# XML AND JSON

## Software Engineering
## CS 130

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Content adapted from Essentials of Software Engineering 3rd edition by Tsui, Karam, Bernal Jones and Bartlett Learning

# JSON

- JSON
  - also structured text
  - also with a syntax applied
  - it can also represent a huge variety of information
    - It also enables data transport
      - Across systems, languages, and networks
- So what does JSON look like?

# JSON


```
{
   "place":[
      {
         "suggestion":"at home",
         "meta":{
            "id":"null",
            "index":0
         },
         "size":"20.0"
      }
   ],
   "activity":[
      {
         "suggestion":"working",
         "meta":{
            "id":"null",
            "index":2
         },
         "size":"10.558333333333334"
      },
      {
         "suggestion":"sleeping",
         "meta":{
            "id":"null",
            "index":3
         },
         "size":"10.0"
      }
   ],
   "other":[
      {
         "suggestion":"(do not disturb)",
         "meta":{
            "id":"null",
            "index":1
         },
         "size":"10.0"
      }
   ],
   "error":[
      "false"
   ]
}
```

# JSON

- What is JSON?
  - JSON stands for “JavaScript Object Notation”
  - JSON was designed to pass data around between browsers and servers
  - JSON has no tags, only data
  - JSON has no meta-data

# JSON

- JSON also does not DO Anything
  - It is a data format
  - A program must be written to manipulate the data
    - To search the data
    - To display the data
    - To change the data

# JSON

- JSON was developed by people who thought that the meta-data in XML was
  - unnecessary
  - too big
  - too hard to maintain
  - not that valuable
- It also happens to be the native data storage format in Javascript / browsers

# JSON

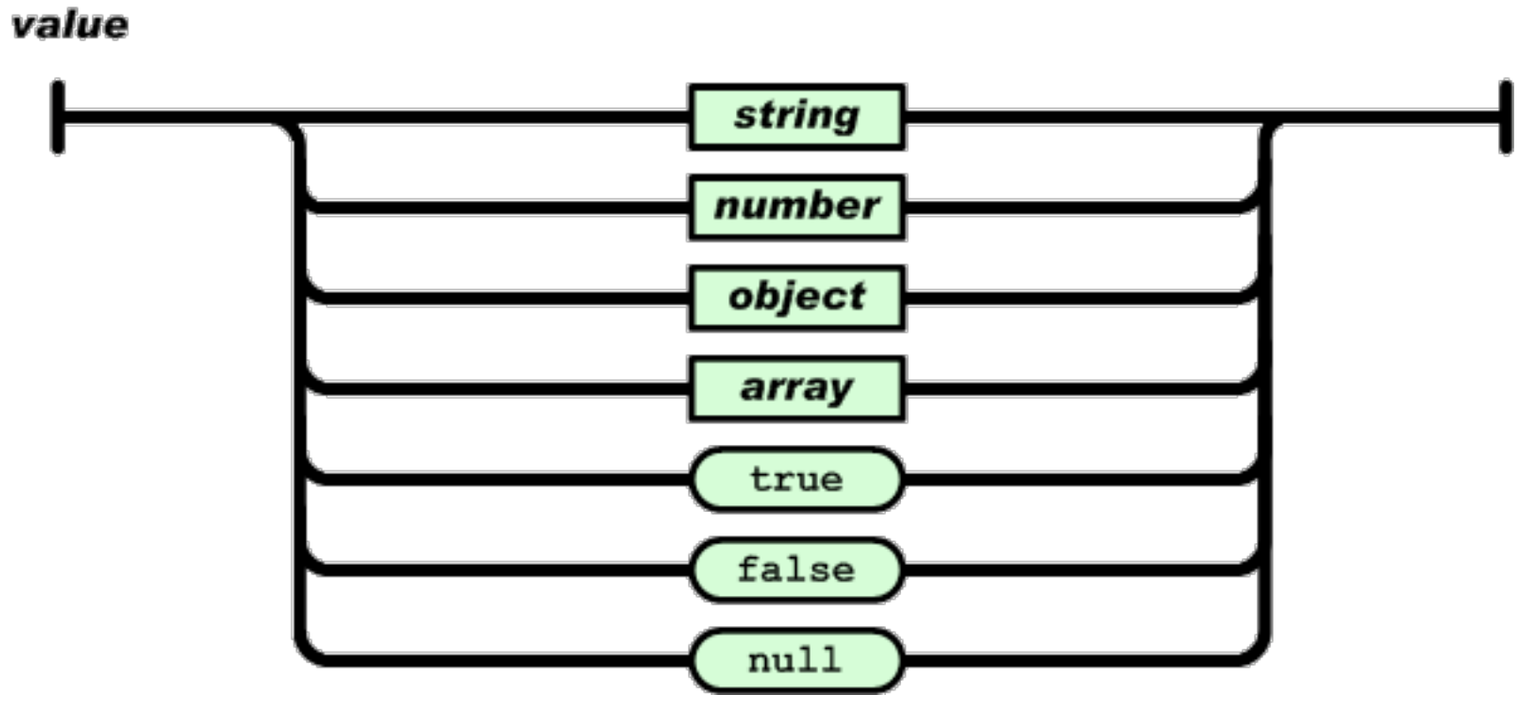
http://json.org/

- Details
  - Two basic structures
    - object:
      - name/value pairs
      - think Map
    - array
      - list of values
      - think List

# JSON

http://json.org/

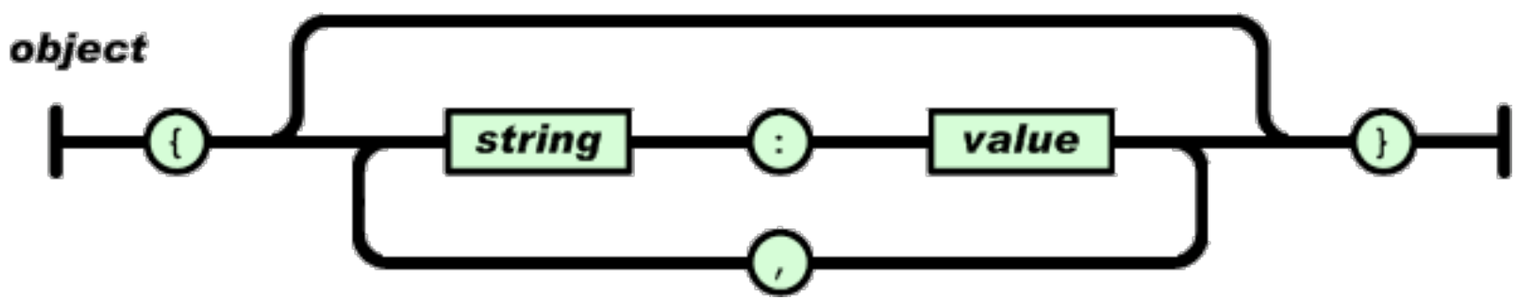
- Details
  - The basic type is a value which can be
    - a string
    - a number
    - an object
    - an array
    - “true”
    - “false”
    - “null”



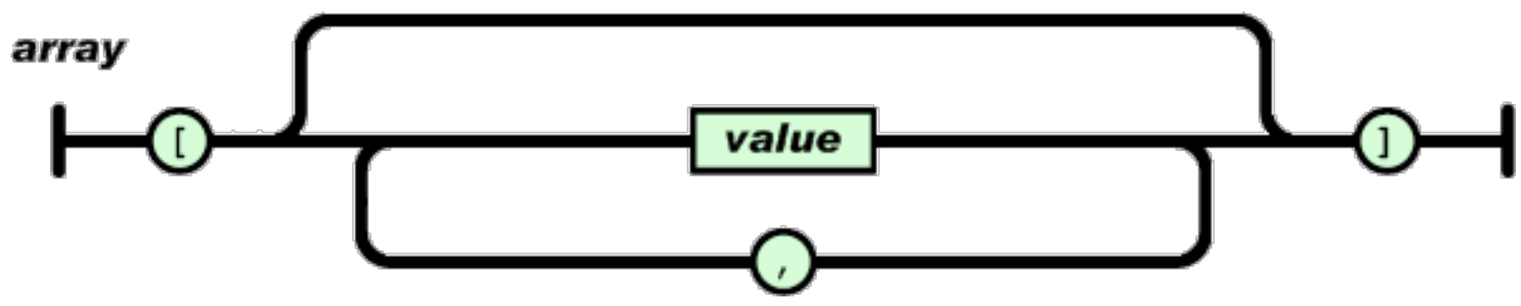
# JSON

http://json.org/

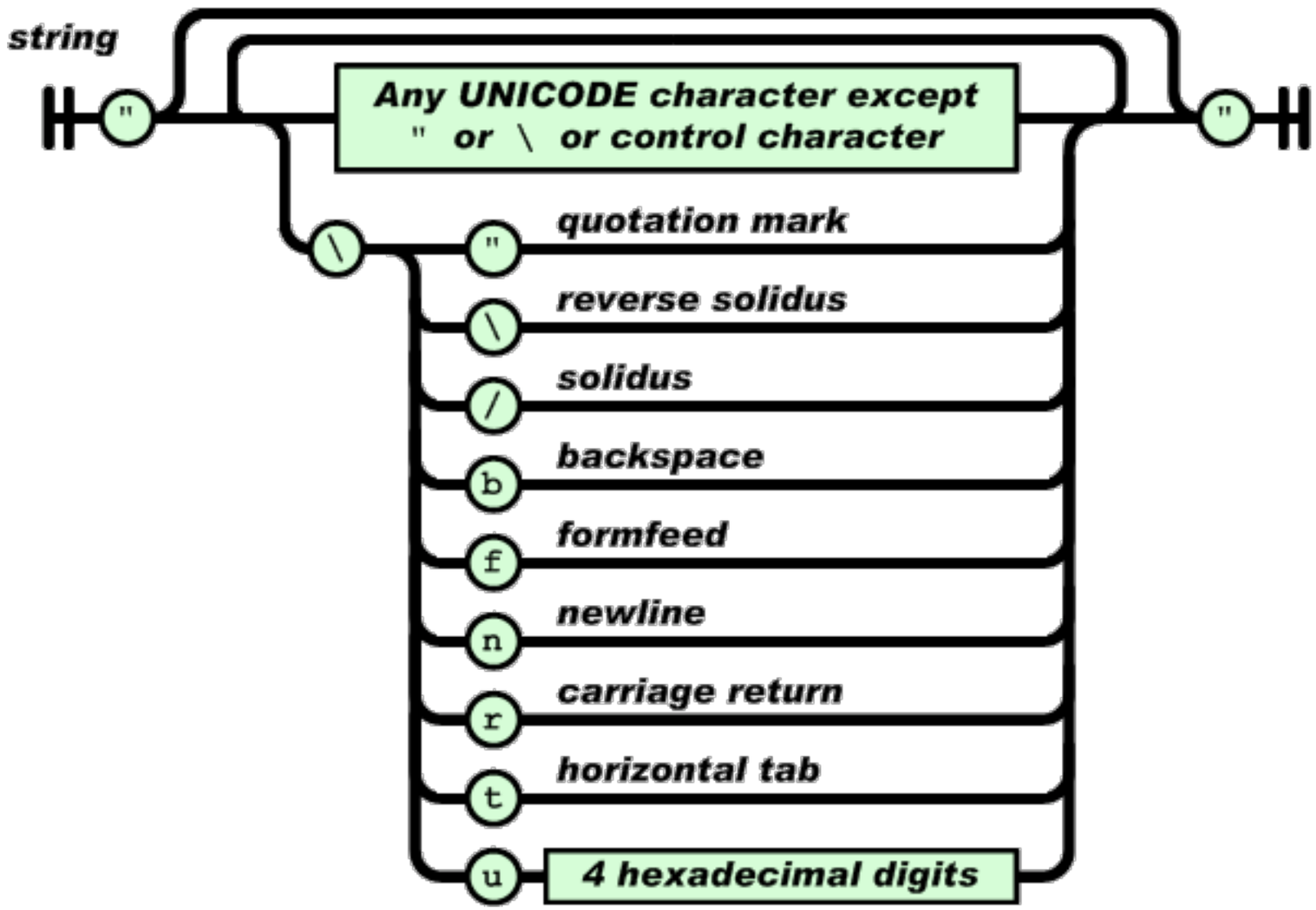
- Details
  - Object
    - Delimited by curly braces
    - name/values are separated by colons
    - elements are separated by commas
      - names are always strings
      - values are always values



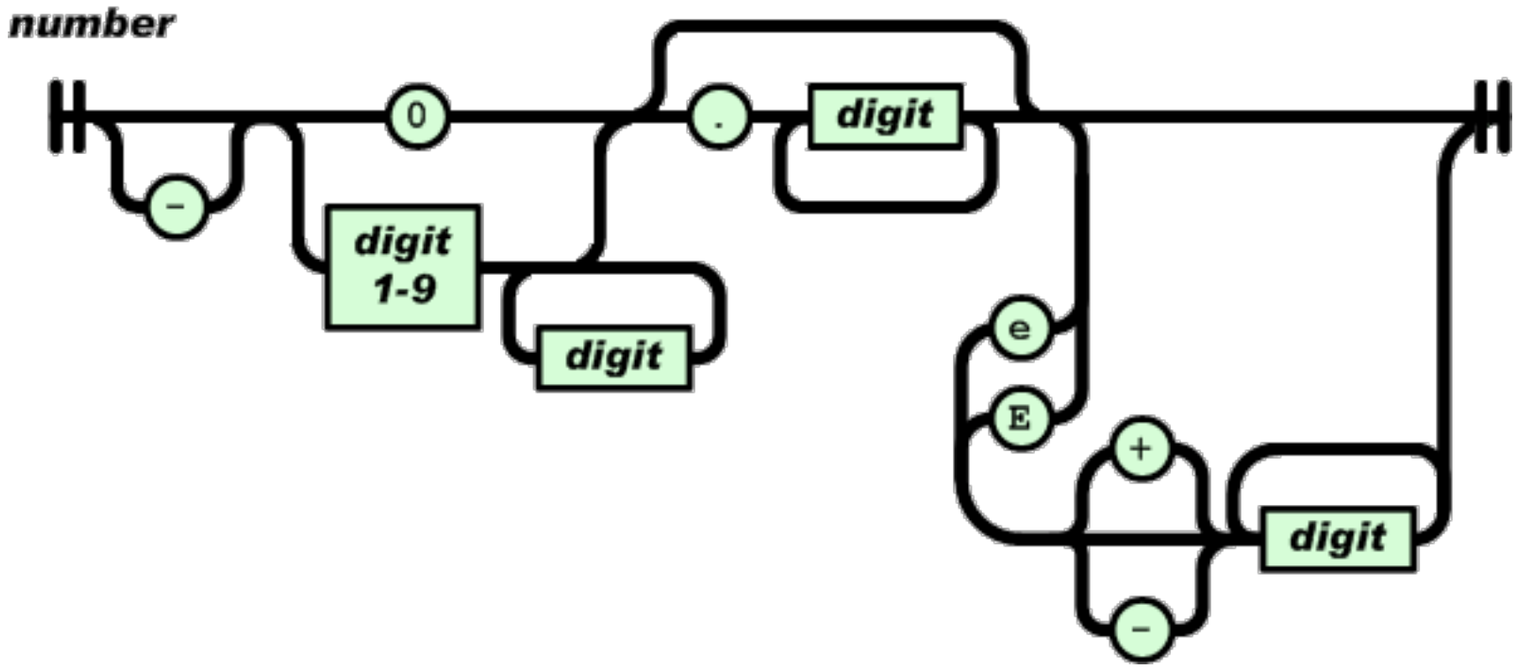
- Details
  - Array
    - Delimited by square braces
      - elements are separated by commas
        - elements are always values



- Details
  - String
    - is UNICODE, recommended is “utf-8”
    - is always in double quotes
    - uses \ escape sequences



- Details
  - Number



# JSON

http://json.org/

- Details
  - White space outside of quotes is ignored

# JSON


```
{
   "place":[
      {
         "suggestion":"at home",
         "meta":{
            "id":"null",
            "index":0
         },
         "size":"20.0"
      }
   ],
   "activity":[
      {
         "suggestion":"working",
         "meta":{
            "id":"null",
            "index":2
         },
         "size":"10.558333333333334"
      },
      {
         "suggestion":"sleeping",
         "meta":{
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            "index":3
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      {
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            "index":1
         },
         "size":"10.0"
      }
   ],
   "error":[
      "false"
   ]
}
```

# JSON

http://json.org/

- Supported languages
  - ASP, ActionScript, C, C++,C#,ColdFusion, D, Delphi, E, Eiffel, Erlang, Fan, Flex, Haskell, haXe, Java, JavaScript, Lasso,Lisp,LotusScript, Lua, Objective C, Objective CAML, OpenLaszlo, Perl, PHP, Pike, PL/SQL,PowerShell, Prolog, Pythong, R, Realbasic, Rebol, Ruby, Squeak, Tcl, Visual Basic, Visual FoxPro

# JSON

- On beyond JSON
  - JSON validation tools are easy to find
    - For example, jsonlint.com
  - No defined schema language
  - No built-in namespaces (no meta-data!)
  - No built-in transformation languages

# XML vs JSON

- XML is like a Ferrari
  - A Ferrari will get you to Las Vegas faster
- JSON is like a good bicycle
  - A bicycle can go off-road

- XML is beautiful and powerful
- XML is well-engineered and well-researched
- JSON is much lighter weight
- JSON is easier to just get going fast


# JSON vs XML

http://www.secretgeek.net/json_3mins.asp

- JSON is like XML
  - They are both human-readable text
  - They are both hierarchical/ tree-structured
  - Both can be parsed and used in many languages
  - Both can be passed in AJAX requests
    - (despite the X in AJAX)

# JSON vs XML

http://www.secretgeek.net/json_3mins.asp

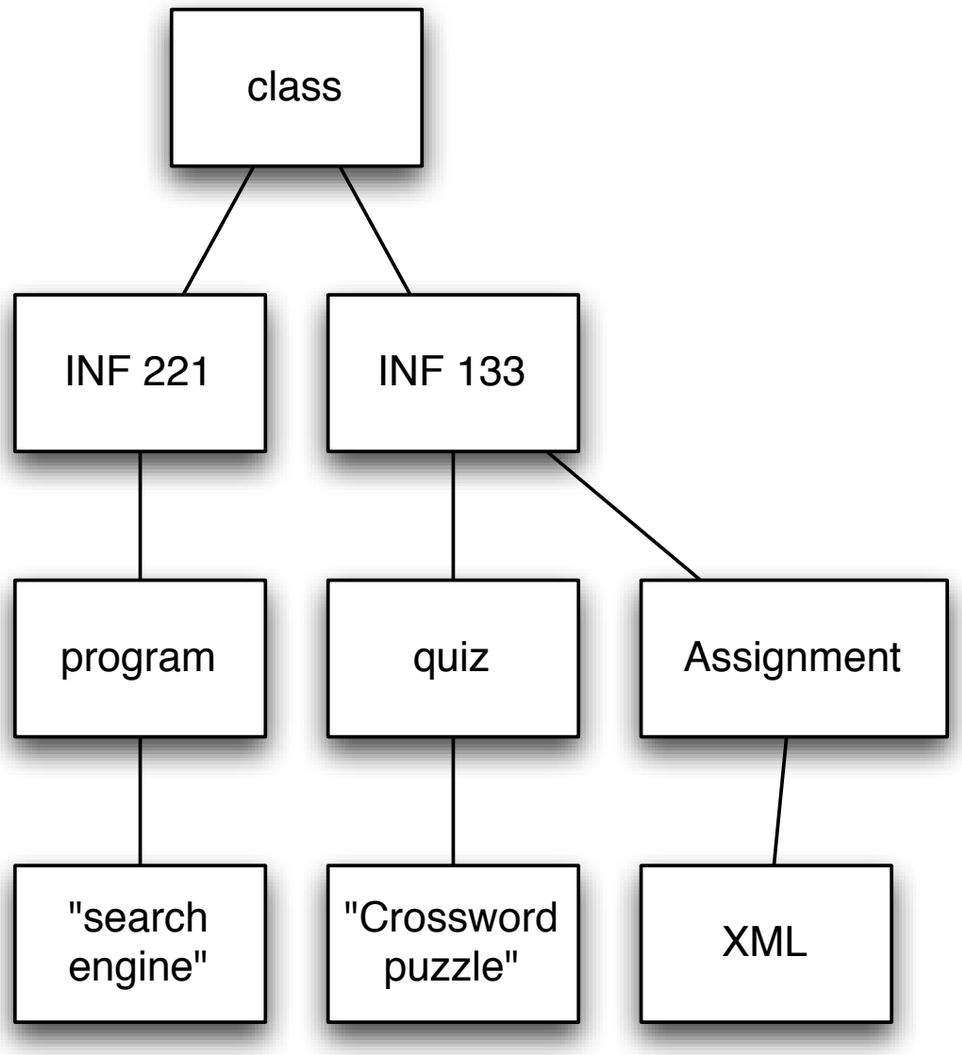
- JSON is different than XML
  - JSON does not have tags
  - JSON is less verbose
    - quicker to write
    - quicker to read
    - quicker to transport
- JSON can be parsed trivially using the eval() procedure in Javascript
- JSON has arrays, XML does not
- XML is extensible JSON usually isn't

# JSON vs XML

http://www.secretgeek.net/json_3mins.asp

- Using either looks like:
  - get the JSON/XML string
  - convert it to a data structure
    - JSON -> eval( <string> )
    - XML -> some parse function (lib dependent)
  - Use the data structure
- Do not process either type of data by “hand”.
  - input: Use a library to parse the data
  - output:
    - Create the data in native data structures
    - Use a program or method to output the data structure in JSON/XML

# Example

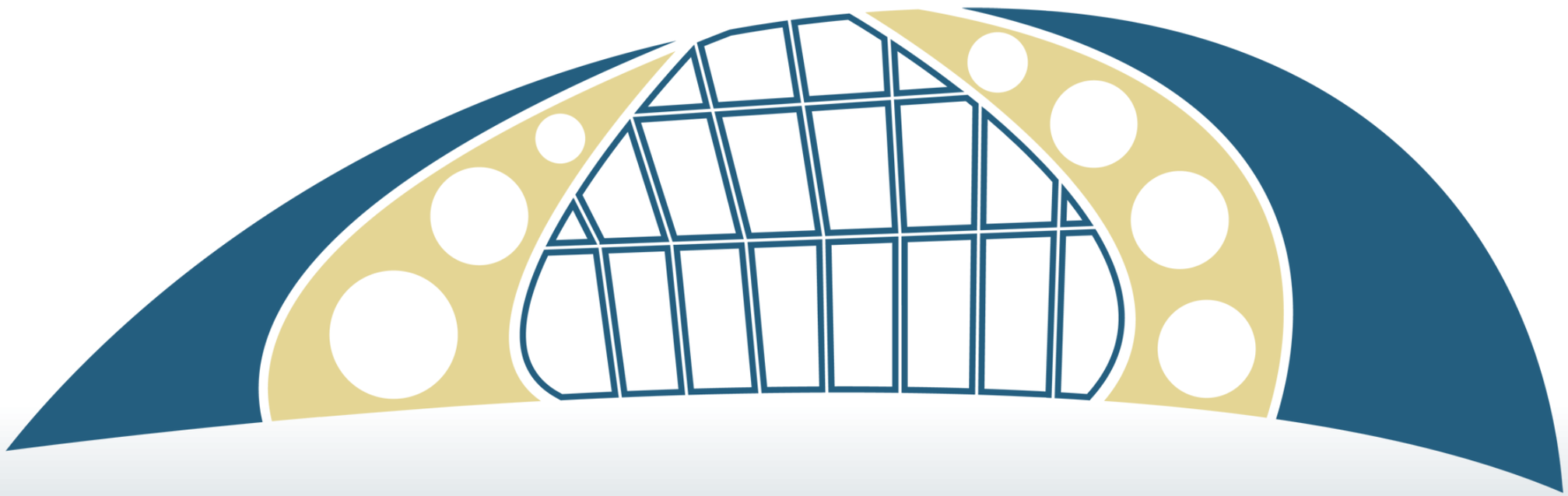



- Represent this as
  - XML
  - JSON
- There is not an absolutely correct answer to how to interpret this tree in the respective languages.
- There are multiple ways to interpret what this tree means.

# Example

```xml
<?xml version="1.0"?>
<class>
  <INF_221>
    <program>
        search engine
    </program>
  </INF_221>
  <INF_133>
    <quiz>
        crossword puzzle
    </quiz>
    <Assignment>
      <XML/>
    </Assignment>
  </INF_133>
</class>
```

```json
{
    "class": {
        "INF 221": {
            "program": "search engine"
        },
        "INF 133": {
            "quiz": "Crossword puzzle",
            "Assignment": "XML"
        }
    }
}
```



# WESTMONT INSPIRED

## COMPUTING LAB