

Skills Up

2018

Developer Skills Report

The tools and trends that define how software developers work today.

Packt

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1.

Introduction

Only one thing is certain in the world of tech: change.

Working in development is about navigating a constantly evolving industry, keeping up to date with the skills you need to succeed.

The Packt Skill Up Developer Skills Report is dedicated to ensuring developers make the right learning choices. Based on an annual survey of thousands of professional developers, it aims to keep track of the trends and tools of the industry.

In particular, we wanted to know:

- » What were the most popular tools developers used every day
- » What did developers think was really worth spending time learning
- » How did developers feel about working in tech, and the wider tech community

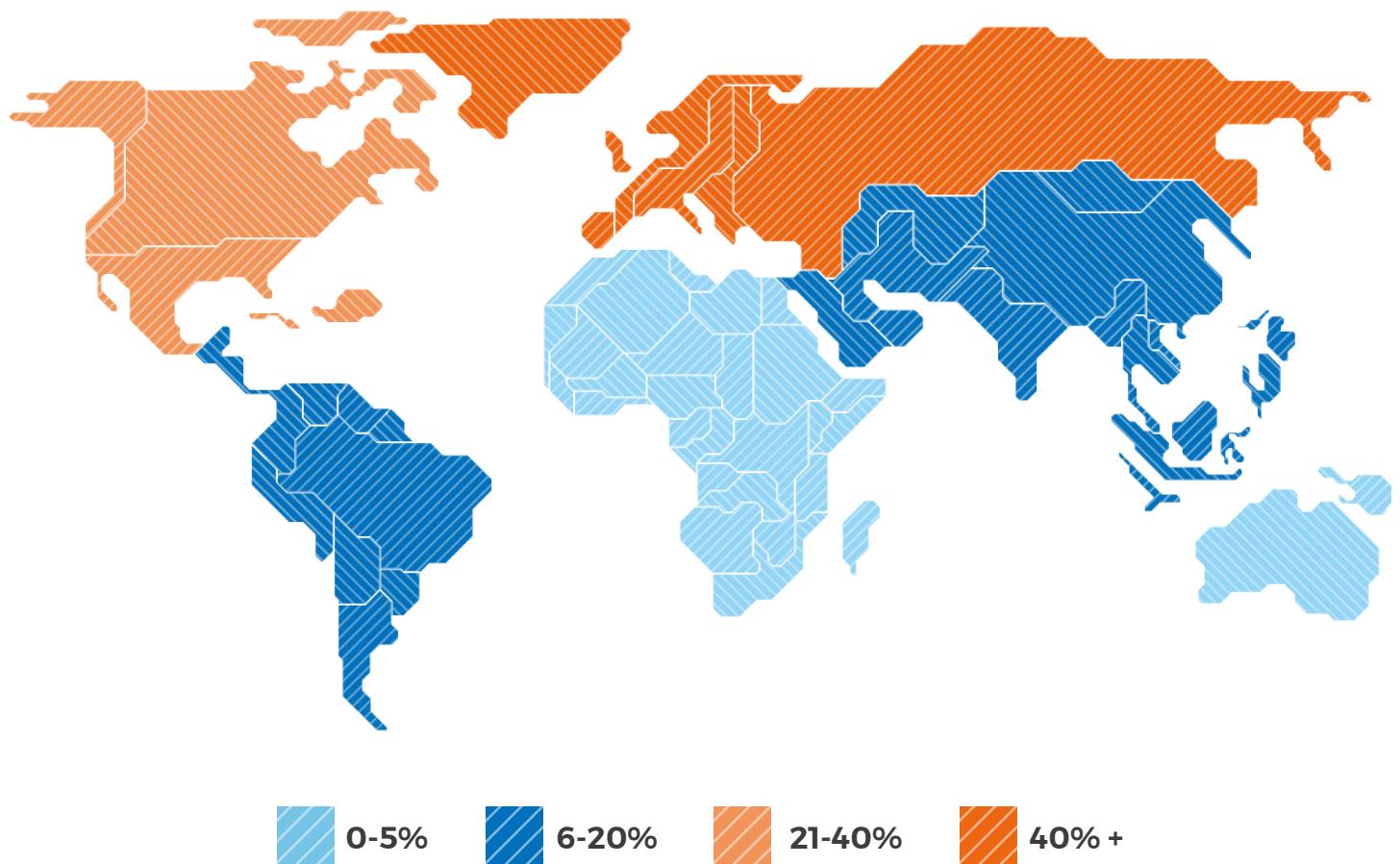
The Skill Up 2018 survey streamed developers into four broad disciplines: application development, web development, security and systems administration, and data. It captured a snapshot of each section of the industry in 2018 to discover the state of the modern tech community in your industry.

7.

Developer Demographics

Almost **8,000** developers responded to the Skill Up Survey 2018. Developers hailed from across the world, with a huge variety of job roles and industry experience.

The largest number of respondents lived in **Europe** (3,190), followed by **North America** (2,385) and **Asia** (1,086).



> Developer Job Roles

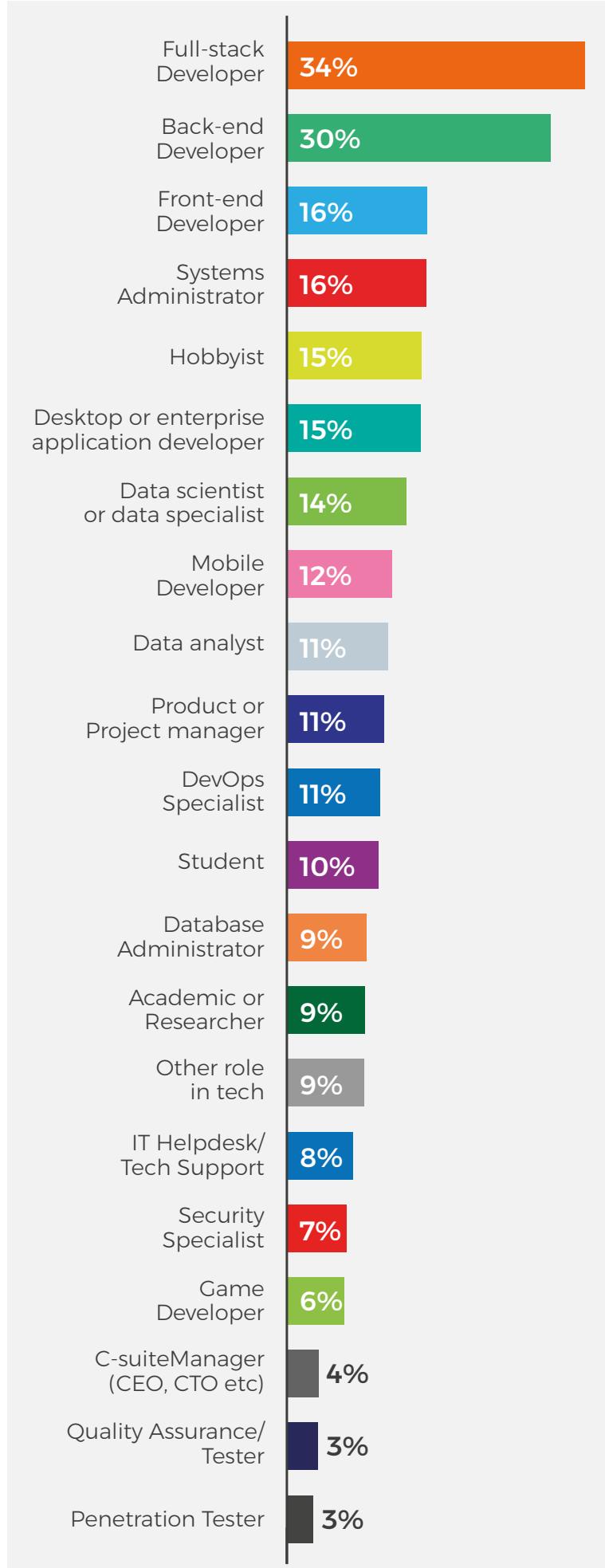
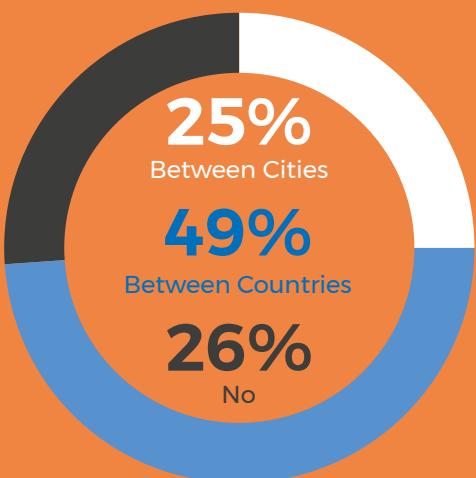
Respondents were most likely to identify as either **back-end developers** (29%) or **full-stack developers** (34%).

Those respondents were most likely to correlate with jobs in desktop or enterprise application development, or mobile development.

287 respondents were in C-Suite roles (CTO, CEO, COO). These company heads were mostly likely to also consider themselves full-stack developers, product- or project-managers, back-end developers, and/or systems admin.

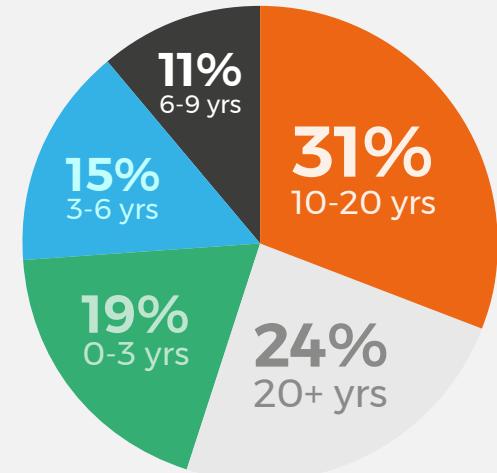
> Would you move for your dream job?

Over **49%** of developers said that they'd be willing to relocate **between countries** if it meant getting their dream job. Developers from Africa were most happy to emigrate (**67%**), and developers from North America were least likely to consider moving countries for work (**27%**).



> Industry Experience

Over half of respondents had **over 10 years experience** working with code, and 22% had **over twenty years professional experience**. Skill Up respondents are speaking with authority.



How many years have you been working with code professionally?



What is your salary in USD?

This held true even when just looking at respondents from wealthier continents (North America, Europe, and Australia), where 1,492 respondents earned **less than \$30,000** and 1,497 earned **more than \$90,000**.

This trend even continues into the kind of work developers are doing. Both top earners and low earners are most likely to have a job in full-stack or back-end development.

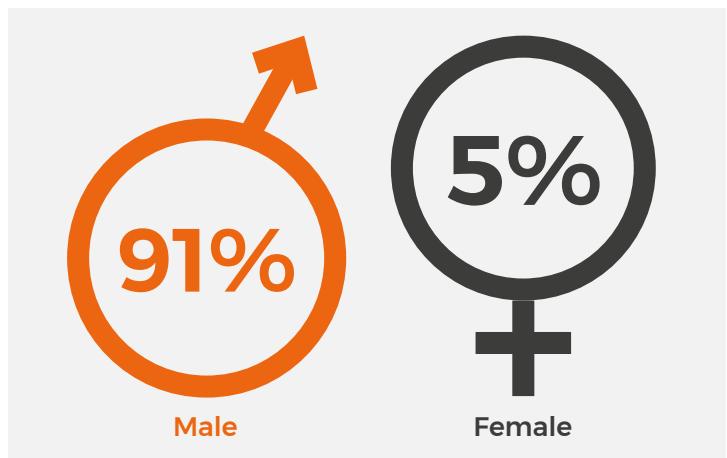
Job Roles of Top Earners (above \$90k)	Job Roles of Lowest Earners (below \$30k)
≡ Full-stack Developer	≡ Full-stack Developer
</> Back-end Developer	</> Back-end Developer
❑ Desktop/Enterprise Application Developer	✳ Front-end Developer
⤻ Data Scientist	🔌 Systems Administrator
👤 Product or Project Manager	📱 Mobile Developer

> Personal Characteristics

When asked their gender, overwhelmingly the respondents were male.

Only 5% of respondents identified as women or another gender identity.

Even in 2018, tech is still very much a man's world.

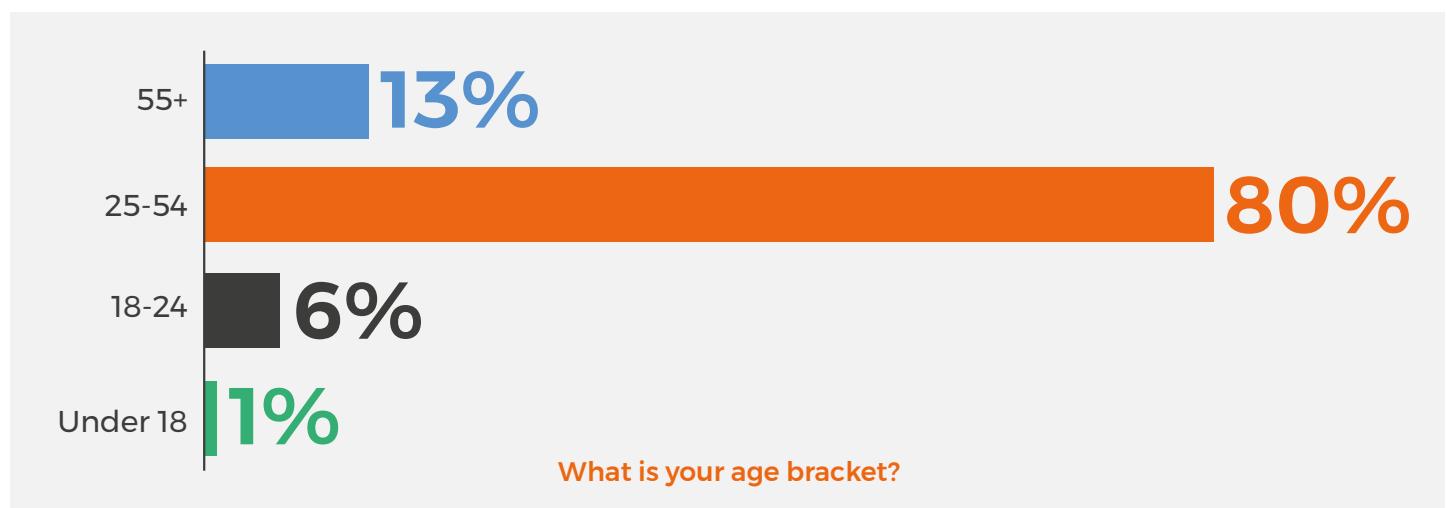


> Women in Tech

Respondents who identified as women were most likely to:

- » Be aged between **25-34**
- » Have worked with code for either **less than 3 years**, or between **10-20 years**
- » Be earning **under \$30,000**
- » Work in **web development**
- » Feel like their peers knew **more about programming than them**

Respondents were evenly split across the age brackets most associated with employment, with **80% between 25-54**.



2.

Work and Community

Is tech like any other job or industry - or is there a community built around the development experience? Are there common barriers developers face at work? Are developers unhappy code monkeys, or do they love their jobs?

> Community and Peers

72% of respondents said that they felt they were **part of a community** with other developers, and only 28% were sure **they did not**. The community spirit is strong in the tech sector.

54% of respondents said they felt their peers knew more about programming than them.

Surprisingly, it wasn't just the least experienced who felt this way. Developers with **10-20 years professional experience** were the most likely (25%) to think they knew less than their peers. New programmers with **less than 3 years experience** were close behind (23%). But even developers who'd been working in tech for over 20 years were more likely to be humble about their skills than the 6-9 year bracket! Is this the Dunning-Kruger effect in action?



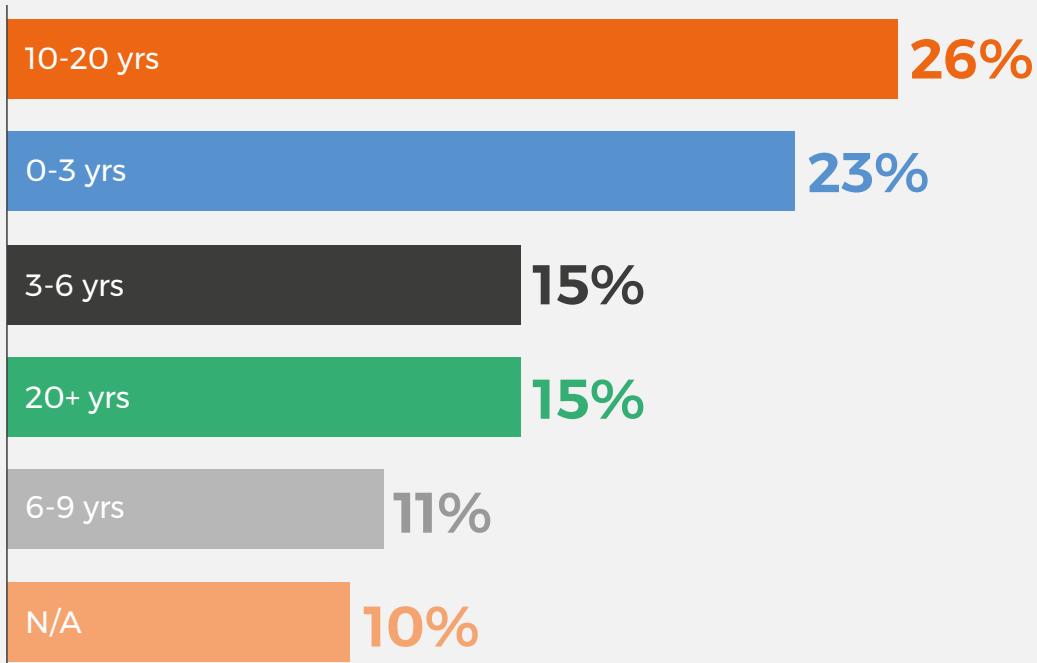
I feel I am part of a community with other developers



I feel like my peers know more about programming than me

> Professional experience of developers who think their peers know more than them

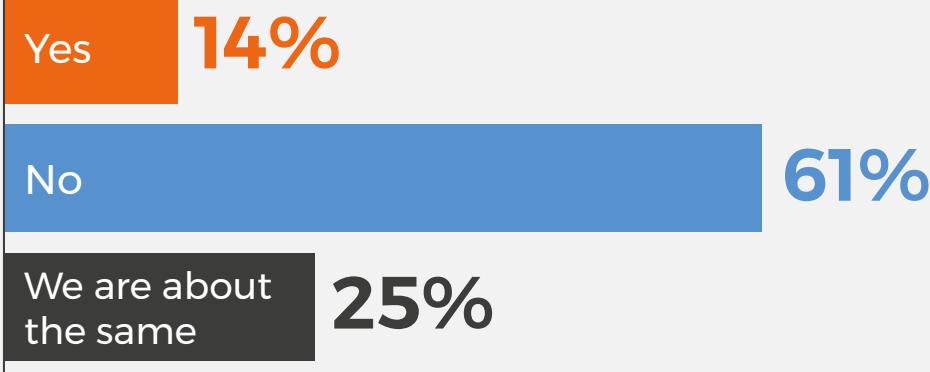
How many years have you been working with code professionally?



One thing is for sure though - **developers think they know more about technology than their manager.** Over half of respondents said they thought they were more knowledgeable, and 20% thought they had the same level of experience. Only those with less than six years experience were more likely to have a manager who they thought knew more about programming than them.



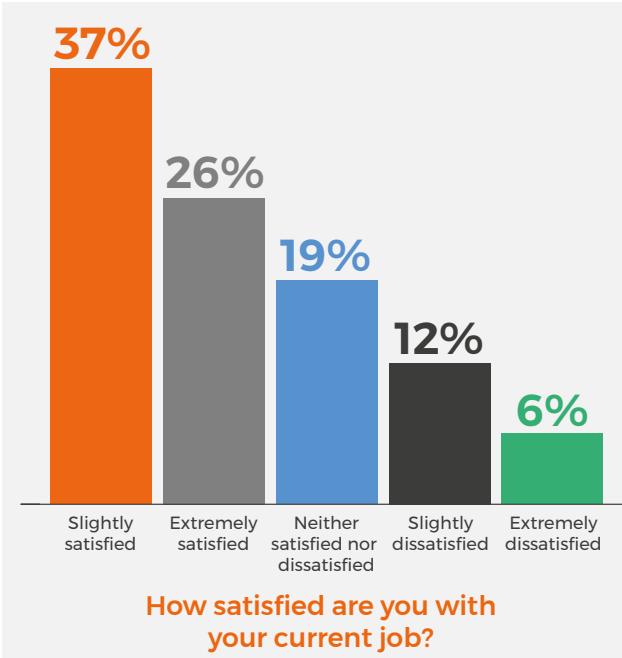
I feel like my manager knows more about technology than me.



> Working Environment

Over **60%** of respondents were **satisfied with their jobs**. Less than **6%** said that they were **extremely dissatisfied**. Developers are **genuinely happy at work!**

The happiest developers were usually very experienced, with over 20 years working in tech. They were also much more likely to be high earners: **30%** of respondents who were **extremely satisfied** with their job were **earning over \$90,000**. However, that doesn't mean only the big earners are pleased with their work. **23%** of those who were **extremely satisfied** were also in the lowest earning bracket, **under \$30,000**.



> Unhappy at Work

Respondents who reported they were dissatisfied with their current job were likely to:

- » Say they **knew more about technology** than their manager
- » Have been working with code for **over 10 years**, but less than 20
- » Feel **less** like they were part of a community
- » Have been in their current role for **more than 4 years**
- » Work in the **Software Industry**, or in **Government** and **Non-profit**

> Barriers to Success

What's keeping developers down? We asked about common barriers to a business/organization's goals.

Overwhelmingly, the top technical barrier across almost all industries was dealing with **technical debt and legacy problems**. 3,241 developers named it as the biggest technical issue for their organization. The sins of the past weigh heavy upon modern tech professionals.

But **43%** of respondents also said that their organization was being impeded by a **lack of quality training and learning**. Are industries failing to invest properly in equipping developers with the skills they need? This might also be influenced by the Skill Up respondents sample: customers seek out Packt for tech learning on their own terms, rather than through training providers.



Software Industry

- Technical debt/ legacy issues
- Lack of quality training and learning
- Short term goals conflicting with long term plans



Advertising & Marketing

- Technical debt/ legacy issues
- Lack of investment in projects
- Short term goals conflicting with long term plans



Education & Research

- Organizational Culture
- Management's technical knowledge
- Lack of quality training and learning



Manufacturing

- Management's technical knowledge
- Organizational Culture
- Lack of quality training and learning



Game Development

- Lack of quality training and learning
- Technical debt/ legacy issues
- Management's technical knowledge



Media & Entertainment

- Technical debt/ legacy issues
- Lack of quality training and learning
- Short term goals conflicting with long term plans



Government & Non-Profit

- Organizational Culture
- Management's technical knowledge
- Technical debt/ legacy issues



Finance and Banking

- Technical debt/ legacy issues
- Working with outdated or inadequate technology
- Organizational Culture



Health

- Technical debt/ legacy issues
- Working with outdated or inadequate technology
- Organizational culture



Defence & Security

- Organizational Culture
- Technical debt/ legacy issues
- Team resources



Professional Services

- Management's technical knowledge
- Organizational Culture
- Lack of quality training and learning



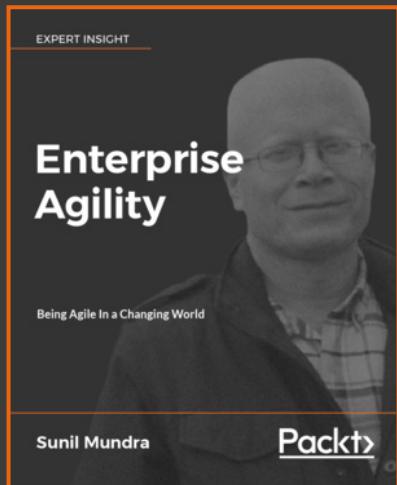
Student & Retired

- Lack of quality training and learning
- Lack of skills to execute planned projects
- Working with outdated or inadequate technology

When asked about organizational barriers faced by their business, over half of respondents said that '**short term goals conflicting with long term plans**' was a problem. This was named as one of the biggest issues by developers working directly in the Software industry, as well as in Marketing and Advertising. Is the monthly drive to hit sales targets or deliver on the next sprint negatively impacting an organization's long term health?

Other common organizational barriers were '**organizational culture**' and '**management's lack of technical knowledge**'. These two issues tended to go hand in hand - and were named as the biggest problems in the Education, Government, Manufacturing and Professional Services industries.

Expert Insight: Sunil Mundra - The Importance of Agile



Non-technical industries are most likely to have a reputation for not moving with the times. Respondents working in Education, Government, Manufacturing, and Professional Services were most likely to complain of organizational culture holding back success. Do they need to start operating more like the software industry in terms of management and structure? Packt author Sunil Mundra talks about the importance of Agile.

The biggest challenge enterprises are facing today is dealing with fast-paced change in all spheres of business. Ever since the advent of management, Enterprises have been modeled as mechanistic or non-living systems. Mechanistic systems are designed to deliver predictability, stability, and repetitiveness. However, enterprises which remain mechanistic are struggling to deal with the complexity arising out of the extent and pace of this disruptive change in the business environment.

Agility is a fundamental shift in thinking about how enterprises work to effectively deal with disruptive changes in the business environment. The core belief underlying Agility is that enterprises are open/living systems. These living systems, also known as Complex Adaptive Systems, are ideally suited to deal with change very effectively.

In his role as Principal Consultant at ThoughtWorks, Sunil Mundra has gained significant experience in understanding the IT and business challenges faced by medium- and large-scale organizations across the globe. He is skilled in identifying the root causes of those challenges and in helping to increase Agility at all levels of the enterprise.

Add to Cart

> Developer Culture

It's official: Ninjas are over. **Just 26% of developers said that they liked creative job terms like 'rockstar', 'wizard' and 'ninja' in the tech sector.** Only developers living in Asia were more likely to approve of the terms. Even then only **45%** say they like them. Every other continent is pretty cynical. Take note, recruiters!

Overwhelmingly, developers agreed it was important to develop 'soft skills'. 86% said that it was important, and only 4% didn't think it was an issue. Looks like you can't just skate by on your code anymore: communication and teamwork are vital.

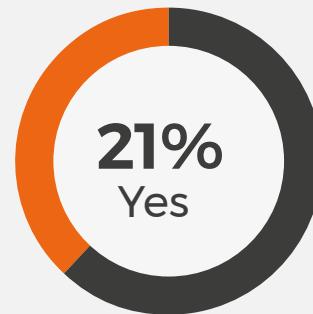
Programming is not just a job for developers – it's also play. Over **80%** of respondents said that they **programmed for fun**, outside of work.

> Goals and Aspirations

Developers aspire to work for both start-ups and big tech companies. 54% of respondents said they like the idea of working for a start up, and 49% of respondents said they'd like to work for one of the 'Big 5' tech companies like Amazon, Apple, Facebook, Google, and Microsoft. The desire to work both in both big tech and small start ups went hand in hand, with a 70% cross-over between respondents who would like to do both.

When asked what they'd like to be doing in five years, a quarter of developers want to be the founder of their own company.

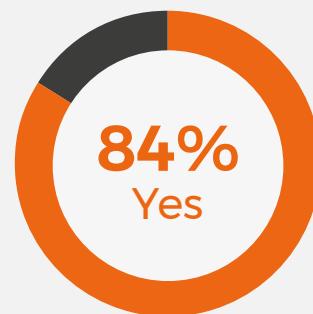
Another 34% wanted to be working in either the same technical field, or have graduated into another technical field. Only 1.2% said they hoped to no longer be working in tech.



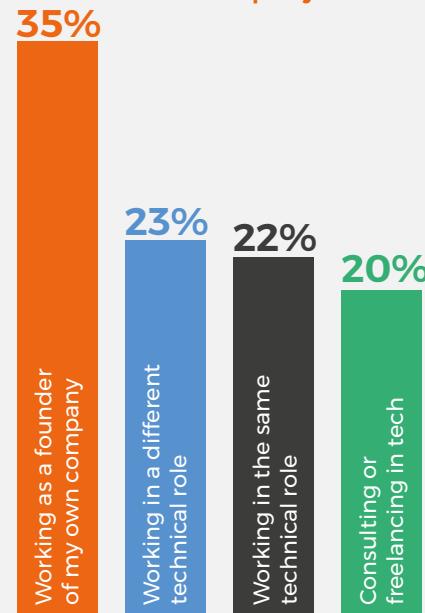
I like creative job terms like 'rockstar', 'ninja', and 'wizard' in the tech sector.



I feel developing 'soft skills' is important for developers.



I would like to work for a 'Big 5' tech company



I feel developing 'soft skills' is important for developers.

3.

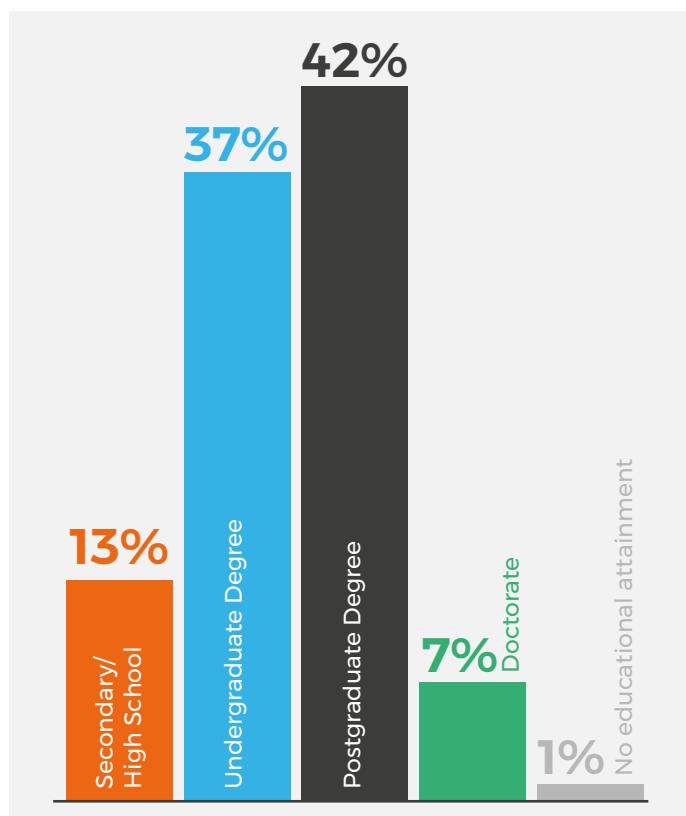
Learning and Training

Effective learning is vital to success as a developer. But how do developers learn, and how often? We asked about our respondents' education and training.

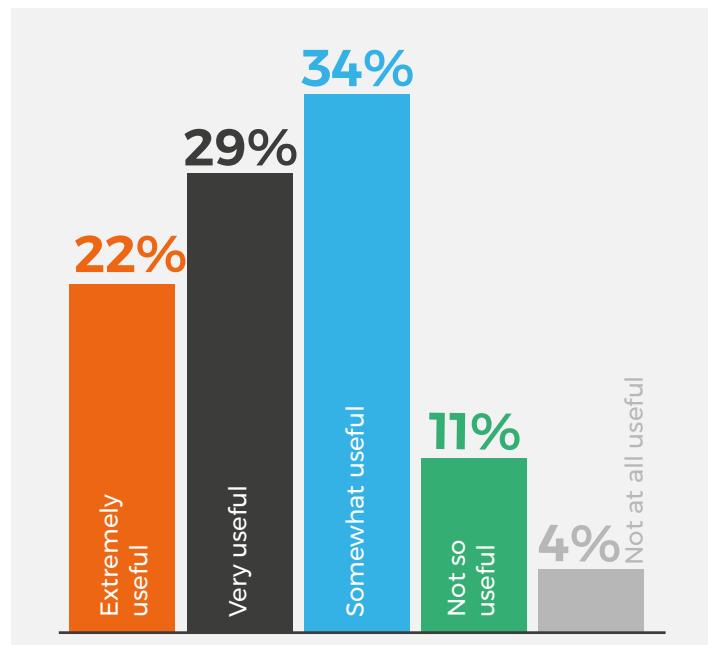
> Formal Education

Almost **80%** of respondents had received a **higher education**, with **42%** having achieved a **postgraduate degree**.

Respondents with postgraduate degrees were most likely to be from Europe, which was also the continent most likely to have respondents who had only completed high school or secondary education.

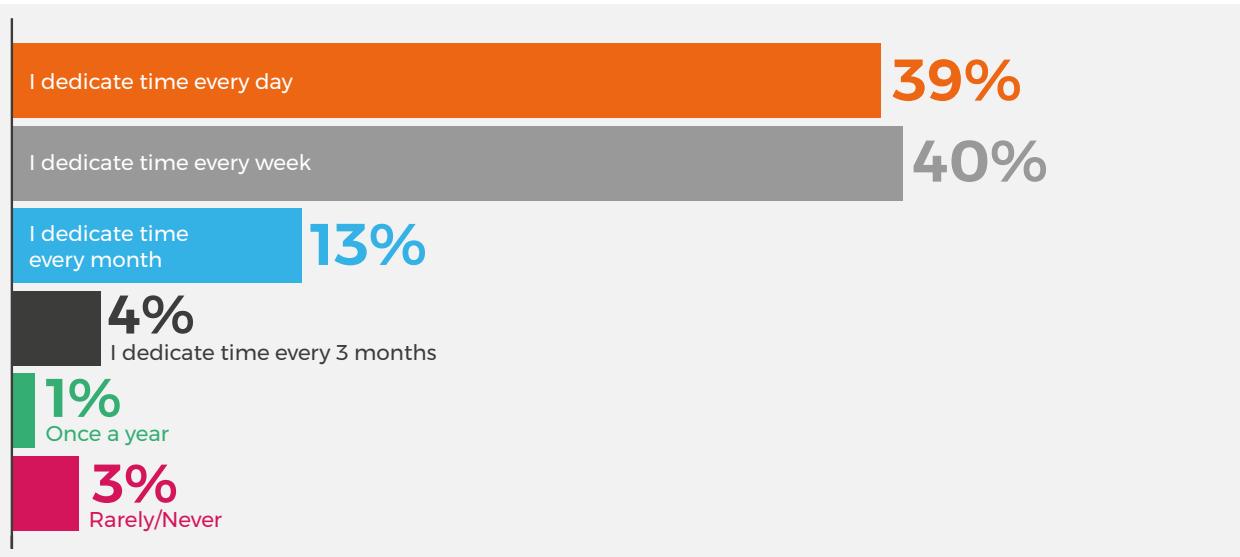


Almost **75%** of respondents said that, if their formal education was in a technical field, they found what they learned at least somewhat useful to their current role. **19%** of respondents also said they found their technical education to be **extremely useful**. These respondents were more likely than the average to have postgraduate qualifications or doctorates. Developers consider there to be plenty of workplace worth in their institutional qualifications.



> Ongoing Education

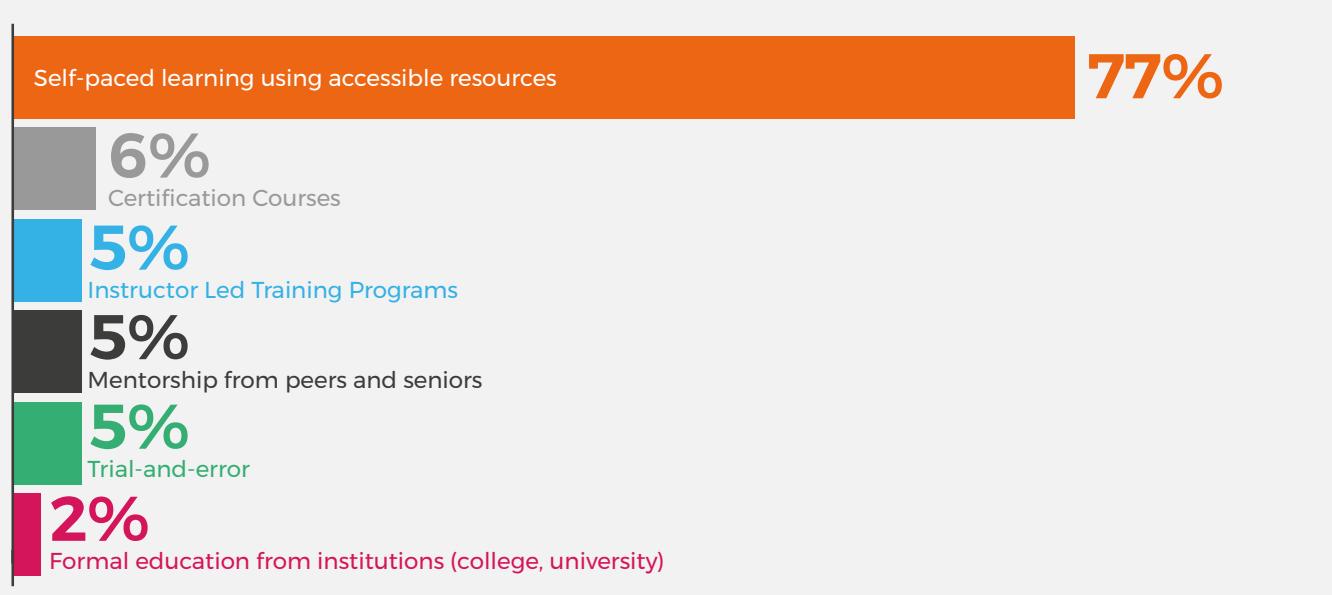
A huge **75%** of developers told us that they set aside time to learn new tech skills at least once a week. 39% dedicated time every day. In 2018, it looks like it's almost mandatory to keep your skills up to date with regularity.



Perhaps unsurprisingly considering how regularly they learn new skills, respondents overwhelmingly prefer to learn at their own pace using accessible resources. **Certification courses, instructor-led training, learning from peers, and even just trial and error** all polled at around **5%**. Developers like to learn independently, under their own steam and on their own schedule using resources that they have to hand.

Those earning the **highest salaries** were even **more likely to favor self-paced learning**, with **80%** of respondents earning over \$90,000 saying it was their preferred method of learning new skills.

The preference for self-paced learning was still strong even among the youngest respondents, in the **18-24 age bracket**. **71%** said they **preferred self-paced learning**, and only **4%** expressed a **preference for formal education** from institutions like colleges.



4.

App Development

Of all the sectors of tech surveyed in Skill Up, none is as large and as varied as application development. Covering everything from Enterprise engineering to game development, **app dev is a constantly evolving and constantly growing section of the industry.**

Every day brings new choices and new challenges to developers. So what are the current industry trends? What are the skills that are essential in 2018? What should you be learning to make sure you stay ahead in your career?

When asked, almost **3,000** respondents said they were working in app development. This was the largest cohort of respondents in the Skill Up survey, at **37%**.

> What do App Developers look like?

App developers were most likely to say they worked as a:

- » Back-end developer (1,112)
- » Full-stack developer (1,107)
- » Desktop/enterprise application developer (806)
- » Mobile developer (587)
- » Hobbyist (535)



App developers were most likely to work in the **software industry** (48%), followed by **finance** and **banking** (8%) and **education and research** (7.5%).



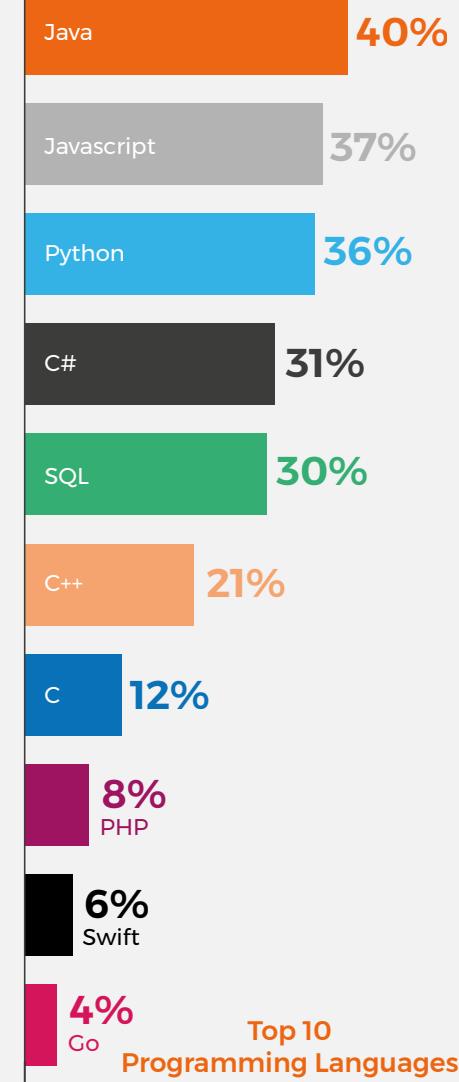
42% of app developers had been working in their current job for **over 4 years**



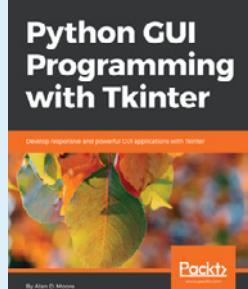
In **Europe**, **North America**, and **Australia**, 38% earned over **\$70,000**.

> Top Languages

In 2018 the top spot for programming language is hotly contested between **Java, JavaScript, and Python**. Java just takes the top spot, used by **40%** of app developers, while JavaScript (**36.85%**) and Python (**36.47%**) have less than a percentage point between them.



Python App Insight

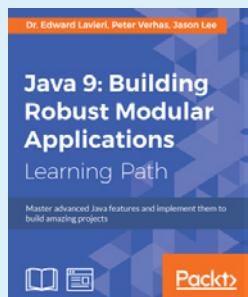


3 Specially Selected Titles for \$25

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- **Python** was most likely to be favored by the highest-earning app developers.
- **C#** was most popular with developers building for Enterprise and desktop, and working in game development
- **Java** was most popular with developers building for mobile.

Elite Level Java



5 Specially Selected Titles for \$50 - LIMITED TIME ONLY

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In 2018, we've seen C-based languages heavily lose out in favor of languages that can write more easily for the web. Only among desktop developers and game scripting does C# still hold the top spot: every other developer is looking to have the capacity to build for the browser, or for mobile.

> Top Tools for Mobile

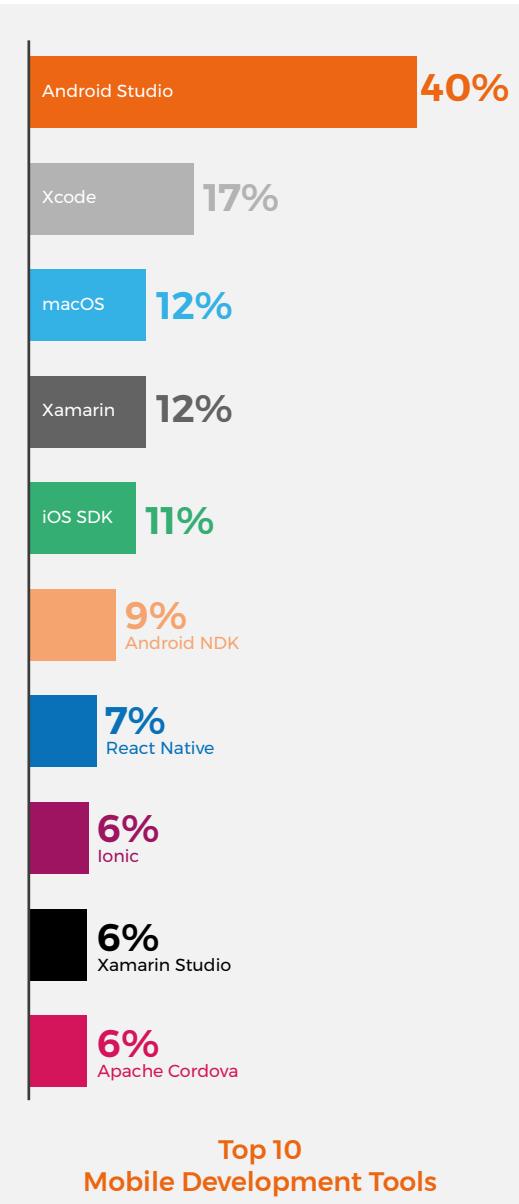
Android Studio is the stand-out lead tool used when working with mobile (39%), with more than double the number of uses than **Xcode** (16%). It looks like developers overall still favor building for **Android over iOS**, and even cross-platform options such as **Xamarin**.

However, among higher-paid developers, **iOS** development tools increase their showing. 50% of developers salaried at \$70,000 or higher used **Xcode**, **iOS SDK**, and/or **macOS** in development. If you're interested in maximising your salary potential in mobile development, it looks worthwhile to invest in **iOS** skills.

Build with Unity

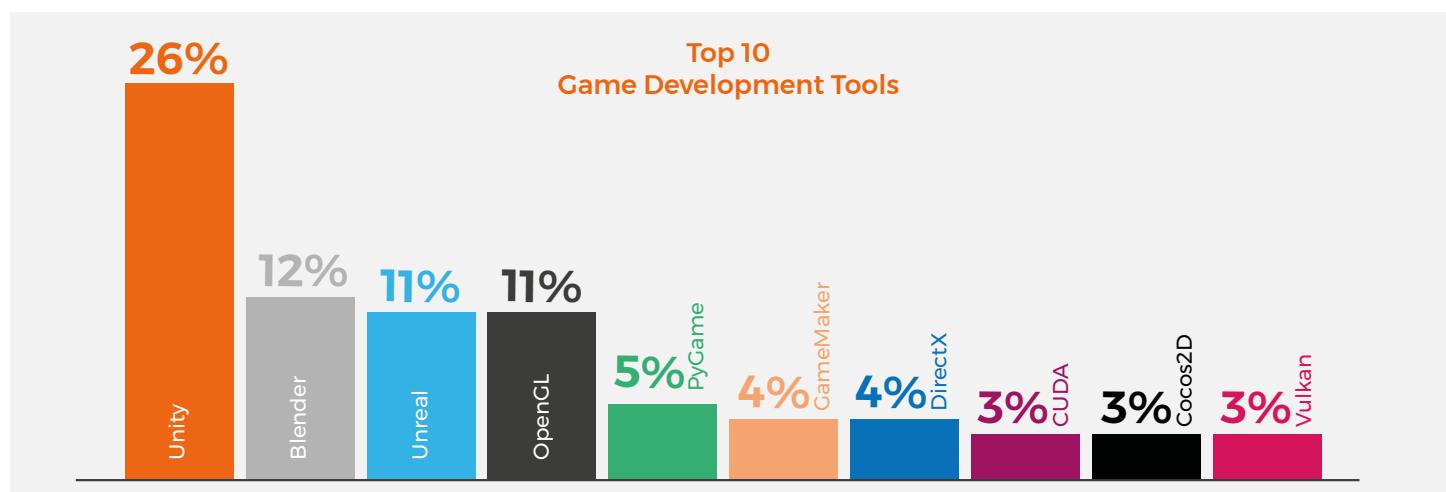
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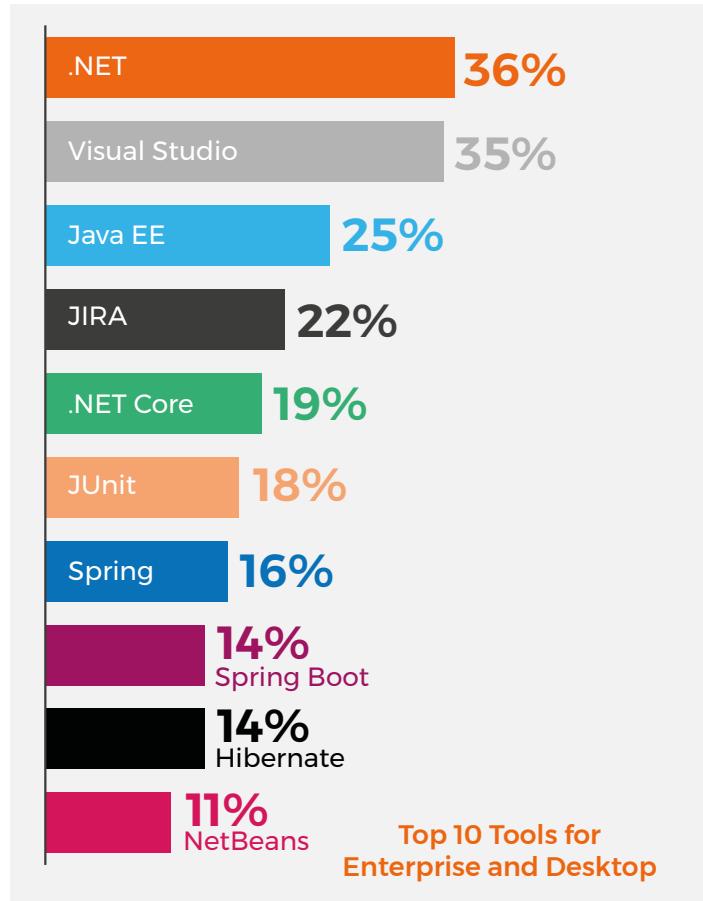
> Top Tools for Game Development

Taking all on all comers, **Unity** comes in as the top tool for game developers, used by 25% of respondents. The next most popular engine, **Unreal**, clocks in at just 11% of respondents.



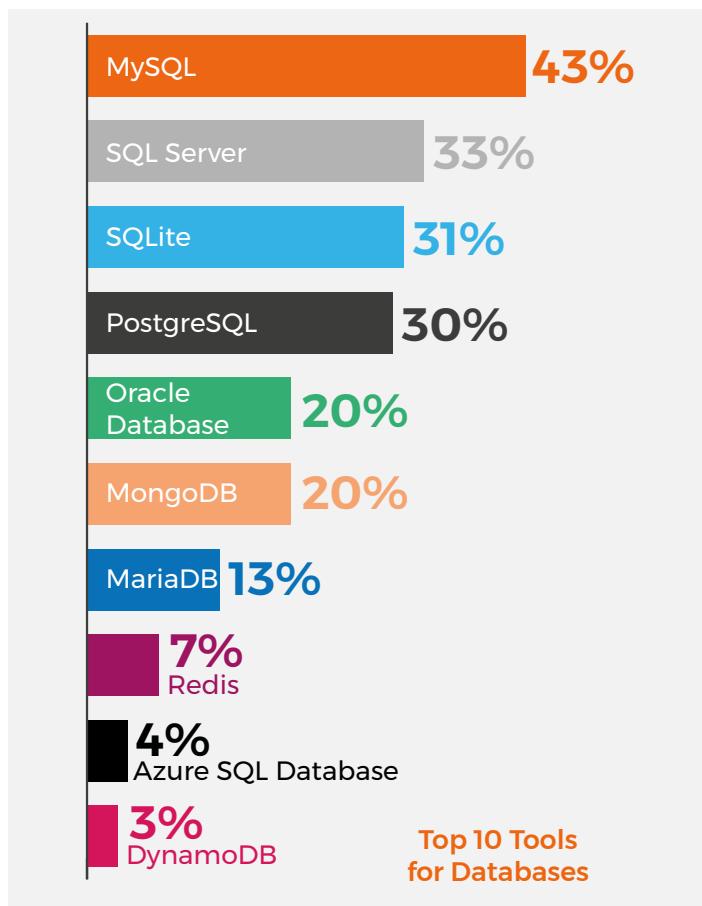
> Top Tools for Enterprise and Desktop

.NET, Visual Studio, and Java EE prove themselves as essentials for Enterprise developers.



> Top Databases

Database use is dominated by SQL-based choices, with MySQL still the most commonly utilized database solution.

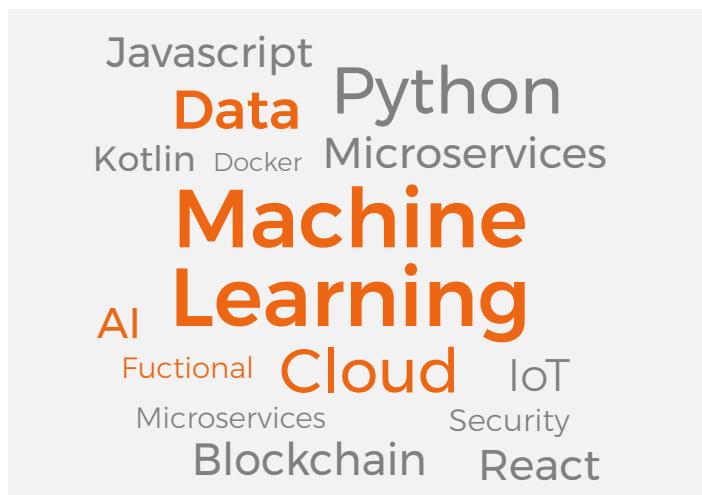


> What's the next big thing in app development?

Weighted by frequency, in the next 12 months, app developers said they are planning on learning:



They say the most valuable thing for developers in their field to be learning is:





Machine Learning

Having stormed data science, machine learning technologies are now being named as the next big thing to learn by app developers. The promise of integrating algorithmic intelligence into applications is huge, and closely connected to much of the cutting edge of app development such as conversational UI. Respondents also listed both TensorFlow and deep learning as new skills they were learning, showing that app developers are getting right into some of the most complex and powerful tools and techniques of machine learning.

Machine Learning

The image shows three book covers related to machine learning:

- Python Machine Learning** by Sebastian Raschka & Vahid Mirjalili, Second Edition - Fully revised and updated. It features a dark background with a portrait of a person's face.
- Machine Learning Solutions** by Jalaj Thanaki, Presented by Samir Bhatia. It has a teal background with a network graph.
- Getting Started with Machine Learning for Developers**. It has a dark background with a pixelated pattern.

3 Specially Selected Titles for \$25 - LIMITED TIME ONLY

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Python

If app developers are diving into machine learning, they're doing it in Python. Beloved for its adaptability and capable of building anything from machine learning algorithms to GUIs, Python in 2018 is becoming the ubiquitous choice of developers. It's also the favored language of the highest-earning app developer respondents.



Web Technologies

The divide between application development and web development is beginning to fade. React Native is a tool that proves that the demand for experiences which combine the usability of native applications with the interactivity of web apps is stronger than ever.

Similarly, the relationship between the backend and front end is changing. As microservices and serverless architecture become the norm, web developers and app developers are starting to share very similar toolchains.

The growth of JavaScript is crucial to this. Node.js in particular is important, as it has been quietly redefining JavaScript for the past few years. Only now are we starting to see it take hold as one of the definitive tools.

Blockchain

App developers were split on how transformational Blockchain is going to be in this year's survey. But it is still viewed as one of the trends app developers feel they should be paying attention to. The types of applications you're building will be critical here.

While it remains to be seen whether Blockchain has an impact on mainstream applications, like eCommerce, it will be interesting to see some of the more niche uses of Blockchain in the near future. Although it may take some time to disrupt the status quo, we could see a huge rise in Blockchain startups aiming to disrupt legal contracts, asset and identity management, and maybe even democracy.

Practical Blockchain



3 Specially Selected Titles for \$25

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Kotlin & Rust

Kotlin and Rust are two languages that are set to define the future of development for the years to come. Kotlin has been around since 2011, but only recently has it started to really capture the imagination of engineers. Google has done a lot to reinforce its reputation - the fact that it was fully supported in Android Studio 3.0 in 2017 has ensured it is now one of the most popular Android development languages. We expect to see it competing closely with Java by the end of the year.

Rust has also been around for some time, but the Mozilla team have honed their strategy carefully in the last year. The organization wants to position Rust as a key language for linking front and back ends - wasm-bindgen, which made Rust interoperable with JavaScript code is clear evidence of this. Having been confirmed as the 'most loved language' in the Stack Overflow survey in 2016, 2017 and 2018, it has undoubtedly got usability and productivity built into its design.

Diving into Rust



3 Specially Selected Titles for \$25

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> Hot Topics

Do you think Kotlin is a serious contender for Java?

Java beware: respondents say that Kotlin might just topple you from your throne. With adoption by Google for Android development, is this the beginning of the end of Java for mobile?

Is virtual reality here to stay in game development?

VR isn't going anywhere. Developers overwhelmingly say that it's a new paradigm for games and game development. Only 13% thought it might be a fad.

Does Swift have potential outside of mobile?

There's more to **Swift** than just building for mobile and OSX. With the language now open-sourced, and picked up as one of IBM's core languages for its cloud platform, **60%** of developers said they thought it had potential outside of mobile.

Do you use, or plan to use, microservices in your application architecture?

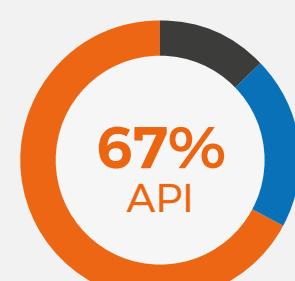
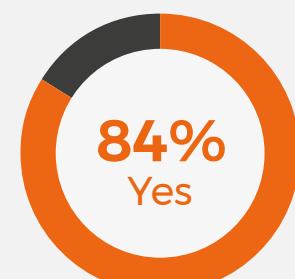
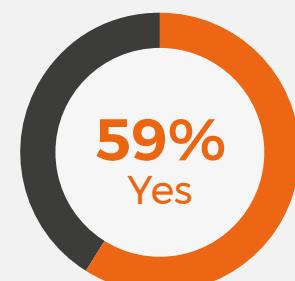
Microservices are here, and everyone's using them. Over **80%** of respondents said they were using or planning to **include microservices** in their application architecture.

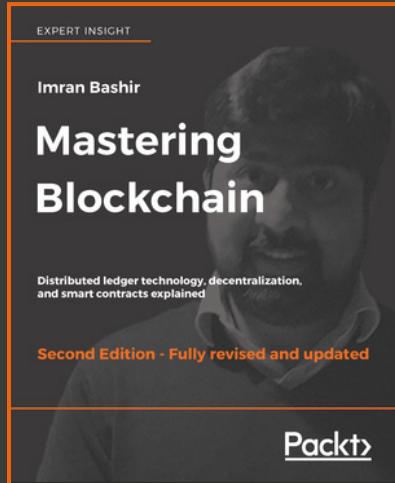
Which new architectural approach are you most excited about?

With the strength of extensibility and customizations, developers say they love the potential of **API Driven Architecture**. Less popular is the prospect of **Chaos Engineering** - deliberately adding bugs to your systems to test its durability looks like a hard sell!

Do you think Blockchain technology will be revolutionary?

We asked each section of developers what they thought about the potential of Blockchain technology. App developers were split **60/40**, with **60%** thinking Blockchain meant a revolution for technology. However, they were less sure than their peers in web development and in data.





Expert Insight: Imran Bashir – The Blockchain Revolution

Packt author Imran Bashir shares his thoughts on Blockchain technology and what it means to modern developers.

I agree with the Skill Up respondents that Blockchain will be revolutionary. The fundamental issue that blockchain solves is that of trust. It enables two or more mutually distrusting parties to transact with each other without the need of establishing trust and a trusted third party. This phenomenon alone is enough to start a revolution.

This paradigm fundamentally changes the way we conduct business and results in significant improvements such as cost saving, security and transparency.

Any developer should learn blockchain technology because in the next year or so there will be a high demand for skilled blockchain developers/engineers. Even now there are many unfilled jobs: it is said that there are 14 jobs open for every Blockchain developer.

Blockchain platforms such as Ethereum and Hyperledger Fabric are the most commonly used for development. As such, developers should focus on at least one of these platforms.

Imran Bashir has an M.Sc. in Information Security from Royal Holloway, University of London, and has a background in software development, solution architecture, infrastructure management, and IT service management. He is also a member of the Institute of Electrical and Electronics Engineers (IEEE) and the British Computer Society (BCS). Imran has sixteen years' of experience in the public and financial sectors.

Add to Cart

5.

Web Development

In 2018, working in tech almost always means working with the web. As more and more applications migrate to the browser and the cloud and as sites become ever more sophisticated, web development knowledge becomes a greater and greater priority.

So what do you need to know to stay ahead in web development? Has a winner emerged in the battle of the JavaScript frameworks? Are people even still using JavaScript?

When asked, almost 2,000 respondents said they were working in web development.



> What do Web Developers look like?

Web developers were most likely to say they worked as a:

- » Full-stack developer (1,177)
- » Back-end developer (773)
- » Front-end developer (676)
- » Hobbyist (258)
- » Mobile developer (250)



Web developers were more likely to have been working in the industry for **less than three years** (20%) than for **more than 20 years** (16%).



31% of web developers aspired to be running their own company in **five years time**.

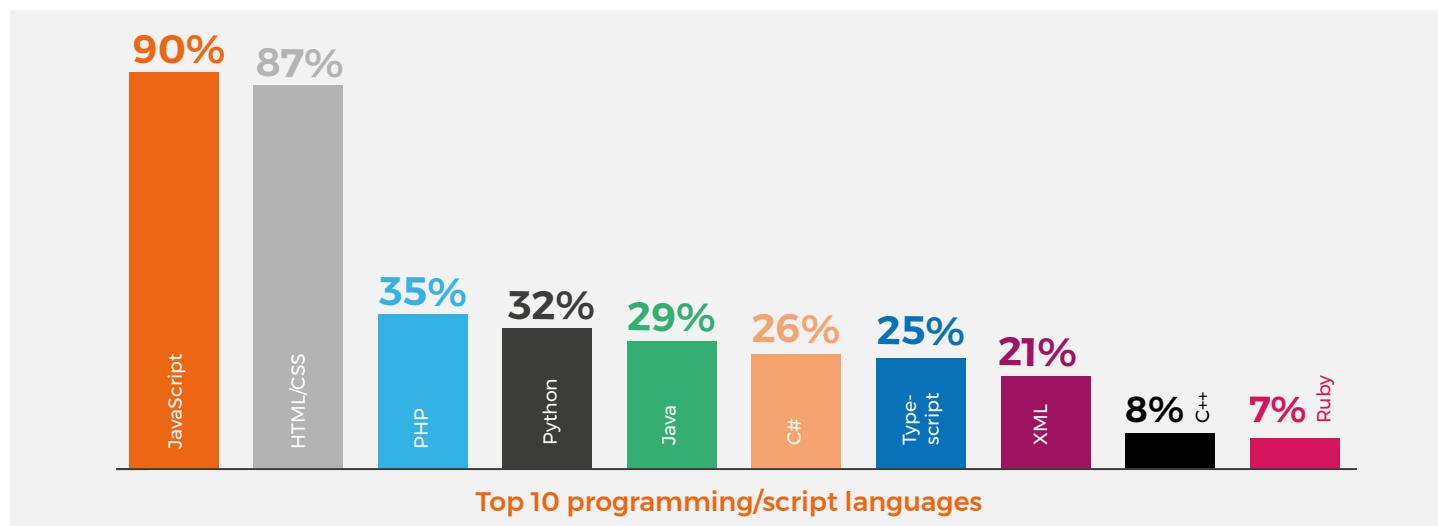


Web developers were mostly likely to be salaried under **\$30,000**. This trend continued even when just looking at **North America, Europe and Australasia**.

> Top Languages

Surprising nobody, **JavaScript** is still the stand-out language of the web. But battling for third and fourth place after **HTML/CSS**, **Python** is closing in fast on **PHP**.

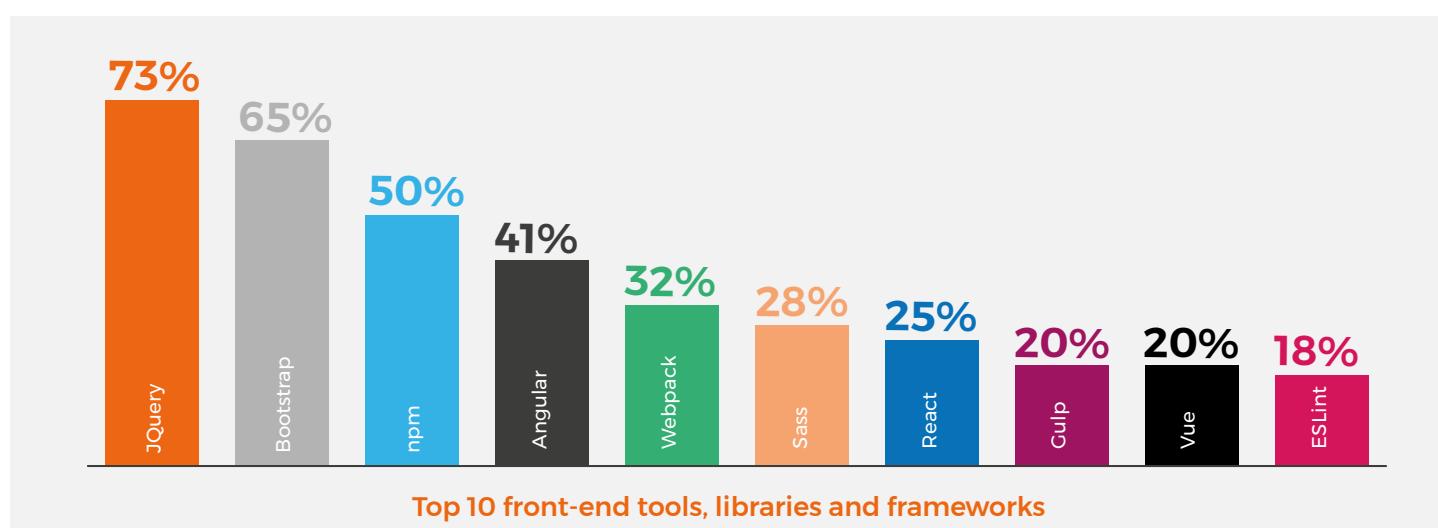
However among the highest salaried developers, the picture shifts again. Web developers earning over \$70,000 were more likely to report using **C# (37%)**, **Java (32%)** and **TypeScript (29%)** than either **Python** or **PHP**.



> Top Front-end Tools and Frameworks

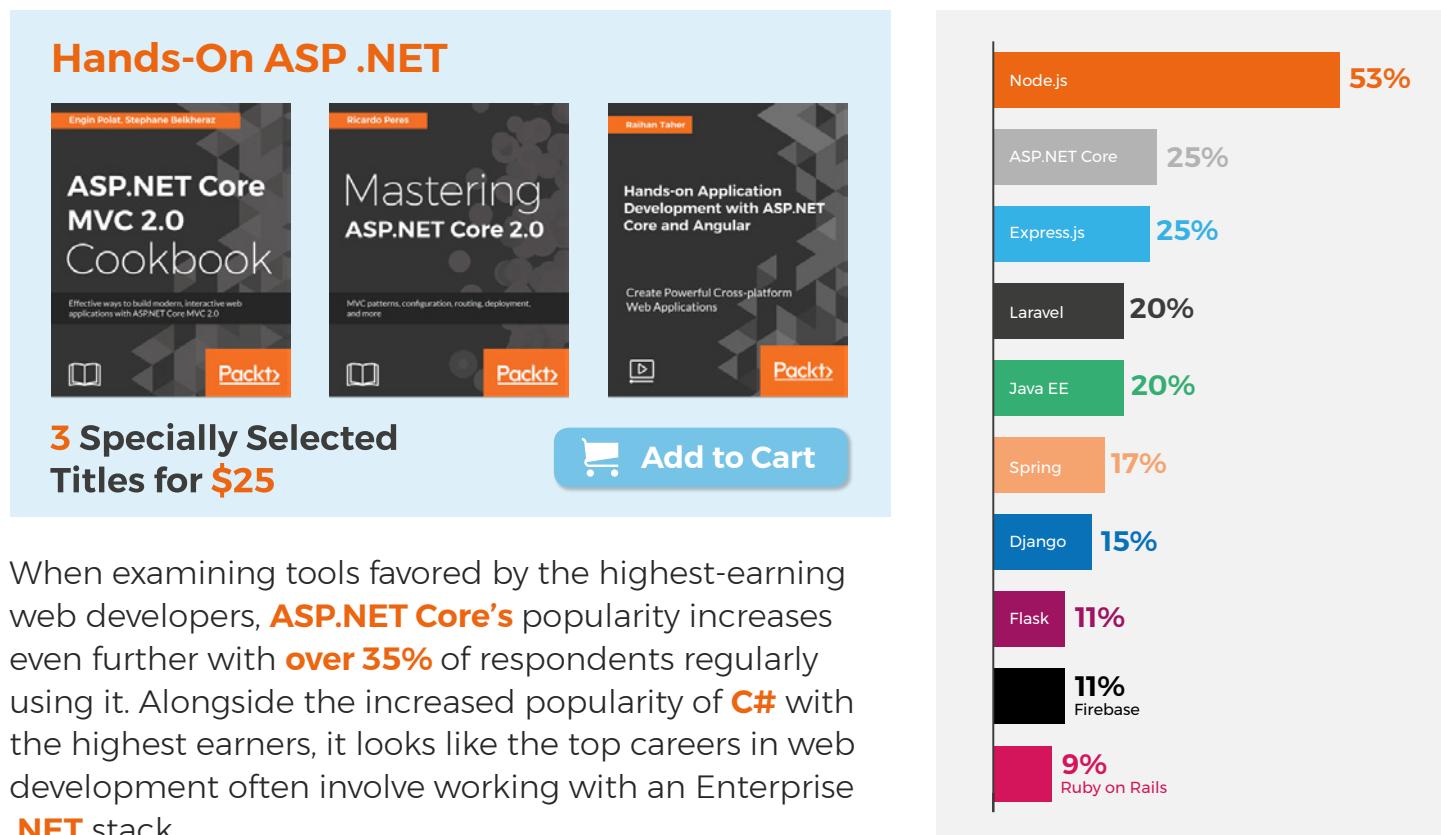
Who's winning the battle of the JavaScript frameworks? Almost **40%** of developers said that they regularly use **Angular**, as opposed to **25%** using **React** and **20%** making use of **Vue**. But React's usage is growing, particularly among higher salaried web developers, who were more likely to be regular React users than average.

Interestingly, when asked '**Who should win the battle of the front-end tools?**' developers appeared to be much more evenly split. There was less than a percentage point between declaring **Angular** or **React** the victor, with Vue also taking a good **20%** of the vote.



> Top Front-end Tools and Frameworks

When working with the back-end, **Node** remains the most common tool favored by developers. But quickly rising in favor is **ASP.NET Core**, used by **25%** of respondents.



When examining tools favored by the highest-earning web developers, **ASP.NET Core's** popularity increases even further with **over 35%** of respondents regularly using it. Alongside the increased popularity of **C#** with the highest earners, it looks like the top careers in web development often involve working with an Enterprise **.NET** stack.

> What's the next big thing in web development?

Weighted by frequency, in the next 12 months, app developers said they are planning on learning:



They say the most valuable thing for developers in their field to be learning is:





Machine Learning

The fact that we're seeing machine learning enter into the web development world isn't surprising. You only have to look at some of the most popular websites to see that personalization and recommendations are shaping the future of UX. Similarly, with chatbots and conversational UI emerging quickly as a big part of digital experiences, it's essential that web developers get to know it as soon as possible.

Luckily, as machine learning becomes more popular in web development, it's also starting to become more accessible. The leading cloud platforms are beginning to build out machine learning solutions that make it easy for developers to build and deploy algorithms. The release of TensorFlow.js earlier this year also signals a simpler step towards running machine learning systems on the browser.

React

React's importance is pretty straightforward: it offers a simple way to build applications that need to manage complex and huge amounts of data. It's also incredibly fast. The virtual DOM, one of React's USPs, gives applications a level of dynamism that even Angular can't quite give you. Arguably React Native has really cemented React's position as the definitive front end JavaScript library making it easy to build cross platform

Power User React

Harmeet Singh, Mayur Tanna

Serverless Web Applications with React and Firebase

Develop real-time applications for web and mobile platforms

Adam Boduch

React 16 Tooling

Master essential cutting-edge tools, such as create-react-app, Jest, and Flow

Diego Muracciole

Advanced React Recipes

Web application using React and Redux

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Angular

There's a lot of talk about the differences between React and Angular. It's not difficult to find an opinion on the matter. But ultimately they're different types of tools. Angular is, after all, a fully fledged framework, offering you a far more extensive suite of tools than React. And because it's built by Google, you can be confident it's always going to be suited to the needs of web users.

The new versioning system may have been a little confusing, but it makes sense. It means the project is going to be continually moving forward and changing with the needs of users and developers. Make sure you pay attention - you never know when you might want it back in your life...



Go is part of an intriguing wave of new languages. It's part of the same generation as Kotlin and Rust in that it's a language that is incredibly performant and quite easy to use once you get past the early learning curve.

It's a language that takes away some of the pain of modern web development, and is well suited to meeting some of the latest challenges that have emerged, like single page web applications and deploying on cloud.

Go for Web

Arpit Aggarwal
Go Web Development
Cookbook
Build full-stack web applications with Go
Book Packt

Kamesh Balasubramanian
Foreword by Mat Ryer
Isomorphic Go
Learn how to build modern isomorphic web applications using the Go programming language, GopherJS, and the Isomorphic Go toolkit
Book Packt

Mihalis Tsoukalos
Mastering Go
Create GoLang production applications using network libraries, concurrency, and advanced Go data structures
Book Packt

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It's this shift to cloud that is the key reason why AWS is becoming more and more important to web developers. In 2018 cloud isn't a new or emerging trend - it is now well and truly mainstream.

One of the reasons that AWS in particular has caught the attention of developers is its impressive suite of developer tools. It's a cloud platform that is designed with continuous delivery and DevOps in mind.



We touted GraphQL as one of the most important tools in 2018 back at the end of the year. We're not surprised to see web developers starting to pay attention to it and adopt - Facebook's data query language is helping to shape the future of API design. With React's popularity continuing to rise, GraphQL is going to fit neatly into the web developer toolchain.

> Hot Topics

Do you use, or plan to use, microservices in your application architecture?

Microservices are not quite as popular in the world of web development as in app development - but they're still heavily favored by **77%** of respondents!

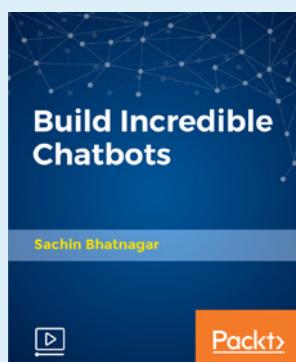
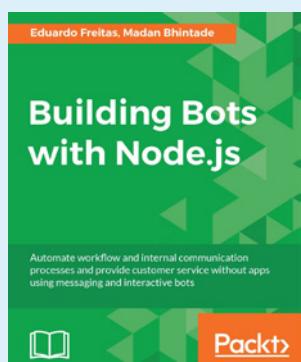


Are Conversational User Interfaces and chatbots going to be the future for web UI?

According to **65%** of respondents, **chat interaction** and **Conversational User Interfaces** are the **future** of the web. After the recent preview of the power of Google Duplex, those numbers might be even higher if asked again today.



Practical Chatbots

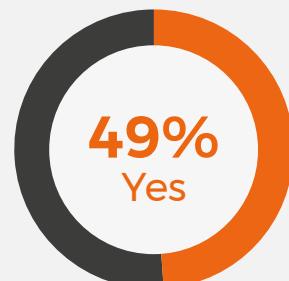


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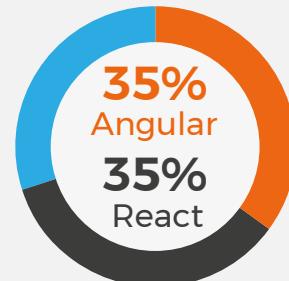
Have you suffered from 'JavaScript fatigue'?

Ouch! One in two web developers admit that they've been struck down by the dreaded JavaScript fatigue. Is there a cure?



Who do you think should win the battle of the front-end tools?

Despite the prevalence of **Angular** in our respondents' daily stack, developers are almost evenly split between **Angular**, **React** and **Vue**. There's less than a percentage point between Angular (**34.94**) and React (**34.85**)!



Angular in 2018



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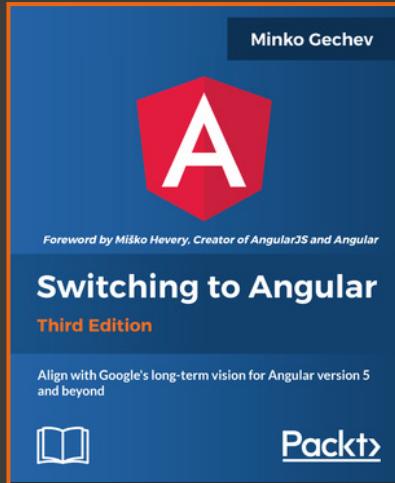
Do you think TypeScript is a serious contender to JavaScript?

Are JavaScript's days numbered? Over **60%** of developers think that **TypeScript** is a serious contender to the top language of the web.

Do you think Blockchain technology will be revolutionary?

We asked each section of developers what they thought about the potential of Blockchain technology. Web developers were confident it would be revolutionary, split **70/30**.





Expert Insight: **Minko Gechev – Modern Web Development**

Packt author Minko Gechev shares his thoughts on the battle of the frameworks, and what modern developers should be investing their time in.

Angular, React and Vue are all unique and interesting ideas which are worth exploring. I truly believe that learning all the major frameworks can help developers go to the next level! Having a high-level understanding of how the frameworks work and how to use them will allow you to adapt according to a project's requirements.

My recommendation would be to understand how to manage the state of our applications because that's probably the most complex problem in our day to day development. Once we have a solid understanding of this, we can easily switch between different frameworks depending on the problems we're solving, what the rest of the team is using, and the project's requirements.

Over the past couple of years I've seen a strong increase in the excitement around TypeScript, not only in the Angular world but also in React and Vue. I'm personally using TypeScript for a few projects – a platform that we built with React and an educational application written in Angular. Recently I haven't started any project with JavaScript – for everything new I'm using TypeScript and I'm trying to migrate, as many of my existing projects as possible.

If you're choosing what to learn in the next 12 months, there are a lot of exciting things happening! Web browsers are getting more and more powerful, exposing hundreds of APIs and opportunities. WebAssembly is moving very quickly and I believe that together with Rust it has a lot of potential in future.

On the other hand, Google recently announced TensorFlow.js. This is a library which allows us to use machine learning (ML) in the browser. In the next few years, ML is going to take a larger portion of our development process. I'm really excited about what's coming up in the near future!

Minko Gechev is a Google Developer Expert for the Angular team and a presenter at over 40 worldwide conferences, including ng-conf, AngularConnect, AngularUP, and many others. Minko is co-author of the official Angular style guide, and has developed codelyzer – a tool for static analysis of Angular applications and best practices, which is part of the Angular CLI, and currently has over a million downloads each month.



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6.

Security and Systems Administration

After a year of high-profile Malware attacks and data breaches, the importance of robust cyber security and well-managed systems has never been more prominent.

But what tools are security and systems professionals using every day? What do they think the vital thing to master in their field will be in the next year?

When asked, over **1,500** respondents said they were working in security and systems administration.

> What do security and sysadmin professionals look like?

Respondents were most likely to say they worked as a:

- » Systems administrator
- » DevOps specialist
- » Security specialist
- » IT Help Desk
- » Back-end developer



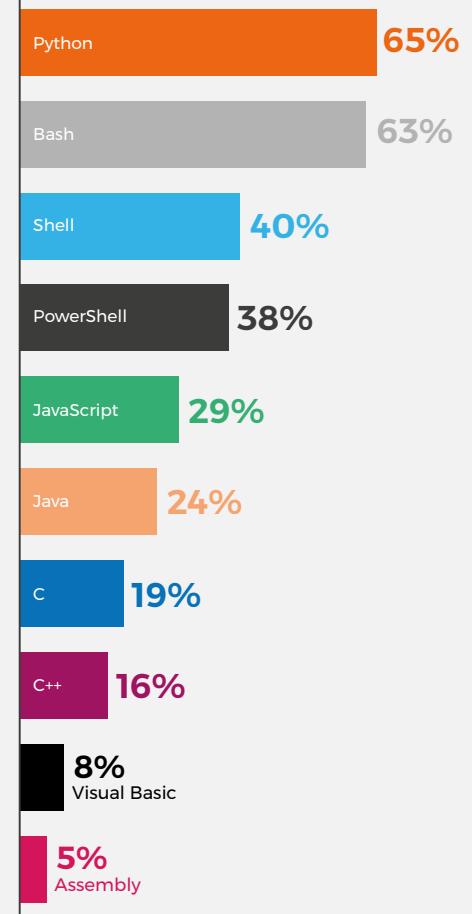
Security and systems professionals were the most likely section to earn salaries of over **\$90,000**



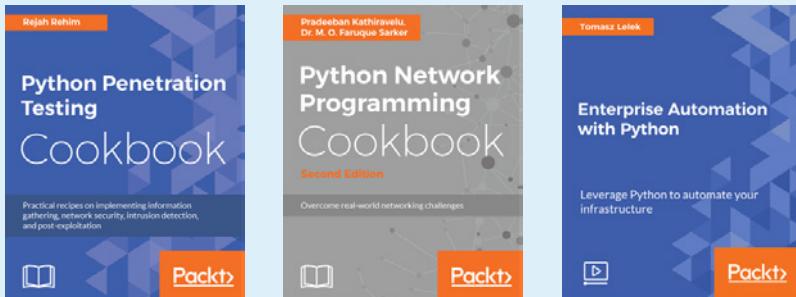
Over 50% of security and systems specialists had been working in tech for **over ten years**.

> Top Languages

Python and **Bash** sit within two percentage points of each other as the most used scripting language in security and systems admin. Both remain equally essential to those respondents who say they're working in security, and those working on network and systems administration.



Hands-On Python Networking

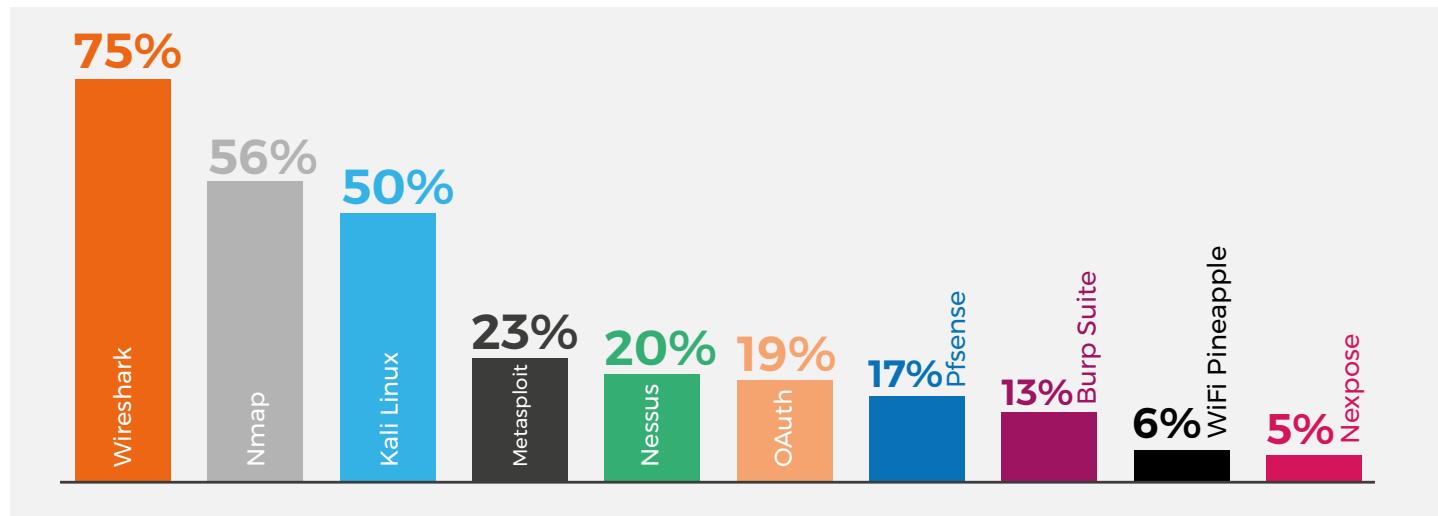


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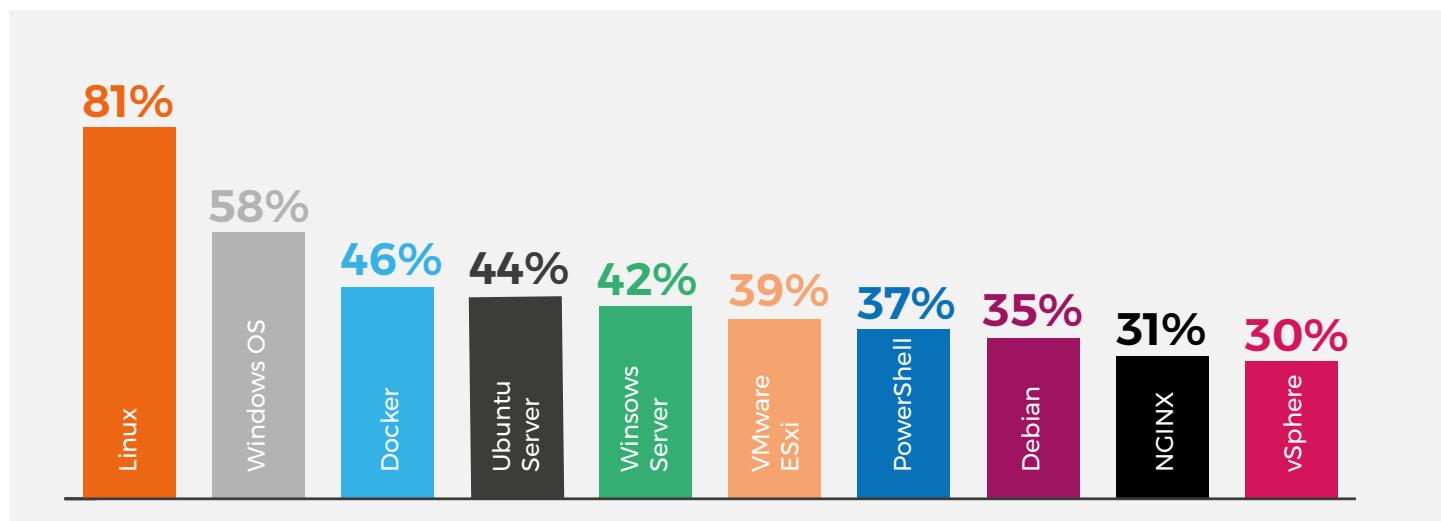
> Top Security Tools

Topping the list of security tools are the network analysis essentials - **Wireshark** and **nmap**. But used by just under **50%** of respondents, **Kali Linux** remains the most essential pentesting tool in a security or systems professional's arsenal.



> Top sysadmin and virtualization tools

Unsurprisingly, the most used operating system was **Linux**, with **WindowsOS** clocking in a full **20%** behind the **Open Source** titan. But having rapidly asserted its dominance as an essential industry tool is **Docker**. Over **45%** of respondents said they used **Docker** regularly.



> What's the next big thing in security and systems?

Weighted by frequency, in the next 12 months, security and systems specialists said they are planning on learning:

Angular Java Azure Testing
JavaScript AWS Openstack
Articial Intelligence Kubernetes
Ansible Docker Cloud IoT
Security Data Science Machine Learning
Blockchain Linux OpenShift
Golang Jenkins

They say the most valuable thing for workers in their field to be learning is:

Machine Learning Azure
DevOps Automation
Articial Intelligence Kubernetes
AWS Security Cloud
Ansible IoT Testing
Serverless Data Science Docker Blockchain
Cloud Python Microservices
JavaScript

Machine Learning

Unsurprisingly, machine learning makes an appearance once again. As if it wasn't clear already, the applications of machine learning are so diverse that just about every technical role could be impacted - empowered, maybe - by it. For security professionals, machine learning is already providing a useful way to identify vulnerabilities and security threats.

For sysadmins, machine learning might look like a threat, but in fact it's going to reshape the role. Yes, sysadmins may need to upskill, but as software infrastructure becomes more complex, it's going to need human intelligence to manage its integration and maintenance successfully.

Kubernetes

Docker is now well established. It's Kubernetes that's framing the future of containerization in 2018. And with Docker now recognizing Kubernetes' strength in the containerization field by providing support in its enterprise edition, it's fair to say Kubernetes is the best in class when it comes to container orchestration.

As containerization continues to take hold, Kubernetes is only going to become more essential - the level of control it offers over large-scale deployments is hugely impressive.

Essential Kubernetes



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Python

Python is a versatile language. We're not surprised to see it so popular with systems and security pros. In particular, as a scripting language, it gives everyone from pentesters to DevOps engineers a significant degree of control - it allows them to solve problems. With machine learning also on the radar, Python is going to play an important role in making it a reality for engineers who are not from a data-specific background.

AWS and Cloud

Once again AWS rears its head. Of course, the cloud space is incredibly competitive with Google and Microsoft bustling for market share alongside Amazon. But it does seem that AWS is becoming the cloud solution of choice for many. Whether it can maintain its popularity remains to be seen - we may start to see hybrid and polycloud solutions coming to the fore as organizations and engineers look for more bespoke and custom cloud platforms.

Comprehensive AWS

The image shows three book covers from Packt Publishing related to AWS:

- AWS Administration - The Definitive Guide (Second Edition)** by Yohan Wadia. Description: Design, build, and manage your infrastructure on Amazon Web Services. Includes a book icon and a Packt logo.
- Mastering AWS Security** by Albert Anthony. Description: Create and maintain a secure cloud ecosystem. Includes a book icon and a Packt logo.
- Practical AWS Networking** by Mitesh Soni. Description: Build and manage secure networks using Amazon services. Includes a video camera icon and a Packt logo.

3 Specially Selected Titles for \$25

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A Ansible

Ansible is perhaps the definitive configuration management tool. Chef and Puppet may have got there first, but Ansible's rise over the last couple of years is largely down to its impressive automation capabilities. And with the demands on operations engineers and sysadmins facing constant time pressures, the need to automate isn't a useful extra, but a necessity.

Ansible's tagline is "allowing smart people to do smart things." It's hard to argue that any software should aim to do much more than that.

> Hot Topics

Do you think IoT is being held back by security issues?

Over two-thirds of security and systems specialists say that the potential of the **Internet of Things** is being held back by issues of security. **A lack of universal security standards** - or even no security at all - is really taking the shine off this much-hyped area of development.

Do most organizations treat cyber security with the seriousness it deserves?

Despite a series of high-profile Malware attacks and shutdowns in the past year, respondents overwhelmingly say that **organizations still don't treat cyber security seriously enough**. Over 80% say it's an issue.

Is your business/organization 'Cloud Native' or planning on integrating operations with the cloud?

Over **75%** of respondents now say that their business or organization has switched to the **Cloud**, or is planning to. Are the days of crowded server rooms soon to vanish entirely?

Does the future of virtualization lie in Open Source or Enterprise technologies?

Respondents strongly feel that **Open Source** is the way forward for virtualization technologies.

Do you think Azure and Google Cloud are a serious contender to AWS?

Despite the huge market share that **Amazon Web Services** hold over the **Cloud** industry, respondents have high hopes for **Microsoft** and **Google Cloud's** offerings.

Is Kali Linux still one of the most relevant tools for penetration testers?

Having turned five this year, the huge variety of tools that **Kali Linux** gives to a pentester means that it's still one of the most vital things to learn and use in security.



7.

Data

Is 2018 the year that data analysis invades development as a whole? In the Skill Up Survey, both app developers and web developers have spoken of the importance of machine learning and other cutting edge data techniques to their future success.

So what language rules for data? What are the most common libraries and tools in the data analyst's arsenal? What do data analysts hate most about the process?

When asked, over **1,450** respondents said they were working in data. This was the smallest cohort of the Skill Up survey.

> What do security and sysadmin professionals look like?



Respondents were most likely to say they worked as a:

- » Data scientist or data specialist
- » Data analyst
- » Academic or Researcher
- » Back-end developer
- » Hobbyist



In five years, respondents were most likely to want to be **running their own company** or doing **consulting** and **freelancing**.

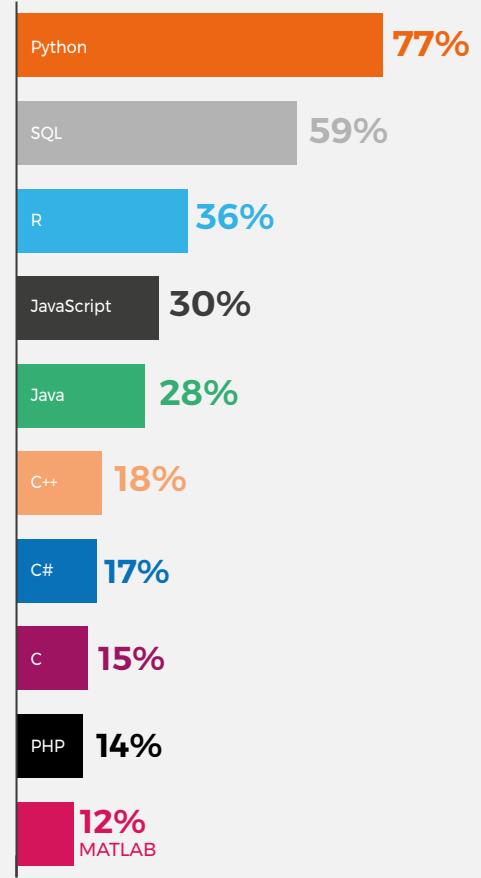


Respondents were most likely to have been working in the industry for **over 10 years**.

Data workers were **less likely** to feel that their peers **knew more about programming than them** than other sections.

> Top Languages

Standing proud, **Python** has ascended to be the number one language of data. It has **over double** the uptake of its traditional rival **R**, which lags behind it in third place. Python's ease of use, powerful tools and libraries, and use outside of the data field make it almost mandatory to know and use in 2018.



Absolute Python Data



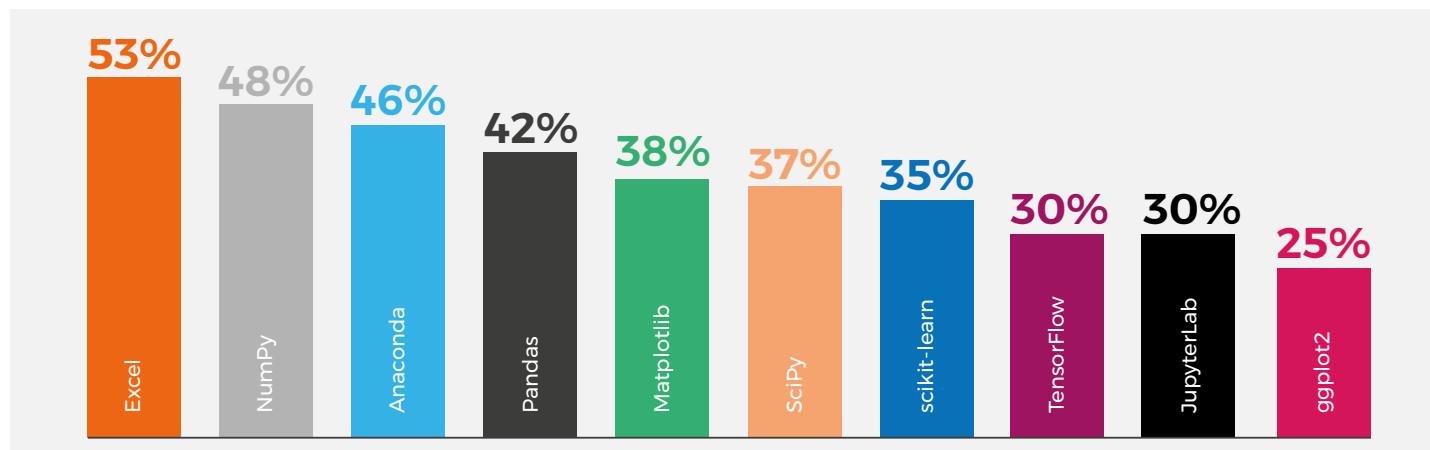
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Surprisingly, **JavaScript** clocks in as more commonly used by data analysts than **Java**. Perhaps as the requirements for constructing accessible web-based dashboards for business intelligence grows, more and more data specialists are having to get to grips with web tech.

> Top libraries, tools and frameworks

After old classic **Excel**, **eight of the top ten** most used data tools are derived from or utilize **Python**. This is where we see one of the key strengths that has caused Python's rise to dominance - the great power and variety of the tools to pair with it. Only in **10th place** does an **R Library** make a showing, in the form of **ggplot2**.

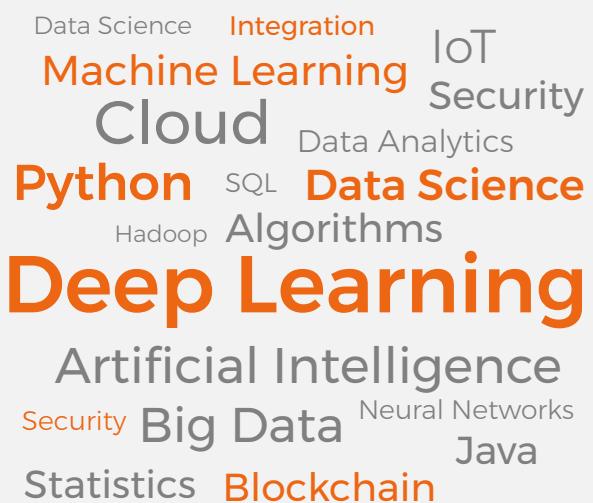


> What's the next big thing in data?

Weighted by frequency, in the next 12 months, data specialists said they are planning on learning:



They say the most valuable thing for workers in their field to be learning is:



TensorFlow, Deep Learning and Machine Learning

Pushing machine learning algorithms further and further is going to be one of the key challenges for every data professional over the next year and beyond. For some this will mean getting deeper into the complexities of incredibly sophisticated AI systems. For others, especially those starting out in data analysis, becoming acquainted with deep learning - via TensorFlow - will be an important step into deep learning.

Advanced Deep Learning

Deep Learning with PyTorch

Deep Learning Quick Reference

3 Specially Selected Titles for \$25

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Natural Language Processing

Natural language processing is currently one of the most important areas in data science. When you consider the rise of conversational UI, as well as the importance of interpreting text whether that's for understanding customer sentiment or healthcare research, it's easy to see why it's such a valuable area.

Practical NLP

Natural Language Processing with Python Cookbook

Python Natural Language Processing

3 Specially Selected Titles for \$25

Add to Cart



Python and PyTorch

Natural language processing is currently one of the most important areas in data science. When you consider the rise of conversational UI, as well as the importance of interpreting text whether that's for understanding customer sentiment or healthcare research, it's easy to see why it's such a valuable area.



Blockchain

Data professionals were the group most likely to view Blockchain as revolutionary. This makes sense, especially in the context of 2018's anxiety around data. With Blockchain, data is more secure; distributed ledgers give you greater visibility on where data has come from, when it was gathered. This is good news from both an analytics and a trust perspective.



Cloud

If software infrastructure is largely cloud based today, the opportunities for data pros are immense. Not only does cloud change the way data is stored, potentially making it more accessible for analysts and scientists, we're also seeing some cloud solutions starting to feature machine learning capabilities. This takes away some of the biggest challenges data analysts face - most importantly, saving a lot of time.



Interest in Spark comes down to two key things: size and speed. There's no other data platform out there that allows you to process such huge amounts of data at immense speed. It has already taken over from Hadoop - but where Hadoop required a lot of effort and investment, Spark simply sits on top of existing big data infrastructure.

Clearly, the big data revolution has passed, and engineers and developers are now looking towards the next generation of big data architecture and analytics.

> Hot Topics

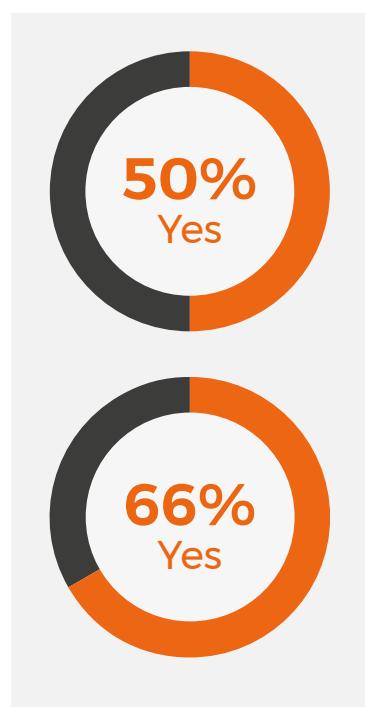
Has Python completely supplanted R as the language of data?

Despite the prevalence of **Python** among most-used languages, respondents are split over whether it's completely overtaken **R**.

But is this R fighting back - or a tipping point it is unlikely to recover from?

Are you incorporating deep learning techniques into your data analysis?

66% of respondents said that they were incorporating **deep learning techniques** into their data analysis. Having embraced the power and potential of machine learning, the industry is now pushing even further into neural networks and machine intelligence outside of the lab.



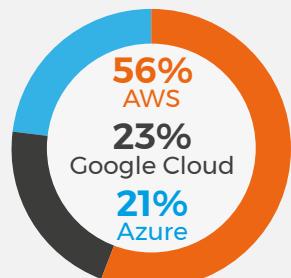
Are you excited about the potential of quantum computing?

Whether it's still decades away or just around the corner, the possibilities of **quantum computing** are really exciting the modern data analyst.



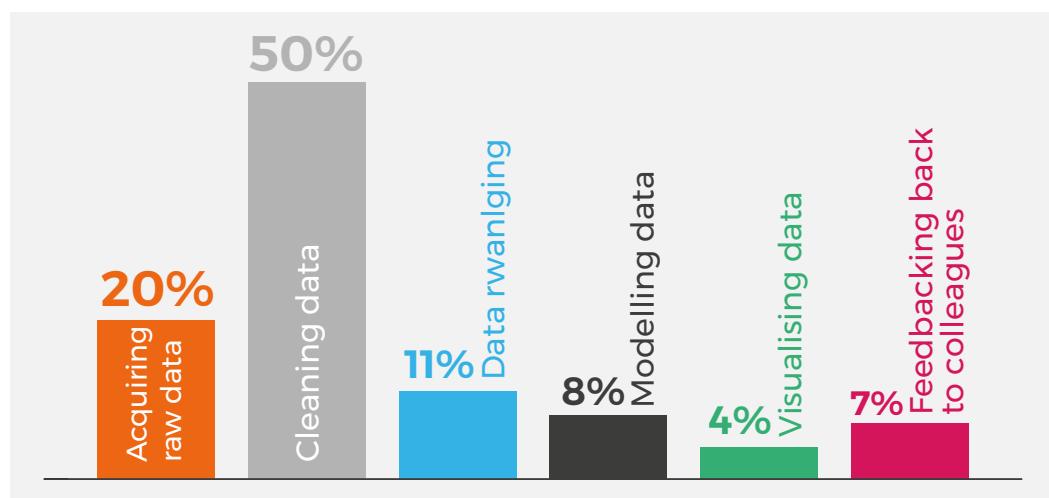
Which cloud platform do you think is best for big data?

Over half of all respondents still think that reigning **Cloud** provider **AWS** is the best service to use for **Big Data**.



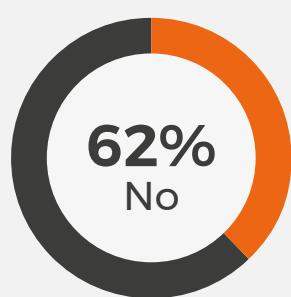
What's the worst part of the data analysis process?

By far, respondents say the **worst part of data analysis** is **cleaning data**. Over half say it's the worst part of their jobs!



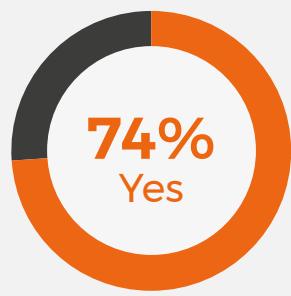
Do you think your organization asks the right questions of its data?

62% of data workers said that they didn't think their organization was asking the right questions of its data. We know that data is vital to decision making - yet the majority of people giving us answers don't think we're asking for the things we need.



Do you think Blockchain technology will be revolutionary?

Respondents working in data were the most likely to say they thought that Blockchain technology would be revolutionary. 74% were in favor of a Blockchain revolution - more than both app developers, and web developers.



8.

Final Thoughts

When the first Skill Up survey ran in 2015, two words were everywhere: Big Data. Four surveys later, we've seen another two words rise to prominence across all tech disciplines. Machine learning crops up again and again as one of the most vital things for developers to be adding to their skills portfolio. With the recent preview of advanced AI assistants like Google Duplex, it feels like we might be on the brink of another real big revolution in tech. Machine learning: is it the next Big Data? The next mobile?

Perhaps one of the most heartening things in the Skill Up survey is the strength of community developers feel with their peers, and how much they genuinely seem to love working in tech. As the industry matures, it's great to see that passion and a communal spirit remains and grows.

Packt are proud to support the developer community. When developers need the skills to respond quickly and reliably to change, we strive to be there with the insight they need to skill up. However you work, whatever tools you use, Packt will be there on demand with answers.

Thanks to all those who took part in this year's survey, and to you for reading this report. Follow **@PacktPub** on Twitter, find us on **Facebook**, or check out the **Packt Hub** for more insights and discussion.



What do you think about our report findings?
Tweet us @packtpub using the hashtag #Skillup2018

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