

# CSCI235 Database Systems

## JSON and BSON

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# JSON and BSON

## Outline

JSON ? What is it ?

BSON ? What is it ?

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# JSON ? What is it ?

Java Script Object Notation (JSON) is a light-weight data interchange format

It is based on a subset of the JavaScript Programming

Language Standard ECMA-262 3rd Edition - December 1999 JSON is built on two structures:

- A collection of name:value pairs - object
- An ordered list of values - array

Object is an unordered set of name:value pairs

```
{ "first name": "James" }
```

JSON objects

```
{ "city": "Sydney", "street": "Victoria", "building number": 25 }
```

```
{ "number": "25", "isOdd ?": true, "nothing": null }
```

```
{ }
```

Empty JSON object

# JSON ? What is it ?

Value is either a string or a number or true or false or null or an object or an array

JSON object with the special characters

```
{ "single quote": "\'", "back slash": "\\",  
  "forward slash": "\/", "line feed": "\u000A" }
```

JSON object with a number, true, false, and nothing values

```
{ "fraction": 0.25, "true": true, "false": false, "nothing": null }
```

Nested JSON object

```
{ "full name": { "first name": "James",  
                "initials": null,  
                "last name": "Bond" },  
  "number": "007" }
```

JSON object with an array of strings

```
{ "colours": [ "red", "green", "blue" ] }
```

JSON object with an array of numbers

```
{ "numbers": [ 10, 20, 30, 40, 50 ] }
```

# JSON ? What is it ?

Array is a sequence of values

```
{ "2dim array": [ [11,12,13,14],  
                  [21,22,23,24],  
                  [31,32,33,34] ] }
```

JSON object with two dimensional array

```
{ "array of objects": [ { "name": "James Bond"},  
                        { "name": "Harry Potter"},  
                        { "name": "Robin Hood" } ] }
```

JSON object with an array of objects

```
{ "array of truth": [true, false, true, true] }
```

JSON object with an array of Boolean values

```
{ "array of nothing": [null, null, null, null, null] }
```

JSON object with an array of nulls

```
{ "empty array": [ ] }
```

JSON object with an empty array

```
{ "array of varieties": [1, "one", true, ["a", "b", "c"]] }
```

JSON object with an array of different values

# JSON and BSON

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# BSON ? What is it ?

**Binary JSON (BSON)** is a computer data interchange format used mainly as a data storage and network transfer format in the MongoDB database system

**BSON** is a binary encoded serialization of **JSON**-like documents (objects)

**BSON** includes the extensions not in **JSON** that allow for representation of data types

For example **BSON** has a **Date** type and a **BinData** type

The common data types include: **null, boolean, number, string, array, embedded document(object)**

The new data types include: **date, regular expression, object id, binary data, code**

# BSON ? What is it ?

```
{"nothing":null}
```

BSON object with a null

```
{"truth":false}
```

BSON object with a Boolean value

```
{"pi":3.14}
```

BSON object with a floating point value

```
{"int":NumberInt("345")}
```

BSON object with an integer value

```
{"long":NumberLong("1234567890987654321")}
```

Long integer value in BSON object with long integer value

```
{"greeting":"Hello !"}
```

BSON object with a string value

```
{"pattern":/(Hi|Hello)!/}
```

BSON object with a regular expression

```
{"date":new Date("2016-10-17")}
```

BSON object with a date

```
{"array of varieties":[1, "one", true, ["a", "b", "c"]]}
```

BSON object with an array of different values

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# BSON ? What is it ?

```
{ "_id": ObjectId() }
```

BSON object with an object identifier

```
{ "code": function() { /* ... */ } }
```

BSON object with a functions

```
{ "Double": 124.56 }
```

BSON object with a timestamp

```
{ "timestamp": Timestamp(1234567, 0) }
```

BSON object with a timestamp

```
{ "timestamp": Timestamp() }
```

BSON object with a timestamp

```
{ "maxkey": { "$maxKey": 1 } }
```

BSON with the largest possible value

```
{ "minkey": { "$minKey" : 1 } }
```

BSON with the smallest possible value

# BSON ? What is it ?

Every document (object) in BSON must have an `"_id"` key !

`"_id"` key's value can be of any type

A default value of `"_id"` key is `ObjectId()`

In a collection of documents (objects) every document (object) must have a unique value for `"_id"`

If a document has no `"_id"` key then when it is inserted into a collection `"_id"` key is automatically added to the document

```
{"_id":ObjectId()}
```

BSON object with an automatically generated object identifier

```
{"_id":ObjectId("507f191e810c19729de860ea") }
```

BSON object with an object identifier

```
{"_id":ObjectId("123456789012345678901234") }
```

BSON object with an object identifier

# References

Introducing JSON, <http://www.json.org/>

BSON, <http://bsonspec.org/>

<https://docs.mongodb.com/manual/>

Chodorow K. MongoDB The Definitive Guide, O'Reilly, 2013