FOR IMMEDIATE RELEASE

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Average market value for 567 non-certified tech skills remained unchanged from April to June while 490 tech certifications declined for the fourth consecutive calendar quarter, reaching a five-year low.

238 technology skills and certifications changed value in the period, with 131 losing cash value against gains for 107

The struggle to reshape company workforces to capitalize on disruptive technologies continues but progress is being made.

NOTE: This news release is a summary extract of content in the latest quarterly update of Foote Partners’ Tech Skills Demand and Pay Trends Report, a market intelligence trend report updated every 3 months from data contributed by 3,351 U.S. and Canadian employers. It contains tech jobs and skills compensation published in the firm’s IT Professional Salary Survey and IT Skills and Certifications Pay Index™ and deep-dive supply/demand benchmark research from Foote Partners field interviews.

Vero Beach, FL – September 1, 2019 - Extra pay awarded by employers to talented tech professionals for 567 non-certified tech skills ---also known as skills pay premiums---remained unchanged in the second calendar quarter of 2019 despite 158 skills changing market value during this period. Currently averaging the equivalent of 9.4 percent of base salary on average for a single non-certified skill, this pay is now near its 19-year high. Conversely, average market values for 490 tech certifications decreased, down nearly one percent overall, currently earning the equivalent of 7.4 percent of base salary on average for a single certification. That’s the lowest average pay premium in 5 years.

This according to the latest quarterly update of Foote Partners’ IT Skills and Certifications Pay Index™ (ITSCPI) based on compensation data provided by 3,351 private and public-sector employers in 83 U.S. and Canadian cities who partner with the firm to report pay for their 303,616 technology professionals in the U.S. and Canada.
Since its launch in 1999, the *IT Skills and Certifications Pay Index™* has continuously tracked cash pay premiums paid to tech professionals by their employers for an ever-increasing number of popular tech skills and certifications. Rigorously validated data and detailed market analyses are updated and published by Foote Partners every 90 days. Currently, premiums are reported for 1,057 certifications and non-certified skills.

**Pay Performance, 3/12/24/4/36 months**  
**Certified vs. Non-certified Tech Skills**  
(78,694 IT professionals, data through 7/1/2019)

![Figure 1](image)

*Source: Foote Partners, *IT Skills and Certifications Pay Index™* (2Q2016 – 2Q2019 data)*
A. TECH SKILLS AND CERTIFICATIONS PAY PERFORMANCE: BY CATEGORY

NON-CERTIFIED TECH SKILLS

NON-CERTIFIED TECH SKILLS. Though 158 surveyed non-certified tech skills changed market value in the second quarter of 2019, average cash pay premiums for 567 non-certified skills actually remained unchanged overall. Pay performance in the second quarter of 2019 was higher for two non-certified tech skills categories reported: Data/Database; Applications Development skills. For the twelve-month period ending July 1, pay was higher across the same categories.

**Noncertified Tech Skills - % Growth/Decline**
3 months & 12 months
(567 skills, data through 7/1/2019)

![Bar chart showing growth/decline in non-certified tech skills](chart_url)

Figure 2

Source: Foote Partners IT Skills & Certifications Pay Index™, 2nd Quarter 2019 data
NONCERTIFIED TECH SKILLS TREND HIGHLIGHTS: Largest Market Value Gainers That are Also Highest Paying

These noncertified tech skills gained 10% or more in market value in the three months ending July 1, 2019 vs. prior quarter (seen below grouped by segment). Listed in descending order of amount of % gain and cash pay premium (including ties). Highest paying skills listed on right in alphabetical order. They are averaging pay in a range 15% to 17% equivalent of base salary.

### TECH SKILLS (noncertified)

<table>
<thead>
<tr>
<th>Applications Development skills</th>
<th>Systems/Networking skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clojure</td>
<td>Cisco IPCC</td>
</tr>
<tr>
<td>WebSphere MQ (MQSeries)</td>
<td>Microsoft Hyper-V</td>
</tr>
<tr>
<td>Microsoft Team Foundation Server</td>
<td>Performance Testing</td>
</tr>
<tr>
<td>ServiceNow ITSM</td>
<td>Cisco ISE (Identity Services Engine)</td>
</tr>
<tr>
<td></td>
<td>Ansible</td>
</tr>
<tr>
<td></td>
<td>Salt</td>
</tr>
</tbody>
</table>

**Database Skills**

<table>
<thead>
<tr>
<th>Base SAS</th>
<th>SAP/ERP skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sybase Adaptive Server Enterprise</td>
<td>SAP UI development toolkit for HTML5</td>
</tr>
<tr>
<td>MySQL</td>
<td>SAP ALE (Application Link Enabling)</td>
</tr>
<tr>
<td>Microsoft SQL Server</td>
<td>SAP Forecasting and Replenishment</td>
</tr>
<tr>
<td>2016/2014/2012/2008</td>
<td>SAP Fior</td>
</tr>
<tr>
<td></td>
<td>SAP MDG (Master Data Governance)</td>
</tr>
<tr>
<td></td>
<td>SAP BODI (Business Objects Data Integrator)</td>
</tr>
<tr>
<td></td>
<td>SAP IS-U (Utilities)</td>
</tr>
<tr>
<td></td>
<td>Microsoft Dynamics/Dynamics 365</td>
</tr>
<tr>
<td></td>
<td>SAP MM (Materials Management)</td>
</tr>
<tr>
<td></td>
<td>SAP GRC (Governance, Risk, and Compliance)</td>
</tr>
<tr>
<td></td>
<td>SAP BOXI (Business Objects XI)</td>
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<tr>
<td></td>
<td>SAP WM (Warehouse Management)</td>
</tr>
<tr>
<td></td>
<td>Oracle Financials</td>
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<tr>
<td></td>
<td>Oracle HFM (Hyperion Financial Management)</td>
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<tr>
<td></td>
<td>SAP WM - EWM (Extended Warehouse Management)</td>
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<tr>
<td></td>
<td>SAP Leonardo</td>
</tr>
<tr>
<td></td>
<td>SAP Exchange Infrastructure (XI)</td>
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<td></td>
<td>SAP PSCD (Collection and Disbursement)</td>
</tr>
</tbody>
</table>

**Web/SOA/E-Commerce skills**

<table>
<thead>
<tr>
<th>Front End Development Documentum</th>
<th><strong>Highest Paying – Cash Premiums (A-Z)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>JavaFX</td>
<td>- Amazon DynamoDB</td>
</tr>
<tr>
<td>Ember.js</td>
<td>- Amazon RedShift</td>
</tr>
<tr>
<td>Sitecore CMS</td>
<td>- Apache Cassandra</td>
</tr>
<tr>
<td>Apache Wicket</td>
<td>- Apache CouchDB</td>
</tr>
<tr>
<td>Google App Engine</td>
<td>- Apache Hive</td>
</tr>
<tr>
<td>Oracle Workflow</td>
<td>- Apache Spark</td>
</tr>
<tr>
<td>Microsoft Internet Security and Acceleration Server</td>
<td>- Apache Zookeeper</td>
</tr>
<tr>
<td></td>
<td>- Artificial Intelligence</td>
</tr>
<tr>
<td></td>
<td>- Big Data analytics</td>
</tr>
<tr>
<td></td>
<td>- Blockchain</td>
</tr>
<tr>
<td></td>
<td>- Cloudera Impala</td>
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<tr>
<td></td>
<td>- Cloudera software</td>
</tr>
<tr>
<td></td>
<td>- Cryptography (encryption, VPN, SSL/TLS, Hybrids)</td>
</tr>
<tr>
<td></td>
<td>- Cyber Threat Intelligence</td>
</tr>
<tr>
<td></td>
<td>- Data Acquisition and Control Systems</td>
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<tr>
<td></td>
<td>- Data Analytics</td>
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<tr>
<td></td>
<td>- Data Architecture</td>
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<td></td>
<td>- Data Governance</td>
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<td></td>
<td>- Data Integration</td>
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<td></td>
<td>- Data Modelling</td>
</tr>
<tr>
<td></td>
<td>- Data Science</td>
</tr>
</tbody>
</table>

Source: Foote Partners IT Skills & Certifications Pay Index™, 2nd Quarter 2019 data
**NONCERTIFIED TECH SKILLS TREND HIGHLIGHTS: Market Value Losers**

These noncertified IT skills *declined 10% or more in market value* in the three months ending July 1, 2019 (grouped by segment). Listed in *descending order of amount of % decline*, including ties.

### TECH SKILLS (Noncertified) Losers

<table>
<thead>
<tr>
<th>Applications Development skills</th>
<th>SAP &amp; Enterprise Business Applications skills</th>
<th>Systems/Networking skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Progress 4GL/Development tools</td>
<td>SAP Hybris</td>
<td>VoIP/IP telephony</td>
</tr>
<tr>
<td>CA PPM (Clarity PPM)</td>
<td>IBM Sterling</td>
<td>CA Endevor</td>
</tr>
<tr>
<td>Tcl</td>
<td>SAP Business Workflow/Webflow</td>
<td>vCloud</td>
</tr>
<tr>
<td>Scala</td>
<td>SAP FS (Insurance)</td>
<td>Cisco CUCM</td>
</tr>
<tr>
<td>Java SE/Java EE</td>
<td>SAP CA (Cross Application)</td>
<td>Cisco UCCE</td>
</tr>
<tr>
<td></td>
<td>SAP CAR (Customer Activity Repository)</td>
<td>Multiprotocol Label Switching (MPLS)</td>
</tr>
<tr>
<td></td>
<td>PeopleSoft (CRM/Financials/HC)</td>
<td>Virtualization (various)</td>
</tr>
<tr>
<td></td>
<td>SAP SM (Service Management)</td>
<td>HTTPS</td>
</tr>
<tr>
<td></td>
<td>SAP CO-PA (Profitability Analysis)</td>
<td>Vagrant</td>
</tr>
<tr>
<td>Web/E-commerce Development skills</td>
<td>SAP BSP (Business Server Pages)</td>
<td>Security Information and Event Management (SIEM)</td>
</tr>
<tr>
<td>JavaServer Pages</td>
<td>SAP Business One</td>
<td>Cisco UCCX</td>
</tr>
<tr>
<td>ActiveX</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VoiceXML</td>
<td>Siebel/Siebel Analytics</td>
<td></td>
</tr>
<tr>
<td>XHTML MP</td>
<td>SAP SRM (Supplier Relationship Management)</td>
<td></td>
</tr>
<tr>
<td>Ajax (Asynchronous JavaScript and XML)</td>
<td>SAP SD (Sales &amp; Distribution)</td>
<td></td>
</tr>
<tr>
<td>Content management systems</td>
<td>Salesforce</td>
<td></td>
</tr>
<tr>
<td>CSS/LESS</td>
<td>SAP Oil &amp; Gas</td>
<td></td>
</tr>
<tr>
<td>SOAP</td>
<td>SAP Service and Asset Management</td>
<td></td>
</tr>
<tr>
<td>Umbraco</td>
<td>SAP HCM ESS/MESS</td>
<td></td>
</tr>
<tr>
<td>Jetty</td>
<td>SAP NetWeaver BW (Business Information Warehouse)</td>
<td></td>
</tr>
<tr>
<td>Django</td>
<td>SAP CRM (Customer Relationship Management)</td>
<td></td>
</tr>
<tr>
<td>Node.js</td>
<td>Oracle Payroll</td>
<td></td>
</tr>
<tr>
<td>REST</td>
<td>Oracle SCM (Supply Chain Management)</td>
<td></td>
</tr>
<tr>
<td>Microsoft Identity Integration Server (MIIS)</td>
<td>SAP Solution Manager</td>
<td></td>
</tr>
<tr>
<td>RESTful</td>
<td>SAP GTS (Global Trade Services)</td>
<td></td>
</tr>
<tr>
<td>Microsoft BizTalk Server</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Management, Process &amp; Methodology</th>
<th>Operating Systems skills</th>
<th>Data/Database</th>
</tr>
</thead>
<tbody>
<tr>
<td>Game Development</td>
<td></td>
<td>Oracle Coherence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>dBASE/xBASE</td>
</tr>
</tbody>
</table>

**Source:** Foote Partners [IT Skills & Certifications Pay Index™](https://www.footepartners.com/it-skills-certifications), 2nd Quarter 2019 data
SUMMARY – cont’d.

TECH CERTIFICATIONS

TECH CERTIFICATIONS. Cash pay for tech certifications is currently near its five-year low. In July 2019, 490 tech certifications lost even more value, down an average of nearly 1 percent in the quarter. Pay performance in the second quarter of 2019 was lower for six certification segments: Architecture/Project Management/Process; Info/Cyber Security; Systems Admin/Engineering; Networking & Communications; Data/Database; and Applications Development/Programming Languages. For the twelve-month period ending April 1 pay was higher in two: Web Development and Foundation level & Training.

Tech Certifications - % Growth/Decline
3 months & 12 months
(490 certifications, data through 7/1/2019)

![Chart showing tech certifications growth/decline](chart.png)

Figure 3

Source: Foote Partners IT Skills & Certifications Pay Index™, 2nd Quarter 2019 data
TECH CERTIFICATION PAY TREND HIGHLIGHTS: Largest Market Value Gainers That are Also Highest Paying

These tech certifications *gained 10% or more in market value* in the three months ending July 1, 2019 (seen below grouped by segment). Listed in *descending order of amount of % gain in cash pay premium* (including ties). Highest paying skills listed on right in *alphabetical order*. They are averaging pay in a range 13% to 17% equivalent of base salary.

### TECH CERTIFICATION Gainers

<table>
<thead>
<tr>
<th>Info/Cyber Security certifications</th>
<th>Networking and Communications certifications</th>
<th>Systems Administration certifications</th>
<th>Applications Development/Programming Languages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisco Certified Network Professional - Security</td>
<td>CompTIA Network (Network+)</td>
<td>NetApp Certified Data Administrator, ONTAP (NCDA)</td>
<td>Microsoft Certified Solutions Associate: SQL 2016 DBA</td>
</tr>
<tr>
<td>InfoSys Security Architecture Professional (ISSAP/CISSP)</td>
<td>Cisco Certified Design Associate (CCDA)</td>
<td>Linux Professional Institute certification (LPIC-Level 2)</td>
<td>Microsoft Certified Solutions Expert: Data Management and Analytics</td>
</tr>
<tr>
<td>GIAC Certified Forensics Analyst (GCFIA)</td>
<td>Cisco Certified Internetwork Expert (CCIE, all variations)</td>
<td>Citrix Certified Administrator - Networking (CCA)</td>
<td>Microsoft Certified Solutions Expert: Data Platform</td>
</tr>
<tr>
<td>Check Point Certified Security Administrator (CCSA)</td>
<td>Cisco Certified Design Expert (CCDE)</td>
<td>Citrix Certified Associate - Virtualization</td>
<td>Oracle Certified Professional - DBA (OCP)</td>
</tr>
<tr>
<td>GIAC Enterprise Defender (GCED)</td>
<td>VMware Certified Advanced Professional (all)</td>
<td>VMware Certified Advanced Professional (all)</td>
<td></td>
</tr>
<tr>
<td>CompTIA Security+</td>
<td>Red Hat Certified Systems Administrator (RHCSA)</td>
<td>Red Hat Certified System Administrator (RHCSA)</td>
<td></td>
</tr>
<tr>
<td>EC-Council Certified Security Analyst (ECSA)</td>
<td>AWS Certified SysOpsAdministrator-Associate (Cloud)</td>
<td>AWS Certified SysOpsAdministrator-Associate (Cloud)</td>
<td></td>
</tr>
<tr>
<td>Systems Security Certified Practitioner (SSCP)</td>
<td>Red Hat Certified System Administrator in Red Hat OpenStack</td>
<td>Red Hat Certified System Administrator in Red Hat OpenStack</td>
<td></td>
</tr>
<tr>
<td>GIAC Certified Windows Security Administrator (GCWN)</td>
<td>VMware Certified Design Expert - Cloud Mgt and Automation</td>
<td>VMware Certified Design Expert - Cloud Mgt and Automation</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

### Highest Paying – Cash Premiums (A – Z)

- Certified Cyber Forensics Professional
- Certified Forensic Computer Examiner
- Certified in Risk and Information Systems Control
- Certified in the Governance of Enterprise IT
- Certified ScrumMaster
- Certified Secure Software Lifecycle Professional
- Cisco Certified Architect
- Cisco Certified Network Professional - Security
- Cybersecurity Forensic Analyst
- GIAC Reverse Engineering Malware
- GIAC Security Expert
- GIAC Web Application Penetration Tester
- Information Systems Security Architecture Professional
- Information Systems Security Management Professional
- ITIL Master
- PMI Portfolio Management Professional
- PMI Professional in Business Analysis
- PMI Program Management Professional
- PMI Risk Management Professional

Source: Foote Partners *IT Skills & Certifications Pay Index™*, 2nd Quarter 2019 data
TECH CERTIFICATION PAY TREND HIGHLIGHTS:  Market Value Losers

These tech IT certifications *declined 10% or more in market value* in the three months ending July 1, 2019 vs. prior quarter (grouped by segment). Listed in *descending order of amount of % decline*, including ties.

<table>
<thead>
<tr>
<th>TECH CERTIFICATIONS Losers</th>
<th>Networking &amp; Communication certifications</th>
<th>Systems Administration certifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Development/Programming Languages</td>
<td>Cisco Certified Network Associate</td>
<td>Red Hat Certified Architect</td>
</tr>
<tr>
<td>Oracle Certified Associate - WebLogic Server Administrator</td>
<td>Juniper Networks Certified Internet Specialist</td>
<td>Red Hat Certified Architect: Cloud</td>
</tr>
<tr>
<td>Architecture, Project Management, and Process Certifications</td>
<td>Cisco Certified Network Associate - Routing and Switching</td>
<td>VMware Certified Associate - Cloud</td>
</tr>
<tr>
<td>Microsoft Specialist in Windows 10</td>
<td>Cisco Certified Network Professional - Data Center</td>
<td>Microsoft Certified Solutions Expert: Cloud Platform and Infrastructure</td>
</tr>
<tr>
<td>PMI Professional in Business Analysis (PMI-PBA)</td>
<td>Cisco Certified Network Professional</td>
<td>VMware Certified Associate - Data Center Virtualization</td>
</tr>
<tr>
<td>Six Sigma Yellow Belt</td>
<td>Cisco Certified Network Professional - Routing and Switching</td>
<td>Microsoft Certified Solutions Associate(all)</td>
</tr>
<tr>
<td>PMI Program Management Professional (PgMP)</td>
<td></td>
<td>Microsoft Certified Solutions Associate: Cloud Platform</td>
</tr>
<tr>
<td>Six Sigma Green Belt</td>
<td></td>
<td>HP Accredited Solutions Expert: Business Intelligence</td>
</tr>
<tr>
<td>Certified Software Quality Analyst (CSQA)</td>
<td></td>
<td>Microsoft Certified Solutions Expert (ASE - all)</td>
</tr>
<tr>
<td>Data/Database</td>
<td></td>
<td>Red Hat Certified Engineer</td>
</tr>
<tr>
<td>Oracle Certified Professional - MySQL 5 Developer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oracle Certified Professional - MySQL 5 Database Administrator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Info/Cyber Security certifications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC-Council Certified Incident Handler</td>
<td></td>
<td></td>
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<tr>
<td>Professional Certified Investigator</td>
<td></td>
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<tr>
<td>GIAC Information Security Professional</td>
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<tr>
<td>EC-Council Certified Network Defender</td>
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<tr>
<td>GIAC Certified Incident Handler</td>
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<tr>
<td>GIAC Certified Project Manager</td>
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<tr>
<td>GIAC Security Essentials</td>
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<tr>
<td>GIAC Certified Intrusion Analyst</td>
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<tr>
<td>Certified Cyber Forensics Professional</td>
<td></td>
<td></td>
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<tr>
<td>Certified Penetration Testing Engineer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GIAC Certified Perimeter Protection Analyst</td>
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</tbody>
</table>

Source: Foote Partners [IT Skills & Certifications Pay Index™](https://www.footepartners.com), 2nd Quarter 2019 data
B. FAST GROWING NON-CERTIFIED TECH SKILLS THAT ARE ALSO EARNING HIGHEST PAY

The following non-certified tech skills meet two prerequisites: they recorded steep gains in cash market value in the six months ending July 1, 2019 in our IT Skills and Certification Pay Index™ and they are also earned workers cash pay premiums well above the average of all 567 skills reported. No skill below is earning less than the equivalent of 16 percent of base salary—significant considering the average for all skills reported is 9.4 percent of base—and are listed in descending ranked order of cash premium and market value increases (including ties).

1. Ethereum
   Market Value Increase: 6 percent (in the six months through July 1, 2019)
   Average Pay Premium: 18 percent of base salary equivalent

   Blockchain! Ethereum is arguably the most popular open source, public blockchain-based distributed computing platform and OS for smart contract functionality. If you want to become a blockchain expert, learning how to build apps on Ethereum is a great place to start.

2. Blockchain
   Risk analytics/assessment
   Apache Pig
   MapReduce
   Market Value Increase: 13.3 percent (in the six months through July 1, 2019)
   Average Pay Premium: 17 percent of base salary equivalent

   At a high level, blockchain technology is a way of securely managing access and information. What makes DLT so interesting to businesses and some governments is how it is positioned to make vast improvements in an almost endless array of transactional activities. Skills shortages will continue for blockchain developers but especially for the architects, project managers, and quality engineers who can design, build, and test Blockchain operating models. Understanding how Blockchain integrates with IoT, Artificial Intelligence, Machine Learning, Robotics, and other technologies is a plus now for architects but will be a requirement in the future as these other technologies mature and adoption rates increase.

   MapReduce is a programming model for processing and generating large data sets with a parallel, distributed algorithm on a cluster. A MapReduce program is composed of a map procedure (or method), which performs filtering and sorting and a reduce method, which performs a summary operation. The "MapReduce System" (also called "infrastructure" or "framework") orchestrates the processing by marshalling the distributed servers, running the various tasks in parallel, managing all communications and data transfers between the various parts of the system, and providing for redundancy and fault tolerance.

   Apache Pig is a high-level platform for analyzing large data sets that consists of a high-level language—Pig Latin—for expressing data analysis programs, coupled with infrastructure for evaluating these programs. The salient property of Pig programs is that their structure is amenable to substantial parallelization, which in turn enables them to handle very large data sets. Pig can execute its Hadoop jobs in MapReduce, Apache Tez, or Apache Spark. Pig Latin abstracts the programming from the Java MapReduce idiom into a notation which makes MapReduce programming
Fast growing/highest paying non-certified tech skills – cont’d.

high level, similar to that of SQL for relational database management systems. Pig Latin can be extended using user-defined functions which the user can write in Java, Python, JavaScript, Ruby or Groovy and then call directly from the language.

Evaluating risk is an obsession for most businesses; for others it is something to ignore at great peril to their future success. The field of risk analytics has entered its prime: recent projections put the global fraud detection and prevention market at $41.59 billion by 2022, up from $16.62 billion in 2017. The spike in interest for non-certified skills to prevent misappropriation of assets, bribery and corruption, fraud, data theft or money laundering in financial services, government or public utilities is in full force in our latest findings. Most employers are rewarding people who can incorporate data and insights from many sources to better identify, measure, and mitigate risk. McKinsey & Company recently published an excellent paper describing what this is all about.

3. Metadata design and development

Market Value Increase: 13.3 percent (in the twelve months through July 1, 2019)
Average Pay Premium: 17 percent of base salary equivalent

Metadata design and development. Data can be replicated and delivered anywhere in the world instantaneously—it is the fundamental resource in the new economy. The business rocket ship known as digital innovation depends on data, metadata, and A.I. working in concert to create systems that gets smarter over time. But while data is used to drive decision-making and insights, it’s the metadata that stores what is learned—what works, when to use it, what is still uncertain—and this the key to “smarter”. Digital transformation is driving a new wave of interest in metadata design and development skills in 2019.

4. Security architecture and models

Market Value Increase: 6.3 percent (in the three months through July 1, 2019)
Average Pay Premium: 17 percent of base salary equivalent

Two fundamental concepts in computer and information security are the security model, which outlines how security is to be implemented—in other words, providing a “blueprint”—and the architecture of a computer system, which fulfills this blueprint. Security architecture is a view of the overall system architecture from a security point and how the system is put together to satisfy the security requirements. It describes the components of the logical hardware, operating system, and software security components, and how to implement those components to architect, build and evaluate the security of computer systems.

With cybersecurity related skills gaining nearly 4 percent in cash market value in the past year and the threat landscape continuing to be a core business issue, we expect security models and architecting skills to continue to be strong going forward.
SUMMARY - cont’d.

Fast growing/highest paying non-certified tech skills – cont’d.

5. Apache CouchDB
   Oracle Exadata
   
   Market Value Increase: 14.3 percent (in the six months through July 1, 2019)
   Average Pay Premium: 16 percent of base salary equivalent

Used by 77% of Fortune Global 100 corporations, Exadata has become almost ubiquitous over the last decade in powering the world’s most important database workloads. Exadata can be described as a purpose-built engine for running SQL, the Structured Query Language, which was designed to deal with every aspect of data: creating it, analyzing it, and protecting it. With us for more than 40 years, SQL should make any short list of most important computer innovations. And especially when powered by Exadata, SQL shows no sign of losing its appeal in the modern era. Originally intended to work with relational data (think orderly rows and columns), SQL has been extended over the years to work with almost any type of data: documents, event streams, graphs, and even spatial data. It’s also kept pace with increasingly sophisticated analysis. Depending on the implementation, literally hundreds of analytics functions can be built in, from simple statistics to sophisticated machine learning models.

Apache CouchDB is an open-source document-oriented NoSQL database, implemented in the concurrency-oriented language Erlang; it uses JSON to store data, JavaScript as its query language using MapReduce, and HTTP for an API. Replication and synchronization capabilities of CouchDB make it ideal for using it in mobile devices, where network connection is not guaranteed, and the application must keep on working offline.

CouchDB is well suited for applications with accumulating, occasionally changing data, on which pre-defined queries are to be run and where versioning is important (CRM, CMS systems, by example). Master-master replication is an especially interesting feature, allowing easy multi-site deployments. It makes an ideal database for mobile device apps and similar service-based needs.

6. Amazon RedShift
   Master Data Management
   Apache Hive
   
   Market Value Increase: 6.7 percent (in the six months through July 1, 2019)
   Average Pay Premium: 16 percent of base salary equivalent

Amazon Redshift is the Internet hosting service and data warehouse product which forms part of the larger cloud-computing platform Amazon Web Services. It is built on top of technology from the massive parallel processing data warehouse company ParAccel, to handle large scale data sets and database migrations. It is a fast, scalable data warehouse that makes it simple and cost-effective to analyze data across data warehouses and data lakes, delivering aster performance by using machine learning, massively parallel query execution, and columnar storage on high-performance disk. Driving demand for this skill is the push for organizations to consider new approaches for their data warehousing environments in the face of exploding data volumes and business imperatives to leverage data to generate additional value in the form of more productive and efficient business operations.
Fast growing/highest paying non-certified tech skills – cont’d.

Master data management (MDM) arose out of the necessity for businesses to improve the consistency and quality of their key data assets, such as product data, asset data, customer data, location data, etc. Many businesses today, especially global enterprises, have hundreds of separate applications and systems (i.e. ERP, CRM) where data that crosses organizational departments or divisions easily become fragmented, duplicated, and most commonly out of date. When this occurs, answering even the most basic, but critical questions about any type of performance metric or KPI for a business accurately becomes hard. The basic need for accurate, timely information is acute and as sources of data increase, managing it consistently and keeping data definitions up to date so all parts of a business use the same information is a never-ending challenge. That’s what has and will continue to drive a premium on MDM skills.

Apache Hive is a data warehouse system built on top of Apache Hadoop that facilitates easy data summarization, ad-hoc queries, and the analysis of large datasets stored in various databases and file systems that integrate with Hadoop, including the MapR Data Platform with MapR XD and MapR Database. Hive offers a simple way to apply structure to large amounts of unstructured data and then perform batch SQL-like queries on that data. Hive easily integrates with traditional data center technologies using the familiar JDBC/ODBC interface.

6. Cloudera Impala

   Market Value Increase: 14.3 percent (in the twelve months through July 1, 2019)
   Average Pay Premium: 16 percent of base salary equivalent

Cloudera Impala is an open source Massively Parallel Processing (MPP) query engine that provides high-performance, low-latency SQL queries on data stored in popular Apache Hadoop file formats. The fast response for queries enables interactive exploration and fine-tuning of analytic queries rather than long batch jobs traditionally associated with SQL-on-Hadoop technologies, meaning that data can be stored, shared, and accessed using various solutions that avoids data silos and minimizes expensive data movement. Impala returns results typically within seconds or a few minutes, rather than the many minutes or hours that are often required for Hive queries to complete. We cannot underestimate the value of this to advanced data analytics platforms and the work of data scientists and analysts engaged in Big Data initiatives and the impact this has on skills acquisition demand going forward.

7. Prometheus

   Market Value Increase: 15.4 percent (in the six months through July 1, 2019)
   Average Pay Premium: 15 percent of base salary equivalent

Prometheus is an open-source software application used for event monitoring and alerting, recording real-time metrics in a time series database (allowing for high dimensionality). This software is built using a HTTP pull model, with flexible queries and real-time alerting. It’s written in Go and licensed under the Apache 2 License with source code available on GitHub, and is a graduated project of the Cloud Native Computing Foundation, along with Kubernetes and Envoy.

Prometheus has become the mainstream, open source monitoring tool of choice for those that lean heavily on containers and microservices. It has the advantage of being highly customizable and designed to deliver rich metrics without creating a drag on system performance.
SUMMARY - cont’d

Fast growing/highest paying non-certified tech skills – cont’d.

8. Data Governance
   Data Integration
   Data Analytics
   Data Modeling
   Apache Cassandra
   Apache Zookeeper
   Penetration Testing

   Market Value Increase: 7.1 percent (in the six months through July 1, 2019)
   Average Pay Premium: 15 percent of base salary equivalent

Data integration involves combining data residing in different sources and providing users with a unified view of them. This process becomes significant in a variety of situations, which include both commercial (such as when two similar companies need to merge their databases) and scientific domains (combining research results from different bioinformatics repositories, for example). Data integration appears with increasing frequency as the volume (that is, big data) and the need to share existing data explodes. It has become the focus of extensive theoretical work, and numerous open problems remain unsolved. Data integration encourages collaboration between internal as well as external users.

Data governance is a data management concept concerning the capability that enables an organization to ensure that high data quality exists throughout the complete lifecycle of the data. The key focus areas of data governance include availability, usability, consistency, data integrity and data security. It includes establishing processes to ensure effective data management throughout the enterprise such as accountability for the adverse effects of poor data quality and ensuring that the data which an enterprise has can be used by the entire organization.

A sound data governance program includes a governing body or council, a defined set of procedures and a plan to execute those procedures. Businesses benefit from data governance because it ensures data is consistent and trustworthy. This is critical as more organizations rely on data to make business decisions, optimize operations, create new products and services, and improve profitability.

Data analytics is the process of examining data sets in order to draw conclusions about the information they contain, increasingly with the aid of specialized systems and software. Data analytics technologies and techniques are widely used in commercial industries to enable organizations to make more-informed business decisions and by scientists and researchers to verify or disprove scientific models, theories and hypotheses.

Data analytics initiatives can help businesses increase revenues, improve operational efficiency, optimize marketing campaigns and customer service efforts, respond more quickly to emerging market trends and gain a competitive edge over rivals -- all with the ultimate goal of boosting business performance. Depending on the particular application, the data that's analyzed can consist of either historical records or new information that has been processed for real-time analytics uses. In addition, it can come from a mix of internal systems and external data sources.
Fast growing/highest paying non-certified tech skills – cont’d.

Data modeling is the process of creating a data model for the data to be stored in a Database. This data model is a conceptual representation of

- Data objects
- The associations between different data objects
- The rules.

Data model emphasizes on what data is needed and how it should be organized instead of what operations need to be performed on the data. Data Model is like architect’s building plan which helps to build a conceptual model and set the relationship between data items.

Data modeling helps in the visual representation of data and enforces business rules, regulatory compliances, and government policies on the data. Data Models ensure consistency in naming conventions, default values, semantics, security while ensuring quality of the data.

Apache Cassandra is a free open-source, distributed, wide column store, NoSQL database management system designed to handle large amounts of data across many commodity servers, providing high availability with no single point of failure. Cassandra offers robust support for clusters spanning multiple datacenters, with asynchronous masterless replication allowing low latency operations for all clients.

It is the database is the right choice when you need scalability and high availability without compromising performance. Linear scalability and proven fault-tolerance on commodity hardware or cloud infrastructure make it the perfect platform for mission-critical data. Cassandra’s support for replicating across multiple datacenters is best-in-class, providing lower latency for your users and the peace of mind of knowing that you can survive regional outages.

Apache ZooKeeper is essentially a service for distributed systems offering a hierarchical key-value store, which is used to provide a distributed configuration service, synchronization service, and naming registry for large distributed systems. Introduced as a sub-project of Hadoop, it is now a top-level Apache project in its own right. ZooKeeper’s architecture supports high availability through redundant services. The clients can thus ask another ZooKeeper leader if the first fails to answer. ZooKeeper nodes store their data in a hierarchical name space, much like a file system or a tree data structure. Clients can read from and write to the nodes and in this way have a shared configuration service.

Some of the prime features of Apache ZooKeeper are:
- **Reliable System**: This system is very reliable as it keeps working even if a node fails.
- **Simple Architecture**: The architecture of ZooKeeper is quite simple as there is a shared hierarchical namespace which helps coordinating the processes.
- **Fast Processing**: ZooKeeper is especially fast in "read-dominant" workloads (i.e. workloads in which reads are much more common than writes).
- **Scalable**: The performance of ZooKeeper can be improved by adding nodes.
SUMMARY - cont’d

Fast growing/highest paying non-certified tech skills – cont’d.

Penetration testing, also called pen testing or ethical hacking, is the practice of testing a computer system, network or web application to find security vulnerabilities that an attacker could exploit. Penetration testing can be automated with software applications or performed manually. Either way, the process involves gathering information about the target before the test, identifying possible entry points, attempting to break in -- either virtually or for real -- and reporting back the findings. The primary objective of penetration testing is to identify security weaknesses but can also be used to test an organization's security policy, its adherence to compliance requirements, its employees’ security awareness and the organization's ability to identify and respond to security incidents.

The sustained demand for pen testing has placed on both non-certified and in our opinion certified pen testing skills will continue unabated for as long as threat levels and breaches continue to grow.

C. TECH CERTIFICATIONS CURRENTLY EARNING WELL ABOVE-AVERAGE PAY AND STILL SHOWING BIG GAINS IN CASH MARKET VALUE - 2019

Average market values for 490 tech certifications decreased in the second quarter of 2019, down nearly one percent overall, and lost 4.3 percent of their value in the last twelve months. Pay premiums for single certifications are averaging the equivalent of 7.3% of base salary now after 47 certifications recorded pay premium losses against 33 gaining value in April/May/June of 2019.

Why are more certifications losing than gaining value? Certifications decline in market value for a number of obvious and not so obvious reasons. Pay premiums may diminish as a certification expires, is retired, or is replaced with more appropriate certifications as technology evolves. Also, there remains a lingering bias that taking a proctored exam does not confer expertise in a subject on the test taker, especially when the pass rate is 70 percent correct answers. The certification industry has fought back against this bias by adding laboratory requirements and even peer review panels that decide if the candidate has qualified to receive designation.

But just as often it’s their popularity that drives down pay premiums for a certification: as interest in a certification escalates and more people attain the certification the gap between supply and demand for the certification narrows, driving down its market value as the laws of scarcity would dictate. This has been documented in the case of dozens of certifications over the 18 years Foote Partners has been tracking and reporting their market values in the IT Skills and Certifications Pay Index.

Which ones are bucking the trend—highest paying and still growing in value? The following tech certifications recorded impressive gains in cash market value in the six months ending July 1, 2019 and they are also earning cash pay premiums significantly above the average of all 490 skills reported.
APPLICATIONS DEVELOPMENT

Certified Secure Software Lifecycle Professional (CSSLP)

Average Pay Premium: 16 percent of base salary equivalent  
Market Value Increase: 33 percent (in the six months through July 1, 2019)

Like other (ISC)² certifications, the CSSLP is a vendor-neutral credential relevant to many kinds of programming and development projects. Aimed at software developers, engineers, architects, QA and penetration testers, security specialists and the like, the CSSLP recognizes competency in securing applications throughout the software development lifecycle. Prerequisites include at least four years’ full-time work-related experience in the software development lifecycle (SDLC) in at least one of eight CSSLP domains, or three years’ experience plus a bachelor’s degree or equivalent in an IT-related field such as computer science or information technology. The required exam covers all phases of this lifecycle, including secure software concepts, requirements, design, implementation and coding, and testing. Candidates should also be up to speed on the eight CSSLP Common Body of Knowledge (CBK) domains which include software concepts, requirements, design, implementation/programming, testing, lifecycle management, deployment, and operations.

BUSINESS ANALYSIS

Certified Business Analysis Professional (CBAP)

Average Pay Premium: 12 percent of base salary equivalent  
Market Value Increase: 20 percent (in the six months through July 1, 2019)

Business analyst has been a popular job for years but with digital transformation and the arrival of dozens of disruptive technologies (e.g. blockchain, IoT, AI, machine learning, cloud, edge computing, robotics) the work of the business analyst has intensified demand. The CBAP is a professional certification offered by the International Institute of Business Analysis that is granted to individuals with extensive business analysis experience. Business analysis practitioners must be accepted to sit for a three-and-a-half-hour situational analysis case-study exam based on the Business Analysis Body of Knowledge (BABOK). Applicants must present at least five years’ experience working in a business analyst capacity, with 7,500 verifiable hours of firsthand business analysis activity recorded against individual projects and specific BA tasks, spanning at least four of the six BABOK knowledge areas. Candidates must have earned at least thirty-five hours of professional development in areas related to Business Analysis in the last four years. Two letters of reference from career managers or clients are required.

INFO / CYBERSECURITY

Information Systems Security Architecture Professional (ISSEP/CISSP)
Information Systems Security Management Professional (ISSMP/CISSP)

Average Pay Premium: 15 percent of base salary equivalent  
Market Value Increase: 25 percent (in the six months through July 1, 2019)

Corporate America and the U.S. government have been sounding the cybersecurity alarm bell for years: There’s a significant shortage of skilled information security professionals in this country. Although numbers vary among various sources, a conservative estimate is that North
Certifications earning well above average and skill growing – cont’d.

America is lacking almost 500,000 security professionals (as of 2018), and the global shortfall for such jobs is expected to reach 4 million or more by 2021. Adding cybersecurity professionals to this equation and this shortfall is expected to rise to 6 million globally by 2019.

Almost every day, around 10,000 positions are available on U.S. job sites that request a Certified Information Systems Security Professional (CISSP). This clearly points to a need for skilled infosec workers, and CISSPs in particular, which is great news for aspiring CISSP candidates. A CISSP is a seasoned employee or consultant, usually with a title such as security manager, security analyst or chief information security officer, to name just a few. This person has been on the job for five or more years, and has thorough knowledge of the IT threat landscape, including emerging and advanced persistent threats, as well as controls and technology to minimize attack surfaces. A CISSP also creates policies that set a framework for proper controls, and can perform or oversee risk management and software development security.

The ISSEP is a specialized extension to the CISSP that was developed in conjunction with the U.S. National Security Agency. This security engineering certification recognizes a keen ability to practically apply systems engineering principles and processes to develop secure systems. You have the knowledge and skills to incorporate security into projects, applications, business processes and all information systems.

The ISSMP shows excellence at establishing, presenting and governing information security programs, demonstrating deep management and leadership skills whether you’re leading incident handling and/or a breach mitigation team. CISSP-ISSMP is ideal for those working in roles such as: Chief information officer; Chief information security officer; Chief technology officer; Senior security executive.

Certified Forensic Computer Examiner (CFCE)

Average Pay Premium: 16 percent of base salary equivalent
Market Value Increase: 6.7 percent (in the six months through July 1, 2019)

The International Association of Computer Investigative Specialists (IACIS) is the organization behind the Certified Forensic Computer Examiner (CFCE) credential. This organization caters primarily to law enforcement personnel, and you must be employed in law enforcement to qualify for regular IACIS membership. A formal application form, along with an application fee, is necessary to join IACIS. Regular membership includes current computer/digital forensic practitioners who are current or former government or law enforcement employees or forensic contractors to a government agency. To obtain the CFCE credential, candidates must demonstrate proficiency with CFCE core competencies which can be achieved via an expensive IACICS two-week training program; candidates completing the training course can enroll directly in the CFCE program upon completion of the course. Another way is to attend a comparable course (subject to IACIS approval), pay a registration fee, and successfully pass a background check to enroll in the CFCE program and sit for the exam.

The CFCE exam is a two-step testing process that includes a peer review and CFCE certification testing. The peer review consists of accepting and completing four assigned practical problems based on core knowledge and skills areas for the credential. These must be solved and then presented to a mentor for initial evaluation (and assistance, where needed) before being presented for peer review. Candidates have 30 days to complete each of the practical problems.
Certifications earning well above average and skill growing – cont’d.

Upon successful conclusion of the peer review, candidates automatically progress to the certification phase. Candidates must begin work on a hard-drive practical problem within seven days of the completion of the peer review phase. Forty days are allotted to candidates to independently analyze and report upon a forensic image of a hard drive provided to them. Following specific instructions, a written report is prepared to document the candidate’s activities and findings. Once that report is accepted and passed, the process concludes with a 100-question written exam (which includes true/false, multiple-choice, matching and short-answer questions). Candidates have 14 days to complete the written examination. A passing score of 80 percent or better is required for both the forensic report and the written exam to earn the CFCE.

**Cisco Certified Network Professional - Security**

- Average Pay Premium: 13 percent of base salary equivalent
- Market Value Increase: **8.3 percent** (in the three months through July 1, 2019)

The Cisco Certified Network Professional (CCNP) takes aim at platforms and products from a leading networking equipment vendor found at most communications and internet service providers, not to mention enterprises and businesses of all sizes, including government, research and academia. It's hard to go wrong with Cisco certification nowadays, and the CCNP is its most important midrange credential across a wide variety of specialties. One of those is the CCNP – Security certification which is aligned specifically to the job role of Cisco Network Security Engineer responsible for security in routers, switches, networking devices and appliances as well as choosing, deploying, supporting and troubleshooting firewalls, VPNs, and IDS/IPS solutions for their networking environments.

**GIAC Reverse Engineering Malware (GREM)**

- Average Pay Premium: 13 percent of base salary equivalent
- Market Value Increase: **8.3 percent** (in the six months through July 1, 2019)

The GIAC Reverse Engineering Malware certification is designed for technologists who protect the organization from malicious code. GREM-certified technologists possess the knowledge and skills to reverse-engineer malicious software (malware) that targets common platforms, such as Microsoft Windows and web browsers. These individuals know how to examine inner-workings of malware in the context of forensic investigations, incident response, and Windows system administration.

**GIAC Exploit Researcher and Advanced Penetration Tester (GXPN)**

- Average Pay Premium: 12 percent of base salary equivalent
- Market Value Increase: **20 percent** (in the six months through July 1, 2019)

A white hat hacker, or ethical hacker, uses penetration testing techniques to test an organization's IT security and to identify vulnerabilities. IT security staff then uses the results of such penetration tests to remediate vulnerabilities, strengthen security and lower an organization's risk factors. Penetration testing is never a casual undertaking; it involves lots of planning, which includes getting explicit permission from management to perform tests, and then running tests as safely as possible. These tests often involve the very same techniques that attackers use to breach a network for real.
Certifications earning well above average and skill growing – cont’d.

White hat hacking involves a great deal of problem solving, as well as communication skills. A white hat hacker also requires a balance of intelligence and common sense, strong technical and organizational skills, impeccable judgement and the ability to remain cool under pressure.

At the same time, a white hat needs to think like a black hat hacker, with all their nefarious goals and devious skills and behavior. Some top-rate white hat hackers are former black hat hackers who got caught, and for various reasons decided to leave a life of crime behind and put their skills to work in a positive (and legal) way. There are no standard education criteria for a white hat hacker — every organization can impose its own requirements on that position — but a bachelor's or master's degree in information security, computer science or even mathematics provides a strong foundation. For those who aren't college bound, a military background, especially in intelligence, can help your resume get noticed by hiring managers. Military service is also a plus for employers who require or prefer those with security clearances.

The Exploit Researcher and Advanced Penetration Tester certification targets security personnel whose job duties involve assessing target networks, systems and applications to find vulnerabilities. The GXPN certifies that candidates have the knowledge, skills, and ability to conduct advanced penetration tests, how to model the abilities of an advanced attacker to find significant security flaws in systems, and demonstrate the business risk associated with these flaws.

GIAC Certified Forensics Analyst (GCFA)

- Average Pay Premium: 11 percent of base salary equivalent
- Market Value Increase: 40 percent (in the six months through July 1, 2019)

The GIAC Certified Forensics Analyst focuses on computer forensics in the context of investigation and incident response, and thus also focus on the skills and knowledge needed to collect and analyze data from Windows and/or Linux computer systems during such activities. Candidates must possess the necessary skills, knowledge, and ability to conduct formal incident investigations and advanced incident handling, including dealing with internal and external data breaches, intrusions, and cyberthreats; collecting and preserving evidence; understanding anti-forensic techniques; and building and documenting advanced digital forensic cases.
SUMMARY - cont’d.

D. Tech Certifications declining the most in cash market value

In the table below are tech certifications currently recording the largest market value losses in the six months ending July 1, 2019 and are currently pay average-to-below average cash pay premiums. In many cases these declines can be attributed to a narrowing of the gap between supply and demand as more candidates achieve certification. However as stated earlier in this report, not all employers recognize certification to be an adequate measure of talent in a technology discipline, preferring alternative forms of accreditation to fit their needs.

<table>
<thead>
<tr>
<th>CERTIFICATION</th>
<th>Average Pay Premium (% of base salary equivalent)</th>
<th>Market Value Decrease (January 2019 to July 2019)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP ATP - Cloud Administrator V1</td>
<td>4 %</td>
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<tr>
<td>HP ASE - Vertica Big Data Solutions Administrator V1</td>
<td>5 %</td>
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<tr>
<td>HP ATP - Big Data Vertica Solutions V1</td>
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<td>Red Hat Certified Architect</td>
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<tr>
<td>Oracle Certified Associate - WebLogic Server Admin.</td>
<td>9 %</td>
<td>-25.0 %</td>
</tr>
<tr>
<td>Certified Fraud Examiner</td>
<td>3 %</td>
<td>-25.0 %</td>
</tr>
<tr>
<td>Red Hat Certified Architect: Cloud</td>
<td>6 %</td>
<td>-25.0 %</td>
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<tr>
<td>VMware Certified Advanced Professional – Network Virtualization</td>
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<tr>
<td>SolarWinds Certified Professional (SCP)</td>
<td>6 %</td>
<td>-25.0 %</td>
</tr>
<tr>
<td>Certified Cyber Forensics Professional</td>
<td>3 %</td>
<td>-25.0 %</td>
</tr>
</tbody>
</table>
Tech Labor Trends Discussion & Analysis

IT Skills and Certifications Pay Index™

Data collected through July 1, 2019
INTRODUCTION. It’s difficult to find an employer that isn’t struggling to come up with its own unique tech staffing model that balances three things: the urgencies of digital transformation and cybersecurity threats, combating ever deepening security threats, and keeping increasingly complex systems and networks running smoothly and efficiently.

The staffing challenge has moved well beyond simply having to choose between contingent workers, full-time tech professionals, and a variety of third-party services options. Over the next few years managers will continue to be tasked with leading a massive transformation of the technology and tech-business hybrid workforce to focus on delivering a wide variety of operational solution and revenue-generating opportunities including:

- Next-gen Internet of Everything
- AI-driven development
- Machine Learning
- Blockchain
- Mobility
- Big Data/Information Integration/BI analytics
- Cybersecurity
- Autonomous things & robotics
- Edge computing
- Quantum computing
- Cloud computing
- Healthcare tech/IoMT/Telemedicine
- Carbon-reducing technology/exponential energy

All of these depend on solving the puzzle of getting the mix of critical technology and business skills and experience just right when shortages of skills and talent have never been more profound or more constraining in effecting business transformation.

These changes don’t happen overnight. Practically speaking, it takes a few fiscal cycles to get budgets in line and recruiting and training efforts in place to build any new foundation for an optimally restructured workforce. To be sure, ‘clean sheeting’ your organizational systems and practices isn’t realistic; you need to build a new human resource foundation under what you’re already doing, incrementally strengthening that foundation over time. This takes a well-thought out job role architecture plus carefully crafted agile compensation models to get people paid to true competitive market levels and incented to perform at high levels.

Dramatic changes in the corporate tech workforce, pushed by digital disruptions, continues to define 2019 tech labor supply and demand

Employers have been facing conspicuously harder tech labor challenges in 2019 than any year in recent history. And their people problems are about to get exponentially worse unless they start laying the groundwork right now for a new staffing paradigm that will soon be thrust upon each and every one of them.

We’ve conducted interviews since late 2018 with 500+ senior tech execs. Our findings? Most not only realize this threat but are conspicuously stressed out about it. Two long time labor trends have shifted recently that will help them in the short term.

First, market value volatility in pay for tech skills is the lowest it’s been the past decade. The 1,057 certified and non-certified tech skills tracked in Foote Partners’ Tech Skills and Certifications Volatility Index are averaging market value fluctuations of 23% in the last twelve months (quarter-to-quarter percent of skills changing value) compared to 27% to 31% four years ago (see page 55 - 59).
LABOR TRENDS DISCUSSION, cont’d.

Second, the constant frenzy surrounding short term skills gaps and unfilled jobs targeted at point solutions has quieted down according to our recent quarterly labor market benchmark research. There are many indicators for this including the fact that growth in pay for the 1,057 skills and certifications in our quantitative research is down for the past six months and negative for the year 2018. In other words, the gap between supply and demand for tech skills has narrowed broadly across all certified and non-certified skills surveyed.

What’s overtaking these two trends is something more urgent and potentially catastrophic when it comes to managing tech professionals: several game-changing emerging technologies that are altering the landscape of not just businesses but the private lives of billions of people. Among them are Artificial Intelligence, Blockchain, the next generation of IoT (Internet of Things), Automation, and countless digital innovations. Layered into all of these is continuing efforts in to building deeper cybersecurity capabilities for constantly escalating threat levels.

The upshot is 2019 will continue the trend that began this year in which employers have finally taken stock in how poorly prepared they are from a talent perspective for consuming these revolutionary (though in many cases, nascent) technologies. And trust us, they will all be enthusiastically deepening their commitment to them within the next three years.

The hardest truth and most difficult barrier are that the human resource management function supporting technology professionals at most companies has for years been unable to get in front of the unique demands of the technology workforce. They’ve been barely getting by for years with short-term fixes. Here’s what it looks like from the perspective of HR leaders:

- **People management systems and practices to tech professionals that have become frighteningly ineffective.** Even ad hoc work-around solutions are failing
- **Persistent fallout**
  - Too many tech job titles
  - High tech staff churn in key roles, especially the most experienced tech workers.
  - Skills gaps. Difficulty finding and hiring tech professionals
  - Overreliance on consultants, contractors, temps
- **Confusion about pay.** Constant uncertainty about how much to pay tech professionals, especially new jobs and the “Swiss Army knife” hybrid positions.
- **Job Definition/Design Chaos.** Managing independently created tech jobs that don’t fit in very well with established tech roles…that are themselves ill-defined
- **Job Path Uncertainty:** tech workers have trouble navigating their careers and employers aren’t helping them very much

If these new blockbuster technologies existed independent of one another it would not be nearly as frightening from a labor demand perspective. But they don’t: they’re all part of one gigantic dynamic mesh. This mesh will demand an unprecedented level of talent that will place a stunning labor strain on employers regardless of whether they are developing, supporting, or consuming these pervasive groundbreaking technologies.

And here’s the rub: employers cannot aspire to capitalize on these transformation technologies without first climbing out of the deep hole they’ve been digging for years. That means replacing HR management systems and practices that lack the power, agility and flexibility necessary to do competitive combat in a labor environment substantially different than what has existed heretofore. The next few years will test employers’ people management capabilities will like never before.

There is a window of opportunity right now while these new technologies are maturing. More employers are commencing the serious work of repairing broken or underperforming people management systems and practices.
LABOR TRENDS DISCUSSION, cont’d.

Tech Architecture to the rescue—but this time for managing people

Foote Partners has worked with countless employers over more than 25 years in rethinking how they define the work of their tech professionals and how they can shape an enterprise tech workforce to deliver on business goals. But even more important, how they need to think about and build capabilities for the future, executing on business strategies that are not yet fully formed but which we, as experienced forecasters and analysts, have helped them understand capabilities which most likely need to be operational in their future.

Our observation across more than 3,000 employers is that the only approach to this particular work that has ever achieved consistent success—much less any proven success—has been one based on a strong architectural foundation. Not business architecture or technical architecture but rather people architecture.

By this we mean applying traditional architecture principles and practices to human capital management. Adopting a framework for tech people and pay that properly defines, classifies, and aligns job roles, levels, skills and competencies across the enterprise and allows for accurate matching of people and jobs to a constantly evolving marketplace. And perhaps most importantly, one that that is flexible in principle and agile enough in practice to enable job and pay scalability, meet forecasted labor needs, and accommodate growth and change with minimal pressure while also not creating new problems as a by-product.

Architecturally driven tech people management practices have been commonplace for years at consulting industry employers and virtually nowhere else. The business models and competitive focus of these employers relies on people performing services and as such their chief assets “walk out the door every night”. They operate within business models that have specialized people practices and budgets that simply are not easily replicated in other industries.

This shouldn’t be a novel idea but it is. It’s similar to how architecture thinking and practices were applied to technology inventorying and acquisition in the early 1990s and to businesses since the day they began. Enterprise architecture later became its own discipline as technology and business converged over the last two decades.

Tech People Architecture is similar in principle to traditional IT architecture initiatives but applied instead to workforce management and tech human capital. There are strategy and capability roadmaps, phase gate blueprints, benchmarks, performance metrics, and stakeholder management is critical. Governance issues need careful attention and business strategy drives it all. Agile Compensation is the answer to the chaos created by the proliferation of technology related job titles and lack of consistency in job definition and pay programs across the enterprise for the same work performed.

But with Agile Compensation and Tech People Architecture it’s about how key human capital management (HCM) elements such as job definition and design, skills demand and acquisition, compensation, incentives and recognition, professional development, and work/life balance plug into an overall optimized operational model. The model is tuned to new technologies, business strategy, organizational goals, and culture and performance philosophies, and it promotes flexibility and scalability, like any disciplined architecture approach.

People architecture approaches correct lack of job title standardization in the marketplace and too many job titles floating around IT departments, corporate departments, and business lines. With so many dimensions and variability in tech jobs, employers are unable to cope with the complexity of defining, determining pay, and laying out career paths for all these jobs. For many, serious retention and hiring problems are showing up for the first time. Recruiters are picking off your best people and candidates are suddenly rejecting offers.
LABOR TRENDS DISCUSSION, cont’d.

Tensions are palpable and that’s one of the factors driving Tech People Architecture and Agile Compensation right now. Let’s take a deeper dive into two of these emerging technologies to see why they’re going to succeed and what skills will be most in demand.

LABOR ANALYSIS: Training becomes the critical differentiator

A 2018 Cyentia Institute study entitled “Unraveling the Cyber Skills Gap & Talent Shortage” found that 80% of respondents do not feel adequately prepared to defend their organizations. 68% of the 3,109 international tech professionals surveyed (81% working in cybersecurity) express doubts about their organization’s readiness to thwart advanced threats.

Foote Partner’s latest IT Skills and Certifications Pay Index™ provides evidence of employers’ response to the cybersecurity talent retention gap: The Certified Cyber Forensics Professional certification is earning the highest certification cash premium among all 458 reported in the Pay Index, averaging the equivalent of 17% of base salary. Further, in the most recent October data update of our IT Professional Salary Survey, Cybersecurity Specialists with three years of experience are averaging $107,000 in base salary in 65 U.S. cities. Senior level cyber specialists with five years’ experience are averaging $137,000.

But with a nagging lack of consistency nationally in cybersecurity career definitions, and a shocking dearth of experienced cyber professionals, employers can expect to experience difficulties in attracting and retaining cybersecurity talent for months or even years to come.

Employers are more aware that they don't have the right people in their security departments. What’s missing are enough experienced security professionals who understand:

- Threat Intelligence and Analysis
- Valuing Asset Inventory
- Access/Identity Mgt
- Visibility
- Cryptography
- Audit log analysis
- Compliance and policy
- Secure Data Management
- Information Risk Management
- Network Security
- Process Optimization and Agile Controls
- Secure and defensive programming
- Business Continuity Management

Chief Security Officers are desperate for qualified talent to determine whether or not there’s been an attack, to identify root cause, and to figure out what information has been exposed. They’re allocating more financial resources to security challenges according to our data. But the linkage between the business and the information security and cybersecurity organizations is still too weak from a labor perspective.

A common refrain in our interviews has been “We’re going to need as many people as possible to ‘hit the ground running’ to meet the demand”. That’s going to be a tall order not to mention a bit unrealistic in the short term. The fact is it’s going to take another three to five years to narrow this particular skills gap. Employers will get there because indications are that the money and incentives are sufficient to get vendors, employers, and training organizations focused on the solution. And of course, it will take that long to get the requisite experience in place, which is typically 4 to 6 years of hands-on experience.
LABOR TRENDS DISCUSSION, cont’d.

Cybersecurity skill sets are still evolving in training protocols. Hands-on experience in a cyber security environment is more critical to cyber security jobs than just academic learning. Only 7% of the top universities around the world offer a technical cybersecurity degree at the undergraduate level. Cybersecurity curriculum has to dramatically expand and colleges need to aggressively pursue internship opportunities for their students to expose them real-world conditions. There need to be clear channels for attracting people into a profession that do not have the cache of software development.

This Cyentia Institute study concludes that organizations that invest in training show improved preparedness at both the employee and corporate level. The problem is that not enough companies are investing in training cybersecurity skills: half of the respondents pay for their own training and only 15% reported that their employers cover all cybersecurity training expenses. Moreover, 60% reported using personal time for IT and security training. Only 13% of companies conduct training during normal business hours and 35% of respondents report spending at least $1,000 annually in training-related expenses.

Figure 4 shows where investment intersects with value according to the perceptions, experience, and activities of Security Operations Center (SOC) and Incident Response (IR) staff. In theory, activities in the upper-left would offer good value at comparatively low cost. The only activity squarely in that quadrant? Training.

Figure 4

Source: Cyentia Institute
LABOR TRENDS DISCUSSION, cont’d.

One of the key findings in our own recent in-depth interviews with more than 90 Chief Security Officers and Chief Information Security Officers is an expanded definition of “security professional” that is being taken more into account in hiring decisions. It’s a long list but it can be distilled down to these:

• Ability to translate technology risk to business risk.
• Think business and learn business speak
• Understand your industry
• Be open-minded and think outside the box (be strategic and not just tactical)
• Develop your people skills and work at being trustworthy.
• Be able to write and present high-level concepts coherently and succinctly. Keeping in mind the language of business

Cybersecurity leadership and governance issues. In some cases, it’s going to become apparent that organizations simply don’t have the right security leadership in place,” suggests Foote. “Organizations have to ask themselves if security itself is sitting in the right place within the organization, who is accountable for security, and how to hold them accountable. You can’t avoid every serious incident, and while many businesses are good at incident management, too few have an established, organized approach for evaluating what went wrong and how to fix it. As a result, they are incurring unnecessary costs and accepting inappropriate risks.

Organizations of all sizes need to take stock now in order to ensure they are fully prepared and engaged to deal with these emerging security challenges and in particular cyber security strategy. By adopting a realistic, broad-based, collaborative approach to cyber security and resilience, government departments, regulators, senior business managers and information security professionals will better understand the true nature of cyber threats and how to respond quickly and appropriately.

Some companies are augmenting their staffing with machine learning technology and probability theory to model patterns of behavior and flag anomalous activity. Machine learning technology is increasingly being adopted as a way to reduce the noise (alerts) that traditional security products produce and to bubble up mid- and high-level concerns to IT staff. The discipline of machine learning finds its way into many large companies through the hiring of data scientists, who use algorithms to efficiently analyze event logs for their security teams.

Overall, we expect an increase in high-profile breaches in the near future. This will push corporate boards and senior business executives even farther to face decades of inadequately staffing their security operations and must now conquer a severe cybersecurity talent gap. They only solution will be to train, train, train over the next four years until as the gap narrows organically.
LABOR TRENDS DISCUSSION, cont’d.

LABOR FORECAST: Tech Workforce Transformation

Popularity of Agile Compensation and Tech People Architecture practices as solutions to persistent IT labor problems.

Clearly the widespread acceptance of technology’s singular role as an engine of innovation and competitiveness is an unquestioned, as is the energized role that has been thrust upon technology professionals and organizations everywhere to monetize technology. Too often those in the C-suite have been reluctant to hold their IT leaders accountable for such a heavy responsibility, instead choosing to create tech innovation departments and/or hire expensive consulting firms to do what they believe their IT leaders and tech workers are not capable of doing.

In the past few years senior business management has been asking tech leadership and business line leaders to be more accountable in managing large segments of technology talent—–for architecting, building and securing new products and services that are largely technology based. And as these leaders are held accountable for higher levels of information and tech management, their performance is being more closely scrutinized. Examples include advanced analytics (for making more informed decisions), greater security (against dreaded cyber-attacks), and capitalizing on fast moving trends such as Blockchain, Machine learning, and digital innovation in general. Meanwhile, for the CIO, the imperative to streamline operations, reduce costs in every possible manner, and ensure compliance with countless regulations must still be met.

Taken together, this has placed tremendous pressure on tech leadership to execute flawlessly and predictably in unfamiliar areas. For many employers this can only be achieved with a dramatic transformation of the tech workforce to a more appropriately skilled group of professionals who are capable of a level of agility, flexibility and aptitude not commonly associated with their predecessors. Companies must be able to architect their human capital to meet business needs now and especially in the future.

Employers are having more difficulty finding and retaining tech talent which can perform at a high caliber on increasingly more difficult tasks. At the same time managers are feeling immense performance pressure. Plus, today the tech workforce is spread throughout the enterprise doing multidimensional jobs that are hard to categorize, price and manage. In this environment architecting of people management is the last and most logical frontier.

Our analysts are learning from tech executives that people architecture practices have been instrumental in dealing with lack of job title standardization in the marketplace and having too many job titles among their internal technology workforce. With so many dimensions and variability in tech jobs, employers have been progressively unable to cope with the complexity of defining, determining pay, and laying out career paths for all these jobs that is consistent across the enterprise.

For many, serious retention and hiring problems were showing up for the first time. Work around solutions used for years to cope with systemic weaknesses in their HR systems were no longer effective. Recruiters started picking off their best people and candidates were suddenly rejecting offers.

The Agile Compensation and Tech People Architecture practices mentioned earlier focus on how key human capital management (HCM) elements such as job definition and design, skills demand and acquisition, compensation, incentives and recognition, professional development, and work/life balance plug into an overall optimized operational model. The model is tuned to new technologies, shifting business strategy and organizational imperatives, culture, and performance philosophies.
LABOR TRENDS DISCUSSION, cont’d.

Together they propel flexibility and scalability, like any disciplined architecture approach. *This is exactly what has been missing for decades in the HR functions at many employers, resulting in constant labor gaps, skills deficits, and failure to execute consistently.*

For employers, Agile Compensation and Tech People Architecture has solved these problems:

- Reducing by 50% to 70% the number of tech related job titles necessary to plan and administer pay;
- Significantly increasing retention rates;
- Narrowing or altogether eliminating persistent technology skills gaps;
- Improving individual and team performance and more predictable execution;
- Increasing consistent availability and quality of skills and workers;
- Achieving higher utilization rates;
- Mapping out how workers can move more effectively through promotions/career paths

Why do we think that Tech People Architecture is a viable alternative for most employers? Because architecture practices are familiar to technology executives. Technical architecture practices have been successful for decades because, when done well, companies have achieved an understanding of what they have systems-wise and could then connect it to where they were going and how they were going to get there, all within a process inclusive of all the various stakeholders who shared the risk in the outcome. A technical architecture helped to clearly define enterprise technology capabilities and give companies more options and flexibility going forward.
IT Skills & Certifications Pay Data Trend Charts

IT Skills and Certifications Pay Index™ – 2nd Quarter 2019 edition

(Data collected through July 1, 2019)

- Tech Certifications
- Noncertified Tech Skills
- IT Skills & Certifications Volatility Index™
How to interpret gains and losses in IT skills and certifications pay premiums

Quarterly gains and losses in premium pay reflect a widening or narrowing, respectively, in the gap between supply and demand for skills and certifications. This may occur for any number of reasons. For example, a quarterly decline in pay for a skill may signal that the market supply of talent for that skill is catching up to demand—not necessarily that demand is starting to wane. IT professionals are often attracted to a skill or certification if they perceive that it has rising value in the marketplace and therefore can help them to achieve higher pay, greater job security, a promotion, or more flexibility in their career choices. As they pursue greater competency in that skill or as more workers attain certification, supply increases and market pricing (which is elastic to the laws of supply and demand) will be driven downward unless demand is rising at the same proportional rate. Conversely, if demand rises and supply is not increasing to match that level of demand, pay premiums for specific skills and certifications will increase.

Therefore, when interpreting gains and losses in market pay it is important to consider all factors that could be driving supply and demand and market perception. Those factors range from:

- aggressive marketing of certifications by vendors;
- changes in certification programs (e.g. certification extensions or retirement);
- new technology and evolution/maturation of current technologies;
- technology adoption rate;
- product integration strategies,
- economic conditions;
- employment opportunities;
- mergers/acquisitions;
- budget cycles and the timing of skills and talent acquisition by employers;
- changes in labor sourcing plans pursuant to company strategies.
Fig 5 - Premium Pay for Tech Certifications Wanes as Non-Certified Tech Skills Show Gains as Disruptive Technologies Intensify

(Average Median Pay for a Single Certified vs. Noncertified Tech Skill, Last 13 years – 78,694 IT professionals)

Source: Foote Partners, IT Skills and Certifications Pay Index™ (1Q 2007 – 2Q 2019 data editions)
Tech Certifications: Latest market value trends

(Data collected through July 1, 2019)
## 2-YEAR TECH CERTIFICATIONS PAY TRENDS

(Through 7/1/2019 – 78,694 IT Professionals)

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<th>IT CERTIFICATIONS CATEGORIES</th>
<th># of certs surveyed</th>
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<th>% Change 6 mos</th>
<th>% Change ANNUAL</th>
<th>% Change 2 yrs</th>
<th>% Change 3 yrs</th>
<th>% Change 4 yrs</th>
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<td>6.3%</td>
<td>6.3%</td>
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<td>-0.3%</td>
<td>-0.6%</td>
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<td>9.4%</td>
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<td>System Administration/Engineering</td>
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<td>3.1%</td>
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<td>Cloud Computing</td>
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<td>-8.1%</td>
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<td>ALL CERTIFICATIONS REPORTED</td>
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<td>-4.3%</td>
<td>-3.7%</td>
<td>-4.2%</td>
<td>-1.4%</td>
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</tbody>
</table>

## 3 & 12 MONTH TECH CERTIFICATIONS PAY TRENDS BY CATEGORY

(Through 7/1/2019 – 78,694 IT Professionals)

% Change in Average Median Pay for a Single IT Certification

% Change in Average Premium Pay by Category
490 Tech Certifications Reported

**Goodyear Professional Cloud Architect**

- Microsoft Certified Solutions Associate: Cloud Platform
- Microsoft Certified Solutions Associate: Microsoft Dynamics 365
- Microsoft Certified Solutions Associate: SQL 2016 DBA
- Microsoft Certified Solutions Associate: SQL Server 2012/2014/2016
- Microsoft Certified Solutions Associate: Web Applications
- Microsoft Certified Solutions Associate: Windows Server 2012/2016
- Microsoft Certified Solutions Developer (MCSD)
- Microsoft Certified Solutions Developer: Applications Builder
- Microsoft Certified Solutions Expert (MCSE) – Server Infrastructure
- Microsoft Certified Solutions Expert: Business Applications
- Microsoft Certified Solutions Expert: Business Intelligence
- Microsoft Certified Solutions Expert: Cloud Platform and Infrastructure
- Microsoft Certified Solutions Expert: Core Infrastructure
- Microsoft Certified Solutions Expert: Data Management and Analytics
- Microsoft Certified Solutions Expert: Data Platform
- Microsoft Certified Solutions Expert: Desktop Infrastructure
- Microsoft Certified Trainer (MCT)
- Microsoft Office Specialist
- Microsoft Specialist in Windows 10
- MongoDB Certified DBA
- MongoDB Certified Developer
- MongoDB Certified Developer Associate
- NetApp Certified Data Administrator, ONTAP (NCDA)
- NetApp Certified Implementation Engineer (NCIE)
- NetApp Certified Storage Associates – Hybrid Cloud
- NetScoutInGenius Certified Analyst (nCA)
- NetScoutInGenius Certified Expert (nCE)
- NetScoutInGenius Certified Master (nCM)
- NetScoutInGenius Certified Professional (nCP)
- Novell/Certified Administrator (CNA)
- Novell/Certified Novell Engineer (CNE)
- Novell Certified Instructor
- Novell Certified Linux Engineer (Novell CLE)
- Novell Certified Linux Professional (Novell CLP)
- Novell Identity Manager Administrator
- Open Group Certified Architect (Open CA)
- Open Group Certified IT Specialist (Open CITS)
- Oracle Business Intelligence Foundation Suite 11G Certified Implementation Specialist
- Oracle Certified Associate - DBA (OCA)

**Oracle Certified Associate - Java SE Programmer**

- Oracle Certified Associate - MySQL 5
- Oracle Certified Associate - WebLogic Server Administrator
- Oracle Certified Expert - Java Platform EE Developer (all)
- Oracle Certified Expert - MySQL 5.1 Cluster Database Administrator
- Oracle Certified Expert - Siebel CRM Business Analyst
- Oracle Certified Expert - Solaris 10 Network Administrator for Solaris
- Oracle Certified Master - DBA (OCM)
- Oracle Certified Master - Java EE Enterprise Architect
- Oracle Certified Master - Java SE Developer
- Oracle Certified Professional - Advanced PL/SQL Developer
- Oracle Certified Professional - Application Server Administrator
- Oracle Certified Professional - Database Cloud Administrator
- Oracle Certified Professional - DBA (OCP)
- Oracle Certified Professional - E-Business Suite 12
- Oracle Certified Professional - Forms Developer
- Oracle Certified Professional - Java EE Web Services Developer
- Oracle Certified Professional - Java SE Programmer
- Oracle Certified Professional - MySQL 5 Database Administrator
- Oracle Certified Professional - MySQL 5 Developer
- Oracle Certified Professional - PL/SQL Developer
- Oracle Certified Professional - Solans 10 Systems Administrator
- Oracle Certified Professional, Java EE Web Component Developer
- Oracle Certified WebLogic Server System Administrator Certified Expert
- Oracle Exadata 11g Certified Implementation Specialist
- Oracle Linux Certified Administrator (OCA)
- Oracle SOA Infrastructure Implementation Certified Expert
- Oracle VM 3.0 for x86 Certified Implementation Specialist

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Pegasystems Certified Lead System Architect  
Pegasystems Certified Senior Systems Architect  
Pegasystems Certified System Architect  
Pegasystems Certified Pegan Business Architect  
Pegasystems Certified UI Specialist  
PHP Certification  
Pivotal Application Architect  
Pivotal Cloud Foundry Operator certification  
Pivotal Developer  
PMI Agile Certified Practitioner (PMI-ACP)  
PMI Portfolio Management Professional (PfMP)  
PMI Professional in Business Analysis (PMI-PBA)  
PMI Program Management Professional (PgMP)  
PMI Project Management Professional (PMP)  
PMI Risk Management Professional (PMI-RMP)  
Prince2 Foundation  
Prince2 Practitioner  
Professional Certified Investigator  
Professional in Project Management (GAQM)  
Qualified Information Security Professional QISP  
Rackspace Certified Technician  
Red Hat Certified Architect  
Red Hat Certified Architect: Application Development  
Red Hat Certified Architect: Application Platform  
Red Hat Certified Architect: Cloud  
Red Hat Certified Architect: DevOps  
Red Hat Certified Datacenter Specialist  
Red Hat Certified Engineer in Red Hat OpenStack  
Red Hat Certified Engineer  
Red Hat Certified Specialist in Virtualization  
Red Hat Certified System Administrator in Red Hat OpenStack  
Red Hat Certified Systems Administrator  
RSA Certified Administrator (RSA/CA)  
RSA Certified Instructor (RSA/CI)  
Salesforce.com Certified Force.com Advanced Developer  
Salesforce.com Certified Force.com Developer  
Salesforce.com Certified Technical Architect  
Salesforce.com Certified Administrator  
Salesforce.com Certified Advanced Administrator  
SAS Certified Advanced Programmer for SAS 9  
SAS Certified Base Programmer for SAS 9  
SAS Certified Big Data Professional Using SAS 9  
SAS Certified Data Integration Developer for SAS 9  
SAS Certified Data Scientist Using SAS 9  
SAS Certified Predictive Modeler - SAS Enterprise Miner 14  
SAS Certified Statistical Business Analyst - SAS 9  
SAS® Certified Advanced Analytics Professional Using SAS®9  
SAS® Certified BI Content Developer for SAS®9  
SAS® Certified Data Quality Steward for SAS®  
Siebel 8 Consultant Certified Expert  
Six Sigma Black Belt  
Six Sigma Green Belt  
Six Sigma Master Black Belt  
Six Sigma Yellow Belt  
SNIA Certified Data Center Professional  
SNIA Certified Storage Networking Expert (SCSN-E)  
SNIA Certified Storage Professional  
SNIA Certified Systems Engineer Sniffer Certified Expert  
SolarWinds Certified Professional (SCP)  
SUSE Certified Administrator  
SUSE Enterprise Engineer (SCE)  
SUSE Enterprise Architect or (SEA)  
Systems Security Certified Practitioner (SSCP)  
Teradata 14 Certified Associate  
Teradata 14 Certified Database Administrator  
Teradata 14 Certified Enterprise Architect  
Teradata 14 Certified Master  
Teradata 14 Certified Professional  
Teradata 14 Certified Solutions Developer  
Teradata 14 Certified Technical Specialist  
TIBCO Certified Professional  
TIBCO Certified SOA Architect  
TOGAF 9 Certified  
VMware Certified Advanced Professional 6.5- Data Center Virtualization Design  
VMware Certified Advanced Professional – Network Virtualization  
VMware Certified Advanced Professional (all)  
VMware Certified Advanced Professional 6- Data Center Virtualization Deployment  
VMware Certified Advanced Professional 6/7 - Cloud Mgt and Automation Deployment  
VMware Certified Advanced Professional 6/7 - Cloud Mgt and Automation Design  
VMware Certified Associate - Cloud  
VMware Certified Associate - Data Center Virtualization  
VMware Certified Design Expert – Network Virtualization  
VMware Certified Design Expert (all)  
VMware Certified Design Expert 6 - Data Center Virtualization  
VMware Certified Professional - Digital Workspace  
VMware Certified Professional - Network Virtualization  
VMware Certified Professional 6 - Data Center Virtualization (VCP6-DCV)  
VMware Certified Professional 6.5 - Data Center Virtualization (VCP6.5-DCV)  
VMware Certified Professional 6/6.5  
VMware Certified Professional 6/7 - Cloud Mgt and Automation  
VMware Certified Professional 6/7 - Cloud Mgt and Automation Design  
VMware Certified Professional 6/7 - Cloud Mgt and Automation Deployment  
VMware Certified Professional 6/7 - Cloud Mgt and Automation Design  
VMware Certified Professional 6/7 - Cloud Mgt and Automation Deployment  
VMware Certified Professional 6/7 - Cloud Mgt and Automation Design  
VMware Certified Professional 6/7 - Cloud Mgt and Automation Deployment
Tech Skills (Non-certified): Latest market value trends

(Data collected through July 1, 2019)
2-YEAR NON-CERTIFIED TECH SKILLS PAY TRENDS
(Through 7/1/2019 – 78,694 IT Professionals)

NON-CERTIFIED TECH SKILLS PAY TRENDS
BY CATEGORY
Average Median Pay for a Single Tech Skill (Non-certified)
(Through 7/1/2019 – 78,694 IT Professionals)

SOURCE: Data supporting these charts is from Foote Partners IT Skills & Certifications Pay Index™ (2004 to 2019 quarterly editions)
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<td><strong>SAP &amp; Enterprise Bus. Apps.</strong></td>
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<tr>
<td>Cognos</td>
<td>SAP APO</td>
</tr>
<tr>
<td>Confluence</td>
<td>SAP Auto-ID Infrastructure</td>
</tr>
<tr>
<td>Cucumber</td>
<td>SAP Digital Banking</td>
</tr>
<tr>
<td>Delphi</td>
<td>SAP Basis Components</td>
</tr>
<tr>
<td>Drupal</td>
<td>SAP BI Accelerator</td>
</tr>
<tr>
<td>Eclipse</td>
<td>SAP BODI</td>
</tr>
<tr>
<td>Epic Systems applications</td>
<td>SAP Data Services (SAP BODS)</td>
</tr>
<tr>
<td>Ethereum</td>
<td>SAP BOX/Category Reports</td>
</tr>
<tr>
<td>F#</td>
<td>SAP BPC</td>
</tr>
<tr>
<td>Git/GitHub</td>
<td>SAP BSD</td>
</tr>
<tr>
<td>GitLab</td>
<td>SAP Business One</td>
</tr>
<tr>
<td>Go language (Golang)</td>
<td>SAP Business Workflow/Workflow</td>
</tr>
<tr>
<td>Google Kubernetes</td>
<td>SAP CA</td>
</tr>
<tr>
<td>Gosu/GuideWire</td>
<td>SAP CAF</td>
</tr>
<tr>
<td>Gradle</td>
<td>SAP CAR</td>
</tr>
<tr>
<td>Graails/Groovy</td>
<td>SAP CCM</td>
</tr>
<tr>
<td>Grunt</td>
<td>SAP CE</td>
</tr>
<tr>
<td>Hibernate/NHibernate</td>
<td>SAP CFP</td>
</tr>
<tr>
<td>HP ALM (App. Lifecycle Mgt)</td>
<td>SAP CO</td>
</tr>
<tr>
<td>HP Unified Functional Testing</td>
<td>SAP CO-PA</td>
</tr>
<tr>
<td>Integration Testing</td>
<td>SAP CRM</td>
</tr>
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<td>iRase</td>
<td>SAP CS</td>
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<tr>
<td>Jasmine</td>
<td>SAP EBP</td>
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<tr>
<td>Java SE/Java EE</td>
<td>SAP EDI</td>
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<td>JBehave</td>
<td>SAP EHS</td>
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<td>Jenkins</td>
<td>SAP EPM</td>
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<td>JIRA</td>
<td>SAP ERP</td>
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<tr>
<td>JUnit</td>
<td>SAP ESA</td>
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<tr>
<td>MapReduce</td>
<td>SAP Exchange Infrastructure (XI)</td>
</tr>
<tr>
<td>MATLAB</td>
<td>SAP FI (Financial Accounting)</td>
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<tr>
<td>Microsoft Azure</td>
<td>SAP FI - CA</td>
</tr>
<tr>
<td>Microsoft SQL Server Mgt Studio</td>
<td>SAP FI - FSCM</td>
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<tr>
<td>Microsoft Team Foundation Server</td>
<td>SAP FI - Travel Management</td>
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<tr>
<td>NetWeaver</td>
<td>SAP Fiori</td>
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<tr>
<td>Nim</td>
<td>SAP F&amp;R</td>
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<tr>
<td>NUnit</td>
<td>SAP FS (Insurance)</td>
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<tr>
<td>Objective-C</td>
<td>SAP GRC</td>
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<tr>
<td>Objective Caml (OCaml)</td>
<td>SAP GTS</td>
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<tr>
<td>OpenShift</td>
<td>SAP HANA</td>
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<tr>
<td>Oracle APEX</td>
<td>SAP HCM (SAP HR)</td>
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<td>Oracle Apps Developer Framework</td>
<td>SAP HCM ESS/MSS</td>
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<tr>
<td>PL/SQL</td>
<td>SAP HR-PA</td>
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<tr>
<td>Powerbuilder</td>
<td>SAP Hybris</td>
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<tr>
<td>Progress 4GL/Development tools</td>
<td>SAP Integrated Business Planning</td>
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<tr>
<td>Prometheus</td>
<td>SAP IS-Retail</td>
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<tr>
<td>R language</td>
<td>SAP IS-U (Utilities)</td>
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<tr>
<td>Rstudio</td>
<td>SAP ITS</td>
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<td>Ruby</td>
<td>SAP Leonardo</td>
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<td>Ruby on Rails</td>
<td>SAP LES</td>
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<td>SaaS</td>
<td>SAP LO</td>
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<td>SAS</td>
<td>SAP Lumira</td>
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<tr>
<td>Scala</td>
<td>SAP Manufacturing</td>
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<tr>
<td>Scrum</td>
<td>SAP MDG (Master Data Governance)</td>
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<tr>
<td>Selenium</td>
<td>SAP MDM</td>
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<td>ServiceNow ITSM</td>
<td>SAP MDX</td>
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<td>SPSS</td>
<td>SAP MII</td>
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<td>SQL</td>
<td>SAP MM</td>
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<td>Swift</td>
<td>SAP MRO</td>
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<td>Td</td>
<td>SAP MRS</td>
</tr>
<tr>
<td>TestNG</td>
<td>SAP Netweaver Applications Server</td>
</tr>
<tr>
<td>Transact-SQL/SQL</td>
<td>SAP Netweaver BW (BW)</td>
</tr>
<tr>
<td>UML (unified modeling language)</td>
<td>SAP NetWeaver Visual Composer</td>
</tr>
<tr>
<td>Visual Basic 6.0</td>
<td>SAP NVDI</td>
</tr>
<tr>
<td>Visual C++</td>
<td>SAP NVDS</td>
</tr>
<tr>
<td>VMware Cloud Foundry PaaS</td>
<td>SAP Oil &amp; Gas</td>
</tr>
<tr>
<td>WebSphereMQ, Xcode</td>
<td>SAP Pi (NetWeaver Process Integr.)</td>
</tr>
<tr>
<td>Hibernate/NHibernate</td>
<td>SAP PLM</td>
</tr>
</tbody>
</table>
567 Non-Certified Tech Skills Reported

Web/e-Commerce Development

- Microsoft SharePoint/SharePoint Server
- Microsoft Silverlight
- Microsoft Visual Studio
- Mobile applications development
- Mule/MuleESB
- Node.js
- Oracle Fusion
- Oracle WebLogic
- Oracle Workflow
- Pandas
- Perl
- PHP (all)
- Python
- React.js
- Redux
- REST
- RESTful
- SailPoint
- Scalable Vector Graphics (SVG)
- Secure software development
- Sitecore CMS
- SOAP
- Social Media/Networks
- Spring Framework
- Spring Boot
- Spring Cloud
- Spring MVC
- TibCO
- UDDI
- Umbraco
- VBScript
- Video/graphics editing
- Visual Interdev
- VoiceXML
- Web collaboration applications
- Web content development
- Web Design/Development
- WebSphere
- WebSphere DataPower
- Wikis
- WSDL
- XAML/XAML
- XHTML MP
- XML (all variants)

Management, Methodology and Process

- Artificial Intelligence

Big Data Analytics
- Bioinformatics
- Business Analysis
- Business Intelligence
- Business process management/ modeling/improvement
- Business performance
- Configuration Management
- Continuous Integration
- Continuous Integration/Build
- Cryptography (encryption, VPN)
- Cybersecurity
- Cyber Threat Intelligence
- Data Acquisition and Control
- Data Analytics
- Data Architecture
- Data Cleansing
- Data Governance
- Data Integration
- Data Management
- Data Modelling
- Data Quality
- Data Science
- Data Security
- Data Visualization
- DevOps
- Digital Analytics
- Digital Forensics
discovery
eDiscovery
- E-Procurement
- ERP
- Game Development
- General Data Protection Regulation (GDPR) (EU) 2016/679
- Google TensorFlow
- HL7
- Incident Management
- Information management
- IT Governance
- ITIL V3

Kanban
- Machine Learning
- Marketo
- Metadata design and development
- Microservices
- Microsoft SQL Server Analysis Services
- Microsoft Visio
- Network Architecture
- NIST
- Penetration testing
- Predictive Analytics and Modeling
- Prescriptive Analytics
- Program Management
- Project management/governance
- QlikView
- Quality Assurance
- Quality management/TQM
- Quantitative Analysis/Regression Analysis
- Razor
- Requirements Engineering/Analysis
- Risk analytics/assessment
- Risk management
- Robotic Process Automation
- Security architecture and models
- SEO
- Service Management
- Six Sigma/Lean Six Sigma
- Social media analysis/Analytics
- Software development lifecycle management
- Splunk
- Tableau
- Test automation
- Test Driven Development/Scripting
- TIBCO ActiveMatrix BusinessWorks
- TOGAF (Enterprise Architecture)
- User Acceptance Testing
- User Experience/Interface Design
- Usability Research/Human Factors Research
- Waterfall
- Web Analytics
- Webtrends analytics
- Zachman Framework

Database

- Amazon DynamoDB
- Apache Cassandra
- Apache CouchDB
- Apache HBase

- Azure Cosmos DB
- Azure Data Factory
- Azure SQL Database
- Amazon RedShift
- Azure SQL Database
- Amazon RedShift
- Base SAS
- Blockchain
- Cloudera Impala
- Couchbase Server
- Database management
- Data mining
- Data security
- DB2
dBASE/DBASE
- ETL (Extract, transform, load)
- Hbase
- Informatica
- Java Database Connectivity
- Master data management
- Microsoft Access
- Microsoft Exchange Server
- Microsoft SQL Server
- 2016/2014/2012/2008/2005
- MongoDB
- MySQL
- NoSQL
- OpenEdge ABL (Progress 4GL)
- Oracle Application Server
- Oracle Business Intelligence Enterprise Edition Plus
- Oracle Coherence
- Oracle DB 9i/10g/11i/12c
- Oracle Enterprise Manager
- Oracle Exadata
- Oracle Forms
- Oracle Reports
- PostgreSQL
- Redis
- Risk
- Smart Contract
- Sqoop
- Sybase Adaptive Server
- Teradata
- TIBCO Spotfire
- Visual SQL
### Systems/Networks

- Active Directory
- Ansible
- Apache Flume
- Arista
- ATM
- Azure Active Directory
- Business continuity and disaster recovery planning
- CA Endevor
- Chef/Opscode
- Cisco ASA
- Cisco CUCM
- Cisco ICM
- Cisco ISE/Identity Services Engine
- Cisco IPCC
- Cisco Nexus
- Cisco Prime
- Cisco UCCE
- Cisco UCCX
- Citrix Virtual Apps (XenApp)
- Citrix Hypervisor (XenServer)
- Cloud architecture
- Cloud security
- DHCP
- EIGRP
- Ethernet
- Fast Ethernet
- Gigabit Ethernet (1 GigE/10 GigE)
- HP Converged System
- HP Quality Center
- HTTPS
- IaaS (Infrastructure as a Service)
- Infrastructure architecture
- Intrusion prevention/detection systems
- IPX/SPX
- Juniper
- LAN
- LTE
- Microsoft Application Virtualization
- Microsoft Hyper-V
- Microsoft SCCM
- Microsoft SCVMM
- Microsoft Virtual Server
- Mobile device management
- Mobile security
- Multiprotocol Label Switching
- iNAS/Network Attached Storage
- Network access control/Identity mgmt systems
- Network security management
- Novell Netware
- PaaS
- Performance Analysis/Tuning
- Performance Testing
- Puppet
- Rackspace Cloud
- RedHat OpenShift
- Routing (e.g. OSPF)
- Salt
- SAN/Storage Area Networks
- Security skills (project-based)
- Security Information and Event Management (SIEM)
- Smart Contract
- SMTP
- SNA
- SolarWinds
- Storage virtualization/administration
- TCP/IP
- Terraform
- Tivoli
- Vagrant
- vCloud
- Virtualization (various)
- Virtual security
- VMware Server/ESX, ESXi Server
- VMware NSX
- Vol/PiP telephony
- VPN/OpenVPN
- WAN/3G/4G services
- Web Infrastructure
- Web services security
- Wireless Network Mgmt
- Wireless security
- Wireless sensors/RFID
- Wireline Networking/Telecomm. WML

### Messaging & Communications

- ActiveMQ
- Apache Camel
- Apache Kafka
- IBM Domino
- Java Messaging Service
- Message-oriented Middleware
  - (Wave, XMPP/Jabber, etc.)
- Microsoft Exchange
- Novell Groupwise
- Oracle Comm Messaging Server
- Outlook/cc/mail/various clients
- RabbitMQ
- TIBCO Enterprise Message Service
- TIBCO Rendezvous
- Unified Communications/Messaging

### Operating Systems

- AIX
- Apache Cloudstack
- CoreOS
- HP-UX
- Linux
- Mac OS X
- Mobile operating systems (iOS, Android)
- OpenStack
- Red Hat Enterprise Linux
- Solaris
- SUSE
- Unix (all)
- VMware vSphere
- Windows 8/10
- Windows NT
- Windows Server 2008/2012
Q2 2019 Trend Charts

2019 IT Skills & Certifications Volatility Index™

(Data collected through July 1, 2019)

Demand dynamics in benchmarked certified and non-certified IT skills pay
Volatility in market value for individual IT skills and certifications—defined as incidence of gains or declines over a period of time in premium pay earned by IT professionals for specific technical and business skills—increased from April 1, 2019 to July 1, 2019 according to the latest update of Foote Partners’ long-running IT Skills and Certifications Pay Index™ of market values for tech skills. Market value is measured by tracking additional cash compensation paid to workers by their employers for specific certified and non-certified skills they possess.

### Current Quarterly Recap (data collected through July 1, 2019)

**TOTAL: All Skills and Certifications**
- 23% of skills and certifications (238 of 1,033) changed in market value in 2nd Quarter 2019 compared to 22.5% in the prior quarter
- 107 gained value and 131 declined in value

**CERTIFIED SKILLS**
- 16.5% of reported certifications (80 of 479) changed market value in 2nd Quarter 2019, up slightly from 16.5% volatility in the prior quarter.
- 33 certifications gained market value; 47 declined in value

**NON-CERTIFIED SKILLS**
- 28.5% of reported skills (158 of 554) changed value in 1st Quarter 2019, up from 27.6% in the prior quarter.
- 74 gained in market value; 84 declined in value

Tracking skills volatility is useful in many ways: analyzing and forecasting demand for skills; monitoring IT workforce transition; and understanding IT management decision making. In fact, we believe statistical volatility in IT skills pay offers a more complete story of true labor market conditions than salary movements and hiring behavior, among other common indicators. Important in this distinction is that skills can be segmented and benchmarked more meaningfully than jobs allowing to microanalyses.

Similar to jobs, IT skills have broad skills categories that can be tracked (e.g., security, networking, systems, database, applications development). But unlike jobs, skills pay can be pinpointed to hundreds of niches and specialization. Also, unlike most job trends analyses, within skills categories and niches are vendor-specific and vendor independent skill specializations for more granular tracking, analysis, and forecasting.

Skills and certifications volatility prior to 2008 averaged in the 14% - 19% range. Quarterly volatility in the last two years has been in the 20% to 31% range. This is an important shift that we believe signals a move that employers are taking a more long-term view to building their tech workforces for emerging technologies such as Blockchain, AI/Machine learning, and a variety of digital solutions. Tech leaders right now are demanding more agility, faster reaction times, and more predictable execution; this is keeping volatility high as skills markets constantly adjust to meet surges in demand for specific certified and non-certified skills.

They will be able to achieve those capabilities through applying architecture principles and practices to people management. **We discuss this in greater detail earlier in this report.**
TECH SKILLS VOLATILITY HIGHLIGHTS - 13 Year Trending

IT Skills and Certifications Volatility Index™ – 1,057 Skills and Certifications

Recent IT skills and certifications volatility trends

QUARTERLY SUMMARY

2nd Quarter 2019 volatility in skills and certifications values measured 23%, consistent with the 2-year (22.8%) and 3-year (23.4%) average volatility for all 1,057 certified and noncertified skills we follow.

NON-CERTIFIED SKILLS VOLATILITY in this quarter was one point higher than the prior quarter: 28.5% vs. 27.6%.

FINDING: Q2 volatility matches the 2-years running average of 28.5% but is lower than 3-year (29.2%) and 4-year (29.8%) average volatility.

IT CERTIFICATIONS VOLATILITY in this quarter was mostly unchanged from the prior quarter, 16.7%.

FINDING: Q2 volatility is higher than the 2-year average, 15.7%, but on par with an 3-year (16.5%) and 4-year (15.2) average volatility.

(Pay data supporting these charts available in the IT Skills and Certifications Pay Index™ – 2007 to 2019 quarterly data edition)
VOLATILITY HIGHLIGHTS  Tech Certifications – 2nd Quarter 2019 data

IT Skills and Certifications Volatility Index™
2Q 2019 data edition findings: Tech Certifications

IT Certifications Volatility Highlights

Among 479 certifications surveyed, highest volatility (>20%) occurred in these segments (ranked highest to lowest):

- Info/Cyber Security
- Architecture/Project Mgt/Process

Within segments, notable upward volatility (value gains) occurred most in these (ranked):

- Info/Cyber Security

Within segments, notable downward volatility (value declines) occurred most in these (ranked):

- Architecture/Project Mgt/Process
- Info/Cyber Security

(Source: Foote Partners LLC, 2019 IT Skills & Certifications Pay Index™)
VOLATILITY HIGHLIGHTS Noncertified Tech Skills – 2nd Quarter 2019 data

IT Skills and Certifications Volatility Index™
2Q 2019 data edition findings: Non-certified Tech Skills

Noncertified IT Skill Pay Volatility Highlights

Among 554 noncertified IT skills surveyed, high volatility (>20%) occurred in these segments (ranked highest to lowest):

- Data/Database
- SAP & Enterprise Business Apps
- Web/E-commerce Development
- Messaging & Communications
- Management/Methodology/Process
- Applications Development Tools and Platforms
- Systems/Networking

Within segments, notable upward volatility (value gains) occurred most in these (ranked):

- Data/Database

Within segments, notable downward volatility (value declines) occurred most in these (ranked):

- Messaging & Communications
- SAP & Enterprise Business Apps
- Web/E-commerce Development

(Source: Foote Partners LLC, 2019 IT Skills & Certifications Pay Index™)
IT Skills and Certifications Pay Index™

- Pay premiums for **1,057 certified and noncertified IT skills**
  - Three data points for each position: 10th, 50th, 90th percentile
- Verified and validated IT skills pay data from **78,694 IT professionals at 3,351 employers** in US and Canada
- Current data collected through July 1, 2019 (updated quarterly)
  - **Excel format data tables. Master agreements for data loading in place with MarketPay, CompAnalyst, WillisTowersWatson.**
- **Certifications Guide** containing basic information about surveyed IT certifications (pre-requisites; costs; test content; lab requirements, etc.)

**Pricing:** $5,800 single edition. $19,800 annual subscription

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**Definition of IT skills premium pay**

- Pay that IT workers receive for possessing high-value IT and business skills used on the job
- Given in the form of a bonus, or embedded in base salary to adjust for the presence of a dominant vendor or technology central to job performance (examples: Cisco Network Engineer, Python Software Engineer, Redhat Linux Systems Administrator, or SAP Developer.)
- Often used to adjust either base pay or total pay in situations where job title does not match actual on-the-job duties and responsibilities, and changing the job title is not an attractive option
- May be used as a reward, recruiting inducement, retention tool, or as a guide for creating consulting rate cards
ABOUT THIS RESEARCH

Foote Partners’ primary research survey for tracking IT skills and certifications pay and supply/demand volatility is the industry-leading IT Skills and Certifications Pay Index™ (ITSCPI), launched in 1999 and updated every three months since that time. Data covering 303,616 tech professionals at 3,351 employers in 83 U.S. and Canada cities are reported for IT salaries and skills pay earned for 222 positions and 1,057 certified and noncertified technical and business skills. Verified and validated pay data for 78,694 tech workers has been included in the 2nd Quarter 2019 data edition of the ITSCPI, compiled from data collected through July 1, 2019.

Demographics of the participating organizations for our latest update are as follows, measured most appropriately for the type of business, by revenues, assets, total premiums and operating budgets:

- 18% of participating organizations have $5 billion+ in sales/$15+ billion in total assets
- 28% of participating organizations earn more than $1 billion in annual revenues or more than $5 billion in total assets
- 46% of participating organizations have $500+ million in sales/$1+ billion in total assets/$500+ million in premiums/$500+ million operating budget (government, educational, not-for-profit)
- 54% of participating organizations fall in the SMB (small-to-medium sized business) segment, generally defined as organization under $500 million in sales.
- [Public sector] 5% have operating budgets of $500 million or more, [nonprofit/educational sectors] 4% with operating budgets $100 million to less than $500 million

TO OBTAIN A COPY OF THE LATEST IT SKILLS AND CERTIFICATIONS PAY INDEX™

Please visit the Foote Partners web site: http://www.footepartners.com/itcompensation.html
Foote Partners 2Q 2019 IT Compensation Survey Product Map

**Survey Demographics**
- 65 US/18 Canadian cities (303,616 IT workers, 3,351 employers)
- 174 Europe/UK cities (188,075 IT workers, 2,045 employers)
- 45+ industries
- Updated continuously.

**Custom Salary Reports**
- Skip survey reports and buy only the job titles, job families, and cities needed.

**IT Infrastructure Survey**

**IT Professional Pay Survey**
(225 Jobs, 37 IT job families)

**IT Skills & Certification Pay Index™**
(1,057 skills/certs)

**IT Skills Demand and Pay Trends Report**

**IT Skills HOT Lists Forecast**

**IT Skills Volatility Index**

**IT Salary + Skills Pay Survey Reports**

**Long-form Job Descriptions**
- updated continuously
- comprehensive, includes internal/external relationships key to job success; skills and certification; detailed experience factors.

**Short-form Job Profiles (JD excerpts)**

**IT Base Positions Survey**

**Custom Salary Reports**
- Choose on the job titles or job families needed
- Choose cities needed.

**JOB FAMILIES AVAILABLE:**
- Big Data
- Business Technology
- Business Applications Delivery
- Cloud Computing
- Data Analytics
- Data Management
- Data Warehousing/BI
- Database Administration
- Database Developers
- DevOps
- Digital Development family
- e-Commerce/Business
- Enterprise Applications
- Enterprise Infrastructure
- Epic Systems
- Help Desk
- InfoCybersecurity
- Internets/intranets/extranets
- IT Architecture
- IT Auditing
- IBM Notes/Domino
- Java Developers
- Messaging
- Mobile Computing
- NET Developers
- Network Eng & Operations
- Project Management
- SAP
- Six Sigma
- Software Quality Assurance
- Storage/SAN/NAS
- Systems Eng. & Administration
- Unix/NT/Linux
- Voice Engineering
- Web/I-net

**SALARY + SKILLS REPORTS AVAILABLE:**
- Applications Development
- Big Data
- Business Analysts/Business Technology
- Database
- Data Warehousing/Business Intelligence
- E-Commerce
- IT Architecture
- Microsoft Windows
- Networking Operations & Engineering
- Project Management
- SAP
- IT Security
- Systems Engineering and Administration
- Web/I-net

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ABOUT FOOTE PARTNERS

Foote Partners, LLC is a technology analyst firm and independent benchmark research organization focusing on the people (versus vendor) side of managing technology and technology value creation. A thought leader and trusted advisor to thousands of employers on five continents who purchase our products and services, our company provides pragmatic benchmark research and forward-thinking advice and market intelligence targeting the tech workforce in the modern highly integrated business/IT hybrid environment in which all private and public organizations now operate.

Our products are deeply grounded in specialized proprietary data-driven statistical and empirical research, benchmark surveys, and business intelligence collected from thousands of North American employers with whom we have deep longstanding research partnerships. These partnerships have been created and supported specifically to enable unique market intelligence views and difficult-to-find decision support research on the multiple facets of IT human capital management. As a group, these U.S., Canadian, and European partners were selected to meet strict criteria for what we believe is the most meaningful demographic representation for tech professionals in each local labor markets.

Founded in 1997 and comprised of former Gartner industry analysts, McKinsey & Company, Mercer and WillisTowersWatson senior consultants, and former corporate HR, IT, and business executives, the firm's research division publishes 70+ quarterly-updated benchmarking, analytical research and forecasting products that help employers benchmark their IT compensation, solve difficult information technology management and workforce problems, and strengthen their ability to execute complex business solutions.

Foote Partners tech compensation survey findings and labor market trend analyses are featured regularly in countless business, HR, and IT media sources and periodicals around the globe, including Bloomberg BusinessWeek, Forbes, Fortune, Wall Street Journal, New York Times, CIO Magazine, ComputerWorld, and WorldatWork’s Journal and Workspan Magazine; and in appearances on network and cable television, National Public Radio, and countless podcasts and webcasts.

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