Informix Dynamic Server 9.4

Performance. Reliability. Scalability

Informix Dynamic Server v9.4-
How and Why to upgrade Today

@business on demand software

DB2 Information Management Software

www.ibm.com/informix/ids

Informix Dynamic Server 9.4

Fast,
Reliable,
Scaleable,
Successful!

Patricia Quinn

WorldWide Brand Manager, Informix Dynamic Server

IBM Information Management Solutions

e·business on demand software

www.ibm.com/informix/ids

DB2 Information Management Software

IDS 9.40 – Market Success!

The fastest, most reliable, highest scaling IDS database ever produced…. provides the performance and reliability needed for today's always available, demanding and global e-business environments.

Inform*i*x
Dynamic Server

"With over 1200 downloads, IDS 9.4 has become the most successful download ever at the IIUG site."
IIUG, July 24, 2003

"… the majority of Informix users plan to continue to use or expand their use of Informix in the foreseeable future…"
July, 2003 IBM survey of over 200 Informix customers worldwide

IDS 9.4 – Delivering Business Value

- IDS 9.4 provides the **performance, reliability and scalability/availability** needed for today's demanding and global e-business environments

- 9.4 continues to reduce the complexity, time, DBA skills and costs associated with database management by eliminating, simplifying and automating many tasks traditionally associated with maintaining an enterprise-class database.

- IBM & IDS enables Customers and Business Partners to improve their profitability, reduce their risk and deliver best of breed solutions.

Who's using IDS 9.40?

Application

Hosts 40,000 financial transactions daily for transportation industry

Business Benefits

Can now offer <u>more secure and highly available processing</u> environment with added encryption and combined ER & HDR functionality. Large chunks saves DBA cycles.

"<u>We chose Informix over Oracle</u> for its superior performance and stability, as well as its extremely competitive price. That decision has consistently reaffirmed itself in our ongoing evaluations of the data management marketplace.

We have no doubt that <u>IBM Informix 9.4</u> is as robust and reliable as any database available today, and the absolute leader in cost-performance."

Stephen Cobb
Senior Database Administrator

Large Chinese Telecommunications Equipment Manufacturer

- Needed to reduce costs and achieve a more stable platform with greater functionality .. wanted to consolidate to a single hardware and database environment.

- Consolidated from a multiplatform to a single Linux environment
- Database servers were consolidated from Microsoft® SQL Server, Oracle and Informix to **Informix IDS 9.4. Linux on IBM eServer xSeries platform**

- Significantly reduced IT platform costs
- Achieved a high performance, scalable and reliable single, integrated hardware and software environment

Major Financial Institution:
IDS 9.4/Finance Foundation/RedHat Linux 7.2

Wanted to develop a **competitive advantage** by implementing a sophisticated quantitative analysis system that could effectively search and analyze both real-time and historical data to spot trends identified by quantitative models. It planned to use the solution for equities research, and arbitrage and hedging analytics in addition to addressing regulatory compliance issues.

In order to meet budget requirements for the project also needed an alternative to its UNIX-based Sun Solaris operating environment that could help drive down costs without compromising system performance.

The new solution has helped to increase revenue and improve risk management functions (and) because the solution is running on Linux, was able to optimize solution performance on Intel-based servers, which are less expensive to purchase and maintain than UNIX-based server.

Application Partners

- Combine IDS with our partner's products to achieve world-class solutions for any business problem!

  ‣ IDS & SAP

  ‣ IDS & BAAN

  ‣ IDS & PeopleSoft

  ‣ IDS & Lawson

9.4 News…

DB2 Information Management Software

IDS 9.4 for Linux on zSeries

- IBM Informix 9.40 is the first IBM database engine to fully exploit the large memory, **64-bit** capabilities of the Linux kernel on the zSeries , and provides an excellent upgrade path for our Linux customers needing a high-performance, Internet-scalable data management system

- Fully implemented **64-bit** architectures, such as zSeries , removes the 31-**bit** limitations from files, files systems, and applications and enables the use of detail-data regardless of its volume.

- **64-bit** systems also reduce the work of the application programmer by removing the design constraints inherent in 31-**bit** architectures. This means larger I/O block sizes, reduced disk accesses, the ability to store more data in system memory, all of which result in improved performance, ease of use, and the ability to handle larger problems more easily.

.Net, Windows 2003

- IDS 9.40 certified on Windows 2003

- Currently, .Net connectivity through ODBC or OLEDB

- Native .Net Provider will be delivered with CSDK 2.81, available by end of 2003

- Technical Preview available as of next week

IDS 9.4 Promotion - US & Canada, ends 12/31/03!

- From 7/22/03 through 12/31/03 Purchase a trade up from IDS 7.x to IDS 9.4 (including Linux on zSeries) or the Transaction Processing Gold Bundle and a NEW IDS 9.4 or Transaction Processing Gold license and receive a rebate!
- Rebates are tiered - more heavily weighted to early months – Buy early!

- For more information
  - US: www.ibm.com web site; enter IDS0722 in the "NavCode" window
  - Canada: www-132.ibm.com/content/home/store_IBMPublicCanada/en_CA/special_offers.html

IDS Product Life Cycle Dates

- **IDS 7.31**
  - ▶ End of marketing 4/15/05   (aka Cat 3)
  - ▶ End of support 4/15/06   (aka Cat 4)

- **IDS 9.2**
  - ▶ End of service 9/30/03
- **IDS 9.3**
  - ▶ End of marketing 1/15/04
  - ▶ End of service 9/15/04
- **IDS 9.4**
  - ▶ End of marketing 4/15/05
  - ▶ End of service 4/15/06

www.ibm.com/software/data/informix/support/plc

Migrating IBM IDS 7.X -> 9.X

DB2 Information Management Software

Jeffrey Bohm
Senior Trainer
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IBM Informix Dynamic Server

IDS 7

Hardended
Classic Database
Features
Traditional Data Types
Administrative helps
- Onstat
- Oncheck
- ISA

Scalability
- Up to 2GB Chunks
- Up to 4TB Instances

Security
- Encrypted Passwords

IDS 9

Database for an On-Demand World
Features
Administrative helps
- **Dynamic locks**
- **Dynamic Logs**
- **Shared Statement Cache**
- **Large Chunks**
- **HDR with ER**
- Onstat Enhancements
- Rename chunks during Restore
- More In-Place Alters
- Attach Detach Fragment
- AGS ServerStudio JE

Developer helps
- **Long Ids**
- On Select Triggers
- Retain Update Locks
- Additional SQL functions
- Non-Logging Tables

Plus ...
Improved Performance
- **Fuzzy checkpoints**
- **Fractional LRU Min/Max**
- **B-Tree Scanner**
- **8-10% Faster than IDS 7.31**
- Memory Resident Tables
- Reduced code paths

Latest Platform Support

Scalability
- **Up to 4TB Chunks**
- **Up to 128PB Instances**
- 2GB Utility Limitation removed

Security
- **Encrypted Communications**
- Plug-in Authentication Modules

… but best of all …
- 2 minute upgrade from 7.3
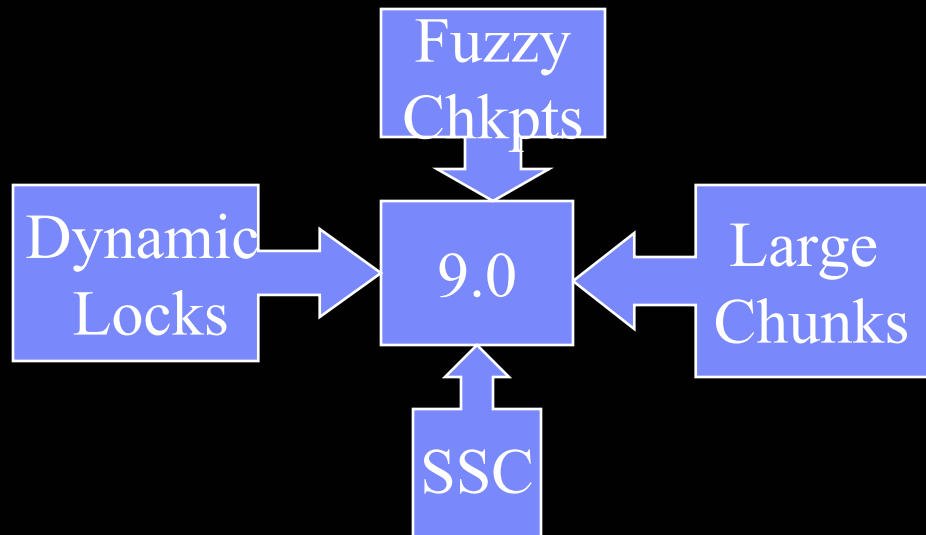- Fully Backward Compatible

The HOW & WHY

- Migration / Reversion
- 9.x Server Features
- SQL Additions
- Smart Large Objects
- Extensibility Feature

What Does 9.X Mean?

- IDS has many 9 versions
  - 9.0, 9.1, 9.2, 9.3, and 9.4
- Extensibility started in 9.0
- Other Features added to later versions

Migration

- Can be done from 7.2, 7.3, 9.14, 9.2, and 9.3
- Release notes provide key information
- A small amount of preparation is required

Release Notes

- Usually 15-20 pages
- Print and keep handy during migration
- Information about new features and changes to existing features
- OS level information
- Third party software version support
- Much, much more………
- $INFORMIXDIR/release/en_us/0333

Migration Footnotes

- Installation media
- Pre-install new version in different directory if possible
- Level 0 archives before and after
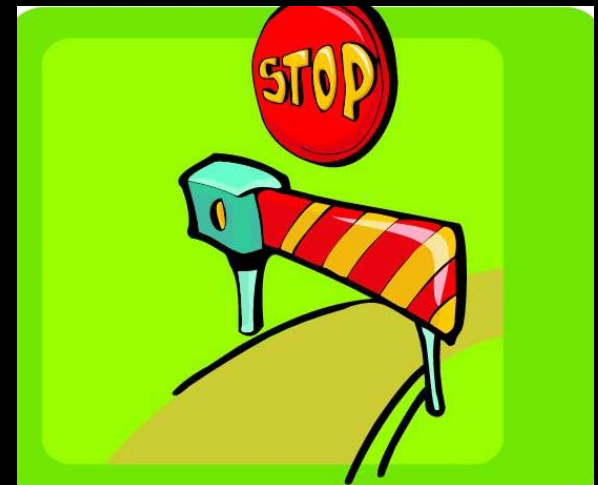- Verify storage manager validation
- Test, test, test……..

Migration Checklist

- Enough disk space
- Configuration files
  - onconfig, sqlhosts, On-Bar, On-Audit
- ER conversion / disable HDR, if necessary
- NO open transactions/ In-Place Alters
- Environment variables
  - INFORMIXDIR,PATH, any library variables
- Data Integrity checks
- UPDATE STATISTICS

Reversion

- Reversion capable
- Only back as far as 7.20.UC1
- Onmode –b <major version>
  - ▸ Major versions are 7.2, 7.3, 9.14, 9.2, 9.3

Reversion Capable??

- New features will not revert back to previous versions
- Onmode –b does a check of all databases for these new features
  - ▸ 2 phases (Check, Reversion)
- Key non-revertible items
 - ▸ New databases, in-place alters, new SPL and triggers, new indices

Reversion Footnotes

- Reversion Capable
- Installation media
- Pre-install old version in different directory if possible
- Level 0 archives before and after
- Verify storage manager validation

Reversion Checklist

- Reversion Capable
- Configuration files
  - ▸ onconfig, sqlhosts, On-Bar, On-Audit
- ER reversion/ disable HDR, if necessary
- NO open transactions/ in-place alters
- Environment variables
  - ▸ INFORMIXDIR,PATH, any library variables
- Data Integrity checks
- UPDATE STATISTICS
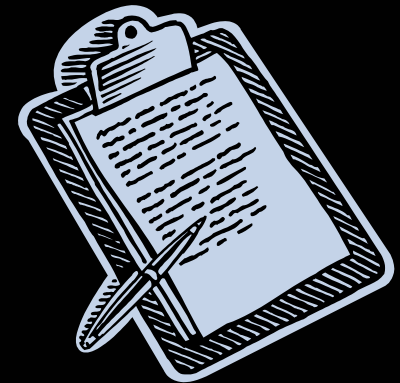
9.x New Server Features

- Sql Statement Cache (SSC)   9.21
- Dynamic Locks   9.20
- Dynamic Logs   9.30
- Large Chunks   9.40
- Onpladm   9.21
- Fuzzy Checkpoints   9.20
- And many, many more………..

SQL Statement Cache

- SQL statements are stored in a shared area
- Session level memory is reduced
- Eliminates statement reparsing
- Only DML statements are eligible
- Onconfig parameters, environment variables, onmode –e commands, and SET SQL statement

Dynamic Locks

- Initial size is still specified with the LOCKS onconfig parameter
- Size can be increased up to 16 more times
- Size is increased by the <u>minimum</u> of:
  - ▸ 100,000
  - ▸ LOCKS parameter setting

Dynamic Logs

- Helps finish ROLLBACK of large transactions that fills the logical logs.
- DYNAMIC_LOGS onconfig parameter
  - ▸ Default value is 2
  - ▸ LTXHWM/LTXEHWM to 80/90 respectively
- Onparams –i option added
- Adding logs no longer requires Quiescent mode or an archive

Fuzzy Checkpoints

- Doesn't flush all dirty buffers to disk
- Shorter checkpoint duration means less impact on the users
- Disk is not physically consistent
- Uses logical logs for disaster recovery
- Reduces physical log size requirements

Onpladm

- New command line administration tool for use with HPL
- X-Windows GUI no longer needed
- Administration can now be scripted
- Example:
  - ‣ onpladm create job *jobname* –n –d *device* –D *database* –t *table*

Large Chunks   9.40

- 4 Terabyte Chunks and Offsets
- 32,767 Chunk limit
- Incremental conversion
    - Onmode –BC <stage>
    - Stages are 0,1, and 2
    - Stage 0 is default (large chunks disabled)
    - Stage 1 is still revertible
    - Stage 2 can only be reverted via archive

Security   9.40

- Previously, password encryption using CSS/CSM technology

- Now (optionally) using CSS/CSM to encrypt all conversations from client to server
  - ▶ Using cryptography libraries from OpenSSL.
  - ▶ Not using OpenSSL directly because of design of ASF.

- Optionally encrypt ER traffic
  - ▶ Often sent over long-haul networks.
  - ▶ Protects data sent over Internet.
- With IDS 9.40 *X*C2 Pluggable Authentication Modules are supported.

- Check the config notes all in $INFORMIXDIR/release/en_us/0333/pam.txt to implement

Pluggable Authentication Modules

- Allows LDAP support with IDS
- Implemented on PAM platforms:
  - AIX 32 bit
  - HP UX
  - Sun Solaris
  - Linux
  - Windows and other non-PAM platforms not supported
- Supports "Challenge Response"
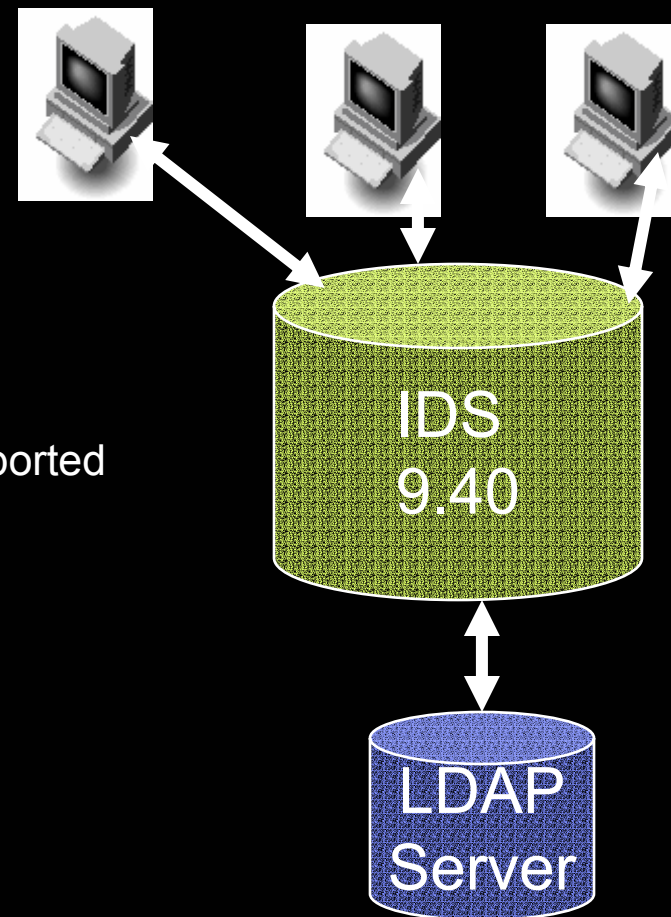
Rewritten B-Tree Cleaning   9.40

- Under previous versions
  - ▶ Single-threaded B-Tree cleaner
  - ▶ Could get overwhelmed by amount of work to do
- Replaced by B-Tree Scanner
  - ▶ Prioritized workload
  - ▶ Multiple scanner threads possible
- Alternative algorithms available
  - ▶ Leaf scan
  - ▶ Light range scan
- Controlled by onmode
- Monitored on onstat
  - ▶ Adjust priority of threads
  - ▶ Adjust number of threads

B-Tree Cleaner

Revised Buffer Priority Management   9.40

- Older system gave priority to
    - ▸ Memory-resident tables
    - ▸ Index pages
- Had four tier priority system
    - ▸ High, Medium High, Medium Low, Low
- New system has two tier priority system
    - ▸ High – using FIFO
    - ▸ Low – using LRU
    - ▸ Maximum amount of High is controllable
    - ▸ Moves frequently used pages from low to high automatically
    - ▸ Resets the use counters at checkpoints
- Dynamically balances use of shared memory
    - ▸ Improves overall performance

And the list goes on and on and on……..

- **Too many new features to continue to mention in this short amount of time.**

SQL Additions

- ANSI JOIN syntax support
- ORDER BY change
- On Select Triggers
- New defined data types

JOIN Syntax

- ANSI JOIN syntax supported in 9.21
  - ▸ SELECT c.cust_num, company, o.ord_num

    FROM customer c JOIN orders o

    ON c.cust_num = o.cust_num

    WHERE …
- LEFT and RIGHT OUTER support in 9.4
- CROSS JOIN support in 9.4

ORDER BY change   9.40

- Order By columns no longer required in the select list
- Example:
    - ▶ SELECT cust_num, lname

        FROM customer

        ORDER BY zipcode;

ON SELECT Triggers   9.30

- Have always had INSERT, UPDATE, and DELETE TRIGGERS
- Can now fire a trigger based on the selection of a column or row of a table
- Syntax:
  - ▸ CREATE TRIGGER trigname

    SELECT [OF column] ON table …

New defined data types

- LVARCHAR
  - ▸ Default 2K, explicitly up to 32,767 and if used as opaque > 2GB
- Boolean
- Integer8 / Serial8
  - ▸ -9,223,372,036,854,775,807 to + of the same
- Row
  - ▸ Named and Unnamed
- Collections
  - ▸ Set, Multiset, and List

Smart Large Objects (SLOBS)

- BLOB and CLOB data types
- Extensibility storage
- Stored only in Sbspaces
- Onspaces –S, -g, -Mo, -Ms, -Df options
- Onconfig parameters
  - SBSPACETEMP
  - SBSPACENAME
  - SYSSBSPACENAME

Simple   vs.   Smart

- Max Size 2GB
- Logging mode depends on the db
- Read/Write at the whole object level
- Lock entire object

- Max Size 4TB
- Logging mode set at the object level
- Read/Write at the byte level
- Lock entire or portion of the object

Etc., etc., etc.

Extensibility

- **Extending into ORDBMS**
  - Complex data types
  - User-defined data types
- **DataBlades**
  - UDTs
  - UDRs / UDAs
  - Written in C, C++, JAVA, or SPL

A Simple Data Query

```
SELECT company_name, SUM(billed_amount) amount
  FROM invoice_history
  WHERE inv_date <= '12/31/97'
  ORDER BY amount DESC;
```

Result set:
company_name	amount
Zuzu Products	$15,498.78
Amalgam Ltd.	$12,458.20
Cosmo Inc.	$11,092.94
Widgets Inc.	$ 9,495.20
Bill Johnson	$ 8,394.44

Add GeoSpatial Information

```
SELECT company_name, mpn_Distance (location, LatLong (
    '52 Commerce St. Dallas, TX 75009'))::miles dist,
    SUM(billed_amount)amount
 FROM invoice_history
 WHERE inv_date <= '12/31/97'
 ORDER BY dist;
```

Result set:

company_name	dist	amount
Zuzu Products	1 mi	$15,498.78
Amalgam Ltd.	207 mi	$12,258.20
Cosmo Inc.	955 mi	$11,092.92
Widgets Unl.	1407 mi	$ 9,495.20
Bill Johnson	9081 mi	$ 8,394.44

User-Defined Types

- ## Distinct

  - ▶ Based on an existing data-type

  - ▶ Strongly typed – explicit cast required

  - ▶ Example
    - CREATE DISTINCT TYPE age_in_months AS SMALLINT
    - CREATE TABLE cust_info (name ROW(fname char(20), lname char(30)), age

      age_in_months);
    - SELECT * FROM cust_info where age::smallint > 60;

User-Defined Types (con't)

- Opaque
  - User created structure
  - Steps:
    - Define the data structure
    - Write support functions
    - Register the data type
    - Register the support functions
    - Cast the opaque data type
    - Grant privileges
    - Write any additional UDRs needed to support the data type
    - Create secondary access methods and aggregates

JAVA in the Server

- Certain versions starting with 9.2 support JAVA
- Run through JVP VP
- JVM 1.3 support starting in 9.3
- Allows UDRs to be written in JAVA
- Several onconfig parameters including
  - JDKVERSION, JVPJAVAHOME, and JVPLOGFILE

IDS 9.40 Common Problems

- Problem: Customer Attempted to load the following into a single directory: Tools 7.32.UC1; SDK 2.81.UC2; IDS 9.40.FC2
- Solution: 64-bit products should be installed in a different directory than any 32-bit products
- Problem: Windows 2000
  - ▸ Build SMI fails with permission problems
  - ▸ Customer created Informix Account & Group
- Solution:
  - ▸ Uninstall
  - ▸ Delete Informix Account & Group
  - ▸ Reinstall and allow install to create necessary users and groups
- Problem: Upgrading from 9.30 one database did not convert because it did not have enough space.
- Solution:
  - ▸ Level 0 Restore
  - ▸ Add adequate space prior to initiating restore

Quick Summary

- IBM IDS has a built-in automatic migration and reversion utilities
- Lots of new features have been added to the 9.x versions to enhance the product in both performance and functionality
- IBM has an interest in continuing to enhance IDS well into the future

Where to Get More Information

- Check http://www.ibm.com/training/us for more classes on 9.x features and administration

- Feel free to email me with questions and comments about today's web-cast
  - Email: jbohm@us.ibm.com

Informix – WebSphere integration

- IBM Informix Dynamic Server (IDS) is certified with WebSphere!*

WebSphere. software

WebSphere Application Server

WebSphere Express

WebSphere Portal Enable

WebSphere Portal Extended

WebSphere Portal Express (multi-platforms)**

WebSphere MQ Series

WebSphere Studio Site Developer

WebSphere Studio Application Developer

WebSphere Studio App. Dev. Integration Edition

WebSphere Studio Enterprise Developer

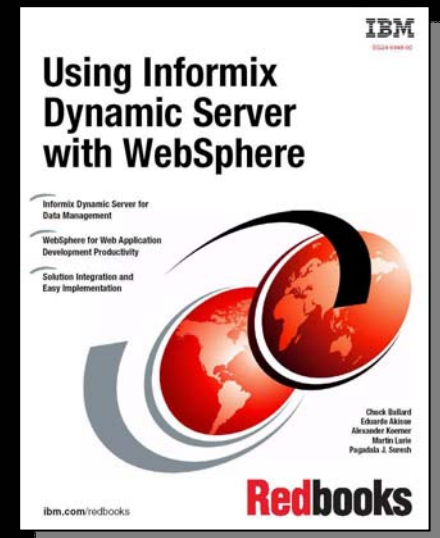* Some products not certified with all releases of IDS
**scheduled to be certified Q303

For more information: www.ibm.com/informix/websphere

The First IBM Informix **Red**book!
- Covers all IDS / WebSphere Topics
- Lots of step-by-step examples (example code downloadable)
- Based on Linux and Windows
- Download at: **ibm.com/redbooks**

  ▸ Redbook ID: SG24-6948

IBM

Using Informix Dynamic Server with WebSphere

Informix Dynamic Server for Data Management

WebSphere for Web Application Development Productivity

Solution Integration and Easy Implementation

Chuck Ballard
Eduardo Akisue
Alexander Koerner
Martin Lurie
Pagadala J. Suresh

ibm.com/redbooks

Redbooks

Thank you!

Official question time…….

Questions????

Websites for more information:

- Informix Dynamic Server (IDS)   ibm.com/informix/ids
- IBM Information Mgt. Software   ibm.com/software/data
- Informix home page   ibm.com/informix
- Informix Portfolio White Paper   ibm.com/informix/whitepaper
- Product Life Cycle   ibm.com/informix/support/plc/
- Informix Users Groups   www.iiug.org
- DeveloperWorks – Informix Section
  www7b.software.ibm.com/dmdd/zones/informix/