

2023/2024(1)
EF234301 Web Programming
Lecture #1

Introduction

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Latest Work Experiences:

- Lecturer, Department of Informatics, ITS, Surabaya, Indonesia **1998-present**
- ICT consultant **1996-present**
- Farming: durians & other fruits, agribusiness **2017-present**
- Owner & handler of subakti.com (education) **2017-present**
- Owner & handler of rusindo.com (business) **2017-present**

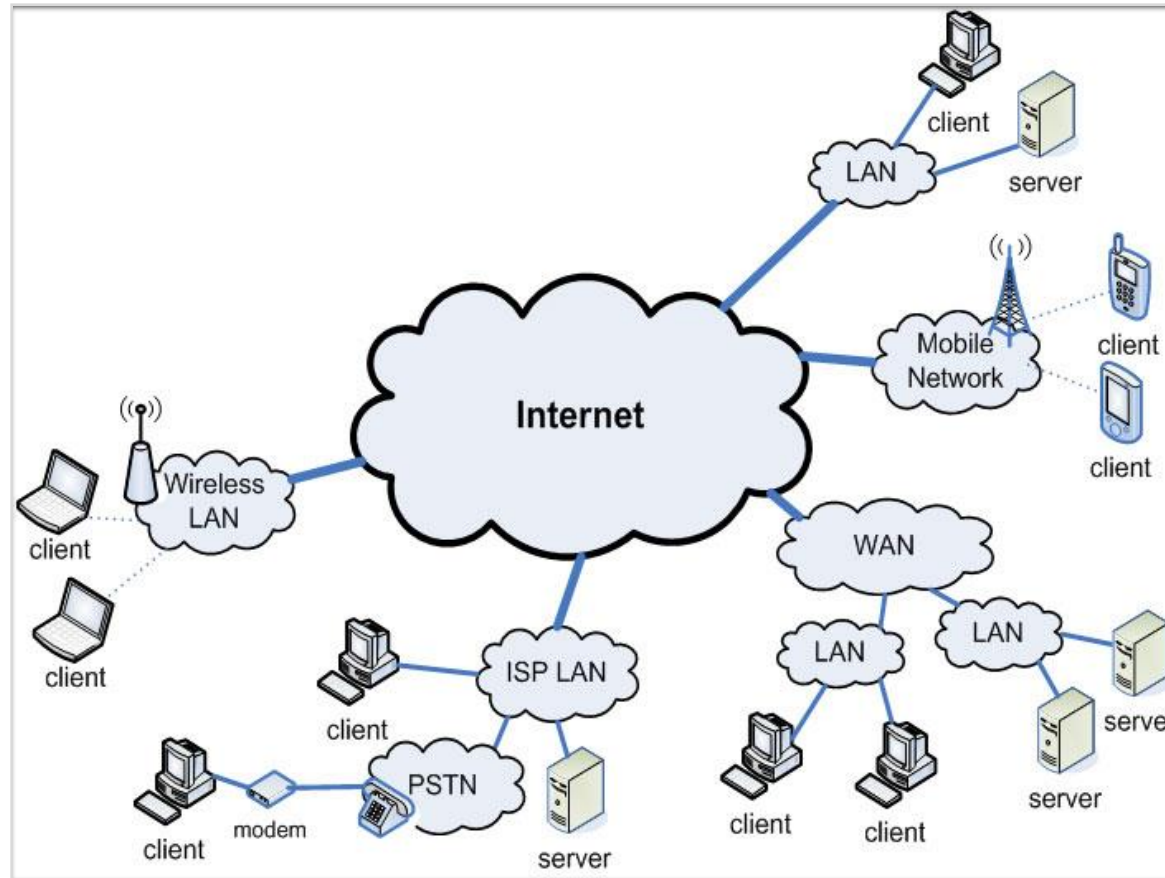
Education/Certification:

- The Institution of Engineers, Indonesia **2022-**
IPM (Insinyur Profesional Madya—Senior Professional Engineer) of Informatics
- Institut Teknologi Sepuluh Nopember, Indonesia **2021-2021**
Insinyur (Ir.), Informatics expertise areas
- Государственный Технический Университет (ТГТУ), Russia **2017-on leave**
Аспирант, Ph.D. program, Institute of Automation and Information Technologies
- University of Birmingham, UK **2011-2017**
Master of Philosophy (M.Phil.)
- National Taiwan University of Science and Technology, Taiwan **2010-on leave**
Ph.D. program, Department of Electrical Engineering
- National Taiwan University of Science and Technology, Taiwan **2003-2005**
Master of Science in Engineering (M.Sc.Eng.)
- Institut Teknologi Sepuluh Nopember, Indonesia **1992-1999**
Sarjana Komputer (S.Kom.), Department of Informatics

Introduction

- Internet?
- Web?
- Are they the same?



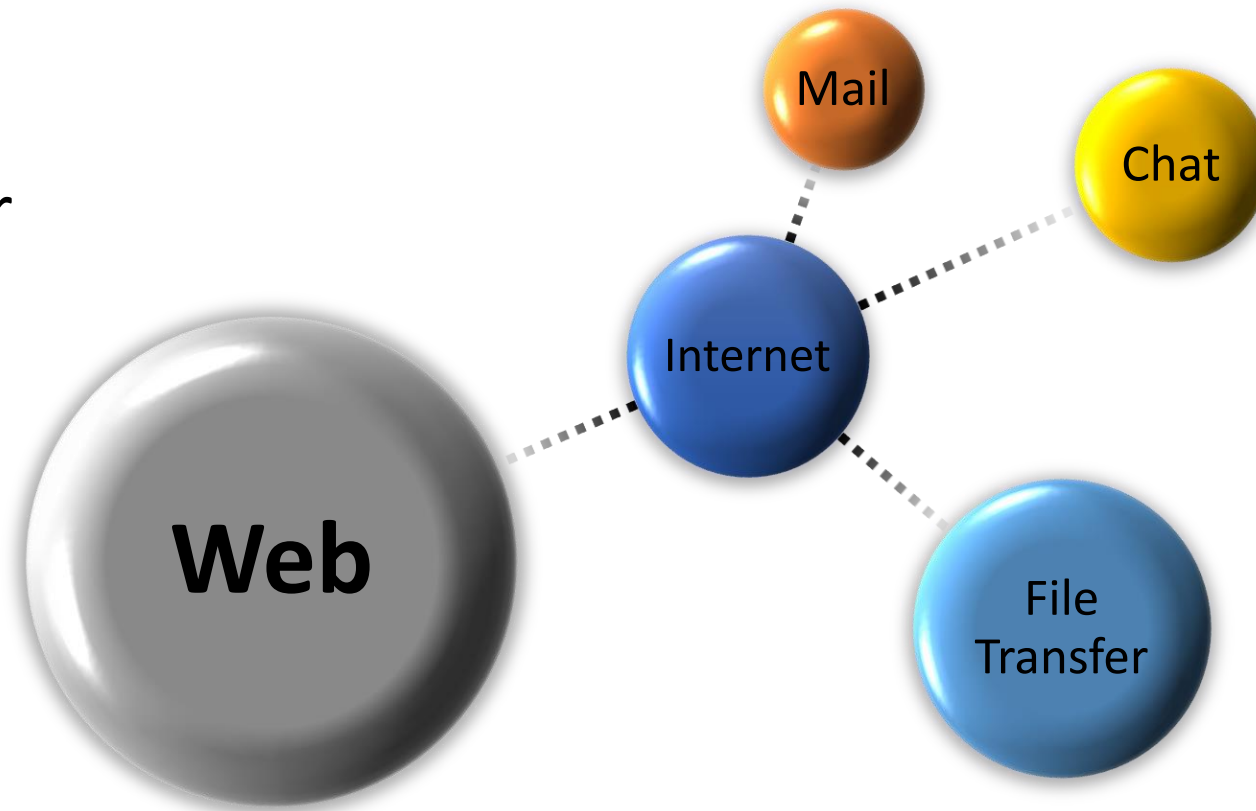


Internet

- Definition
 - Very big computer network
 - Using communication network around the world
 - Big networks connecting small networks
 - TCP/IP protocol
- Example
 - World Wide Web
 - Social media
 - E-mail
 - Mobile applications
 - Multiplayer online games
 - Internet telephony
 - File sharing
 - Streaming media services

Internet: facility example

- Web
- File transfer
- Chat
- Mail



Web

- Internet service which is run on the HTTP application protocol

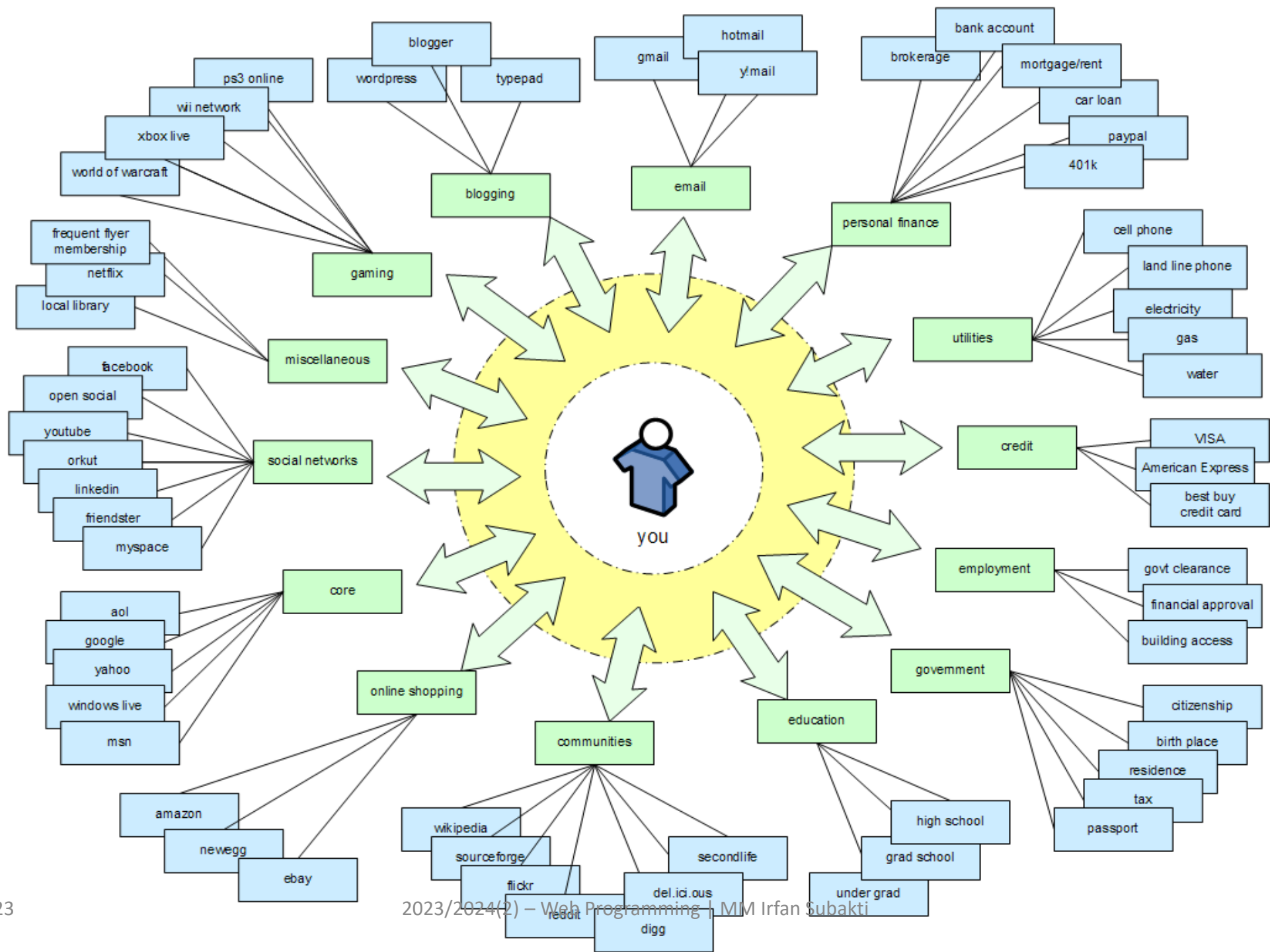
Internet vs Web

Internet-based app

- Use the existing app protocol or define its own protocol
- Server-side app directly communicate with the client
- Client-side app can be a standalone app or embedded in other app

Web-based app

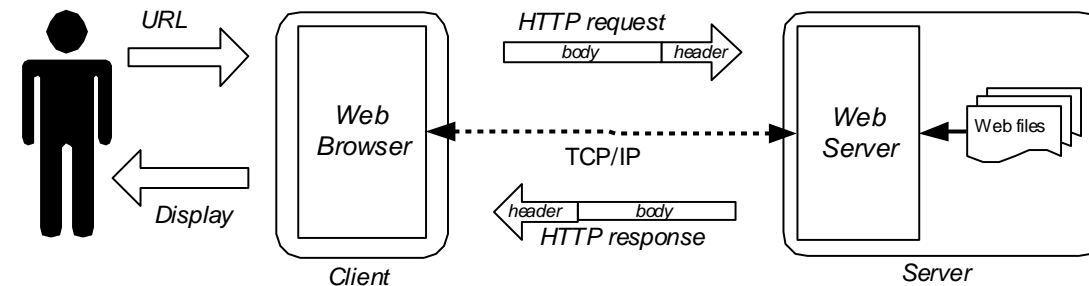
- Using the HTTP protocol
- Server-side app communicates with the client via web server
- Client-side app usually implemented as web browser



Web-based app developing technology

- Web client (web browser)
- Web server
- URL: Uniform Resource Locator
- HTTP: HyperText Transfer Protocol
- HTML: HyperText Markup Language
- CSS: Cascading Style Sheet
- Web programming
 - CGI → server-side executed program
 - Server-side scripting
 - Client-side scripting
 - Plug-in → client-side executed program

How the web works?



- The user type the URL on the browser
- The browser call the server which is stated in URL
- Once it connected, the browser send the HTTP request
- The server answers by sending the HTTP response (it contains header & document's content)
- For the document whose several files (e.g., images) the browser once again has to send the HTTP request for each file
- The browser shows all of the document to the user

Web browser

- Client side

```
xterm
#<<<>>> Lynx (web browser) - Wikipedia, the free encyclopedia (p1 of 5)
#copyright

Your continued donations keep Wikipedia running!

Lynx (web browser)

From Wikipedia, the free encyclopedia

Jump to: navigation, search

CAPTION: Lynx

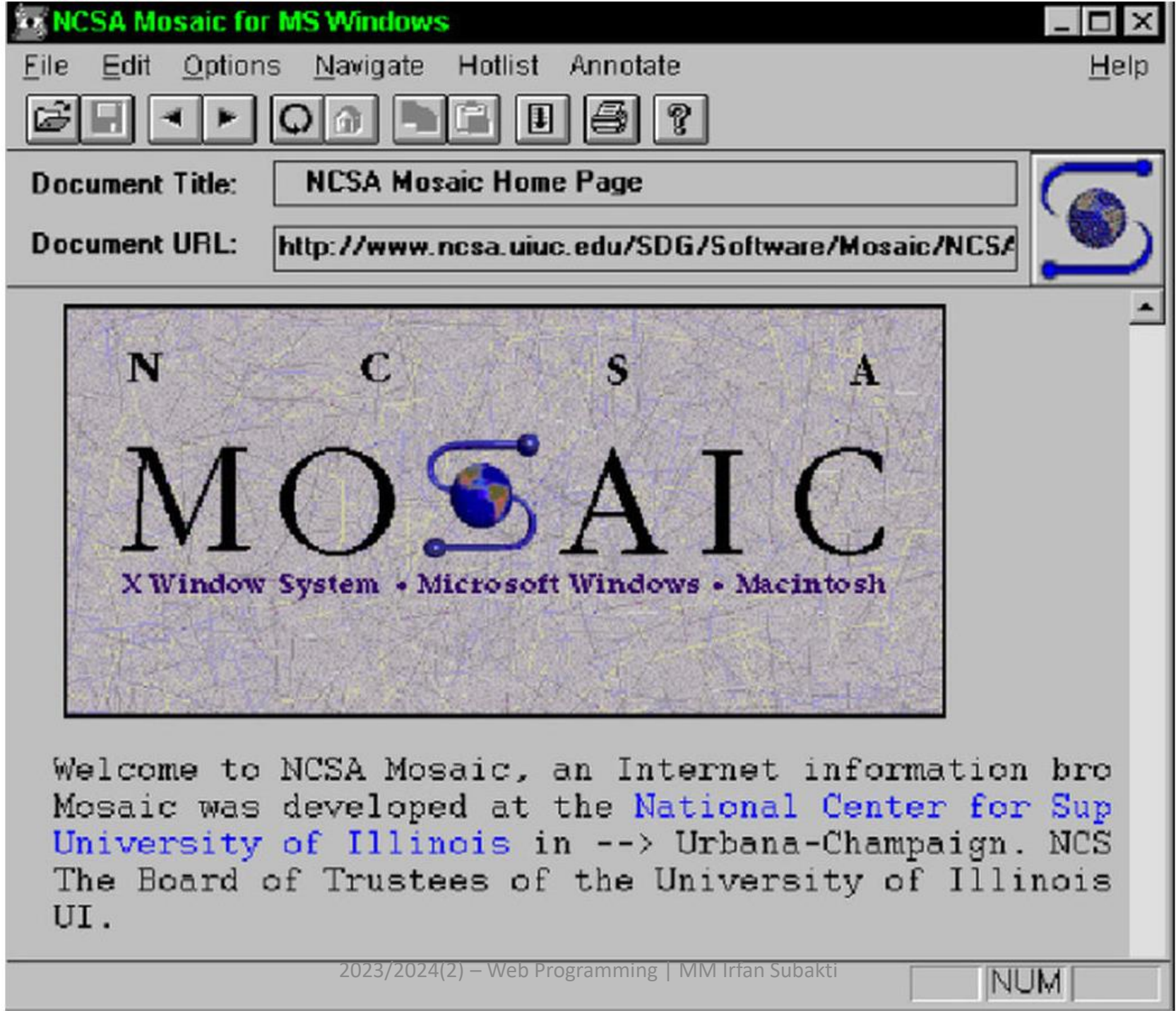
Wikipedia Main Page displayed in Lynx
Wikipedia Main Page displayed in Lynx
Maintainer: Thomas Dickey
Stable release: 2.8.5 (February 4, 2004) [[+/-]]
Preview release: 2.8.6 (?) [[+/-]]
OS: Cross-platform
Use: web browser
License: GPL
Website: lynx.isc.org

Lynx is a text-only Web browser and Internet Gopher client for use on cursor-addressable, character cell terminals.

Browsing in Lynx consists of highlighting the chosen link using cursor keys, or having all links on a page numbered and entering the chosen link's number. Current versions support SSL and many HTML features. Tables are linearized (scrunched together one cell after another without tabular structure), while frames are identified by name and can be explored as if they were separate pages.

Lynx is a product of the Distributed Computing Group within Academic Computing Services of the University of Kansas, and was initially developed in 1992 by a team of students at the university (Lou Montulli, Michael Grobe and Charles Rezac) as a hypertext browser used solely to distribute campus information as part of a Campus-Wide Information Server. In 1993 Montulli added an Internet interface and released a new version (2.0) of the browser [1] [2] [3].

more- http://en.wikipedia.org/wiki/Image:Lynx_228web_browser229.png
```





Internet Explorer

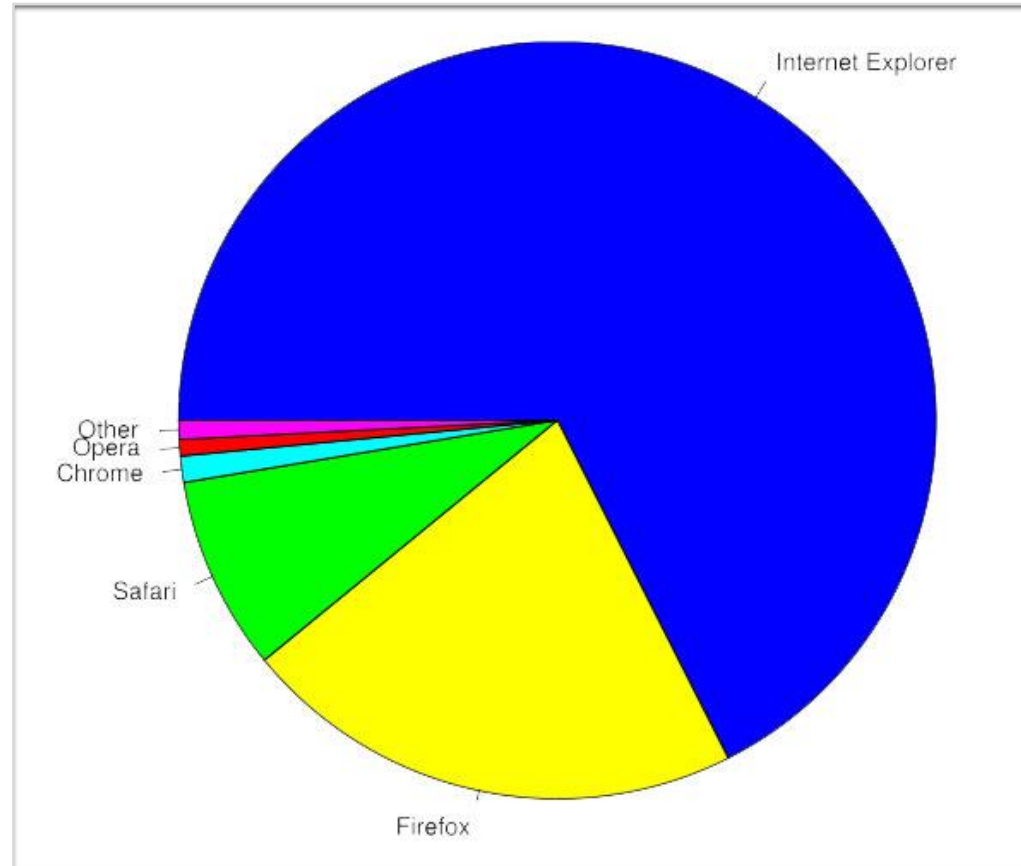
Mozilla Firefox

Safari

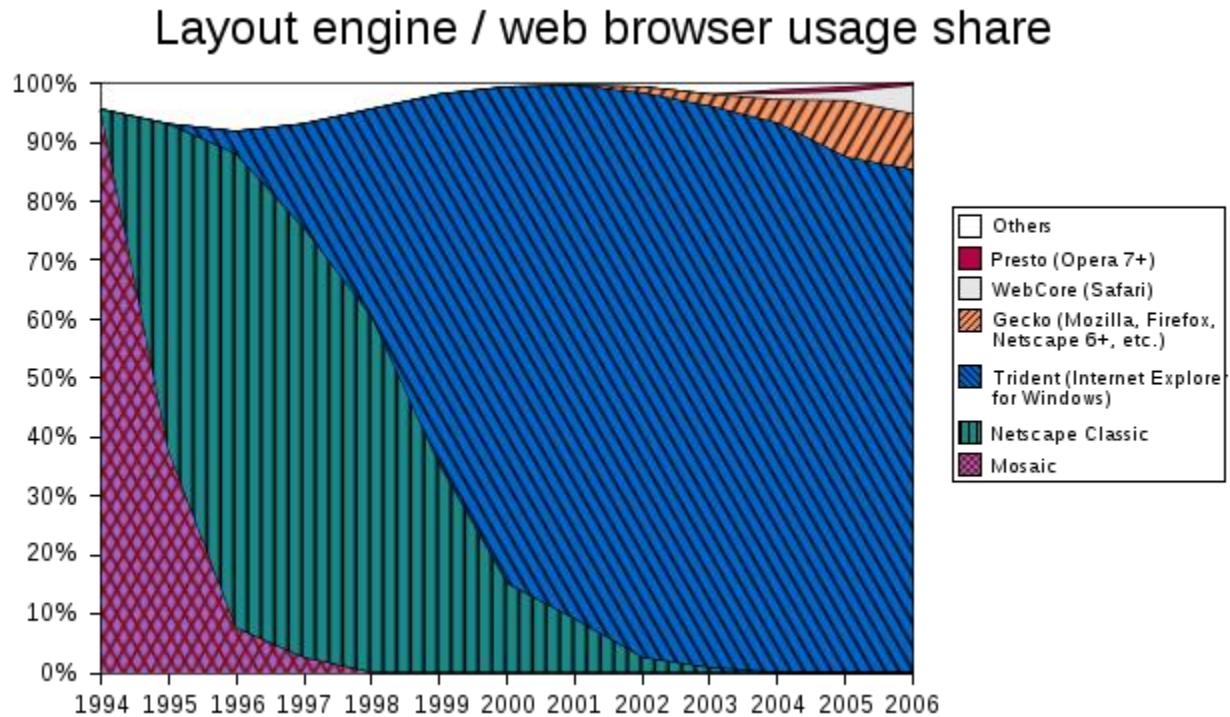
Google Chrome

Opera

Web browser market share: January 2009

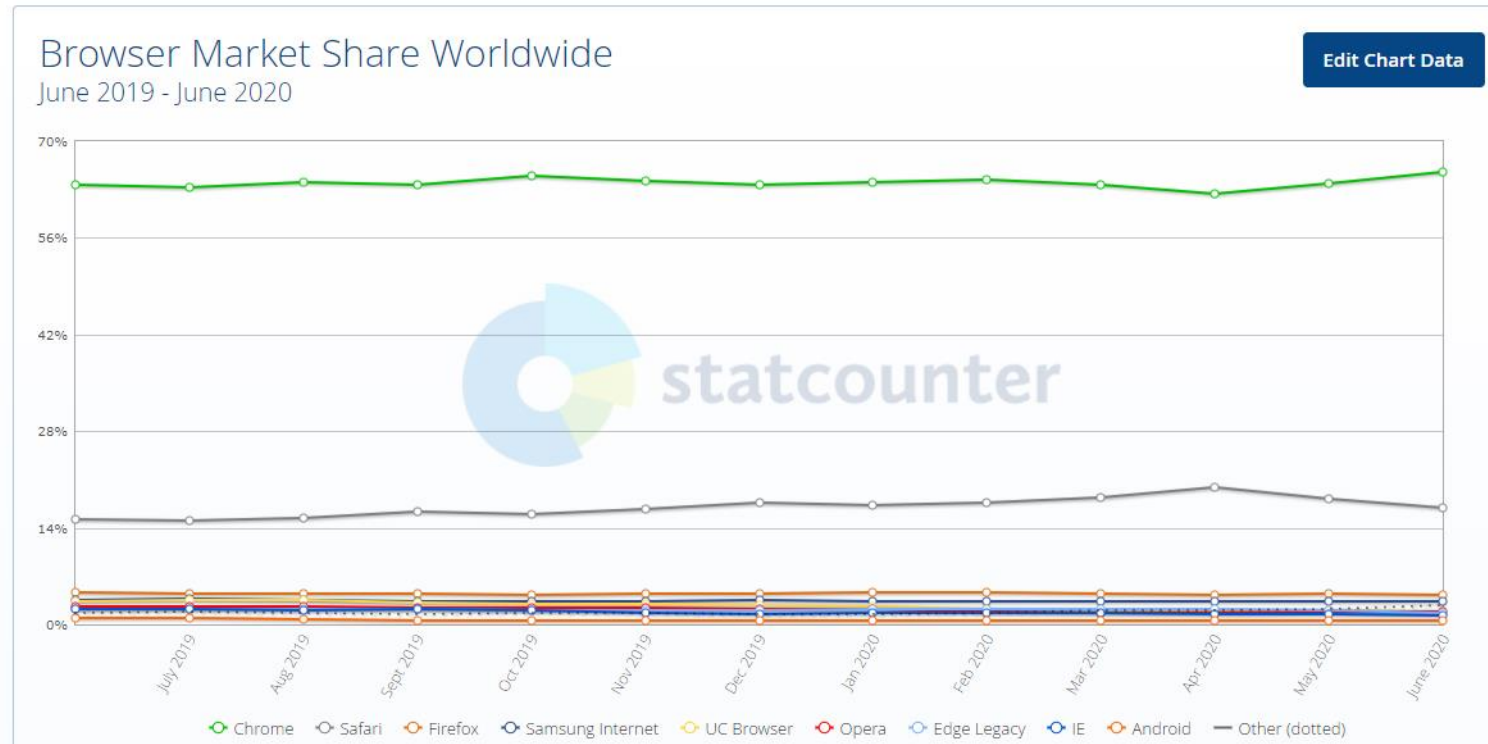


Web browser market share: 1994-2006

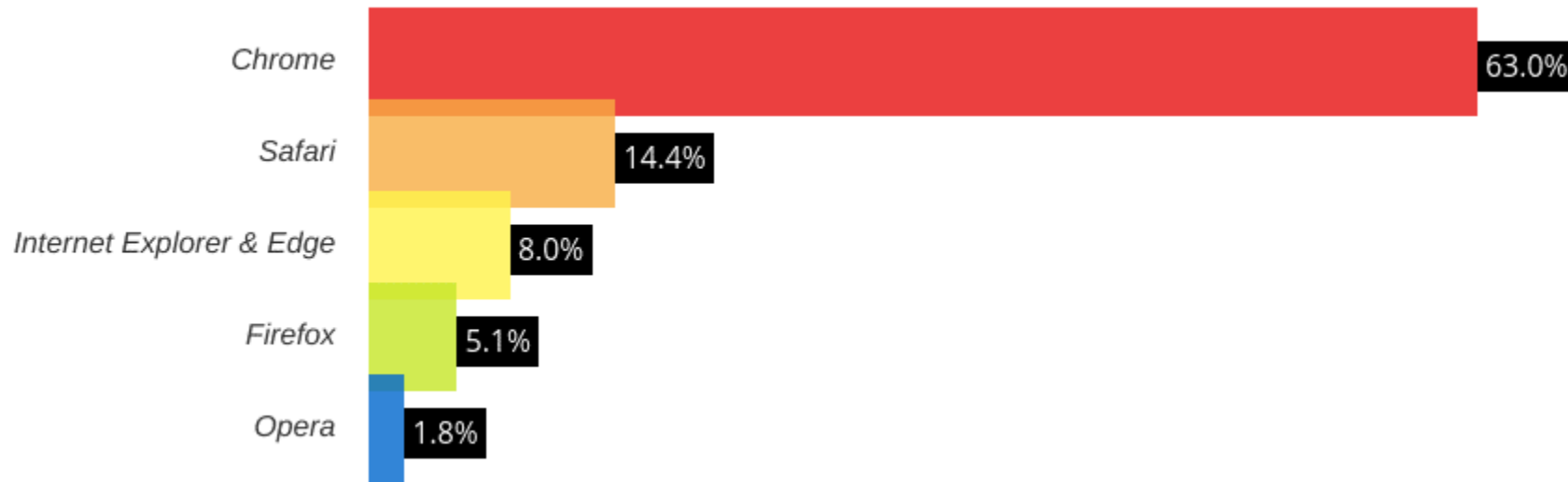


Web browser market share: June 2020

- Client side



Web browser market share: 2021



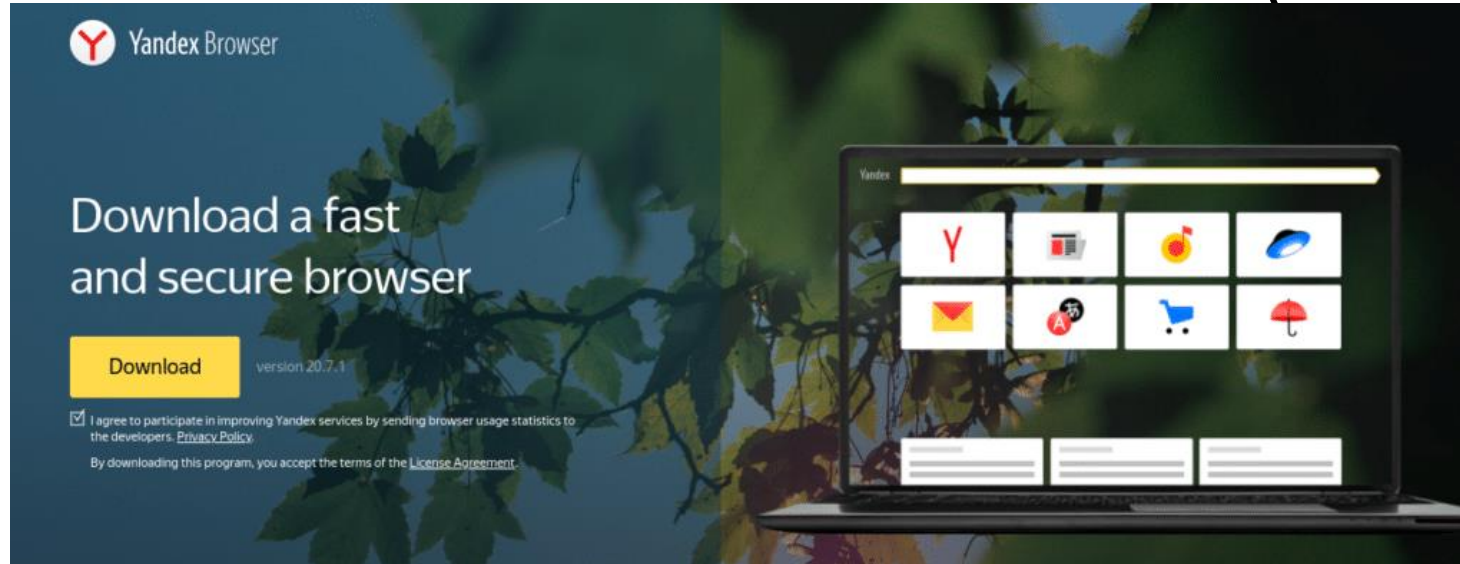
- Chrome accounts for 63 percent of the total market share for all browsers worldwide (W3Counter, 2021).
- Google the search engine market share on desktops, coming in with nearly 92 percent of global usage.
 - ChromeOS holds just 0.42 percent of the desktop OS market share worldwide.
 - In comparison, Windows accounts for 87.82 percent, and macOS holds a 9.42 percent share.

Web browser market share: 2021 (continued)



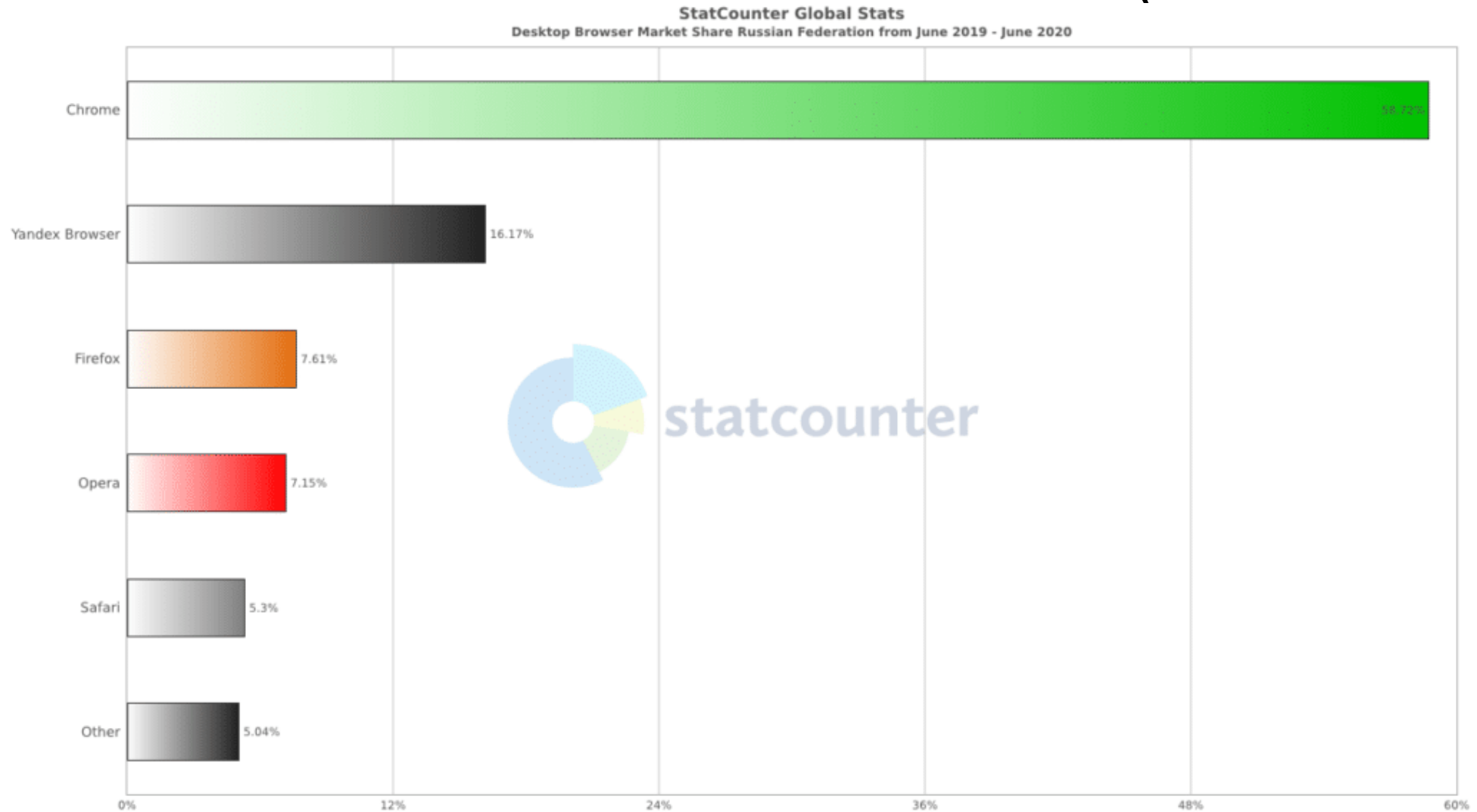
- Sogou Explorer, a popular browser in China, has a global market share of 1.76 percent. Sogou is a freeware browser based on Chromium. It also uses two web browser engines: IE's Trident and Google Chrome's Webkit.
- QQ, a web browser developed by Chinese technology company Tencent, has a just slightly higher global market share at 1.98 percent:
- However, in China QQ is the second biggest desktop browser, holding a market share of over 7 percent.

Web browser market share: 2021 (continued)



- Unless you live in Russia, you may not have heard of the Yandex Browser. Among desktop devices worldwide, this browser holds a small 0.87 percent market share.
- However, in the Russian Federation Yandex has a 16.17 percent market share for desktop browsers, making it second only to Chrome.

Web browser market share: 2021 (continued)



Web browser market share: July 2022



Most Popular ccTLDs

Country	Registrations	The most frequently registered ccTLDs today are an reflection of the world's most populated countries — in lowest yet.
de	11,130,000	China has the fastest growing ccTLD and is on pace to overtake Germany by 2019. Overall, the 10 most popular ccTLDs account for nearly 70% of all ccTLD registrations.
cn	6,035,000	
uk	6,010,000	
nl	2,545,000	
it	1,425,000	
us	1,300,000	
ar	1,200,000	
br	1,130,000	
ru	1,000,000	
fr	1,000,000	
au	953,152	There are not all ccTLDs are equally used (and cheap) to register, which is one reason some countries have had stronger growth than others.
jp	905,000	

Source: CoM, Statista, Stat Lead Research

Country Codes of the World

At the end of every URL and email address is a top-level domain (TLD). Of the 133 national TLDs that have been registered, more than 71 million are ccTLDs.

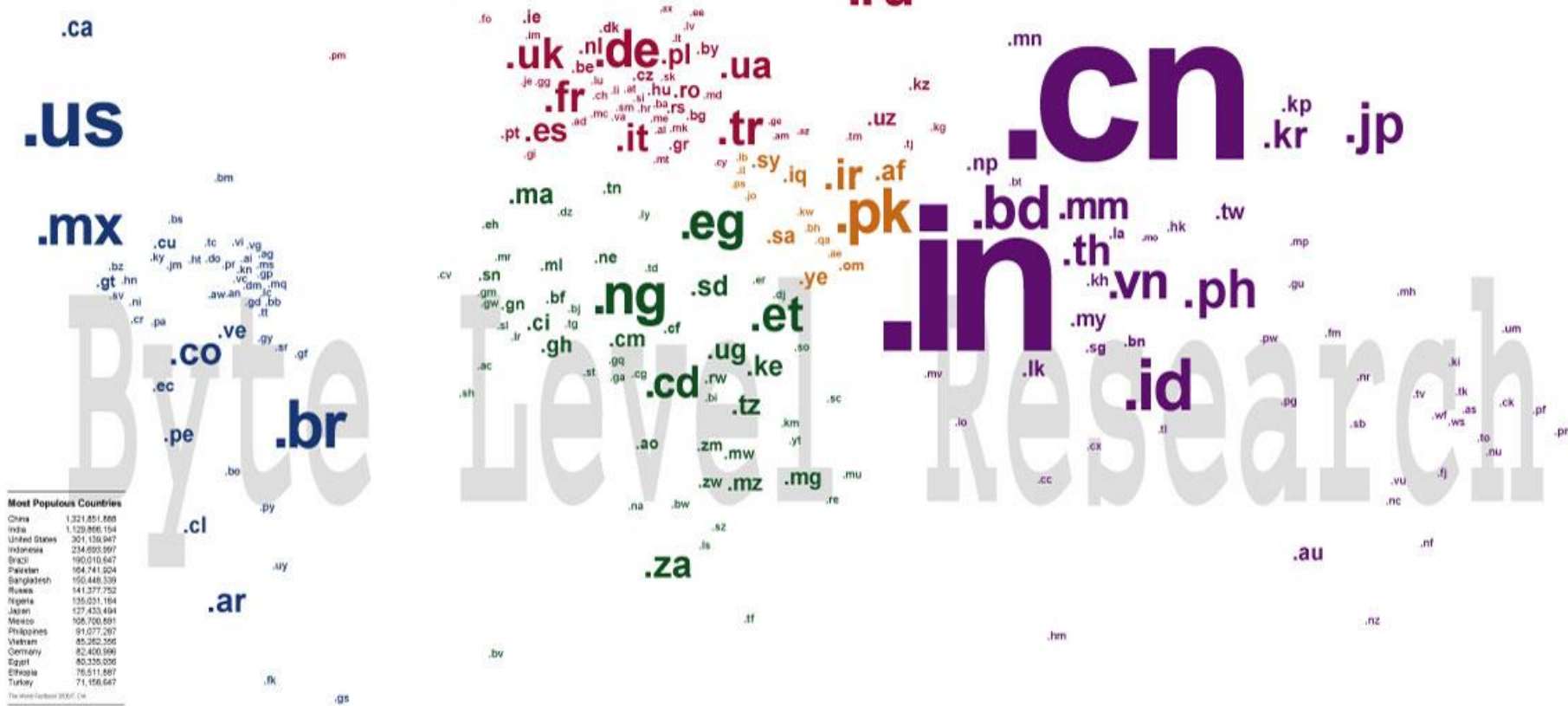
Although rare in the world's most popular TLDs, it is the same story. There are more than 200 TLDs in use around the world, most of which are country code top-level domains (ccTLDs).

ccTLDs are two- to 3-letter assigned to countries and territories. That's where the map fits in.

This map includes 145 ccTLDs, each aligned with the country or territory it represents.

Each ccTLD is sized relative to the population of the country or territory, with the exception of those two letters, which were retained for 200 years under the legacy. At the other end of the spectrum, the smallest type size used reflects those countries with 10 million or fewer residents.

For more information about ccTLDs, visit www.icann.org.



Most Populous Countries

China	1,321,851,869
India	1,129,866,194
United States	321,156,947
Indonesia	234,693,597
Brazil	190,010,647
Pakistan	164,741,524
Bangladesh	150,446,336
Russia	141,277,752
Nigeria	135,031,184
Japan	127,433,494
Mexico	108,750,891
Philippines	91,077,297
Vietnam	85,262,356
Germany	82,400,996
Egypt	80,335,006
Ethiopia	76,511,867
Turkey	71,166,647

The World Factbook 2007 | CIA

Americas ag Antigua and Barbuda | an Anguilla | an Netherlands Antilles | ar Argentina | aw Aruba | bb Barbados | bm Bermuda | bo Bolivia | br Brazil | bs Bahamas | bz Belize | ca Canada | cl Chile | co Colombia | cr Costa Rica | cu Cuba | dm Dominica | do Dominican Republic | ec Ecuador | fk Falkland Islands (Malvinas) | gd Grenada | gf French Guiana | gp Guadeloupe | gs South Georgia and the South Sandwich Islands | gt Guatemala | gy Guyana | hn Honduras | ht Haiti | jm Jamaica | kn Saint Kitts and Nevis | ky Cayman Islands | lc Saint Lucia | mq Martinique | ms Montserrat | mx Mexico | ni Nicaragua | pe Peru | pr Puerto Rico | py Paraguay | sr Suriname | sv El Salvador | tc Turks and Caicos Islands | tt Trinidad and Tobago | us United States | uy Uruguay | vc Saint Vincent and the Grenadines | ve Venezuela | vg Virgin Islands, British | vi Virgin Islands, US

Europe ad Andorra | al Albania | am Armenia | at Austria | ax Åland Islands | az Azerbaijan | ba Bosnia and Herzegovina | be Belgium | bg Bulgaria | by Belarus | ch Switzerland | cy Cyprus | cz Czech Republic | de Germany | dk Denmark | ee Estonia | es Spain | fi Finland | fo Faroe Islands | fr France | gg Guernsey | gi Gibraltar | gl Greenland | gr Greece | hr Croatia (Hrvatska) | hu Hungary | ie Ireland | im Isle of Man | is Iceland | it Italy | je Jersey | kg Kyrgyzstan | kz Kazakhstan | lb Lebanon | li Lithuania | lu Luxembourg | lv Latvia | mc Monaco | md Moldova | me Montenegro | mk Macedonia | ml Malta | nl Netherlands | no Norway | on Poland | pm Saint Pierre and Miquelon | pt Portugal | ro Romania | rs Serbia | ru Russian Federation | se Sweden | si Slovenia | sj Svalbard and Jan Mayen Islands | sk Slovakia | sm San Marino | tj Tajikistan | tn Tunisia | tr Turkey | ua Ukraine | uk United Kingdom | uz Uzbekistan | va Holy See (Vatican City State) | ve Venezuela | vn Vietnam | wf Wallis and Futuna | ye Yemen | za South Africa

Africa ac Ascension Island | ag Anguilla | bf Burkina Faso | bi Burundi | bj Benin | bv Bouvet Island | bw Botswana | cd Congo, The Democratic Republic of the | cf Central African Republic | cg Congo, Republic of | ci Côte d'Ivoire | cm Cameroon | cv Cape Verde | dj Djibouti | dz Algeria | eg Egypt | eh Western Sahara | er Eritrea | et Ethiopia | ga Gabon | gh Ghana | gm Gambia | gn Guinea | gw Guinea-Bissau | ke Kenya | km Comoros | lr Liberia | ls Lesotho | ly Libya | ma Morocco | mg Madagascar | ml Mali | mr Mauritania | mu Mauritius | mw Malawi | mz Mozambique | na Namibia | ne Niger | ng Nigeria | ni Niue | nl Netherlands | no Norway | np Nepal | nr Namibia | nt Norfolk Island | nz New Zealand | om Oman | pk Pakistan | pl Poland | pm Saint Pierre and Miquelon | pr Puerto Rico | pt Portugal | re Réunion Island | rw Rwanda | sc Seychelles | sd Sudan | se Sweden | sg Singapore | sh Saint Helena | si Sierra Leone | sn Senegal | so Somalia | st Sao Tome and Principe | sv Swaziland | td Chad | tf French Southern Territories | tg Togo | th Thailand | tk Tokelau | tl Timor-Leste | to Tonga | tv Tuvalu | tw Taiwan | um United States Minor Outlying Islands | uz Uzbekistan | va Holy See (Vatican City State) | vc Saint Vincent and the Grenadines | ve Venezuela | vn Vietnam | wf Wallis and Futuna | ye Yemen | za South Africa

Middle East ae United Arab Emirates | af Afghanistan | bh Bahrain | il Israel | iq Iraq | ir Iran, Islamic Republic of | jo Jordan | kw Kuwait | lb Lebanon | om Oman | pk Pakistan | pn Palestinian Territory | qa Qatar | sa Saudi Arabia | sy Syrian Arab Republic | ye Yemen

Asia-Pacific as American Samoa | au Australia | bd Bangladesh | bn Brunei | bt Bhutan | cc Cocos (Keeling) Islands | ck Cook Islands | cn China | cx Christmas Island | cy Cyprus | fm Micronesia, Federated States of | gu Guam | hk Hong Kong | hn Heard and McDonald Islands | id Indonesia | in India | io British Indian Ocean Territory | jp Japan | kh Cambodia | ki Kiribati | kp Korea, Democratic People's Republic | kr Korea, Republic of | la Lao People's Democratic Republic | lk Sri Lanka | mh Marshall Islands | mm Myanmar | mn Mongolia | mo Macao | mp Northern Mariana Islands | mv Maldives | my Malaysia | nc New Caledonia | nf Norfolk Island | np Nepal | nr Nauru | nu Niue | nz New Zealand | pf French Polynesia | pg Papua New Guinea | ph Philippines | pn Pitcairn Island | pw Palau | sb Solomon Islands | sg Singapore | th Thailand | tk Tokelau | tl Timor-Leste | to Tonga | tv Tuvalu | tw Taiwan | um United States Minor Outlying Islands | uz Uzbekistan | va Holy See (Vatican City State) | vc Saint Vincent and the Grenadines | ve Venezuela | vn Vietnam | wf Wallis and Futuna | ye Yemen | za South Africa

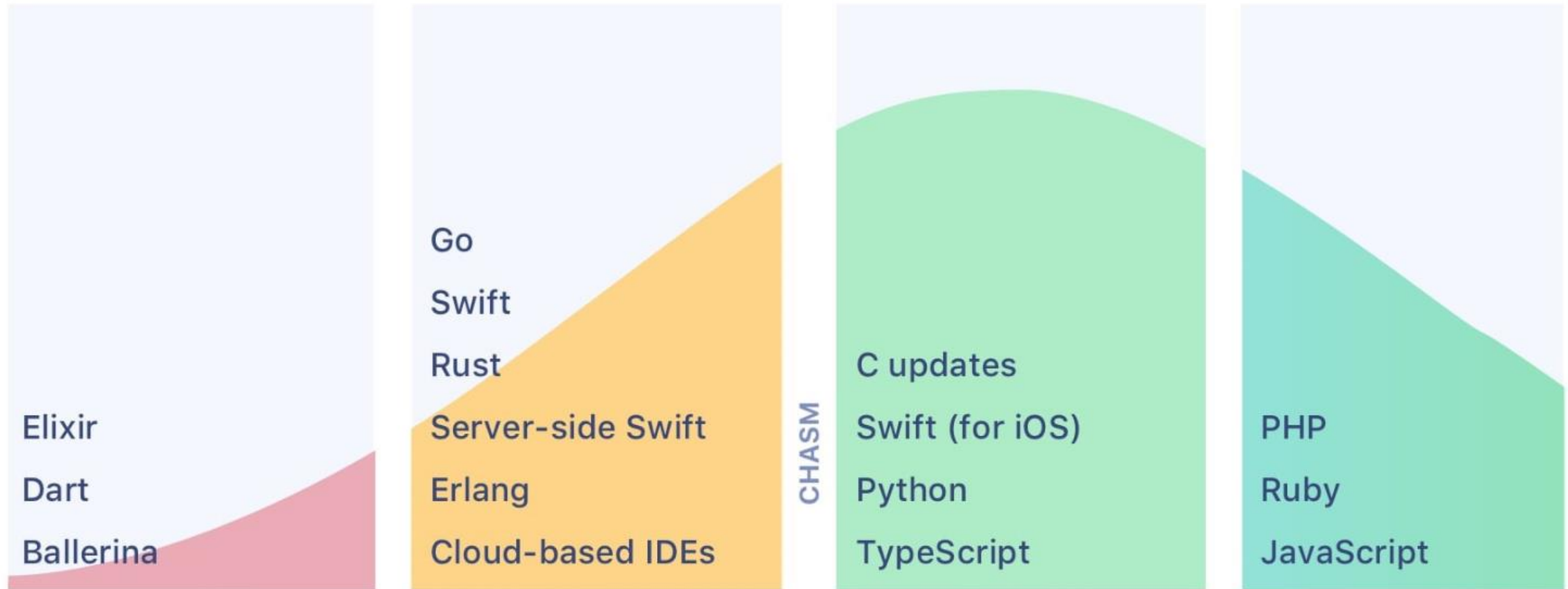
Web server

- What's it?
 - It's software
 - Run on the server
 - Enabling web document stored in the server can be accessed by the user through the internet
- Web server software
 - Apache (Linux & Windows)
 - Microsoft Internet Information Server / IIS (Windows) / PWS (Win98)
 - Tomcat → Java (Windows & Linux)

Web programming language:
development stage

Software Development Programming Languages Trends 2019 Q3 Graph

<http://info.link/proglang2019>



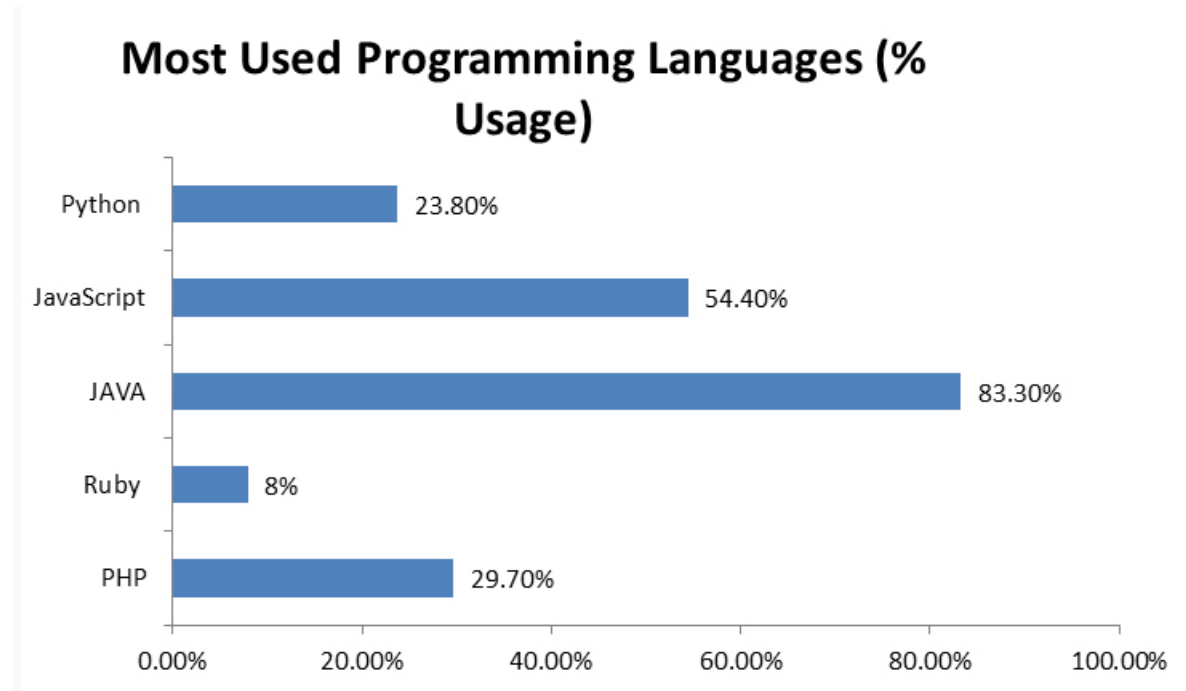
Innovators

Early Adopters

Early Majority

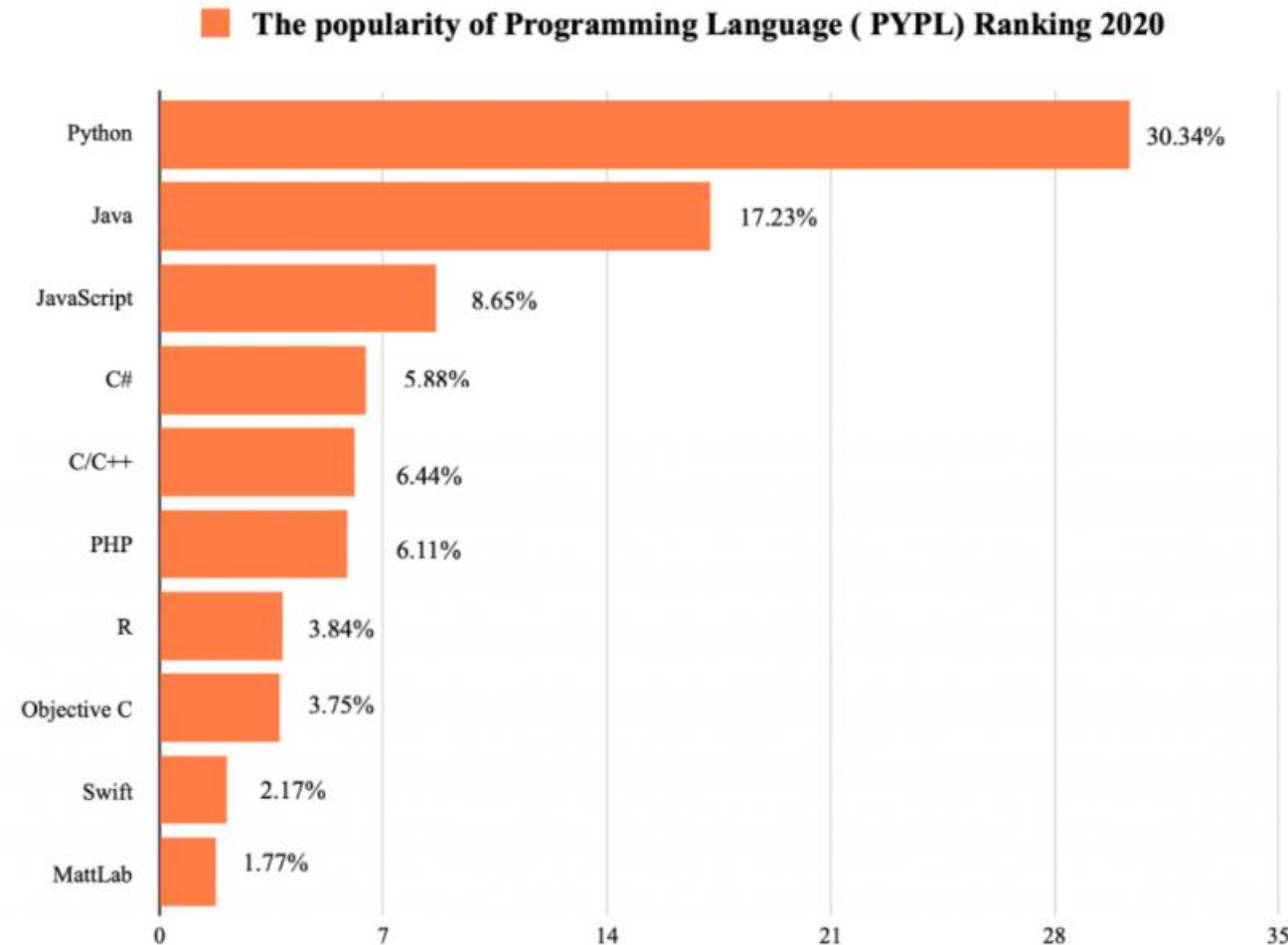
Late Majority

2015 StackOverflow Survey



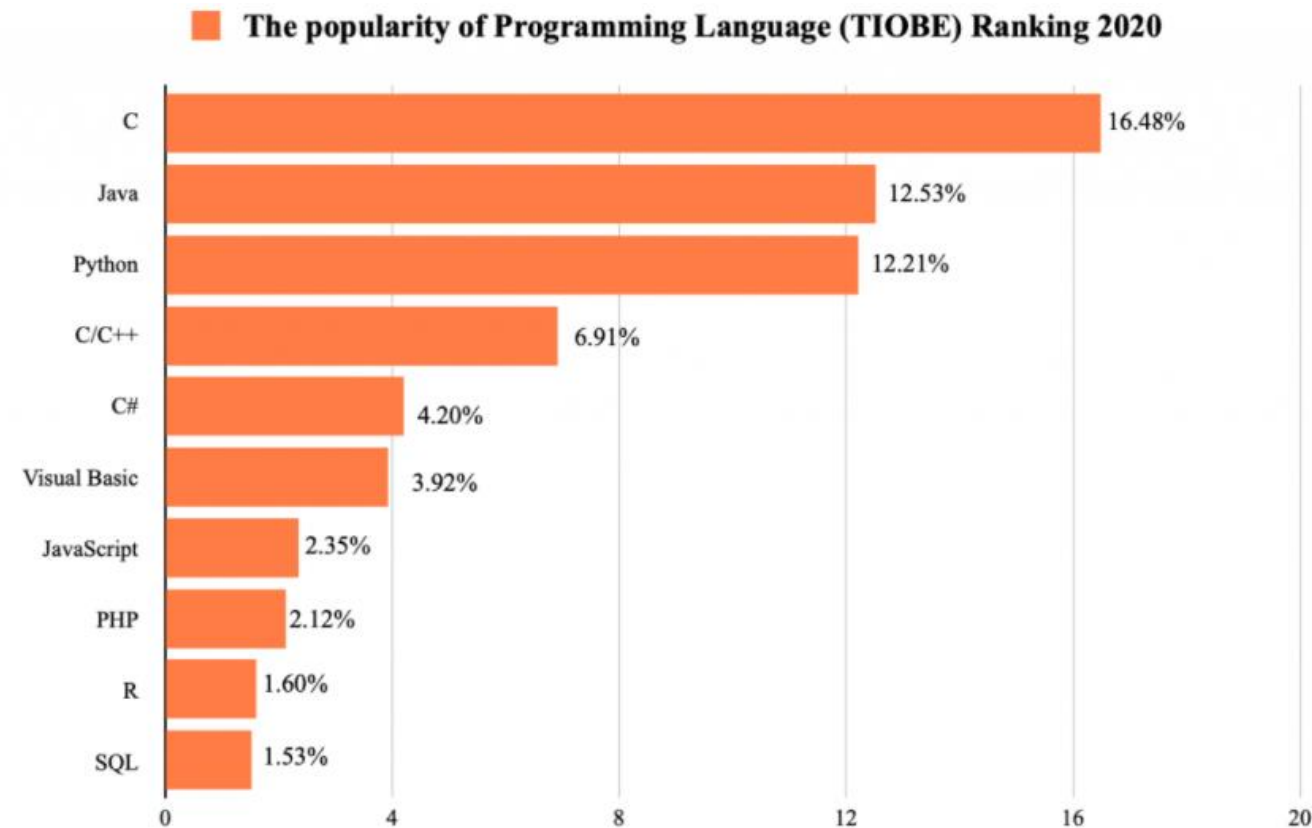
Popularity of Programming Language (PYPL) Ranking 2021

- Created by analysing how often language tutorials are searched on Google.
- The more a language tutorial is searched, the more popular the language is assumed to be. The raw data comes from Google Trends.
- The PYPL Popularity of Programming Language index can help you decide which language to study, or which one to use in a new software project.



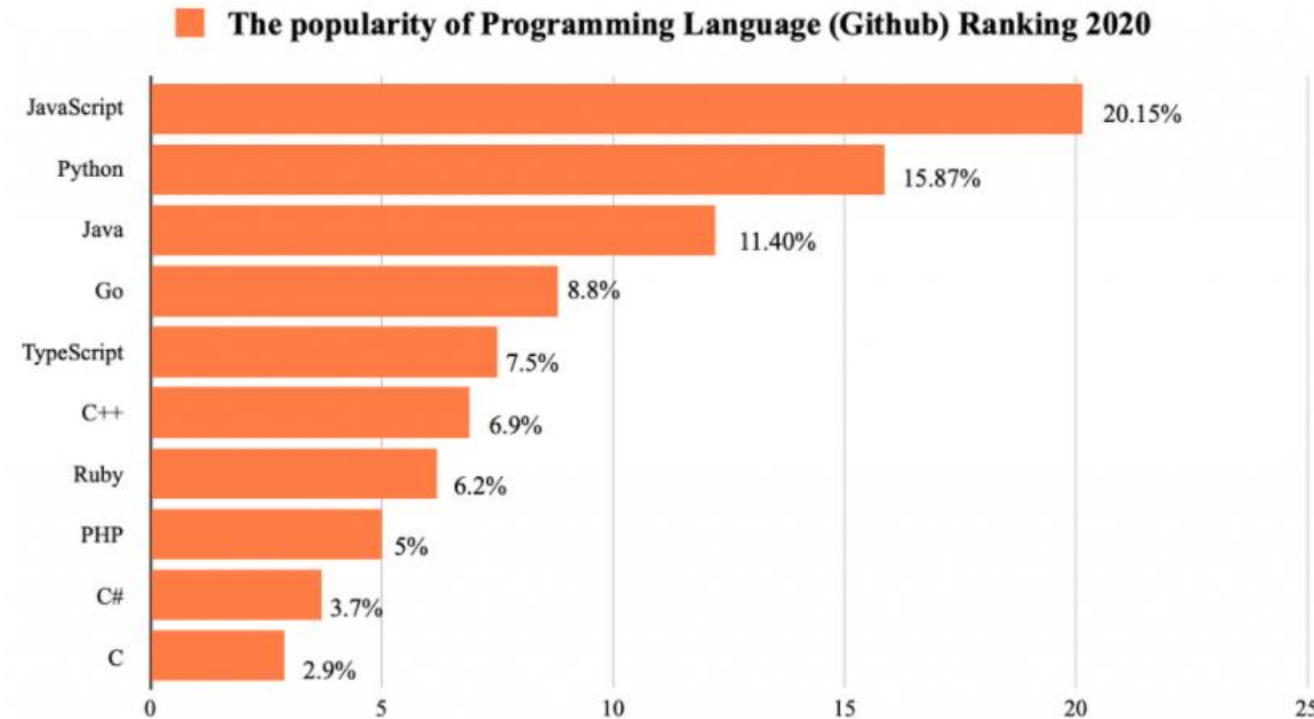
Popularity of Programming Language (TIOBE) Ranking 2021

- The TIOBE Programming Community index is an indicator of the popularity of programming languages. The index is updated once a month. The ratings are based on the number of skilled engineers world-wide, courses and third-party vendors. Popular search engines such as Google, Bing, Yahoo!, Wikipedia, Amazon, YouTube and Baidu are used to calculate the ratings.
- It is important to note that the TIOBE index is not about the best programming language or the language in which most lines of code have been written.

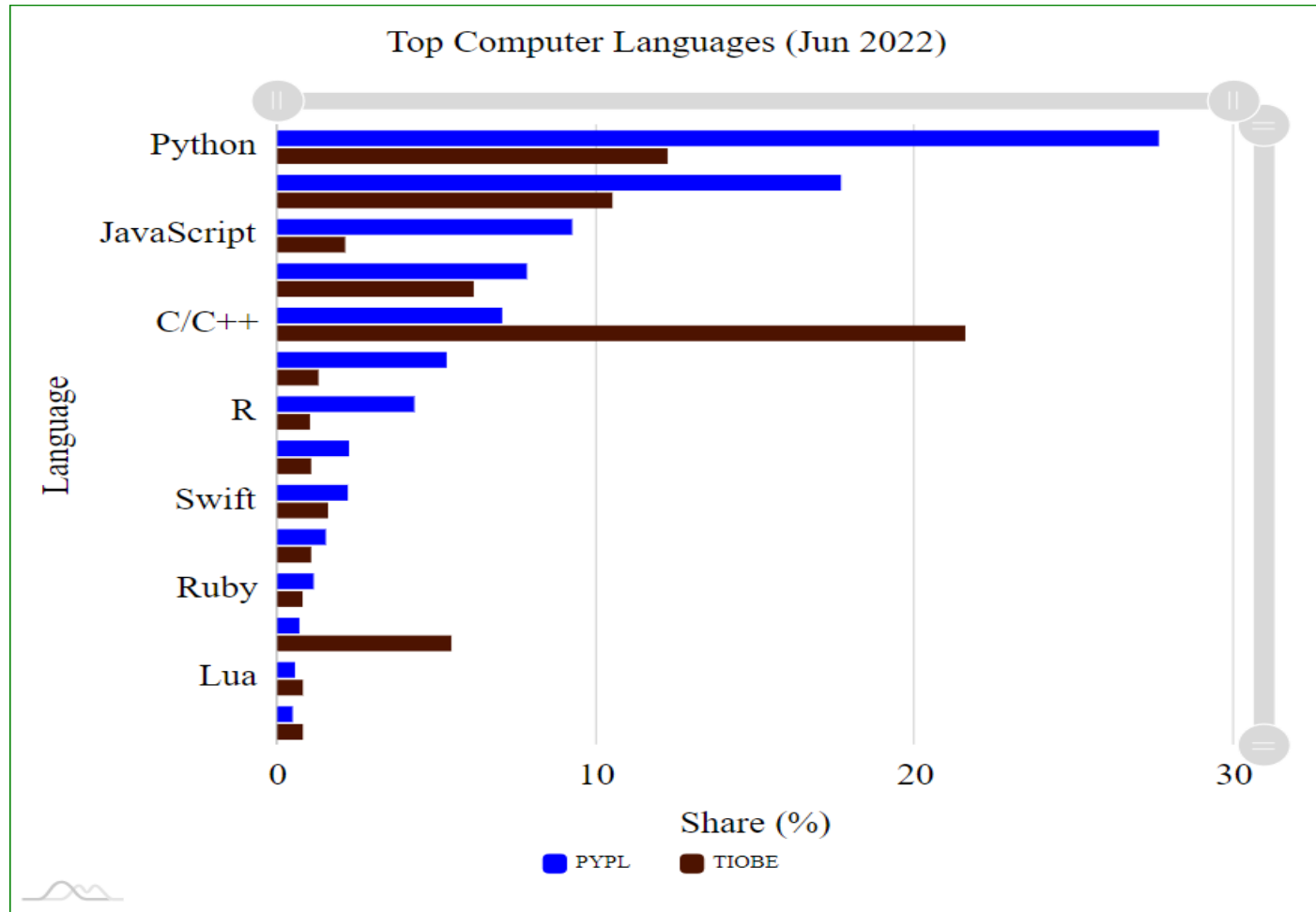


Popularity of Programming Language (Github) Ranking 2021

- GitHub is one of the biggest code repositories that boasts a massive developer community spanning across the globe. The repository is also growing at a blazing speed. Nearly 70% of global fortune 50 companies have lately made contributions to Github's open-source codes.
- Github also shares a yearly review of programming languages' popularity. Here are the top 10 programming languages ranking according to the latest Github report.



Top Computer Languages statisticstimes.com: June 2022



Mark-up Language

Scribe, SGML, HTML, XML, XHTML

WWW & HTML: History

- Tim Berners-Lee: the inventor of WWW

HTML: HyperText Markup Language

- Standard format for writing the web document
- HTML 4.01: standard specification → <http://www.w3.org/TR/html4>
- E.g.,

```
<html>
<head>
  <title>My first HTML
document</title>
</head>
<body>
  <p>Hello
world!<br>Welcome to my
<b>first</b> HTML page.
  </p>
</body>
</html>
```

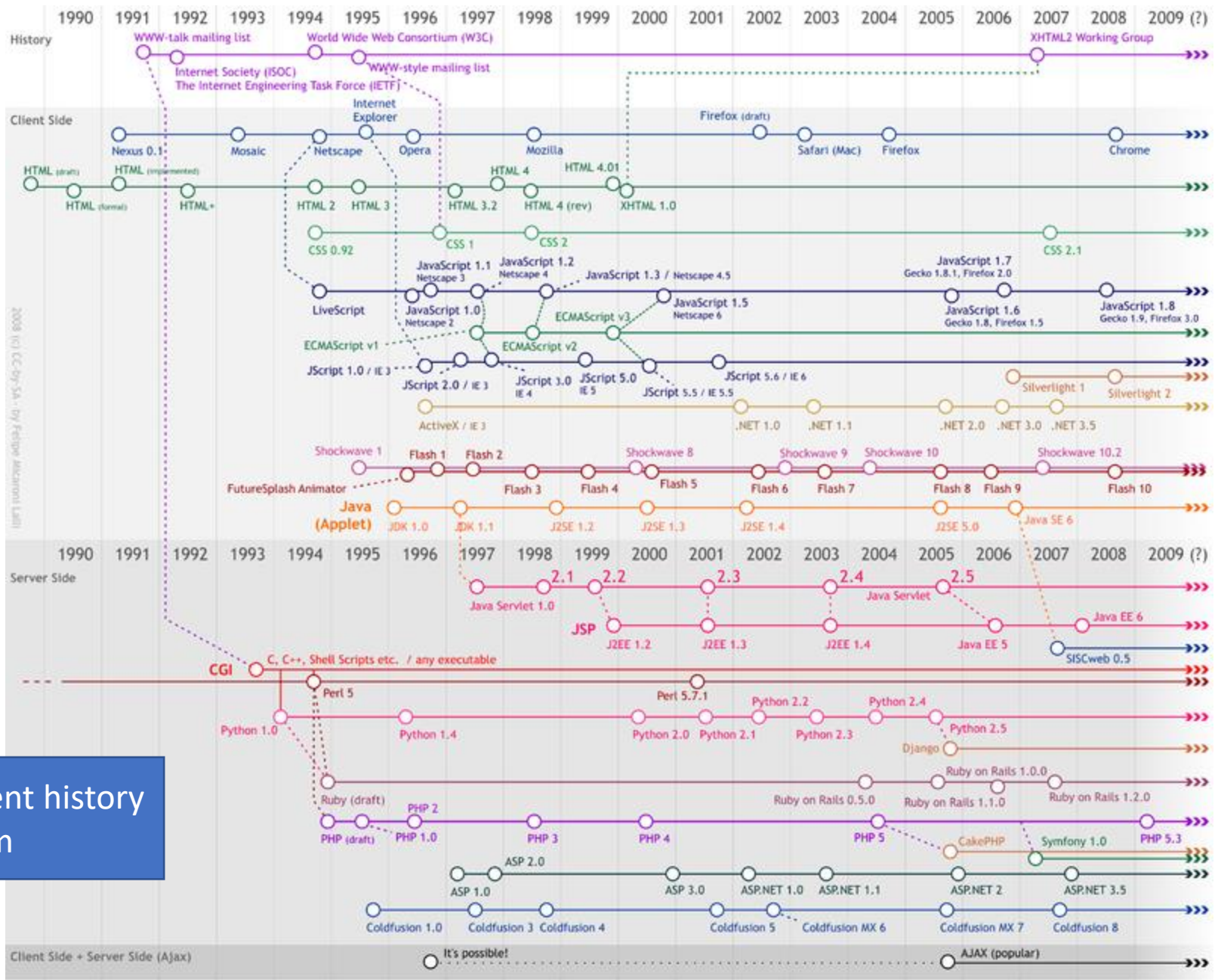


Hello world!
Welcome to my **first**
HTML page.

Web programming

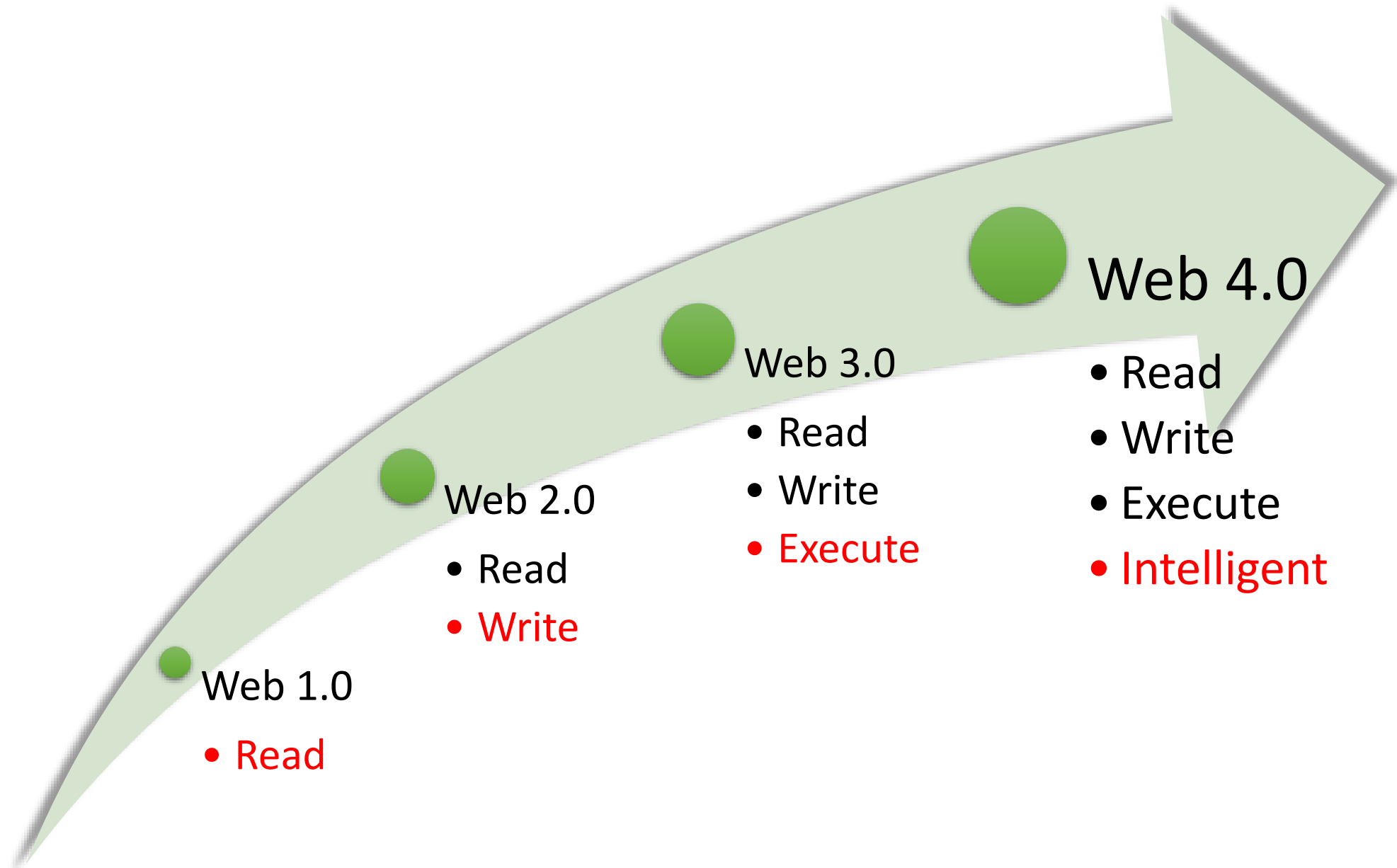
- CGI → server-side executed program (Perl, C)
 - Web server runs the program files and use the output as the HTTP response
- Server-side scripting (PHP, ASP, JSP, Python)
 - Web server identifies & run the program scripts which are inserted in the web document and put the output as the part of the web document
- Client-side scripting (JavaScript, JScript, VBScript)
 - Web browser identifies and run the program scripts which are inserted in the web document (that is received from the server), and can update the appearance of the web document on the user's computer without sending the new request to the web server
- Plug-in → client-side executed program (Applet, ActiveX, Flash)
 - Web browser runs the program files supported by plug-in viewer/player and make a designated area in the web document as the place for showing the program interface

Web development history diagram



Web technology development:

Web 1.0, Web 2.0, Web 3.0 and Web 4.0



Web 1.0

- Read

Web 2.0

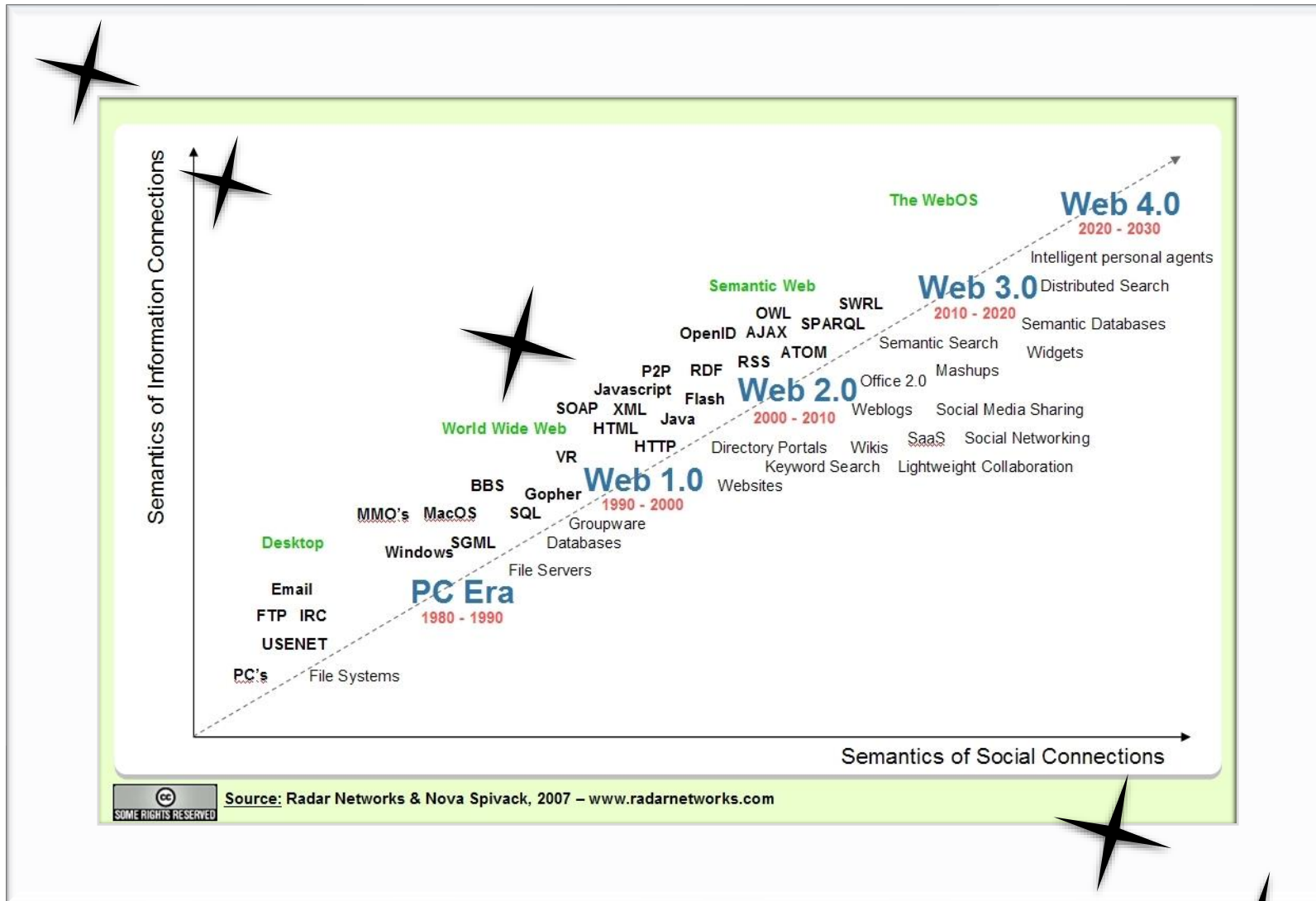
- Read
- Write

Web 3.0

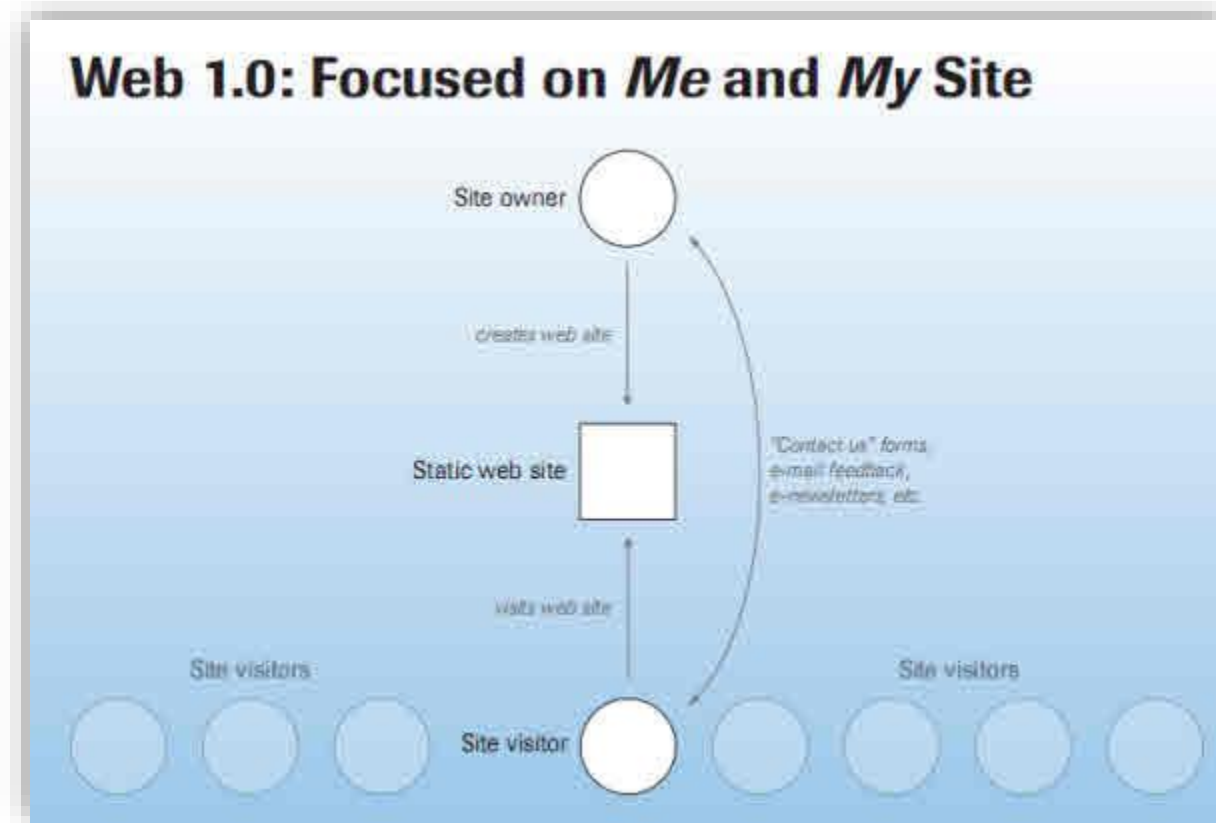
- Read
- Write
- Execute

Web 4.0

- Read
- Write
- Execute
- Intelligent

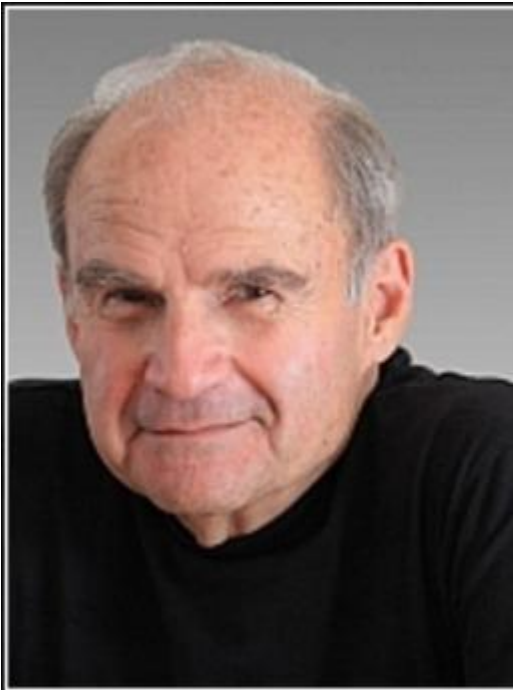
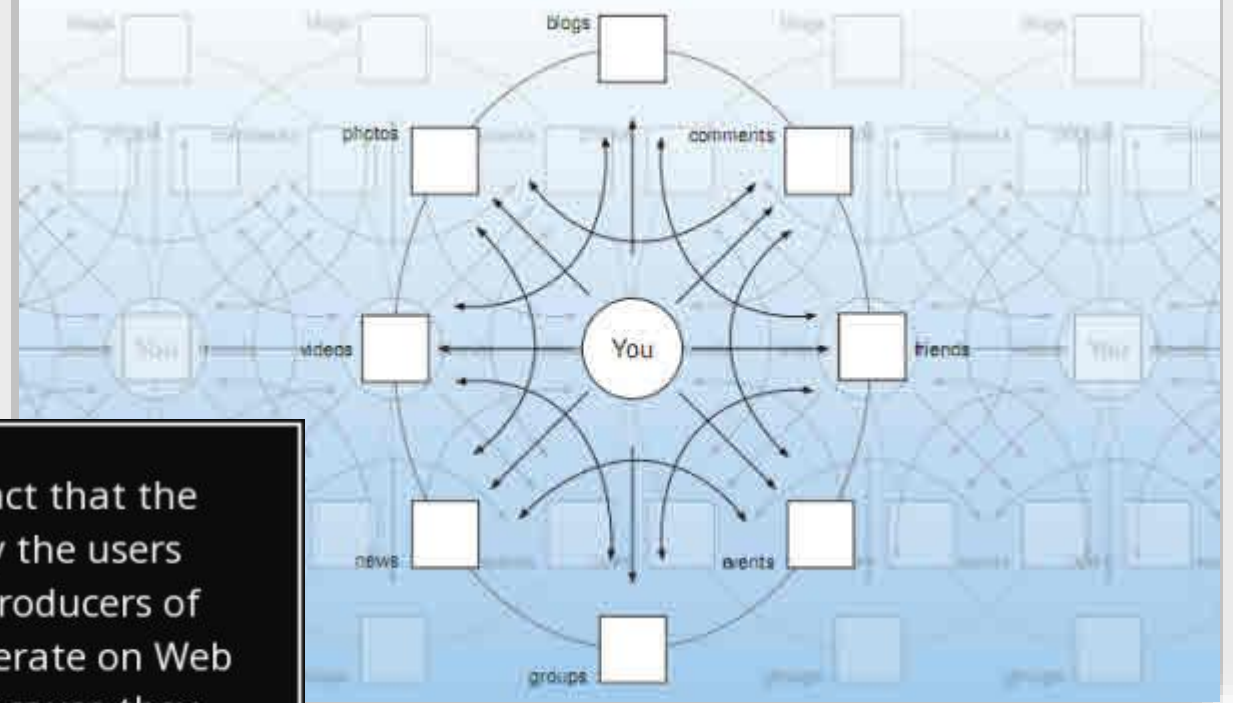


Web 1.0



Web 2.0

Web 2.0: The Social Network



What defines Web 2.0 is the fact that the material on it is generated by the users (consumers) rather than the producers of the system. Thus, those who operate on Web 2.0 can be called prosumers because they simultaneously produce what they consume such as the interaction on Facebook and the entries on Wikipedia.

— George Ritzer —

AZ QUOTES

Web 1.0 vs Web 2.0

Web 1.0

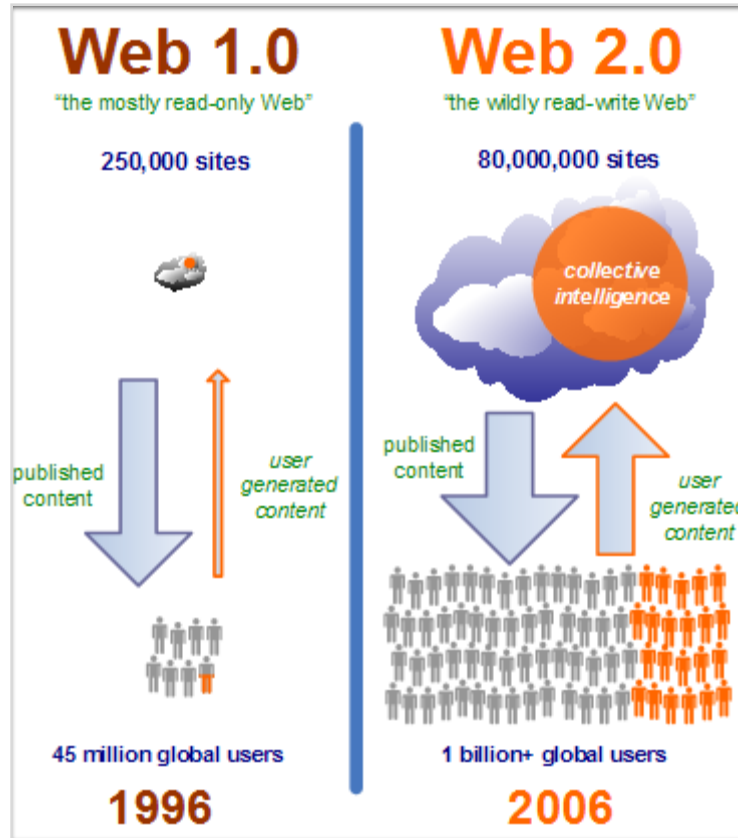
- It's about companies, dot com bubble → 1990s
- It's about homepages
- It's about wires
- It's about Netscape
- It's dial up → telephone line
- Yahoo mail (1998) → 2 MB

Web 2.0

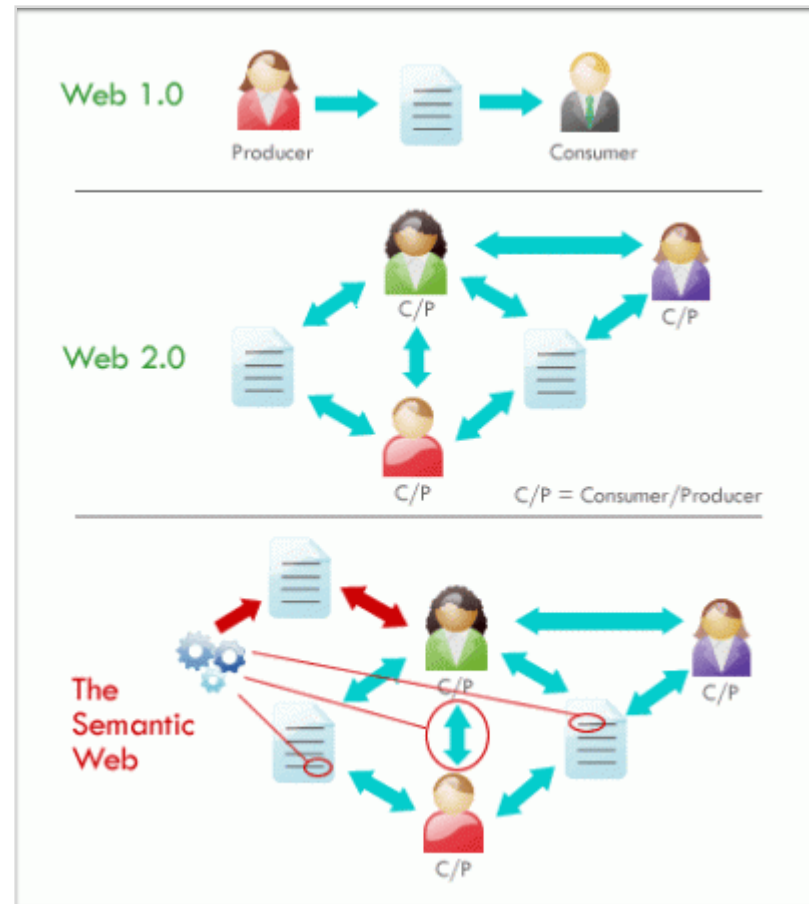
- It's about communities, MySpace, Facebook
- It's about blogging
- It's about wireless
- It's about Google
- It's about broadband
- GMail (Google Mail) → 15 GB
 - Receive 50 MB, attachment 25 MB

Working system: Web 1.0 & Web 2.0





Working system: Web 1.0, Web 2.0 & Web 3.0



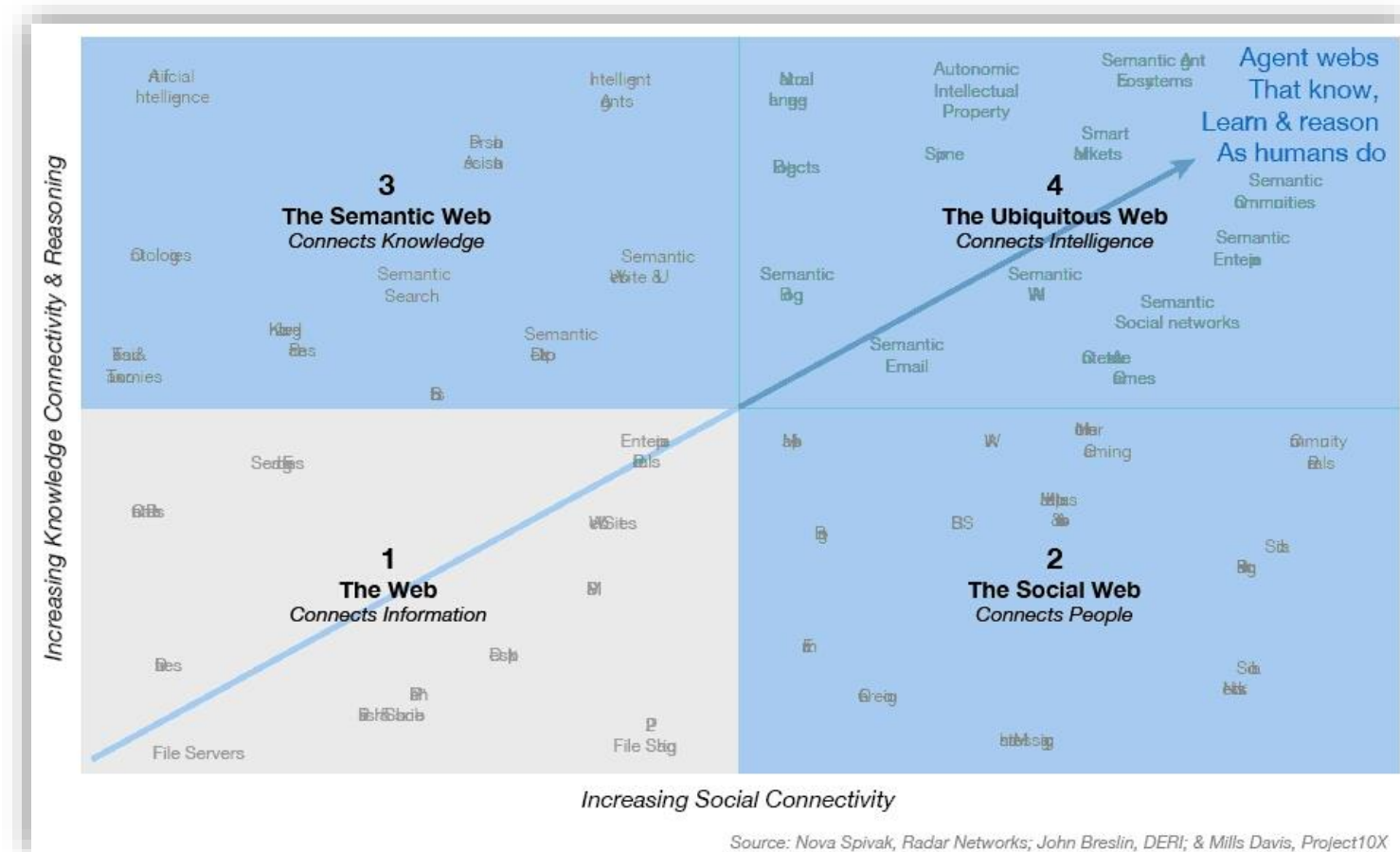
App examples: Web 1.0 - 3.0



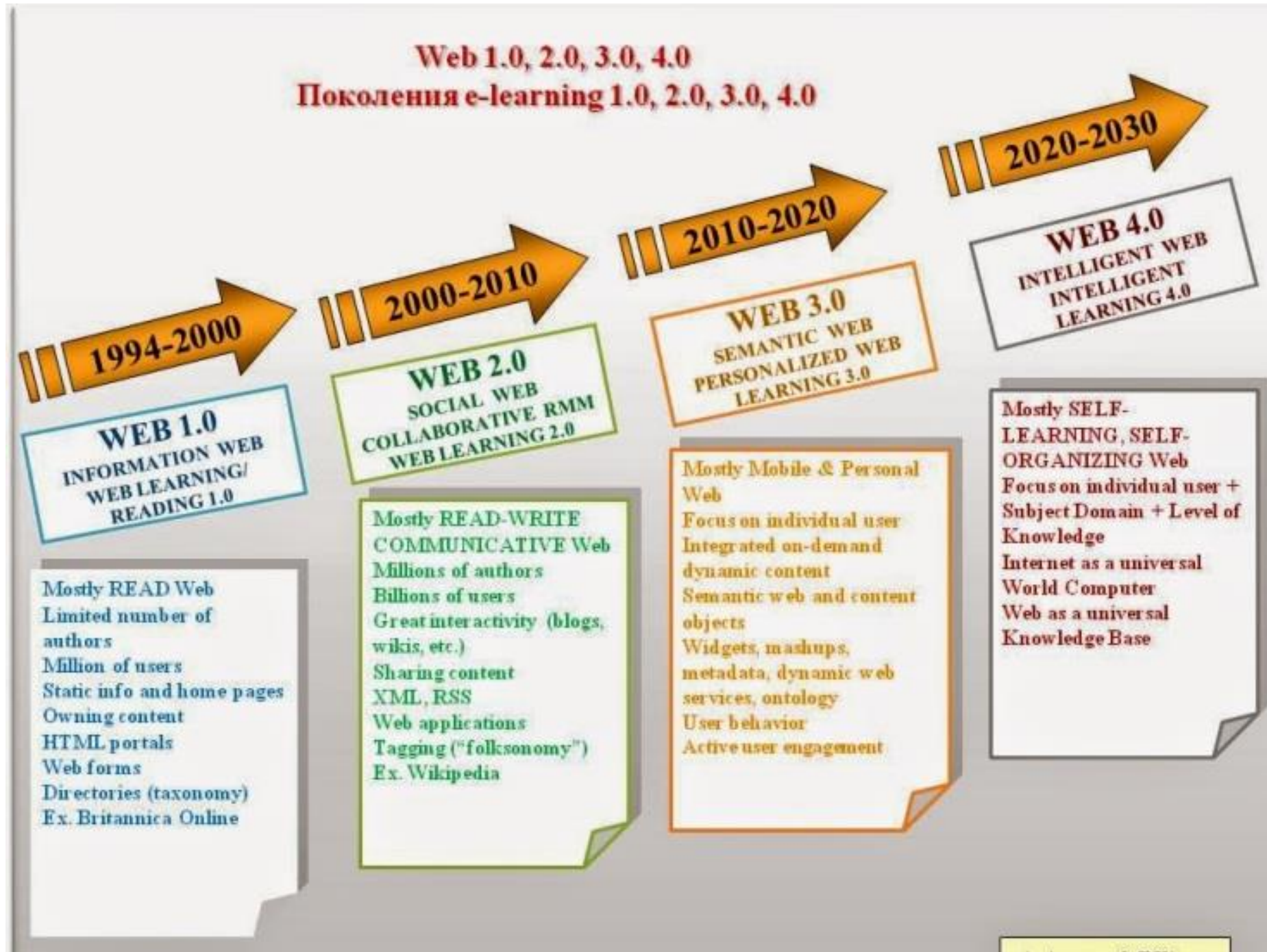
Web 1.0 / 2.0 / 3.0 Summary

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

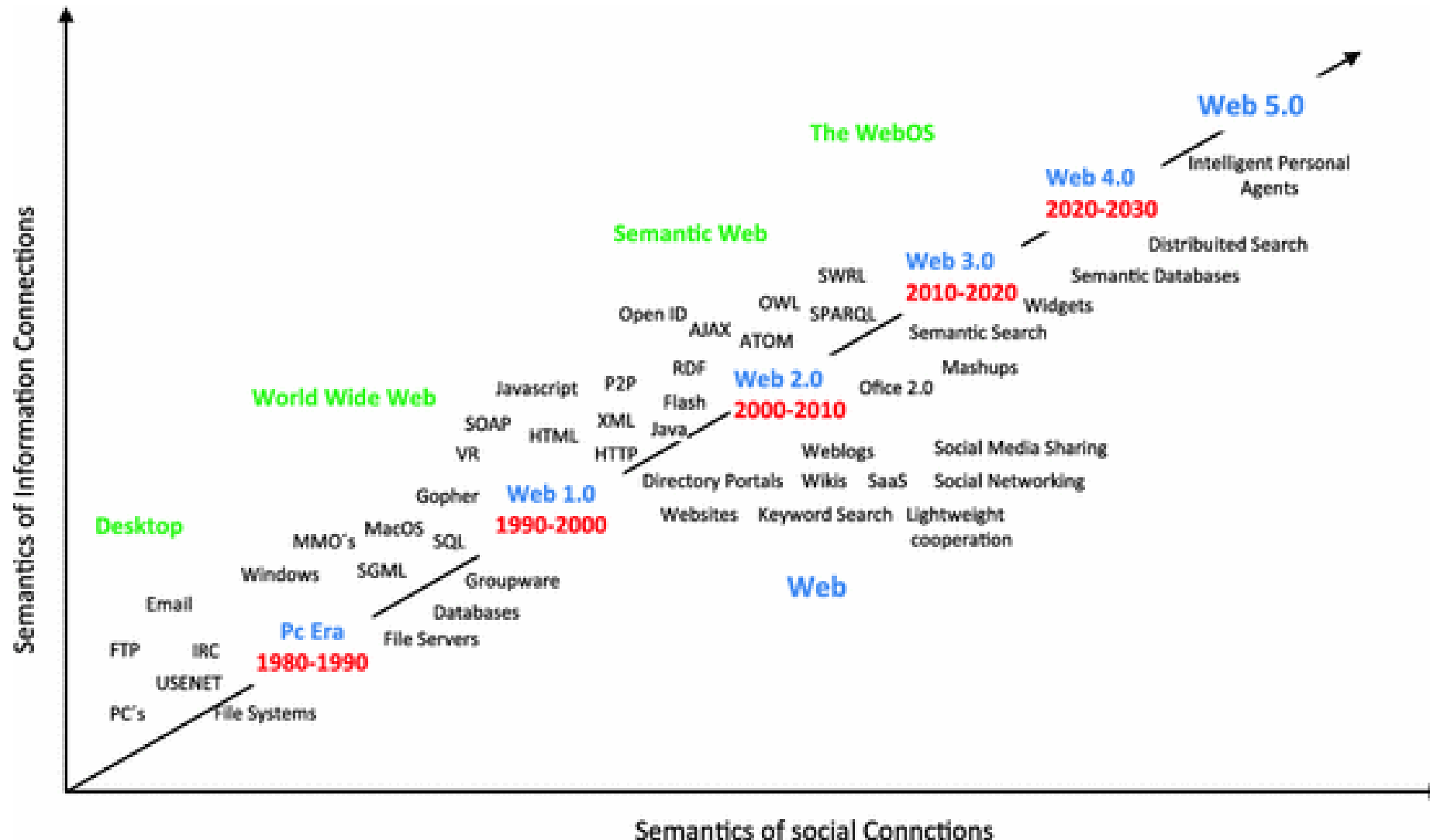
... Web 4.0



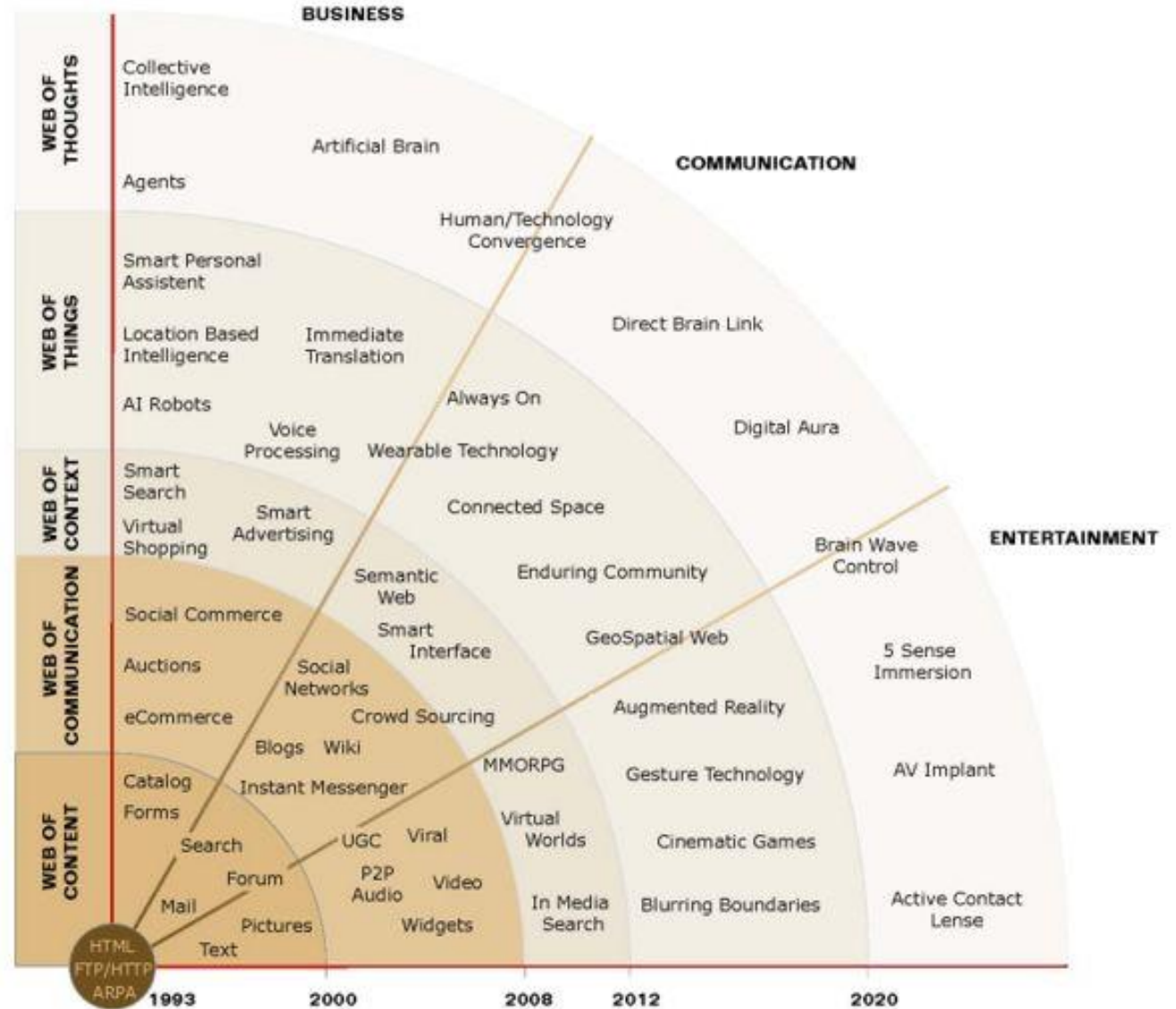
... Web 4.0 (cont'd)



Web 5.0 and beyond

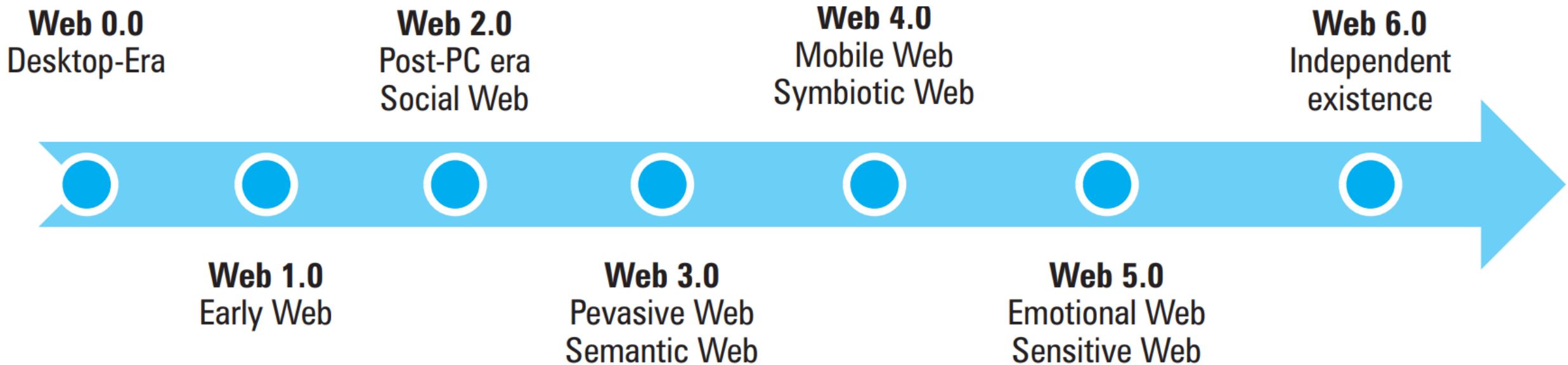


WoT: Things → Thoughts



Online Mapping Evolution from Web 1.0-6.0

- <https://gll.urk.edu.pl/zasoby/74/GLL-1-3-2020.pdf>



Web3

- Web3 (also known as Web 3.0) is an idea for a new iteration of the World Wide Web which incorporates concepts such as decentralization, blockchain technologies, and token-based economics.
- Some technologists and journalists have contrasted it with Web 2.0, wherein they say data and content are centralized in a small group of companies sometimes referred to as 'Big Tech' (Alphabet/Google, Amazon, Apple, Meta/Facebook and Microsoft. Can be extended to Twitter, Netflix, Tesla. In Asian regions: Tencent & Alibaba Group).
- The term 'Web3' was coined in 2014 by Ethereum co-founder Gavin Wood, and the idea gained interest in 2021 from cryptocurrency enthusiasts, large technology companies, and venture capital firms.