stack**overflow**

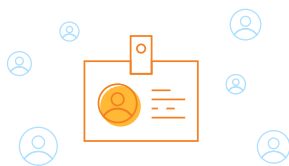# Developer Survey Results
2018

Overview

This year, over 100,000 developers told us how they learn, build their careers, which tools they're using, and what they want in a job.

Each year, we ask the developer community about everything from their favorite technologies to their job preferences. This year marks the eighth year we've published our Annual Developer Survey results—with the largest number of respondents yet. Over 100,000 developers took the 30-minute survey this past January.

This year, we covered a few new topics ranging from artificial intelligence to ethics in coding. Here are a few of the top takeaways from this year's results:

- DevOps and machine learning are important trends in the software industry today. Languages and frameworks associated with these kinds of works are on the rise, and developers working in these areas command the highest salaries.
- Only tiny fractions of developers say that they would write unethical code or that they have no obligation to consider the ethical implications of code, but beyond that, respondents see a lot of ethical gray. Developers are not sure how they would report ethical problems, and have differing ideas about who ultimately is responsible for unethical code.
- Developers are overall optimistic about the possibilities that artificial intelligence offers, but are not in agreement about what the dangers of AI are.
- Python has risen in the ranks of programming languages on our survey, surpassing C# in popularity this year, much like it surpassed PHP last year.
- When assessing a prospective job, different kinds of developers apply different sets of priorities. Women say their highest priorities are company culture and opportunities for professional development, while men say their highest priorities are compensation and working with specific technologies.

Want to dive into the results yourself? In a few weeks, we'll make the anonymized results of the survey available for download under the Open Database License (ODbL) (https://opendatacommons.org/licenses/odbl/1.0/). We look forward to seeing what you find!
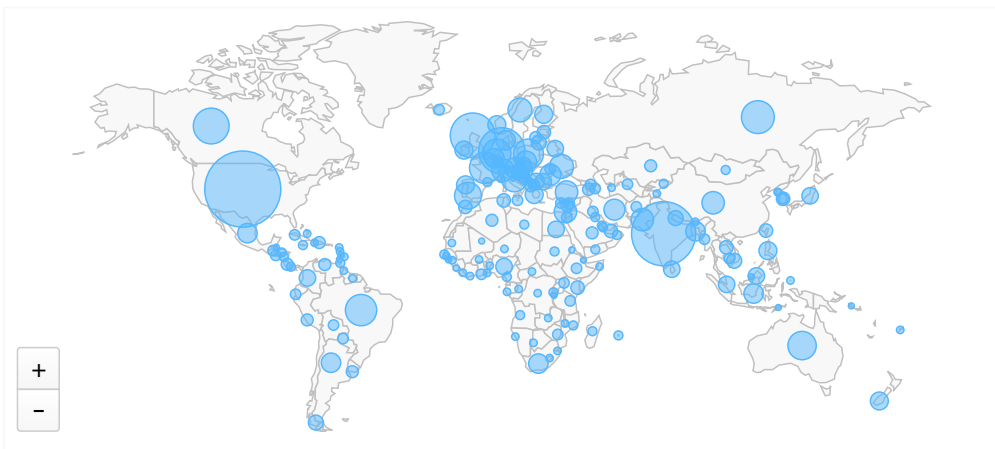
Developer Profile

What we know about the developers who are writing the script for the future

Geography

Survey Respondents	Monthly Stack Overflow Visits	Professional Developers

Each month, about 50 million people visit Stack Overflow to learn, share, and build their careers. We estimate that 21 million of these people are professional developers and university-level students.

Our estimate of professional developers comes from the things people read and do (https://kevinmontrose.com/2015/01/27/providence-machine-learning-at-stack-exchange/) when they visit Stack Overflow. We collect data on user activity to help surface jobs we think you might find interesting and questions we think you can answer. You can download (https://stackoverflow.com/users/prediction-data) and clear this data at any time.

Developer Roles

Developer Type

Back-end developer   57.9%

|	
Full-stack developer	48.2%
Front-end developer	37.8%
Mobile developer	20.4%
Desktop or enterprise applications developer	17.2%
Student	17.1%
Database administrator	14.3%
Designer	13.1%
System administrator	11.3%
DevOps specialist	10.4%
Data or business analyst	8.2%
Data scientist or machine learning specialist	7.7%
QA or test developer	6.7%
Engineering manager	5.7%
Embedded applications or devices developer	5.2%
Game or graphics developer	5.0%
Product manager	4.7%
Educator or academic researcher	4.0%
C-suite executive (CEO, CTO, etc.)	3.8%
Marketing or sales professional	1.2%

92,098 responses; select all that apply

Almost 60% of respondents identify as back-end developers, and about 20% consider themselves mobile developers. The median number of developer type identifications per respondent is 2, and the most common pairs are combinations of back-end, front-end, and full-stack developer. Pairs that are highly correlated are database administrator and system administrator, DevOps specialist and system administrator, and designer and front-end developer.

Contributing to Open Source

All Respondents	Professional Developers

No	56.4%
Yes	43.6%
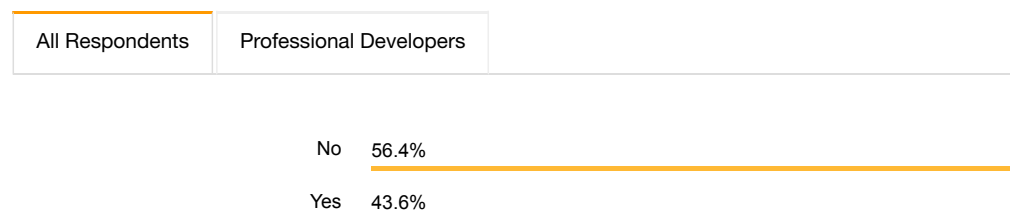
98,855 responses

Almost half of professional developers on Stack Overflow contribute to open source projects. Involvement in open source varies with language. Over 70% of developers who work with Rust, Julia, and Clojure contribute to open source, while less than 40% of developers who work with VBA, VB.NET, and C# do so.

Coding as a Hobby

All Respondents	Professional Developers

Yes 80.8%

No 19.2%
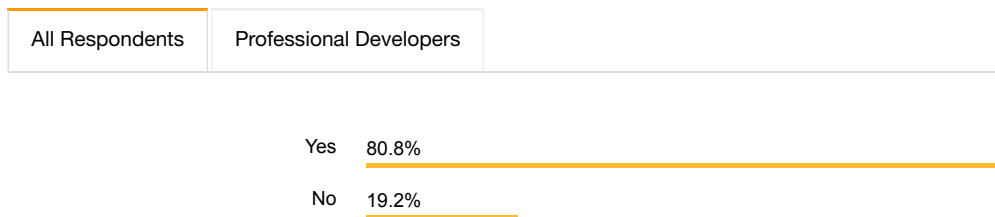
98,855 responses

Many developers work on code outside of work. Over 80% of our respondents say that they code as a hobby. Other interests or responsibilities outside of software don't seem to reduce developers' interest in coding as a hobby. Those who said they are parents or have other caretaking responsibilities, those who exercise daily, or those who spend the most time outside were slightly *more* likely to code as a hobby than other groups.

Experience

Years Since Learning to Code

All Respondents	Professional Developers

0-2 years 11.4%

3-5 years 24.8%

6-8 years 20.6%

9-11 years 13.0%

12-14 years 8.6%

15-17 years 6.5%

18-20 years 5.4%

21-23 years 2.8%

24-26 years 2.0%

27-29 years 1.1%

30 or more years 3.8%
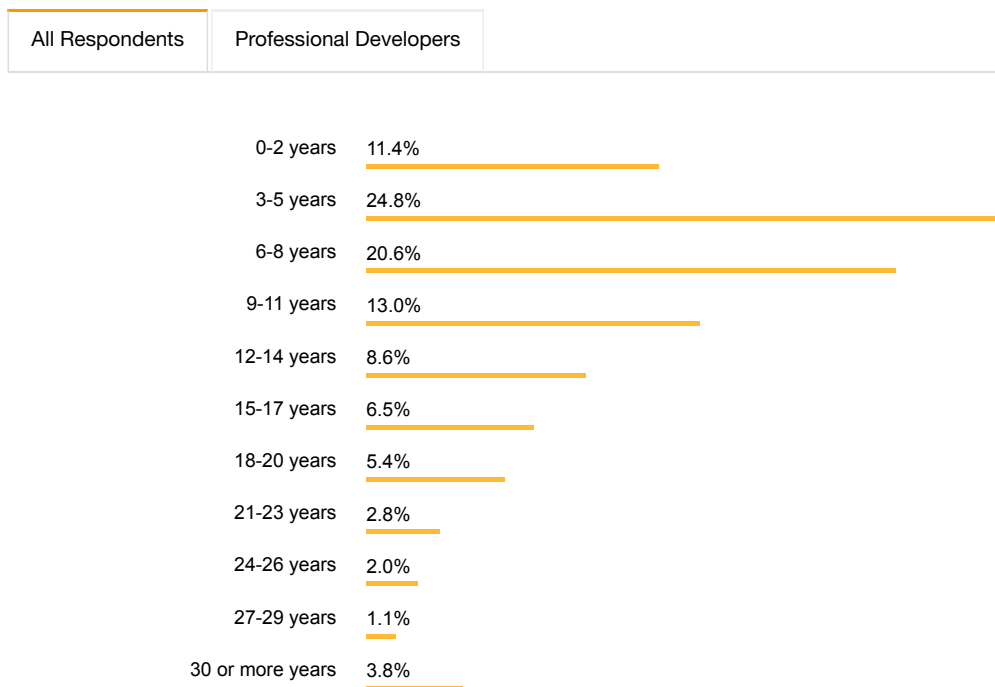
93,835 responses

There is a wide range of experience levels among developers, and a full third of professional developers on Stack Overflow learned to code within the past five years.
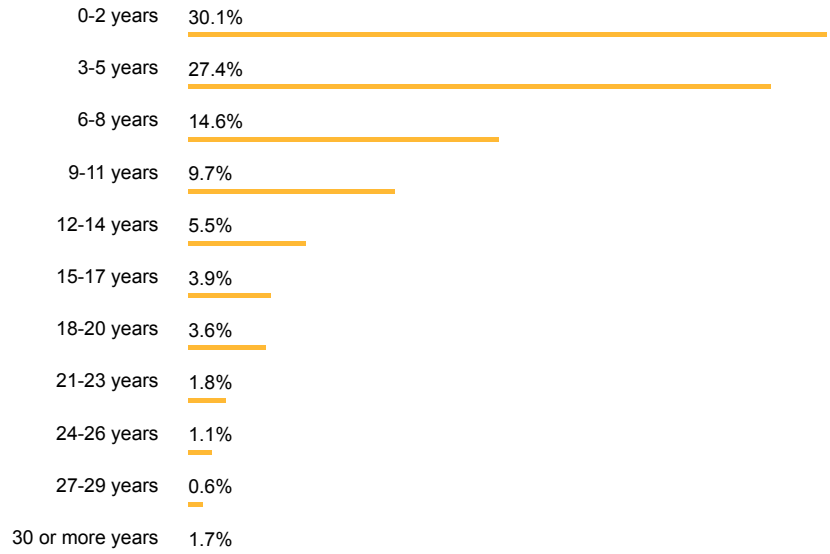
Years Coding Professionally

0-2 years	30.1%
3-5 years	27.4%
6-8 years	14.6%
9-11 years	9.7%
12-14 years	5.5%
15-17 years	3.9%
18-20 years	3.6%
21-23 years	1.8%
24-26 years	1.1%
27-29 years	0.6%
30 or more years	1.7%

77,903 responses

Over half of respondents have five years of professional coding experience or less. Developers who work with languages such as Cobol and Perl have the most years of professional coding experience, while developers who work with languages like Matlab, Haskell, and Kotlin have the fewest.

Years of Professional Coding Experience by Developer Type

Engineering manager	10.2
DevOps specialist	8.0
Desktop or enterprise applications developer	7.7
Embedded applications or devices developer	7.5
Data or business analyst	7.2
System administrator	7.0
Database administrator	6.9
Full-stack developer	6.3
Back-end developer	6.2
Educator or academic researcher	6.2
Designer	6.0
QA or test developer	5.8

Front-end developer	5.5
Data scientist or machine learning specialist	5.5
Mobile developer	5.2
Game or graphics developer	4.6

Mean of 77,078 responses

Developers who work in different areas of software development have different average amounts of experience. DevOps specialists and developers who code for desktop and enterprise applications have the most experience. DevOps as a discipline and professional identity is relatively new, but the people working in this field are highly experienced. Game/graphics developers and mobile developers have the fewest years of experience.
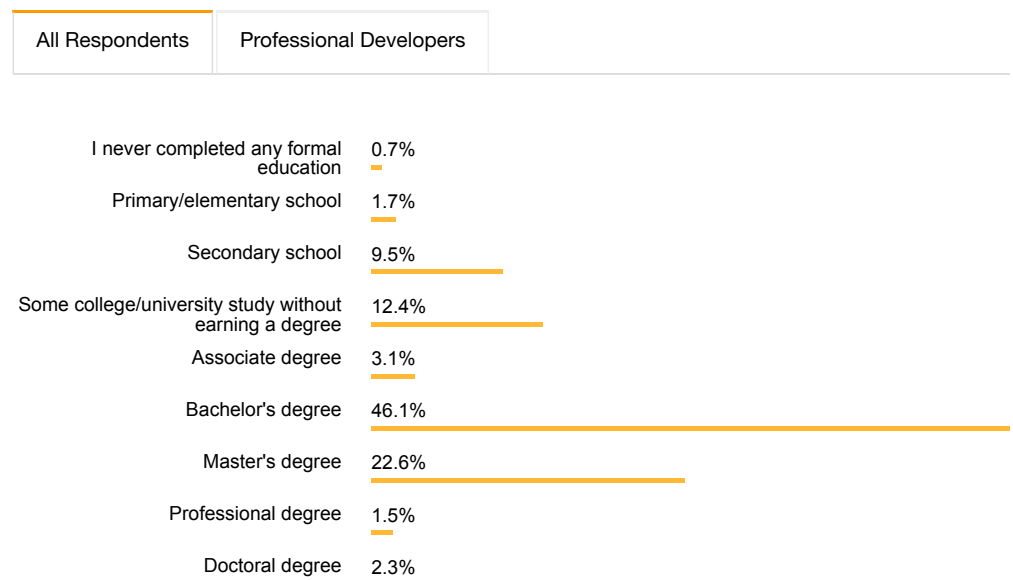
📖 Education

How Many Developers are Students?

No	74.2%
Yes, full-time	19.4%
Yes, part-time	6.4%

94,901 responses

About one-quarter of respondents are enrolled in a formal college or university program full-time or part-time.

Educational Attainment

All Respondents	Professional Developers

I never completed any formal education	0.7%
Primary/elementary school	1.7%
Secondary school	9.5%
Some college/university study without earning a degree	12.4%
Associate degree	3.1%
Bachelor's degree	46.1%
Master's degree	22.6%
Professional degree	1.5%
Doctoral degree	2.3%

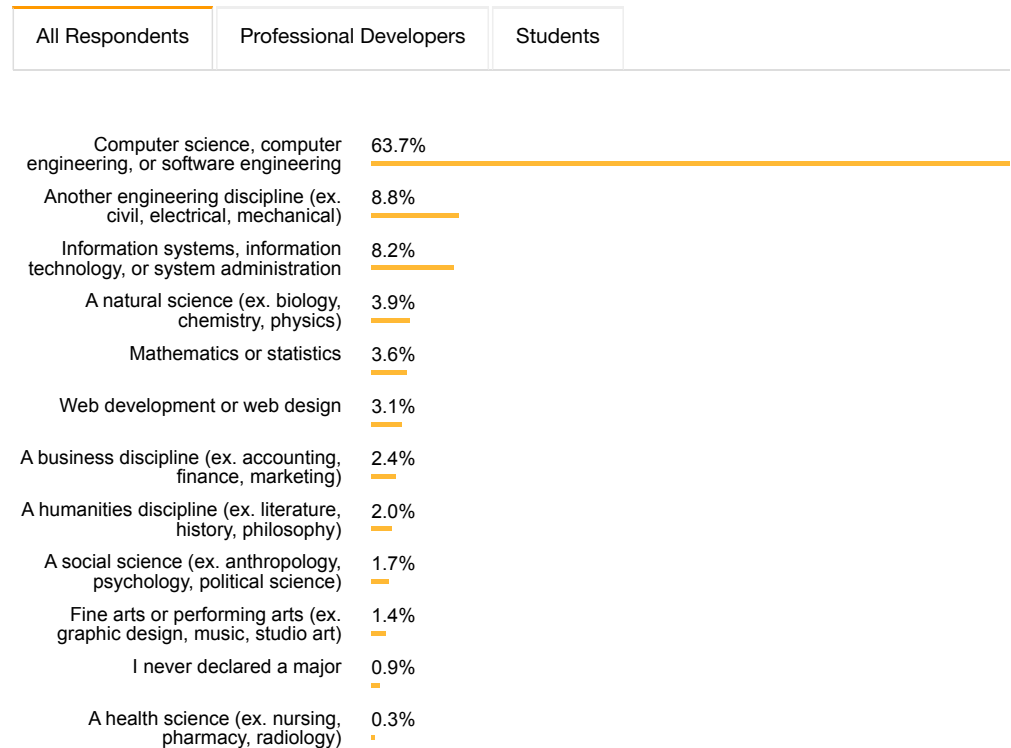*94,703 responses*

Worldwide, about three-fourths of professional developers have the equivalent of a bachelor's degree or higher. It is not that rare to find accomplished professional developers who have not completed a degree.
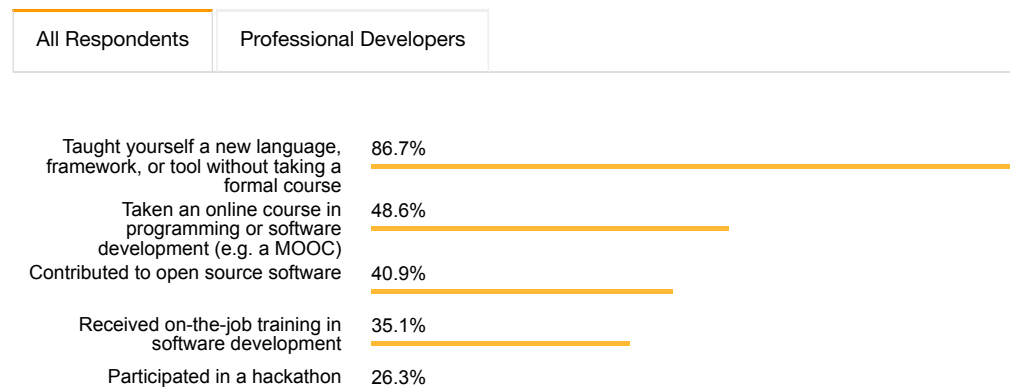
Undergraduate Major

All Respondents	Professional Developers	Students

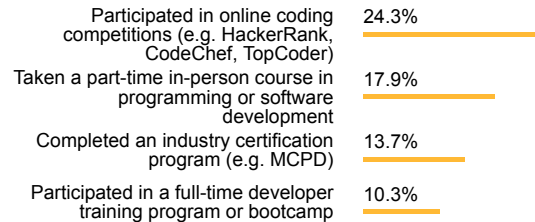|	
Computer science, computer engineering, or software engineering	63.7%
Another engineering discipline (ex. civil, electrical, mechanical)	8.8%
Information systems, information technology, or system administration	8.2%
A natural science (ex. biology, chemistry, physics)	3.9%
Mathematics or statistics	3.6%
Web development or web design	3.1%
A business discipline (ex. accounting, finance, marketing)	2.4%
A humanities discipline (ex. literature, history, philosophy)	2.0%
A social science (ex. anthropology, psychology, political science)	1.7%
Fine arts or performing arts (ex. graphic design, music, studio art)	1.4%
I never declared a major	0.9%
A health science (ex. nursing, pharmacy, radiology)	0.3%

79,036 responses

Of professional developers who studied at the university level, over 60% said they majored in computer science, computer engineering, or software engineering. This proportion is somewhat higher in currently enrolled students, and the proportion of respondents majoring in other engineering disciplines like electrical and mechanical engineering is lower among current students than among professionals.

Other Types of Education

All Respondents	Professional Developers

Taught yourself a new language, framework, or tool without taking a formal course	86.7%
Taken an online course in programming or software development (e.g. a MOOC)	48.6%
Contributed to open source software	40.9%
Received on-the-job training in software development	35.1%
Participated in a hackathon	26.3%

Participated in online coding competitions (e.g. HackerRank, CodeChef, TopCoder) — 24.3%

Taken a part-time in-person course in programming or software development — 17.9%

Completed an industry certification program (e.g. MCPD) — 13.7%

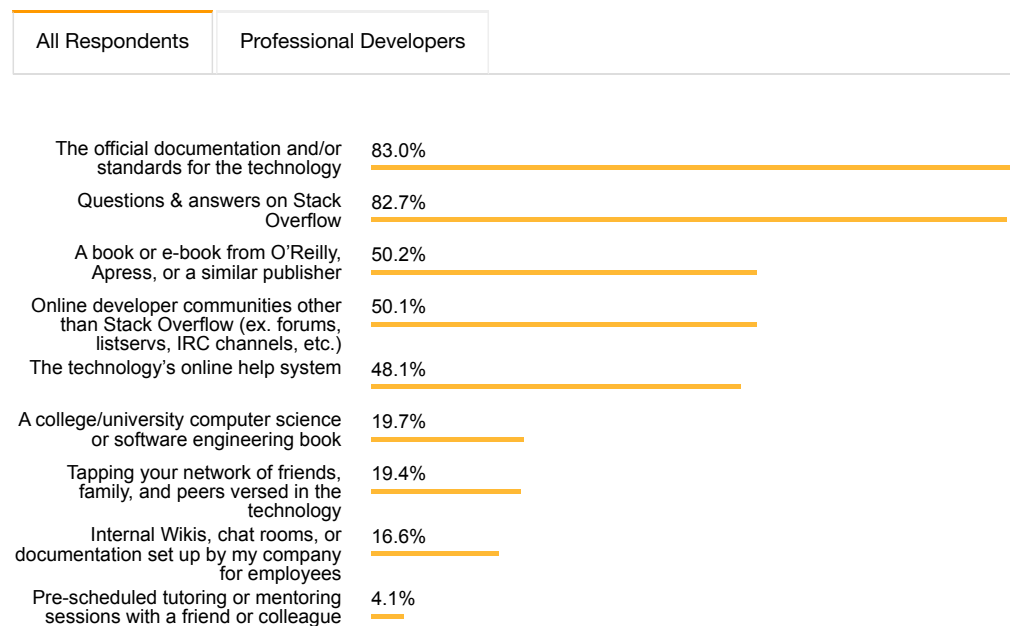Participated in a full-time developer training program or bootcamp — 10.3%

67,960 responses; select all that apply

Developers are lifelong learners; almost 90% of all developers say they have taught themselves a new language, framework, or tool outside of their formal education. Among professional developers, almost half say they have taken an online course like a MOOC, and about a quarter have participated in a hackathon.
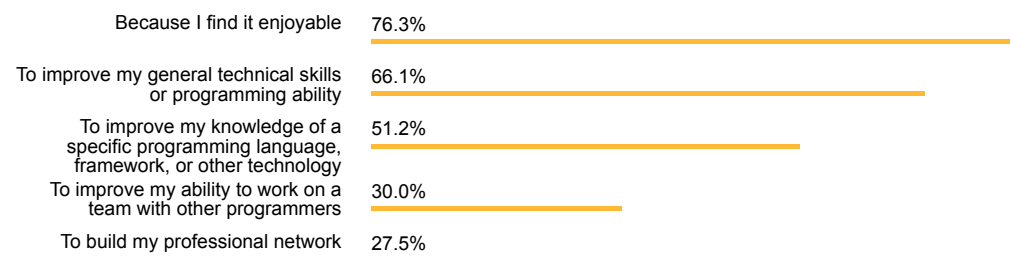
Ways Developers Learn on Their Own

| All Respondents | Professional Developers |

The official documentation and/or standards for the technology — 83.0%

Questions & answers on Stack Overflow — 82.7%

A book or e-book from O'Reilly, Apress, or a similar publisher — 50.2%

Online developer communities other than Stack Overflow (ex. forums, listservs, IRC channels, etc.) — 50.1%

The technology's online help system — 48.1%

A college/university computer science or software engineering book — 19.7%

Tapping your network of friends, family, and peers versed in the technology — 19.4%

Internal Wikis, chat rooms, or documentation set up by my company for employees — 16.6%

Pre-scheduled tutoring or mentoring sessions with a friend or colleague — 4.1%
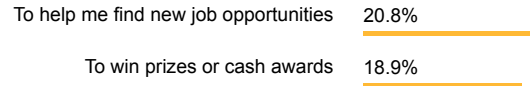
57,354 responses; select all that apply

Over 80% of respondents rely on Stack Overflow Q&A when learning something new. Additionally, developers understand the value of good documentation, as over 80% also use documentation as a resource when learning.

Why Do Developers Participate in Hackathons?

Because I find it enjoyable — 76.3%

To improve my general technical skills or programming ability — 66.1%

To improve my knowledge of a specific programming language, framework, or other technology — 51.2%

To improve my ability to work on a team with other programmers — 30.0%

To build my professional network — 27.5%

To help me find new job opportunities 20.8%
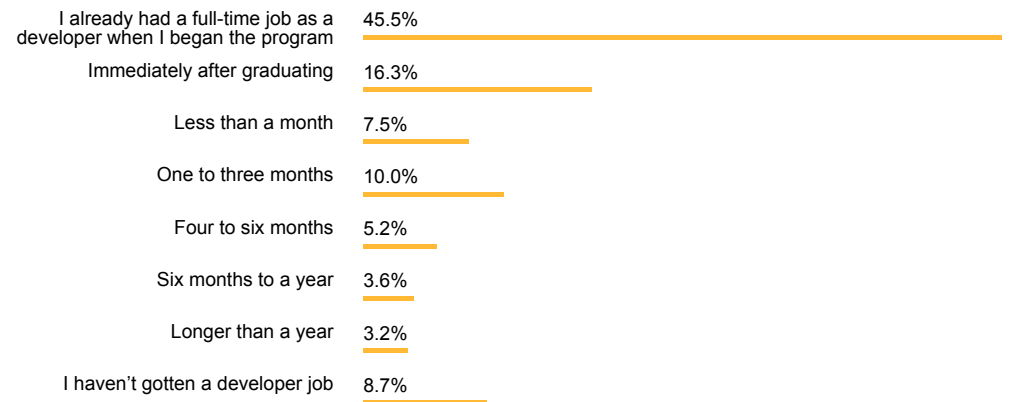
To win prizes or cash awards 18.9%

25,691 responses; select all that apply

Among the respondents who said they have participated in hackathons or online coding competitions, their number one reason for engaging is that they find them enjoyable. These are also opportunities for learning, both general and specific.
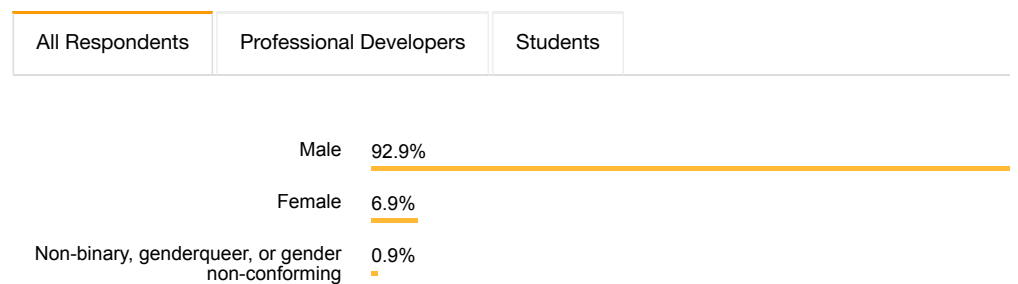
Finding a Job After Bootcamp

I already had a full-time job as a developer when I began the program 45.5%

Immediately after graduating 16.3%

Less than a month 7.5%

One to three months 10.0%

Four to six months 5.2%

Six months to a year 3.6%

Longer than a year 3.2%

I haven't gotten a developer job 8.7%

6,652 responses

Bootcamps are typically perceived as a way for newcomers to transition into a career as a software developer, but according to our survey, many participants in coding bootcamps were already working as developers. Almost half of our respondents who said they went to a coding bootcamp said they were already working as developers; these developers are likely updating their skills and moving to new areas of the tech industry. Of other bootcamp participants, the most common outcome is to find a job immediately or soon after graduating.

Demographics

Gender

All Respondents	Professional Developers	Students

Male 92.9%

Female 6.9%

Non-binary, genderqueer, or gender non-conforming 0.9%
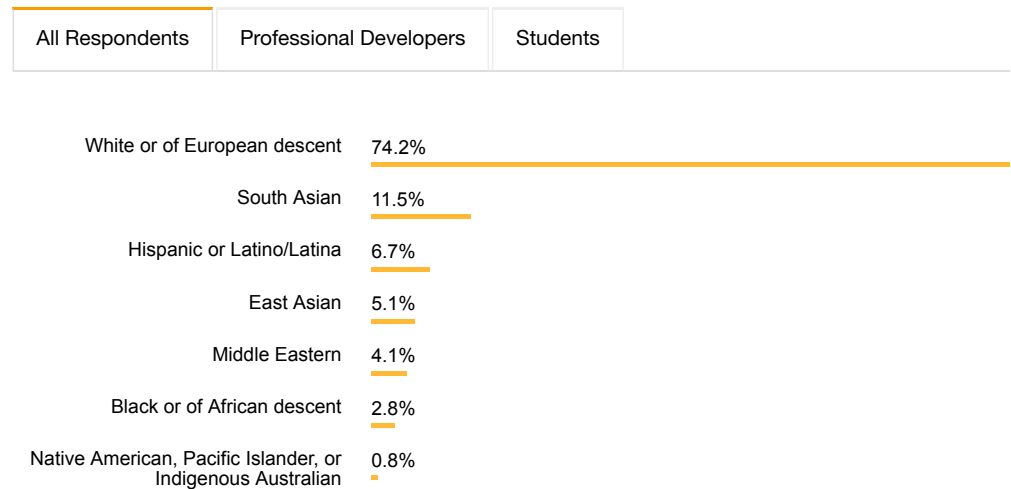
64,364 responses; select all that apply

We asked our respondents about their gender identity, and found that over 90% of our respondents are male. According to Quantcast, women account for about 10% of Stack Overflow's US traffic; this year 9% of US survey respondents are women. We had survey participation at almost the rate we would expect from our traffic, although such a low percentage points to problems with inclusion in the tech industry in general and Stack Overflow in particular. In regions including the United States, India, and the UK, women are represented at higher levels among students than among professional developers.

This year, 0.7% of respondents identified as transgender men or women. The gender identifications are select all that apply, so transgender men and women are included in the categories shown here.
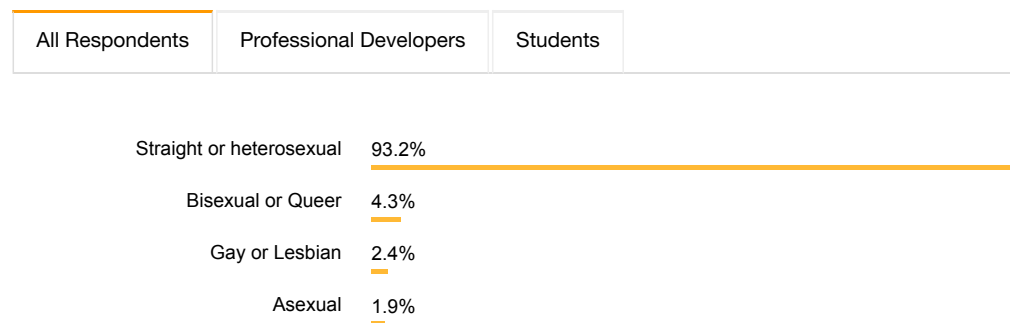
Race and Ethnicity

All Respondents	Professional Developers	Students

White or of European descent	74.2%
South Asian	11.5%
Hispanic or Latino/Latina	6.7%
East Asian	5.1%
Middle Eastern	4.1%
Black or of African descent	2.8%
Native American, Pacific Islander, or Indigenous Australian	0.8%

57,473 responses; select all that apply

Here again we see evidence for problems with diversity and inclusion. We see higher proportions of developers of color in students than professional developers. This year, 7.4% of professional developers in the United States identified as black, Hispanic or Latino/Latina, or Native American while over 10% of students in the United States identified as a member of one of these groups.
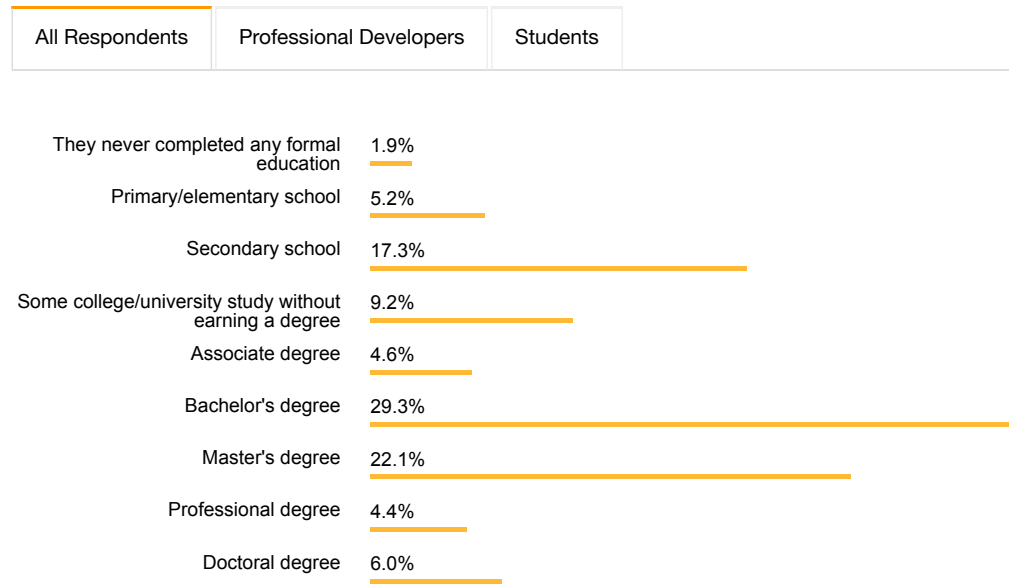
Sexual Orientation

All Respondents	Professional Developers	Students

Straight or heterosexual	93.2%
Bisexual or Queer	4.3%
Gay or Lesbian	2.4%
Asexual	1.9%

59,765 responses; select all that apply

This is the first year we asked our respondents about their sexual orientation.

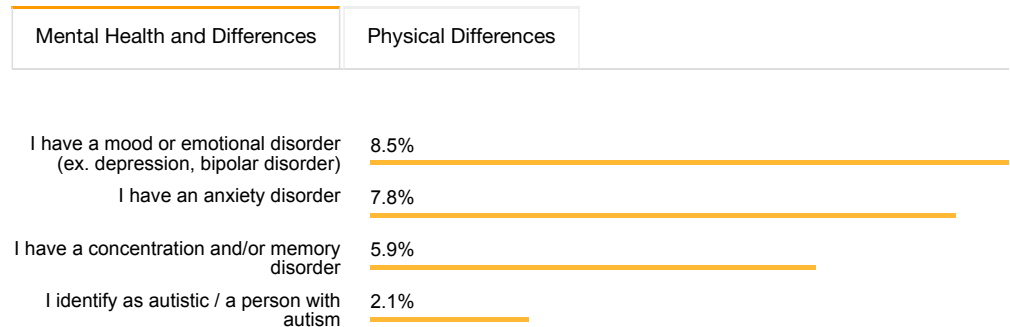## Parents' Education Level

All Respondents	Professional Developers	Students

They never completed any formal education	1.9%
Primary/elementary school	5.2%
Secondary school	17.3%
Some college/university study without earning a degree	9.2%
Associate degree	4.6%
Bachelor's degree	29.3%
Master's degree	22.1%
Professional degree	4.4%
Doctoral degree	6.0%

61,813 responses

Like developers themselves, most developers' parents have the equivalent of a bachelor's degree or higher. Just under 40% of respondents said their parents do not hold a bachelor's degree.
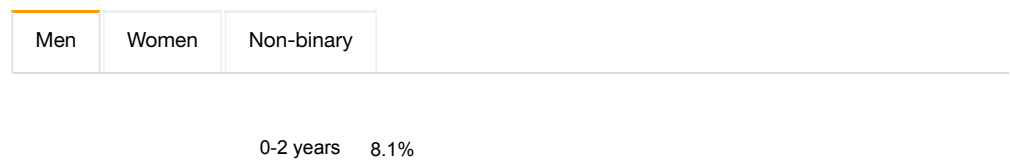
Disability Status

Mental Health and Differences	Physical Differences

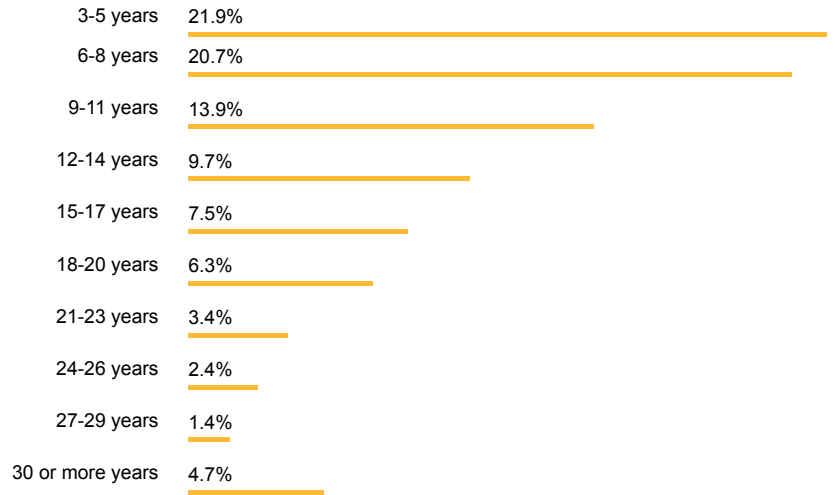|	
I have a mood or emotional disorder (ex. depression, bipolar disorder)	8.5%
I have an anxiety disorder	7.8%
I have a concentration and/or memory disorder	5.9%
I identify as autistic / a person with autism	2.1%

11,431 responses identified as having a mental difference

We know developers can experience many forms of disability and difference, from mental health challenges to physical disability. Mental health issues like depression and anxiety are particularly common among our respondents. In the United States, almost 20% of respondents said they deal with either or both.

Experience and Gender

Men	Women	Non-binary

0-2 years	8.1%

|		
3-5 years	21.9%	
6-8 years	20.7%	
9-11 years	13.9%	
12-14 years	9.7%	
15-17 years	7.5%	
18-20 years	6.3%	
21-23 years	3.4%	
24-26 years	2.4%	
27-29 years	1.4%	
30 or more years	4.7%	

59,749 responses; gender categories were select all that apply

We find differences among developers by gender in our survey responses. For example, twice as many women than men have been coding two years or less, evidence for the shifting demographics of coding as a profession. Also, developers who identify as transgender men or women or of non-binary gender contribute to open source at higher rates (58% and 60%, respectively) than developers who identify as men or women overall (45% and 33%.)
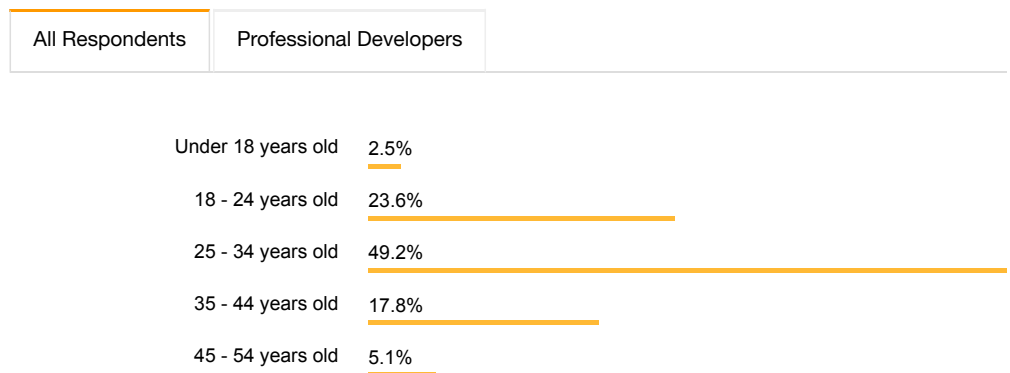
Developer Role and Gender
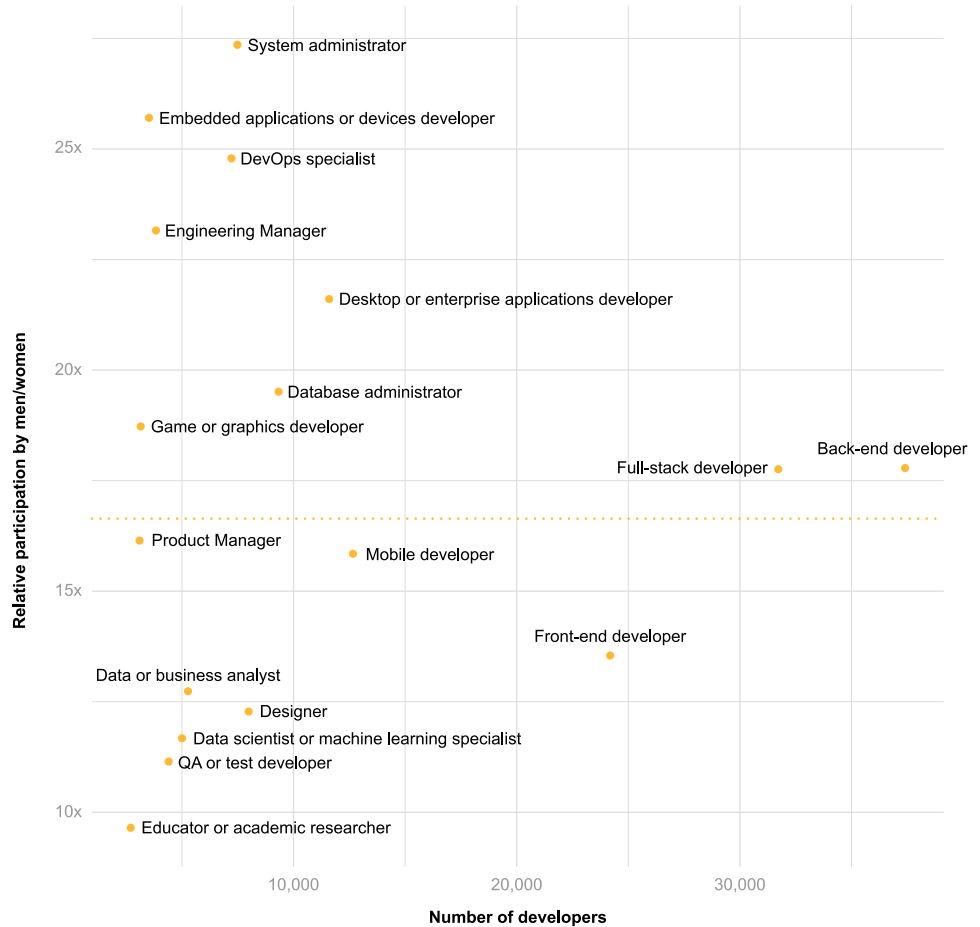
The dashed line shows the average ratio of men's to women's participation

We see varying representation by men and women in different developer roles on our survey. All categories have dramatically more developers who identify as men than women but the ratio of men to women varies. Developers who are educators or academic researchers are about 10 times more likely to be men than women, while developers who are system admins or DevOps specialists are 25-30 times more likely to be men than women. Women have the highest representation as academics, QA developers, data scientists, and designers.
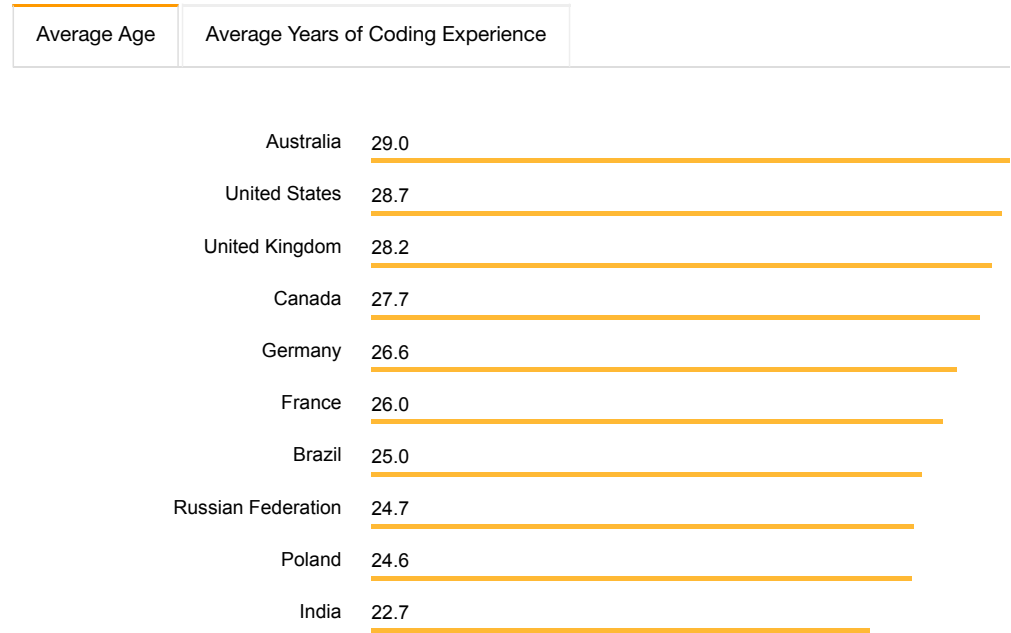
Age

All Respondents	Professional Developers

Under 18 years old	2.5%
18 - 24 years old	23.6%
25 - 34 years old	49.2%
35 - 44 years old	17.8%
45 - 54 years old	5.1%

55 - 64 years old	1.5%
65 years or older	0.3%

64,574 responses

About three-fourths of professional developers who took our survey are younger than 35.

Age and Experience by Country

Average Age	Average Years of Coding Experience

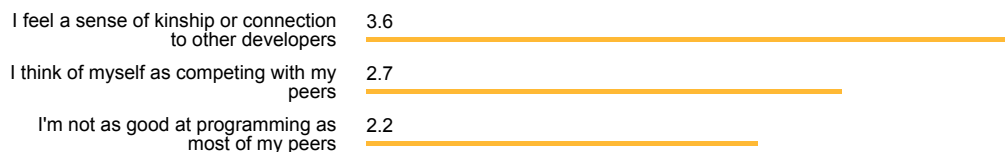|	
Australia	29.0
United States	28.7
United Kingdom	28.2
Canada	27.7
Germany	26.6
France	26.0
Brazil	25.0
Russian Federation	24.7
Poland	24.6
India	22.7

Mean of 42,042 responses

Developers on Stack Overflow are older with more experience in Australia, countries in Western Europe, and North America and younger with less experience in countries like India and Russia.

Connection and Competition

Kinship, Competition, and Self-Evaluation

I feel a sense of kinship or connection to other developers	3.6
I think of myself as competing with my peers	2.7
I'm not as good at programming as most of my peers	2.2

68,577 responses; agreement on a 1-5 scale, from strongly disagree to strongly agree

We asked how much respondents agree or disagree with several statements about their place in the developer community. Overall 70% of developers agree or strongly agree that they feel a sense of connection with other developers. Developers are overall confident about their own skills compared to their peers, with only 18% agreeing or strongly agreeing that they are not as good at programming as their colleagues.

Experience and Belonging
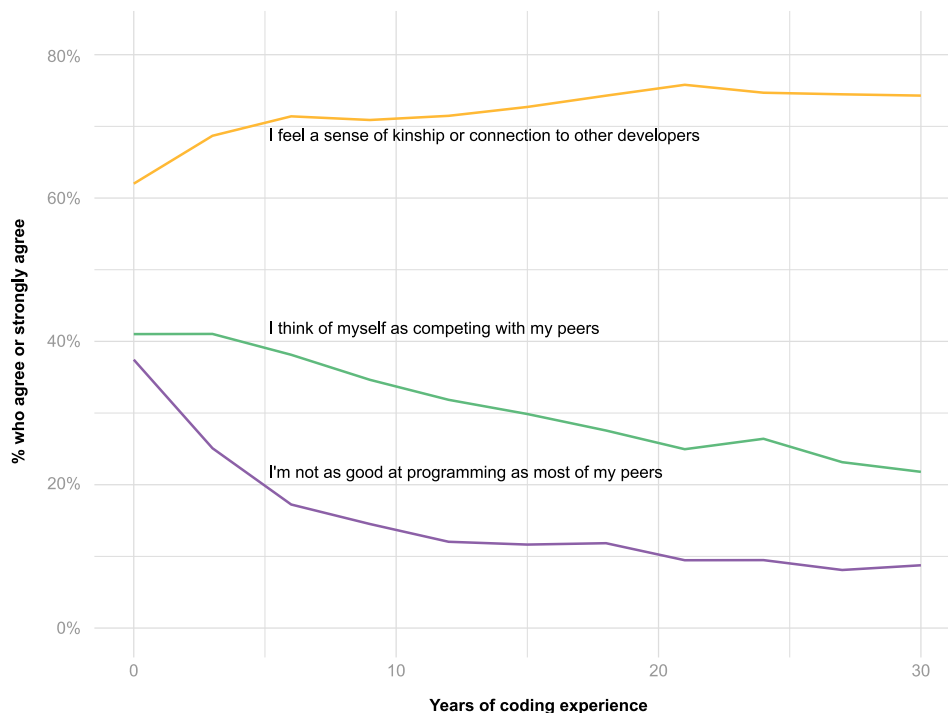
Respondents' feelings on how much they belong and how they stack up to their peers change with how much experience they have. More experienced developers feel more connected, more confident, and less competitive. Notice that feeling less skilled drops quickly with experience while feeling less competitive drops more gradually and continues to drop into the second decade of coding experience.

Life Outside Work

Children and Other Dependents
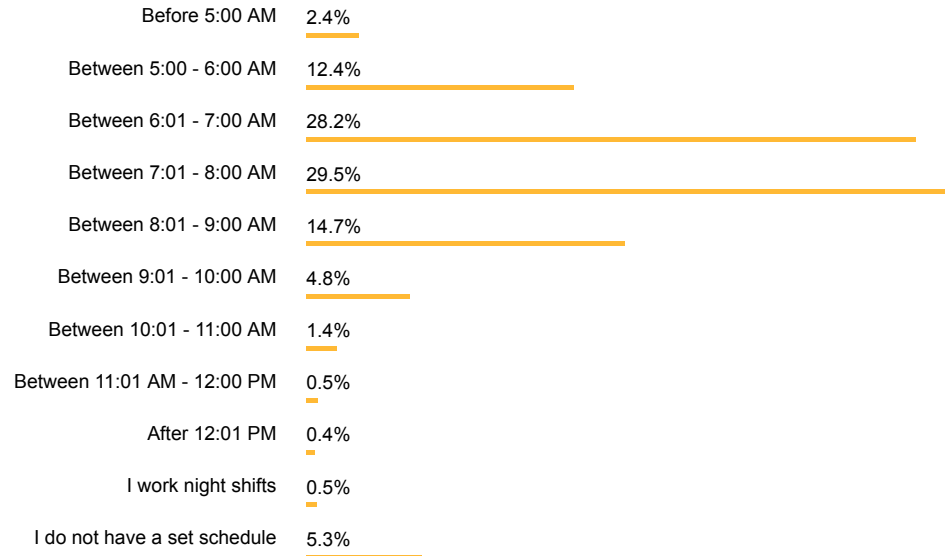
No	71.1%
Yes	28.9%

62,596 responses

This year we asked respondents if they have children or other dependents that they care for, and about a quarter of respondents say that they do. We asked in a free response question what these developers do for dependent care during work hours, and our respondents talked about options like school, their spouses/partners, and daycare.

The developers who said they do not have dependents to care for are younger on average than those who do. Over 30% of the developers without dependents are younger than 25, while only 5% of those with dependents are younger than 25. Almost 60% of developers with 10 or more years of professional coding experience have children or other dependents.

What Time Do Developers Wake Up?

Before 5:00 AM	2.4%
Between 5:00 - 6:00 AM	12.4%
Between 6:01 - 7:00 AM	28.2%
Between 7:01 - 8:00 AM	29.5%
Between 8:01 - 9:00 AM	14.7%
Between 9:01 - 10:00 AM	4.8%
Between 10:01 - 11:00 AM	1.4%
Between 11:01 AM - 12:00 PM	0.5%
After 12:01 PM	0.4%
I work night shifts	0.5%
I do not have a set schedule	5.3%

72,146 responses

We are confident that most developers have pulled a late night here and there, but most of our respondents say they are up by 8am.

How Much Time Do Developers Spend on a Computer?

Less than 1 hour	0.3%
1 - 4 hours	3.3%
5 - 8 hours	30.6%
9 - 12 hours	52.7%
Over 12 hours	13.2%
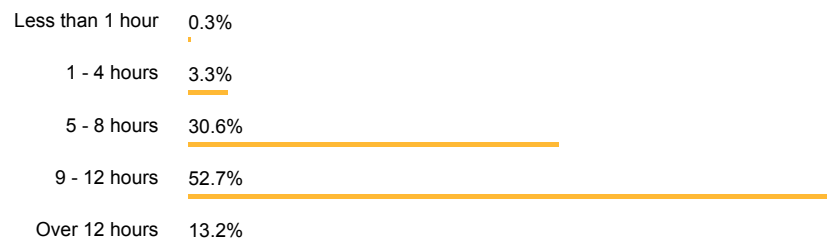
72,133 responses

Our respondents include people who code as professionals, students, and hobbyists. The overwhelmingly majority spend large fractions of their waking hours on a typical day with their desktops and laptops.

How Much Time Do Developers Spend Outside?

Less than 30 minutes	15.6%

30 - 59 minutes	33.3%
1 - 2 hours	38.6%
3 - 4 hours	10.0%
Over 4 hours	2.5%
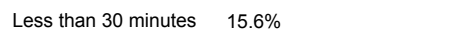
72,024 responses

Developers get outside for recreation, commuting, or other reasons. About half of our respondents spend an hour or more outside a day.

Healthy Habits

How Often Do Developers Skip Meals To Be Productive?	How Often Do Developers Exercise?

Never	63.6%
1 - 2 times per week	25.2%
3 - 4 times per week	6.0%
Daily or almost every day	5.2%

71,946 responses

Developers tell us they do not often skip meals because of their workload, and a majority say they exercise at least some. Over 60% of respondents exercise at least weekly, but the most often chosen exercise frequency is 'never'.
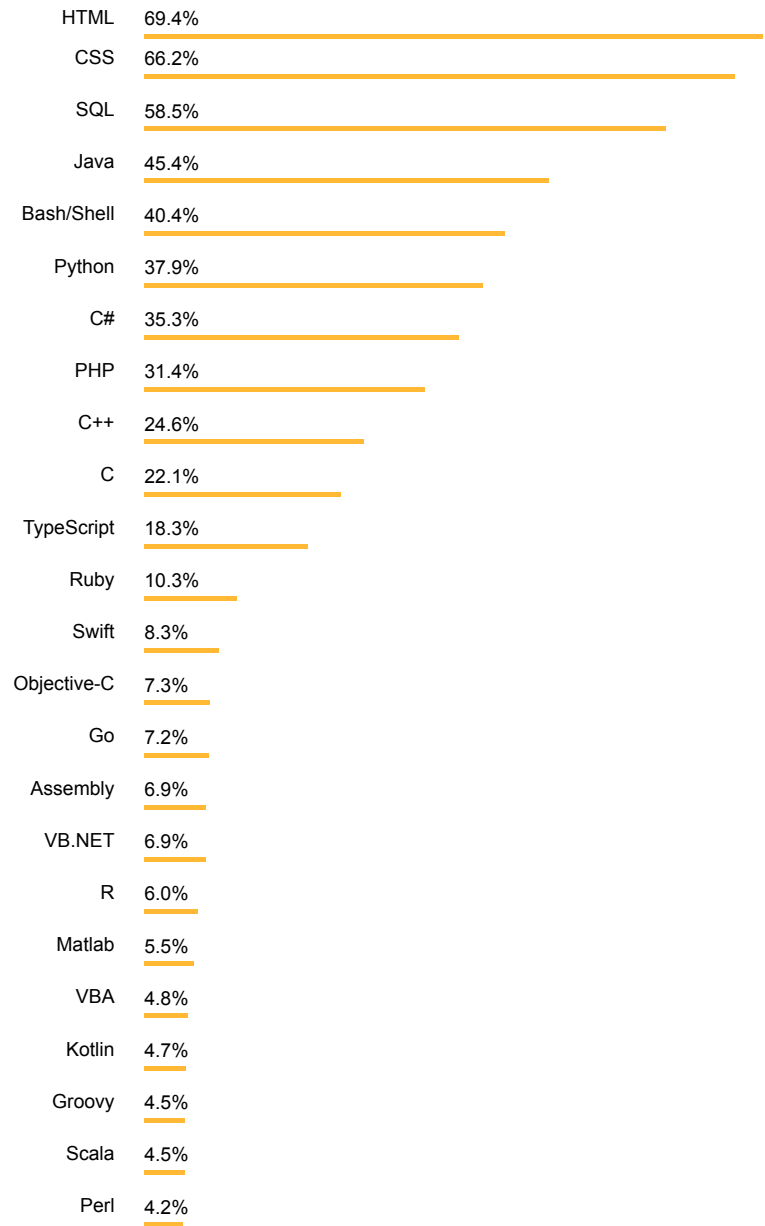
Technology

The tools of the trade

Most Popular Technologies

Programming, Scripting, and Markup Languages

All Respondents	Professional Developers

JavaScript	71.5%

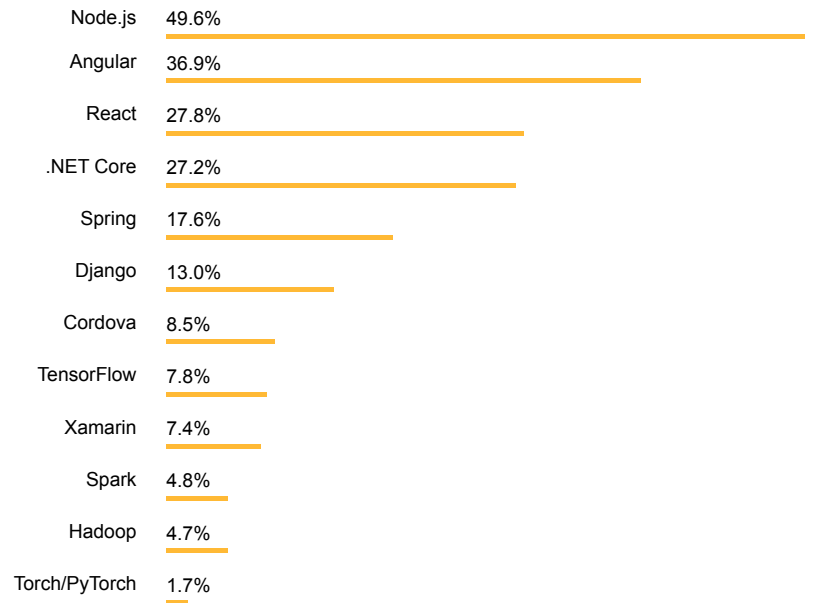| Language	%
HTML	69.4%
CSS	66.2%
SQL	58.5%
Java	45.4%
Bash/Shell	40.4%
Python	37.9%
C#	35.3%
PHP	31.4%
C++	24.6%
C	22.1%
TypeScript	18.3%
Ruby	10.3%
Swift	8.3%
Objective-C	7.3%
Go	7.2%
Assembly	6.9%
VB.NET	6.9%
R	6.0%
Matlab	5.5%
VBA	4.8%
Kotlin	4.7%
Groovy	4.5%
Scala	4.5%
Perl	4.2%

73,248 responses; select all that apply

For the sixth year in a row, JavaScript is the most commonly used programming language. Python has risen in the ranks, surpassing C# this year, much like it surpassed PHP last year. Python has a solid claim to being the fastest-growing major programming language (https://stackoverflow.blog/2017/09/06/incredible-growth-python/).

We see close alignment in the technology choices of professional developers and the developer population overall.

Frameworks, Libraries, and Tools

All Respondents	Professional Developers

Node.js	49.6%
Angular	36.9%
React	27.8%
.NET Core	27.2%
Spring	17.6%
Django	13.0%
Cordova	8.5%
TensorFlow	7.8%
Xamarin	7.4%
Spark	4.8%
Hadoop	4.7%
Torch/PyTorch	1.7%

51,620 responses; select all that apply

Node.js and AngularJS continue to be the most commonly used technologies in this category, with React and .Net Core also important to many developers.

Databases

All Respondents	Professional Developers

MySQL	58.7%
SQL Server	41.2%
PostgreSQL	32.9%
MongoDB	25.9%
SQLite	19.7%
Redis	18.0%
Elasticsearch	14.1%
MariaDB	13.4%
Oracle	11.1%
Microsoft Azure (Tables, CosmosDB, SQL, etc)	7.9%
Google Cloud Storage	5.5%
Memcached	5.5%
Amazon DynamoDB	5.2%
Amazon RDS/Aurora	5.1%
Cassandra	3.7%

Take control of your job search.
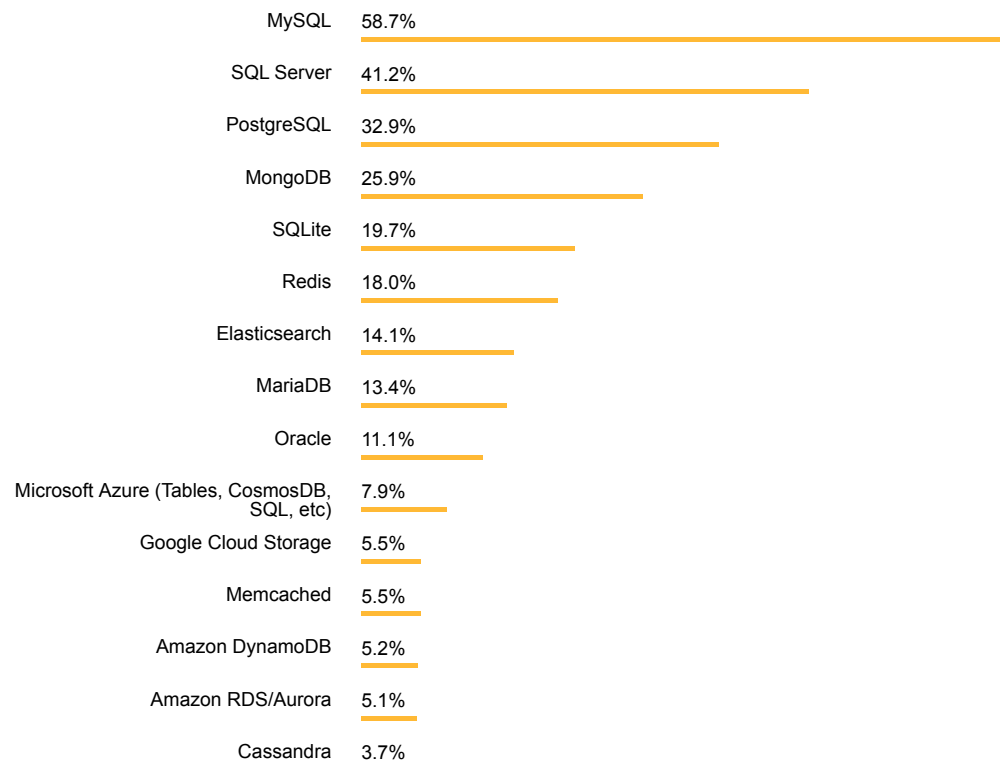
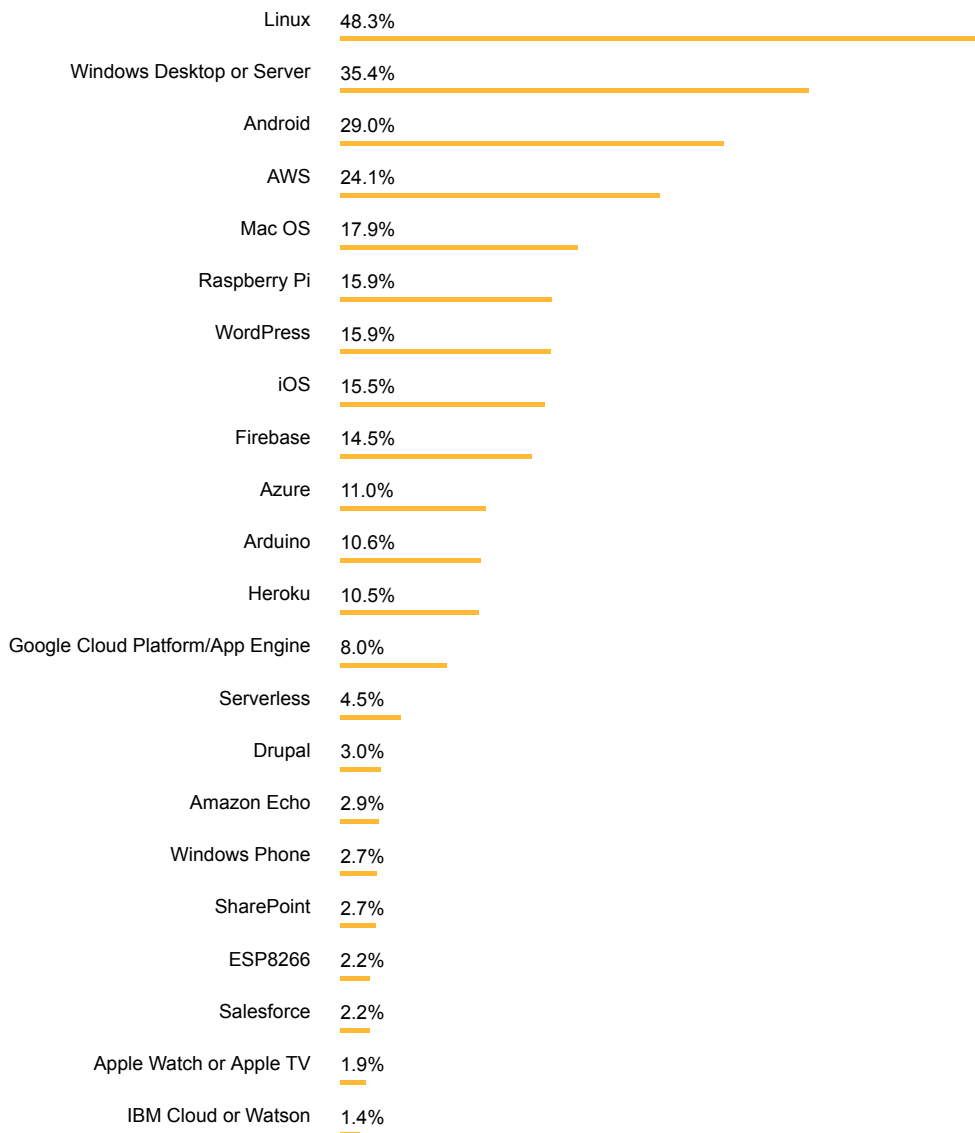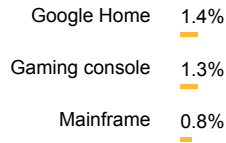|	
IBM Db2	2.5%
Neo4j	2.4%
Amazon Redshift	2.2%
Apache Hive	2.2%
Google BigQuery	2.1%
Apache HBase	1.7%
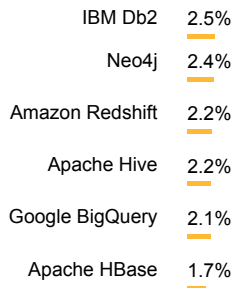
66,264 responses; select all that apply

Like last year, MySQL and SQL Server are the most commonly used databases.

Platforms

All Respondents	Professional Developers

Linux	48.3%
Windows Desktop or Server	35.4%
Android	29.0%
AWS	24.1%
Mac OS	17.9%
Raspberry Pi	15.9%
WordPress	15.9%
iOS	15.5%
Firebase	14.5%
Azure	11.0%
Arduino	10.6%
Heroku	10.5%
Google Cloud Platform/App Engine	8.0%
Serverless	4.5%
Drupal	3.0%
Amazon Echo	2.9%
Windows Phone	2.7%
SharePoint	2.7%
ESP8266	2.2%
Salesforce	2.2%
Apple Watch or Apple TV	1.9%
IBM Cloud or Watson	1.4%

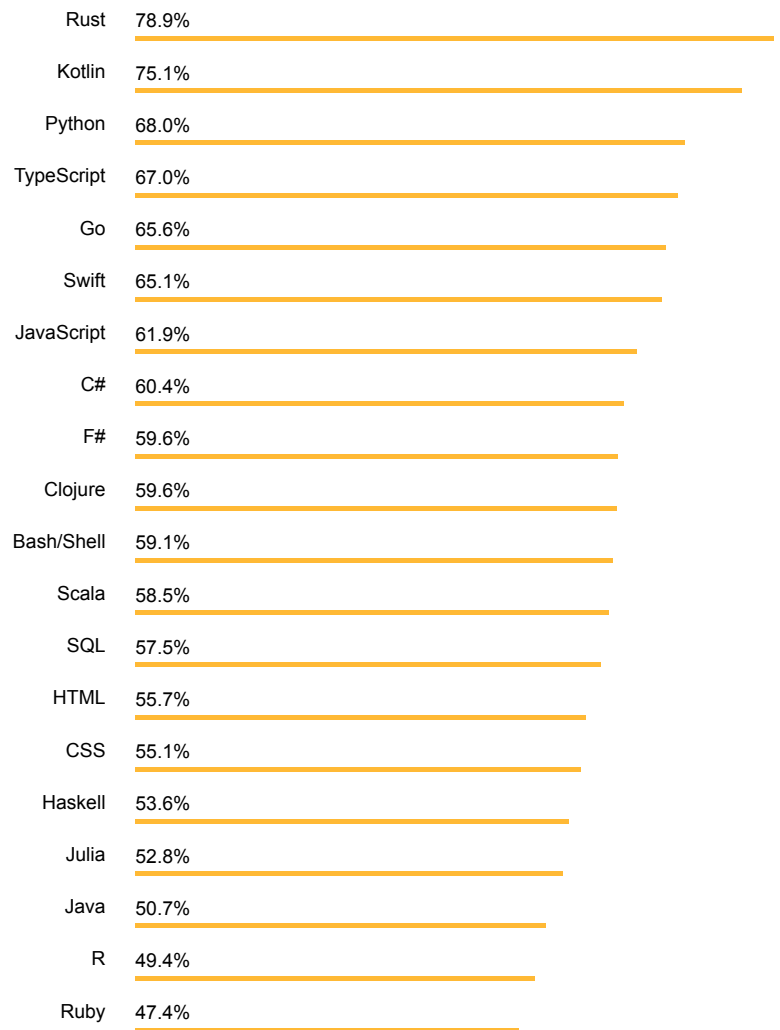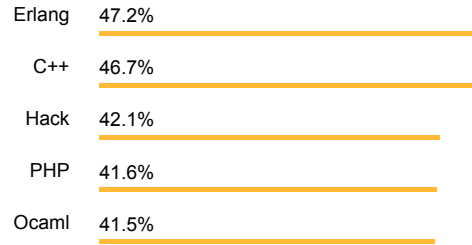|	
Google Home	1.4%
Gaming console	1.3%
Mainframe	0.8%

65,999 responses; select all that apply

Linux and Windows Desktop or Server are the most common choices that our respondents say they have done development work for this year.

Most Loved, Dreaded, and Wanted

Most Loved, Dreaded, and Wanted Languages

Loved	Dreaded	Wanted

Rust	78.9%
Kotlin	75.1%
Python	68.0%
TypeScript	67.0%
Go	65.6%
Swift	65.1%
JavaScript	61.9%
C#	60.4%
F#	59.6%
Clojure	59.6%
Bash/Shell	59.1%
Scala	58.5%
SQL	57.5%
HTML	55.7%
CSS	55.1%
Haskell	53.6%
Julia	52.8%
Java	50.7%
R	49.4%
Ruby	47.4%

Erlang	47.2%
C++	46.7%
Hack	42.1%
PHP	41.6%
Ocaml	41.5%

% of developers who are developing with the language or technology and have expressed interest in continuing to develop with it
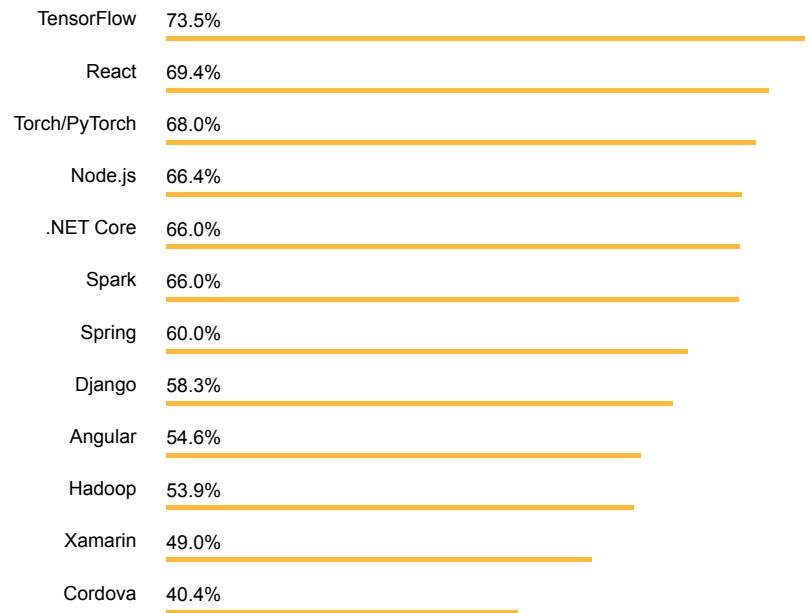
For the third year in a row, Rust is the most loved programming language among our respondents, followed close behind by Kotlin, a language we asked about for the first time on our survey this year. This means that proportionally, more developers want to continue working with these than other languages.

Also for the third year in a row, Visual Basic 6 ranks as the most dreaded programming language. Most dreaded means that a high percentage of developers who are currently using the technology express no interest in continuing to do so.

Python is the most wanted language for the second year in a row, meaning that it is the language that developers who do not yet use it most often say they want to learn.

Most Loved, Dreaded, and Wanted Frameworks, Libraries, and Tools

Loved	Dreaded	Wanted

TensorFlow	73.5%
React	69.4%
Torch/PyTorch	68.0%
Node.js	66.4%
.NET Core	66.0%
Spark	66.0%
Spring	60.0%
Django	58.3%
Angular	54.6%
Hadoop	53.9%
Xamarin	49.0%
Cordova	40.4%

% of developers who are developing with the language or technology and have expressed interest in continuing to develop with it

TensorFlow, one of the fastest growing technologies on Stack Overflow, is most loved by developers, while Cordova is most dreaded. React is the framework developers say they most want to work with if they do not already.
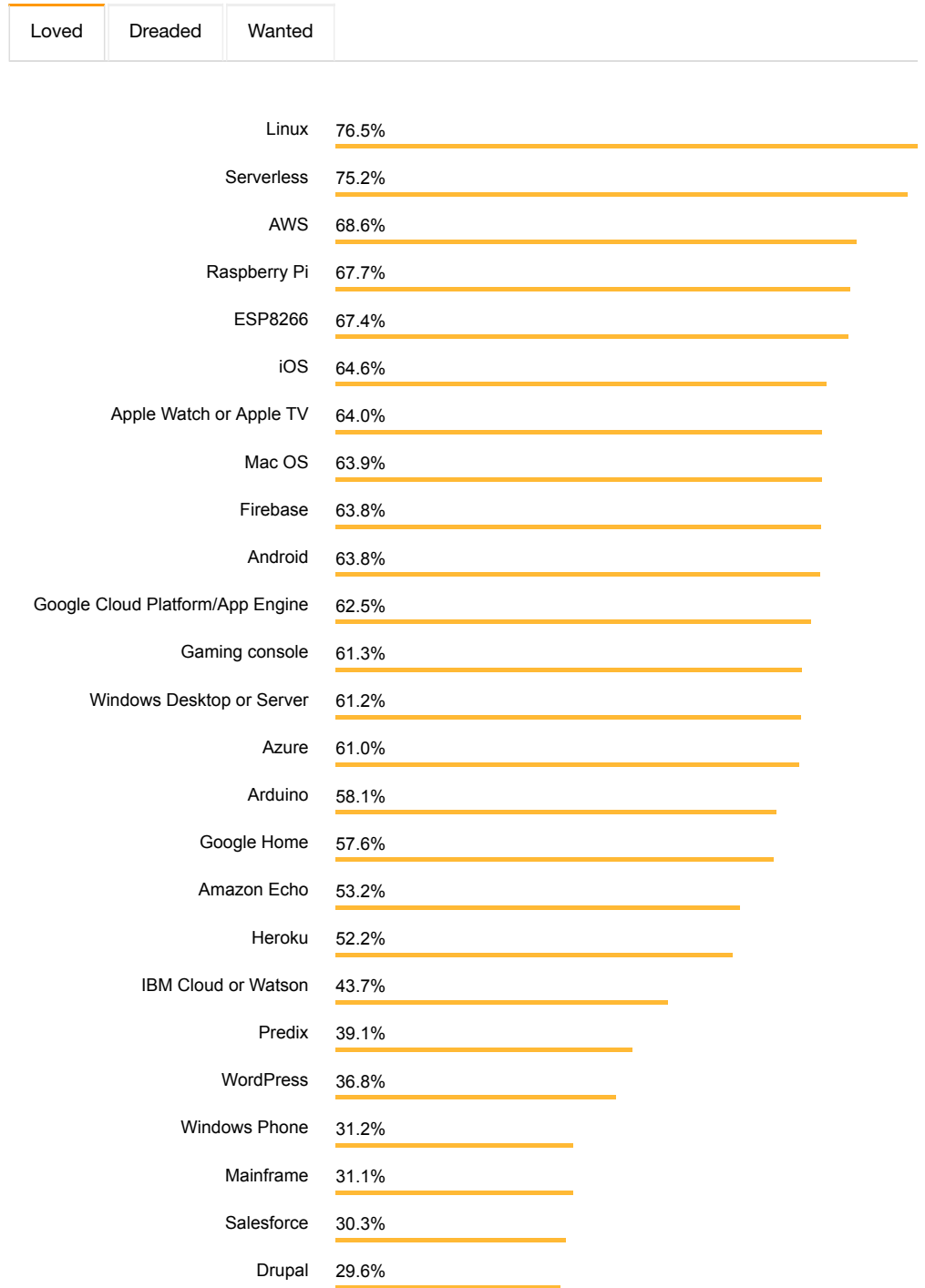
Most Loved, Dreaded, and Wanted Databases
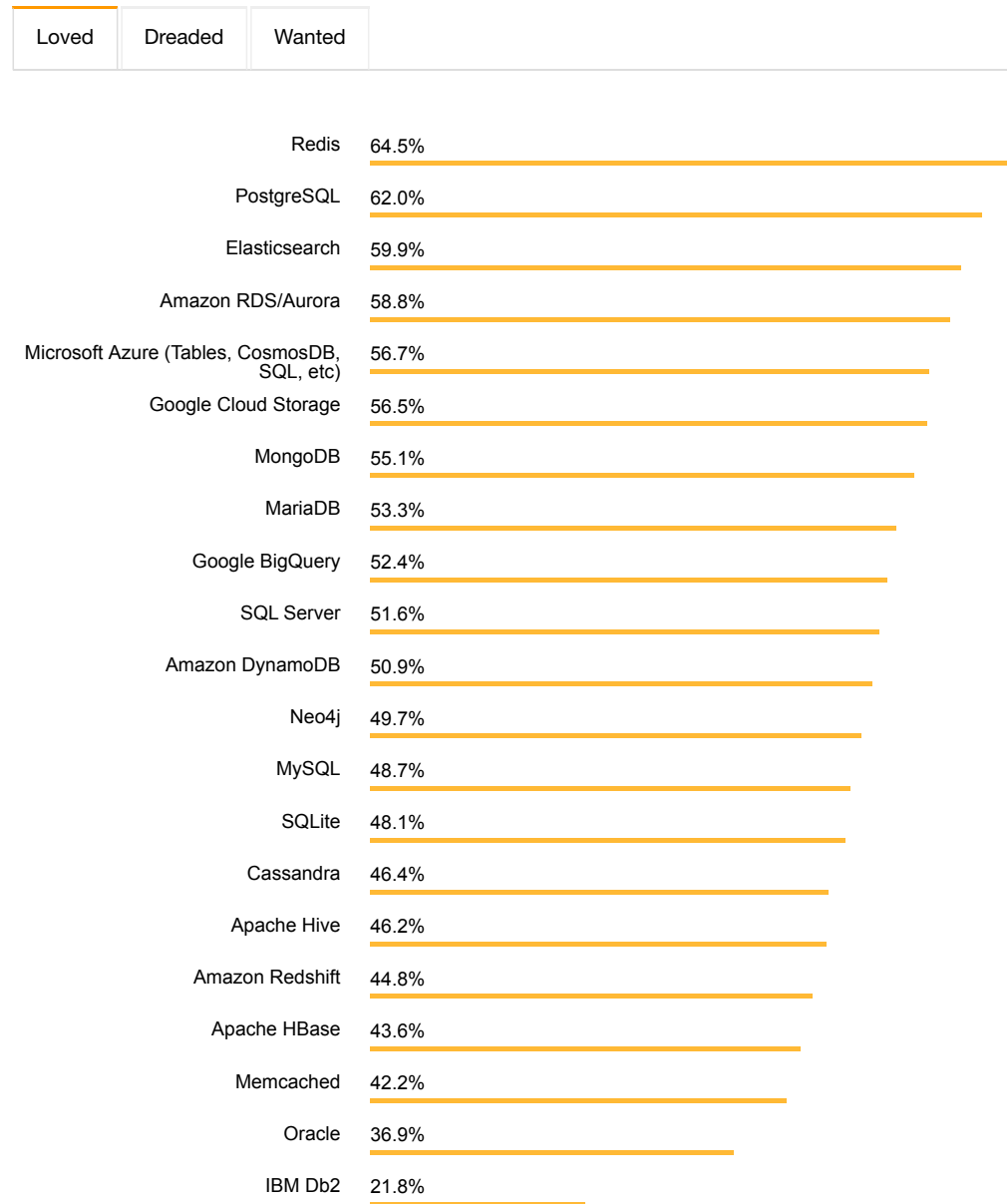
| Loved | Dreaded | Wanted |

Redis	64.5%
PostgreSQL	62.0%
Elasticsearch	59.9%
Amazon RDS/Aurora	58.8%
Microsoft Azure (Tables, CosmosDB, SQL, etc)	56.7%
Google Cloud Storage	56.5%
MongoDB	55.1%
MariaDB	53.3%
Google BigQuery	52.4%
SQL Server	51.6%
Amazon DynamoDB	50.9%
Neo4j	49.7%
MySQL	48.7%
SQLite	48.1%
Cassandra	46.4%
Apache Hive	46.2%
Amazon Redshift	44.8%
Apache HBase	43.6%
Memcached	42.2%
Oracle	36.9%
IBM Db2	21.8%

% of developers who are developing with the language or technology and have expressed interest in continuing to develop with it

For the second year in a row, Redis is most loved database, meaning that proportionally more developers wanted to continue working with it than any other database. IBM's Db2 offering ranks as the most dreaded database, and for the second year in a row, MongoDB is the most wanted database.

Most Loved, Dreaded, and Wanted Platforms

Loved	Dreaded	Wanted

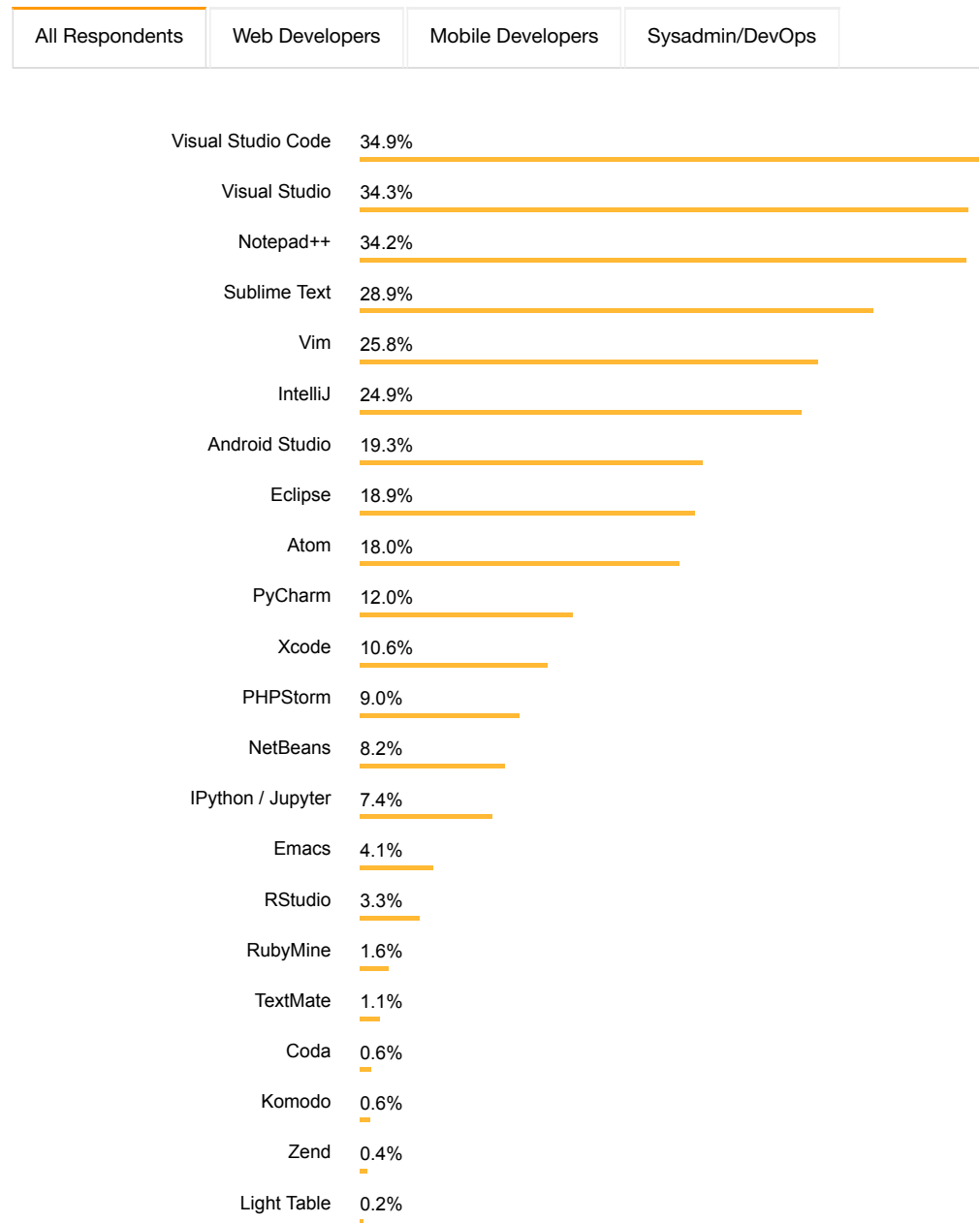|	
Linux	76.5%
Serverless	75.2%
AWS	68.6%
Raspberry Pi	67.7%
ESP8266	67.4%
iOS	64.6%
Apple Watch or Apple TV	64.0%
Mac OS	63.9%
Firebase	63.8%
Android	63.8%
Google Cloud Platform/App Engine	62.5%
Gaming console	61.3%
Windows Desktop or Server	61.2%
Azure	61.0%
Arduino	58.1%
Google Home	57.6%
Amazon Echo	53.2%
Heroku	52.2%
IBM Cloud or Watson	43.7%
Predix	39.1%
WordPress	36.8%
Windows Phone	31.2%
Mainframe	31.1%
Salesforce	30.3%
Drupal	29.6%

% of developers who are developing with the language or technology and have expressed interest in continuing to develop with it

Linux is once again the most loved platform for development, with serverless infrastructure also loved this year. Sharepoint is the most dreaded development platform for the second year in a row, and many developers say they want to start developing for the Android platform and the Raspberry Pi.

Development Environments and Tools

Most Popular Development Environments

All Respondents	Web Developers	Mobile Developers	Sysadmin/DevOps

Visual Studio Code	34.9%
Visual Studio	34.3%
Notepad++	34.2%
Sublime Text	28.9%
Vim	25.8%
IntelliJ	24.9%
Android Studio	19.3%
Eclipse	18.9%
Atom	18.0%
PyCharm	12.0%
Xcode	10.6%
PHPStorm	9.0%
NetBeans	8.2%
IPython / Jupyter	7.4%
Emacs	4.1%
RStudio	3.3%
RubyMine	1.6%
TextMate	1.1%
Coda	0.6%
Komodo	0.6%
Zend	0.4%
Light Table	0.2%

75,398 responses; select all that apply

Visual Studio Code just edged out Visual Studio as the most popular developer environment tool across the board, but there are differences in tool choices by developer type and role. Developers who write code for mobile apps are more likely to choose Android Studio and Xcode, the most popular choice by DevOps and sysadmins is Vim, and data scientists are more likely to work in IPython/Jupyter, PyCharm, and RStudio.

Developers' Primary Operating Systems

All Respondents	Professional Developers

Windows	49.9%
MacOS	26.7%
Linux-based	23.2%
BSD/Unix	0.2%

76,179 responses

We asked our respondents what operating systems they use for work. About half said they mainly use Windows, and the remainder were about evenly split between MacOS and Linux.

How Many Monitors?

1	31.9%
2	51.1%
3	14.4%
4	1.2%
More than 4	1.4%

76,398 responses

Over 65% of respondents use two or more monitors to get work done at their main workstation; the median number of monitors for respondents at their main workstation is two.

Top Paying Technologies

What Languages Are Associated with the Highest Salaries Worldwide?

| Global	United States

F#	$74,000
Ocaml	$73,000
Clojure	$72,000
Groovy	$72,000
Perl	$69,000
Rust	$69,000
Erlang	$67,000

Language	Salary
Scala	$67,000
Go	$66,000
Ruby	$64,000
Bash/Shell	$63,000
CoffeeScript	$60,000
Haskell	$60,000
Julia	$60,000
TypeScript	$60,000
C#	$59,000
Objective-C	$58,000
R	$58,000
Swift	$57,000
Lua	$56,000
Python	$56,000
SQL	$56,000
JavaScript	$55,000
HTML	$54,000
CSS	$53,000

Median of 56,835 responses; USD

Globally, respondents who use F#, Ocaml, Clojure, and Groovy earn the highest salaries, with median salaries above $70,000 USD. There are regional variations in which languages are associated with the highest pay. Erlang and Scala developers in the US are among the highest paid, while Clojure, Erlang, and Haskell developers earn the most in India.

Correlated Technologies

How Technologies Are Connected
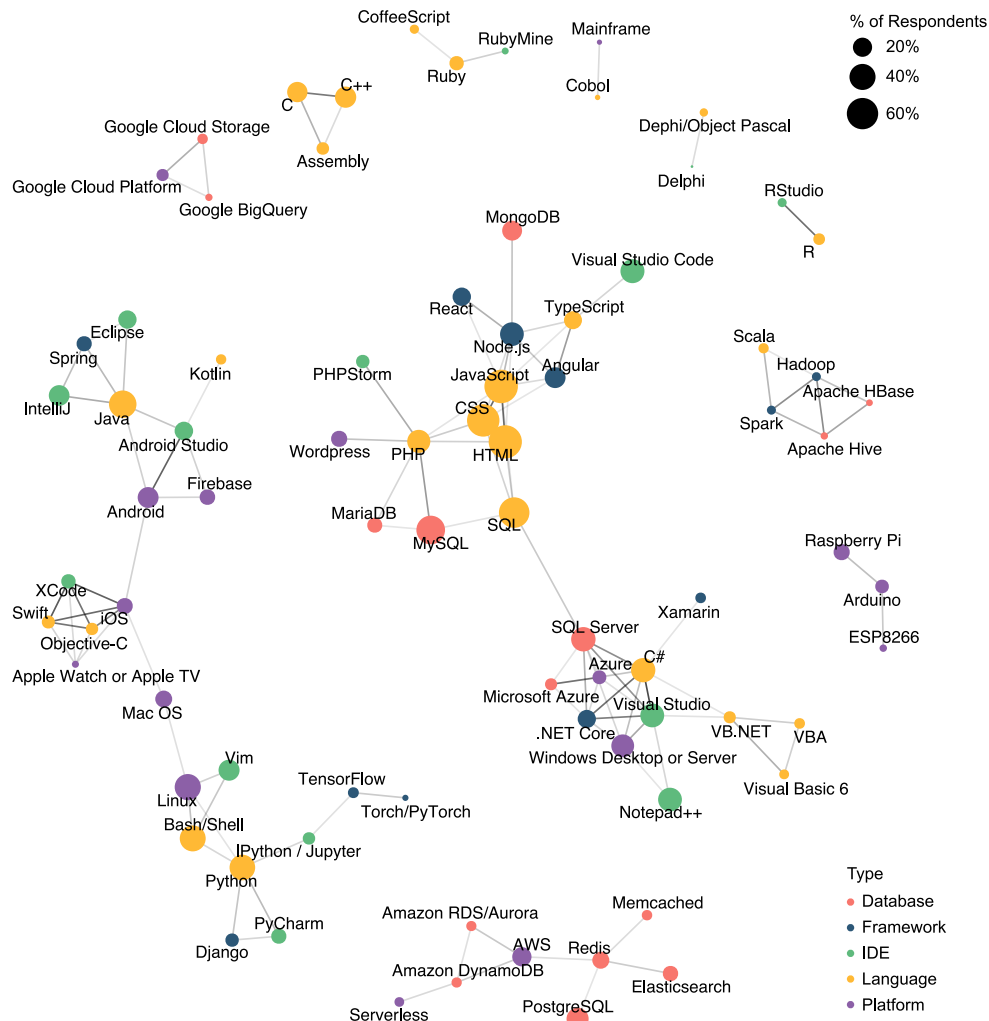
Technologies cluster together into related ecosystems that tend to be used by the same developers. In this chart we see a large central cluster for web development (with JavaScript, HTML, and CSS) connected via SQL to one for Microsoft technologies (with C#, Visual Studio, and .NET Core). Along the left we see a constellation connecting Java, Android, and iOS across to Linux, bash/shell, and Python. Other smaller correlated clusters include Scala/Spark, C/C++, and other smaller technologies that include language-specific IDEs.

Technology and Society

What Do Developers Think Is Dangerous and Exciting About AI?

Dangerous	Exciting

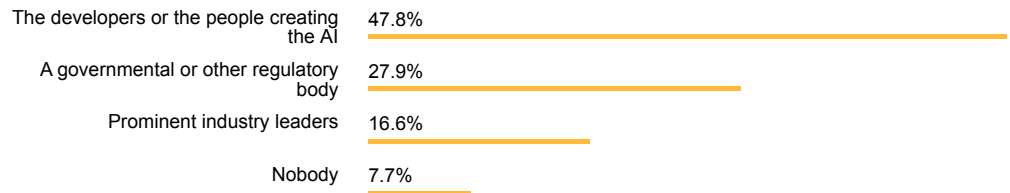|	
Algorithms making important decisions	28.6%
Artificial intelligence surpassing human intelligence ("the singularity")	28.0%
Evolving definitions of "fairness" in algorithmic versus human decisions	23.7%
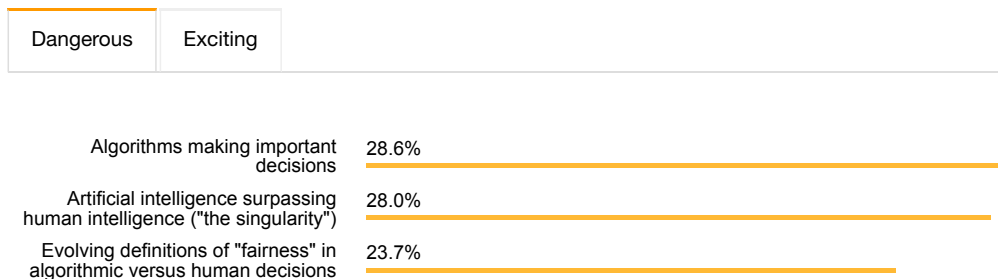
Increasing automation of jobs   19.8%

63,115 responses

Some types of developers are involved in the increasing role of machine learning and artificial intelligence in the world today, so we asked developers what they think is dangerous and exciting about these technologies. There is not much consensus among developers about what is most dangerous; each answer was chosen roughly equally. The top choice for what is exciting about increasing AI is that jobs can be automated.
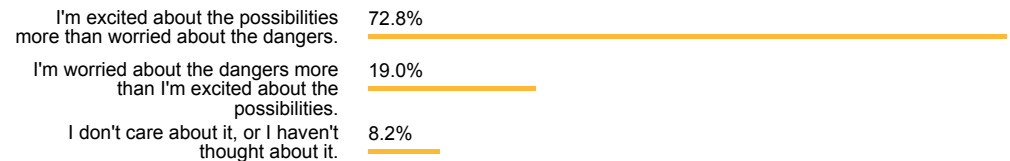
Who is Primarily Responsible for Considering the Ramifications of AI?

The developers or the people creating the AI   47.8%

A governmental or other regulatory body   27.9%

Prominent industry leaders   16.6%

Nobody   7.7%

65,553 responses

Developers are most likely to think that the creators and technologists behind the machine learning and AI algorithms are the ones who are ultimately most responsible for the societal issues surrounding artificial intelligence. About a quarter of respondents think that a regulatory body should be primarily responsible.
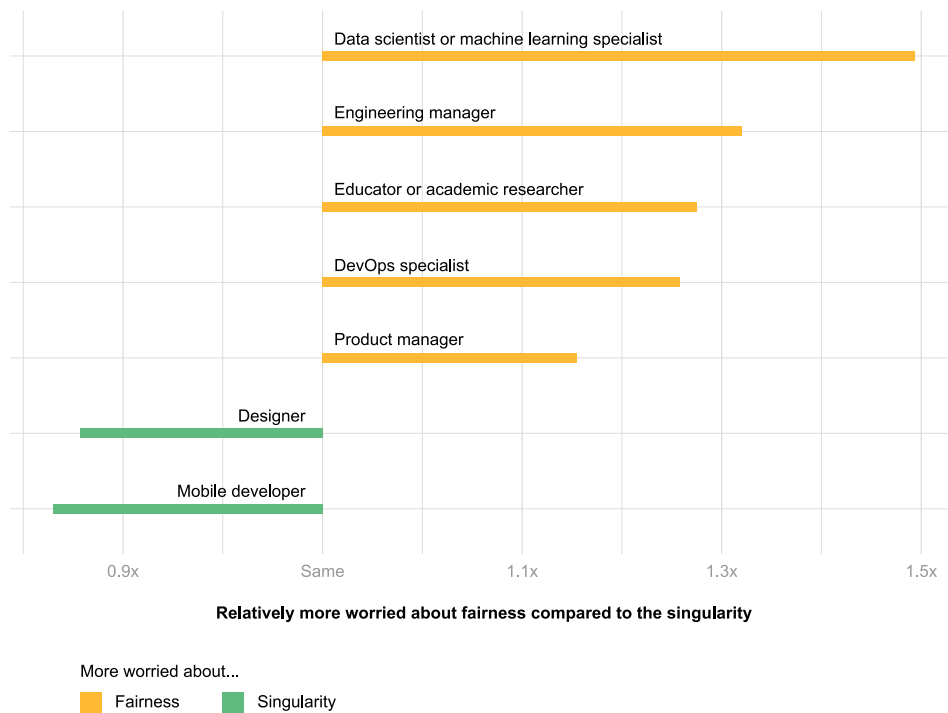
How Do Developers Feel About the Future of AI?

I'm excited about the possibilities more than worried about the dangers.   72.8%

I'm worried about the dangers more than I'm excited about the possibilities.   19.0%

I don't care about it, or I haven't thought about it.   8.2%

69,728 responses

Developers are mostly optimistic about the possibilities that artificial intelligence offers our world, with almost three-fourths of respondents saying that they are overall more excited than worried about the AI future.

AI Concerns by Developer Type

Data scientist or machine learning specialist

Engineering manager

Educator or academic researcher

DevOps specialist

Product manager

Designer

Mobile developer

| 0.9x | Same | 1.1x | 1.3x | 1.5x |

Relatively more worried about fairness compared to the singularity

More worried about...

Fairness   Singularity

The concerns that developers bring to issues around artificial intelligence depend on the kind of coding work they do. For example, data scientists are 1.5 times more likely to consider issues around algorithmic fairness dangerous than any upcoming singularity when computers become more intelligent than people, the most of any kind of developer. We included a free response option on this question; there was not much serious worry about Skynet, but many developers discussed systemic bias being built into algorithmic decision making and the danger of AI being used without the ability to inspect and reason about decision pathways.

Work

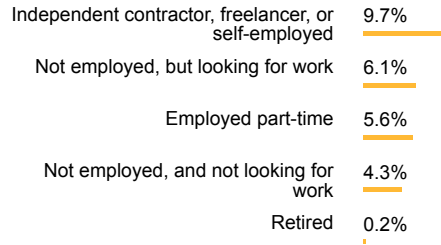## How developers get down to the business of software

Employment

Employment Status

| All Respondents | Professional Developers |

Employed full-time   74.0%

Independent contractor, freelancer, or self-employed   9.7%

Not employed, but looking for work   6.1%

Employed part-time   5.6%

Not employed, and not looking for work   4.3%
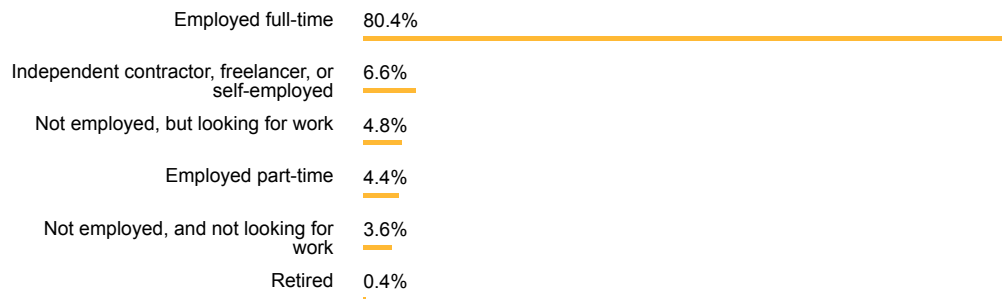
Retired   0.2%

95,321 responses

Over 90% of developers are employed at least part-time.

Employment Status by Geography

| United States | India | United Kingdom | Germany | Canada |

Employed full-time   80.4%

Independent contractor, freelancer, or self-employed   6.6%

Not employed, but looking for work   4.8%

Employed part-time   4.4%

Not employed, and not looking for work   3.6%
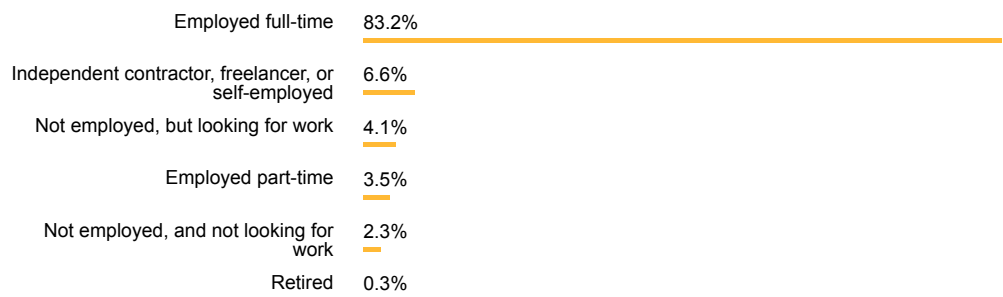
Retired   0.4%

19,948 responses

Germany has an unusually high proportion of developers working part-time. Developers in the United States are somewhat less likely to work as independent contractors or freelancers. In all of these locations, between 70% and 80% of developers are employed full-time.

Employment Status for Professional Developers by Geography

| United States | India | United Kingdom | Germany | Canada |

Employed full-time   83.2%

Independent contractor, freelancer, or self-employed   6.6%

Not employed, but looking for work   4.1%

Employed part-time   3.5%

Not employed, and not looking for work   2.3%

Retired   0.3%

18,435 responses

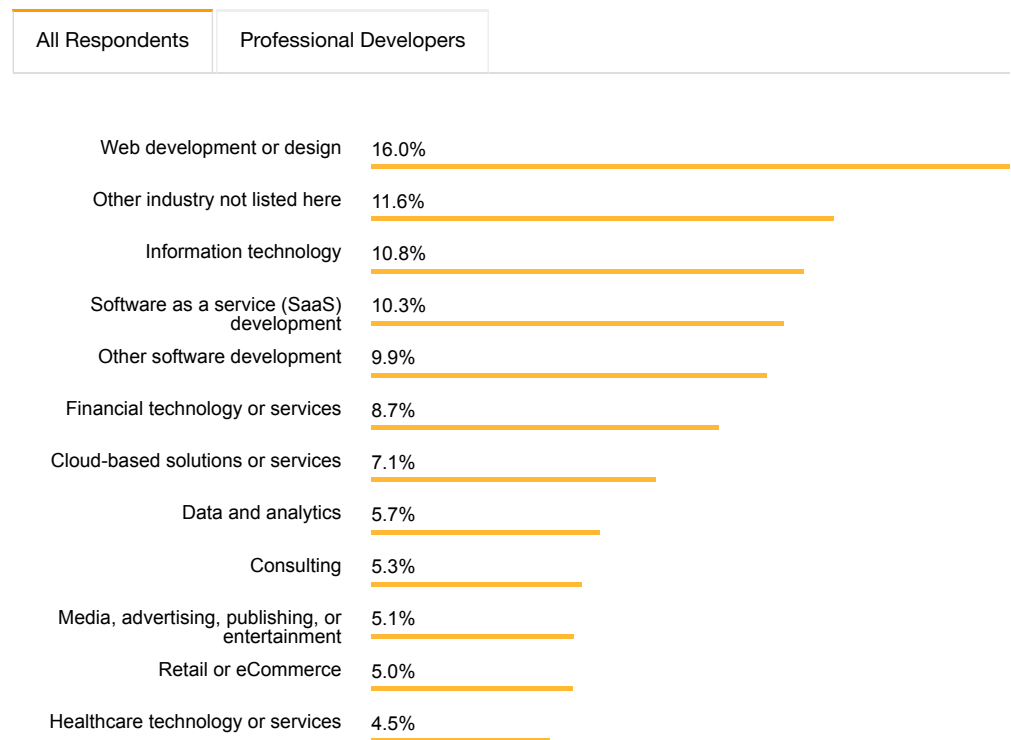Respondents who are professional developers are employed full-time at higher rates than respondents in general.

Looking for a new development job? Check out Stack Overflow Jobs (https://www.stackoverflow.com/jobs).

Company Type

Industry

All Respondents	Professional Developers

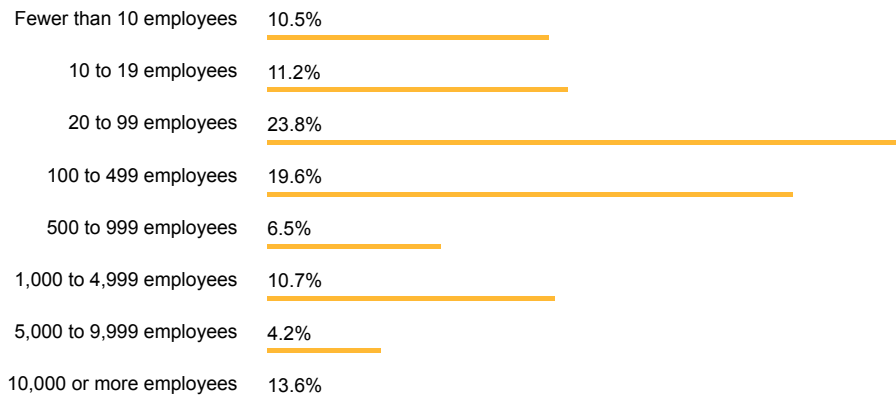|	
Web development or design	16.0%
Other industry not listed here	11.6%
Information technology	10.8%
Software as a service (SaaS) development	10.3%
Other software development	9.9%
Financial technology or services	8.7%
Cloud-based solutions or services	7.1%
Data and analytics	5.7%
Consulting	5.3%
Media, advertising, publishing, or entertainment	5.1%
Retail or eCommerce	5.0%
Healthcare technology or services	4.5%

82,114 responses

Software developers work in a diverse range of industries (so diverse that it's hard to ask about them all in one question!) both inside and outside the technology industry. Our answer choices focused on the tech industry this year, and of these choices, more professional developers work for companies doing web development, IT, and SaaS. Developers working in industries such as consulting and healthcare have more years of professional coding experience. Developers in these industries are twice as likely to have more than 20 years of experience than developers working in web development/design or eCommerce.

Company Size

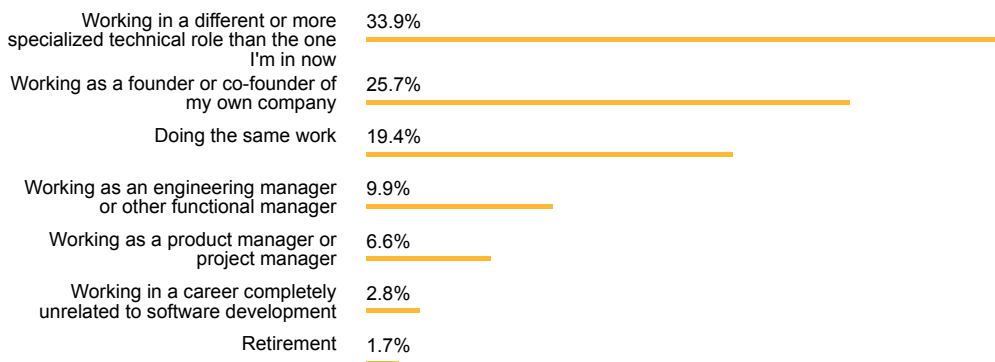|	
Fewer than 10 employees	10.5%
10 to 19 employees	11.2%
20 to 99 employees	23.8%
100 to 499 employees	19.6%
500 to 999 employees	6.5%
1,000 to 4,999 employees	10.7%
5,000 to 9,999 employees	4.2%
10,000 or more employees	13.6%

71,531 responses

Developers work in companies of all sizes, from quite small to large enterprise organizations. More software developers in the United States work at larger companies compared to the rest of the world. The more experienced a developer is, the more likely they are to work at one of the largest companies. A developer with 30 years of experience is twice as likely to work at a company with more than 5,000 employees than a developer with 2 years of experience.

Career Values

What Do Developers Hope To Be Doing in Five Years?

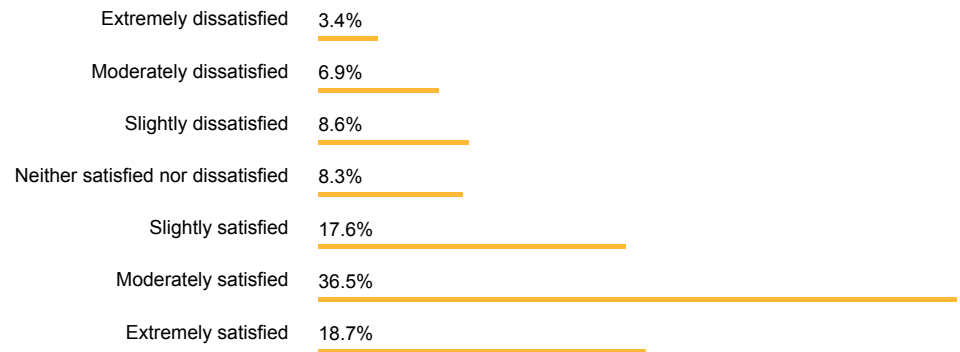|	
Working in a different or more specialized technical role than the one I'm in now	33.9%
Working as a founder or co-founder of my own company	25.7%
Doing the same work	19.4%
Working as an engineering manager or other functional manager	9.9%
Working as a product manager or project manager	6.6%
Working in a career completely unrelated to software development	2.8%
Retirement	1.7%

75,718 responses

Developers' career goals are largely focused on technical work, with just over half of respondents saying they want to be in the same or a different technical role in the future. About a quarter of our respondents say they want to start their own company, but this is most common among developers who are younger than 25 years old.

How Do Developers Feel About Their Careers and Jobs?

Career Satisfaction	Job Satisfaction

Extremely dissatisfied	3.4%
Moderately dissatisfied	6.9%
Slightly dissatisfied	8.6%
Neither satisfied nor dissatisfied	8.3%
Slightly satisfied	17.6%
Moderately satisfied	36.5%
Extremely satisfied	18.7%

76,504 responses

Developers tend to be more satisfied with their career than with their current job. Overall, career satisfaction does not vary significantly by industry. However, current job satisfaction is significantly lower for developers working in financial services and IT. Career satisfaction is highest for older developers, with ages of 50 or higher, and those with 20, 30, or more years of professional experience. Job satisfaction, by contrast, is highest for developers between 35 and 44 years old.
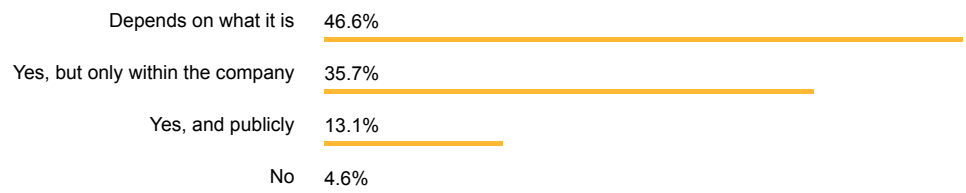
⚖ Ethics

What Would Developers Do If Asked to Write Code for an Unethical Purpose?

No	58.5%
Depends on what it is	36.6%
Yes	4.8%

70,782 responses

When posed with a hypothetical situation where they are asked to write code for a product or purpose that they consider clearly unethical, over half of our respondents say that they would not write such code. Ethical situations can be complicated, and about another third say that it would depend on the situation.
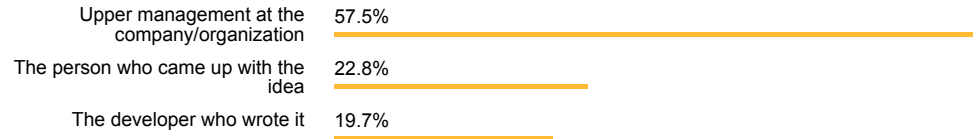
How Would Developers Report Ethical Problems with Code?

Depends on what it is	46.6%
Yes, but only within the company	35.7%
Yes, and publicly	13.1%
No	4.6%

70,426 responses

The question of what to do *next* after an ethical problem has arisen is even more tricky, according to our respondents. The most common answer, from almost half of respondents, is that how to report an ethical problem depends on the particulars of any given situation.

Who Is Ultimately Most Responsible for Code That Accomplishes Something Unethical?

Upper management at the company/organization	57.5%
The person who came up with the idea	22.8%
The developer who wrote it	19.7%

64,540 responses

Most developers feel that management is ultimately most accountable for unethical results of code. Just under 20% of respondents said that a developer who writes code used for unethical purposes is most responsible.

Do Developers Have an Obligation to Consider the Ethical Implications of Their Code?

Yes	79.6%
Unsure / I don't know	14.3%
No	6.1%

69,309 responses

Almost 80% of respondents affirm that considering what their code can be used for is the right thing for developers to do. Those who said they were unsure about this were 40% more likely to also say that they do *not* need to report any ethical problems.

We included a free response opportunity after this question, and we saw thoughtful reflections from developers. These include responses about how the tools developers build are powerful and come with a lot of responsibility, situations where unethical outcomes may accidentally arise, and how large teams are involved in building software but developers can be the last line of defense against unethical code.
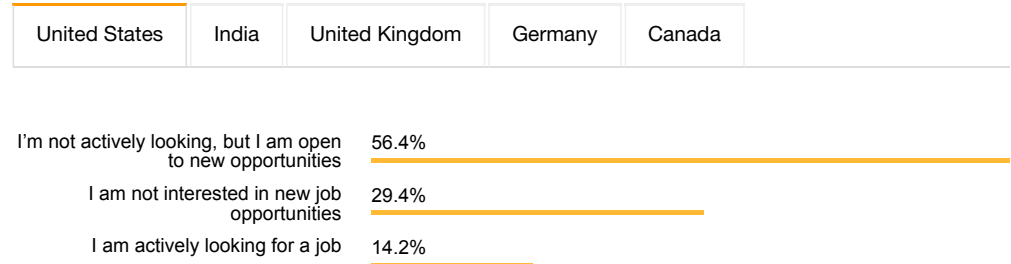
📢 Looking for a Job

Job Search Status

I'm not actively looking, but I am open to new opportunities	59.8%
I am not interested in new job opportunities	24.3%
I am actively looking for a job	15.9%

79,488 responses

Only 16% of respondents are actively looking for a job, but about three-fourths of developers are interested in hearing about new job opportunities.
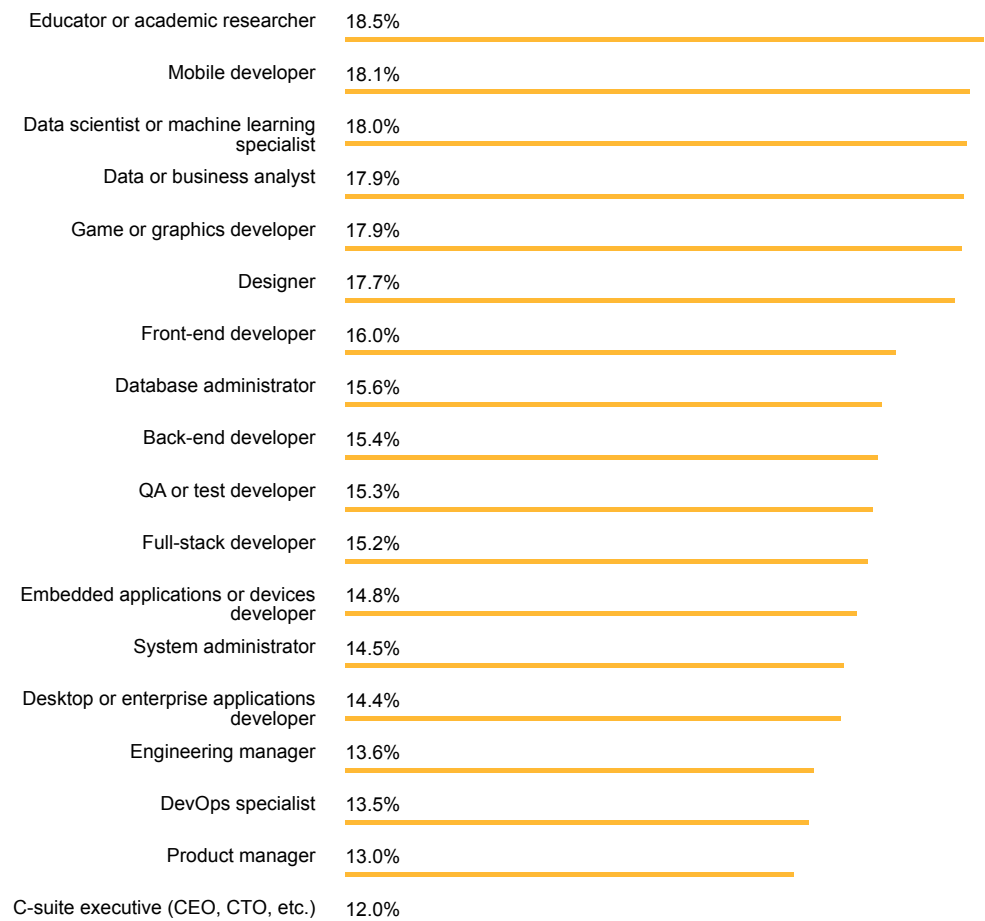
Job Search Status by Geography

| United States | India | United Kingdom | Germany | Canada |

I'm not actively looking, but I am open to new opportunities — 56.4%

I am not interested in new job opportunities — 29.4%

I am actively looking for a job — 14.2%

17,706 responses

Job seeking status is largely consistent across these regions.

Who's Actively Looking for a Job?

Educator or academic researcher — 18.5%

Mobile developer — 18.1%

Data scientist or machine learning specialist — 18.0%

Data or business analyst — 17.9%

Game or graphics developer — 17.9%

Designer — 17.7%

Front-end developer — 16.0%

Database administrator — 15.6%

Back-end developer — 15.4%

QA or test developer — 15.3%

Full-stack developer — 15.2%

Embedded applications or devices developer — 14.8%

System administrator — 14.5%

Desktop or enterprise applications developer — 14.4%

Engineering manager — 13.6%

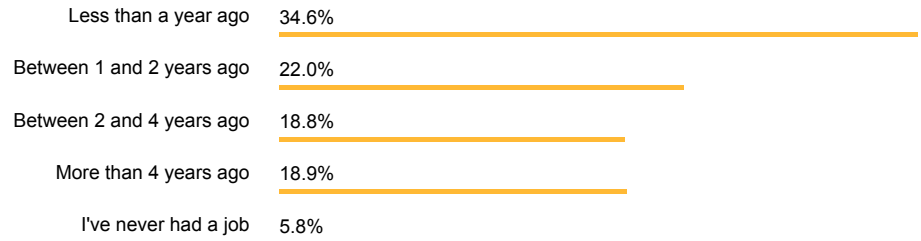DevOps specialist — 13.5%

Product manager — 13.0%

C-suite executive (CEO, CTO, etc.) — 12.0%

Mean of 76,354 responses

Among professional developers, those who work at the C-level and as engineering managers or product managers are looking for work the least. Developers working in academia and data scientists (categories that we know often overlap) are looking for work at higher proportions.
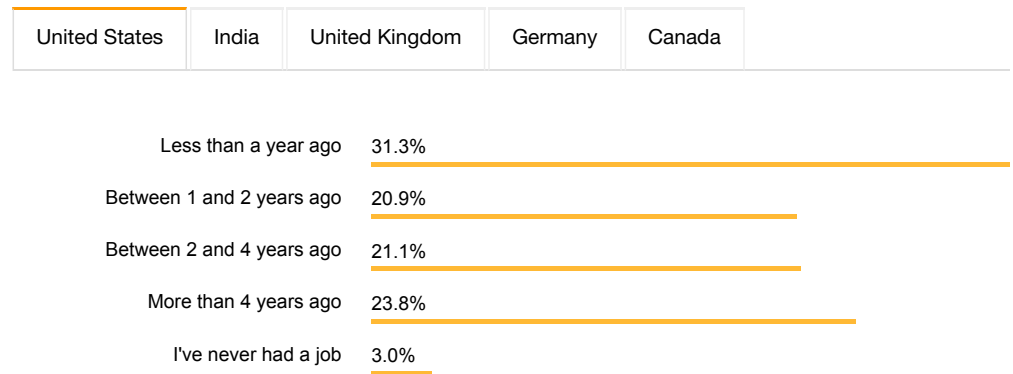
How Long Ago Did Developers Last Change Jobs?

Less than a year ago	34.6%
Between 1 and 2 years ago	22.0%
Between 2 and 4 years ago	18.8%
More than 4 years ago	18.9%
I've never had a job	5.8%

78,889 responses

About half of the respondents on our survey have taken a new job within the past two years; frequent job changes are the norm for software developers.
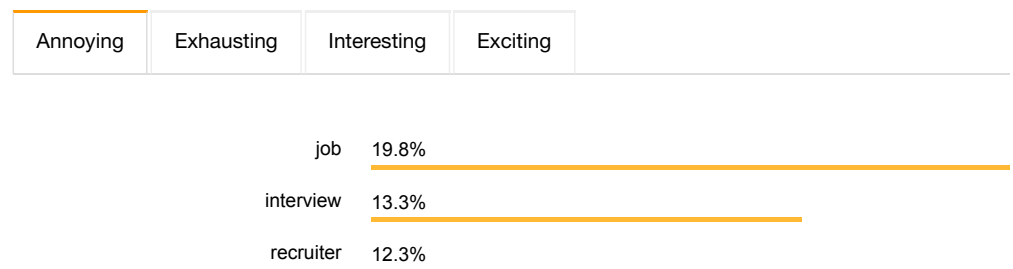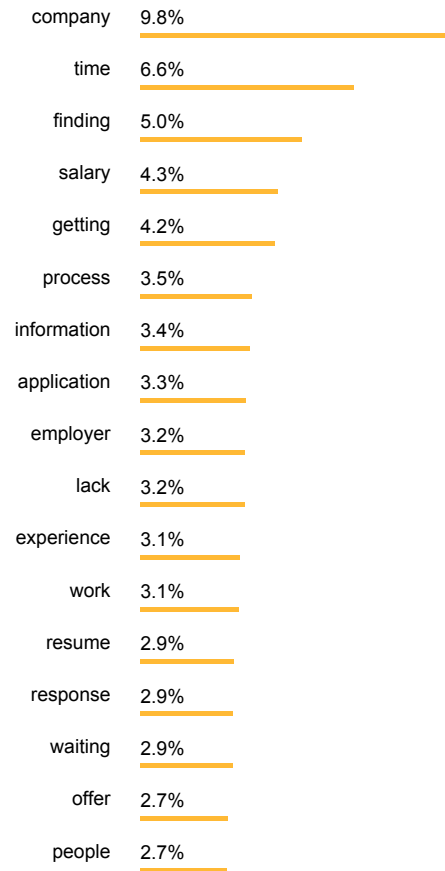
Job Change Timelines by Geography

United States	India	United Kingdom	Germany	Canada

Less than a year ago	31.3%
Between 1 and 2 years ago	20.9%
Between 2 and 4 years ago	21.1%
More than 4 years ago	23.8%
I've never had a job	3.0%

17,633 responses

Across the US, UK, Germany, and Canada, software developers change jobs at about the same rates.

What Words Do Developers Use to Describe Searching for a Job?

Annoying	Exhausting	Interesting	Exciting

job	19.8%
interview	13.3%
recruiter	12.3%

company   9.8%

time   6.6%

finding   5.0%

salary   4.3%

getting   4.2%

process   3.5%

information 3.4%

application 3.3%

employer   3.2%

lack   3.2%

experience   3.1%

work   3.1%

resume   2.9%

response   2.9%

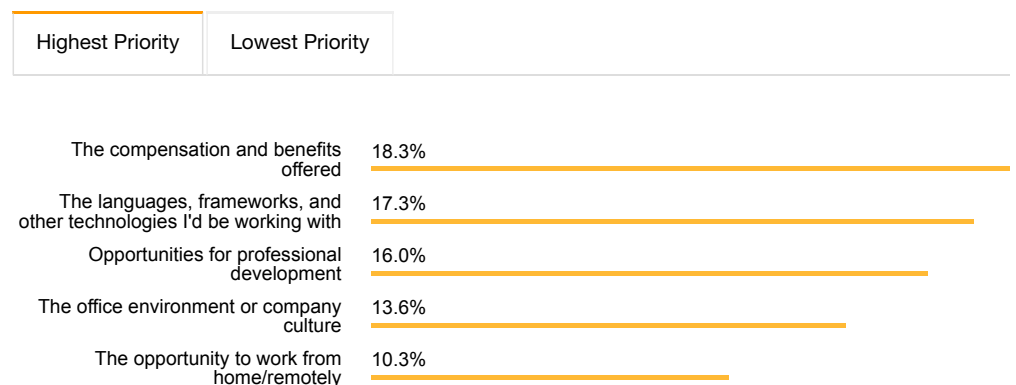waiting   2.9%

offer   2.7%

people   2.7%

25,022 responses; % of respondents who used each word

We asked developers on Stack Overflow what they find annoying, exhausting, interesting, and exciting about the process of searching for a new job in separate free response questions. Respondents said the positive aspects of searching for a new job include the new opportunities, technologies, and people that a new position can offer. On the other hand, they expressed frustration with broken processes around interviews and recruiting.

Job Priorities

How Do Developers Assess Potential Jobs?

Highest Priority	Lowest Priority

The compensation and benefits offered   18.3%

The languages, frameworks, and other technologies I'd be working with   17.3%

Opportunities for professional development   16.0%

The office environment or company culture   13.6%

The opportunity to work from home/remotely   10.3%

The industry that I'd be working in — 7.4%

How widely used or impactful the product or service I'd be working on is — 6.5%

The specific department or team I'd be working on — 5.5%

The financial performance or funding status of the company or organization — 3.4%
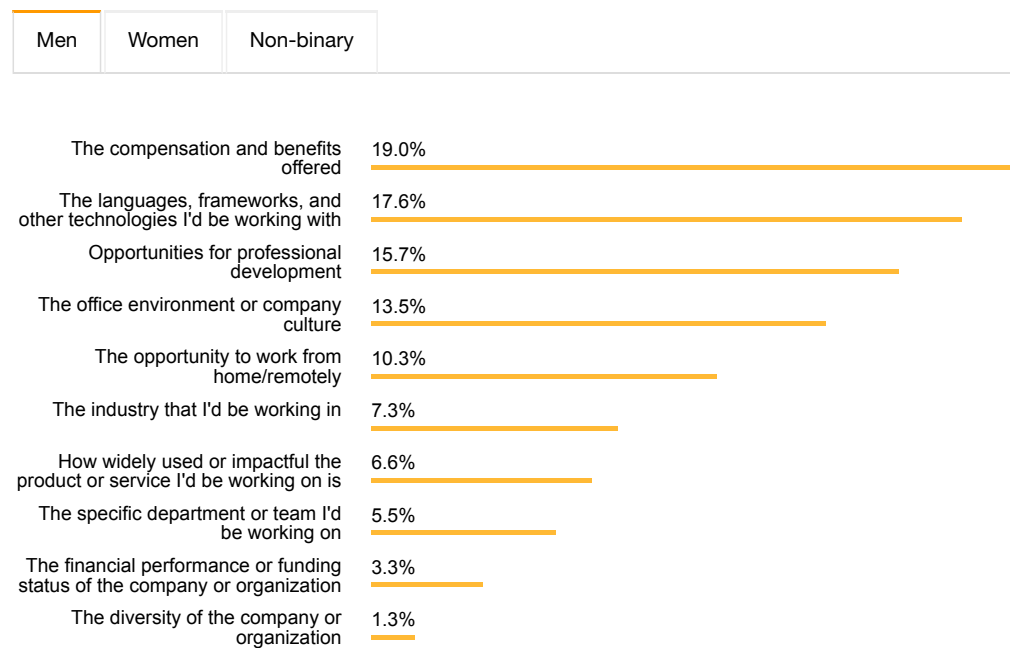
The diversity of the company or organization — 1.6%

66,985 responses; % of respondents who chose each option as their highest priority

In general, developers' top priority in assessing a job is compensation, followed by the specific technologies that they will work with. The tech industry is struggling overall with issues around diversity, and individual developers are not making it a priority when looking for a job.

Differences in Assessing Jobs by Gender

Men	Women	Non-binary

The compensation and benefits offered — 19.0%

The languages, frameworks, and other technologies I'd be working with — 17.6%

Opportunities for professional development — 15.7%

The office environment or company culture — 13.5%

The opportunity to work from home/remotely — 10.3%

The industry that I'd be working in — 7.3%

How widely used or impactful the product or service I'd be working on is — 6.6%

The specific department or team I'd be working on — 5.5%

The financial performance or funding status of the company or organization — 3.3%
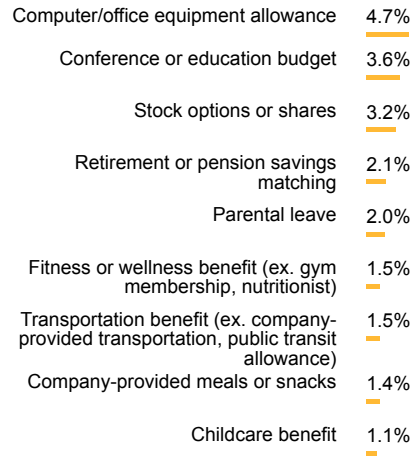
The diversity of the company or organization — 1.3%

54,536 responses; % of respondents who chose each option as their highest priority

Different types of developers apply different sets of priorities when considering jobs. Developers who belong to gender minorities in tech rank the company culture and office environment as their highest concern when assessing a new job. The gender identification question allowed respondents to select all that apply.

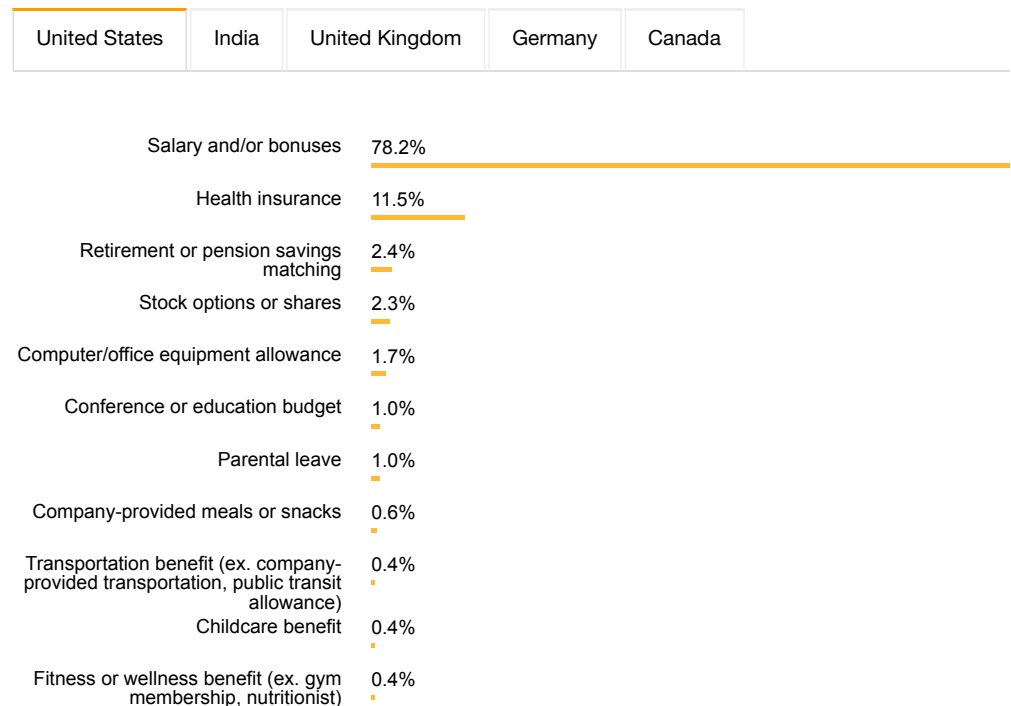## What Developers Value in Compensation and Benefits

Highest Priority	Lowest Priority

Salary and/or bonuses — 70.2%

Health insurance — 8.6%

Computer/office equipment allowance	4.7%
Conference or education budget	3.6%
Stock options or shares	3.2%
Retirement or pension savings matching	2.1%
Parental leave	2.0%
Fitness or wellness benefit (ex. gym membership, nutritionist)	1.5%
Transportation benefit (ex. company-provided transportation, public transit allowance)	1.5%
Company-provided meals or snacks	1.4%
Childcare benefit	1.1%

64,918 responses; % of respondents who chose each option as their highest priority

Overall, respondents on our survey prioritize salary highest, with all other considerations like computer equipment and conference budgets ranking much lower.

Valuing Compensation and Benefits by Geography

United States	India	United Kingdom	Germany	Canada

Salary and/or bonuses	78.2%
Health insurance	11.5%
Retirement or pension savings matching	2.4%
Stock options or shares	2.3%
Computer/office equipment allowance	1.7%
Conference or education budget	1.0%
Parental leave	1.0%
Company-provided meals or snacks	0.6%
Transportation benefit (ex. company-provided transportation, public transit allowance)	0.4%
Childcare benefit	0.4%
Fitness or wellness benefit (ex. gym membership, nutritionist)	0.4%

15,782 responses; % of respondents who chose each option as their highest priority

The specifics of how developers are compensated with salary and benefits work differently across the world, so developer responses vary by geography. Health insurance is prioritized in countries without a national healthcare system (like the United States), and computer equipment allowances are unusually important to developers in India and the UK.
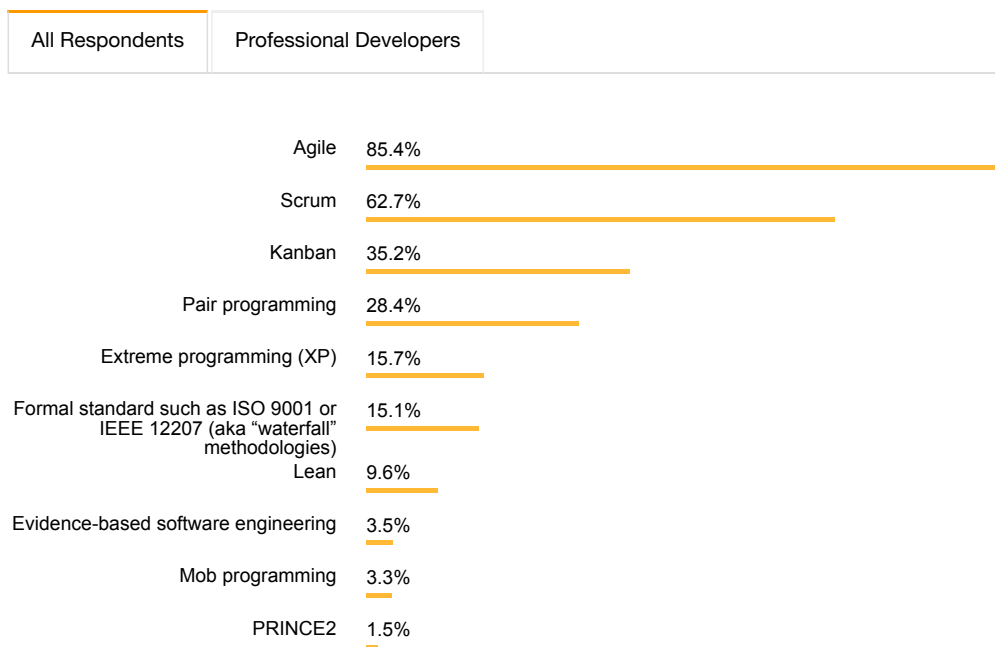
⌨ Development Practices

What Do Developers Use to Stay Comfortable While Working?

Ergonomic keyboard or mouse	52.2%
Standing desk	50.4%
Wrist/hand supports or braces	22.4%
Fatigue-relieving floor mat	12.4%
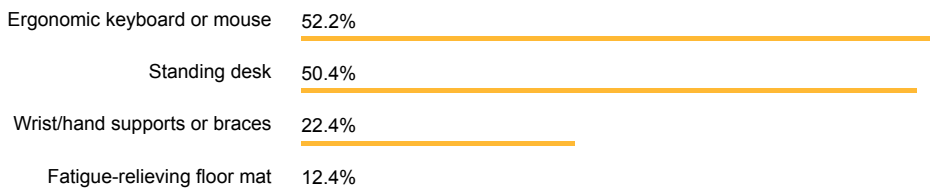
34,058 responses; select all that apply

Standing desks are not confined to trendy Silicon Valley offices; over half of our respondents say they use one, almost the same proportion who use a device like an ergonomic keyboard or mouse.

Which Methodologies Do Developers Use?

All Respondents	Professional Developers

Agile	85.4%
Scrum	62.7%
Kanban	35.2%
Pair programming	28.4%
Extreme programming (XP)	15.7%
Formal standard such as ISO 9001 or IEEE 12207 (aka "waterfall" methodologies)	15.1%
Lean	9.6%
Evidence-based software engineering	3.5%
Mob programming	3.3%
PRINCE2	1.5%

58,981 responses; select all that apply

Agile and Scrum are popular methodologies for developers to keep their projects on track.

How Long Do Developers Expect New Coworkers to Take to Be Productive?

Less than a month	30.0%

One to three months	44.7%
Three to six months	17.4%
Six to nine months	5.1%
Nine months to a year	1.7%
More than a year	1.2%

51,872 responses

We asked our respondents to imagine they had a new coworker with four years of relevant experience joining their team, and then to estimate how long that person would take to become fully productive and contribute at a typical level. About three-fourths of developers thought that the hypothetical new coworker would be fully up to speed within three months or less.

Version Control

All Respondents	Professional Developers

Git	87.2%
Subversion	16.1%
Team Foundation Version Control	10.9%
Zip file back-ups	7.9%
Copying and pasting files to network shares	7.9%
I don't use version control	4.8%
Mercurial	3.6%
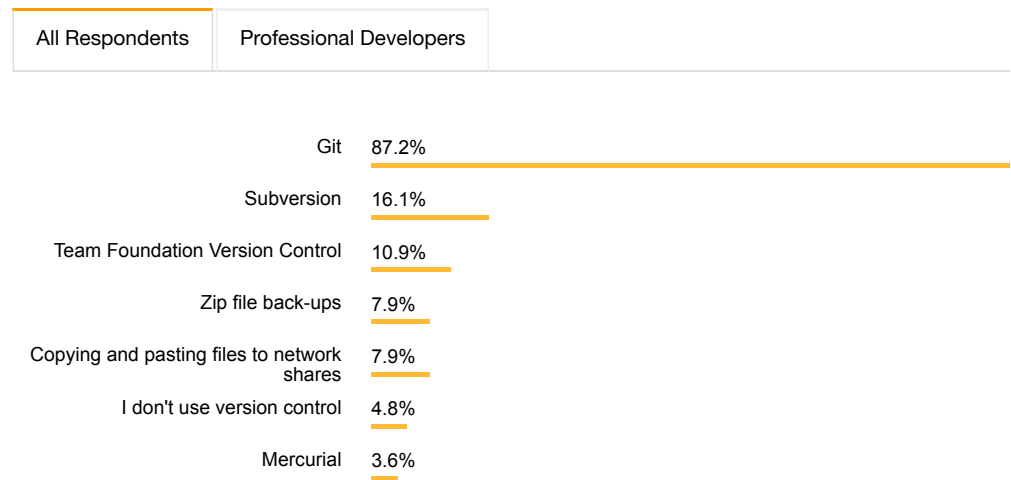
74,298 responses; select all that apply

Git is the dominant choice for version control for developers today, with almost 90% of developers checking in their code via Git.

How Often Do Developers Check In Code?

All Respondents	Professional Developers

Multiple times per day	60.2%
A few times per week	19.1%
Once a day	9.1%
Weekly or a few times per month	6.9%
Less than once per month	3.2%
Never	1.5%
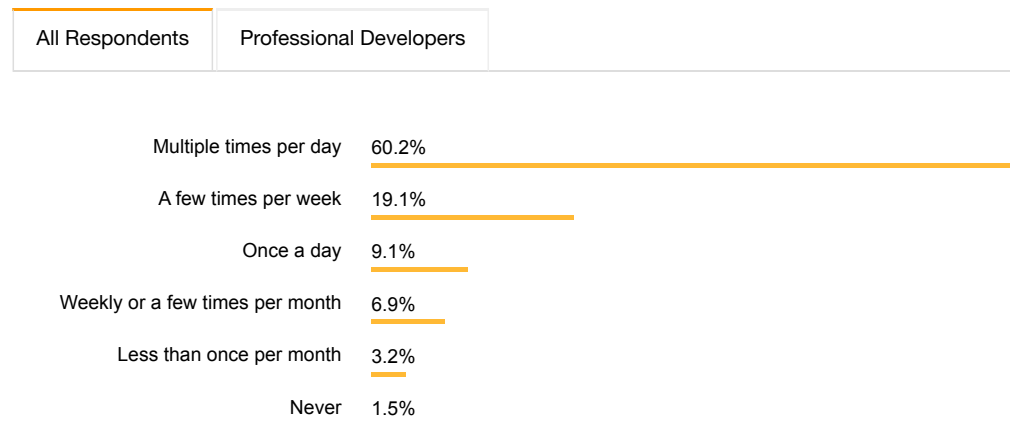
72,355 responses

The majority of developers check in code multiple times per day. Professional developers are less likely to check in code rarely or never.

How are Job Satisfaction and Committing Code Related?

Multiple times per day	5.14
Once a day	4.98
A few times per week	4.94
Never	4.82
Weekly or a few times per month	4.79
Less than once per month	4.73
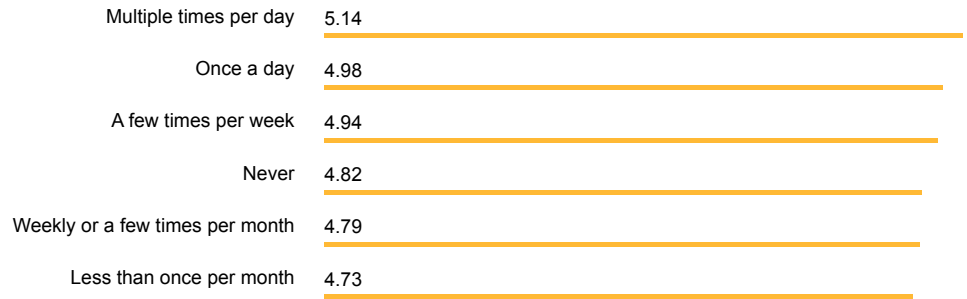
Mean of 59,260 responses; satisfaction on a 1-7 scale, from extremely dissatisfied to extremely satisfied

Developers who check in code the most often also have higher job satisfaction.

💳 Salary

Salary by Developer Type

Global	United States

Engineering manager	$89,000
DevOps specialist	$72,000
Data scientist or machine learning specialist	$60,000
Data or business analyst	$59,000
Embedded applications or devices developer	$59,000
Full-stack developer	$59,000
Desktop or enterprise applications developer	$57,000
Back-end developer	$56,000
System administrator	$56,000
QA or test developer	$55,000
Database administrator	$51,000
Front-end developer	$51,000

Designer	$46,000
Educator or academic researcher	$44,000
Mobile developer	$43,000
Game or graphics developer	$40,000

Median of 57,183 responses; USD

Engineering managers, DevOps specialists, and data scientists command the highest salaries. See our Methodology (https://insights.stackoverflow.com/survey/2018#methodology) section for information on how we converted local currencies used by respondents to U.S. dollars.

Average top earners vary by geography. In India, for example, data scientists are among the top earners, while in European countries, back-end developers and developers working with embedded devices are among the top earners.

Salary and Experience by Developer Type
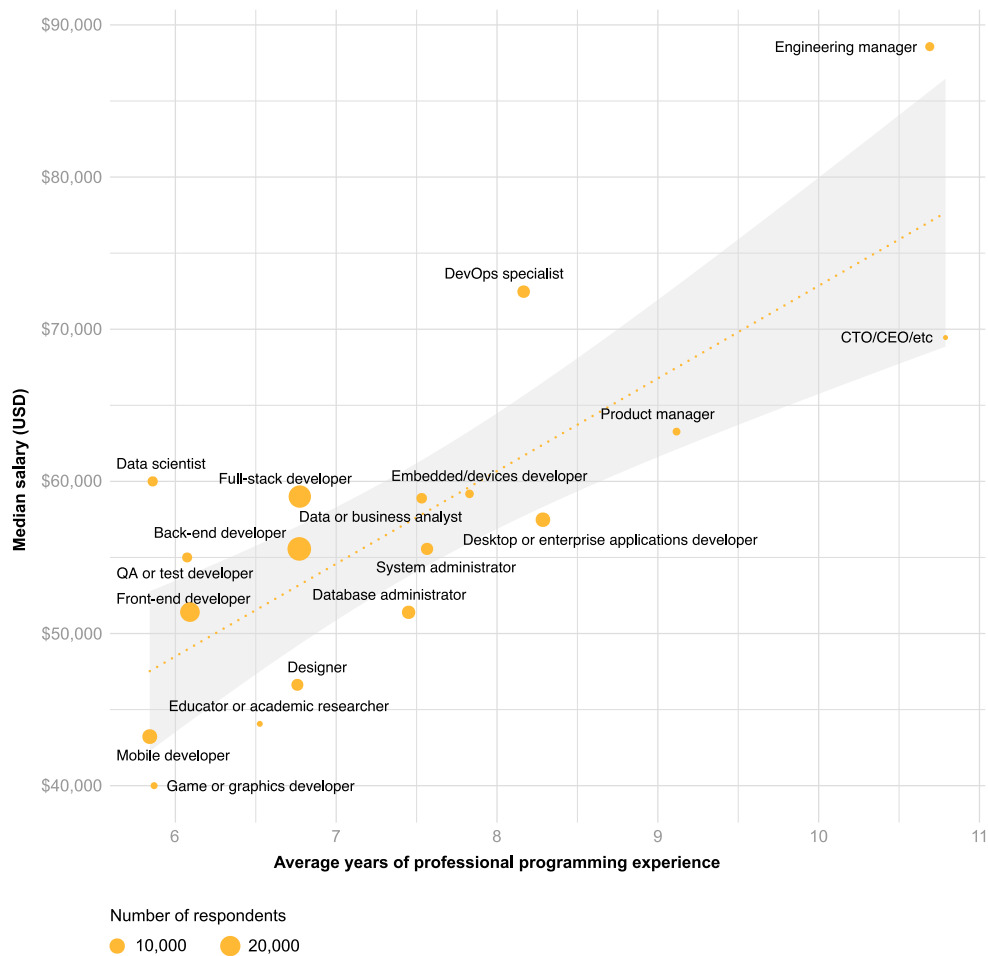
Naturally, developers with more years of experience are paid more. However, we also see that some type of coding work is paid more highly at the same level of experience. Data scientists and DevOps specialists are high earners for their level of experience.

Salary and Experience by Language
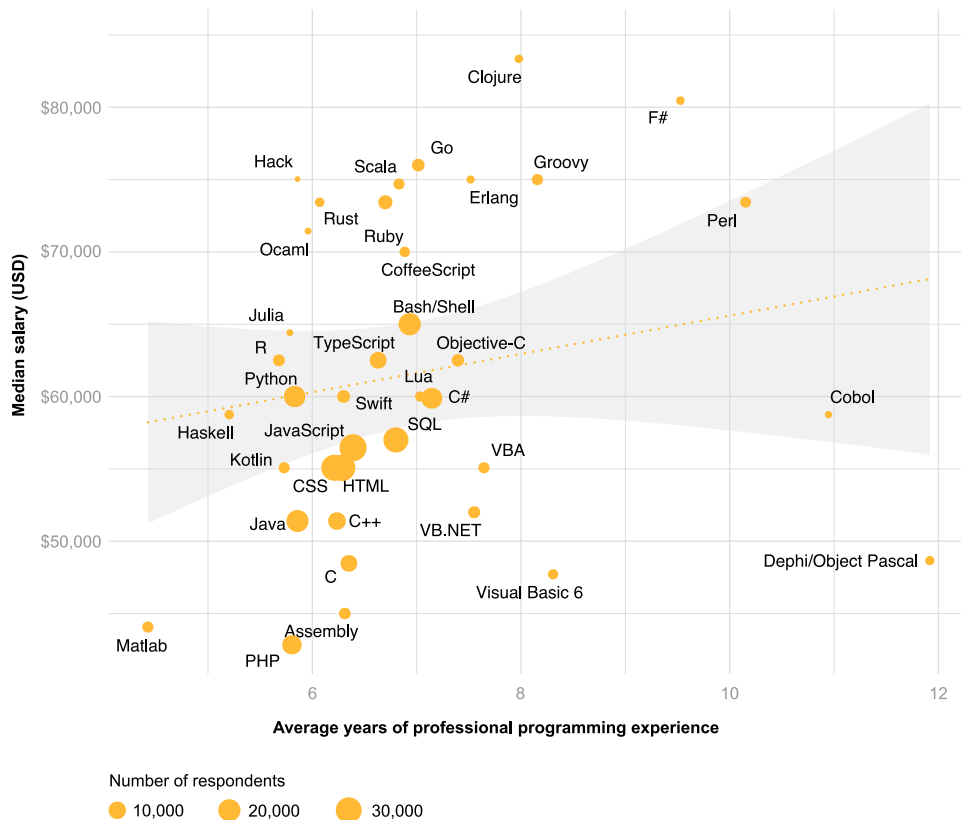
Developers using languages that appear above the line in this chart, such as Go, Clojure, and F#, are being paid more even given how much experience they have. Developers using languages below the line, like PHP and Visual Basic 6, however, are paid less even given years of experience. The size of the circles in this chart represents how many developers are using that language compared to the others.

Looking to hire developers? Learn how with Stack Overflow Talent (https://www.stackoverflowbusiness.com/talent).
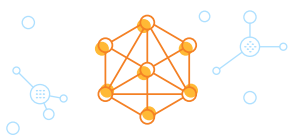
Community

Where developers come to learn, share knowledge, and build their careers

Site Use

Visiting Stack Overflow

I have never visited Stack Overflow (before today) 0.5%

Less than once per month or monthly 2.0%

A few times per month or weekly 11.5%

A few times per week 22.4%

Daily or almost daily 32.5%

Multiple times per day 31.1%
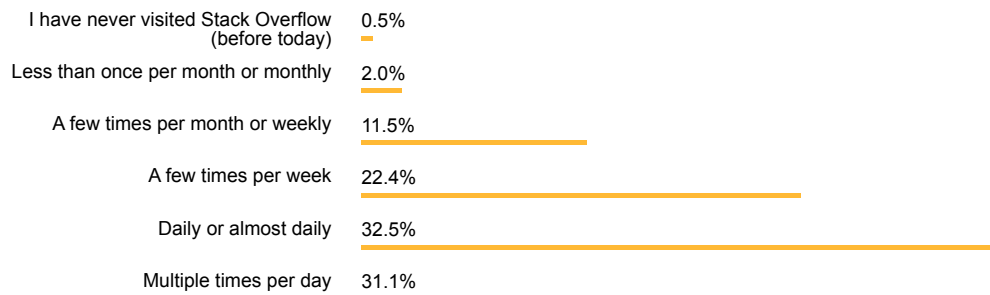
76,811 responses

Developers visit Stack Overflow. A lot. Over 85% of respondents visit Stack Overflow at least a few times per week, with over half visiting every day. Our respondents also feel very positively about Stack Overflow. We asked a traditional net promoter score (https://en.wikipedia.org/wiki/Net_Promoter) question for Stack Overflow as a whole and our NPS is 75, a world class score according to benchmarks.

How Many Participants Have a Stack Overflow Account?

Yes 87.4%

No 8.8%

I'm not sure / I can't remember 3.8%

76,791 responses

Almost 90% of the participants in our survey are registered users with accounts.

Sharing What You've Built in Your Developer Story

No, and I don't know what that is 36.6%

No, I know what it is but I don't have one 23.7%

No, I have one but it's out of date 23.0%

Yes 16.7%
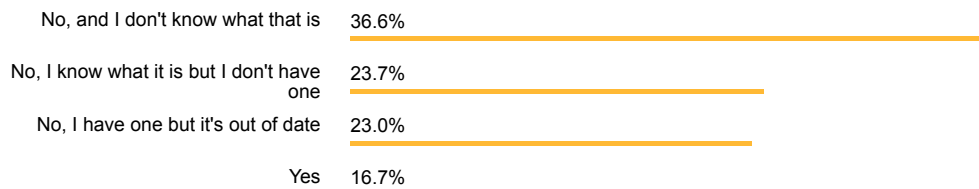
65,677 responses

Almost 40% of respondents have a Developer Story here on Stack Overflow. You can create your own Developer Story (https://stackoverflow.com/users/story/join?utm_source=so-owned&utm_medium=site&utm_campaign=dev-survey-2018-promotion) to show off what you've built.

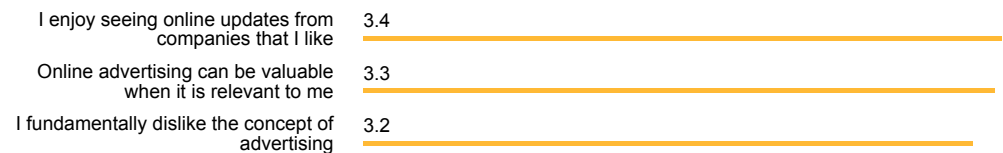### How Often Do Developers Participate on Stack Overflow?

I have never participated in Q&A on Stack Overflow	17.3%
Less than once per month or monthly	39.2%
A few times per month or weekly	22.6%
A few times per week	11.7%
Daily or almost daily	5.9%
Multiple times per day	3.2%
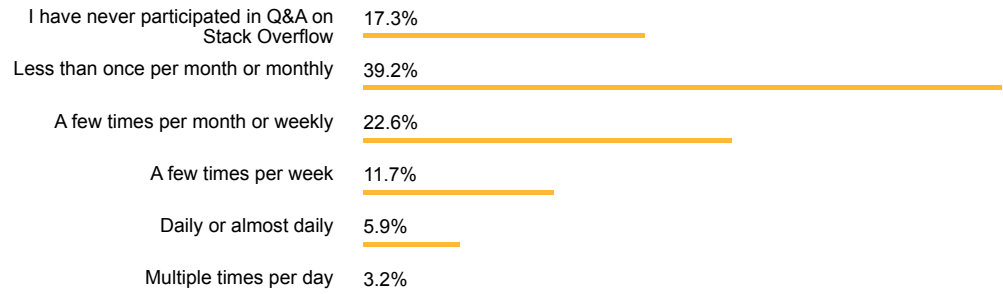
65,740 responses

Some developers come to Stack Overflow only to find answers to their questions, while others participate in the community by asking, answering, voting for, or commenting on questions. Over 40% of survey respondents participate on Stack Overflow a few times per month or more often.

Developer Opinions on Ads

How Do Developers Feel About Ads?

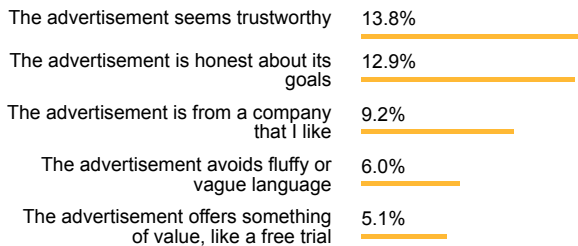|	
I enjoy seeing online updates from companies that I like	3.4
Online advertising can be valuable when it is relevant to me	3.3
I fundamentally dislike the concept of advertising	3.2

74,710 responses; agreement on a 1-5 scale, from strongly disagree to strongly agree

Like many websites, Stack Overflow has ads, and we want to know how to make our ads more relevant for our users. Over half of our respondents agreed or strongly agreed that they enjoy seeing online updates from companies they like and that online advertising can be valuable when it is relevant. About 40% of developers say they fundamentally dislike the concept of advertising.

Ad Priorities for Developers

Highest Priority	Lowest Priority

The advertisement is relevant to me	38.8%
The advertisement provides useful information	14.1%

The advertisement seems trustworthy | 13.8%

The advertisement is honest about its goals | 12.9%

The advertisement is from a company that I like | 9.2%

The advertisement avoids fluffy or vague language | 6.0%

The advertisement offers something of value, like a free trial | 5.1%

60,479 responses; % of respondents who chose each option as their highest priority

In general, developers' top priority in assessing an advertisement is whether it's relevant to them, followed by whether it provides useful information and is trustworthy. Developers are not swayed by free offers in advertisements.

Looking to advertise to developers? Learn more with Stack Overflow Ads (https://www.stackoverflowbusiness.com/advertise).

Engaging Together

Do Developers Consider Themselves Part of the Stack Overflow Community?

| Overall | By Gender |

Yes | 55.5%

No | 22.4%

I'm not sure | 22.2%
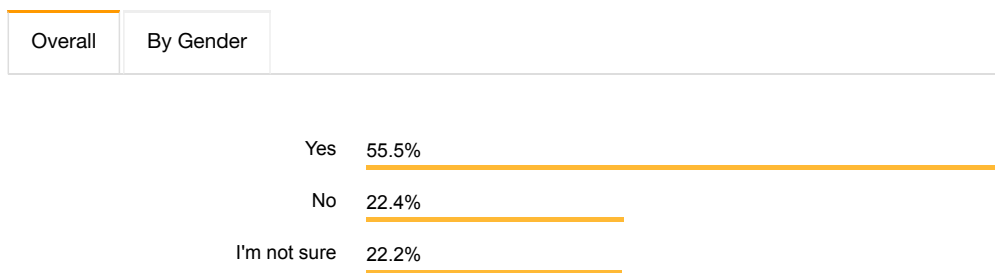
76,007 responses

Most of the respondents to our survey consider themselves part of our community, but this varies for different groups of people. For example, we find that respondents who identify as male see themselves as part of the community at higher rates than those with other gender identities. The tech community as a whole, and we at Stack Overflow in particular, still have work to do in this area.

Interest in Hypothetical New Tools on Stack Overflow

An employer or job review system | 3.2

An area for Q&A related to career growth | 3.2

A programming-oriented blog platform | 3.0

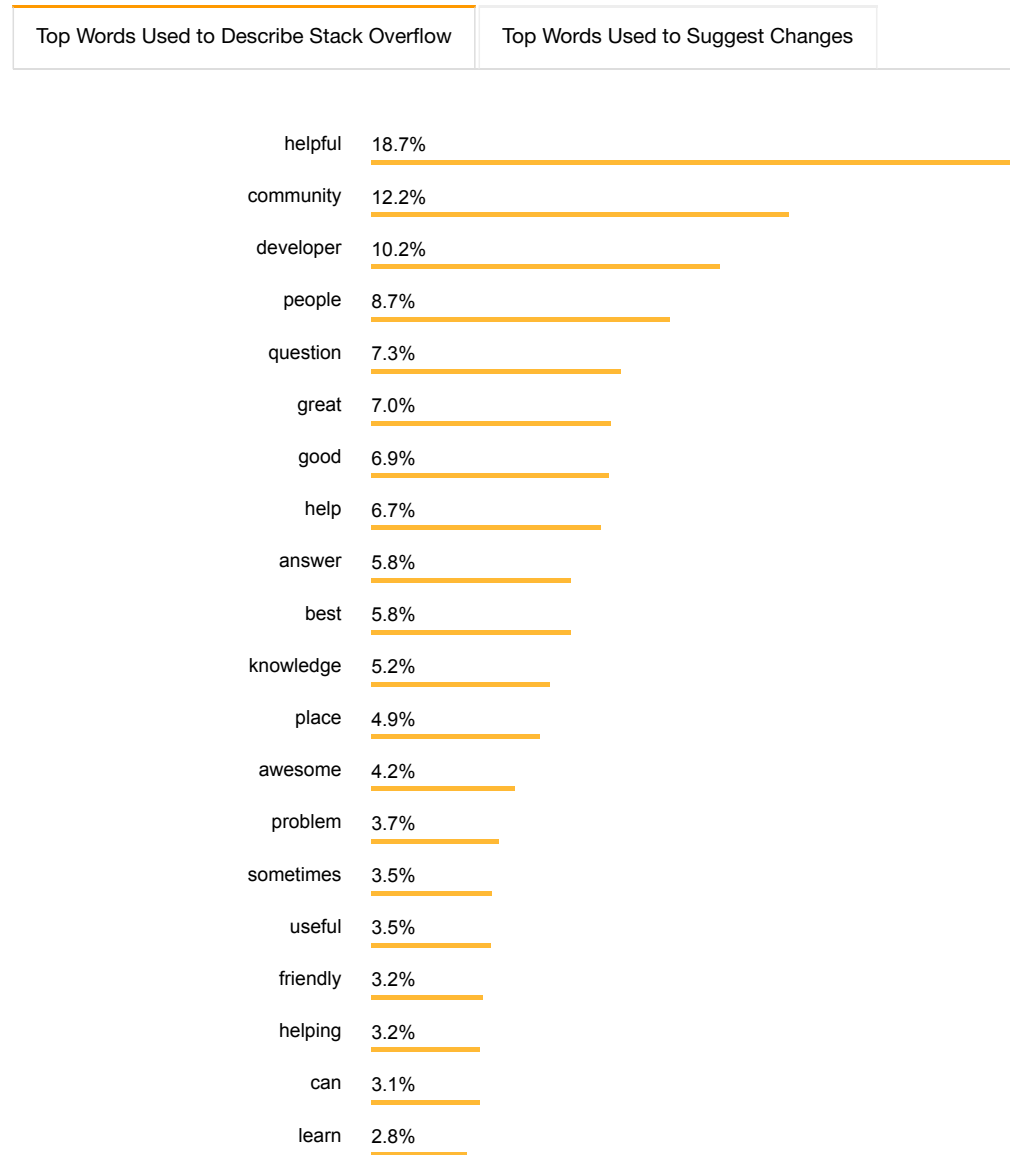| A peer mentoring system | 2.8 |
| A private area for people new to programming | 2.6 |

70,687 responses; interest on a 1-5 scale, from not at all interested to extremely interested

As we work to make our community a better place for developers to learn, share, and grow their careers, we asked our survey respondents about their interest in possible new tools. An employer review system and help with career growth garnered the most interest.

What Words Do Developers Use to Describe Stack Overflow?

| Top Words Used to Describe Stack Overflow | Top Words Used to Suggest Changes |

helpful	18.7%
community	12.2%
developer	10.2%
people	8.7%
question	7.3%
great	7.0%
good	6.9%
help	6.7%
answer	5.8%
best	5.8%
knowledge	5.2%
place	4.9%
awesome	4.2%
problem	3.7%
sometimes	3.5%
useful	3.5%
friendly	3.2%
helping	3.2%
can	3.1%
learn	2.8%

5,209 responses; % of respondents who used each word

In these free response questions, we asked developers first to describe the Stack Overflow community in general, and then what they would change about it. Developers were largely positive about Stack Overflow, focusing on the helpful nature of the community, and specifically had ideas about how

questions, answers, comments, and reputation are handled. The treatment of new users and new people in our community were mentioned often as well.

Developers' Perspectives About Our Community

Relative use in positive/negative responses
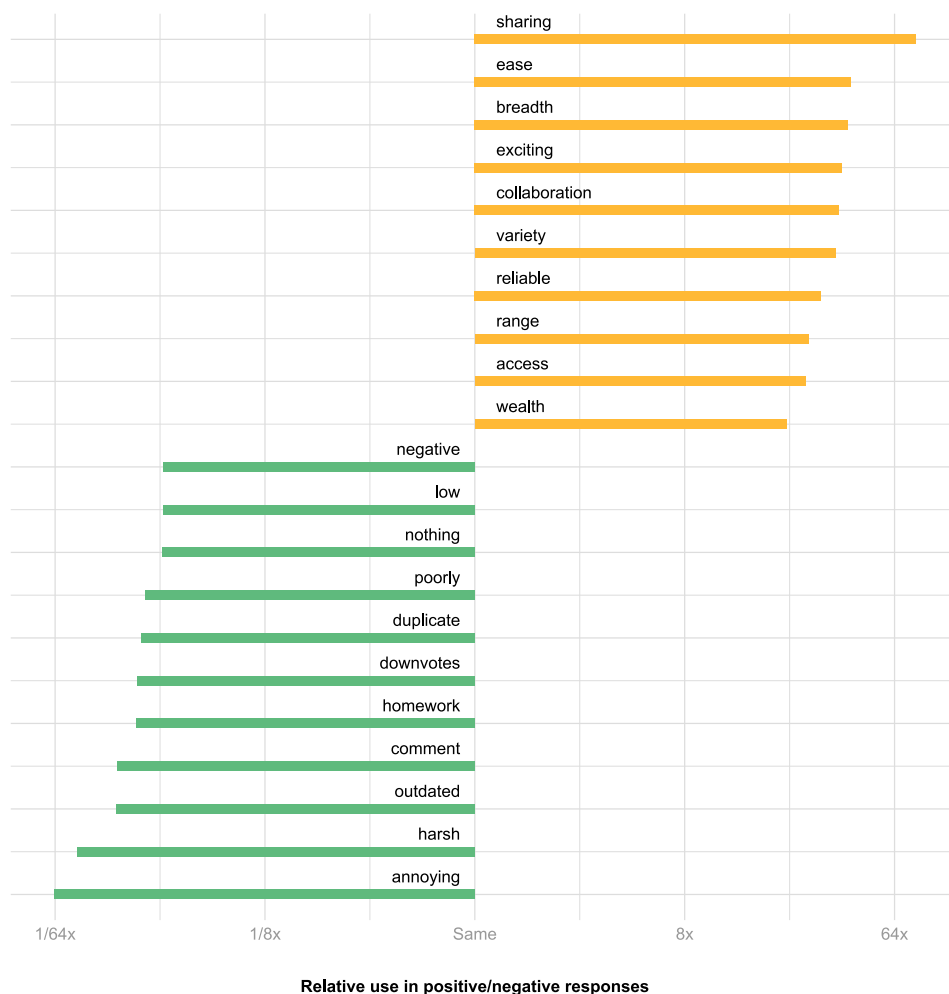
This year, our survey included questions about what developers think the best, worst, most annoying, and most exciting things about Stack Overflow are. (These questions were randomized so that each respondent got one positive and one negative version.) In the positive versions of these questions, respondents were more likely to talk about the wealth of sharing and collaboration on our site. In the negative versions, respondents reflected on harsh interactions they've witnessed, downvotes, and handling of duplicate questions.

Looking for a place for you and your technical team to ask and answer questions in a secure environment? Learn more about Stack Overflow for Teams (https://stackoverflow.com/teams). Want an on-premise or private cloud version? Check out Stack Overflow Enterprise (https://www.stackoverflowbusiness.com/enterprise).

Methodology

How we planned and analyzed our survey

This report is based on a survey of 101,592 software developers from 183 countries around the world. This number of responses are what we consider "qualified" for analytical purposes based on completion and time spent on the survey; another approximately 20,000 responses were started but not included in the analysis because respondents did not answer enough questions. Of the qualified responses, 67,441 (66.4%) completed the entire survey.

Qualified Responses Worldwide

Europe	39,001
North America	25,016
Asia	24,700
South America	4,162
Africa	2,869
Australia/Oceania	2,591
Other (country not listed)	84

- The survey was fielded from January 8 to January 28.
- The median time spent on the survey for qualified responses was 25.8 minutes, and the median time for those who finished the entire survey was 29.4 minutes.
- Respondents were recruited primarily through channels owned by Stack Overflow. The top 5 sources of respondents were banner ads, email lists, house ads, blog posts, and Twitter. Since respondents were recruited in this way, highly engaged users on Stack Overflow were more likely to notice the links for the survey and click to begin it. Respondents who finished the survey were awarded a "Census" badge as a motivation to complete the survey.
- We treated responses as qualified for analysis if the user spent a certain amount of time relative to how far they got into the survey. Most survey responses that spent less than 5 minutes were excluded from the final sample.
- We asked respondents about their salary. First, we asked what currency each respondent typically used. Then we asked that respondent what their salary was in that currency, and whether that salary was weekly, monthly, or yearly.
    - For a short time on the first day, there was a bug that left out the last part of the question (weekly vs. monthly vs. yearly); those salary responses are not included here.
    - We converted salaries from user currencies to USD using the exchange rate on 2018-01-18, and also converted to annual salaries assuming 12 working months and 50 working weeks.
    - This question, like most on the survey, was optional. There were 58,650 respondents (57.7% of qualified respondents) who gave us salary data.
    - The top approximately 1% of salaries inside and outside of the US were trimmed and replaced with threshold values. The threshold values for inside and outside the US were different.
- Many questions were only shown to respondents based on their previous answers. For example, questions about jobs and work were only shown to those who said they were working in a job.
- The questions were organized into several blocks of questions, which were randomized in order. Also, the answers to most questions were randomized in order.
- Due to an error, Oracle and SQLite were excluded from the question about databases for the first day of the survey. We carefully examined whether the results for the other databases changed from

the first day compared to the rest of the survey fielding period and they did not. The results shown here for database use and most loved/dreaded/wanted databases only use responses from after Oracle and SQLite were added to the possible answers.

- On 2018-3-19, we made some edits to this site based on community feedback to address two issues: a) how we handled the responses of transgender developers, to avoid implying that being a transgender man or woman is a separate gender and b) a higher level of clarity throughout the discussion about our survey sample and its limitations.

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