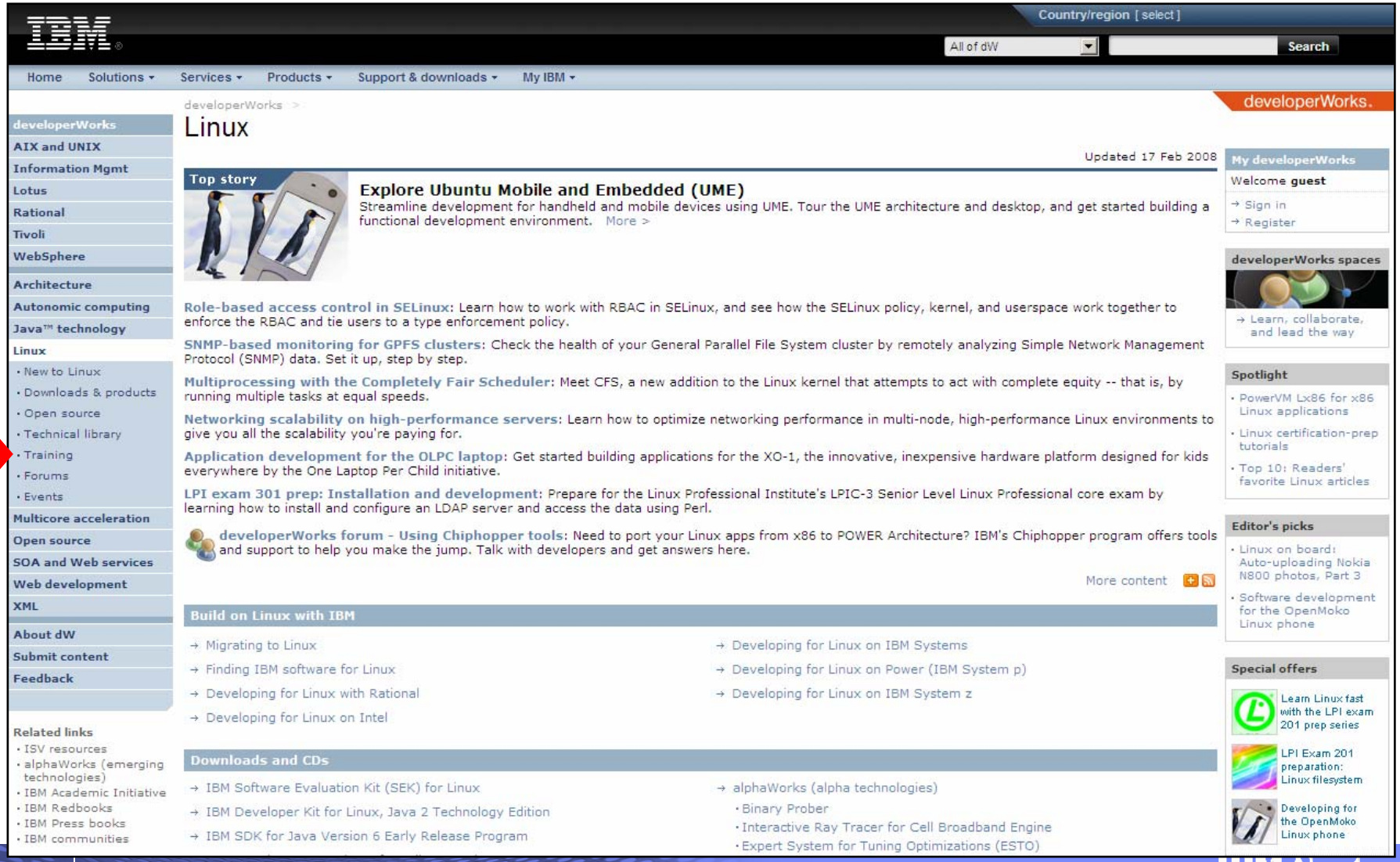
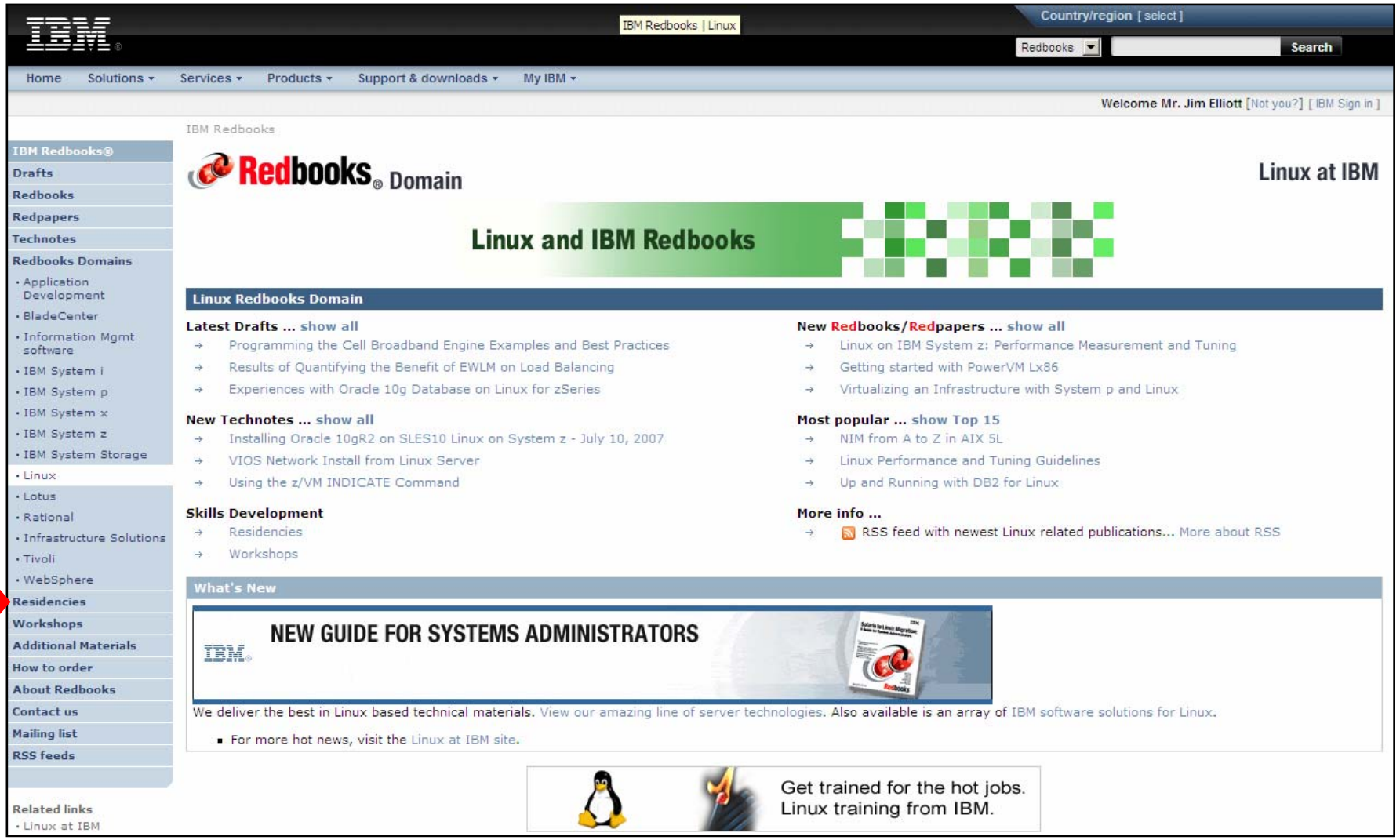


IBM Redbooks

http://ibm.com/redbooks/linux



What next?

- Familiarize yourself with the facts
- Establish an Open Policy
- Align to Open Standards
- View Open Source and Linux as valid alternatives for IT systems
- Make decisions based on business value; not hype and hope!
- Be prepared for change!

Thank you

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