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ADVANCED DATA TYPES – JSON

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AGENDA

1. JSON

2. SQL 2 JSON

3. JSON 2 SQL

4. Modifying JSON data

5. T&T

JSON 1/2

- **J**avaScript **O**bject **N**otation

- language in depended

- open standard format

- simple and very popular

- JSON objects are human readable lists of key-value pairs.

```json
{
    "Name": "John Doe",
    "BlogURL": "http://blog.matesic.info",
    "Born": 1979,
    "Spouse": null,
    "BornAfterWoodstock": true,
    "FavoriteDrinks": [
        {
            "Name": "Gin and tonic",
            "Drink": "Occasionally"
        },
        {
            "Name": "Craft beer",
            "Drink": "Occasionally"
        },
        {
            "Name": "Coffe with milk",
            "Drink": "Daily"
        },
        {
            "Name": "Cold water",
            "Drink": "Daily"
        }
    ],
    "Parents": {
        "Mom": "Iva",
        "Dad": "Boris"
    }
}
```

JSON 2/2

- Supported data types:
  - **String** - escaped Unicode text surrounded by double quotes
  - **Number** - double-precision float
  - **Boolean** - true/false written in lowercase
  - **null** - represents a null value

- Escaping rules
  - Quotation mark (") -> \"
  - Reverse solidus (\) -> \\
  - Solidus (/) -> \/
  - Backspace -> \b
  - Form feed -> \f
  - New line -> \n
  - Carriage return -> \r
  - Horizontal tab -> \t
 - Control characters (0-31) -> **\u**<code> (e.g. CHAR(0) -> **\u**0000)

JSON VS **XML**
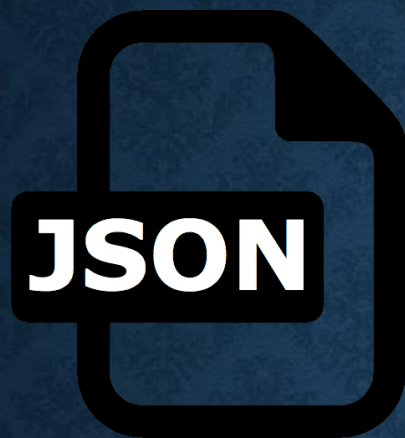
- [
-   {
-     "CustomerID": 1,
-     "CustomerName": "Tailspin Toys (Head Office)",
-     "PhoneNumber": "(308) 555-0100",
-     "FaxNumber": "(308) 555-0101",
-     "WebsiteURL": "http:\/\/www.tailspintoys.com",
-     "DataDateTime": "2018-10-05T16:06:36.200"
-   }
-]

```xml
<Customer>
    <CustomerID>1</CustomerID>
    <CustomerName>Tailspin Toys (Head Office)</CustomerName>
    <PhoneNumber>(308) 555-0100</PhoneNumber>
    <FaxNumber>(308) 555-0101</FaxNumber>
    <WebsiteURL>http://www.tailspintoys.com</WebsiteURL>
    <DataDateTime>2018-10-05T16:07:52.813</DataDateTime>
</Customer>
```

▦ Results | ▦ Messages

	CustomerID	CustomerName	PhoneNumber	FaxNumber	WebsiteURL	DataDateTime
1	1	Tailspin Toys (Head Office)	(308) 555-0100	(308) 555-0101	http://www.tailspintoys.com	2020-05-21 11:24:08.990

JSON VS **XML**
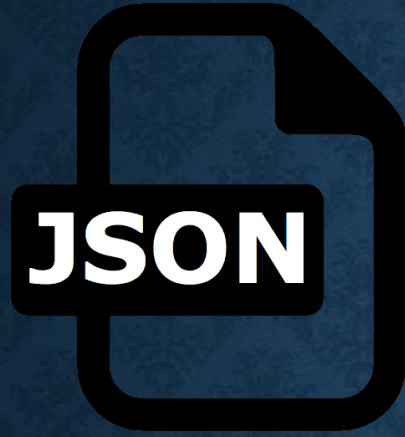
- arrays and objects
- can store only data
- less verbose and easier to read
- less data
- SQL:
  - NVARCHAR -> COMPRESS ?!?!
  - index problem

- tree structure
- can store more complex data types
- can store additional information's
- more robust
- SQL:
  - native XML data type

SQL 2 JSON

- Pretty much like creating XML data (FOR XML) -> **FOR JSON**
- Two modes supported:

  - **FOR JSON AUTO**
  - **FOR JSON PATH**

- Additional options

  - **INCLUDE_NULL_VALUES**
  - **ROOT**
  - **WITHOUT_ARRAY_WRAPPER**

SQL 2 JSON – DATA CONVERSION

Source data type	Destination data type
Char, Varchar, Nchar, NVarchar, Text, Ntext, Date, DateTime, DateTime2, DateTimeOffset, Time, UniqueIdentifier, Smallmoney, Money, XML, HierarchyId, Sql_Variant	String
Tinyint, Smallint, Int, Bigint, Decimal, Float, Numeric	Number
Bit	Boolean
Binary, Varbinary, Image, Rowversion, Timestamp	Base 64 encoded string
null	null
geography, geometry, and CLR-based user defined data types	**not supported**

DEMO

JSON 2 SQL

- **OPENJSON**

- **rowset function** (table-valued function)

- Two types of return tables:

  - Default schema
  - Explicit schema

OPENJSON - DEFAULT SCHEMA

- **OPENJSON (Expression, [Path])**

    - **Expression** – JSON object in Unicode text format
    - **Path** – optional argument to specify a fragment (sub-node) of the input expression

- Return - table result with three columns

    - **Key**
    - **Value**
    - **Type**

0 -> null	1 -> string	2 -> int	3 -> true/false	4 -> array	5 -> object

DEMO

OPENJSON - EXPLICIT SCHEMA

- **OPENJSON (Expression, [Path])**

- [**WITH** (

- **columnName dataType** [**columnPath**] [**AS JSON**]

- [, columnName dataType [columnPath] [AS JSON]]

-)]

- **columnName** – Name of the output column

- **dataType** – Data type of the output column

- **columnPath** – Optional argument to specify a fragment (sub-node) of the column

- **AS JSON** – Optional argument to specify that the referenced property contains an inner JSON object or array. If used, the column must be NVARCHAR(MAX) data type

- WITH keyword - at least one column must be specified!!!

DEMO

JSON_VALUE

- extracts a scalar value (primitive data type) from a JSON string

- **JSON_VALUE (Expression, [Path])**

  - **Expression** – JSON object in Unicode text format
  - **Path** – optional argument to specify a fragment (sub-node) of the input expression

- Return – result of nvarchar(4000) data type with the same collation as in the input expression.

- Can be used in SELECT, WHERE, and ORDER BY clauses

JSON_QUERY

- extract a JSON fragment or to get a complex value (object or array)

- **JSON_QUERY (Expression, [Path])**

  - **Expression** – JSON object in Unicode text format
  - **Path** – optional argument to specify a fragment (sub-node) of the input expression

- Return – nvarchar(max) if the input string is defined as (n)varchar(max); otherwise -> nvarchar(4000)

DEMO

MODIFYING JSON DATA

- **JSON_MODIFY (expression , path , newValue)**

  - **Expression** – JSON object in Unicode text format
  - **Path** – A JSON path expression that specifies the property to update
  - **newValue** – The new value for the property specified by path

- Return - updated JSON string

- Adding, Removing, Updating JSON property

- Multiple changes

DEMO

ISJSON

- To JSON or not to JSON ?

- **ISJSON (expression)**

  - **Expression** – The string to test

  - Return – int
    - - 1 - string contains valid JSON
    - - 0 - string is not valid JSON
    - - NULL - input expression is NULL

```
{
    "Name": "John Doe",
    "Name": "John Doe",
    "BlogURL": "http:\/\/www.microsoft.com"
}
```

T&T

- Import JSON from a file

- Indexing JSON data

- Examples:
    - Compare two table rows using JSON
    - Processing data from a comma-separated list of values
    - Hash and compare records

- …

DEMO

THANKS

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