





TECH TALENT SUPPLY, TECH TALENT DEMAND + INNOVATION

# NC TECH METRO INDEX

### **METHODOLOGY**

To create the index, Economic Leadership LLC reviewed the data available at the metropolitan statistical area (MSA) level relevant to the tech sector. This list of potential metrics was presented to NC Tech leaders who provided feedback to finalize the list. The list of metrics was grouped into three subindexes of tech talent supply, tech talent demand, and innovation. Based on feedback from the tech business leaders on the board, supply of tech workers was given the highest weighting, as they felt it was one of the biggest factors in a tech business' location decision. Demand was the next priority, as colocation has been a big factor in tech agglomeration. Innovation was given the lower weighting, as the metrics available at the metro level were more focused on general research & development (R&D) and entrepreneurship, rather than specifically tech focused data.

### **INTRODUCTION**

NC TECH has been quantifying the state's progress in the tech industry for years. In early 2022, the organization will release the 8<sup>th</sup> version of the State of the Tech Industry (STIR) report, which analyzes the size and growth of the state's tech workers, firms, and wages. A key component of the STIR report is comparing North Carolina with the other states in the nation to gauge performance. The STIR report is produced annually by Economic Leadership LLC, a research and consulting firm also based in North Carolina.

In 2021, NC TECH wanted to develop a way to evaluate the metro areas of the state (STIR focuses on the state level), and asked Economic Leadership LLC to help develop an index to compare the state's metros' tech performance against other top metros in the country. Together, we developed a methodology to compare metro tech performance with data that is released annually, which can continue to be assessed yearly.

The metro index focuses on some of the emerging challenges for tech hubs, including a heavy focus on the availability of workforce. The issue of finding qualified workers has only been exacerbated as we emerge from the COVID-19 pandemic. The index also places an equal emphasis on tech skills as traditional educational training. As skills-based hiring is rising as a trend to find talent, this index includes data on job postings and online profiles based on whether they contain tech skills. In this way, we are still quantifying talent if the worker does not have relevant postsecondary education. Self-employed tech workers were also included in this analysis to capture all available tech talent.



### THE NC TECH METRO INDEX WEIGHTING

Each subindex consisted of seven unique metrics that were weighted equally (14.3 percent) based on their ranking. Most of the data evaluated is from the year 2021 or 2020. Some of the public governmental sources are a few years older. While the year 2020 had tremendous upheaval, the tech data is still relevant as so many tech jobs were able to convert to remote work. Half of the states actually grew their tech workforce from 2019 to 2020. A more detailed description of each metric is provided in the appendix.

2020

2017-2020

2020

#### **TECH TALENT SUPPLY: 45%**

Resident tech workers per 1,000 adults	EMSI
Computer, math, and statistics degrees per 1,000 adults	Census
STEM educational completions per 1,000 adults	EMSI
Number of online profiles in MSA with tech skills per 1,000 adults	EMSI
Bachelor's degree or higher per 1,000 adults	EMSI
H-1B visa approvals per 1,000 adults	USCIS
Diversity of tech occupations relative to total population	EMSI

#### TECH TALENT DEMAND: 35%

Tech occupation location quotient (LQ)	EMSI	2021
Unique job postings with tech skills per 1,000 adults	EMSI	2017-2021
Median job posting duration	EMSI	2017-2021
Cost of living adjusted tech wages	EMSI	2020
Annual tech job openings per 1,000 adults	EMSI	2017-2021
Competitive effect of tech job growth	EMSI	2017-2021
Turnover rate of employees	EMSI	2020

#### **INNOVATION: 20%**

Patents per 1,000 workers	US PATENT Office	2019
Higher education R&D as % of gross area product	NSF	2019
Business funded higher education R&D as a $\%$ of gross area product	NSF	2019
SBIR/STTR funding per \$ of gross area product	SBIR	2019
Business dynamism rate (opening vs closing Rate)	Census	2018
Business applications per 1,000 adults	Census	2020
Business R&D as a % of gross area product	NSF	2018

An index value was created for each subindex and then based on its weighting a final overall index was created. This index included the top 105 populated MSAs in America as well as the top ten populated metros in NC. Some of the NC metros were included in the top 105 MSAs in terms of population. This created a total of 110 metros to be ranked. Data was also standardized by the adult population (those over age 25 in each MSA), or the gross area product of the metro's economy.

# OVERALL RESULTS

With the tech supply, tech demand, and innovation indexes combined, the final results included Charlotte, Raleigh, and Durham in the top 30 tech metros. With Durham-Chapel Hill and Raleigh-Cary both in the top ten at 6th and 7th respectively.

Interestingly, several of the smaller metros in the state that fall outside of the top 105 metros in terms of population performed well. Considering that Wilmington's 2021 adult population ranked the metro 163rd out of all MSAs in the nation, it is quite impressive that the metro ranked as the 60th best metro for tech. Many of the typical tech metro rankings across the country only look at the top 50 or 100 metros so many of these smaller metros in NC had not been compared to other metros across the country prior to this research.

## NORTH CAROLINA Standings

DURHAM-CHAPEL HILL, NC	91	6
RALEIGH-CARY, NC	42	(7)
		Ψ
CHARLOTTE-CONCORD-GASTONIA, NC-SC	24	(27
WILMINGTON, NC	163	GO
GREENSBORO-HIGH POINT, NC	76	<b>(</b> 17
		Y
WINSTON SALEM, NC	87	
		- 30
FAYETTEVILLE, NC	117	02
		- <u>J</u> Z
ASHEVILLE, NC	112	
		- 33
JACKSONVILLE, NC	264	
		- 94
HICKORY-LENOIR-MORGANTON, NC	141_	
		-1113
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## OVERALL TECH METRO INDEX RANKINGS

Seattle came out on top as the number one tech metro, followed by the Silicon Valley area. Other top performers included Austin, TX, Boston, MA, and Washington, DC. The Charlotte metro ranked just behind New York city.

Seattle-Tacoma-Bellevue, WA San Jose-Sunnyvale-Santa Clara, CA Austin-Round Rock-Georgetown, TX Boston-Cambridge-Newton, MA-NH San Francisco-Oakland-Berkeley, CA Durham-Chapel Hill, NC 6 Raleigh-Cary, NC 7 Madison, WI Washington-Arlington-Alexandria, DC-VA-MD-WV Provo-Orem, UT Minneapolis-St. Paul-Bloomington, MN-WI Salt Lake City, UT San Diego-Chula Vista-Carlsbad, CA Atlanta-Sandy Springs-Alpharetta, GA Denver-Aurora-Lakewood, CO **Dallas-Fort Worth-Arlington, TX** Baltimore-Columbia-Towson, MD Fayetteville-Springdale-Rogers, AR Columbus, OH **Colorado Springs, CO** Albany-Schenectady-Troy, NY Philadelphia-Camden-Wilmington, PA-NJ-DE-MD Portland-Vancouver-Hillsboro, OR-WA Pittsburgh, PA Hartford-East Hartford-Middletown, CT New York-Newark-Jersey City, NY-NJ-PA Charlotte-Concord-Gastonia, NC-SC 27 Lansing-East Lansing, MI **Dayton-Kettering, OH** Chicago-Naperville-Elgin, IL-IN-WI **Phoenix-Mesa-Chandler, AZ** Cincinnati, OH-KY-IN **Rochester, NY** Nashville-Davidson--Murfreesboro--Franklin, TN **Omaha-Council Bluffs. NE-IA Des Moines-West Des Moines, IA** Palm Bay-Melbourne-Titusville, FL

Sacramento-Roseville-Folsom, CA Worcester, MA-CT St. Louis, MO-IL Indianapolis-Carmel-Anderson, IN Kansas City, MO-KS Boise City, ID Harrisburg-Carlisle, PA Tampa-St. Petersburg-Clearwater, FL **Detroit-Warren-Dearborn, MI Richmond**, VA Bridgeport-Stamford-Norwalk, CT Milwaukee-Waukesha, WI Charleston-North Charleston, SC Los Angeles-Long Beach-Anaheim, CA Orlando-Kissimmee-Sanford, FL Oxnard-Thousand Oaks-Ventura, CA Houston-The Woodlands-Sugar Land, TX **Tucson**, AZ Ogden-Clearfield, UT **Cleveland-Elyria, OH** Providence-Warwick, RI-MA Virginia Beach-Norfolk-Newport News, VA-NC Wilmington, NC 60 Knoxville, TN Albuquerque, NM Portland-South Portland, ME Buffalo-Cheektowaga, NY Louisville/Jefferson County, KY-IN Jacksonville, FL Syracuse, NY San Antonio-New Braunfels, TX Akron, OH New Haven-Milford, CT **Greenville-Anderson, SC** Birmingham-Hoover, AL Springfield, MA Oklahoma City, OK

Wichita, KS Miami-Fort Lauderdale-Pompano Beach, FL Greensboro-High Point, NC 77 Poughkeepsie-Newburgh-Middletown, NY Urban Honolulu, HI Columbia, SC Little Rock-North Little Rock-Conway, AR Grand Rapids-Kentwood, MI Allentown-Bethlehem-Easton, PA-NJ North Port-Sarasota-Bradenton, FL Spokane-Spokane Valley, WA Augusta-Richmond County, GA-SC Tulsa, OK Chattanooga, TN-GA **Baton Rouge, LA** Winston-Salem, NC 90 Memphis, TN-MS-AR Fayetteville, NC 92 Asheville, NC 93 Jacksonville, NC 94 New Orleans-Metairie, LA **Deltona-Daytona Beach-Ormond Beach, FL** Las Vegas-Henderson-Paradise, NV **Cape Coral-Fort Myers, FL** Toledo, OH Jackson, MS El Paso, TX Scranton--Wilkes-Barre, PA Hickory-Lenoir-Morganton, NC (103) **Riverside-San Bernardino-Ontario, CA** Stockton, CA McAllen-Edinburg-Mission, TX Lakeland-Winter Haven, FL **Bakersfield, CA** Fresno, CA Modesto, CA

# NO.1 TECH TALENT SUPPLY INDEX

The Tech Talent Supply subindex was given the highest weighting (45 percent) out of the three. This was based on feedback provided by NC tech leaders, who advise that the availability of workforce was the greatest challenge for tech companies, and biggest draw that a tech hub could provide. This index included the metrics of the number of tech workers who live in the metro, the number of computer and math degrees present, and tech skills present in the population. The ability of the metro to accept high skilled workers from abroad, and the diversity of the tech sector, were also included in evaluating the supply of tech workers.



# TOP 1 O N C 1 O METROS

Raleigh-Cary, NC ranked eighth of the 110 metros for tech talent supply, just behind Austin. Durham-Chapel Hill, NC scored just outside of the top ten at 11th. Raleigh-Cary scored in the top ten for every supply metric except H1-B visa approvals and tech worker diversity. Charlotte ranked in the top 20 for online profiles with tech skills, indicating that when looking at skills, the metro has more tech talent than the educational data suggests.



# NC TECH TALENT SUPPLY INDEX CHARTS

**RANKING ACROSS ALL METROS** 

NUMBER OF RESIDENT TECH WORKERS\* 7 42.7 Raleigh, Cary Durham, Chapel Hill 20 29.3 Charlotte, Concord, Gastonia 22 28.4 Greensboro, 76 16.0 **High Point** 79 15.7 Wilmington 83 15.0 Jacksonville *8*4 14.5 Winston-Salem *89* 13.1 Fayetteville Hickory, Lenoir, Morganton 103 *9.7* 107 8.5 Asheville

**COMPUTER, MATH & STATISTICS DEGREES\*** 



STEM EDUCATIONAL COMPLETIONS\*

3	7.48	Raleigh, Cary
6	<i>6.22</i>	Durham, Chapel Hill
<b>48</b>	2.42	Greensboro, High Point
<i>60</i>	2.11	Wilmington
<i>96</i>	1.80	Fayetteville
7 <i>3</i>	1.79	Charlotte, Concord, Gastonia
87	1.44	Hickory, Lenoir, Morganton
<b>95</b>	1.15	Winston-Salem
<b>9</b> 7	1.13	Asheville
101	0.88	Jacksonville

\*PER 1,000 ADULTS

NUMBER OF ONLINE PROFILES W/ TECH SKILL(S)\*



**PEOPLE W/ BACHELOR'S DEGREES OR HIGHER\*** 



H-1B VISA APPROVALS\*

2	33.9	Durham, Chapel Hill
27	5.7	Raleigh, Cary
34	4.5	Charlotte, Concord, Gastonia
53	2.6	Wilmington
66	1.8	Greensboro, High Point
81	1.1	Winston-Salem
106	0.4	Hickory, Lenoir, Morganton
108	0.3	Fayetteville
109	0.2	Asheville
110	0.1	Jacksonville
		*PER 1,000 ADULTS

TECH WORKER DIVERSITY INDEX

4

8



# **NO.2 TECH TALENT DEMAND INDEX**

The Tech Talent Demand subindex was given the second highest weighting (35 percent) of the three. Demand is an important indicator for tech because tech companies and startups look for thriving tech presence when they decide where they want to locate.

This index includes the metrics of tech worker concentration, tech wages, and turnover rate. Skills based data was used for measuring demand in job postings.



# TOP 1 O N C 1 O METROS

Durham-Chapel Hill, NC ranked ninth of the 110 metros for tech talent demand, just behind Washington, DC. The Charlotte and Raleigh metros scored in the top 20. Seven of the ten NC metros scored in the top 50 on cost-of-living adjusted tech wages.



NG TEGH CHARTS

RANKING ACROSS ALL METROS



UNIQUE JOB POSTINGS W/ TECH SKILL(S)\*



#### MEDIAN JOB POSTING W/ TECH SKILL(S) DURATION, DAYS

18	38	Raleigh, Cary
22	37	Fayetteville
30	36	Charlotte, Concord, Gastonia
41	35	Durham, Chapel Hill
61	33	Greensboro, High Point
<b>91</b>	29	Jacksonville
91	29	Winston-Salem
96	<i>28</i>	Wilmington
<i>98</i>	27	Asheville
1 <i>02</i>	26	Hickory, Lenoir, Morganton

COST OF LIVING ADJUSTED MEDIAN HOURLY TECH WAGES



#### ANNUAL TECH JOB OPENINGS\*



**COMPETITIVE EFFECT OF TECH JOB GROWTH\*** 

3	4.59	Durham, Chapel Hill
7	2.74	Wilmington
11	2.44	Charlotte, Concord, Gastonia
17	1.21	Greensboro, High Point
38	0.24	Hickory, Lenoir, Morganton
39	0.20	Asheville
53	-0.26	Fayetteville
55	-0.39	Winston-Salem
76	-1.11	Raleigh, Cary
95	-1.94	Jacksonville
		*PER 1,000 ADULTS

#### TURNOVER RATES OF TECH WORKERS



# NO.3 TECH INNOVATION INDEX

The Tech Innovation subindex evaluates the culture of R&D and entrepreneurship in each metro. Feedback provided by the NC Tech leaders reminded the researchers that the next great tech advancements will come in non-tech industries such as automobiles, healthcare, etc. This is why research & development is so important to developing new and innovative technology. Some of the biggest unicorns have been tech startups. If a metro is able to support new businesses and help them thrive, than perhaps the next great tech startup will come out of their area.



# TOP 1 O N C 1 O METROS

Raleigh-Cary and Durham-Chapel Hill rank 2nd and 3rd respectively out of all 110 metros studied, just behind Austin, TX for the most innovative tech metro. The other metros in North Carolina did not fare as well in innovation as they did in other subindexes. Jacksonville, NC did rank 4th overall in business dynamism, meaning more businesses were opening, than closing, in the metro. The innovation subindex is where Charlotte metro scored lower than expected, given its size.



### 

1	.618%	Durham, Chapel Hill
9	.064%	Raleigh, Cary
8	. <b>041</b> %	Winston-Salem
8	.007%	Wilmington
1	.002%	Charlotte, Concord, Gaston
2	.001%	Fayetteville
7	.001%	Greensboro, High Point
10	.000%	Asheville
)4	.000%	Jacksonville
04	.000%	Hickory, Lenoir, Morganto

#### PATENTS PER 1,000 WORKERS

10	2.41	Raleigh, Cary
16	1.83	Durham, Chapel Hill
47	0.78	Winston-Salem
58	0.61	Hickory, Lenoir, Morganton
64	0.56	Charlotte, Concord, Gastonia
70	0.49	Wilmington
75	0.45	Asheville
77	0.43	Greensboro, High Point
108	0.09	Jacksonville
109	0.09	Fayetteville

#### HIGHER ED R&D AS A % OF GROSS AREA PRODUCT

1	4.47%	Durham, Chapel Hill
18	0.66%	Winston-Salem
24	<i>0.57%</i>	Raleigh, Cary
73	0.14%	Greensboro, High Point
<b>76</b>	0.11%	Wilmington
<i>90</i>	0.03%	Charlotte, Concord, Gastonia
<i>92</i>	0.02%	Asheville
93	0.02%	Fayetteville
107	0.00%	Jacksonville
107	0.00%	Hickory, Lenoir, Morganton

#### SBIR/STTR FUNDING PER \$1M OF GROSS AREA PRODUCT





**BUSINESS APPLICATIONS PER 1,000 ADULTS** 

18	24.3	Charlotte, Concord, Gastonia
24	22.2	Raleigh, Cary
33	21.4	Fayetteville
<b>43</b>	<i>19.6</i>	Greensboro, High Point
<i>52</i>	17.8	Durham, Chapel Hill
55	17.4	Wilmington
<i>69</i>	14.9	Jacksonville
78	13.9	Winston-Salem
<i>82</i>	13.6	Asheville
110	8.6	Hickory, Lenoir, Morganton

#### FUNDED TOTAL R&D AS A % OF GROSS AREA PRODUCT

<b>4.9%</b>	Durham, Chapel Hill
<b>2.4</b> %	Hickory, Lenoir, Morganton
2.4%	Asheville
2.4%	Jacksonville
2.4%	Wilmington
2.4%	Fayetteville
2.4%	Raleigh, Cary
1.7%	Greensboro, High Point
1.0%	Winston-Salem
0.8%	Charlotte, Concord, Gastonia

# INSIGHTS

The Tech Metro Index shows which metros have the talent, the demand, and the innovation to maintain, create, and recruit tech business. North Carolina's top metros score well across the board, and rank in the top 30 overall. Some of the small metros in the state "punched above their weight", and scored higher than expected based on their population size, particularly Wilmington.



This analysis reveals that NC metros rank well on several metrics that contribute to their competitiveness. All of the NC metros had positive business dynamism rates, which means more businesses are being created than exiting. Several NC metros scored high in the competitive effect of tech occupation growth. This means growth is driven by more than just national and tech industry trends.

There are also opportunities for NC metros to improve their rankings. Outside of the Triangle, the innovation metrics lagged. Fostering more business R&D and entrepreneurship would improve innovation in these other metros. Several NC metros also had high turnover rates for tech occupations, with Charlotte having the highest out of all 110 metros in 2020. This could indicate high rates of cannibalism between firms or insufficient hiring and/or training programs for employees. This shows an opportunity for local educational institutions to help ensure that their students are ready to hit the ground running when they start at a local firm. Many NC metros also scored low in approvals of H1-B visas. This means metros could be missing out on injecting talent to their area. Out analysis helps benchmark the top metros of the state against the top metros in the country and can quantify future improvement needed to become even stronger tech hubs.

### **APPENDIX**

SUPPLY	DESCRIPTION	
Resident tech workers per 1,000 adults	The number of tech workers who live within the metro area standardized by the adult population of the metro (over the age of 25).	
Computer, math, and statistics degrees per 1,000 adults	The number of adults who had their first major in a computer, math, or statistics degree in the metro standardized by the adult population of the metro.	
STEM educational completions per 1,000 adults	Number of completions (certification, degree, or award from a postsecondary institution) in STEM fields standardized by the adult population of the metro.	
Number of online profiles in MSA with tech skills per 1,000 adults	Number of online professional profiles that contained any tech skill in the metro area standardized by the adult population of the metro.	
Bachelor's degree or higher per 1,000 adults	Number of adults with a bachelor's degree standardized by the adult population of the metro.	
H-1B visa approvals per 1000 adults	The number of new and renewed high-skilled immigration work visas standardized by the adult population of the metro.	
Diversity of tech occupations relative to total population	The percentage of tech workers who are people of color divided by the percentage of people of color in the general adult population. A value of 100 means the tech workforce is as diverse as the general population of the metro. If lower, less diverse. If higher, more diverse.	
DEMAND	DESCRIPTION	
Tech occupation location quotient (LQ)	Tech workers % of the total metro workforce compared to the national average. If higher than 1, more concentrated in tech than the national average.	
Unique job postings with tech skills per 1,000 adults	Online job postings (with duplicates removed) that required at least one tech skill standardized by the adult population of the metro.	
Median job posting duration	The median amount of time it takes for an online job posting with at least one tech skill to be filled.	
Cost of living adjusted tech wages	The median hourly wage for tech workers in the metro adjusted for the cost of living in the metro.	
Annual tech job openings per 1,000 adults	Openings are the number of jobs that need to be filled to meet growth demand, turnover, and retirement of workers in a year.	
Competitive effect of tech job growth	The competitive effect is the actual change in tech workers minus the expected change in tech workers for the metro. The expected change accounts for the national growth and the industry mix. If positive, it means the job growth was higher than expected due to the region's competitive effect.	
Turnover rate of employees	The total number of separations in tech jobs divided by the total number of tech jobs. A separation is when a worker's SSN is removed from a company's payroll. This demonstrates the amount of movement occurring in tech jobs.	
INNOVATION	DESCRIPTION	
Patents per 1,000 workers	The number of registered patents created in a metro area standardized by the number of workers in the metro.	
Higher education R&D as % of gross area product	The \$ amount of research & development spending occurring at universities in the met- ro standardized by the gross area product of the metro.	
Business funded higher education R&D as a % of gross area product	The \$ amount of research & development spending occurring at universities that are funded by the private sector in the metro standardized by the private sector gross area product of the metro.	
SBIR/STTR funding per \$ of gross area product	The total funding awarded to SBIR/STTR projects in the metro standardized by the gross area product of the metro.	
Business Dynamism Rate (Opening vs Clos- ing Rate)	The percentage of business opening compared to the percentage of the business clos- ing in the area. If positive, it means that there is good business churn in the area that contributes to innovation.	
Business applications per 1,000 adults	The number of applications people submitted to start businesses in the metro standardized by the adult population of the metro.	
Business R&D as a % of gross area product	The \$ amount of research & development that is funded by the private sector in the metro standardized by the private sector gross area product of the metro. For some values there was not data available, in this case the state level was used.	

### **TECH SKILLS LIST**

**AMX Programming Data Lakes** ExactTarget **Cisco Certified Network Professional** (CCNP) Wireless **On-Screen Takeoff (Estimating Software) Semantic Parsing Defect Life Cycle** Windows Software **Amazon Elastic Container Registry CompTIA Security+ CE Geospatial Information Technology (GIT)** Avaya (Telecommunications) **Automated Machine Learning Sprint Backlogs Crimeware Correlation Analysis Epicor Prophet 21 (Distribution Software) Pega Certified Senior System Architect Cisco Certified Internetwork Expert (CCIE) Routing And Switching** Avid Media Composer (Software) Shiny (R Package) **Dialogflow (Google Service)** Word Embedding **OmniGraffle Cisco Certified Network Associate (CCNA) Routing And Switching MITRE ATT&CK Framework** Elixir (Programming Language) Anaconda (Software) Software Installation **Custom Scripting** Aderant (Software) **Voice User Interface Crestron Certified Programmer** 

Interactive Web Pages Sizmek (Software) Agile Product Development Adobe Spark **Test Datasets Cloud Management Platforms** HyperWorks (CAE Software) Soft Sensors IAM Level III Certification Cyber Incident Response **Network Science** Information Systems Architecture Mobile Native Application Testing FileAid (Software) **Digital Communications** Facebook Advertising **Google Adwords Certification** Vbrick (Software) ASC 606 (Revenue Recognition) Project Management Body Of Knowledge (PMBOK) Methodology **SpriteKit Construction Management Software** Application Delivery Controller **Cellular Phone Exploitation Azure Logic Apps** Graphics API **Growth Hacking** Cloud-Native Computing Foundation (CNCF) **Standards Bluecoat Proxies** Defense In Depth Go-to-Market Strategy **Cloud-Native Computing Ridge/LASSO Regressions MeteorJS** 

Espresso (Android Testing Framework) watch0S **Microsoft Enterprise Library Azure Service Fabric Ad Serving IT Security Documentation** ATLAS.ti (Qualitative Data Analysis Software) **Power Distribution Units Performance Profiling Oracle Human Capital Management (HCM) Cloud Hosting** CompTIA Cybersecurity Analyst (CySA+) XtremIO (Network-Attached Storage System) Informatica Data Validation Option **Server Automation** Ionic 4 (Mobile App Framework) **Azure Data Lake Spring Cloud Solution Design Digital Rights Management PMI Professional in Business Analysis** Accubid (Estimating Software) **Microsites Computational Design** Adaptive Insights (Software) Amazon Elastic File System **Content Filtering AWS App Mesh GigE Vision 3D Touch Office 365 Administration ASP.NET MVC 5 Excel Services** Gatsby.js **Energy Policy Analysis Supply Chain Cyber Security** 

### **TECH SKILLS LIST CONTINUED**

**Interactive Web Content** Worksoft Certify **Oracle Demantra** Spring WebFlux **PHP Frameworks** Capital IQ (Software) **Atmospheric Modeling Product Roadmap Management** Cisco Meraki **Amazon WorkSpaces** Julia (Programming Language) **Oracle HRMS Amag Symmetry AWS Auto Scaling Jamf Certification Atlassian OpsGenie** Computer-To-Plate **Smart Meter Systems** Microsoft Delve IxVeriWave (Network Test Tool) **Microservices Development Amazon Textract Natural Language Generation Cloud Management** Amazon Elastic Container Service Canva (Software) Haskell (Programming Language) **Design Portfolio Android Testing** 2D Computer-Aided Drafting And Design **Poll Everywhere (Polling Software) Alexa Skills Kit Cyber Operations** IxChariot (Traffic Generator) **Microsoft Dynamics 365 IBM Informix Digital Content Management** 

**Cloud-Native Architecture** Azure Command-Line Interface (Azure CLI) Pelco (Security System) Image Segmentation Microsoft 365 Endpoint Devices Ixia BreakingPoint Microsoft Planner eTapestry (Fundraising Software) UX Research Desktop Management Pega Certified Lead System Architect **PVT Analysis** Amazon Translate **Tricentis Tosca Cloud Services** Email Service Providers Flask (Web Framework) Apache Avro Cyber Security Strategy AWS Certified Solutions Architect Crazy Egg (Website Optimization Tool) **Sports Analytics** Hybrid Cloud Computing **EnCase Certified Examiner** Small-Unmanned Aerial Systems (S-UAS) Navisworks (BIM Software) iSqFt (Bidding Software) Nintex Workflow Virtual Reality IxLoad (Network Testing Tool) Gulp.js **GoSystems (Tax Software)** Adobe Business Catalyst Enterprise Storage System **AWS CodeDeploy** Hootsuite (Social Media Management Software)

**Command And Data Handling Unified Endpoint Management Amazon Macie** Industry 4.0 Video Ads **Cyber Governance** AWS Internet Of Things (IoT) **Crestron (A/V Systems) Geospatial Mapping** Android Emulators **Cyber Defense Optitex (Fashion Design Software) Cyber-Physical Systems TransCAD Digital Design Server Configuration Sponsored Posts** Informatica **Audio-Visual Technology AWS Inferentia** Houdini (3D Animation Software) Kenshoo (Marketing Software) **CISCO Certified Network Professional -Security DevSecOps** Apple Device Enrollment Program (DEP) **Macros Economic Modeling** Control-M (Batch Scheduling Software) **Azure Active Directory Deep Learning Methods Finance Automation BuzzSumo** (Software) Lumion (3D Rendering Software) **Travel Demand Modeling Learner Analysis Fastboot** 

### **TECH SKILLS LIST CONTINUED**

**Office 365 Admin Center** Data Literacy Amazon Quantum Ledger Database (QLDB) **ITIL Foundation Certification Mainframe Testing** Mechanical Electrical Plumbing (MEP) **Design Software Google Cloud Dataproc** Amazon Forecast **File Naming NedGraphics (Textile Design Software) Certified Information System Auditor (CISA) Industry Analysis Robotic Process Automation** Amazon Comprehend **Clinical Informatics** LS-DYNA (FEA Software) AWS CodeCommit AWS SageMaker Autonomous Underwater Vehicle **Dell Boomi (Integration Platform) Citrix Workspace Smart Buildings** WebVR **Spectre Circuit Simulator Machine Learning Methods Cisco Certified Internetwork Expert (CCIE) Wireless** Zuken (Software) Autoregressive Integrated Moving Average (ARIMA) **Full Stack Development Quantum Mechanics** Breeze.js Amazon ElastiCache **Quantitative Data Analysis** 

**AWS Kinesis Healthcare Analytics Expense Forecasting** Ivalua (Spend Management Software) **Data Interfaces** Agile Project Management Equivio (eDiscovery Software) **Amazon Data Pipeline** Figma (Design Software) **CompTIA IT Fundamentals Pega Robotics Software Cyber Safety Cyber Security Management Microsoft Certified: Azure Fundamentals User Journey Mapping** Radare2 (Reverse Engineering Software) **Google Display & Video 360** AWS Key Management Service (KMS) **Software Development Engineer in Test** Thermal Desktop (Thermal Modeling Software) Host Based Security System (HBSS) Feature Learning **Technology Strategy Development** Foglight (Database Software) Sybase (Software) **Microsoft Azure Certification General Fund Enterprise Business Systems** (GFEBS) **Heuristic Evaluation AWS CloudHSM Data Management Platforms** Spring MVC **Automation Controls** Social Media Trends **Online Marketing** Windows Performance Analyzer

**Qualitative Data Analysis** Part-of-Speech Tagging **FastAPI Sound Design ADDIE Instructional Design Model Network Infrastructure** System Recovery SAP IoT **GIS Certificate GIAC Web Application Defender Virtualization Security Cyber Hygiene Reltio (Master Data Management Software) Azure Security Conversational User Interface Apache Flume** 

### **TECH OCCUPATIONS LIST**

CODE	DESCRIPTION
11-3021	Computer and Information Systems Managers
15-1211	Computer Systems Analysts
15-1212	Information Security Analysts
15-1221	Computer and Information Research Scientists
15-1231	Computer Network Support Specialists
15-1232	Computer User Support Specialists
15-1241	Computer Network Architects
15-1244	Network and Computer Systems Administrators
15-1245	Database Administrators and Architects
15-1251	Computer Programmers
15-1256	Software Developers and Software Quality Assurance Analysts and Testers
15-1257	Web Developers and Digital Interface Designers
15-1299	Computer Occupations, All Other
17-2061	Computer Hardware Engineers



### 2021 RESEARCH UNDERWRITERS

PARTNERS



Google

**GOLD SUPPORTERS** 



**DC**LTechnologies





SILVER SUPPORTERS

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