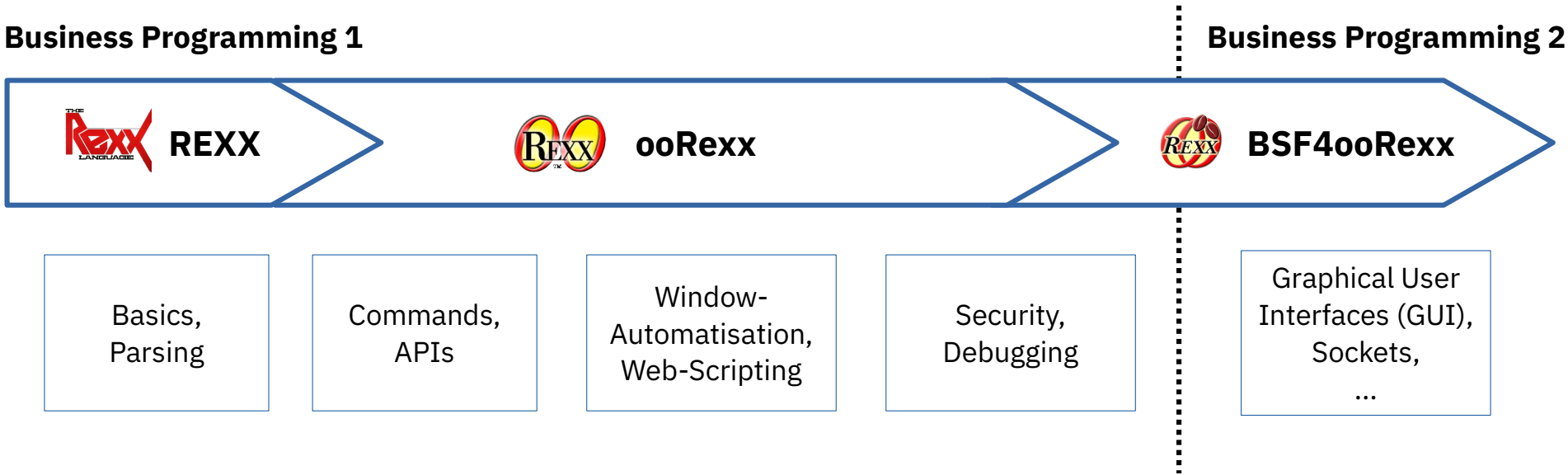
JSON (JavaScript Object Notation) with json.cls (Introduced with ooRexx 5.0)



Overview

- Introduction to **JSON** and the ooRexx package **json.cls**
  - Introduced with ooRexx 5.0.0
  - ooRexx 5.1.0 improves it
    - Generates JSON boolean types, supports all collection classes
    - Adds a legible rendering of JSON text
    - The 5.1.0 version can be used to replace deployed 5.0.0 versions
- Nutshell examples
- Roundup

JSON Encoded Data from Wikipedia

- Defined in the beginning of the 2000 to ease exchange of structured data via the Internet with JavaScript
- **JSON**
  - Acronym for "JavaScript Object Notation"
  - JSON-Datatypes
    - *Object* – a collection of comma separated name-value pairs (a Map) in curly brackets
    - *Array* – an ordered list of comma separated values in square brackets
    - *String* – a quoted sequence of UTF-8 characters
    - *Boolean* – true or false
    - *Number* – any number
    - *null* (void) – null
  - cf. https://www.json.org/, https://en.wikipedia.org/wiki/JSON

The ooRexx package json.cls

- Introduced with ooRexx 5.0.0, improved in ooRexx 5.1.0
- Needs to be required, such that its public class JSON becomes accessible (`::requires "json.cls"`)
  - Explicitly supplies JSON Boolean values with .json~true and .json~false which behave like ooRexx .true and .false (can be used as ooRexx Booleans as well)
- Class methods for reading/writing JSON data directly from/to file
  - fromJsonFile(path2file), returns a Rexx object representing the JSON data
  - toJsonFile path2file, rexxObject [, legible]), where legible is .false (default) or .true
- Class (and instance) methods for turning an ooRexx object into a JSON string or a JSON string into an ooRexx object
  - toJson(rexxObject [, legible]), where legible is .false (default) or .true
  - fromJson(jsonString), returns a Rexx collection object with the JSON data

Example of JSON Encoded Data (Legible)

- Cf. Wikipedia https://en.wikipedia.org/wiki/JSON (2024-05-05)

```
{
  "first_name": "John",
  "last_name": "Smith",
  "is_alive": true,
  "age": 27,
  "address": {
    "street_address": "21 2nd Street",
    "city": "New York",
    "state": "NY",
    "postal_code": "10021-3100"
  },
  "phone_numbers": [
    {
      "type": "home",
      "number": "212 555-1234"
    },
    {
      "type": "office",
      "number": "646 555-4567"
    }
  ],
  "children": [
    "Catherine",
    "Thomas",
    "Trevor"
  ],
  "spouse": null
}
```

Unencode and encode JSON Data (1/4)

- Read JSON encoded data from file
  - Use Wikipedia's example
    - JSON encoded sample data is broken up into lines and indented for better legibility
    - Usually JSON encoded data is "minimized", i.e. does not contain ignorable whitespace meant for easying legibility and comprehensibility for humans
  - Result is an ooRexx *directory* object that contains all imported data
    - JSON arrays are represented (stored) as ooRexx *array* objects
    - JSON maps get represented (stored) as ooRexx *directory* objects
  - At the end the generated ooRexx *directory* object will be used to create a legible and a minimal JSON rendering of it

Unencode and encode JSON Data (1/2)

```
-- ooRexx 5.1 or higher
parse arg fn                -- get file name
o = .json~fromJsonFile(fn) -- reads and unencodes JSON file

say .json~toJson(o,.true)  -- encode as legible (human-friendly) JSON string
say "---"
say .json~toJson(o)        -- encode as minimized (standard) JSON string

::requires "json.cls"      -- get access to the JSON class
```

Unencode and encode JSON Data (2/2)

rexx json_01.rxj wikipedia.json

Wikipedia.json

```
{
  "first_name": "John",
  "last_name": "Smith",
  "is_alive": true,
  "age": 27,
  "address": {
    "street_address": "21 2nd Street",
    "city": "New York",
    "state": "NY",
    "postal_code": "10021-3100"
  },
  "phone_numbers": [
    {
      "type": "home",
      "number": "212 555-1234"
    },
    {
      "type": "office",
      "number": "646 555-4567"
    }
  ],
  "children": [
    "Catherine",
    "Thomas",
    "Trevor"
  ],
  "spouse": null
}
```

Output (note attributes are sorted by name to ease locating them):

```
{
   "address": {
      "city": "New York",
      "postal_code": "10021-3100",
      "state": "NY",
      "street_address": "21 2nd Street"
   },
   "age": 27,
   "children": [
      "Catherine",
      "Thomas",
      "Trevor"
   ],
   "first_name": "John",
   "is_alive": true,
   "last_name": "Smith",
   "phone_numbers": [
      {
         "number": "212 555-1234",
         "type": "home"
      },
      {
         "number": "646 555-4567",
         "type": "office"
      }
   ],
   "spouse": null
}
```

```
---
{"address":{"city":"New
York","postal_code":"10021-
3100","state":"NY","street_address":"21
2nd Street"},"age":27,"children":
["Catherine","Thomas","Trevor"],"first_nam
e":"John","is_alive":true,"last_name":"Smi
th","phone_numbers":[{"number":"212 555-
1234","type":"home"},{"number":"646 555-
4567","type":"office"}],"spouse":null}
```

Minimal (standard):
– no white space characters
– no carriage-return characters
– no line-feed characters

Creating a JSON Encoding from ooRexx Data (1/2)

- The toJSON class method takes an ooRexx object to encode
- The example creates an ooRexx structure using an ooRexx relation object and an ooRexx array and demonstrates how to encode that data
  - Encoding to JSON demonstrates how a JSON Boolean value gets employed
  - The toJSON class method creates minimized encodings by default
  - An instance of the JSON class encodes for humans if toJSON's optional legible argument is set to .true

Creating a JSON Encoding from ooRexx Data (2/2)

```
rel = .relation~new          -- create a relation (allows duplicates)
rel["WU"]="Vienna Business University"
rel["Wien"]= ("Vienna", "Vienne")   -- English, French
rel["historical districts"] = .list~of(1190, 1090, 1020)
rel["currently in district"] = 1020
rel["is older than Harvard"] = .json~false   -- a JSON false value


say .json~toJson(rel)        -- encode as minimized JSON (standard)
say "---"
say .json~toJson(rel,.true)-- encode as legible JSON (human-friendly)

::requires "json.cls"        -- get access to the JSON class
```

```
{"WU":"Vienna Business University","Wien":
["Vienna","Vienne"],"currently in
district":1020,"historical districts":
[1190,1090,1020],"is older than
Harvard":false}
---
{
   "WU": "Vienna Business University",
   "Wien": [
      "Vienna",
      "Vienne"
   ],
   "currently in district": 1020,
   "historical districts": [
      1190,
      1090,
      1020
   ],
   "is older than Harvard": false
}
```

Roundup

- ooRexx 5.0 introduced the Rexx package json.cls
  - Implements an ooRexx class named JSON
    - The fromJSON class and instance methods allow for turning JSON encoded string data into an ooRexx structure (collection)
    - The toJSON class and instance methods allow for encoding any ooRexx structure (collection) into a JSON string
- ooRexx 5.1 improves "json.cls"
  - Compatible with ooRexx 5.0 "json.cls" (hence no need to change programs)
  - Adds explicit support for JSON Boolean values
  - The attribute legible, if set to .true will encode JSON in a human friendly form
  - Adds utility class methods to directly read from (fromJsonFile(fileName)) or write to (toJsonFile(fileName, rexxObject, isLegible=.false)) files