Information and Communication Technologies

Date: 4/30/2024
Time: 8:30 -10:30
Location: Dorothy Inghram Learning Center
Hosted by: SBCROP
Facilitator: Terri Giamarino
Advisory Documents: https://bit.ly/ICT_Advisorydocs2024

Advisors:

Alfonso Anaya, CEO, Kids That Code, Inc.
Jeffrey Huynh, Technology Support Specialist II, SBCCD
Joe Beard, Software Engineer & Adjunct Professor, Esri/CHC, VVC, & Cabrillo College
Kelly Kaliher, Software Systems Training Manager, SBCSS
Michael Harte, Client Systems Administrator, SBCSS
Renan Mamaril, IT Division Manager, SB County - Innovation and Technology Depart.
Ryan Ritualo, IT Manager, East Valley Water District
Steve Dix, Senior Data Engineer, QGenda

K12 Educational Participants:

Chelsea Ramirez, San Bernardino City Unified, College and Career Coordinator
Elizabeth Kackery, San Bernardino City Unified, Linked Learning College & Career Program Specialist
Gloria Fuentes, San Bernardino County ROP, MOS Instructor
Guadalupe Berry, Fontana Unified, Computer Business Applications
Karla Lechuga, San Bernardino County ROP, Coordinator
Kenneth Soldmann, Colton Joint Unified, Curriculum Program Specialist
Laura Smith, San Bernardino City Unified, Program Specialist
Maria Camacho, Fontana Unified, CTE Teacher
Melissa Dix, Colton-Redlands-Yucaipa ROP, Director of Education Services
Michael Richards, San Bernardino County Superintendent of Schools, Coordinator
Phillip Alvarez, San Bernardino City Unified, CTE Instructor
Sean Baldwin, Colton-Redlands-Yucaipa ROP, CTE Teacher

Minutes:

The Information Communication Technology panel was composed of eight industry professionals with varying degrees of responsibilities in their respective career fields. The following is a summary of their responses to the questions posed at the advisory.

1. What trends do you see impacting your industry within the next 3-5 years?

Joe Beard: Joe projects significant developments in 3D and 4D analysis, integration of BIM and CAD with GIS, and extensive use of real-time data visualization tools like COVID Dashboards and webGIS. These advancements will enhance enterprise GIS applications across various disciplines, particularly in educational sectors.

Kelly Kaliher: Kelly foresees a deeper integration of Microsoft Office applications through SharePoint, driven by AI, enhancing flexibility and productivity in office environments**.**

Michael Harte: Michael anticipates increased deployment of AI in administrative tasks, augmented and virtual reality in education, and an emphasis on cloud computing security informed by best practices.

Renan Mamaril: Renan emphasizes the growing importance of cybersecurity, particularly in the wake of incidents like those affecting the SB Sheriff's Department, and the need for robust privacy and security measures as digital tools like LLMs become more integrated.

Ryan Ritualo: Ryan highlights the critical shortage of SCADA technicians and the necessity for specialized training to manage water control systems, stressing the integration of GIS with SCADA for enhanced operational efficiency.

Steve Dix: Steve discusses the rapid advancement of AI technologies, which are becoming crucial in solving complex problems across various sectors.

Jeffrey Huynh: Jeffrey raises concerns about cybersecurity vulnerabilities, particularly with AI and voice tools, emphasizing the need to prepare students to recognize and respond to such threats.

Alfonso Anaya: Alfonso points out the critical need for cybersecurity and STEM education in schools, highlighting the importance of preparing students early for these challenges.

2. How would you recommend addressing these trends to better prepare students for your industry?

Renan Mamaril: Renan advocates for continuous learning and adaptation to technological changes, promoting certifications like CompTIA and MOS as essential for staying current.

Joe Beard: Joe encourages leveraging networking, guest speakers, and resources like ESRI's online platforms to provide students with hands-on experience and a practical understanding of GIS technologies.

Kelly Kaliher: Kelly emphasizes the importance of teaching critical thinking and problem-solving skills, alongside obtaining Microsoft Office certifications to enhance employability.

Michael Harte: Michael recommends providing students with hands-on experience through mentorships and partnerships with employers to bridge the gap between education and industry demands.

Ryan Ritualo: Ryan suggests identifying niche interests in technology and pursuing relevant certifications, complemented by volunteer opportunities to gain practical experience.

3. What are the necessary skills/education/certification (s) needed for a student to obtain employment within your industry?

Joe Beard: Joe highlights the importance of passion and practical knowledge of tools like ARCGIS over formal education, suggesting that resources provided by ESRI can significantly aid in learning.

Kelly Kaliher: Kelly notes the necessity of critical thinking and proficiency in Microsoft Office, particularly Excel, for effective performance in technical and administrative roles.

Michael Harte: Michael underlines the value of a blend of military training and cybersecurity knowledge, advocating for a combination of hands-on experience and formal certifications leading to IT careers.

Renan Mamaril: Renan stresses the critical role of soft skills like communication and adaptability alongside technical capabilities, suggesting ongoing education for educators to keep them abreast of technological advancements.

4. What skills or practices should educators focus on to support emerging technologies, equipment, regulations, or laws in your industry?

Joe Beard: Joe emphasizes the importance of networking and making professional connections. He suggests that educational programs integrate real-world tools like GIS, providing students with resources such as ESRI's lesson galleries and project-based learning opportunities.

Kelly Kaliher: Kelly advocates for clear articulation of problems, aiming to equip students with the ability to explain complex technical content in simple terms, a skill crucial in any professional setting.

Michael Harte: Michael stresses the need for a curriculum that keeps pace with technological advancements, particularly in computer science and cloud technologies. He suggests regular curriculum reviews to incorporate emerging technologies and industry best practices.

Renan Mamaril: Renan points out that alongside technical skills, soft skills like communication, critical thinking, and adaptability are essential. He suggests continuous education for educators to stay updated and effectively prepare students for the technological landscape.

Ryan Ritualo: Ryan supports hands-on learning and exploration of students' interests, highlighting the importance of certifications and practical experience over traditional educational paths.

Steve Dix: Steve recommends integrating project-based learning using tools like Python and Jupyter Notebooks to analyze job market requirements and adapt educational content accordingly.

Jeffrey Huynh: Jeffrey advises leveraging available online resources to teach problem-solving skills, emphasizing the importance of learning to troubleshoot using the internet effectively.

5. Can you provide us with a few other occupations within your industry that may not require the highest degree/credential but provide a living wage?

Joe Beard: Joe lists various roles such as data collectors, ARCGIS specialists, developers skilled in C++ or Python, and digitizers as viable career paths that provide living wages with practical skills and certifications rather than high academic degrees.

Kelly Kaliher: Kelly mentions roles like data analysts, highlighting the need for analytical skills that can guide business decisions, which can be developed without requiring the highest academic qualifications.

Michael Harte:
Michael discusses the importance of data analytics, emphasizing that positions like support technicians can provide sustainable careers with the right combination of certifications and practical experience.

Renan Mamaril: Renan highlights that there are many entry-level positions in IT that do not require advanced degrees but instead focus on certifications and practical experience.

Ryan Ritualo: Ryan points out the demand for roles in cybersecurity, GIS, and database engineering, suggesting that relevant certifications and some college education can suffice for successful career paths.

Steve Dix: Steve speaks about the roles of project managers and architects, emphasizing that these positions require specific skills applicable across various industries and can be obtained through targeted training and certifications.

Jeffrey Huynh: Jeffrey reflects on his own career path, explaining how part-time jobs and on-the-job training provided him with the skills necessary to advance in the field without the highest degrees.

Alfonso Anaya: Alfonso underscores the importance of early exposure to coding and technology, advocating for game development roles that can be pursued with targeted training and certifications in programming languages like C++ and CSharp.

Key Takeaways and Action Items by Panelist

These key takeaways and action item lists highlight each respondent's insights, concerns, and suggested actions to address industry trends and to prepare students for the evolving landscape within their respective industries.

Joe Beard, Software Engineer, Esri

Key Takeaways:

- Predicts significant advancements in 3D and 4D analysis and the integration of BIM and CAD with GIS.
- Foresees the extensive use of real-time data visualization tools in various disciplines, particularly educational sectors.
- Emphasizes the importance of GIS in enhancing enterprise applications across disciplines.

Action Items:

- Develop and implement training programs focused on GIS and 3D/4D analysis.
- Increase collaborations between educational institutions and GIS professionals to enhance curriculum relevance.
- Encourage the use of real-time data visualization tools in classroom settings.

Kelly Kaliher, Software Systems Training Manager, SBCSS

Key Takeaways:

- Anticipates deeper integration of Microsoft Office applications through SharePoint enhanced by AI.
- Stresses the importance of AI in increasing office flexibility and productivity.

Action Items:

- Facilitate workshops on Microsoft Office integration and the effective use of SharePoint.
- Develop training modules on AI applications in office management.

Michael Harte, Client Systems Administrator, SBCSS

Key Takeaways:

- Anticipates the increased role of AI in administrative tasks and education.

- Sees a growing need for augmented and virtual reality in educational settings.
- Emphasizes the importance of cloud computing security.

Action Items:

- Implement AI tools to enhance administrative efficiency and productivity.
- Develop AR and VR modules for student learning experiences.
- Focus on training programs centered around cybersecurity and cloud computing best practices.

Renan Mamaril, IT Division Manager, SBCounty - Innovation & Technology Department

Key Takeaways:

- Highlights the critical importance of cybersecurity in the wake of recent security breaches.
- Stresses the necessity of integrating privacy and security measures with new technologies like LLMs.

Action Items:

- Conduct regular cybersecurity training sessions and updates for all department staff.
- Develop guidelines and policies on the use of LLMs and other AI tools to ensure data privacy and security.

Ryan Ritualo, IT Manager, East Valley Water District

Key Takeaways:

- Points out the shortage of SCADA technicians and the need for specialized training.
- Emphasizes the importance of integrating GIS with SCADA for better management of water control systems.

Action Items:

- Initiate an internship program to train SCADA technicians.
- Partner with local colleges to develop specialized GIS training programs related to water management.

Steve Dix, Senior Data Engineer, QGenda

Key Takeaways:

- Discusses the rapid advancement of AI technologies as crucial in solving complex industry problems.
- Advocates for the use of AI as a tool rather than viewing it as just a technology.

Action Items:

- Organize AI-focused workshops and seminars to educate staff and clients on its benefits.
- Encourage project teams to incorporate AI strategies in problem-solving.

Jeffrey Huynh, Technology Support Specialist II, San Bernardino Community College District

Key Takeaways:

- Raises concerns about cybersecurity vulnerabilities with AI and voice tools.
- Stresses the importance of preparing students to recognize and respond to cybersecurity threats.

Action Items:

- Develop a curriculum focused on AI and cybersecurity awareness.
- Host seminars and workshops on recognizing and preventing cyber threats.

Alfonso Anaya, CEO, Kids that Code

Key Takeaways:

- Stresses the need for early cybersecurity and STEM education in schools.
- Highlights the importance of preparing children for future challenges through coding and technology education.

Action Items:

- Partner with local schools to integrate coding and cybersecurity into their curriculum.
- Launch community workshops and summer camps focusing on STEM education for children.

Labor Market Information

The following labor market information was sourced from https://www.onetonline.org/ on May 6, 2024.

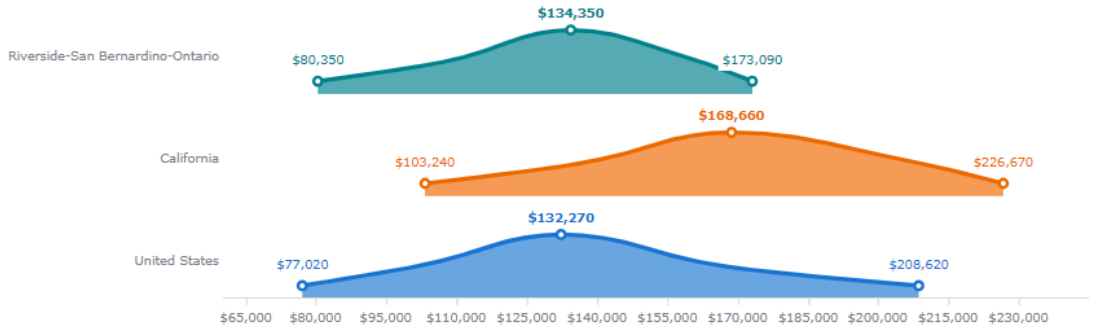
Local Wages

15-1252.00 - Software Developers Bright Outlook

Wages for state: California Go

Wages near ZIP Code: 92408 Go

Annual Wages | Hourly Wages



In Riverside-San Bernardino-Ontario, CA:

- Workers on average earn **$134,350**.
- 10% of workers earn **$80,350 or less**.
- 10% of workers earn **$173,090 or more**.

In California:

- Workers on average earn **$168,660**.
- 10% of workers earn **$103,240 or less**.
- 10% of workers earn **$226,670 or more**.

In the United States:

- Workers on average earn **$132,270**.
- 10% of workers earn **$77,020 or less**.
- 10% of workers earn **$208,620 or more**.

Source: Bureau of Labor Statistics 2023 wage data.

California Employment Trends

15-1252.00 - Software Developers Bright Outlook

View trends for state: California Go

In California:

Employment data for **Software Developers and Software Quality Assurance Analysts and Testers**.

Employment (2020)	321,600 employees
Projected employment (2030)	437,800 employees
Projected growth (2020-2030)	36%
Projected annual job openings (2020-2030)	39,040

In the United States:

Employment data for **Software Developers**.

Employment (2022)	1,594,500 employees
Projected employment (2032)	2,004,900 employees
Projected growth (2022-2032)	■■■■ 26% Much faster than average
Projected annual job openings (2022-2032)	136,300

California source: Projections Central 2020-2030 long-term projections. United States source: Bureau of Labor Statistics 2022-2032 employment projections. "Projected growth" represents the estimated change in total employment over the projections period. "Projected annual job openings" represent openings due to growth and replacement.

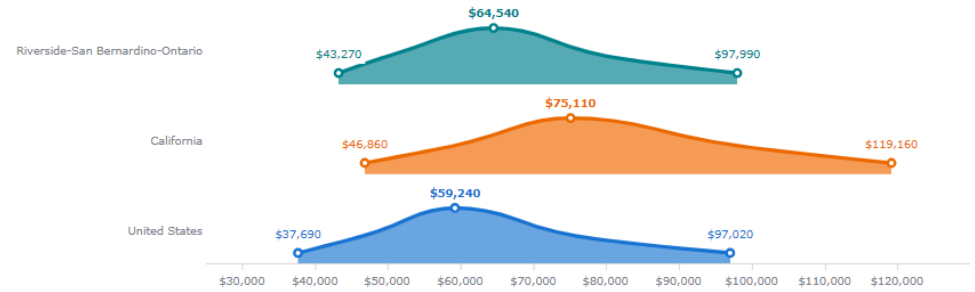
Local Wages

15-1232.00 - Computer User Support Specialists Bright Outlook

Wages for state: California Go

Wages near ZIP Code: 92408 Go

Annual Wages | Hourly Wages



In Riverside-San Bernardino-Ontario, CA:

- Workers on average earn **$64,540**.
- 10% of workers earn **$43,270 or less**.
- 10% of workers earn **$97,990 or more**.

In California:

- Workers on average earn **$75,110**.
- 10% of workers earn **$46,860 or less**.
- 10% of workers earn **$119,160 or more**.

In the United States:

- Workers on average earn **$59,240**.
- 10% of workers earn **$37,690 or less**.
- 10% of workers earn **$97,020 or more**.

Source: Bureau of Labor Statistics 2023 wage data.

California Employment Trends

15-1232.00 - Computer User Support Specialists Bright Outlook

View trends for state: California Go

In California:

Employment (2020)	66,600 employees
Projected employment (2030)	76,100 employees
Projected growth (2020-2030)	14%
Projected annual job openings (2020-2030)	6,070

In the United States:

Employment (2022)	736,200 employees
Projected employment (2032)	772,900 employees
Projected growth (2022-2032)	■■■■ 5% Faster than average
Projected annual job openings (2022-2032)	53,200

California source: Projections Central 2020-2030 long-term projections. United States source: Bureau of Labor Statistics 2022-2032 employment projections. "Projected growth" represents the estimated change in total employment over the projections period. "Projected annual job openings" represent openings due to growth and replacement.

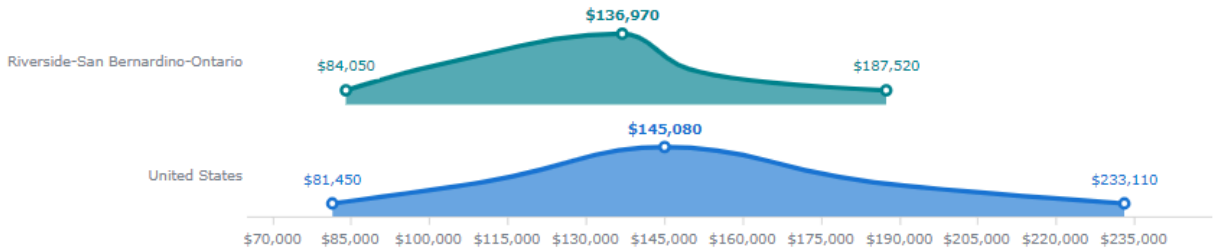
Local Wages

15-1221.00 - Computer and Information Research Scientists Bright Outlook

Wages for state: California Go

Wages near ZIP Code: 92408 Go

Annual Wages | Hourly Wages



In Riverside-San Bernardino-Ontario, CA:

- Workers on average earn **$136,970**.
- 10% of workers earn **$84,050 or less**.
- 10% of workers earn **$187,520 or more**.

In California:

- Workers on average earn **$175,530**.
- 10% of workers earn **$95,210 or less**.
- 10% of workers earn **$239,200+ or more**.

In the United States:

- Workers on average earn **$145,080**.
- 10% of workers earn **$81,450 or less**.
- 10% of workers earn **$233,110 or more**.

Source: Bureau of Labor Statistics 2023 wage data.

California Employment Trends

15-1221.00 - Computer and Information Research Scientists Bright Outlook

View trends for state: California Go

In California:

Employment (2020)	8,500 employees
Projected employment (2030)	12,000 employees
Projected growth (2020-2030)	41%
Projected annual job openings (2020-2030)	1,050

In the United States:

Employment (2022)	36,500 employees
Projected employment (2032)	44,800 employees
Projected growth (2022-2032)	■■■■ 23% Much faster than average
Projected annual job openings (2022-2032)	3,400

California source: Projections Central 2020-2030 long-term projections. United States source: Bureau of Labor Statistics 2022-2032 employment projections. "Projected growth" represents the estimated change in total employment over the projections period. "Projected annual job openings" represent openings due to growth and replacement.

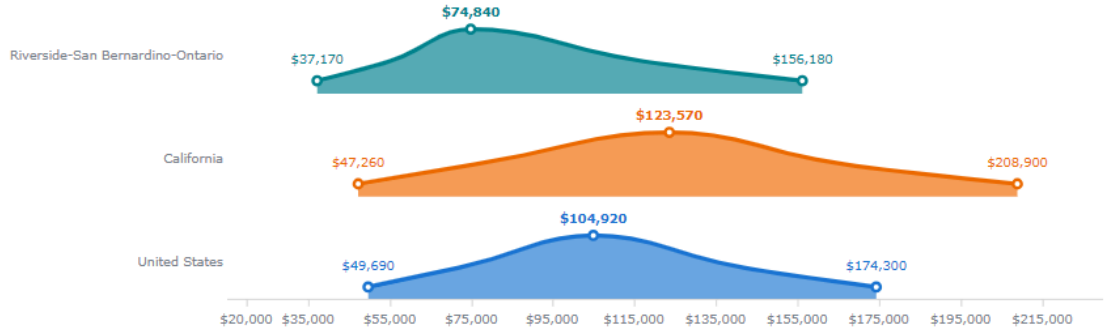
Local Wages

15-1299.08 - Computer Systems Engineers/Architects Bright Outlook

Wages for state: California Go

Wages near ZIP Code: 92408 Go

Annual Wages | Hourly Wages



In Riverside-San Bernardino-Ontario, CA:

Wage data for **Computer Occupations, All Other**.

- Workers on average earn **$74,840**.
- 10% of workers earn **$37,170 or less**.
- 10% of workers earn **$156,180 or more**.

In California:

Wage data for **Computer Occupations, All Other**.

- Workers on average earn **$123,570**.
- 10% of workers earn **$47,260 or less**.
- 10% of workers earn **$208,900 or more**.

In the United States:

Wage data for **Computer Occupations, All Other**.

- Workers on average earn **$104,920**.
- 10% of workers earn **$49,690 or less**.
- 10% of workers earn **$174,300 or more**.

Source: Bureau of Labor Statistics 2023 wage data.

California Employment Trends

15-1299.08 - Computer Systems Engineers/Architects Bright Outlook

View trends for state: California Go

In California:

Employment data for **Computer Occupations, All Other**.

Employment (2020)	107,900 employees
Projected employment (2030)	128,100 employees
Projected growth (2020-2030)	19%
Projected annual job openings (2020-2030)	10,550

In the United States:

Employment data for **Computer Occupations, All Other**.

Employment (2022)	449,400 employees
Projected employment (2032)	493,100 employees
Projected growth (2022-2032)	■■■■ 10% Much faster than average
Projected annual job openings (2022-2032)	33,500

California source: Projections Central 2020-2030 long-term projections. United States source: Bureau of Labor Statistics 2022-2032 employment projections. "Projected growth" represents the estimated change in total employment over the projections period. "Projected annual job openings" represent openings due to growth and replacement.

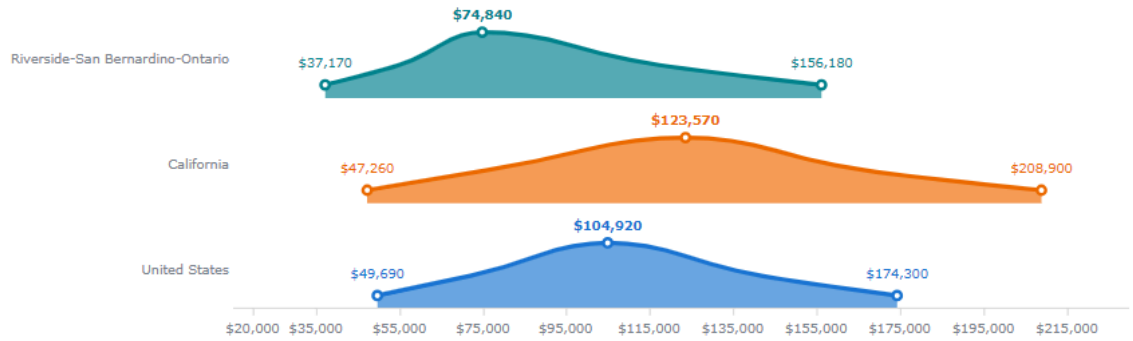
Local Wages

15-1299.05 - Information Security Engineers Bright Outlook

Wages for state: California Go

Wages near ZIP Code: 92408 Go

Annual Wages | Hourly Wages



In Riverside-San Bernardino-Ontario, CA:

Wage data for **Computer Occupations, All Other**.

- Workers on average earn **$74,840**.
- 10% of workers earn **$37,170 or less**.
- 10% of workers earn **$156,180 or more**.

In California:

Wage data for **Computer Occupations, All Other**.

- Workers on average earn **$123,570**.
- 10% of workers earn **$47,260 or less**.
- 10% of workers earn **$208,900 or more**.

In the United States:

Wage data for **Computer Occupations, All Other**.

- Workers on average earn **$104,920**.
- 10% of workers earn **$49,690 or less**.
- 10% of workers earn **$174,300 or more**.

Source: Bureau of Labor Statistics 2023 wage data.

California Employment Trends

15-1299.05 - Information Security Engineers Bright Outlook

View trends for state: California Go

In California:

Employment data for **Computer Occupations, All Other**.

Employment (2020)	107,900 employees
Projected employment (2030)	128,100 employees
Projected growth (2020-2030)	19%
Projected annual job openings (2020-2030)	10,550

In the United States:

Employment data for **Computer Occupations, All Other**.

Employment (2022)	449,400 employees
Projected employment (2032)	493,100 employees
Projected growth (2022-2032)	■■■■ 10% Much faster than average
Projected annual job openings (2022-2032)	33,500

California source: Projections Central 2020-2030 long-term projections. United States source: Bureau of Labor Statistics 2022-2032 employment projections. "Projected growth" represents the estimated change in total employment over the projections period. "Projected annual job openings" represent openings due to growth and replacement.

Local Wages

11-3021.00 - Computer and Information Systems Managers Bright Outlook

Wages for state: California Go

Wages near ZIP Code: 92408 Go

Annual Wages | Hourly Wages

In Riverside-San Bernardino-Ontario, CA:

- Workers on average earn **$165,960**.
- 10% of workers earn **$99,330 or less**.
- 10% of workers earn **$239,200+ or more**.

In California:

- Workers on average earn **$210,490**.
- 10% of workers earn **$128,710 or less**.
- 10% of workers earn **$239,200+ or more**.

In the United States:

- Workers on average earn **$169,510**.
- 10% of workers earn **$101,590 or less**.
- 10% of workers earn **$239,200+ or more**.

Source: Bureau of Labor Statistics 2023 wage data.

California Employment Trends

11-3021.00 - Computer and Information Systems Managers Bright Outlook

View trends for state: California Go

In California:

Employment (2020)	94,700 employees
Projected employment (2030)	117,200 employees
Projected growth (2020-2030)	24%
Projected annual job openings (2020-2030)	10,000

In the United States:

Employment (2022)	557,400 employees
Projected employment (2032)	643,300 employees
Projected growth (2022-2032)	■■■■ 15% Much faster than average
Projected annual job openings (2022-2032)	46,900

California source: Projections Central 2020-2030 long-term projections. United States source: Bureau of Labor Statistics 2022-2032 employment projections. "Projected growth" represents the estimated change in total employment over the projections period. "Projected annual job openings" represent openings due to growth and replacement.

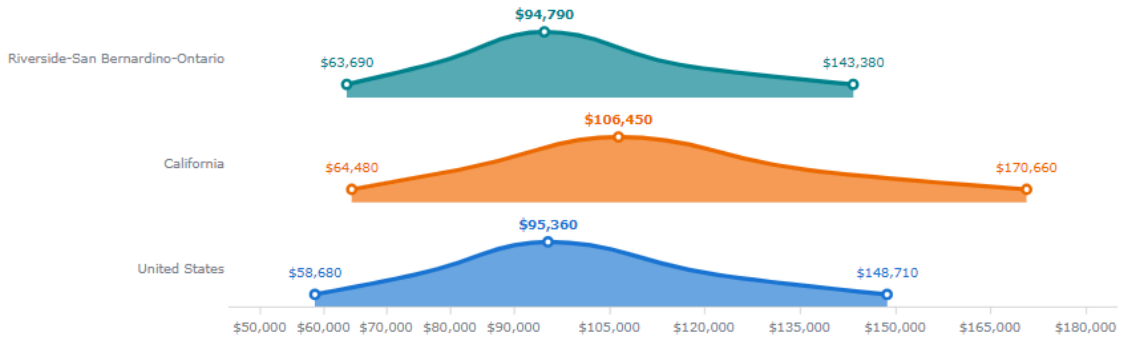
Local Wages

15-1244.00 - Network and Computer Systems Administrators

Wages for state: California Go

Wages near ZIP Code: 92408 Go

Annual Wages | Hourly Wages



In Riverside-San Bernardino-Ontario, CA:

- Workers on average earn **$94,790**.
- 10% of workers earn **$63,690 or less**.
- 10% of workers earn **$143,380 or more**.

In California:

- Workers on average earn **$106,450**.
- 10% of workers earn **$64,480 or less**.
- 10% of workers earn **$170,660 or more**.

In the United States:

- Workers on average earn **$95,360**.
- 10% of workers earn **$58,680 or less**.
- 10% of workers earn **$148,710 or more**.

Source: Bureau of Labor Statistics 2023 wage data.

California Employment Trends

15-1244.00 - Network and Computer Systems Administrators

View trends for state: California Go

In California:

Employment (2020)	29,100 employees
Projected employment (2030)	33,000 employees
Projected growth (2020-2030)	13%
Projected annual job openings (2020-2030)	2,370

In the United States:

Employment (2022)	339,900 employees
Projected employment (2032)	348,200 employees
Projected growth (2022-2032)	3% Average
Projected annual job openings (2022-2032)	19,800

California source: Projections Central 2020-2030 long-term projections. United States source: Bureau of Labor Statistics 2022-2032 employment projections. "Projected growth" represents the estimated change in total employment over the projections period. "Projected annual job openings" represent openings due to growth and replacement.