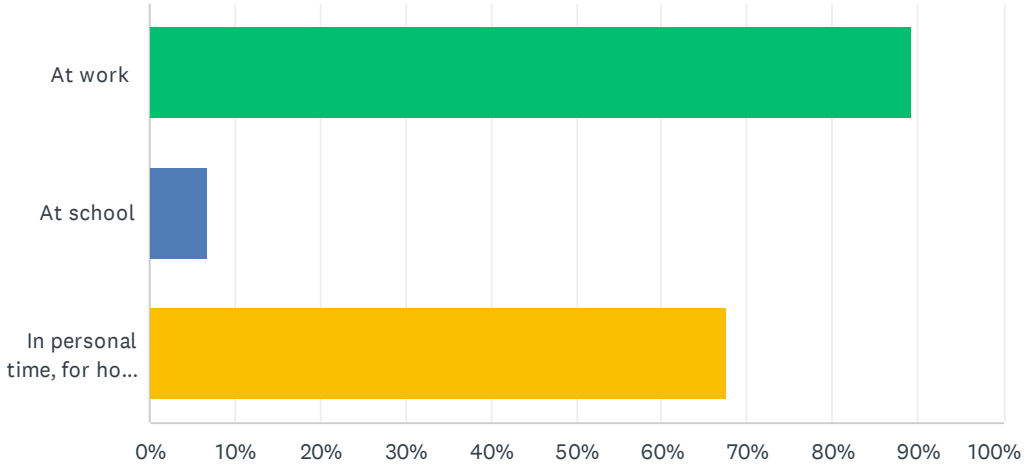
Q1 Where do you use C++? (select all that apply)

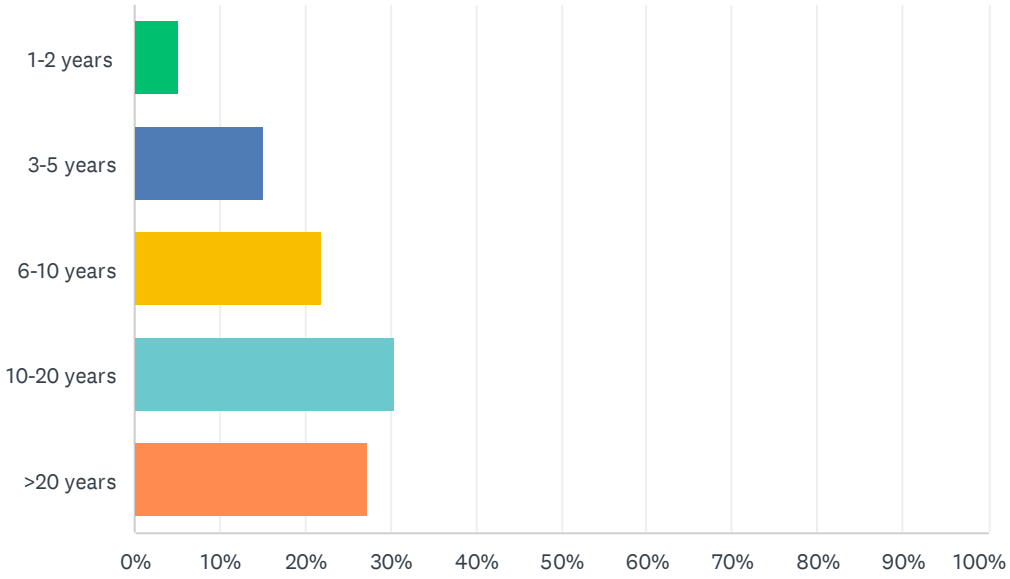
Answered: 1,720 Skipped: 6



ANSWER CHOICES	RESPONSES	
At work	89.24%	1,535
At school	6.80%	117
In personal time, for hobby projects or to try new things	67.62%	1,163
Total Respondents: 1,720		

Q2 How many years of programming experience do you have in C++ specifically?

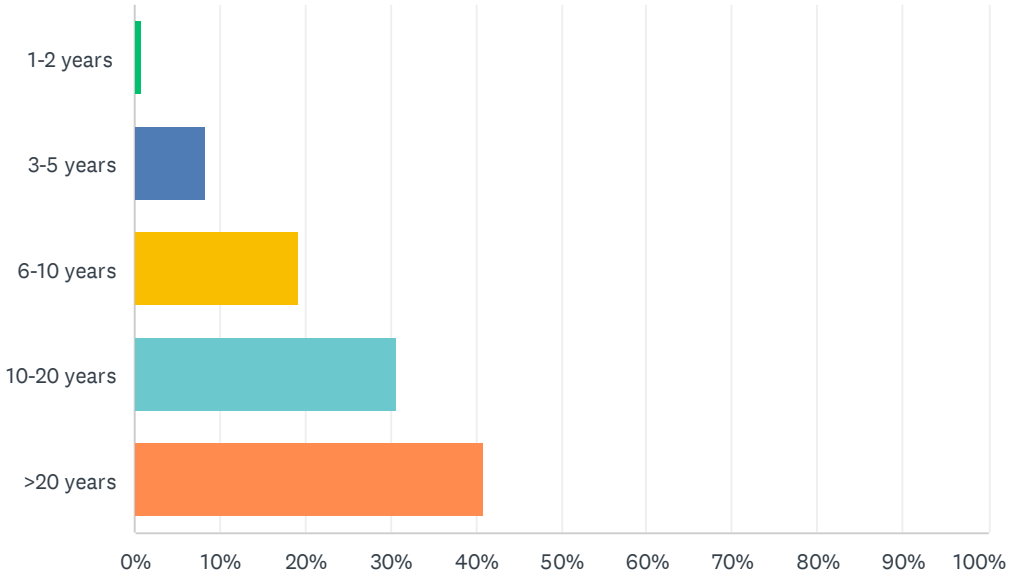
Answered: 1,722 Skipped: 4



ANSWER CHOICES	RESPONSES	
1-2 years	5.11%	88
3-5 years	15.16%	261
6-10 years	22.01%	379
10-20 years	30.43%	524
>20 years	27.29%	470
TOTAL		1,722

Q3 How many years of programming experience do you have overall (all languages)?

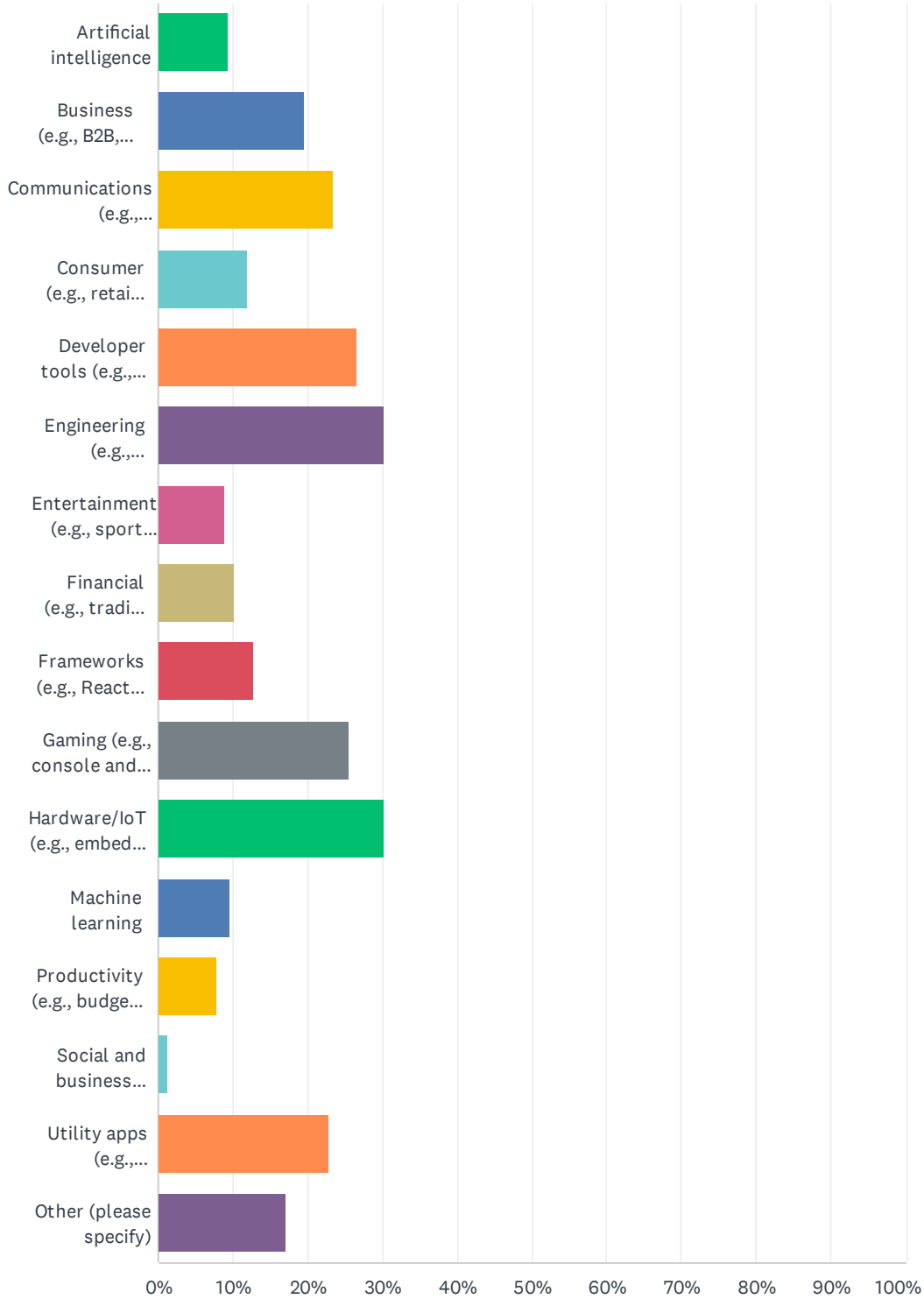
Answered: 1,716 Skipped: 10



ANSWER CHOICES	RESPONSES	
1-2 years	0.87%	15
3-5 years	8.22%	141
6-10 years	19.23%	330
10-20 years	30.77%	528
>20 years	40.91%	702
TOTAL		1,716

Q4 What types of projects do you work on? (select all that apply)

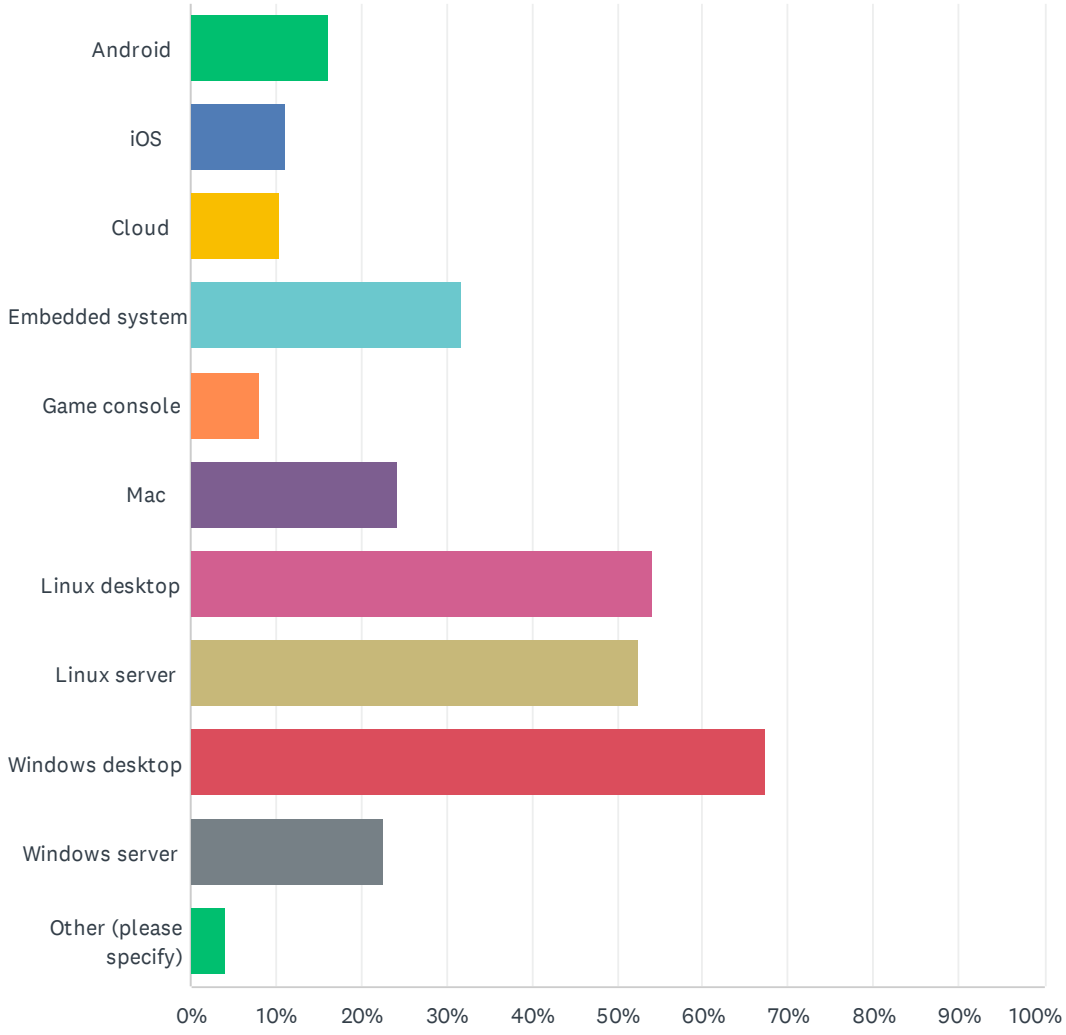
Answered: 1,715 Skipped: 11



ANSWER CHOICES	RESPONSES	
Artificial intelligence	9.33%	160
Business (e.g., B2B, B2E)	19.53%	335
Communications (e.g., networking, email)	23.56%	404
Consumer (e.g., retail websites, mobile apps)	11.84%	203
Developer tools (e.g., compilers, code editors)	26.65%	457
Engineering (e.g., avionics, power management)	30.38%	521
Entertainment (e.g., sports apps, video streaming)	9.04%	155
Financial (e.g., trading, mortgage, asset management)	10.26%	176
Frameworks (e.g., React, Unity)	12.83%	220
Gaming (e.g., console and mobile games)	25.60%	439
Hardware/IoT (e.g., embedded systems, home automation)	30.26%	519
Machine learning	9.68%	166
Productivity (e.g., budget tracking, note taking)	7.93%	136
Social and business networking (e.g., Facebook, Twitter)	1.22%	21
Utility apps (e.g., calculators, simple image editors)	22.74%	390
Other (please specify)	16.97%	291
Total Respondents: 1,715		

Q5 What platforms do you develop for? (select all that apply)

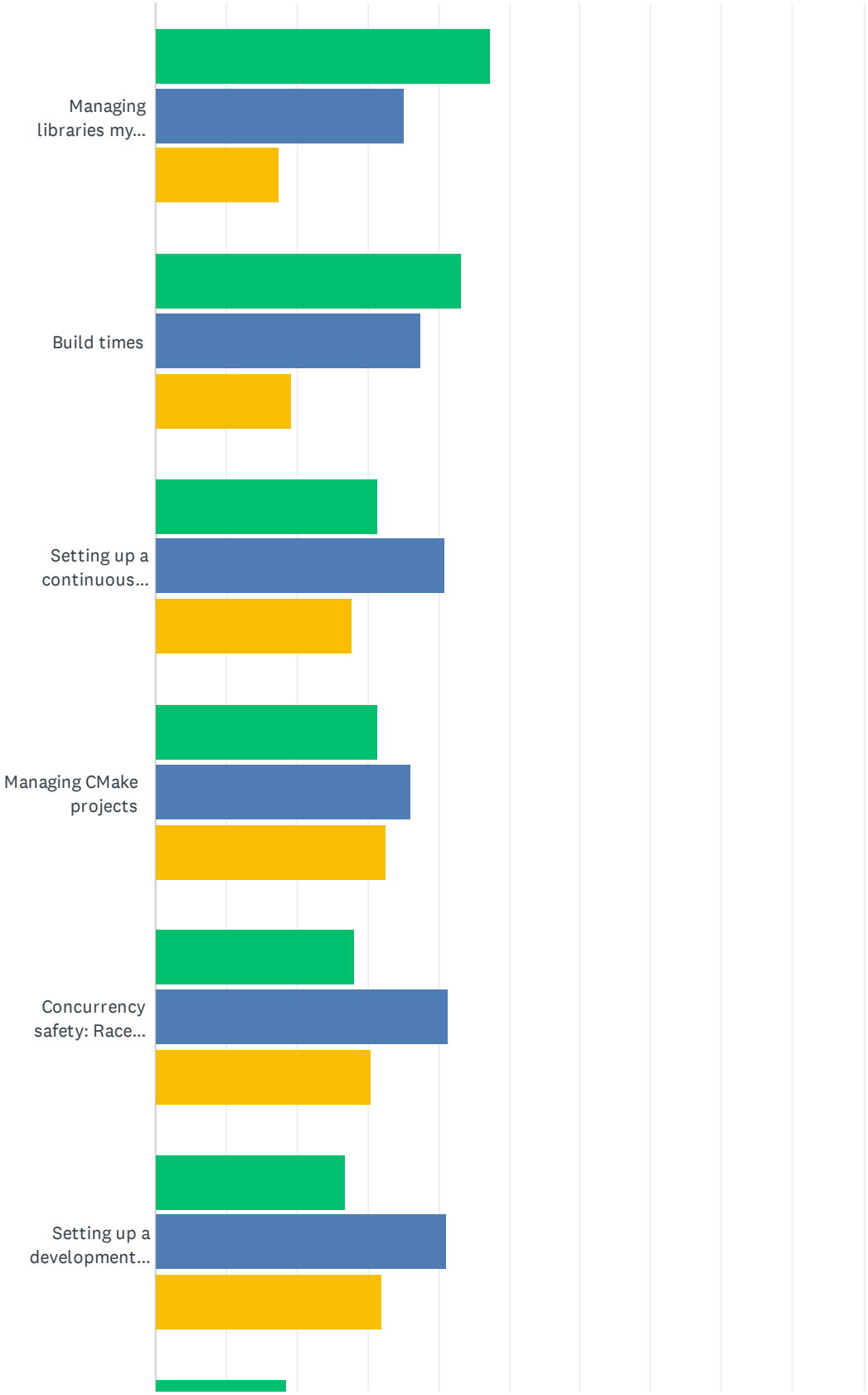
Answered: 1,720 Skipped: 6

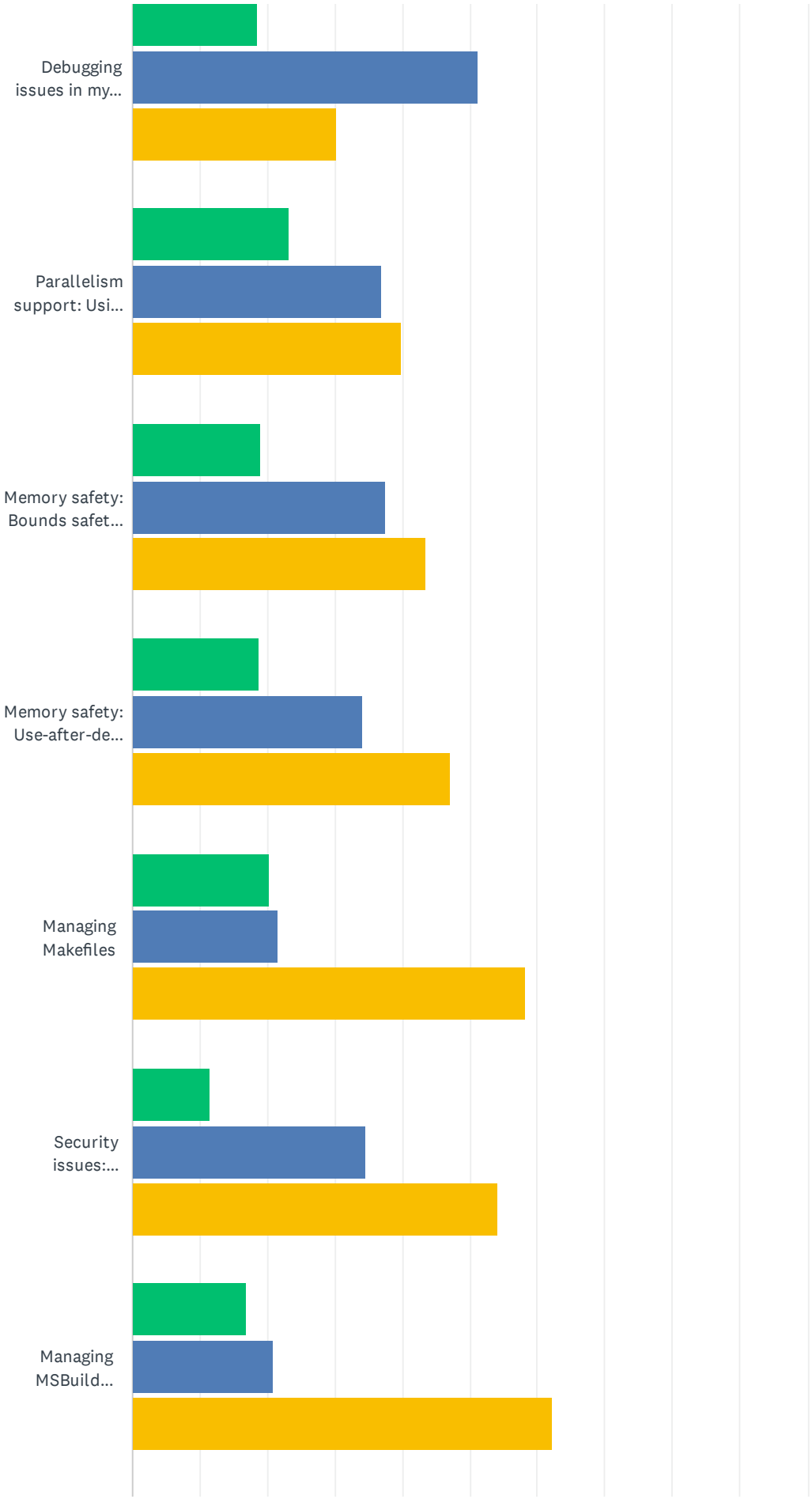


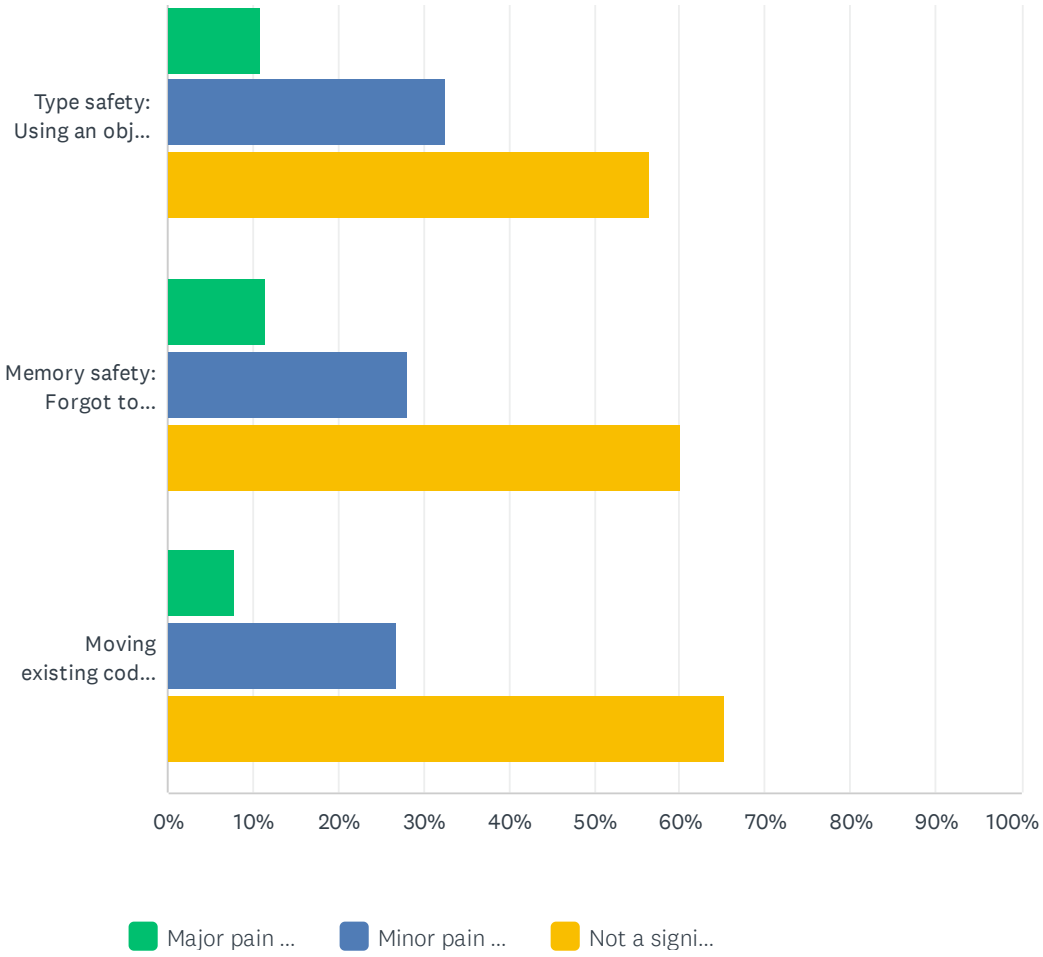
ANSWER CHOICES	RESPONSES	
Android	16.10%	277
iOS	11.16%	192
Cloud	10.47%	180
Embedded system	31.74%	546
Game console	8.20%	141
Mac	24.36%	419
Linux desktop	54.19%	932
Linux server	52.44%	902
Windows desktop	67.38%	1,159
Windows server	22.50%	387
Other (please specify)	4.01%	69
Total Respondents: 1,720		

Q6 Which of these do you find frustrating about C++ development?

Answered: 1,721 Skipped: 5




Debugging issues in my...
Parallelism support: Usi...
Memory safety: Bounds safet...
Memory safety: Use-after-de...
Managing Makefiles
Security issues:...
Managing MSBuild...


Type safety: Using an obj...
Memory safety: Forgot to...
Moving existing cod...
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Major pain ...
Minor pain ...
Not a signi...

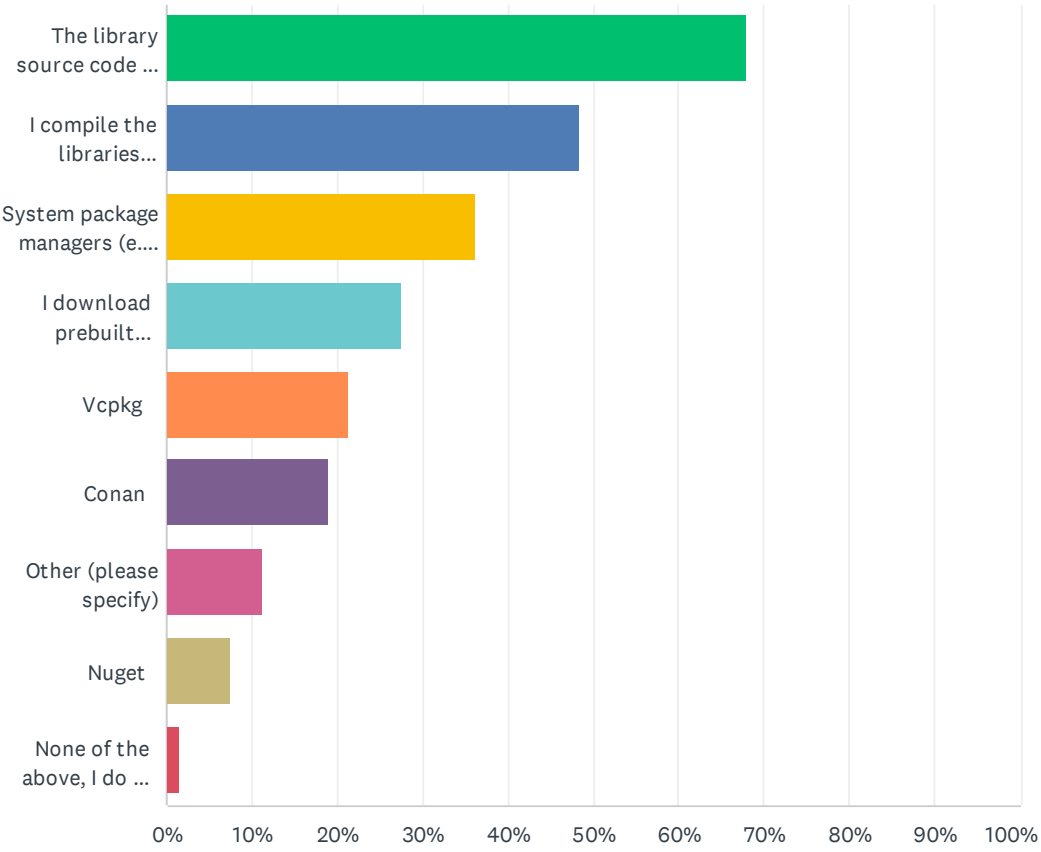
	MAJOR PAIN POINT	MINOR PAIN POINT	NOT A SIGNIFICANT ISSUE FOR ME	TOTAL	WEIGHTED AVERAGE
Managing libraries my application depends on	47.37% 810	35.09% 600	17.54% 300	1,710	2.30
Build times	43.34% 735	37.56% 637	19.10% 324	1,696	2.24
Setting up a continuous integration pipeline from scratch (automated builds, tests, …)	31.35% 531	40.85% 692	27.80% 471	1,694	2.04
Managing CMake projects	31.24% 527	36.10% 609	32.66% 551	1,687	1.99
Concurrency safety: Races, deadlocks, performance bottlenecks	28.17% 480	41.37% 705	30.46% 519	1,704	1.98
Setting up a development environment from scratch (compiler, build system, IDE, …)	26.83% 459	41.09% 703	32.09% 549	1,711	1.95
Debugging issues in my code	18.52% 313	51.24% 866	30.24% 511	1,690	1.88
Parallelism support: Using more CPU/GPU/other cores to compute an answer faster	23.24% 393	36.84% 623	39.92% 675	1,691	1.83
Memory safety: Bounds safety issues (read/write beyond the bounds of an object or array)	18.92% 323	37.55% 641	43.53% 743	1,707	1.75
Memory safety: Use-after-delete/free (dangling pointers, iterators, spans, …)	18.83% 321	34.13% 582	47.04% 802	1,705	1.72
Managing Makefiles	20.21% 333	21.48% 354	58.31% 961	1,648	1.62
Security issues: Overlaps with “safety” but includes other issues (secret disclosure, vulnerabilities, exploits, …)	11.42% 193	34.44% 582	54.14% 915	1,690	1.57
Managing MSBuild projects	16.77% 274	20.99% 343	62.24% 1,017	1,634	1.55
Type safety: Using an object as the wrong type (unsafe downcasts, unsafe unions, …)	10.90% 186	32.69% 558	56.41% 963	1,707	1.54
Memory safety: Forgot to delete/free (memory leaks)	11.60% 198	28.24% 482	60.16% 1,027	1,707	1.51
Moving existing code to the latest language standard	7.92% 135	26.88% 458	65.20% 1,111	1,704	1.43

Q7 In the past year, what things in the C++ world (in standards, projects, conferences, articles, etc.) are you most excited about / make you feel positive about C++ and its future? Why?

Answered: 978 Skipped: 748

Q8 How do you manage your C++ 1st and 3rd party libraries? (Check all that apply)

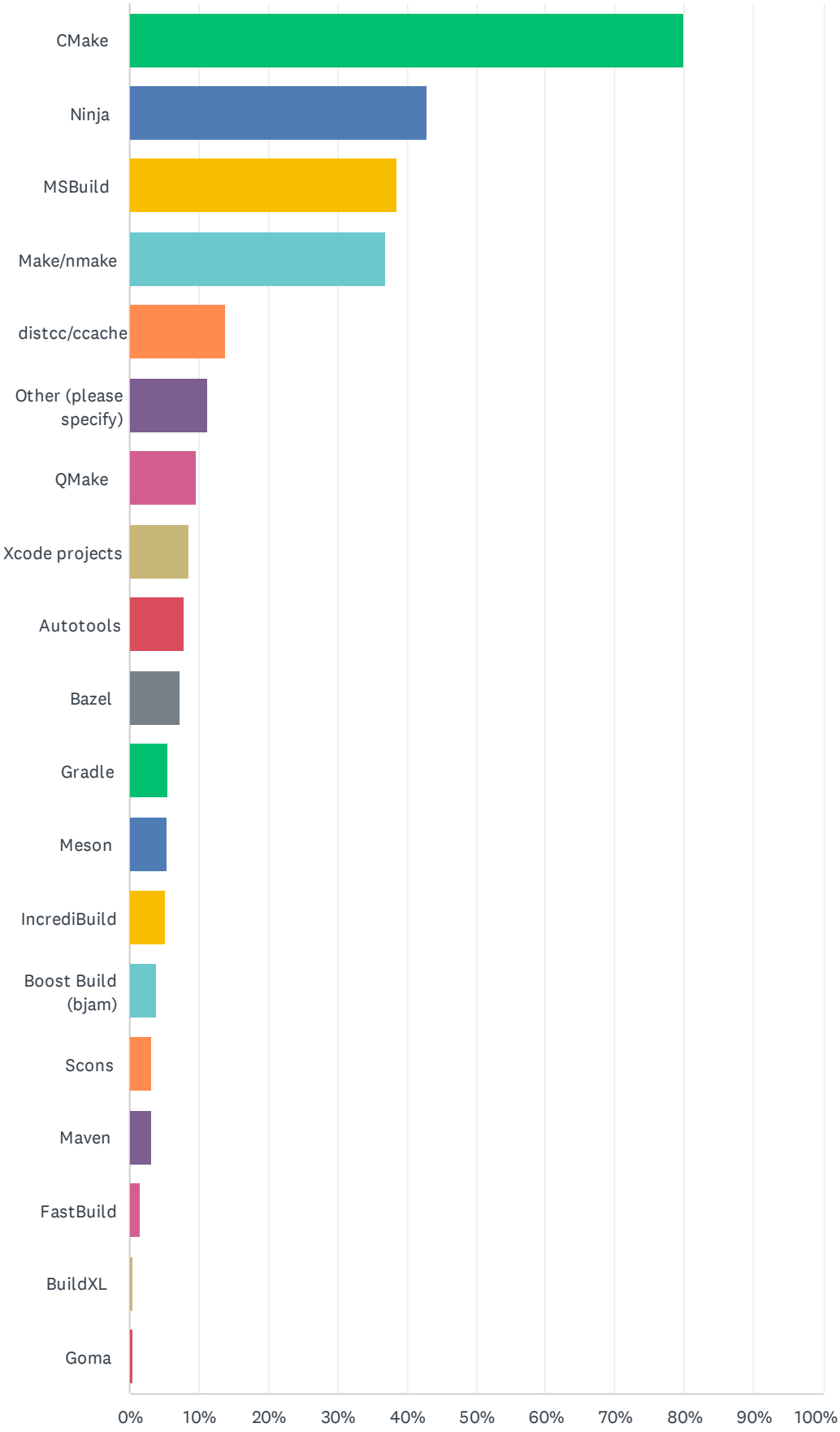
Answered: 1,706 Skipped: 20



ANSWER CHOICES	RESPONSES	
The library source code is part of my build	68.11%	1,162
I compile the libraries separately using their instructions	48.30%	824
System package managers (e.g., apt, brew, …)	36.23%	618
I download prebuilt libraries from the Internet	27.43%	468
Vcpkg	21.34%	364
Conan	18.93%	323
Other (please specify)	11.25%	192
Nuget	7.50%	128
None of the above, I do not have any dependencies	1.41%	24
Total Respondents: 1,706		

Q9 What build tools do you use? (Check all that apply)

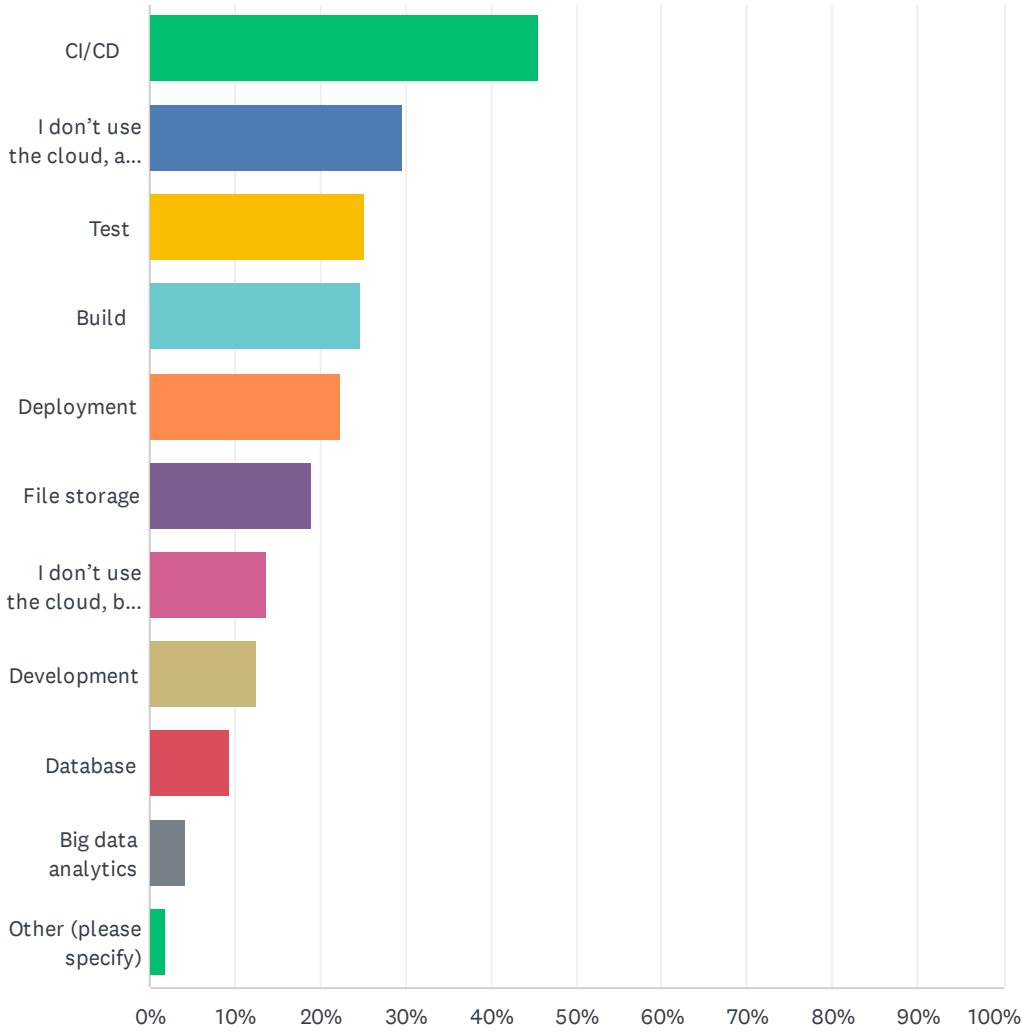
Answered: 1,705 Skipped: 21


CMake
Ninja
MSBuild
Make/nmake
distcc/ccache
Other (please specify)
QMake
Xcode projects
Autotools
Bazel
Gradle
Meson
IncrediBuild
Boost Build (bjam)
Scons
Maven
FastBuild
BuildXL
Goma
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

ANSWER CHOICES	RESPONSES	
CMake	79.88%	1,362
Ninja	42.93%	732
MSBuild	38.53%	657
Make/nmake	36.89%	629
distcc/ccache	13.96%	238
Other (please specify)	11.38%	194
QMake	9.62%	164
Xcode projects	8.62%	147
Autotools	7.92%	135
Bazel	7.27%	124
Gradle	5.45%	93
Meson	5.28%	90
IncrediBuild	5.10%	87
Boost Build (bjam)	3.81%	65
Scons	3.23%	55
Maven	3.17%	54
FastBuild	1.58%	27
BuildXL	0.47%	8
Goma	0.35%	6
Total Respondents: 1,705		

Q10 What parts of your development lifecycle use the cloud? (Check all that apply)

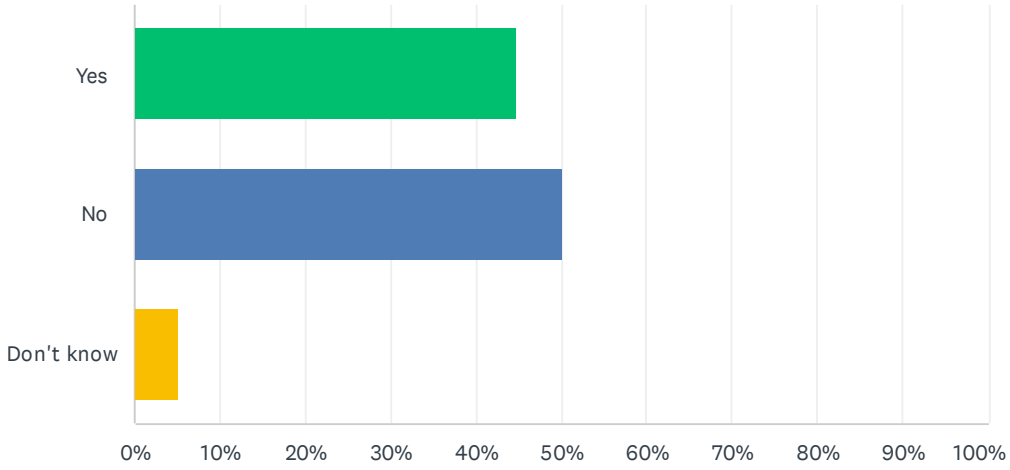
Answered: 1,681 Skipped: 45



ANSWER CHOICES	RESPONSES	
CI/CD	45.69%	768
I don’t use the cloud, and I am not interested	29.57%	497
Test	25.10%	422
Build	24.69%	415
Deployment	22.37%	376
File storage	18.92%	318
I don’t use the cloud, but I am interested	13.74%	231
Development	12.67%	213
Database	9.28%	156
Big data analytics	4.28%	72
Other (please specify)	2.02%	34
Total Respondents: 1,681		

Q11 Does your current project use sanitizers and/or fuzzing as part of its normal development and release cycle?

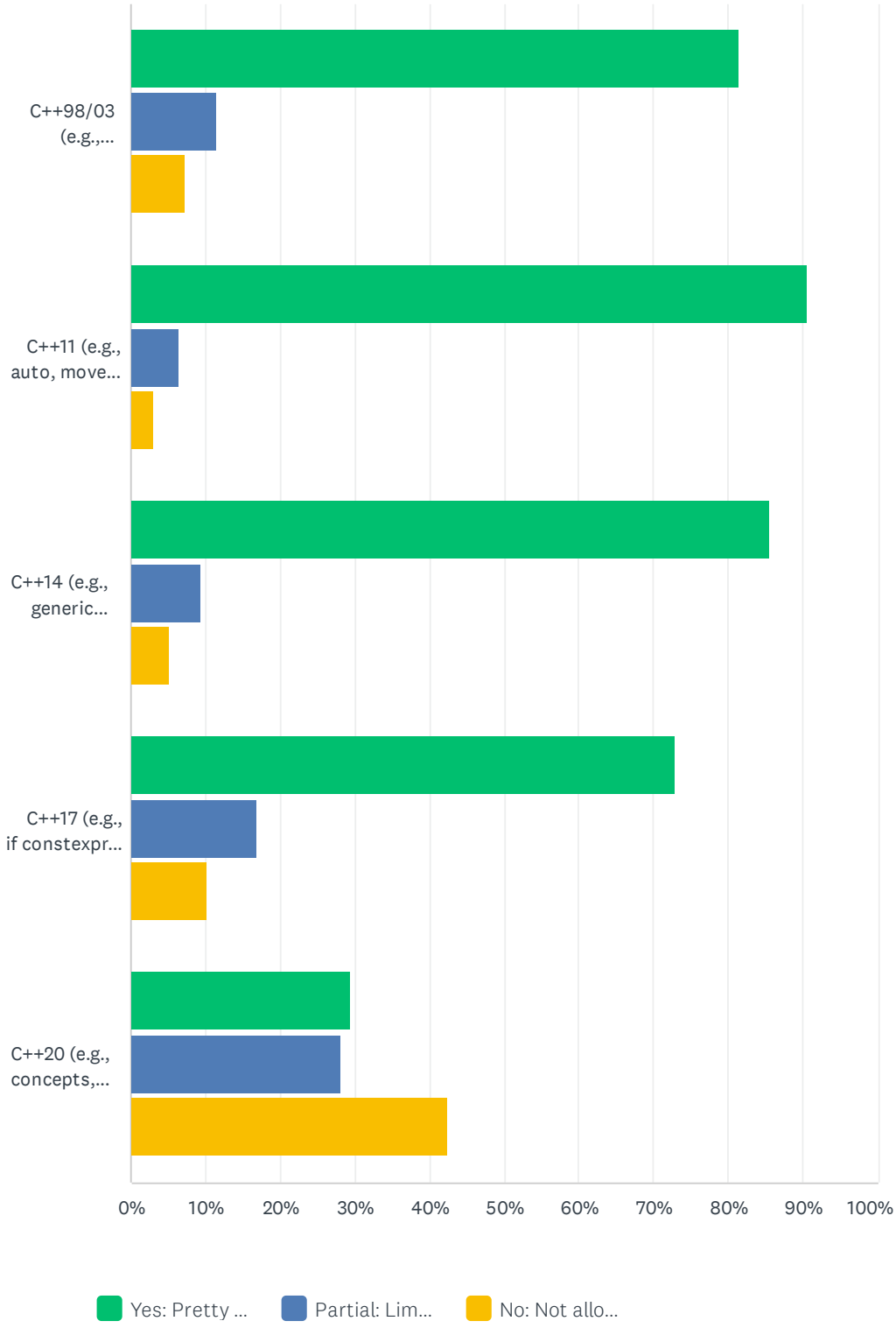
Answered: 1,708 Skipped: 18



ANSWER CHOICES	RESPONSES	
Yes	44.85%	766
No	50.06%	855
Don't know	5.09%	87
TOTAL		1,708

Q12 What version(s) of C++ are you allowed to use on your current project (work or school)?

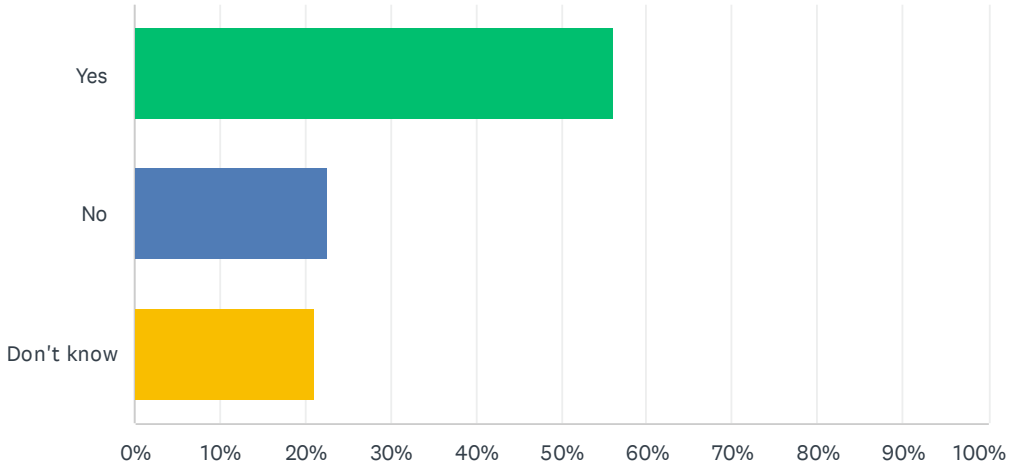
Answered: 1,707 Skipped: 19



	YES: PRETTY MUCH ALL	PARTIAL: LIMITED FEATURES/USAGE	NO: NOT ALLOWED	TOTAL	WEIGHTED AVERAGE
C++98/03 (e.g., exceptions, templates, RTTI)	81.35% 1,278	11.46% 180	7.19% 113	1,571	2.74
C++11 (e.g., auto, move semantics, =delete/=default, shared_ptr, lambdas)	90.69% 1,452	6.31% 101	3.00% 48	1,601	2.88
C++14 (e.g., generic lambdas, auto return types, general constexpr functions)	85.42% 1,377	9.43% 152	5.15% 83	1,612	2.80
C++17 (e.g., if constexpr, if/switch scoped variables, structured bindings, string_view, optional/any/variant, Parallel STL)	72.91% 1,203	16.79% 277	10.30% 170	1,650	2.63
C++20 (e.g., concepts, coroutines, modules)	29.33% 483	28.17% 464	42.50% 700	1,647	1.87

Q13 In the next 12 months, does your current project plan to start allowing additional use of newer C++ standard features (i.e., more than in the previous answer)?

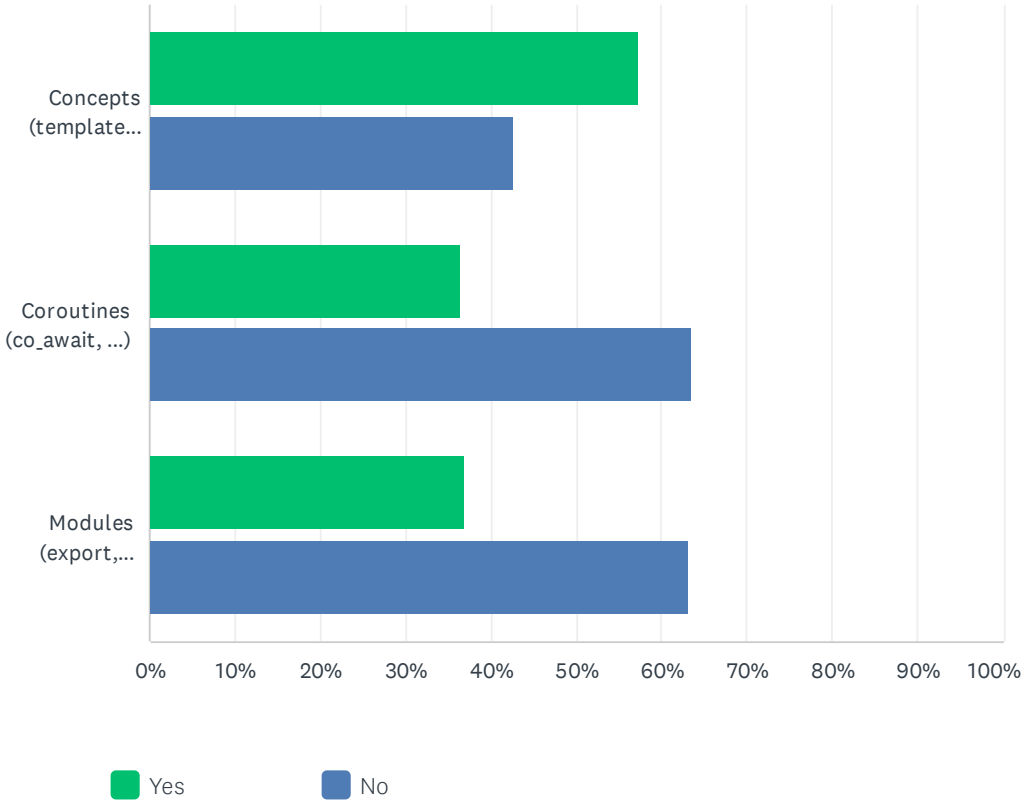
Answered: 1,700 Skipped: 26



ANSWER CHOICES	RESPONSES	
Yes	56.18%	955
No	22.65%	385
Don't know	21.18%	360
TOTAL		1,700

Q14 Specifically for major C++20/23 features: In the next 12 months, does your current project plan to allow use of these C++20 features in production code?

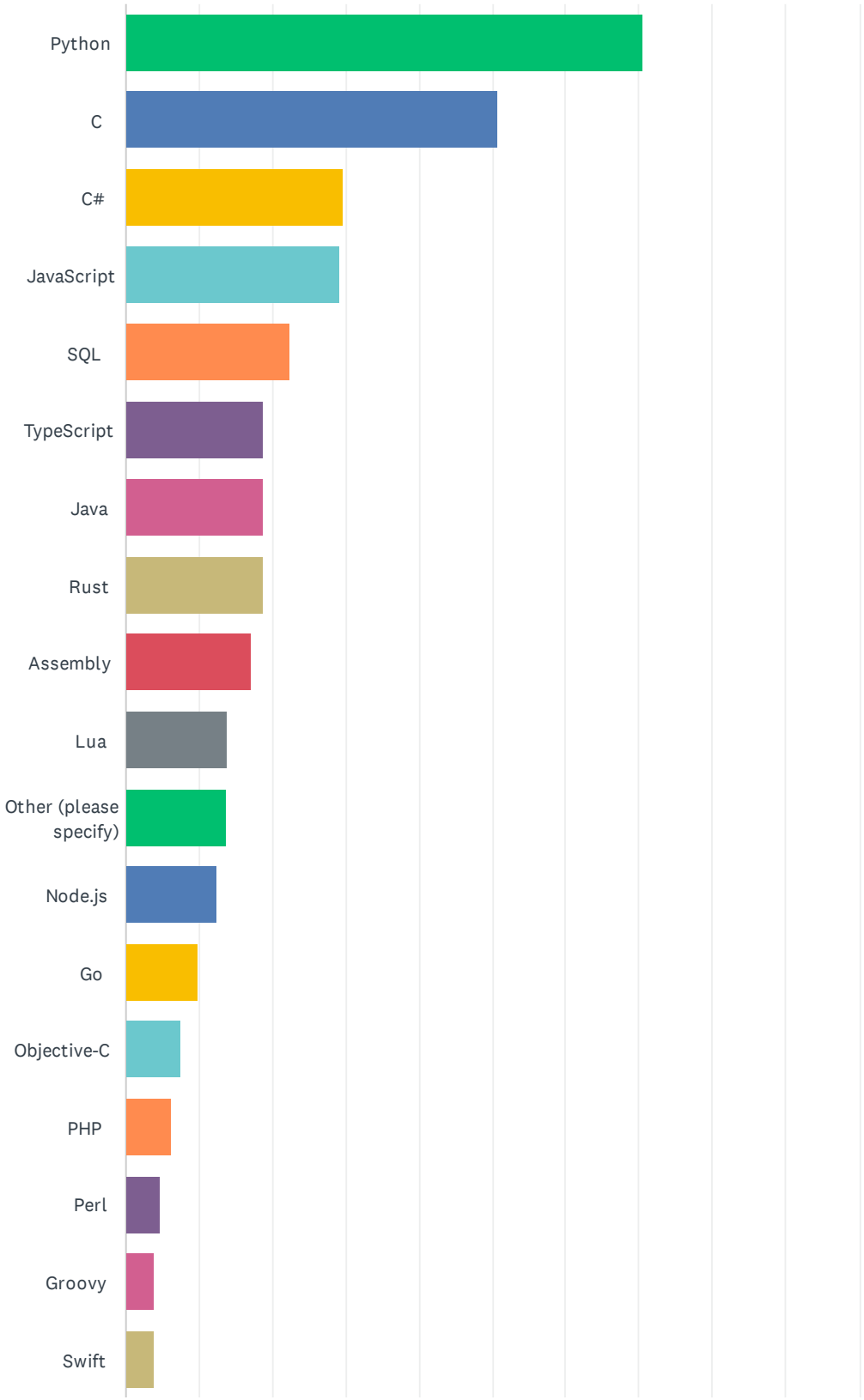
Answered: 1,650 Skipped: 76

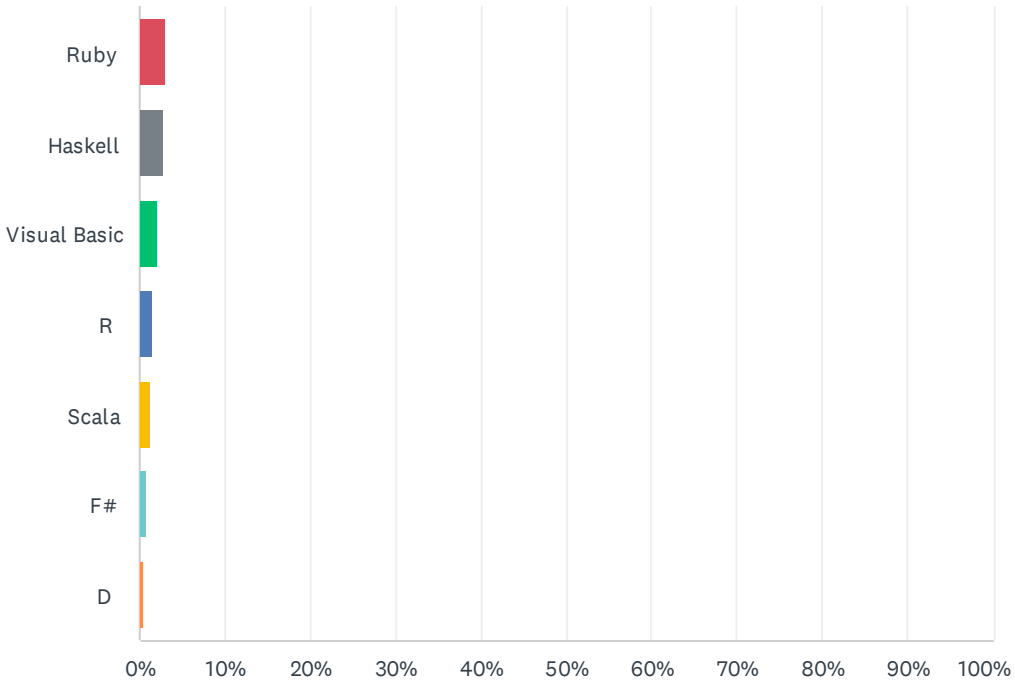


	YES	NO	TOTAL	WEIGHTED AVERAGE
Concepts (template constraints, requires, ...)	57.39% 940	42.61% 698	1,638	1.85
Coroutines (co_await, ...)	36.42% 594	63.58% 1,037	1,631	2.27
Modules (export, import, ...)	36.87% 601	63.13% 1,029	1,630	2.26

Q15 Besides C++, what programming languages/environments do you use in your current and recent projects? (select all that apply)

Answered: 1,676 Skipped: 50

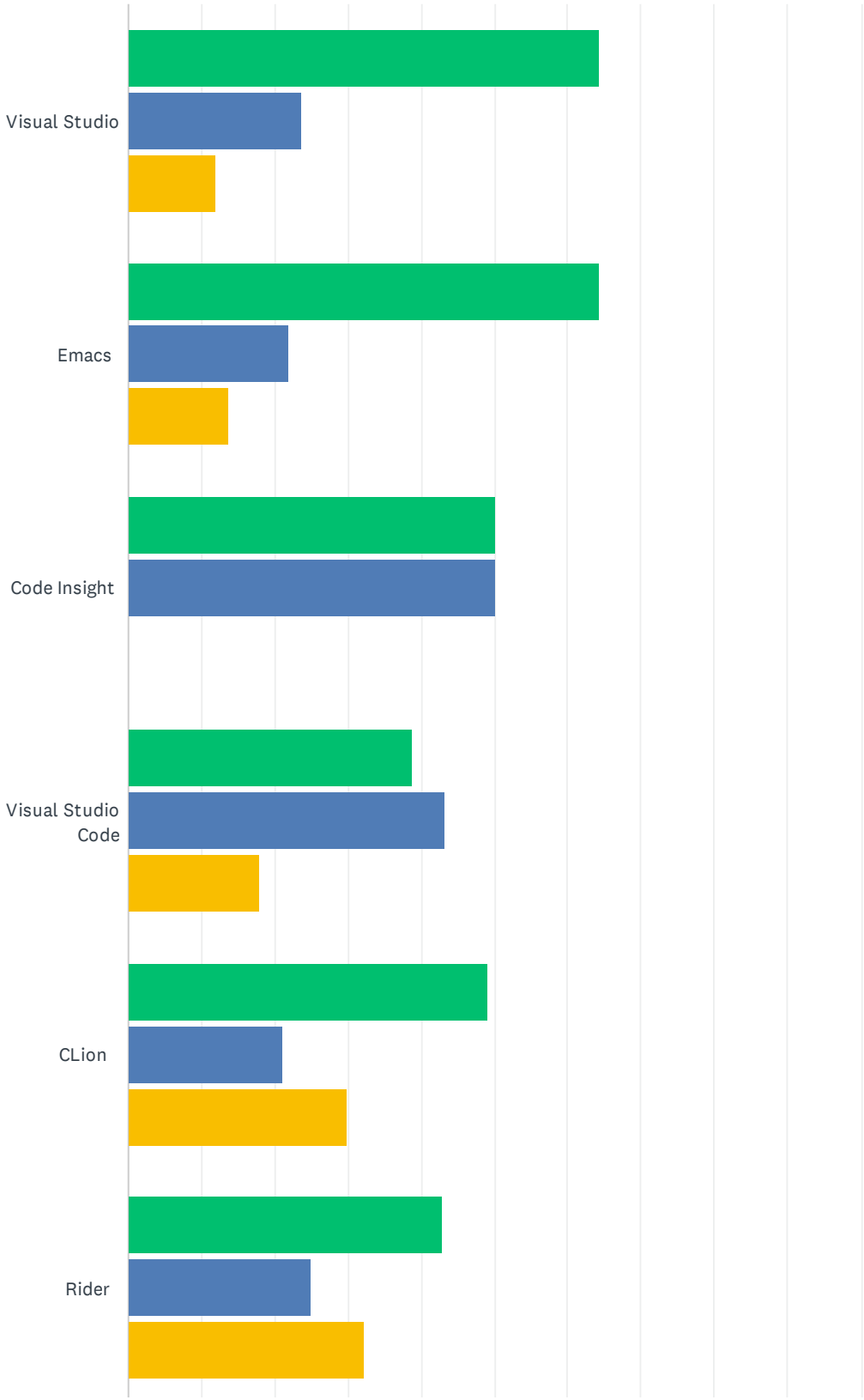



Ruby
Haskell
Visual Basic
R
Scala
F#
D
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

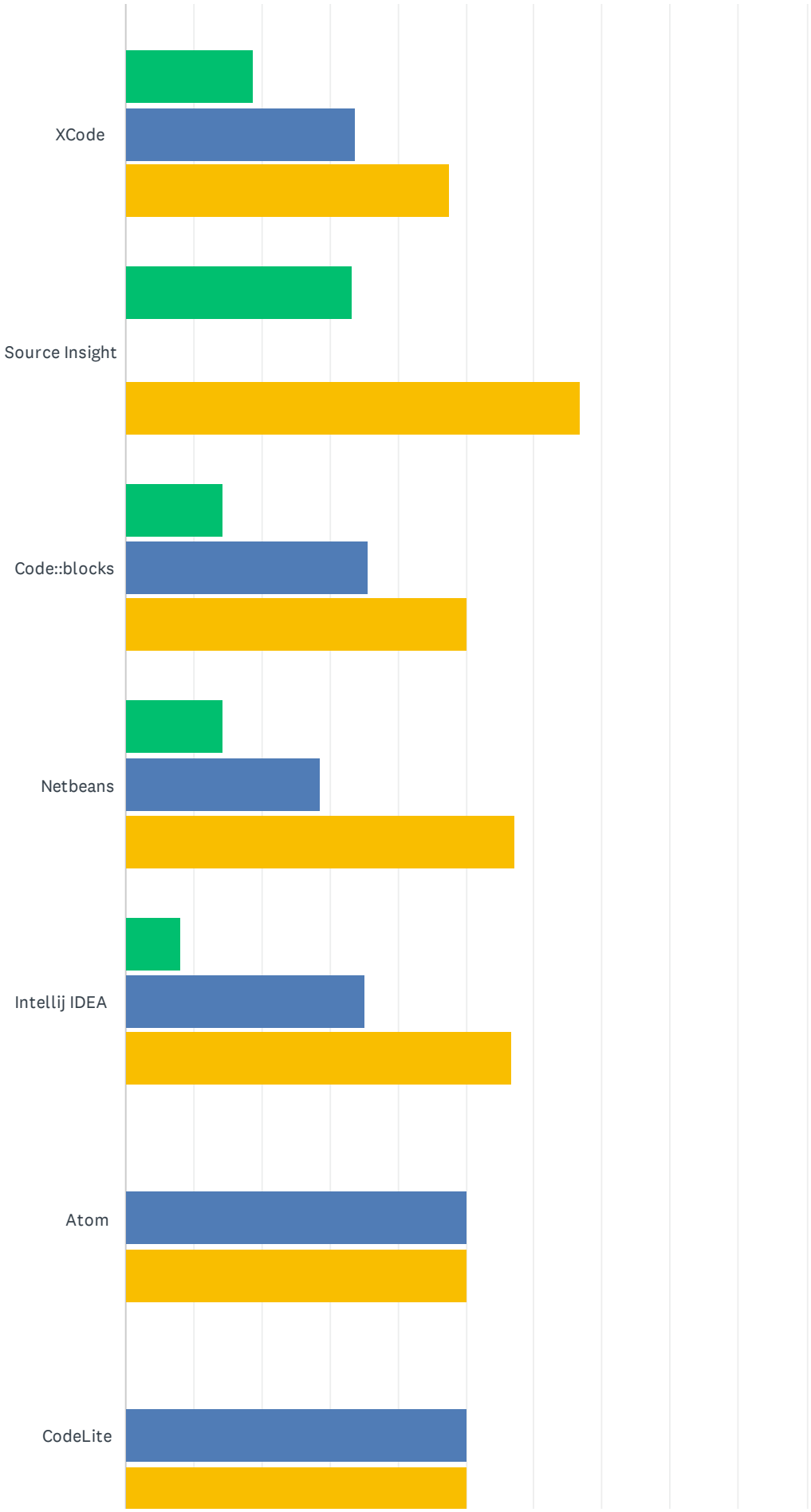
ANSWER CHOICES	RESPONSES	
Python	70.53%	1,182
C	50.78%	851
C#	29.59%	496
JavaScript	29.30%	491
SQL	22.43%	376
TypeScript	18.85%	316
Java	18.74%	314
Rust	18.68%	313
Assembly	17.06%	286
Lua	13.78%	231
Other (please specify)	13.60%	228
Node.js	12.41%	208
Go	9.73%	163
Objective-C	7.46%	125
PHP	6.21%	104
Perl	4.71%	79
Groovy	3.88%	65
Swift	3.88%	65
Ruby	2.98%	50
Haskell	2.86%	48
Visual Basic	2.03%	34
R	1.43%	24
Scala	1.25%	21
F#	0.84%	14
D	0.36%	6
Total Respondents: 1,676		

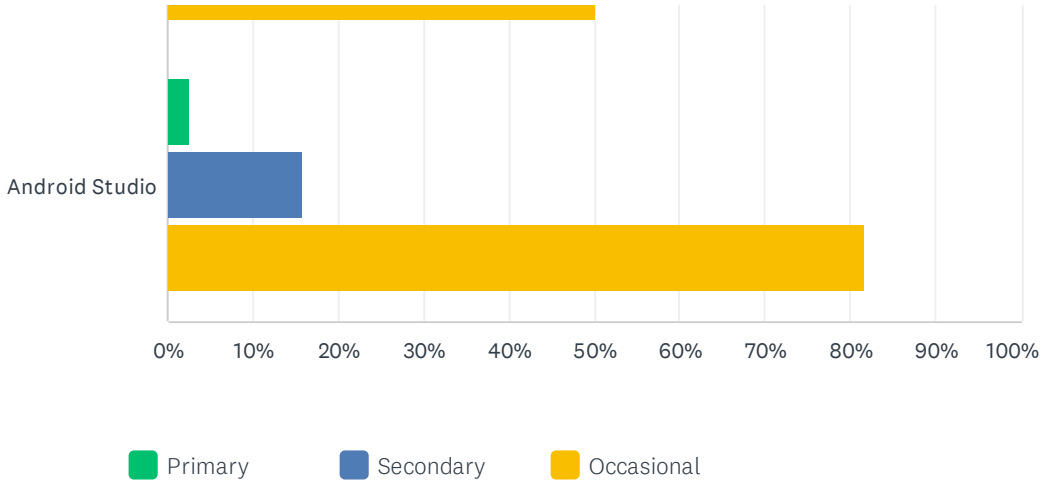
Q16 Which development environments (IDEs) or editors do you use for C++ development?

Answered: 1,708 Skipped: 18




Vim
KDevelop
Webstorm
Qt Creator
Eclipse
Sublime
Kate

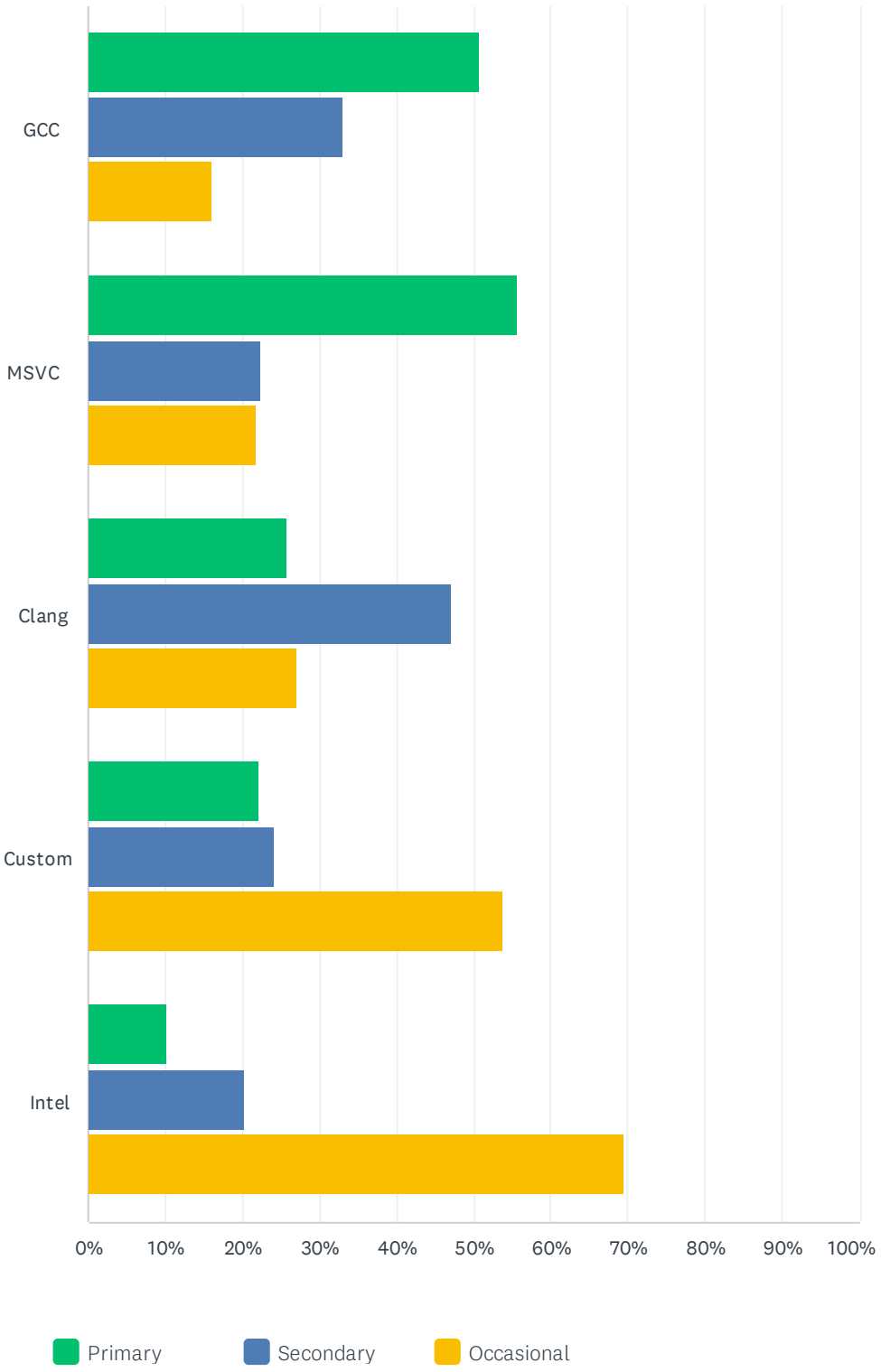

XCode
Source Insight
Code::blocks
Netbeans
Intellij IDEA
Atom
CodeLite


Android Studio
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Primary
Secondary
Occasional

	PRIMARY	SECONDARY	OCCASIONAL	TOTAL	WEIGHTED AVERAGE
Visual Studio	64.49% 632	23.67% 232	11.84% 116	980	2.53
Emacs	64.38% 94	21.92% 32	13.70% 20	146	2.51
Code Insight	50.00% 1	50.00% 1	0.00% 0	2	2.50
Visual Studio Code	38.72% 419	43.35% 469	17.93% 194	1,082	2.21
CLion	49.08% 133	21.03% 57	29.89% 81	271	2.19
Rider	42.86% 12	25.00% 7	32.14% 9	28	2.11
Vim	37.50% 192	29.10% 149	33.40% 171	512	2.04
KDevelop	34.38% 11	34.38% 11	31.25% 10	32	2.03
Webstorm	33.33% 1	33.33% 1	33.33% 1	3	2.00
Qt Creator	33.21% 91	28.10% 77	38.69% 106	274	1.95
Eclipse	32.84% 22	23.88% 16	43.28% 29	67	1.90
Sublime	20.20% 20	40.40% 40	39.39% 39	99	1.81
Kate	23.08% 9	30.77% 12	46.15% 18	39	1.77
XCode	18.75% 30	33.75% 54	47.50% 76	160	1.71
Source Insight	33.33% 1	0.00% 0	66.67% 2	3	1.67
Code::blocks	14.29% 2	35.71% 5	50.00% 7	14	1.64
Netbeans	14.29% 1	28.57% 2	57.14% 4	7	1.57
Intellij IDEA	8.11% 3	35.14% 13	56.76% 21	37	1.51
Atom	0.00% 0	50.00% 3	50.00% 3	6	1.50
CodeLite	0.00% 0	50.00% 1	50.00% 1	2	1.50
Android Studio	2.63% 2	15.79% 12	81.58% 62	76	1.21

Q17 Which compilers do you use for C++ development?

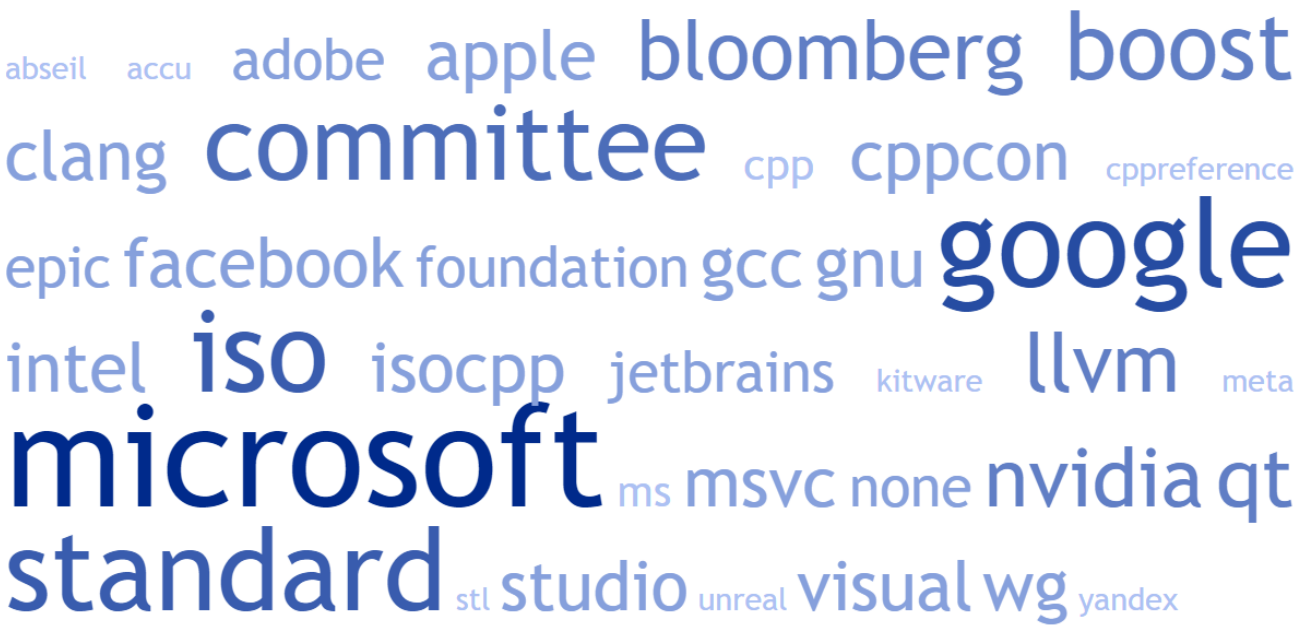
Answered: 1,708 Skipped: 18



	PRIMARY	SECONDARY	OCCASIONAL	TOTAL	WEIGHTED AVERAGE
GCC	50.84% 695	33.14% 453	16.02% 219	1,367	2.35
MSVC	55.70% 650	22.45% 262	21.85% 255	1,167	2.34
Clang	25.78% 337	47.21% 617	27.01% 353	1,307	1.99
Custom	22.22% 12	24.07% 13	53.70% 29	54	1.69
Intel	10.14% 7	20.29% 14	69.57% 48	69	1.41

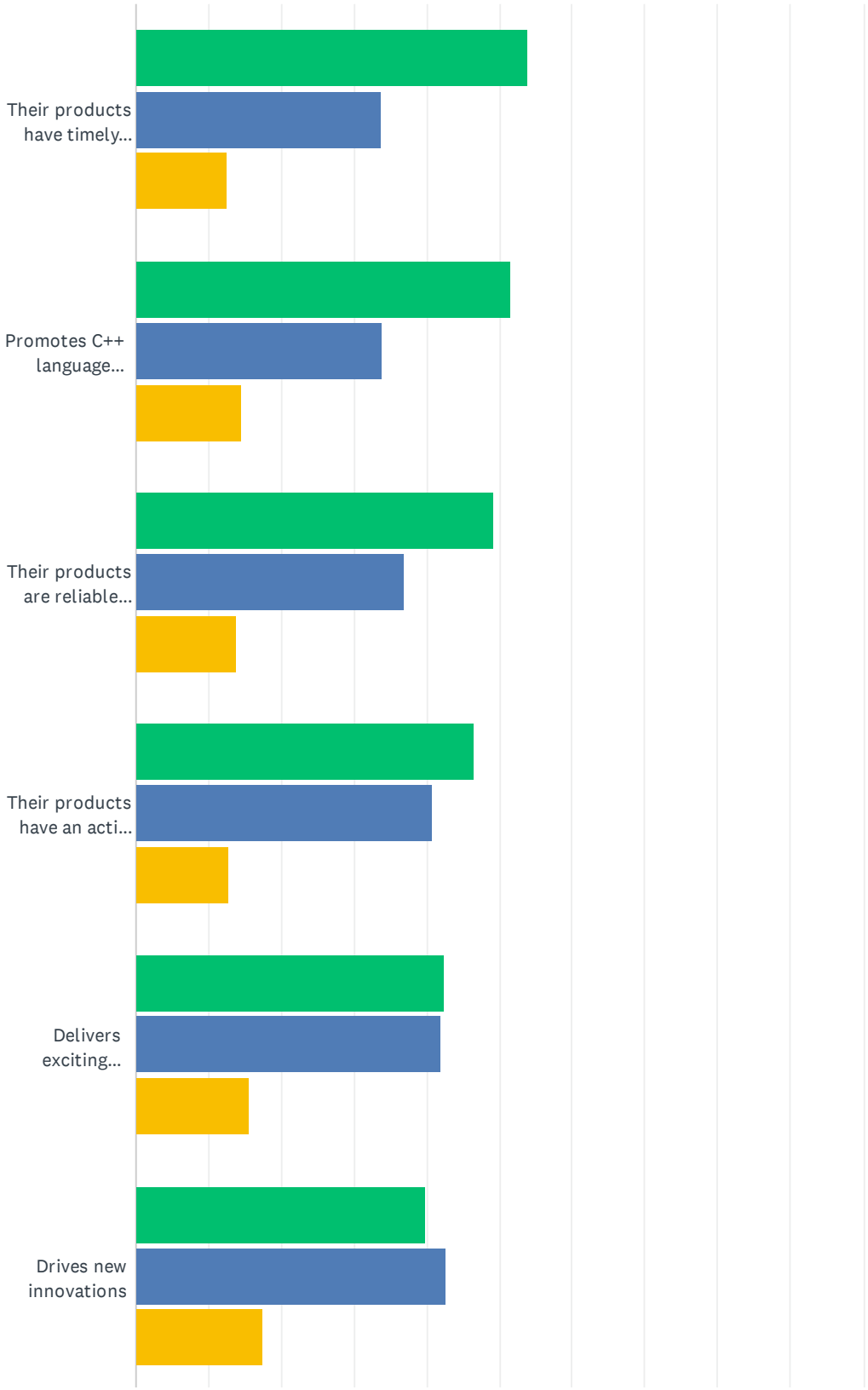
Q18 What organizations come to your mind the most when you think about C++? Why?

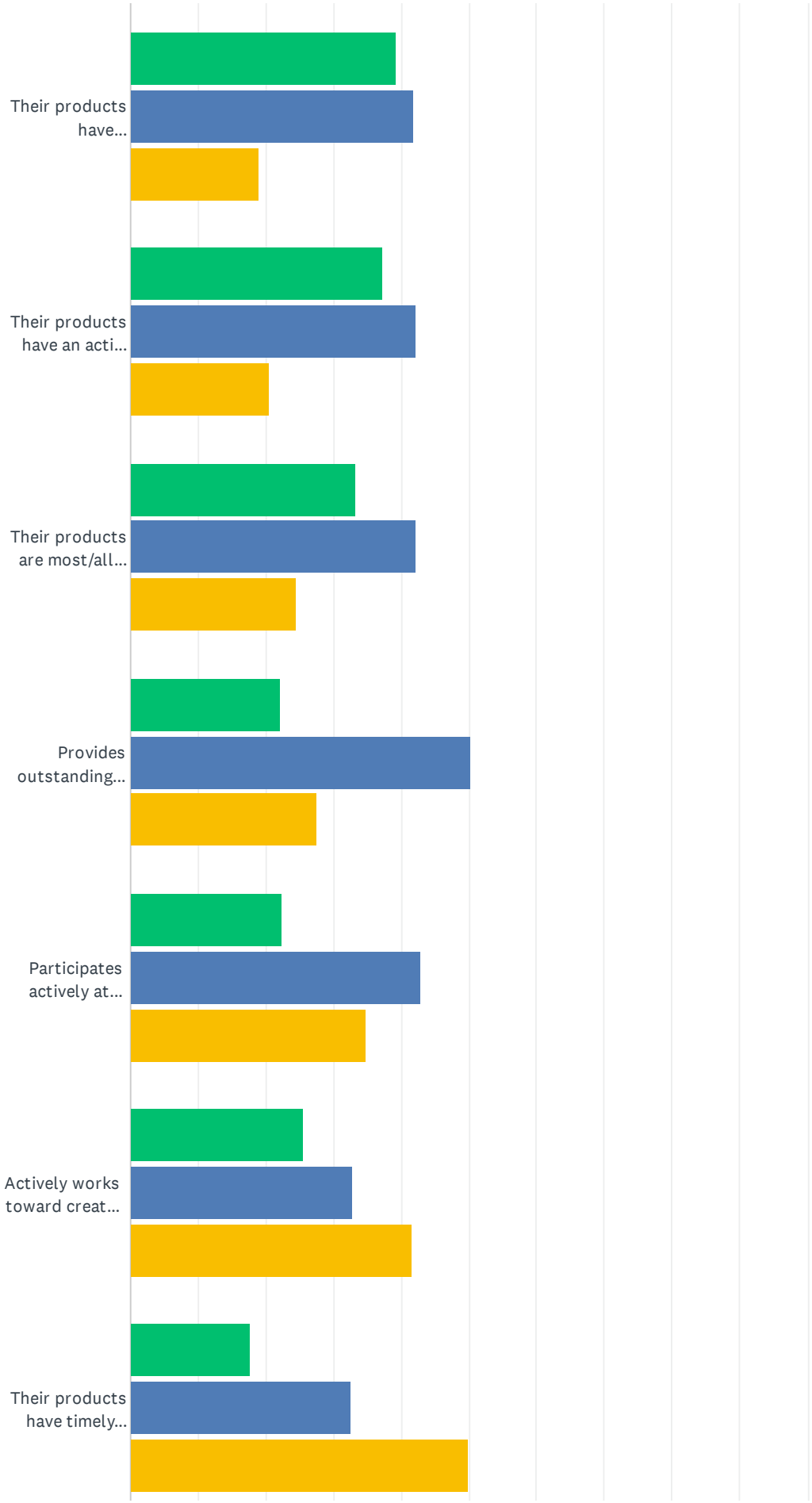
Answered: 887 Skipped: 839

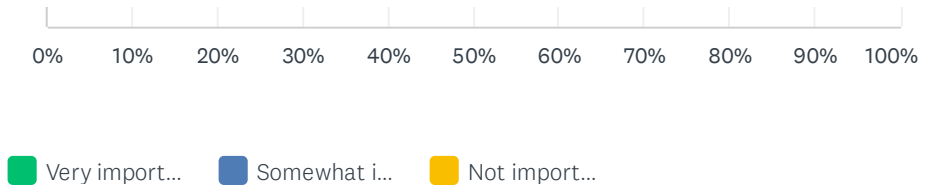


Q19 How important is each of these to you when you think about an organization's involvement in C++?

Answered: 1,563 Skipped: 163



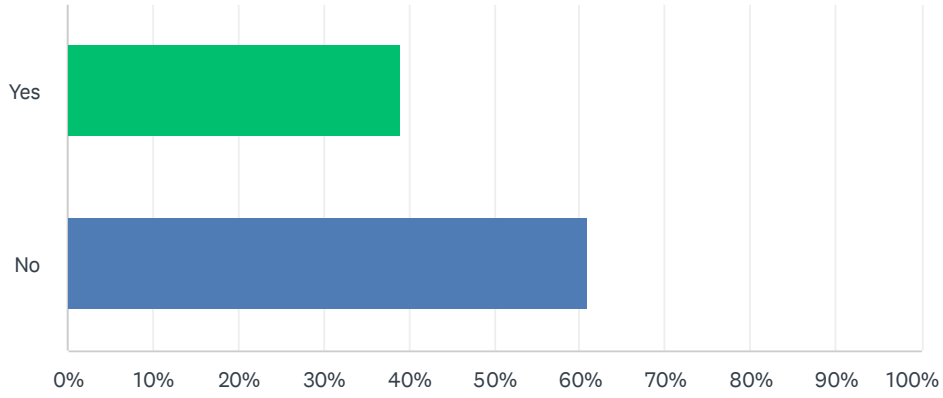

Their products have...
Their products have an acti...
Their products are most/all...
Provides outstanding...
Participates actively at...
Actively works toward creat...
Their products have timely...



	VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT	TOTAL	WEIGHTED AVERAGE
Their products have timely support for the latest C++ standard	53.87% 829	33.59% 517	12.54% 193	1,539	2.41
Promotes C++ language evolution in directions that help my work	51.53% 791	33.94% 521	14.53% 223	1,535	2.37
Their products are reliable and backward-compatible	49.15% 752	36.93% 565	13.92% 213	1,530	2.35
Their products have an active user community	46.42% 707	40.71% 620	12.87% 196	1,523	2.34
Delivers exciting solutions to common development problems	42.49% 648	42.03% 641	15.48% 236	1,525	2.27
Drives new innovations	39.88% 605	42.58% 646	17.53% 266	1,517	2.22
Their products have high-quality training materials	39.28% 601	41.76% 639	18.95% 290	1,530	2.20
Their products have an active open source community	37.39% 571	42.24% 645	20.37% 311	1,527	2.17
Their products are most/all open-sourced	33.27% 510	42.27% 648	24.46% 375	1,533	2.09
Provides outstanding customer support and servicing	22.11% 336	50.39% 766	27.50% 418	1,520	1.95
Participates actively at conferences (e.g., talks, booths)	22.41% 342	42.79% 653	34.80% 531	1,526	1.88
Actively works toward creating a more diverse and inclusive C++ community	25.61% 391	32.87% 502	41.52% 634	1,527	1.84
Their products have timely support for the latest C standard	17.65% 269	32.55% 496	49.80% 759	1,524	1.68

Q20 Is an organization's involvement in the C++ community a major factor in choosing their developer tools and services?

Answered: 1,584 Skipped: 142



ANSWER CHOICES	RESPONSES	
Yes	39.02%	618
No	60.98%	966
TOTAL		1,584

Q21 If you could wave a magic wand and change one thing about any part of C++, what would it be, and how would that change help your daily work?

Answered: 1,176 Skipped: 550