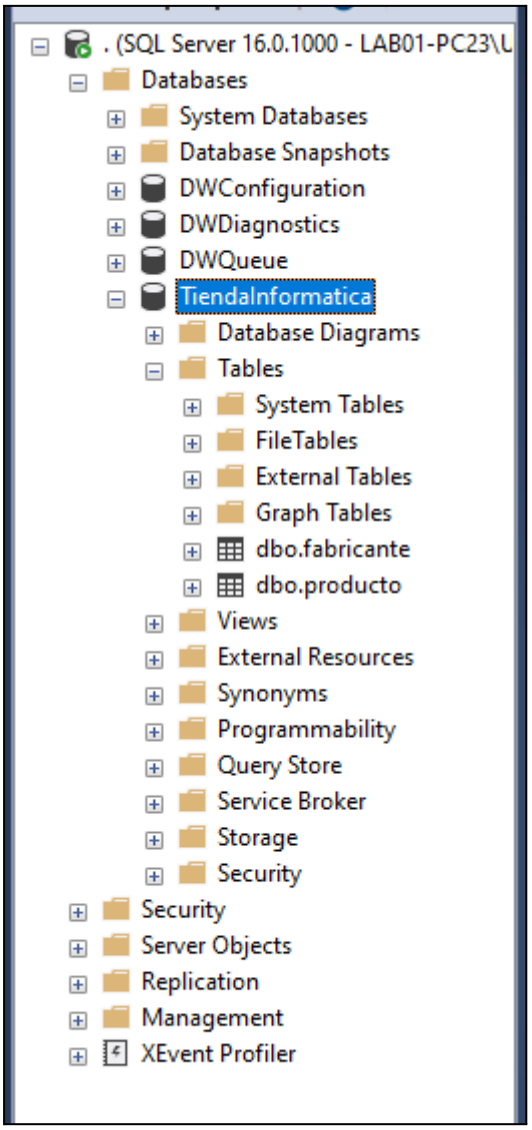
BASE DE DATOS UTILIZADA



Monitoreo del Rendimiento de SQL Server

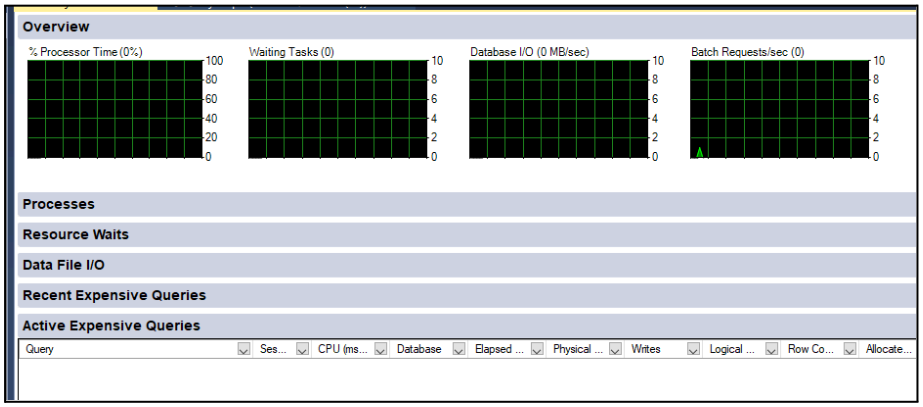
El monitoreo del rendimiento en SQL Server es esencial para garantizar que el servidor funcione de manera eficiente, identificando problemas antes de que afecten la operación. Las áreas clave a monitorear incluyen:

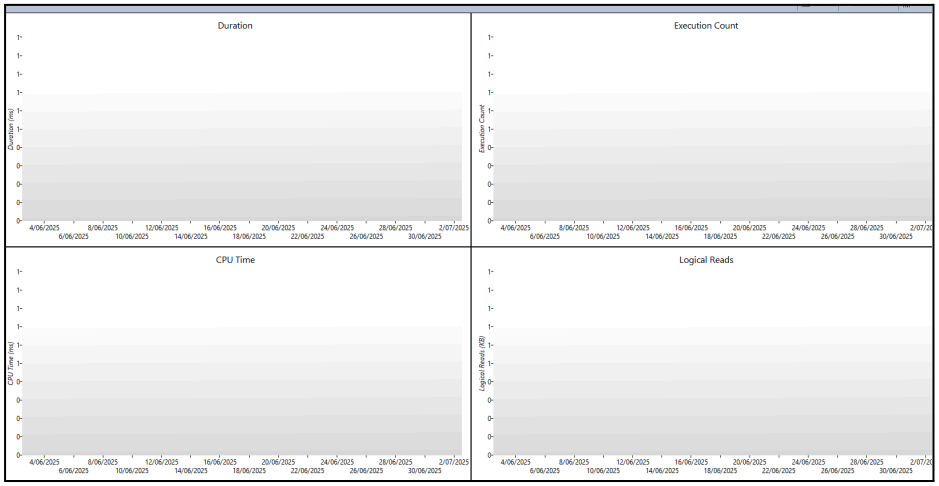
1. Uso de CPU: Consultas mal optimizadas pueden sobrecargar la CPU, afectando el rendimiento global.
2. Uso de Memoria: SQL Server debe tener suficiente memoria disponible para evitar que el sistema utilice el disco (swap), lo que reduce la velocidad.
3. Actividades de Disco: Un mal rendimiento en I/O de disco puede ser un cuello de botella. Es crucial monitorear las lecturas/escrituras.
4. Consultas Lentas y Bloqueos: Consultas no optimizadas o bloqueos de recursos afectan el rendimiento. Detectarlas a tiempo es clave.
5. Esperas de Recursos: Las esperas por recursos como CPU, disco o bloqueos deben ser analizadas para detectar cuellos de botella.

Herramientas comunes:

- SQL Server Profiler: Captura eventos y ayuda a detectar consultas lentas.
- Performance Monitor (PerfMon): Mide el rendimiento del hardware y recursos del sistema.
- DMVs: Proveen detalles sobre el estado interno de SQL Server, como el uso de índices y las estadísticas de consultas.
- Extended Events: Ofrece una forma moderna de recolectar eventos de bajo nivel sin afectar el rendimiento.

1.1. Herramientas de monitoreo





1.2

```
SELECT TOP 10
    qs.session_id,
    qs.status,
    qs.cpu_time,
    qs.total_elapsed_time,
    SUBSTRING(qt.text, qs.statement_start_offset / 2 + 1,
        (CASE WHEN qs.statement_end_offset = -1
              THEN LEN(CONVERT(NVARCHAR(MAX), qt.text)) * 2
              ELSE qs.statement_end_offset END - qs.statement_start_offset) / 2 + 1) AS query_text
FROM sys.dm_exec_requests qs
CROSS APPLY sys.dm_exec_sql_text(qs.sql_handle) qt
ORDER BY qs.cpu_time DESC;
```

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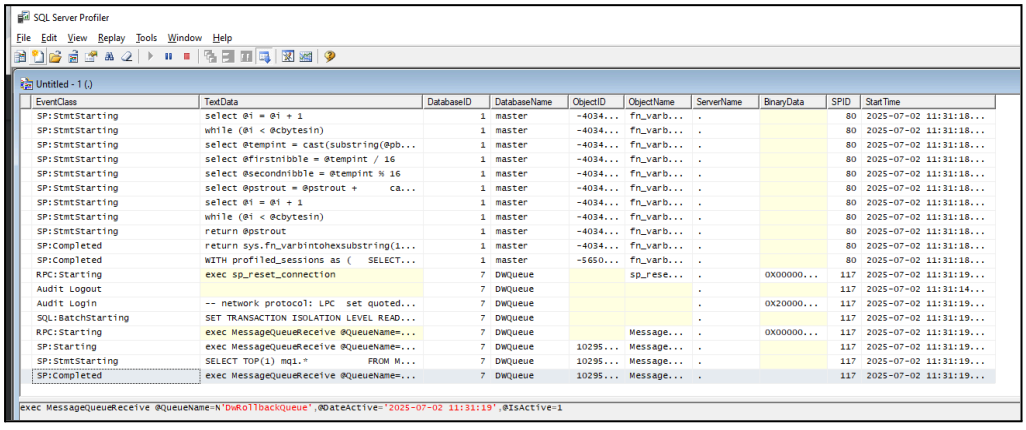
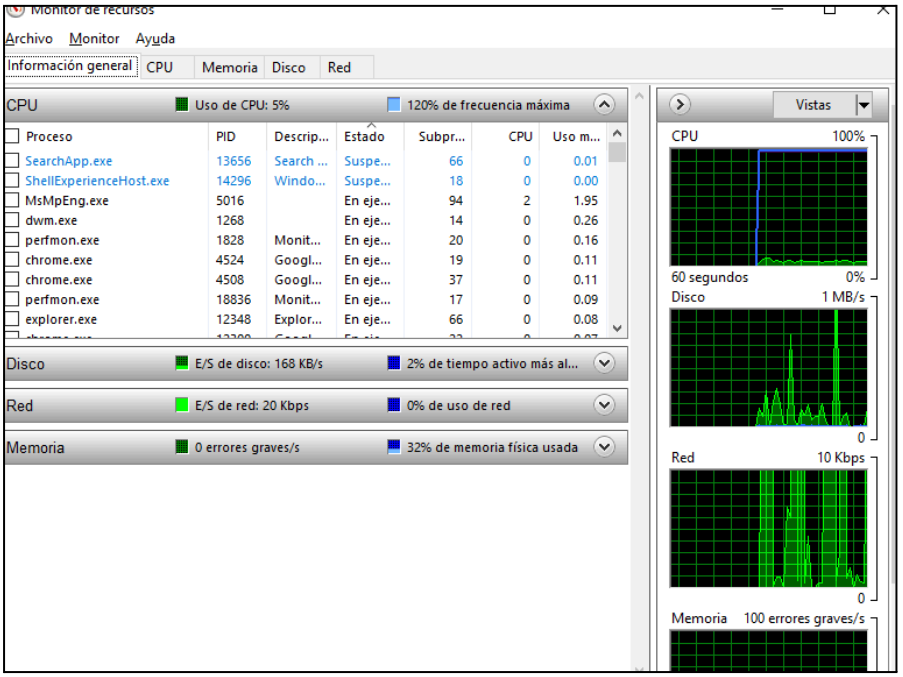
Results | Messages

	session_id	status	cpu_time	total_elapsed_time	query_text
1	70	running	1	2	SELECT TOP 10 qs.session_id, qs.statu...

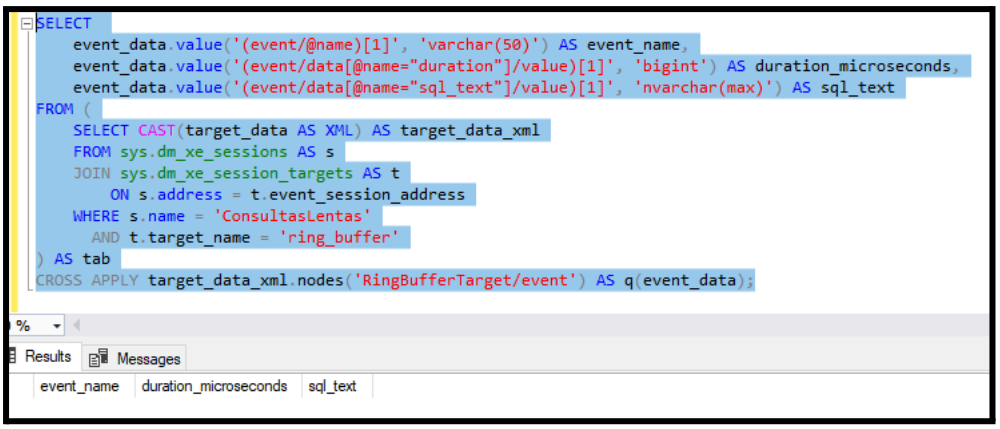
1.3



1.4



1.5

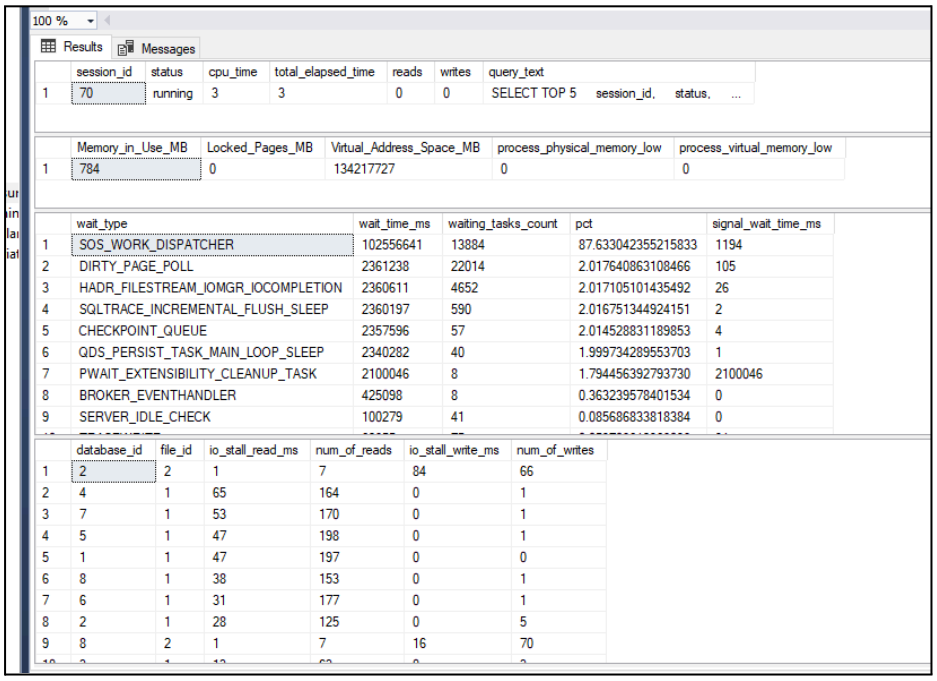


```
SELECT
    event_data.value('(event/@name)[1]', 'varchar(50)') AS event_name,
    event_data.value('(event/data[@name="duration"]/value)[1]', 'bigint') AS duration_microseconds,
    event_data.value('(event/data[@name="sql_text"]/value)[1]', 'nvarchar(max)') AS sql_text
FROM (
    SELECT CAST(target_data AS XML) AS target_data_xml
    FROM sys.dm_xe_sessions AS s
    JOIN sys.dm_xe_session_targets AS t
        ON s.address = t.event_session_address
    WHERE s.name = 'ConsultasLentas'
      AND t.target_name = 'ring_buffer'
) AS tab
CROSS APPLY target_data_xml.nodes('RingBufferTarget/event') AS q(event_data);
```

Results Messages

event_name	duration_microseconds	sql_text

2. Métricas clave de rendimiento



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Results Messages

	session_id	status	cpu_time	total_elapsed_time	reads	writes	query_text
1	70	running	3	3	0	0	SELECT TOP 5 session_id, status, ...

	Memory_in_Use_MB	Locked_Pages_MB	Virtual_Address_Space_MB	process_physical_memory_low	process_virtual_memory_low
1	784	0	134217727	0	0

	wait_type	wait_time_ms	waiting_tasks_count	pct	signal_wait_time_ms
1	SOS_WORK_DISPATCHER	102556641	13884	87.633042355215833	1194
2	DIRTY_PAGE_POLL	2361238	22014	2.017640863108466	105
3	HADR_FILESTREAM_IOMGR_IOCOMPLETION	2360611	4652	2.017105101435492	26
4	SQLTRACE_INCREMENTAL_FLUSH_SLEEP	2360197	590	2.016751344924151	2
5	CHECKPOINT_QUEUE	2357596	57	2.014528831189853	4
6	QDS_PERSIST_TASK_MAIN_LOOP_SLEEP	2340282	40	1.999734289553703	1
7	PWAIT_EXTENSIBILITY_CLEANUP_TASK	2100046	8	1.794456392793730	2100046
8	BROKER_EVENTHANDLER	425098	8	0.363239578401534	0
9	SERVER_IDLE_CHECK	100279	41	0.085686833818384	0

	database_id	file_id	io_stall_read_ms	num_of_reads	io_stall_write_ms	num_of_writes
1	2	2	1	7	84	66
2	4	1	65	164	0	1
3	7	1	53	170	0	1
4	5	1	47	198	0	1
5	1	1	47	197	0	0
6	8	1	38	153	0	1
7	6	1	31	177	0	1
8	2	1	28	125	0	5
9	8	2	1	7	16	70

3.Cuellos de botella

3.1

```sql
SELECT TOP 10
    wait_type,
    wait_time_ms,
    waiting_tasks_count,
    100.0 * wait_time_ms / SUM(wait_time_ms) OVER() AS pct_wait_time,
    signal_wait_time_ms
FROM sys.dm_os_wait_stats
WHERE wait_type NOT IN (
    'CLR_SEMAPHORE', 'LAZYWRITER_SLEEP', 'RESOURCE_QUEUE', 'SLEEP_TASK',
    'SLEEP_SYSTEMTASK', 'SQLTRACE_BUFFER_FLUSH', 'WAITFOR', 'LOGMGR_QUEUE',
    'REQUEST_FOR_DEADLOCK_SEARCH', 'XE_TIMER_EVENT', 'XE_DISPATCHER_JOIN',
    'BROKER_TO_FLUSH', 'BROKER_TASK_STOP', 'CLR_MANUAL_EVENT', 'CLR_AUTO_EVENT',
    'DISPATCHER_QUEUE_SEMAPHORE', 'FT_IFTS_SCHEDULER_IDLE_WAIT', 'XE_DISPATCHER_WAIT',
    'FT_IFTSHC_MUTEX'
)
ORDER BY wait_time_ms DESC;
```

Results | Messages

wait_type	wait_time_ms	waiting_tasks_count	pct_wait_time	signal_wait_time_ms
SOS_WORK_DISPATCHER	110679647	14703	87.647856934167332	1280
DIRTY_PAGE_POLL	2523327	23527	1.998237344343189	111
HADR_FILESTREAM_IOMGR_IOCOMPLETION	2522943	4972	1.997933252507201	27
SQLTRACE_INCREMENTAL_FLUSH_SLEEP	2520507	630	1.996004169922653	2
QDS_PERSIST_TASK_MAIN_LOOP_SLEEP	2520320	43	1.995856083533773	1
CHECKPOINT_QUEUE	2517713	68	1.993791585053512	5
PWAIT_EXTENSIBILITY_CLEANUP_TASK	2400046	9	1.900610402592091	2400046
BROKER_EVENTHANDLER	425098	8	0.336637581496810	0
SERVER_IDLE_CHECK	100279	41	0.079411524013094	0
TRACEWRITE	62855	75	0.049775240497442	31

3.2

```sql
SELECT TOP 10
    qs.sql_handle,
    qs.plan_handle,
    qs.execution_count,
    qs.total_worker_time / 1000 AS total_cpu_ms,
    qs.total_elapsed_time / 1000 AS total_duration_ms,
    qs.max_elapsed_time / 1000 AS max_duration_ms,
    SUBSTRING(qt.text, (qs.statement_start_offset/2) + 1,
        ((CASE WHEN qs.statement_end_offset = -1
            THEN LEN(CONVERT(NVARCHAR(MAX), qt.text)) * 2
            ELSE qs.statement_end_offset END) - qs.statement_start_offset)/2) AS query_text
FROM sys.dm_exec_query_stats qs
CROSS APPLY sys.dm_exec_sql_text(qs.sql_handle) qt
ORDER BY total_duration_ms DESC;
```

Results | Messages

sql_handle	plan_handle	execution_count	total_cpu_ms	total_duration_ms	max_duration_ms	query_text
0x0300FF7FFF7AAEE14CE66A0028AF000001000000000000...	0x0500FF7FFF7AAEE1F0AC1748EF0100000100000000000...	1	10	63005	63005	select * from OpenRowset(TABLE TRCDATA, @traceid, @...
0x020000009987 6B377E6FF987D49F911A592B37A491F279620...	0x060005009987 6B37806FC141EF0100000100000000000...	1	126	272	272	SELECT db_id() as database_id, sm.[is_inlineable] ...
0x020000008604D91CA9F06795CE074F7300128D092E006FD8...	0x060001008604D91C80997827EF0100000100000000000...	8	64	114	27	SELECT target_data FROM sys.dm_xe_session_targ...
0x020000001C70C614D261C85875D4EF3C90BD18D02D62453...	0x060001001C70C61480F6F943EF0100000100000000000...	1	37	101	101	SELECT SCHEMA_NAME(sp.schema_id) AS [Schema], sp...
0x020000001C70C614D261C85875D4EF3C90BD18D02D62453...	0x060008001C70C61420F78644EF0100000100000000000...	2	66	88	48	SELECT SCHEMA_NAME(sp.schema_id) AS [Schema], sp...
0x0300020064FC7DAAEC50BC000EB3000001000000000000...	0x0500020064FC7DAA60998F26EF0100000100000000000...	94	73	73	0	WITH interval_waitstats AS (-- First get resource wait s...
0x020000006352 3C1935FA36A02F1BB33F3700E6D6A954892F...	0x060008006352 3C198073064AEF0100000100000000000...	1	2	68	68	SELECT wait_type, wait_time_ms, waiting_tasks_...
0x020000000C37C8B117DB72BE4DAE40289209E33E2725FBAB...	0x060002000C37C8B1140206D47EF0100000100000000000...	95	65	65	1	WITH profiled_sessions as (SELECT DISTINCT session_...
0x020000006758 4F0EB54412D67D1CAA869BEC3D6DE279C24...	0x060002006758 4F0E50F8E146EF0100000100000050000...	96	63	63	0	SELECT @current_request_count = cntr_value FROM sy...
0x0300020064FC7DAAEC50BC000EB3000001000000000000...	0x0500020064FC7DAA60998F26EF0100000100000000000...	96	58	58	0	INSERT INTO #am_wait_stats_snapshots SELECT ...

3.3

```sql
SELECT
    (physical_memory_in_use_kb / 1024) AS Memory_in_Use_MB,
    (locked_page_allocations_kb / 1024) AS Locked_Pages_MB,
    (total_virtual_address_space_kb / 1024) AS Virtual_Address_Space_MB,
    process_physical_memory_low,
    process_virtual_memory_low
FROM sys.dm_os_process_memory;
```

100 %

Results | Messages

	Memory_in_Use_MB	Locked_Pages_MB	Virtual_Address_Space_MB	process_physical_memory_low	process_virtual_memory_low
1	786	0	134217727	0	0

3.4

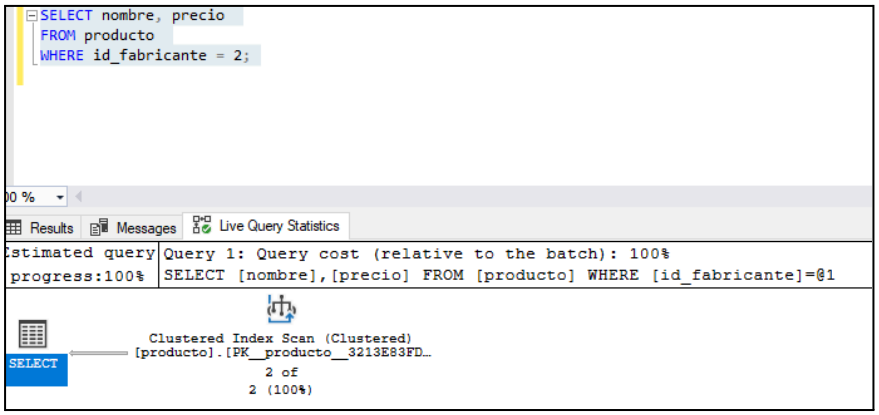
```sql
SELECT
    tl.request_session_id AS blocked_session_id,
    wt.blocking_session_id AS blocking_session_id,
    wt.wait_duration_ms,
    OBJECT_NAME(p.object_id) AS locked_object,
    tl.resource_type,
    tl.resource_description,
    es1.login_name AS blocked_login,
    es2.login_name AS blocking_login,
    st1.text AS blocked_query,
    st2.text AS blocking_query
FROM sys.dm_tran_locks tl
JOIN sys.dm_os_waiting_tasks wt ON tl.lock_owner_address = wt.resource_address
JOIN sys.dm_exec_sessions es1 ON wt.blocked_session_id = es1.session_id
JOIN sys.dm_exec_sessions es2 ON wt.blocking_session_id = es2.session_id
CROSS APPLY sys.dm_exec_sql_text(es1.most_recent_sql_handle) st1
CROSS APPLY sys.dm_exec_sql_text(es2.most_recent_sql_handle) st2
```

Optimización de consultas

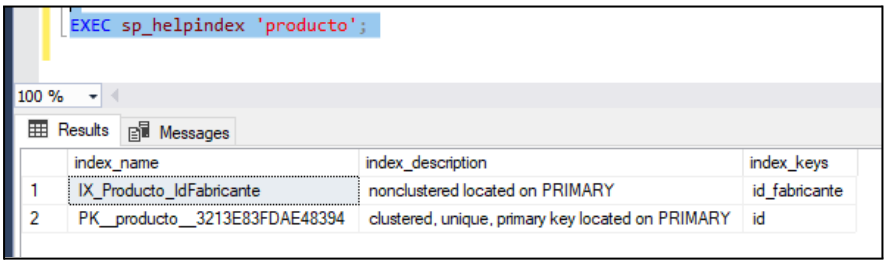
Es el proceso mediante el cual un sistema gestor de bases de datos (SGBD) busca la forma más eficiente de ejecutar una consulta SQL. El objetivo es reducir el tiempo de respuesta y el consumo de recursos, como CPU y memoria. La optimización puede incluir reescritura de la consulta, selección del mejor plan de ejecución y uso adecuado de índices.

- **Planes de ejecución de consultas**
- **Índices**
- **Estadísticas de tablas**

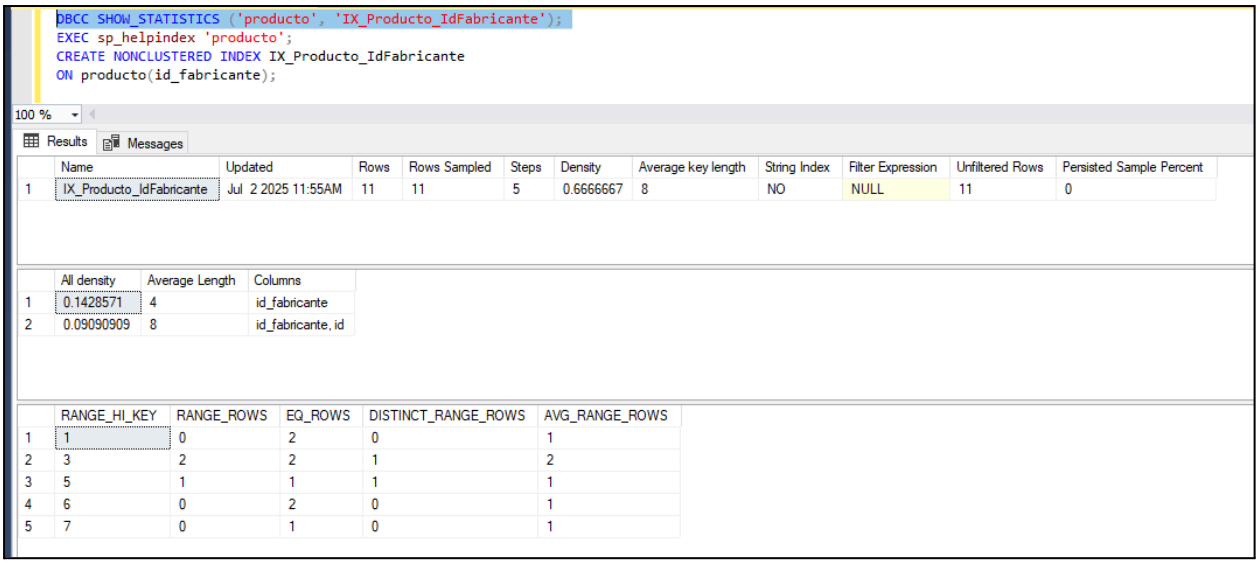
1.Planes de ejecución de consultas



2.Indices



3.Estadísticas de tabla

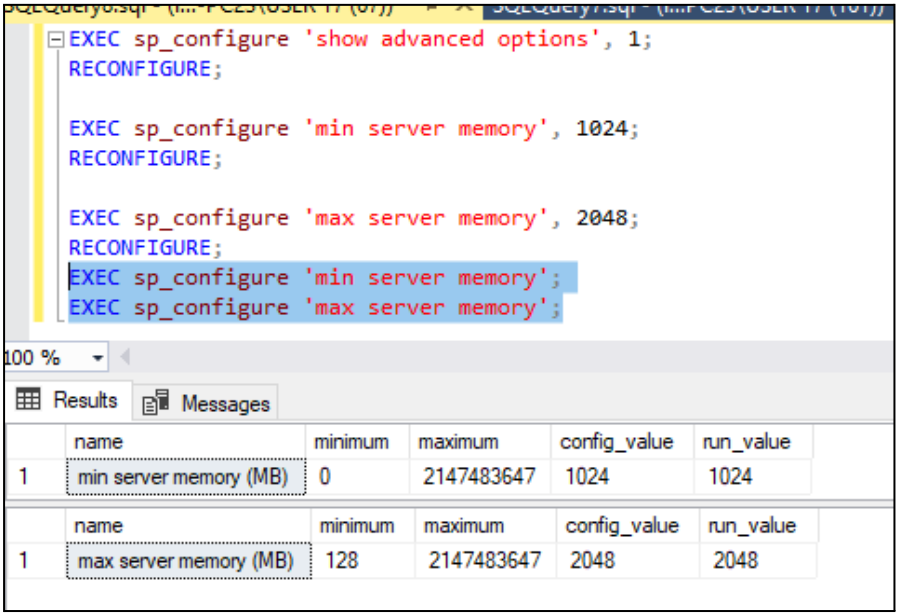


Ajuste del rendimiento del servidor

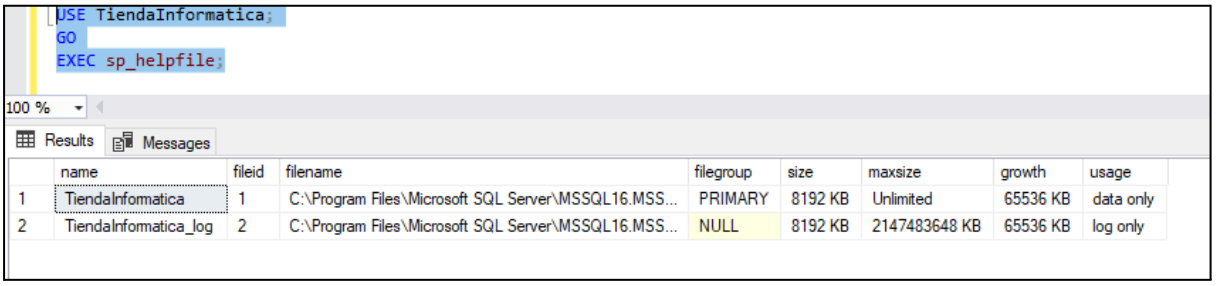
El ajuste del rendimiento del servidor se refiere al conjunto de técnicas y configuraciones aplicadas a un servidor de bases de datos (o servidor en general) para maximizar su eficiencia, capacidad de respuesta y estabilidad bajo diferentes cargas de trabajo. El objetivo es asegurar que el servidor maneje las solicitudes de forma óptima, evitando cuellos de botella y minimizando tiempos de espera.

- Configuración de la memoria
- Configuración del disco
- Configuración del procesador

1.Configuración de la memoria



2.Configuración del disco



3.Configuración del procesador