Format Query Results as JSON with FOR JSON (SQL Server)

docs.microsoft.com/en-us/sql/relational-databases/json/format-query-results-as-json-with-for-json-sql-server

- 06/03/2020
- 6 minutes to read
-
  - 
  - 
  - 
  - 
  - 
  - +1

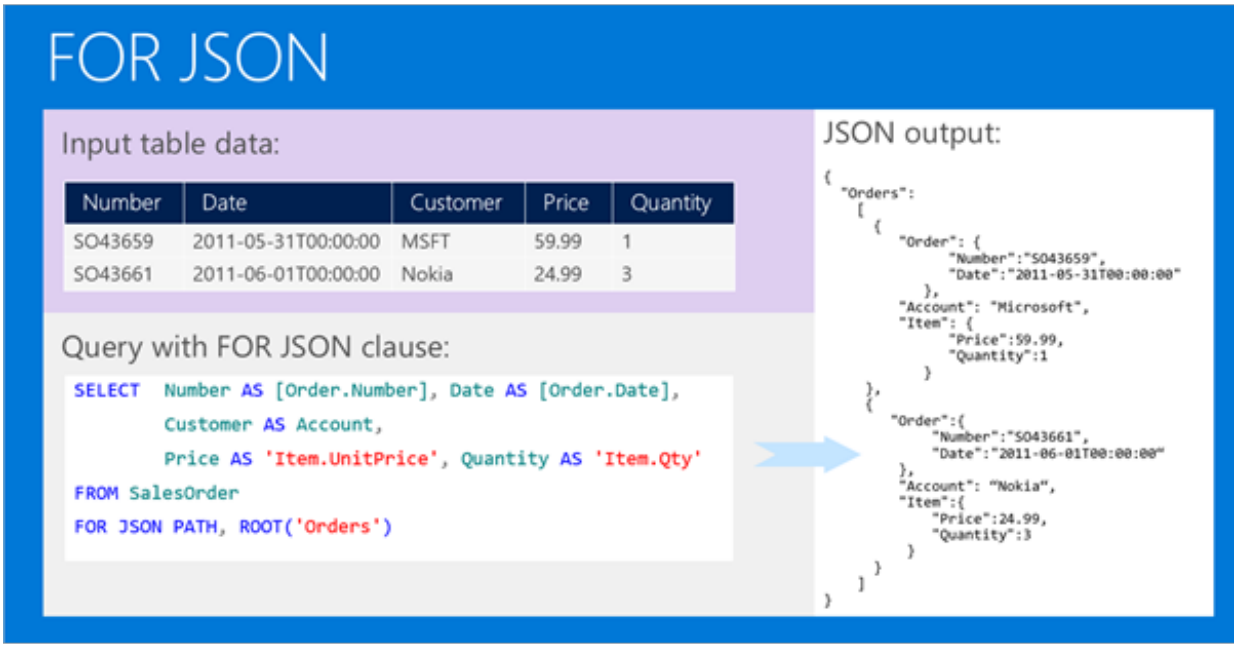
Applies to: SQL Server (all supported versions) Azure SQL Database

Format query results as JSON, or export data from SQL Server as JSON, by adding the **FOR JSON** clause to a **SELECT** statement. Use the **FOR JSON** clause to simplify client applications by delegating the formatting of JSON output from the app to SQL Server.

When you use the **FOR JSON** clause, you can specify the structure of the JSON output explicitly, or let the structure of the SELECT statement determine the output.

- To maintain full control over the format of the JSON output, use **FOR JSON PATH**. You can create wrapper objects and nest complex properties.
- To format the JSON output automatically based on the structure of the SELECT statement, use **FOR JSON AUTO**.

Here's an example of a **SELECT** statement with the **FOR JSON** clause and its output.



Option 1 - You control output with FOR JSON PATH

In **PATH** mode, you can use the dot syntax - for example, `'Item.UnitPrice'` - to format nested output.

Here's a sample query that uses **PATH** mode with the **FOR JSON** clause. The following example also uses the **ROOT** option to specify a named root element.

More info about FOR JSON PATH

For more detailed info and examples, see Format Nested JSON Output with PATH Mode (SQL Server).

For syntax and usage, see FOR Clause (Transact-SQL).

Option 2 - SELECT statement controls output with FOR JSON AUTO

In **AUTO** mode, the structure of the SELECT statement determines the format of the JSON output.

By default, **null** values are not included in the output. You can use the **INCLUDE_NULL_VALUES** to change this behavior.

Here's a sample query that uses **AUTO** mode with the **FOR JSON** clause.

SQL Copy

```
SELECT name, surname
FROM emp
FOR JSON AUTO;
```

And here is the returned JSON.

JSON Copy

```
[{
 "name": "John"
}, {
 "name": "Jane",
 "surname": "Doe"
}]
```

2.b - Example with JOIN and NULL

The following example of `SELECT...FOR JSON AUTO` includes a display of what the JSON results look like when there is a 1:Many relationship between data from `JOIN`'ed tables.

The absence of the null value from the returned JSON is also illustrated. However, you can override this default behavior by use of the `INCLUDE_NULL_VALUES` keyword on the `FOR` clause.

SQL Copy

```
go

DROP TABLE IF EXISTS #tabStudent;
DROP TABLE IF EXISTS #tabClass;

go

CREATE TABLE #tabClass
(
  ClassGuid   uniqueIdentifier  not null  default newid(),
```

```
  ClassName   nvarchar(32)      not null
);

CREATE TABLE #tabStudent
(
  StudentGuid   uniqueIdentifier  not null  default newid(),
  StudentName   nvarchar(32)      not null,
  ClassGuid     uniqueIdentifier      null   -- Foreign key.
);

go

INSERT INTO #tabClass
    (ClassGuid, ClassName)
  VALUES
    ('DE807673-ECFC-4850-930D-A86F921DE438', 'Algebra Math'),
    ('C55C6819-E744-4797-AC56-FF8A729A7F5C', 'Calculus Math'),
    ('98509D36-A2C8-4A65-A310-E744F5621C83', 'Art Painting')
;

INSERT INTO #tabStudent
    (StudentName, ClassGuid)
  VALUES
    ('Alice Apple', 'DE807673-ECFC-4850-930D-A86F921DE438'),
    ('Alice Apple', 'C55C6819-E744-4797-AC56-FF8A729A7F5C'),
    ('Betty Boot' , 'C55C6819-E744-4797-AC56-FF8A729A7F5C'),
    ('Betty Boot' , '98509D36-A2C8-4A65-A310-E744F5621C83'),
    ('Carla Cap'  , null)
;

go

SELECT
    c.ClassName,
    s.StudentName
  from
                  #tabClass   as c
    RIGHT OUTER JOIN #tabStudent as s ON s.ClassGuid = c.ClassGuid
  --where
  --   c.ClassName LIKE '%Math%'
  order by
    c.ClassName,
    s.StudentName
  FOR
    JSON AUTO
    --, INCLUDE_NULL_VALUES
;

go

DROP TABLE IF EXISTS #tabStudent;
DROP TABLE IF EXISTS #tabClass;

go
```

And next is the JSON that is output by the preceding SELECT.

JSON Copy

```
JSON_F52E2B61-18A1-11d1-B105-00805F49916B

[
  {"s":[{"StudentName":"Carla Cap"}]},
  {"ClassName":"Algebra Math","s":[{"StudentName":"Alice Apple"}]},
  {"ClassName":"Art Painting","s":[{"StudentName":"Betty Boot"}]},
  {"ClassName":"Calculus Math","s":[{"StudentName":"Alice Apple"},{"StudentName":"Betty
Boot"}]}
]
```

More info about FOR JSON AUTO

For more detailed info and examples, see Format JSON Output Automatically with AUTO Mode (SQL Server).

For syntax and usage, see FOR Clause (Transact-SQL).

Control other JSON output options

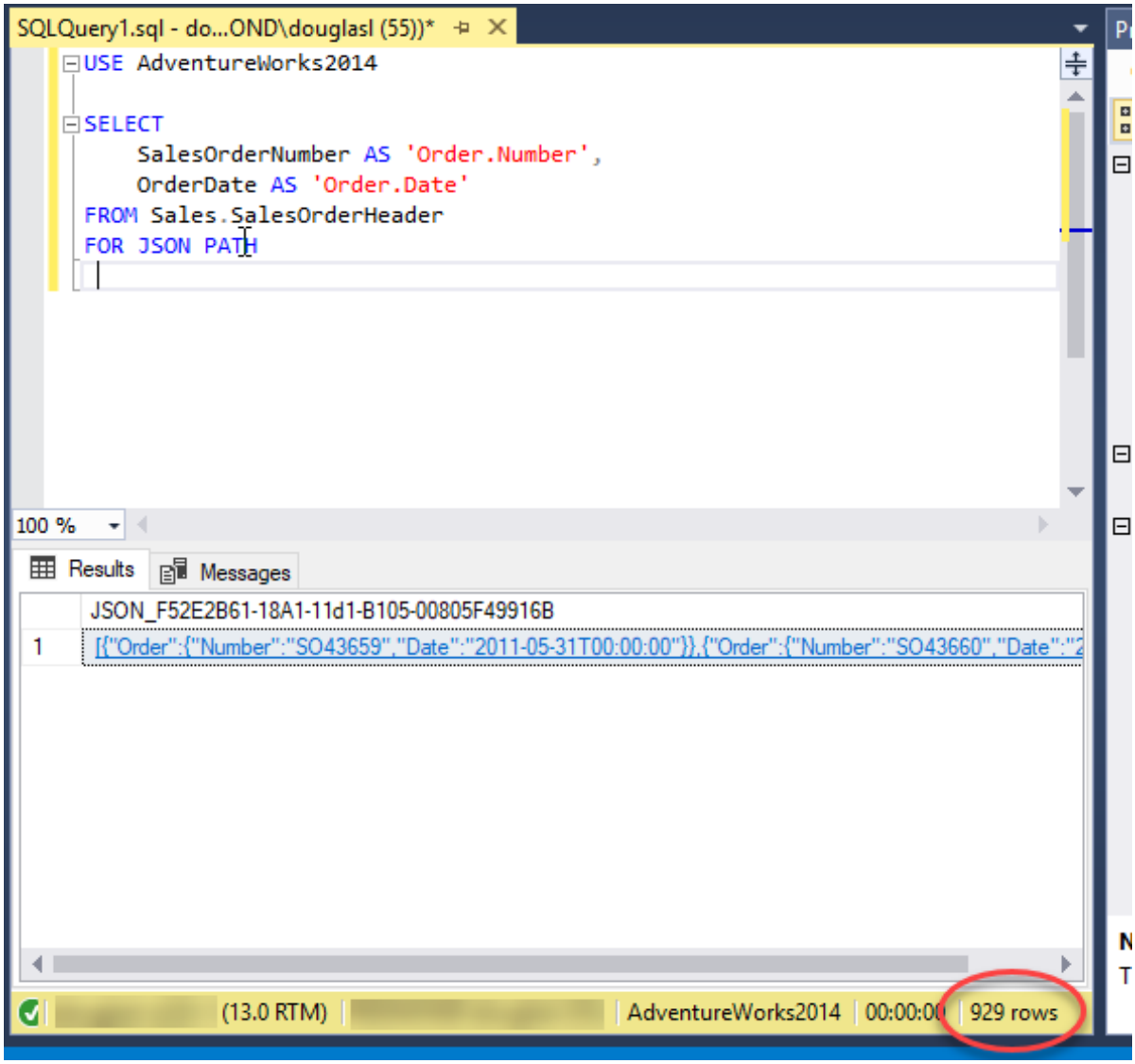
Control the output of the **FOR JSON** clause by using the following additional options.

- **ROOT**. To add a single, top-level element to the JSON output, specify the **ROOT** option. If you don't specify this option, the JSON output doesn't have a root element. For more info, see Add a Root Node to JSON Output with the ROOT Option (SQL Server).
- **INCLUDE_NULL_VALUES**. To include null values in the JSON output, specify the **INCLUDE_NULL_VALUES** option. If you don't specify this option, the output doesn't include JSON properties for NULL values in the query results. For more info, see Include Null Values in JSON Output with the INCLUDE_NULL_VALUES Option (SQL Server).
- **WITHOUT_ARRAY_WRAPPER**. To remove the square brackets that surround the JSON output of the **FOR JSON** clause by default, specify the **WITHOUT_ARRAY_WRAPPER** option. Use this option to generate a single JSON object as output from a single-row result. If you don't specify this option, the JSON output is formatted as an array - that is, it's enclosed within square brackets. For more info, see Remove Square Brackets from JSON Output with the WITHOUT_ARRAY_WRAPPER Option (SQL Server).

Output of the FOR JSON clause

The output of the **FOR JSON** clause has the following characteristics:

1. The result set contains a single column.
    - A small result set may contain a single row.
    - A large result set splits the long JSON string across multiple rows.
        - By default, SQL Server Management Studio (SSMS) concatenates the results into a single row when the output setting is **Results to Grid**. The SSMS status bar displays the actual row count.
        - Other client applications may require code to recombine lengthy results into a single, valid JSON string by concatenating the contents of multiple rows. For an example of this code in a C# application, see Use FOR JSON output in a C# client app.



2. The results are formatted as an array of JSON objects.
    - The number of elements in the JSON array is equal to the number of rows in the results of the SELECT statement (before the FOR JSON clause is applied).
    - Each row in the results of the SELECT statement (before the FOR JSON clause is applied) becomes a separate JSON object in the array.
    - Each column in the results of the SELECT statement (before the FOR JSON clause is applied) becomes a property of the JSON object.
3. Both the names of columns and their values are escaped according to JSON syntax. For more info, see How FOR JSON escapes special characters and control characters (SQL Server).

Example

Here's an example that demonstrates how the **FOR JSON** clause formats the JSON output.

Query results

A	B	C	D
10	11	12	X
20	21	22	Y
30	31	32	Z

Example

JSON output

JSON Copy

```
[{
 "A": 10,
 "B": 11,
 "C": 12,
 "D": "X"
}, {
 "A": 20,
 "B": 21,
 "C": 22,
 "D": "Y"
}, {
 "A": 30,
 "B": 31,
 "C": 32,
 "D": "Z"
}]
```

For more info about what you see in the output of the **FOR JSON** clause, see the following topics.

- How FOR JSON converts SQL Server data types to JSON data types (SQL Server)
  The **FOR JSON** clause uses the rules described in this topic to convert SQL data types to JSON types in the JSON output.
- How FOR JSON escapes special characters and control characters (SQL Server)
  The **FOR JSON** clause escapes special characters and represents control characters in the JSON output as described in this topic.

Learn more about JSON in SQL Server and Azure SQL Database

Microsoft videos

For a visual introduction to the built-in JSON support in SQL Server and Azure SQL Database, see the following videos:

- SQL Server 2016 and JSON Support
- Using JSON in SQL Server 2016 and Azure SQL Database
- JSON as a bridge between NoSQL and relational worlds

See Also

FOR Clause (Transact-SQL)
Use FOR JSON output in SQL Server and in client apps (SQL Server)