State Management

Cookies and Sessions
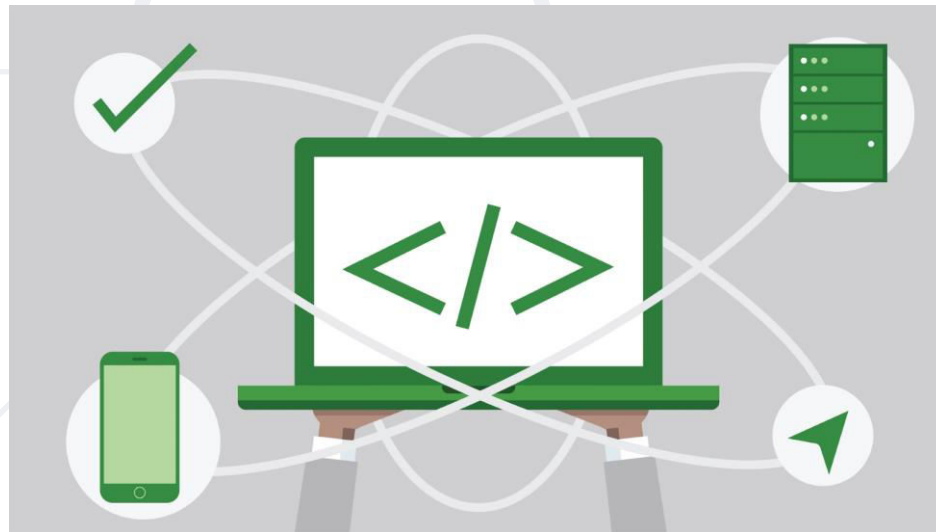
SoftUni Team

Technical Trainers

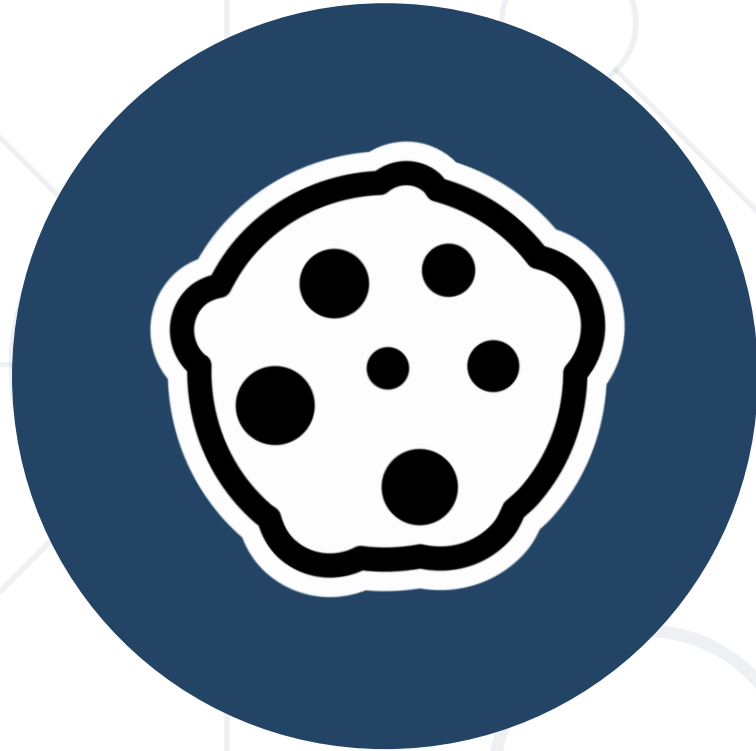**Software University**

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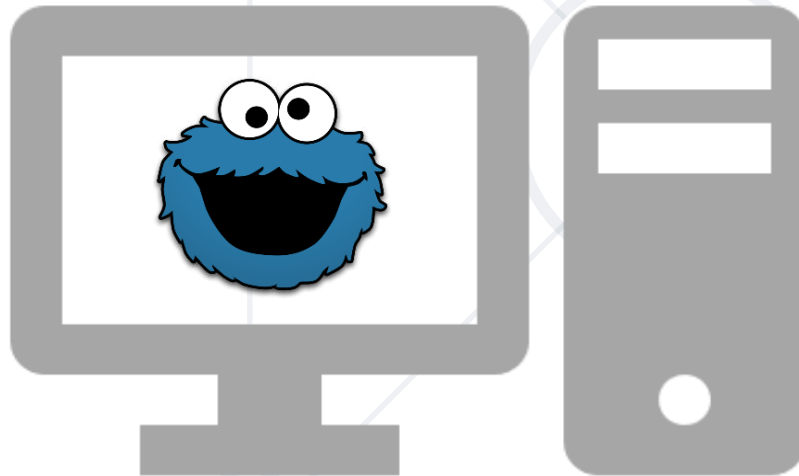
sli.do

#java-web

HTTP Cookies

Usages and Control

What are Cookies?

- A small file of plain text with no executable code

    - Sent by the server to the client's browser

    - Stored by the browser on the client's device (computer, tablet, etc.)

   - Hold small piece of data for a particular client and a web site

What are Cookies used for?

- Session management

  - Logins, shopping carts, game scores, or anything else the server should remember

- Personalization

  - User preferences, themes, and other custom settings

- Tracking

  - Recording and analyzing user behavior

- Breakfast

  - But that's not what we are currently talking about

Session Management

- The HTTP object is **stateless**

    - it **doesn't store** information about the requests

Web Client

Web Application

GET

POST

GET

Not stored

Stateless HTTP – the Problem
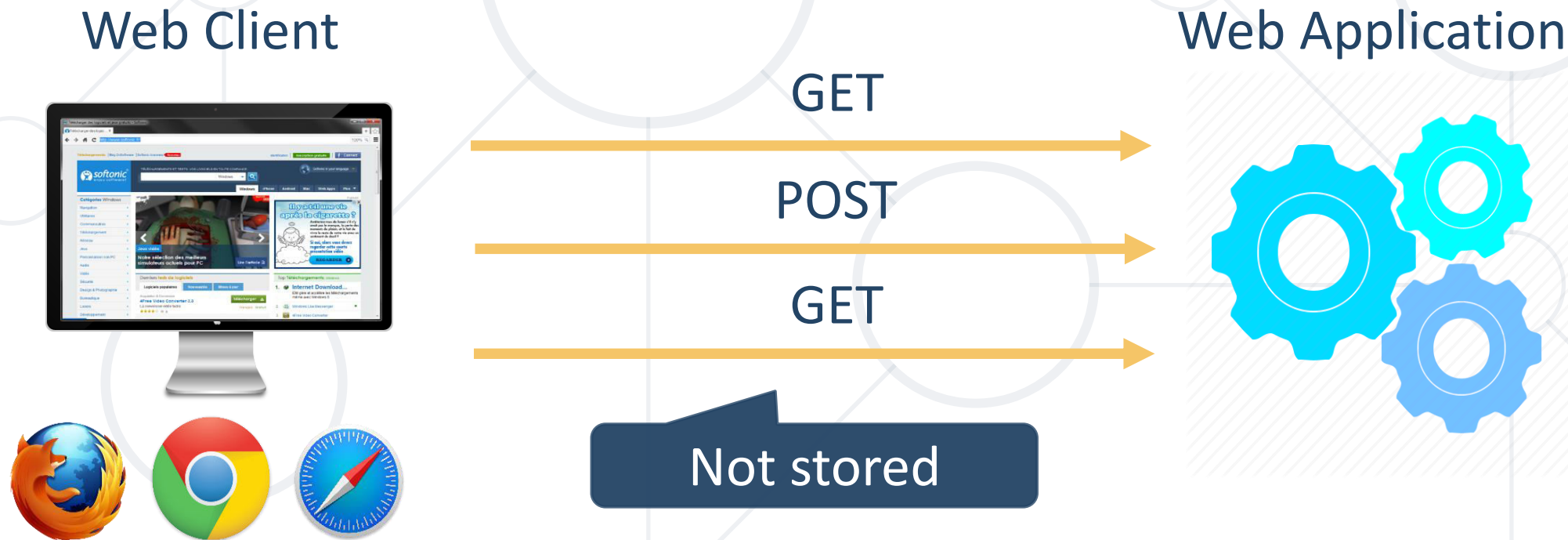
- The server does not know if two requests come from the same client

- State management problems

  - Navigation through pages requires authentication each time

  - Information about the pages is lost between the requests

  - Harder personalization of functionality of pages

Stateless HTTP – the Cookie Solution

- A reliable mechanism for websites to remember stateful information

    - to know whether the user is logged in or not

    - to know which account the user is logged in with

    - to record the user's browsing activity

    - to remember pieces of information previously entered into form fields (usernames, passwords, etc.)
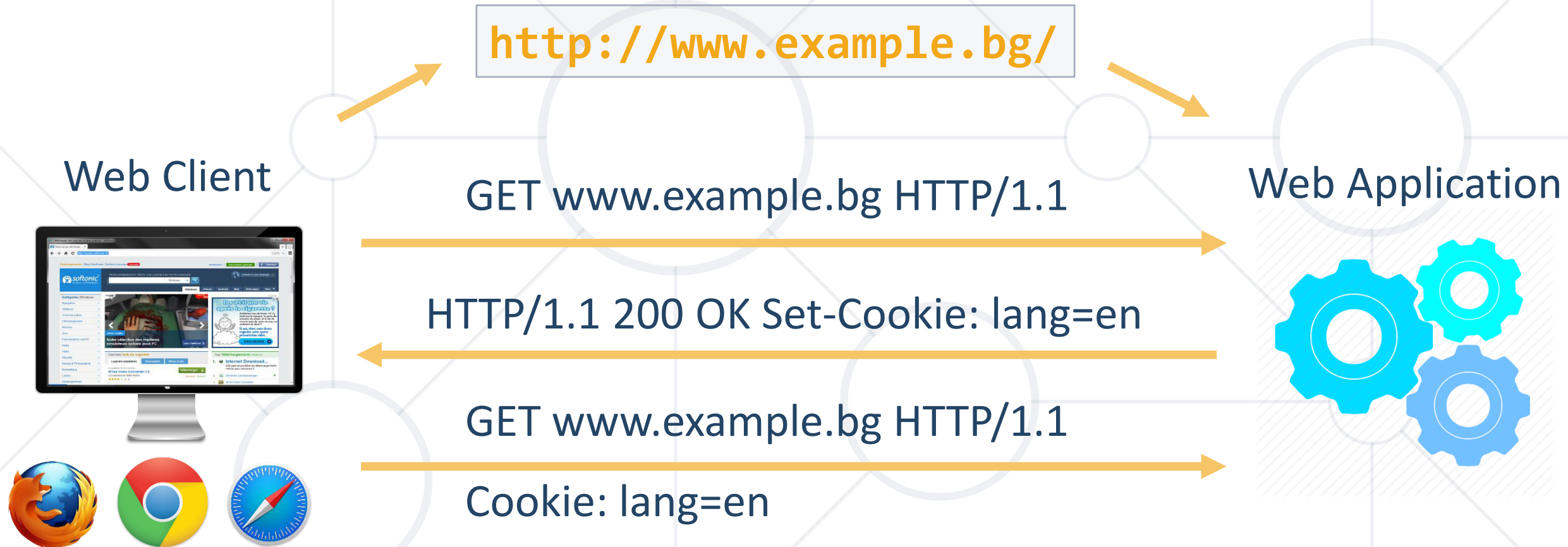
How are Cookies Used?

- The response holds the cookies to be saved within the **Set-Cookie** header

```
HTTP/1.1 200 OK
Set-Cookie: lang=en
```

- The request holds the specific web site cookie within the **Cookie** header

```
GET www.example.bg HTTP/1.1
Cookie: lang=en
```

Server-Client Cookies Exchange

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Web Client

http://www.example.bg/

Web Application

GET www.example.bg HTTP/1.1

HTTP/1.1 200 OK Set-Cookie: lang=en

GET www.example.bg HTTP/1.1

Cookie: lang=en

Cookie Structure

- The cookie consists of Name, Value and Attributes (optional)

- The attributes are key-value pairs with additional information

- Attributes are not included in the requests

- Attributes are used by the client to control the cookies

Name=Value

Attributes

```
Set-Cookie: SSID=Ap4P…GTEq; Domain=foo.com; Path=/;
Expires=Wed, 13 Jan 2021 22:23:01 GMT; Secure; HttpOnly
```

Scope

- Defined by the attributes **Domain** and **Path**

- **Domain** – defines the website that the cookie belongs to

- **Path** – Indicates a **URL** path that must exist in the requested re source before sending the **Cookie** header

```
Set-Cookie: SSID=Ap4P…GTEq; Domain=foo.com; Path=/;
Expires=Wed, 13 Jan 2021 22:23:01 GMT; Secure; HttpOnly
```

Lifetime

- Defined by the attributes **Expires** and **Max-Age**

- **Expires** – defines the date the browser should delete the cookie

    - By default the cookies are deleted after the end of the session

- **Max-Age** – interval of seconds before the cookie is deleted

```
Set-Cookie: SSID=Ap4P…GTEq; Domain=foo.com; Path=/;
Expires=Wed, 13 Jan 2021 22:23:01 GMT; Secure; HttpOnly
```

Security

- Security flags do not have associated values

- **Security** - tells the browser to use cookies only via secure/encrypted connections

- **HttpOnly** – defines that the cookie cannot be accessed via client-side scripting languages

```
Set-Cookie: SSID=Ap4P…GTEq; Domain=foo.com; Path=/;
Expires=Wed, 13 Jan 2021 22:23:01 GMT; Secure; HttpOnly
```

What is in the Cookie?

- The cookie file contains a table with **key-value** pairs

Name:	ELOQUA
Content:	GUID=50B3A712CDAA4A208FE95CE1F2BA7063
Domain:	.oracle.com
Path:	/
Send for:	Any kind of connection
Accessible to script:	Yes
Created:	Monday, August 15, 2016 at 11:38:50 PM
Expires:	Wednesday, August 15, 2018 at 11:38:51 PM

Remove

Examine Your Cookies

- Most cookies are stored in a **RDBMS**, usually **SQLite**

- Download **SQLite browser** from here

- Location of Mozilla cookies

```
C:\Users\{username}\AppData\Roaming\Mozilla\Firefox\Profiles\{name}.default\cookies.sqlite
```

- Location of Chrome cookies

```
C:\Users\{username}\AppData\Local\Google\Chrome\User Data\Default\Cookies
```

Examine Your Cookies (2)

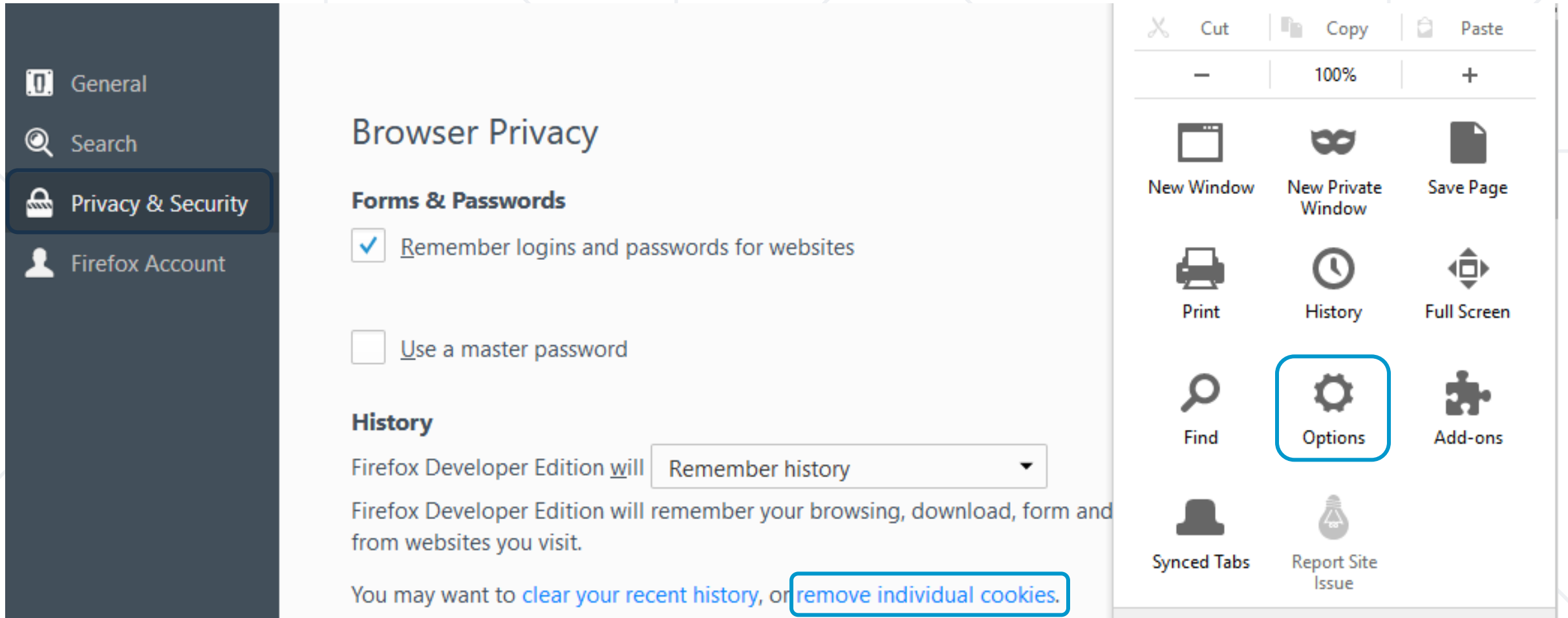- Open the file with the SQLite browser
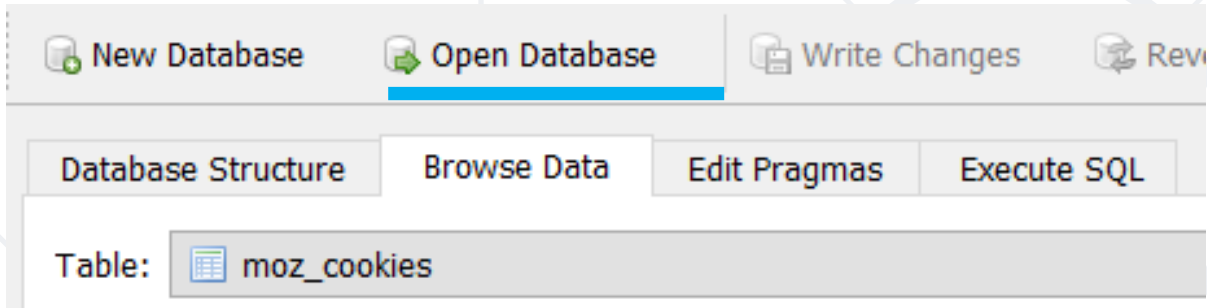
- Browse the cookies table

	baseDomain	originAttributes	name	value	host	path	expiry	lastAccessed	creationTime
	Filter	Filter	Filter	Filter	softuni	Filter	Filter	Filter	Filter
1	softuni.bg		_ga	GA1.2.14749...	.softuni.bg	/	1548331112	1485259173536000	1472458246652000
2	softuni.bg		cb-enabled	enabled	platform.soft...	/	1512124532	1485213524987000	1480588532898000
3	softuni.bg		cookies-notifi...	ok	judge.softuni....	/	1787818276	1485259172447000	1472458276862000
4	softuni.bg		cb-enabled	accepted	softuni.bg	/	1503994248	1485214353890000	1472458248921000

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Control Your Cookies – Mozilla Browser

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Control Your Cookies – Mozilla Browser (2)

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Browse cookies from a selected website

Delete a particular cookie or all cookies

Control Your Cookies – Chrome Browser

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On startup		Bookmarks	▶
● Open the New Tab page		Zoom	− 100% + ⊏⊐
○ Continue where you left off		Print...	Ctrl+P
○ Open a specific page or set of pages		Cast...	
		Find...	Ctrl+F
		More tools	▶
	Advanced ▾	Edit Cut Copy Paste	
		Settings	
		Help	▶
		Exit	Ctrl+Shift+Q
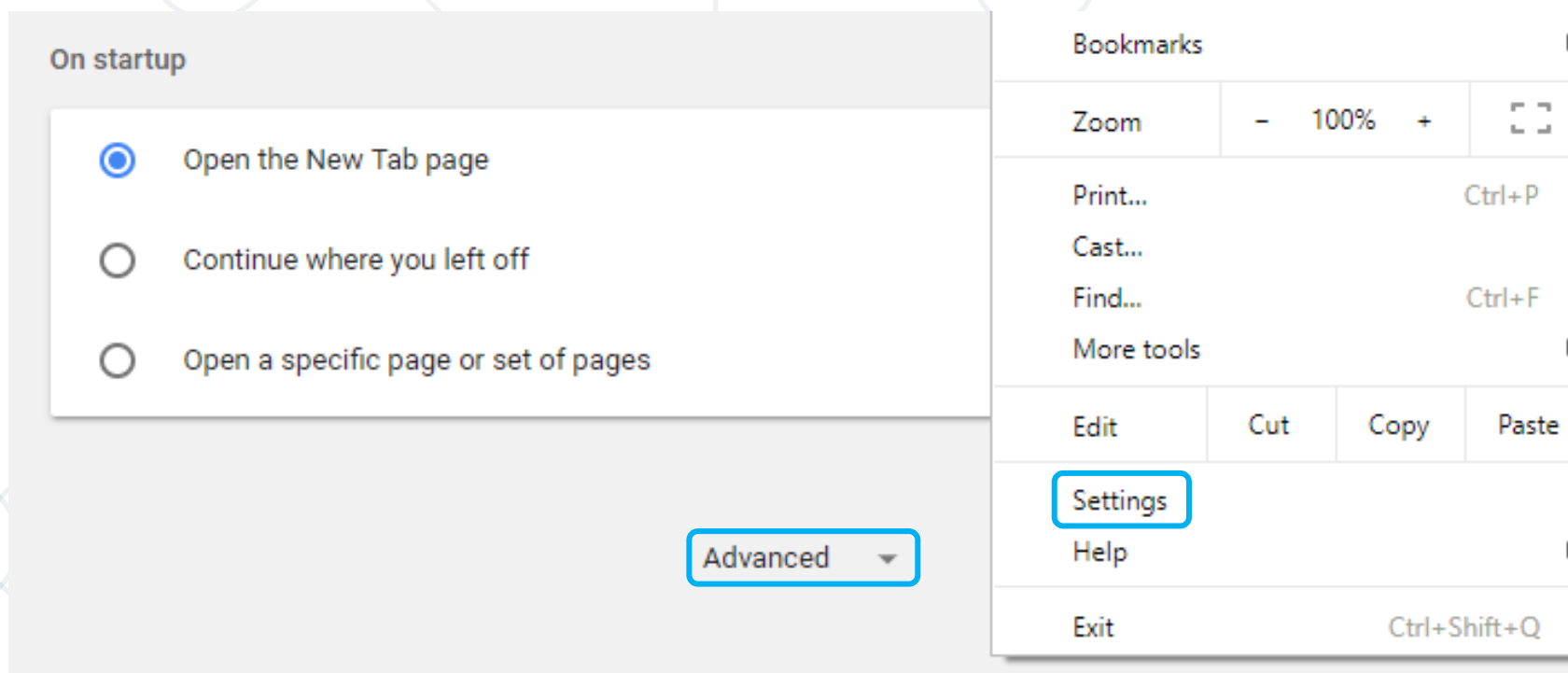
Content settings
Control what information websites can use and what content they can show you

Cookies
Allow sites to save and read cookie data

Third Party Cookies

- Cookies stored by an external party (different domain)

http://stackoverflow.com/

Web Client

Web Application

Cookie transfer

Cookie transfer
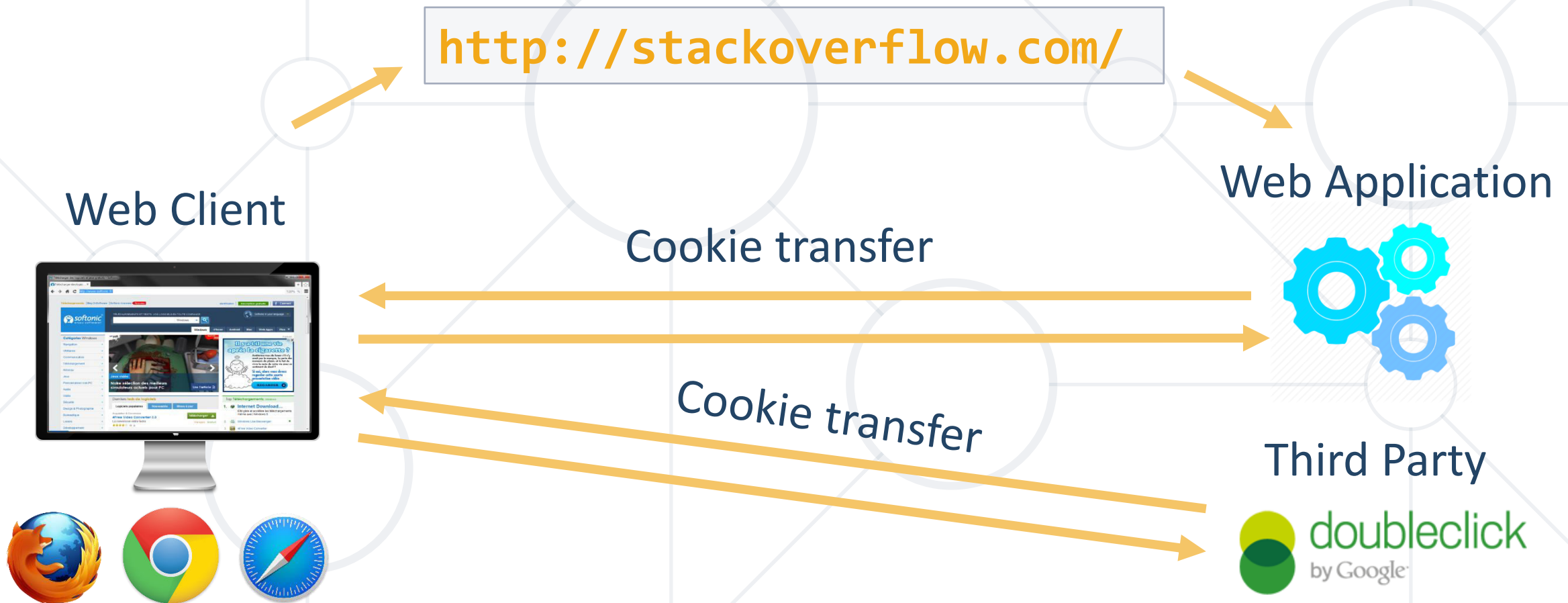
Third Party

Third Party Cookies

- Cookies stored by an external party (different domain)

- Mainly used for advertising and tracking across the web

`http://stackoverflow.com/`

Web Client

Web Application

Cookie transfer

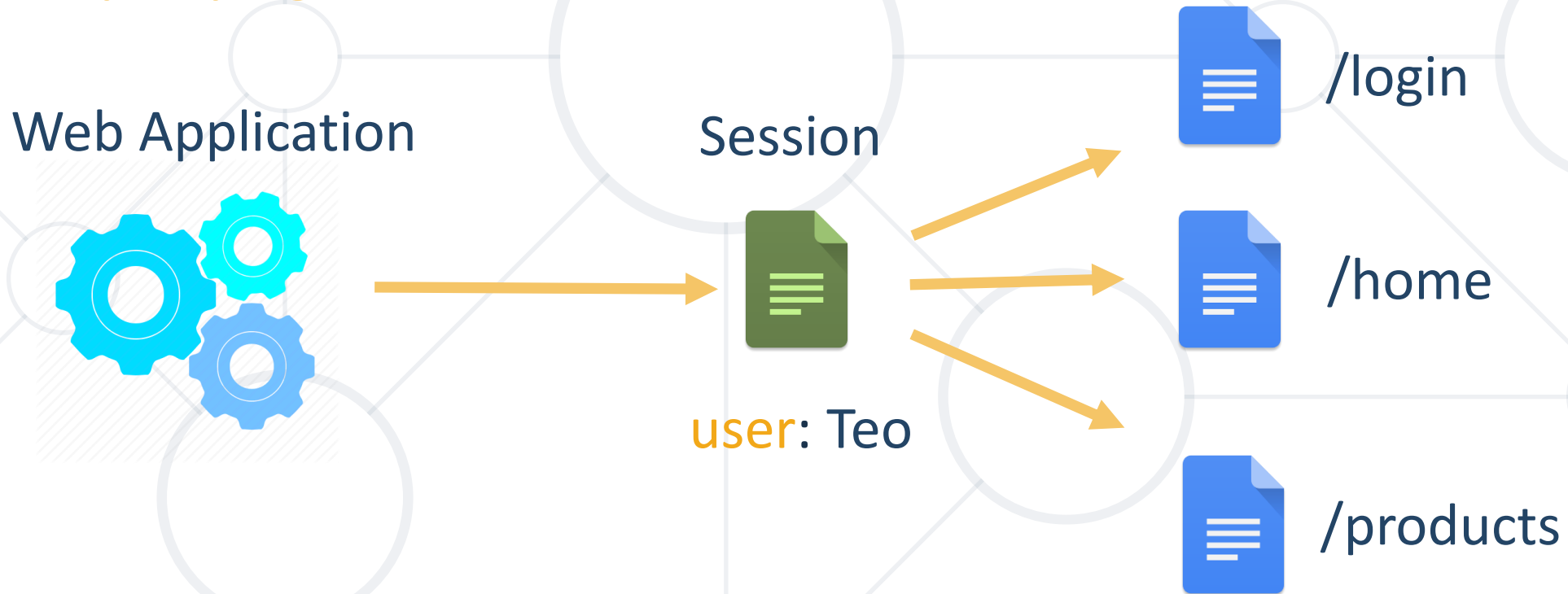Cookie transfer

Third Party
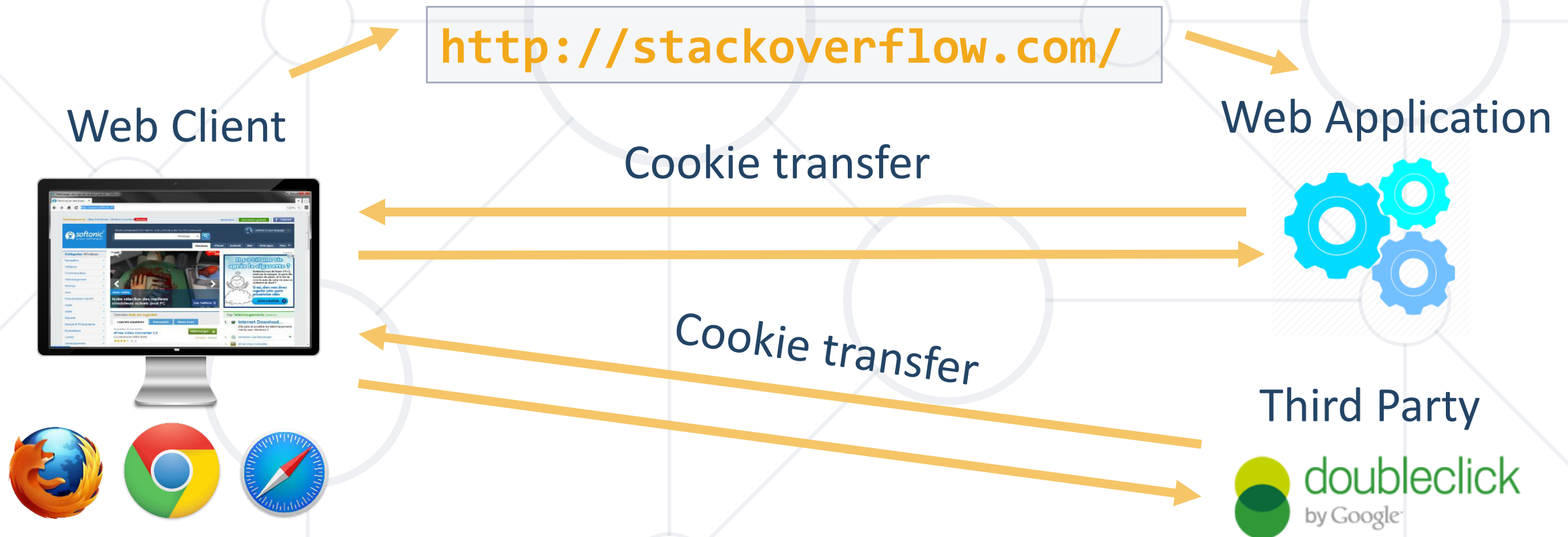
Cookies
Live Demo

HTTP Sessions

What are Sessions?

- A way to store information about a user to be used across multiple pages

Web Application

Session

user: Teo

/login

/home

/products

Session Management

- The exchange mechanism be used between the user and the web application

First Time Login

Web Client

Web Application

User credentials

Session ID

Session Management

- The exchange mechanism be used between the user and the web application

Browsing Pages

Web Client

Web Application

Session ID

Requested data + Session ID

Session Management

- The exchange mechanism be used between the user and the web application

Browsing pages after the server is restarted

Web Client

Web Application

Session ID

Requested Data + Session ID

Relation with Cookies

Session Store

```
sid 5 {
  uid: 101
}
sid 7 {
  uid: 102
}
```

Cookie {

name: sid

value: 5

}

Req
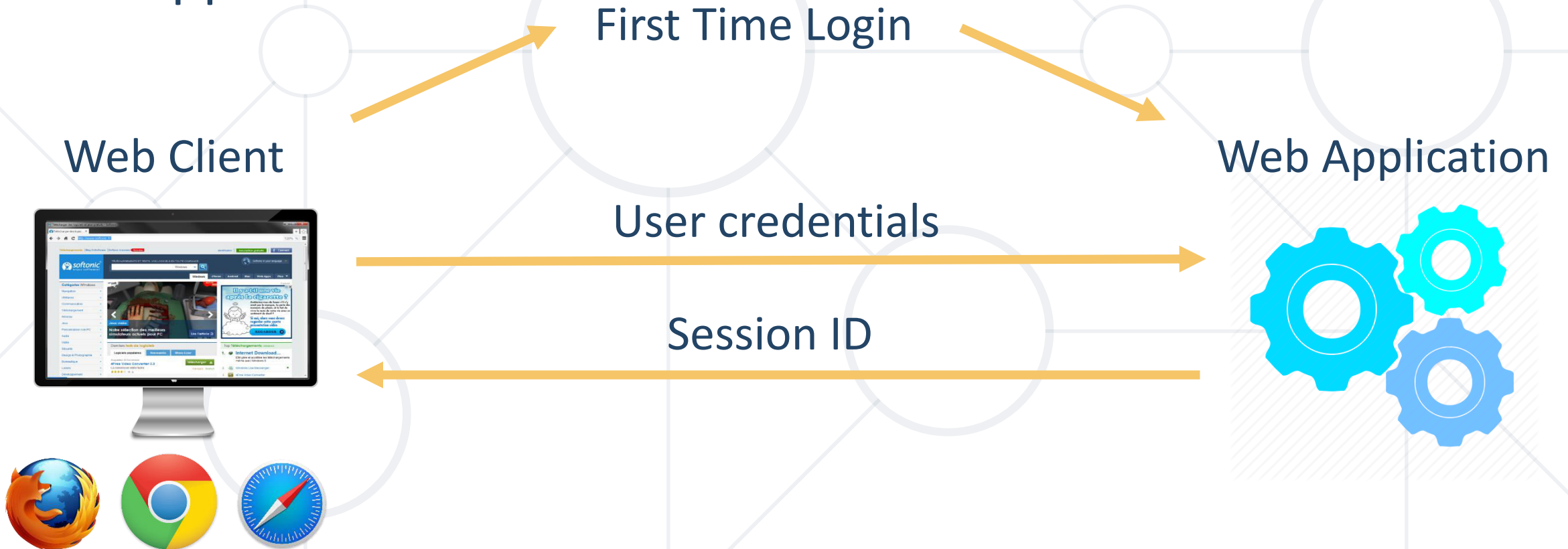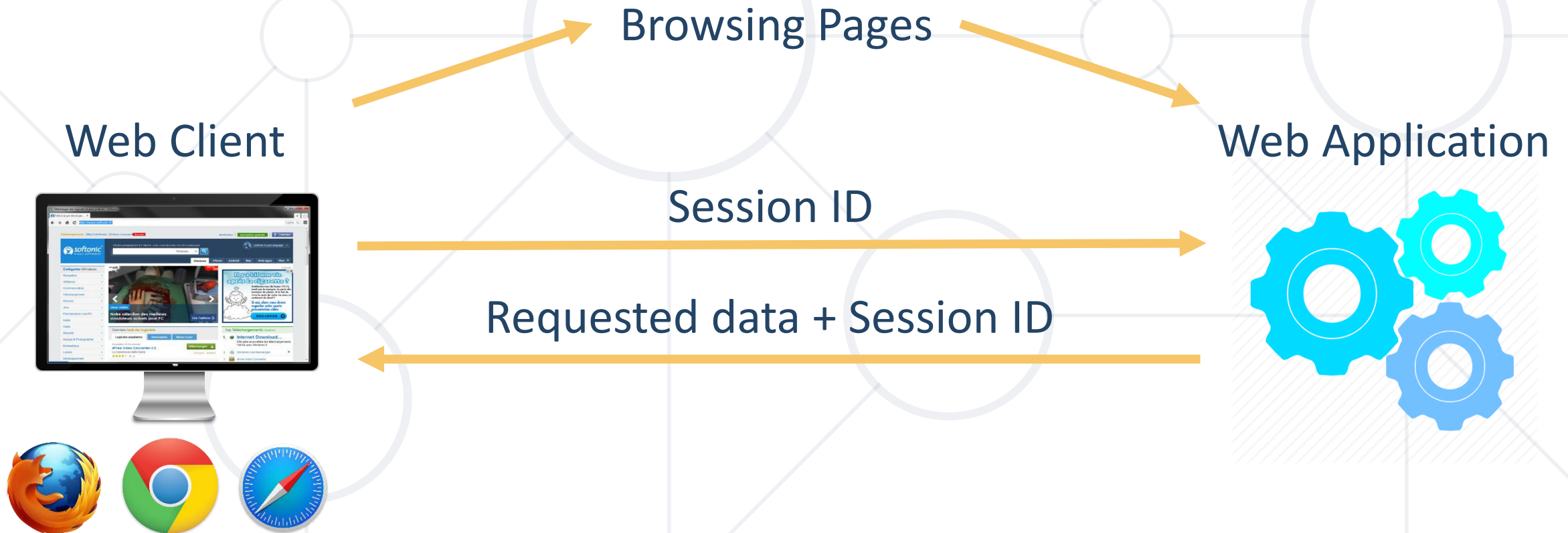
Web Application

Resp

Validate

Session

Cookie {

name: sid

value: 7

}

Req

Resp

Create personal web page

Get data

Database

```
uid  name
101 Teo
102 Bojo
```

Session Structure

Unique Session ID

Key-Value pairs with user data

```
"hje85d3" : {
               user_id: 789
               username: FirstUser
           },
"af354dd" : {
               user_id: 456
               username: SecondUser
           },
"fg78e5s" : {
               user_id: 654
               username: ThirdUser
           }
```
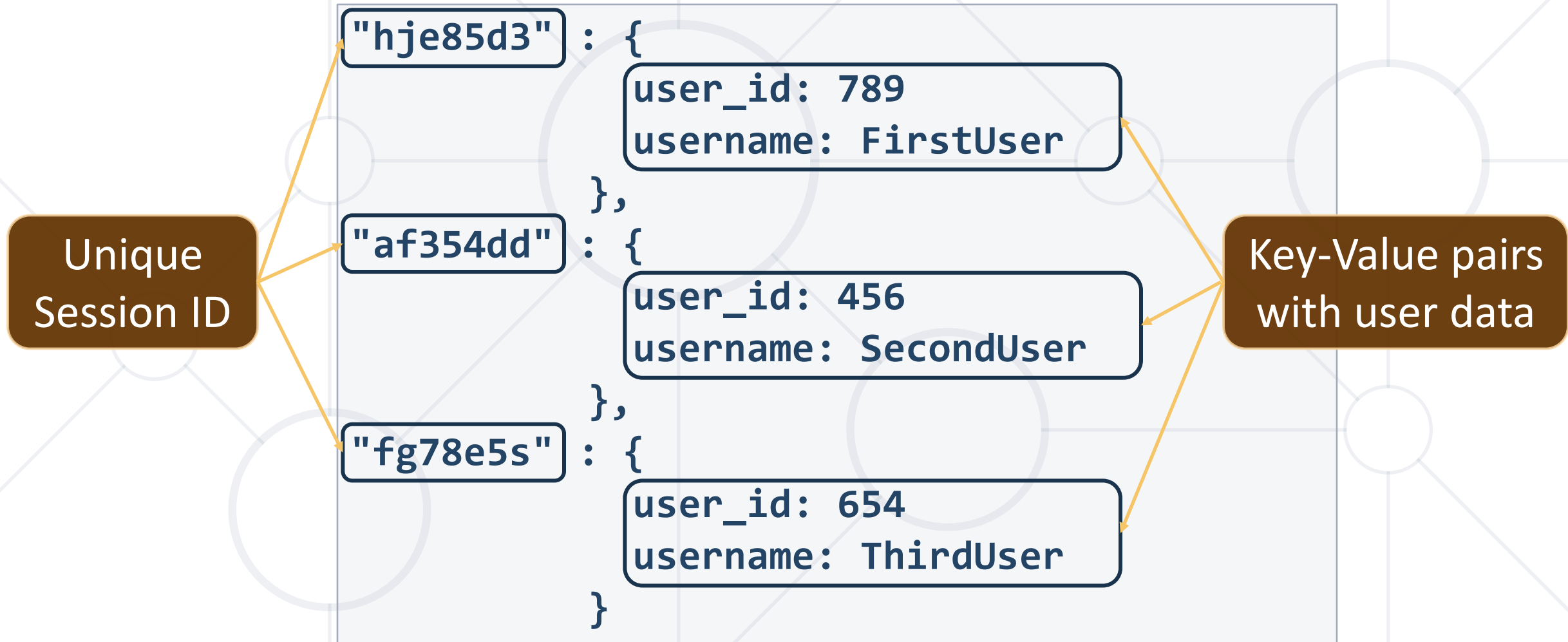
Sessions
Live Demo

Summary

- Cookies are client based stored information
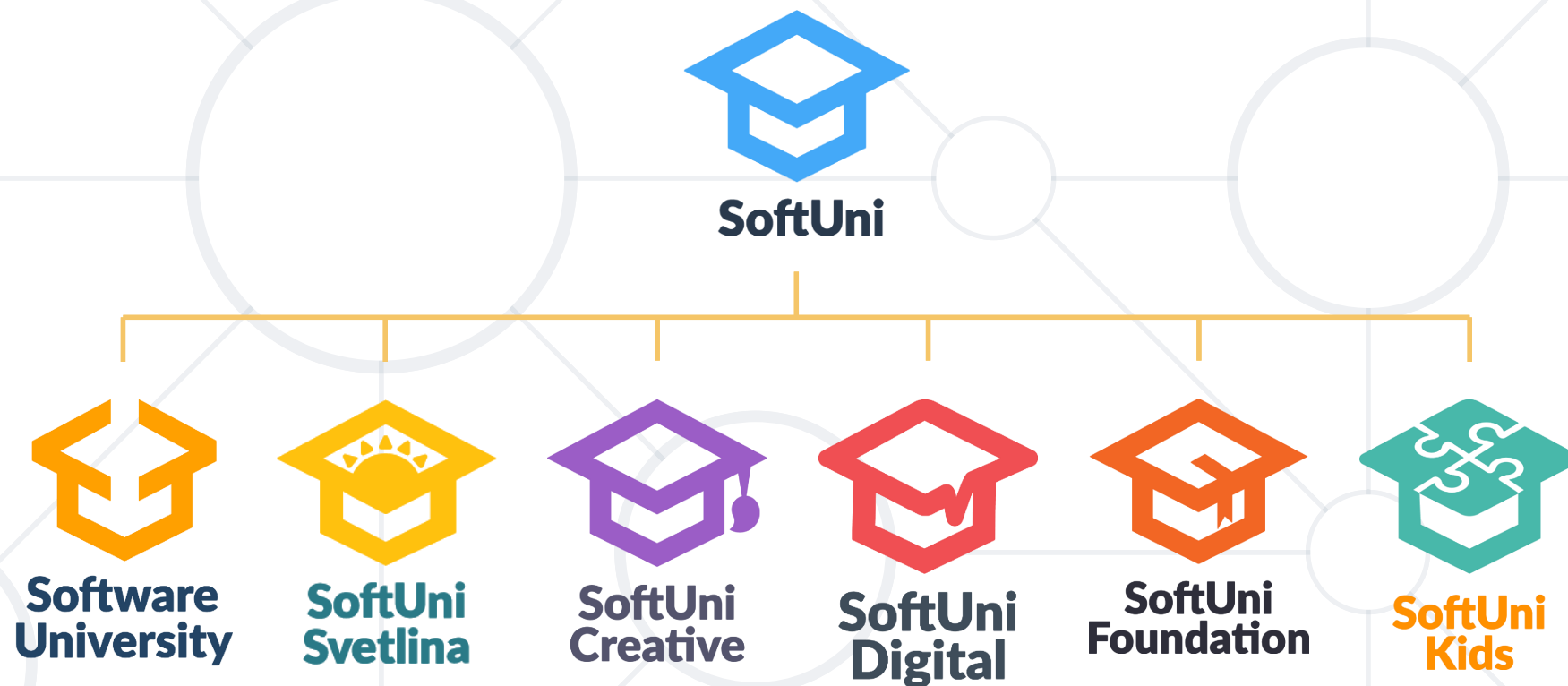 - They are created by web applications
  - Browser sends them back to the application
- Sessions are server based information
  - They are used across multiple pages
  - Stores important info about the client

Questions?

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https://softuni.bg/trainings/courses

SoftUni Diamond Partners

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telenor

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NETPEAK

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æternity

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