COSC 304
Introduction to Database Systems

JavaScript Object Notation (JSON)

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JavaScript Object Notation (JSON)

JavaScript Object Notation (JSON) is a method for serializing data objects into text form.

Benefits:

- Human-readable
- Supports semi-structured data
- Supported by many languages (not just JavaScript)

Often used for data interchange especially with AJAX/REST from web server to client.

JSON Example

JSON constructs:

- **Values:** number, strings (double quoted), `true`, `false`, `null`
- **Objects:** enclosed in `{ }` and consist of set of key-value pairs
- **Arrays:** enclosed in `[ ]` and are lists of values
- Objects and arrays can be nested.

Example:

```
{"Employees": [{"eno":"E1", "ename":"J. Doe", "title":"EE", "salary":30000, "WorksOn":["P1"]},
               {"eno":"E2", "ename":"M. Smith", "title":"SA", "salary":50000, "WorksOn":["P1","P2"]},
               {"eno":"E3", "ename":"A. Lee", "title":"ME", "salary":40000, "WorksOn":["P3"]}
],
"Projects": [{"pno":"P1", "pname":"Instruments", "budget":150000},
               {"pno":"P2", "pname":"DB Develop", "budget":135000},
               {"pno":"P3", "pname":"Budget", "budget":250000}
]
}
```

JSON versus Relations

	JSON	Relational
Structure	Nested objects + arrays	Tables
Schema	Variable (and not required)	Fixed
Queries	Limited	SQL, RA
Ordering	Arrays are sorted	No
Systems	Used with programming languages and some NoSQL systems	Many commercial and open source systems

JSON Parsers

A **JSON parser** converts a JSON file (or string) into program objects assuming no syntactic errors.

- In JavaScript, can call `eval()` method on variable containing a JSON string.

A **JSON validator** validates according to a schema and then performs the parsing.

Online validation tool: http://jsonlint.com

Using JSON in Programs

Many programming languages have APIs to allow for the creation and manipulation of JSON.

One common usage is for the JSON data to be provided from a server (either from a relational or NoSQL database) and sent to a web client.

The web client then uses JavaScript to convert the JSON into objects and manipulate it as required.

JSON Question

Question: **True or False:** The following JSON is valid.

```
{"employee":1}
```

A) true

B) false

JSON Question (2)

Question: **True or False:** The following JSON is valid.

```
{"array":["a", 1, {"c":2}]}
```

A) true

B) false

JSON Question (3)

Question: **True or False:** The following JSON is valid.

```
{"array":["a", true, FALSE]}
```

A) true

B) false

JSON Question (4)

Question: **True or False:** The following JSON is valid.

```
{ }
```

A) true

B) false

JSON Question (5)

Question: **True or False:** The following JSON is valid.

```
{4, 5, "c":"a"}
```

A) true

B) false

Conclusion

JavaScript Object Notation (JSON) is a method for serializing data objects into text form and is commonly used for data interchange.

JSON uses base values, objects, and arrays to encode data and nesting is possible.

JSON is semi-structured similar to XML but is often regarded as "simpler" and is widely supported by browsers and programming languages.

Objectives

Understand the basic constructs used to encode JSON data.

Compare JSON representation versus relational model.

Practice using JSON in programs.