Working with Database

Client-server sides

AJAX

JSON

Data formats

Working with JSON data

Request

Response

Bytes Database

Web programming

Basic Web Programming:

HTML

CSS

JavaScript

For more Dynamic Web Programming:

ASP.NET

SQL

AJAX

PHP

JSON

etc. (But these are not part of this Tutorial)

Web architecture

Client-side

Web Browser

HTML

CSS

JavaScript

Server-side

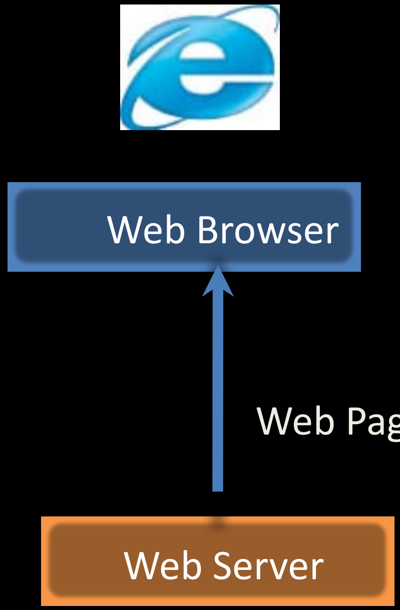
Web Server

Web Platform

The Web Browser creates the visual web page you see in the browser based on the HTML code

```
<!DOCTYPE html>
<head>
</head>
<body>
<h1> DES 421</h1>
<p> paragraph</p>
</body>
</html>
```

The code runs on the server and converted to HTML before sending to client (Web Browser)



DES 421

Paragraph

HTML, CSS, JavaScript

Client-side

ASP, PHP, JSON, Etc.

Server-side

InternetInformation Services (IIS), Apache, etc.

Data models

A **data model** is a collection of concepts for describing data

- The relational model of data is the most widely used model today
  - Main Concept: the *relation*- essentially, a table

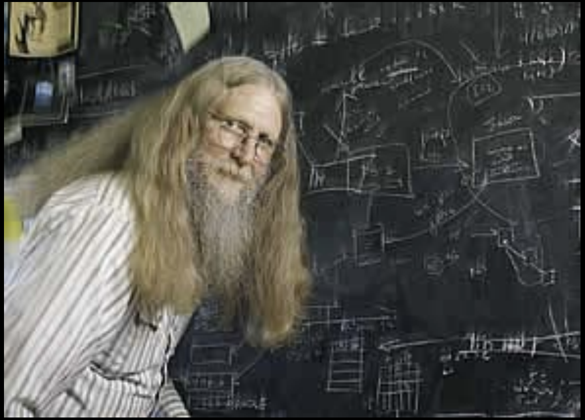
A **schema** is a description of a particular collection of data, **using the given data model**

- E.g. every *relation* in a relational data model has a *schema* describing types, etc.

Data models

“Relational databases form the bedrock of western civilization”.

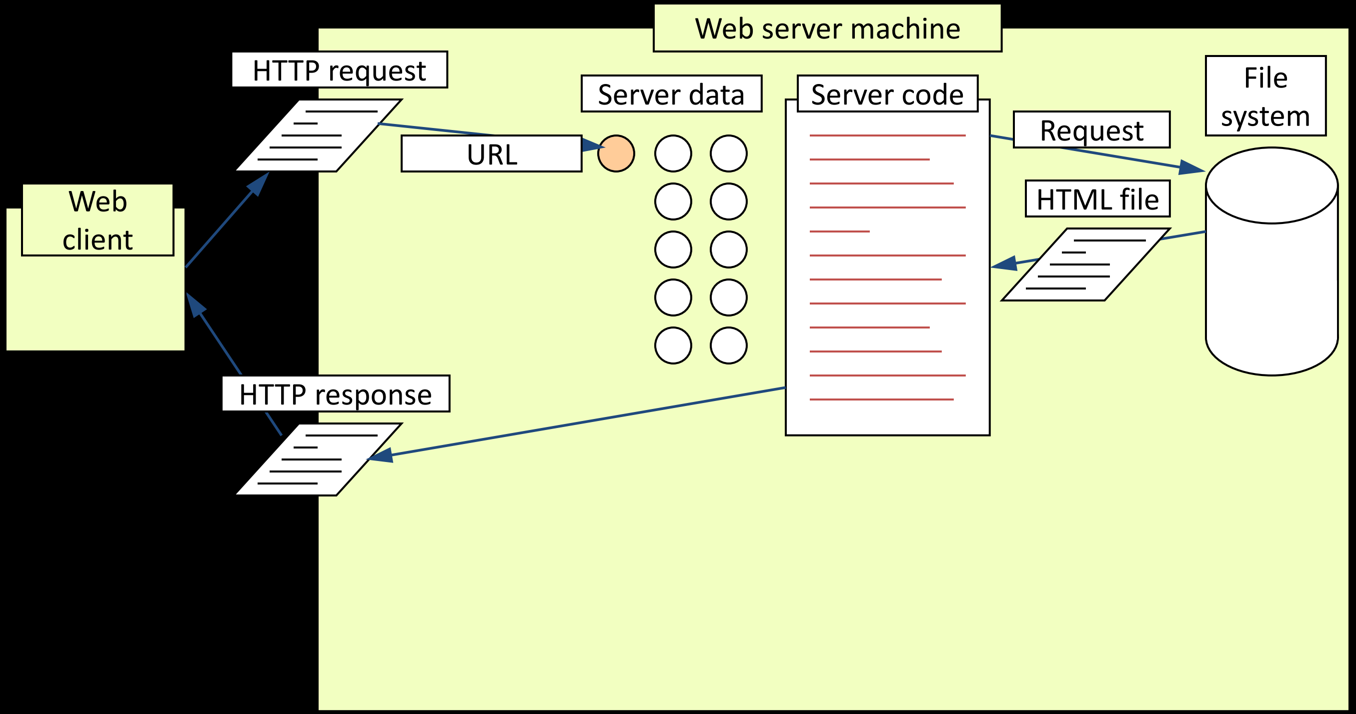
- Bruce Lindsay, IBM Research



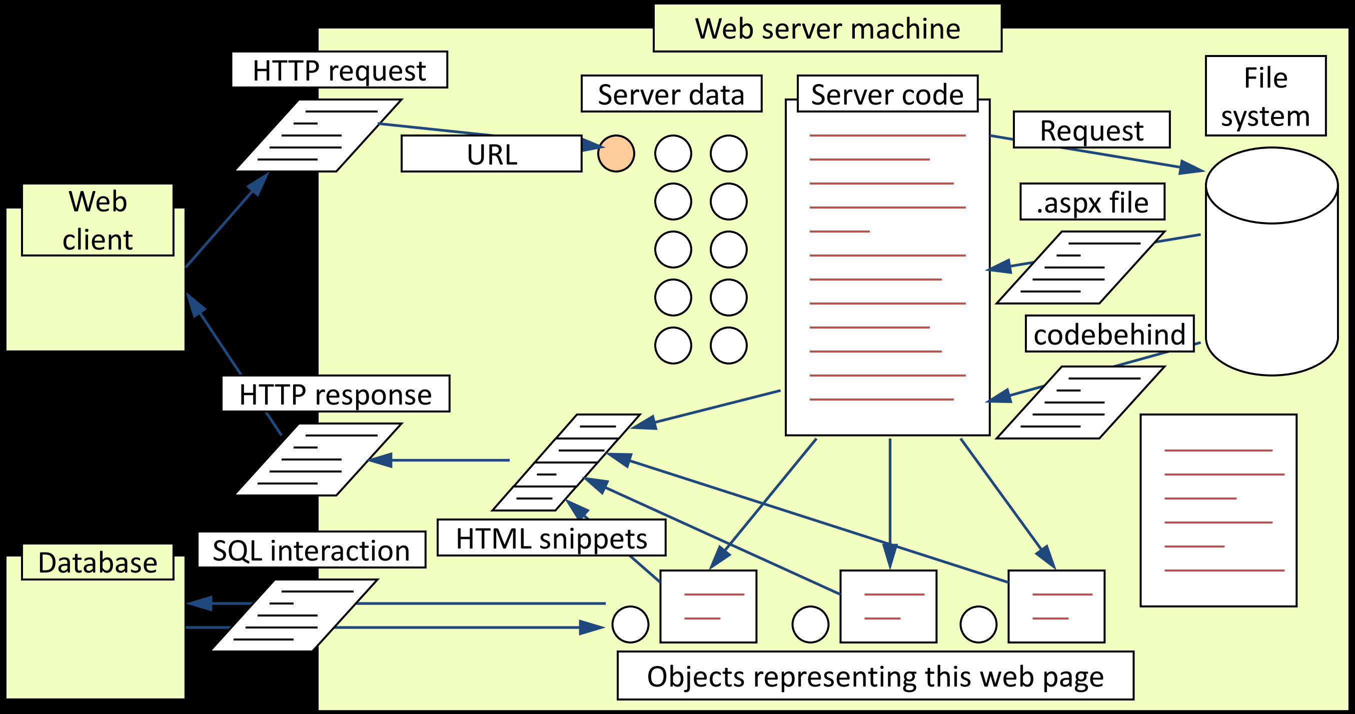
Server side programming

- Short history
  - CGI – separate programs launched by web server
    - They produce an HTML document as output
    - They receive arguments as input
    - Strong isolation, bad performance
  - Programs embedded inside web page (php, ASP, JSP)
    - Program executed inside web server process
  - Separate "code-behind" file for the code (ASP.NET)
- What are dynamic pages used for?
  - Personalizing based on user identity
  - Interacting with databases (e.g. on-line banking)
  - Web applications (e.g. web based email)
- Separate database keeps persistent data

Lifecycle of static web page



Page with database interaction



School of Design

JSON

JavaScript Object Notation

Minimal

Textual

Subset of JavaScript

JSON

A Subset of ECMA-262 Third Edition.

Language Independent.

Text-based.

Light-weight.

Easy to parse.

JSON Is Not...

JSON is not a document format.

JSON is not a markup language.

JSON is not a general serialization format.

- No cyclical/recurring structures.
- No invisible structures.
- No functions.

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Values

Strings

Numbers

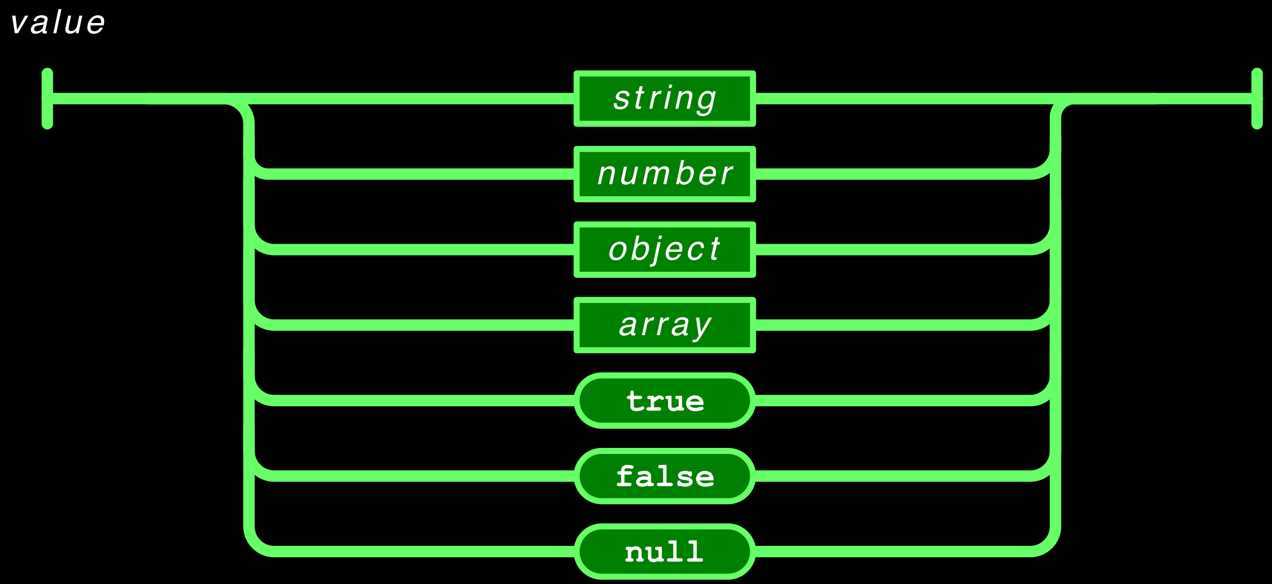
Booleans

Objects

Arrays

`null`

Value



School of Design

Strings

Sequence of 0 or more Unicode characters

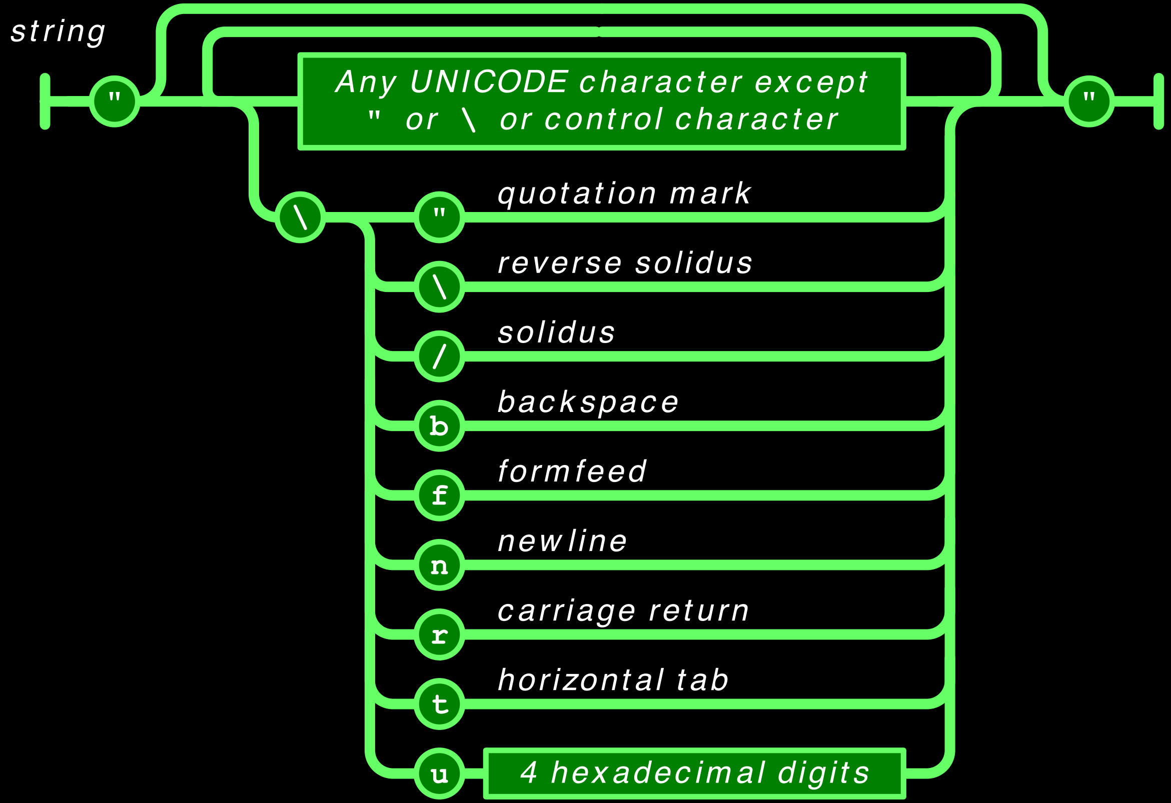
No separate character type

- A character is represented as a string with a length of 1

Wrapped in "double quotes"

Backslash escapement

String



School of Design

Numbers

Integer

Real

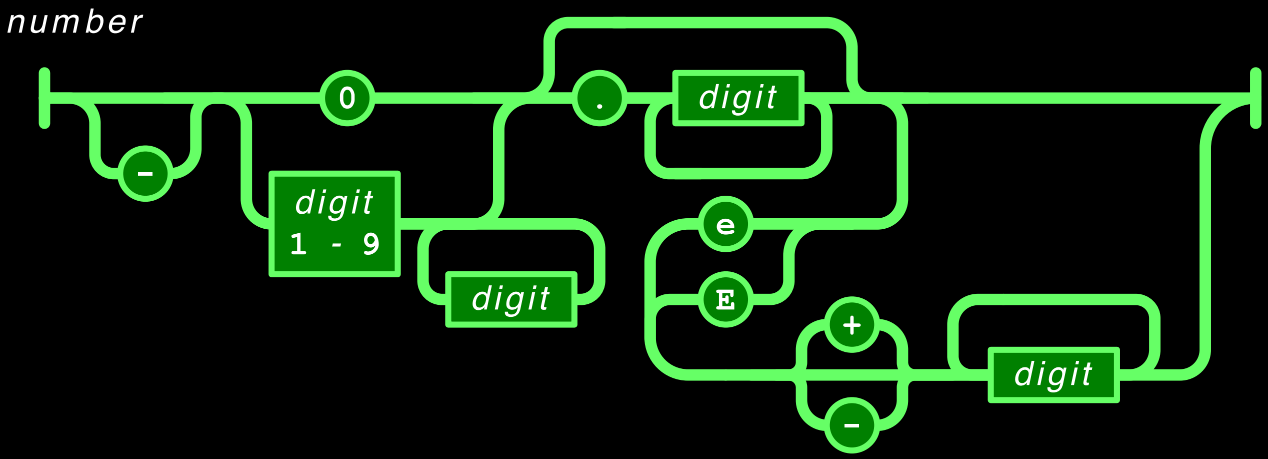
Scientific

No octal or hex

No **`NaN`** or **`Infinity`**

- Use **`null`** instead

Number



School of Design

Booleans

```
true

false
```

`null`

A value that isn't anything

Object

Objects are unordered containers of key/value pairs

Objects are wrapped in { }

, separates key/value pairs

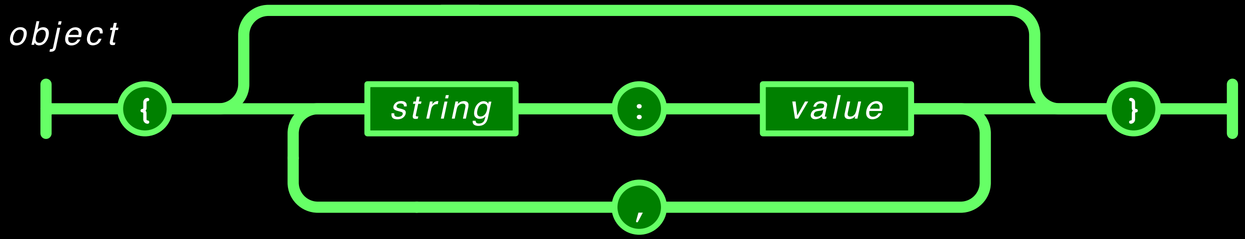
: separates keys and values

Keys are strings

Values are JSON values

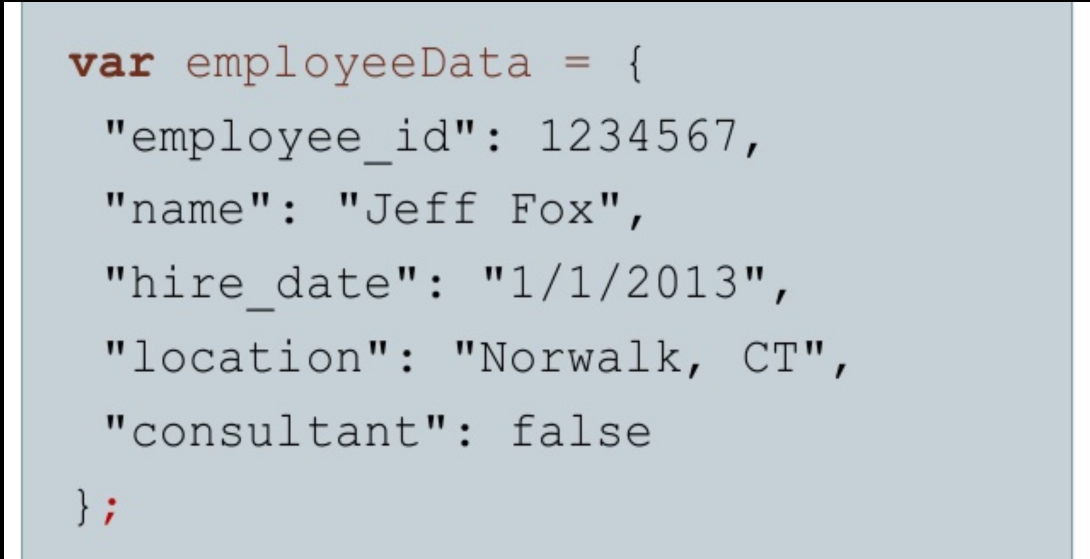
- struct, record, hashtable, object

Object



Object

```
{"name":"Jack B. Nimble","at large":
true,"grade":"A","level":3,
"format":{"type":"rect","width":1920,
"height":1080,"interlace":false,
"framerate":24}}
```



```
var employeeData = {
  "employee_id": 1234567,
  "name": "Jeff Fox",
  "hire_date": "1/1/2013",
  "location": "Norwalk, CT",
  "consultant": false
};
```

Object

```
{
    "name":      "Jack B. Nimble",
    "at large": true,
    "grade":     "A",
    "format": {
        "type":      "rect",
        "width":     1920,
        "height":    1080,
        "interlace": false,
        "framerate": 24
    }
}
```

Array

Arrays are ordered sequences of values

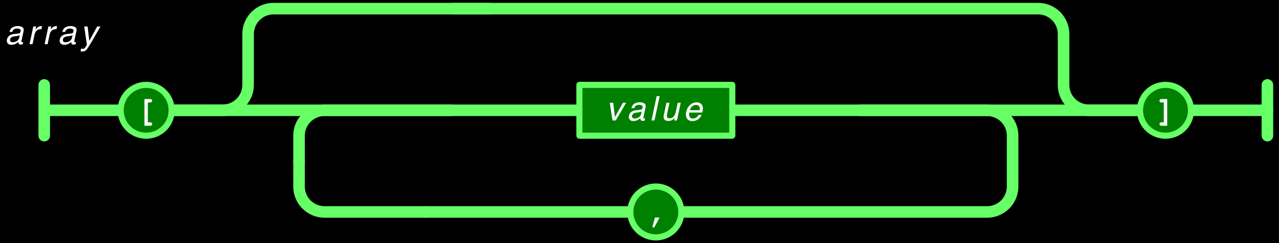
Arrays are wrapped in `[]`

`,` separates values

JSON does not talk about indexing.

- An implementation can start array indexing at 0 or 1.

Array



Array

```
["Sunday", "Monday", "Tuesday", "Wednesday",
"Thursday", "Friday", "Saturday"]


[
   – [0, -1, 0],
   – [1, 0, 0],
   – [0, 0, 1]
]
```

Arrays vs Objects

Use objects when the key names are arbitrary strings.

Use arrays when the key names are sequential integers.

Don't get confused by the term Associative Array.

Data Interchange

JSON is a simple, common representation of data.

Communication between servers and browser clients.

Communication between peers.

Language independent data interchange.

JSON in Ajax

HTML Delivery.

JSON data is built into the page.

- `<html>...`
- `<script>`
- `var data = { ... JSONdata ... };`
- `</script>...`
- `</html>`

School of Design

JSON in Ajax

XMLHttpRequest

- Obtain **`responseText`**
- Parse the **`responseText`**

  - `responseData = eval(`
  - `      '(' + responseText + ')');`

  - `responseData =`
  - `      responseText.parseJSON();`

JSON in Ajax

Is it safe to use **`eval`** with XMLHttpRequest?

The JSON data comes from the same server that vended the page. **`eval`** of the data is no less secure than the original html.

If in doubt, use ***`string`*****`.parseJSON`** instead of **`eval`**.

JSON in Ajax

Secret **`<iframe>`**

Request data using **`form.submit`** to the **`<iframe>`** target.

The server sends the JSON text embedded in a script in a document.

- **`<html><head><script>`**
- **`document.domain = 'penzance.com';`**
- **`parent.deliver({ ... JSONtext ... });`**
- **`</script></head></html>`**

The function **`deliver`** is passed the value.

JSON in Ajax

Dynamic script tag hack.

Create a script node. The `src` url makes the request.

The server sends the JSON text embedded in a script.

- `deliver({ ... JSONtext ... });`

The function `deliver` is passed the value.

The dynamic script tag hack is insecure.

JSONRequest

A new facility.

Two way data interchange between any page and any server.

Exempt from the Same Origin Policy.

Campaign to make a standard feature of all browsers.

Where is JSON used

- Anywhere and everywhere!

And many, many more!

Ajax

AJAX = **A**synchronous **J**avaScript **A**nd **X**ML.

AJAX is not a programming language.

AJAX just uses a combination of:

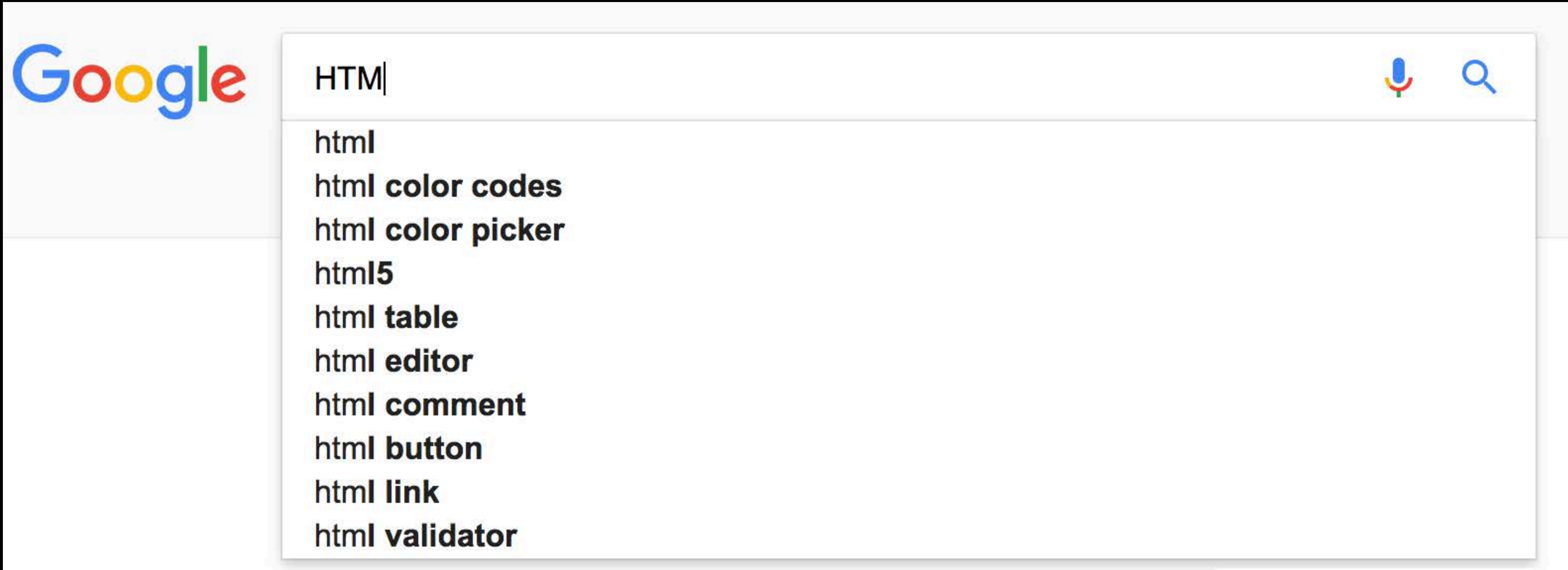
A browser built-in XMLHttpRequest object (to request data from a web server)

JavaScript and HTML DOM (to display or use the data)

- Updates a web page without reloading the page
- Requests data from a server - after the page has loaded
- Receives data from a server - after the page has loaded
- Sends data to a server - in the background

Ajax

AJAX = **A**synchronous **J**avaScript **A**nd **X**ML.



HTM

html
html **color codes**
html **color picker**
html**5**
html **table**
html **editor**
html **comment**
html **button**
html **link**
html **validator**

Ajax

AJAX uses an asynchronous processing model.

The user can do other things while the web browser is waiting for the data to load, speeding up the UX.

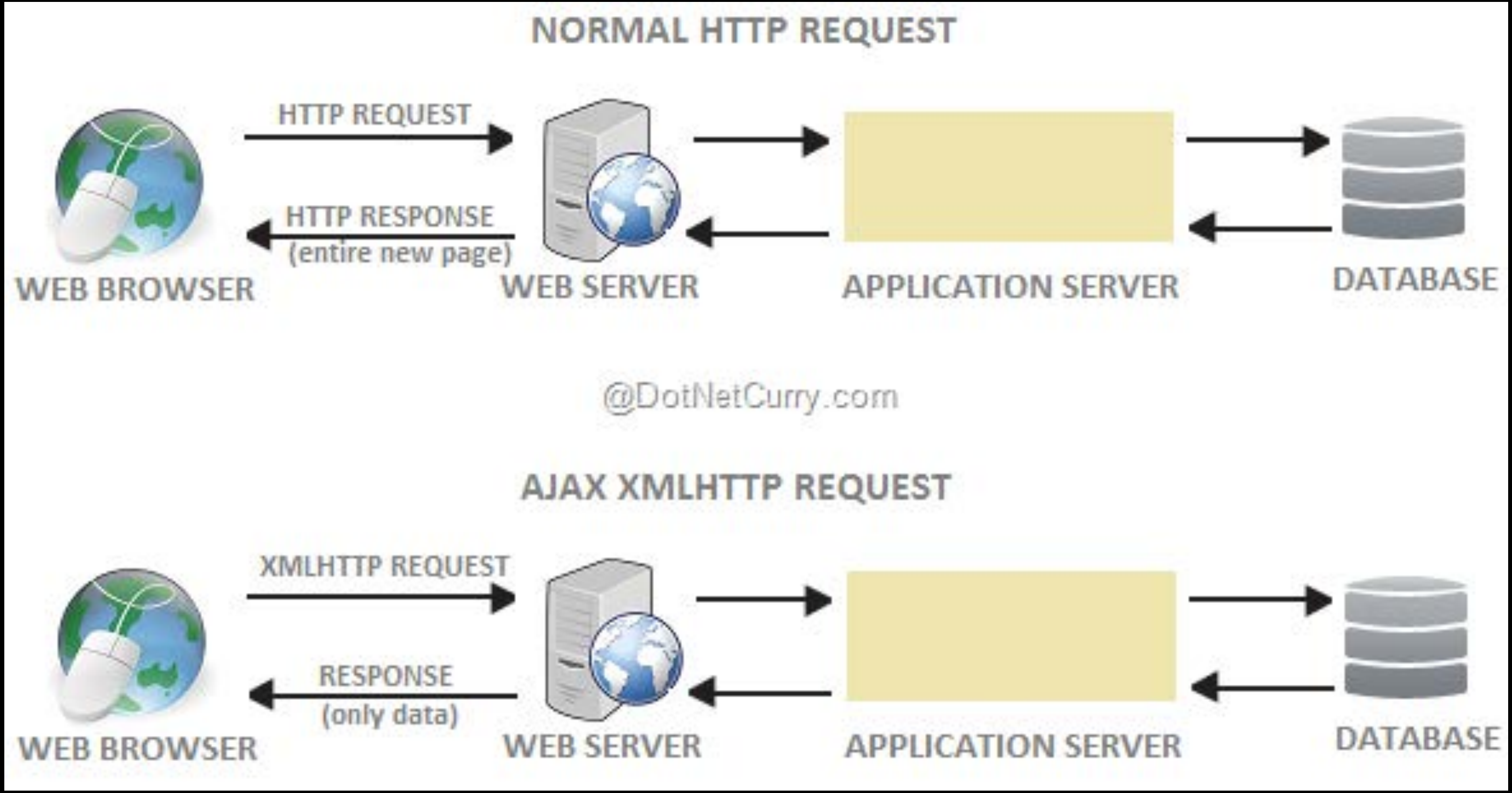
synchronous processing model

- <script> - the browser stops and processes the script, DB calls

Asynchronous processing model

- with AJAX the browser requests data from the server and continues loading the page
- updating only part of the page / content, etc.

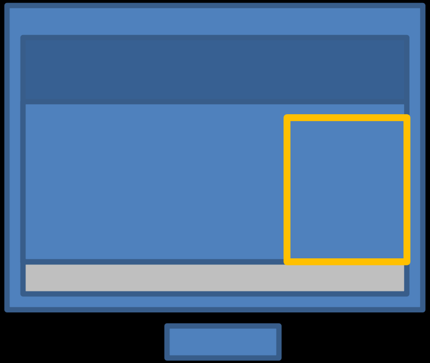
Ajax


NORMAL HTTP REQUEST
HTTP REQUEST
HTTP RESPONSE
(entire new page)
WEB BROWSER
WEB SERVER
APPLICATION SERVER
DATABASE
@DotNetCurry.com
AJAX XMLHTTP REQUEST
XMLHTTP REQUEST
RESPONSE
(only data)
WEB BROWSER
WEB SERVER
APPLICATION SERVER
DATABASE

Ajax

1

request



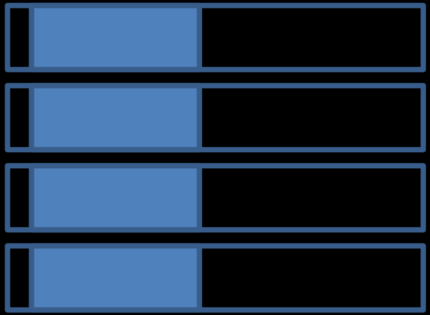
browser request data from the server;

XMLHttpRequest object to handle AJAX requests;

Once request is made, the browser does not for a response from the server

2

server



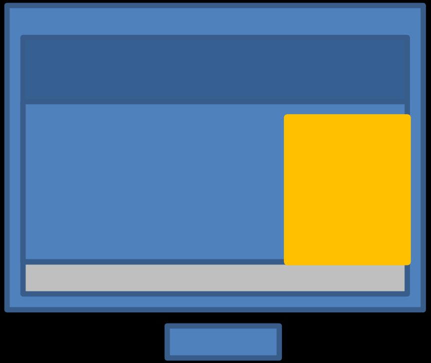
The sever responds with data:

JSON, HTML, XML.

Server-side tech. ASP, php, NodeJS, Ruby generate web pages for each user. Upon ajax request server can send data in HTML, JSON, XML format which browser turns into HTML

3

response



Browser processes the content and adds it to the webpage.

When the server finished the request, the browser will fire an event which will trigger the JS function that will process the data and incorporate it into one part of the webpage (w.o. affecting the rest of the page)

Data Formats

The response to an Ajax request usually comes in one of three formats:

HTML

- Easy to write, request and display
- Data from the server goes straight to the page
- The server must produce HTML in the ready to use in the page format
- No good data-portability
- the request must come from the same domain

XML

- Stricter syntax
- Data is flexible, can represent complex structures
- Works with different platforms and applics
- considered a verbose language (tags add tons of extra charcaters)
- Requires a lot of code
- the request must come from the same domain

JSON

- Can be called from any domain
- More concise (less verbose)
- Used commonly with JS
- Stricter syntax (missed quote, comma can break the file)
- Security issues through JS (can contain malicious content)

JSON - JavaScript Object Notation

- a text-based data format following JavaScript object syntax
- can be used independently from JavaScript
- many programming environments feature the ability to read (parse) and generate JSON

JSON exists as a string — useful when you want to transmit data across a network.

It needs to be converted to a native JavaScript object when you want to access the data

JavaScript provides a global JSON object that has methods available for converting between the two.

JSON - JavaScript Object Notation

JSON data is just plain text data

```
{
“location”: ”San Francisco, CA”,
“capacity”: 270,
“booking”: true
}
```

key value

JSON - JavaScript Object Notation

```
{
“location”: ”San Francisco, CA”,
“capacity”: 270,
“booking”: true
}
```

key

Key is separated from its value by a colon
The key should be places in double quotes “ “
Each key/value pair is separated by a comma.
No comma after the last key

value

The value can be any of the following data types

string	text (in quotes “ “)
number	
Boolean	true or false
array	of values or objects
object	JS object – can have child objects
null	empty value

Loading JSON with Ajax

The request for JSON data uses XMLHttpRequest object

When the server responds, the JSON will be converted into HTML

When JSON data is sent from the server to a browser, it is transformed into a sting.

When it reaches the browser, your script must then convert string into a JavaScript object. This Is known as deserializing an object.
Done using parse() method.

Loading JSON with Ajax

Once the string has been parsed, the script can access the data in the object and create HTML to be shown on the page.

The HTML is added to the page using innerHTML property. It should be used only when you are confident that it contain no malicious code.

JSON object has method stringify()
Which converts objects into a string using JSON notation so it can be sent from the browser back to a server. Known as serializing an object.

stringify() method can be used when the user has interacted with the page to update the data help in JavaScript object (i.e. filling a form)
So that it can then update the info stored on the server.

JSON – the request

1. To create Ajax request, browser use the XMLHttpRequest object.

When the server responds to the request, the same XMLHttpRequest object will process the result. (var xhr)

2. xhr.open (‘GET’, ’db_URL’, true);

The XMLHttpRequest object’s open() method prepares the request. It has 3 parameters: I) the HTTP method (GET), II) the url of the database page,

III) a Boolean indicating if it should be asynchronous (true).

3. The send () method sends the prepared request to the server. Extra info is passed in the parentheses (i.e. ‘search=arduino’). If no extra info is sent, null is used (xhr.send(null);

JSON – the response

```
1.  xhr.onload = function () {
2.         if (xhr.status === 200) {
            //code to process the results from the server
            }
    }
```

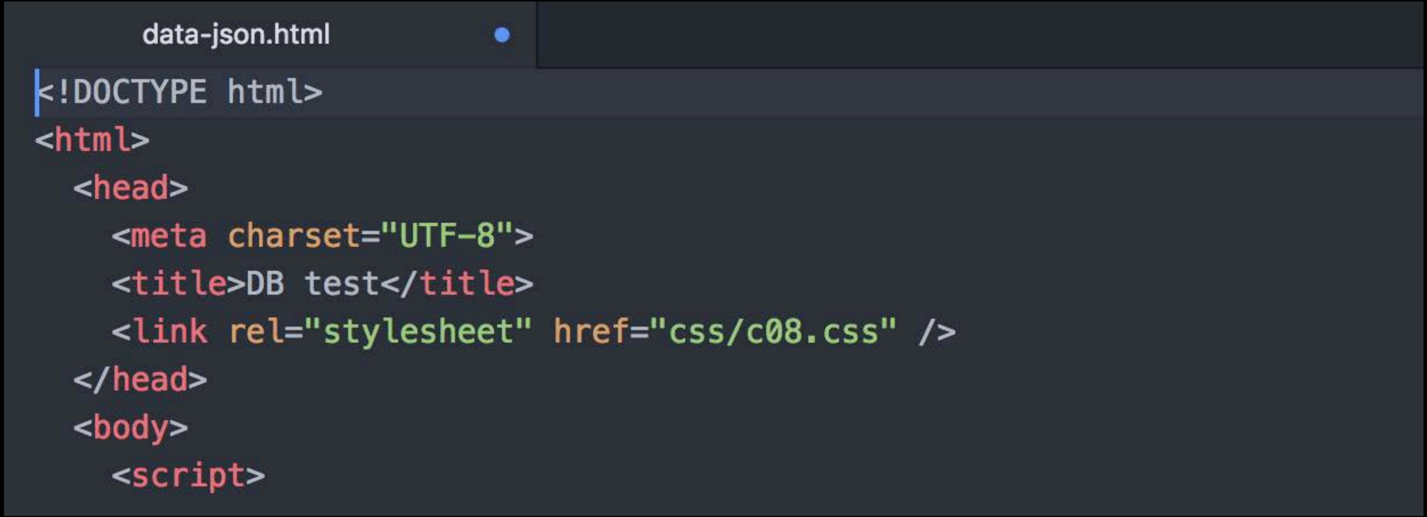
1. When the browser has received and loaded a response from the server, the load event will fire. This will trigger a function
   xhr.onload = function() {   .....

2. The function checks the status property of the object. This is used to make sure the server's response was ok. (If this property is blank, check the setup of the server).

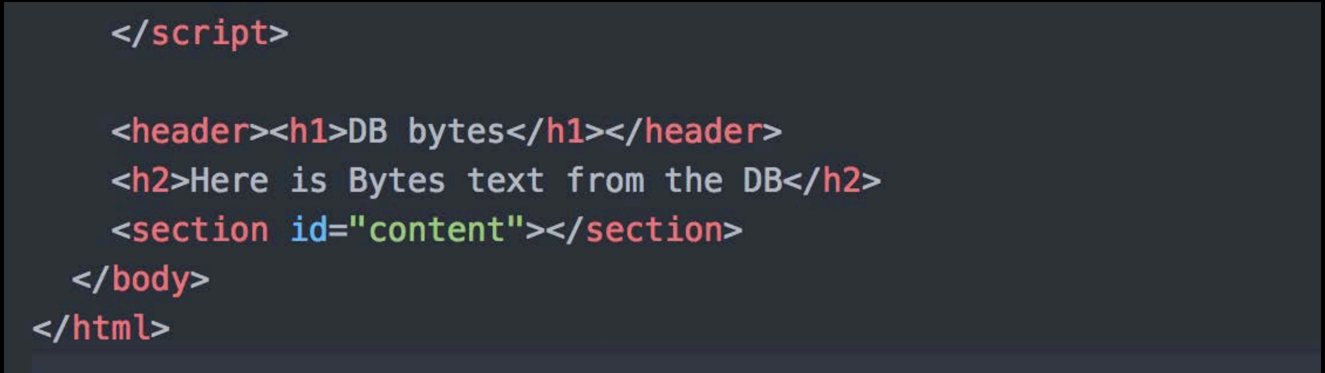
JSON – the response

1. JSON data from the server is stored in a var responseObject.
2. When it comes from the server JSON data is a string, so it is coverted into a JavaScript using JSON object parse() method.
3. The newContent variable is created to hold the new HTML data. It is set to an empty string outside the loop so that the code in the loop can add to the string.
4. Loop through the objects that represent each event using a for loop.
5. The data in the objects are accessed using dot notation.
6. Inside the loop, the contents of the object are added to the newContent variable, along with their corresponding HTML markup.
7. When the loop has finished running through the event objects in respinseObject, the new HTML is added to the page using innerHTML property.

JSON – data_json.html



```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="UTF-8">
    <title>DB test</title>
    <link rel="stylesheet" href="css/c08.css" />
  </head>
  <body>
    <script>
```



```
    </script>

    <header><h1>DB bytes</h1></header>
    <h2>Here is Bytes text from the DB</h2>
    <section id="content"></section>
  </body>
</html>
```

JSON – request

1. XMLHttpRequest object creates Ajax request / stores the object in a variable xhr

2. xhr.open (‘GET’, 'db_URL’, true);

The open() method prepares the request. 3 parameters: the HTTP method (GET), the url of the database page, a Boolean indicating if it should be asynchronous (true).

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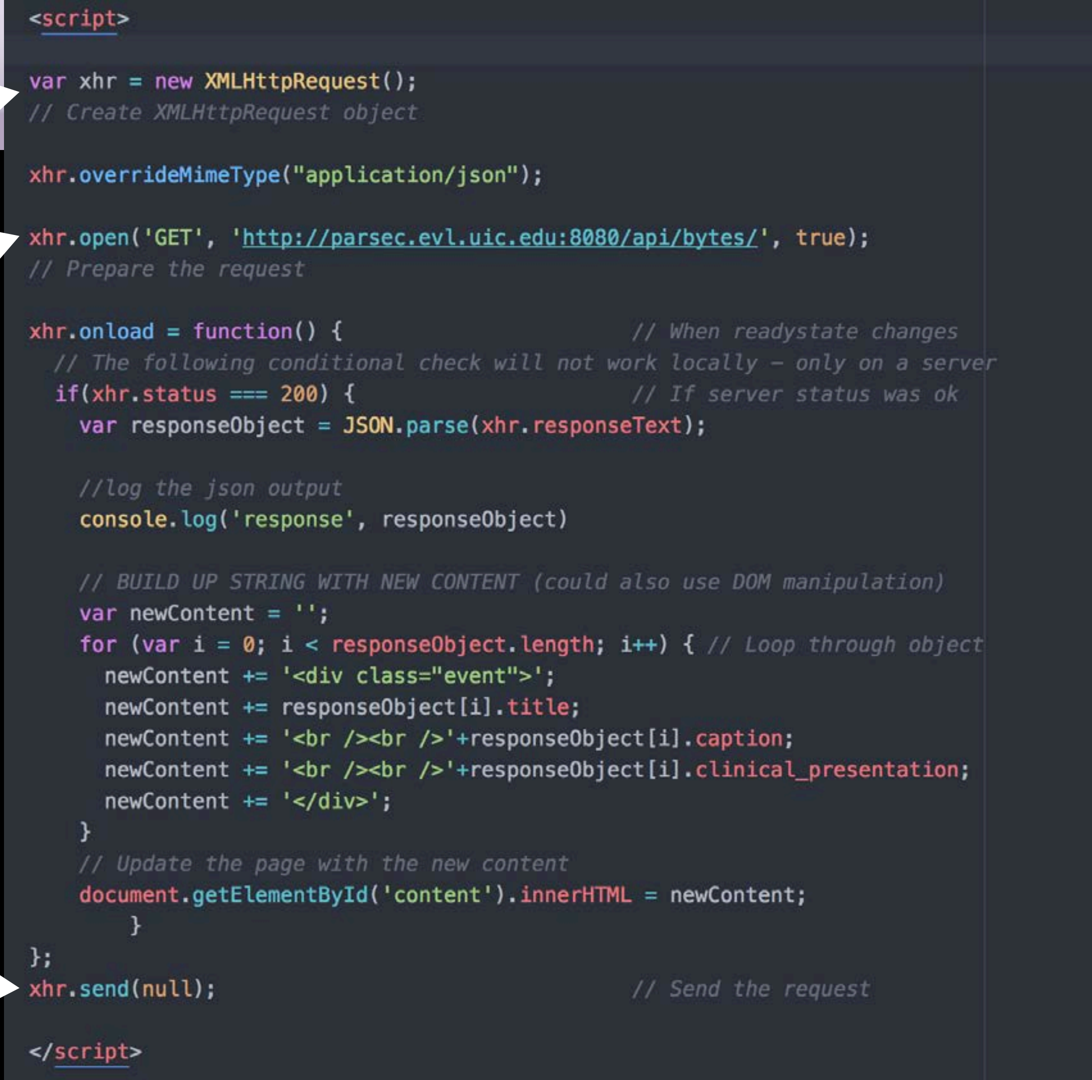

```
<script>

var xhr = new XMLHttpRequest();
// Create XMLHttpRequest object

xhr.overrideMimeType("application/json");

xhr.open('GET', 'http://parsec.evl.uic.edu:8080/api/bytes/', true);
// Prepare the request

xhr.onload = function() {                       // When readystate changes
  // The following conditional check will not work locally - only on a server
  if(xhr.status === 200) {                      // If server status was ok
    var responseObject = JSON.parse(xhr.responseText);

    //log the json output
    console.log('response', responseObject)

    // BUILD UP STRING WITH NEW CONTENT (could also use DOM manipulation)
    var newContent = '';
    for (var i = 0; i < responseObject.length; i++) { // Loop through object
      newContent += '<div class="event">';
      newContent += responseObject[i].title;
      newContent += '<br /><br />'+responseObject[i].caption;
      newContent += '<br /><br />'+responseObject[i].clinical_presentation;
      newContent += '</div>';
    }
    // Update the page with the new content
    document.getElementById('content').innerHTML = newContent;
        }
};
xhr.send(null);                                 // Send the request

</script>
```

JSON – response

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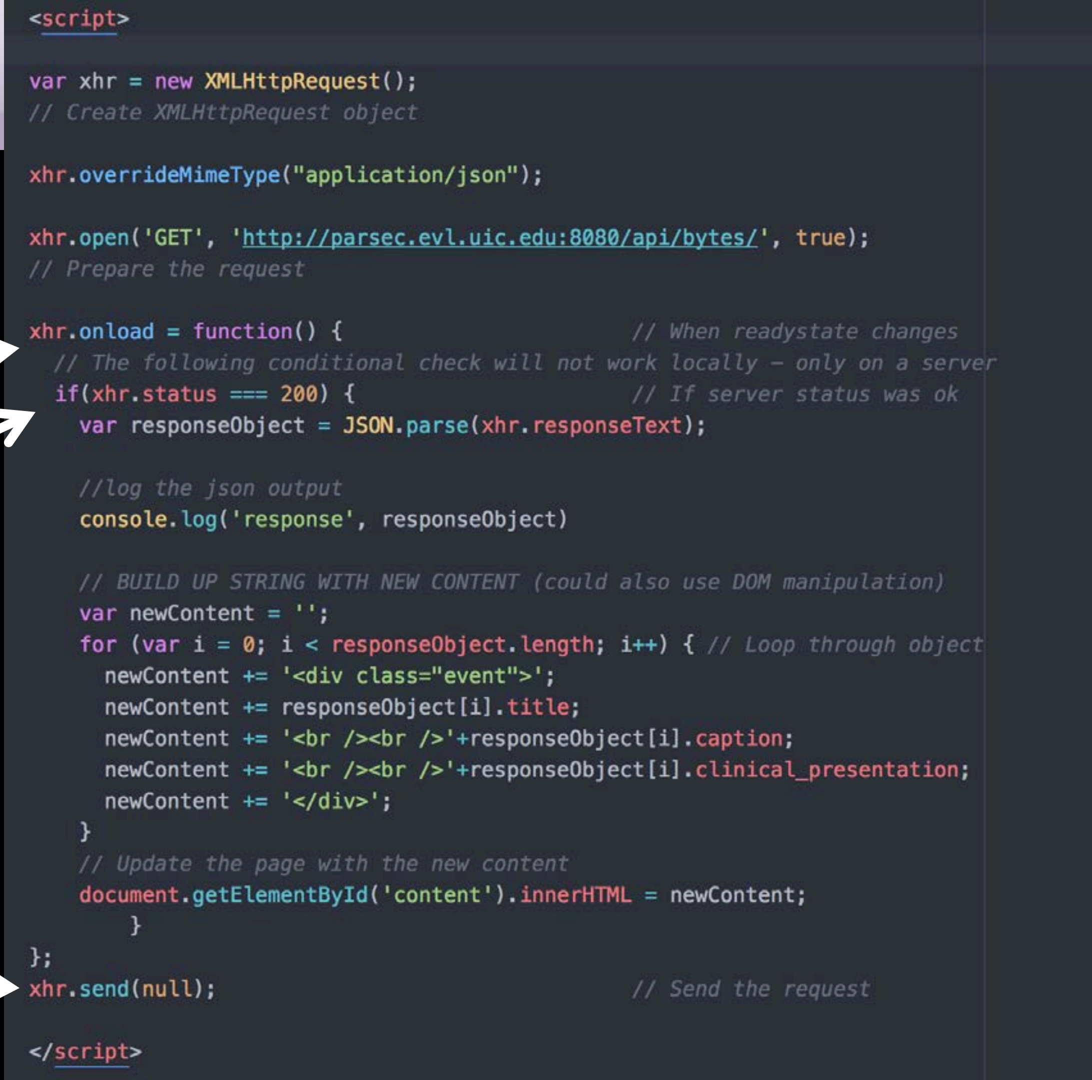

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    }
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xhr.send(null);                                 // Send the request

</script>
```

JSON – data_json

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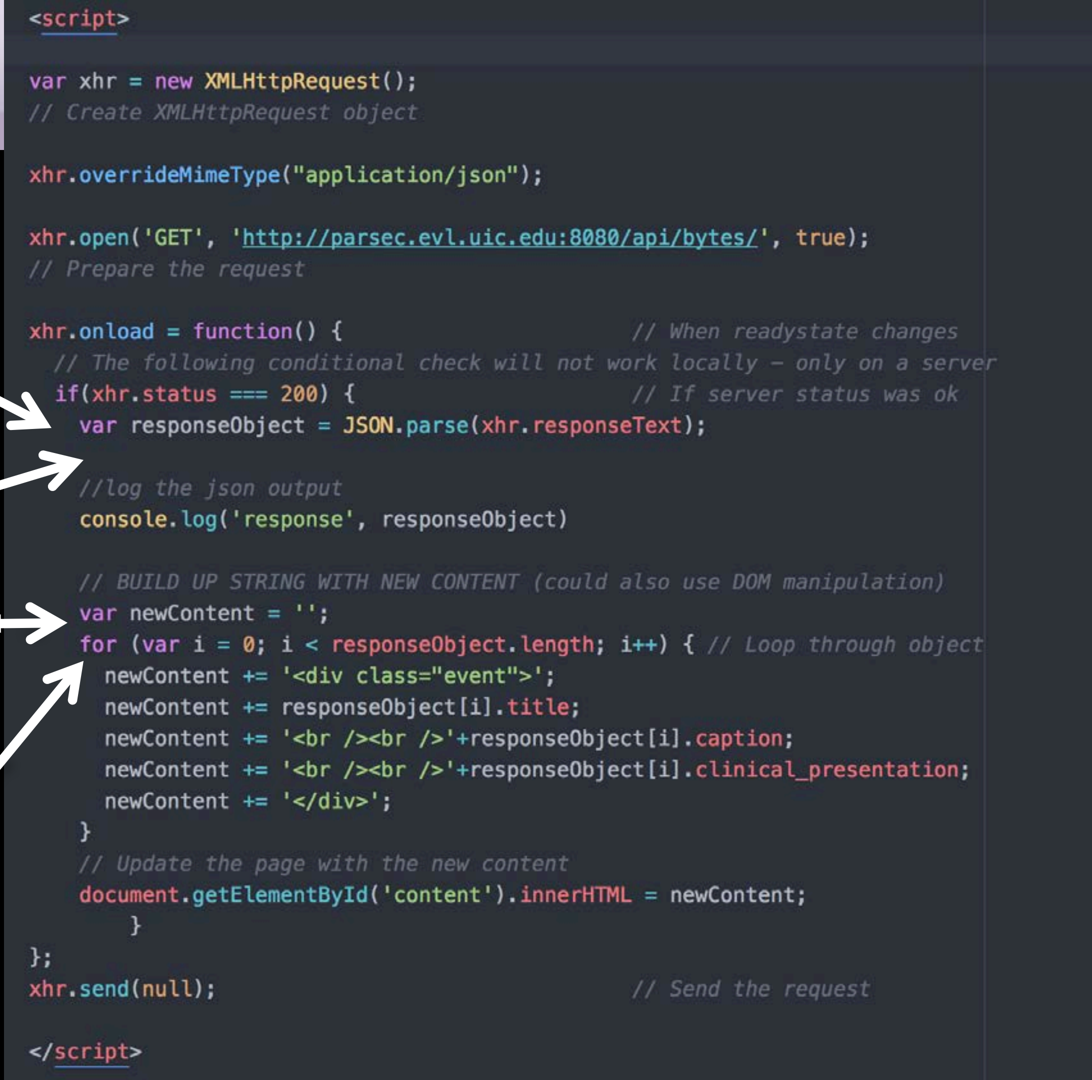

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        }
};
xhr.send(null);                                 // Send the request

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```

JSON – data_json

4. Loop through the objects that represent each event using a for loop.

The data in the objects are accessed using dot notation.

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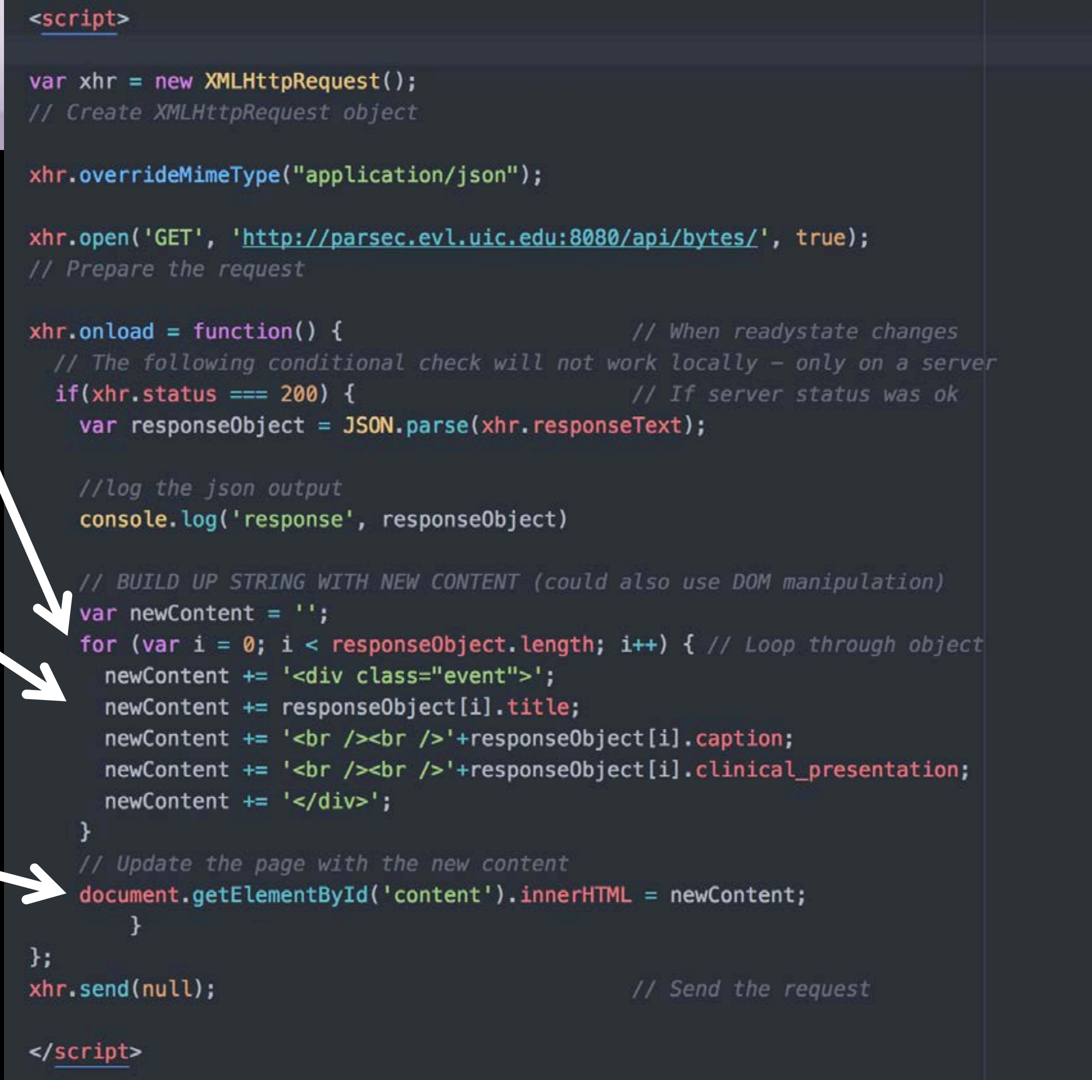
6. When the loop has finished running through the event objects in respinseObject, the new HTML is added to the page using innerHTML property.



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      newContent += '</div>';
    }
    // Update the page with the new content
    document.getElementById('content').innerHTML = newContent;
        }
};
xhr.send(null);                                 // Send the request

</script>
```

Bytes database

http://parsec.evl.uic.edu:8080/api/scores -- this will respond with all scores (this link is actually active right now, but it only has test data inside of it)

http://parsec.evl.uic.edu:8080/api/bytes -- this will respond with all bytes

http://parsec.evl.uic.edu:8080/api/bytes/id/23 -- byte 23
http://parsec.evl.uic.edu:8080/api/bytes/id/18 -- byte 18

To access bytes by category:

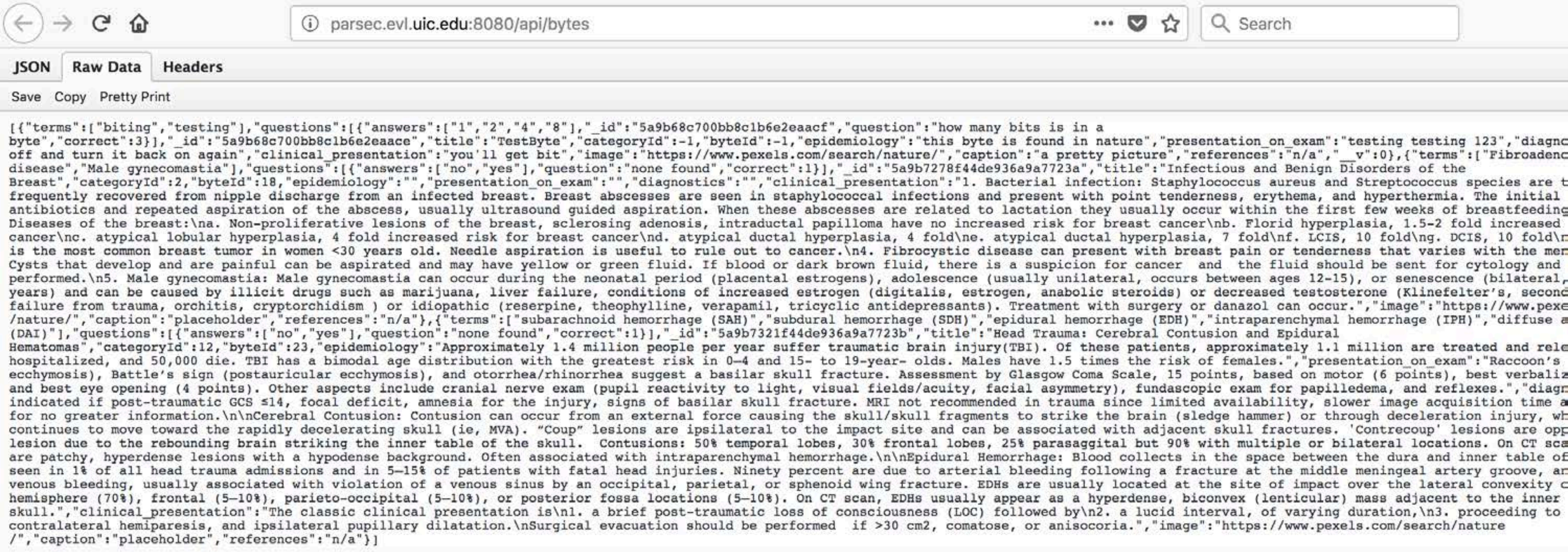
http://parsec.evl.uic.edu:8080/api/bytes/category/12 (Only byte 23)

or you can query all categories:

http://parsec.evl.uic.edu:8080/api/categories

Bytes database

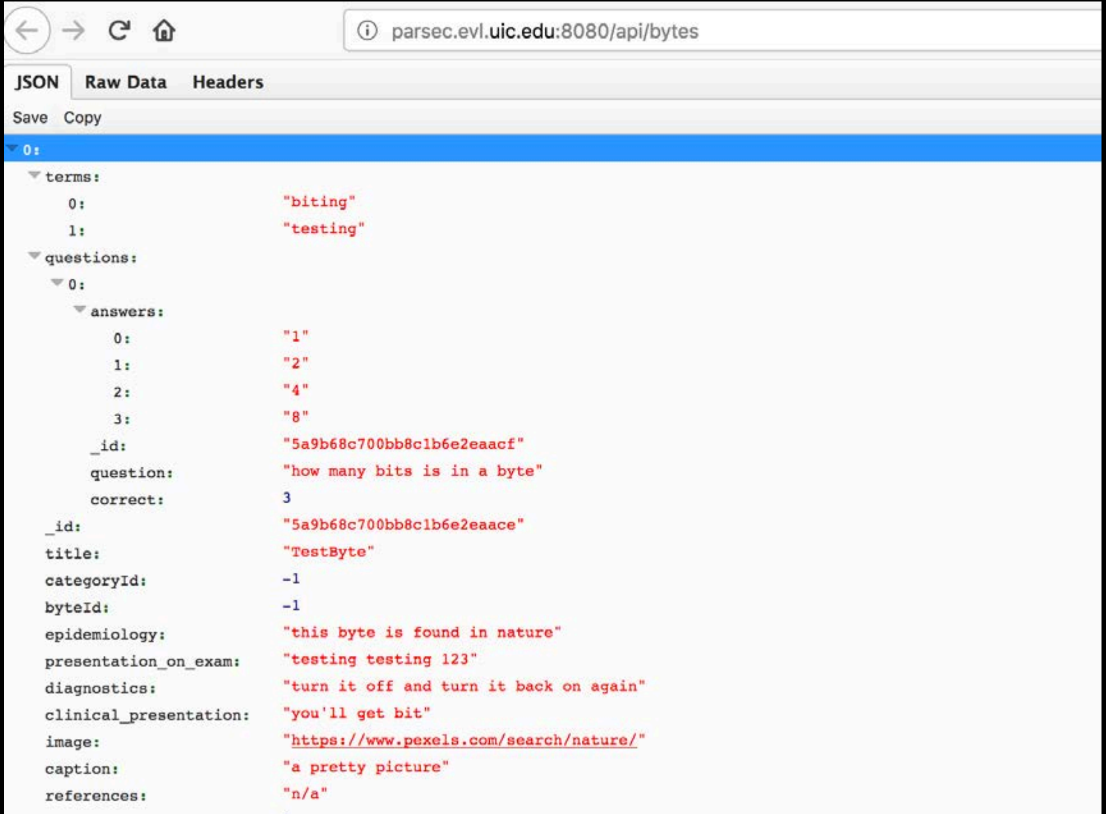
http://parsec.evl.uic.edu:8080/api/bytes -- this will respond with all bytes



```
[{"terms":["biting","testing"],"questions":[{"answers":["1","2","4","8"],"_id":"5a9b68c700bb8c1b6e2eaacf","question":"how many bits is in a
byte","correct":3}],"_id":"5a9b68c700bb8c1b6e2eaace","title":"TestByte","categoryId":-1,"byteId":-1,"epidemiology":"this byte is found in nature","presentation_on_exam":"testing testing 123","diagnc
off and turn it back on again","clinical_presentation":"you'll get bit","image":"https://www.pexels.com/search/nature/","caption":"a pretty picture","references":"n/a","__v":0},{"terms":["Fibroadenc
disease","Male gynecomastia"],"questions":[{"answers":["no","yes"],"question":"none found","correct":1}],"_id":"5a9b7278f44de936a9a7723a","title":"Infectious and Benign Disorders of the
Breast","categoryId":2,"byteId":18,"epidemiology":"","presentation_on_exam":"","diagnostics":"","clinical_presentation":"1. Bacterial infection: Staphylococcus aureus and Streptococcus species are t
frequently recovered from nipple discharge from an infected breast. Breast abscesses are seen in staphylococcal infections and present with point tenderness, erythema, and hyperthermia. The initial
antibiotics and repeated aspiration of the abscess, usually ultrasound guided aspiration. When these abscesses are related to lactation they usually occur within the first few weeks of breastfeeding
Diseases of the breast:\na. Non-proliferative lesions of the breast, sclerosing adenosis, intraductal papilloma have no increased risk for breast cancer\nb. Florid hyperplasia, 1.5-2 fold increased
cancer\nc. atypical lobular hyperplasia, 4 fold increased risk for breast cancer\nd. atypical ductal hyperplasia, 4 fold\ne. atypical ductal hyperplasia, 7 fold\nf. LCIS, 10 fold\ng. DCIS, 10 fold\n
is the most common breast tumor in women <30 years old. Needle aspiration is useful to rule out to cancer.\n4. Fibrocystic disease can present with breast pain or tenderness that varies with the men
Cysts that develop and are painful can be aspirated and may have yellow or green fluid. If blood or dark brown fluid, there is a suspicion for cancer  and  the fluid should be sent for cytology and
performed.\n5. Male gynecomastia: Male gynecomastia can occur during the neonatal period (placental estrogens), adolescence (usually unilateral, occurs between ages 12-15), or senescence (bilateral,
years) and can be caused by illicit drugs such as marijuana, liver failure, conditions of increased estrogen (digitalis, estrogen, anabolic steroids) or decreased testosterone (Klinefelter's, second
failure from trauma, orchitis, cryptorchidism ) or idiopathic (reserpine, theophylline, verapamil, tricyclic antidepressants). Treatment with surgery or danazol can occur.","image":"https://www.pexe
/nature/","caption":"placeholder","references":"n/a"},{"terms":["subarachnoid hemorrhage (SAH)","subdural hemorrhage (SDH)","epidural hemorrhage (EDH)","intraparenchymal hemorrhage (IPH)","diffuse a
(DAI)"],"questions":[{"answers":["no","yes"],"question":"none found","correct":1}],"_id":"5a9b7321f44de936a9a7723b","title":"Head Trauma: Cerebral Contusion and Epidural
Hematomas","categoryId":12,"byteId":23,"epidemiology":"Approximately 1.4 million people per year suffer traumatic brain injury(TBI). Of these patients, approximately 1.1 million are treated and rele
hospitalized, and 50,000 die. TBI has a bimodal age distribution with the greatest risk in 0–4 and 15- to 19-year- olds. Males have 1.5 times the risk of females.","presentation_on_exam":"Raccoon's
ecchymosis), Battle's sign (postauricular ecchymosis), and otorrhea/rhinorrhea suggest a basilar skull fracture. Assessment by Glasgow Coma Scale, 15 points, based on motor (6 points), best verbaliz
and best eye opening (4 points). Other aspects include cranial nerve exam (pupil reactivity to light, visual fields/acuity, facial asymmetry), fundascopic exam for papilledema, and reflexes.","diagn
indicated if post-traumatic GCS ≤14, focal deficit, amnesia for the injury, signs of basilar skull fracture. MRI not recommended in trauma since limited availability, slower image acquisition time a
for no greater information.\n\nCerebral Contusion: Contusion can occur from an external force causing the skull/skull fragments to strike the brain (sledge hammer) or through deceleration injury, wh
continues to move toward the rapidly decelerating skull (ie, MVA). "Coup" lesions are ipsilateral to the impact site and can be associated with adjacent skull fractures. 'Contrecoup' lesions are opp
lesion due to the rebounding brain striking the inner table of the skull.  Contusions: 50% temporal lobes, 30% frontal lobes, 25% parasaggital but 90% with multiple or bilateral locations. On CT sca
are patchy, hyperdense lesions with a hypodense background. Often associated with intraparenchymal hemorrhage.\n\nEpidural Hemorrhage: Blood collects in the space between the dura and inner table of
seen in 1% of all head trauma admissions and in 5–15% of patients with fatal head injuries. Ninety percent are due to arterial bleeding following a fracture at the middle meningeal artery groove, an
venous bleeding, usually associated with violation of a venous sinus by an occipital, parietal, or sphenoid wing fracture. EDHs are usually located at the site of impact over the lateral convexity c
hemisphere (70%), frontal (5–10%), parieto-occipital (5–10%), or posterior fossa locations (5–10%). On CT scan, EDHs usually appear as a hyperdense, biconvex (lenticular) mass adjacent to the inner
skull.","clinical_presentation":"The classic clinical presentation is\n1. a brief post-traumatic loss of consciousness (LOC) followed by\n2. a lucid interval, of varying duration,\n3. proceeding to
contralateral hemiparesis, and ipsilateral pupillary dilatation.\nSurgical evacuation should be performed  if >30 cm2, comatose, or anisocoria.","image":"https://www.pexels.com/search/nature
/","caption":"placeholder","references":"n/a"}]
```

Bytes database

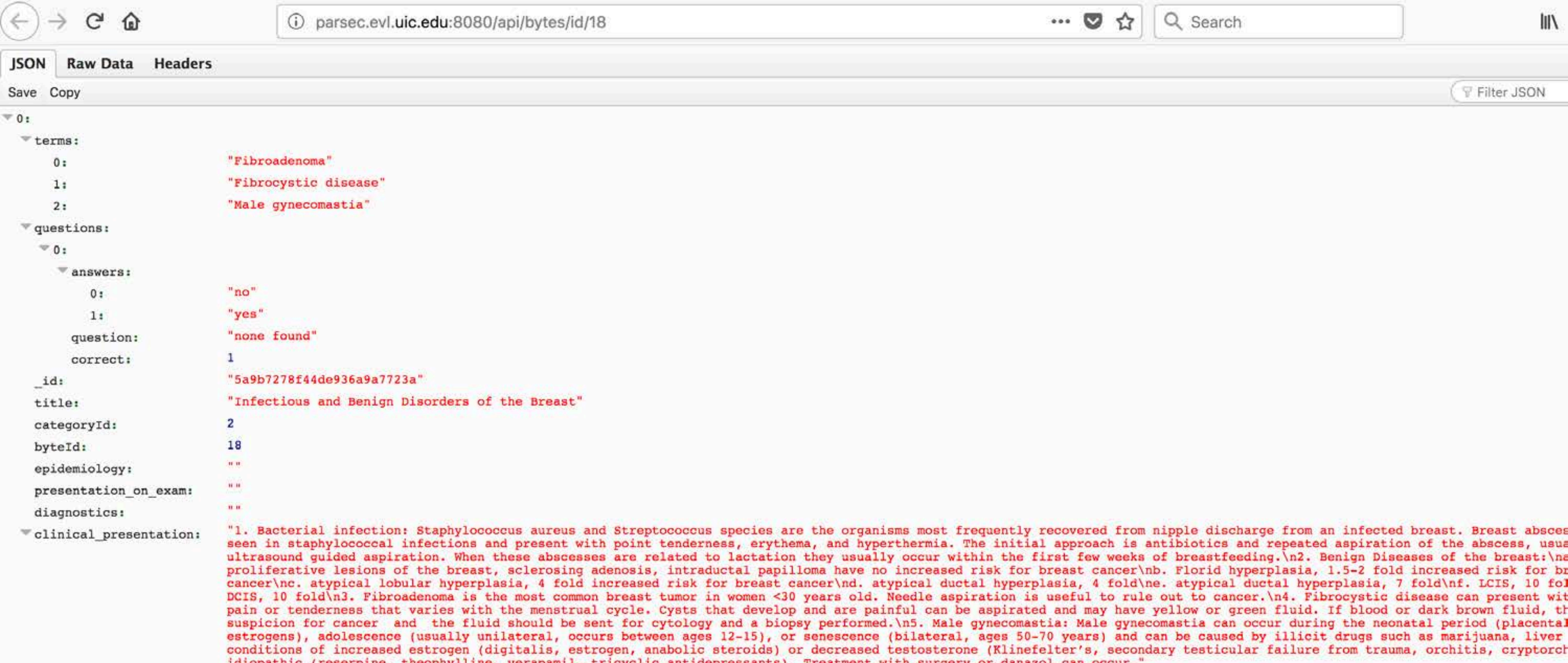
http://parsec.evl.uic.edu:8080/api/bytes -- this will respond with all bytes



```
0:
  terms:
    0:                        "biting"
    1:                        "testing"
  questions:
    0:
      answers:
        0:                    "1"
        1:                    "2"
        2:                    "4"
        3:                    "8"
      _id:                    "5a9b68c700bb8c1b6e2eaacf"
      question:               "how many bits is in a byte"
      correct:                3
  _id:                        "5a9b68c700bb8c1b6e2eaace"
  title:                      "TestByte"
  categoryId:                 -1
  byteId:                     -1
  epidemiology:               "this byte is found in nature"
  presentation_on_exam:       "testing testing 123"
  diagnostics:                "turn it off and turn it back on again"
  clinical_presentation:      "you'll get bit"
  image:                      "https://www.pexels.com/search/nature/"
  caption:                    "a pretty picture"
  references:                 "n/a"
```

Bytes database

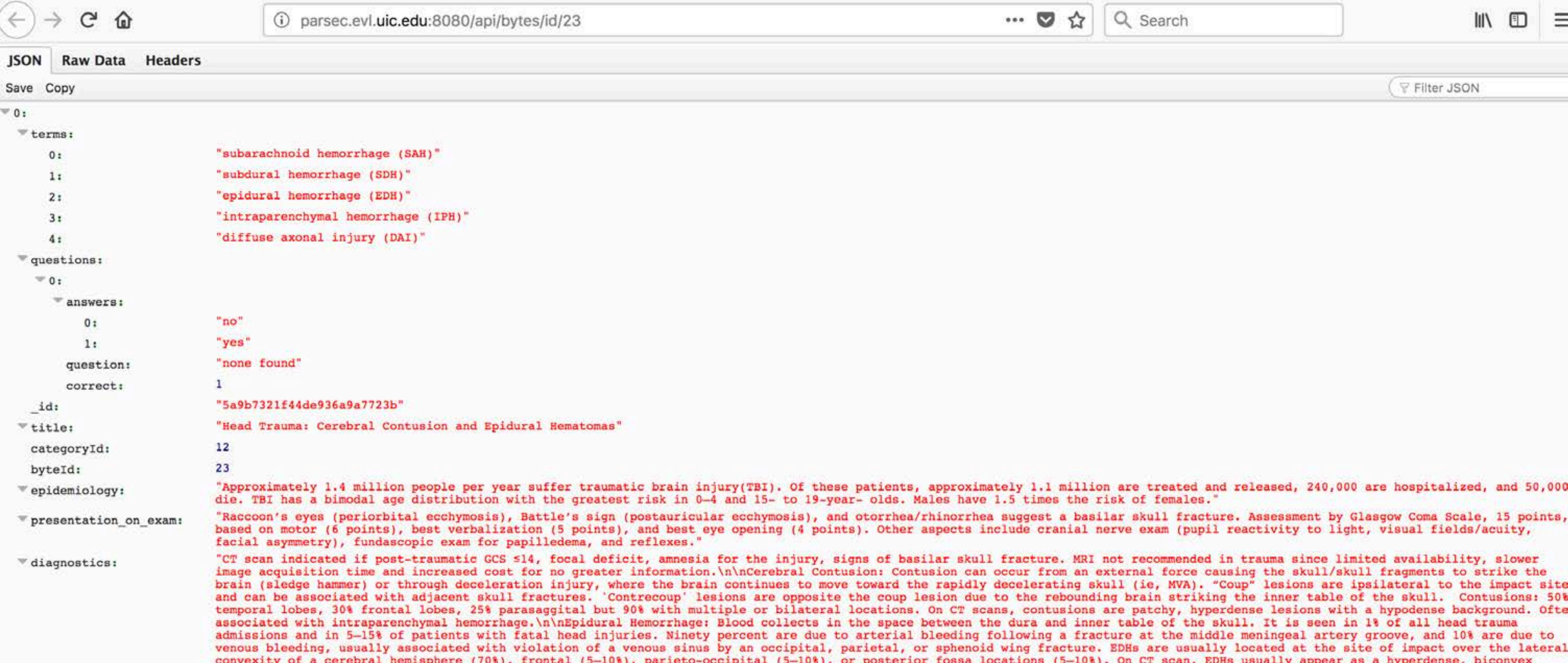
http://parsec.evl.uic.edu:8080/api/bytes/id/18 -- byte 18



```
▼ 0:
  ▼ terms:
      0:                    "Fibroadenoma"
      1:                    "Fibrocystic disease"
      2:                    "Male gynecomastia"
  ▼ questions:
    ▼ 0:
      ▼ answers:
          0:                "no"
          1:                "yes"
        question:           "none found"
        correct:            1
    _id:                    "5a9b7278f44de936a9a7723a"
    title:                  "Infectious and Benign Disorders of the Breast"
    categoryId:             2
    byteId:                 18
    epidemiology:           ""
    presentation_on_exam:   ""
    diagnostics:            ""
  ▼ clinical_presentation:  "1. Bacterial infection: Staphylococcus aureus and Streptococcus species are the organisms most frequently recovered from nipple discharge from an infected breast. Breast absces
                            seen in staphylococcal infections and present with point tenderness, erythema, and hyperthermia. The initial approach is antibiotics and repeated aspiration of the abscess, usua
                            ultrasound guided aspiration. When these abscesses are related to lactation they usually occur within the first few weeks of breastfeeding.\n2. Benign Diseases of the breast:\na
                            proliferative lesions of the breast, sclerosing adenosis, intraductal papilloma have no increased risk for breast cancer\nb. Florid hyperplasia, 1.5-2 fold increased risk for br
                            cancer\nc. atypical lobular hyperplasia, 4 fold increased risk for breast cancer\nd. atypical ductal hyperplasia, 4 fold\ne. atypical ductal hyperplasia, 7 fold\nf. LCIS, 10 fol
                            DCIS, 10 fold\n3. Fibroadenoma is the most common breast tumor in women <30 years old. Needle aspiration is useful to rule out to cancer.\n4. Fibrocystic disease can present wit
                            pain or tenderness that varies with the menstrual cycle. Cysts that develop and are painful can be aspirated and may have yellow or green fluid. If blood or dark brown fluid, th
                            suspicion for cancer  and  the fluid should be sent for cytology and a biopsy performed.\n5. Male gynecomastia: Male gynecomastia can occur during the neonatal period (placental
                            estrogens), adolescence (usually unilateral, occurs between ages 12-15), or senescence (bilateral, ages 50-70 years) and can be caused by illicit drugs such as marijuana, liver
                            conditions of increased estrogen (digitalis, estrogen, anabolic steroids) or decreased testosterone (Klinefelter's, secondary testicular failure from trauma, orchitis, cryptorch
                            idiopathic (reserpine, theophylline, verapamil, tricyclic antidepressants). Treatment with surgery or danazol can occur."
```

Bytes database

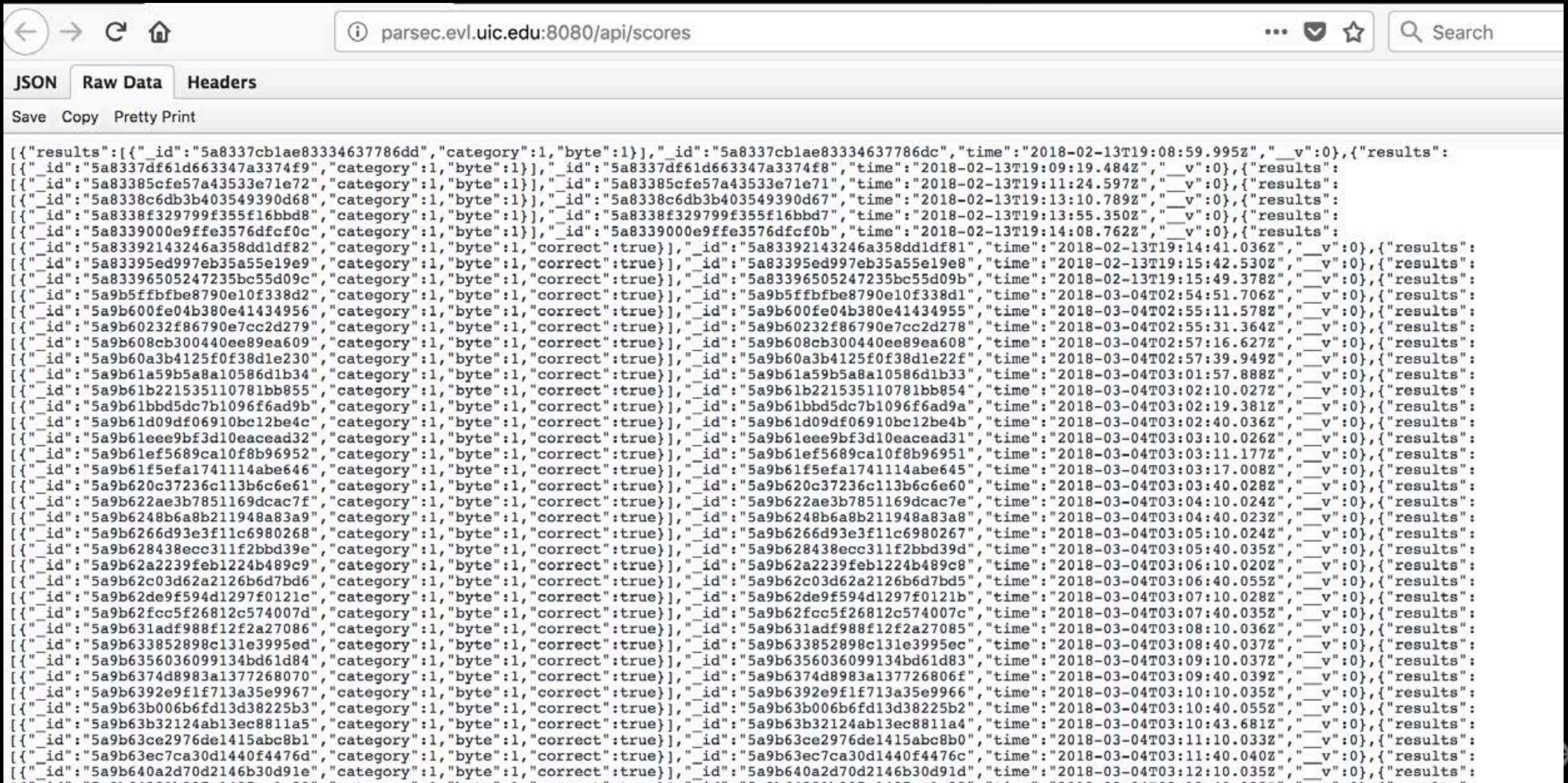
http://parsec.evl.uic.edu:8080/api/bytes/id/23 -- byte 23



```
0:
  terms:
    0:                      "subarachnoid hemorrhage (SAH)"
    1:                      "subdural hemorrhage (SDH)"
    2:                      "epidural hemorrhage (EDH)"
    3:                      "intraparenchymal hemorrhage (IPH)"
    4:                      "diffuse axonal injury (DAI)"
  questions:
    0:
      answers:
        0:                  "no"
        1:                  "yes"
      question:             "none found"
      correct:              1
  _id:                      "5a9b7321f44de936a9a7723b"
  title:                    "Head Trauma: Cerebral Contusion and Epidural Hematomas"
  categoryId:               12
  byteId:                   23
  epidemiology:             "Approximately 1.4 million people per year suffer traumatic brain injury(TBI). Of these patients, approximately 1.1 million are treated and released, 240,000 are hospitalized, and 50,000
                            die. TBI has a bimodal age distribution with the greatest risk in 0–4 and 15- to 19-year- olds. Males have 1.5 times the risk of females."
  presentation_on_exam:     "Raccoon’s eyes (periorbital ecchymosis), Battle’s sign (postauricular ecchymosis), and otorrhea/rhinorrhea suggest a basilar skull fracture. Assessment by Glasgow Coma Scale, 15 points,
                            based on motor (6 points), best verbalization (5 points), and best eye opening (4 points). Other aspects include cranial nerve exam (pupil reactivity to light, visual fields/acuity,
                            facial asymmetry), fundascopic exam for papilledema, and reflexes."
  diagnostics:              "CT scan indicated if post-traumatic GCS ≤14, focal deficit, amnesia for the injury, signs of basilar skull fracture. MRI not recommended in trauma since limited availability, slower
                            image acquisition time and increased cost for no greater information.\n\nCerebral Contusion: Contusion can occur from an external force causing the skull/skull fragments to strike the
                            brain (sledge hammer) or through deceleration injury, where the brain continues to move toward the rapidly decelerating skull (ie, MVA). “Coup” lesions are ipsilateral to the impact site
                            and can be associated with adjacent skull fractures. 'Contrecoup' lesions are opposite the coup lesion due to the rebounding brain striking the inner table of the skull.  Contusions: 50%
                            temporal lobes, 30% frontal lobes, 25% parasaggital but 90% with multiple or bilateral locations. On CT scans, contusions are patchy, hyperdense lesions with a hypodense background. Ofte
                            associated with intraparenchymal hemorrhage.\n\nEpidural Hemorrhage: Blood collects in the space between the dura and inner table of the skull. It is seen in 1% of all head trauma
                            admissions and in 5–15% of patients with fatal head injuries. Ninety percent are due to arterial bleeding following a fracture at the middle meningeal artery groove, and 10% are due to
                            venous bleeding, usually associated with violation of a venous sinus by an occipital, parietal, or sphenoid wing fracture. EDHs are usually located at the site of impact over the lateral
                            convexity of a cerebral hemisphere (70%), frontal (5–10%), parieto-occipital (5–10%), or posterior fossa locations (5–10%). On CT scan, EDHs usually appear as a hyperdense, biconvex
```

Bytes database

http://parsec.evl.uic.edu:8080/api/scores --



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```
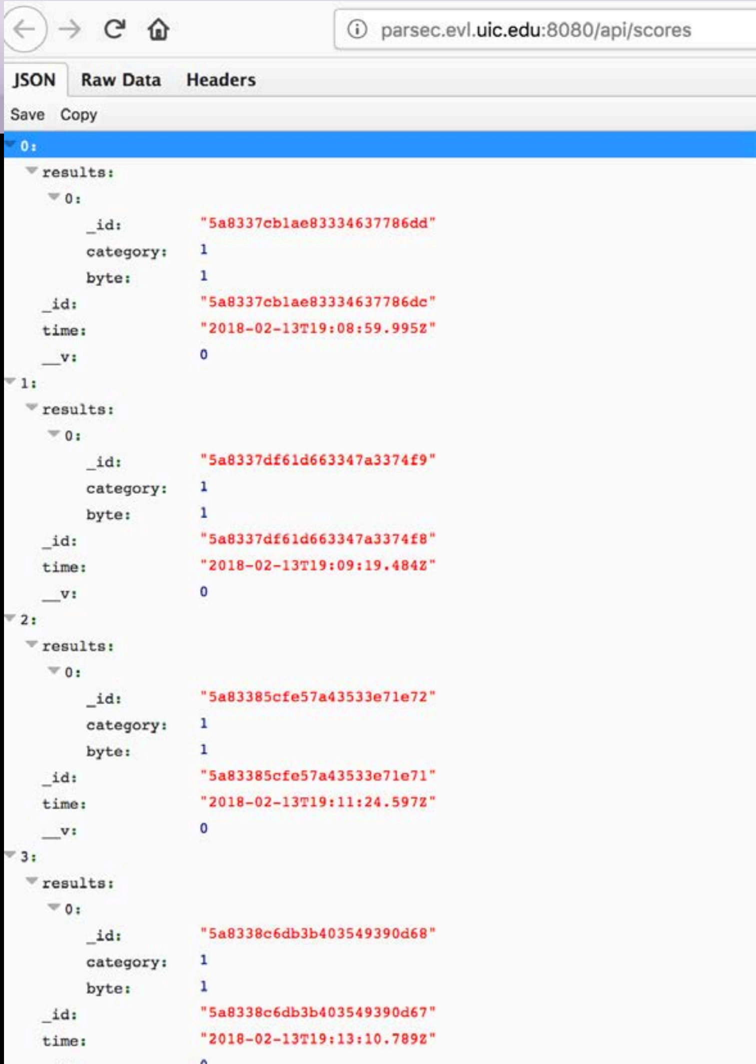

Bytes database

http://parsec.evl.uic.edu:8080/api/scores --



```
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  results:
    0:
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      byte:       1
  _id:            "5a8337cb1ae83334637786dc"
  time:           "2018-02-13T19:08:59.995Z"
  __v:            0
1:
  results:
    0:
      _id:        "5a8337df61d663347a3374f9"
      category:   1
      byte:       1
  _id:            "5a8337df61d663347a3374f8"
  time:           "2018-02-13T19:09:19.484Z"
  __v:            0
2:
  results:
    0:
      _id:        "5a83385cfe57a43533e71e72"
      category:   1
      byte:       1
  _id:            "5a83385cfe57a43533e71e71"
  time:           "2018-02-13T19:11:24.597Z"
  __v:            0
3:
  results:
    0:
      _id:        "5a8338c6db3b403549390d68"
      category:   1
      byte:       1
  _id:            "5a8338c6db3b403549390d67"
  time:           "2018-02-13T19:13:10.789Z"
```
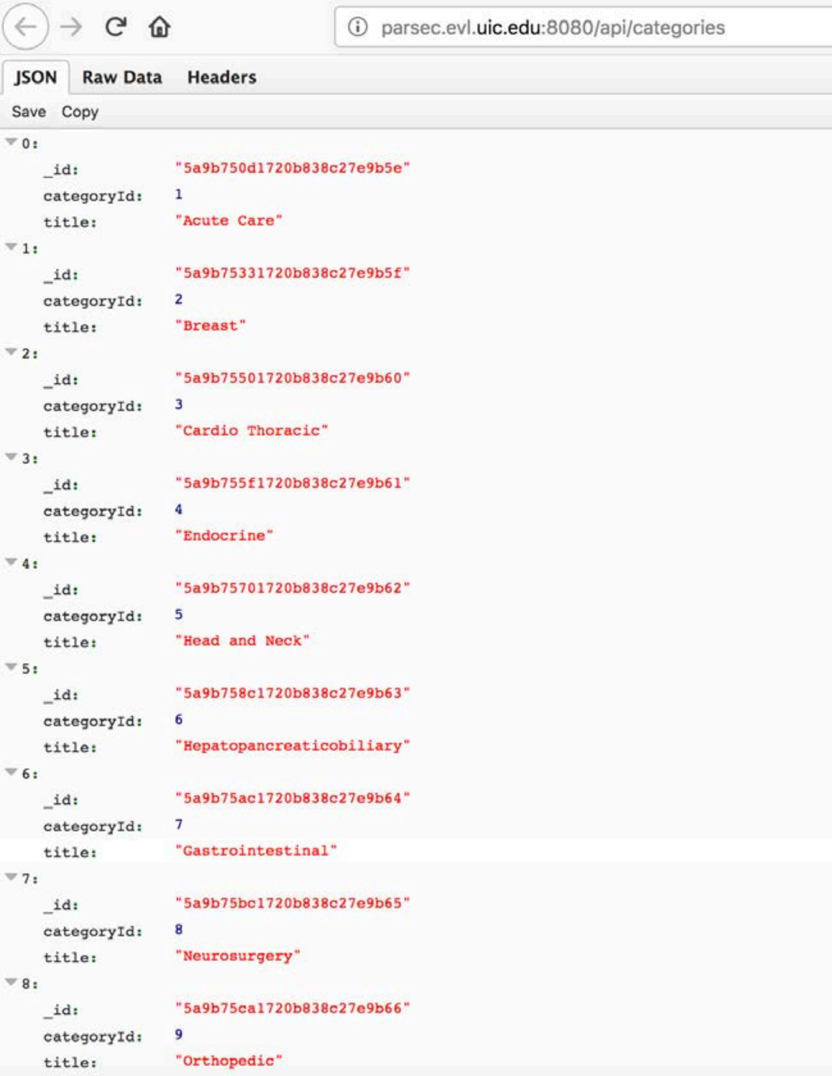

Bytes database

categories



```
0:
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    categoryId:   1
    title:        "Acute Care"
1:
    _id:          "5a9b75331720b838c27e9b5f"
    categoryId:   2
    title:        "Breast"
2:
    _id:          "5a9b75501720b838c27e9b60"
    categoryId:   3
    title:        "Cardio Thoracic"
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    _id:          "5a9b755f1720b838c27e9b61"
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    title:        "Endocrine"
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    _id:          "5a9b75701720b838c27e9b62"
    categoryId:   5
    title:        "Head and Neck"
5:
    _id:          "5a9b758c1720b838c27e9b63"
    categoryId:   6
    title:        "Hepatopancreaticobiliary"
6:
    _id:          "5a9b75ac1720b838c27e9b64"
    categoryId:   7
    title:        "Gastrointestinal"
7:
    _id:          "5a9b75bc1720b838c27e9b65"
    categoryId:   8
    title:        "Neurosurgery"
8:
    _id:          "5a9b75ca1720b838c27e9b66"
    categoryId:   9
    title:        "Orthopedic"
```
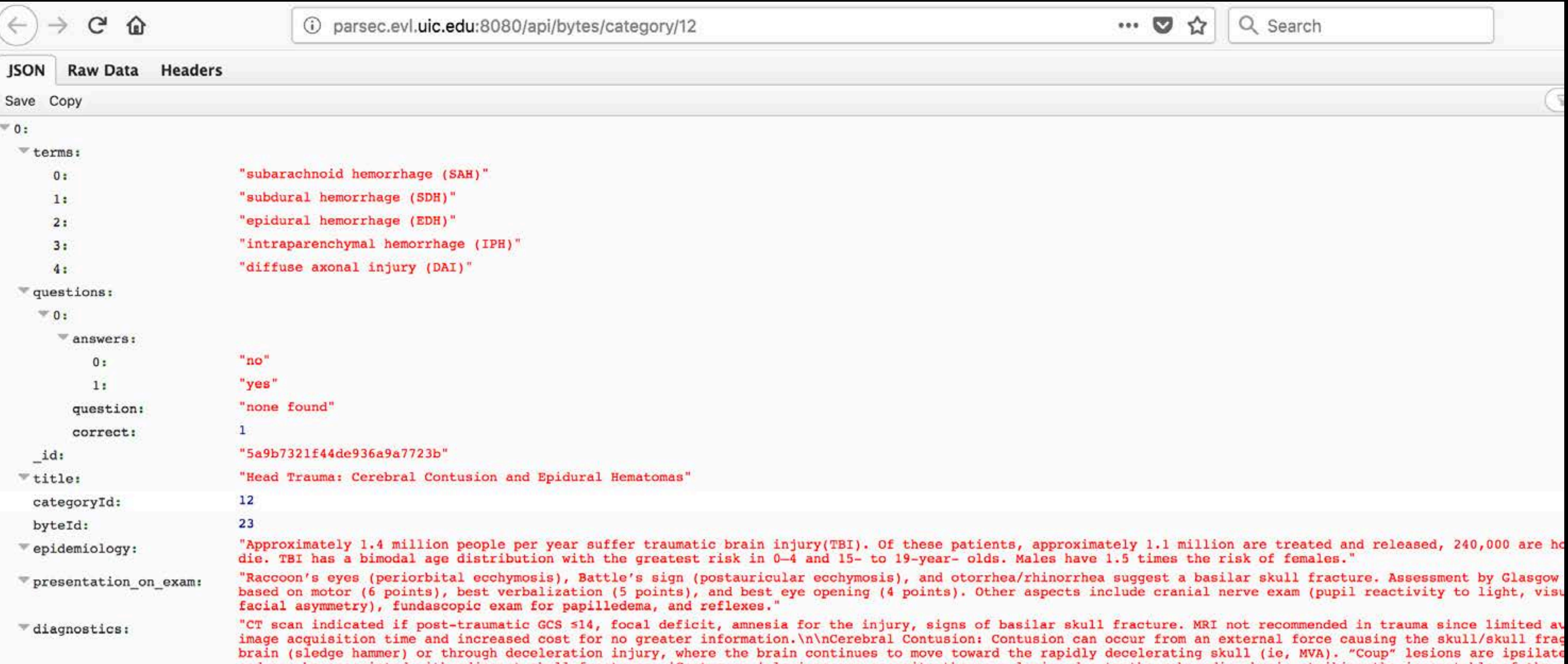

Bytes database

Category 12



```
▼ 0:
  ▼ terms:
      0:                    "subarachnoid hemorrhage (SAH)"
      1:                    "subdural hemorrhage (SDH)"
      2:                    "epidural hemorrhage (EDH)"
      3:                    "intraparenchymal hemorrhage (IPH)"
      4:                    "diffuse axonal injury (DAI)"
  ▼ questions:
    ▼ 0:
      ▼ answers:
          0:                "no"
          1:                "yes"
        question:           "none found"
        correct:            1
    _id:                    "5a9b7321f44de936a9a7723b"
  ▼ title:                  "Head Trauma: Cerebral Contusion and Epidural Hematomas"
    categoryId:             12
    byteId:                 23
  ▼ epidemiology:           "Approximately 1.4 million people per year suffer traumatic brain injury(TBI). Of these patients, approximately 1.1 million are treated and released, 240,000 are ho
                            die. TBI has a bimodal age distribution with the greatest risk in 0–4 and 15- to 19-year- olds. Males have 1.5 times the risk of females."
  ▼ presentation_on_exam:   "Raccoon's eyes (periorbital ecchymosis), Battle's sign (postauricular ecchymosis), and otorrhea/rhinorrhea suggest a basilar skull fracture. Assessment by Glasgow
                            based on motor (6 points), best verbalization (5 points), and best eye opening (4 points). Other aspects include cranial nerve exam (pupil reactivity to light, visu
                            facial asymmetry), fundascopic exam for papilledema, and reflexes."
  ▼ diagnostics:            "CT scan indicated if post-traumatic GCS ≤14, focal deficit, amnesia for the injury, signs of basilar skull fracture. MRI not recommended in trauma since limited av
                            image acquisition time and increased cost for no greater information.\n\nCerebral Contusion: Contusion can occur from an external force causing the skull/skull frag
                            brain (sledge hammer) or through deceleration injury, where the brain continues to move toward the rapidly decelerating skull (ie, MVA). "Coup" lesions are ipsilate
```