EXPLORING THE POWER OF
Browser Storage

ConFoo.CA
DEVELOPER CONFERENCE

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EXPLORING THE POWER OF BROWSER STORAGE

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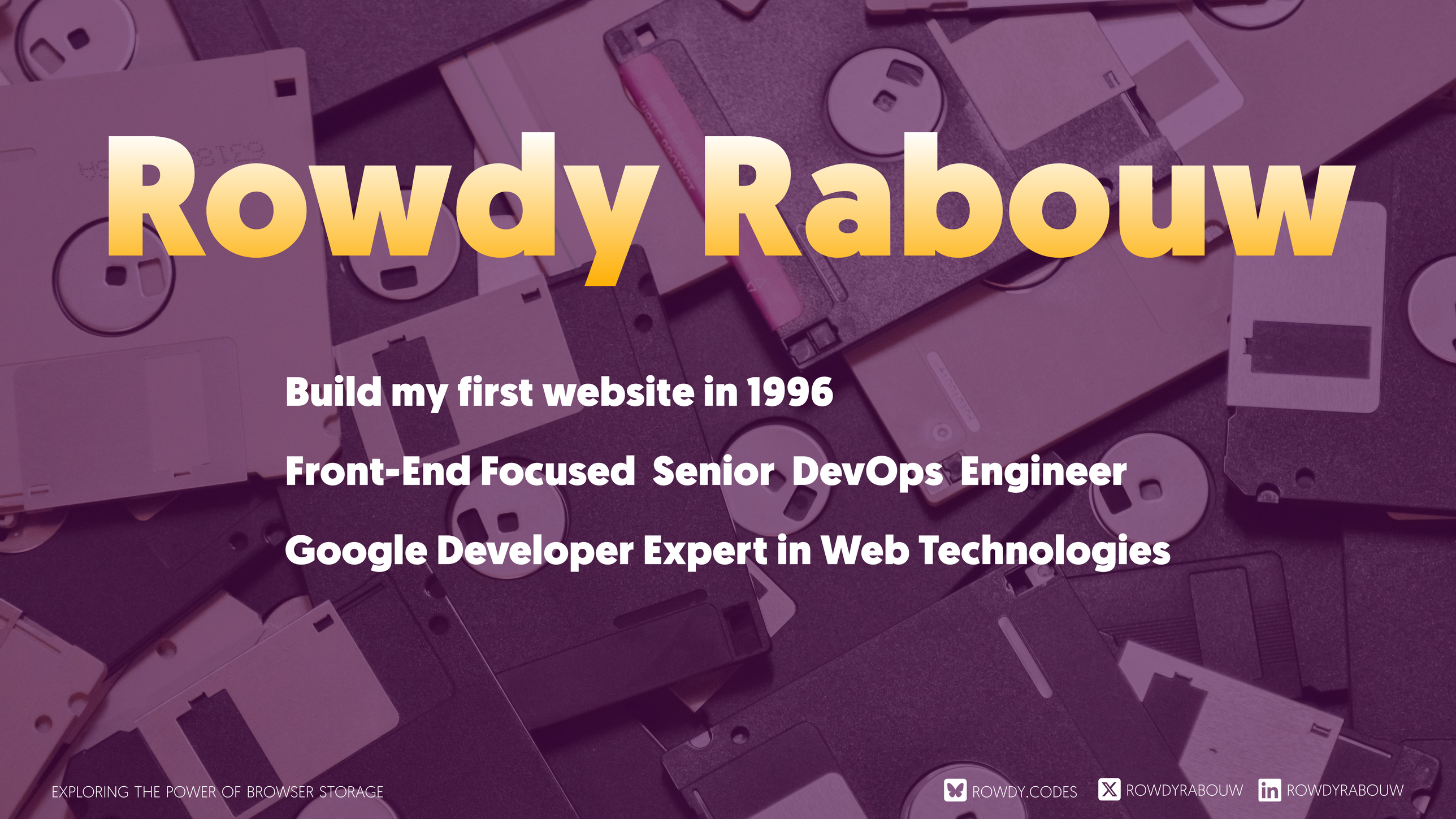
Boeing 747-200 (February 1987)

Geosky Georgia


UNITED STATES OF AMERICA
28000


I'M OLD,
NOT
OBSOLETE



Rowdy Rabouw

Build my first website in 1996

Front-End Focused Senior DevOps Engineer

Google Developer Expert in Web Technologies

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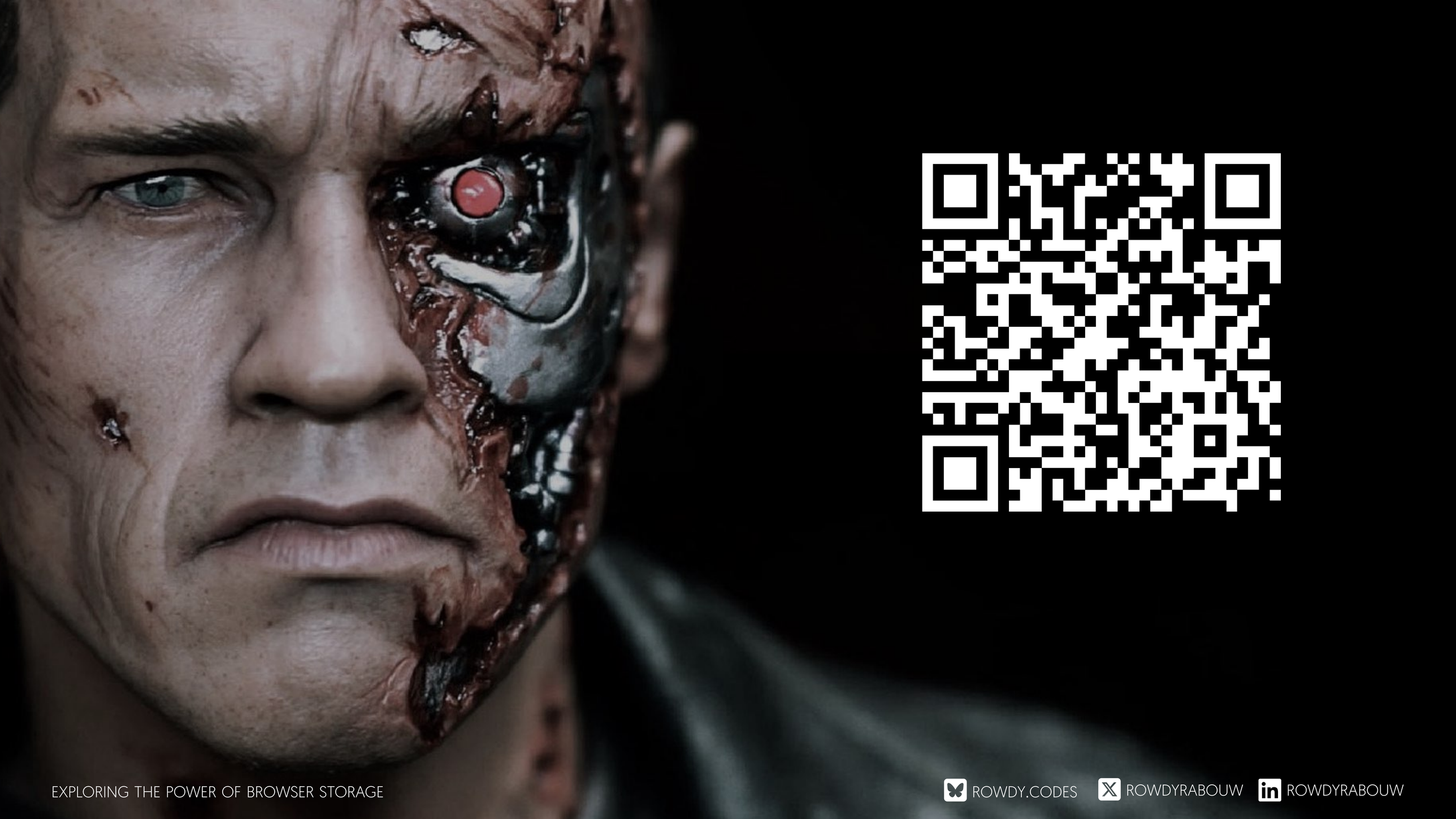

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EXPLORING THE POWER OF Browser Storage

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Cookies

IndexedDB

Local Storage

File System API

Session Storage

AppCache

WebSQL

Cache Storage

Cookies

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Cookies

Formally known as HTTP Cookies

Synchronous, blocking, and single-threaded

Tracking

Login

Analytics

```
document.cookie = 'Favorite=Chocolate; path=/; max-age=31536000;';
```

path: defaults to the current path

domain: defaults to the current hostname

expires: date in GMT format

max-age: in seconds

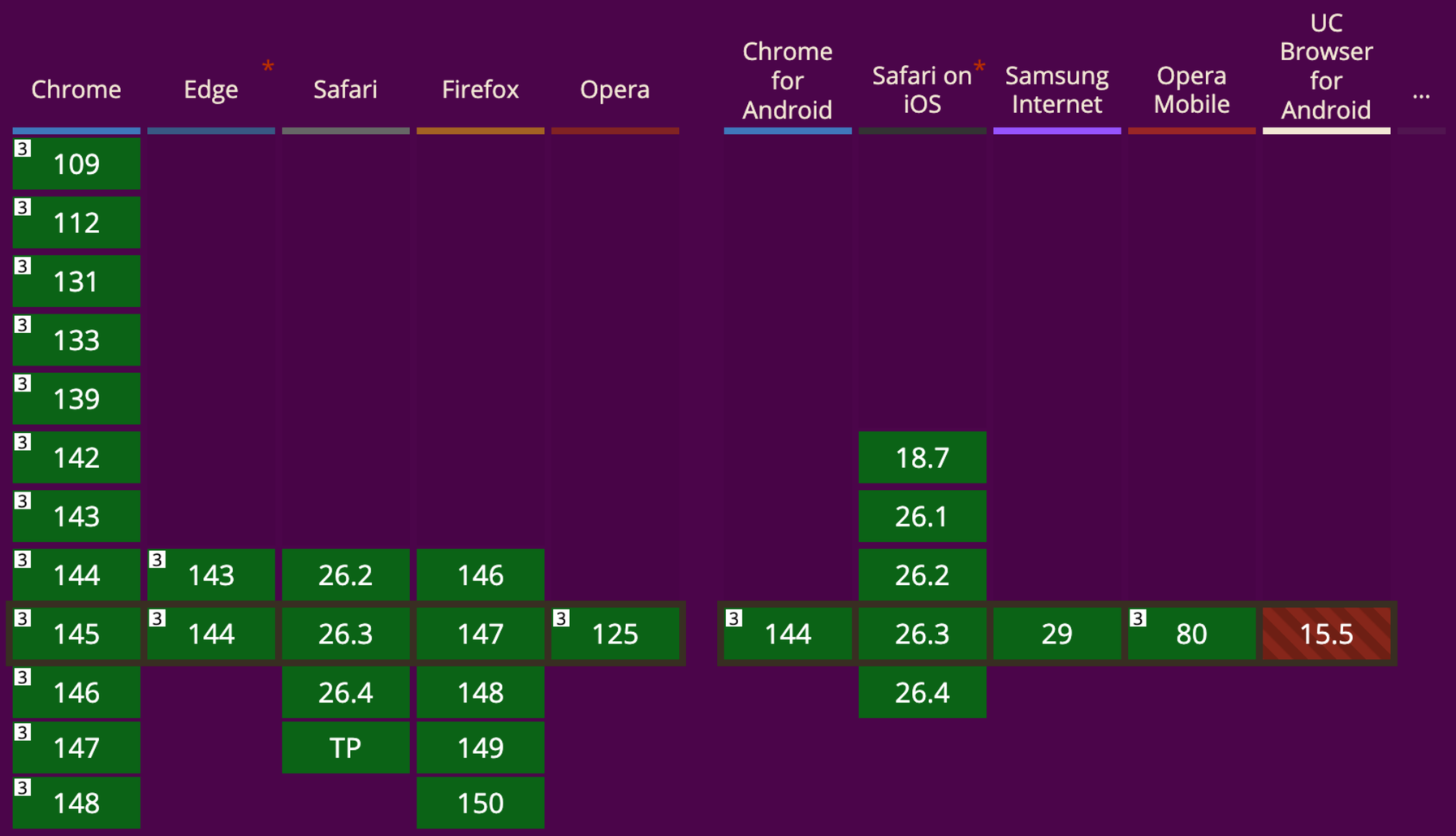
same-site:

lax = same-site requests and navigation GET requests

strict = not sent to any external sites

none = no restrictions

Cookies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Safari on iOS *
Samsung Internet
Opera Mobile
UC Browser for Android
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Cookie Store

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Cookie Store

Asynchronous and non-blocking

Works in Service Workers

```
cookieStore.set('Favorite', 'Chocolate');

cookieStore.get('Favorite');

cookieStore.getAll('Favorite');

cookieStore.delete('Favorite');
```

```
const day = 24 * 60 * 60 * 1000;

cookieStore.set({
  name: "Favorite",
  value: "Chocolate",
  expires: Date.now() + day,
  path: "/",
});
```

path: defaults to the current path

domain: defaults to the current hostname

expires: date in GMT format

same-site:

lax = same-site requests and navigation GET requests

strict = not sent to any external sites

none = no restrictions

Cookie Store

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Web Storage

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Web Storage

Key and Value pairs

Key and Value are always a strings

Web Storage

Object

JSON.stringify / JSON.parse

Array

array.toString / string.split(“,”)

Local Storage
Session Storage

Local Storage

Not bound to a session (tab or window)

Persistent “forever”

Available on next visit

```
localStorage.setItem(key, value);

localStorage.getItem(key);

localStorage.removeItem(key);
```

Local Storage

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148			150							

Session Storage

Bound to Session (tab or window)

Duplicating a tab will copy Session Storage

```
sessionStorage.setItem(key, value);

sessionStorage.getItem(key);

sessionStorage.removeItem(key);
```

Session Storage

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WebSQL

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WebSQL

Bringing SQLite to the frontend

Never implemented in Firefox

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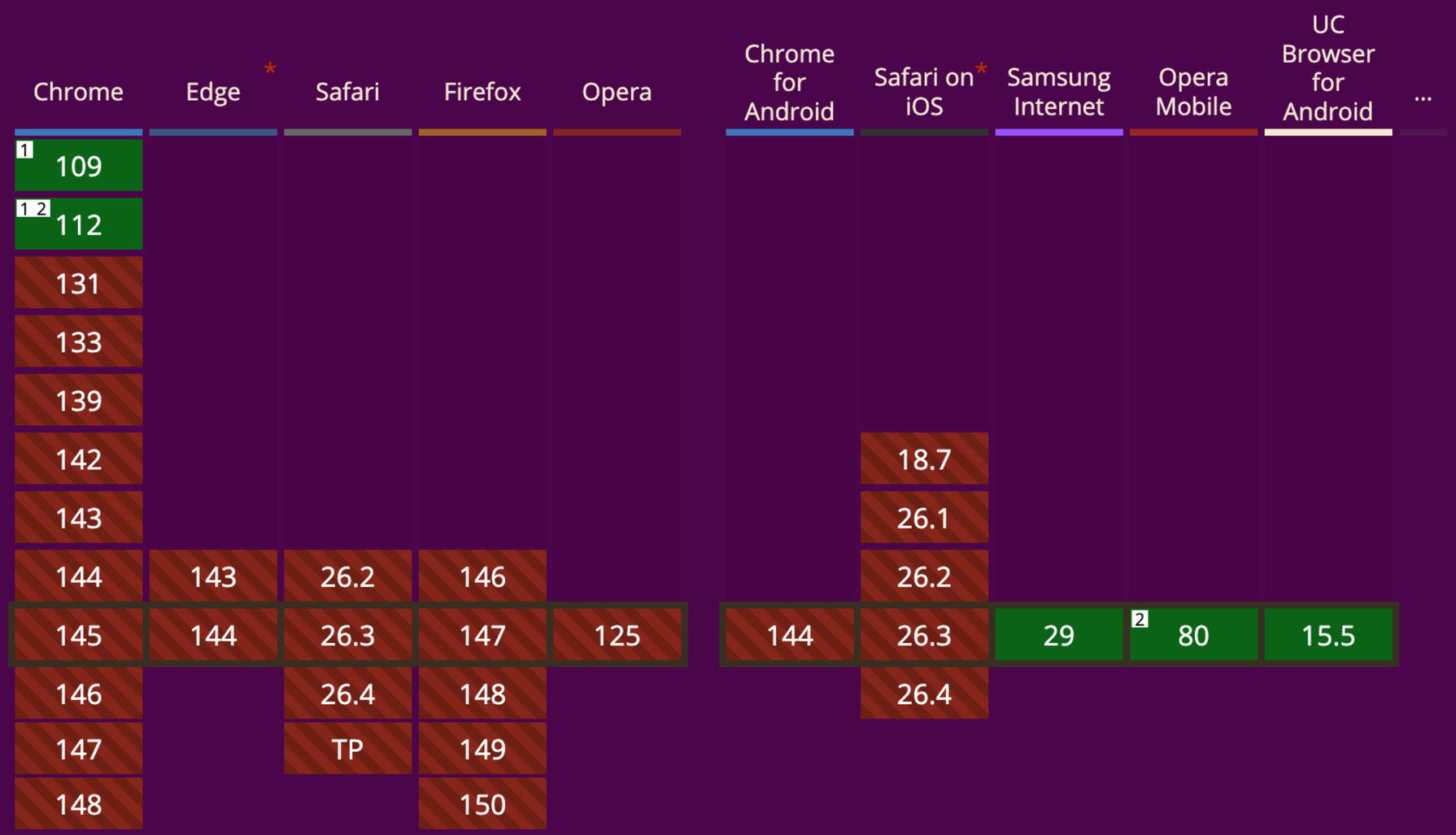
```
openDatabase('mydatabase', 1, 'mydatabase', 5000000, function (db) {
  db.transaction(function (tx) {
    tx.executeSql('create table rainstorms (mood text, severity int)',
      [], function () {
        tx.executeSql('insert into rainstorms values (?, ?)',
          ['somber', 6], function () {
            tx.executeSql('select * from rainstorms where mood = ?',
              ['somber'], function (tx, res) {
                var row = res.rows.item(0);
                console.log('rainstorm severity: ' + row.severity +
                  ',  my mood: ' + row.mood);
              });
          });
      });
  }, function (err) {
    console.log('boo, transaction failed!: ' + err);
  }, function () {
    console.log('yay, transaction succeeded!');
  });
});
```

WebSQL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IndexedDB

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IndexedDB

Replacement for WebSQL but as NoSQL

Tables are object stores

Store values by keys, like Web Storage

Supports transactions for reliability

Supports indexes

IndexedDB

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148			150							

```
let db;

const openDB = indexedDB.open("groceries-IndexedDB", 1);

openDB.onupgradeneeded = function (event) {
  db = openDB.result;
  const oldVer = event.oldVersion;
  if (oldVer < 1) {
    db.createObjectStore('groceryList', { keyPath: "product" });
  }
};
```

```
openDB.onsuccess = function () {
  console.info("Database opened successfully");
  db = openDB.result;
};

openDB.onerror = function () {
  console.error(openDB.error);
};
```

```
const store =
db.transaction("groceryList", "readwrite").objectStore("groceryList");

let request = store.put({ product: "Orange Juice", amount: 1 });

request.onsuccess = function () {
  console.log("Product added:", request.result);
};

request.onerror = function () {
  console.warn(request.error);
};
```


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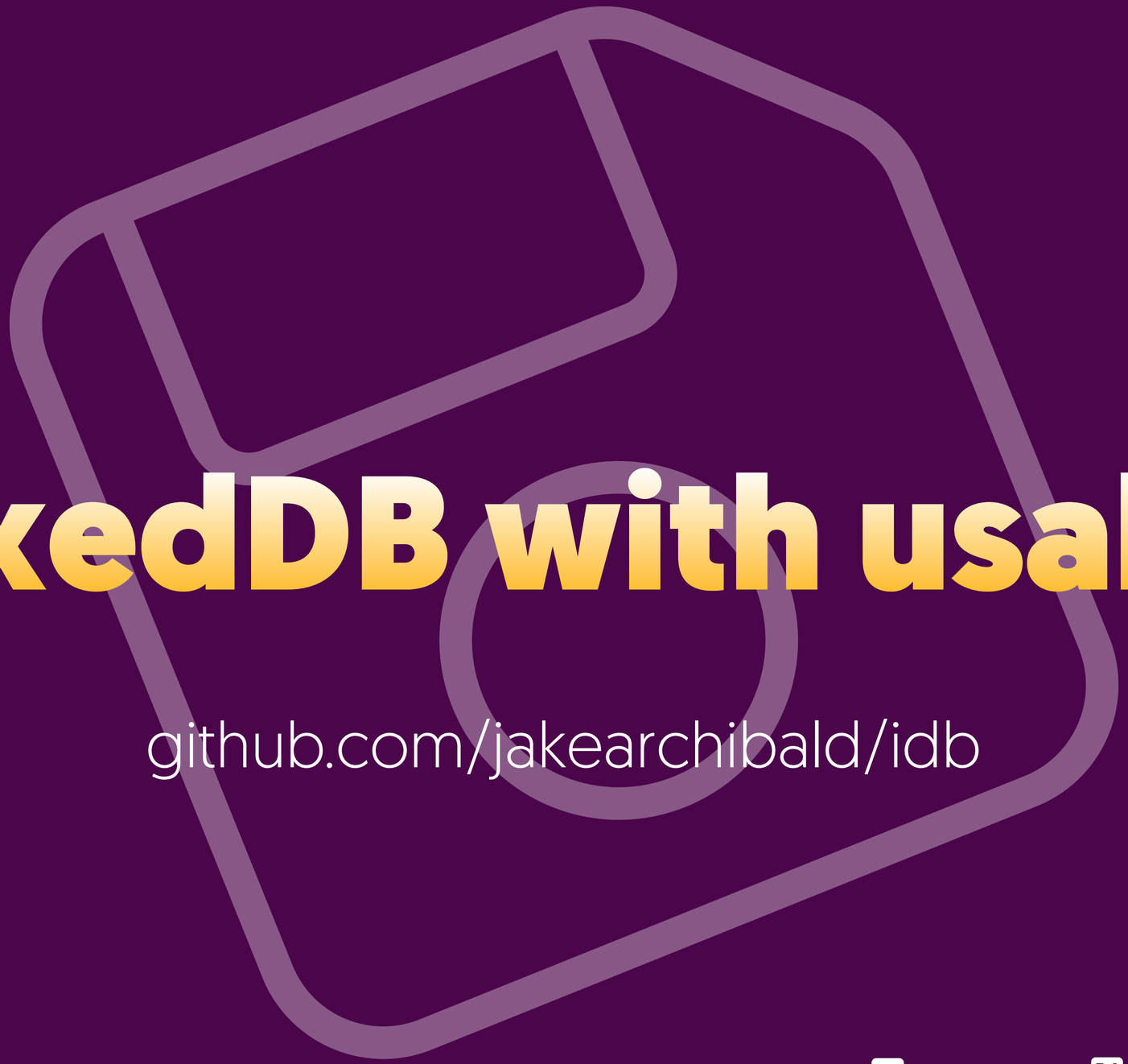

IndexedDB with usability

github.com/jakearchibald/idb

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idb

Promises enables async / await

Shortcuts for common transactions like getAll, put, delete

```
let db;

const openDatabase = async () ⇒ {
  db = await idb.openDB('groceries-idb', 1, {
    upgrade(db, oldVersion, newVersion, transaction, event) {
     if (oldVersion < 1) {
        db.createObjectStore('groceryList', { keyPath: "product" });
      }
    }
  });
};

await db.put('groceryList', { product: "Orange Juice", amount: 1 });
```


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Data Synchronization

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script.js

```
import './idb.js';
import { openDatabase, saveData } from "./utils.js";

async function useWorker() {
  try {
    const worker = new Worker('worker.js', { type: 'module' });
    worker.postMessage('CheckNetworkState');
  }
  catch (error) {
    console.error('Failed to create worker:', error);
  }
}
```

worker.js

```
onmessage = (e) => {
  if (e.data === 'CheckNetworkState') {
    checkNetworkState();
  }
};

const checkNetworkState = () => {
  setInterval(() => {
    if (navigator.onLine) {
      console.info('NetworkState: online')
      syncRecords();
    }
    else {
      console.info('NetworkState: offline')
    }
  }, 3000);
}
```

worker.js

```
const syncRecords = async () => {
  const db = await openDatabase();
  const records = await db.getAllFromIndex('groceryList', 'synced', 'false');
  db.close();

  records.forEach(async (record) => {
    const response = await fetch('http://127.0.0.1:3000', {
      method: "post",
      headers: {
        'Accept': 'application/json',
        'Content-Type': 'application/json',
      },
      body: JSON.stringify(record)
    });

    if (response.status === 200) {
      await saveData([{ ...record, synced: 'true' }]);
    }
  });
}
```

utils.js

```
export const saveData = async (data) ⇒ {
  if (data.length > 0) {
    const db = await openDatabase();
    data.forEach(async (item) ⇒ {
      await db.put('groceryList', item);
    });
    db.close();
  }
}
```


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Access File System API

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File System Access API

Interact with files on the user's local device

Adobe Photoshop Web Version

vscode.dev

```
const saveFile = async () => {
  const fileHandle = await window.showSaveFilePicker({
    types: [
      {
        accept: { 'text/plain': ['.txt'] }
      }
    ]
  });
  const writable = await fileHandle.createWritable();
  await writable.write('Hello World!');
  await writable.close();
};
```

```
const readFile = async () => {
  const fileHandle = await window.showOpenFilePicker(
    {
      types: [
        {
          accept: { 'text/plain': ['.txt'] }
        }
      ]
    });
  const file = await fileHandle[0].getFile();
  const contents = await file.text();
  console.log(contents);
};
```


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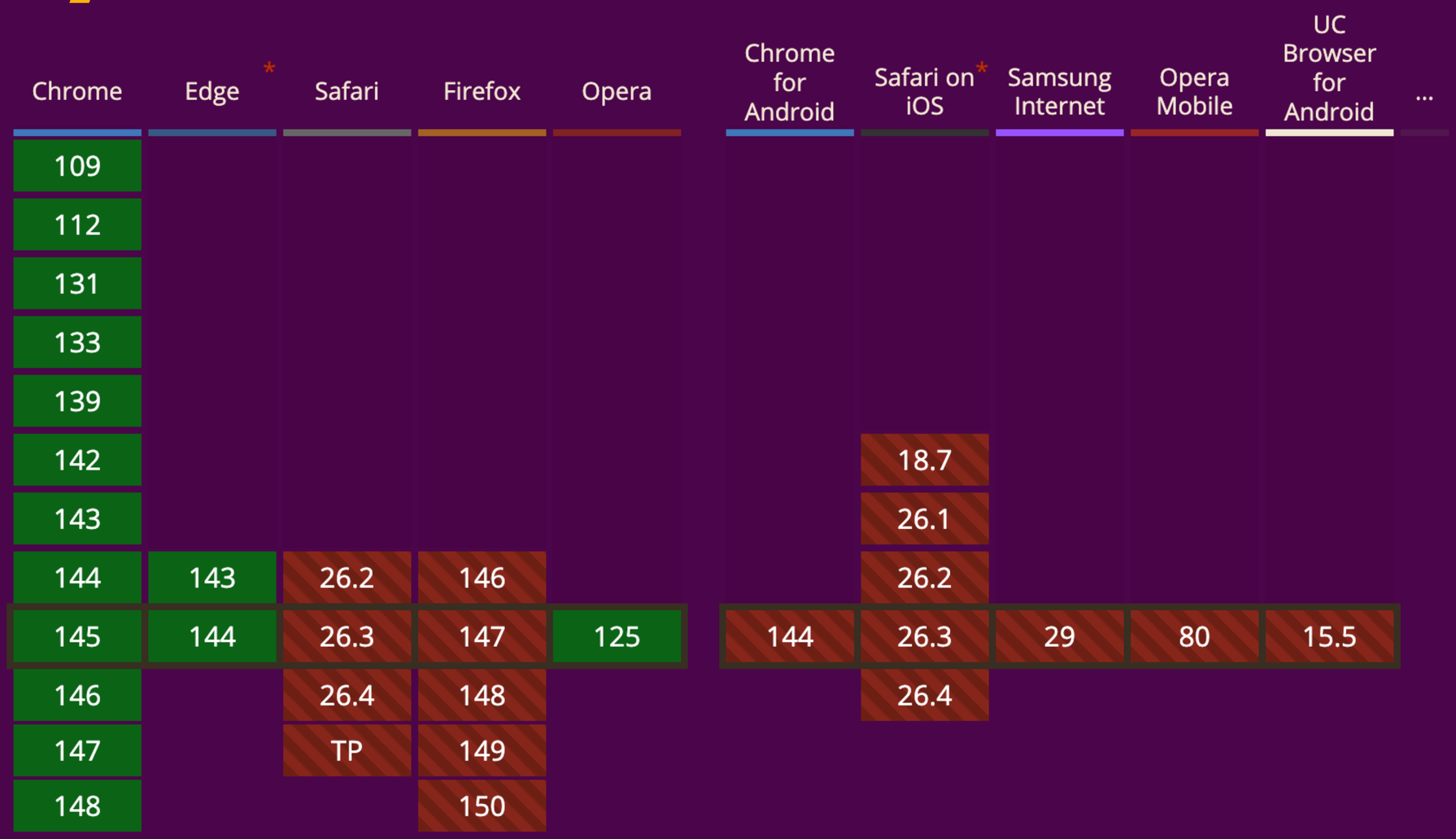
File System Access API



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File API

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File API

Origin Private File System

Virtual drive within the browser sandbox

No access to the users' file system

input type = “file” or via drag and drop

Read-only

```
const fileInput = document.querySelector("input[type=file]");
const output = document.querySelector(".output");

fileInput.addEventListener("change", async () ⇒ {
  const [file] = fileInput.files;

  if (file) {
    output.innerText = await file.text();
  }
});
```

File API

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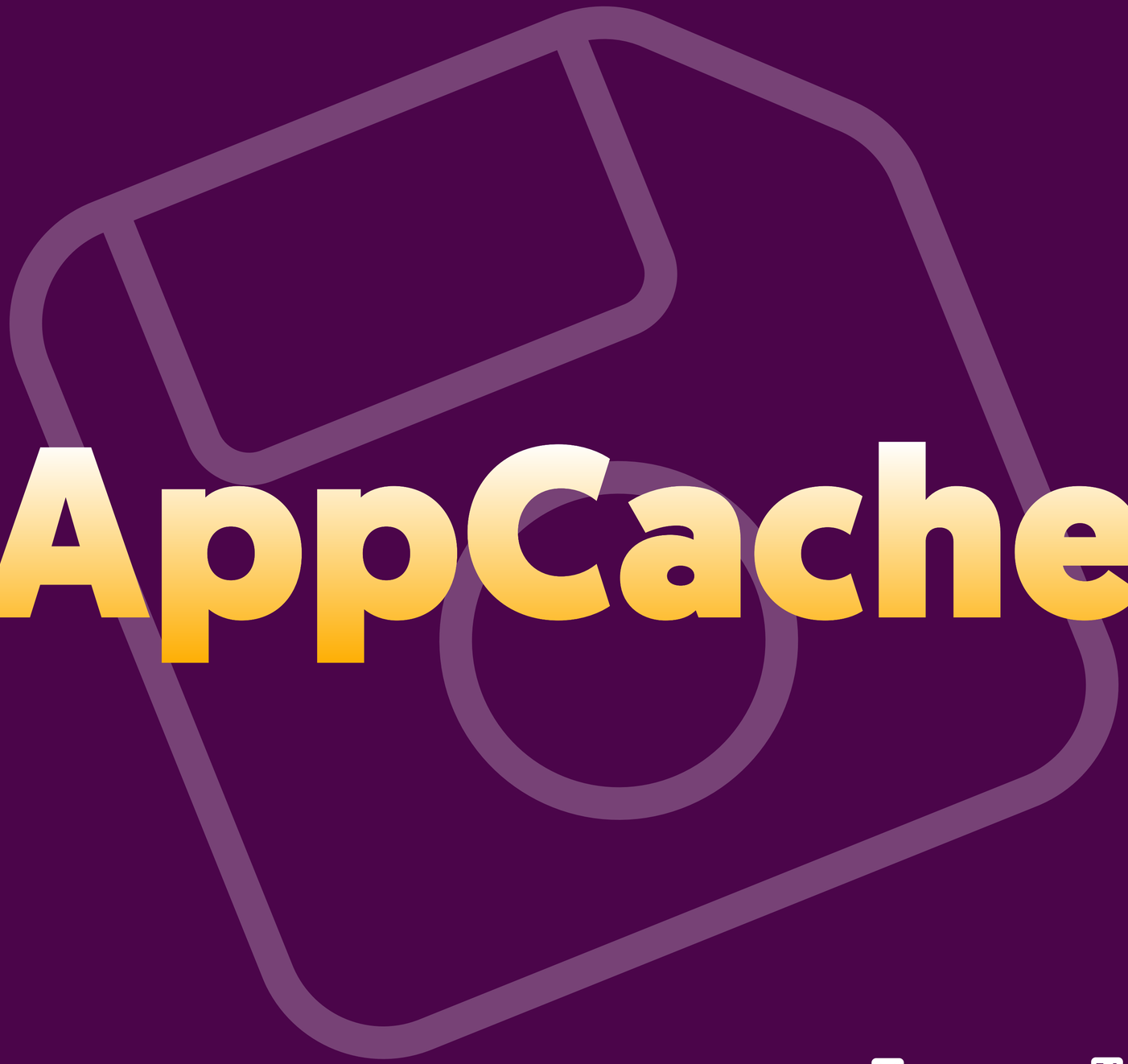

AppCache

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```html
<!DOCTYPE html>
<html lang="en" manifest="offline.appcache">
```

```
CACHE MANIFEST
# v2

favicon.ico
js/script.js
css/styles.css
https://code.jquery.com/jquery-3.7.1.min.js

NETWORK:
img/hero.jpg
```

AppCache

Files are only cached if all files in the manifest are available

HTML file that has manifest is cached as well

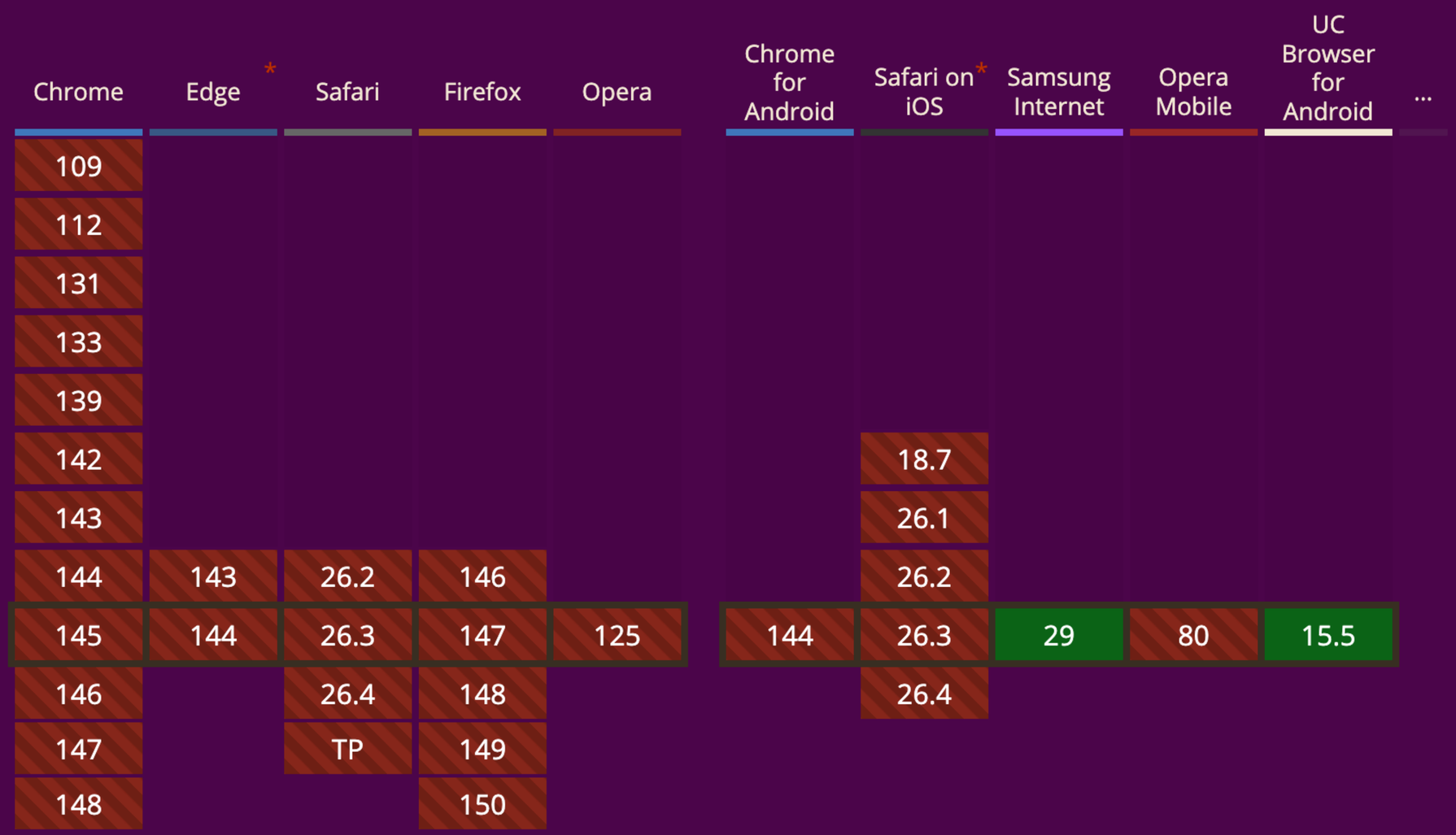
Cache files are always served from appcache

HTML updates require update manifest

Online only assets (like analytics) must be in NETWORK

mobilism
2012

AppCache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Cache Storage

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Cache Storage

Typically used with Service Workers

Pre-cache static assets

Cache assets on the fly

Serve assets from the cache for performance and offline access

```
const STATIC_CACHE = "static";
const STATIC_FILES = [
  "index-3.html",
  "script-3.js",
  "../assets/svg/floppy.svg",
  "../assets/css/style.css",
];

self.addEventListener("install", async () => {
  const cache = await caches.keys();
  if (!cache.length) {
    caches.open(STATIC_CACHE).then((cache) => {
      cache.addAll(STATIC_FILES);
    });
  }
  self.skipWaiting();
});
```

```
DYNAMIC_CACHE = "dynamic";

self.addEventListener("fetch", (event) => {
  event.respondWith(getFromNetworkOrCache(event.request));
});

const getFromNetworkOrCache = async (request) => {
  const cacheResponse = await caches.match(request);
  if (cacheResponse) {
    return cacheResponse;
  }
  else {
    const networkResponse = await fetch(request);
    const cache = await caches.open(DYNAMIC_CACHE);
    cache.put(request, networkResponse.clone());
    return networkResponse;
  }
}
```


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Cache Storage

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Merci beaucoup!

rowdy.codes/storage

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