

Universidad Peruana Los Andes
Facultad de Ingeniería
Escuela profesional de Ingeniería de Sistemas



PRACTICA DE LA SEMANA 10

Curso: Base de datos II

Docente: Raul Enrique Fernandez Bejarano

Estudiante: Sarmiento Mosquera Yeims Abraham

Ciclo: V - Código: s03807f

Huancayo - 2025

Semana 13: Monitoreo y rendimiento

Objetivo: Optimizar la eficiencia de SQL Server y prevenir problemas de rendimiento.

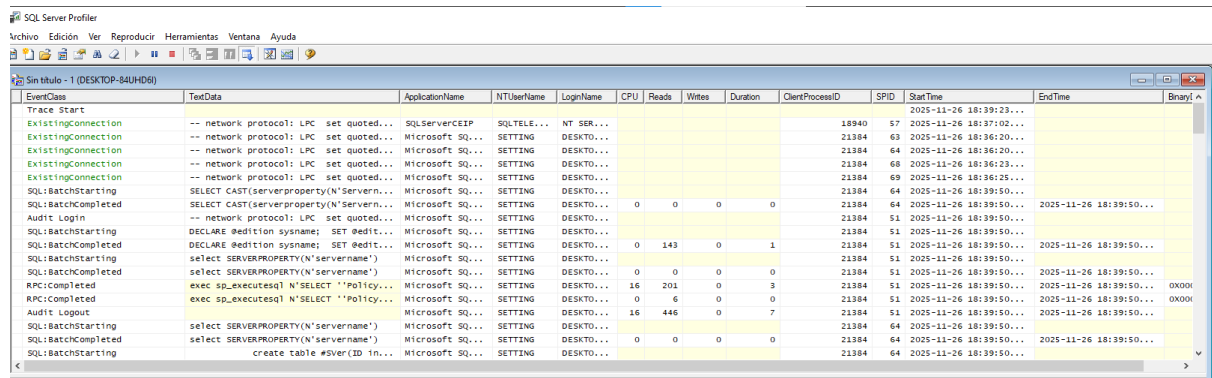
Temas:

1. Análisis de rendimiento con SQL Profiler y Extended Events.

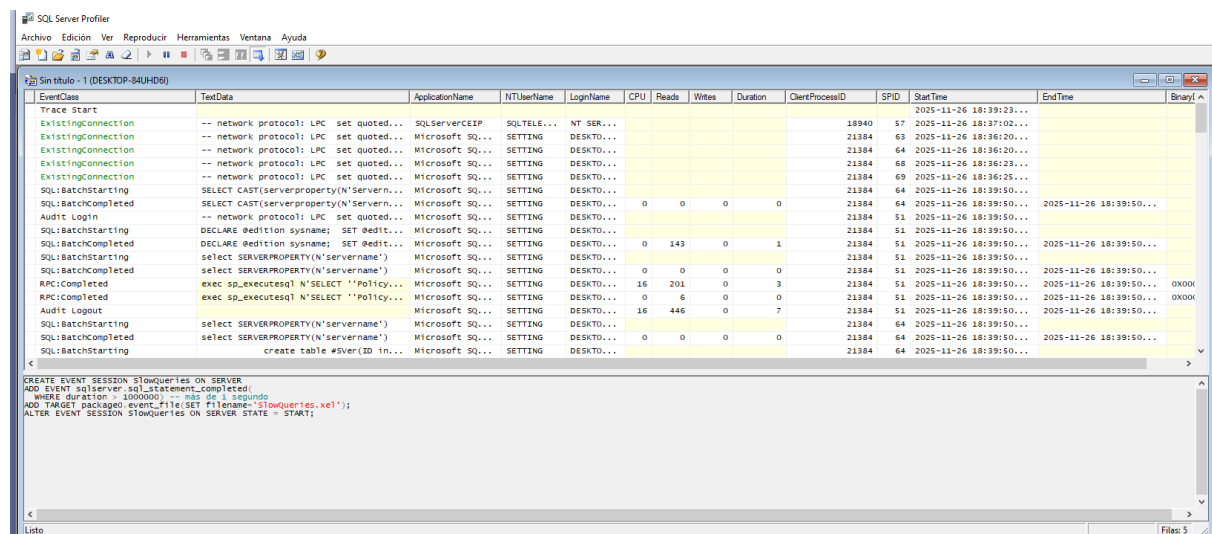
- **SQL Profiler:** Herramienta gráfica que permite capturar eventos en tiempo real, como ejecución de consultas, bloqueos, y uso de recursos. Útil para diagnósticos rápidos.
- **Extended Events:** Sistema más moderno y eficiente para monitorear eventos del servidor. Consume menos recursos y permite análisis detallado de rendimiento.

Ejemplo

```
CREATE EVENT SESSION SlowQueries ON SERVER
ADD EVENT sqlserver.sql_statement_completed(
    WHERE duration > 1000000) -- más de 1 segundo
ADD TARGET package0.event_file(SET filename='SlowQueries.xel');
ALTER EVENT SESSION SlowQueries ON SERVER STATE = START;
```



EventClass	TextData	ApplicationName	NTUserName	LoginName	CPU	Reads	Writes	Duration	ClientProcessID	SPID	StartTime	EndTime	Binary
Trace Start											2025-11-26 18:39:23...		
ExistingConnection	-- network protocol: LPC set quoted...	SQLServerCEIP	SQLTELE...	NT SER...					18940	57	2025-11-26 18:37:02...		
ExistingConnection	-- network protocol: LPC set quoted...	Microsoft SQL...	SETTING	DESKTO...					21384	63	2025-11-26 18:36:20...		
ExistingConnection	-- network protocol: LPC set quoted...	Microsoft SQL...	SETTING	DESKTO...					21384	64	2025-11-26 18:36:20...		
ExistingConnection	-- network protocol: LPC set quoted...	Microsoft SQL...	SETTING	DESKTO...					21384	68	2025-11-26 18:36:23...		
ExistingConnection	-- network protocol: LPC set quoted...	Microsoft SQL...	SETTING	DESKTO...					21384	69	2025-11-26 18:36:25...		
SQLBatchStarting	SELECT CAST(serverproperty(N'Servern...	Microsoft SQL...	SETTING	DESKTO...					21384	64	2025-11-26 18:39:50...		
SQLBatchCompleted	SELECT CAST(serverproperty(N'Servern...	Microsoft SQL...	SETTING	DESKTO...	0	0	0	0	21384	64	2025-11-26 18:39:50...	2025-11-26 18:39:50...	
Audit Login	-- network protocol: LPC set quoted...	Microsoft SQL...	SETTING	DESKTO...					21384	51	2025-11-26 18:39:50...		
SQLBatchStarting	DECLARE @edition sysname; SET @edit...	Microsoft SQL...	SETTING	DESKTO...					21384	51	2025-11-26 18:39:50...		
SQLBatchCompleted	DECLARE @edition sysname; SET @edit...	Microsoft SQL...	SETTING	DESKTO...	0	143	0	1	21384	51	2025-11-26 18:39:50...	2025-11-26 18:39:50...	
SQLBatchStarting	select SERVERPROPERTY(N'servername')	Microsoft SQL...	SETTING	DESKTO...					21384	51	2025-11-26 18:39:50...		
SQLBatchCompleted	select SERVERPROPERTY(N'servername')	Microsoft SQL...	SETTING	DESKTO...	0	0	0	0	21384	51	2025-11-26 18:39:50...	2025-11-26 18:39:50...	
RPC:completed	exec sp_executesql N'SELECT ''Policy...	Microsoft SQL...	SETTING	DESKTO...	16	201	0	3	21384	51	2025-11-26 18:39:50...	2025-11-26 18:39:50...	OX000
RPC:completed	exec sp_executesql N'SELECT ''Policy...	Microsoft SQL...	SETTING	DESKTO...	0	6	0	0	21384	51	2025-11-26 18:39:50...	2025-11-26 18:39:50...	OX000
Audit Logout									21384	51	2025-11-26 18:39:50...		
SQLBatchStarting	select SERVERPROPERTY(N'servername')	Microsoft SQL...	SETTING	DESKTO...	16	446	0	7	21384	51	2025-11-26 18:39:50...		
SQLBatchCompleted	select SERVERPROPERTY(N'servername')	Microsoft SQL...	SETTING	DESKTO...					21384	64	2025-11-26 18:39:50...	2025-11-26 18:39:50...	
SQLBatchStarting	create table #Sver(ID in...	Microsoft SQL...	SETTING	DESKTO...	0	0	0	0	21384	64	2025-11-26 18:39:50...	2025-11-26 18:39:50...	



EventClass	TextData	ApplicationName	NTUserName	LoginName	CPU	Reads	Writes	Duration	ClientProcessID	SPID	StartTime	EndTime	Binary
Trace Start											2025-11-26 18:39:23...		
ExistingConnection	-- network protocol: LPC set quoted...	SQLServerCEIP	SQLTELE...	NT SER...					18940	57	2025-11-26 18:37:02...		
ExistingConnection	-- network protocol: LPC set quoted...	Microsoft SQL...	SETTING	DESKTO...					21384	63	2025-11-26 18:36:20...		
ExistingConnection	-- network protocol: LPC set quoted...	Microsoft SQL...	SETTING	DESKTO...					21384	64	2025-11-26 18:36:20...		
ExistingConnection	-- network protocol: LPC set quoted...	Microsoft SQL...	SETTING	DESKTO...					21384	68	2025-11-26 18:36:23...		
ExistingConnection	-- network protocol: LPC set quoted...	Microsoft SQL...	SETTING	DESKTO...					21384	69	2025-11-26 18:36:25...		
SQLBatchStarting	SELECT CAST(serverproperty(N'Servern...	Microsoft SQL...	SETTING	DESKTO...					21384	64	2025-11-26 18:39:50...		
SQLBatchCompleted	SELECT CAST(serverproperty(N'Servern...	Microsoft SQL...	SETTING	DESKTO...	0	0	0	0	21384	64	2025-11-26 18:39:50...	2025-11-26 18:39:50...	
Audit Login	-- network protocol: LPC set quoted...	Microsoft SQL...	SETTING	DESKTO...					21384	51	2025-11-26 18:39:50...		
SQLBatchStarting	DECLARE @edition sysname; SET @edit...	Microsoft SQL...	SETTING	DESKTO...					21384	51	2025-11-26 18:39:50...		
SQLBatchCompleted	DECLARE @edition sysname; SET @edit...	Microsoft SQL...	SETTING	DESKTO...	0	143	0	1	21384	51	2025-11-26 18:39:50...	2025-11-26 18:39:50...	
SQLBatchStarting	select SERVERPROPERTY(N'servername')	Microsoft SQL...	SETTING	DESKTO...					21384	51	2025-11-26 18:39:50...		
SQLBatchCompleted	select SERVERPROPERTY(N'servername')	Microsoft SQL...	SETTING	DESKTO...	0	0	0	0	21384	51	2025-11-26 18:39:50...	2025-11-26 18:39:50...	
RPC:completed	exec sp_executesql N'SELECT ''Policy...	Microsoft SQL...	SETTING	DESKTO...	16	201	0	3	21384	51	2025-11-26 18:39:50...	2025-11-26 18:39:50...	OX000
RPC:completed	exec sp_executesql N'SELECT ''Policy...	Microsoft SQL...	SETTING	DESKTO...	0	6	0	0	21384	51	2025-11-26 18:39:50...	2025-11-26 18:39:50...	OX000
Audit Logout									21384	51	2025-11-26 18:39:50...		
SQLBatchStarting	select SERVERPROPERTY(N'servername')	Microsoft SQL...	SETTING	DESKTO...	16	446	0	7	21384	51	2025-11-26 18:39:50...		
SQLBatchCompleted	select SERVERPROPERTY(N'servername')	Microsoft SQL...	SETTING	DESKTO...					21384	64	2025-11-26 18:39:50...	2025-11-26 18:39:50...	
SQLBatchStarting	create table #Sver(ID in...	Microsoft SQL...	SETTING	DESKTO...	0	0	0	0	21384	64	2025-11-26 18:39:50...	2025-11-26 18:39:50...	

```
CREATE EVENT SESSION SlowQueries ON SERVER
ADD EVENT sqlserver.sql_statement_completed(
    WHERE duration > 1000000) -- más de 1 segundo
ADD TARGET (package0.event_file(SET filename='SlowQueries.xel');
ALTER EVENT SESSION SlowQueries ON SERVER STATE = START;
```

2. Estadísticas e índices (creación, fragmentación, mantenimiento).

- **Índices:** Estructuras que aceleran la búsqueda y ordenamiento de datos. Pueden ser clustered o non-clustered.
- **Estadísticas:** Información sobre la distribución de datos en columnas, usada por el optimizador de consultas.
- **Fragmentación:** Desorden en las páginas de índice que reduce el rendimiento. Se corrige con REORGANIZE o REBUILD.

Ejemplo

The screenshot displays two windows from SQL Server Enterprise Manager. The top window, titled 'SQLQuery1.sql...ETTING (68))', contains the following SQL query:

```
1 SELECT
2     name AS NombreIndice,
3     avg_fragmentation_in_percent AS Fragmentacion
4 FROM sys.dm_db_index_physical_stats(DB_ID('QhatuPeru'), OBJECT_ID('Ventas'), NULL, NULL, 'LIMITED');
5
6 DBCC SHOW_STATISTICS ('Ventas', 'IX_Ventas_Fecha');
7
```

The bottom window, titled 'Sin título - 1 (DESKTOP-84UHD6)', shows a trace of network protocol events. The trace table has columns: EventClass, TextData, ApplicationName, NTUserName, LoginName, CPU, Reads, Writes, Duration, ClientProcessID, SPID, StartTime, EndTime, and BinaryData. The trace shows several 'ExistingConnection' events for the 'Microsoft SQL Server' application, all with a duration of 0.00 seconds. The bottom status bar indicates 'El seguimiento se está ejecutando.' and 'Lin 7, Col 1 Filas: 7'.

3. Administración de transacciones y bloqueos.

- **Transacciones:** Conjunto de operaciones que se ejecutan como una unidad lógica. Garantizan consistencia y recuperación ante fallos.
- **Bloqueos:** Mecanismo de control de concurrencia que evita conflictos entre usuarios. Pueden ser compartidos, exclusivos o de intención.

Ejemplo

```
1 SELECT
2     request_session_id AS Sesion,
3     resource_type AS Tipo,
4     resource_description AS Recurso,
5     request_mode AS ModoBloqueo
6 FROM sys.dm_tran_locks;
7
8 SELECT * FROM sys.dm_tran_active_transactions;
9
```

	transaction_id	name	transaction_begin_time	transaction_type	transaction_uow	transaction_state	transaction_status	transaction_status2	dtc_state	dtc_status	dtc_isolation_level	filestream_transaction_id
1	320	worktable	2025-11-26 08:24:00.693	2	NULL	2	0	0	0	0	0	NULL
2	323	worktable	2025-11-26 08:24:00.693	2	NULL	2	0	0	0	0	0	NULL
3	325	worktable	2025-11-26 08:24:00.693	2	NULL	2	0	0	0	0	0	NULL
4	327	worktable	2025-11-26 08:24:00.693	2	NULL	2	0	0	0	0	0	NULL
5	330	worktable	2025-11-26 08:24:00.697	2	NULL	2	0	0	0	0	0	NULL
6	333	worktable	2025-11-26 08:24:00.697	2	NULL	2	0	0	0	0	0	NULL
7	230492	SELECT	2025-11-26 18:57:13.113	2	NULL	2	0	0	0	0	0	NULL
8	231524	SELECT	2025-11-26 18:58:26.133	2	NULL	2	0	0	0	0	0	NULL

4. Análisis de planes de ejecución.

Representación gráfica o XML del proceso que sigue SQL Server para ejecutar una consulta. Muestra operaciones como escaneo de tablas, uso de índices, joins, etc. Permite identificar cuellos de botella.

Ejemplo

Para ejecutar con consultas se pueden usar la opción de ejecutar con consulta dinámica o en tiempo real

The screenshot shows the SQL Server Enterprise Manager interface. At the top, there is a toolbar with the 'Ejecutar' (Execute) button highlighted. Below the toolbar, the 'Estadísticas de consultas dinámicas' (Dynamic query statistics) window is open, displaying two queries. The first query, 'Consulta 1: Costo de la consulta (relativo al lote): 1 %', is a SELECT statement from sys.dm_tran_locks. The second query, 'Consulta 2: Costo de la consulta (relativo al lote): 99 %', is a SELECT statement from sys.dm_tran_active_transactions. The window also shows the progress of each query, with 'Consulta 1' at 100% and 'Consulta 2' at 99%.

5. Optimización de consultas T-SQL.

Proceso de reescritura y ajuste de consultas para mejorar su eficiencia. Incluye evitar SELECT *, usar filtros adecuados, aprovechar índices, y reducir operaciones costosas como JOIN innecesarios.

Ejemplo

```
SELECT TOP 5
    total_elapsed_time / execution_count AS TiempoPromedio,
    execution_count,
    text AS Consulta
FROM sys.dm_exec_query_stats
CROSS APPLY sys.dm_exec_sql_text(sql_handle)
ORDER BY TiempoPromedio DESC;
```

	TiempoPromedio	execution_count	Consulta
1	1061758862	1	create procedure sys.sp_trace_getdata (@traceid int, ...
2	797383	1	SELECT request_session_id AS Sesion, resource_ty...
3	231630	1	(@_msparam_0 nvarchar(4000),@_msparam_1 nvarchar...
4	43929	1	SELECT request_session_id AS Sesion, resource_ty...
5	36631	1	SELECT request_session_id AS Sesion, resource_ty...

6. Control de recursos con **Resource Governor**.

- Funcionalidad que permite asignar límites de CPU, memoria y concurrencia a grupos de trabajo. Útil para evitar que procesos intensivos afecten el rendimiento general del servidor.

Ejemplo

SQLQuery1.sql...ETTING (68))*

```

1 SELECT
2     session_id,
3     total_cpu_time,
4     total_elapsed_time
5 FROM sys.dm_exec_sessions
6 WHERE is_user_process = 1;
7
8
9 SELECT * FROM sys.dm_resource_governor_workload_groups;
10

```

group_id	name	pool_id	external_pool_id	statistics_start_time	total_request_count	total_queued_request_count	active_request_count	queued_request_count	total_cpu_time_violation_count	total_cpu_usage_ms	max_request_cpu_time_ms	blocked_task_count	total_jo...
1	internal	1	2	2025-11-26 08:23:58.767	0	0	0	0	0	176325	0	0	15
2	default	2	2	2025-11-26 08:23:58.767	2636	0	2	0	0	176325	475	0	2

Prácticas:

- Identificar consultas lentas y reescribirlas.
- Crear y mantener índices para una tabla de ventas.
- Configurar alertas de bloqueo y saturación de CPU.

...ETTING (68))*

```

1 SELECT TOP 5
2     total_elapsed_time / execution_count AS Promedio,
3     text
4 FROM sys.dm_exec_query_stats
5 CROSS APPLY sys.dm_exec_sql_text(sql_handle)
6 ORDER BY Promedio DESC;

```

100 % 1 0 ↑ ↓		
Resultados Mensajes		
	Promedio	text
1	1061758862	create procedure sys.sp_trace_getdata (@traceid int, ...
2	797383	SELECT request_session_id AS Sesión, resource_ty...
3	231630	(@_msparam_0 nvarchar(4000), @_msparam_1 nvarchar...
4	81088	SELECT target_data FROM sys.dm_xe_session_t...
5	43929	SELECT request_session_id AS Sesión, resource_ty...

```

CREATE INDEX IX_Ventas_ClienteFecha ON Ventas(IdCliente, Fecha);
ALTER INDEX IX_Ventas_ClienteFecha ON Ventas REBUILD;

EXEC sp_add_alert @name = 'Alerta CPU Alta',
                 @message_id = 17830,
                 @severity = 10,
                 @enabled = 1;

```

Sin título - 1 (DESKTOP-84UHD6)													
EventClass	TextData	ApplicationName	NTUserName	LoginName	CPU	Reads	Writes	Duration	ClientProcessID	SPID	StartTime	EndTime	Binary
Audit Login	-- network protocol: LPC set quoted...	SQLServerCEIP	SQLTELE...	NT SER...					18940	57	2025-11-26 19:02:03...		
SQL:BatchStarting	SET DEADLOCK_PRIORITY -10	SQLServerCEIP	SQLTELE...	NT SER...					18940	57	2025-11-26 19:02:03...		
SQL:BatchCompleted	SET DEADLOCK_PRIORITY -10	SQLServerCEIP	SQLTELE...	NT SER...	0	0	0	0	18940	57	2025-11-26 19:02:03...	2025-11-26 19:02:03...	
SQL:BatchStarting	IF not exists (select * from sys.dm...	SQLServerCEIP	SQLTELE...	NT SER...					18940	57	2025-11-26 19:02:03...		
SQL:BatchCompleted	IF not exists (select * from sys.dm...	SQLServerCEIP	SQLTELE...	NT SER...	0	20	0	1	18940	57	2025-11-26 19:02:03...	2025-11-26 19:02:03...	
SQL:BatchStarting	SELECT TOP 5 total_elapsed_time /...	Microsoft SQ...	SETTING	DESKTO...					21384	68	2025-11-26 19:02:28...		
SQL:BatchCompleted	SELECT TOP 5 total_elapsed_time /...	Microsoft SQ...	SETTING	DESKTO...	0	254	6	10	21384	68	2025-11-26 19:02:28...	2025-11-26 19:02:28...	
Audit Logout		Microsoft SQ...	SETTING	DESKTO...					21384	77	2025-11-26 19:03:154...	2025-11-26 19:03:124...	
RPC:Completed	exec sp_reset_connection	Microsoft SQ...	SETTING	DESKTO...	0	21...	0	89327	21384	77	2025-11-26 19:03:154...	2025-11-26 19:03:124...	0X00K
Audit Login	-- network protocol: LPC set quoted...	Microsoft SQ...	SETTING	DESKTO...					21384	77	2025-11-26 19:03:24...		
RPC:Completed	exec sp_executesql N'SELECT dtb.col1...	Microsoft SQ...	SETTING	DESKTO...	0	8	0	0	21384	77	2025-11-26 19:03:24...	2025-11-26 19:03:24...	0X00K
Audit Logout		Microsoft SQ...	SETTING	DESKTO...					21384	77	2025-11-26 19:03:24...	2025-11-26 19:03:24...	
RPC:Completed	exec sp_reset_connection	Microsoft SQ...	SETTING	DESKTO...	0	21...	0	0	21384	77	2025-11-26 19:03:24...	2025-11-26 19:03:24...	0X00K
Audit Login	-- network protocol: LPC set quoted...	Microsoft SQ...	SETTING	DESKTO...					21384	77	2025-11-26 19:03:24...		
SQL:BatchStarting	SELECT dtb.name AS [Name], CAST(0 AS...	Microsoft SQ...	SETTING	DESKTO...					21384	77	2025-11-26 19:03:24...		
SQL:BatchCompleted	SELECT dtb.name AS [Name], CAST(0 AS...	Microsoft SQ...	SETTING	DESKTO...	0	50	0	0	21384	77	2025-11-26 19:03:24...	2025-11-26 19:03:24...	
SQL:BatchStarting	EXEC sp_add_alert @name = 'Alerta CP...	Microsoft SQ...	SETTING	DESKTO...					21384	68	2025-11-26 19:03:32...		
SQL:BatchCompleted	EXEC sp_add_alert @name = 'Alerta CP...	Microsoft SQ...	SETTING	DESKTO...	0	4	0	2	21384	68	2025-11-26 19:03:32...	2025-11-26 19:03:32...	

```

EXEC sp_add_alert @name = 'Alerta CPU Alta',
                 @message_id = 17830,
                 @severity = 10,
                 @enabled = 1;

```

El seguimiento se está ejecutando.

Lin 322, Col 1 Filas 322