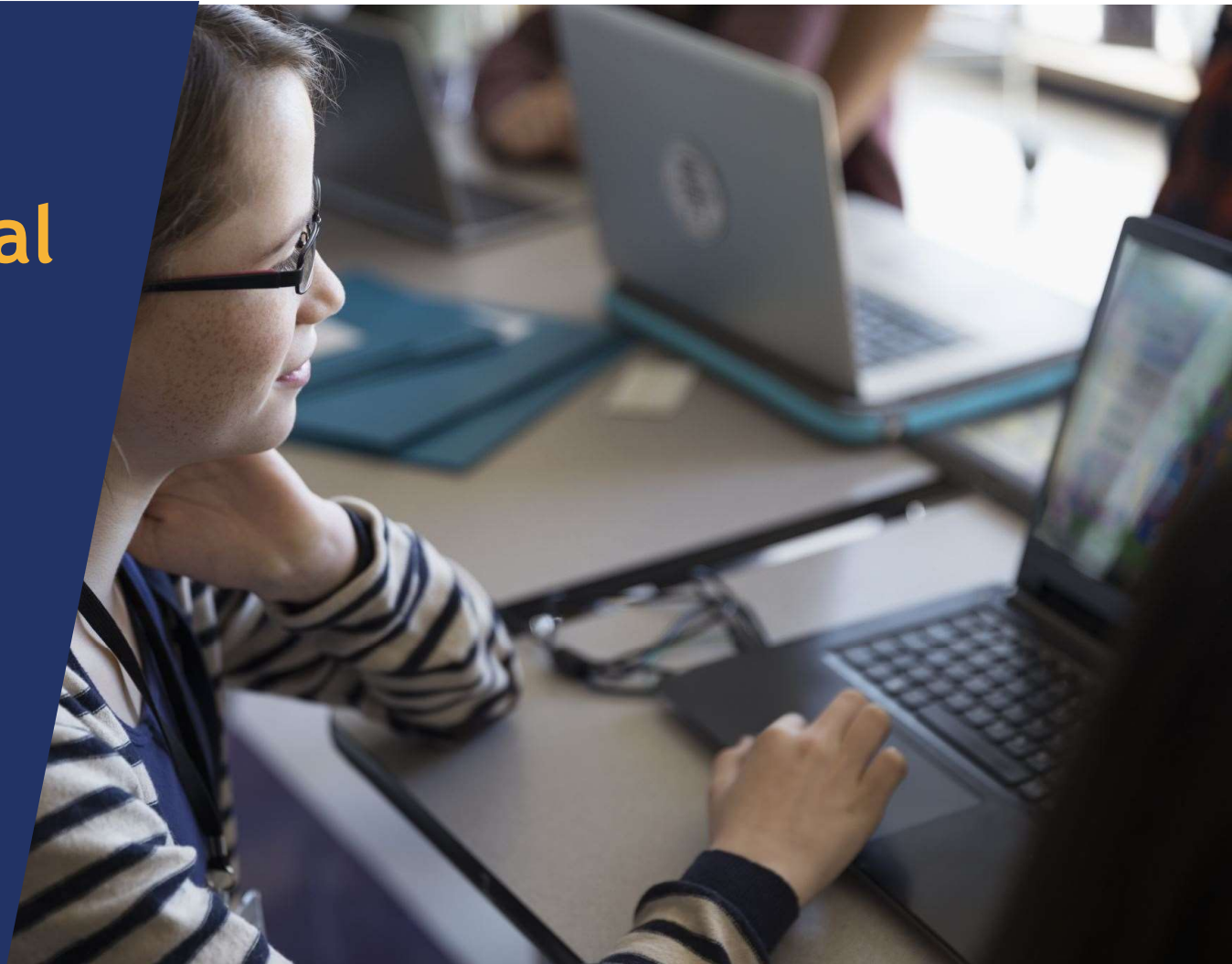


ICT/DM San Diego/Imperial Counties

Sector Profile

Imperial Valley Regional CTE
Advisory
2 December, 2020

Duane Rinehart, MBA



Overview

- ICT/DM Sector Overview
- Labor Market Info
- Trends
- Recommendations

Overview of Subsectors

Behind the Screen			In Front of the Screen		
Networking - Cybersecurity	Computer Science (Transfer)	Tech Forest	Business Software Apps	Digital Media	Entertainment
Infrastructure for communication (LAN, WAN, wireless, mobile)	Software Development [Desktop, Web, Mobile]	Operating Systems (Windows/Linux)	Business communications	Graphic Design	Radio/TV production (Video/Audio Production)
Information security/Privacy (project management, policy management, auditing)	Data Structures	Databases	Office apps	Audio (esp. for eGaming, podcasts, radio/TV)	Commercial music, journalism (writing, recording, editing)
Cyber threats, vulnerabilities (penetration testing, auditing, scripting)		Cloud computing	Document management	Web/mobile layout, editing, animations	

Knowledge, Skills & Abilities by Subsector

Behind the Screen			In Front of the Screen		
Networking - Cybersecurity	Computer Science (Transfer)	Tech Forest	Business Software Apps	Digital Media	Entertainment
Industry-recognized certificates (next slide)	Software Development language, methodology, debugging	Cloud frameworks/API (AWS/Azure)	Business Communications & Computer Literacy	Design apps (Adobe Suite) for print, web and mobile	Avid Pro Tools
Scripting language for automation (python, bash, Powershell)	Key languages: python, JavaScript, Java, C++, C#, C	Linux, Windows Server (certification valued but not without degree)	MS Office (Word, Outlook)	Video/Audio Production	Commercial music, journalism (writing, recording, editing)
Intermediate Networking	RDBMS (MySQL, MS SQL Server, Oracle) NoSQL (mongo, couchdb); graph db (e.g. Neo4j) for GIS	Scripting language for automation (python, JavaScript)	Excel (pivot tables, vlookup) or Google Docs	Publishing (blogs, podcasts)	
Cloud frameworks/API		Database knowledge (RDBMS & NoSQL)	Quickbooks, Salesforce	Writing / storytelling / journalism	
Security policy frameworks		IoT (API, sensors, data mgmt.)	Business math	Photography	

Cybersecurity/Networking Certifications

Organization	Certification	Demand	
		Jobs ⁽¹⁾	Percent
CompTIA	Security+, CASP+, CySA+, Network+ PenTest+	5,742	86%
Cisco	CCNA, CCNP, CCIE	229	3%
SANS	GIAC – (GSEC, GSNA, GICSP, GCIH, GCFA, GCED, GCIA)	229	3%
(ISC) ²	CISSP, CCSP	177	3%
ISACA	CISA, CISM	120	2%
AXELOS	ITIL	111	2%
Wireshark	WCNA	32	<1%
Solarwinds	Solarwinds Certified Professional	26	<1%
EC-Council	Certified Ethical Hacker (CEH), CHFI, ECSA	16	<1%

1) Source: NOV2020 search on indeed.com for certification in San Diego & Imperial Counties

Labor Market Demand vs. Supply

- Traditional “IT” is considered resilient sector with supply gap (drives up wages)

	Demand (Avg. Annual Job Openings)	Supply (Avg. Annual Awards) ⁽²⁾	Net Gap
Business Software Apps	26,820	14,128	12,692
Tech Forest	7,047	969	6,078
Computer Science (Transfer)	5,074	386	4,688
Networking - Cybersecurity	1,727 ⁽¹⁾	1,425	302
Entertainment	2,037	2,033	4
Digital Media	1,146	2,208	(1,062)

Source: 1) Average of WestEd and San Diego EDC for 2019; 2) “Annual persistent students”, Research conducted by WestEd, Apr. 2020 – San Diego/Imperial Counties Opportunity Assessment <<https://icdmsector.org/achieving-ccc-metrics-through-market-intelligence/>>;

Imperial County & Proximity Opportunities

- 53% of tech occupations are **NOT** in “tech” industry^(3,4)
- 80% of all cyber breaches occur in supply chain⁽⁷⁾

	Population ⁽¹⁾	Targeted Businesses ⁽²⁾	Distance from El Centro ⁽⁸⁾	Major Sector Clusters
Imperial County	181,285	69	NA	POPULATION: RETAIL, PUBLIC ADMIN, HEALTHCARE (57 DENTAL), EDUCATION SALES: AG-RELATED (SEEDS, FERTILIZER, LIVESTOCK FEED) ⁽⁶⁾ , RETAIL, HEALTHCARE
Mexicali (MX)	1,091,604	>129 ⁽⁵⁾	31 miles	MANUFACTURING: (ELECTRONICS, AUTOMOTIVE, AVIATION, MEDICAL) PROFESSIONAL & SCIENTIFIC: SILICON BORDER?
Yuma County (AZ)	213,787	90	61 miles	AGRICULTURE, MILITARY
San Diego County	3,379,160	3,930	113 miles	SEE PREVIOUS SLIDE
Riverside County	2,470,546	1,394	Not Relevant	RETAIL, HEALTHCARE, CONSTRUCTION, AGRICULTURE
La Paz County (AZ)	21,098	13	Not Relevant	ACCOMODATION, RETAIL

Source: 1) US Census Bureau 2019 except Mexicali – Consejo Nacional de Población (CONAPO), 2018; 2) Data Axle - Reference Solutions; 3) https://www.cyberstates.org/pdf/CompTIA_Cyberstates_2020.pdf; 4) “Tech” companies have primary NAICS: 334220, 511210, 512110, 517311, 517312, 517410, 517911, 517919, 518210, 519130, 541511, 541512; 5) Comisión de Desarrollo Industrial de Mexicali; 6) 46% of total sales volume; 7) Can’t Turn Back Time: Cybersecurity Must Be Dealt With”, Industry Week, 3 JAN 2017; 8) Distance applicable for 50% of county pop

Hybrid or New Subsectors

Ag Tech	Healthcare	Advanced Manufacturing	Data Mgmt. / Cloud
Milking Parlor Automation	Security (HIPAA compliance)	Sensor-driven analytics	Software Engineering
Livestock sensors, remote monitoring, water recycling	Electronic Medical Records Systems	Universal integration (API, connecting subsystems)	Scrum / Agile
Unmanned Aerial Vehicles (crop maintenance)	ICD-10 coding (terminology)	Basic Statistics / Math	Functional/Unit Testing
Artificial Intelligence for feed monitoring (spoilage, consistency, consumption)	Business management	CAD/CAM	DevOps
Crop tracking (organics, allergens, contaminants)	Reporting	Robotics (programming)	Software Architecture
	TeleHealth	Supply chain / ERP knowledge	Application Design

Hourly Earnings by Representative Occupation

Title	Entry-Level Hourly Earnings (25 th Percentile)	Median Hourly Earnings
Information Security Analyst (15-1122)	\$37.16	\$46.62
Operations Research Analyst (15-2031) ⁽¹⁾	\$32.24	\$46.43
Computer Systems Analyst (15-1121)	\$35.87	\$45.86
Database Administrator (15-1199)	\$34.44	\$45.20
Computer Occupations, All Other (15-1199)	\$29.56	\$42.21
Network and Computer Systems Administrators (15-1142)	\$33.94	\$41.54
Special Effects Artists and Animators (27-1014)	\$26.63	\$36.19
Computer Network Support Specialist (15-1231) ⁽¹⁾	\$24.97	\$34.53
Computer User Support Specialist (15-1232) ⁽¹⁾	\$21.90	\$28.00
Web Developers (SOC 15-1134)	\$19.53	\$31.03

Note: Living wage for a 2 adult, 2 school-age children in Imperial County = \$13.20/hour⁽²⁾

Sources: "Occupational Employment Statistics", Bureau of Labor Statistics, 2019 unless otherwise noted; 1) EMSI. 2020.04. Self-employed + QCEW + non-QCEW; 2) <<https://insightccd.org/2018-family-needs-calculator/>>, Standard chosen due to the 3.68 persons per household (2012-2016) as determined by the U.S. Census for Imperial County

Trends

- Industry certifications are aligning with 3-year expiration
- Remote work & distributed teams (due to COVID-19) increasingly prevalent
 - Increased reliance on independent workers and collaboration tools (Slack, Teams)
 - Opportunity for secondary or rural economic regions
- Tighter product integration with Artificial Intelligence/ML and Virtual/Augmented Reality
 - 37% y/y increase in data science/analytics over next 5 years
 - Need for employees in IoT, cloud [data] and cybersecurity
- Automation and data-driven decision making in advanced manufacturing (robotics, predictive analytics), supply chain (JIT), healthcare (Decision Support Systems)
- 47.4m “smart homes” in United States (36.6% penetration rate of households); 7 billion IoT devices in use by the end of 2020

Recommendations (CC)

- Align curriculum to C-ID (<https://c-id.net/>)
- Add software development (esp. python, JavaScript, Java) programs/sections
 - Must include Agile, Debugging, [functional & unit] Testing, Version Control (git)
- For cyber programs, align curriculum to industry certification objectives (esp. CompTIA)
- Augment system administration curriculum with automation/scripting skills (Powershell or bash)
- Encourage cross-enrollment / hybrid programs between digital media and journalism or business
- Explore “Future of Work” requirements as add-on to existing programs
 - Slack, Discourse, Teams (collaboration)
 - 21-Century Skills (oral/written communication, time management, etc.)⁽¹⁾

1) Complete report: <https://myworkforceconnection.org/wp-content/uploads/2020/04/21st-Century-Employability-Skills-Soft-Skills-Study-Summary_2020-04-29v3.pdf>

Recommendations (K-12)

- Establish agreements for early college credit/dual enrollment
- Available Cyber Curriculum:
 - CETAP curriculum⁽¹⁾
 - National Institute for Cyber Education (NICE) Framework⁽²⁾
- Encourage student participation (outside of class):
 - Promote cyber camps⁽³⁾
 - Hackathons (especially those on community college campus)⁽⁴⁾
 - Careers in ICT/DM zoom conferences (San Diego / Imperial Regional Consortium)

1) <https://cyber.org/>; 2) <https://www.nist.gov/itl/applied-cybersecurity/nice/resources/online-learning-content>; 3) <https://cyber-guild.org/> ,
<https://www.baycyber.net/> ; 4) <https://sdhacks.io/>

GRACIAS --- THANK YOU --- MERCI

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COMMUNITY COLLEGES

SAN DIEGO & IMPERIAL COUNTIES

CAREER EDUCATION

General Recommendations & Resources








- Learn & share best practices for educators
 - Weekly sector webinars: <https://ictdmsector.org/educator-webinars/>
 - San Diego Educator Advisory (2x/year): <https://www.freelists.org/list/sd4c>
 - SD/Imperial K14 Discussion Forums (3x/year): (San Diego / Imperial Regional Consortium) - [Meeting Registration](#)⁽¹⁾
- Professional development
 - <https://www.wastc.org/> has highly subsidized training
 - <https://codinglist.com/>
 - YouTube
 - CompTIA Instructor Network (CIN) “Train the Trainer” – <https://ictdmsector.org/educator-webinars>
 - LinkedIn Learning: <https://www.linkedin.com/learning-login>

1) Direct URL - <https://cccconfer.zoom.us/meeting/register/tJEsd-mupjgrHNHM-HrgmXNwN5zJ82Yet9s->

General Recommendations & Resources (con't)




- Encourage companies to offer all paid internships, provide competitive wages for workers to discourage leaving region and allow for better quality of life
- Implement “capstone” projects for team building and increased female engagement⁽¹⁾
- Integrate classroom presentations by industry professionals (e.g. Nepris - <https://www.nepris.com/>)
- Contact RDEE for guidance

Career Ladder – Cybersecurity (less than Bachelor)

Education	Positions	Skills & Competencies
<p>Middle-skill High school diploma + work experience or Post-secondary non-degree award or Associate degree +</p> <p>Industry certifications⁽¹⁾:</p> <ul style="list-style-type: none"> • CompTIA: Security+, CySA+ • Cisco: CCNA • ISACA: CISA • EC-Council: CEH • AXELOS: ITIL • SANS: GIAC 	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <div style="border: 1px solid black; padding: 5px; width: 100px;"> Network Administrator⁽⁵⁾ \$95K/year </div> </div> <div style="text-align: center;">  <div style="border: 1px solid black; padding: 5px; width: 100px;"> Information Security Analyst⁽³⁾ \$93K/year </div> </div> <div style="text-align: center;">  <div style="border: 1px solid black; padding: 5px; width: 100px;"> Project Manager⁽¹¹⁾ \$87K/year </div> </div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;"> <div style="text-align: center;">  <div style="border: 1px solid black; padding: 5px; width: 100px;"> Intern \$18/hour - \$37K/year⁽⁷⁾ </div> </div> <div style="text-align: center;">  <div style="border: 1px solid black; padding: 5px; width: 100px;"> Technical Support Specialist \$50K/year </div> </div> <div style="text-align: center;">  <div style="border: 1px solid black; padding: 5px; width: 100px;"> IT Technician⁽⁴⁾ \$34K/year </div> </div> </div>	<ul style="list-style-type: none"> • Knowledge of intermediate Networking • Knowledge of cloud frameworks/API • Knowledge of security policy frameworks • Skill in project management • Skill in running SQL queries (if software security role) <ul style="list-style-type: none"> • Ability to work on a team • Ability to think analytically • Knowledge of system administration • Knowledge of customer service
<p>Entry-level High school diploma or Less than high school diploma</p>	<div style="text-align: center;">  <div style="border: 1px solid black; padding: 5px; width: 100px;"> Customer Service⁽⁶⁾ \$37K/year </div> </div>	<ul style="list-style-type: none"> • Operating Systems (esp. Linux) • Tech Literacy

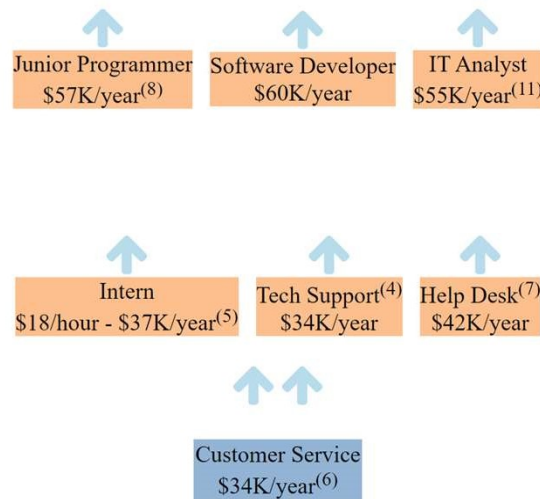
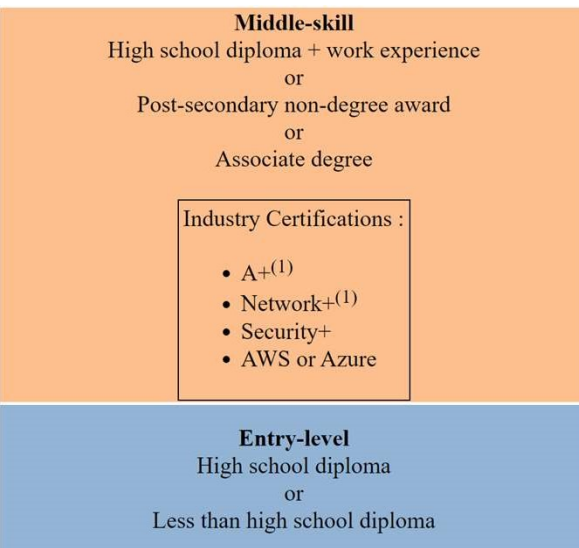
1) 59% of cybersecurity jobs require an industry certification - source: Burning Glass 2019 Cybersecurity Jobs Report; 3) "Information Security Analyst" (SOC 15-1122) median salary; 4) "Computer Repair Technician" Robert Half Salary Guide 2020; 5) "Network and Computer Systems Administrators" (SOC 15-1244) median salary; 6) "Customer Service" (SOC 43-4051) median salary; 7) "Computer User Support Specialist" (SOC 15-1151) 10th percentile; temporary position; annual wage listed only for reference, most interns are part-time; 11) "Computer and Information Systems Managers" (SOC 11-3021) 10th percentile; All salary data from EMSI. 2020.04. Self-employed + QCEW + non-QCEW unless otherwise stated

Career Ladder – Cybersecurity (Bachelor or higher)

Education	Positions	Skills & Competencies
<p>Higher skill Bachelor of Arts/Science + work experience + Industry certifications⁽¹⁾:</p> <ul style="list-style-type: none"> • CompTIA: CASP+ • (ISC)² : CISSP 	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Security Architect⁽¹⁰⁾ \$119K/year </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Penetration Tester⁽¹⁰⁾ \$85K- \$158K/year </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Cybersecurity Manager⁽⁸⁾ \$103/year </div> </div>	<ul style="list-style-type: none"> • Knowledge of advanced networking • Knowledge of ethical hacking practices • Ability to perform penetration testing on applications, systems and networks (non-managerial) • Ability to create strategic plans and implement security policy (managerial)
<p>High skill Bachelor of Arts/Science + work experience + Industry certifications⁽¹⁾:</p> <ul style="list-style-type: none"> • CompTIA: PenTest+ • Cisco: CCNP, CCIE • (ISC)²: CCSP • ISACA: CISM • EC-Council: ECSA, CHFI 	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Programmer⁽⁹⁾ \$88K/year </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Security Engineer/Architect⁽¹⁰⁾ \$124/year </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Risk Manager/Auditor \$95K/year⁽⁸⁾ </div> </div>	<ul style="list-style-type: none"> • Knowledge of scripting language (for automation)⁽²⁾ • Knowledge of tools related to information security, cryptography, network scanning • Knowledge of cybersecurity and privacy principals • Ability to identify basic coding flaws at high level

1) 59% of cybersecurity jobs require an industry certification - source: Burning Glass 2019 Cybersecurity Jobs Report; 2) Automation of auditing/risk assessment provides 15% salary uplift - source: Burning Glass 2019 Cybersecurity Jobs Report; 4) "Computer Repair Technician" Robert Half Salary Guide 2020; 8) Cyberseek.com, 2020; 9) "Software Developer - Applications" (SOC 15-1132) 25th percentile; title may vary; 10) payscale.com, 2020; All salary data from EMSI, 2020.04. Self-employed + QCEW + non-QCEW unless otherwise stated

Career Ladder – Software Development (less than Bachelor)



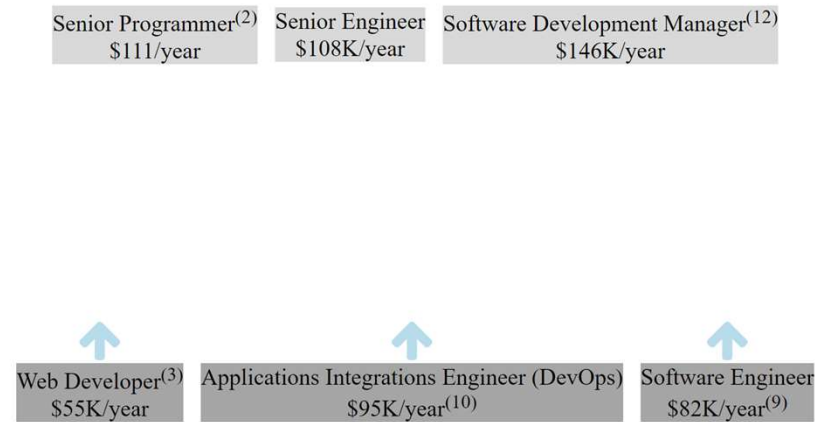
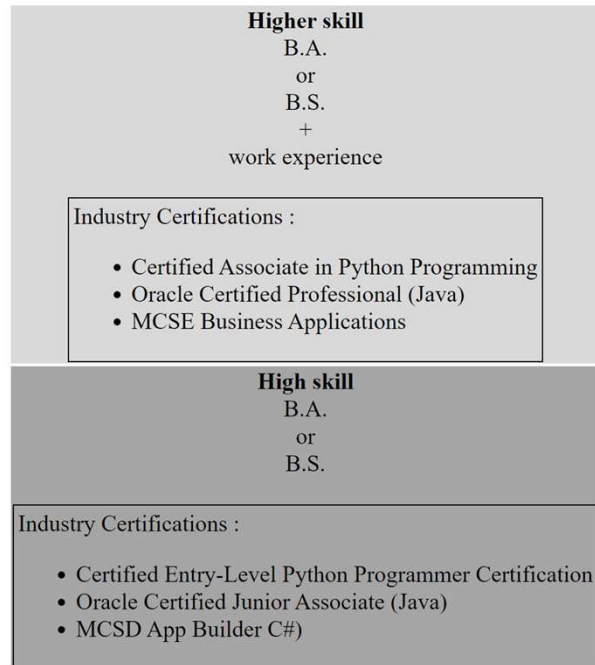
- Skills & competencies**
- Intermediate Networking
 - Software Development Methods
 - SQL & NoSQL Databases
 - Software debugging Skills

- Skills & competencies**
- Networking
 - Programming Principals
 - Can create simple programs
 - Ability to work on a team

- Skills & competencies**
- Operating Systems
 - Tech Literacy

1) A+ or Network+ will uplift salaries by \$9K-\$13K/year (help desk) - source: <https://moneywise.com/a/10-job-certifications-that-will-puff-up-your-pay>; 4) "Computer Repair Technician" Robert Half Salary Guide 2020; 5) "Computer User Support Specialist" (SOC 15-1151) 10th percentile; temporary position; annual wage listed only for reference, most interns are part-time 6) "Customer Service" (SOC 43-4051) median salary; 7) "Help Desk/Tech Support" Robert Half Salary Guide 2020; 8) "Software Developer - Applications" (SOC 15-1132) 10th percentile; title may vary; 9) "Software Developer - Applications" (SOC 15-1132) 25th percentile; title may vary; 10) payscale.com, 2020; 11) "Computer Systems Analyst" (SOC 15-1211) 10th percentile;

Career Ladder – Software Development (Bachelor or higher)



Skills & competencies

- Knowledge of additional [modern] languages
- Ability to tailor code analysis for applications

Skills & competencies

- Knowledge of complex data structures
- Knowledge of software engineering
- Knowledge of org's QA requirements
- Skill in creating programs that validate applications
- Skill in creating and utilizing mathematical models
- Skill in performing root cause analysis

2) "Software Developer - Applications" (SOC 15-1132) median salary; title may vary; 3) "Web Developer" (SOC 15-1134) median salary; title may vary; 9) "Software Developer - Applications" (SOC 15-1132) 25th percentile; title may vary; 10) payscale.com, 2020; 11) "Computer Systems Analyst" (SOC 15-1211) 10th percentile; 12) "Computer and Information Systems Managers" (SOC 11-3021) median salary