

Welcome!

TRANSACTIONS AND ERROR HANDLING IN SQL SERVER



Miriam Antona
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Topics covered

- Chapters 1 and 2: Error handling
- Chapter 3: Transactions
- Chapter 4: Concurrency in transactions

Dataset: Electric bike store

- Products

product_id	product_name	stock	price
1	Trek Conduit+ - 2016	50	2999.99
2	Sun Bicycles ElectroLite - 2017	47	1559.99
3	Trek Powerfly 8 FS Plus - 2017	41	4999.99
4	Trek Conduit+ - 2018	10	2799.99
5	Trek CrossRip+ - 2018	12	4499.99

Dataset: Electric bike store

- Buyers

buyer_id	first_name	last_name	email	phone
1	Dylan	Smith	dylansmith@mail.com	555888999
2	John	Antona	johnantona@mail.com	555111222
3	Astrid	Harper	astridharper@mail.com	555000999
4	Angus	Brown	angusbrown@mail.com	555222012
5	David	Elcano	davideelcano@mail.com	555602314

Dataset: Electric bike store

- Staff

staff_id	first_name	last_name	email	phone
1	Mohammed	Ferrec	mohammedferrec@mail.com	555888111
2	Dimitri	Brown	dimitribrown@mail.com	555012012
3	Leila	Merheg	leilamerheg@mail.com	555999133
4	Mateo	Casanovas	mateocasanovas@mail.com	555110996
5	Carl	York	carlyork@mail.com	555010011

Dataset: Electric bike store

- Orders

order_id	product_id	buyer_id	staff_id	price	order_date
1	2	1	5	100	1559.99
2	2	5	5	100	1559.99
3	5	10	1	100	4499.99
4	10	3	3	100	2799.99
5	15	2	7	100	2299.99

Getting an error

product_id	product_name	stock	price
19	Trek Powerfly 5 - 2018	15	3499.99

```
CONSTRAINT unique_product_name UNIQUE (product_name);
```

```
INSERT INTO products (product_name, stock, price)
VALUES ('Trek Powerfly 5 - 2018', 10, 3499.99);
```

Violation of UNIQUE KEY constraint 'unique_product_name'.
Cannot insert duplicate key in object 'dbo.products'.
The duplicate key value is (Trek Powerfly 5 - 2018).

The TRY...CATCH syntax

```
BEGIN TRY
    { sql_statement | statement_block }
END TRY
BEGIN CATCH
    [ { sql_statement | statement_block } ]
END CATCH
[ ; ]
```

- Enclose your statements within the **TRY** block
- Place your error handling code within the **CATCH** block
- Error in the **TRY** block -> the **CATCH** block takes the control
- No error in the **TRY** block -> the **CATCH** block is skipped

Example with TRY...CATCH

```
BEGIN TRY
    INSERT INTO products (product_name, stock, price)
        VALUES ('Trek Powerfly 5 - 2018', 10, 3499.99);
    SELECT 'Product inserted correctly!' AS message;
END TRY
BEGIN CATCH
    SELECT 'An error occurred! You are in the CATCH block' AS message;
END CATCH
```

```
| message |
|-----|
| An error occurred! You are in the CATCH block |
```

Example with TRY...CATCH

```
BEGIN TRY
    INSERT INTO products (product_name, stock, price)
        VALUES ('Super new Trek Powerfly', 5, 1499.99);
    SELECT 'Product inserted correctly!' AS message;
END TRY
BEGIN CATCH
    SELECT 'An error occurred! You are in the CATCH block' AS message;
END CATCH
```

```
| message |
|-----|
| Product inserted correctly! |
```

Nesting TRY...CATCH

```
BEGIN TRY
    INSERT INTO products (product_name, stock, price)
        VALUES ('Trek Powerfly 5 - 2018', 10, 3499.99);
    SELECT 'Product inserted correctly!' AS message;
END TRY
BEGIN CATCH
    SELECT 'An error occurred inserting the product!
        You are in the first CATCH block' AS message;
    BEGIN TRY
        INSERT INTO myErrors
            VALUES ('ERROR!');
        SELECT 'Error inserted correctly!' AS message;
    END TRY
    BEGIN CATCH
        SELECT 'An error occurred inserting the error!
            You are in the second CATCH block' AS message;
    END CATCH
END CATCH
```

```
| message |
|-----|
| An error occurred inserting the product! |
| You are in the first CATCH block |

| message |
|-----|
| An error occurred inserting the error! |
| You are in the second CATCH block |
```

Let's practice!

TRANSACTIONS AND ERROR HANDLING IN SQL SERVER

Error anatomy and uncatchable errors

TRANSACTIONS AND ERROR HANDLING IN SQL SERVER



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Error anatomy

```
INSERT INTO products (product_name, stock, price)
VALUES ('Trek Powerfly 5 - 2018', 10, 3499.99);
```

```
Msg 2627, Level 14, State 1, Line 1
Violation of UNIQUE KEY constraint 'unique_name'.
Cannot insert duplicate key in object 'dbo.products'.
The duplicate key value is (Trek Powerfly 5 - 2018).
```

Error anatomy

Error number

```
Msg 2627, Level 14, State 1, Line 1
Violation of UNIQUE KEY constraint 'unique_name'. Cannot insert duplicate key in object 'dbo.products'.
The duplicate key value is (Trek Powerfly 5 - 2018).
```

- SQL errors: 1 to 49999
- Own errors: starting from 50001

```
select * from sys.messages
```

message_id	language_id	severity	...	text
...
2627	1033	14	...	Violation of %ls constraint '%.*ls'. Cannot insert duplicate...
...

Error anatomy

Severity level

```
Msg 2627, Level 14, State 1, Line 1
Violation of UNIQUE KEY constraint 'unique_name'. Cannot insert duplicate key in object 'dbo.products'.
The duplicate key value is (Trek Powerfly 5 - 2018).
```

- 0-10: informational messages
- 11-16: errors that can be corrected by the user (constraint violation, etc.)
- 17-24: other errors (software problems, fatal errors)

Error anatomy

State

```
Msg 2627, Level 14, State 1, Line 1
Violation of UNIQUE KEY constraint 'unique_name'. Cannot insert duplicate key in object 'dbo.products'.
The duplicate key value is (Trek Powerfly 5 - 2018).
```

- 1: if SQL Server displays error
- 0-255: own errors

Error anatomy

Line

```
Msg 2627, Level 14, State 1, Line 1
Violation of UNIQUE KEY constraint 'unique_name'. Cannot insert duplicate key in object 'dbo.products'.
The duplicate key value is (Trek Powerfly 5 - 2018).
```

Procedure

```
Msg 2627, Level 14, State 1, Procedure Insert_product, Line 1
Violation of UNIQUE KEY constraint 'unique_name'.
Cannot insert duplicate key in object 'dbo.products'.
The duplicate key value is (Trek Powerfly 5 - 2018).
```

Uncatchable errors

- **Severity** lower than 11 (*11-19 are catchable*)
- **Severity** of 20 or higher that stop the connection
- **Compilation** errors: objects and columns that don't exist

Uncatchable errors - Compilation error example

```
BEGIN TRY
    SELECT non_existent_column FROM products;
END TRY
BEGIN CATCH
    SELECT 'You are in the CATCH block' AS message;
END CATCH
```

```
Msg 207, Level 16, State 1, Line 2
Invalid column name 'non_existent_column'.
```

Let's practice!

TRANSACTIONS AND ERROR HANDLING IN SQL SERVER

Giving information about errors

TRANSACTIONS AND ERROR HANDLING IN SQL SERVER



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Getting an error - review

```
INSERT INTO products (product_name, stock, price)
VALUES ('Trek Powerfly 5 - 2018', 10, 3499.99);
```

```
Msg 2627, Level 14, State 1, Line 1
Violation of UNIQUE KEY constraint 'unique_name'.
Cannot insert duplicate key in object 'dbo.products'.
The duplicate key value is (Trek Powerfly 5 - 2018).
```

Getting an error - review

```
BEGIN TRY
    INSERT INTO products (product_name, stock, price)
        VALUES ('Trek Powerfly 5 - 2018', 10, 3499.99);
    SELECT 'Product inserted correctly!' AS message;
END TRY
BEGIN CATCH
    SELECT 'An error occurred! You are in the CATCH block' AS message;
END CATCH
```

```
| message |
|-----|
| An error occurred! You are in the CATCH block |
```


Error functions

`ERROR_NUMBER()` returns the number of the error.

`ERROR_SEVERITY()` returns the error severity (11-19).

`ERROR_STATE()` returns the state of the error.

`ERROR_LINE()` returns the number of the line of the error.

`ERROR_PROCEDURE()` returns the name of stored procedure/trigger. NULL if there is not stored procedure/trigger.

`ERROR_MESSAGE()` returns the text of the error message.

Error functions - examples

```
BEGIN TRY
    INSERT INTO products (product_name, stock, price)
        VALUES ('Trek Powerfly 5 - 2018', 10, 3499.99);
END TRY
BEGIN CATCH
    SELECT ERROR_NUMBER() AS Error_number,
           ERROR_SEVERITY() AS Error_severity,
           ERROR_STATE() AS Error_state,
           ERROR_PROCEDURE() AS Error_procedure,
           ERROR_LINE() AS Error_line,
           ERROR_MESSAGE() AS Error_message;
END CATCH
```

Error_number	Error_severity	Error_state	Error_procedure	Error_line	Error_message
2627	14	1	NULL	2	Violation of UNIQUE KEY constraint 'unique_name'...

Error functions - examples

Last output

Error_number	Error_severity	Error_state	Error_procedure	Error_line	Error_message
2627	14	1	NULL	2	Violation of UNIQUE KEY constraint 'unique_name'...

Original error information

```
Msg 2627, Level 14, State 1, Line 1
Violation of UNIQUE KEY constraint 'unique_name'. Cannot insert duplicate key in object 'dbo.products'. The duplicate key
value is (Trek Powerfly 5 - 2018).
```

Error functions - examples

```
SELECT  ERROR_NUMBER() AS Error_number,  
        ERROR_SEVERITY() AS Error_severity,  
        ERROR_STATE() AS Error_state,  
        ERROR_PROCEDURE() AS Error_procedure,  
        ERROR_LINE() AS Error_line,  
        ERROR_MESSAGE() AS Error_message;
```

Error_number	Error_severity	Error_state	Error_procedure	Error_line	Error_message
-----	-----	-----	-----	-----	-----
NULL	NULL	NULL	NULL	NULL	NULL

Error functions in nested TRY...CATCH constructs

```
BEGIN TRY
    INSERT INTO products (product_name, stock, price)
        VALUES ('Trek Powerfly 5 - 2018', 10, 3499.99);
END TRY
BEGIN CATCH
    BEGIN TRY
        INSERT INTO myErrors
            VALUES ('ERROR!')
    END TRY
    BEGIN CATCH
        SELECT 'Outer CATCH block' AS 'Error_from',
            ERROR_NUMBER() AS Error_number,
            ERROR_MESSAGE() AS Error_message;
    END CATCH
END CATCH
```

Error_from	Error_number	Error_message
-----	-----	-----
Outer CATCH block	8152	String or binary data would be truncated.

Let's practice!

TRANSACTIONS AND ERROR HANDLING IN SQL SERVER