DB2 9 for z/OS
Latest News and a Peek into the future

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Agenda

- V8 news

- zIIP news and status

- DB2 V9 highlights and news

- Futures

V8 News

- **SOAP UDF enhancements for authentication and security**
  APAR PK48773 (OPEN)
- **SORTNUM elimination**
  APAR PK45916 (OPEN)
- **SORTDATA optional**
  APAR PK18059, PTF available
- **New Zparm for relief for 254 compressed parts in LOAD/REORG**
  APAR PK51853 (OPEN)
- **V7 COBOL precompiler**
  APAR PK46170, PTF shipped 9/07
- **BatchPipes input to LOAD for fast loading**
  APAR PK34251, PTF shipped 6/07
- **IDENTITYOVERRIDE keyword on LOAD utility**
  APAR PK27287, PTF available
- **Allow RESTART(LIGHT) to not wait for INDOUBT URs**
  APAR PK29791, PTF available

V8 News

- **DB2 MQ UDF: V8/V9 Support of the MQI API**
  - APAR PK37290, PTF available
- **MQListenersupport for logical message grouping**
  - APAR PK51290 (OPEN)
- **SQLINTRP- SQL interrupt processing ENABLE or DISABLE**
  - APAR PK41661, PTF available
- **DISPLAY THREAD(*) SERVICE(STORAGE)**
  - APAR PK20800, PTF available. Allow users to display the amount of REAL, Auxiliary, and virtual storage used
- **OPEN/CLOSE DSMAX**
  - APAR PK28008/PK33496/PK42106
- **INSERT performance**
  - APAR PK30160/PK36717/PK47840
- **EDM POOL contention calling SP multiple times**
  - APAR PK28046

Portions of the following DB2 for z/OS workloads may benefit from zIIP*

1. ERP, CRM, Business Intelligence and/or other enterprise applications

   - Via **DRDA®** over a **TCP/IP** connection

2. Data warehousing applications

   - Requests that utilize parallel queries using star schema and non star schema

3. DB2 for z/OS utilities

ty functio   x structures

New Specialty Engine

- The zIIP is designed so that a program can work with z/OS to have all or a portion of its enclave Service Request Block (SRB) work directed to the zIIP.
- The above types of DB2 V8 work are those executing in enclave SRBs, of which portions can be sent to the zIIP.

Recent zIIPAnnouncements

- **Announced**
  - **z/OS 1.8 CS TCP/IP IPSecencryption (Aug 2007)**
    - Network end to end Security Protocol
  - **z/OS XML System Services (Statement of Direction)**
    - Assembler interface z/OS 1.7 and above
      - Plans to add C/C++ interface in z/OS 1.9
    - **DB2 V9 uses assembler interface for XML parsing**
    - **XMLSS to use zAAP–applicable for DB2 local connections (TCB mode)**
    - **XMLSS to fully utilize zIIP**
      - Today: DDF enclaves partially utilize zIIP for XMLSS, as with other DDF work
      - Future: DDF enclaves will fully utilize zIIP for XMLSS
    - **Will benefit DB2 V9 XML Parsing**
      - DB2 Applications (SQL/XML requests)
      - DB2 Utilities over tables with XML columns

DB2 9 for z/OS Technology Themes

- **Enable high-volume transaction processing for next wave of Web applications**

- **Extend the lead in transaction processing availability, scalability and performance**

- **Extend the lead in security and reduce cost of ownership and zSeries-specific skill needs**

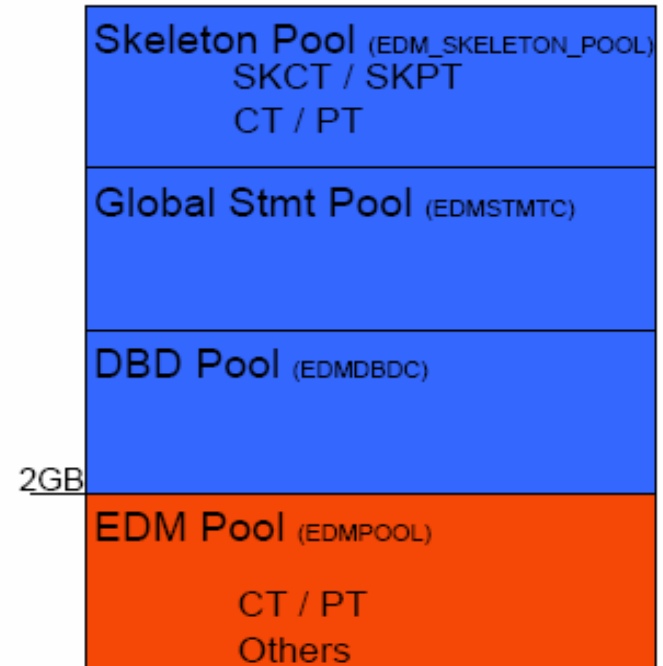- **Improve data warehousing and OLTP reporting**

DB2 9 for z/OS delivers on more than 225 requirements submitted by customers, business partners, and worldwide user group communities

64 bit Evolution (Virtual Storage Relief)

Virtual Storage Constraint is still an important issue for many DB2 customers. The following changes provide some relief:

- EDMPOOL Changes:
  - V8 – DBD storage moved above 2GB bar.
  - V9 – SKCT, SKPT, some CT, PT storage moved above 2GB bar.
  - V9 approx. 60% reduction in EDMPOOL size observed for lab workloads

- Other changes:
  - Some storage acquired for distributed applications moved above 2GB bar.
  - Control blocks for pagesets and RTS move above the bar.
  - DSC statement text moved above the bar
    - SAP tests have shown almost 300MB reduction in vstor below 2GB bar

Skeleton Pool (EDM_SKELETON_POOL)
SKCT / SKPT
CT / PT

Global Stmt Pool (EDMSTMTC)

DBD Pool (EDMDBDC)

2GB

EDM Pool (EDMPOOL)
CT / PT
Others

IFCID 217: detailed DBM1 virtual storage health
IFCID 225: consolidated DBM1 virtual storage health

64-bit DDF –Shared Private with DBM1

- DDF address space runs in 64-bit addressing mode
  - Shared 64-bit memory object avoids xmem moves between DBM1 and DDF and improves performance
  - VSCR

z/OS Shared Private Storage

2GB Bar

DBM1   DIST
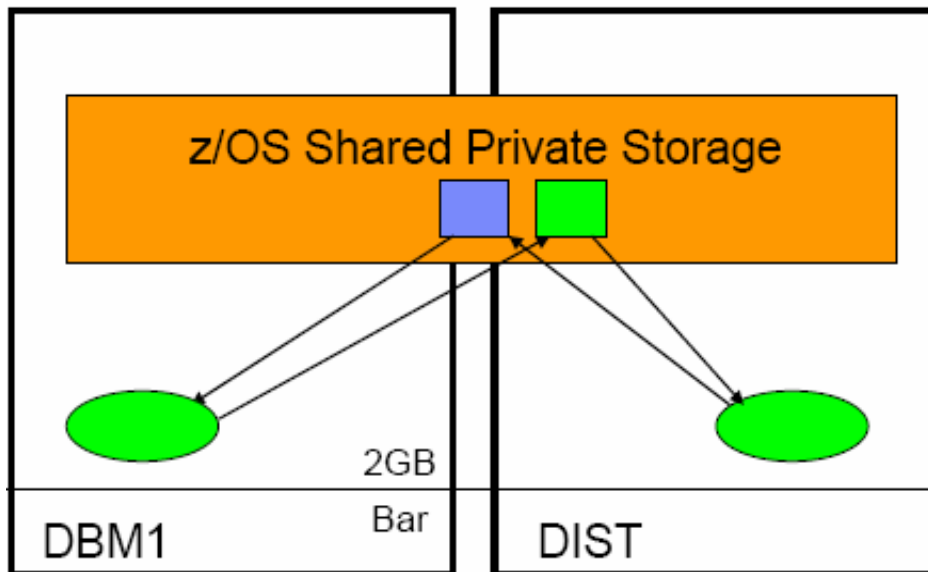
- Shared memory: new virtual storage type allowing multiple address spaces to share storage.

- Similar to ECSA – always addressable, avoids AR and XM moves.

- Different from ECSA – only available to those address spaces registering with z/OS to share this storage.

- Reduces data formatting and data movement

- Reduces virtual storage
  - It exists once, instead of in each address space

WLM Buffer Pool Management

- WLM-assisted buffer pool management
  - ▶ -ALTER BUFFERPOOL () AUTOSIZE(YES)
  - ▶ z/OS 1.8
  - ▶ DB2 registers BP to WLM and reports synch read I/O delays to WLM
  - ▶ DB2 periodically reports BP hit stats to WLM
  - ▶ WLM projects effect of adjusting BP size on workload performance goals
    - ▪ Takes into account overall system storage usage
  - ▶ WLM drives DB2 exit to adjust size if appropriate
    - ▪ V9 restricts to +/- 25%

DB2

BP1
800MB

WLM

Name	BP1
Current	800MB
Min	600MB
Max	1GB
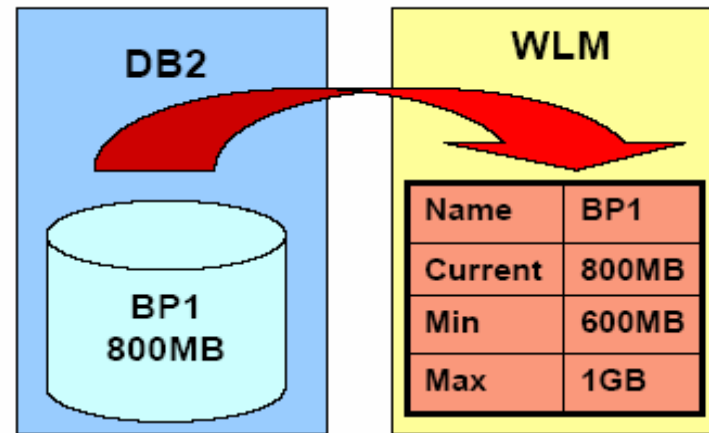
DSNB555I WLM RECOMMENDATION TO
ADJUST SIZE FOR BUFFER POOL
bpname HAS COMPLETED
OLD SIZE = csize BUFFERS
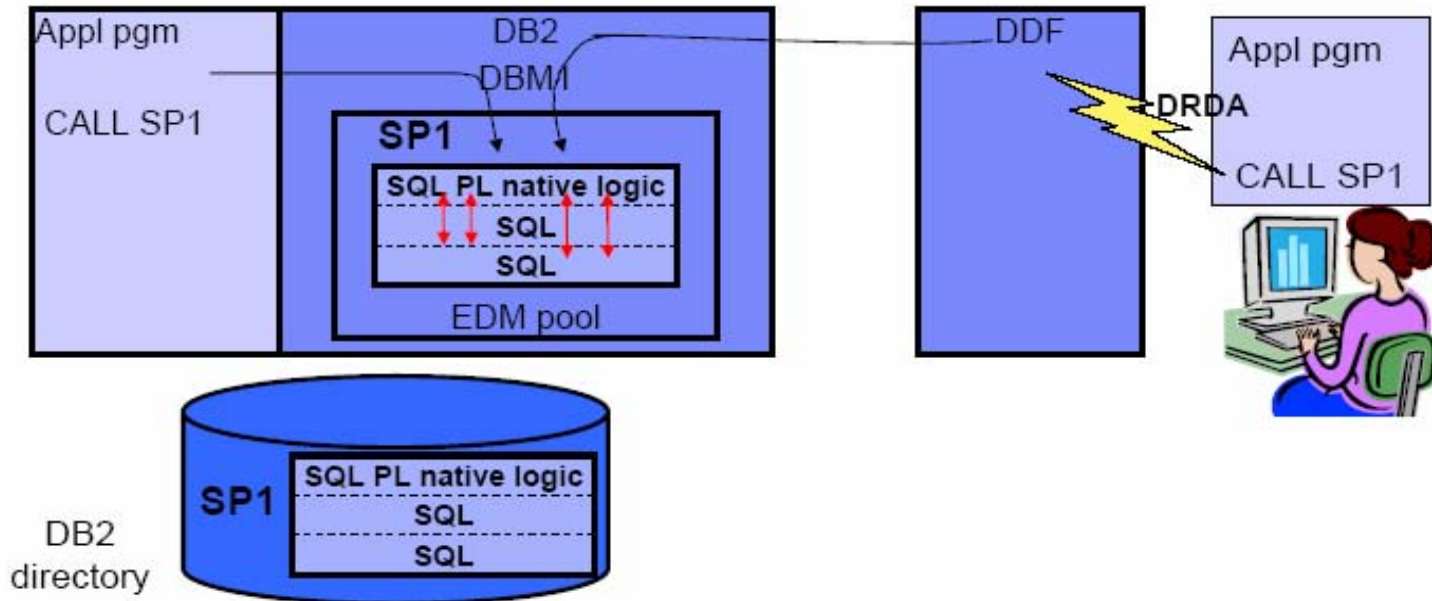NEW SIZE = nsize BUFFERS

SQL Enhancements

- INTERSECT, EXCEPT

- INSTEAD OF triggers

- MERGE

- SELECT FROM MERGE/UPDATE(DELETE

- TRUNCATE

- New data types

- New SQL functions

- Native SQL Procedures

- XML native data type

Native SQL SP

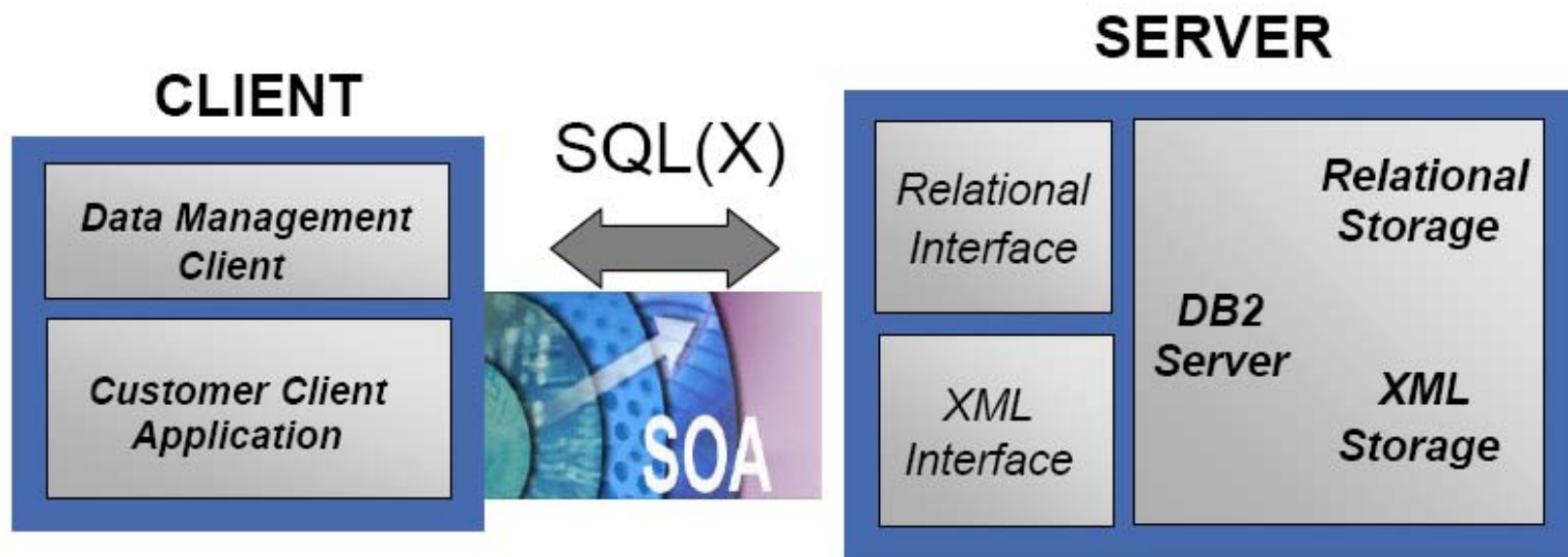## Native SQL Procedural Language

- Eliminates generated C code and compilation
- Fully integrated into the DB2 engine
  - ▶ An SQL procedure created without FENCED or EXTERNAL is a native SQL procedure

zIIP Enabled for DRDA

Appl pgm	DB2		DDF	Appl pgm
CALL SP1	DBM1		DRDA	CALL SP1

SP1
- SQL PL native logic
- SQL
- SQL

EDM pool

DB2 directory

SP1
- SQL PL native logic
- SQL
- SQL

Trusted Contexts – An Introduction

- A ***TRUSTED CONTEXT*** establishes a trusted relationship between DB2 and an external entity such as a middleware server. For example:
  - WebSphere Application Server
  - Lotus Domino
  - SAP NetWeaver
  - PeopleSoft V7

- A set of *trust attributes* is evaluated to determine if a specific context is to be trusted.

- A trusted context allows the external entity to use a database connection under a different user ID without the database server authenticating that ID.

- It also allows an AUTHID to acquire database privileges associated with that trusted context, and not available outside it, via a ***ROLE***.

Dynamic Warehousing

Dynamic Warehousing with System z
Mission-critical analysis of operational data

Rapid and secure user-access to data analysis
- *Interactive executive dashboards & information portals*

Over 50 Warehousing features in V8 and V9
- *V8 Materialized Query Tables*
- *V8 longer SQL statements, index keys, complex joins*
- *V8 up to 4096 partitions in a single table*
- *V8 and V9 Improved SQL & optimization*
- *V9 Index compression added to data compression*
- *V9 Online Rebuild Index*
- *V9 Global Query Optimization*
- *V9 Dynamic index ANDing for improved star schema query support*
- *V9 Histogram Statistics*

Cost optimization with parallel queries running on zIIP

Data Sharing V9 Enhancements

- Log latch contention relief

- Restart performance enhancements
  - Reduced impact of retained locks –released as rollbacks are completed
  - Open data sets ahead of log apply

- Command to remove GBP-dependency at object level
  - ACCESS DB MODE(NGBPDEP)
  - Typical usage would be before batch run
  - Command to "prime"open data set
  - ACCESS DB MODE(OPEN) [PART]

- Auto-recover GRECP/LPL objects on group restart
  - Useful in Disaster Recovery or GDPS scenarios

- DB2 overall health taken into account for WLM routing

- Balance group attach connections across multiple members on same LPAR (V7, V8 usermod)

Utilities Highlights

- **More online utilities**

  - Rebuild Index SHRLEVEL CHANGE

  - Reorg LOB now supports SHRLEVEL REFERENCE (space reclamation)

  - Check data, LOB and repair locate …SHRLEVEL CHANGE

  - Check index SHRLEVEL REFERENCE supports parallel for > 1 index

  - Clones for "online LOAD REPLACE"

- **Online REORG BUILD2 phase elimination**

- **REORG parallelism for UNLOAD, RELOAD, LOG phases**

- **Utility TEMPLATE switching**

- **UNLOAD SKIP LOCKED DATA option**

Utilities Highlights

- MODIFY Recovery enhancements
  - "*Retain*"keyword added to improve management of copies
    - LAST(n), LOGLIMIT, GDGLIMIT
- Volume-based COPY/RECOVER (BACKUP SYSTEM/RESTORE SYSTEM)
  - RECOVER modified to enable object-level recovery from volume FlashCopy
  - Full integration of tape into BACKUP/RESTORE SYSTEM utilities
  - Incremental FlashCopy, APAR PK41001
- Truncate log based on timestamp
- RECOVER to any point-in-time with consistency
- RECOVER RESTOREBEFORE to use an earlier image copy
- Display progress of RECOVER during log apply
- COPY CHECKPAGE option always active
  - "Copy Pending"avoided if broken page encountered
- COPY SCOPE PENDING to copy only objects in "Copy Pending"

DB2 for z/OS Into the Future - Delivering Customer Value

20xx

2007

➢**DB2 X**

2004

•**DB2 9**

2001

•**V8**

data definition on demand

•**V7**

64 bit

pureXML™
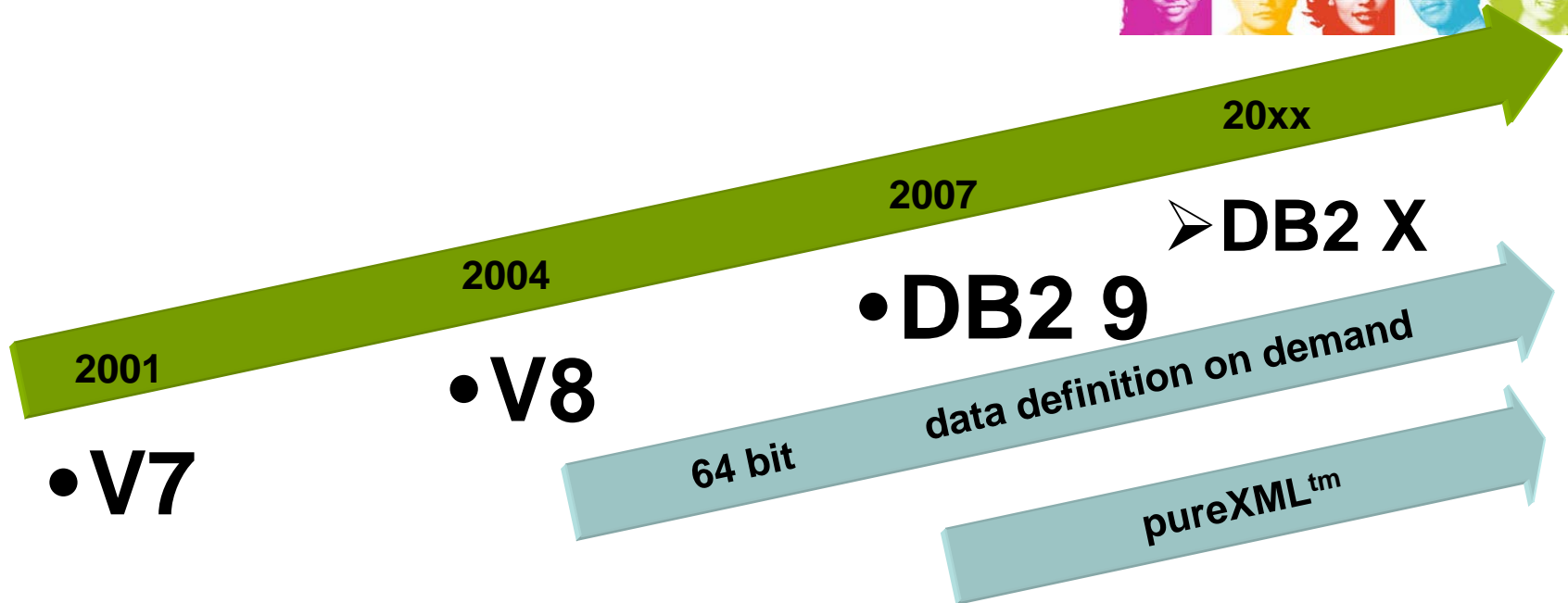
<u>Ongoing technology themes</u>
•Performance   Scalability
•Reliability Availability Serviceability
•Security Productivity
•Application Development
   •SQL   XML   SOA

DB2 X for z/OS Status

- The following slides represent DB2 Development's current thinking on some of the items that are candidates for Vnext

- It is still early in the planning process, so the details will change

- The intention is to give you some information on DB2's future technical directions

64-bit Evolution –The Final Frontier

- ## DB2 vstor constraint is still an important issue for some customers
  - Can limit number of concurrent active threads on a single DB2
  - Can make it more difficult to grow DB2 environments
    - Consolidation through mergers / acquisitions
    - Enterprise workload consolidation to reduce costs
    - Some customers put multiple DB2 members from the same DSG on thesame LPAR

- ## Vnext: dramatic reduction of DBM1 31-bit private vstor
  - Allow for big increase in max number of active threads
  - Remove need for detailed DBM1 virtual storage monitoring
  - May allow for consolidation to fewer DB2 members on fewer LPARs

Performance, Performance, Performance

- DB2 applications require always-improving performance

- Future machines require new s/wperformance techniques
    - Higher n-way SMPs, more memory, higher cache-miss penalties

- Vnext objective: significantly improved DB2 performance for a wide range of applications
    - New high performance technique for p-key access
    - Make DB2 code and control structures more cpucache friendly
    - Several internal DB2 code optimizations
    - Buffer pool enhancements
    - More indexing enhancements
    - Inline LOBs, LOB streaming inside DB2
    - DDF performance enhancements

Productivity –Doing More with Less!

- ## Vnext:

  - Automatic stats collection

  - Automatic enable/disable compression

  - Safe query optimization and plan stability

  - REORG avoidance: avoid impact of disorganized indexes

  - Autonomic diagnosis and tuning for query performance issues

  - Automatic configuration of IBM supplied SPs and UDFs

Service Oriented Architecture and XML…

- ## Vnext:
  - XML schema validation in the engine for improved usability, performance
  - Binary XML exchange format for improved performance
  - XML multi-versioning for more robust XML queries
  - Allow easy update of sub-parts of an XML document
  - Introduction of XQuerysyntax
  - Stored proc, UDF, Trigger enhanced support for XML