**Tutorial No.09**

**Title:** Study of JSON and CBOR.

**Batch: B2 Roll No.: 1914078 Tutorial No.: 9**

**Aim:** Study of JSON and CBOR.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**\_\_

**Resources needed:** Windows OS, Google chrome web browser, notepad

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Pre Lab/ Prior Concepts:**

Students should have knowledge of basic HTML tags. They should know how to use CSS in their webpage. They should be aware of interactive web page design and client side scripting.

**Activity:**

* Advantages of Using JSON format.
* Explore features of JSON.
* Advantages and disadvantages of CBOR.
* Features of CBOR.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Results: a document**

1. **Advantages of Using JSON format.**

**1. JSON is Faster:**

JSON syntax is very easy to use. We have to use only -> as a syntax which provides us an easy parsing of the data and faster execution of the data. Since its syntax is very small and light weighted that’s the reason that it executes the response in the faster way.

**2. Schema Support:**

It has the wide range of supported browser compatibility with the operating systems so the applications made with the coding of JSON doesn’t require much effort to make it all browser compatible.

**3. Server Parsing:**

On the server side parsing is the important part that developers want if the parsing will be fast on the server side then the only user can get the fast response of their response so in this case JSON server-side parsing is the strong point that indicates us to use the JSON on the server side.

**4. Tool for sharing data:**

JSON is the best tool for the sharing data of any size even audio, video etc. This is because JSON stores the data in the arrays so data transfer makes easier. For this reason, JSON is a superior file format for web APIs and for web development.

1. **Explore features of JSON.**
2. **Standard Structure**: As we have seen so far that JSON objects are having a standard structure that makes developers job easy to read and write code, because they know what to expect from JSON.
3. **Light weight**: When working with AJAX, it is important to load the data quickly and asynchronously without requesting the page re-load. Since JSON is light weighted, it becomes easier to get and load the requested data quickly.
4. **Scalable**: JSON is language independent, which means it can work well with most of the modern programming language. Let’s say if we need to change the server side language, in that case it would be easier for us to go ahead with that change as JSON structure is same for all the languages.
5. **Easy to use -** JSON API offers high-level facade, which helps you to simplify commonly used use-cases.
6. **Performance -** JSON is quite fast as it consumes very less memory space, which is especially suitable for large object graphs or systems.
7. **Free tool -** JSON library is open source and free to use.
8. **Doesn't require to create mapping -** Jackson API provides default mapping for many objects to be serialized.
9. **Clean JSON -** Creates clean, and compatible JSON result that is easy to read.
10. **Dependency -** JSON library does not require any other library for processing
11. **Advantages and disadvantages of CBOR**

**Advantage:**

1. Can create and process entirely in stream with no extra memory
2. Don’t have to pre-define any schema as our data is dynamic and variant
3. It’s an open international standard from the IETF makes it a even better choice than a proprietary one.
4. It’s designed for low memory, non-conversion, stream-based processing while also providing extensions for other data types

**Disadvantage:**

1. CBOR says that it follows the JSON model (so not strictly typed objects)
2. It starts with the same types of objects (strings, integers, maps, etc.).
3. **Features of CBOR**
4. **JSON data model:** CBOR is based on the wildly successful JSON data model: numbers, strings, arrays, maps (called objects in JSON), and a few values such as false, true, and null.
5. **No Schema needed:** One of the major practical wins of JSON is that successful data interchange is possible without casting a schema in concrete. This works much better in a world where both ends of a communication relationship may be evolving at high speed.
6. **Embracing binary:** Some applications that would like to use JSON need to transport binary data, such as encryption keys, graphic data, or sensor values. In JSON, these data need to be encoded (usually in base64 format), adding complexity and bulk.
7. **Concise encoding:** Some applications also benefit from CBOR itself being encoded in binary. This saves bulk and allows faster processing. One of the major motivators for the development of CBOR was the Internet of Things, which will include very simple, inexpensive nodes where this counts.
8. **Stable format:** CBOR is defined in an Internet Standards Document, RFC 7049. The format has been designed to be stable for decades.
9. **Extensible:** To be able to grow with its applications and to incorporate future developments, a format specification needs to be extensible. CBOR defines tags as a mechanism to identify data that warrants additional information beyond the basic data model. Both future RFCs and third parties can define tags, so innovation is “permissionless” but can still be coordinated.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Questions:**

1. Differentiate between XML and JSON.

**Ans.**

|  |  |
| --- | --- |
| JSON | XML |
| It is JavaScript Object Notation | It is Extensible markup language |
| It is based on JavaScript language. | It is derived from SGML. |
| It is a way of representing objects. | It is a markup language and uses tag structure to represent data items. |
| It does not provides any support for namespaces. | It supports namespaces. |
| It supports array. | It doesn’t supports array. |
| Its files are very easy to read as compared to XML. | Its documents are comparatively difficult to read and interpret. |
| It doesn’t use end tag. | It has start and end tags. |
| It is less secured. | It is more secured than JSON. |
| It doesn’t supports comments. | It supports comments. |
| It supports only UTF-8 encoding. | It supports various encoding |

1. Write real world applications of JSON.

**Ans.**

API is the most widely used area where JSON is used for data exchange. Specially, web applications those have a social face, it has become obvious now that they have an API, so that developers can consume the huge amount of data collected by the app and then can create derivative apps. Twitter, Facebook, Linkedin, Flicker, Dribble, you name it, all the well-known apps on the internet today has an API and uses JSON as their preferred format for serving data to the developers. Out of these APIs, some have support for both JSON and XML, but some support only JSON.

1. Write real world applications of CBOR.

**Ans.**

In a streaming application, a data stream may be composed of a sequence of CBOR data items concatenated back-to-back. In such an environment, the decoder immediately begins decoding a new data item if data is found after the end of a previous data item. Not all of the bytes making up a data item may be immediately available to the decoder; some decoders will buffer additional data until a complete data item can be presented to the application. Other decoders can present partial information about a top-level data item to an application, such as the nested data items that could already be decoded, or even parts of a byte string that hasn't completely arrived yet.

CBOR is increasingly used as a line protocol in the IOT world where the overhead of transmitting JSON on constrained devices can be large in packet size and processing overheads.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Outcomes:**

CO4: Implement web application using ReactJS, Angular JS, JSON &CBOR

**Conclusion:**

Studied and understood JSON data format its reprsentation, syntax, applications, advantages and disadvantages. Also learnt about CBOR data format, its features and applications.

**Grade: AA / AB / BB / BC / CC / CD /DD**

**Signature of faculty in-charge with date**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**References:**

**Books/ Journals/ Websites:**

* + 1. [www.w3schools.com](http://www.w3schools.com/)
    2. [www.tutorialspoint.com](http://www.tutorialspoint.com/)
    3. <https://docs.rs/cbor/0.4.1/cbor/>