



DB2 for z/OS Best Practices

DB2 Security: Protect Your Assets

*Roger Miller, IBM Silicon Valley Lab
DB2 for z/OS development*



© 2010 IBM Corporation



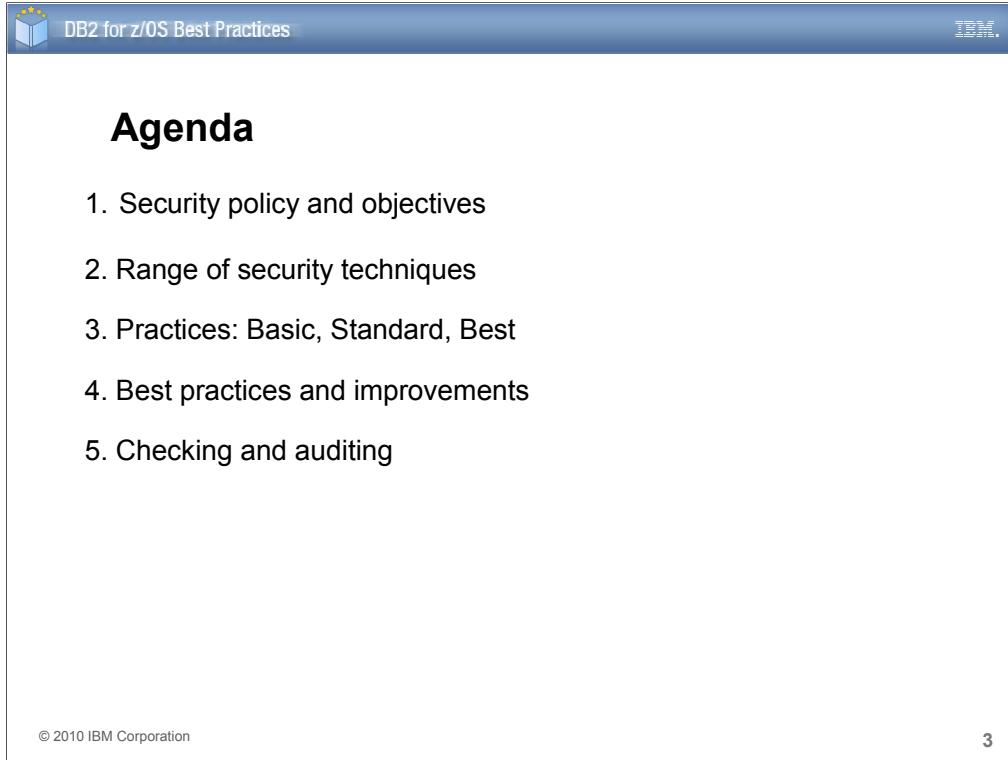
Disclaimer/Trademarks

The information contained in this document has not been submitted to any formal IBM test and is distributed AS IS. The use of this information or the implementation of any of these techniques is a customer responsibility and depends on the customer's ability to evaluate and integrate them into the customer's operational environment. While IBM may have reviewed each item for accuracy in a specific situation, there is no guarantee that the same or similar results will be obtained elsewhere. Anyone attempting to adapt these techniques to their own environments do so at their own risk.

Any performance data contained in this document were determined in various controlled laboratory environments and are for reference purposes only. Customers should not adapt these performance numbers to their own environments as system performance standards. The results that may be obtained in other operating environments may vary significantly. Users of this document should verify the applicable data for their specific environment.

Trademarks

IBM, the IBM logo, and ibm.com are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the Web at "[Copyright and trademark information](#)" at www.ibm.com/legal/copytrade.shtml.



The slide is titled "DB2 for z/OS Best Practices". It features a blue header bar with the title and an IBM logo. The main content area is white with a black border. The title "Agenda" is at the top, followed by a numbered list of five items. At the bottom left is a copyright notice, and at the bottom right is the number "3".

Agenda

1. Security policy and objectives
2. Range of security techniques
3. Practices: Basic, Standard, Best
4. Best practices and improvements
5. Checking and auditing

© 2010 IBM Corporation

3

This is the agenda for the presentation, beginning with a discussion of possible objectives, then looking through guidelines and techniques, while distinguishing the best practices from other security techniques. We will discuss ways to improve situations that I have seen before and emphasize the need for checking and auditing.

For more detail on DB2 security, see

[ftp://ftp.software.ibm.com/software/db2storedprocedure/db2zos390/techdocs/db2sec1001p.pdf](http://ftp.software.ibm.com/software/db2storedprocedure/db2zos390/techdocs/db2sec1001p.pdf)

This presentation will be updated and placed on the DB2 web site. Check for it before and after conference time to get additions, corrections and many more notes.

<http://www.ibm.com/software/data/db2/zos/support.html>

Then click on Technical Presentations and put security into the additional search terms, sort results by date – newest first.

DB2 for z/OS Best Practices

IBM

Explosive Growth of Information Drives Enterprise Infrastructure Challenges



Information Availability
How to deliver continuous and reliable access to information?

Downtime costs can amount up to 16% of revenue in some industries.



Information Security
How to protect and enable secure sharing of information?

84% of security breaches come from internal sources.



Information Retention
How to support our information retention policies?

Average legal discovery request can cost organizations from \$150k to \$250k.



Information Compliance
How to reduce our reputation risks and audit deficiencies?

63% IT executives rate compliance with regulations a top challenge.

Sources: CIO Magazine survey 2007; IBM Tivoli Market needs and profiling study 2005; The Costs of Enterprise Downtime: NA Vertical Markets 2005* Information Research; IBM Market Intelligence

© 2010 IBM Corporation

4

What we're proposing is that enterprises that want to succeed in such a challenging business climate need to focus on four key areas to ensure their information infrastructures can support the goals of the business. The 4 key areas are:

- Information Availability
- Information Security
- Information Retention
- Information Compliance

• What do we mean by Information Infrastructure? This is the overall infrastructure of integrated and optimized storage HW and SW, application servers, applications and middleware, networks, and endpoint devices that combine to deliver information across the extended enterprise.

The IBM Information Infrastructure aims to help businesses get the right information to the right people when they need it... in a secure manner.



Within this security framework, we have segmented our offerings into five solution areas... Security Compliance, Identity and Access Management, Information Security, Application Security, and Infrastructure Security. For the purposes of this presentation, we will focus our attention on Information Security, which addresses the challenges of protecting and securing an organization's information assets.

- People and Identity – Tivoli Identity Manager, Tivoli Federated Identity Manager, Tivoli Access Manager, Trusted Identity, Identity Provisioning, Identity Proofing, access control capabilities inherent in our server and storage platforms
- Data and Information - Database/Content Management, Content Monitoring, Data Governance, Data Encryption Solutions, Storage Management
- Application and Process - Secure Development Tools, Security Method Enforcement, Web Application Scanning, Application Firewall, SOA & XML Security
- Network, Server, and Endpoint - Intrusion Detection, Vulnerability Mgmt., Event Correlation, Change & Configuration Mgmt, Security Compliance Scan
- Physical Infrastructure - Digital Video Surveillance, Smart Surveillance Solutions, RFID solutions, Enterprise Asset Mgmt, Physical Security

For more, see <http://www.ibm.com/security/outlook.html>

DB2 for z/OS Best Practices

Reduce Risk with System z & z/OS world-class Security and Business Resiliency solutions

- Security-rich holistic design to help protect system
- Centralized security management for the enterprise
 - Identity and authorization via Security Server
- Encryption solutions secure data
 - Cryptographic acceleration and centralized key management
- Collaboration with Tivoli's enterprise security management solutions for identity, access, and audit
- Integration and synergy with DB2 for z/OS
- History and experience with well-earned reputation as the most secure platform

© 2010 IBM Corporation

6

Security-rich holistic design to help protect system from mal-ware, viruses, and insider threats

Centralized security management for the enterprise

Identity and authorization management

Certificate Authority in System z

Encryption key management

Encryption solutions to help secure data from theft or compromise

Cryptographic acceleration and centralized key management

Tamper-resistant secure-key processing

FIPS 140-2 Level 4

Internet security features

Collaboration with Tivoli's enterprise security management solutions

Identity and access management

Monitoring, audit and compliance via z/Secure Suite

Network Product Guide Magazine recently issued its annual awards for the best business technology products and services that readers trust. The IBM System z10 took home two awards:

Best in Server Solutions

Best in Cryptography

When you're talking about securing your information infrastructure, it's difficult to not mention the mainframe. For years, the IBM mainframe has been satisfying the most demanding customers with the highest levels of performance, availability, and security. Originally designed to be shared by thousands of users, the mainframe has security built into nearly every level of the system - from the processor level, to the operating system to the application level. This design helps protect it from malware, viruses and threats from both within and from outside the organization.

By providing the ability to enforce, monitor and manage security, System z is the logical central management point for enterprise-wide security. From user identification and authentication, access control and auditing to distributed directory, networking security and security administration, the mainframe is designed to provide integrity, process isolation and cryptographic capabilities to help keep information secure. On top of this solid hardware foundation, System z operating systems offer a variety of customizable security elements within the Security Server and Communication Server components. And of course along with the inherent security built into the mainframe, there are additional security management offerings from Tivoli, like Identity and Access Management and the Tivoli zSecure suite, that can provide even more security to help protect the information infrastructure. Clients with mainframes already know all this. But it's helpful to understand why customers consider System z as the information security hub for their businesses. System z security technologies include high-performance cryptography, multilevel security, large-scale digital certificate authority and lifecycle management, improved Secure Sockets Layer (SSL) performance and advanced Resource Access Control Facility function. And with the addition of z/OS Intrusion Detection Services, System z has enhanced the system's ability to resist network-based attacks.

 DB2 for z/OS Best Practices

Start with IBM System Security

System z as the information security hub

- Security-rich holistic design to help protect system from mal-ware, viruses, and insider threats
- Centralized security management for the enterprise
 - Identity and authorization management
 - Certificate Authority in System z
 - Encryption key management
- Encryption solutions to help secure data from theft or compromise
 - Cryptographic acceleration and centralized key management
 - Tamper-resistant secure-key processing
FIPS 140-2 Level 4
 - Internet security features
- Collaboration with Tivoli's enterprise security management solutions
 - Identity and access management
 - Monitoring, audit and compliance via z/Secure Suite
- Network Product Guide Magazine recently issued its annual awards for the best business technology products and services that readers trust. The IBM System z10 took home two awards:
 - Best in Server Solutions
 - Best in Cryptography



Today's Mainframe:
The power of industry-leading security, the simplicity of centralized management

© 2010 IBM Corporation

7

When you're talking about securing your information infrastructure, it's difficult to not mention the mainframe. For years, the IBM mainframe has been satisfying the most demanding customers with the highest levels of performance, availability, and security. Originally designed to be shared by thousands of users, the mainframe has security built into nearly every level of the system - from the processor level, to the operating system to the application level. This design helps protect it from malware, viruses and threats from both within and from outside the organization.

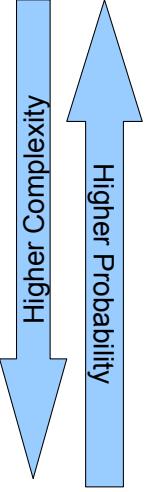
By providing the ability to enforce, monitor and manage security, System z is the logical central management point for enterprise-wide security. From user identification and authentication, access control and auditing to distributed directory, networking security and security administration, the mainframe is designed to provide integrity, process isolation and cryptographic capabilities to help keep information secure. On top of this solid hardware foundation, System z operating systems offer a variety of customizable security elements within the Security Server and Communication Server components.

And of course along with the inherent security built into the mainframe, there are additional security management offerings from Tivoli, like Identify and Access Management and the Tivoli zSecure suite, that can provide even more security to help protect the information infrastructure. Clients with mainframes already know all this. But it's helpful to understand why customers consider System z as the information security hub for their businesses. System z security technologies include high-performance cryptography, multilevel security, large-scale digital certificate authority and lifecycle management, improved Secure Sockets Layer (SSL) performance and advanced Resource Access Control Facility function. And with the addition of z/OS Intrusion Detection Services, System z has enhanced the system's ability to resist network-based attacks.

DB2 for z/OS Best Practices

IBM

What kind of attacks do we face?



- Errors and Omissions
- Lost backups, in transit
- Application user (e.g. SQL injection)
- SQL users
- Network (e.g. LAN sniffer)
- Valid user for the server (e.g. stack overflow, data sets)
- Application developer, valid user for data
- Administrator

© 2010 IBM Corporation

8

See the next few slides and the operational environment slide for more potential of places which need to be addressed, including application code, web servers, database servers, directory and authentication devices, firewalls, network and enclave configuration and operating system platforms.

It's important to understand the other security techniques and the controls to be sure there are no gaps in the fences.

In general, we find more business losses from errors and omissions than from any other category. This area is a gateway to bigger problems, and one that can have a very positive return on investment.

DB2 for z/OS Best Practices

IBM

Administrators?

COMPUTERWORLD
Security

IDG

SEARCH Google Custom Search GO

Rogue DBA Steals, Sells Personal Info

Jaikumar Vijayan Today's Top Stories • or Other Security Stories •

Comments (0) Recommendations: 72 — Recommend this article

July 09, 2007 (Computerworld) — Call it a case of hiring a fox to guard the henhouse.

Fidelity National Information Services Inc. said last week that a senior database administrator responsible for defining and enforcing data access rights at one of its subsidiaries sold the personal information of about 2.3 million consumers to a data broker. The broker in turn sold a subset of the data to "a limited number" of direct marketing companies, Fidelity National said.

The Jacksonville, Fla.-based company, which offers data processing and outsourcing services to financial institutions and other businesses, added that the stolen data included names, addresses, birth dates, and bank account and credit card information.

For now, at least, it appears that the companies that bought the information have used it mainly to send marketing solicitations to the affected individuals, according to Fidelity National. "We have no reason to believe that the theft resulted in any subsequent fraudulent activity," said Renz Nichols, president of the company's Certegy Check Services Inc. unit.

The database administrator has since been



**Managing encrypted data
doesn't have to be
frustrating.**

Simplify with centralized key management

[Learn More >](#)

MORE RELATED CONTENT

- Washington state works out \$1M settlement with 'safe surf' vendor
- Firms found in breach of UK law on customer data
- House's second antispionage bill rolls onward to the Senate

TODAY'S TOP STORIES

- How to track down network tie-ups
- Cisco co-founder launching optical network start-up
- Profile: Hayden Hamilton
- FastSoft speeds up WAN with FastTCP technology
- BT customers begin migration

© 2010 IBM Corporation

9

This is the headline on eWeek, but the financial loss information is sent broadly. One blog states “DBA is weakest link at processing firm.” While the database administrators are difficult to control, they still cannot have access to all of the information without controls. Here is a recent headline and the sources on the web from the July 3, 2007 disclosure.

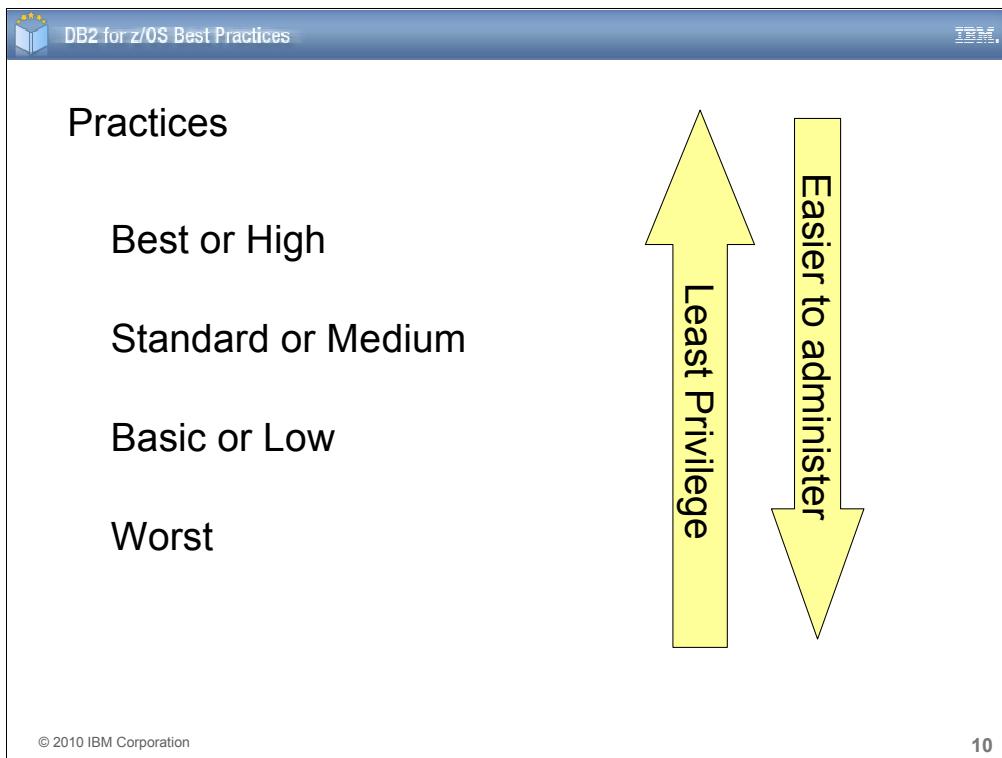
http://www.computerworld.com/action/article.do?command=viewArticleBasic&taxonyName=security&articleId=298312&taxonyId=17&intsrc=kc_top

<http://www.eweek.com/article2/0,1895,2154837,00.asp?kc=EWKNLNAV070507STR1>

<http://authentium.blogspot.com/2007/07/dba-is-weakest-link-at-processing-firms.html>

<http://www.forbes.com/feeds/ap/2007/07/03/ap3882026.html>

http://www.forbes.com/prnewswire/feeds/prnewswire/2007/07/03/prnewswire200707030830PR_NEWS_B_MWT_CL_CLTU026.html



Security needs, dimensions and concerns for security vary widely. Some of the information needs best security practices, while other information can use standard or basic security to reduce the administration. As I get questions about best practices, I've split many practices into these categories.

Best practice or high security will prohibit user access to a wide range of resources and require intensive access level checking. This mode may disable some less secure function and might reduce system performance. Access control is strict, with stringent audit and comprehensive protection.

Standard practice or medium security provides a balance of security with administration cost and system performance. The access control is moderately strict, with selective auditing. This level provides protection of resources that will be adequate for much of the information.

Basic practice or low security provides basic or minimal protection, with few constraints.. Minimal auditing is done. Protection is provided for some resources and a higher degree of risk is accepted for the lower cost of administration.

Worst practice provides essentially no security. One example is GRANT SYSADM TO PUBLIC or to groups that are broadly permitted, such as all data base administrators. Another example would be no use of audit.

DB2 for z/OS Best Practices

Primary security tasks

- identification & authentication → RACF, ...
- access control
- confidentiality and privacy
- data integrity IBM Redbooks pub SG24-7111
- non-repudiation
- audit
- security management
- intrusion detection

Information Management software

IBM

Data Integrity with DB2 for z/OS

© 2010 IBM Corporation

11

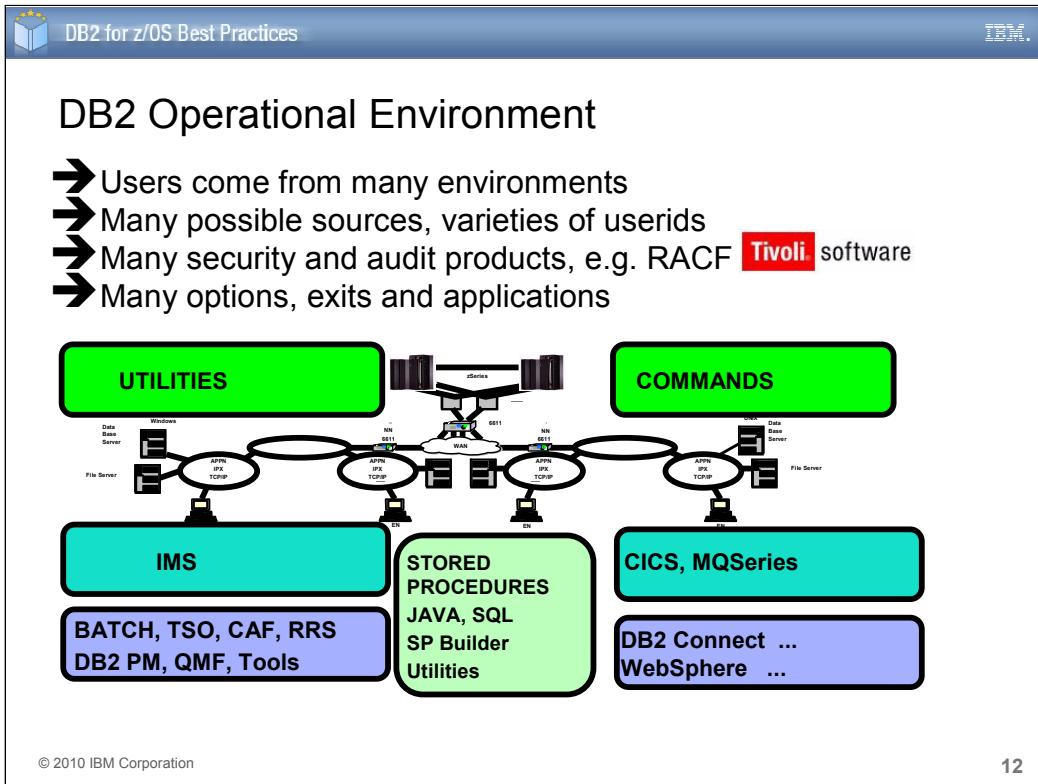
Security control components are often categorized: Identification and authentication determine who the user is. Access control uses that identification to determine what resources can be used. Confidentiality and privacy controls help ensure that the access is allowable and monitored.

Data integrity controls are the basis for every database management system, with the ACID properties (atomicity, consistency, isolation and durability).

Non-repudiation assures that authorized users are not denied access.

Audit is the step of assuring that the access controls are working as intended. This step lets us correct the inevitable mistakes and find attacks.

Security management is the process of setting up the controls.



There are many different environments for DB2, with different connections and security. DB2 uses the security context when possible, so batch jobs, TSO users, IMS and CICS transactions have security that uses a consistent identification and authentication. This is true for stored procedures from these environments as well. The large number of options, exits, environments and asynchronous or parallel work provide challenges for security. Some key applications manage security at the application level.

For some work, such as distributed database serving, DB2 is the initial point on this platform. For this work (DRDA distributed access, remote stored procedures), DB2 establishes the security context and manages the work.



DB2 for z/OS Best Practices

IBM.

Subsystem parameters Basic

Use protection DSN6SPRM AUTH YES

Install SYSADM, SYSOPR Groups? Roles? Who?

Other administrators: DBA, MONITOR2, SYSCTRL,
PACKADM, BINDAGENT, security, auditor

Security settings for communication

Security settings for routines

Integrating security with other subsystems

identification & authentication Standard

access control

© 2010 IBM Corporation

13

There are a few requirements for basic DB2 security. One is that authorization should always be used. The number of people who can be install SYSADM, SYSADM or SYSCTRL should be small. These names should be groups or roles, and the number of people able to use those groups or roles should be small. My rule of thumb would be 10 people, most of whom do not use this authority for their normal work. Access with SYSADM authority should be audited. Other administrative users should be restricted to the access needed. Where the work is sensitive, auditing is required.

BINDAGENT and SYSCTRL are relatively weak security. The BINDAGENT privilege is intended for separation of function, not for strict security. A bind agent with the EXECUTE privilege might be able to gain all the authority of the grantor of BINDAGENT.



DB2 for z/OS security exits and interfaces

- ❑ Connection routines and sign-on routines
- ❑ Access control authorization exit routine
 - ❑ RACF access control module
 - ❑ Other vendors
- ❑ Edit routines
- ❑ Validation routines
- ❑ Field procedures
- ❑ Log capture routines
- ❑ Instrumentation Facility Interface or trace
 - ❑ Interpreting trace information
- ❑ Interpreting Recovery Log information

DB2 exit routines can make significant changes in identification, authentication, access control and auditing. These modules run APF authorized, key 7, so they can compromise security and system integrity. Most of the information about these routines is in Appendix B, Writing Exit Routines, of the Administration Guide. Other appendices document tracing, instrumentation interfaces, and recovery log data used for audit.

DB2 for z/OS Best Practices

Cryptography and DB2: options

What do you want to protect? From whom? Techniques, where to encrypt / decrypt? Who manages keys?

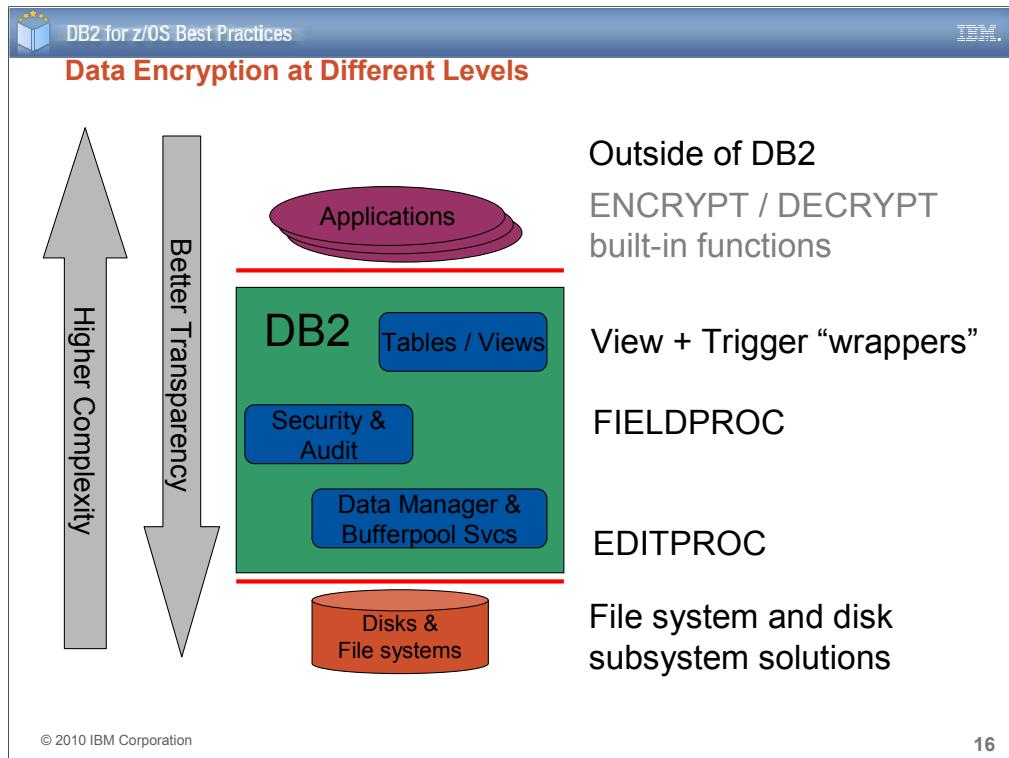
* Outside of DB2 (ICSF, IBM Encryption for z/OS)	General, flexible, no relational range comparisons FOR BIT DATA
DB2 FIELDPROC	No relational range comparisons, FIELDPROC restrictions, FOR BIT DATA
* DB2 EDITPROC (IBM tool)	indexes are not encrypted, EDITPROC restrictions
User-defined function or stored procedure	General, flexible, invocation needed, no relational range comparisons, manage keys
SQL functions (DB2 V8)	General, flexible, invocation needed, no relational range comparisons, manage keys
* On the wire (DRDA V8, SSL V9, IPSec)	General, flexible
* Tape, Backup (z/OS, TS1130)	General, flexible, IBM hardware & software
* Disk (z/OS, DS8000)	Protect retirement, repair, loss of disk

© 2010 IBM Corporation

15

There are many ways to encrypt data in DB2. The answers to the questions, "What do you want to protect and from whom?" and "How much effort can be used?" are generally needed to determine which technique to use and where to encrypt and decrypt. Encryption is relatively easy on this platform, but key management is difficult. Full disk encryption is solid, relatively simple, and robust, but has very little granularity. Full disk encryption provides good protection for disk retirement or repair. Encryption of data is a primary choice, but encrypted values do mean some tradeoffs in function, usability and performance. Either the indexes are not encrypted or encrypted data will not give correct results for comparisons other than equals or not equals. All greater than, less than and range predicates are not usable. An EDITPROC is the most used technique, and one is provided to use cryptography hardware with an IBM Tool. The CMOS Cryptographic Coprocessors feature and ICRF hardware were designed to address high volume cryptographic transaction rates and bulk security requirements on z/OS. The Integrated Cryptographic Service Facility (ICSF) and the IBM Encryption Facility for z/OS provide the interfaces to service routines supported by the hardware, such as key management.

<http://www.ibm.com/servers/eserver/zseries/security/cryptography.html>



This diagram shows the range of places where data encryption can be performed. It is complementary to the prior page, which indicates some of the specific challenges.

If the applications are already written, then there is generally a very high need for transparency. But transparency means that some kinds of protection are not provided.

Some vendors address encryption as well.

Here are the primary references for encryption in DB2.

<http://www.ibm.com/support/docview.wss?uid=swg21168217>

<http://www.ibm.com/support/docview.wss?uid=swg27007844&aid=1>

<http://www.ibm.com/support/docview.wss?uid=swg27007842&aid=1>

<http://www.ibm.com/developerworks/db2/library/techarticle/benfield/0108benfield.html>

<http://www.redbooks.ibm.com/redbooks/pdfs/sg24711.pdf>

sections 1.1.13 & 1.1.14

 DB2 for z/OS Best Practices

IBM System Storage DS8000
Enhancing Security

- Drive-Level Encryption
 - Encryption of “data at rest”
 - Continuous, real-time encryption of individual drives
 - Expected to:
 - Have no performance impact
 - Require no application changes
 - Uses Tivoli Key Lifecycle Manager
 - Key management via ICSF and RACF®
 - Audit via SMF



© 2010 IBM Corporation

17

Drive-Level Encryption

New DS8000 feature supports encryption of “data at rest”

Continuous, real-time encryption of the individual drives

Expected to:

Have no performance impact

Require no application changes

Uses Tivoli Key Lifecycle Manager (5608-A91)

Key management via ICSF and RACF®

Auditability via SMF

Supported on z/OS R9 R10 with the PTF
for APAR OA27393

DB2 for z/OS Best Practices

Expanding from Tape to Disk Systems
Modeled after encrypting tape solution with same key manager

IBM **Seagate** **LSI**

Full disk encryption (FDE) drives

- Encrypt data-at-rest with embedded encryption key and password authentication

Storage system

- Define secure volume groups, authenticate with the key source, and pass authentication key to the drive

Key management service

- Uses same proven key management as TS1130 tape drive to easily and securely manage keys

Standards for interoperability

- FDE management support via Trusted Computing Group security protocol
- Working to create industry standards for the authentication key management protocol

Professional services to aid design and implementation

Enterprise Key Management Host

Application Servers

System Admin

SAN

Tape

Midrange Storage System

NAS Systems

High-end Storage System

© 2010 IBM Corporation

18

At a high level, the solution aims to address key IT requirements for simplicity and manageability for data-at-rest encryption: Simplified and proven key management system, operational in the largest banks in the world. Unified key management will handle all forms of storage – The encrypting disk solution will use TKLM (formerly EKM), the same key manager used for IBM's tape encrypting solution. As with the encrypting tape solution, the encrypting disk solution will be transparent to the OS, applications, databases, system administrators, and end-users, which will make deployment much simpler than deploying specialized encryption appliances.

- Designed for standard-based manageability - Every one of the hard drive vendors is active in the Trusted Computing Group, the organization writing the standards for these self-encrypting drives. Standards drive interoperability, which drives volume and creates competition. Volume and competition drive cost. We expect the other HDD vendors to closely follow us with products.
- Maintains performance and linear scalability – The Seagate Secure drives include ASICs, which maintain I/O speeds, and since encryption is done within each drive, the system scales linearly without additional hardware accelerators necessary with specialized encryption appliances.

At its core, the self-encrypting disk solution will consist of Seagate Secure full-disk encrypting drives. Each Seagate Secure drive will have an ASIC, which encrypts data as it enters the drive and decrypts data as it leaves the drive.

For the various security reasons mentioned earlier, we recommend deploying TKLM on the mainframe if customers have one.

<http://www.ibm.com/software/tivoli/products/key-lifecycle-mgr/>

Transparently detects encryption-capable media and assigns the authorization keys necessary to lock and unlock individual drives. Greatly simplifies implementation: Can run on most existing server platforms to leverage the resident server's existing access control and high availability/disaster recovery configurations. Tivoli Key Lifecycle Manager (TKLM) is part of the IBM Java environment and uses the IBM Java Security components for its cryptographic capabilities. TKLM has three main functions that are used to control its behavior:

1. **Keystore** – customers have a choice of using key stores they've already deployed or installing new key stores, including the TKLM one.
 - SW-based keystore type: JCEKS (file-based)
 - HW-based keystore type: PKCS11IMPLKS (PKCS11 cryptographic device), System z, System i
 - In total about 40 3rd-party keystores are supported by TKLM's key serving engine (see below)
2. **Key serving** (Cryptographic services provider) – this is the most valuable component of the TKLM today, which transparently detects storage (tape) media, assigns unique encryption keys to each tape cartridge, and automatically serves the keys when a tape cartridge is mounted into the drive. The key serving mechanism supports about 40 3rd-party key stores and uses standard APIs, like PKCS11 and T10, to access 3rd-party key stores. In addition to the 40 3rd-party key stores supported, TKLM also supports 6 different *types* of key stores for additional implementation flexibility.
3. **Key management** – maintains policies to perform cryptographic services, like what data gets encrypted, which keys to use, synchronization of key stores, audit capabilities. These policies are stored in different places according to the encryption model the customer deploys (i.e., the tape library or the application itself). [Note: Future versions could include automatic rotation/deletion of keys and other automated policy functions.]

Tape Systems supporting encrypting tape drives: Enterprise: TS3400 TS3500 TS7700, TS7500 (no attach to System z); LTO: TS3500, TS3310, TS3100 TS3200, and DR550. Another option is the System z ability to encrypt data written to tape with its (Encryption Facility for z/OS).

DB2 for z/OS Best Practices

DB2 encryption tool using EDITPROC

- Data encryption on disk, data at rest
 - Data on channel, in buffer pools are encrypted
 - Data to applications & indexes are not encrypted
- Existing authorization controls are unaffected

© 2010 IBM Corporation

20

On this slide, data above the middle line is not encrypted and data below the line is encrypted.

In this example, the encryption is not providing an additional level of security for your DB2 or IMS applications. It is providing encryption of the data on the disk.

Once the data is brought, for example, into DBMS working storage, you are using the existing DB2 and IMS authorizations to secure data. As the data is written out to disk, that is once it leaves the channel and enters the network to move to the disk, the data is encrypted.

The example on this slide shows two subsystems with disks. The circle on the bottom half of the picture might be what we have known as an ESCON director in the past. The processor on the right hand side, below the line, might also be attached to that same I/O device; however, if the processor is a System z that does not have the encryption key it will not be able to interpret the data.

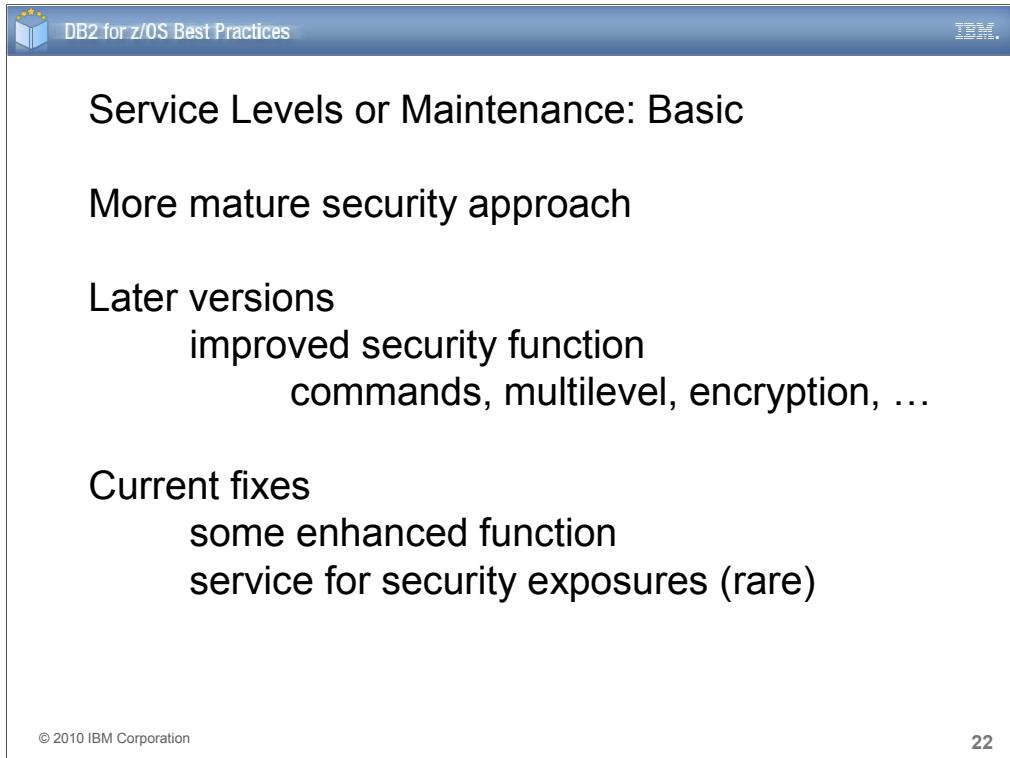
See the DB2 tools web pages for more about this.

<http://www.ibm.com/software/data/db2imstools/db2tools/ibmencrypt.html>

<http://www.ibm.com/software/os/zseries/telecon/14sep/>

The screenshot shows a web page from Tech Dispenser, which is a blog aggregator. The main headline is "Is your data encrypted?". The sidebar on the left lists various technology categories like Home, News, E-mail Newsletters, Tech Dispenser, Shark Bait, Knowledge Centers, and Security. The main content area discusses a data breach at HBOS where customer data was lost due to human error. A green box on the right says "IS YOUR DATA SECURED RELIABLY?". The page includes links to other stories and a search bar.

You don't want the next headline to be yours. The costs are simply too high in terms of disclosure and lost customers. The costs are too low to encrypt anything which might be sent outside the secure vault.



DB2 for z/OS Best Practices

IBM

Service Levels or Maintenance: Basic

More mature security approach

Later versions

- improved security function
- commands, multilevel, encryption, ...

Current fixes

- some enhanced function
- service for security exposures (rare)

© 2010 IBM Corporation

22

Service levels for z/OS are generally a bit less critical for security fixes than Unix, Linux or Windows, since there are very few security fixes needed, any many fewer significant security exposures. The security was driven by commitments for system integrity and system security on System z in the 1970s and 1980s.

Still, later levels and service do provide some improvements in security function. Some examples are improved security in DB2 for z/OS V8 with command security, multilevel security and encryption options.

On the Unix, Windows and Linux platforms, be sure to install the needed service.

The screenshot shows a news article from Computerworld titled "Oracle to issue 59 critical patches". The article discusses Oracle's plan to release 59 security patches on Tuesday, January 12, 2010. It highlights that 21 of these patches affect Solaris, Unix, and Linux operating systems, which were acquired through Oracle's purchase of Sun Microsystems. Seven of these vulnerabilities can be exploited remotely without needing a password or username. The update also includes 13 patches for Oracle's database product line, specifically mentioning TimesTen and Secure Backup. The article is dated January 12, 2010, at 03:37 PM ET.

http://www.computerworld.com/s/article/9139364/In_six_years_of_Patch_Tuesdays_400_security_bulletins_745_vulnerabilities?source=CTWNLE_nlt_security_2009-10-15

Google Oracle security patch 2009 10 million hits

<http://www.eweek.com/c/a/Security/Oracle-Database-Security-Shortcomings-Raises-Red-Flags-616982/?kc=EWKNLSTE10152009STR2>

http://blogs.oracle.com/security/2009/07/july_2009_critical_patch_update_released.html

<http://www.integrigy.com/oracle-security-blog/archive/2009/07/15/oracle-cpu-july-2009/view>

<http://blogs.oracle.com/security/2009/09/announcement REGARDING THE OCT.html>

http://www.computerworld.com/action/article.do?command=viewArticleBasic&taxonyName=spam,_malware_and_vulnerabilities&articleId=9131663&taxonyId=85&intsrc=kc_top

Oracle delivers 43 security patches By Chris Kanaracus

April 15, 2009 (IDG News Service) Oracle released 43 security fixes on Tuesday for a range of applications, including its flagship database, Oracle Application Server, E-Business Suite, PeopleSoft Enterprise and WebLogic Server.

Sixteen of the patches are for various database versions. The most severe vulnerability, which affects versions 9.2.0.8 and 9.2.0.8DV, "can potentially allow an attacker to gain full control of a vulnerable server," according to a [post](#) on Oracle's global product security blog. Full details are available on Oracle's [Web site](#). Oracle releases its patch updates on a quarterly basis; the next is scheduled for July 14.

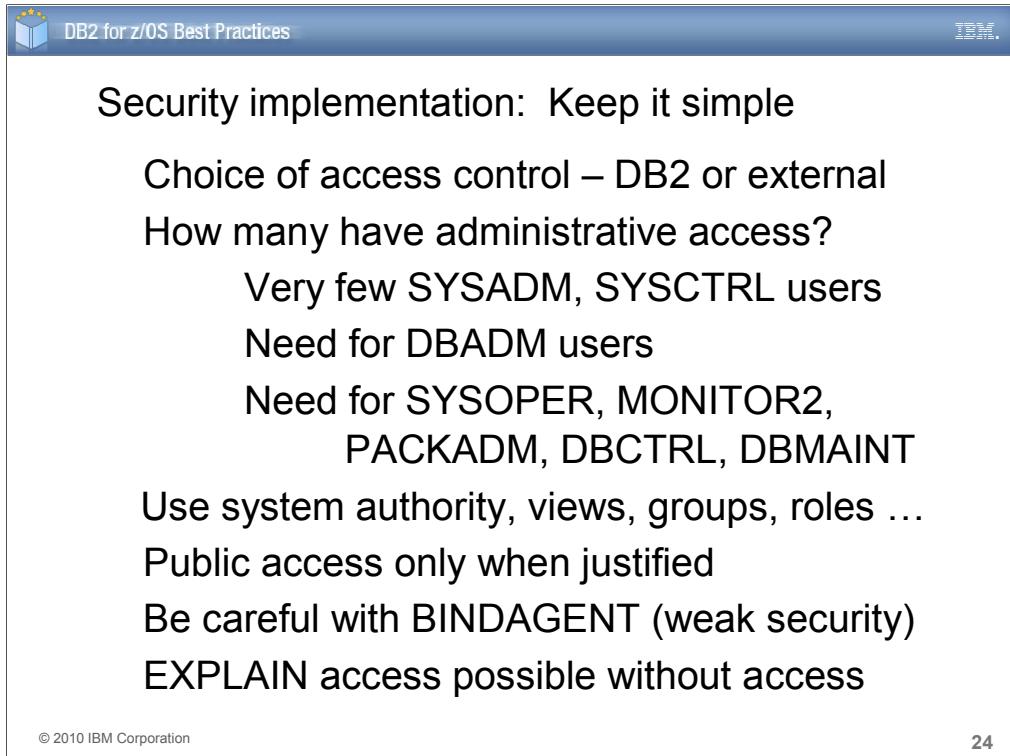
<http://www.eweek.com/c/a/Security/Oracle-Releases-Critical-Patch-Update-With-41-Fixes/?kc=EWKNLNAV01142009STR3>

Oracle Releases Critical Patch Update with 41 Fixes

By Brian Prince
2009-01-13

Oracle releases 41 security fixes in its first critical patch update of 2009. The CPU includes fixes for a number of flaws with the highest possible severity rating.

Oracle delivered 41 security fixes to its customers in its first CPU (Critical Patch Update) of 2009.



DB2 for z/OS Best Practices

IBM

Security implementation: Keep it simple

- Choice of access control – DB2 or external
- How many have administrative access?
 - Very few SYSADM, SYSCTRL users
 - Need for DBADM users
 - Need for SYSOPER, MONITOR2,
PACKADM, DBCTRL, DBMAINT
- Use system authority, views, groups, roles ...
- Public access only when justified
- Be careful with BINDAGENT (weak security)
- EXPLAIN access possible without access

© 2010 IBM Corporation

24

One of the keys to success is keeping the security as simple as possible. Having as direct as possible a mapping from the security policy to the implementation will keep mistakes to a minimum, but we must allow for mistakes and for correcting those mistakes.

The number of people who can be install SYSADM, SYSADM or SYSCTRL should be small. These names should all be groups or roles, and the number of people able to use those groups or roles should be small. My rule of thumb would be 10 people, most of whom do not use this authority for their normal work. All access with SYSADM or SYSCTRL authority should be audited. Other administrative users should be restricted to the access needed and also be groups or roles. Where the work is sensitive, auditing is required. SYSOPER can be controlled. MONITOR2 should only be provided to those who can view all work on the DBMS. Public access should be avoided without careful justification and understanding of the security policy.

The BINDAGENT privilege is relatively weak security. Grant BINDAGENT from an id with only the needed authority, not SYSADM in general. There is a fairly new example of how to provide EXPLAIN access when the individuals do not have direct access to the data. An example showing how to have EXPLAIN authorization without direct access to the tables is provided with the V8 Visual Explain and APARs PQ90022 and PQ93821. For this example, you may want to have the binder not have SYSADM, and will not want to grant access to public.

<http://www.ibm.com/software/data/db2/zos/osc/ve/index.html>



When to look at RACF access control today 16:30 RACF and DB2: Teamed for Security

● Policy and people implications

- Roles will change
- Authorities will change
 - Use RACF facilities more, e.g. groups & patterns
 - Not a completely compatible change
- Need both DB2 & RACF knowledge for implementation and for administration
- Mix of RACF and DB2 Authorization

● Security group should define authorization

● Centralized Security Control Point

● Use patterns, not individual access authority

The choice of using RACF for access control is not for everyone. There are significant policy and people implications. If you want the database administrators to manage security, then integration with DB2 is very important. If you want security administrators to manage security, then integration with the security server is more important. As you make this change, note that roles will change and authorities will change. This is not a compatible change.

You must plan to use RACF facilities more, like groups and patterns. The implementation team needs both DB2 and RACF knowledge for implementation.

If you want a security group to define authorization and a centralized security control point, then this is a match for your needs. As you implement, plan to use patterns instead of individual item access authorities.

See the Protect Your Assets presentation for more on this topic:

<http://www.ibm.com/support/docview.wss?rs=64&uid=swg27001877>



Views

SQL - Data Definition Language

```
CREATE VIEW SW_CUSTOMER AS
  SELECT CUST_NBR, CUST_NAME,
  CUST_CREDIT
    FROM CUSTOMER
   WHERE CUST_REGION='SW'
```

- Only customers in SW
- Only customer number, name & credit

■ **Views can:**

- Protect data: rows and/or columns
- Simplify access to data
- Join or union to add or remove information

Views can be used to hide data. They can provide only certain fields, as noted. Views are often used to simplify access to data by being able to define the view once and use it many times.

Table privileges DELETE, INSERT, SELECT, UPDATE, or ALL can be granted individually on a view. By creating a view and granting privileges on it, you can give someone access only to a specific combination of data. This capability is sometimes called field-level access control or field-level sensitivity.

Multilevel Security and DB2 Best

- Labeled security allows sharing of resources with mixed levels of security in a single image
- Integrated access control, consistent for files, communications, print, database
- Control SQL and utility access

SECURITY LABEL	Col 1	Col 2	Col 3
Personnel	234	USA	50%
Finance	198	France	23%
Personnel	2	UK	9%
Finance	234	USA	11%
Personnel	22	Germany	9%
IT	87	USA	14%
Contractor	23	UK	20%
Personnel	34	Germany	43%
Finance	981	USA	12%
IT	223	USA	10%
Contractor	49	Canada	29%

Multilevel Security on z, z/OS, RACF

© 2010 IBM Corporation

27

z/OS 1.5 and RACF or Security Server 1.5 (improved in 1.6) add another type of security, called multilevel security, labeled security or mandatory access control (MAC). The only option in the past with a high degree of separation has been physical separation. In the database world that might mean another machine or LPAR or perhaps another subsystem, another database or another table. With multilevel security, we still have a high degree of security even with data in the same table.

Access control is consistent across many types of resources using RACF, so that multilevel controls apply for data sets, for communications, for print and for database access – both objects and now with row level granularity. The DB2 controls are for both SQL access and for utility access.

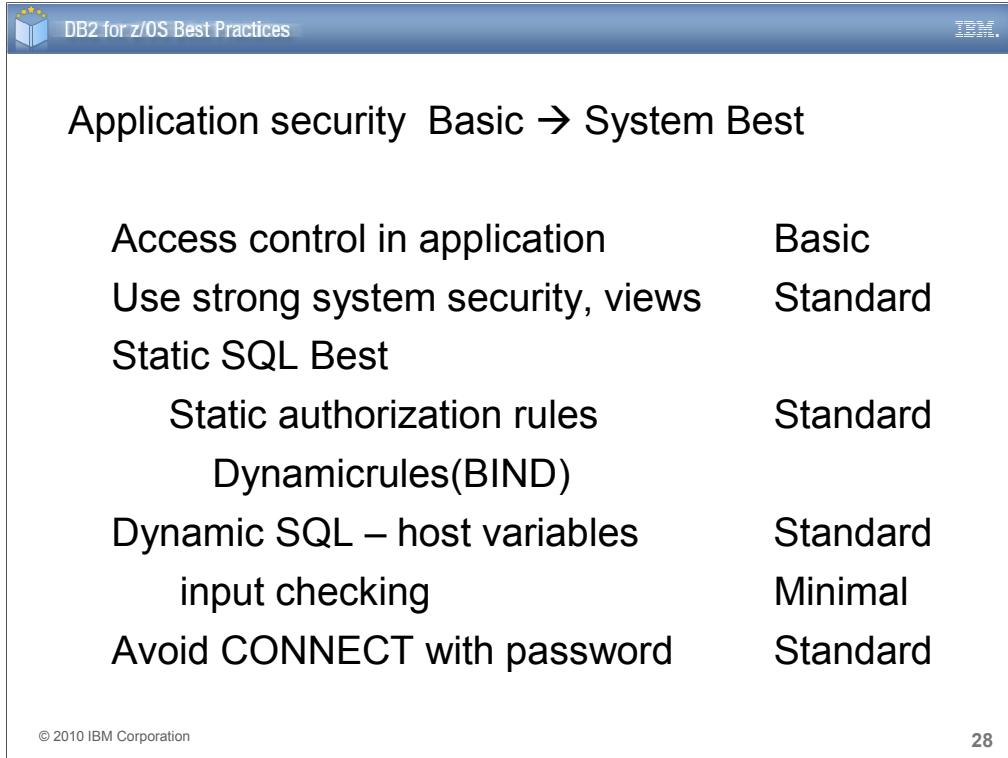
For more on multilevel security, see **Planning for Multilevel Security and Common Criteria (GA22-7509)**

<http://publibz.boulder.ibm.com/epubs/pdf/e0z2e121.pdf>

Securing DB2 and Implementing MLS on z/OS, SG24-6480-01

<http://www.redbooks.ibm.com/abstracts/sg246480.html>

<http://www.ibm.com/systems/z/security/mls.html>



DB2 for z/OS Best Practices

IBM

Application security Basic → System Best

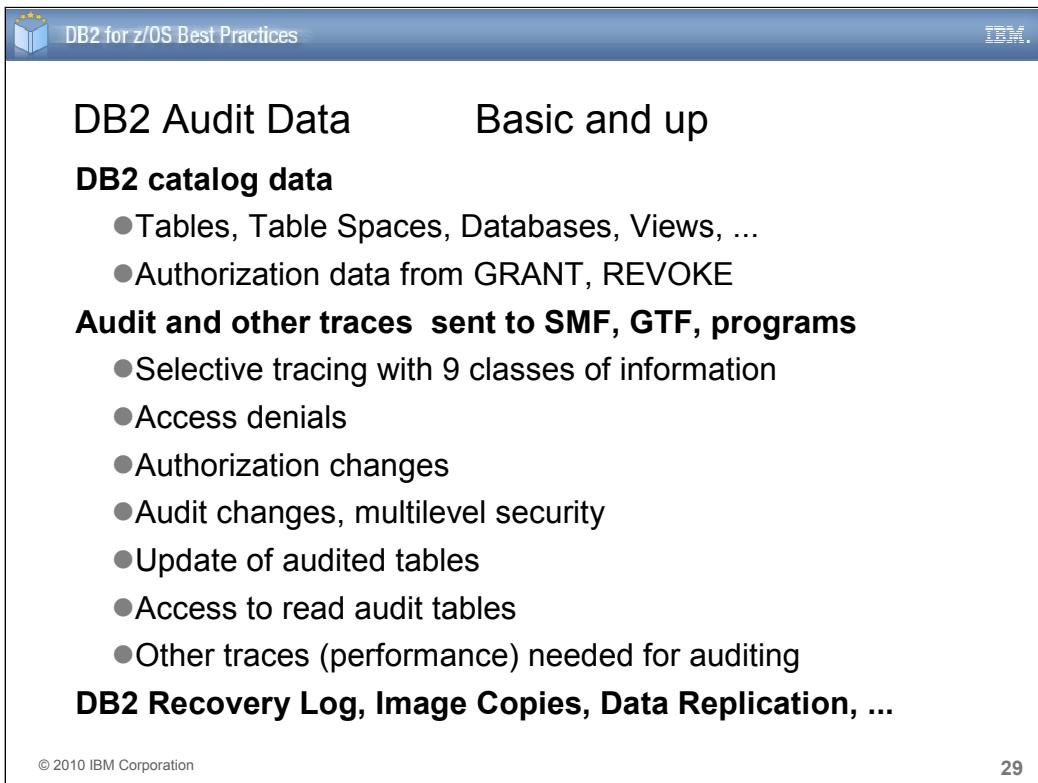
Access control in application	Basic
Use strong system security, views	Standard
Static SQL Best	
Static authorization rules	Standard
Dynamicrules(BIND)	
Dynamic SQL – host variables	Standard
input checking	Minimal
Avoid CONNECT with password	Standard

© 2010 IBM Corporation

28

Applications do not have some of the protection mechanisms or the level of assurance provided by system security, so use the stronger system techniques whenever possible. Static SQL prevents a number of problems, including SQL injection, while improving performance. Static SQL authorization techniques can be used to avoid granting wide access to tables. If dynamic SQL is used, then use of parameter markers and host variables for input can also avoid SQL injection. Checking the input must be performed. Use of CONNECT with a password provides a shared technique and userid that will make management more difficult. Use system identification and authentication. Changing the password is needed more if you have passwords in programs.

There are several vendors for application security function.



DB2 for z/OS Best Practices

IBM.

DB2 Audit Data Basic and up

DB2 catalog data

- Tables, Table Spaces, Databases, Views, ...
- Authorization data from GRANT, REVOKE

Audit and other traces sent to SMF, GTF, programs

- Selective tracing with 9 classes of information
- Access denials
- Authorization changes
- Audit changes, multilevel security
- Update of audited tables
- Access to read audit tables
- Other traces (performance) needed for auditing

DB2 Recovery Log, Image Copies, Data Replication, ...

© 2010 IBM Corporation

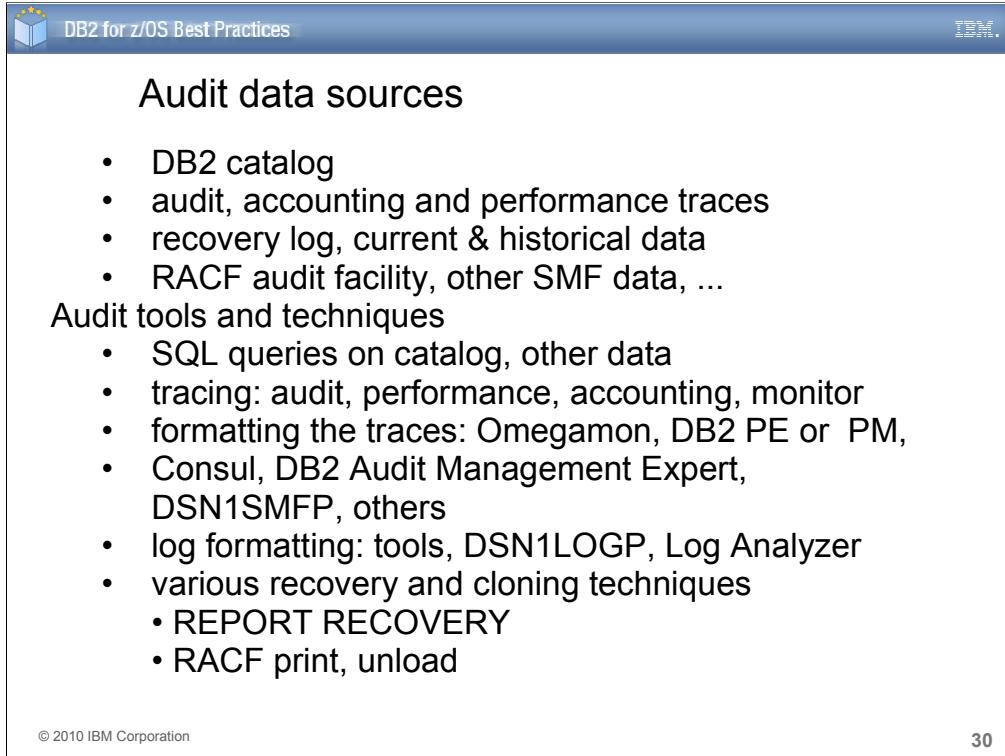
29

There are many kinds of audit information available in DB2. The DB2 catalog stores the definitions of all the objects and the authorization. Users who are allowed to access these tables can use the power of SQL to audit and manage security. RACF has an unload facility that allows its security definitions to be loaded into DB2, so that broader auditing can be performed.

One of the primary audit sources is an audit trace that can provide very selective information. Other trace information can also be used in auditing.

The DB2 recovery log and utilities are also helpful in finding out how and when some data was modified.

Please read the Audit section of the Security and Auditing chapter of the DB2 Administration Guide.



DB2 for z/OS Best Practices

IBM

Audit data sources

- DB2 catalog
- audit, accounting and performance traces
- recovery log, current & historical data
- RACF audit facility, other SMF data, ...

Audit tools and techniques

- SQL queries on catalog, other data
- tracing: audit, performance, accounting, monitor
- formatting the traces: Omegamon, DB2 PE or PM,
- Consul, DB2 Audit Management Expert,
- DSN1SMFP, others
- log formatting: tools, DSN1LOGP, Log Analyzer
- various recovery and cloning techniques
 - REPORT RECOVERY
 - RACF print, unload

© 2010 IBM Corporation

30

Notes on audit data sources, information, tools & techniques

- DB2 catalog: SQL Reference, some queries in Admin book
 - audit, accounting and performance traces - Audit chapter of Admin, details in Admin; traces in Command Reference & DSNWMSGS
 - recovery log – Admin appendix, DSNDQJ00
 - RACF audit facility, other SMF data, ... RACF Access Control Module Guide, RACF books, z/OS SMF book
- audit tools and techniques:
- SQL queries on catalog, other data Some in Admin
 - tracing: Command Reference, Admin. Audit chapter, DSNWMSGS
 - formatting traces: Omegamon, DB2 PE, DB2 PM, DB2 Audit Management Expert, See Omegamon books, Report Reference
 - Consul audit tool, DSN1SMFP (if you don't have products)
 - log formatting: tool, DSN1LOGP, Admin, Utility Guide
 - various recovery and cloning techniques: REPORT RECOVERY: Utility Guide and Administration Guide
 - RACF print, unload: RACF documentation



DB2 for z/OS Best Practices

IBM.

DB2 Instrumentation Records IFCIDs for Audit

Accounting	0003: successful access
Audit	0140: Audit all authorization failures 0141: Audit all grants & revokes 0142: Audit DDL Create / Alter / Drop 0143: Audit First Write 0144: Audit First Read 0145: Audit DML Statement 0314: Authorization Exit Parameters
Performance	0004: Trace Start 0005: Trace Stop 0023: Utility Start 0024: Utility Change 0025: Utility End 0106: System Parameters 0247: input host variables 0350: SQL Statement
	...

© 2010 IBM Corporation

31

Here are some suggested audit traces and other traces. These traces were chosen for a DB2 V8 Common Criteria audit. Most of the audit products will format all of them. The instrumentation has information about the performance, resources, and processes, as well as security and specific sensitive data audits. If more detailed information is required, you can also examine the individual SQL statements (IFCID 0350), input host variables (IFCID 0247), record accesses and locking. Other detailed trace data allows full accounting by user or transaction, with detailed data written every plan deallocation or change of user and fully detailed tracing down to individual call / IO / component level.

If you are using DB2 9, then add Audit class 10 IFCIDs 269 and 270.



DB2 security audit suggestions: catalog table queries

Audit class 1, 2, 3

0140: audit all authorization failures
0141: audit all grants & revokes

DB2 9 audit class 10: audit trusted context

0269: establish trusted connection and switch user
0270: CREATE & ALTER TRUSTED CONTEXT statements

Performance

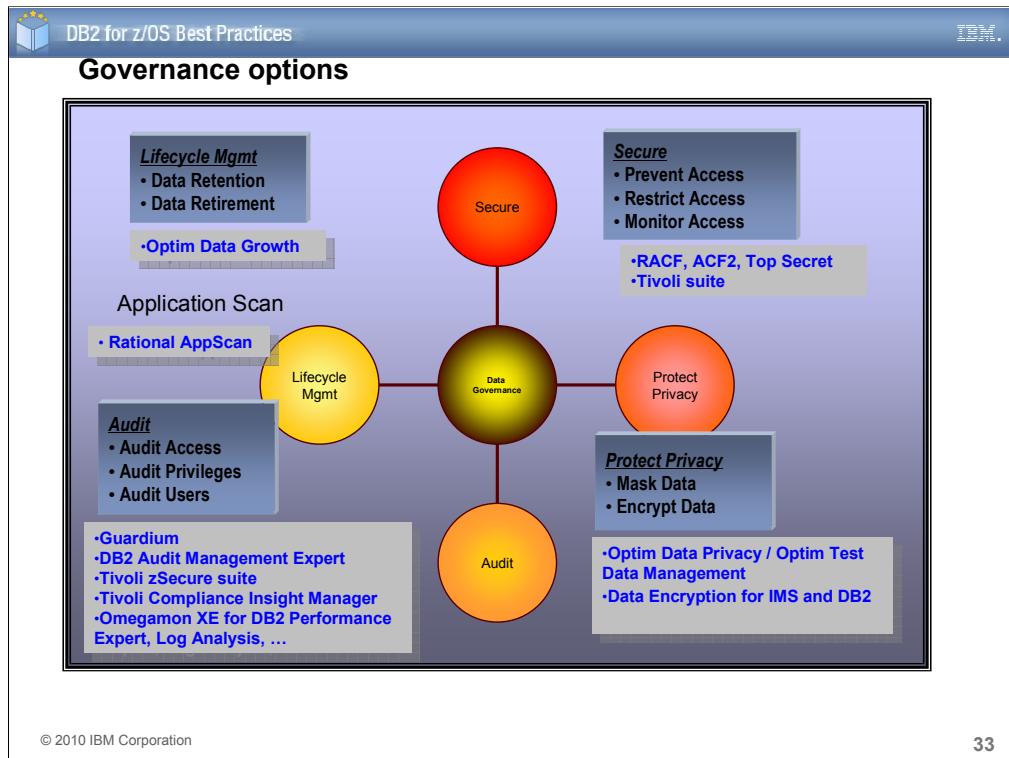
0004: Trace Start
0005: Trace Stop
0106: System Parameters

Here is a minimal audit trace intended to cover only auditing for security – not the specific auditing for changes or access to data. The performance overhead for these traces should be much smaller than 0.01% unless you have severe security problems. The primary records are IFCIDs 0140 and 0141. Authorization failures need to be understood. Finding and correcting authorization errors is important to avoid widening exposures. IFCIDs 0004, 0005, and 0106 ensure that system security is functioning and that the audit trace data is complete.

The primary cost of these audit classes is writing the data to a monitor (1X), GTF (2X), or SMF (4X). Context switch can occur frequently, but all others should have negligible performance and space concerns, as they should be very infrequent.

Also use queries on the DB2 catalog tables to answer most authorization questions.

If you are running DB2 9, then these trusted context audit records should be added to the prior page and used whenever trusted contexts exist.



With data compliance and privacy regulations on the rise, many IT organizations are experiencing new levels of complexity around data management. The DB2 and IMS Tools offer a data governance solution that responds to ongoing requirements related to the auditing, retention and privacy of your data. The tools provide the capabilities IT organizations need to more confidently comply with regulations while saving time and expense in the data center.

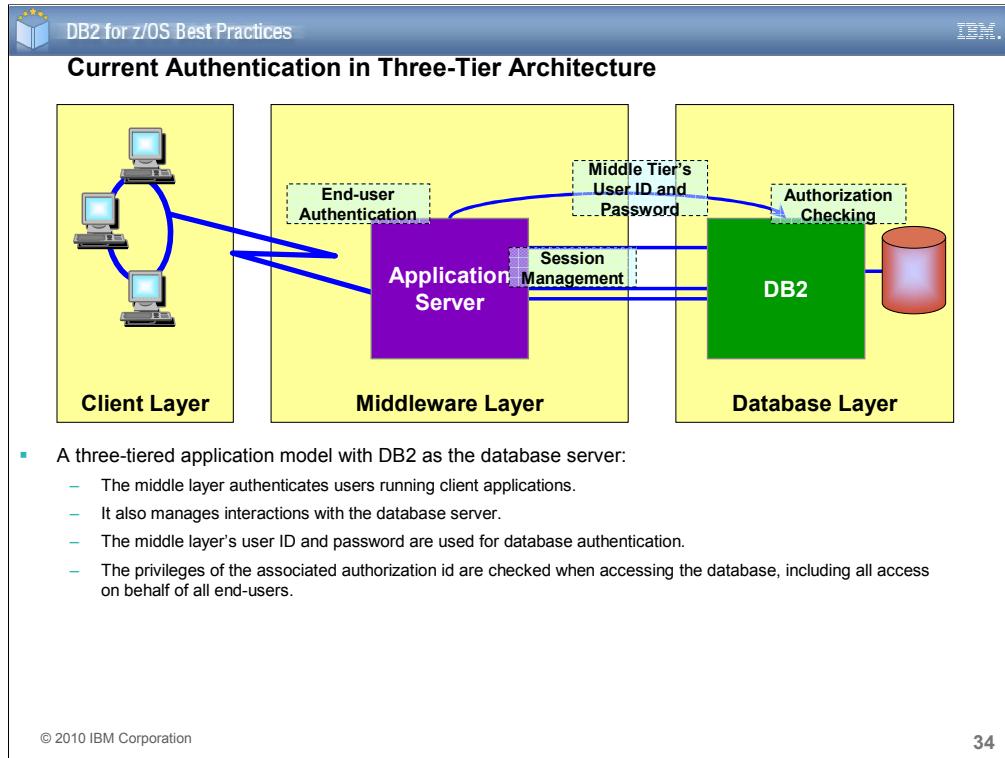
Is your DB2 audit reporting strategy lacking institutional controls, or perhaps even nonexistent? Are you using "live" production data for unit testing, with no masking of sensitive data values? Are you wasting resources storing large amounts of unreferenced and inactive data on your operational databases? Is sensitive data potentially being exposed to theft while at rest or in transit between you and your business partners?

Many products from IBM and others can help with parts of the challenge, from security management to detailed auditing.

<http://www.ibm.com/software/data/db2imstools/solutions/compliance.html>

<http://www.ibm.com/software/tivoli/solutions/security/>

<http://www.ibm.com/servers/eserver/zseries/zos/racf/>



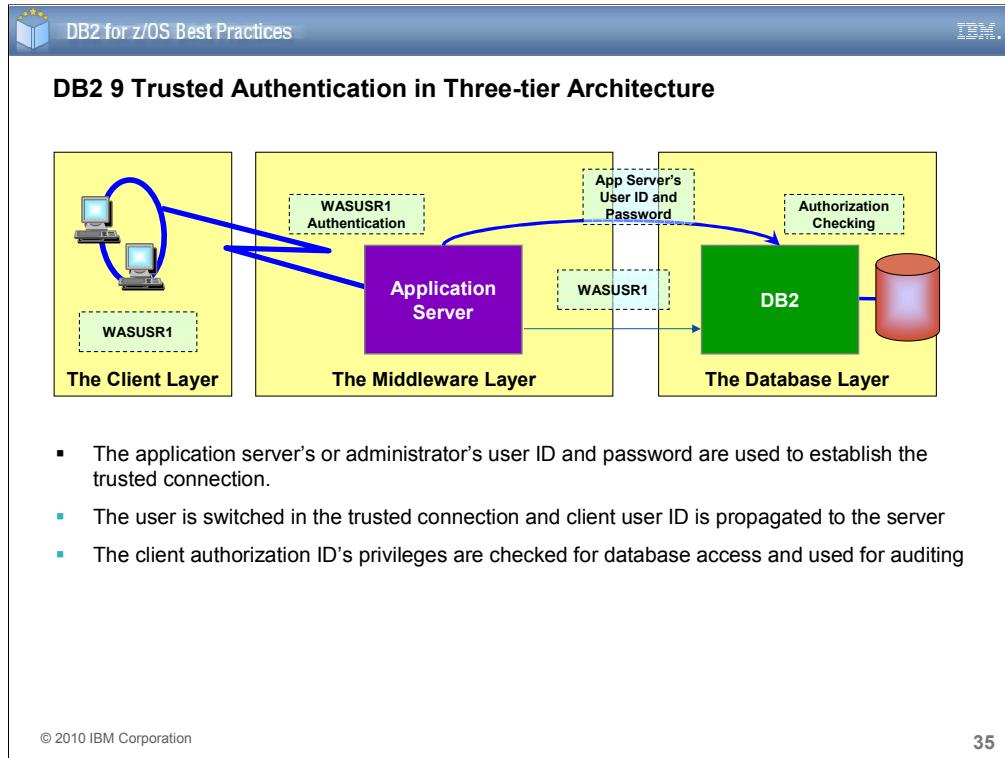
In a typical three-tiered application model with DB2 as the database server:

The middle layer (sometimes called the middleware layer) authenticates users running client applications.

The middle layer also manages interactions with the database server (DB2).

The middle tier's user ID and password are used for authentication purposes.

The database privileges associated with that authorization ID are checked when accessing the database, including all access on behalf of all end-users.



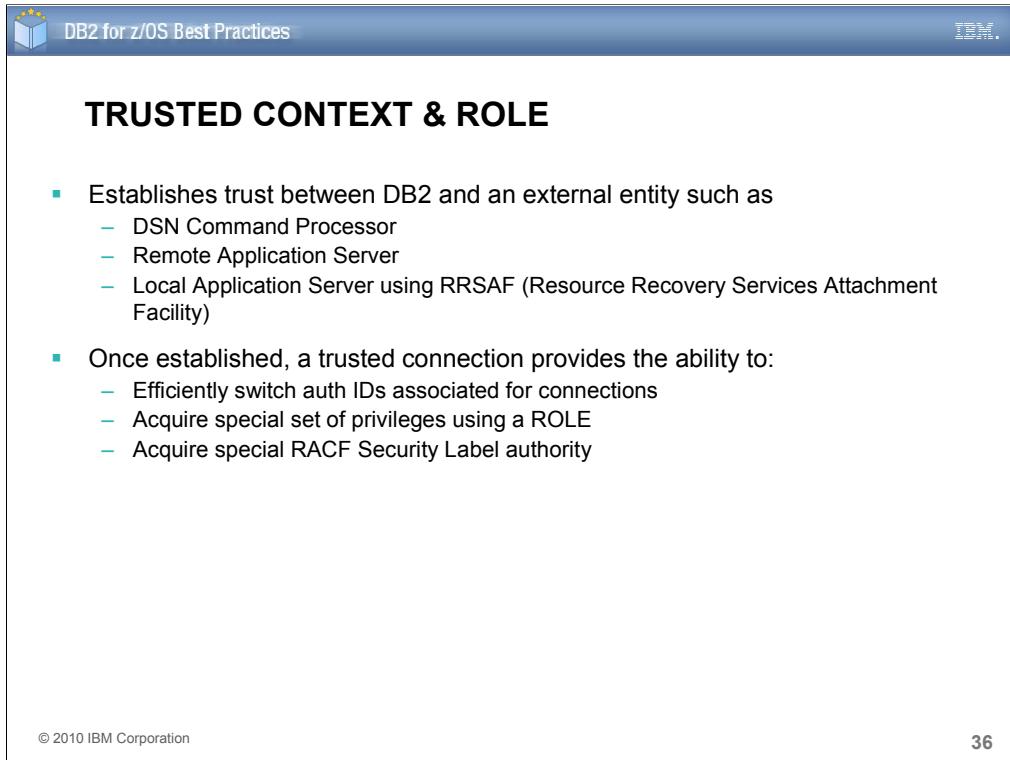
Trusted context addresses the problem of establishing a trusted relationship between DB2 and an external entity, such as a middleware server.

A series of trust attributes are evaluated at connect time to determine if a specific context is to be trusted.

The relationship between a connection and a trusted context is established when a connection to the server is first created.

Once established, a trusted connection provides the ability to:

- Use the trusted connection for a different user without authentication.
- Acquire special set of privileges by an authorization ID, that are not available to it outside the trusted context. This is accomplished by associating a role with the trusted context.
- Allow a role to own objects, if objects are created in a trusted context with role defined as the owner.
- Acquire security label (RACF SECLABEL) to be used for multi-level security verification. Multi-level security restricts access to an object or a row based on the security label of the object or row and the security label of the user.



The slide header features the IBM logo and the text "DB2 for z/OS Best Practices".

TRUSTED CONTEXT & ROLE

- Establishes trust between DB2 and an external entity such as
 - DSN Command Processor
 - Remote Application Server
 - Local Application Server using RRSAF (Resource Recovery Services Attachment Facility)
- Once established, a trusted connection provides the ability to:
 - Efficiently switch auth IDs associated for connections
 - Acquire special set of privileges using a ROLE
 - Acquire special RACF Security Label authority

© 2010 IBM Corporation

36

Trusted security context: Today, you have the option to set a system parameter which indicates to DB2 that all connections are to be trusted. It is unlikely that all connection types, such as DRDA, RRS, TSO, and batch, from all sources will fit into this category. It is likely that only a subset of connection requests for any type and source may be trusted or that you want to restrict trusted connections to a specific server. More granular flexibility will allow for the definition of *trusted connection objects*.

Once defined, connections from specific users via defined attachments and source servers will allow trusted connections to DB2. The users defined in this context can also be defined to obtain a *database role*.

Database role: A database role is a virtual authorization ID that is assigned to the user via the context mentioned next. DB2 privileges are assigned to the defined role.

The role exists as an object independent of its creator, so creation of the role does not produce a dependency on its creator.

This capability can allow a DBA to have privileges to create objects and manage them for a time, even though ownership is to be another id.

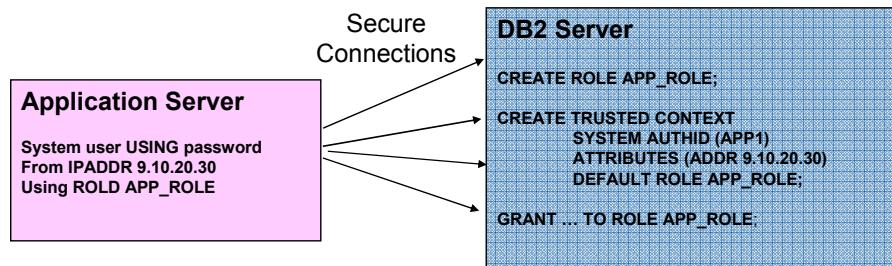
The role can be assigned and removed from individuals via the trusted authorization context as needed. This allows a DBA to perform object maintenance during a change control window on a Saturday night, for example. But when Monday arrives, they do not have the authority to do this same work.

Auditing trails of the work completed during the maintenance window are available for verification by a security administrator or auditor.



Access control for Application Server

- Create Trusted context and role associated with an application server
 - Remove privileges associated with the application server ID
 - Grant needed privileges to a role used by the application
 - Restrict access to connections from the App Server IP address
- No changes needed on the application server



© 2010 IBM Corporation

37

ROLES and Trusted Context can be used to provide added security for your network-attached application servers. These new capabilities allow the DBA to make GRANT statements conditional, so that they can only be used from a specified list of IP addresses. If someone steals the application server's userid / password, they won't be able to access the database unless they are also able to execute the SQL statement on one of the approved application servers.



DB2 for z/OS Best Practices

IBM

Secure DBA Activities

Security administrator can control use of special DBA privileges by:

- a. Revoking DBA privileges from individual IDs
- b. Granting special privileges to a DBA role
- c. Creating trusted context and assign the DBA role to the DBA IDs

When DBA needs to perform database change, the security administrator then

1. Starts DB2 audit trace (always on)
2. Enables trusted context to allow access to sensitive objects
3. DBA can now connect and performs the database change
4. Disables trusted context to protect sensitive objects
5. Stops DB2 audit trace (if used for short time)

Auditor can review the audit trace to ensure compliance

© 2010 IBM Corporation

38

The Trusted Context and ROLE support can be used to implement DBA privileges that can easily be disconnected and reconnected to individual employees. This provides function similar to shared SYSADM or DBADM userids, but avoids the audit compliance problems associated with shared userids. The ROLES have the ability to “own” DB2 objects, so that revoking a person’s ROLE does not cause the objects to be cascade deleted.

With these capabilities, customers are able to create DBA procedures that can be audited and protected so that one individual cannot violate the established rules without being detected during the audit review.



DB2 for z/OS Best Practices

IBM

End-to-End Auditing for Remote Applications

- Applications accessing DB2 without RACF user IDs
- Inbound IDs are different across systems
- Exploits z/OS Security Server user mapping SAF plug-in service
 - Default implementation is RACF's Enterprise Identity Mapping Feature (based on LDAP)
 - Retrieves RACF auth ID (used as DB2 primary authorization ID) from the remote user ID (non-RACF or distributed ID)
 - Provides many to one mapping
- Remote user IDs and DB2 auth IDs are included in both DB2 and RACF audit records

© 2010 IBM Corporation

39

The default implementation of the z/OS Security Server RACF (SAF) user mapping plug-in makes use of EIM domain on z/OS. EIM is a LDAP server, which acts as a repository of mappings between an authenticated user registry name and a z/OS user ID.

For DB2 to use the SAF user mapping plug-in, you need to set up and configure an EIM domain with user registries and user ID mappings on the z/OS system

To enhance the auditing of user identities who authenticate themselves in a distributed security domain and then access resources on a z/OS system, DB2 provides the original end user identity and the authenticated source registry name (Identity Context) to be included in RACF audit records. z/OS V1.8 or later is required for EIM. More details about EIM can be found at:

<http://www.ibm.com/servers/eserver/security/eim/>

Trusted connection is established using application server's user id and password. The user is switched in the trusted connection and client id and registry name are sent to the DB2 server. DB2 maps the registry name and client id to obtain DB2 authorization id. DB2 authorization id is used to determine if the user is allowed to switch in the trusted connection.

See chapter 9 and appendix B in the Securing DB2 and Implementing MLS on z/OS (SG24-6480-01) IBM Redbooks publication for more information on EIM scenario.



Disclaimer



Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision. The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code or functionality. Information about potential future products may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.

DB2 for z/OS Best Practices

IBM

DB2 10: Business Security & Compliance

- Protect sensitive data from privileged users & improve productivity
 - SYSADM & DBADM without data access
 - Usability: DBADM for all DB
 - Revoke without cascade
- Separate authorities to perform security related tasks, e.g. security administrator, EXPLAIN, performance monitoring and management
- Audit privileged users
- Row and column access control
 - Allow masking of value
 - Restrict user access to individual cells

Use disk encryption

© 2010 IBM Corporation

41

Customers are being pressed for a wide range of improved security and compliance. Data retention is a growing need. Protecting sensitive data from the privileged users and administrators is required. Separation of authority for security, access, and some common tasks, like EXPLAIN will help. Auditing for privileged users can also make compliance simpler.

Access control is refined in several ways with better granularity for the administrative privileges and with finer grained access control at the row and column level, including the ability to mask access to some fields. Auditing is also enhanced.

Minimize the use of SYSADM

- . New granular system authorities and install security parameters

Prior to DB2 10 <ul style="list-style-type: none"> ▪ SYSADM ▪ DBADM ▪ DBCTRL ▪ DBMAINT ▪ SYSCtrl ▪ PACKADM ▪ SYSOPR 	New in DB2 10 <ul style="list-style-type: none"> ▪ Install SECADM ▪ System DBADM ▪ ACCESSCTRL ▪ DATAACCESS ▪ SQLADM ▪ EXPLAIN
---	--

Prevent SYSADM and SYSCtrl from granting or revoking privileges

- New separate security install parameter
- New install SECADM has grant and revoke privilege

Control cascading effect of revokes

- New revoke dependent privileges install parameter
- New revoke dependent privileges SQL clause



© 2010 IBM Corporation

42

In DB2 X, new granular authorities are introduced to separate security tasks from system tasks, protect sensitive data from privileged users, and separate SQL tuning from requiring data access. New audit function allows to audit the use of privileged users.

Privilege – the capability to perform a specific operation, sometimes on a specific object

Explicit – GRANT or REVOKE

Implicit – ownership

Authority – a set of privileges, often covering a related set of objects.

Authorities often include privileges that are not explicit, have no name, and cannot be specifically granted. For example, when an ID is granted the SYSOPR authority, the ID is implicitly granted the ability to terminate any utility job.

Another refresher of current DB2 authorities. Emphasis can be made that the new authorities are to provide a separation of duties to different users without overlapping the responsibilities of each authority. SYSADM and DBADM are the existing authorities that are most affected.



Audit Policies provide needed flexibility and functionality

- New auditing capability allow you to comply without expensive external data collectors
 - New audit policies managed in catalog
 - Audit privileged users
 - Audit SQL activity against a table
 - Audit (non-z/OS) distributed identities





Protect against unplanned and all dynamic access

- Define additional data controls at the table level
 - Security policies are defined using SQL providing flexibility
 - Separate security logic from application logic
- Security policies based on real time session attributes
 - Protects against SQL injection attacks
 - Determines how column values are returned
 - Determines which rows are returned
- No need to remember various view or application names
 - No need to manage many views; no view update or audit issues
- All access including adhoc query tools, report generation tools is protected
- Policies can be added, modified, or removed to meet current company rules without change to applications



DB2 for z/OS Best Practices

DB2 10 Security Benefits

- More flexible authorization
- Separation of duties
- Do job without access to data
- Policies for audit
- Simpler control
- Tighter security
- Avoid cascade delete
- Avoid views and application security logic
- Allow more tools
- Evolve security policies
- Easier to manage security policy
→ Improved productivity & tighter security

© 2010 IBM Corporation

45

Access control is refined in several ways with better granularity for the administrative privileges and row and column access, including the ability to mask access to some fields. Auditing is also enhanced.

New security administrative authorities allow a flexible solution to allow a company to not use SYSADM by defining separate administrative authorities as required by company security policies

Performance analysts can perform their tasks without having access to user data

New audit capability allows security administrator to audit all use of new administrative authorities as well as define a set of security policies to audit the DB2 security policies

Using SQL to provide tighter security directly on tables with column masking and row filtering.

Eliminating views and security logic in applications

Preventing access from authorities including SYSADM and DBADM

Allowing usage of ad-hoc query tools, report generation tools

Making the evolution of security policies easy to deal with

Relieving the difficulties of managing security policies

 DB2 for z/OS Best Practices 

DB2 Security Provides

Very significantly increased

- ✓ **Security**
- ✓ **Flexibility**
- ✓ **Integration**
- ✓ **Ease of use for safe security**
- ✓ **Assurance**



© 2010 IBM Corporation 46

Everyone seems to be more aware of security today. Improving integration and making security more robust and easier to manage are very important.

Customers asked for a wide range of enhancements for security. New options for tighter security, more granularity, and more information for additional flexibility in applications and SQL are needed. Improved integration with the hardware and software platform provide a better end-to-end solution.

The design point for DB2 security is being easy to use for safe security, with solid system security and some security that is more flexible, that we'll call application security.

Finally, it will be helpful to see what assurance can be provided, such as certification. DB2 V8 is in evaluation for Common Criteria certification.

DB2 for z/OS Best Practices

Audit and security: other presentations

- DB2 10 security
- Protect & Comply – spectrum of solutions
- Best practices for security
- DB2 9 for z/OS security enhancements
- DB2 for z/OS Version 8 security enhancements
- Protect Your Assets with DB2 security
- DB2 for z/OS Auditing
- Other presentations on DB2 Events web page
- Click on Presentations from previous conferences



© 2010 IBM Corporation

47

DB2 security and auditing presentations:

New DB2 10 for z/OS Security Features Help Satisfy Your Auditors

http://www.ibm.com/software/os/systemz/telecon/6jul/index.html?S_TACT=100GU00M&S_CMP=SP

<ftp://public.dhe.ibm.com/software/data/db2/zos/presentations/v10-new-function/security-iod-2010-pickel.pdf>

Protect & Comply – spectrum of solutions

<ftp://ftp.software.ibm.com/software/data/db2/zos/presentations/security/protect-comply-imtc-2007-miller.pdf>

Best practices for security

<ftp://ftp.software.ibm.com/software/data/db2/zos/presentations/security/best-practice-security-idug-eu-2007-miller.pdf>

DB2 9 security enhancements

<ftp://ftp.software.ibm.com/software/data/db2/zos/presentations/security/db2-9-security-enhancements-iod-2007-chandran.pdf>

<ftp://ftp.software.ibm.com/software/data/db2/zos/presentations/security/db2-9-security-betworks-2007.pdf>

<ftp://ftp.software.ibm.com/software/data/db2/zos/presentations/security/db2-9-security-betworks-2007.wmv>

DB2 for z/OS Version 8 security enhancements

<ftp://ftp.software.ibm.com/software/data/db2/zos/presentations/security/v8-security-topics-multi-level-share-2005-miller.pdf>

Protect your assets with DB2 security

<ftp://ftp.software.ibm.com/software/data/db2/zos/presentations/security/>

Other presentations on DB2 Events web page. Start here, then Click on Presentations from previous conferences

<http://www.ibm.com/software/data/db2/zos/events.html>

Securing DB2 and Implementing MLS on z/OS, SG24-6480-01

<http://www.redbooks.ibm.com/abstracts/sg246480.html>

 DB2 for z/OS Best Practices

For Additional Information on IBM's End-to-End Security Solutions

Learn more about how IBM can provide a holistic, business-driven security approach

www.ibm.com/security

Learn more about specific solutions with IBM security

- [IBM System z Security Building Blocks](#)
- [IBM Data Encryption Solutions](#)
- [IBM Security Management Solutions](#)
- [IBM Facility Security Solutions](#)
- [IBM Security Services](#)



© 2010 IBM Corporation

48

<http://www.ibm.com/security/>
<http://www.ibm.com/systems/z/advantages/security/features.html>
http://www.ibm.com/systems/storage/solutions/data_encryption/index.html
<http://www.ibm.com/software/tivoli/solutions/security/>
<http://www.ibm.com/services/us/index.wss/offerfamily/gts/a1027703>
<http://www.ibm.com/services/us/index.wss/itservice/iss/a1030786>

<http://www.ibm.com/security/outlook.html>
http://memphistn.rchland.ibm.com/wps/wcm/connect/content_en_US/systems/systems/dynamicinfrastructure
ftp://ftp.software.ibm.com/software/tivoli/whitepapers/outlook_emerging_security_technology_trends.pdf

Disk encryption announcement,
http://www.ibm.com/common/ssi/rep_ca/0/897/ENUS109-120/ENUS109-120.PDF
<http://www.ibm.com/systems/storage/>
<http://www.ibm.com/systems/storage/disk/ds8000/index.html>
<http://www.ibm.com/systems/storage/solutions/security/>

 DB2 for z/OS Best Practices

Get updated books **April 2010**
<http://publib.boulder.ibm.com/infocenter/imzic/>

- ✓ Administration Guide
- ✓ Data Sharing: Planning and Administration
- ✓ Performance Guide
- ✓ Utility Guide and Reference
- ✓ Application Programming Guide & Reference
- ✓ Application Programming Guide & Reference for JAVA™
- ✓ ODBC, Spatial, ...
- ✓ Redbooks
- ✓ Installation Guide
- ✓ RACF Access Control Module Guide
- ✓ Messages
- ✓ Codes

...
© 2010 IBM Corporation





49

You can get most of the books from the Information Center or from the DB2 Library web page. The books continue to be updated, so get the latest ones. Some of the IBM Redbooks publications will be helpful. You may need books from the z/OS Library as well.

<http://publib.boulder.ibm.com/infocenter/imzic/>

<http://www.ibm.com/support/docview.wss?rs=64&uid=swg27011656>

<http://www.ibm.com/systems/z/os/zos/bkserv/r9pdf/>

Be sure to use the latest information to save time and problems. Some of the IBM Redbooks publications have added lately or updated (next page).

DB2 for z/OS Best Practices

DB2 9 in IBM Redbooks Publications

- 1. DB2 9 Technical Overview SG24-7330
- 2. DB2 9 Performance Topics SG24-7473 update just made
- 3. DB2 9 Stored Procedures SG24-7604
- 4. Index Compression with DB2 9 for z/OS redp4345
- 5. SQL Reference for Cross-Platform Development
- 6. Enterprise Database Warehouse, SG24-7637
- 7. 50 TB Data Warehouse on System z, SG24-7674
- 8. New Tools for Query Optimization SG24-7421
- 9. LOBs with DB2 for z/OS SG24-7270
- 10. Deploying SOA Solutions SG24-7663
- 11. Enhancing SAP - DB2 9 SG24-7239
- 12. SAP Application on Linux z SG24-6847
- 13. Best practices SAP BI - DB2 9 SG24-6489-01
- 14. Data Sharing in a Nutshell, SG24-7322
- 15. Securing DB2 & MLS z/OS SG24-6480-01
- 16. Data Sharing: Distributed Load Balancing & Fault Tolerant Configuration redp4449
- 17. Considerations on Small & Large Packages redp4424
- 18. Backup and Recovery Considerations redp4452
- 19. Powering SOA with IBM Data Servers SG24-7259
- 20. Packages Revisited, SG24-7688
- 21. Data Studio V2.1 Web Services redp4510
- 22. Ready to Access Solid-State Drives redp4537
- 23. Distributed Functions SG24-6952
- 24. Buffer Pool Monitoring & Tuning redp4604
- 25. Securing & Auditing Data SG24-7720
- 26. Serialization and Concurrency SG24-4725-01 new
- 27. Utilities SG24-6289-01 newest
- 28. Integrated Data Management Service Level Objectives, SG24-7769

© 2010 IBM Corporation

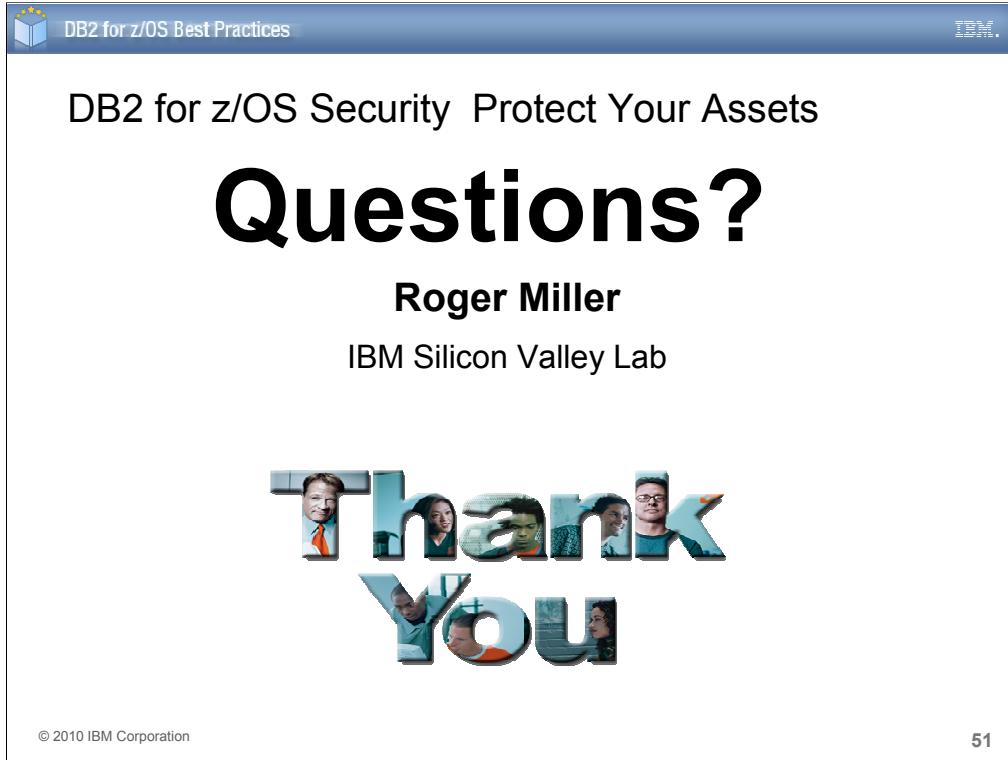
50

DB2 library more information <http://www.ibm.com/software/data/db2/zos/library.html>

Many IBM Redbooks publications, Redpapers and one cross-platform book on DB2 9 are published, in addition to the standard library, with more in the works. Check for updates.

<http://www.redbooks.ibm.com/cgi-bin/searchsite.cgi?query=db2+AND+9+AND+for+AND+z/os>

1. DB2 9 Technical Overview, SG24-7330 <http://www.redbooks.ibm.com/abstracts/SG247330.html>
2. DB2 9 Performance Topics, SG24-7473, <http://www.redbooks.ibm.com/abstracts/SG247473.html>
3. DB2 9 Stored Procedures, SG24-7604, <http://www.redbooks.ibm.com/abstracts/SG247604.html>
4. Index Compression DB2 9, REDP4345, <http://www.redbooks.ibm.com/abstracts/redp4345.html>
5. Deploying SOA Solutions SG24-7663, <http://www.redbooks.ibm.com/abstracts/SG247259.html>
6. Cross-Platform Development Version 3, <http://www.ibm.com/developerworks/db2/library/techarticle/0206sqlref/0206sqlref.html>
ftp://ftp.software.ibm.com/ps/products/db2/info/xplatsql/pdf/en_US/cpsqlrv3.pdf
7. Enterprise Data Warehousing, SG24-7637, <http://www.redbooks.ibm.com/abstracts/sq247637.html>
8. LOBs: Stronger & Faster SG24-7270, <http://www.redbooks.ibm.com/abstracts/SG247270.html>
9. Securing DB2 & MLS z/OS, SG24-6480-01, <http://www.redbooks.ibm.com/abstracts/sq246480.html>
10. Enhancing SAP, SG24-7239, <http://www.redbooks.ibm.com/abstracts/SG247239.html>
11. Best practices SAP BI, SG24-6489-01, <http://www.redbooks.ibm.com/abstracts/sq246489.html>
12. New Tools for Query Optimization, SG24-7421, <http://www.redbooks.ibm.com/abstracts/sq247421.html>
13. Data Sharing in a Nutshell, SG24-7322, <http://www.redbooks.ibm.com/abstracts/sq247421.html>
14. DB2 9 for z/OS Data Sharing: Distributed Load Balancing and Fault Tolerant Configuration <http://www.redbooks.ibm.com/abstracts/redp4449.html>
15. Considerations on Small and Large Packages redp4424 <http://www.redbooks.ibm.com/abstracts/redp4424.html>
16. Backup and Recovery Considerations redp4452 <http://www.redbooks.ibm.com/abstracts/redp4452.html>
17. Powering SOA IBM Data Servers, SG24-7259 <http://www.redbooks.ibm.com/abstracts/SG247259.html>
18. Packages Revisited, SG24-7688 <http://www.redbooks.ibm.com/abstracts/SG247688.html>
19. 50 TB Data Warehouse Benchmark on IBM System z <http://www.redbooks.ibm.com/abstracts/sq247674.html>
20. SAP on DB2 9 for z/OS: Implementing Application Servers on Linux for System z <http://www.redbooks.ibm.com/abstracts/sq246847.html>
21. IBM Data Studio V2.1: Getting Started with Web Services on DB2 for z/OS <http://www.redbooks.ibm.com/abstracts/redp4510.html>
22. Ready to Access DB2 for z/OS Data on Solid-State Drives <http://www.redbooks.ibm.com/abstracts/redp4537.html>
23. Parallel Sysplex Operational Scenarios <http://www.redbooks.ibm.com/abstracts/sq242079.html>
24. Distributed Architecture <http://www.redbooks.ibm.com/abstracts/sq246952.html>
25. Buffer Pool Monitoring & Tuning <http://www.redbooks.ibm.com/abstracts/redp4604.html>
26. Securing and Auditing Data <http://www.redbooks.ibm.com/abstracts/sq247720.html>
27. Serialization & concurrency, SG24-4725-01 <http://www.redbooks.ibm.com/abstracts/sq244725.html>
28. Utilities SG24-6289-01 <http://www.redbooks.ibm.com/abstracts/sq246289.htm>



DB2 for z/OS Best Practices

IBM

DB2 for z/OS Security Protect Your Assets

Questions?

Roger Miller

IBM Silicon Valley Lab



© 2010 IBM Corporation

51

Thanks for coming.

Title – DB2 for z/OS technical evangelist, strategist, architect, designer, developer, writer, service, DB2 factotum (from the Latin for does everything or jack of all DB2 trades, master of several).

Current Projects - Roger is working to roll out DB2 9 for z/OS, to design the next improvements in DB2.

Technical accomplishments - Roger Miller is a DB2 for z/OS technical evangelist, architect and designer who worked on many facets of DB2, ranging from overall design issues to SQL, languages, install, security, audit, standards, performance, concurrency, and availability. He has worked for 30 years on DB2 development, product design and strategy. He often helps customers to use the product, answers many questions and presents frequently to user groups.

Fun facts - Roger likes hiking, bicycling, reading, Shakespeare, Yosemite and bears. He has learned to like working out with a personal trainer.