Meetup de DB2 para Linux Unix y Windows en Madrid

DB2 LUW v11.1

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DB2 Version 11.1 Agenda

- Titulares
- Fin de soporte de versiones anteriores.
- Ediciones.
- Consideraciones sobre
  - Plataformas soportadas y migración a db2 11.1.
- Novedades en pureScale
- BLU + MPP
- Otras novedades en BLU.
- Novedades en la gestión de DB2. Herramientas.
- Funciones SQL y Compatibilidad.
TITULARES.
FIN DE SOPORTE VERSIONES ANTERIORES
DB2 Version 11.1 TITULARES

Core Mission Critical Workloads: Extending DB2 Leadership

Comprehensive Enterprise Security

- Enterprise Encryption

Availability

- Simple Fast Deployment
- Even Greater Availability
  - Zero data loss DR with HADR
- More Platforms Supported

Significant Core Database Advances

- Very Large Database Performance
- Simpler, Faster, More Online Upgrades

Warehousing Workloads: Most Consumable, Most Scalable In-Memory Warehousing Platform

Massive Scale Warehousing at In-Memory Performance

- MPP BLU Scalability

Next Gen In-Memory Performance, Function & Workloads

- Faster ELT/ETL performance
- More Query Workloads Optimised
- More Function supported
  - Generated Columns
  - RCAC
  - OLAP + BLU Perf

Enhanced Compatibility

- Multi-Lingual SQL Advances
  - PostgresQL
  - Support for European Languages
  - Codepage 819

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DB2 Version 11.1 Ya está disponible

- DB2 Version 11.1 announced on April 12th
  - General Availability (eGA) on June 15th

- How to download DB2 Version 11.1
- DB2 Version 11.1 Trial
End of Service for DB2 Version 9.7 and 10.1

- Announcing the End of Service for both DB2 Version 9.7 and 10.1 in conjunction with the announcement of DB2 Version 11.1
  - Effective End of Service date of September 30th, 2017
  - DB2 Version 11.1 will support a direct upgrade from DB2 Version 9.7, 10.1, and 10.5
  - Provides customers the ability to migrate either to:
    - DB2 Version 10.5 - been in the market for a longer time
    - DB2 Version 11.1 - provides a longer service period (at least 5 years)

- Sufficient time to upgrade/migrate
  - 18 month notice for End of Service of DB2 Version 9.7 and 10.1
  - Extended support contracts can be negotiated for those customers requiring a longer time to migrate
  - End of Service date is not applicable to SAP customers with an ASL as they have a different end of service period
Product versions

- DB2 Advanced Enterprise Server Edition
- DB2 Enterprise Server Edition
- DB2 Advanced Workgroup Server Edition
- DB2 Workgroup Server Edition
- DB2 Developer Edition
- DB2 Direct Advanced Edition
- DB2 Direct Standard
- DB2 Express-C Edition
Ediciones

- **DB2 Express-C**: No charge edition

- **DB2 Workgroup Server Edition**
  - **Simple Limits**
    - 16 Cores (8 for Virtual Server)
    - 128 GB of memory with no database size limit.

- **DB2 Advanced Workgroup Server Edition**
  - **All Features**
  - **Licensing**: PVU, AUSI, Terabyte
  - **Limits**:
    - 16 cores, 128 GB memory, 4 sockets (Terabyte)

- **DB2 Enterprise Server Edition**
  - **No Limits Cores/Memory**

- **DB2 Advanced Enterprise Server Edition**
  - **All Features**
  - **Licensing**: PVU, AUSI, Terabyte
  - **No limits Cores/Memory**

- **DB2 Direct Standard Edition**

- **DB2 Direct Advanced Edition**

- **Additional capability**
  - pureScale Standby Node Option
  - Table partitioning, Encryption
  - Multi-dimensional Clustering
  - Limited Federation (DB2 & Informix)

- **Exclusions**
  - Data Partitioning
  - SQL Warehouse (SQW)
  - BLU Acceleration, Compression, Materialized Query Tables
  - No MQ or CDC Replication
  - pureScale

- **Optional**
  - DB2 Performance Management Offering (WLM) with Data Server Manager Enterprise Edition
  - Advanced Recovery Feature

- **Additional capability**
  - pureScale Standby Node Option
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pureScale Standby Node Option

Application workloads (transactional, batch, etc.) run on the primary member

Workload

Primary Member

Workload

Secondary Admin Member

Backup

Restore

Runstats

Security

Reorg

Replication

Monitoring

Configuration

DDL

Administrative tasks/utilities allowed to run on secondary member

Administrative tasks/utilities allowed, but best practice is to run them on secondary member

Application workloads (transactional, batch, etc.) run on the primary member

Secondary Admin Member

DDL
Ediciones Advanced. All Features.
Advanced Workgroup

- **Licensing**
  - Advanced Workgroup Edition
    - PVU, AUSI, Terabyte license
    - Restrictions: 16 cores, 128 GB memory, 4 sockets (Terabyte)

- **Includes**
  - DB2 Connect included for using SQW tooling to access DB2 for z and DB2 for i
  - InfoSphere Data Architect (10 users)
  - Cognos Analytics (5 users)
  - DSM Enterprise Edition
  - Federation

- **Optional Packages**
  - Advanced Recovery Feature

---

Advanced Enterprise Edition

- **Licensing**
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    - PVU, AUSI, Terabyte license

- **Includes**
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  - Federation

- **Optional Packages**
  - Advanced Recovery Feature
Federation. Data Virtualization

Access data anywhere in your enterprise…

- No matter where it resides
- Regardless of what format it is in
- Regardless of vendor
- Without creating new databases
- Using standard SQL and any tool that supports JDBC/ODBC…
- Without worrying about the solution’s reliability and availability

An information integration technique that virtually consolidates multiple data sources to make them appear as a single source
Federation Included in Packaging

- Integrated support for homogeneous federation (DB2/Informix Family)
  - Single install replacing any prior separate Infosphere Federation Server install
  - Support for upgrading from either a DB2 database product or Infosphere Federation Server

- Additional Wrappers in Advanced Editions
  - DB2, PureData System for Analytics (PDA), Oracle, Informix, dashDB, SQLServer, BigSQL, SparkSQL, Hive, Impala, and other Big Data sources.
Federation. Use Case.

Objetos Virtualizados: NICKNAME
Federation. Use Case

- Creación de tablas en DB2 LUW iguales a tablas DB2 z/OS.

Sin posibilidad de error. Compatibilidad de tipos de datos. CREATE TABLE T1 LIKE N1
Federation. Use Case

- Carga de tablas en DB2 LUW sin necesidad de fichero intermedio.

```
DECLARE C1 CURSOR FOR SELECT * FROM N1
LOAD FROM C1 OF CURSOR
INSERT INTO T1
```

DB2 LUW

LOAD de T1 desde N1

ORACLE
DB2 Direct Editions

- New Delivery Mechanism for DB2 licenses
  - New license metrics to facilitate hybrid cloud deployments
  - Acquire the product directly online (Passport Advantage)
  - Option to deploy either on-premises or on cloud

- Two Versions depending on Requirements
  - DB2 Direct Standard Edition 11.1
    - Has all of the database features of DB2 Workgroup Server Edition
  - DB2 Direct Advanced Edition 11.1
    - Has all of the database features of DB2 Advanced Enterprise Server Edition

- Newly introduced simplified license metric, the Virtual Processor Core (VPC) sold as a monthly license charge

- Predictable maintenance releases
Encryption and Enterprise Key Management

- **Encrypted flows between HADR primary and secondary**
  - Simplified integration via SSL/TLS
  - Initial support on Linux x86
- **V11.1 adds support for KMIP 1.1 complaint centralized key managers**
  - Validated on IBM's Security Key Lifecycle Manager (ISKLM)
- **Direct support for Hardware Security Modules (HSMs) (Preview)**
  - Support to include SafeNet Luna & Thales nShield Connect+
PLATAFORMAS SOPORTADAS.
MIGRACIÓN A DB2 11.1
**Operating Systems - Supported**

- **New Operating System Support**
  - Power Linux LE (Little Endian)
    - Red Hat Enterprise Linux (RHEL) 7.1+
    - SUSE Linux Enterprise Server (SLES) 12
    - Ubuntu 14.04 LTS

- **Supported Operating Systems**
  - Intel 64-bit
    - Windows 7, 8.1, 10, Windows Server 2012 R2
    - Red Hat Enterprise Linux (RHEL) 6.7+, 7.1+
    - SUSE Linux Enterprise Server (SLES) 11SP4+, 12
    - CentOS 6.7, 7.1
    - Ubuntu 14.04 LTS
  - AIX Version 7.1 TL 3 SP5+
  - zLinux
    - Red Hat Enterprise Linux (RHEL) 7.1+
    - SUSE Linux Enterprise Server (SLES) 12
Operating Systems - Discontinued

- In DB2 V11, the following operating systems (on any platform) are no longer supported for Client or Server:
  - HP-UX
  - Solaris
  - Power Linux BE
  - Inspur K-UX

- Migration
  - Customers on these platforms will continue to be supported until the end-of-service date for DB2 V10.5 (last release that supports these platforms)
Operating Systems - Virtualization

- **IBM System z**
  - IBM Processor Resource/System Manager
  - z/VM and z/KVM on IBM System z

- **IBM Power**
  - IBM PowerVM and PowerKVM and IBM Workload Partitions on IBM Power Systems

- **Linux X86-64 Platforms**
  - Red Hat KVM
  - SUSE KVM

- **VMWare ESXi**

- **Docker container support – Linux only**

- **Microsoft**
  - Hyper-V
  - Microsoft Windows Azure on x86-64 Windows Platforms only

- **pureScale support on Power VM/KVM, VMWare, and KVM**
Migración: Streamlined Upgrade Process

- Upgrade directly from Version 9.7, 10.1 and 10.5
  - (3 releases back)

- Ability to roll-forward through database version upgrades
  - Upgrading from DB2 Version 10.5 Fix Pack 7, or later
  - Users are no longer required to perform an offline backup of existing databases before or after they upgrade
  - A recovery procedure involving roll-forward through database upgrade now exists
  - Applies to all editions and configurations except Database Partitioning Feature (DPF)
Streamlined Upgrade Process

- HADR environments can now be upgraded without the need to re-initialize the standby database after performing an upgrade on the primary database
  - Applies to all editions except DB2 pureScale
  - DB2 Version 10.5 Fix Pack 7, or later
NOVEDADES EN PURESCALE
DB2 pureScale. Novedades

- Easier Installation and ‘Up and Running’
- Power Linux Little-Endian (LE) support
- Linux Virtualization Enhancements
- HADR and GDPC Enhancements
- Performance Enhancements
- Increased Workload Balancing Flexibility:
  - Member Subset
- Manageability Improvements
HADR in DB2 pureScale (desde version 10.5)

- **HADR**: High Availability Disaster Recovery
  - (CON DB2 desde hace mucho mucho tiempo.....)

![Diagram showing HADR setup with Primary Server and Standby Server connected through a network connection.](image-url)
HADR in DB2 pureScale (desde version 10.5)

- **Integrated disaster recovery solution**
  - Very simple to setup, configure, and manage

- **SYNC LEVEL?**
Synchronization Modes

Synchronous, Near Synchronous, Asynchronous and Super Asynchronous
HADR in pureScale
Support for SYNC and NEARSYNC Mode

- Support for SYNC and NEARSYNC has been added to pureScale
  - This enhancement combines the continuous availability of DB2 pureScale with the robust disaster recovery capabilities of HADR providing an integrated zero data loss (i.e. RPO=0) disaster recovery solution
  - HADR peer window (hadr_peer_window) is not supported

- HADR support with pureScale now includes:
  - SYNC, NEARSYNC, ASYNC and SUPERASYNC modes
  - Time delayed apply, Log spooling
  - Both non-forced (role switch) and forced (failover) takeovers
pureScale GDPC

- GDPC: Geographically Dispersed pureScale Cluster
GDPC Support Enhancements

- DB2 V11 adds improved high availability for Geographically dispersed DB2 pureScale clusters (GDPC) for both RoCE & TCP/IP
  - Multiple adapter ports per member and CF to support higher bandwidth and improved redundancy at the adapter level
  - Dual switches can be configured at each site to eliminate the switch as a site-specific single point of failure (i.e. 4-switch configuration)
**RENDIMIENTO:**

Improved Performance for Highly Concurrent Workloads

- Streamlined bufferpool latching protocol implemented in DB2 V11
  - Reduces contention which can develop on large systems with many threads
  - Particularly helpful with transactional workloads

Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.
Improved Table TRUNCATE Performance in pureScale

- More efficient processing of Global Bufferpool (GBP) pages
  - Speeds up truncate of permanent tables especially with large GBP sizes
  - Helps DROP TABLE and LOAD / IMPORT / INGEST with REPLACE option
  - Enables improved batch processing with these operations

- Example
  - Workload with INGEST (blue) and TRUNCATE (green) of an unrelated table
  - DB2 v11.1 has much smaller impact on OLTP workload than DB2 10.5 fp5
DB2 10.5. Workload Balancing Across Member Subsets

- Workload balancing can be configured to take place across a subset of members, which enables
  - Isolation of batch from transactional workloads within a single database
  - Workloads for multiple databases in a single instance isolated from each other

Example of isolating a batch workload from a transactional workload
Unified Workload Balancing with pureScale - example

Define member subset “SUBSET_A”

CALL SYSPROC.WLM_CREATE_MEMBER_SUBSET
    ('SUBSET_A','<databaseAlias>SALES_A</databaseAlias>','(0)');

CALL SYSPROC.WLM_ALTER_MEMBER_SUBSET
    ('SUBSET_A',NULL,'( ADD 1 )');
Unified Workload Balancing with pureScale - example

Define member subset “SUBSET_A”

CALL SYSPROC.WLM_CREATE_MEMBER_SUBSET ('SUBSET_A','<databaseAlias>SALES_A</databaseAlias>','(0)');

CALL SYSPROC.WLM_ALTER_MEMBER_SUBSET ( 'SUBSET_A',NULL,'( ADD 1 )');

- **Subset_A has effective Members 0 & 1**
  - Member 0 & 1 are failover_priority 0
Unified Workload Balancing with pureScale - example

Define alternate members for subset “SUBSET_A”

CALL SYSPROC.WLM_CREATE_MEMBER_SUBSET
(‘SUBSET_A’, NULL,
 (ADD 2 FAILOVER_PRIORITY 1, ADD 3 FAILOVER_PRIORITY 1));

- Subset_A has effective Members 0 & 1
  - Member 0 & 1 are failover_priority 0
  - Member 2 & 3 are failover_priority 1 (alternate)
Unified Workload Balancing with pureScale - example

Member failure – subset includes alternate member 2

- Subset_A has effective Members 0 & 2
  - Member 0 & 1 are failover_priority 0
  - Member 2 & 3 are failover_priority 1 (alternate)
Unified Workload Balancing with pureScale - example

Member failback

- Subset_A has effective Members 0 & 2
  - Member 0 &1 are failover_priority 0
  - Member 2 & 3 are failover_priority 1 (alternate)
Unified Workload Balancing with pureScale - example

Member failback – subset returns to member 1

- Subset_A has effective Members 0 & 1
  - Member 0 & 1 are failover_priority 0
  - Member 2 & 3 are failover_priority 1 (alternate)
Unified Workload Balancing with pureScale

Subsets can overlap

- **Subset_A has effective Member 0 & 1**
  - Member 0 & 1 are failover_priority 0
  - Member 2 & 3 are failover_priority 1 (alternate)

- **Subset_B has effective Member 3**
  - Member 3 has failover_priority 0
DB2 11.1 Unified Workload Balancing with pureScale

- With member subsets, you can isolate application workloads to a specific set of members

- Version 11.1 extends the configuration options for member subsets allowing the user to explicitly define alternate members in a subset
  
  - This provides greater flexibility and member-level workload management.
  - Applications that connect to a database alias that is associated with a member subset balance their workload between the members in the subset
  - The members included in the subset can be modified dynamically, impacting where the workload of applications assigned to the member subset runs
  - Using new member subset management routines, you can create, alter, and drop member subset objects
  - Managing these member subset definitions, you can add or drop members to a member subset, or enable or disable a member subset
DB2 BLU + MPP
BLU Acceleration: MPP Scale Out

**Technology**
- Pervasive SMP & MPP Query Parallelism
- Inter-partition query parallelism simultaneous with intra-partition- parallelized, memory-optimized, columnar, SIMD-enabled, BLU processing

**Value**
- Improve Response Time
  - All servers contribute to the processing of a query
- Massively Scale Data
- Streamline BLU Adoption
  - Add BLU Acceleration to existing data warehouses

<table>
<thead>
<tr>
<th>DB2 10.5 BLU Capacity</th>
<th>DB2 V11.1 BLU Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>10s of TB</td>
<td>1000s of TB</td>
</tr>
<tr>
<td>100s of Cores</td>
<td>1000s of Cores</td>
</tr>
</tbody>
</table>
BLU Acceleration: MPP Scale Out

- Further Details: DB2 BLU DPF extends BLU Acceleration into a true MPP column store
  - Data Exchange during distributed joins and aggregation processing occurs entirely within the BLU runtime in native columnar format,
BLU Acceleration DPF: Data Distribution

- Just as with row organized tables:
  - Data is distributed across database partition according to a **distribution key**.
  - Each table has its own **distribution key** defined (a single column or a group)
  - The performance of queries tipically be increased if the join is **COLLOCATED**.
**BLU Acceleration DPF: DISTRIBUTION BY RANDOM**

- **New RANDOM option for distribution key:**

  ```
  CREATE TABLE SALES (C1 INTEGER NOT NULL, C2 SMALLINT NOT NULL, C3 CHAR (10))
  IN TABLESPACE1
  ORGANIZE BY COLUMN
  DISTRIBUTION BY RANDOM;
  ```

- **RANDOM … SIMPLE OPTION TO CONSIDER IF:**
  - Collocated joins are not possible
  - Other distribution keys result in significant **data skew** across the data partitions.
BLU Acceleration on DPF. Common Compression Encoding.

- Data Compression for BLU tables is unique per column.

- BLU MPP exploit a common compression encoding across data slides.

- Column A in table MyTable has the same encoding in all slices.
Demonstrating BLU MPP Linear Scaling

- **DB2 Version 11.1 on an IBM Power Systems E850 Cluster**

<table>
<thead>
<tr>
<th>Scaling Hardware at constant Data Volume</th>
<th>Scaling Hardware along with Data Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Queries Per Hour</strong></td>
<td><strong>Queries Per Hour</strong></td>
</tr>
<tr>
<td>3 Node (10TB) - 6 MLNS</td>
<td>6 Node (10TB) - 12 MLNS</td>
</tr>
<tr>
<td>QpH</td>
<td>111</td>
</tr>
<tr>
<td><strong>QpH</strong></td>
<td><strong>1.92x</strong></td>
</tr>
</tbody>
</table>

- **Scaling was measured in two different ways**
  - Doubling the hardware but keeping the database constant
  - Doubling the hardware and doubling the database size
  - Both tests used the BD Insights Heavy Analytics Internal Workload

Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.
BLU DPF. Automatic WLM

- Built-in and automated query resource consumption control.
- Enabled automatically when DB2_WORKLOAD = ANALYTICS
- Many queries can be submitted but limited number get executed concurrently.
- Now supported and optimized for BLU DPF
DB2 BLU
MÁS NOVEDADES
Performance: Optimized SQL Support for Columnar Tables

- Industry Leading Parallel Sort
- Push-down of a number of OLAP functions into the BLU engine
- Additional Oracle Compatibility Support
  - Wide rows
  - Logical character support (CODEUNITS32)
- DGTT support (except not logged on rollback preserve rows)
  - Parallel insert into not-logged DGTT from BLU source
- IDENTITY and EXPRESSION generated columns
- European Language support (Codepage 819)
- NOT LOGGED INITIALLY support
- Row and Column Access Control (RCAC)
- ROWID Support
- Faster SQL MERGE processing
- Nested Loop Join Support
Demonstrating BLU Single Instance Improvement

- **DB2 V11.1 on Intel Haswell EP**

  ![Query Throughput BD Insights (800GB)](image)

<table>
<thead>
<tr>
<th>Queries Per Hour</th>
<th>DB2 V10.5 FP5</th>
<th>DB2 V11.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>QpH</td>
<td>703,85</td>
<td>955,82</td>
</tr>
</tbody>
</table>

  - 1.36x improvement

- **Configuration Details**
  - 2 socket, 36 core Intel Xeon E5-2699 v3 @ 2.3GHz
  - 192GB RAM
  - BD Insights Internal Multiuser Workload 800GB

- **Reasons for Improvement**
  - **Native BLU Evaluation**
    - Native Sort
    - Native OLAP (usually combined with sort)
    - Enables query plans to remain as much as possible within the columnar engine
  - **Query Rewrite Improvements**
    - Find areas to improve degree determination and improve parallel use
  - **Improved SORTHEAP Utilization**
    - SORTHEAP used for building hash tables for JOINs, GROUP BYs, and other runtime work
    - Efficient use allows for more concurrent intra-query and inter-query operations to co-exist.

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SQL Functions Optimized for Columnar Mode

- **String Functions**
  - LPAD, RPAD
  - TO_CHAR
  - INITCAP
- **Numeric Functions**
  - POWER, EXP, LOG10, LN
  - TO_NUMBER
  - MOD
  - SIN, COS, TAN, COT, ASIN, ACOS, ATAN
  - TRUNCATE
- **Date and Time Functions**
  - TO_DATE
  - MONTHNAME, DAYNAME
- **Miscellaneous**
  - COLLATION_KEY

OLAP Functions Support by BLU

- **OLAP functions supported by BLU:**
  - RANK, DENSE_RANK, ROW_NUMBER
- **OLAP column functions supported by BLU:**
  - AVG
  - COUNT, COUNT_BIG
  - MIN, MAX
  - SUM
  - FIRST_VALUE
  - RATIO_TO_REPORT

**Note:** Window aggregation group clause is limited to:

- ROWS/RANGE BETWEEN UNBOUNDED PRECEDING AND UNBOUNDED FOLLOWING
- ROWS BETWEEN UNBOUNDED PRECEDING AND CURRENT ROW
- ROWS BETWEEN CURRENT ROW AND CURRENT ROW (not supported for FIRST_VALUE)
Columnar Engine Native Sort + OLAP Support

- No longer compensated on single instance DB2 V11.1

```sql
with v1 as(
    select i_category, i_brand, cc_name, d_year, d_moy, sm_type,
    sum(cs_sales_price) sum_sales,
    avg(sum(cs_sales_price)) over
    (partition by i_category, i_brand, cc_name, d_year)
    avg_monthly_sales,
    rank() over
    (partition by i_category, i_brand, cc_name
    order by d_year, d_moy) rn
from BDINSIGHTS.item
    , BDINSIGHTS.catalog_sales
    , BDINSIGHTS.date_dim
    , BDINSIGHTS.call_center
    , BDINSIGHTS.ship_mode
where cs_item_sk = i_item_sk and cs_sold_date_sk = d_date_sk
    and cc_call_center_sk = cs_call_center_sk
    and cs_ship_mode_sk = sm_ship_mode_sk
    and d_year = 2000
    group by i_category
    , i_brand , cc_name , d_year , d_moy , sm_type),
v2 as(
    select v1.i_category, v1.i_brand, v1.cc_name, v1.d_year, v1.d_moy
    , v1.avg_monthly_sales, v1.sum_sales, v1.sm_type, v1_lag.sum_sales psum
    , v1_lead.sum_sales nsum
    from v1
    , v1 v1_lag , v1 v1_lead
where v1.i_category = v1_lag.i_category
    and v1.i_brand = v1_lag.i_brand
    and v1.cc_name = v1_lag.cc_name
    and v1.d_year = 2000
    and v1.avg_monthly_sales > 0
    and case when avg_monthly_sales > 0
    then abs(sum_sales - avg_monthly_sales) / avg_monthly_sales
    else null end > 0.1
    order by sum_sales - avg_monthly_sales , cc_name
fetch first 100 rows only
)
OLAP Functions
rank, avg
OLAP Query Elapsed Time (s)
(4.3x Faster!!)
```

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Columnar Engine Native Sort + OLAP Support

- Access Plan Difference with Native Evaluator support

DB2 V10.5

Row Data Engine

Columnar Data Engine

DB2 V11.1
**DB2 BLU: DGTT SUPPORT**

**DEFINITION**
- *The declared temporary table description does not appear in the system catalog. It is not persistent and cannot be shared with other sessions. Each session that defines a declared global temporary table of the same name has its own unique description of the temporary table. When the session terminates, the rows of the table are deleted, and the description of the temporary table is dropped.*

**SUPPORT WITH BLU**
- Support for a column-organized DGTT
- Support all options except NOT LOGGED ON ROLLBACK PRESERVE ROWS
- Can be BLU MPP

```sql
DECLARE GLOBAL TEMPORARY TABLE SESSION.CUST_TEMP (  
"C_CUSTOMER_SK" INTEGER NOT NULL ,  
"C_FIRST_NAME" CHAR(20 OCTETS) ,  
"C_LAST_NAME" CHAR(30 OCTETS) ,  
  etc.  
)  
DISTRIBUTE BY HASH("C_CUSTOMER_SK") IN USERTEMP1  
ORGANIZE BY COLUMN NOT LOGGED;
```
PARALLEL INSERT INTO BLU DGTT

- **Multiple DB agents can insert into a column-organized DGTT**
  - Source must be a single column-organized table (regular or DGTT)
  - Must be enough rows per subagent to make it worthwhile (about 100 rows/per agent)
BLU Acceleration: Massive Gains for ELT & ISV Apps

BLU Declared Global Temporary Table (not-logged DGTT) Parallelism

Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.
MEJORAS EN LA GESTIÓN
Manageability and tooling

- **INPLACE Table Reorg:**
  - ON DATA PARTITION clause: Single partition can be reorganized with INPLACE option (no nonpartitioned indexes)

- **New option for ADMIN_MOVE_TABLE**
  - REPORT (Monitor)
  - TERM (Terminate a table move in progress)

- You can access **IBM® SoftLayer® Object Storage** or **Amazon Simple Storage Service (S3)** directly with the INGEST, LOAD, BACKUP, and RESTORE commands by using storage access aliases.

- **db2relocatedb. New option : -g**

- **DB2 backup and log archive compression** now support the NX842 hardware accelerator on POWER 7+ and POWER 8 processors (Only for AIX)
SQL ENHANCEMENTS
New Functions, Data Types and Columnar Optimization

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<tr>
<th>Date/Time</th>
<th>Date/Time</th>
<th>Statistics</th>
<th>Bit Manipulation</th>
<th>Data Types</th>
<th>Strings</th>
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Reference Information

- DB2 Version 11.1 Information Center

- dsmtop

- DB2 LUW product website

- DB2 Product Documentation