HTML5 Web Storage, IndexedDB and File System

IndexedDB: Initialization & CRUD Operations

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pluralsight
hardcore developer training

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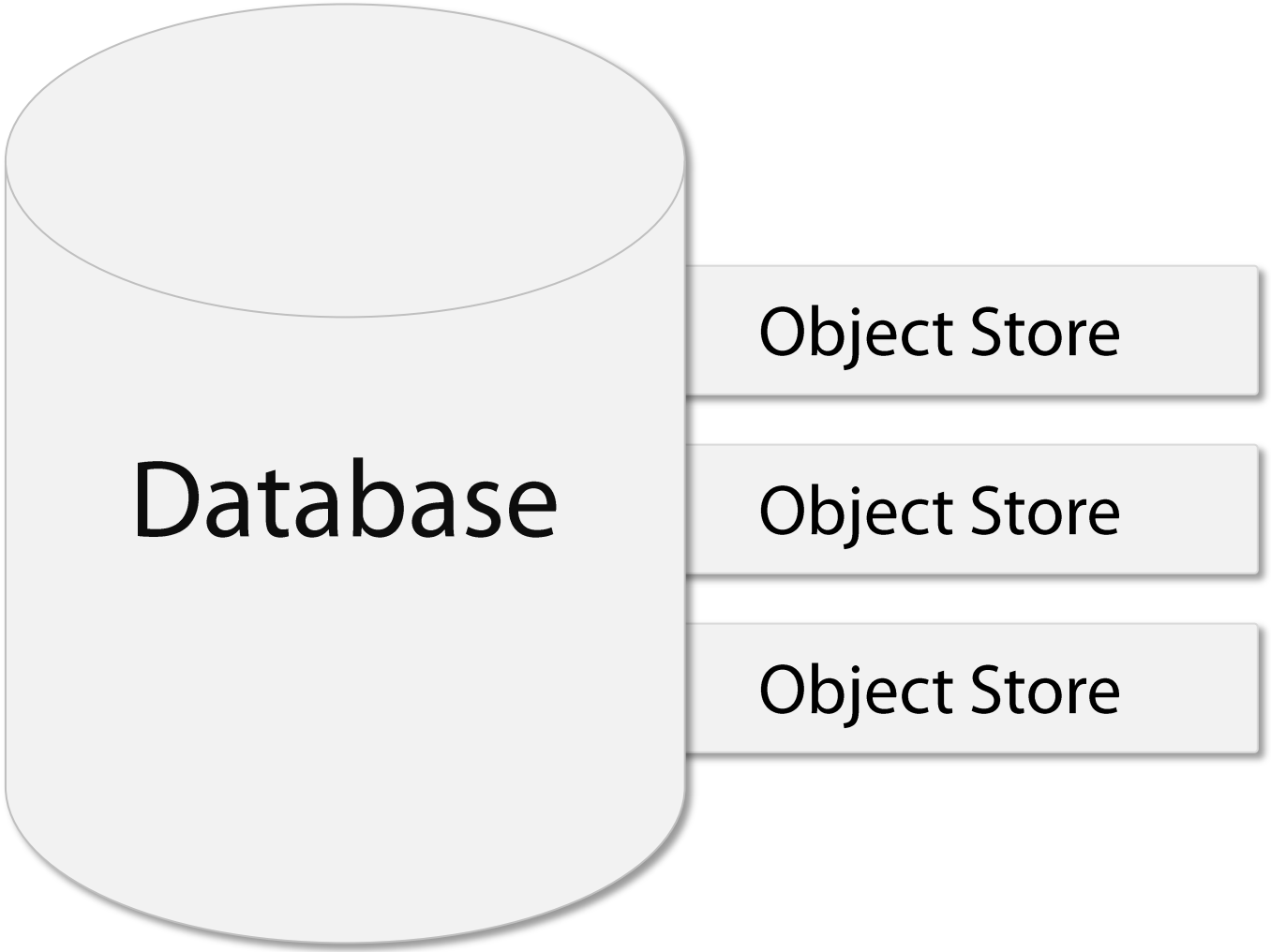
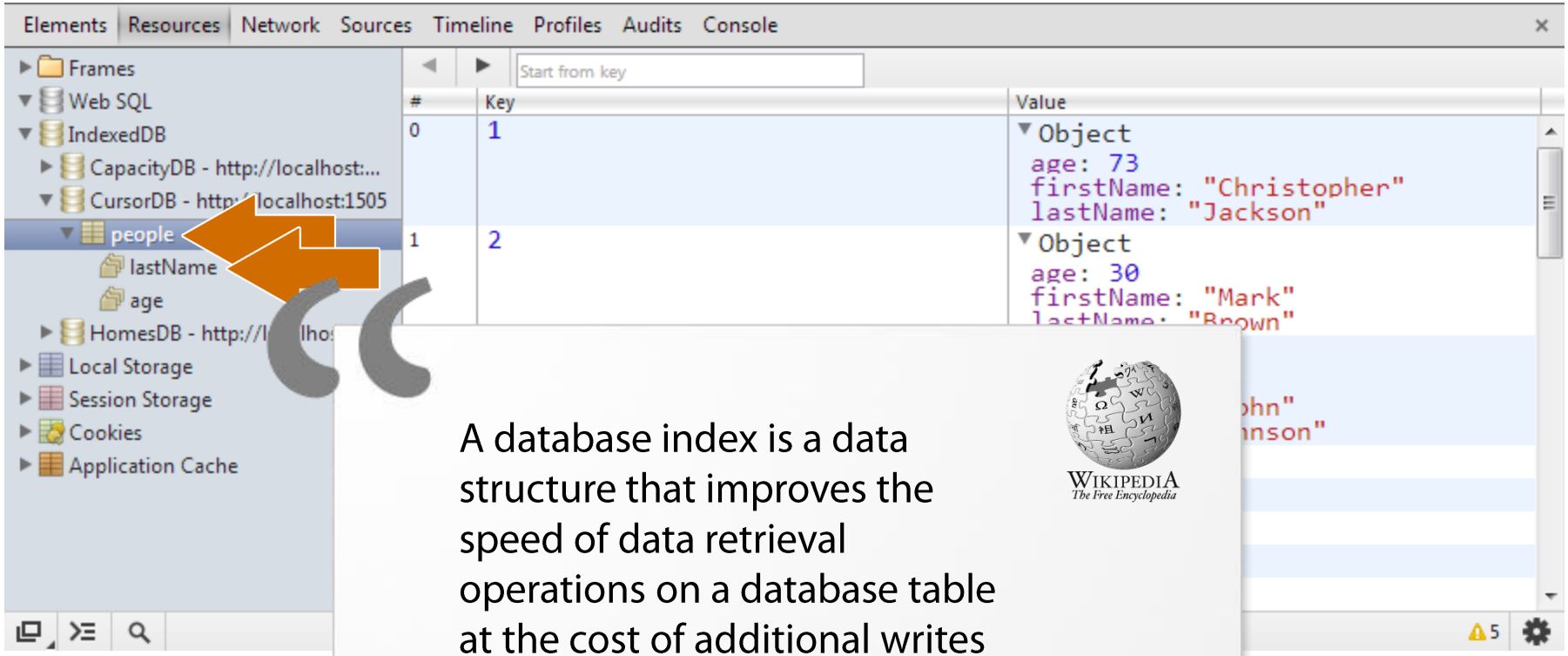
What is IndexedDB?

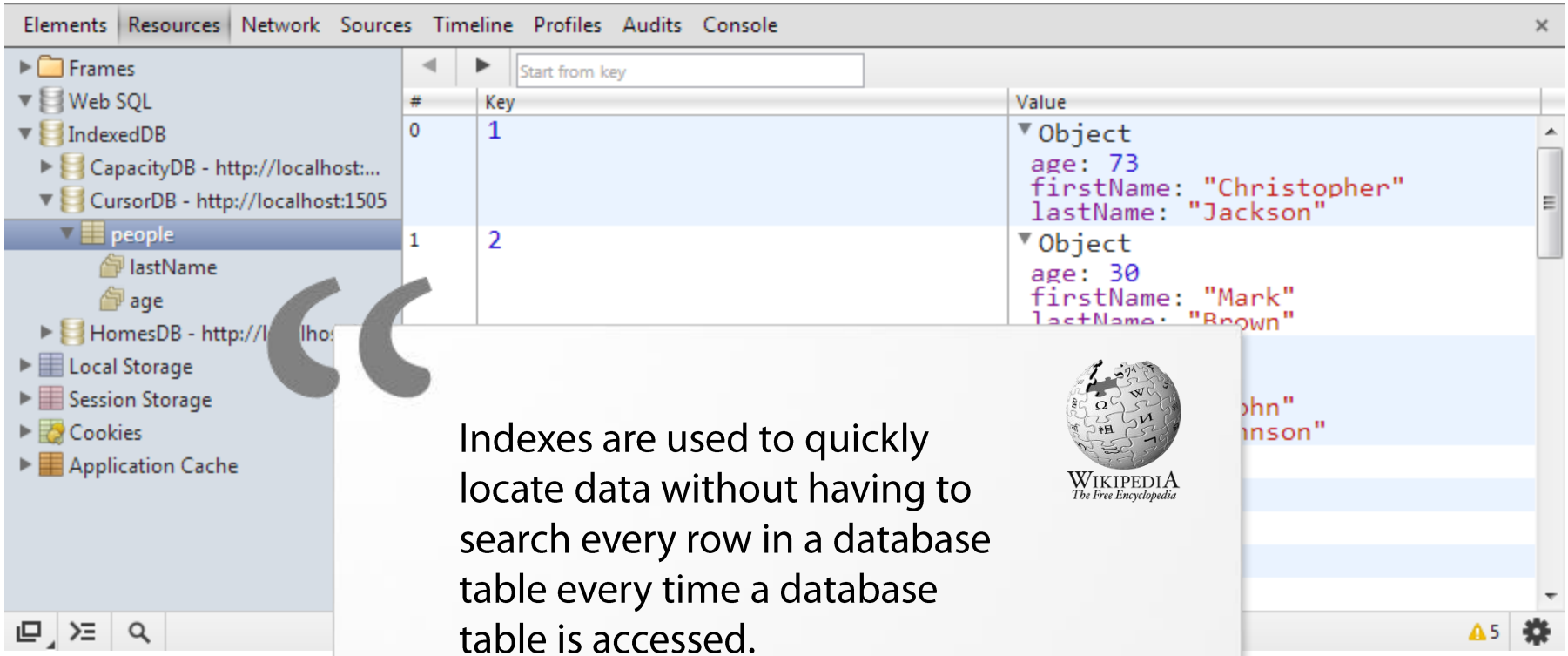

Database
Object Store
Object Store
Object Store



A database index is a data structure that improves the speed of data retrieval operations on a database table at the cost of additional writes and the use of more storage space to maintain the extra copy of data.

WIKIPEDIA
The Free Encyclopedia

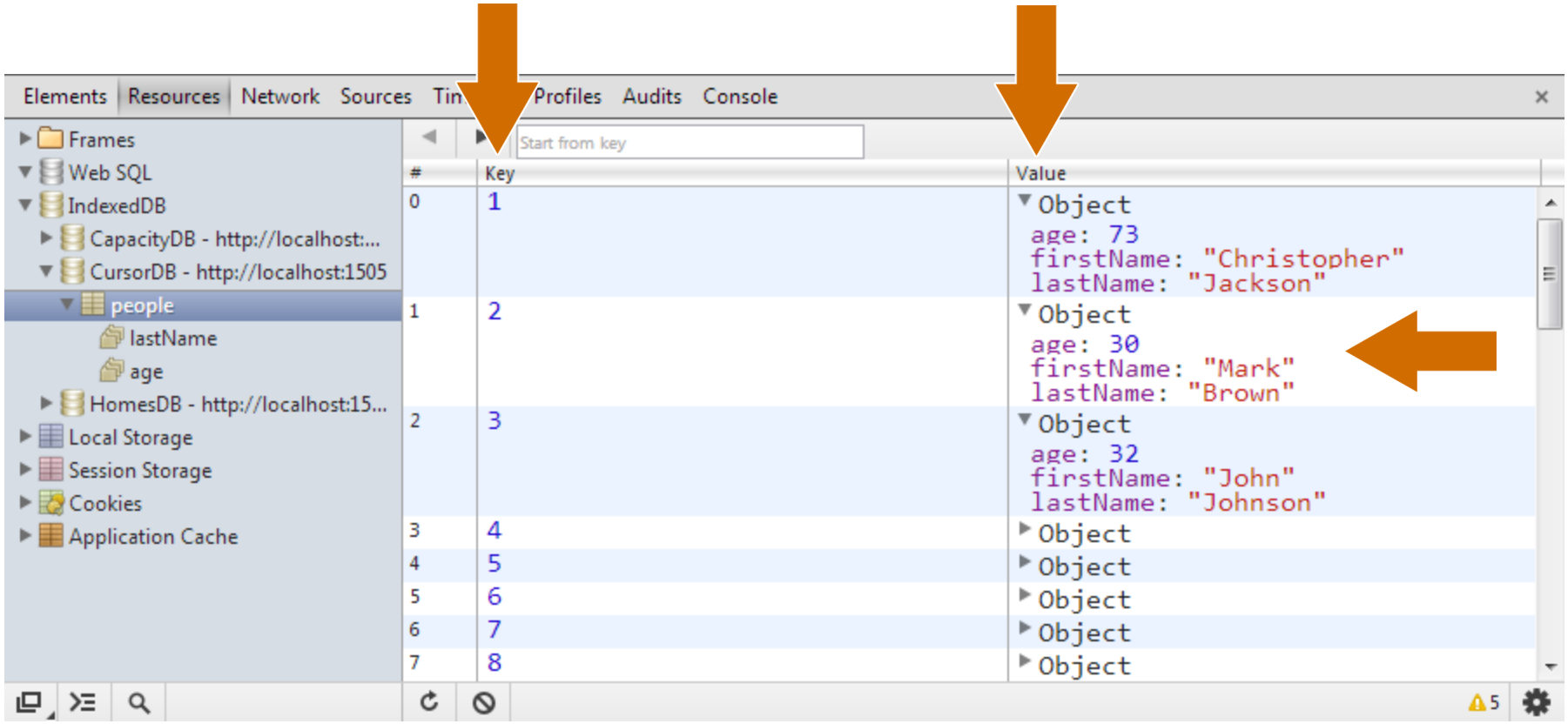
http://bit.ly/17fn6t7



Indexes are used to quickly locate data without having to search every row in a database table every time a database table is accessed.

WIKIPEDIA
The Free Encyclopedia

http://bit.ly/17fn6t7


Elements
Resources
Network
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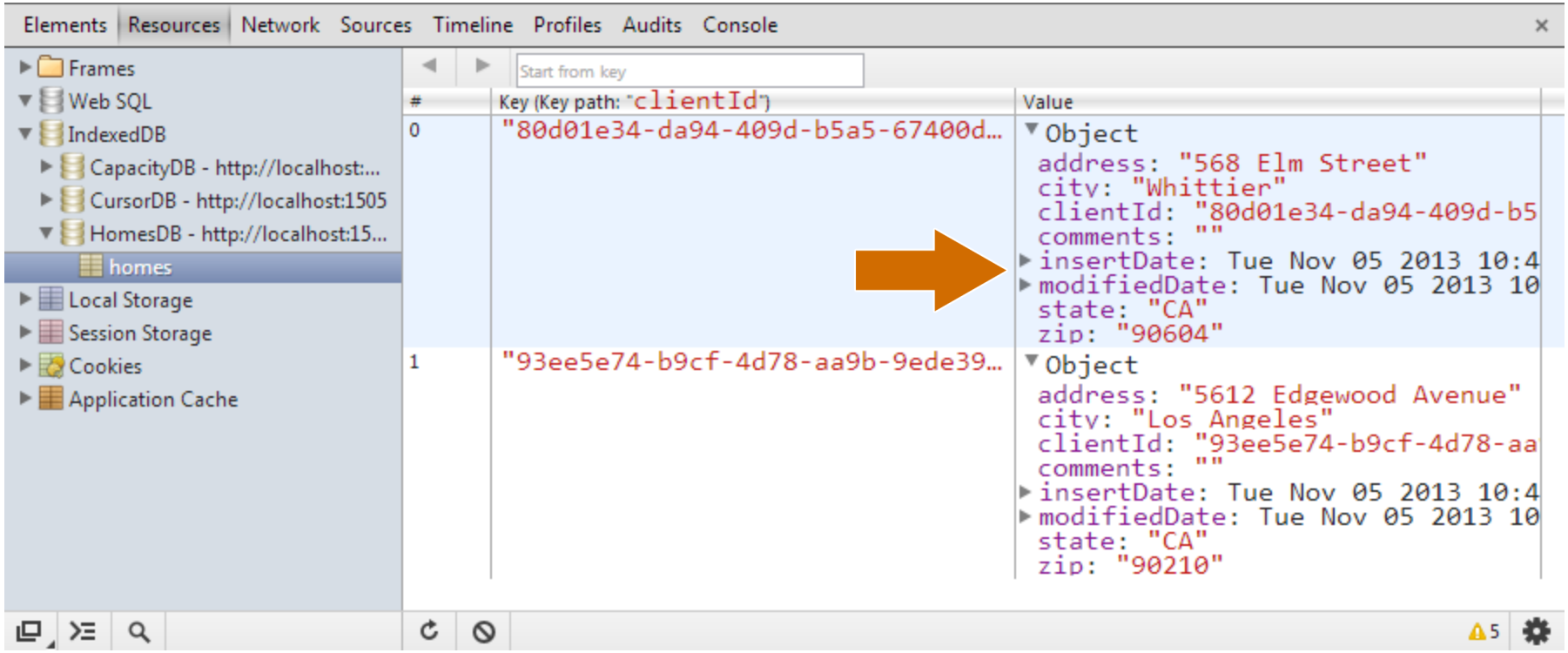
Web SQL
IndexedDB
CapacityDB - http://localhost:...
CursorDB - http://localhost:1505
people
lastName
age
HomesDB - http://localhost:15...
Local Storage
Session Storage
Cookies
Application Cache
Start from key
#
Key
Value
0
1
Object
age: 73
firstName: "Christopher"
lastName: "Jackson"
1
2
Object
age: 30
firstName: "Mark"
lastName: "Brown"
2
3
Object
age: 32
firstName: "John"
lastName: "Johnson"
3
4
Object
4
5
Object
5
6
Object
6
7
Object
7
8
Object
5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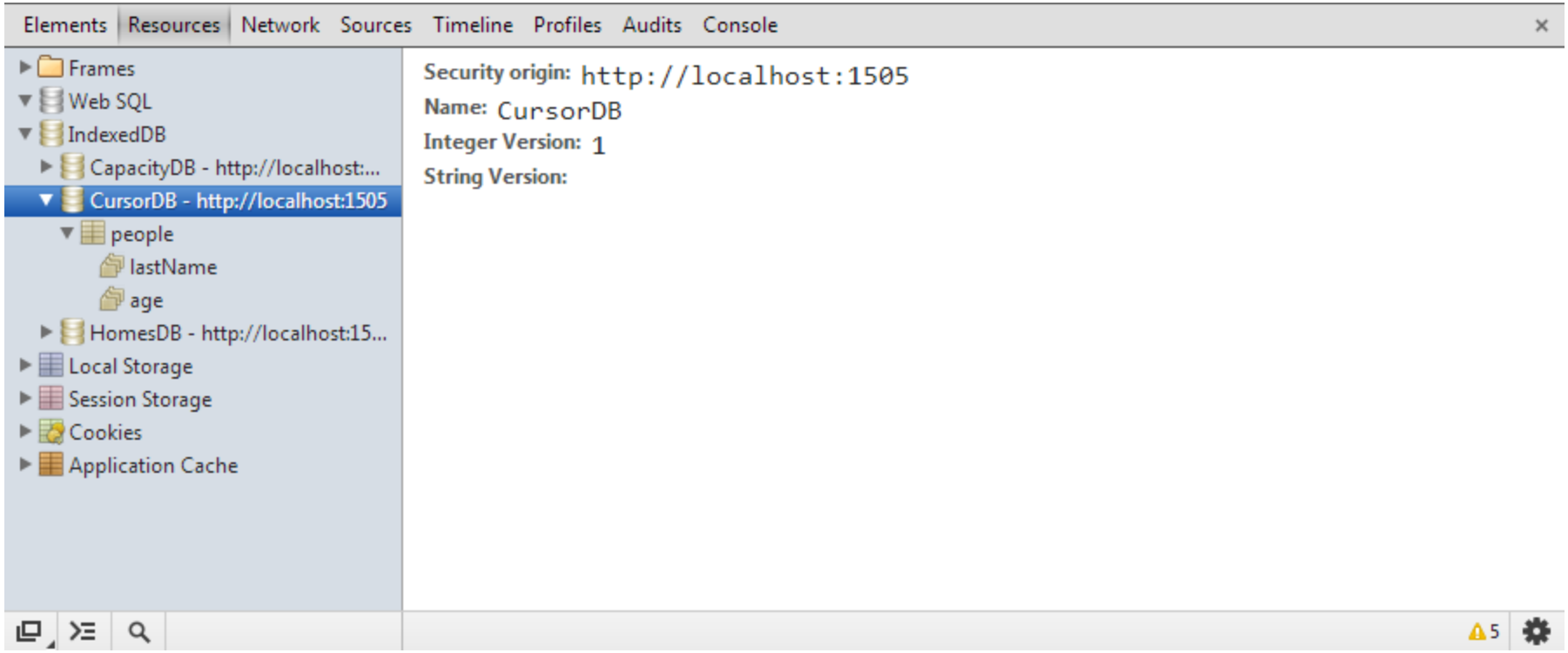
HomesDB - http://localhost:15...
homes
Local Storage
Session Storage
Cookies
Application Cache
Start from key
#
Key (Key path: "clientId")
Value
0
"80d01e34-da94-409d-b5a5-67400d...
Object
address: "568 Elm Street"
city: "Whittier"
clientId: "80d01e34-da94-409d-b5
comments: ""
insertDate: Tue Nov 05 2013 10:4
modifiedDate: Tue Nov 05 2013 10
state: "CA"
zip: "90604"
1
"93ee5e74-b9cf-4d78-aa9b-9ede39...
Object
address: "5612 Edgewood Avenue"
city: "Los Angeles"
clientId: "93ee5e74-b9cf-4d78-aa
comments: ""
insertDate: Tue Nov 05 2013 10:4
modifiedDate: Tue Nov 05 2013 10
state: "CA"
zip: "90210"
5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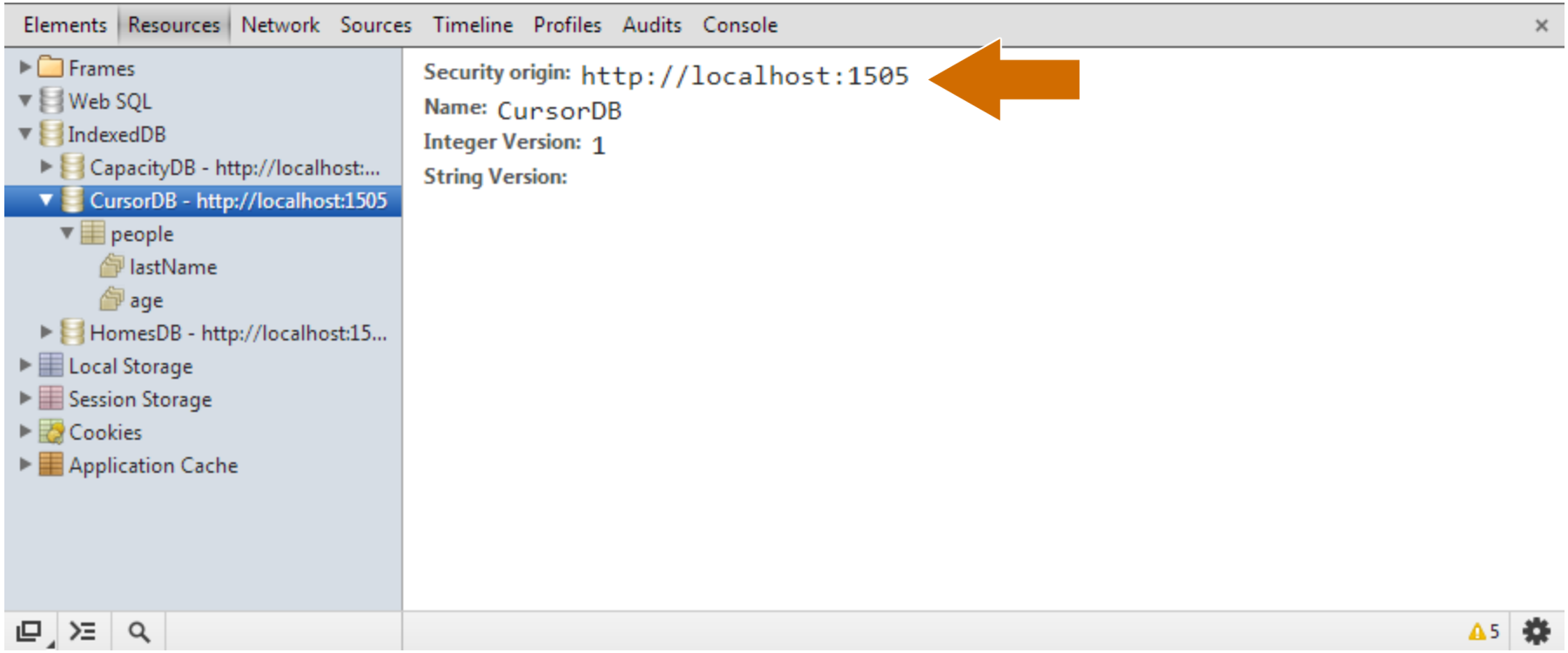
CursorDB - http://localhost:1505
people
lastName
age
HomesDB - http://localhost:15...
Local Storage
Session Storage
Cookies
Application Cache
Security origin: http://localhost:1505
Name: CursorDB
Integer Version: 1
String Version:
5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HomesDB - http://localhost:15...
Local Storage
Session Storage
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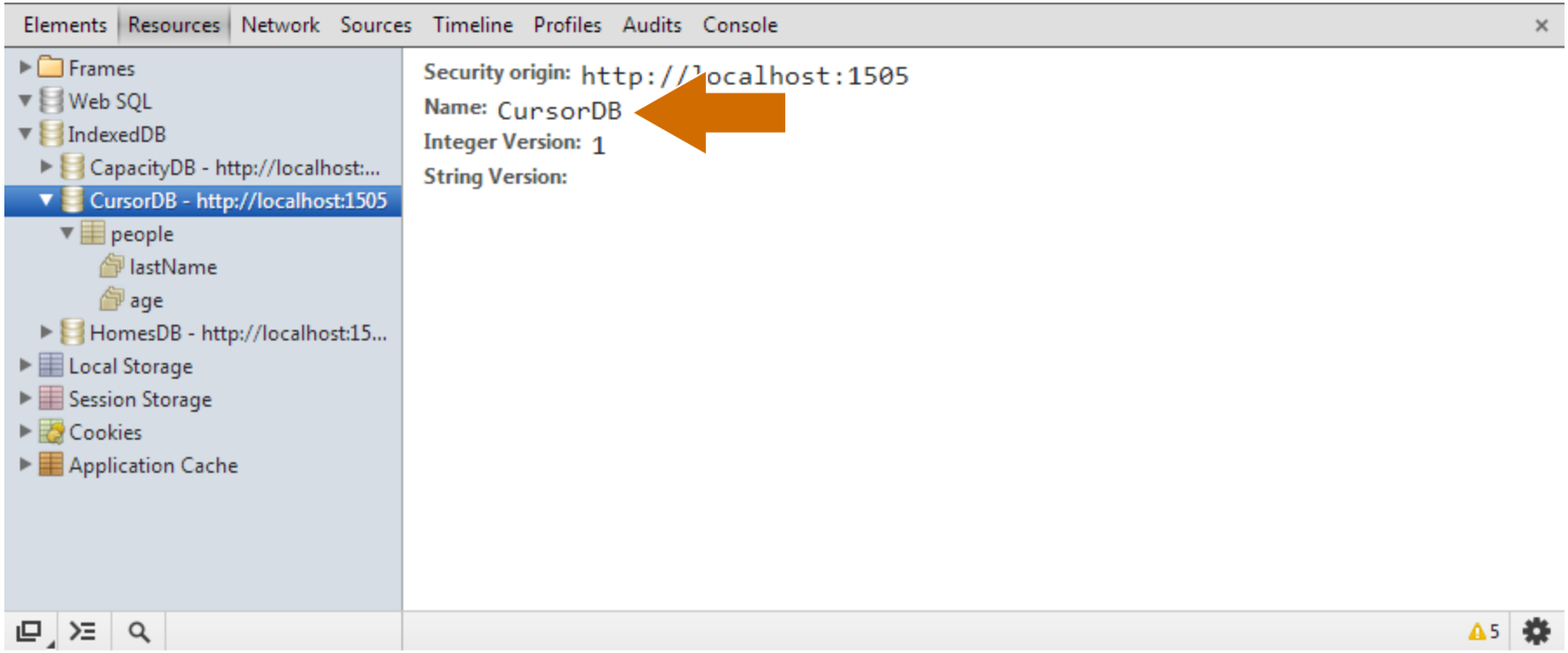
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Cookies
Application Cache
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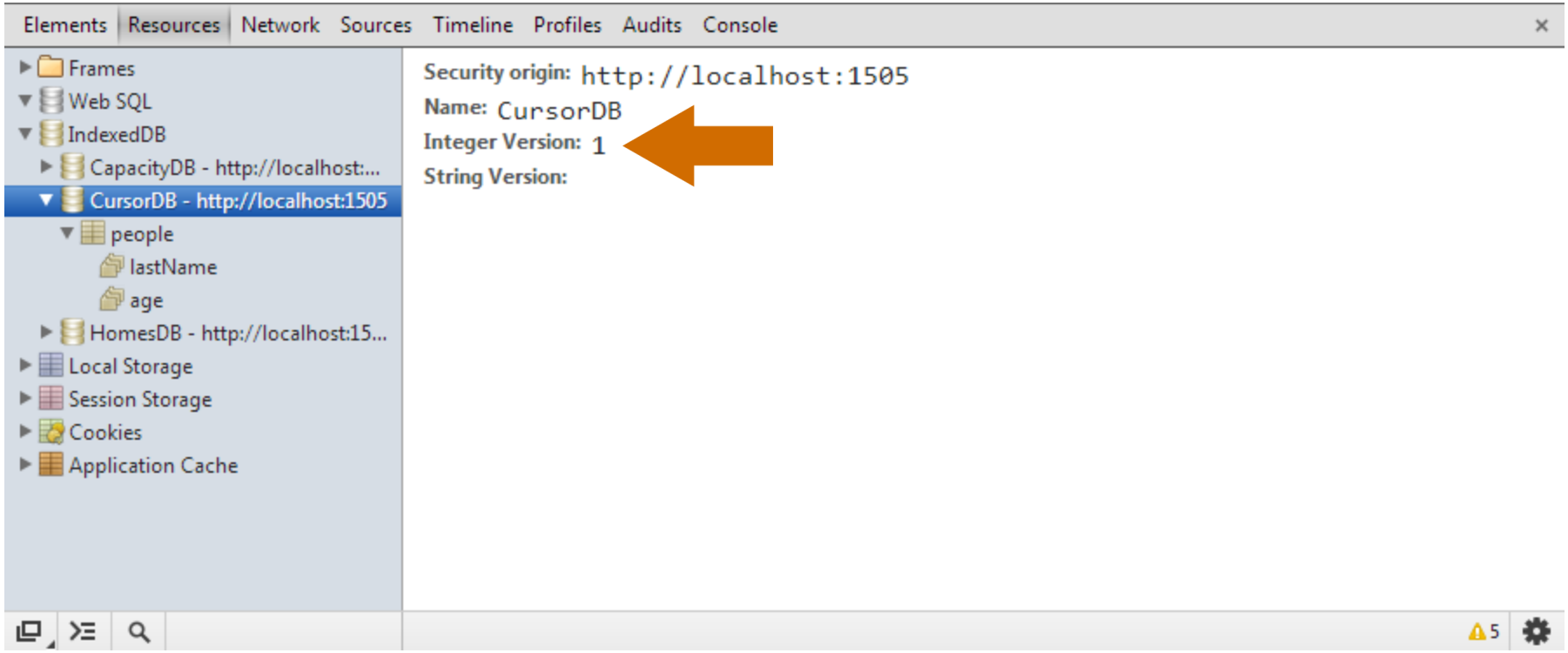
5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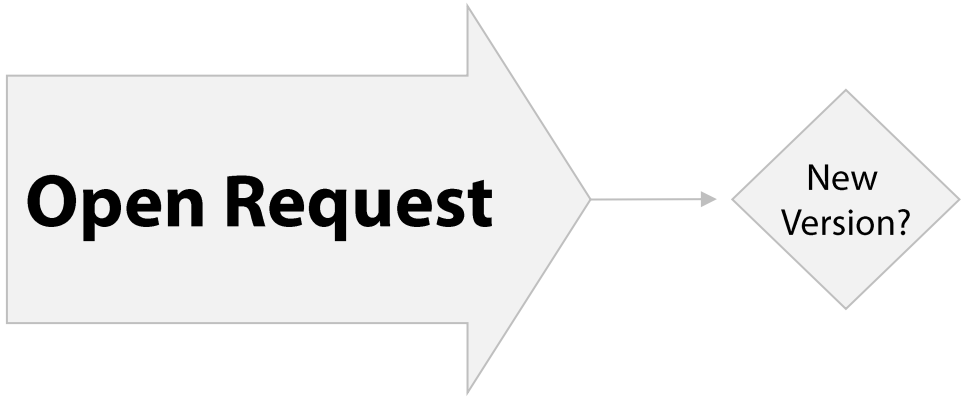
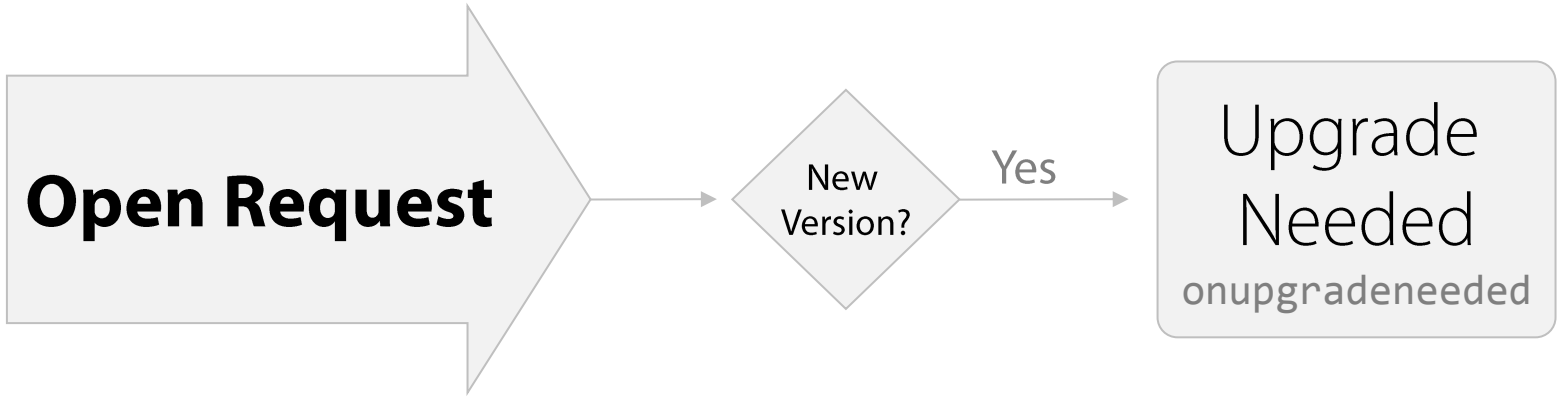
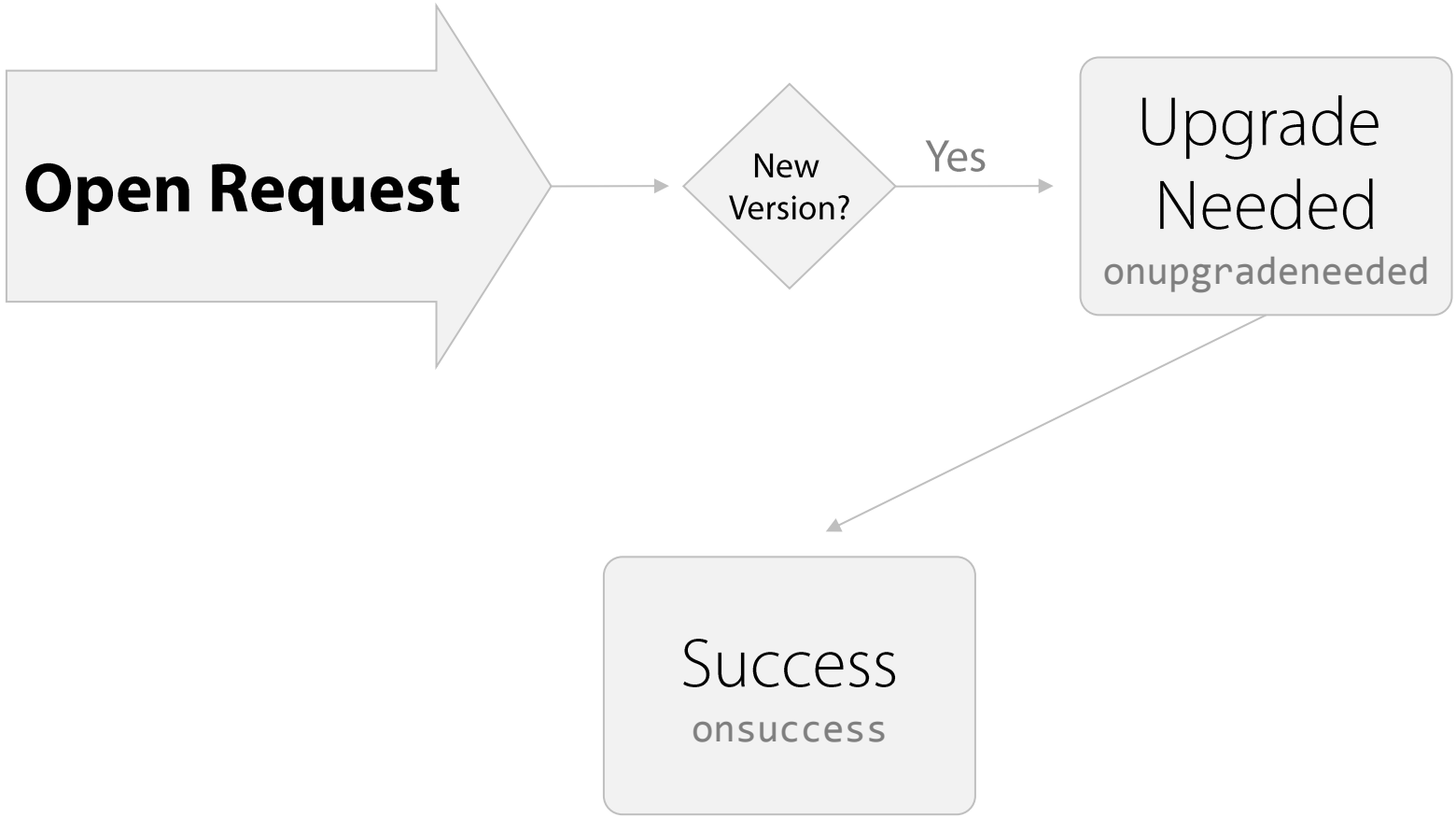
Local Storage
Session Storage
Cookies
Application Cache
Security origin: http://localhost:1505
Name: CursorDB
Integer Version: 1
String Version:
5

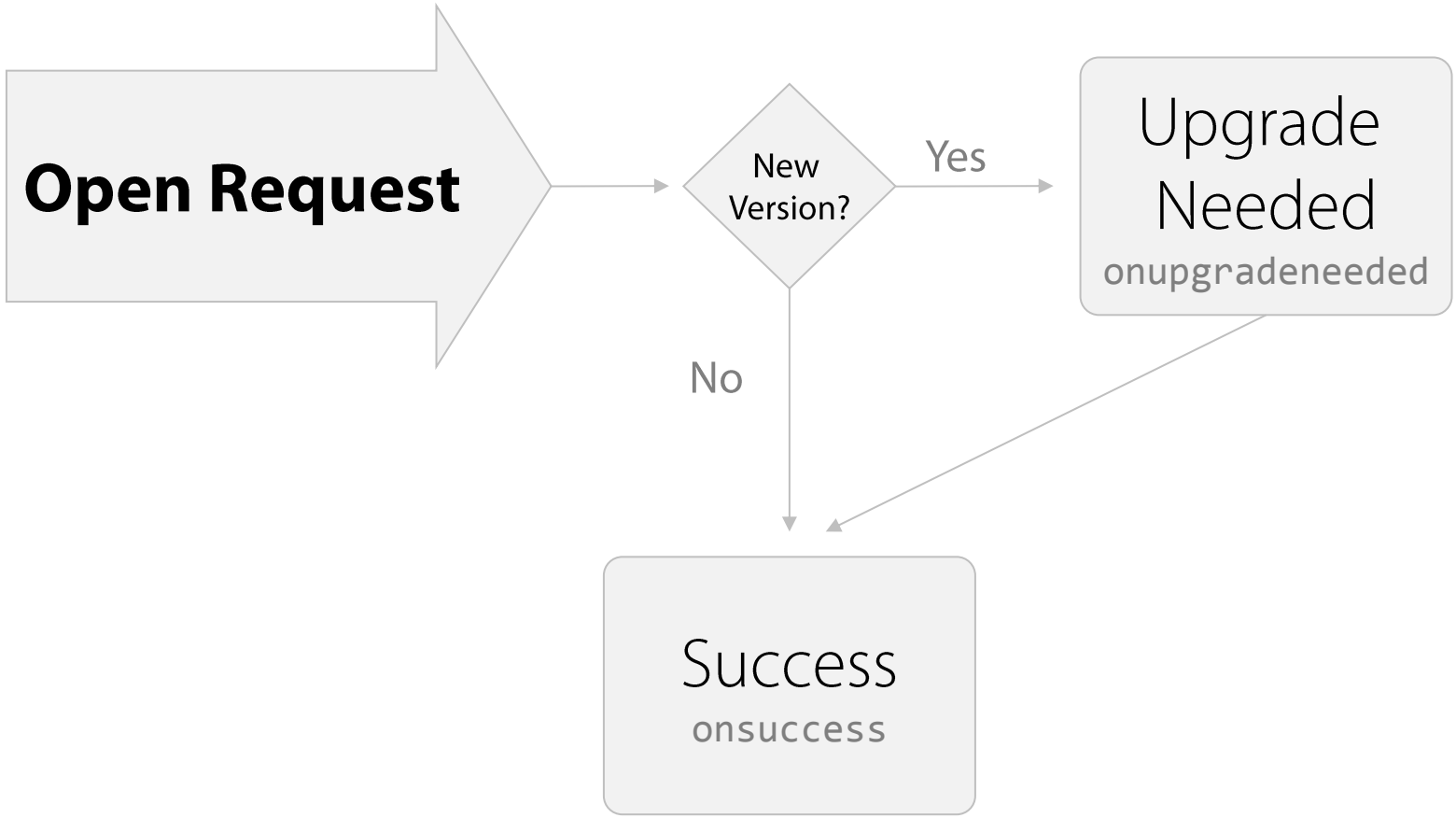
Event Lifecycle

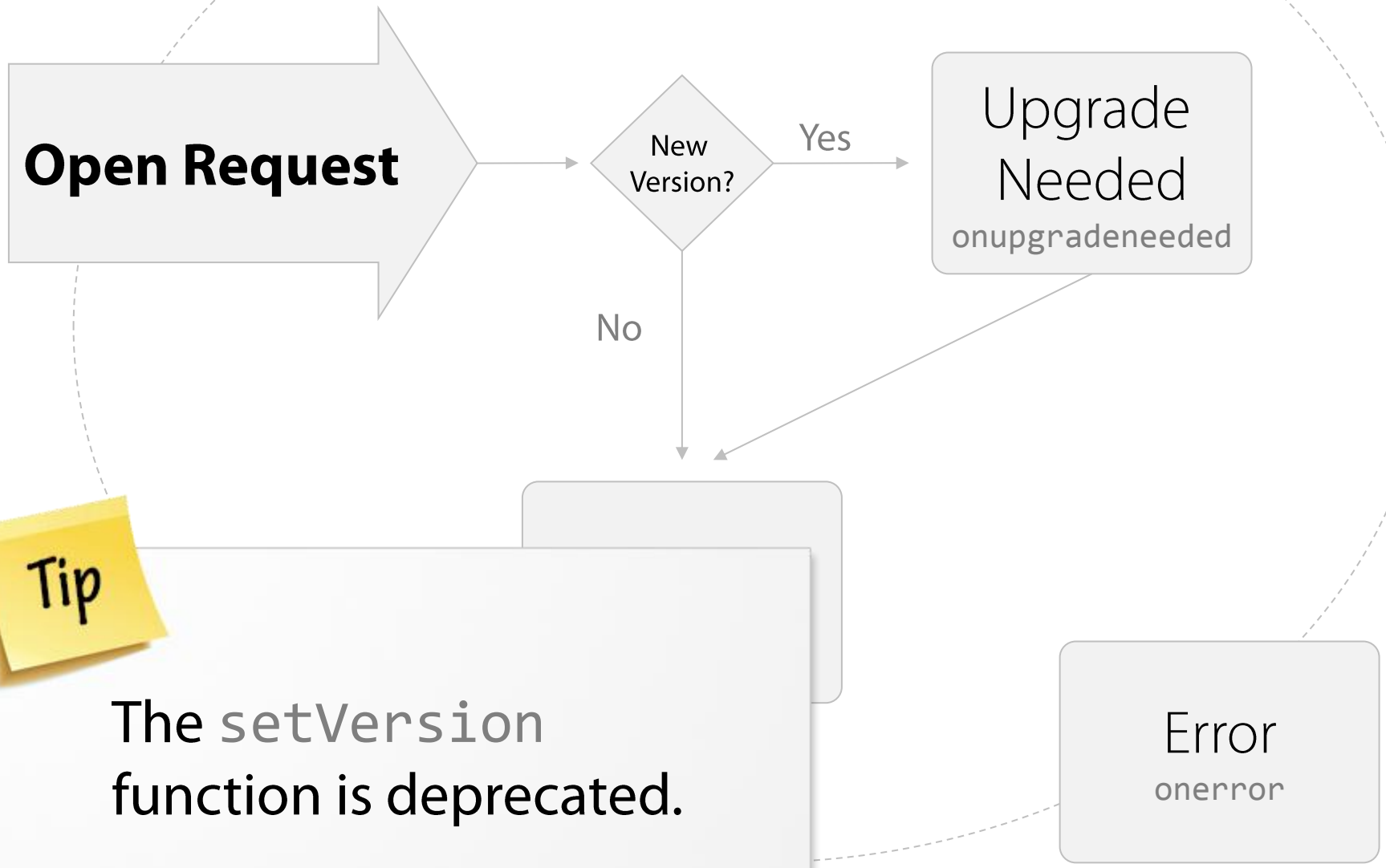
Open Request


Open Request
New
Version?


Open Request
New Version?
Yes
Upgrade Needed
onupgradeneeded


Open Request
New Version?
Yes
Upgrade Needed
onupgradeneeded
Success
onsuccess


Open Request
New Version?
Yes
Upgrade Needed
onupgradeneeded
No
Success
onsuccess



Tip

The `setVersion` function is deprecated.

IndexedDB Features

Asynchronous API

Synchronous API

Used with Web Workers

HTML5 Advanced Topics

http://pluralsight.com/courses/html5-advanced

Transactional

Versioning

Sandboxed Data

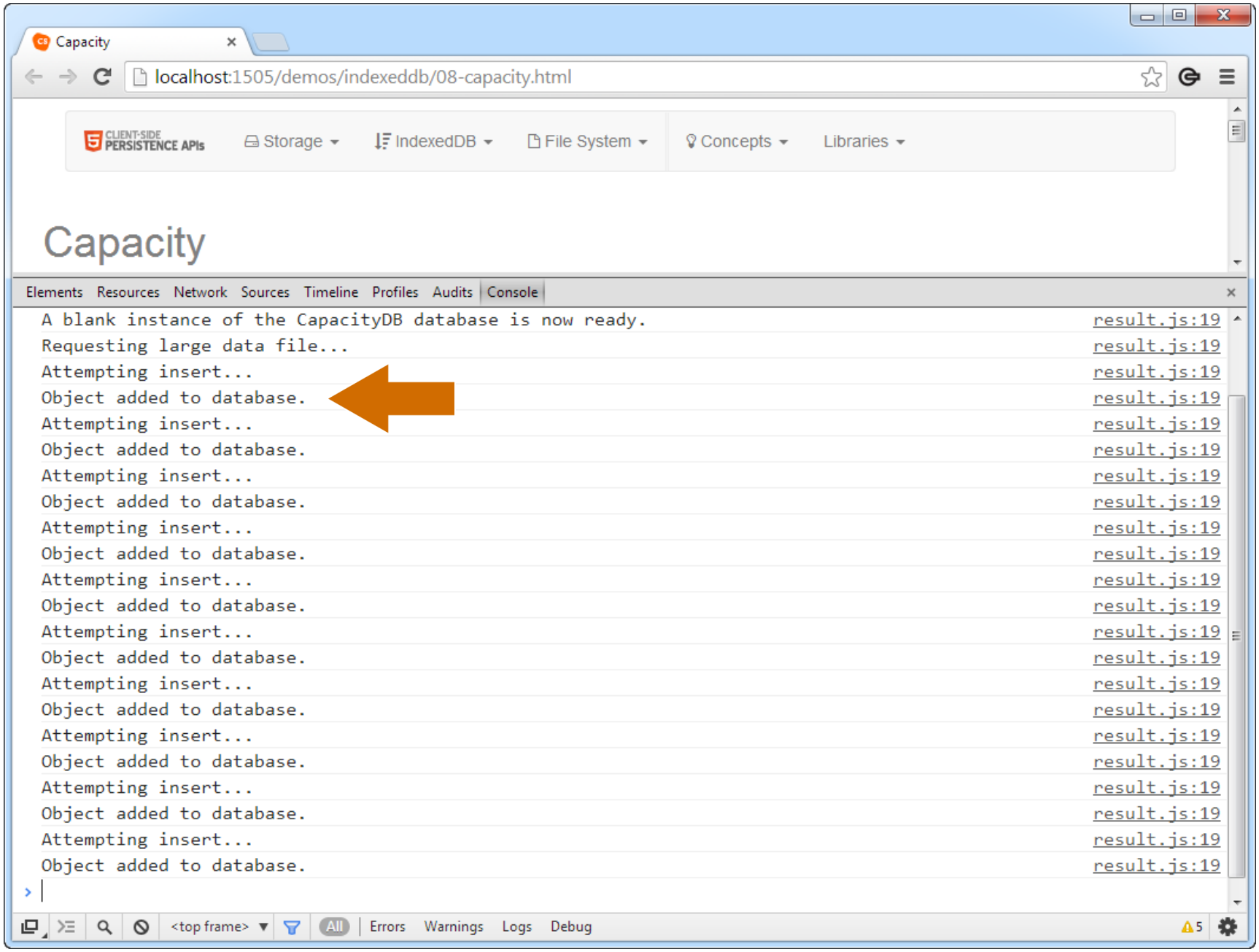
Capacity

Indexed Database API

W3C Candidate Recommendation 04 July 2013

IndexedDB Specification

http://bit.ly/1hL89RG


Capacity
localhost:1505/demos/indexeddb/08-capacity.html
CLIENT-SIDE PERSISTENCE APIs
Storage
IndexedDB
File System
Concepts
Libraries
Capacity
Elements Resources Network Sources Timeline Profiles Audits Console
A blank instance of the CapacityDB database is now ready. result.js:19
Requesting large data file... result.js:19
Attempting insert... result.js:19
Object added to database. result.js:19
Attempting insert... result.js:19
Object added to database. result.js:19
Attempting insert... result.js:19
Object added to database. result.js:19
Attempting insert... result.js:19
Object added to database. result.js:19
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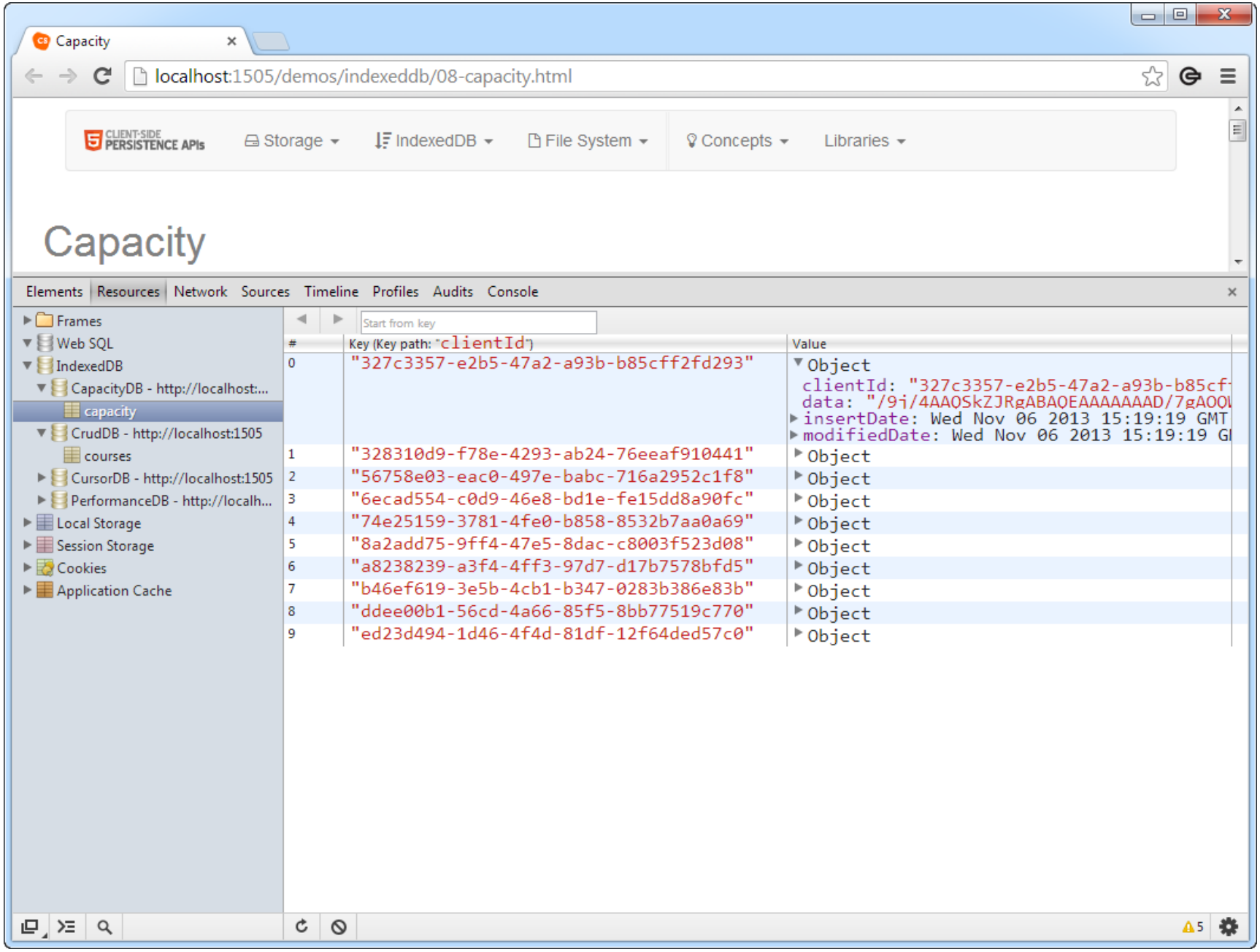
Attempting insert... result.js:19
Object added to database. result.js:19
Attempting insert... result.js:19
Object added to database. result.js:19
Attempting insert... result.js:19
Object added to database. result.js:19
<top frame>
All
Errors
Warnings
Logs
Debug
5


Capacity
localhost:1505/demos/indexeddb/08-capacity.html
CLIENT-SIDE PERSISTENCE APIs
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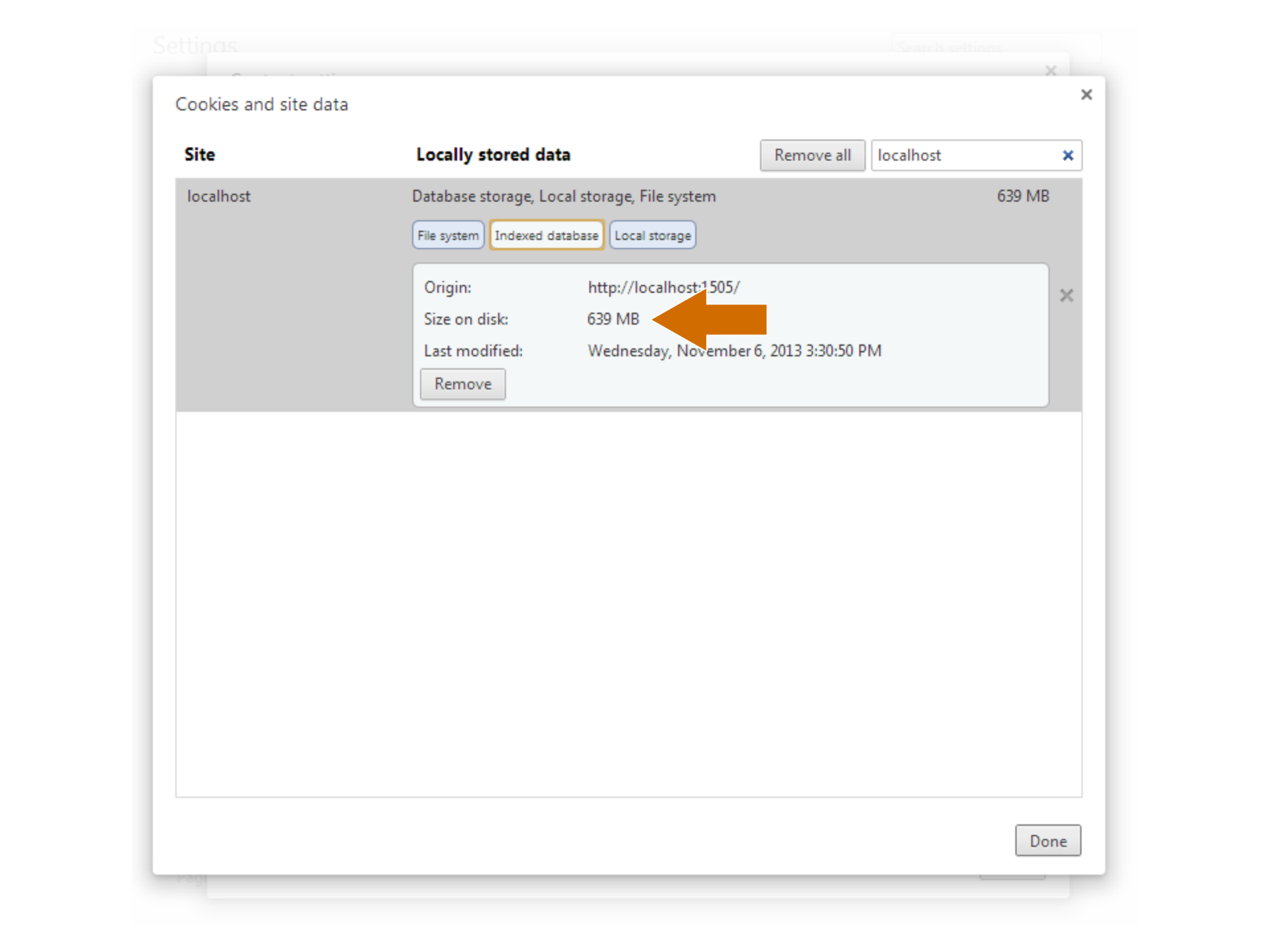
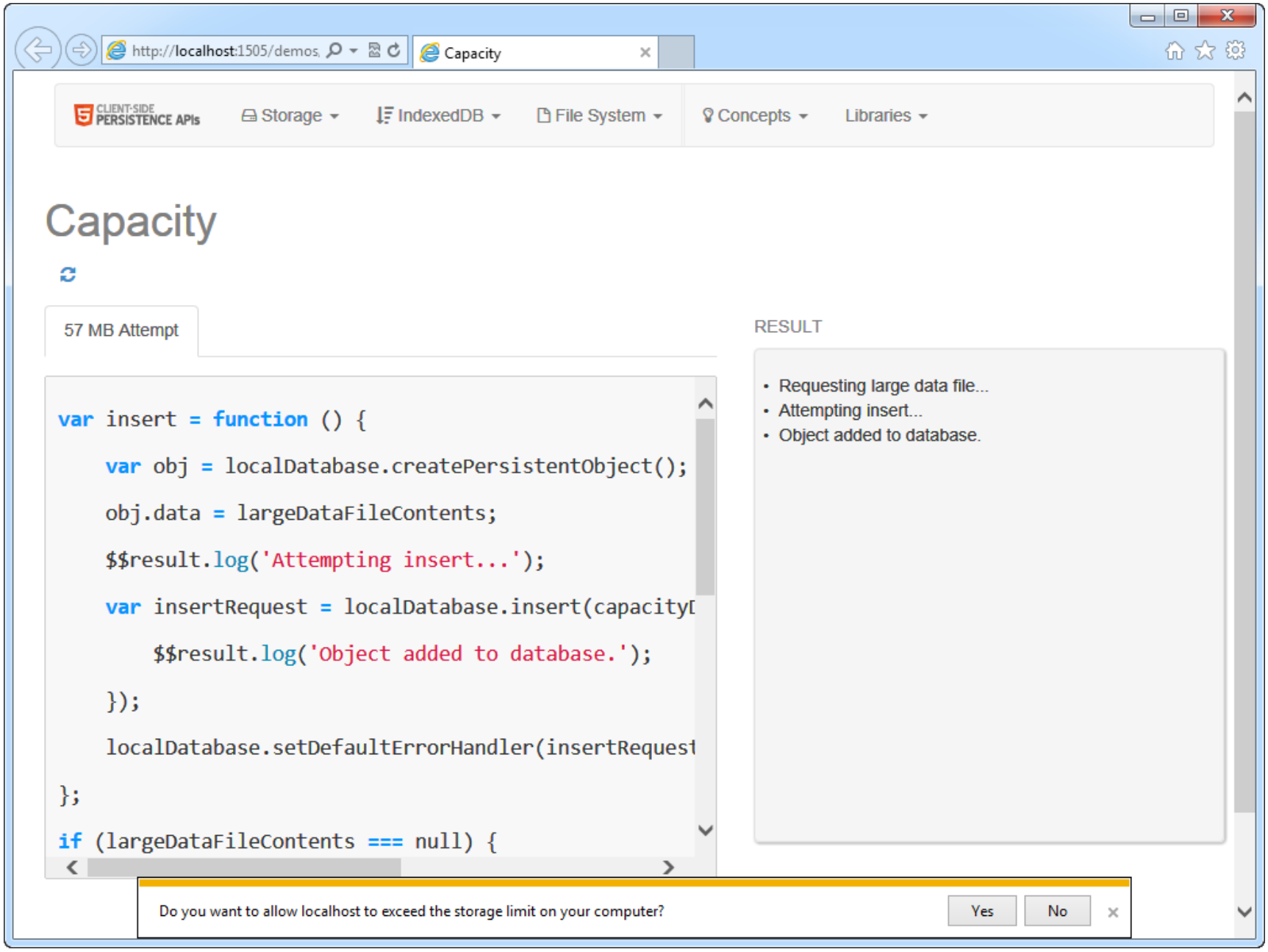
Web SQL
IndexedDB
CapacityDB - http://localhost:...
capacity
CrudDB - http://localhost:1505
courses
CursorDB - http://localhost:1505
PerformanceDB - http://localh...
Local Storage
Session Storage
Cookies
Application Cache
Start from key
Key (Key path: "clientId") Value
0 "327c3357-e2b5-47a2-a93b-b85cff2fd293" Object
clientId: "327c3357-e2b5-47a2-a93b-b85cf
data: "/9j/4AAQSkZJRgABAQEAAAAAAAD/7gAOQ
insertDate: Wed Nov 06 2013 15:19:19 GMT
modifiedDate: Wed Nov 06 2013 15:19:19 G
1 "328310d9-f78e-4293-ab24-76eeaf910441" Object
2 "56758e03-eac0-497e-babc-716a2952c1f8" Object
3 "6ecad554-c0d9-46e8-bd1e-fe15dd8a90fc" Object
4 "74e25159-3781-4fe0-b858-8532b7aa0a69" Object
5 "8a2add75-9ff4-47e5-8dac-c8003f523d08" Object
6 "a8238239-a3f4-4ff3-97d7-d17b7578bfd5" Object
7 "b46ef619-3e5b-4cb1-b347-0283b386e83b" Object
8 "ddee00b1-56cd-4a66-85f5-8bb77519c770" Object
9 "ed23d494-1d46-4f4d-81df-12f64ded57c0" Object
5


Cookies and site data
Site
Locally stored data
Remove all
localhost
localhost
Database storage, Local storage, File system
639 MB
File system
Indexed database
Local storage
Origin:
http://localhost:1505/
Size on disk:
639 MB
Last modified:
Wednesday, November 6, 2013 3:30:50 PM
Remove
Done


http://localhost:1505/demos
Capacity
CLIENT-SIDE PERSISTENCE APIs
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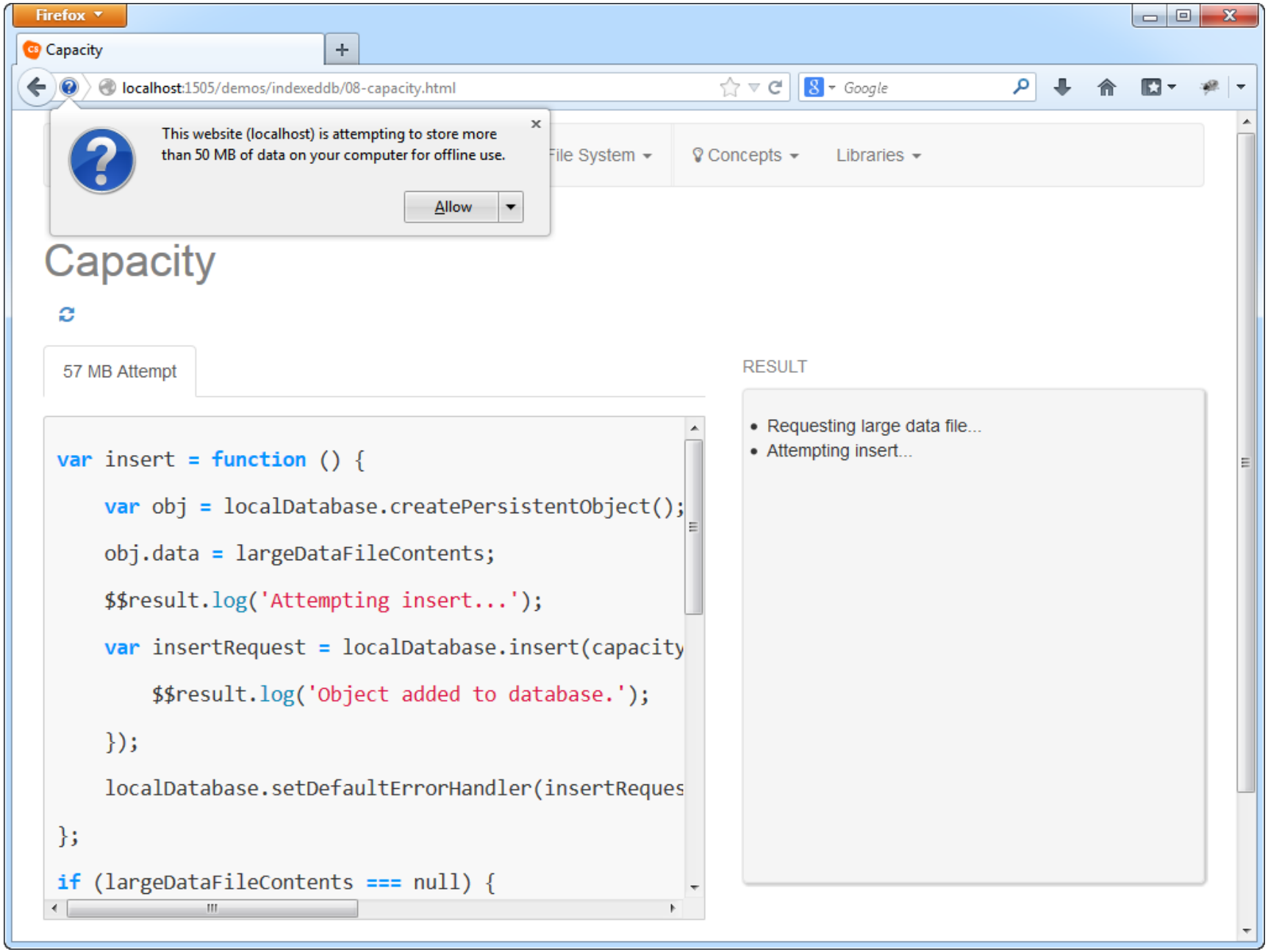
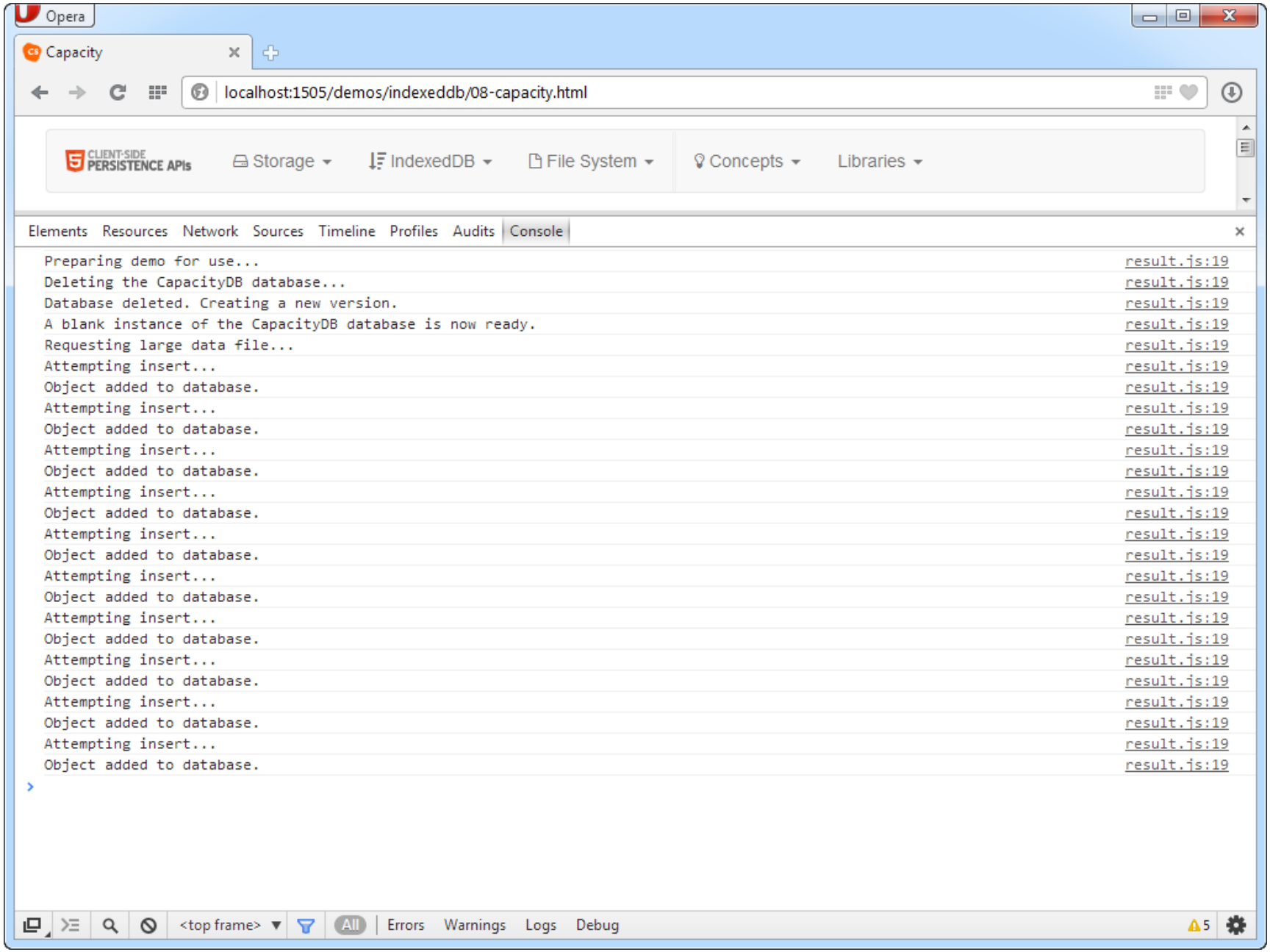
IndexedDB
File System
Concepts
Libraries
Capacity
57 MB Attempt
var insert = function () {
var obj = localDatabase.createPersistentObject();
obj.data = largeDataFileContents;
$$result.log('Attempting insert...');
var insertRequest = localDatabase.insert(capacityD
$$result.log('Object added to database.');
});
localDatabase.setDefaultErrorHandler(insertRequest
};
if (largeDataFileContents === null) {
RESULT
Requesting large data file...
Attempting insert...
Object added to database.
Do you want to allow localhost to exceed the storage limit on your computer?
Yes
No


Firefox
Capacity
localhost:1505/demos/indexeddb/08-capacity.html
Google
This website (localhost) is attempting to store more than 50 MB of data on your computer for offline use.
Allow
File System
Concepts
Libraries
Capacity
57 MB Attempt
var insert = function () {
var obj = localDatabase.createPersistentObject();
obj.data = largeDataFileContents;
$$result.log('Attempting insert...');
var insertRequest = localDatabase.insert(capacity
$$result.log('Object added to database.');
});
localDatabase.setDefaultErrorHandler(insertReques
};
if (largeDataFileContents === null) {
RESULT
Requesting large data file...
Attempting insert...


Opera
Capacity
localhost:1505/demos/indexeddb/08-capacity.html
CLIENT-SIDE PERSISTENCE APIs
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File System
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Libraries
Elements Resources Network Sources Timeline Profiles Audits Console
Preparing demo for use... result.js:19
Deleting the CapacityDB database... result.js:19
Database deleted. Creating a new version. result.js:19
A blank instance of the CapacityDB database is now ready. result.js:19
Requesting large data file... result.js:19
Attempting insert... result.js:19
Object added to database. result.js:19
Attempting insert... result.js:19
Object added to database. result.js:19
Attempting insert... result.js:19
Object added to database. result.js:19
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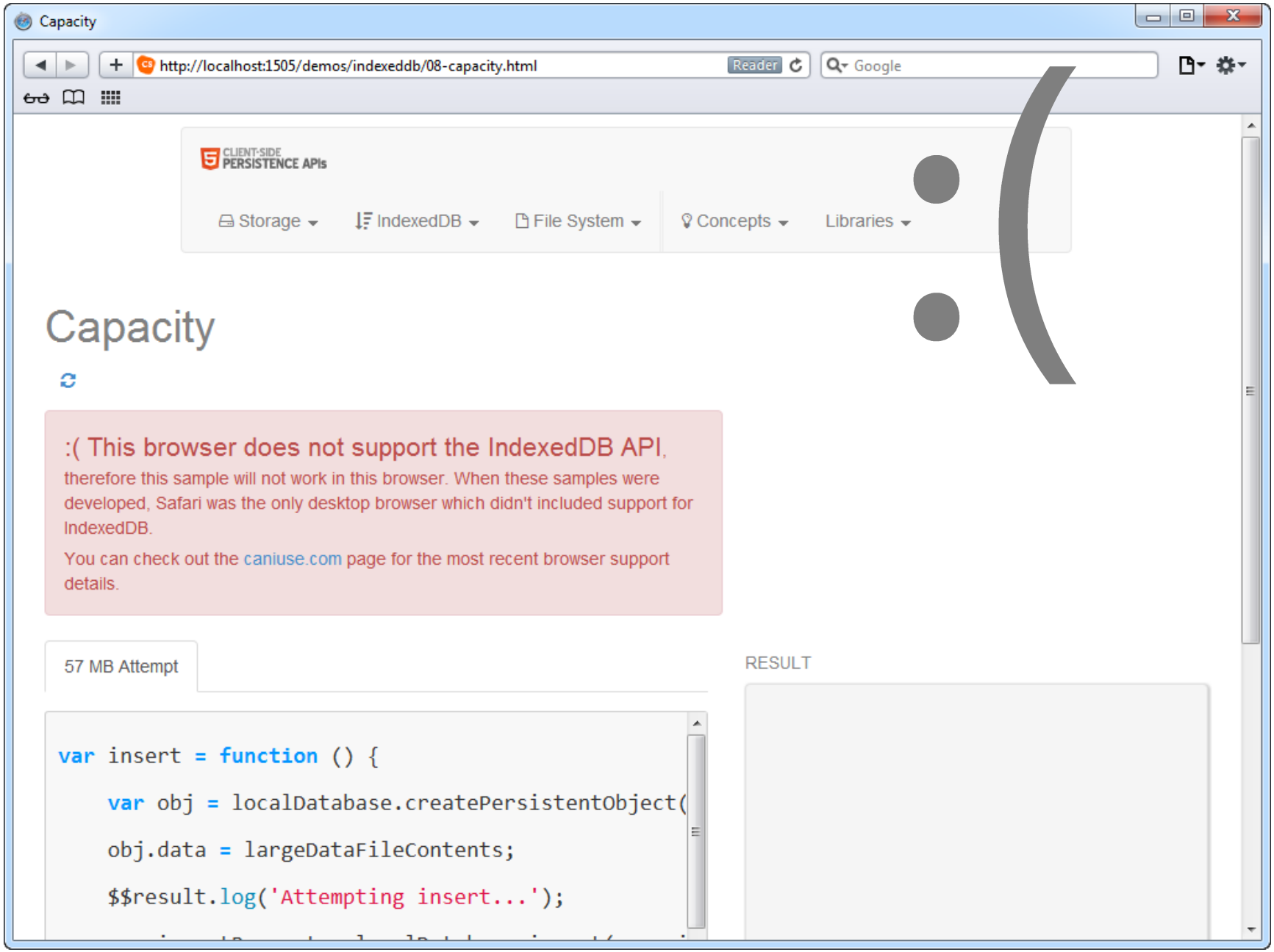
Attempting insert... result.js:19
Object added to database. result.js:19
Attempting insert... result.js:19
Object added to database. result.js:19
<top frame>
All
Errors
Warnings
Logs
Debug
5


Capacity
http://localhost:1505/demos/indexeddb/08-capacity.html
Reader
Google
CLIENT-SIDE PERSISTENCE APIs
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File System
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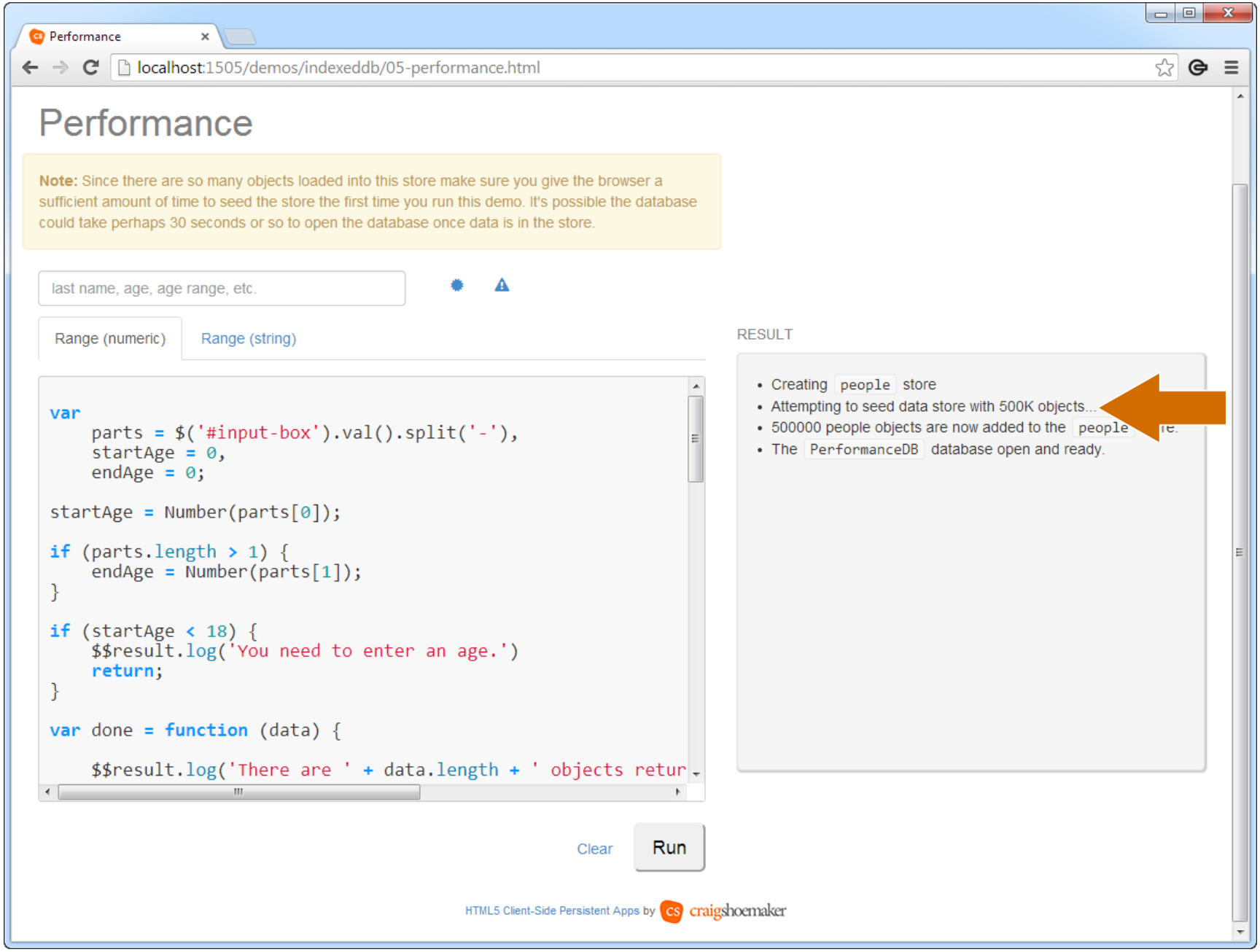
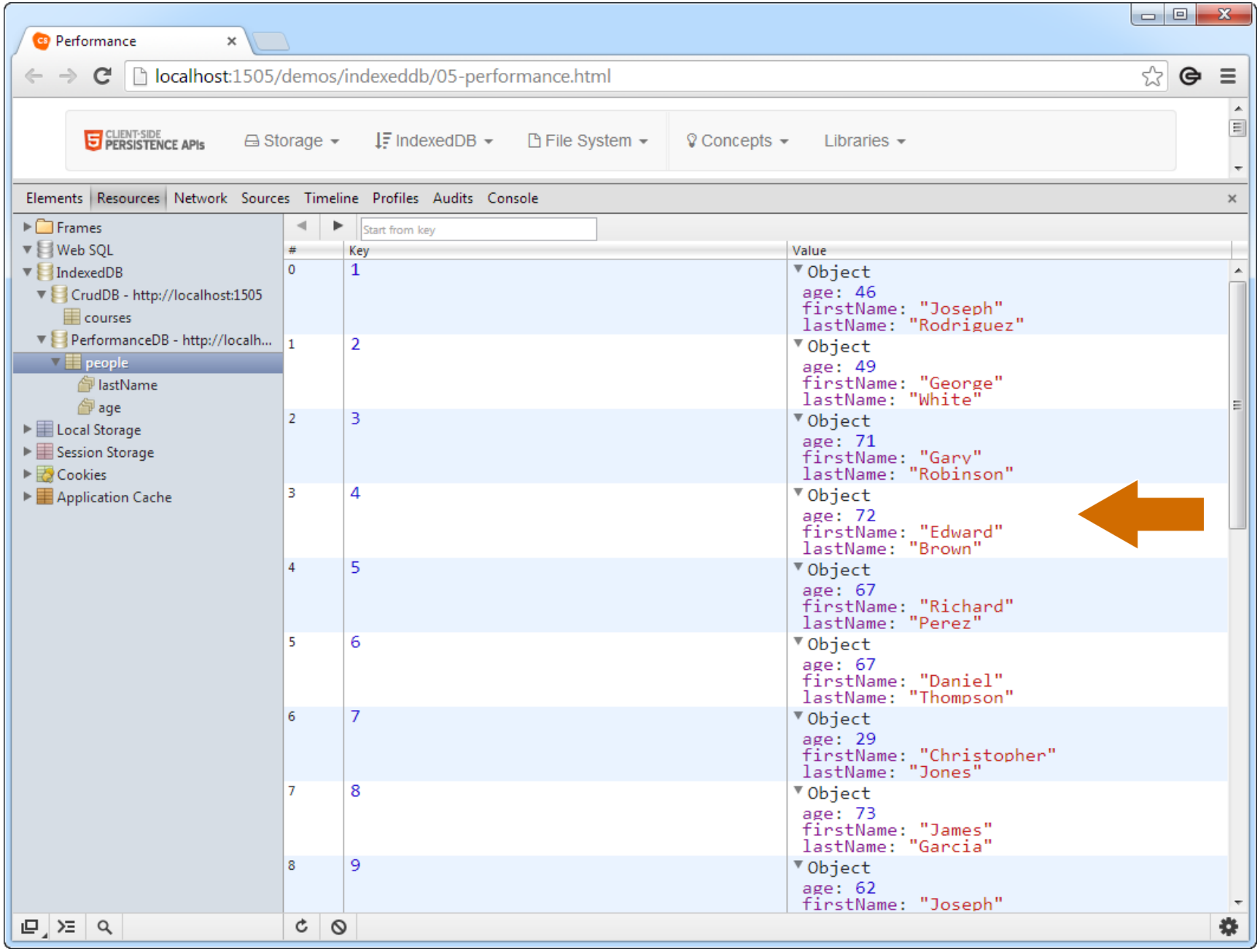
Libraries
Capacity
:(This browser does not support the IndexedDB API.
therefore this sample will not work in this browser. When these samples were developed, Safari was the only desktop browser which didn't included support for IndexedDB.
You can check out the caniuse.com page for the most recent browser support details.
57 MB Attempt
RESULT
var insert = function () {
var obj = localDatabase.createPersistentObject(
obj.data = largeDataFileContents;
$$result.log('Attempting insert...');


Performance
localhost:1505/demos/indexeddb/05-performance.html
Performance
Note: Since there are so many objects loaded into this store make sure you give the browser a sufficient amount of time to seed the store the first time you run this demo. It's possible the database could take perhaps 30 seconds or so to open the database once data is in the store.
last name, age, age range, etc.
Range (numeric)
Range (string)
var
parts = $('#input-box').val().split('-'),
startAge = 0,
endAge = 0;
startAge = Number(parts[0]);
if (parts.length > 1) {
endAge = Number(parts[1]);
}
if (startAge < 18) {
$$result.log('You need to enter an age.')
return;
}
var done = function (data) {
$$result.log('There are ' + data.length + ' objects retur
RESULT
Creating people store
Attempting to seed data store with 500K objects...
500000 people objects are now added to the people
The PerformanceDB database open and ready.
Clear
Run
HTML5 Client-Side Persistent Apps by craigshoemaker


Performance
localhost:1505/demos/indexeddb/05-performance.html
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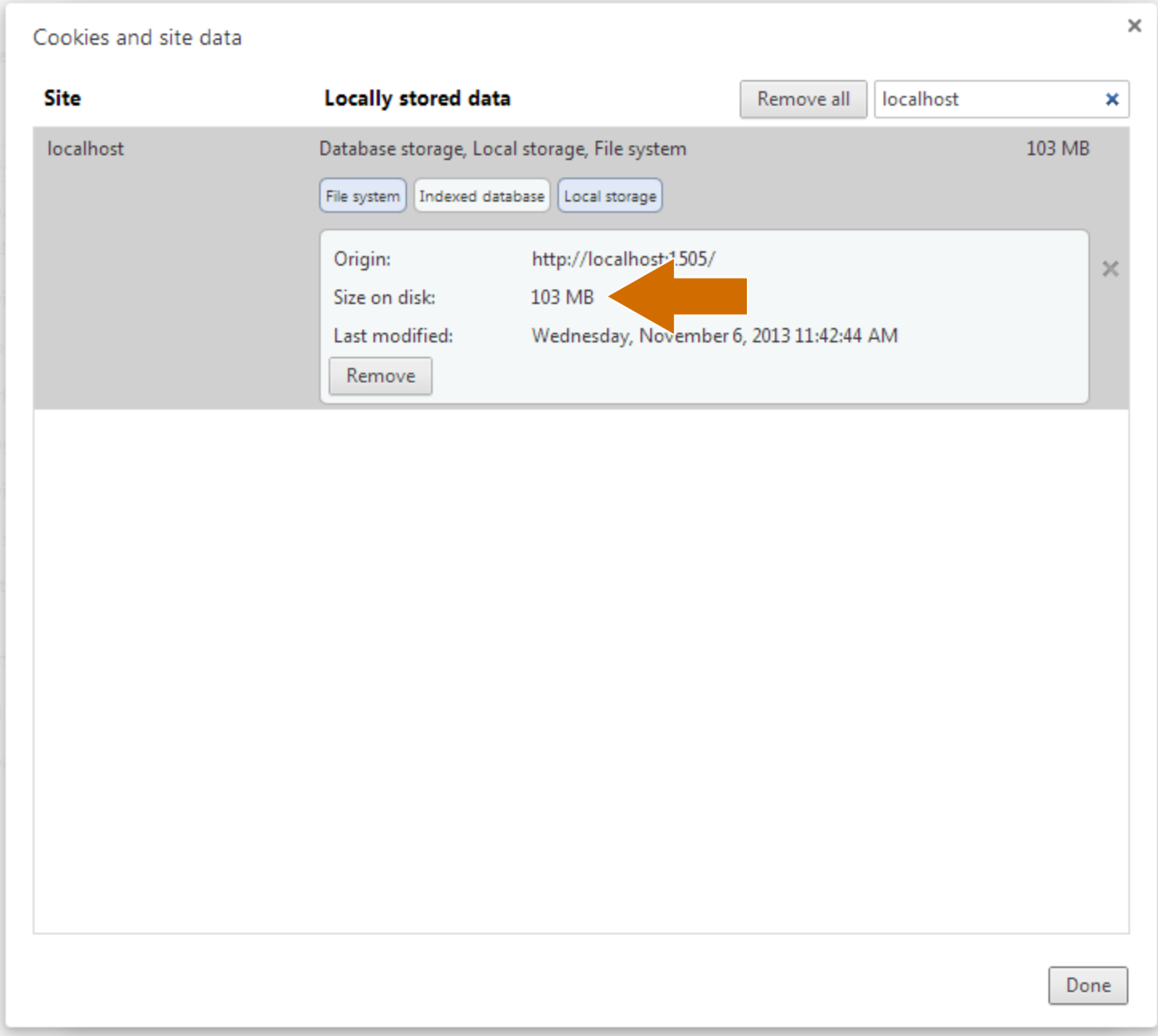
CrudDB - http://localhost:1505
courses
PerformanceDB - http://localh...
people
lastName
age
Local Storage
Session Storage
Cookies
Application Cache
Start from key
Key Value
0 1 Object age: 46 firstName: "Joseph" lastName: "Rodriguez"
1 2 Object age: 49 firstName: "George" lastName: "White"
2 3 Object age: 71 firstName: "Gary" lastName: "Robinson"
3 4 Object age: 72 firstName: "Edward" lastName: "Brown"
4 5 Object age: 67 firstName: "Richard" lastName: "Perez"
5 6 Object age: 67 firstName: "Daniel" lastName: "Thompson"
6 7 Object age: 29 firstName: "Christopher" lastName: "Jones"
7 8 Object age: 73 firstName: "James" lastName: "Garcia"
8 9 Object age: 62 firstName: "Joseph"


Cookies and site data
Site
Locally stored data
Remove all
localhost
localhost
Database storage, Local storage, File system
103 MB
File system
Indexed database
Local storage
Origin:
http://localhost:1505/
Size on disk:
103 MB
Last modified:
Wednesday, November 6, 2013 11:42:44 AM
Remove
Done

Browser Support

IndexedDB - **Working Draft**

Method of storing data client-side, allows indexed database queries. Previously known as WebSimpleDB API.

Global user stats*:	
Support:	59.46%
Partial support:	1.68%
Total:	61.14%

Resources: WebPlatform Docs | Mozilla Hacks article | Polyfill for browsers supporting WebSQL | has.js test

	IE	Firefox	Chrome	Safari	Opera	iOS Safari	Opera Mini	Android Browser	Blackberry Browser	Opera Mobile	Chrome for Android	Firefox for Android	IE Mobile
26 versions back			4.0										
25 versions back		2.0	5.0										
24 versions back		3.0	6.0										
23 versions back		3.5	7.0										
22 versions back		3.6	8.0										
21 versions back		4.0 moz	9.0										
20 versions back		5.0 moz	10.0										
19 versions back		6.0 moz	11.0 webkit										
18 versions back		7.0 moz	12.0 webkit										
17 versions back		8.0 moz	13.0 webkit										
16 versions back		9.0 moz	14.0 webkit										
15 versions back		10.0 moz	15.0 webkit										
14 versions back		11.0 moz	16.0 webkit										
13 versions back		12.0 moz	17.0 webkit		9.0								
12 versions back		13.0 moz	18.0 webkit		9.5-9.6								
11 versions back		14.0 moz	19.0 webkit		10.0-10.1								
10 versions back		15.0 moz	20.0 webkit		10.5								
9 versions back		16.0	21.0 webkit		10.6								
8 versions back		17.0	22.0 webkit		11.0								
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IndexedDB - **Working Draft**

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Total:	61.14%

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Near future													
Farther future													

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http://caniuse.com/indexeddb

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Fallbacks & Polyfills

and Progressive Enhancement

IndexedDB

- **IndexedDB Polyfill** by **Parashuram**
  - Polyfill for IndexedDB on WebSql
  - Tested on IndexedDB libraries like PouchDB, JqueryIndexedDB Plugin, Linq2IndexedDB and DBJS

The All-In-One Entirely-Not-Alphabetical Guide to HTML5 Fallbacks

http://bit.ly/175J1xA

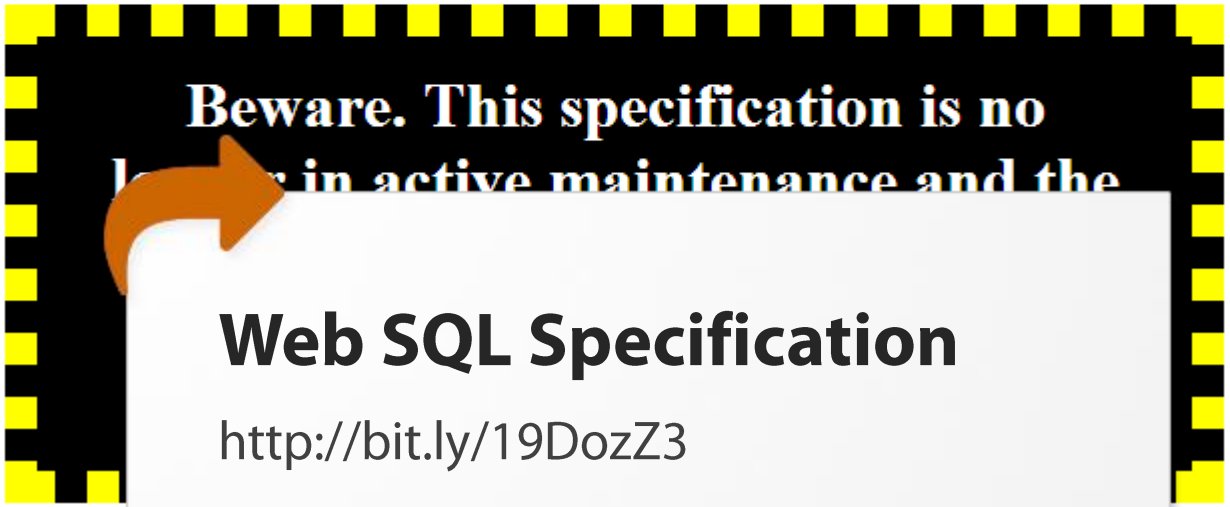
Web SQL Database

W3C Working Group Note 18 November 2010

Abstract

This specification defines an API for storing data in databases that can be queried using a variant of SQL.

Status of This Document



Web SQL Database - Unofficial / Note

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Method of storing data client-side, allows Sqlite database queries for access and manipulation

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16 versions back		9.0	14.0										
15 versions back		10.0 moz	15.0										
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IndexedDB &
Web SQL Support

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Caveats

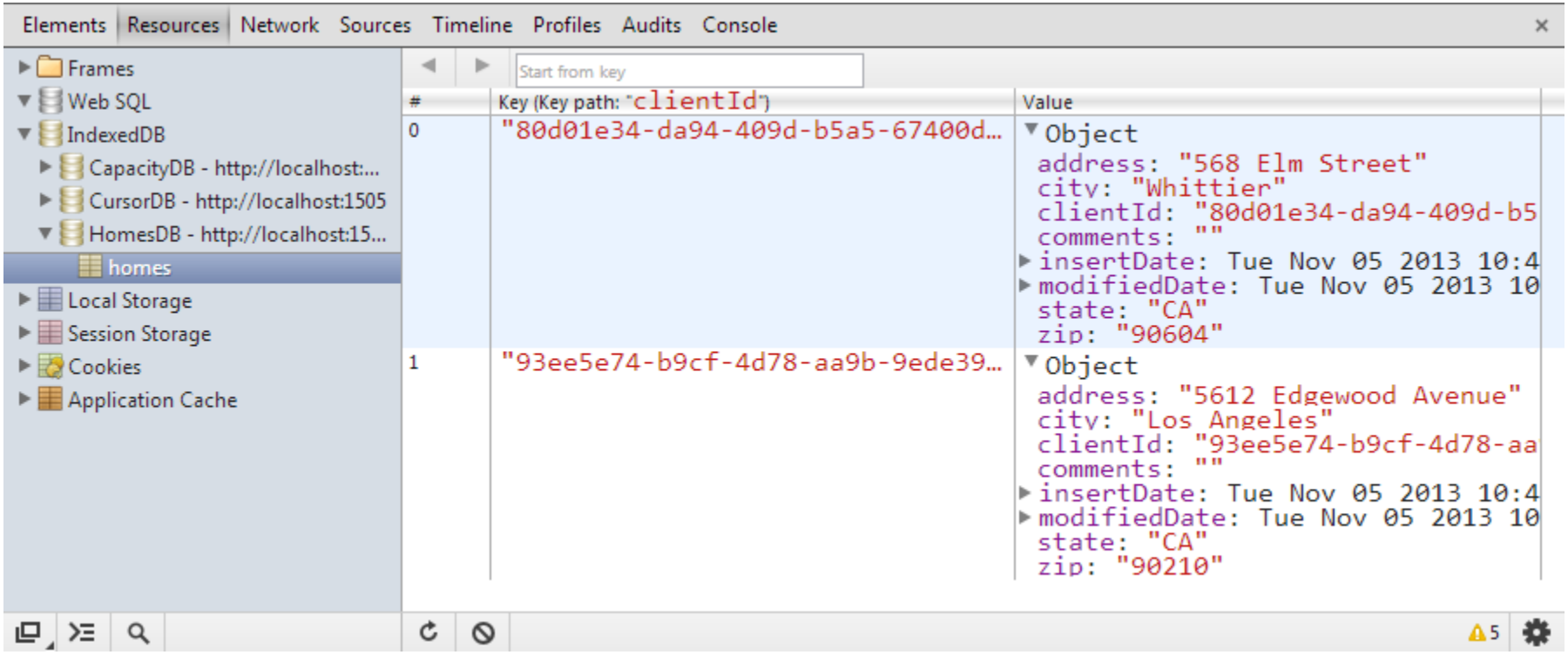
No LIKE operator

Complex API

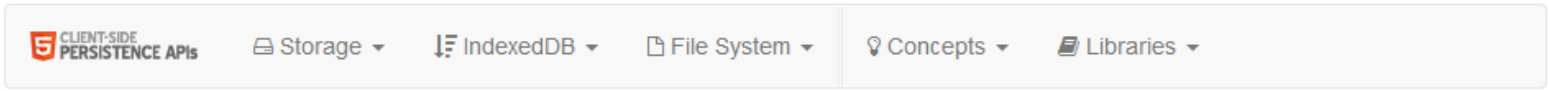
Browser Support

Browser-Specific

Summary


Elements
Resources
Network
Sources
Timeline
Profiles
Audits
Console
Frames
Web SQL
IndexedDB
CapacityDB - http://localhost:...
CursorDB - http://localhost:1505
HomesDB - http://localhost:15...
homes
Local Storage
Session Storage
Cookies
Application Cache
Start from key
#
Key (Key path: "clientId")
Value
0
"80d01e34-da94-409d-b5a5-67400d...
Object
address: "568 Elm Street"
city: "Whittier"
clientId: "80d01e34-da94-409d-b5
comments: ""
insertDate: Tue Nov 05 2013 10:4
modifiedDate: Tue Nov 05 2013 10
state: "CA"
zip: "90604"
1
"93ee5e74-b9cf-4d78-aa9b-9ede39...
Object
address: "5612 Edgewood Avenue"
city: "Los Angeles"
clientId: "93ee5e74-b9cf-4d78-aa
comments: ""
insertDate: Tue Nov 05 2013 10:4
modifiedDate: Tue Nov 05 2013 10
state: "CA"
zip: "90210"
5

Up Next...



CRUD Operations

key value

db Model | Create | Read | Update | Delete

```
var db = {
    name: 'CrudDB',
    version: 1,
    instance: {},
    storeNames: {
        courses: 'courses'
    },
    defaultErrorHandler: function (e) {
        $$result.log(e);
    },
    setDefaultErrorHandler: function (request) {

        if ('onerror' in request) {
            request.onerror = db.defaultErrorHandler
        }

        if ('onblocked' in request) {
            request.onblocked = db.defaultErrorHandl
```

RESULT

- The `CrudDB` database open and ready.