Behind the Scenes of an Online Ad
Google Doubleclick Frame:
https://s0.2mdn.net/9026094/1559035272353/amnet_160x600/index.html
How Does A Browser Work?

Six main components inside a web browser:

1. User interface
2. Rendering engine
3. Browser engine
4. JavaScript interpreter
5. Networking
6. Data storage
1. User Interface

- The main window that displays the web page and
- The navigation elements, e.g.,:
  - address bar,
  - forward & back button,
  - toolbar,
  - search bar, etc.
- The backend of the user interface connects to the operating system.
2. Rendering Engine

- The rendering engine displays the web page.
- It does so by parsing HTML code and CSS code.
- When the content is parsed, it is displayed on the screen.
3. Browser Engine

The browser engine links the user interface with the rendering engine.
4. JavaScript Interpreter [1]

- The JavaScript interpreter parses and executes the scripts on a web page.
- When a web page is loaded, the browser creates the Document Object Model (DOM) and the CSS Object Model (CSSOM) of the web page.

- The nodes of every document are organized in a tree structure, called the DOM tree and the CSSOM tree.
- JavaScript can add, change, and remove any of the elements and attributes in the trees.
- JavaScript makes elements interactive by reacting to existing events and create new events.
5. Networking

The networking building block performs implements of HTTP requests and responses.
6. Data Storage

- JavaScript has access to **Web APIs**.
- When writing code for the Web, there are a large number of **Web APIs** available for the development of a **web page** or a **web app**.

**Example Web APIs:**

**Storage (API) mechanisms in browsers:**
- Cache Storage
- Indexed DB
- Service Worker registrations
- Cookies
- Local Storage
- Session Storage
First Party and Third Party Definition

Publisher and store are first party contexts, while tracker and metrics are in the third party context.
## Cookie Differences By Browser

<table>
<thead>
<tr>
<th></th>
<th>Chrome</th>
<th>Firefox</th>
<th>Safari</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cookies in a third-party context</td>
<td>No restrictions*</td>
<td>Access restricted for known trackers*</td>
<td>All access restricted, except with Storage Access API</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Google Chrome will no longer support 3rd party cookies <strong>in late 2023.</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Firefox to add SmartBlock to preserve functionality while blocking tracking mechanisms</td>
<td></td>
</tr>
<tr>
<td>Protection mechanism</td>
<td>N/A</td>
<td>Enhanced Tracking Protection (+SmartBlock)</td>
<td>Intelligent Tracking Prevention (ITP)</td>
</tr>
<tr>
<td>Default protection mode</td>
<td>N/A</td>
<td>By Default</td>
<td>By Default</td>
</tr>
<tr>
<td>Classification of “known trackers”</td>
<td>N/A</td>
<td>Disconnect.me</td>
<td>Algorithmic</td>
</tr>
</tbody>
</table>