



VŠB TECHNICKÁ  
UNIVERZITA  
OSTRAVA

FAKULTA  
ELEKTROTECHNIKY  
A INFORMATIKY

KATEDRA  
INFORMATIKY

## Základy informačních technologií

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# Web Technologies



## WWW – World Wide Web

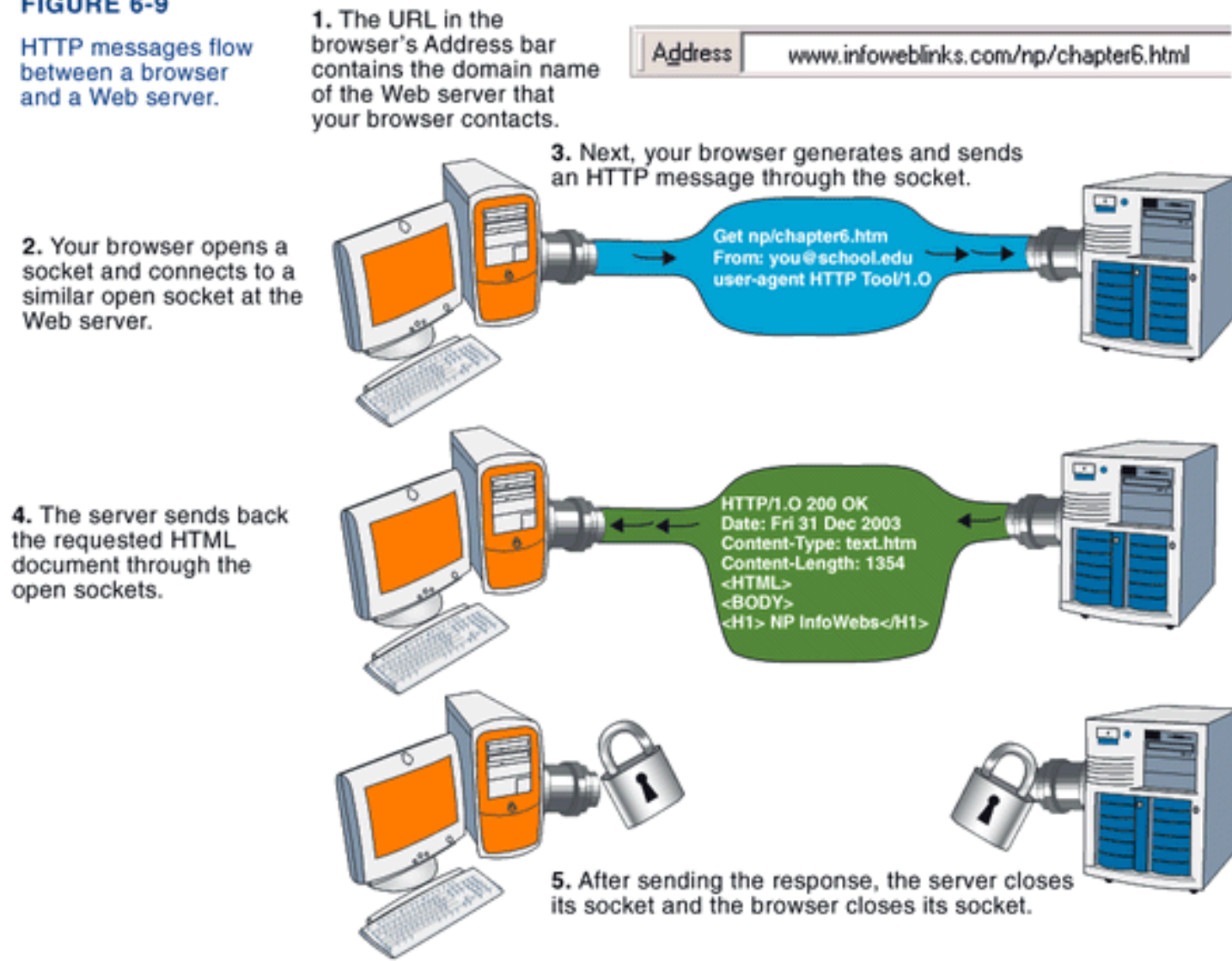
- A system of linked hypertext documents accessible on the Internet/intranet
- Making text and multimedia content available
- Built on **HTTP** (TCP/IP protocol)
- URLs are used to identify documents (not only)
- Uses the HTML scripting language (XHTML)
- Today's web pages separate content from appearance using CSS
  - static website - information stored and presented unchanged
  - dynamic web - information changes/is generated based on requests and parameters, both on the client side (javaScript, CSS, Applety, ActiveX, etc.) and on the server side (CGI, SSI, PHP, ASP, Java, etc.)

# HTTP (HyperText Transfer Protocol)

- Stateless text protocol
- Cookies – the ability to ensure "state", information stored at the client's premises, automatically sent in requests within the application/domain, Cookie bar vs. security of user

FIGURE 6-9

HTTP messages flow between a browser and a Web server.



# HTTP request

- Request GET  
GET path HTTP/version

```
GET / HTTP/1.0
Host: www.google.com
User-Agent: Mozilla/5.0
Accept: text/xml,application/xml,application/xhtml+xml,text/html
Accept-Language: cs-CZ,cs;q=0.9,en-US;q=0.8,en;q=0.7,defaultQLS
Accept-Encoding: gzip,deflate
Accept-Charset: windows-1250,utf-8;q=0.7,*;q=0.7
Cookie: PREF=ID=c0f4d58d41001453:TB=2:TM=1168255510:LM=1177510598:S=32VaTkcUR4ijOcQr
```

- Request POST  
POST path HTTP/version

```
POST /path/script.cgi HTTP/1.0
From: mole@garden.cs
User-Agent: MoleHill/0.13
Content-Type: application/x-www-form-urlencoded
Content-Length: 32

name=mole&event=trap&action=kill
```

- A set of other methods: PUT, HEAD, DELETE, PATCH, ...

# HTTP request

- Difference Between GET and

| Feature            | GET Method                                                            | POST Method                                                               |
|--------------------|-----------------------------------------------------------------------|---------------------------------------------------------------------------|
| Operation          | Used to retrieve information from the server.                         | Used to send data to the server to create/update a resource.              |
| Data Location      | Appends data to the URL, visible to all.                              | Includes data in the request body, not displayed in the URL.              |
| <u>Idempotency</u> | Idempotent; the same request can be repeated with no further changes. | Non-idempotent; repeating the same request can lead to different results. |
| Data Size          | Limited by the URL length; less data can be sent.                     | No limitations on data size; suitable for large amounts of data.          |
| Caching            | Can be cached.                                                        | Not cached by default.                                                    |
| Security           | Less secure as data is exposed in the URL.                            | More secure; data is concealed within the request body.                   |
| Use Case           | Ideal for searching and retrieving data.                              | Ideal for transactions and updating data.                                 |

# HTTP response

- HTTP/*version code text*

```
HTTP/1.1 200 OK
Cache-Control: private
Content-Type: text/html; charset=UTF-8
Content-Encoding: gzip
Server: gws
Content-Length: 68
Date: Fri, 21 Sep 2007 08:53:37 GMT

.....W.v.6...S .Z.jI..8.J"}.6q..I.'Mw.??> .R.@...@...G...../.....
```

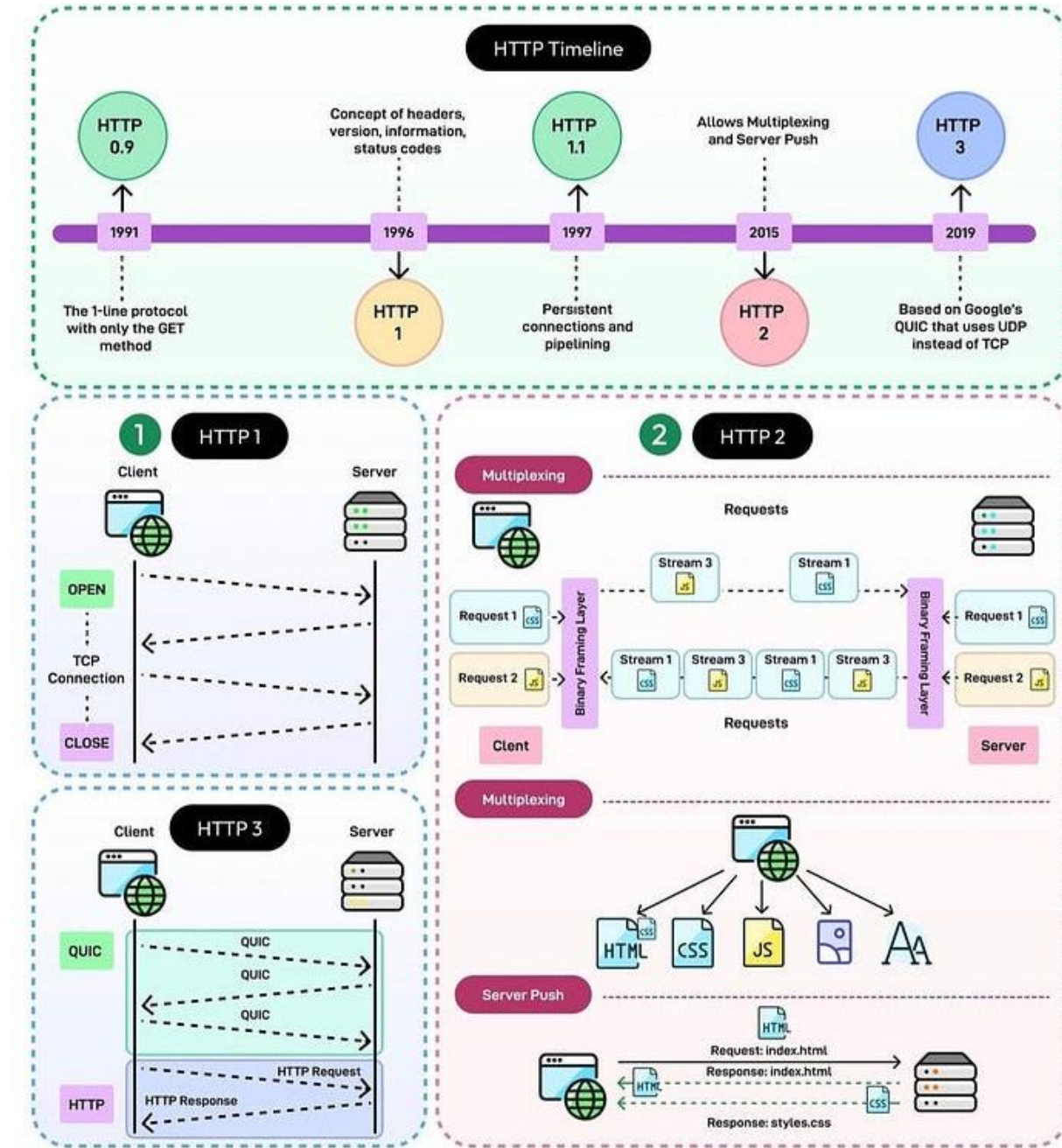
```
HTTP/1.0 404 Not Found
...
...
```

| kód | význam                         |
|-----|--------------------------------|
| 1xx | informační zpráva              |
| 2xx | indikuje nějaký úspěch         |
| 3xx | redirekce klienta na jinou URL |
| 4xx | chyba na straně klienta        |
| 5xx | chyba na straně serveru        |

# HTTP 1.1

- Persistent connection, cache - must be supported by both the client and the server
- Chunked data (sending in parts)
- Response 100 Continue
- Date in the header as a timestamp
- In header If-Modified-Since, If-Unmodified-Since

```
HTTP/1.1 304 Not Modified
Date: Fri, 31 Dec 1999 23:59:59 GMT
```



# HTTP/2

- Approved 2015
  - Based on Google's SPDY protocol
  - One TCP connection for parallel streams
  - Implementation always inside TLS (HTTPS)
  - Same HTTP API (1.1)
- 
- Request multiplexing
  - HTTP header compression
  - Binary protocol
  - Server pushing – sending data before the request
  - Improved safety

# HTTP/3

- Solves HTTP/2 issues (packet loss, filtering)
- Based on Google's QUIC protocol
- Based on UDP on the lower layer
- Reliable (even if UDP is not)
- Focus on speed and security/encryption
- <https://www.youtube.com/watch?v=a-sBfyiXysl>

# HTTPS

## SSL

- Secure Socket Layer is a protocol that between transport (TCP/IP) and application layer (HTTP) adds encryption
- SSL certificates – Asymmetric cryptography

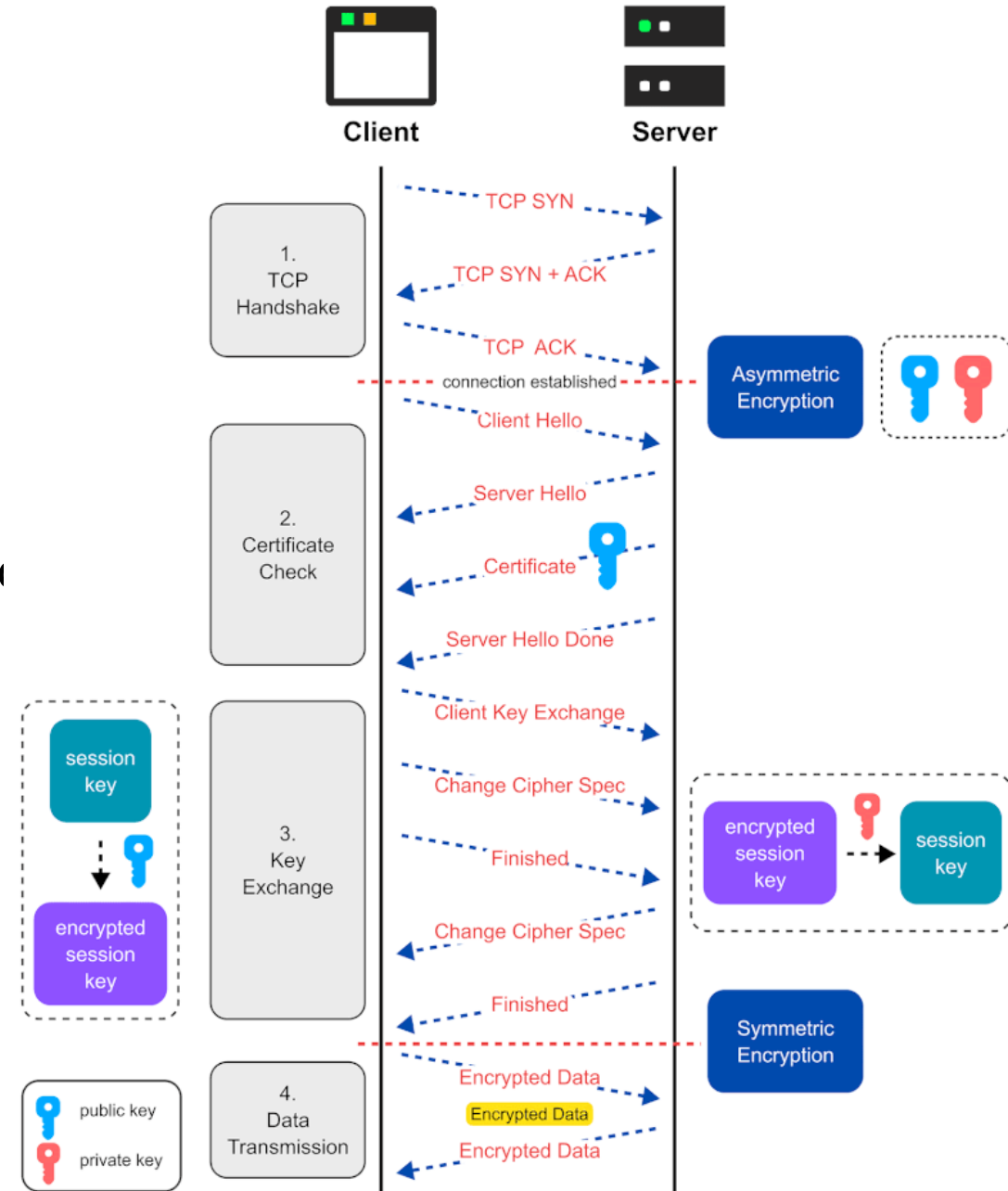
## TLS

- Transport Layer Security is the successor of the protocol SSL
- Confidentiality, Integrity, Verification
- TLS 1.3

## HTTPS

- "result" of an SSL/TLS application to HTTP protocol
- Port 443

## How does HTTPS Work?



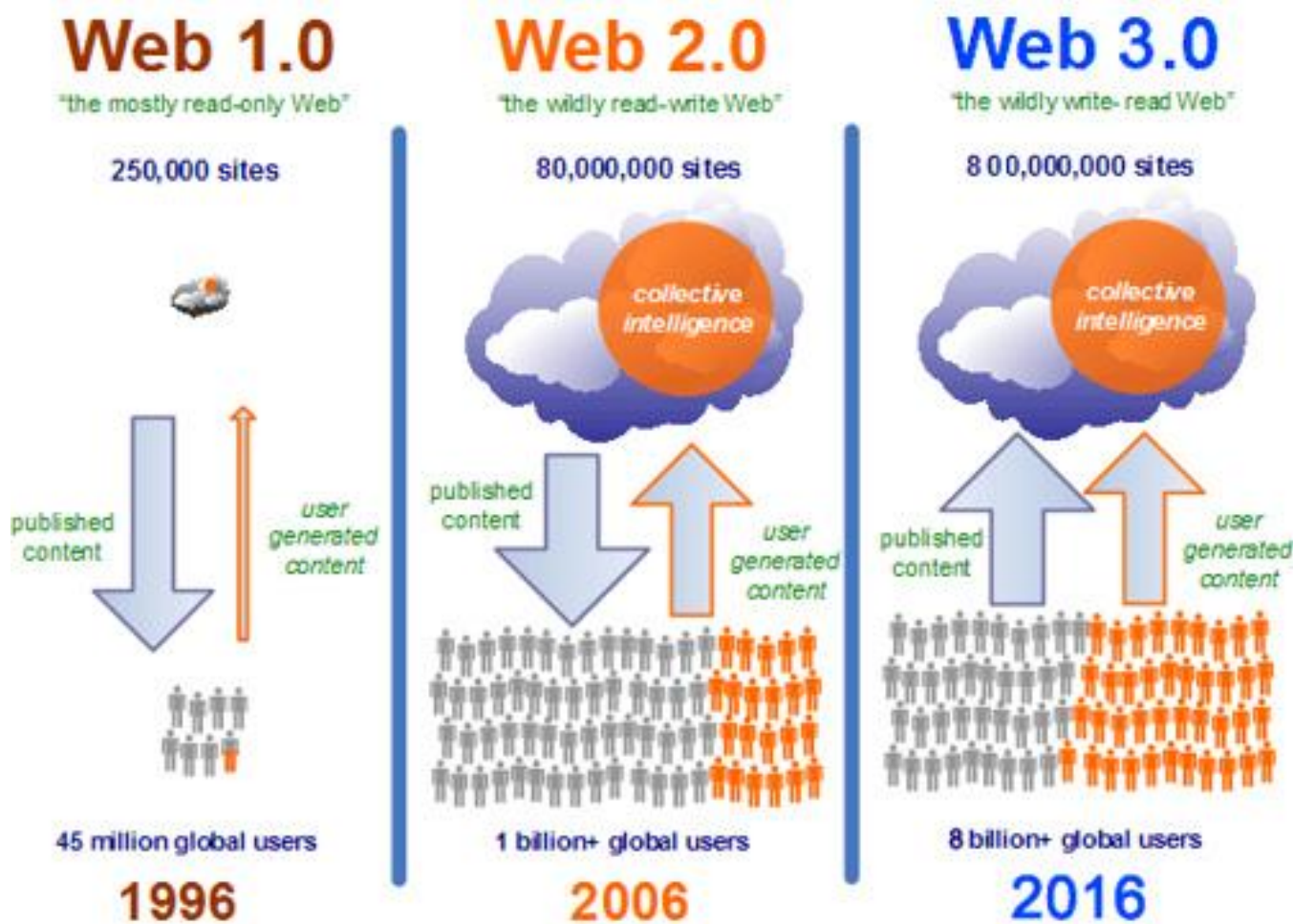
## Web 1.0

- Concept of the web as a space for searching for information and reading it using hypertext
- Almost exclusively, the owner of the content is also its author and must provide a background for the publication of his information
- It also includes a certain degree of interaction with the visitor (shopping cart)
- <https://www.youtube.com/watch?v=nHhAEkG1y2U>

## Web 2.0

- This is not a specification or standard
- It is a term that covers a wide range of ideas and visions that lead to new possibilities of using Internet services, and it uses existing modern web application technologies to support **these ideas and visions**
- Main Features
  - by changing hypertext pages from isolated information repositories to resources containing both information and functionality – they become a platform providing web applications to the end user
  - social phenomenon - the creation and distribution of web content is available to anyone, open communication, decentralization of authority, sharing and reuse, and the "market as a conversation"
  - More organized and sorted content with a more sophisticated hyperlink structure
- **Web 2.0 is an platform of ideas, not a technological one, for new services and possibilities of using the Internet**

# Web 2.0

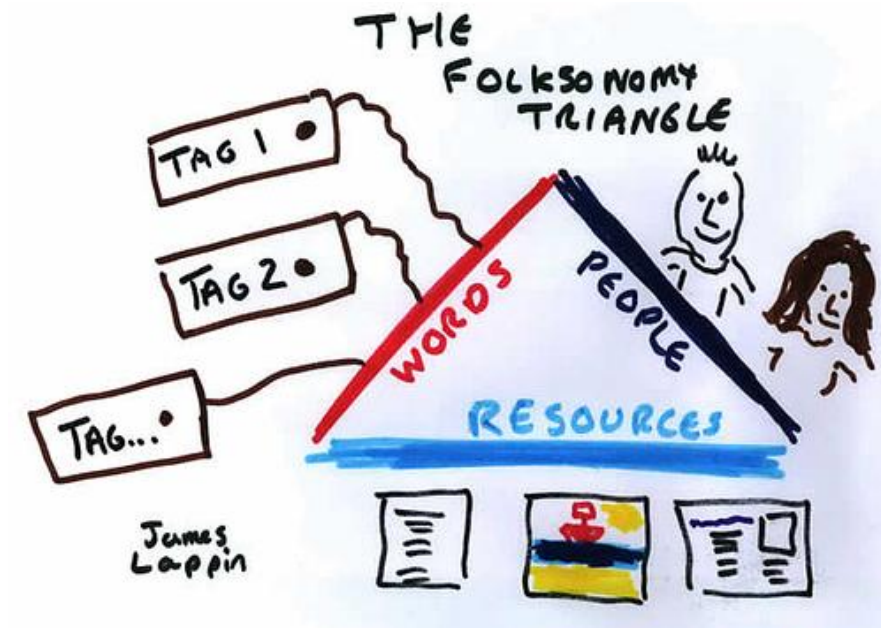


## Web 1.0 / 2.0 / 3.0 Summary

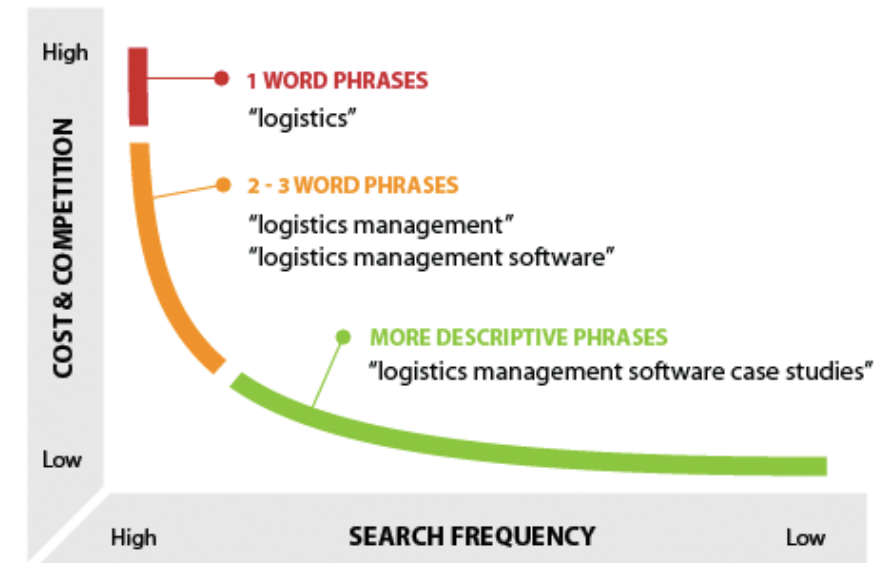
| Crawl              | Walk                    | Run                    |
|--------------------|-------------------------|------------------------|
| Web 1.0            | Web 2.0                 | Web 3.0                |
| Mostly Read-Only   | Wildly Read-Write       | Portable & Personal    |
| Company Focus      | Community Focus         | Individual Focus       |
| Home Pages         | Blogs / Wikis           | Lifestreams / Waves    |
| Owning Content     | Sharing Content         | Consolidating Content  |
| Web Forms          | Web Applications        | Smart Applications     |
| Directories        | Tagging                 | User Behavior          |
| Page Views         | Cost Per Click          | User Engagement        |
| Banner Advertising | Interactive Advertising | Behavioral Advertising |
| Britannica Online  | Wikipedia               | The Semantic Web       |
| HTML / Portals     | XML / RSS               | RDF / RDFS / OWL       |

## Web 2.0

- **Tagging and folksonomy**  
sorting and describing information by meaning, directly users (vs. taxonomies)
- **Social Relationships & Blogs**  
group membership and collective creation of content and tags;  
Users in the roles of readers, creators and contributors
- **Mashup**  
By combining existing content and services, it is possible to create new information offer, use of HTTP technologies, REST API, Services.
- **Content syndication**  
Source and content is primary regardless of form  
RSS, ATOM
- **Long tail**  
A lot of small resources are able to create a large resource  
Information
- Net Generation, Generation Z,  
Collective intelligence, new media (form doesn't matter)



## B2B Long Tail SEO



# Web 2.0 (2022)

- <https://www.hootsuite.com/research/social-trends>, <https://datareportal.com/>



On average, users spend  
**35 minutes** a day on Facebook

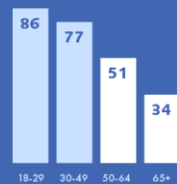
There are **2.5 billion** monthly  
active users

**74%** of users visit the site daily

## Demographics



Age (%)



On average, users spend  
**53 minutes** a day on Instagram

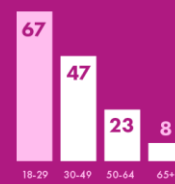
There are **1 billion** monthly  
active users

**42%** of users visit the site  
multiple times a day

## Demographics



Age (%)

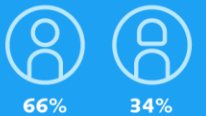


On average, users spend  
**3 minutes** a day on Twitter

There are **330 million** monthly  
active users

**460,000** new accounts  
are made daily

## Demographics



Age (%)

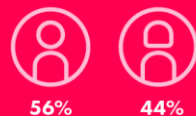


On average, users spend  
**53 minutes** a day on TikTok

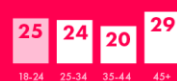
There are **800 million**  
active users

**1 billion** views each day

## Demographics



Age (%)



On average, users spend  
**6 minutes** a day on LinkedIn

There are **303 million** monthly  
active users

**5.26 million** new accounts  
are made monthly

## Demographics



Age (%)



On average, users spend  
**30 minutes** a day on Snapchat

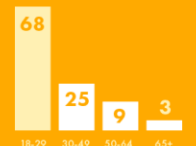
There are **210 million** monthly  
active users

**63%** of users visit the site  
multiple times a day

## Demographics



Age (%)



## Trendy webu

- Mobile First approach (<https://twitter.com/LukeW>, <https://www.lukew.com/presos/>)
- Responsive design
- Multimedia Content, Content, and Typography
- Cloud services and applications
- Cross-platform applications and progressive web applications (PWAs)
- Social networks
- Artificial Intelligence (AI)

## Web x.0

- <https://www.youtube.com/watch?v=nHhAEkG1y2U>
- <https://www.youtube.com/watch?v=-7VAzK4v6zs>
- <https://www.youtube.com/watch?v=yLPfPqbAlJw>

## Web 3.0

- Web 2.0 + semantic web = Web 3.0
- Web 3.0 = 4C + P + VS  
(Content, Commerce, Community, Context + Personalization + Vertical Search)
- database transformation of the website, the use of the third dimension in navigation, the involvement of artificial intelligence technologies, ontologies, agents, inference, etc.
- Data decentralization, principles of blockchain technology, artificial intelligence

## Web 4.0

- Intelligent/Symbiotic Web Ideas
- WebOS concept, AI

# Web x.0

