

# Preparing for DB2 UDB for z/OS Version 8

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# Agenda

- Pre-requisites
- Unicode
- Access Path Review
- Schema Evolution
- Catalog Changes
- V7 to V8 Migration




# Introductory Comments

- DB2 V6 is scheduled for end of service on June 30, 2005
- There are more new lines of code in DB2 V8 than there were lines of code in V1
- Planning is more important for this version than any previous version



# Pre-requisites

- DB2 V7 with Fallback SPE (UQ81009)
- No Type 1 Indexes
- zSeries, z/Architecture Processor
- Running in 64-bit mode
- z/OS V1R3 or later
  - Requires WLM goal mode
  - Some functions require z/OS 1.4 , 1.5



# Pre-requisites

- Migrate to IBM COBOL V2.2 or V3.2
  - No OS/VS COBOL or VS COBOL II compiles
  - Run “Old” COBOL Modules
- Unicode Conversion Services
- Run DSNTIJPM or DSNTIJP8 (PQ84421)
  - Identifies CCSIDs and incompatibilities

# Pre-requisites

- WLM Goal Mode Requirements
  - Stored Procedures require it
  - DB2 exploits Enclave SRBs
    - Better control of priorities by workload
    - More definitions and policies to maintain
    - Naming Standards are important
  - Better performance control
    - When policies are well defined
    - When workloads are easily identifiable

# Pre-requisites Summary

<b>Hardware and OS</b>	
OS	z/OS V1R3 Base Services (5694-A01), or later, executing in 64-bit addressing mode
Hardware	Any processor that supports z/Architecture™
<b>Optional Program Requirements</b>	
<b>Transaction Management</b>	
IMS	Version 7 or Higher
CICS TS	Version 1.3 or Higher
MQSeries	WebSphere MQSeries for OS/390 V5.2
<b>Programming Languages</b>	
PL/1	Version 3.2 or Higher
COBOL	IBM COBOL for OS/390 and VM V2.2 or Enterprise Cobol V3.2
Java	Applications or stored procedures written in Java require IBM Developer Kit for OS/390, Java 2 Technology Edition

# Unicode

- DB2 UDB for z/OS Version 8:
  - Most Catalog Tables
  - DBRM
  - All Parsing
  - Pre-compiler (new parm CCSID)

OK, so what's Unicode?





# Unicode

- New concept for many z/OS centric personnel
- Unicode is a single character set that encodes all of the world's scripts (Latin, Chinese, mathematics, etc.)
- The Unicode standard provides a cross platform, cross vendor method of encoding data that enables representation and manipulation without loss

# Unicode

- The Unicode Consortium publishes the Unicode standard [www.unicode.org](http://www.unicode.org)
- New characters constantly being added
- Before Unicode: Many Standards, Many Owners
- CCSID: (Coded Character Set Identifier)
  - Used by DB2 to tag string data
  - Precisely defines the decoding of that data
  - ASCII: CCSIDs: 850, 819, 437, ...
  - EBCDIC: CCSIDs: 500, 37, .....



# Unicode

## – UNICODE UTF-8 CCSID 1208

- Uses 1 byte (8 bits) for common characters
- Code points 0 – 127 each occupy 1 byte
- These code points are compatible with ASCII
- Contain upper & lower A-Z, digits 0-9, common punctuation, blank, etc.
- Code points 128+ each occupy 2, 3 or 4 bytes

## – UNICODE UTF-16 CCSID 1200

- Uses 2 bytes (16 bits) for common characters
- Uses 2 two-byte sets for other characters

# Unicode Character Conversion

German EBCDIC Code Page 273

	4	5	6	7	8	9	A	B	C	D	E	F
0									0	1	2	3
1									A	J		1
2									B	K	S	2
3									C	L	T	3
4									D	M	U	4
5									E	N	V	5
6									F	O	W	6
7									G	P	X	7
8									H	Q	Y	8
9									I	R	Z	9
A												
B												
C												
D												
E												
F												

US Code Page 37

	4	5	6	7	8	9	A	B	C	D	E	F
0									0	1	2	3
1									A	J		1
2									B	K	S	2
3									C	L	T	3
4									D	M	U	4
5									E	N	V	5
6									F	O	W	6
7									G	P	X	7
8									H	Q	Y	8
9									I	R	Z	9
A												
B												
C												
D												
E												
F												

# Unicode

- Unicode Conversion Services on z/OS:
  - Central repository for conversions
  - Callable z/OS Service to convert a character string from 1 CCSID to another CCSID
  - High Performance
  - Conversion image built by off-line utility
    - Each desired translation must be explicitly defined
    - CONVERSION 37, 1208, ER;
      - Constructs the CCSID 37 to 1208 translation table
      - ER ensures data integrity
      - Does not construct the 1208 to 37 translation table

# Unicode – Watch out for:

## Collating Sequence

### Different between Unicode and EBCDIC

- UTF-8                  Numeric then Alphabetic
- EBCDIC                Alphabetic then Numeric

Similar to what we encounter today

- z/OS vs. Unix
- z/OS vs. PC

## Character Length

A, a, 9, Å, ¬ (A with a ring accent and logical not)

- ASCII                  '41'x, '61'x, '39'x, 'C5'x, n/a
- UTF-8                 '41'x, '61'x, '39'x, 'C385'x, 'CA2C'x
- EBCDIC                'C1'x, '81'x, 'F9'x, n/a, '5F'x



# Access Path Review

- DB2 Optimizer
  - Cost Based
    - CPU and I/O Estimates
    - Always lowest ESTIMATED cost
  - Getting the desired Access Path from Optimizer
    - Manipulate Statistics
    - Using SQL Clauses
    - Using a Hint



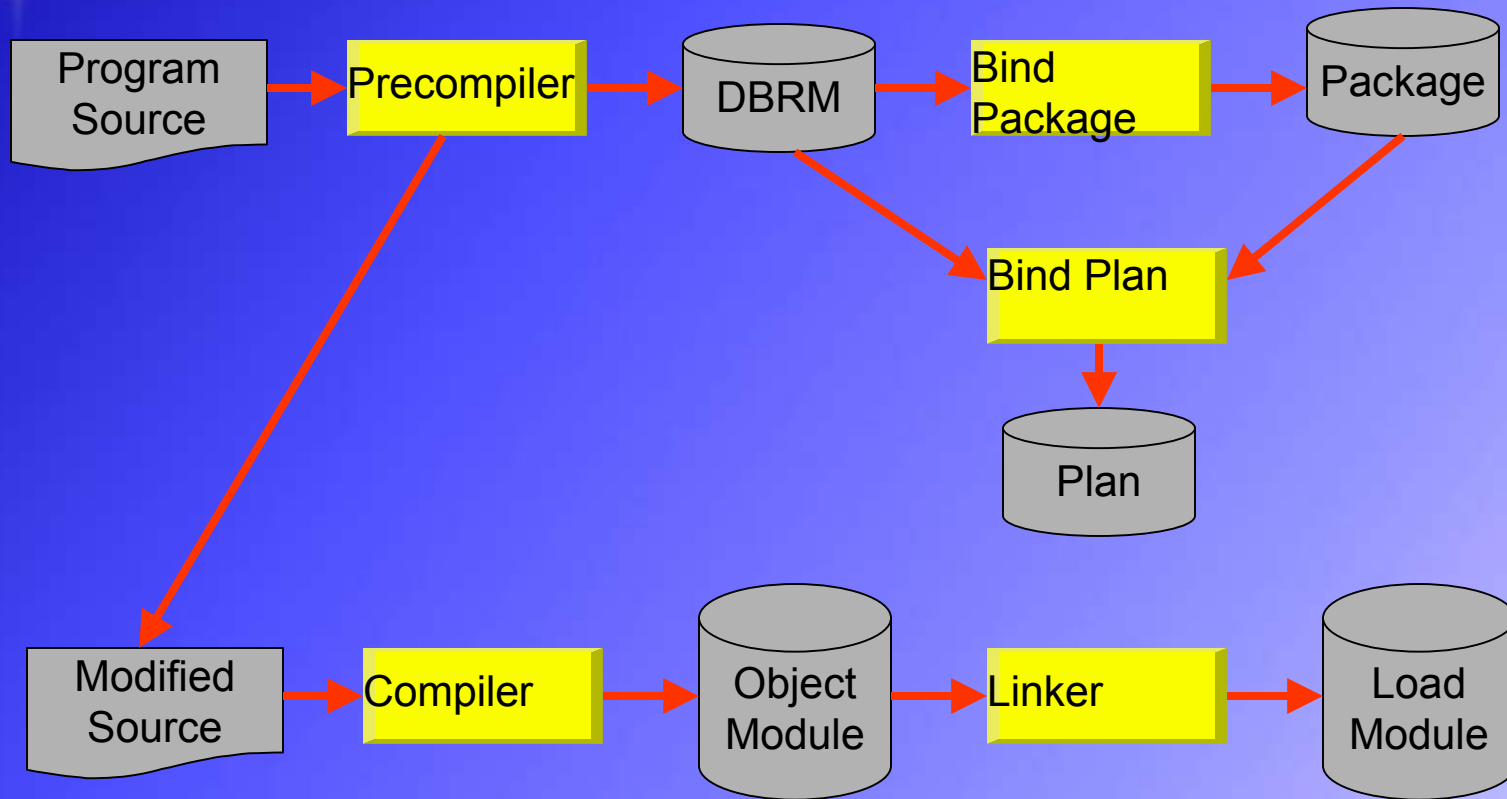
# Access Path Review

- When is an Access Path Selected?
  - Bind/Rebind time for Static SQL
  - Mini-bind at execution time for Dynamic SQL
- Any output from this process?
  - Access Path in the directory
  - Tables containing optimizer data
  - V8 will really hide some of these tables



# Review Access Path Selection

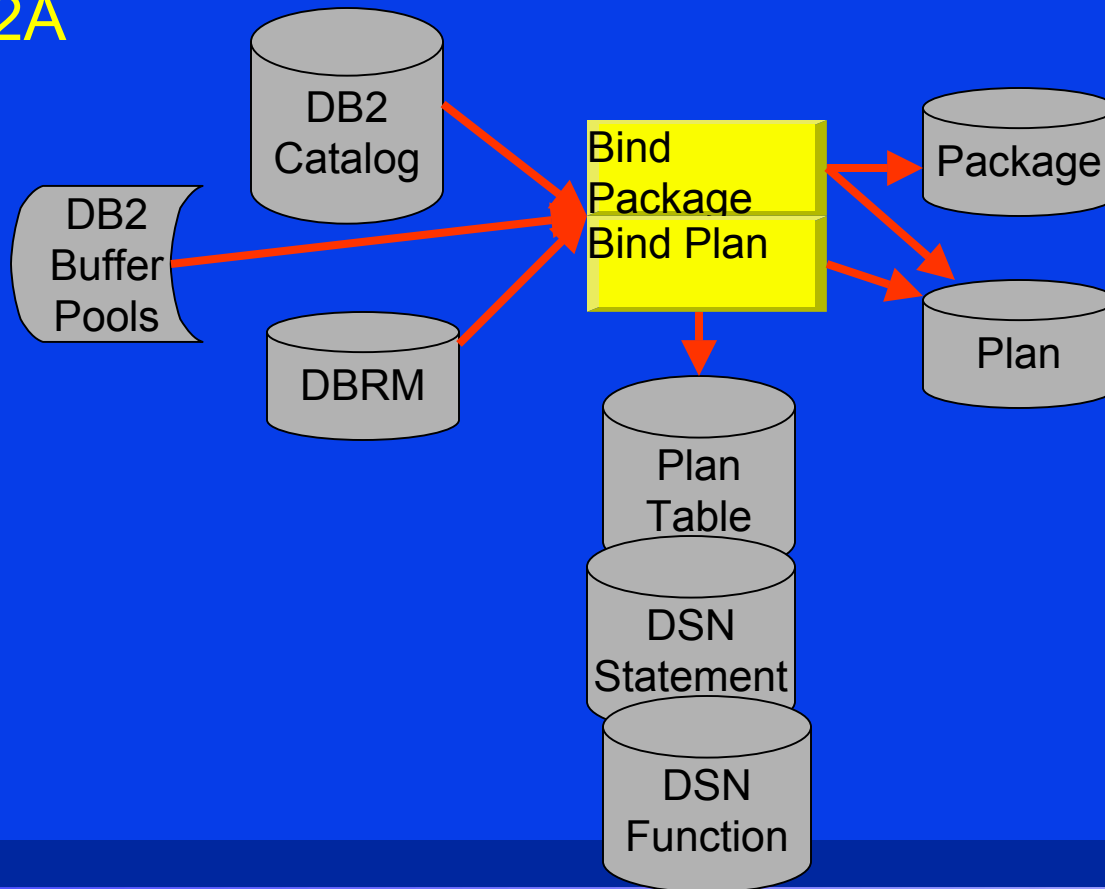
## The Big Picture



# Review Access Path Selection

## The DB2 Picture

DB2A



# External Optimizer Influences

- CPU Processor Speeds
- Buffer Pool Differences
  - Assignment of objects
  - Size
  - Thresholds
- Available Processors Online

# Impact of Externals

- SQL remains unchanged
- Access Path Changes
  - On a different CPU
  - On a different DB2 Subsystem
  - With different Buffer Pool Configuration
  - On a different Version of DB2



# Impact of Externals

- Migrate without Bind
  - Ensured Access Path did not change
  - Propagated old DB2 control blocks
  - Will cause problems in Version 8



# Schema Evolution

- Significant enhancements to Alter
  - Character columns
    - increase length
    - change data type
  - Change type for numeric data columns
  - Add column to an index
  - Change the clustering index
  - Add a partition
  - Rotate partitions
  - Alter an index to have true varying length character data



# Catalog Changes

- Alter the length of many columns
  - Removes the current 8 or 18 byte limit
  - Dependent for Long Names/Identifiers support
- Alter indexes to be true varying length
  - Dependent upon support for Long Index Keys
  - Dependent upon Varying Length Index Keys support
- Convert most catalog tablespaces to Unicode (UTF-8)
  - Dependent upon Unicode Conversion Services

# V7 to V8 Migration

- Pre-Migration Activities
  - DB2 V7
    - No Type 1 Indexes
    - Install fallback SPE (UQ81009)
  - zSeries, z/Architecture in 64-bit mode
  - z/OS V1R3 or later
  - Other products at required levels
  - Unicode Conversion Services
  - Run DSNTIJPM



# V7 to V8 Migration

- Migration to Compatibility Mode
  - Install the base DB2 V8 product
  - Invoke the catalog maintenance process
  - Normal DSNTIJTC job
    - Performs some “minor” changes to the catalog [normal catmaint]
    - “Minor” compared to what’s coming
    - Transitions the catalog for major changes

# V7 to V8 Migration

- Compatibility Mode (CM)
  - EBCDIC Catalog
  - Data Sharing Coexistence with DB2 V7
  - Can fall back to V7
  - V8 new function forbidden
  - Suggest to run at least one “business cycle” in this mode; an extended period is possible.
  - Might consider migrating all DB2s to CM before migrating any to the next mode

# V7 to V8 Migration

- Enabling New Function Mode (ENFM)
  - DSNTIJNE job
  - 1st step places subsystem in ENFM
  - Group wide event; cannot coexist with DB2 V7.
    - Will not start with a V7 running in the group
    - V7 will not start once group in ENFM
  - No returning to CM
  - Cannot fall back to V7
  - Most V8 new function forbidden

# V7 to V8 Migration

- Enabling New Function Mode (ENFM)
  - A period of conversions
  - One Catalog Tablespace converted at a time in a multi-step process:
    - Test tablespace status
    - Alter TABLE statements
    - Define new data sets
    - Reorg tablespace SHRLEVEL(REFERENCE)
    - Delete old data sets
  - Catalog from EBCDIC to Unicode (UTF-8)
  - Many catalog columns increasing in length
  - At any point in time during this mode
    - a catalog might be EBCDIC or Unicode
    - a catalog column might be old or new length

# V7 to V8 Migration

- Enabling New Function Mode (ENFM)
  - DSNTIJNE job
    - Do not cancel this job
    - Do not modify this job
  - DSNTIJNH job will stop DSNTIJNE
    - after the reorg of current tablespace completes
    - could run a bit before it gets there
  - Restarting the DSNTIJNE job
    - Resubmit the DSNTIJNE job
    - Skips already processed tablespaces
    - Resumes at first tablespace not successfully converted

# V7 to V8 Migration

- New Function Mode (NFM)
  - DSNTIJNF job
  - The conversions are complete
  - Catalog is Unicode
  - No fallback with or to V7
  - No coexistence with V7
  - All V8 new functionality is allowed (based on z/OS level)

# V7 to V8 Migration

- A new DB2 V8 subsystem starts in NFM
- DRDA communication possible from all modes to all releases

## Converting Tablespaces

SYSVIEWS	SYSDBASE	SYSDBAUT
SYSDDDF	SYSGPAUT	SYSGROUP
SYSGRTNS	SYSHIST	SYSJAVA
SYSOBJ	SYSPKAGE	SYSPLAN
SYSSEQ	SYSSEQ2	SYSSTATS
SYSSTR	SYSUSER	SPT01

# Summary


- DB2 UDB for z/OS Version 8
  - Became GA on March 26, 2004
  - Healthy amount of pre-requisites
  - Large and complex release
  - Lots of new functions and features
  - Significant migration process
  - Requires planning and training



# Next Steps with DB2 V8 and Lightyear


- Our series of detailed presentations on various DB2 V8 topics:

Pre-requisites	V7 to V8 Migration
Unicode	Utilities
Access Path Review	Highlights of New Functionality
Schema Evolution	In Depth Review of the "Top" 5 New Functions
Catalog Changes	Enhancements to SQL



# Next Steps with DB2 V8 and Lightyear

- We will start these FREE presentations in the late September time frame.
- These presentations will be given to just one customer at a time and will be tailored to that customer.
- Presentations will vary in length, dependent upon topic and tailoring.
- A 15 minute “prep” call will be required.



# Next Steps with DB2 V8 and Lightyear

- Access Path Review is a performance factor
- We offer a free on-site two-day review
  - Your systems
  - Your SQL
  - Predictive Report of potential problem SQL
- Watch our website for details on both of these exciting and FREE offers and register your interest.

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- *CICS* & *IMS* Web enabling design and implementation
- Database and online system performance analysis and tuning



# Questions ...

