

Data Management

Moving from Sybase ASE to DB2 easily

An introduction to the
IBM DB2 SQL Skin feature
for applications compatible with Sybase ASE



> Executive's Message



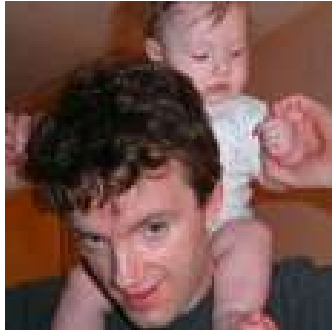
Sal Vella

Vice President, Development,
Distributed Data Servers and Data Warehousing

IBM



> Featured Speaker



William Kulju

Product Manager,
DB2 for Linux, UNIX, and Windows

IBM



Agenda

- **Industry trends: cost cutting & consolidation**
- **What DB2 is doing to make saving money and consolidation easy**
- **Introducing the DB2 SQL Skin for Sybase ASE**
- **Results from the beta**
- **Architectural overview**
- **Compatibility details**
- **Q&A**



Reducing database costs is top of mind

Q: How critical is it to address each of the following challenges with regards to improving your business performance and efficiency?



Q: How critical are each of the following IT areas with regards to improving your business performance and efficiency?



Source: 2009 IBM Survey of 1879 IT decision makers

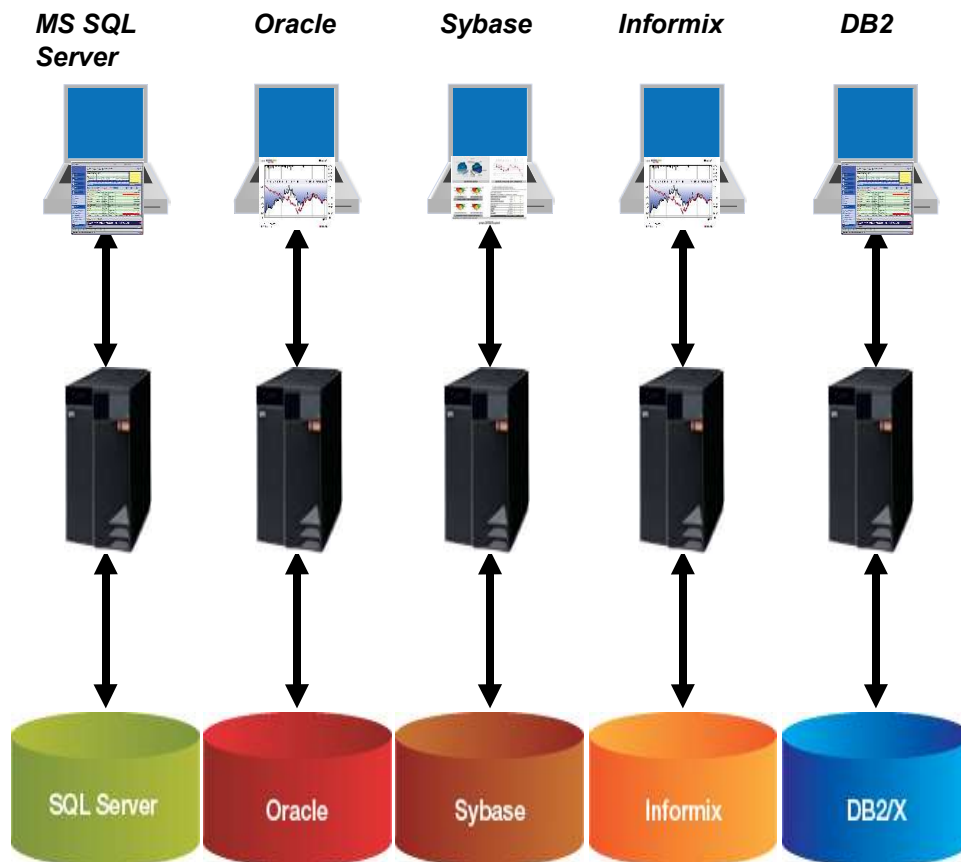
Database consolidation: Doing more with less

1. Heterogeneous database environments are costly

- Underutilized software licenses and hardware
- Increased complexity
 - Fixpaks and patches
 - Development and test
 - New version deployment
 - End-user training and support
 - Dealing with multiple vendors
- Non-transferrable development and administration skills

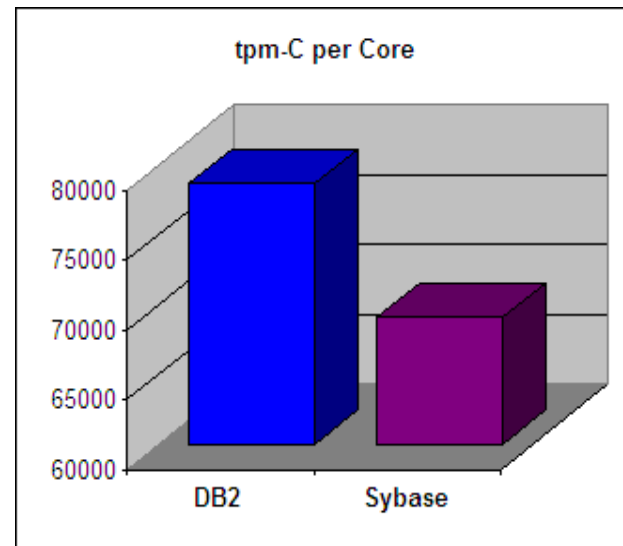
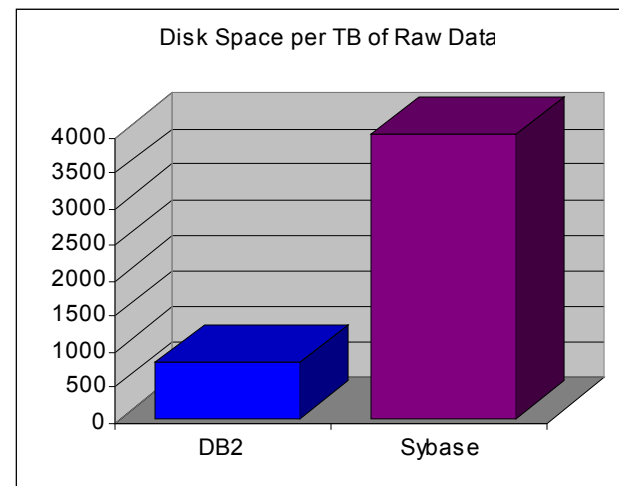
2. Consolidation frees up budget and staff for

- New IT projects
- Improvement of existing services



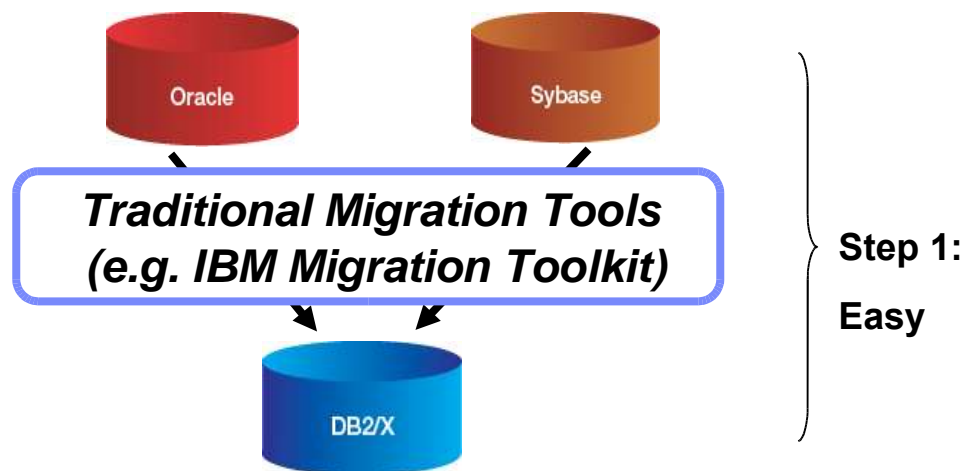
DB2 9.7 is the premier consolidation platform

- **Full Autonomics**
 - Free your DBAs from mundane administrative tasks to focus on more useful work
 - Helps Sybase + Oracle DBAs become productive on DB2 quickly
- **Deep Compression**
 - Compress data by up to 80% and save big on storage
- **Virtualization and Flexible Licensing**
 - Enjoy the benefits of consolidation
 - Only pay for what you use
- **Excellent Performance Characteristics**
 - Do more work with existing hardware
- **Oracle and now Sybase Compatible**
 - Save on licensing, maintenance and support

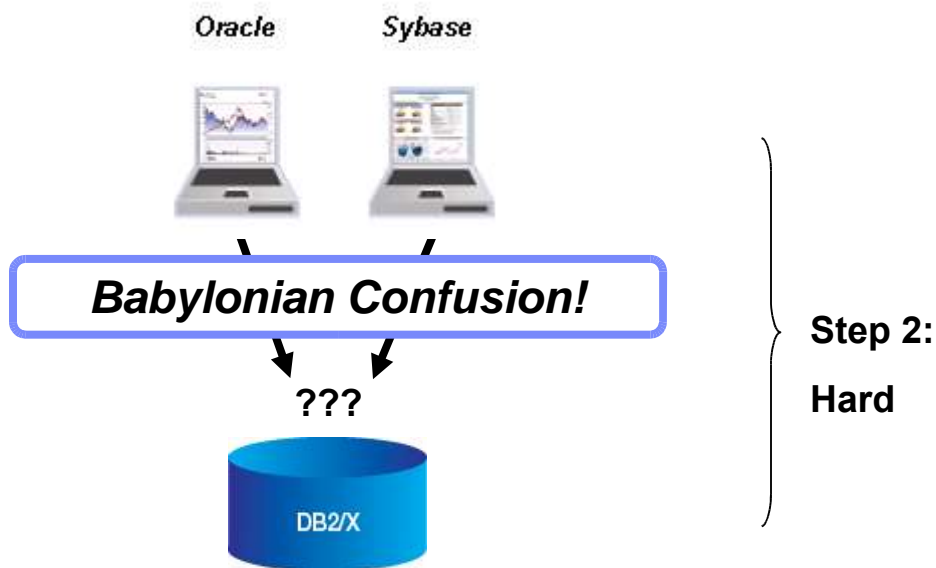


Results current as of Nov 4, 2009
Check <http://www.tpc.org> for latest results

Traditionally, consolidating on DB2 wasn't easy

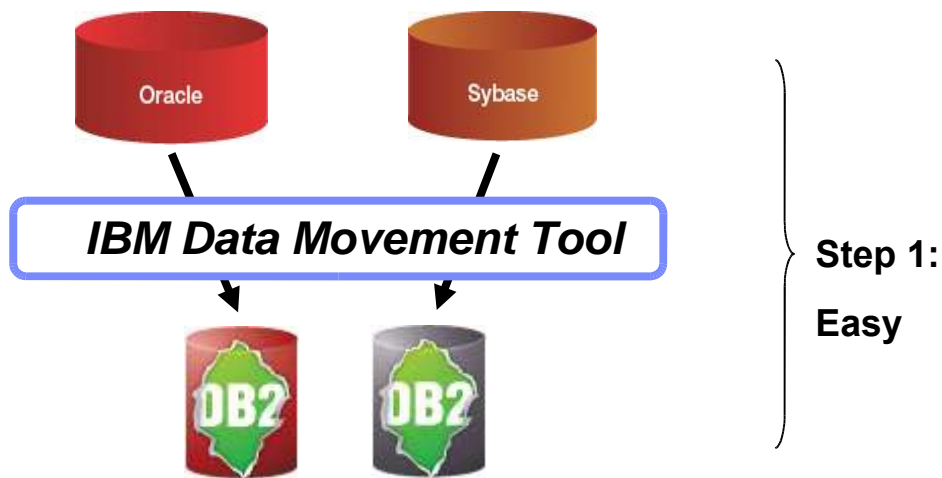


- Traditional migration tools excellent to migrate database schema and data



- Application (queries, functions, stored procedures and APIs) have incompatible semantics and/or syntax with the new database and need to be rewritten which is **risky and expensive**

Moving to DB2 from Oracle or Sybase is now Easy

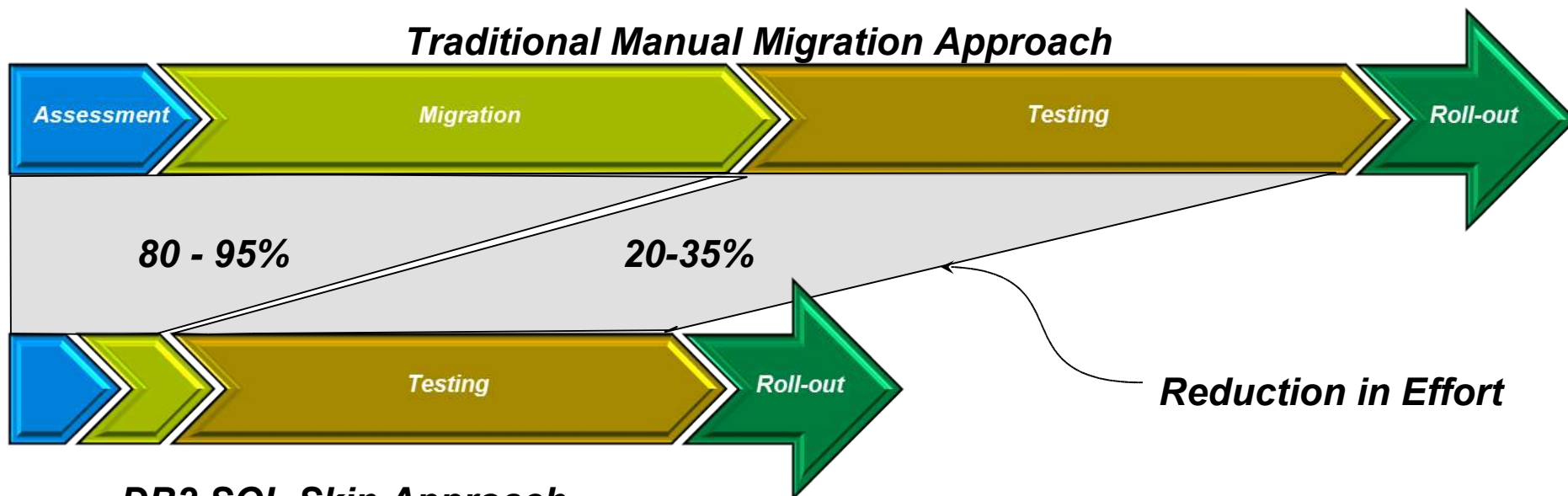


- **IBM Data Movement tool is excellent to migrate database schema and data**



- **Application (queries, functions, stored procedures and APIs) semantics and/or syntax largely compatible with the new database**
minimizing need to modify code

Traditional Migration vs DB2 SQL Skin for Sybase ASE



DB2 SQL Skin Approach

- All work is focused on the database
- Fewer resources required for migration (i.e. developers time)
- Few if any application code changes
- Fewer bugs introduced due to code changes

From Assessment to Testing 80-95% Faster!

DB2 SQL Skin: What are customers saying?

"What we saw in the beta was a seamless move to DB2 requiring no changes to the application. This is really important as we would not want to disrupt our business by changing application behavior."

Jim Ofalt, Systems Manager at The Pep Boys Manny, Moe & Jack



"We have two applications that use Sybase ASE, one is a Clinical Results Review and eBusiness application for one of our hospitals and the second is a decision support system. The new IBM DB2 9.7 functionality that enables Sybase ASE applications to move to DB2 with virtually no changes will allow us to eliminate Sybase in three to four weeks instead of spending six or more months to rewrite and test every SQL command in the application."

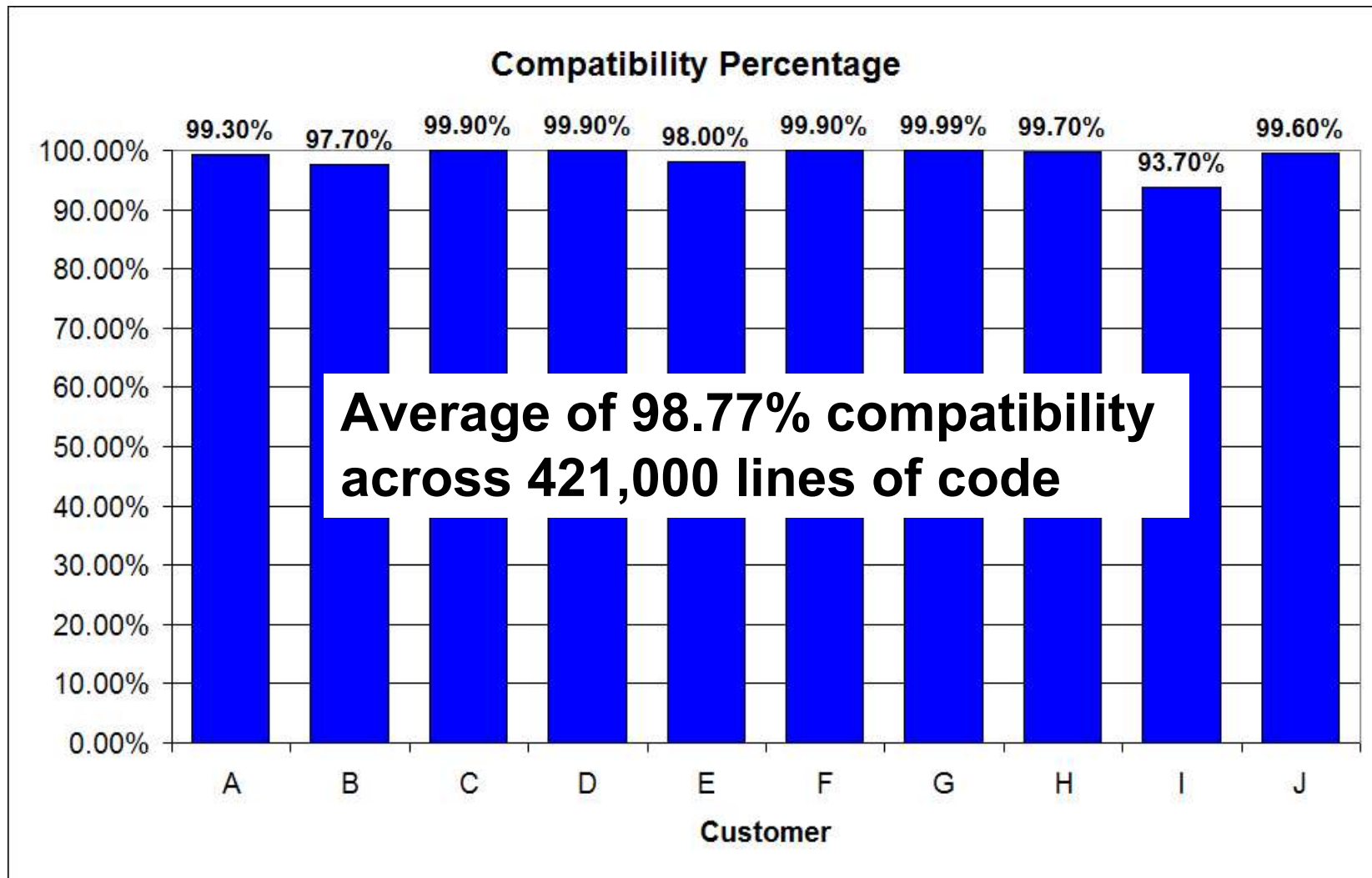
Tom Holdener, Lead Architect at BJC HealthCare



- The results speak for themselves



DB2 SQL Skin: Example Compatibility Results



DB2 9.7 MEET Report

MEET DB2 Report - IBM Confidential

Migration Enablement Evaluation Tool for DB2
 Knowledgebase version 00.20
 Knowledgebase for DB2 version 9.7

Send any comments to meetdb2@torolab.ibm.com

99.0% of statements
 immediately transferable to IBM DB2

Executive Summary

99.0% of statements immediately transferable to IBM DB2.

MEET DB2 has estimated that **99.0% of statements** and **99.2% of objects** are immediately transferable to IBM DB2. The technical report below is provided to detail exact instances and locations of potential issues to simplify the migration process.

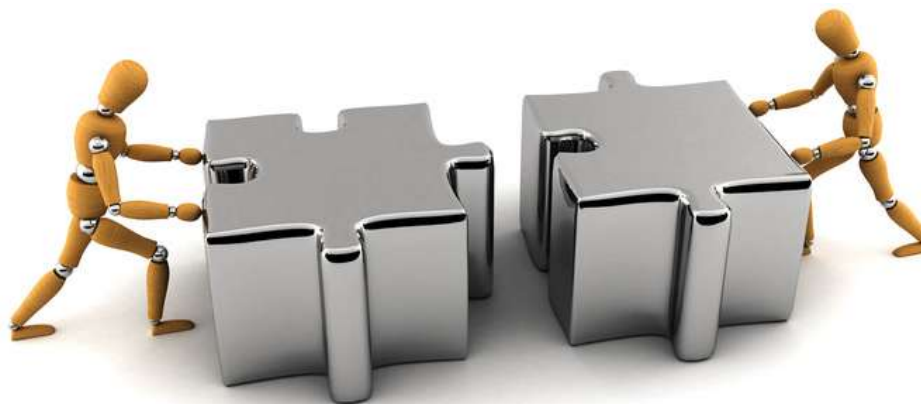
MEET Report

- **Rapid assessment of application**
- **Early confirmation of compatibility**
- **Lists details and source code line number for exceptions**

Object Type	Total Number	Number That Require Attention	Percent That Require Attention
package	0	0	0 %
anonymous	0	0	0 %
table	0	0	0 %
type	0	0	0 %
function	97	0	0 %
procedure	158	2	1 %
Total Objects	255	2	0.8 %
Statements	13292	2	0 %

DB2 SQL Skin for Sybase ASE

- **Jointly developed by IBM and Ants Software**
 - Partners on this feature since 2008
 - In beta test since late 2009
- **Tightly integrated to maximize performance**
 - T-SQL Stored procedures run as native DB2 procedures
 - DB2 engine optimized for SQL Skin workloads
- **Tightly integrated to maximize flexibility**
 - Full support for ODBC, JDBC, CT-LIB, DB-LIB applications
 - Full support of compression, workload management, high availability, and all other DB2 features



> Featured Speaker



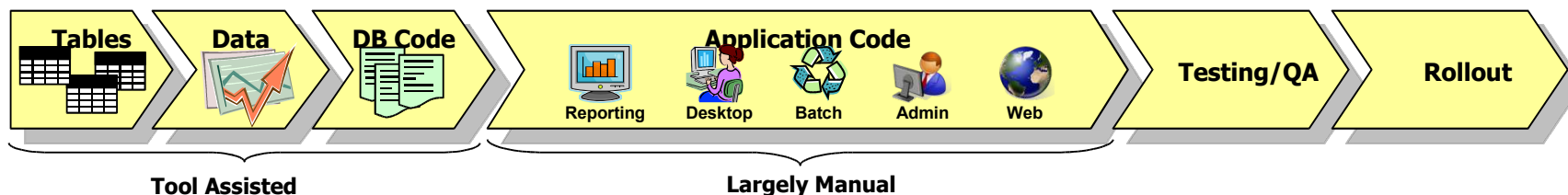
Scott Gray

**Chief Architect,
DB2 SQL Skin for applications compatible with
Sybase ASE**

ANTs Software Inc.



Traditional Migration Approach



• Migrate Database

- Tables and data
- Users and security
- Procedural logic (stored procedures, functions, triggers, etc.)
- There are tools to assist (e.g. MTK, data modeling tools, etc.)
- Few tools can achieve 100% database migration

• Migrate Applications

- Most databases have more than one application
- Each application needs
 - API calls replaced as necessary (e.g. CT-LIB to CLI)
 - Alter code that dynamically generates SQL
 - Datatype conversions as necessary
 - Re-write application as necessary (e.g. Open Server)
 - Etc.
- Typically at least 3x-5x more lines of code than in database

• Testing, testing, testing

• Rollout to production

Sample Data	
Application Stats	
Tables	1824
Triggers	662
Procedures	6812
App lines of code	1.2 million
Migration Tool Stats	
Tables	100%
Triggers	0%
Procedures	72%
App lines of code	0%
Remaining Effort	
DB lines of code	600,000
App lines of code	1.2 Million



DB2 SQL Skin (SSacSA)

- **SSacSA adds real-time Sybase T-SQL translation to DB2 LUW 9.7.2**

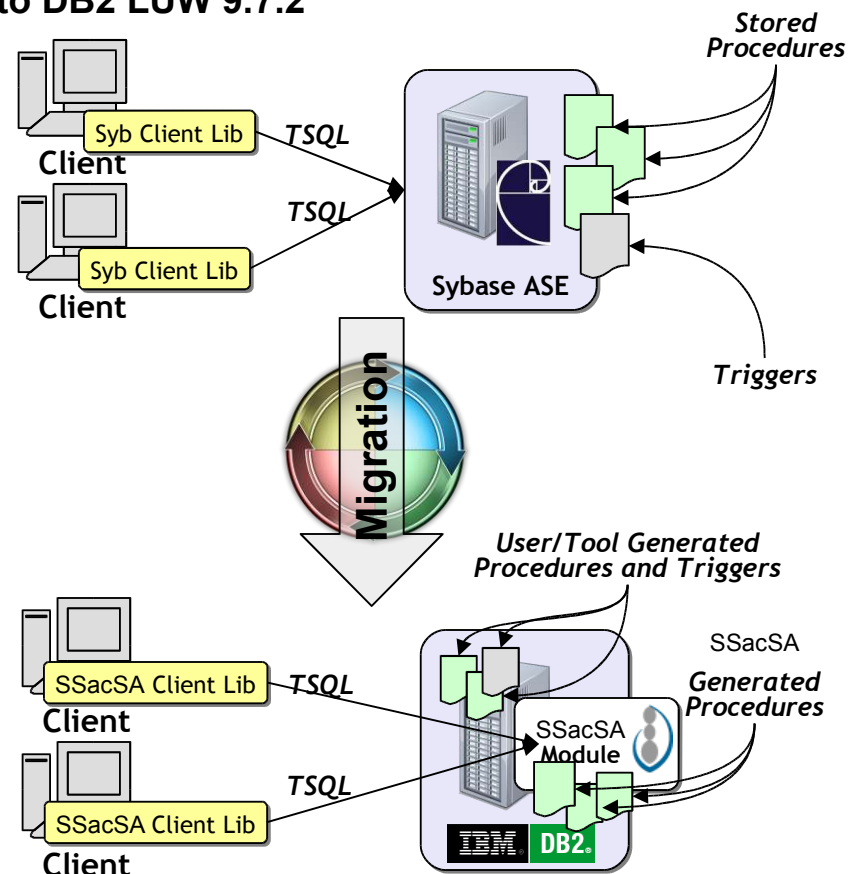
- **Tried-and-true application code runs with minimal or no changes—often without even recompiling**

- **SSacSA translates major Sybase functionality**

- Stored procedures
- SQL query (DML)
- Tables
- Temp tables
- Data types
- Error messages
- Global variables
- Cursors
- LOBS
- Etc.

- **Can integrate with existing DB2 SQL/PL procedures**

- **All actual tables and data storage reside in DB2**



Migration with SSacSA

- **Install SSacSA module into DB2**
 - Looks like an “empty” ASE server instance
- **Install SSacSA drivers into client(s)**
- **Migrate database (two approaches)**
 - Replay Sybase DDL through SSacSA
 - Associate existing DB2 objects into SSacSA environment using SSacSA Control Center GUI
 - Triggers must be migrated by hand or using tools
- **Test**
- **Rollout to production**

SSacSA + Tool Migration	
Application Stats	
Tables	1824
Triggers	662
Procedures	6812
App lines of code	1.2 million
Migration Tool Stats	
Tables	100%
Triggers	0%
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App lines of code	0%
SSacSA Stats*	
Tables	100%
Triggers	0%
Procedures	100%
App lines of code	100%
Remaining Effort	
DB lines of code	5,000
App lines of code	0

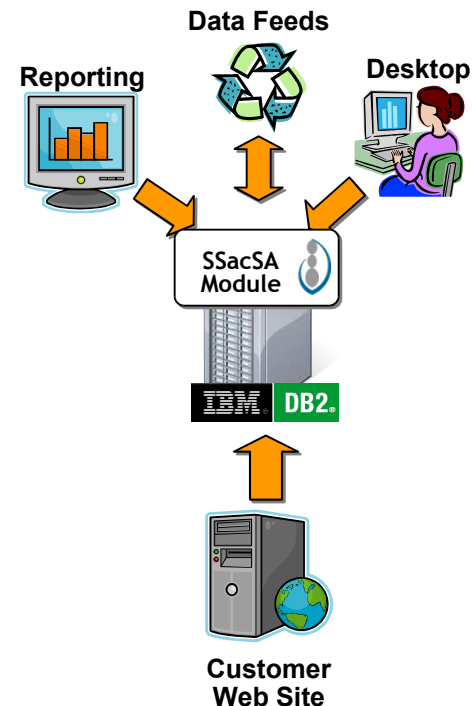
* Ideal application

Is it really that easy?

- **100% emulation difficult to achieve**
 - Administrative commands and procedures don't make much sense to translate
 - Seemingly simple functions may have hundreds of idiosyncrasies that are too expensive to emulate
 - Similarly, client libraries have many idiosyncratic or niche calls
 - Some features are rarely used by customers
 - Perfect emulation sometimes requires significant performance penalties
- **SSacSA focuses on what most customer applications require in order to function**
- **Analysis of applicability of SSacSA**
 - MEET DB2 provides coverage analysis of compatibility of application(s) and SSacSA (MeetDB2)
 - Soon to be extended into capturing/analyzing SQL generated at run-time by applications

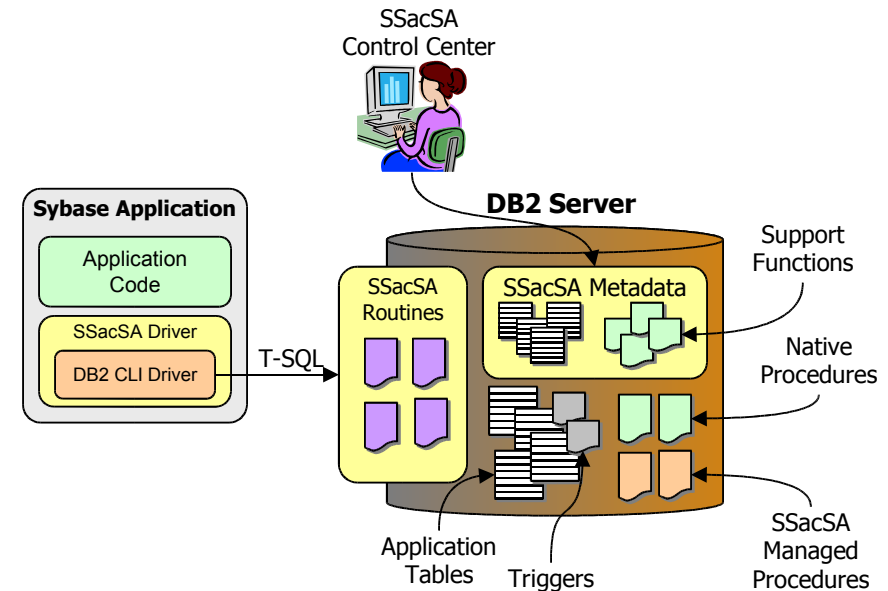
It's not all or nothing

- **It's rare that you have just a single client application these days**
 - Legacy desktop front-ends
 - Modern web front-ends
 - Multiple feeder systems
 - Batch processing
- **Since all information is stored in DB2, native and SSacSA migrated applications can share the DB2 instance**
 - Share native triggers and procedures
 - Share DB2 enforced security
 - Use SSacSA only where/when it makes sense
- **Each application can be migrated natively at your pace**
- **Use SSacSA where/when it makes sense**



Product Architecture

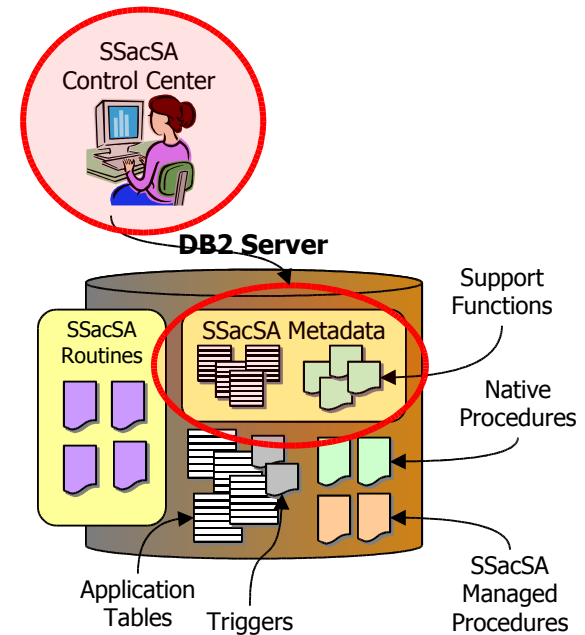
- **Major SSacSA components**
 - Metadata repository
 - Control Center GUI
 - T-SQL translation routines
 - Managed procedures
 - Native procedures
 - Client driver(s)



Metadata Repository and Control Center GUI

- **The SSacSA repository is a DB2 schema containing**

- Tables mapping Sybase names to DB2 names
- Tables mapping Sybase security model to DB2
- Tables mapping DB2 error codes/text to Sybase
- Representations of Sybase system tables
- Functions used to support SSacSA generated procedures
- SSacSA configuration information

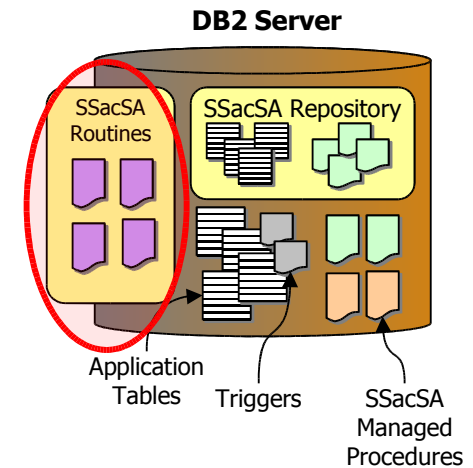


- **SSacSA Control Center**

- Allows manipulation of SSacSA metadata
- “Import” of pre-existing DB2 objects into SSacSA environment

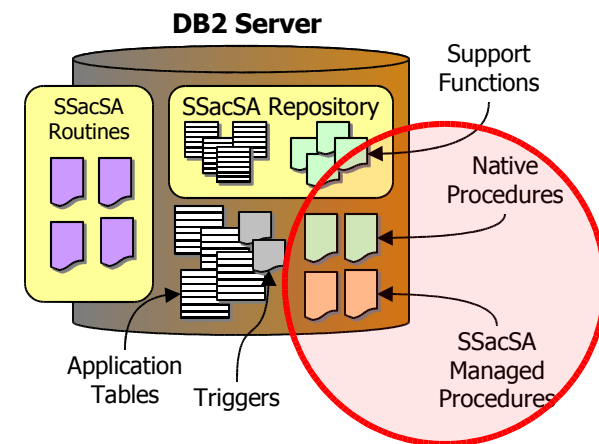
Translation Routines

- **All actual translation logic is implemented via DB2 external routines**
 - Implemented in C++ for maximum performance
 - Execute along side of DB2 process so there is no impact on stability or security of DB2 instance
- **Raw DML statements are translated and executed at run time**
- **DDL statements are translated to equivalent DB2 objects**
 - Stored procedures (more on next slide)
 - Tables and views
 - Groups/roles
 - Etc.
- **Translation routines can translate DB2 error codes/text to ASE codes/text**



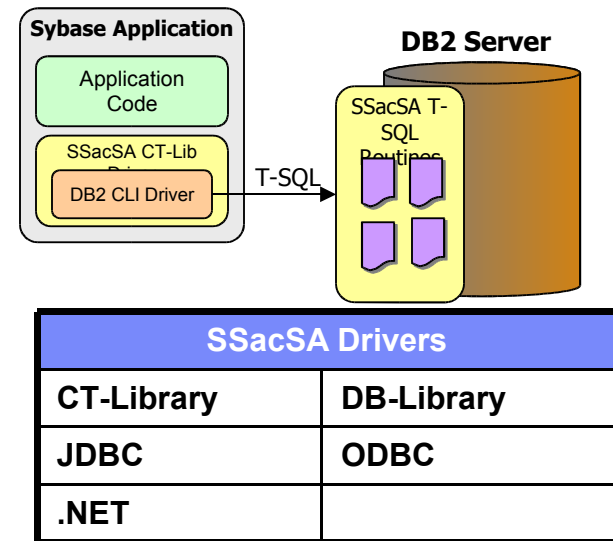
Stored Procedures

- **T-SQL procedures translate directly to SQL/PL**
 - Execute at native DB2 speeds
 - One-time translation, not at execution time
 - Procedure cooperate with client drivers to implement certain Sybase behavior, e.g.
 - PRINT
 - RAISERROR
 - Referred to as “managed” procedures
 - These procedures are not generally re-usable outside of SSacSA
- **User developed SQL/PL procedures**
 - Pre-existing/hand written DB2 procedures can be integrated as if they were native ASE procedures
 - Metadata catalog provides mapping of Sybase name and argument types
 - Client will do its best to choose appropriate Sybase data types for results
 - Can be shared between SSacSA and non-SSacSA applications



Client Drivers

- **SSacSA client drivers are drop-in replacements for ASE drivers**
- **Implemented as very thin veneer over DB2 driver**
- **Raw SQL is passed as procedure call to SSacSA T-SQL translation routines**
- **Stored procedure calls result in DB2 procedure calls**
- **Driver interprets certain “special” results coming from generated procedures, for example**
 - **Used for PRINT, RAISERROR, and COMPUTE BY (future)**
 - **Embedded datatype information to guide the driver in translating to client**
- **SSacSA drivers can wrap and embed actual Sybase drivers**
 - **Useful for inspection and analysis of Sybase client behavior**
 - **Allows client to connect to DB2 (via SSacSA) and Sybase simultaneously**



Performance

- **Performance is highly dependant upon type of workload**
 - Stored procedures are translated only once
 - Run at DB2 native speeds
 - Some additional overhead due to function calls to assist in emulation
 - Immediate execution of SQL will undergo translation on each execution
 - Fortunately, most Sybase environments lean heavily on procedures
 - Raw SQL requires translation on each call
 - DB2 recognizes and optimize frequently executed SQL
 - Some SQL constructs more expensive to emulate than others
- **Becomes more apparent with very small “point” queries**
 - If a query ran in 7ms on ASE, and takes 2ms to translate and 7ms to execute, is 29% overhead
- **As workload becomes more bound to execution time, overhead drops**
 - Adding 2ms to a query that ran in 2 seconds, is 0.1% overhead.



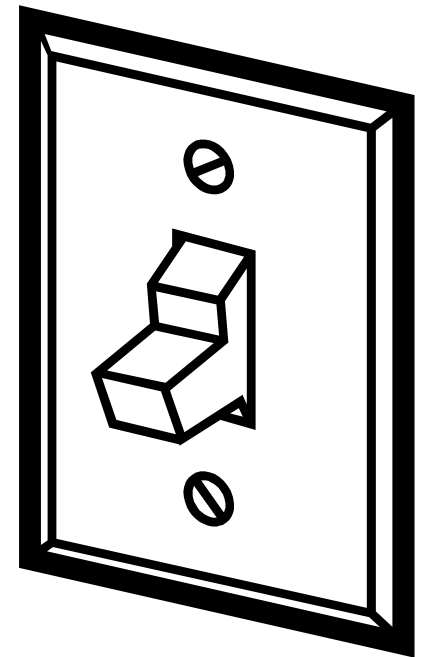
Performance

- **Fortunately, most applications are a mix!**
 - Interactively, going from 7ms to 9ms is virtually unnoticeable
 - Longer, execution bound queries can likely run faster
 - Advanced DB2 parallelism features
 - Compression
- **Specific procedures can always be manually replaced**
- **Small changes to the T-SQL can make dramatic performance improvements (and remain ASE compatible)**



What to expect from a migration

- **SQL Skin dramatically decreases the time to migrate an application**
- **Not all SQL is 100% compatible**
 - Experience has shown 3%-7% of statements may need to be reviewed or modified
 - All modifications will still be valid T-SQL!
- **Application modifications**
 - We strive for no application modifications, but...
 - Incompatible statements generated by applications will need remediation there
 - Some driver API calls are not supported, and may need adjustments
 - This sort of modification is atypical, but does happen
- **If you only have to touch 5% of your code, that is 95% improvement over direct port/re-write!**
 - Fewer changes, fewer bugs, less cost



What to expect from a migration

- **SSacSA focuses on the application side of the database**
- **Back-end support processes still need to be addressed**
 - Performance and tuning
 - Backup and recovery
 - Replication
 - High availability
 - Production rollout process
 - Monitoring and support processes
 - 3rd party applications
 - Etc.
- **IBM/ANTs services can assist in addressing these items**



Conclusion/Questions

**Break Free
From High Database Costs**



Thank You!

ibm.com/db2/labchats



Thank you for attending!

