

# COMPUTER SYSTEMS ANALYSTS

A DEEP DIVE FOR SKILLS-BASED HIRING

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# Occupation Overview: Computer Systems Analysts

## Foundational Competencies

- **Critical Thinking:** Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to problems.
- **Systems Analysis:** Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes.
- **Complex Problem Solving:** Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.
- **Judgment and Decision Making:** Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- **Programming:** Writing computer programs for various purposes.
- **Systems Evaluation:** Identifying measures or indicators of system performance and the actions needed to improve or correct performance relative to the goals of the system.
- **Operations Analysis:** Analyzing needs and product requirements to create a design.
- **Active Learning:** Understanding the implications of new information for both current and future problem solving and decision making.
- **Quality Control Analysis:** Conducting tests and inspections of products, services, or processes to evaluate quality or performance.
- **Technology Design:** Generating or adapting equipment and technology to serve user needs.

## Occupation-Specific Competencies

- **Basic General Database:** Demonstrated proficiency with SQL basics (e.g., selecting, inserting, updating, deleting records), at least one database management software application, and database fundamentals such as normalization, schemas, and relationships.
- **Intermediate Systems Design and Implementation:** Demonstrated ability to assist customers in the gathering of requirements and design, implement, and support moderately complex technology solutions to existing business problems.
- **Intermediate Business Process and Analysis:** Demonstrated ability to analyze and process complex data for core business operations; demonstrated ability to analyze systems, create business requirements documentation, and perform decision-support and life-cycle analysis.
- **Basic Microsoft Office:** Familiarity with the use of multiple end-user software packages (which must include a business productivity suite such as MS Office or Google Docs), and some knowledge of how to install, configure, and maintain some of these packages.
- **Basic Business Solutions:** Able to accurately diagnose common business problems; able to implement IT Strategy and to recommend appropriate technology-based solutions; some knowledge of guiding clients through basic process design, prototyping and order management; familiarity with Enterprise Resource Planning and specific solutions (e.g., JD Edwards).
- **Basic General Data Techniques:** Basic to moderate ability to collect, analyze, manipulate, and manage data; basic proficiency in converting data between some formats.
- **Basic Software Development:** Familiarity with the use of object-oriented techniques, user experience and responsive design, web mobility, back-end processes, communication tools (such as AJAX), web services (including REST), a web framework, version control, and a development life-cycle methodology (such as Agile).
- **Basic Core Coding Languages:** Familiarity with the concepts and ability to develop very basic front-end, back-end and/or mobile applications utilizing core coding languages (e.g., Java, C#, Objective C, JavaScript) on a development platform and integrating data storage (including SQL), libraries, methods, interfaces, and/or objects.
- **Intermediate Testing:** Demonstrated ability to design tests, create test scripts, ensure that test cases mimic user usage, and execute and validate unit, system, and performance test routines for a team; demonstrated ability to use appropriate test tools.
- **Basic General Information Security:** Familiarity with software assurance best practices and their use in software development.

## Job Description (Example)

Analyze science, engineering, business, and other data processing problems to implement and improve computer systems. Analyze user requirements, procedures, and problems to automate or improve existing systems and review computer system capabilities, workflow, and scheduling limitations. May analyze or recommend commercially available software.

- Responsible for supporting critical applications and ensuring the stability of the applications by performing proactive maintenance activities, engaging in automation activities, doing root cause analysis and remediation.
- Requires working knowledge of production support processes such as incident/change/problem management, call triaging, escalation procedures and such. The role will also demand the ability to write and maintain scripts to monitor system activity including application smoke test activities during pre- and post-production implementations.
- Will lead by example, be self-motivated, and have excellent interpersonal communication skills.

## Activities (Example List)

- Expand or modify system to serve new purposes or improve work flow.
- Test, maintain, and monitor computer programs and systems, including coordinating the installation of computer programs and systems.
- Develop, document, and revise system design procedures, test procedures, and quality standards.
- Provide staff and users with assistance solving computer-related problems such as malfunctions and program problems.
- Review and analyze computer performance indicators to locate code problems and system bottlenecks, and be able to suggest corrective action.
- Use object-oriented programming languages, as well as client and server applications development processes and multimedia and internet technology.
- Consult with management to ensure agreement on system principles.

## Prioritized Foundational Competencies: Computer Systems Analysts

Most Common Required Competencies	
1	<b>Critical Thinking:</b> Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to systems or process problems; ideally able to effectively decompose problems into a logical set of smaller, related sub-problems; able to judge the relative strengths and weaknesses of the set of possible options to inform decisions.
2	<b>Systems Analysis:</b> Determining how a business process should work and how various changes (e.g., conditions, operations) will affect the process and outcomes; identifying and considering a decision's repercussions for the system as a whole; ideally, able to act as a bridge between IT and the business to make optimal decisions; some ability to think across systems when needed.
3	<b>Active Learning:</b> Understanding the implications of new information for both current and future problems and decisions; embracing change and understanding new concepts; breaking systems down their key underlying elements; asking appropriate questions; talking with others to gain answers and insights, particularly business needs and IT capabilities.

Most Preferred Competencies	
1	<b>Critical Thinking:</b> <i>See previous.</i>
2	<b>Systems Analysis:</b> <i>See previous.</i>
3	<b>Complex Problem Solving:</b> <i>See previous.</i>

Most Evolving Competencies	
1	<b>Technology Design:</b> Evolution driven by increasing complexity of servers, software, architectures, and frameworks combined with a desire for more data and more efficient processes; changes bring about new processes and solutions; increase value of active learning skills, including willingness to learn and adapt to new technologies and share information with others.
2	<b>Systems Analysis:</b> Evolution due to increasing complexity of technological systems; changes increase value of being able to anticipate how new business processes should work and how various changes will affect the process and outcomes.
3	<b>Systems Evaluation:</b> Evolution driven by increasing complexity of hardware, software, core processes, and increasing data available; changes give companies greater flexibility in decision making and make it more important to make informed decisions on how to make important tradeoffs (e.g., cost, efficiency).

Most Common Break Point Competencies	
1	<b>Systems Analysis:</b> <i>See previous.</i>
2	<b>Critical Thinking:</b> <i>See previous.</i>
3	<b>Complex Problem Solving:</b> Able to frame and then solve complex problems by reviewing related information to develop and evaluate options and implement solutions; synthesizing needs and insights from both business and IT in a collaborative way and then socializing proposed solution to refine and get agreement.

Most Hard-to-Find Competencies	
1	<b>Critical Thinking:</b> <i>See previous.</i>
2	<b>Complex Problem Solving:</b> <i>See previous.</i>
3	<b>Judgment and Decision Making:</b> Considering the relative business impacts and benefits of potential actions to choose the most appropriate one; interested in and able to conduct a return on investment (ROI) analysis to inform decisions (e.g., "should a system be redone, patched up or just left alone?"); ideally, developing a point of view on prioritization given resource constraints.

## Prioritized Occupation-Specific Competencies: Computer Systems Analysts

Most Common Required Competencies	
1	<b>Intermediate Systems Design and Implementation:</b> Demonstrated ability to assist customers in the gathering of requirements and to design, implement, and support moderately complex technology solutions to existing business problems.
2	<b>Intermediate Business Process and Analysis:</b> Demonstrated ability to analyze and process complex data for core business operations; demonstrated ability to analyze systems, create business requirements documentation; able to perform end-to-end process analysis.
3	<b>Basic Business Solutions:</b> Able to accurately diagnose common business problems; able to devise IT strategy and to recommend appropriate technology-based solutions; some knowledge of guiding users through basic process design and prototyping; familiarity with Enterprise Resource Planning.

Most Common Break Point Competencies	
1	<b>Intermediate Systems Design and Implementation:</b> <i>See previous.</i>
2	<b>Intermediate Business Process and Analysis:</b> <i>See previous.</i>
3	<b>Basic Business Solutions:</b> <i>See previous.</i>

Most Preferred Competencies	
1	<b>Intermediate Systems Design and Implementation:</b> <i>See previous.</i>
2	<b>Basic Business Solutions:</b> <i>See previous.</i>
3	<b>Intermediate Testing:</b> Demonstrated ability to design tests, create test scripts, ensure that test cases mimic user usage, and execute and validate unit, system, and performance test routines for a team; demonstrated ability to use appropriate test tools.

Most Hard-to-Find Competencies	
1	<b>Intermediate Systems Design and Implementation:</b> <i>See previous.</i>
2	<b>Intermediate Business Process and Analysis:</b> <i>See previous.</i>
3	<b>Basic Business Solutions:</b> <i>See previous.</i>

Most Evolving Competencies	
1	<b>Basic General Data Techniques:</b> Evolution driven by increasing complexity and availability of data, data formats, and potential business use cases; changes increase value of collecting, analyzing, manipulating, and managing data; also important to apply data to answer business problems.
2	<b>Basic General Information Security:</b> Evolution due to increased complexity of information and potential security threats; changes make it more important to anticipate security risks and requirements and to make changes to security measures in light of new and complex information.
3	<b>Basic Software Development:</b> Evolution driven by the increasing number, sophistication, and capabilities of software; changes increase value of understanding the current software technology available and how that can be used to solve business problems, potentially in new ways; able to collaborate with the technical team to create complete solutions.

## Work Scenarios: Computer Systems Analysts

Description of Work Scenario	List of Competencies
<p>It's 9 am, and Venkat gets an email from his manager. A customer had emailed in and said a specific internal module of their web-based ordering system does not work. Specifically, the customer cannot download a product specification document when they push on the "download" button. The customer wants to know when the problem can be fixed. They cannot purchase this item until they know the details. The manager tells Venkat to look into this. Venkat searches for available information about this application in the company's internal database. He also seeks input from some colleagues. Based on his research, Venkat determines the button should be working and is probably a bug. Venkat calls his manager, summarizes his research and offers his conclusion: this is probably a bug. The manager schedules a meeting with the customer an hour later. Venkat, the manager and the customer get on a video conference to see the problem in action. The customer clicks the download button, and the production specification does not download. The manager tells the customer the issue will be resolved soon.</p>	<ul style="list-style-type: none"> <li>• Critical Thinking</li> <li>• Systems Analysis</li> <li>• Active Learning</li> <li>• <i>Systems Design and Implementation</i></li> <li>• <i>Business Process and Analysis</i></li> </ul>
<p>After hanging up, the manager tells Venkat to look into the issue and reach out to a technical expert if needed. Venkat replicates the problem on his system and does some basic troubleshooting to see if the configuration has been set-up properly or not. He determines the configuration has been set-up properly so technical expertise is required. Venkat goes into the company's ticketing system, creates a ticket, attaches a screenshot and adds details. Venkat then assigns the ticket to the technical expert recommended by the manager. He then calls the technical expert. The technical expert says he will look into it and get back to Venkat later that day. Two hours later, the technical expert calls back and says the bugs has been fixed. Venkat goes into the system, logs in and tests the specific module to make sure it works. The download works, and Venkat reports this to the manager who then lets the customer know. The customer confirms the fix works on their system. Venkat then gets on to the ticketing system, adds some details (e.g., what fix was used by the technical expert) and closes the ticket.</p>	<ul style="list-style-type: none"> <li>• Critical Thinking</li> <li>• Systems Analysis</li> <li>• <i>Systems Design and Implementation</i></li> <li>• <i>Business Process and Analysis</i></li> <li>• <i>Testing</i></li> </ul>
<p>In the early afternoon, Tamara gets a call. Her manager explains that a functional manager and analyst, Venkat, called and reported a bug in the company's web-based ordering system. He gives Tamara the ticket number. Tamara logs into the ticketing system, reads through the details and gets a grasp of the problem. Tamara logs into the ordering system and replicates the issue. Tamara cannot download the document. Tamara reaches out to a senior team member to figure out where the relevant code is. The senior member provides the location. Tamara logs into the code repository, goes to the right location and downloads the code. She opens the code in a development tool. She also requests a log file from a database administrator. Tamara reviews the log file and sees a potential source of the problem. Tamara goes to the part of the code suggested by her review of the log file. She starts to debug the code, finds the problem and fixes it. She retests the ordering system and verifies the fix works. She updates the ticket, assigns the ticket to Venkat and lets Venkat know the problem has been fixed.</p>	<ul style="list-style-type: none"> <li>• Critical Thinking</li> <li>• Systems Analysis</li> <li>• Active Learning</li> <li>• <i>Systems Design and Implementation</i></li> <li>• <i>Business Process and Analysis</i></li> <li>• <i>Testing</i></li> <li>• <i>Software Development</i></li> </ul>
<p>Because Tamara modified the code, she needs to update the technical specification document that lives in the company's document repository. Tamara goes into the document repository and downloads the relevant document. She finds the relevant section of the document and then writes in plain-spoken English about the change she made to the code and specifically mentions the components that have been modified. She then sends the revised document to a senior member of her team for review. Later that day, she gets an email back and confirms that the change to the document looks good. She then uploads the updated document into the company's document repository.</p>	<ul style="list-style-type: none"> <li>• Critical Thinking</li> <li>• Systems Analysis</li> <li>• <i>System Design and Implementation</i></li> <li>• <i>General Data Techniques</i></li> </ul>

# Occupation Deep Dive: Computer Systems Analysts

## Job Titles Within This Occupation

- Systems Analyst
- Technical Analyst
- Technical Consultant
- Information Technology Business Analyst
- Information Technology Analyst
- Business Analyst
- Systems Engineer
- Information Technology Auditor

## Certification and Education Preferences (Example)

- Certified Information Systems Auditor (CISA)
- Project Management Certification (e.g., PMP)
- Certified Information Systems Security Professional (CISSP)
- Certified Public Accountant (CPA)
- Epic Certification

## Tools Used (Example List)

- Oracle
- SQL
- SAP
- Java
- LINUX
- Enterprise Resource Planning (ERP)
- JavaScript
- Quality Center
- Automated Testing Tools
- Bug Tracking System
- ERP Solutions
- User Experience
- Any Web Development Process Modeling Tools
- System Automation Testing Tools, etc.

## Other Relevant Foundational Competencies

1	Speaking
2	Active Listening
3	Reading Comprehension
4	Writing
5	Social Perceptiveness
6	Time Management
7	Monitoring
8	Troubleshooting
9	Service Orientation
10	Persuasion
11	Coordination
12	Mathematics
13	Instructing
14	Learning Strategies
15	Operation Monitoring
16	Management of Personnel Resources
17	Negotiation
18	Science
19	Equipment Selection
20	Management of Financial Resources
21	Management of Material Resources
22	Operation and Control
23	Installation
24	Equipment Maintenance
25	Repairing

## Other Relevant Occupation-Specific Competencies

1	Business Software
2	LINUX/UNIX
3	Basic Web Development Languages
4	Core Operating Systems
5	Database Administration
6	Microsoft Stack
7	General Accounting
8	Business Intelligence
9	System Administration
10	Microsoft Project Management Tools
11	Data Storage
12	Advanced JAVA for Web Development
13	Sales and Business Development
14	General Networking Tools and Concepts
15	Clinical Informatics
16	Product Management
17	Administrative Support
18	Employee Training
19	Information Security
20	Mathematics
21	Strategizing
22	Server Administration
23	Purchasing
24	Web Development Concepts
25	Validation



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