



Global Technology Trends Report March 2018

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This report sheds light on the globally technologies trends related to the Labor Market Needs Assessment. The report is funded by the Quality Improvement Fund (QIF)/ World Bank Group (WBG) as part of Labor Market Needs Assessment component that is conducted in partnership with Palestinian IT Association of Companies – PITA and three Palestinian universities and colleges : Islamic University of Gaza, University of Palestine, Gaza Community College for Tourist Studies

Introduction

Information and Communication Technologies (ICTs) become more powerful, accessible and widespread. ICTs play a key role in enhancing competitiveness, enabling development, and bringing progress to all the levels of society. It is one of the fastest growing areas of the world's economy.

There are several sources for work that an ICT graduate can seek whether locally or internationally. They can work full time or part time or as freelancers. In Gaza, Some institutions and private companies offer co-working spaces for renting to remote works.

The extent to which university education is capable of producing potential employable ICT graduates, in the competitive 21st century, is an important issue for both universities and employers. One of the challenges of the ICT sector is the fast change and the emergence of new technologies that sometimes dominate over the previously used ones.

Both the local private sector and universities are looking for an answer of: what is the main dominant technology to be taught for students and adopted in their projects. There are many ways to measure a technology's popularity, but we believe that examining job demand and the usage of statistics are the most useful due to their importance in developing the developers' career prospects.

In this section, we provide some insights about where is the international market heading for some of the most important ICT areas taught and required by the three Palestinian universities in this study. This section introduces the dominant global ICT technologies and the recommended educational curricula as well as the training needs to suit the global market.

To accomplish this, we analyzed data obtained from several sources to determine the top most in-demand technologies in 2018. It was not easy to decide which technology is the dominant in the field; this is why we take into consideration comparing the demand side (global market) from several aspects:

- Jobs advertisements from well-known job and freelancing portals.
- Search statistics and online trends.
- Actual use reports/ surveys from online repositories.

Search Engines Trends	<ul style="list-style-type: none"> •Google Trends •TIOBE Index •PYPL (For tutorial search) •DB-Engines Ranking
International Job Advertisements	<ul style="list-style-type: none"> •TrendySkills •Indeed.com
Surveys / Reports on actual use	<ul style="list-style-type: none"> •Stack Over Flow •GitHub •BuiltWith •W3techs
Freelancing Jobs	<ul style="list-style-type: none"> •Freelancer.com

The following resources provide valuable information regarding the most trending and in-demand technologies.

TIOBE Index

The TIOBE Software company¹ offers one of the most comprehensive and timely surveys of *programming language* use. This index uses online resources, which covers searches in Google, Google Blogs, MSN, Yahoo!, Baidu, Wikipedia and YouTube, to assess the use of programming languages in industrial practice worldwide, and updates its estimates on a monthly basis.

The TIOBE Index works like market share; the percentage is the amount of "market share" a language holds. All of the languages combined total 100%. TIOBE factors in variables like the number of professional developers worldwide, training courses and third-party vendors. Most of this information comes from analyzing search engine results.²

GitHub

GitHub is one of the largest code repositories and web-based hosting service for version control using Git. It offers all of the distributed version control and source code management (SCM) functionality of Git as well as adding its own features.³

On a yearly basis, GitHub releases a Year in Review report⁴, sharing statistics about their programmer community. The statistics from GitHub are considered one of the most important statistics sources for the use

¹ <http://www.tiobe.com>

² <https://www.tiobe.com/tiobe-index/programming-languages-definition/>

³ <https://en.wikipedia.org/wiki/GitHub>

of programming languages due to its wide use among the professionals community. The Github Year in Review gives us the top pull requests from their community. Pull requests are an indicator of the amount of code being written.

PYPL Popularity of Programming Language

This index is different from the previous mentioned ones. The PYPL Popularity of Programming Language Index is created by analyzing how often language tutorials are searched on Google. PYPL states in their web page that the more a language tutorial is searched, the more popular the language is assumed to be. It is a leading indicator. The raw data comes from Google Trends.

Stack Overflow

Stack Overflow was created to be a more open alternative to earlier question and answer websites such as Experts-Exchange. It features questions and answers on a wide range of topics in computer programming.

Stack Overflow produced recently the 2017 report which is based on a survey of 64,227 software developers from 213 countries and territories around the world. Respondents were recruited primarily through channels "owned" by Stack Overflow, such as blog posts and banner ads on the site.

Of these, 36,601 (57% of respondents) completed the entire survey, and an additional 15,403 (24%) answered enough questions to be considered a "partial complete," for a total of 51,392 usable responses.⁵ The survey fielded from January 12th to February 6th, 2018.

TrendySills

TrendySkills is a tool that provides a quantitative representation about trends that job employers seek in the IT industry. It has started at 2012 from a BSc thesis "Data mining on labor market of IT sector", which was an application that⁶:

- Searches and extracts from popular advertising websites the skills and technologies that employers are looking for
- Classifies skills sought (for example, a requirement knowledge for SQL Server is part of the general category of RDBMS)
- Generates useful statistics about the results, as the trends prevailing per category or per time period
- Provides the statistical data to the public via a public API

The data is being daily extracted from major job advertisement websites (e.g. <https://www.monster.com>) in the following countries: USA, UK, Germany, Sweden, Spain, Ireland, Netherlands, Austria, Czech Republic, Belgium, Finland, India and Greece.

DB-Engines Ranking⁷

⁴ <https://octoverse.github.com/>

⁵ <https://insights.stackoverflow.com/survey/2017>

⁶ <https://trendyskills.com/about>

⁷ https://db-engines.com/en/ranking_definition

The DB-Engines Ranking considers popularity as the main indicator of database management systems. It is monthly updated. Six factors play a role in the measurement of popularity: 1) Number of mentions of the system on websites, 2) General interest in the system, 3) Frequency of technical discussions about the system, 4) Number of job offers, in which the system is mentioned, 5) Number of profiles in professional networks, in which the system is mentioned and 6) Relevance in social networks.

W3techs Ranking⁸

The website provides daily web technology usage statistics. It investigates technologies of websites, not of individual web pages. It reviews only the top 10 million websites in the statistics in order to limit the impact of domain spammers. W3techs Ranking depends on the popularity rankings provided by Alexa (an Amazon.com company) that uses a 3 months average ranking.

Freelancer.com⁹

Freelancer.com was founded, in 2009, to be a global freelancing marketplace portal that allows potential employers to post jobs that freelancers can then bid to complete. Although there are several other freelancing portals such as upwork.com, peopleperhour.com, guru.com and many others, we selected freelancer.com for the following reasons:

- Categories are well- organized and structured easily.
- Skill tags are added by the clients and then can be optimized by the freelancers who apply for the jobs. This provides more accuracy because the clients sometimes are not sure which technology skills to ask for.
- One of the largest online freelancing communities. There are more than 27.5 million registered freelancers and more than 13.5 million Total Jobs Posted.

Many jobs ads mention part of the skill name or even include irrelevant search results, which affects the freelancers' ability to find a suitable job. Thus, we preferred to use the number of jobs under the "Skill tags" instead of the keyword search for the skill to make a more measure depending on putting the sub- skill under the "categories" of the portal.

The search results vary from time to time. There were +226,000 job posting on the portal. These numbers were taken on 12-14 March 2018.

Global Technology Trends

In this section, we provide some insights about some relevant ICT technologies and their usage globally. It is not easy to cover them all, but we will use similar methodology for any needed additional technology required by the universities.

⁸ <https://w3techs.com/technologies>

⁹ <https://www.freelancer.com/>

Programming Languages and web

Recent technological development makes the world more techno-savvy. Programming techniques have grown tremendously, surpassing normal growth standards. Software development is considered a very dynamic field, in which new programming languages, frameworks, and technologies may live and die within a few years. Graduates, in this field, need to constantly learn new skills to remain relevant and up-to-date with the market demand. In this section, we provide some collected data about the use of most famous programming languages in 2018.

Search Engines Trends

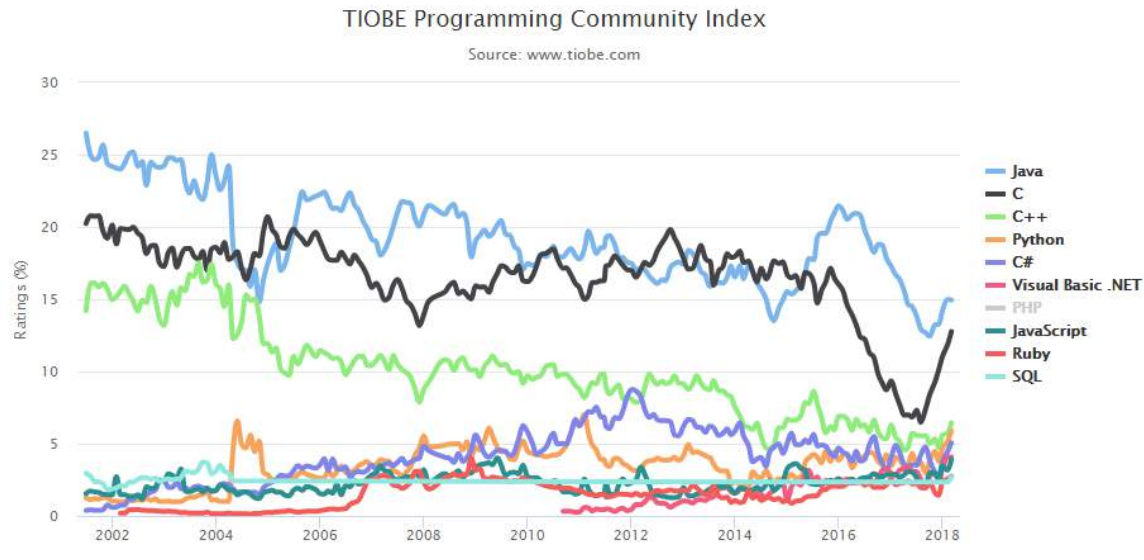
According to **TIOBE Index in March 2018¹⁰**, the following languages are top searched. The index can be used to check whether your programming skills are still up to date or to make a strategic decision about what programming language should be adopted when starting to build a new software system.

Mar 2018	Mar 2017	Change	Programming Language	Ratings	Change
1	1		Java	14.941%	-1.44%
2	2		C	12.760%	+5.02%
3	3		C++	6.452%	+1.27%
4	5	▲	Python	5.869%	+1.95%
5	4	▼	C#	5.067%	+0.66%
6	6		Visual Basic .NET	4.085%	+0.91%
7	7		PHP	4.010%	+1.00%
8	8		JavaScript	3.916%	+1.25%
9	12	▲	Ruby	2.744%	+0.49%
10	-	▲▲	SQL	2.686%	+2.69%
11	11		Perl	2.233%	-0.03%
12	10	▼	Swift	2.143%	-0.13%
13	9	▼▼	Delphi/Object Pascal	1.792%	-0.75%
14	16	▲	Objective-C	1.774%	-0.22%
15	15		Visual Basic	1.741%	-0.27%
16	13	▼	Assembly	1.707%	-0.53%

¹⁰ <https://www.tiobe.com/tiobe-index/>

			language		
17	17		Go	1.444%	-0.54%
18	18		MATLAB	1.408%	-0.45%
19	19		PL/SQL	1.327%	-0.34%
20	14	⚡	R	1.128%	-0.89%

Over the years, we can see how the ranking is trending:



TIOBE index also provides a very long term history comparison to make the picture bigger. These are average positions for a period of 12- months, and for seven different years:

Programming Language	2018	2013	2008	2003	1998	1993	1988
Java	1	2	1	1	17	-	-
C	2	1	2	2	1	1	1
C++	3	4	3	3	2	2	5
Python	4	7	6	12	24	16	-
C#	5	5	7	9	-	-	-
Visual Basic .NET	6	13	-	-	-	-	-
JavaScript	7	10	8	7	21	-	-
PHP	8	6	4	5	-	-	-
Ruby	9	9	9	19	-	-	-
Perl	10	8	5	4	3	10	-
Objective-C	18	3	45	48	-	-	-
Ada	30	16	17	14	7	7	2

Lisp	31	12	15	13	6	4	3
Pascal	140	14	19	97	11	3	13

Tutorials Trends

By using PYPL Popularity index, we can measure the trending of the learning of each language. These data are reported in March 2018¹¹

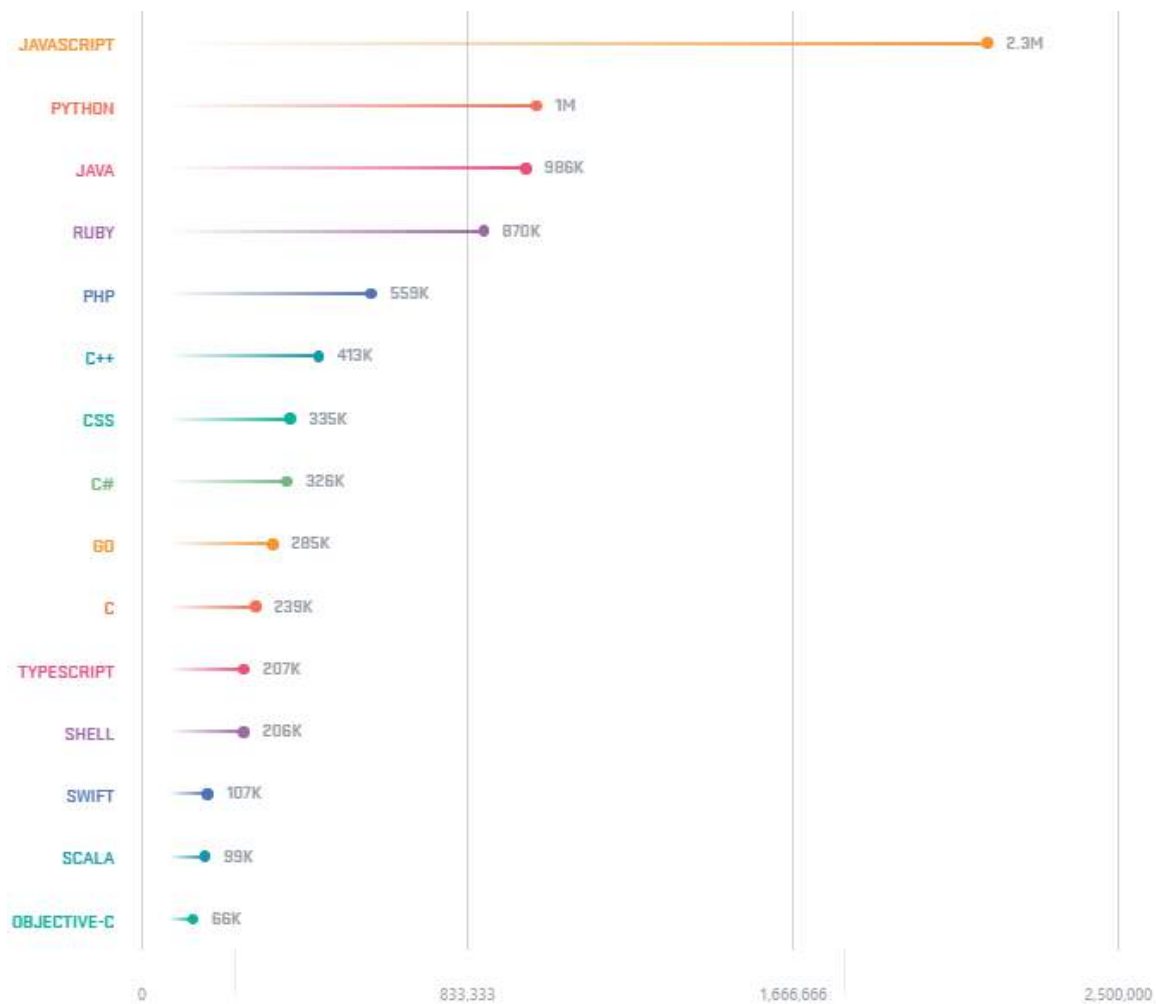
Rank	Change	Language	Share	Trend
1		Java	22.7 %	-0.8 %
2		Python	21.69 %	+5.4 %
3	⬆️	Javascript	8.53 %	+0.3 %
4	⬇️	PHP	8.33 %	-1.7 %
5	⬇️	C#	7.99 %	-0.7 %
6		C	6.42 %	-1.3 %
7	⬆️	R	4.23 %	+0.4 %
8	⬇️	Objective-C	3.81 %	-1.1 %
9		Swift	3.0 %	-0.6 %
10		Matlab	2.39 %	-0.4 %
11		Ruby	1.72 %	-0.4 %
12	⬆️⬆️	TypeScript	1.52 %	+0.4 %
13		VBA	1.42 %	+0.0 %
14	⬇️	Visual Basic	1.26 %	-0.3 %
15	⬇️	Scala	1.21 %	-0.0 %
16	⬆️⬆️⬆️	Kotlin	0.9 %	+0.8 %
17		Go	0.78 %	+0.3 %
18	⬇️	Perl	0.78 %	-0.1 %
19	⬇️	lua	0.36 %	-0.1 %
20	⬆️	Rust	0.36 %	+0.1 %
21	⬇️	Delphi	0.31 %	-0.1 %
22	⬇️	Haskell	0.3 %	-0.0 %

Surveys and Global use

Based on the GitHub published "2017 Year in Review report"¹², the fifteen most popular languages on GitHub are:

¹¹ <https://pypl.github.io/PYPL.html>

¹² <https://octoverse.github.com/>



GitHub published their pull-requests for the 4th quarter of 2017¹³, which indicated the trends of each programming language as the following:

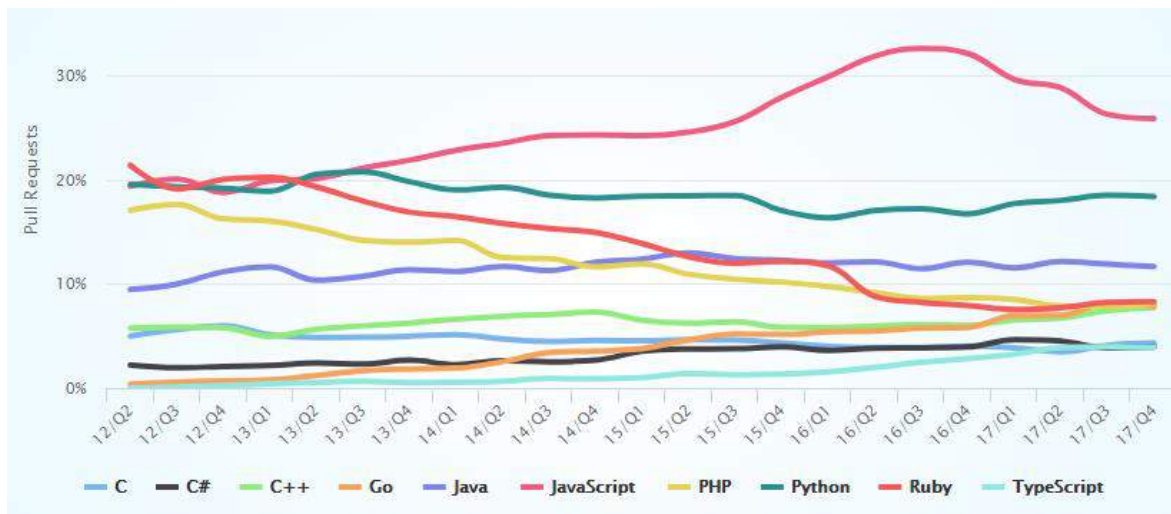
# Ranking	Programming Language	Percentage (Change)	Trend
1	JavaScript	22.290% (-5.487%)	
2	Python	15.823% (+1.355%)	
3	Java	10.054% (-0.392%)	
4	Ruby	7.144% (+0.293%)	▲
5	PHP	7.003% (-0.494%)	▼
6	Go	6.792% (+1.751%)	▲
7	C++	6.653% (+1.445%)	▼
8	C	3.728% (+0.232%)	
9	C#	3.406% (-0.009%)	
10	TypeScript	3.382% (+0.947%)	

¹³ https://madnight.github.io/github/#/pull_requests/2017/4

11	Shell	2.058% (-0.224%)	
12	Scala	1.499% (+0.139%)	
13	Swift	1.120% (-0.214%)	
14	DM	1.010% (+0.693%)	⬆
15	Rust	0.984% (+0.095%)	
16	Objective-C	0.846% (-0.153%)	⬇
17	CoffeeScript	0.532% (-0.263%)	⬇
18	Haskell	0.387% (+0.026%)	⬆
19	Groovy	0.386% (+0.114%)	⬆
20	Lua	0.383% (-0.006%)	⬇
21	Clojure	0.367% (+0.033%)	⬇
22	Perl	0.366% (-0.032%)	⬇
23	Kotlin	0.351% (+0.186%)	⬆
24	Elixir	0.271% (+0.022%)	
25	PowerShell	0.235% (-0.003%)	
26	OCaml	0.217% (-0.052%)	⬇
27	Julia	0.207% (+0.020%)	⬆
28	Dart	0.189% (+0.055%)	⬆
29	Emacs Lisp	0.186% (+0.064%)	⬆
30	Erlang	0.176% (-0.055%)	⬇
31	R	0.163%	⬇
32	Vim script	0.162%	
33	Puppet	0.142%	⬇
34	HCL	0.140%	⬆
35	Visual Basic	0.113%	⬇
36	Matlab	0.100%	⬇
37	F#	0.089%	⬇
38	Crystal	0.061%	⬆
39	Fortran	0.060%	⬆
40	Elm	0.044%	⬇
41	Roff	0.044%	⬆
42	Perl 6	0.040%	⬆
43	GAP	0.039%	⬆
44	Assembly	0.039%	

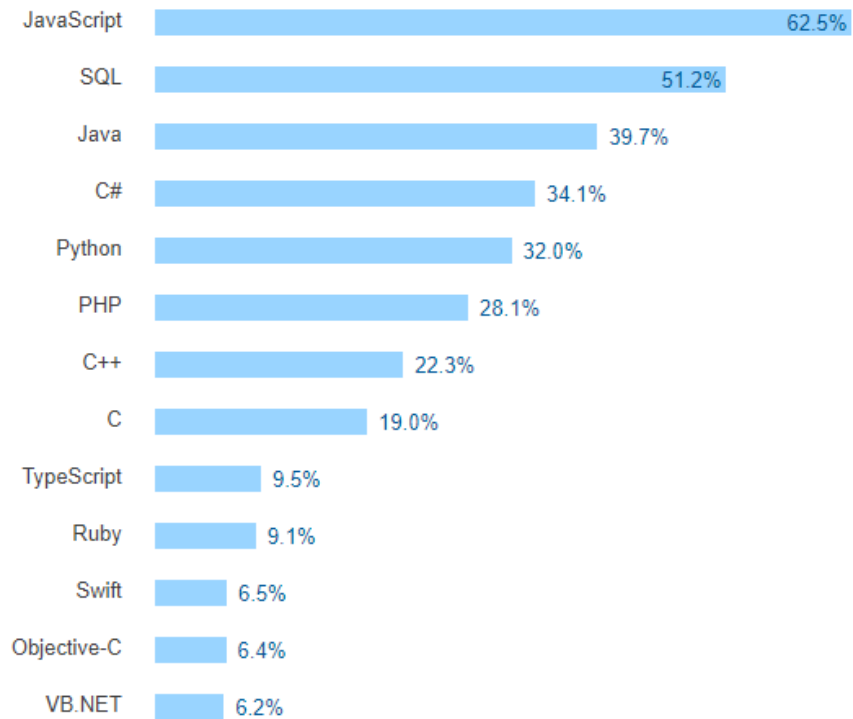
45	Vala	0.037%	⬆️
46	BitBake	0.036%	⬆️
47	Gherkin	0.035%	⬆️
48	Logos	0.033%	⬆️
49	D	0.033%	⬆️
50	SQF	0.033%	⬇️

The following graph shows the trends in the past years (from 2012-2017) according to GitHub report:



Another source for the information of programming languages use is the 2017 Stack Overflow survey¹⁴ which was published recently.

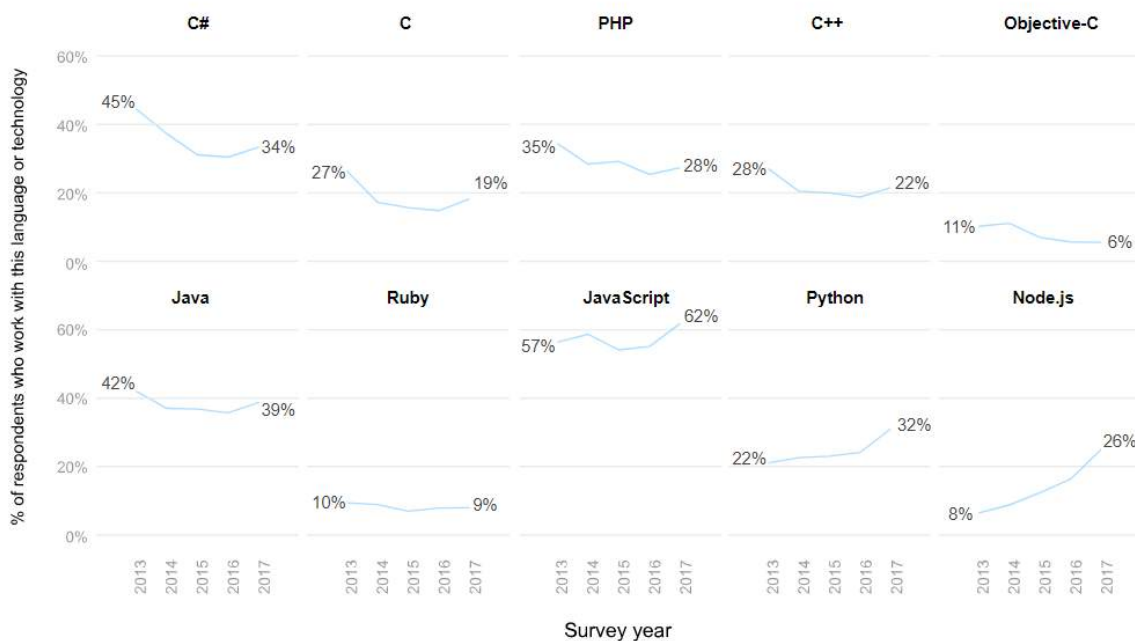
¹⁴ <https://insights.stackoverflow.com/survey/2017>



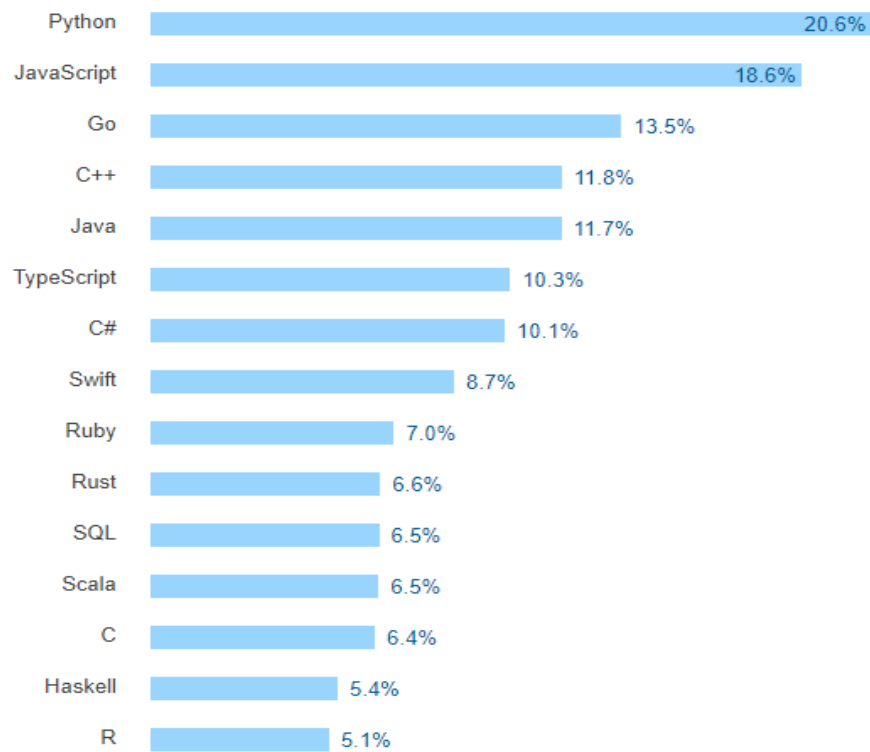
Interesting information provided by the Stack Overflow report is the five years track of the same survey. These results showed grow in popularity for languages such as Python and Node.js, while the usage of languages like C# and C has diminished.

Change in technology popularity over time

Arranged in ascending order of total 2013 to 2017 change.

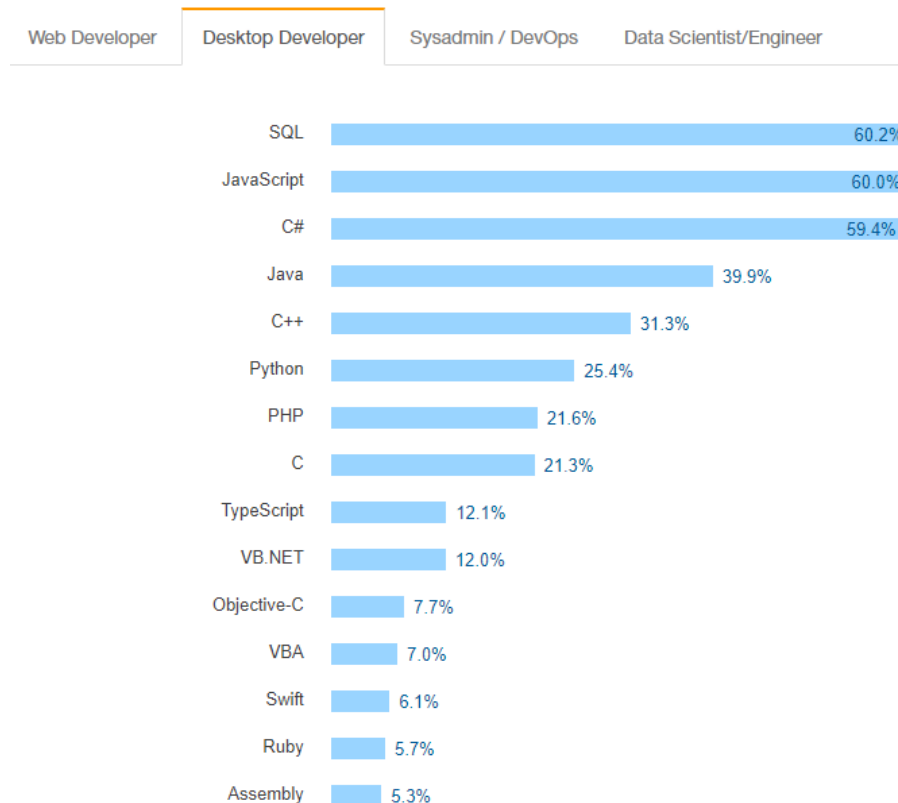
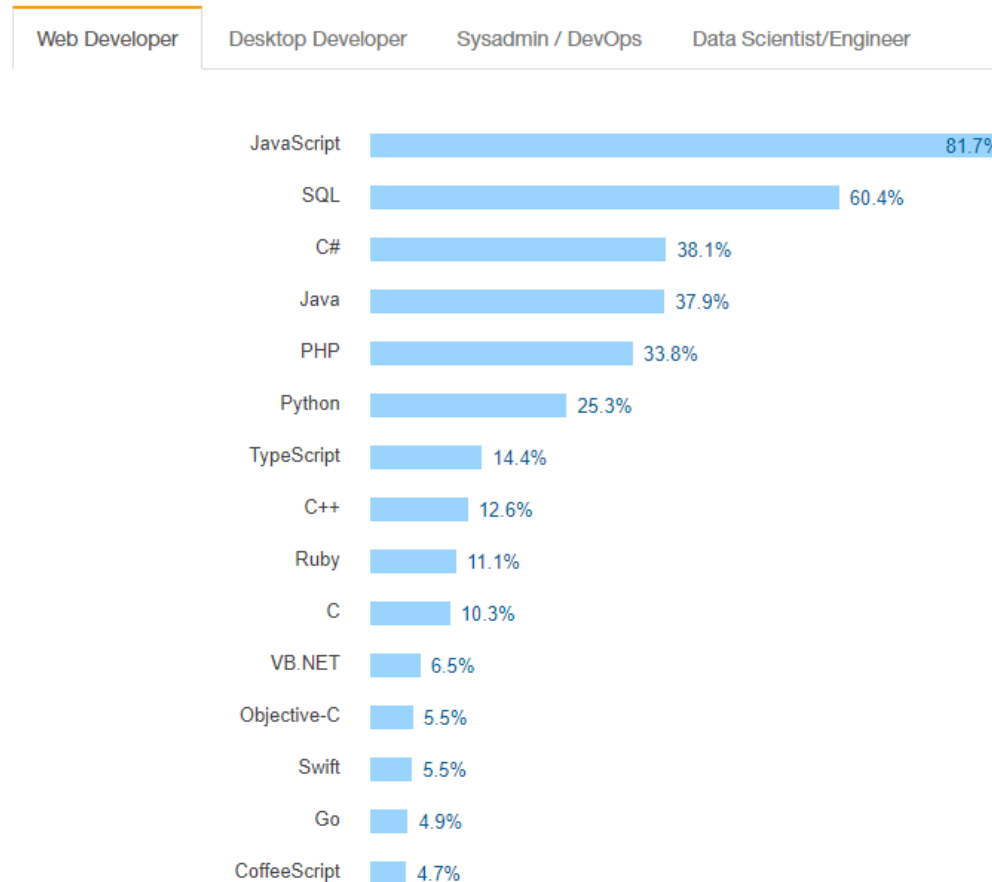


The Stack Overflow survey also asked the developers which languages are the most demanded, and the answer was the as follows: Python jumped to the peak after ranking fourth last year.

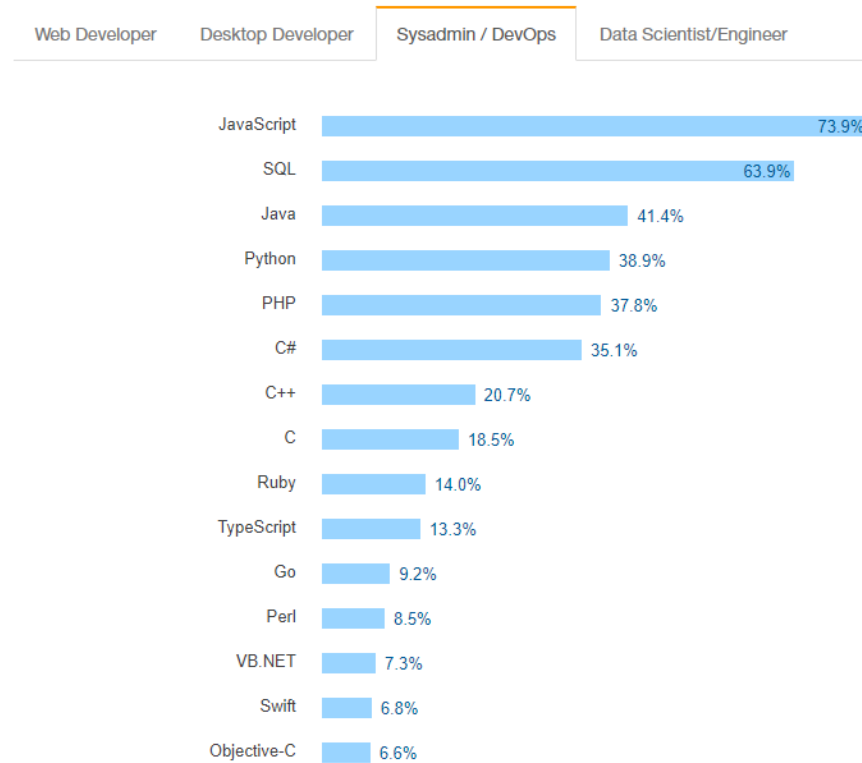


According to Stack Overflow's survey, JavaScript and SQL are the most popular languages across web developers, desktop developers, sysadmins/DevOps and data scientists. Not surprisingly, **R** is far more popular with data scientists than other occupations.

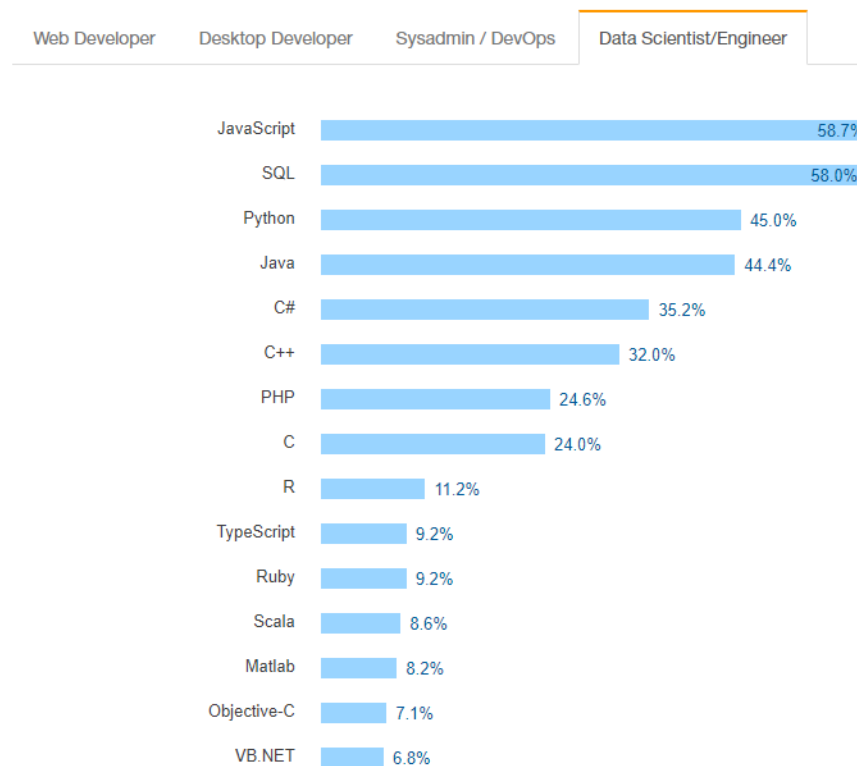
Most Popular Languages by Occupation



Most Popular Languages by Occupation

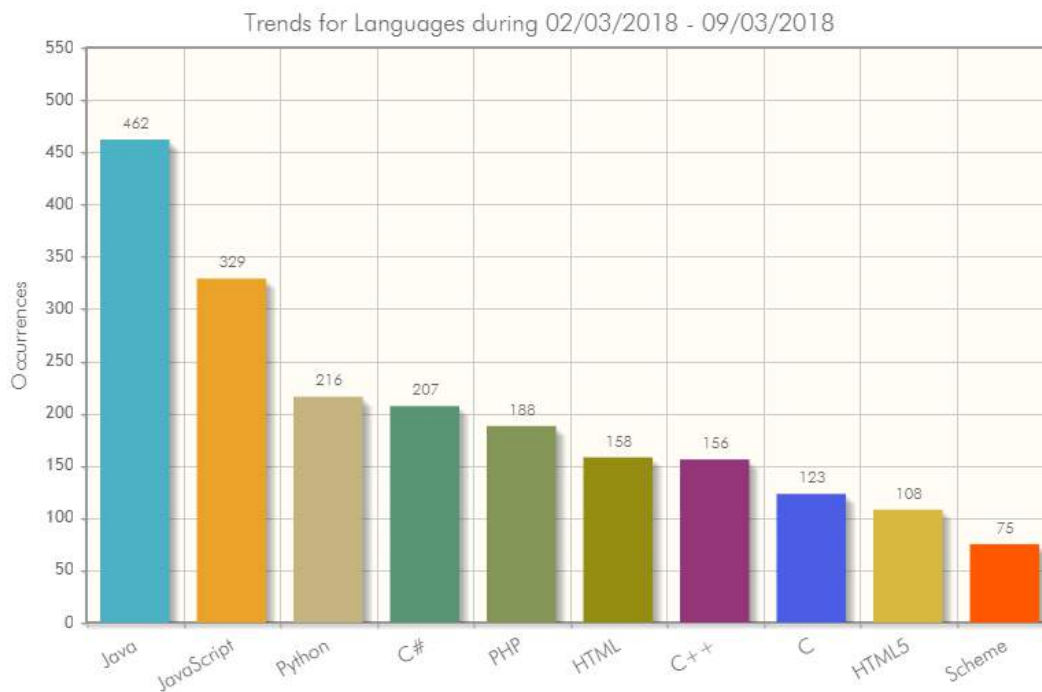


Most Popular Languages by Occupation

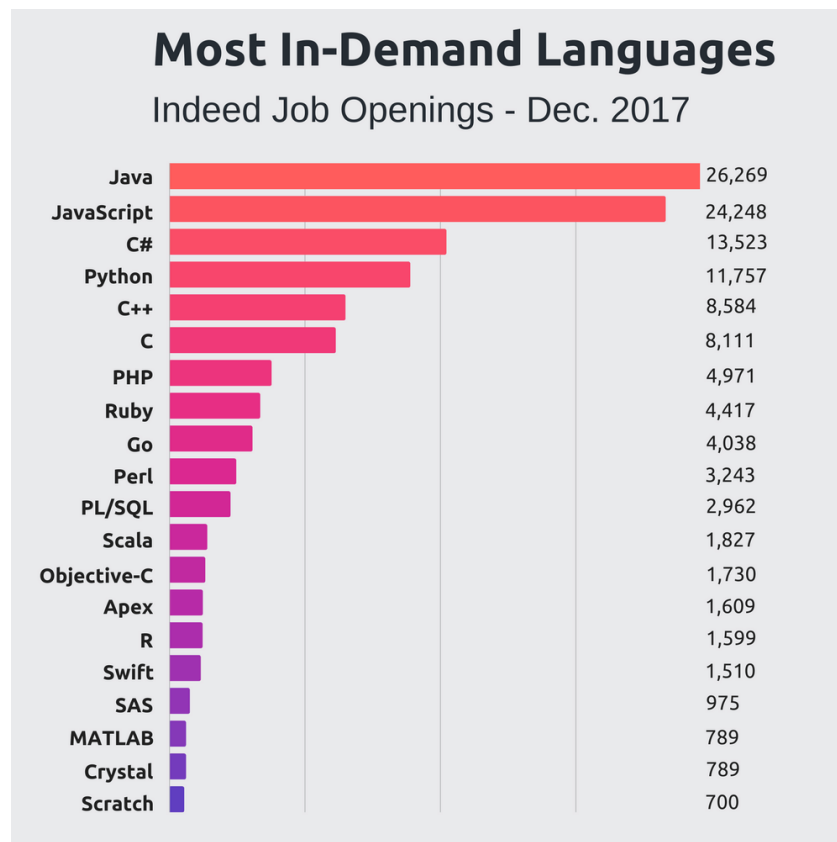


International Jobs Advertisements

There are many sources for jobs around the world. According to TrendySkills, which provides searches and extracts from popular advertising websites, the skills and technologies that employers are looking for are:



Another source for jobs in the programming category was published by Stackify.com¹⁵. They searched the famous www.indeed.com portal and took the 50 most popular languages from the TIOBE Index and searched for "(Language name) Developer". The result was the following:

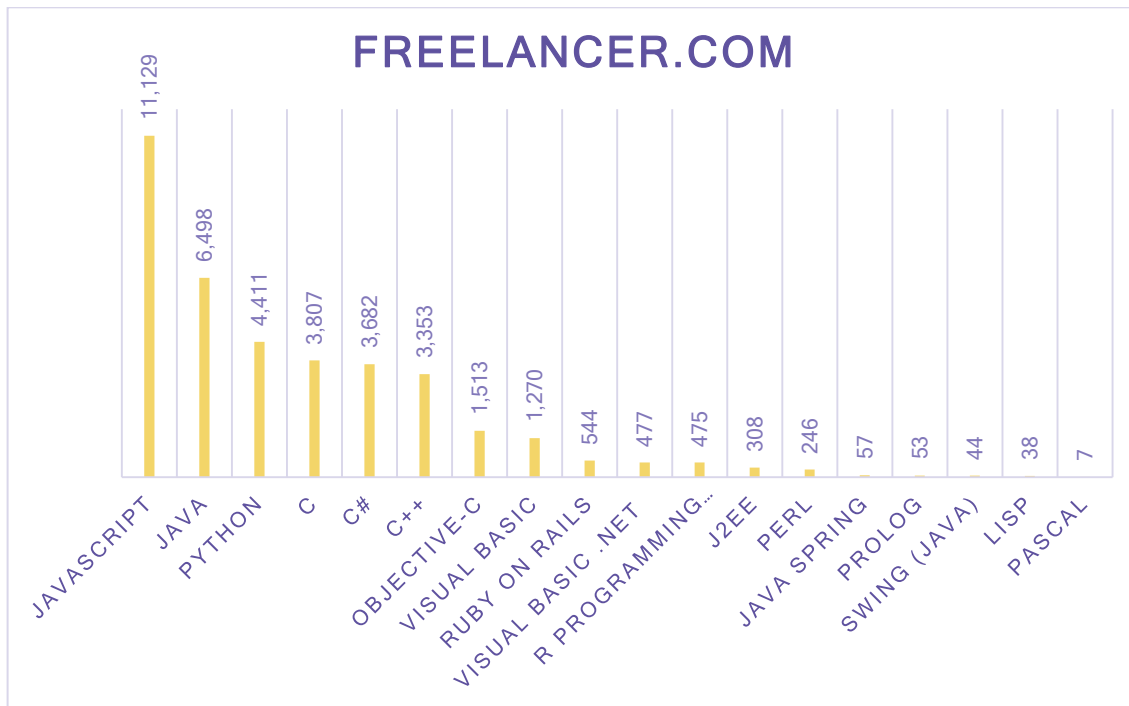


¹⁵ <https://stackify.com/popular-programming-languages-2018/>

Freelancing Jobs

Based on the skills search on Freelancer.com, the following programming languages have these numbers of jobs postings:

#	Skill	# of Job Posts
1.	JavaScript	11,129
2.	Java	6,498
3.	Python	4,411
4.	C	3,807
5.	C#	3,682
6.	C++	3,353
7.	Objective-C	1,513
8.	Visual Basic	1,270
9.	Ruby on Rails	544
10.	Visual Basic .NET	477
11.	R Programming Language	475
12.	J2EE	308
13.	Perl	246
14.	Java Spring	57
15.	Prolog	53
16.	Swing (Java)	44
17.	Lisp	38
18.	Pascal	7



Database Technologies

The database management system (DBMS) essentially serves as an interface between the database and end users or application programs, ensures that data is consistently organized and remains easily accessible. In this section, we highlight the usage of several DBMSs from different perspectives.

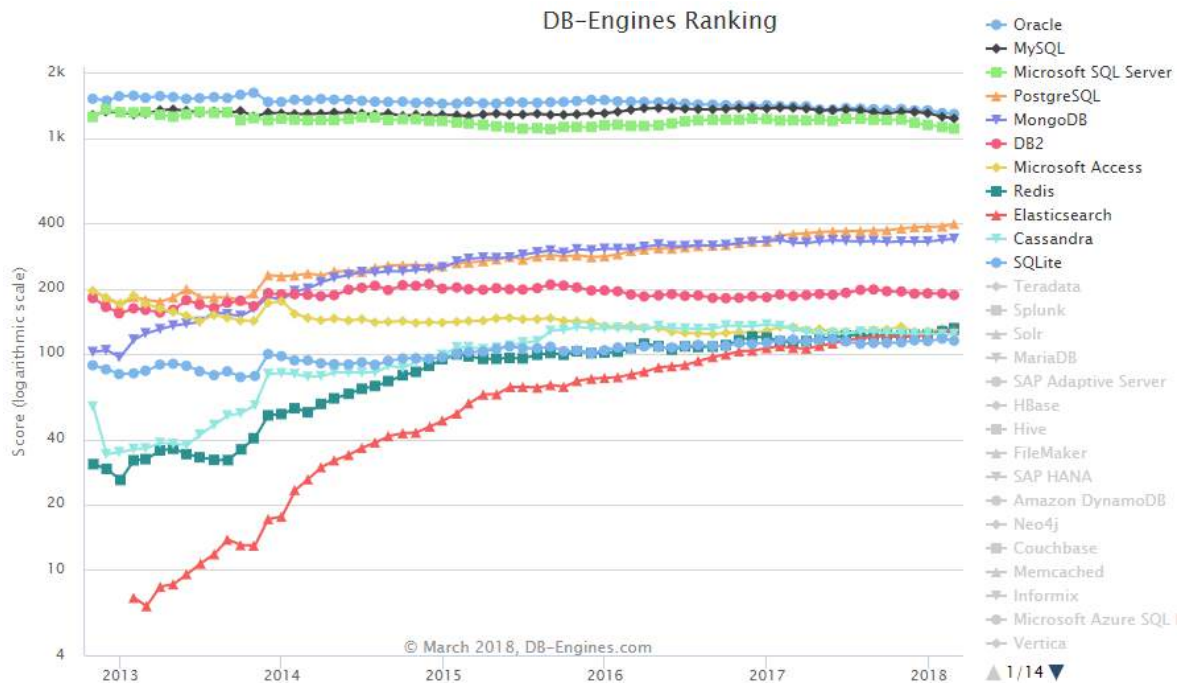
Search Engines Trends

DB-Engines Ranking provides monthly reports of each popular DBMS by using 6 factors, most of them rely on the searching trends. The ranking is:

Rank			DBMS	Database Model	Score		
Mar 2018	Feb 2018	Mar 2017			Mar 2018	Feb 2018	Mar 2017
1.	1.	1.	Oracle	Relational DBMS	1289.61	-13.67	-109.89
2.	2.	2.	MySQL	Relational DBMS	1228.87	-23.60	-147.21
3.	3.	3.	Microsoft SQL Server	Relational DBMS	1104.79	-17.25	-102.70
4.	4.	4.	PostgreSQL	Relational DBMS	399.35	+10.97	+41.71
5.	5.	5.	MongoDB	Document store	340.52	+4.10	+13.59
6.	6.	6.	DB2	Relational DBMS	186.66	-3.31	+1.75
7.	7.	7.	Microsoft Access	Relational DBMS	131.95	+1.88	-0.99
8.	8.	10.	Redis	Key-value store	131.22	+4.21	+18.22

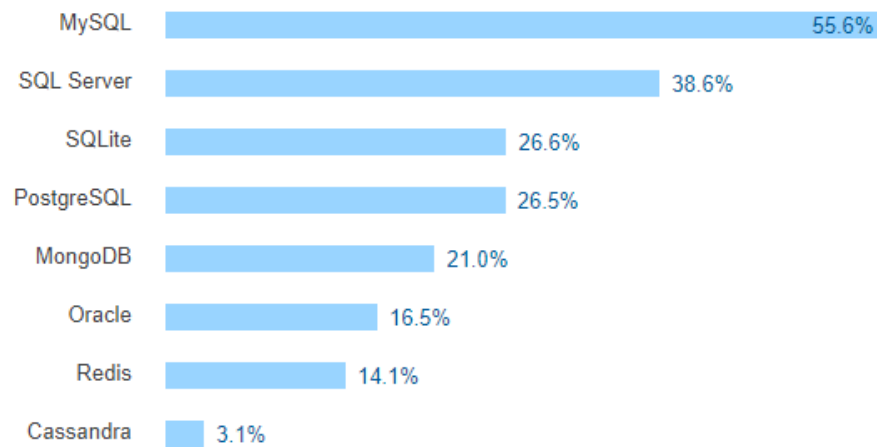
9.	9.	11.	Elasticsearch	Search engine	128.54	+3.23	+22.32
10.	10.	8.	Cassandra	Wide column store	123.49	+0.71	-5.70
11.	11.	9.	SQLite	Relational DBMS	114.81	-2.46	-1.37
12.	12.	12.	Teradata	Relational DBMS	72.46	-0.53	-1.07
13.	13.	17.	Splunk	Search engine	65.67	-1.60	+11.58
14.	14.	14.	Solr	Search engine	64.81	+0.94	+0.82
15.	17.	19.	MariaDB	Relational DBMS	63.10	+1.45	+16.22
16.	15.	13.	SAP Adaptive Server	Relational DBMS	62.62	-0.87	-7.51
17.	16.	15.	HBase	Wide column store	60.93	-0.77	+1.96
18.	18.	20.	Hive	Relational DBMS	57.00	+1.94	+12.38
19.	19.	16.	FileMaker	Relational DBMS	55.13	+0.77	+0.55
20.	20.	18.	SAP HANA	Relational DBMS	48.53	+1.17	-1.53

The use over the past five years is explained in the following graph:

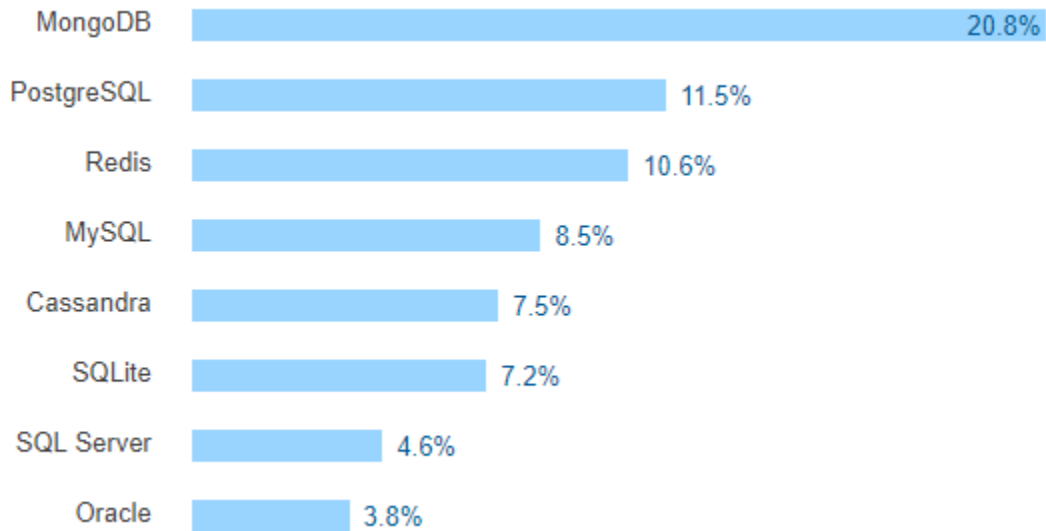


Surveys / Reports on actual use

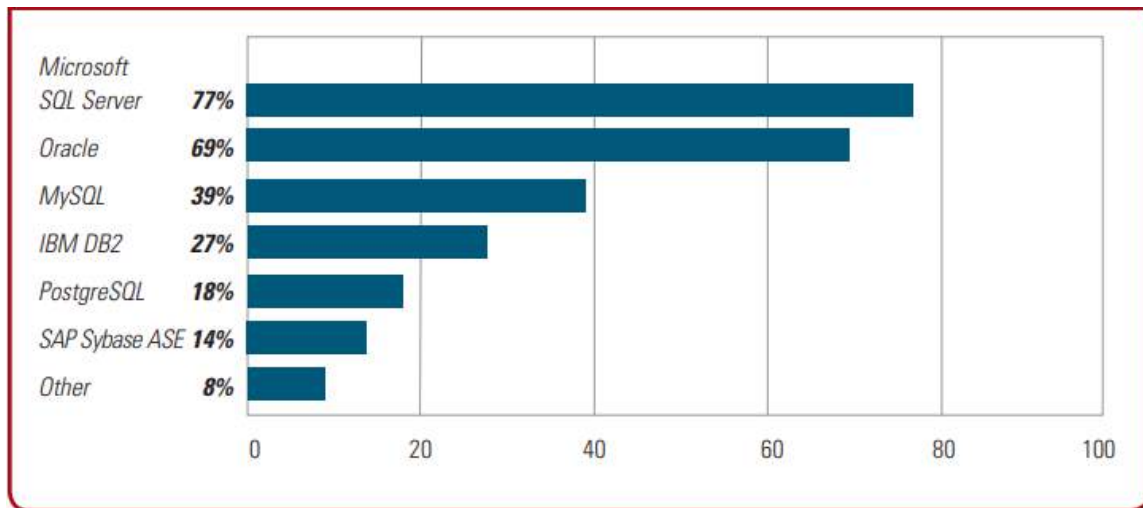
When developers were asked by Stack Overflow: what does database technology they use? The results show that MySQL and SQL Server are the most commonly used.



While Redis is proportionally the most preferable database to the developers, using Oracle represents the most formidable task. Developers' usage of MongoDB has significant rates this year than any other database.



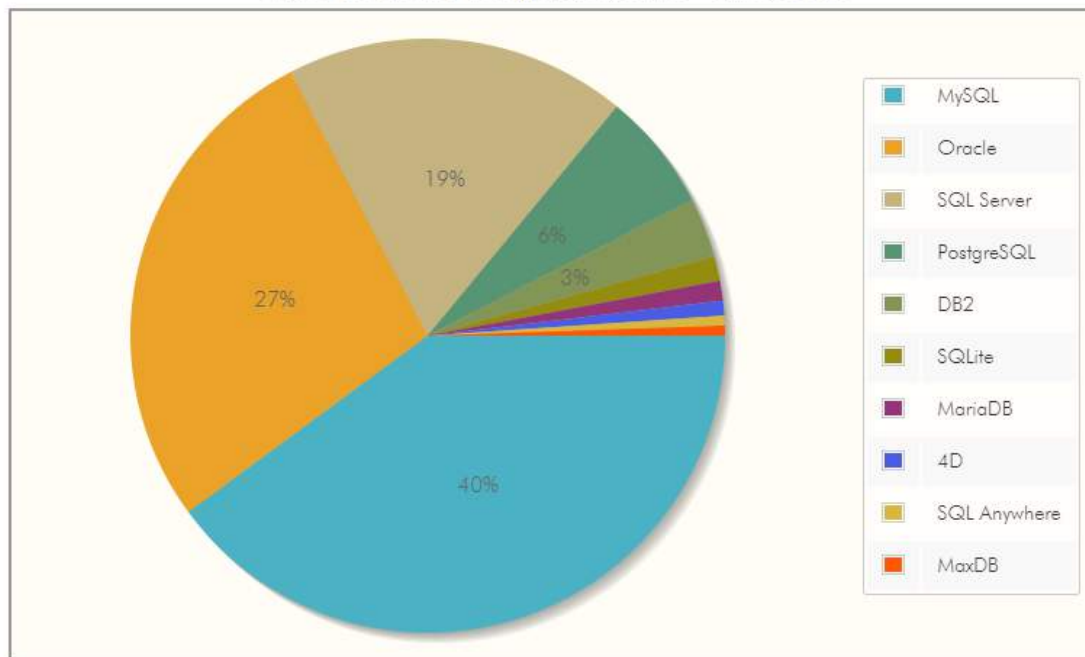
"DBAs Face New Challenges: Trends In Database Administration", a survey published by Dr. Elliot King in December 2017, asked more than 200 respondents- more than half of them were DBAs or database developers and 20% came from companies with more than 5,000 employees- came from a wide range of industries and companies of different sizes about their running relational database management system platform/ brands in their organizations. The answers were as follows:



International Job Advertisements

The statistics published by TrendySkills shows that MySQL is the most requested DBMS, followed by Oracle and SQL Server.

Trends for RDBMS during 02/03/2018 - 09/03/2018

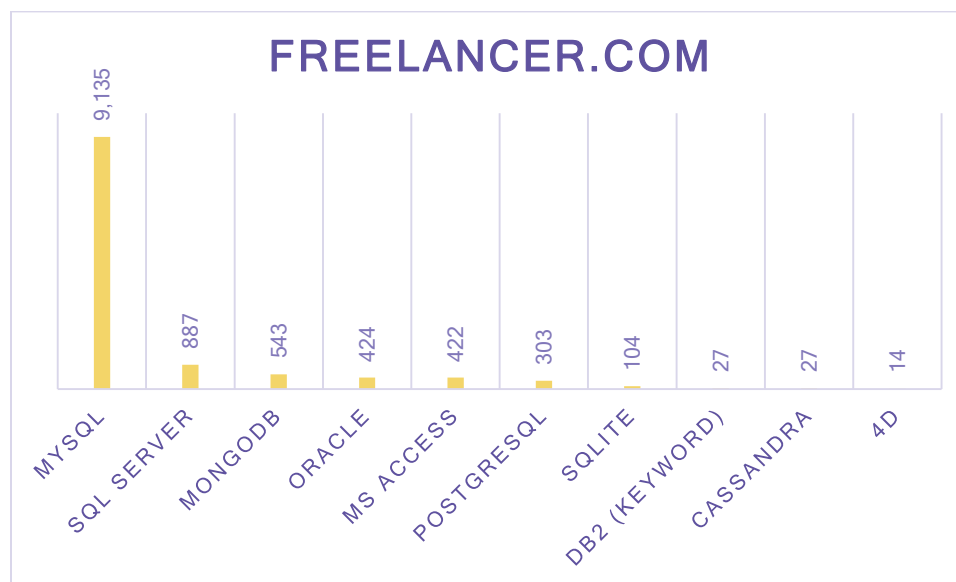


Freelancing Jobs

#	Skill	# of Job Posts ¹⁶
1.	MYSQL	9,135
2.	SQL	1,519

¹⁶ On Freelancer.com

3.	SQL Server	887
4.	MongoDB	543
5.	Oracle	424
6.	Microsoft Access	422
7.	PostgreSQL	303
8.	SQLite	104
9.	DB2 (Keyword)	27
10.	Cassandra	27
11.	4D	14



Web Technologies

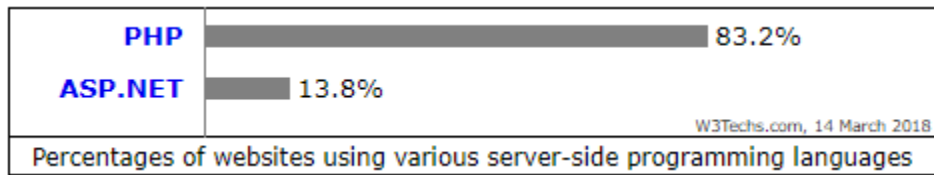
There are many web technologies including the previously mentioned programming languages in addition to the frameworks, libraries, databases, CMS and many others. In this section, we provide an overview about the main technologies from several perspectives.

Because there are many services that measure the actual use of different technologies, there is no need to include the trending of search engines.

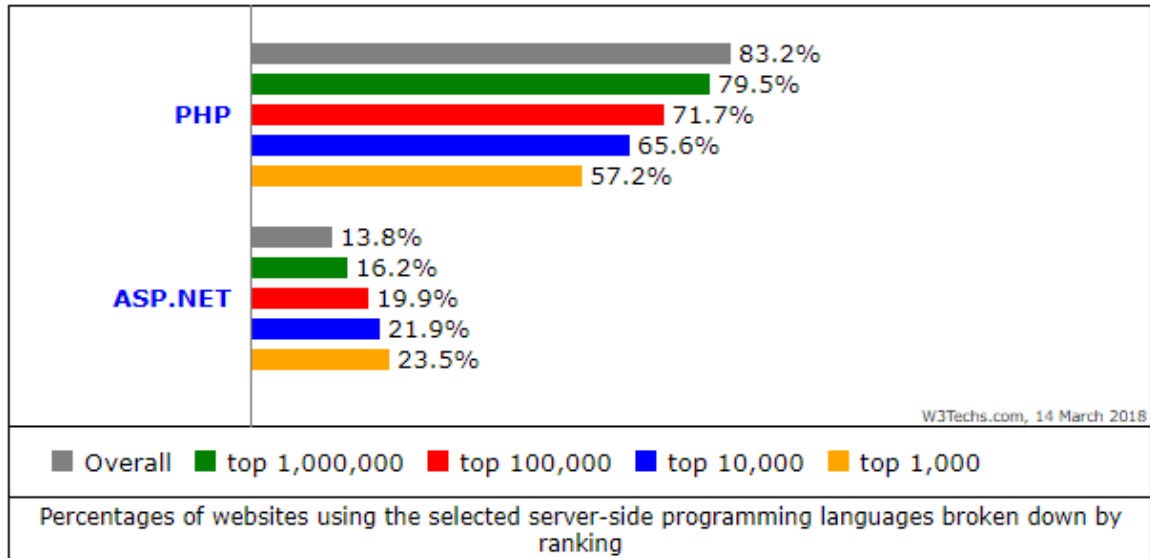
Reports on Actual Use

According to w3techs statistics, the following are quick comparisons between several web technologies:

PHP is used by 83.2% of all the websites whose server-side programming language known by w3techs.

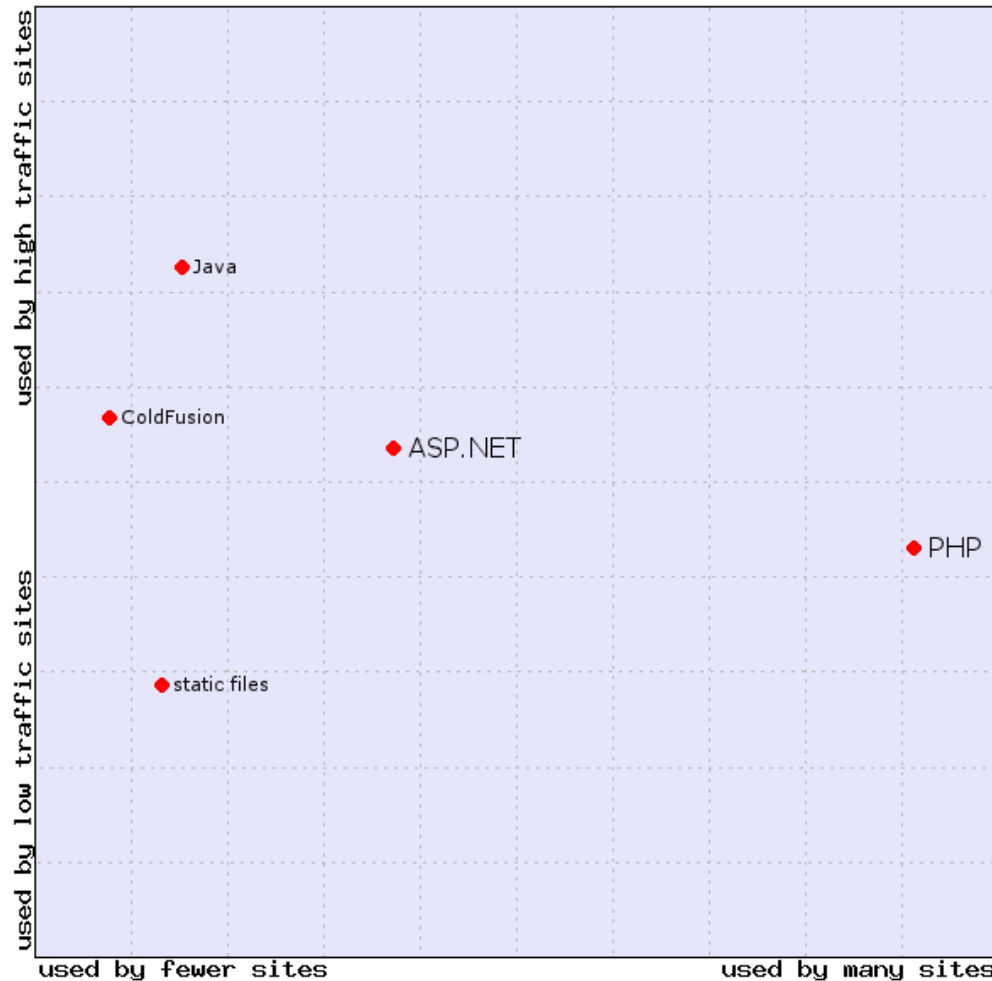


PHP is used by 79.5% of all the websites whose server-side programming language is known and that is ranked in the top 1,000,000.

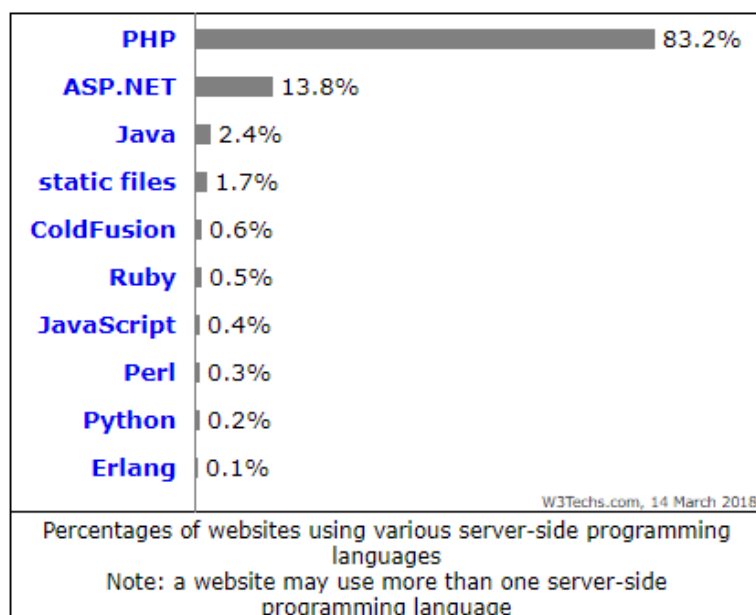


Each technology positioned itself based on the traffic and number of sites as the following:

Market position, selected server-side programming languages, 14 Mar 2018, W3Techs.com



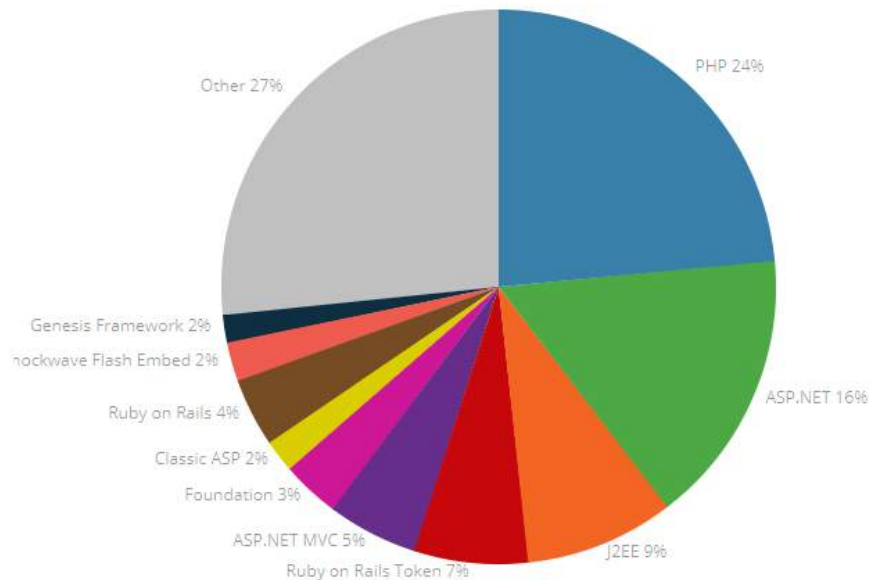
Regarding the server-side programming languages in general, we can see a general trending in the first two technologies:



BuiltWith.com is another dedicated trend page provides up-to-date usage statistics for the website and monitoring the frameworks. A framework according to BuiltWith definition of the word is a technology that is

used to build a website from a development perspective. Many frameworks exist and each one can typically have another framework built on top of it.

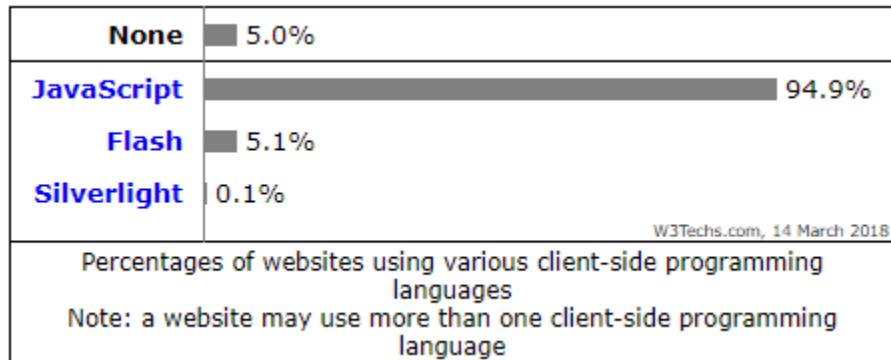
PHP is the most popular framework in the BuiltWith list, although many sites report PHP usage even if it is not being used. ASP.NET, Microsoft's web development framework, is the second most popular. Please note that this is reference to all the websites not as the previous statistics which concentrated on the server side websites.



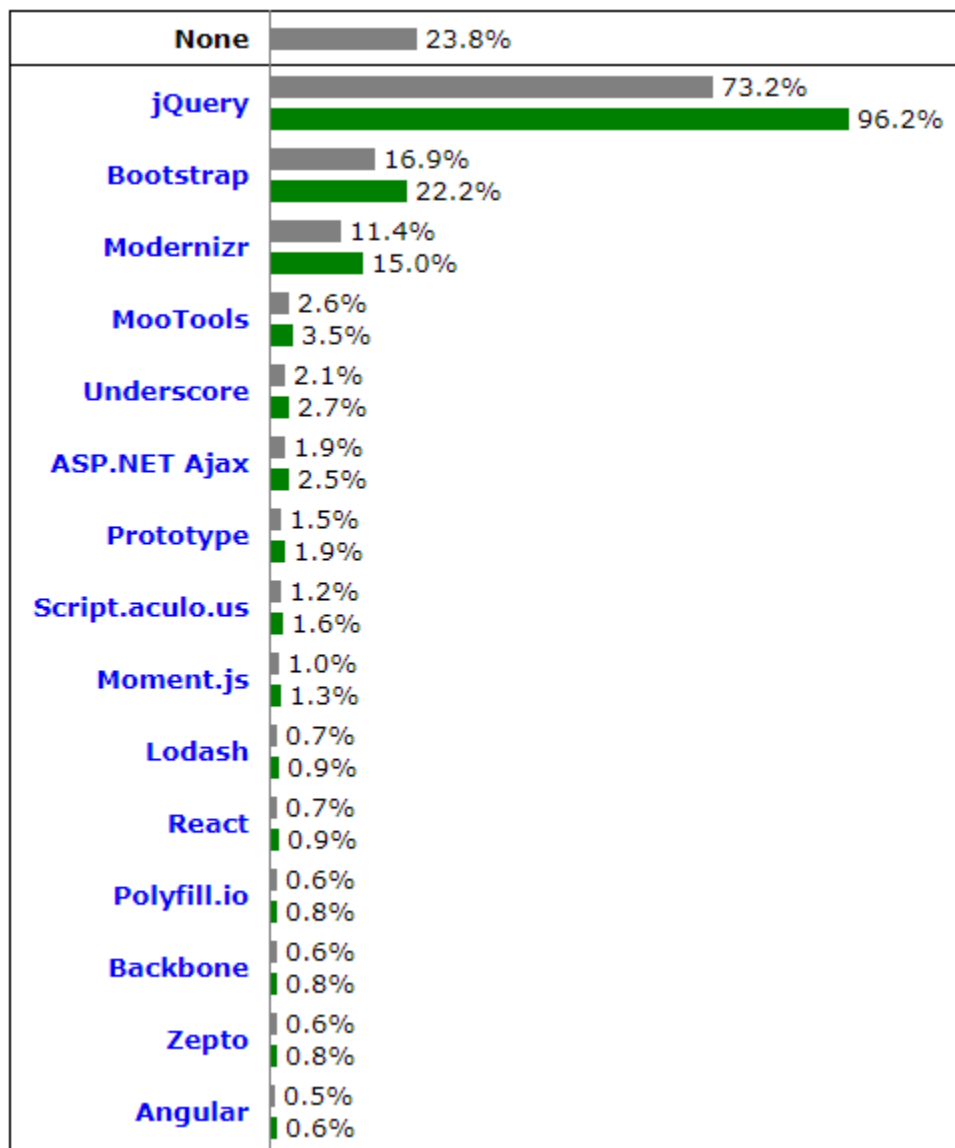
The top in Frameworks based on BuiltWith (Week beginning Mar 12th 2018)

Name	10k	100k	Million	Entire Web
PHP	✓ 3,288	✓ 33,231	✓ 317,860	✓ 52,080,678
ASP.NET	✓ 2,249	✓ 21,337	✓ 140,209	✓ 39,753,697
J2EE	✓ 1,217	✓ 6,174	✓ 28,140	✓ 1,736,157
Ruby on Rails Token	✓ 927	✓ 4,323	✓ 14,861	✓ 591,049
ASP.NET MVC	✓ 738	✓ 4,181	✓ 15,753	✓ 887,710
ASP.NET Ajax	✓ 673	✓ 7,113	✓ 32,775	✓ 750,422
Ruby on Rails	✓ 559	✓ 3,056	✓ 12,147	✓ 813,883
Foundation	✓ 474	✓ 3,279	✓ 17,093	✓ 417,402
Shockwave Flash Embed	✓ 319	✓ 3,045	✓ 25,693	✓ 5,388,229
Express	✓ 272	✓ 954	✓ 4,268	✓ 205,936
Classic ASP	✓ 265	✓ 3,258	✓ 21,595	✓ 2,449,873
Adobe Dreamweaver	✓ 252	✓ 2,847	✓ 26,929	✓ 2,088,704
OpenResty	✓ 239	✓ 1,760	✓ 21,601	✓ 1,206,087
Genesis Framework	✓ 224	✓ 3,026	✓ 14,081	✓ 343,481
Heroku Vegur Proxy	✓ 208	✓ 986	✓ 4,195	✓ 180,600
Django CSRF	✓ 164	✓ 680	✓ 2,173	✓ 63,557
Adobe ColdFusion	✓ 163	✓ 1,438	✓ 8,714	✓ 157,072
DAV	✓ 125	✓ 1,364	✓ 8,389	✓ 641,743
Telerik Controls	✓ 118	✓ 1,525	✓ 7,970	✓ 167,923
Laravel	✓ 113	✓ 766	✓ 5,292	✓ 516,983

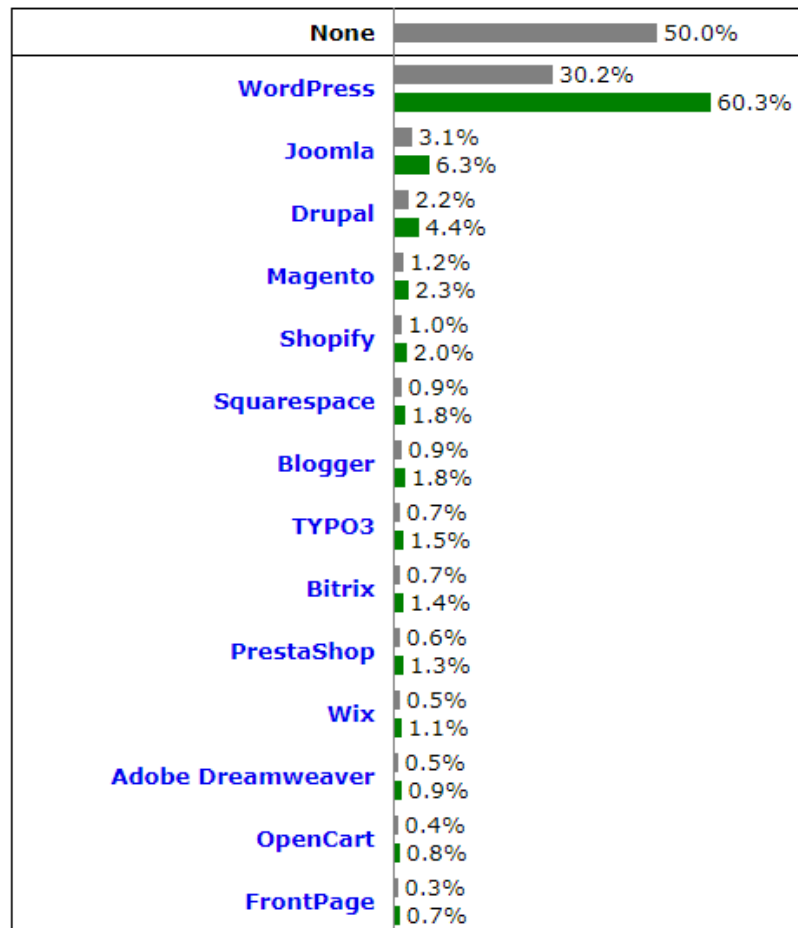
For the client-side programming languages of the websites, we can see that JavaScript is used by 94.9% of all websites.



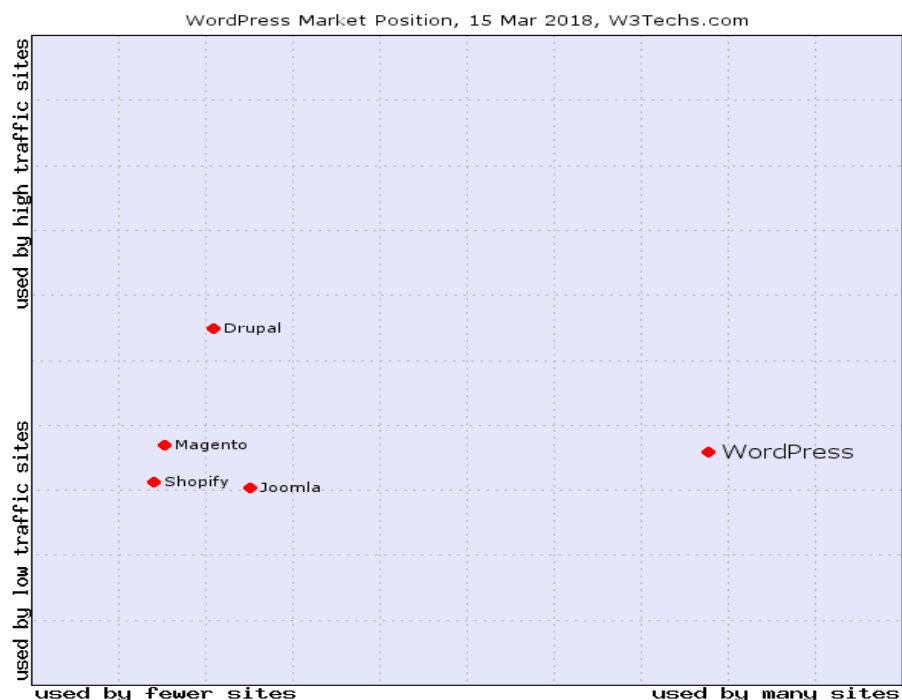
There are many websites using JavaScript libraries. that is a JavaScript library market share of 96.2%. Only 23.8% of the websites use none of the JavaScript libraries that are monitored by w3techs. jQuery is used by 73.2% of all the websites,



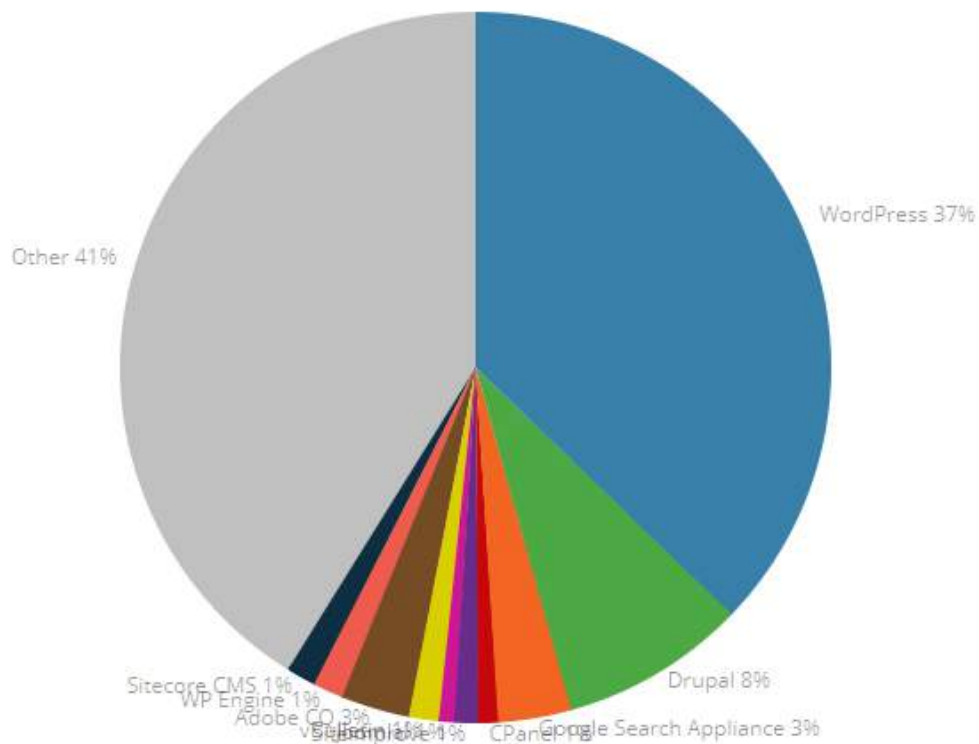
The use of Content Management Systems (CMSs) are widely used in the web. 50% of the websites use none of the content management systems that are monitored by w3techs. On the other hand, WordPress is used by 30.2% of all the websites. Thus, the content management system market share of 60.3%.



We notice that most of the CMSs are used by the smaller websites:



Another usage statistics for the CMS from BuiltWith:



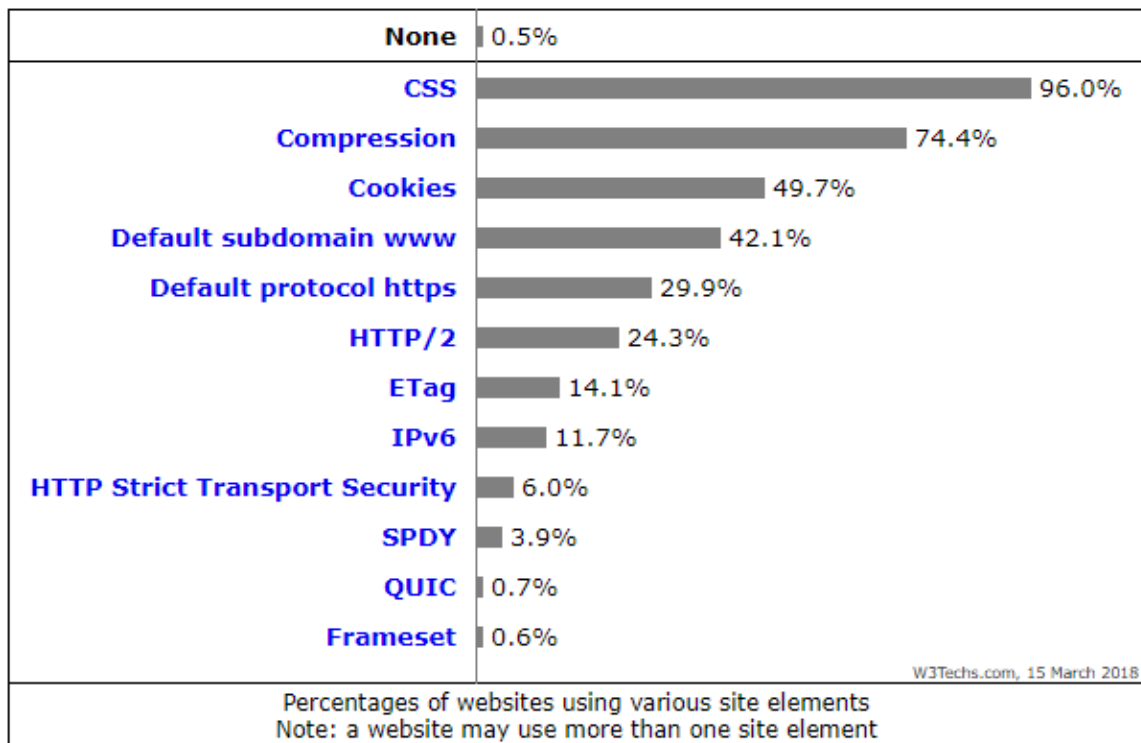
Usage of markup languages for websites: HTML is used by 80.6% of all the websites whose markup language. 86.8% of all the websites who use HTML are using HTML5.

HTML	80.6%
XHTML	19.8%

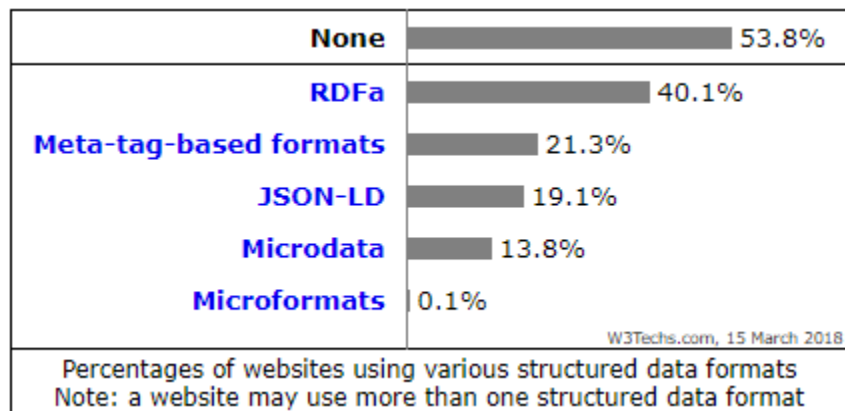
W3Techs.com, 15 March 2018

Percentages of websites using various markup languages
Note: a website may use more than one markup language

A relevant information is the usage of site elements for websites: CSS is used by 96.0% of all the websites.



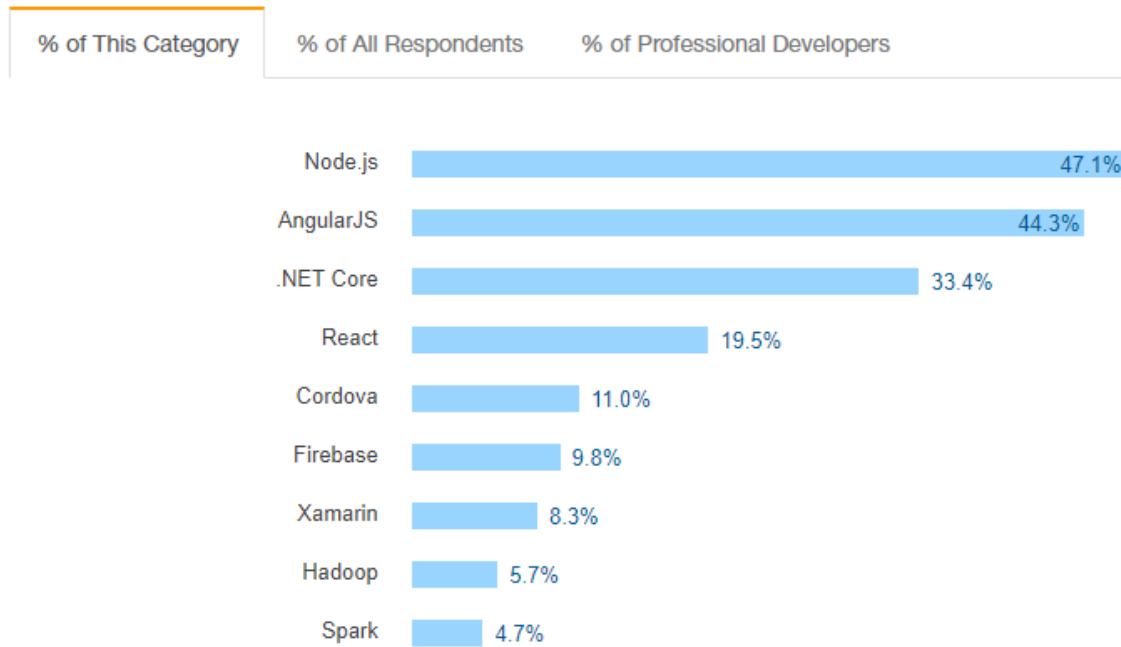
Usage of structured data formats for websites: 53.8% of the websites use none of the structured data formats monitored by w3techs. RDFa is used by 40.1% of all the websites.



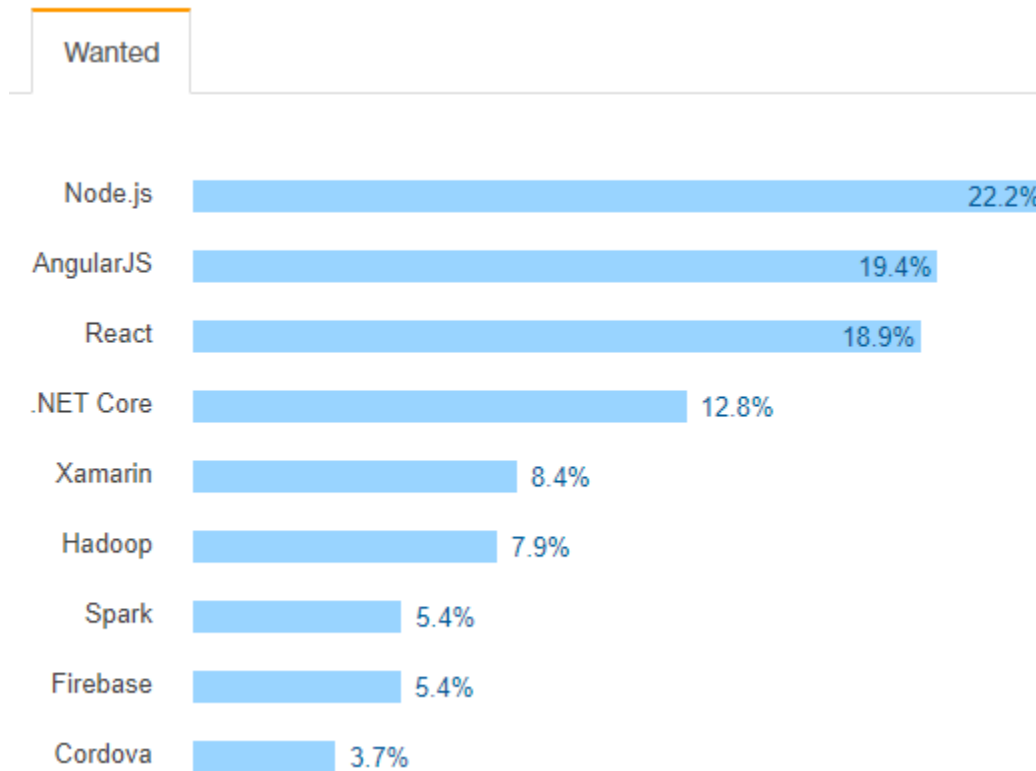
Surveys

We referred to the survey conducted by Stack OverFlow for 2017, Node.js and AngularJS continue to be the most commonly used technologies in this category.

Frameworks, Libraries, and Other Technologies

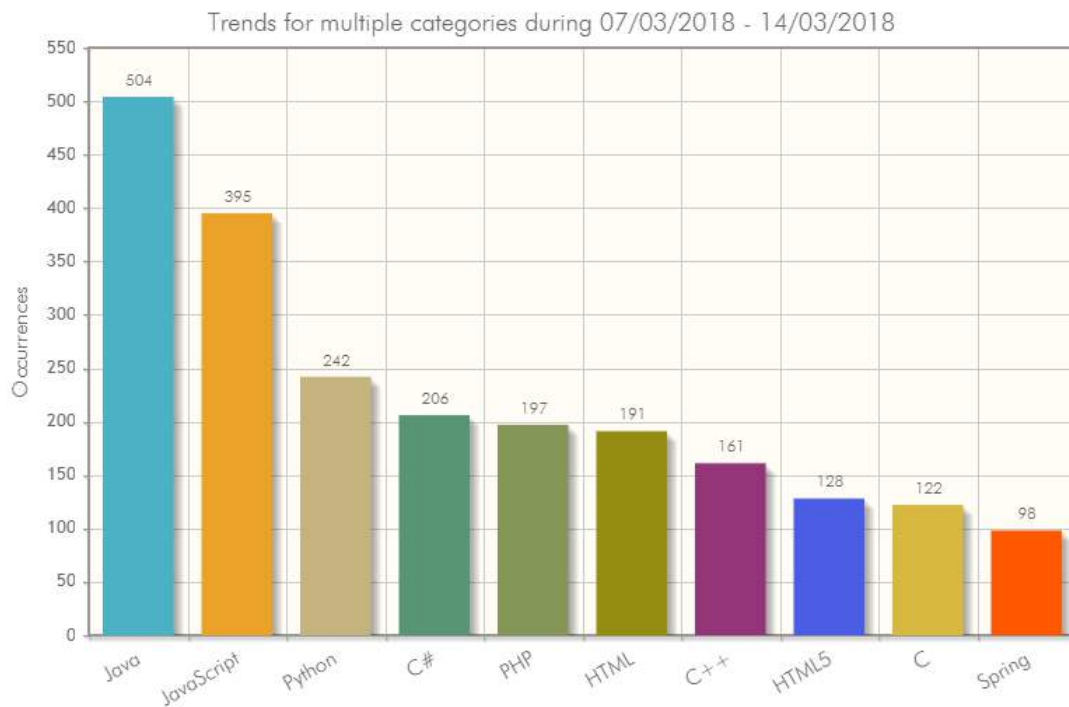


React is the most loved among developers, whereas Cordova is the most dreaded. However, Node.js is the most wanted.

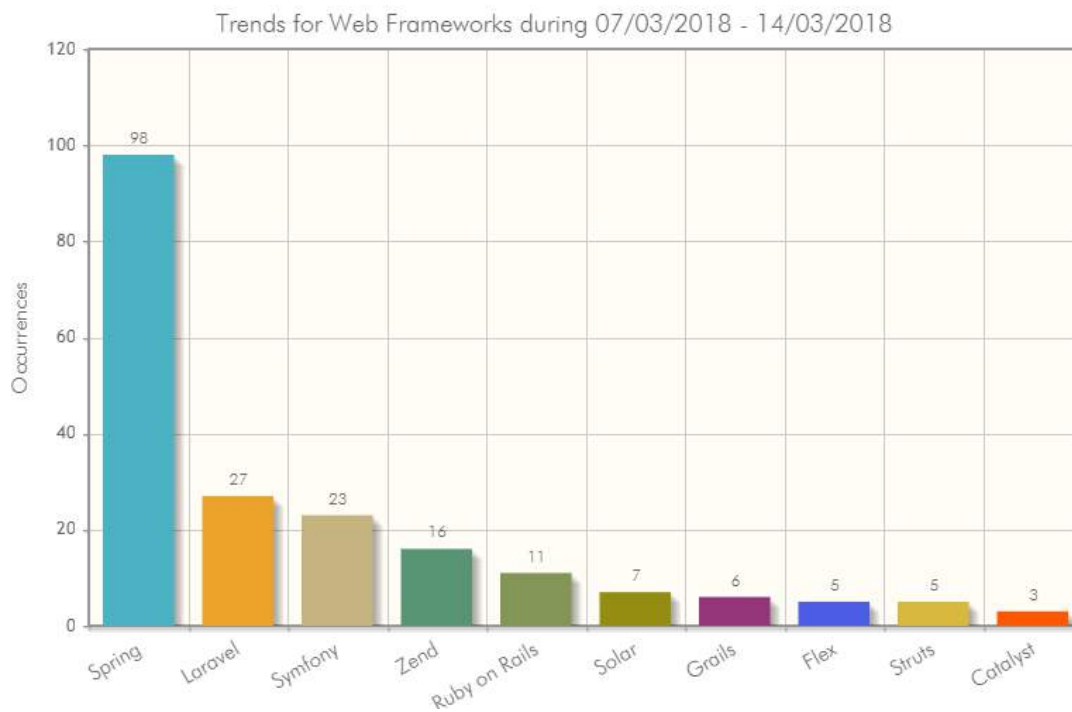


Job Postings

When we refer to TrendySkills statistics for the job posts, we find several web technologies that are required the most (included in the graph the programming trends)

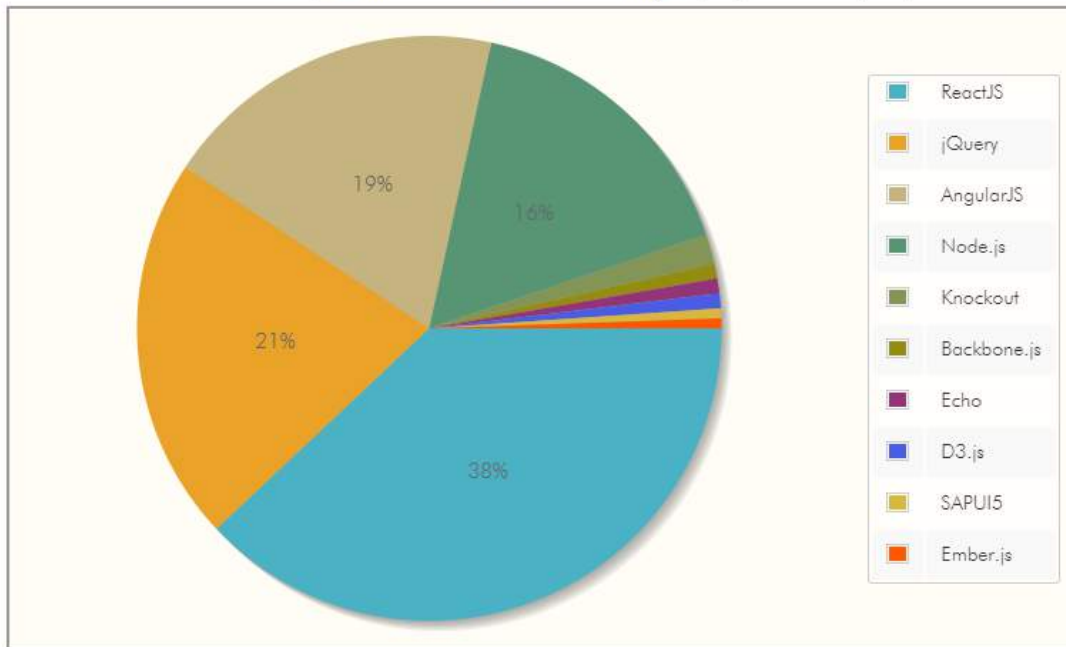


When we take only the Web Frameworks category, we can see the following trends:



For Javascript frameworks, ReactJS is the top choice of employers.

Trends for Javascript Frameworks & Libraries during 02/03/2018 - 09/03/2018



Freelancing Platforms

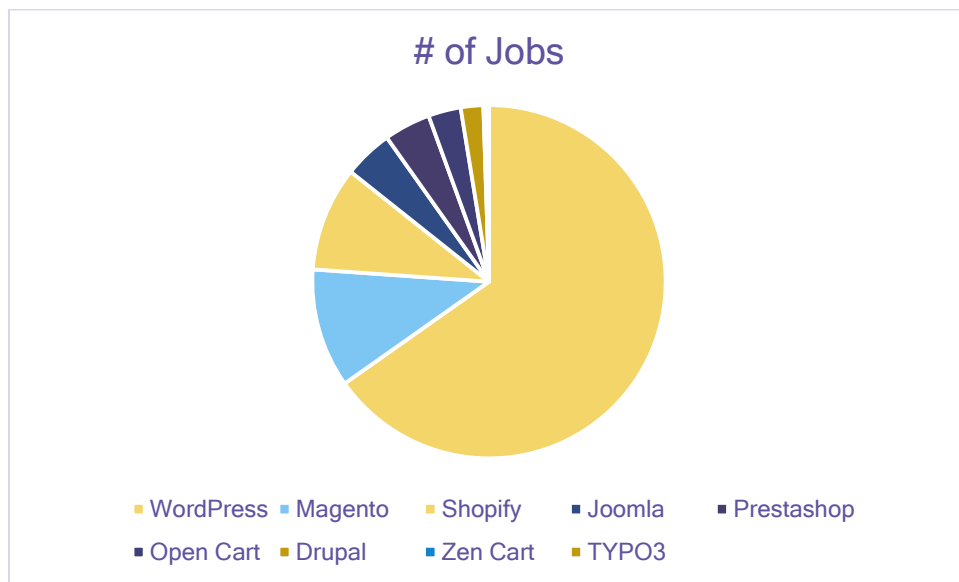
#	Skill	# of Job Posts ¹⁷
1.	PHP	45,366
2.	WordPress	11,285
3.	Javascript	11,129
4.	HTML5	3,927
5.	.NET	2,645
6.	Web Scraping	2,337
7.	Angular.js	2,148
8.	Magento	1,884
9.	node.js	1,800
10.	Shopify	1,657
11.	Amazon Web Services	1,472
12.	JQuery / Prototype	1,417
13.	ASP.NET	1,156
14.	Laravel	813
15.	Joomla	778
16.	Blockchain	776

¹⁷ Freelancer.com

17.	React.js	772
18.	Prestashop	737
19.	XML	724
20.	AJAX	678
21.	Codeigniter	651
22.	CSS3	603
23.	Ruby on Rails	546
24.	Open Cart	516
25.	Django	465
26.	Web Services	421
27.	Drupal	357
28.	SAP	334
29.	Google Maps API	304
30.	Xamarin	292
31.	Express JS	277
32.	Express JS	276
33.	RESTful	276
34.	Facebook API	269
35.	CakePHP	259
36.	Azure	258
37.	JSP	219
38.	Salesforce App Development	206
39.	Delphi	185
40.	Zoho	169
41.	Typescript	105
42.	Zen Cart	60
43.	vBulletin	52
44.	Zend	47
45.	Flask	38
46.	TYPO3	28
47.	Silverlight	3

To highlight the CMS usage:

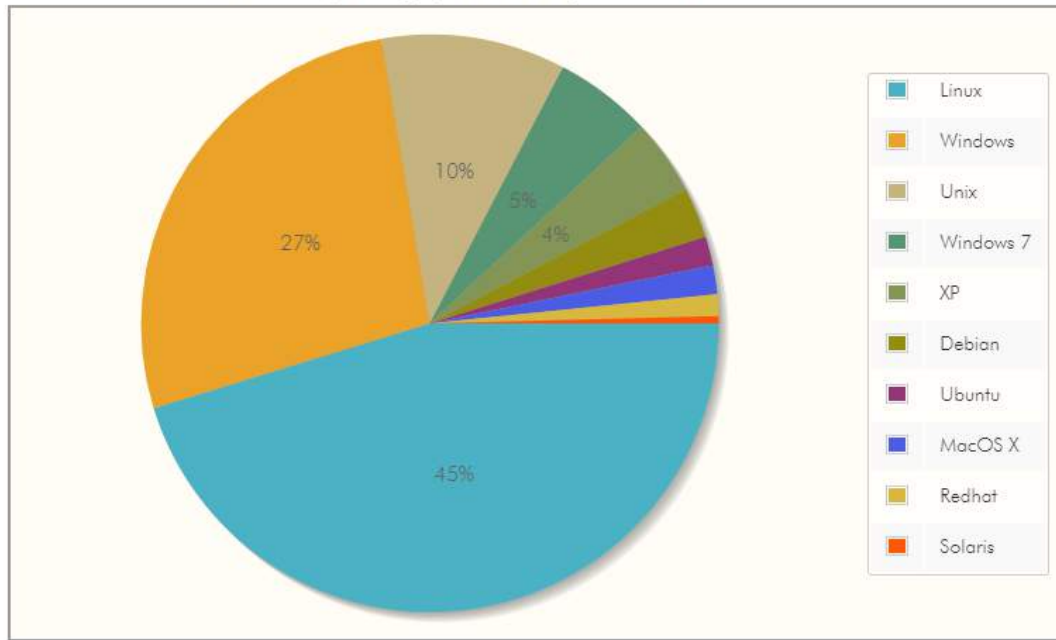
WordPress	11,285
Open Cart	516
Shopify	1,657
Magento	1,884
Zen Cart	60
Joomla	778
Drupal	357
Prestashop	737
TYPO3	28



Highlights from other technologies:

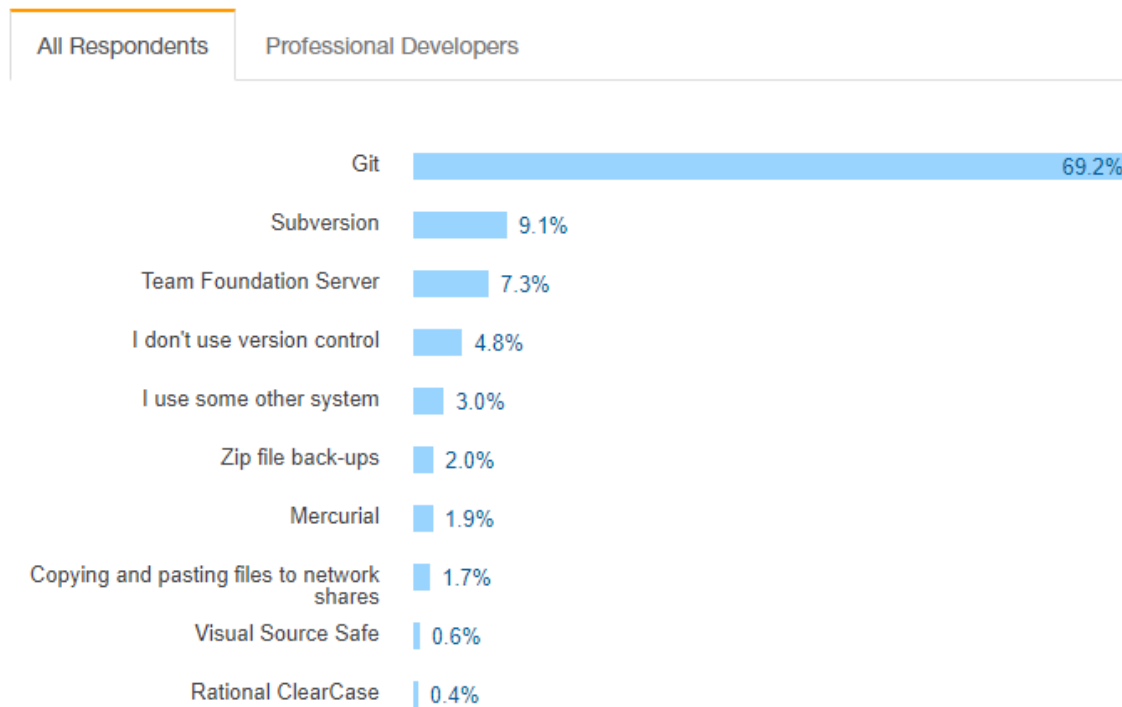
- Linux is the number one operating system in Jobs postings

Trends for Operating Systems during 02/03/2018 - 09/03/2018

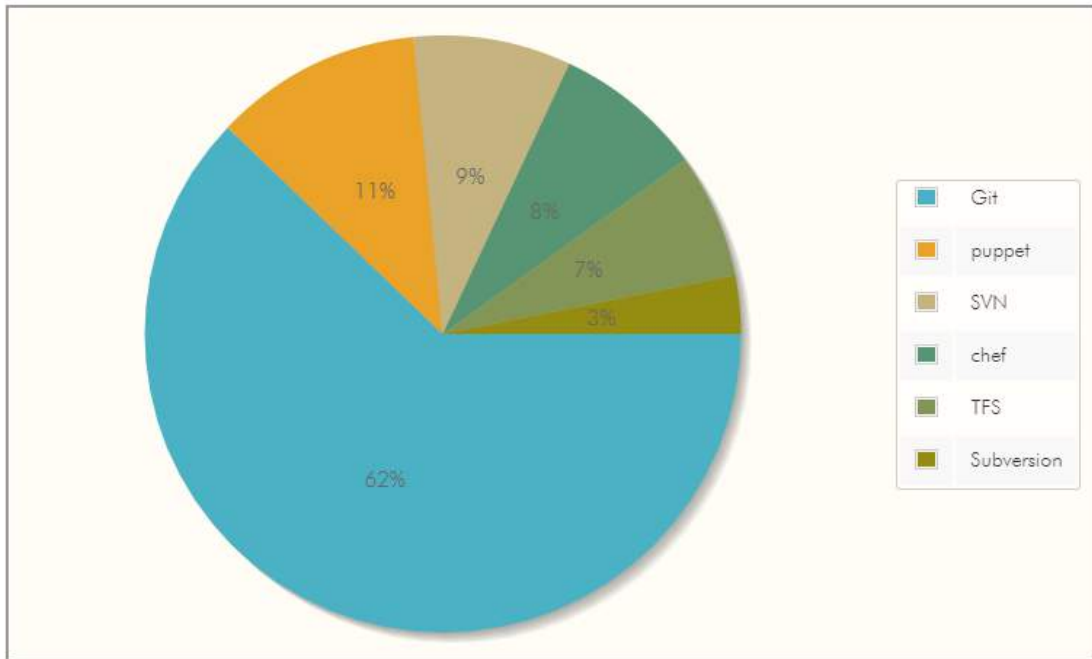


- Git is the overwhelmingly clear choice of version control (stack overflow survey & Trendskills)

Version Control

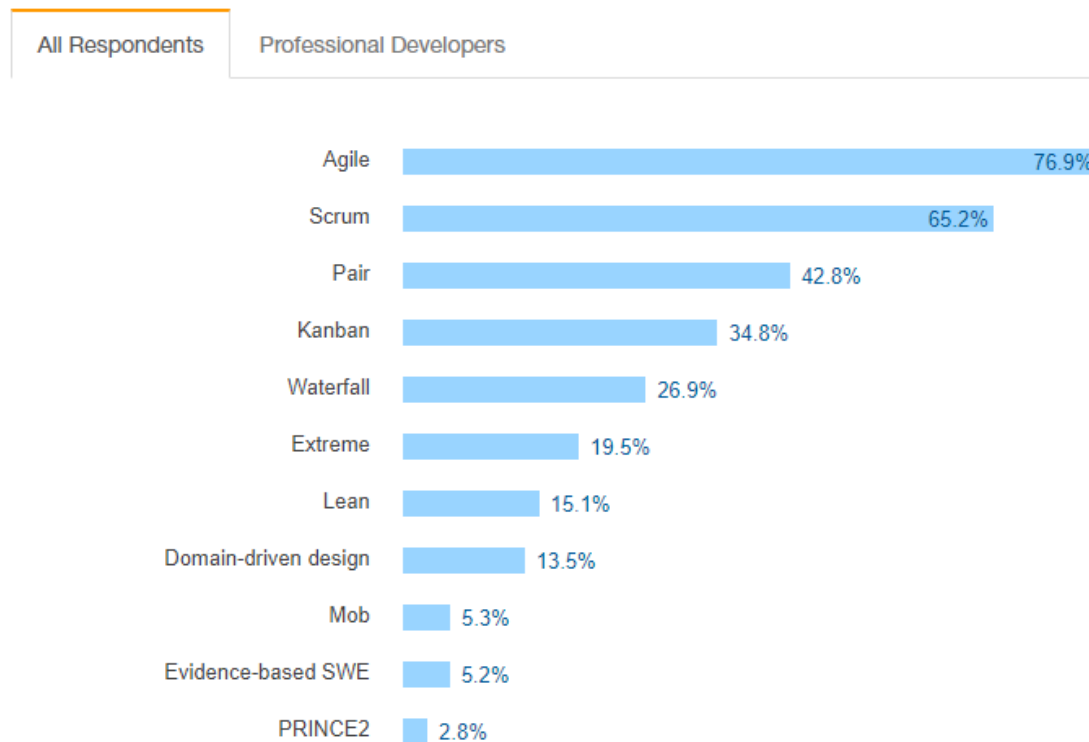


Trends for CM during 02/03/2018 - 09/03/2018

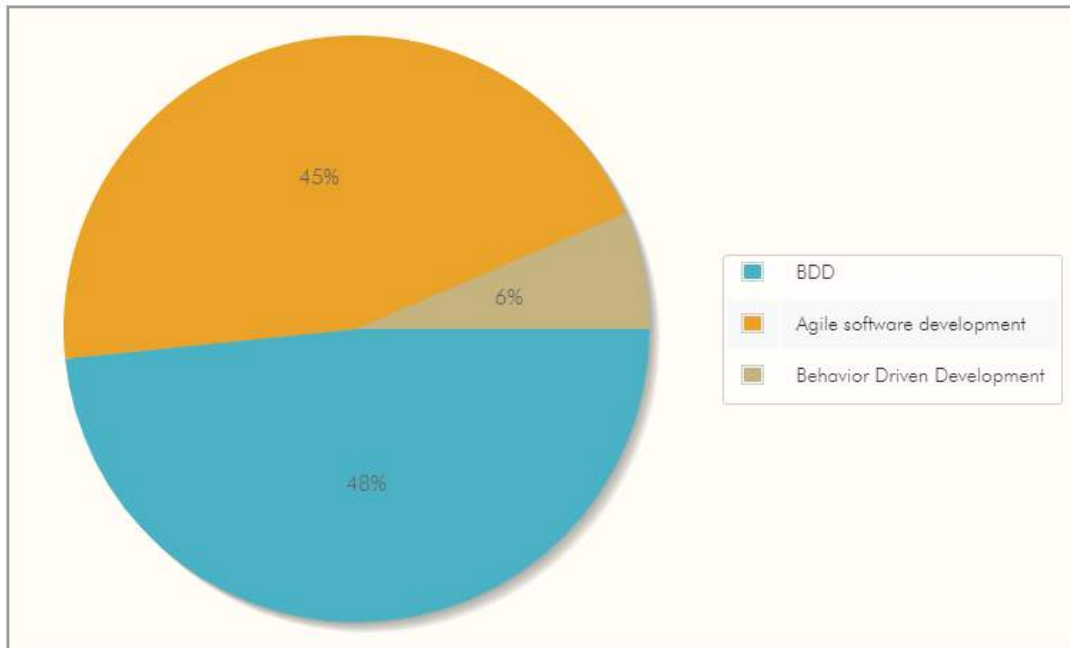


- Software development: Agile and Scrum are popular methodologies for developers to keep their projects on track. 42.8% of developers have used pair programming to improve their code quality and skill set. Jobs on Trendskills put Behavior-driven development (BDD) as number 1 choice of the employers:

Which Methodologies Do Developers Use?



Trends for Software Development Methodologies during 02/03/2018 - 09/03/2018



- The following are some of Mobile development trends in Freelancer.com:

Table 1: Freelancing Mobile development trends

#	Skill	# of Job Posts ¹⁸
1.	Mobile App Development	17,511
2.	Android	14,282
3.	iPhone	7,813
4.	iPad	1,806
5.	Unity 3D	1,196
6.	iOS Development	1,074
7.	Swift	831
8.	PhoneGap	716
9.	Windows Mobile	83
10.	Red Hat	40
11.	Kotlin	23
12.	Blackberry	21
13.	WebOS	9
14.	Symbian	5

- Other technologies in freelancing portals:

¹⁸ Freelancer.com

Table 2: Other Technology Trends in Freelancing Portals

#	Skill	# of Job Posts ¹⁹
1.	Software Testing	794
2.	Web Security	744
3.	Adobe Illustrator	637
4.	Ubuntu	588
5.	Windows Server	583
6.	Website Testing	467
7.	Cloud Computing	414
8.	Big Data	312
9.	Payment Gateway Integration	291
10.	Sharepoint	274
11.	PayPal API	254
12.	Mobile App Testing	222
13.	Hadoop	202
14.	Raspberry Pi	193
15.	Adobe Premiere Pro	175
16.	OpenGL	169
17.	JavaFX	169
18.	Augmented Reality	167
19.	Amazon Kindle	112

¹⁹ Freelancer.com

Recommendations and Conclusion

Based on the aforementioned studies and numbers, we provide some recommendations help graduates to choose their career path professionally. They are grouped into different categories to be easily tracked by for the reader.

1. Follow Specific Career Paths

It is recommended to equip the graduate with a good knowledge of Correlated Technologies: Technologies were clustered into several distinct "ecosystems" that tended to be used by the same developers (Stack Overflow Developers Survey, 2017). They can be matched together and can be used with each other.

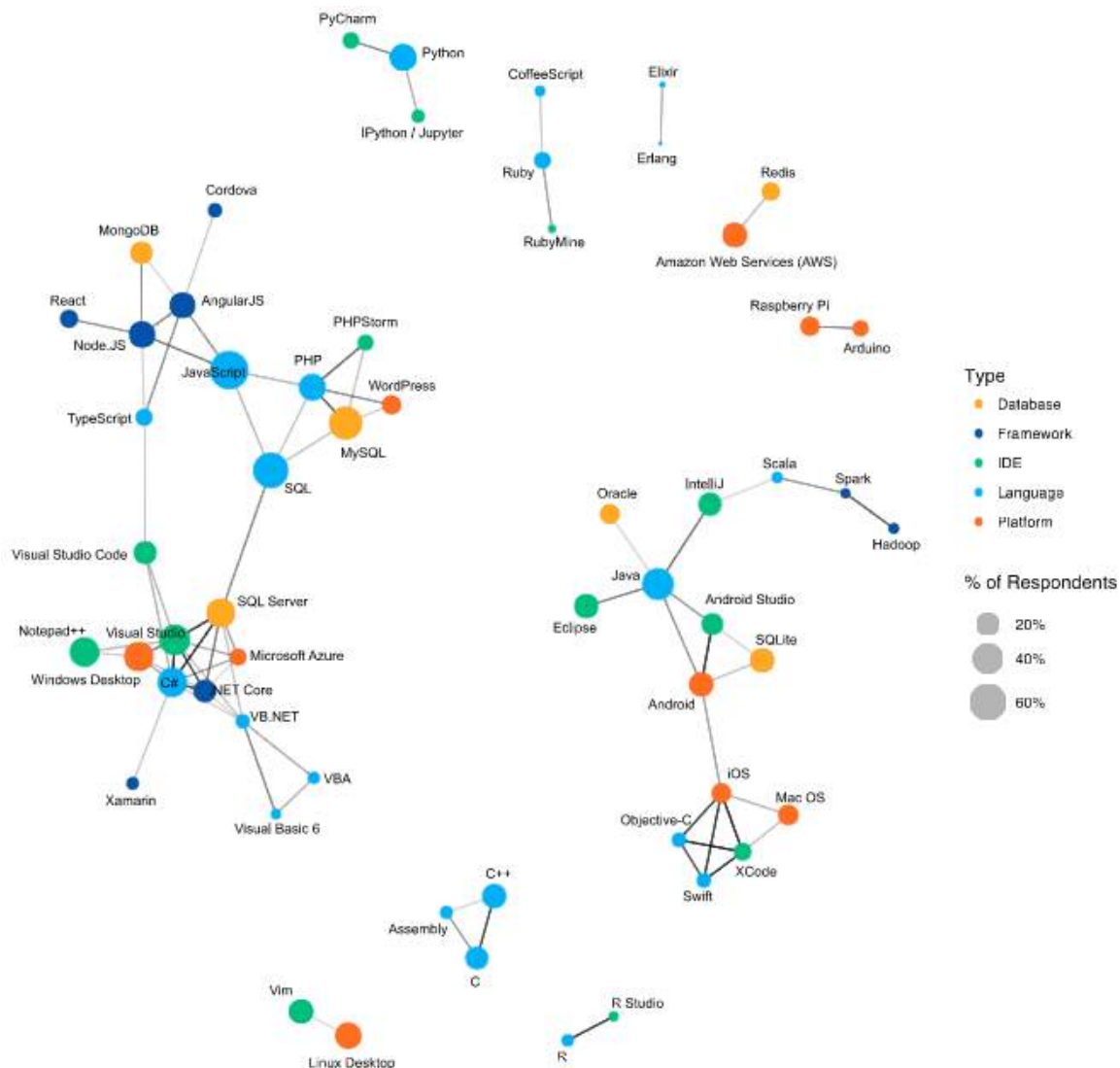


Figure 1: Sample ICT Career Paths

On the left of this chart we can see a large cluster representing web development (with JavaScript at the center) and another for Microsoft technologies (centered around C# and Visual Studio). On the right, we see a constellation connecting Java, Android and iOS. Other smaller correlated clusters included C/C++/Assembly, Raspberry Pi with Arduino, and languages like Python and R alongside language-specific IDEs.

2. Identify Career Choices

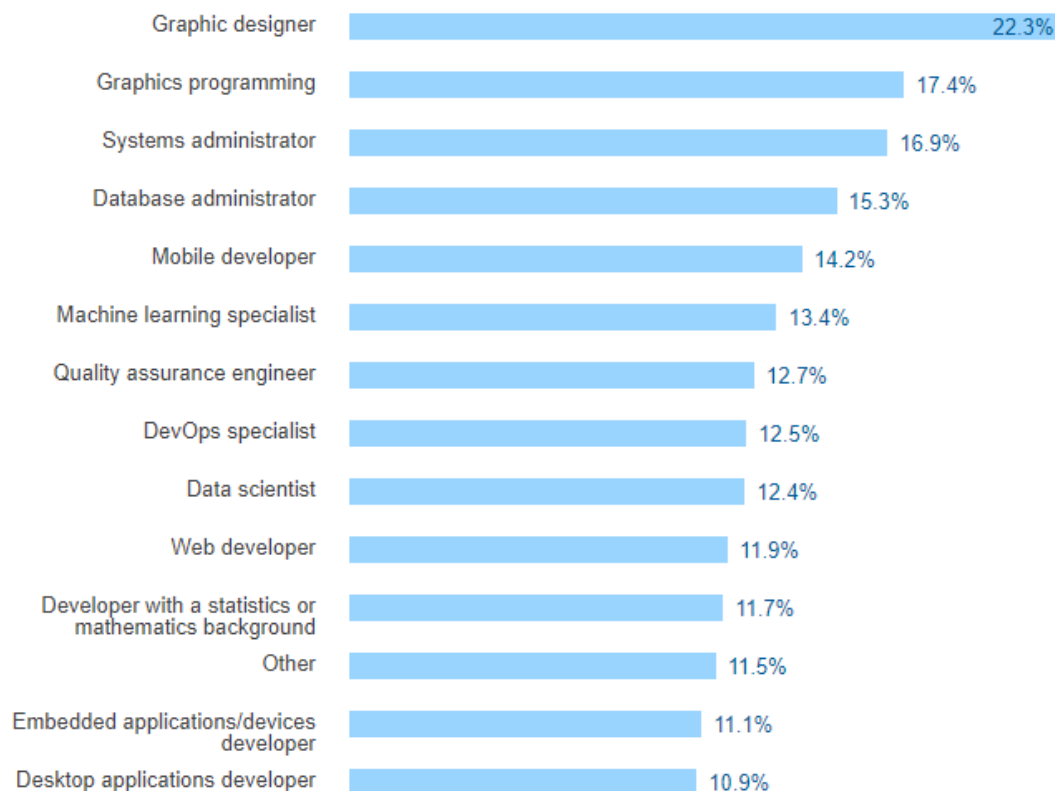
There are several career choices for the graduates, they can have several options including:

- Hired by local ICT and non-ICT companies or institutions.
- Work remotely with international firms,
- Work as a freelancer
- Startups and entrepreneurship

They have first to be aware of the potential opportunities; this can be done by having a dedicated course of freelancing and entrepreneurship or by including these concepts within the taught courses materials.

It is worthy noting that not all career choices are suitable for the different ICT specializations. A survey of more than 35,000 professional developers in Stack Overflow shows that graphic designers and graphics programming professionals work remotely more than desktop application developers whereas only 10.9% of them get the chance to work remotely.

Which Kinds of Developers Work Remote?



3. Understand Technology Trends

Constantly global changing technologies impose a need on the graduates and the local market to be aware of the suitable methodologies to keep pace with the propagated at a frightening pace technologies. There is always a new technique or a new programming language to master in order to stay current. Usually, the most popular languages or technologies have the most job openings.

Demand for the evolving skill sets of software developers creates an environment where it can be difficult to find the expertise to handle the needs of a software development project. Here, measuring the job demand is one of the useful ways to know a technology's popularity. The following points summarizes some of these trends in technologies:

Table 3: Suggested Trends

#	Technologies	Purpose	Suggested Trends
1.	Programming Languages	Development	Java Python C# C C++
2.	Web Development	Server Side	PHP ASP.NET Ruby
		Client Side	JavaScript HTML5 CSS
		Frameworks, Libraries	jQuery Node.js AngularJS React
3.	Content Management System	Web Development	WordPress Drupal Joomla
		E-Commerce	Magento Shopify
4.	Databases	DBMS	Oracle MySQL Microsoft SQL Server

Java

Java fluctuated between first and second rank in popularity since its creation in the mid-90's. Many of the world's biggest companies use Java to build desktop apps and backend web systems.

Java is still a leading language due to several reasons²⁰²¹:

- Portability – Thanks to the platform-agnostic Java Virtual Machine (JVM), Java can run on nearly every system. Java is also the most popular Android language, so the vast majority of Android apps are built in Java.
- Scalability – Java is built for scalability in mind, which is why it is so popular among enterprises and scaling startups (Twitter moved from Ruby to Java for scaling purposes). Since Java is a statically-typed language, it is faster and easier to maintain with less bugs. It is also backwards compatible, which means old versions of the language will still run perfectly even after new versions are released. This is a big relief for businesses who would otherwise worry about rewriting their code every time a new version comes out.
- Large community – The popularity of Java helps to ensure its future popularity, thanks to a huge community of users. With massive Stack Overflow and GitHub communities, developers can find help on virtually any problem they might encounter. Coupled with its portability, developers know that investing in Java will pay dividends for a long, long time.

There are some important remarks regarding Java:

- In a comparison between the jobs posting in 2018 and 2017, we found that 2017 has an increase of 6,000 jobs posting, according to an analysis done by indeed.com.
- Android apps are based on Java, and 90% of Fortune 500 companies use Java as a server-side language for backend development (Speros Misirlakis, head of curriculum at Coding Dojo²²).

C programming language

C is one of the oldest, most popular programming languages. Thanks to its near universal portability and early adoption by Tech's biggest brands, including Microsoft, Apple, Linux, and Oracle.

- C is the most popular language for embedded systems in cars, electronics, and other devices.
- C is one of the top programming languages for IoT devices, including wearables and car dashboards. As more products become "smart", we'll see C's use continue to expand.
- portable assembly language. It works with nearly every system and operates about as low to the machine as you can get.
- Suitable for operating and embedded systems
- The "universal language" of programming languages. C spinoffs like C++ and C# are also among the top 5 most popular languages, emphasizing the influence C still has today.
- Robotics relies on C as well as other languages for its use in systems programming
- Dropbox, eBay and Spotify all use C programming, and the entirety of the Linux OS is written using C language.

C++

It was created in 1983 as an alternative to C, and instantly gained popularity, for good reason. It features predefined classes that can be used alongside classes a programmer may already be using. Microsoft Windows and Google Chrome are two of the most well-known projects created with C++, and indeed, most of Adobe, and much of Amazon's websites are written in C++. This programming language has remained in

²⁰ <https://stackify.com/popular-programming-languages-2018/>

²¹ <https://www.quora.com/Which-programming-language-is-the-most-trending-What-should-I-learn-for-better-placement>

²² <http://www.codingdojo.com/blog/7-most-in-demand-programming-languages-of-2018/>

demand because it is a powerful tool that is adaptable in a variety of sectors, including Finance, Banking, Games, Telecoms, Electronic Banking, Retail, and more.

Learning C++ enables you to code apps as well as games and commercial software with ease. It's one of the most powerful languages out there, and hosts a variety of features, including being platform dependent, (i.e. the program is executed in the same operating system in which it was developed).

C#

C# is an object-oriented programming language from Microsoft designed to run on Microsoft's .NET platform and to make development quicker and easier than Microsoft's previous languages. C#, like C++, is heavily used in video game development, so any aspiring video game developers would do well to learn both of them.

Python

Python is getting more popularity each year, and reached the top 5 on the TIOBE index in the past few years.

- Python is a major language in some of most exciting technologies today such as Machine learning, artificial intelligence (AI), Big Data, and Robotics. Cyber Security, one of the top software challenges of our time, is also driven by Python.
- Simplicity of learning Python. It's now the most popular introductory language taught in universities and often picked up by experienced developers as a second or third language.
- It is a general-purpose programming language used for web development and as a support language for software developers.

JavaScript

Due to the wide spread of web browsers, JavaScript has become one of the most popular programming languages in the world, and number 1 on GitHub in terms of pull requests.

- JavaScript allows developers to add interactive effects to web pages. It often works alongside HTML, but it's becoming more common for web apps to be built entirely in JavaScript
- Because of its simplicity and speed, more startups and tech businesses are starting to use JavaScript on the backend via the Node.js framework.
- JavaScript is used by over 80% of developers and by 95% of all websites for any dynamic logic on their pages. Several front-end frameworks for JavaScript such as React and AngularJS have huge future potential as IoT and mobile devices become more popular.

Ruby

Ruby is one of the most popular languages among tech startups including Airbnb, Twitch, GitHub, and Twitter. It is a general purpose, object oriented programming language born in the 1993.

- It's popularity is bolstered (and perhaps dependent) on Ruby on Rails, a full-stack web application framework that runs Ruby.
- Ruby operates as a dynamic, object orientated, because it reads like English, it makes the code easy to read. Ruby has an incredibly simple beautiful syntax that allows a developer to do more with less code.
- thanks to Ruby on Rails, getting a web application up-and-running takes less time than in other frameworks.

- It's needed to maintain code databases for many high end websites, so Ruby's demand is increasing, so much so that it's become common within DevOps roles, i.e. the engineers ensuring the reliability and efficiency of the servers running websites with high traffic.
- The downside of Ruby is its scalability. Ruby is a dynamically-typed language, which makes it very flexible and great for prototypes, but difficult to maintain at scale.

Kotlin

2017 was a big year for Kotlin, the statically-typed programming language from JetBrains.

- Kotlin was also named an official development language for the Android platform.
- Android is the most popular mobile development platform, it's the 3rd most popular development platform behind Windows desktop and Linux, according to StackOverflow.
- Total interoperability with Java and the fact that it runs on Java Virtual Machine (Java is another official Android language).
- Kotlin also compiles down into JavaScript, making it extremely versatile for both front and backend development.

PHP

Most developers use PHP for web development, either to add functions that HTML can't handle or to interact with MySQL databases. PHP is widely used thanks to Wordpress. 80% of the top 10 million websites use PHP in some sort of way, including Facebook and Wikipedia.

- There are no hard rules on how to build features, and it boasts flexibility in solving problems.
- It's further used widely in a freelance capacity or for popular content management systems. It's a great choice for web development as it's mainly a server side scripting language, forming the base of both Wordpress and Facebook.
- You can use PHP for various web development projects, including ecommerce, mobile app development, content management system. It's an open source, easy to learn, with an easy data base integration and has numerous applications and uses.

Perl

Perl dropped by about 3,000 job postings since last year. Perl 5 and Perl 6 are both chugging along and Perl continues to be popular for system and network administrators and as a glue language.

Swift

Swift, the programming language for iOS and macOS that Apple released in 2014, the language for developing native iOS or Mac OS apps, and is the programming language with the most potential for reshaping the future. Native apps have been found to outperform cross-platform hybrid apps, and SpriteKit makes it even easier to build 2D games. Indeed, it builds itself on the successes of C and Objective-C without the constraints of compatibility²³.

Swift came late in some rankings. This may be partially because many job posting ask for "iOS" experience without naming specific languages. Swift has been growing steadily in popularity since it launched according to IEEE Spectrum and Stackify.

²³ <https://medium.com/swlh/best-10-programming-languages-to-learn-in-2018-2d6cbc5ffc2a>

R

it's rising in popularity in both international and US search rankings and was the "least-disliked" language on a Stack Overflow survey this year. Its growth may be due to the growth of big data analysis jobs.

Rust

Although Rust ranks is low on most lists, it has been steadily growing in popularity according to Google Trends data.

SQL

SQL is the standard query language for storing, retrieving and manipulating data in databases. It's not technically a programming language since it lacks looping and other basic functions, but extensions like PL/SQL have added some of these. SQL is in extremely high job demand, with over 30,000 more job postings mentioning it than the top programming language, Java.

.NET:

.NET is Microsoft's platform for desktop, web, mobile, gaming and IoT app development. It was made open-source in 2016 and is used by the C#, Visual Basic and F# programming languages. .NET Core, a cross platform .NET implementation, extends .NET to iOS, Linux, and Android. Many Windows applications run on .NET, making it extremely prevalent in the business world and it is expected to become more popular now that it's become open-source.

Node

Node.js is an open-source run-time environment that allows JavaScript code to be run on the server side, allowing web developers to use one language for an entire web application.

Node.js was not one of the top most-popular technologies in this report, but enough to show a solid demand for these skills. Codingdojo recommend that any JavaScript developers spend some time with Node.js to make themselves more well-rounded, even if they focus on the client side.