JSON

JSON (JavaScript Object Notation) is a lightweight, text-based data format that is used to represent structured data in a readable way. It is commonly used for exchanging data between a server and a client in web applications, as it is easy for both humans to read and machines to parse.

Key Characteristics of JSON:

- **Text-based:** It is a string format that can be easily stored and transmitted.
- **Language-independent:** Although JSON is derived from JavaScript, it is language-agnostic, meaning it can be used in almost any programming language.
- **Lightweight:** JSON has a simple and compact structure, making it a popular choice for data interchange.

JSON Structure:

JSON is primarily built on two types of structures:

1. **Objects** (unordered key-value pairs)
2. **Arrays** (ordered lists of values)

1. JSON Objects:

An object is a collection of key-value pairs enclosed in curly braces {}. The keys (also called properties) are strings, and the values can be any valid JSON type (string, number, object, array, true, false, or null).

Example:

```
{
  "name": "John",
  "age": 30,
  "isStudent": false
}
```

In the example above:

- "name" is a key, and "John" is its corresponding value (a string).
- "age" is a key, and 30 is its value (a number).
- "isStudent" is a key, and false is its value (a boolean).

2. JSON Arrays:

An array is an ordered list of values enclosed in square brackets []. The values can be of any type, and they are separated by commas.

Example:

```
[1, 2, 3, 4, 5]
```

Or with mixed types:

```
["apple", 2, true, {"name": "John"}]
```

Data Types in JSON:

- **String**: A sequence of characters enclosed in double quotes.

"hello world"

- **Number**: A number, which can be an integer or a floating-point number.

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- **Object**: A collection of key-value pairs.

{ "key": "value" }

- **Array**: An ordered list of values.

[1, 2, 3]

- **Boolean**: Either true or false.

true

- **Null**: Represents an empty or non-existent value.

Null

Example of a Complex JSON:

json
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```
{
  "name": "John",
  "age": 30,
  "isStudent": false,
  "address": {
    "street": "123 Main St",
    "city": "New York"
  },
  "phoneNumbers": ["123-456-7890", "987-654-3210"]
}
```

In this example:

- "address" is an object containing additional key-value pairs.
- "phoneNumbers" is an array of strings.

Use Cases:

1. **Web APIs**: JSON is widely used to transmit data between a server and a client, especially in RESTful APIs.
2. **Configuration Files**: JSON is used to store settings and configuration in applications.
3. **Data Storage**: JSON is often used in NoSQL databases like MongoDB for storing structured data.

JSON in JavaScript:

In JavaScript, you can easily convert JavaScript objects to JSON format using JSON.stringify(), and you can parse a JSON string back to an object using JSON.parse().

Example:

```
// JavaScript object
const person = {
  name: "Alice",
```

```
  age: 25,
  isStudent: true
};

// Convert JavaScript object to JSON string
const jsonString = JSON.stringify(person);
console.log(jsonString);
// Output: '{"name":"Alice","age":25,"isStudent":true}'

// Convert JSON string back to JavaScript object
const parsedObject = JSON.parse(jsonString);
console.log(parsedObject.name);
// Output: "Alice"
```

JSON provides an easy and standardized way to represent data for various applications, especially in web development.

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