O*NET OnLine

Software Developers
15-1252.00

☀ Bright Outlook   📅 Updated 2025

> A subset of this occupation's profile is available. Data collection is currently underway to populate other parts of the profile.

Research, design, and develop computer and network software or specialized utility programs. Analyze user needs and develop software solutions, applying principles and techniques of computer science, engineering, and mathematical analysis. Update software or enhance existing software capabilities. May work with computer hardware engineers to integrate hardware and software systems, and develop specifications and performance requirements. May maintain databases within an application area, working individually or coordinating database development as part of a team.

Sample of reported job titles: Application Developer, Application Integration Engineer, Developer, Infrastructure Engineer, Network Engineer, Software Architect, Software Developer, Software Development Engineer, Software Engineer, Systems Engineer

| Summary | Details | Custom | ⚲ Easy Read | ⚲ Veterans | ⚲ Español |

Contents

Occupation-Specific Information

Tasks
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- ⊕ Analyze information to determine, recommend, and plan installation of a new system or modification of an existing system.
- ⊕ Analyze user needs and software requirements to determine feasibility of design within time and cost constraints.
- ⊕ Confer with data processing or project managers to obtain information on limitations or capabilities for data processing projects.
- ⊕ Confer with systems analysts, engineers, programmers and others to design systems and to obtain information on project limitations and capabilities, performance requirements and interfaces.

- ⊕ Consult with customers or other departments on project status, proposals, or technical issues, such as software system design or maintenance.
- ⊕ Coordinate installation of software system.
- ⊕ Design, develop and modify software systems, using scientific analysis and mathematical models to predict and measure outcomes and consequences of design.
- ⊕ Determine system performance standards.
- ⊕ Develop or direct software system testing or validation procedures, programming, or documentation.
- ⊕ Modify existing software to correct errors, adapt it to new hardware, or upgrade interfaces and improve performance.
- ⊕ Monitor functioning of equipment to ensure system operates in conformance with specifications.
- ⊕ Obtain and evaluate information on factors such as reporting formats required, costs, or security needs to determine hardware configuration.
- ⊕ Prepare reports or correspondence concerning project specifications, activities, or status.
- ⊕ Recommend purchase of equipment to control dust, temperature, or humidity in area of system installation.
- ⊕ Specify power supply requirements and configuration.
- ⊕ Store, retrieve, and manipulate data for analysis of system capabilities and requirements.
- ⊕ Supervise and assign work to programmers, designers, technologists, technicians, or other engineering or scientific personnel.
- ⊕ Supervise the work of programmers, technologists and technicians and other engineering and scientific personnel.
- ⊕ Train users to use new or modified equipment.

> Find occupations related to multiple tasks

Technology Skills

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- ⊕ **Access software —** Citrix cloud computing software; PuTTY
- ⊕ **Administration software —** Software distribution management software
- ⊕ **Analytical or scientific software** — IBM SPSS Statistics 🔥 ; SAS 🔥 ; TensorFlow 🔥 ; The MathWorks MATLAB 🔥 ; 6 more
- ⊕ **Application server software —** Atlassian Bitbucket 🔥 ; GitLab 🔥 ; Kubernetes 🔥 ; Red Hat OpenShift 🔥 ; 7 more
- ⊕ **Authentication server software —** Single sign-on SSO
- ⊕ **Backup or archival software —** Backup and archival software; Veritas NetBackup
- ⊕ **Business intelligence and data analysis software —** Alteryx software 🔥 ; IBM Cognos Impromptu; Microsoft Power BI 🔥 ; Tableau 🔥 ; 3 more

- ➕ **Cloud-based data access and sharing software** — Dropbox; Google Drive; Platform as a service PaaS; Slack 🔥

- ➕ **Cloud-based management software** — Amazon Web Services AWS CloudFormation 🔥; IBM WebSphere MQ 🔥; Oracle Cloud software 🔥; Splunk Enterprise 🔥; [2 more](#)

- ➕ **Clustering software** — VMware

- ➕ **Communications server software** — IBM Domino

- ➕ **Computer based training software** — Moodle

- ➕ **Configuration management software** — Chef 🔥; IBM Terraform 🐱; Perforce Helix software; Puppet 🔥; [6 more](#)

- ➕ **Content workflow software** — Atlassian JIRA 🐱; Emerald Software Group Emerald Green Office

- ➕ **Customer relationship management CRM software** — Blackbaud The Raiser's Edge; Oracle Eloqua; Salesforce software 🔥

- ➕ **Data base management system software** — Amazon DynamoDB 🔥; Oracle Database 🔥; Oracle PL/SQL 🔥; Redis 🔥; [21 more](#)

- ➕ **Data base reporting software** — Microsoft SQL Server Reporting Services SSRS 🔥; Oracle Business Intelligence Discoverer; SAP Business Intelligence; SAP Crystal Reports; [3 more](#)

- ➕ **Data base user interface and query software** — Airtable; Blackboard software; GraphQL 🔥; PyTorch 🔥; [15 more](#)

- ➕ **Data mining software** — Google Analytics 🔥

- ➕ **Desktop communications software** — Skype

- ➕ **Desktop publishing software** — Adobe InDesign 🔥; Microsoft Publisher

- ➕ **Development environment software** — Apache Kafka 🐱; Apache Maven 🔥; Oracle Java 2 Platform Enterprise Edition J2EE 🔥; Oracle SQL Developer 🔥; [62 more](#)

- ➕ **Device drivers or system software** — Microsoft DirectX

- ➕ **Document management software** — Adobe Acrobat 🔥; Document management system software; Microsoft SharePoint 🔥

- ➕ **Electronic mail software** — Google Gmail; IBM Notes; Microsoft Exchange; Microsoft Outlook 🔥

- ➕ **Enterprise application integration software** — Extensible markup language XML 🔥; IBM InfoSphere DataStage; Jenkins CI 🐱; Microsoft SQL Server Integration Services SSIS 🔥; [5 more](#)

- ➕ **Enterprise resource planning ERP software** — Microsoft Dynamics 🔥; Oracle PeopleSoft 🔥; SAP ERP 🔥; Workday software 🔥; [9 more](#)

- ➕ **Enterprise system management software** — IBM Power Systems software

- ➕ **Expert system software** — Ansible software 🔥

- ➕ **File versioning software** — Apache Subversion SVN 🔥; Git 🐱; Version control software

- ➕ **Filesystem software** — File server software

- ➕ **Financial analysis software** — Delphi Technology; Oracle E-Business Suite Financials

- ➕ **Graphical user interface development software** — Figma 🔥; Graphical user interface GUI builder software; Graphical user interface GUI design software; Salesforce Visualforce

- ➕ **Graphics or photo imaging software** — Adobe Creative Cloud software 🔥; Adobe Illustrator 🔥; JamBoard; Trimble SketchUp Pro 🔥; [4 more](#)

- ➕ **Information retrieval or search software** — Apache Avro; LexisNexis

- ⊕ **Instant messaging software** — Blink; GroupMe
- ⊕ **Internet directory services software** — Microsoft Active Directory 🔥
- ⊕ **Internet protocol IP multimedia subsystem software** — Voice over internet protocol VoIP system software
- ⊕ **Map creation software** — ESRI ArcGIS software 🔥
- ⊕ **Metadata management software** — Informatica software 🔥; Quest Erwin Data Modeler; Talend Data Fabric
- ⊕ **Network conferencing software** — LogMeIn GoToWebinar
- ⊕ **Network monitoring software** — Nagios; Wireshark
- ⊕ **Network operation system software** — IBM z/OS operating systems
- ⊕ **Network security and virtual private network VPN equipment software** — Firewall software; Virtual private networking VPN software
- ⊕ **Object or component oriented development software** — Apache Spark 🔥; jQuery 🔥; Scala 🔥; TypeScript 🔥; [34 more](#)
- ⊕ **Object oriented data base management software** — Hibernate ORM 🔥; PostgreSQL 🔥
- ⊕ **Office suite software** — LibreOffice; Microsoft Office software 🔥
- ⊕ **Operating system software** — Apple iOS 🔥; Google Android 🔥; Microsoft Windows Server 🔥; UNIX Shell 🔥; [21 more](#)
- ⊕ **Platform interconnectivity software** — Migration software
- ⊕ **Portal server software** — Apache HTTP Server
- ⊕ **Presentation software** — Google Slides; Microsoft PowerPoint 🔥
- ⊕ **Process mapping and design software** — Microsoft Visio 🔥
- ⊕ **Program testing software** — Hewlett Packard LoadRunner; JUnit 🔥; Selenium 🔥; SonarQube; [21 more](#)
- ⊕ **Project management software** — Atlassian Confluence 🔥; Microsoft Team Foundation Server 🔥; Microsoft Teams 🔥; Oracle Primavera Enterprise Project Portfolio Management 🔥; [1 more](#)
- ⊕ **Requirements analysis and system architecture software** — IBM Rational RequisitePro; Requirements management software; Unified modeling language UML
- ⊕ **Sales and marketing software** — Marketo Marketing Automation 🔥
- ⊕ **Spreadsheet software** — Google Sheets 🔥; Microsoft Excel 🔥
- ⊕ **Storage networking software** — Amazon Simple Storage Service S3 🔥; Storage area network SAN software
- ⊕ **Switch or router software** — Border Gateway Protocol BGP 🔥
- ⊕ **Transaction security and virus protection software** — Encryption software; McAfee; NortonLifeLock cybersecurity software
- ⊕ **Transaction server software** — Customer information control system CICS; IBM Middleware; Microsoft Internet Information Services (IIS); Object Management Group Object Request Broker; [1 more](#)
- ⊕ **Video conferencing software** — Cisco Webex 🔥; Google Meet; LogMeIn GoToMeeting; Zoom 🔥; [1 more](#)
- ⊕ **Video creation and editing software** — Adobe After Effects 🔥; Flipgrid; Screencastify; YouTube; [1 more](#)
- ⊕ **Web page creation and editing software** — Adobe Dreamweaver; Google Sites; Social media sites; WordPress 🔥; [1 more](#)
- ⊕ **Web platform development software** — Bootstrap 🔥; Eclipse Jersey 🔥; React 🔥; Vue.js 🔥; [31 more](#)

- ➕ **Word processing software** — 3M Post-it App; Google Docs 🔥; Microsoft OneNote; Microsoft Word 🔥;
  [1 more](#)

🔥 Hot Technologies are requirements most frequently included across all employer job postings.
[See all 149 Hot Technologies for this occupation.](#)

📈 In Demand skills are frequently included in employer job postings for this occupation.
[See all 31 In Demand skills for this occupation.](#)

Tools Used

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- ➕ **Central processing unit CPU processors** — Graphics processing unit GPU; Multi-core central processing unit CPU
- ➕ **Computer servers** — Application servers
- ➕ **Desktop computers**
- ➕ **Digital cameras**
- ➕ **Flash memory storage card** — Flash disks
- ➕ **High end computer servers** — Directory servers
- ➕ **Integrated circuit testers** — In circuit emulators ICE; Logic analyzers
- ➕ **Mainframe computers**
- ➕ **Notebook computers**

Occupational Requirements

Detailed Work Activities

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- ➕ Analyze project data to determine specifications or requirements.
- ➕ Modify software programs to improve performance.
- ➕ Supervise information technology personnel.
- ➕ Apply mathematical principles or statistical approaches to solve problems in scientific or applied fields.
- ➕ Assess database performance.
- ➕ Assign duties or work schedules to employees.
- ➕ Collaborate with others to determine design specifications or details.
- ➕ Collaborate with others to resolve information technology issues.
- ➕ Communicate project information to others.
- ➕ Coordinate software or hardware installation.
- ➕ Design software applications.

- ➕ Develop performance metrics or standards related to information technology.
- ➕ Develop testing routines or procedures.
- ➕ Document technical specifications or requirements.
- ➕ Identify information technology project resource requirements.
- ➕ Manage information technology projects or system activities.
- ➕ Monitor computer system performance to ensure proper operation.
- ➕ Prepare data for analysis.
- ➕ Provide recommendations to others about computer hardware.
- ➕ Provide technical support for software maintenance or use.
- ➕ Teach others to use computer equipment or hardware.

Find occupations related to multiple detailed work activities

Experience Requirements

Job Zone

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Title	Job Zone Four: Considerable Preparation Needed
Education	Most of these occupations require a four-year bachelor's degree, but some do not.
Related Experience	A considerable amount of work-related skill, knowledge, or experience is needed for these occupations. For example, an accountant must complete four years of college and work for several years in accounting to be considered qualified.
Job Training	Employees in these occupations usually need several years of work-related experience, on-the-job training, and/or vocational training.
Job Zone Examples	Many of these occupations involve coordinating, supervising, managing, or training others. Examples include real estate brokers, sales managers, database administrators, graphic designers, conservation scientists, art directors, and cost estimators.
SVP Range	(7.0 to < 8.0)

Training & Credentials

State training	Select a State	Go
Local training	ZIP Code	Go
Certifications	Find certifications nationwide	

| **State licenses** | Select a State | Go |

Apprenticeship Opportunities

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Example apprenticeship titles for this occupation:

- Application Developer
- Commercial Drone Software Developer

Specific title(s) listed above are vetted by industry and approved by the U.S. Department of Labor for use in a Registered Apprenticeship Program.

> Start your career and build your skillset. Visit **Apprenticeship.gov** ⤴ to learn about opportunities related to this occupation.

Worker Characteristics

Interests

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Occupational Interest	Interest
81	⊕ **Investigative** — Work involves studying and researching non-living objects, living organisms, disease or other forms of impairment, or human behavior. Investigative occupations are often associated with physical, life, medical, or social sciences, and can be found in the fields of humanities, mathematics/statistics, information technology, or health care service.
74	⊕ **Conventional** — Work involves following procedures and regulations to organize information or data, typically in a business setting. Conventional occupations are often associated with office work, accounting, mathematics/statistics, information technology, finance, or human resources.
49	⊕ **Realistic** — Work involves designing, building, or repairing of equipment, materials, or structures, engaging in physical activity, or working outdoors. Realistic occupations are often associated with engineering, mechanics and electronics, construction, woodworking, transportation, machine operation, agriculture, animal services, physical or manual labor, athletics, or protective services.

Occupational Interest	Interest
21	⊕ **Artistic** — Work involves creating original visual artwork, performances, written works, food, or music for a variety of media, or applying artistic principles to the design of various objects and materials. Artistic occupations are often associated with visual arts, applied arts and design, performing arts, music, creative writing, media, or culinary art.
15	⊕ **Enterprising** — Work involves managing, negotiating, marketing, or selling, typically in a business setting, or leading or advising people in political and legal situations. Enterprising occupations are often associated with business initiatives, sales, marketing/advertising, finance, management/administration, professional advising, public speaking, politics, or law.
15	⊕ **Social** — Work involves helping, teaching, advising, assisting, or providing service to others. Social occupations are often associated with social, health care, personal service, teaching/education, or religious activities.

Workforce Characteristics

Wages & Employment Trends

Median wages (2024)	$63.98 hourly, $133,080 annual
State wages	Select a State [Go]
Local wages	ZIP Code [Go]
Employment (2023)	1,692,100 employees
Projected growth (2023-2033)	▪▪▪▪ Much faster than average (9% or higher)
Projected job openings (2023-2033)	125,100
State trends	Select a State [Go]
Top industries (2023)	Professional, Scientific, and Technical Services (42% employed in this sector) Information (20%) Finance and Insurance (10%)

Source: Bureau of Labor Statistics 2024 wage data ↗ and 2023-2033 employment projections ↗. "Projected growth" represents the estimated change in total employment over the projections period (2023-2033). "Projected job openings"

represent openings due to growth and replacement.

Job Openings on the Web

State job openings	Select a State	Go
Local job openings	ZIP Code	Go

More Information

Related Occupations

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- 17-2061.00 Computer Hardware Engineers ☀ **Bright Outlook**
- 15-1241.00 Computer Network Architects ☀
- 15-1251.00 Computer Programmers
- 15-1211.00 Computer Systems Analysts ☀
- 15-1299.08 Computer Systems Engineers/Architects ☀
- 15-1242.00 Database Administrators ☀
- 15-1243.00 Database Architects ☀
- 15-1299.05 Information Security Engineers ☀
- 15-1253.00 Software Quality Assurance Analysts and Testers ☀
- 15-1254.00 Web Developers ☀

Professional Associations

Disclaimer: Sources are listed to provide additional information on related jobs, specialties, and/or industries. Links to non-DOL Internet sites are provided for your convenience and do not constitute an endorsement.

National Associations   ⌄ 5 of 27 displayed

- Association for Computing Machinery ⤴
- Association for Information Science and Technology ⤴
- Association for Information Systems ⤴
- Association for the Advancement of Artificial Intelligence ⤴
- Association for Women in Computing ⤴

Regional Associations

- Midwest Association for Information Systems ⤴
- Southern Association for Information Systems ⤴

Accreditation, Certification, & Unions

- CompTIA ↗
- Project Management Institute ↗