

INFORMATION TECHNOLOGY (IT) IN COLORADO

IT occupations have consistently been in high demand in recent years and typically pay good wages (across IT occupations, the median annual wage is approximately \$85,000). Globally, strong employment growth in IT positions across all industries—not just in the IT sector—is expected, reinforcing the wide range of data and technological literacy demanded by today’s jobs (World Economic Forum, 2016). Yet, despite growth in postsecondary program completions in related disciplines, the number of emerging graduates still has not been adequate in meeting employer demand. This section provides a high level overview of activity related to the development of IT career pathways and related talent development issues. *For more in-depth information, please review the complete overview of IT career pathway development on the Colorado Workforce Development Council website.*

DEVELOPING CAREER PATHWAYS IN IT

The passage of House Bill 15-1274 provided the opportunity for state, regional, and local partners across Colorado to align around the development of regional industry-driven career pathways systems and the creation of a statewide career pathway map. The first set of career pathways created focuses on IT occupations; subsequent work will focus on healthcare and construction trades. Developing regional industry-driven career pathway systems is a proven strategy for ensuring that students and jobseekers find meaningful employment, and employers find the talent they need for their businesses to thrive. In the spring and summer of 2016, technology businesses led conversations with community support partners from education, training, and workforce systems in order to build partnerships focused on technology employers’ talent needs; this series of conversations was called the Tech Talent Forums. In these partnerships, community support

WHAT IS A CAREER PATHWAY?

A career pathway is defined as a well-articulated sequence of quality education and training programs, work-based learning experiences, and supportive services that develop youth and adults’ core academic, technical and employability skills; provide them with continuous education, training; place them in high-demand, high-opportunity jobs; and enable advancement to successively higher levels of education and employment in a given industry sector or occupation.

partners stay deeply attuned and responsive to the needs of the technology labor market, preparing students and workers with the skills and credentials they need for jobs and careers.

The Tech Talent Forums provided a setting for industry to lead conversations and devise action plans to collectively address their talent needs. Specifically, the Tech Talent Forums:

- a. Identified critical job functions in technology that most impact employers' long-term competitiveness;
- b. Created a shared understanding of career pathways in technology, identifying typical job families and paths to progression within and across occupations;
- c. Began to uncover key competencies required to perform effectively in critical occupations;
- d. Identified potential actions that would address priority talent gaps, informing the development of a regional career pathways action plan;
- e. Called for industry champions to continue developing career pathways actions in collaboration with regional education, training and workforce development partners;
- f. Identified where deeper discussion is warranted. Set up businesses to have ongoing conversations with one another and with education in their region to address talent issues (using a sector partnership model where appropriate).

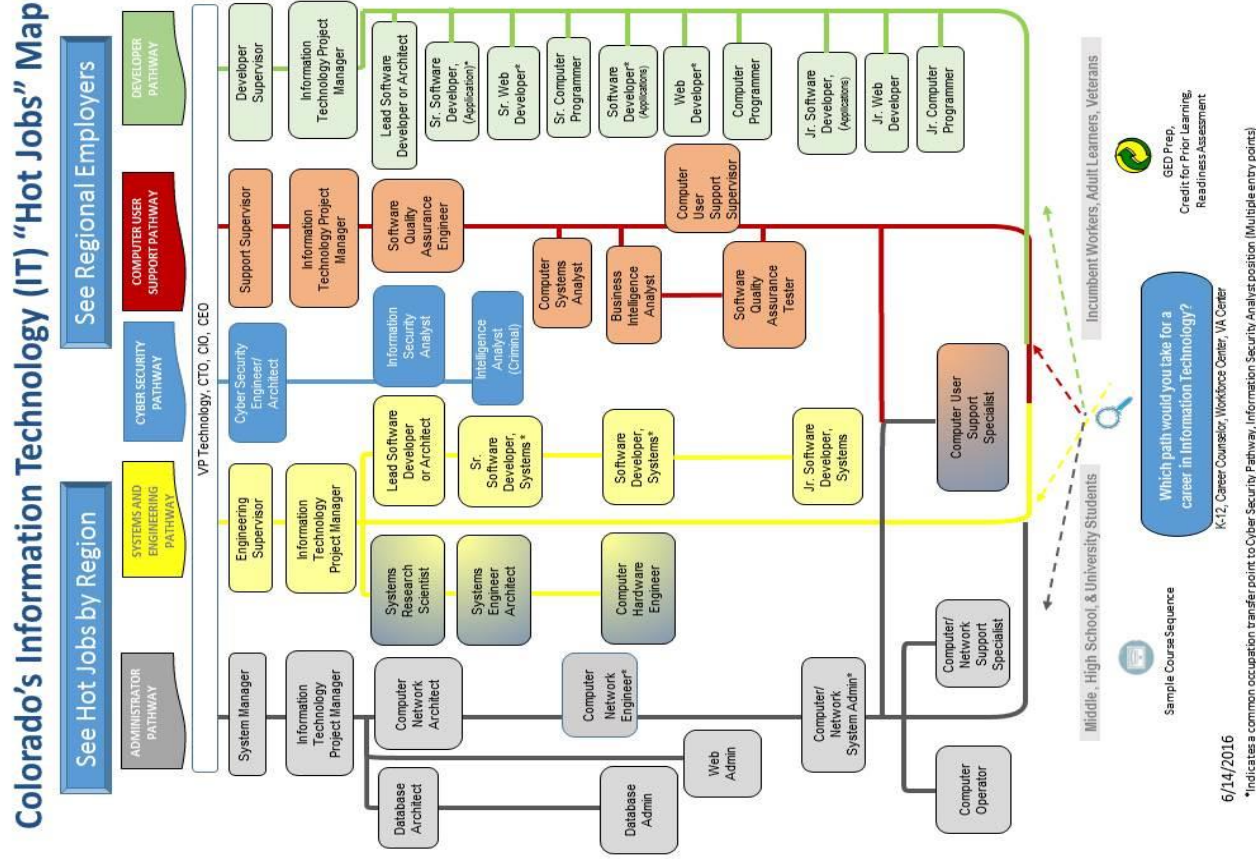
Tech Talent Forums were conducted throughout Colorado in areas of the state that have high concentrations of IT employers. Altogether, forty employers offered their knowledge and insight during the Forums, with fifty-eight public partners actively involved to develop responses to employer needs. Forums covered the following locations:

- El Paso County and Pueblo County (hosted in Colorado Springs);
- Summit County, Eagle County and Park County (hosted in Frisco);
- Mesa County (hosted in Grand Junction);
- Boulder County and Broomfield County (hosted in Boulder);
- Larimer County and Weld County (hosted in Fort Collins);
- La Plata County (hosted in Durango).

MAY 2016 TECH TALENT FORUMS
Six regional forums were conducted across the state.

- 40 Employers attended, offering insight and knowledge
- 58 public partners listened to the issues

Currently, IT career pathways are outlined on careersincolorado.com (hosted by College in Colorado). This site is currently being redesigned to be a dynamic click-through resource for students and jobseekers. A model of the IT pathways can be reviewed in the figure below. Recent work through the Skillful Initiative completed in-depth job competency profiles for ten middle skill occupations in IT. These interactive snapshots outline in detail the occupational and foundational skills found in these fast-growing IT occupations, and link to career exploration tools and jobs overview videos.



CROSS-CUTTING THEMES FROM REGIONAL TECH TALENT FORUMS

While each region has distinct technology workforce needs and challenges, several cross-cutting themes emerged across all six Forums:

- **Companies in the IT industry as well as IT divisions of companies in other industries share similar talent needs.** The Forums brought together leaders from IT companies that produce and sell IT products and services (both startup and more established firms). Also present were leaders of IT departments or divisions from companies in a range of industries including healthcare, education, banking and finance and public sector agencies. While there were differences in specialized talent needs across these employers, there was general agreement that, at an entry level, IT companies and IT divisions of companies in other industries look for employees with similar skillsets. For instance, businesses noted a need for foundational or generalized IT skills for entry-level positions in the IT industry and businesses are willing to invest and train individuals to meet this demand.
- **Better information about required skills and aptitudes will help students and jobseekers find the right fit within the IT industry.** Several employers discussed a misperception that careers in technology are limited to technical, backend development roles when, in fact, many critical job functions require a combination of technical skills as well as communication skills, customer-facing abilities and broader business knowledge. By making it clearer that “it’s not all about coding,” employers would be able to attract a broader group of students and jobseekers to careers in technology. In addition, developing better assessment mechanisms tailored to the IT industry would help students understand how their interests and aptitudes align with opportunities in the industry.
- **Cybersecurity is a critical and growing need across the industry.** Cybersecurity is both a cross-cutting function that applies to nearly all aspects of IT as well as its own specialized occupational family. Employers reported a need for foundational cybersecurity skills to be integrated in all IT programs as well as to increase the number of students and jobseekers pursuing specialized cybersecurity skills.

SUPPLY & DEMAND FOR IT IN COLORADO

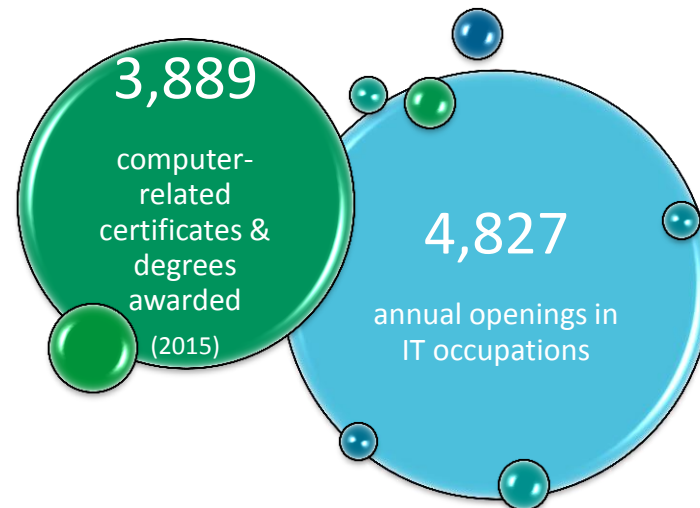
As identified in the 2015 Colorado Talent Pipeline Report, these highlighted occupations were identified as top cross-industry occupations which intersect with IT and were used as a conversation guide with the goal of learning what the critical occupations are regionally and directly from employers. These jobs made the list by having a median wage at or above a sustainable living wage, above average projected growth rates and above 40 annual openings. For the 2016 IT occupations that made the “Top Jobs” list, the only changes were the addition of Network Administrators and removal of Computer Network Architects (with the projected growth rate being just below the cut-off).

Consistent with the previous three years of supply-demand analysis in the Skills for Jobs legislative report produced by the Colorado Department of Higher Education, data show we are likely not producing enough graduates at the mid-level and bachelors level for computer-related occupations. While credential completions have increased from 2010 to 2015, demand has also increased substantially.

There are a lot of opportunities in IT jobs in Colorado. Annually, there are over 4,800 job openings—and median earnings across all job types exceed a living wage for a family of three.

IT Jobs that made the “Top Jobs” list:

1. Computer and Information Systems Managers
2. Computer Systems Analysts
3. Information Security Analysts
4. Software Developers, Applications
5. Software Developers, Systems Software
6. Web Developers
7. Database Administrators
8. Network & Computer Systems Administrators
9. Computer User Support Specialists
10. Computer Hardware Engineers



Compared to IT occupations across the country, we have considerably higher concentrations of computer hardware engineers, software developers and computer network architects. The vast majority of these occupations typically require some type of postsecondary education.

Colorado Labor Market Information for IT Occupations

| SOC | Occupation Title | Median Annual Wage | Growth Rate 2015-2025 | Avg. Annual Openings | Location Quotient | Typical Entry Education |
|---------|----------------------------------------------|--------------------|-----------------------|----------------------|-------------------|-----------------------------------|
| 11-3021 | Computer and Information Systems Managers | \$146,478 | 33.65 | 301 | 1.00 | Bachelor's degree |
| 15-1111 | Computer and Information Research Scientists | \$88,903 | 25.57 | 9 | 0.43 | Doctoral or professional degree |
| 15-1121 | Computer Systems Analysts | \$90,021 | 40.95 | 484 | 1.04 | Bachelor's degree |
| 15-1122 | Information Security Analysts | \$98,142 | 40.74 | 95 | 1.03 | Bachelor's degree |
| 15-1131 | Computer Programmers | \$81,288 | 4.17 | 97 | 0.82 | Bachelor's degree |
| 15-1132 | Software Developers, Applications | \$102,195 | 36.85 | 1249 | 1.72 | Bachelor's degree |
| 15-1133 | Software Developers, Systems Software | \$108,278 | 35.04 | 659 | 1.56 | Bachelor's degree |
| 15-1134 | Web Developers | \$55,542 | 50.05 | 210 | 1.33 | Associate's degree |
| 15-1141 | Database Administrators | \$96,790 | 32.21 | 132 | 1.21 | Bachelor's degree |
| 15-1142 | Network and Computer Systems Administrators | \$80,261 | 25.04 | 432 | 1.53 | Bachelor's degree |
| 15-1143 | Computer Network Architects | \$105,416 | 22.47 | 149 | 1.61 | Bachelor's degree |
| 15-1151 | Computer User Support Specialists | \$53,017 | 30.79 | 603 | 1.28 | Some college, no degree |
| 15-1152 | Computer Network Support Specialists | \$65,354 | 23.18 | 146 | 1.24 | Associate's degree |
| 15-1199 | Computer Occupations, All Other | \$91,318 | 22.02 | 323 | 1.91 | Bachelor's degree |
| 17-2061 | Computer Hardware Engineers | \$108,114 | 29.96 | 197 | 2.55 | Bachelor's degree |
| 43-9011 | Computer Operators | \$51,536 | -8.21 | 4 | 0.55 | High school diploma or equivalent |

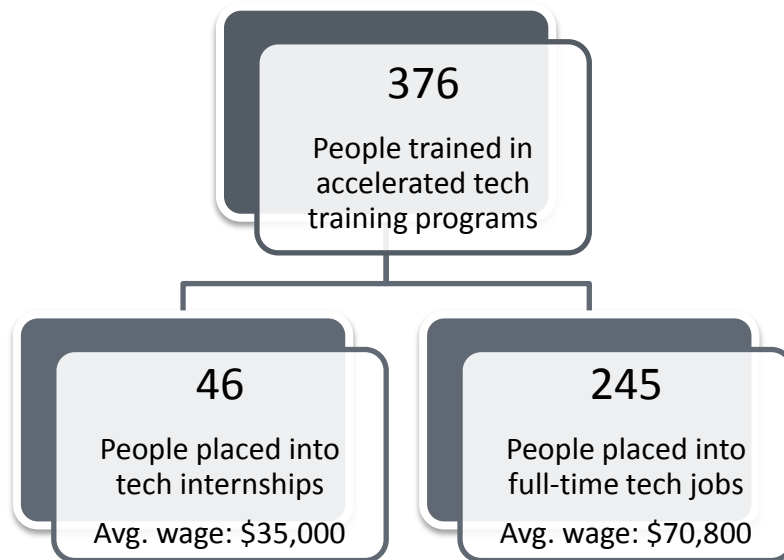
Source: Colorado LMI; EMSI 2016.2

Colorado Postsecondary Completions that Crosswalk to IT Occupations

| | | | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|------------------------------------------------|---------|-----------------------------------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| All Related Program Completions (IPEDS) | | | 2,462 | 2,567 | 2,970 | 2,969 | 3,629 | 3,889 |
| Largest Programs | 11.0101 | Computer and Information Sciences, General | 464 | 565 | 768 | 853 | 1,069 | 1,060 |
| | 11.0103 | Information Technology | 525 | 396 | 416 | 575 | 791 | 875 |
| | 11.0701 | Computer Science | 238 | 342 | 411 | 423 | 579 | 615 |
| | 11.0901 | Computer Systems Networking and Telecommunications | 135 | 218 | 240 | 245 | 293 | 452 |
| | 52.1201 | Management Information Systems, General | 118 | 137 | 85 | 80 | 116 | 164 |
| | 11.0401 | Information Science/Studies | 380 | 223 | 205 | 170 | 128 | 132 |
| | 11.1003 | Computer and Information Systems Security/Information Assurance | 166 | 126 | 153 | 85 | 112 | 91 |

Source: IPEDS Completions crosswalked using EMSI 2016.3. Inclusive of both public and private institutions that report to IPEDS.

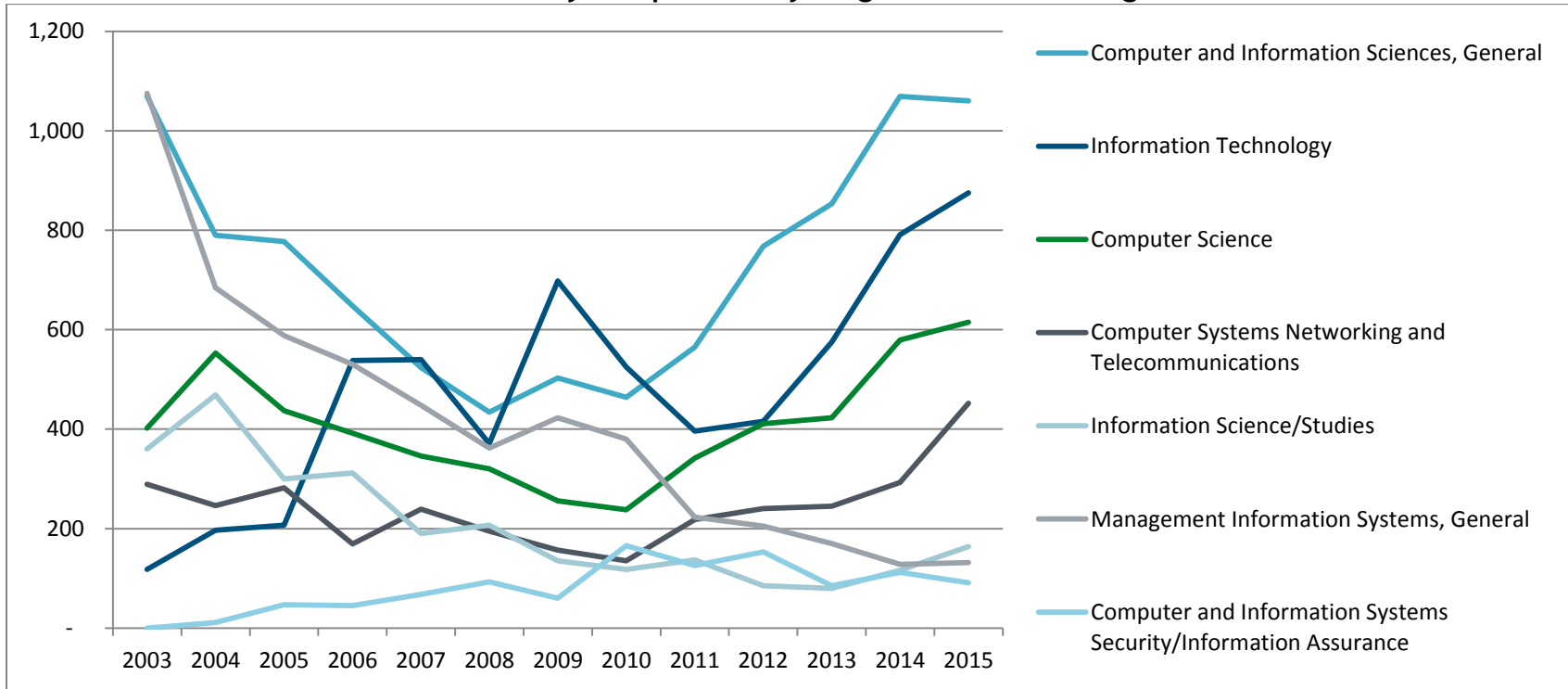
Accelerated tech training options (“tech boot camps”) have also blossomed in recent years to fill a gap in the supply pipeline. Based on self-reported data to the Colorado Technology Association, Colorado-based tech boot camps trained an additional 376 individuals from March 2015 to March 2016.



661 Colorado high school students took the AP Computer Science exam in 2015.

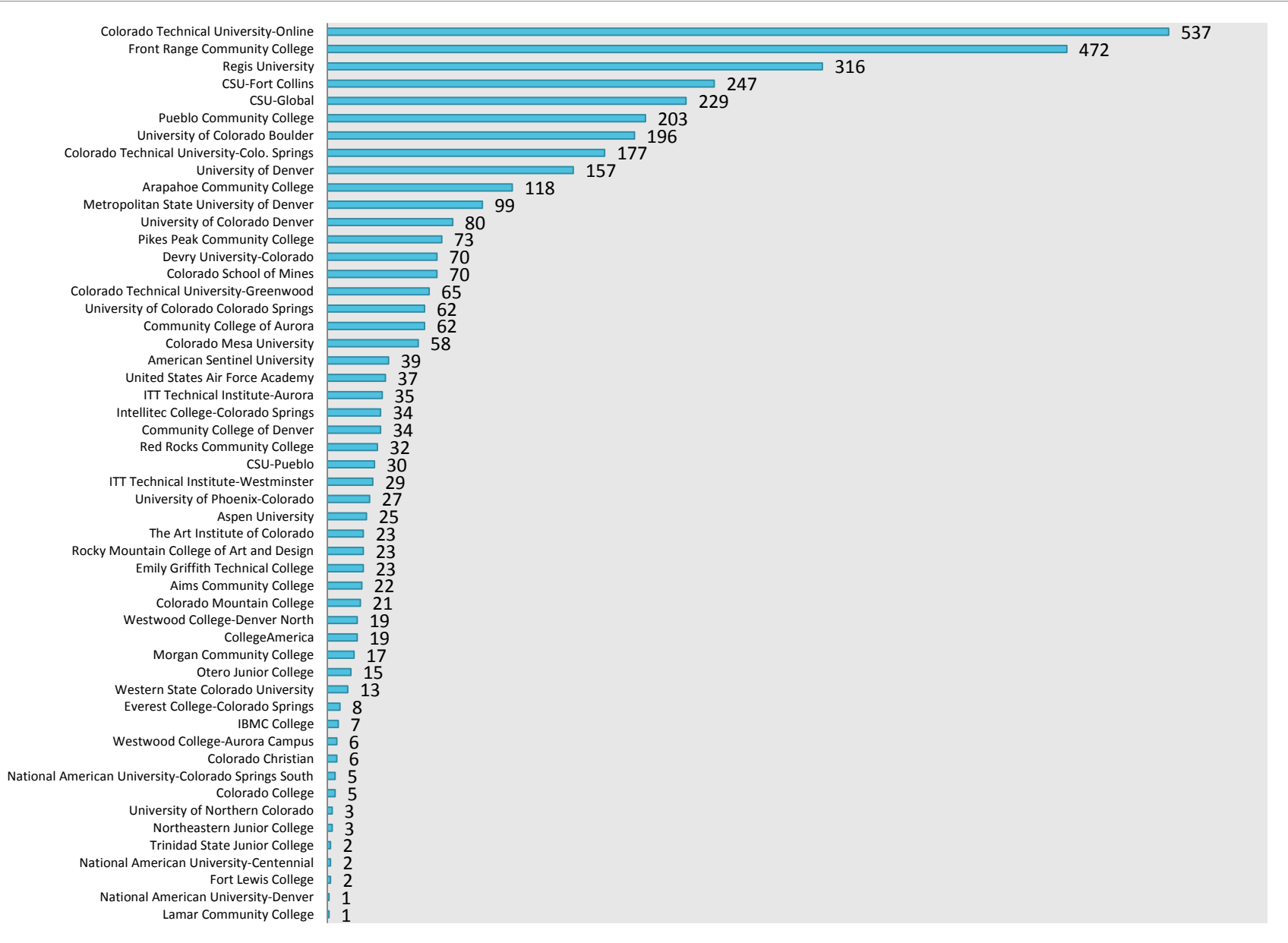
- 72** were low-income
- 67** were students of color
- 57** were in a rural school
- 51** were female

Colorado Postsecondary Completions by Largest IT-Related Programs since 2003



Source: IPEDS Completions crosswalked using EMSI 2016.3. Inclusive of both public and private institutions that report to IPEDS.

2015 Completions by Institution for College and University Certificate and Degree Programs that Crosswalk to IT Occupations



TOP SKILLS IN COLORADO IT JOB POSTINGS

(from job postings in last 3 months)

1. Linux
2. Java
3. Structured query language
4. UNIX
5. JavaScript
6. Quality Assurance
7. Technical support
8. Systems Development Life Cycle
9. Python
10. Microsoft SQL Server

TOP COMPANIES IN COLORADO IT JOB POSTINGS

(from job postings in last 3 months)

1. Oracle
2. Lockheed Martin
3. Northrop Grumman
4. Level 3 Communications
5. Raytheon Corporation
6. DISH Network Corporation
7. General Dynamics
8. Charles Schwab Corporation
9. Blackstone Technology Group
10. NetApp

Wanted Analytics, July 2016

Industries employing the most IT workers

| NAICS | Industry | IT Jobs in Industry (2015) | IT Jobs in Industry (2025) | Change (2015 - 2025) | % Change (2015 - 2025) | % of All Colorado IT Jobs in Industry | IT Jobs as % of Total Jobs in Industry |
|--------|---------------------------------------------------------------|----------------------------|----------------------------|----------------------|------------------------|---------------------------------------|----------------------------------------|
| 541512 | Computer Systems Design Services | 18,029 | 24,821 | 6,792 | 38% | 17.1% | 61.1% |
| 541511 | Custom Computer Programming Services | 14,229 | 19,717 | 5,488 | 39% | 13.8% | 61.0% |
| 511210 | Software Publishers | 6,654 | 6,641 | (13) | (0%) | 6.3% | 54.7% |
| 517110 | Wired Telecommunications Carriers | 4,106 | 3,616 | (490) | (12%) | 3.8% | 19.4% |
| 518210 | Data Processing, Hosting, and Related Services | 4,074 | 4,535 | 461 | 11% | 3.8% | 46.2% |
| 551114 | Corporate, Subsidiary, and Regional Managing Offices | 3,972 | 5,677 | 1,705 | 43% | 3.8% | 11.6% |
| 902612 | Colleges, Universities, and Professional Schools (State Gov.) | 2,745 | 3,239 | 494 | 18% | 2.6% | 4.1% |
| 541330 | Engineering Services | 2,707 | 3,240 | 533 | 20% | 2.5% | 7.9% |
| 901199 | Federal Government, Civilian, Excluding Postal Service | 2,652 | 2,618 | (34) | (1%) | 2.4% | 6.2% |
| 561320 | Temporary Help Services | 2,147 | 2,754 | 607 | 28% | 2.0% | 4.9% |

Source: EMSI, 2016.2

Largest IT Industries in Colorado

| NAICS | Description | 2015 Jobs | 2025 Jobs | 2015 - 2025 Change | 2015 - 2025 % Change | 2015 Location Quotient |
|--------|------------------------------------------------------------------------------|-----------|-----------|--------------------|----------------------|------------------------|
| 541512 | Computer Systems Design Services | 29,534 | 40,472 | 10,938 | 37% | 1.73 |
| 541511 | Custom Computer Programming Services | 23,332 | 32,290 | 8,958 | 38% | 1.46 |
| 517110 | Wired Telecommunications Carriers | 21,161 | 18,848 | (2,313) | (11%) | 1.97 |
| 511210 | Software Publishers | 12,182 | 12,060 | (122) | (1%) | 2.05 |
| 518210 | Data Processing, Hosting, and Related Services | 8,861 | 9,466 | 605 | 7% | 1.65 |
| 423430 | Computer and Computer Peripheral Equipment and Software Merchant Wholesalers | 6,091 | 6,551 | 460 | 8% | 1.50 |
| 515210 | Cable and Other Subscription Programming | 3,430 | 4,229 | 799 | 23% | 3.01 |
| 519130 | Internet Publishing and Broadcasting and Web Search Portals | 3,179 | 3,592 | 413 | 13% | 0.95 |
| 517919 | All Other Telecommunications | 2,872 | 5,572 | 2,700 | 94% | 5.47 |
| 334413 | Semiconductor and Related Device Manufacturing | 2,521 | 1,502 | (1,019) | (40%) | 0.77 |

(IT industries are defined by the Technology & Information Key Industry Network)

Source: EMSI, 2016.2