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Exploring the Computer-Related Workforce of Washington State

December 2020, *By Isaac Kwakye, Emma Kibort-Crocker, Sarah Pasion, and Mark Lundgren*

What is the labor market outlook for computer-related occupations?

Employment in computer-related occupations is growing faster than many other occupations, and the number of jobs in the field is projected to increase 11 percent nationally by 2029[1]. This equates to more than half a million new high-paying jobs in the United States, most of which will likely require at least a bachelor's degree[2].

> **Computer-related** is defined as computer and information sciences and technology fields

Washington's demand for computer-related workers is also expected to grow over the next decade. Projections from the Washington State Employment Security Department estimate that computer-related occupations will have an average annual growth rate of 3 percent between 2018 and 2023, and an average annual growth rate of 2 percent between 2023 and 2028 (see Appendix Table A for additional details). Figure 1 shows that more than 50,000 new computer-related jobs are estimated to be created in Washington between 2018 and 2028.

Figure 1. Computer-related occupations are growing in Washington
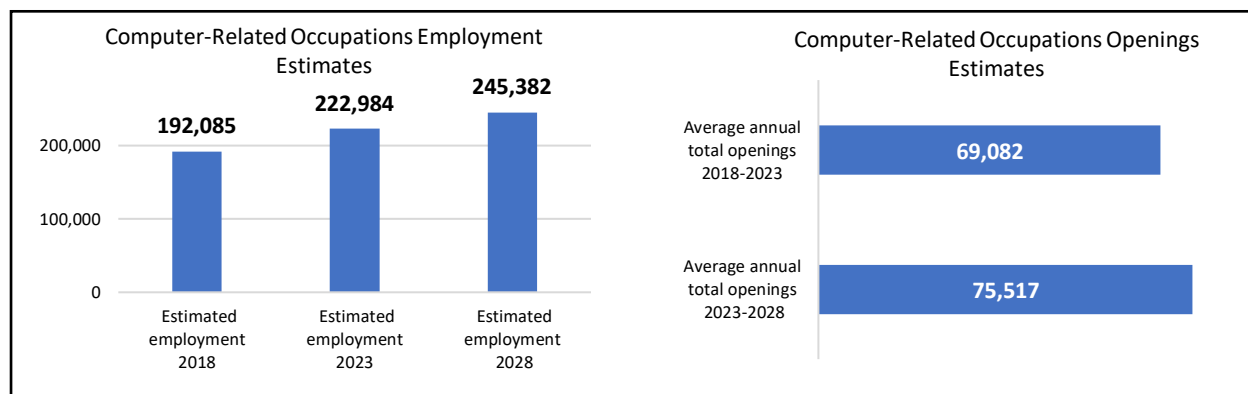
Source: Labor Market and Economic Analysis, Washington State Employment Security Department

How much computer-related talent are we producing?

Washington will need to produce graduates with credentials in relevant fields to meet the growing demand for computer-related occupations. As indicated by the Bureau of Labor Statistics, many of the projected jobs in computer-related occupations will likely require a bachelor's degree.

The proportion of bachelor's degrees awarded in STEM majors to Washington students has grown substantially in the last decade. In 2011, 20 percent of all bachelor's degrees in Washington were

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[1] *Occupational Outlook Handbook: Computer and Information Technology Occupations*. (2020, September 1). Bureau of Labor Statistics. https://www.bls.gov/ooh/computer-and-information-technology/home.htm

[2] The median annual wage for computer and information technology occupations in the U.S. is $88,240 as of May 2019 (ibid.).

awarded in STEM majors (6,120 out of 30,569 bachelor's degrees overall). By 2019, 37 percent of bachelor's degrees were awarded in STEM majors (12,692 out of 34,222 bachelor's degrees overall)[3].

Specifically, the number of bachelor's degrees in computer-related fields has grown in Washington in recent years. In 2010, there were less than 800 bachelor's degrees in computer-related fields awarded in the state. That number more than doubled by 2016 and almost doubled again by 2019 (figure 2).

Figure 2. Bachelor's degrees in computer-related fields have grown in Washington
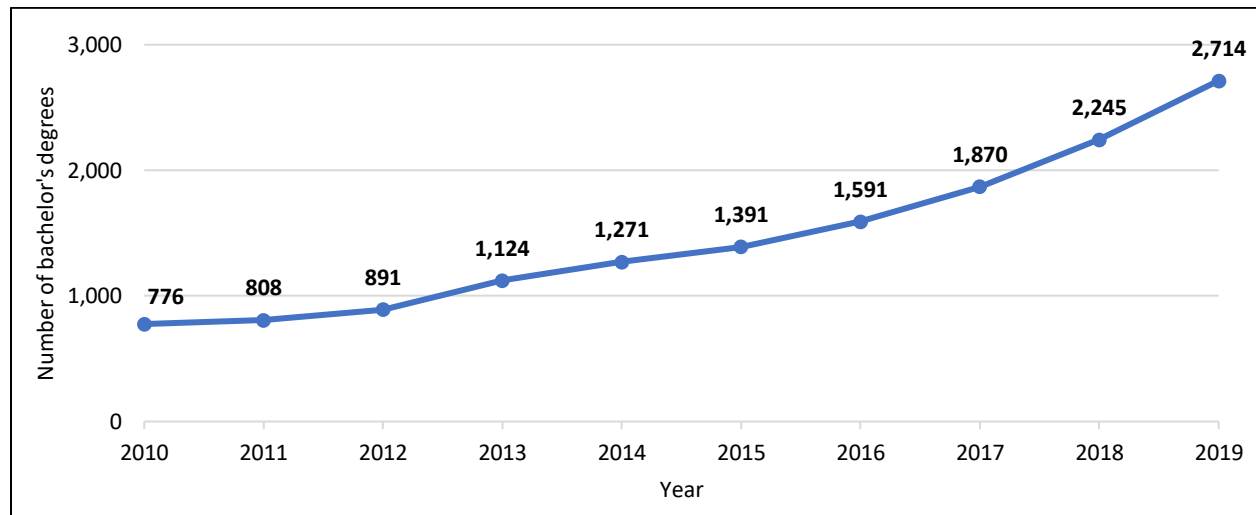
Source: WSAC staff analysis of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data Systems (IPEDS), 2020, bachelor's degree conferrals in computer and information sciences and support services in Washington

The impact of COVID-19 on the labor market and talent production

The COVID-19 crisis is impacting many aspects of Washington's labor market and higher education system. The crisis has upended some industries, and economists predict that many jobs lost during the pandemic will not return[4]. Workers who have lost their jobs may need to upskill or reskill to reenter the labor market. In addition to the labor market's effects, the COVID-19 crisis has disrupted higher education, and many institutions have seen drops in enrollment in Fall 2020[5]. However, patterns during previous recessions indicate that higher education enrollment may surge after the immediate health and safety concerns subside. The ongoing crisis's total impact is not yet known, but the COVID-19 crisis will likely have long-term effects on the labor market and higher education. Therefore, it is difficult to draw any firm conclusions about the demand and supply for specific occupations in the near future, such as computer-related occupations.

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[3] ERDC staff analysis of IPEDS data on degrees conferred (November 2020). ERDC STEM Dashboard https://erdc.wa.gov/data-dashboards/STEM
[4] Barrero, J. M., Bloom, N., & Davis, S. J. (2020). COVID-19 Is Also a Reallocation Shock. 60.
[5] *COVID-19: Stay Informed with the Latest Enrollment Information*. (2020, October 22). National Student Clearinghouse Research Center. https://nscresearchcenter.org/stay-informed/

How does Washington grow its computer-related workforce?

Washington higher education institutions will likely need to produce more graduates with computer-related credentials to meet the state's expected growth of computer-related workers. We also know that people with degrees tend to have a higher likelihood of moving, and moving farther away, than people without degrees. And those with degrees in STEM fields are even more likely to move farther distances[6].

To examine how Washington grows its computer-related workforce, we utilize the American Community Survey (ACS) data from the U.S. Census Bureau to explore migration trends. However, there is limited data and information about who is migrating to and leaving Washington with specific credentials. The ACS only collects the field of study for bachelor's degree holders. Table 1 outlines the computer-related fields of study in ACS data.

Table 1. Computer-related fields of study in ACS data	
Code	**Field of Study**
2100	Computer and Information Systems
2101	Computer Programming and Data Processing
2102	Computer Science
2105	Information Sciences
2106	Computer Administration Management and Security
2107	Computer Networking and Telecommunications

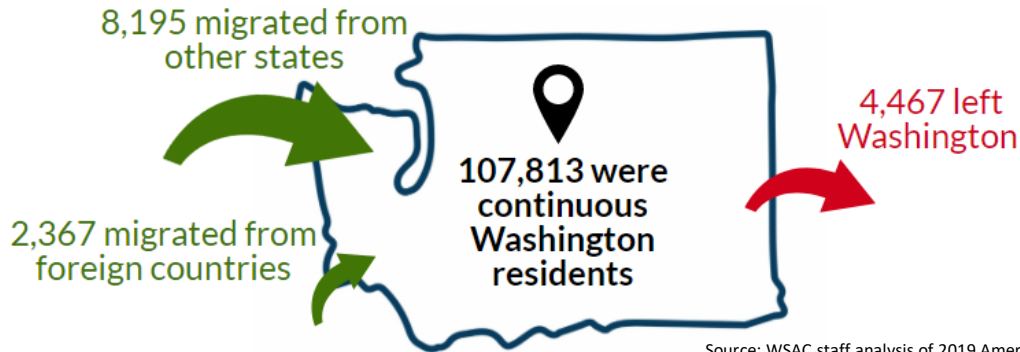Source: 2019 American Community Survey

Migration data from the ACS is based on residence changes from the prior year. For this analysis, we define three categories of migrants:

- **Migrated to Washington (from other states)**: People who moved to Washington from within the U.S. were defined as someone living in a state other than Washington in the prior year.
- **Migrated to Washington (from foreign countries)**: People who moved to Washington from a foreign country were defined as someone living outside of the U.S. in the prior year.
- **Left Washington (to other states)**: People who moved out of Washington to a different state—defined as someone living in Washington in the prior year and moved to a different state. We do not present information about those who moved from Washington to a foreign country.

In 2019, about 8,000 individuals with a bachelor's degree in a computer-related field of study who did not live in Washington during the prior year migrated to Washington from other states (figure 3). Even though Washington is ranked third among states with incoming bachelor's degree holders in a computer-related field, it is also ranked high among states with outgoing bachelor's degree holders in a computer-related field. About 4,500 individuals with a bachelor's degree in a computer-related field who lived in Washington in 2018 moved to a different state in 2019. A detailed table with migration information and state comparisons can be found in Appendix Table B.

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[6] Wright, R., & Ellis, M. (2019). Where science, technology, engineering, and mathematics (STEM) graduates move: Human capital, employment patterns, and interstate migration in the United States. *Population, Space and Place*, *25*(4). https://doi.org/10.1002/psp.2224

Figure 3. Washington State gained and lost computer-related bachelor's degree holders in 2019

8,195 migrated from other states

2,367 migrated from foreign countries

107,813 were continuous Washington residents

4,467 left Washington

Source: WSAC staff analysis of 2019 American Community Survey
Note: Bachelor's degrees in computer-related fields and migrants based on definitions above

Migration trends among those with a bachelor's degree in computer-related fields have changed over time in Washington (figure 4). Since 2015, there has been an increase in the number of individuals with bachelor's degrees in computer-related fields moving to Washington from other states. There was a slight uptick in the number of individuals with bachelor's degrees in computer-related fields moving to Washington from foreign countries in 2016, followed by a slight decline in the following years. The number of individuals with bachelor's degrees in computer-related fields who moved to other states from Washington fell slightly between 2015 and 2017 and then rose slightly between 2017 and 2019. We see a moderate increase in computer-related bachelor's degree holders moving to Washington from other states when we look beyond the year-to-year fluctuations. The findings also suggest a marginal decrease in foreign computer-related bachelor's degree holders entering Washington and a slight increase in the number of computer-related bachelor's degree holders moving away from Washington over the last five years.
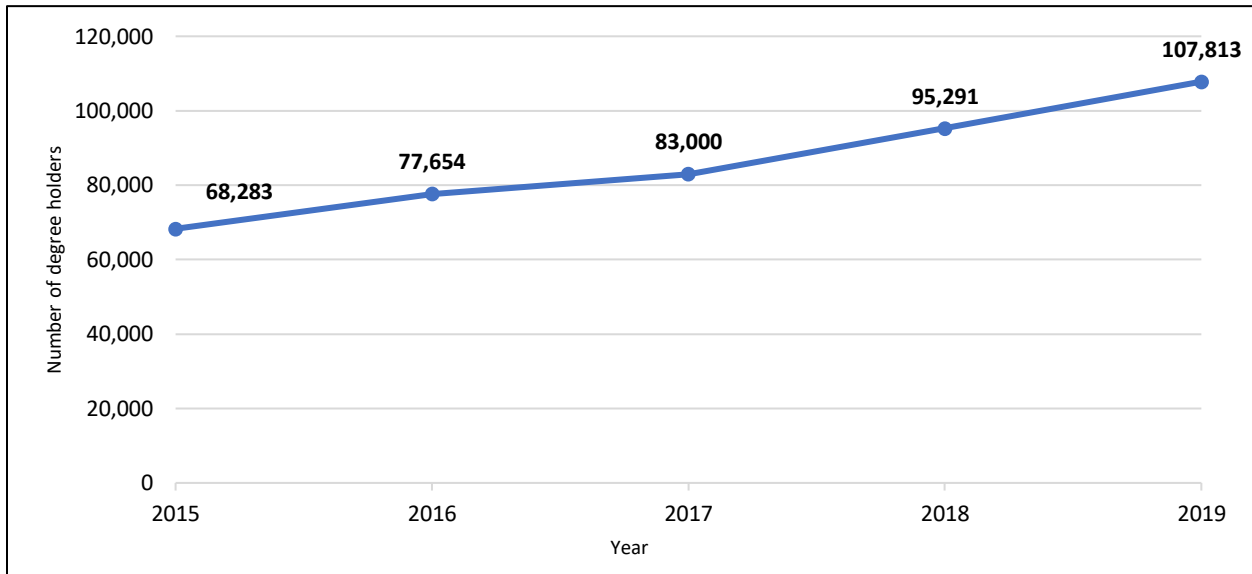
Figure 4. Migration trends in Washington for computer-related bachelor's degree holders have changed over time
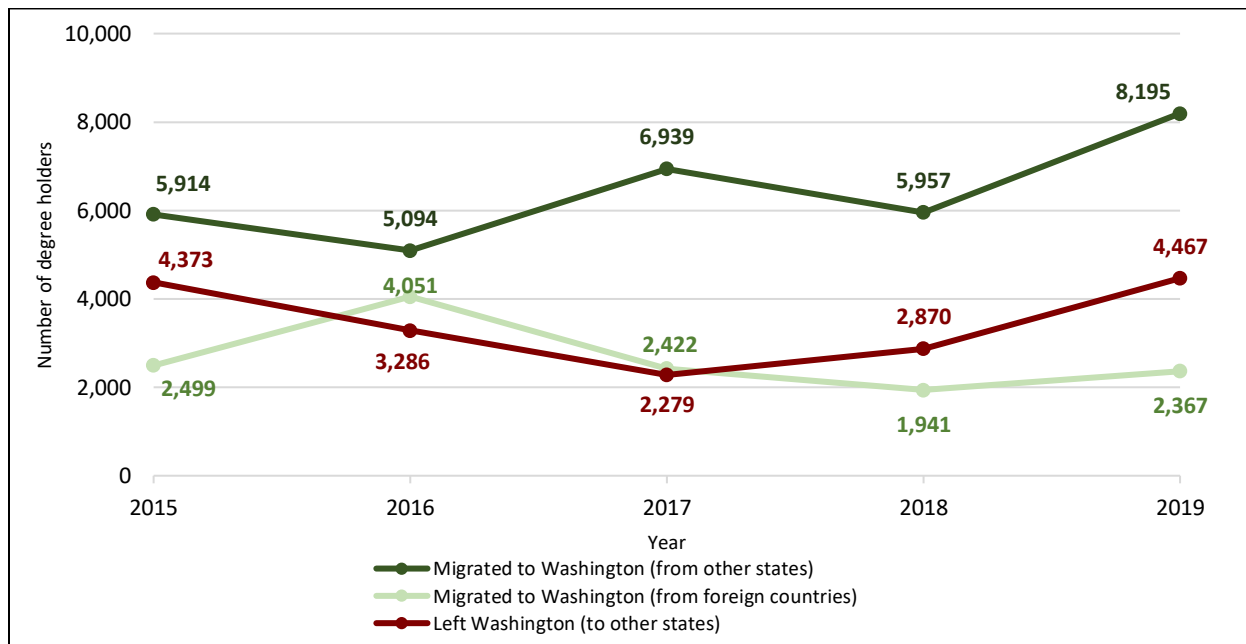
Source: WSAC staff analysis of 2019 American Community Survey
Note: Bachelor's degrees in computer-related fields and migrants based on definitions above

The number of Washington residents who lived in the state in the prior year and have a bachelor's degree in a computer-related field grew considerably in recent years (figure 5). In 2015, there were less than 70,000 people in Washington with bachelor's degrees in computer-related fields who lived in the state a year prior. By 2019, that number grew to more than 107,000, demonstrating a notable growth in the state's computer-related talent pool.

Figure 5. The number of continuing Washington residents with computer-related bachelor's degrees has grown in the last five years

Source: WSAC staff analysis of 2019 American Community Survey
Note: Bachelor's degrees in computer-related fields and migrants based on definitions above

Conclusion

The demand for computer-related occupations is growing nationally and in Washington State. In addition to the growing number of bachelor's degrees granted in Washington in computer-related fields of study, migration patterns impact the supply of talent in the state. In 2019, about 107,000 Washington residents who lived in the state a year prior had a bachelor's degree in a computer-related field. The same year, roughly 8,000 workers with computer-related bachelor's degrees moved to Washington from other states, and an additional 2,000 moved to Washington from foreign countries. Approximately 4,500 people with bachelor's degrees in computer-related fields resided in Washington the year before moving to other states in 2019.

There are limited information and data to accurately assess how Washington is fulfilling the growing demand for computer-related talent in the state. Using available ACS data gives some indication of migration trends among computer-related bachelor's degree holders in Washington and enables us to draw comparisons with other states. However, the analysis only provides an estimate.

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Appendix Table A. Employment Projections for Computer-Related Occupations in Washington

SOC code	Occupational title	Estimated employment			Average annual growth rate		Average annual openings due to growth		Average annual total openings	
		2018	2023	2028	2018-2023	2023-2028	2018-2023	2023-2028	2018-2023	2023-2028
15-1100	**Computer Occupations (All)**	**192,085**	**222,984**	**245,382**	**3.03%**	**1.93%**	**6,181**	**4,480**	**69,082**	**75,517**
15-1211	Computer Systems Analysts	18,363	20,118	21,427	1.84%	1.27%	351	262	6,055	6,421
15-1212	Information Security Analysts	3,307	3,850	4,313	3.09%	2.30%	109	93	1,251	1,395
15-1221	Computer and Information Research Scientists	2,776	3,366	3,757	3.93%	2.22%	118	78	1,030	1,136
15-1231	Computer Network Support Specialists	3,580	3,913	4,100	1.79%	0.94%	67	37	1,131	1,175
15-1232	Computer User Support Specialists	18,902	20,987	22,562	2.11%	1.46%	417	315	7,116	7,628
15-1241	Computer Network Architects	4,987	5,256	5,434	1.06%	0.67%	54	36	1,373	1,412
15-1242	Database Administrators	2,759	3,069	3,301	2.15%	1.47%	62	46	861	919
15-1244	Network and Computer Systems Administrators	8,688	9,646	10,422	2.11%	1.56%	192	155	3,126	3,367
15-1251	Computer Programmers	6,505	6,709	6,572	0.62%	-0.41%	41	-27	1,888	1,829
15-1252	Software Developers	86,731	103,946	116,708	3.69%	2.34%	3,443	2,552	30,907	34,333
15-1254	Web Developers	18,203	21,479	23,322	3.37%	1.66%	655	369	5,661	6,021
15-1299	Computer Occupations, All Other	17,284	20,645	23,464	3.62%	2.59%	672	564	8,683	9,881

Source: Labor Market and Economic Analysis, Washington State Employment Security Department

Appendix Table B. Migration of Bachelor's Degree Holders in Computer-Related Fields of Study in 2019

State	Migrated in from other states		Migrated in from foreign countries		Migrated out to other states	
	Number	Ranking	Number	Ranking	Number	Ranking
California	13,742	1	5,790	1	10,613	1
Texas	8,455	2	5,326	2	8,027	2
Washington	8,195	3	2,367	7	4,467	7
New York	5,640	4	2,630	4	6,872	3
Florida	5,413	5	2,718	3	4,702	6
Virginia	5,275	6	2,398	6	5,363	4
Pennsylvania	4,864	7	986	16	3,607	12
Colorado	3,963	8	718	20	2,656	18
Massachusetts	3,699	9	1,213	14	3,819	9
Georgia	3,460	10	1,375	13	4,177	8
Maryland	3,425	11	1,582	10	2,755	15
Illinois	3,323	12	1,487	11	3,725	10
New Jersey	3,219	13	2,109	8	5,146	5
Arizona	3,163	14	1,421	12	2,278	19
North Carolina	3,016	15	951	17	3,342	13
Tennessee	2,649	16	685	21	1,161	26
Connecticut	2,234	17	880	18	2,085	20
Ohio	2,138	18	819	19	3,055	14
Michigan	1,900	19	164	33	2,741	16
Oregon	1,694	20	419	23	1,189	25
Alabama	1,565	21	50	37	1,708	21
New Hampshire	1,413	22	2,492	5	430	41
Wisconsin	1,247	23	244	28	1,291	23
Idaho	1,239	24	0	39	56	50
Missouri	1,216	25	1,176	15	1,244	24
Indiana	1,163	26	353	25	3,693	11
Alaska	1,009	27	0	39	124	49
Nevada	948	28	213	31	1,394	22
South Carolina	853	29	321	26	693	35
District of Columbia	830	30	214	30	766	34
Kansas	799	31	0	39	771	33
Utah	761	32	15	38	850	30
Minnesota	595	33	464	22	808	32
New Mexico	507	34	73	36	618	38
Iowa	446	35	1,983	9	956	29
Mississippi	402	36	0	39	350	42
Oklahoma	392	37	298	27	650	37
Louisiana	338	38	114	35	1,055	27
Hawaii	319	39	380	24	570	39
Delaware	315	40	0	39	811	31

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Migration of Bachelor's Degree Holders in Computer-Related Fields of Study in 2019 (continued)					
State	**Migrated in from other states**		**Migrated in from foreign countries**		**Migrated out to other states**	
	Number	Ranking	Number	Ranking	Number	Ranking
Rhode Island	289	**41**	0	**39**	557	**40**
West Virginia	281	**42**	0	**39**	55	**51**
Kentucky	226	**43**	219	**29**	2,688	**17**
Montana	195	**44**	0	**39**	334	**43**
North Dakota	190	**45**	0	**39**	288	**44**
Arkansas	177	**46**	0	**39**	669	**36**
Maine	170	**47**	123	**34**	159	**47**
Wyoming	31	**48**	0	**39**	158	**48**
South Dakota	30	**49**	0	**39**	164	**46**
Nebraska	0	**50**	208	**32**	1,016	**28**
Vermont	0	**50**	0	**39**	172	**45**

Source: WSAC staff analysis of 2019 American Community Survey
Note: Bachelor's degrees in computer-related fields and migrants based on definitions above