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## DATABASE ADMINISTRATION AND DEVELOPMENT

*Summary of Critical Work Functions*

| A. Analyze and Design Database | B. Develop and Implement Database | C. Perform Administration and Maintenance | D. Perform Security Administration | E. Provide Client Services |
|---|---|---|---|---|
| A1 Perform research and analyze requirements | B1 Develop physical database characteristics and user interface | C1 Develop and implement monitoring plan | D1 Gather and document security requirements | E1 Provide and support development environments |
| A2 Create and refine conceptual and logical data models | B2 Create database objects | C2 Analyze monitoring data | D2 Design and document security plan | E2 Plan user training |
| A3 Identify high-level business rules for data model | B3 Select unique identifiers and normalize the data model | C3 Manage backup and recovery both on-site and off-site | D3 Implement and enforce security requirements | E3 Deliver user training |
| A4 Adapt conceptual and logical data models to enterprise model | B4 Support population of database | C4 Create and implement maintenance plan for regular integrity checks | D4 Maintain and improve security in response to industry developments and user | E4 Identify additional requirements |
| A5 Validate conceptual and logical data models with clients | B5 Integrate high-level business rules with code | C5 Maintain physical organization of database objects | | E5 Adapt existing structure to new business environments |
| A6 Determine target environment/platform | B6 Develop and implement testing of database components | C6 Apply software upgrades and fixes | | |
| A7 Identify backup and recovery requirements | B7 Develop and validate database implementation plan | C7 Plan and manage physical resource requirements | | |
| A8 Identify access and concurrency requirements | B8 Deploy database | C8 Administer and enforce standards | | |
| A9 Design distributed model | B9 Produce business and technical documents | C9 Audit database systems | | |

Highlighted text = skills covered

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## DATABASE ADMNISTRATION AND DEVELOPMENT

***Critical Work Function: Analyze and Design Database***

| KEY ACTIVITY | PERFORMANCE INDICATORS<br>*How do we know when the key activity is performed well?* | TECHNICAL KNOWLEDGE<br>*Skills, Abilities, Tools* | EMPLOYABILITY SKILLS<br>*SCANS Skills and Foundation Abilities* |
|---|---|---|---|
| **A1 Perform research and analyze requirements** | • Business objectives and goals for the project are well defined.<br>• Necessary project information is complete, accurate and free of conflicting requirements.<br>• Sources of information are reliable and current.<br>• Complete set of requirements is communicated to and approved by client/user.<br>• Final set of requirements is documented in an accurate, complete and succinct form.<br>• Third-party tools are identified and agreed upon by all parties.<br>• Client/users are properly educated regarding requirements, technology and tools | • Knowledge of basic business objectives and requirements analysis.<br>• Knowledge of database software and design principles.<br>• Knowledge of operating systems and third-party tools | • Ability to identify key sources of information.<br>• Ability to analyze information for accuracy and consistency.<br>• Ability to work cooperatively with others and contribute ideas, suggestions and assistance.<br>• Ability to ask relevant questions.<br>• Ability to accurately summarize and document information.<br>• Ability to resolve conflicts in available information and expressed needs. |
| **A2 Create and refine conceptual and logical data models** | • Conceptual model is documented accurately and completely.<br>• Entities, attributes and relationships are identified and defined in a complete and accurate form within scope.<br>• Clients/users are consulted during conceptual data modeling process as appropriate | • Knowledge of data modeling and database software and tools.<br>• Ability to translate client/user requirements into data model.<br>• Ability to define attributes and align to entities.<br>• Ability to resolve discrepancies in different/multiple models.<br>• Ability to relate user specifications to data model. | • Ability to create, store and distribute documentation according to requirements.<br>• Ability to recognize and resolve conflicting specifications.<br>• Ability to work cooperatively with others and contribute ideas, suggestions and assistance.<br>• Ability to ask relevant questions.<br>• Ability to accurately summarize and document information. |
| **A3 Identify high-level business rules for data model** | • Pertinent business rules are identified or defined during modeling.<br>• High-level business rules are documented.<br>• Data ownership is clearly defined.<br>• Data definitions are fully developed and agreed upon in accordance with company procedures.<br>• High-level business rules are integrated within the data model.<br>• Validation rules are identified and documented. | • Knowledge of business structure.<br>• Knowledge of business entities and relationships.<br>• Knowledge of business policies and procedures.<br>• Knowledge of validation rules and data constraints. | • Ability to synthesize information.<br>• Ability to create detailed supporting documentation.<br>• Ability to visually analyze relationship between parts/whole. |

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| **A4 Adapt conceptual and logical data models to enterprise model** | • Conceptual and logical data models are consistent with enterprise model.<br>• Possible adaptations of enterprise model are considered.<br>• Company data and objects standards and standardization policies are thoroughly followed. | • Knowledge of company modeling policies and company development standards.<br>• Ability to communicate modeling issues to a variety of audiences.<br>• Ability to visualize and integrate conceptual and logical model to conform with the enterprise model.<br>• Knowledge of database software and database modeling techniques. | • Ability to examine data for relevance and accuracy.<br>• Ability to pay attention to detail.<br>• Ability to analyze structure and organization of information.<br>• Ability to negotiate and resolve conflicts.<br>• Ability to present technical information clearly |
| **A5 Validate conceptual and logical data models with clients** | • Data model is presented clearly and completely and approved as appropriate.<br>• Issues are resolved and recommendations are fed back into the modeling process.<br>• Conceptual and logical models are reconciled with appropriate level process models.<br>• Conceptual and logical data models are validated by client.<br>• Changes or modifications to all models and validation process and outcomes are accurately, concisely and completely documented.<br>• Data ownership and reuse are properly validated. | • Knowledge of validation procedures and processes.<br>• Ability to recognize and resolve conflicts between models.<br>• Ability to read and understand process model.<br>• Ability to negotiate changes or modifications in models with a variety of audiences.<br>• Knowledge of database software, operating systems and the particular business or domain | • Ability to understand and respond to client/user concerns.<br>• Ability to negotiate and resolve conflicts and compare multiple viewpoints.<br>• Ability to use word processing and database software.<br>• Ability to analyze structure and organization of information.<br>• Ability to examine data for relevance and accuracy. |
| **A6 Determine target environment/platform** | • Available options are researched, analyzed and documented.<br>• Decisions are based on technical and business information, resources and strategies.<br>• Target environment/platform is agreed upon by key people.<br>• Database technology is properly selected.<br>• Platforms and environments are reviewed, and options and recommendations are effectively communicated to appropriate personnel. | • Knowledge of computer platforms and environments.<br>• Knowledge of platform capabilities and limitations.<br>• Knowledge of platform implication on database design, performance and usability issues.<br>• Knowledge of installed base and preferred products.<br>• Knowledge of database software. | • Ability to synthesize information.<br>• Ability to compare multiple viewpoints.<br>• Ability to generate alternative solutions.<br>• Ability to analyze alternatives, consider tradeoffs and make decisions.<br>• Ability to work with a diverse group of issues and people. |

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| **A7 Identify backup and recovery requirements** | • Backup and recovery requirements are consistent with corporate policy and business needs.<br>• Requirements are specific to database and are documented completely.<br>• Users are appropriately consulted and educated regarding backup and recovery methods. | • Knowledge of corporate policy and business data requirements.<br>• Knowledge of backup and recovery technology of platform.<br>• Knowledge of user needs and skill levels. | • Ability to create detailed supporting documentation and write teccal documents for a variety of audiences.<br>• Ability to integrate multiple items of data and synthesize information.<br>• Ability to analyze system configuration/stability.<br>• Ability to analyze goals and constraints.<br>• Ability to use word processing and database software. |
| **A8 Identify access and concurrency requirements** | • Requirements are specific to database and are documented completely.<br>• Access requirements include input, output and volume of every user view.<br>• Access plan is integrated with backup and recovery plan.<br>• User views are categorized by type of transaction.<br>• Access to data is documented by type of access.<br>• Record locking mechanism is selected and provides maximum data integrity and acceptable performance.<br>• Locking alternatives are examined, analyzed and documented and locking granularity is documented and justified.<br>• Users are appropriately consulted and educated regarding access and concurrency procedures. | • Knowledge of corporate policy and business data requirements.<br>• Knowledge of alternative concurrency control methods.<br>• Knowledge of user views and user access requirements.<br>• Knowledge of locking mechanisms and tradeoffs between lock types. | • Ability to write technical documents for a variety of audiences.<br>• Ability to analyze and synthesize information.<br>• Ability to analyze system configuration/stability.<br>• Ability to analyze goals and constraints.<br>• Ability to use word processing and database software. |
| **A9 Design distributed model** | • Each site has the appropriate datasets.<br>• Site autonomy is assured and replication remains consistent.<br>• Access to fragments is seamless.<br>• Accuracy of data and response meet client/user needs.<br>• Distribution model meets security concerns. | • Knowledge of network structure and protocols.<br>• Ability to use appropriate modeling tools and methodologies.<br>• Ability to document decisions about database distribution.<br>• Knowledge of database software.<br>• Ability to plan adequately distributed model. | • Ability to analyze organization of information.<br>• Ability to create detailed technical documentation.<br>• Ability to identify and resolve technical issues.<br>• Ability to communicate clearly to a variety of audiences.<br>• Ability to visually analyze relationship between parts/whole |

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## DATABASE ADMNISTRATION AND DEVELOPMENT

***Critical Work Function: Develop physical database***

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| **B1 Develop physical database characteristics and user interface** | • Attributes have uniform structure.<br>• Table and file names follow naming conventions.<br>• Data types are consistent between attributes.<br>• Physical design is reconciled with the processing requirements.<br>• Entities are uniformly and logically linked throughout the database structure.<br>• User interface meets client/user requirements.<br>• Database characteristics and user interface are completely documented | • Knowledge of naming conventions and standards.<br>• Ability to recognize and resolve conflicts between models.<br>• Ability to read and understand logical model.<br>• Knowledge of data types and attributes.<br>• Knowledge of user interface requirements and standards. | • Ability to create detailed documentation.<br>• Ability to analyze and synthesize information and write clearly and concisely.<br>• Ability to compare multiple viewpoints and negotiate changes.<br>• Ability to apply logic to structures and processes.<br>• Ability to examine data for relevance/accuracy.<br>• Ability to pay attention to detail. |
| **B2 Create database objects** | • Database objects are created and tested in a timely manner.<br>• Database objects are created in accordance with best practices and/or company procedures.<br>• Database objects are created to meet user requirements and usability specifications. | • Knowledge of database object design and testing procedures.<br>• Ability to relate database usability and user requirements to object design.<br>• Ability to present data and database tools in a user-friendly manner.<br>• Knowledge of user preferences and expertise levels. | • Ability to attend to detail in checking model/database.<br>• Ability to clarify, interpret and influence communication.<br>• Ability to work with minimal supervision.<br>• Ability to identify and resolve conflicts in data and requirements. |
| **B3 Select unique identifiers and normalize the data model** | • Logical model is consistent with conceptual model.<br>• Logical and data models and identifiers have been validated by client.<br>• Identifiers are selected and documented and primary and foreign keys are properly identified.<br>• Rationale behind selection is documented.<br>• Data model is normalized to match user specifications.<br>• Attributes of entities and relationships between entities are defined in a complete and accurate form. | • Ability to transform conceptual model into logical model.<br>• Ability to identify and define attributes and align attributes to entities.<br>• Knowledge of operating systems and database software and principles.<br>• Ability to choose and document identifiers and relate identifier selection to business domain.<br>• Knowledge of normalization rules and processes. | • Ability to organize data in a usable form.<br>• Ability to track information efficiently and effectively.<br>• Ability to use logic to draw conclusions from available information. |

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| **B4 Support population of database** | • Data entry is complete and accurate.<br>• Data conversion is complete and accurate.<br>• Where applicable, third-party vendors are used to solve problems.<br>• Data transfer strategies are applied effectively.<br>• Users are consulted to determine new database content. | • Knowledge of database software.<br>• Knowledge of database querying methods.<br>• Knowledge of various database attributes.<br>• Ability to re-engineer off-the-shelf databases.<br>• Knowledge of operating systems and the domain. | • Ability to generate/evaluate solutions.<br>• Ability to devise/implement plan of action.<br>• Ability to organize information and reports.<br>• Ability to compare multiple viewpoints and relate intent to desired results.<br>• Ability to pay attention to detail and follow up on assigned tasks. |
| **B5 Integrate high-level business rules with code** | • Pertinent business rules are examined and their impact on database is accurately determined.<br>• Database triggers and procedures are implemented to reflect business rules.<br>• Database code supports high-level business rules. | • Knowledge of business structure.<br>• Knowledge of business entities and relationships.<br>• Knowledge of user interface and database rules.<br>• Knowledge of database code development. | • Ability to synthesize information.<br>• Ability to create detailed supporting documentation.<br>• Ability to visually analyze relationship between parts/whole.<br>• Ability to integrate multiple items of data and research additional information sources.<br>• Ability to organize technical reports and select methods of communication. |
| **B6 Develop and implement testing of database components** | • Acceptance testing and regression testing are satisfactorily completed based on specification criteria.<br>• Benchmarking is carried out in accordance with proper procedures.<br>• Components are systematically and thoroughly tested.<br>• Testing methods follow company guidelines.<br>• Testing process is clearly documented.<br>• Testing is completed according to schedule.<br>• Technical conflicts are identified and resolved. | • Knowledge of acceptance testing and regression testing procedures.<br>• Knowledge of database testing methods, tools and processes.<br>• Knowledge of contingency procedures.<br>• Knowledge of benchmarking procedures.<br>• Ability to evaluate defect impact on overall system performance and integrity.<br>• Knowledge of appropriate validation process and database system error resolution procedures.<br>• Ability to evaluate importance of defect and communicate to relevant personnel. | • Ability to work with minimal supervision.<br>• Ability to attend to detail in testing database components.<br>• Ability to identify and resolve technical conflicts.<br>• Ability to organize and communicate technical ideas/information. |

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| **B7 Develop and validate database implementation plan** | • Implementation plan development involves key team members.<br>• Database implementation plan is completed in a timely manner.<br>• Clients/users are consulted as required.<br>• Implementation plan is complete and congruent with project plan.<br>• Implementation plan meets user specifications and timeline.<br>• Transition plan is implemented with minimal impact on overall productivity. | • Knowledge of implementation and transition process.<br>• Knowledge of productivity factors and risk management techniques.<br>• Knowledge of contingency procedures.<br>• Ability to evaluate overall system performance and productivity.<br>• Knowledge of database software. | • Ability to synthesize and organize information.<br>• Ability to create detailed supporting documents.<br>• Ability to manage resources and timelines to maximize effectiveness.<br>• Ability to identify underlying issues and resolve technical conflicts to client/user satisfaction.<br>• Ability to assume responsibility for accomplishing team goals.<br>• Ability to provide feedback to relevant personnel. |
| **B8 Deploy database** | • Software and dataset are installed according to implementation plan.<br>• Internal and external feedback and user issues are presented clearly and concisely, and user questions about conversion are completely and professionally answered.<br>• New database management system is fully operational, users have proper access to data and database is accessible through the network, where applicable.<br>• Issues and questions concerning acceptance and validation are resolved to user satisfaction.<br>• Post-implementation reviews are thoroughly conducted in accordance with company procedures.<br>• Non-pressing issues are documented for next design upgrade.<br>• Database is thoroughly tested to ensure proper installation. | • Knowledge of appropriate validation process and database system error resolution procedures.<br>• Ability to evaluate acceptance testing plan.<br>• Knowledge of feedback generation techniques and procedures.<br>• Ability to evaluate overall system performance and productivity.<br>• Knowledge of the domain. | • Ability to relate intent to desired results.<br>• Ability to evaluate/adjust plan of action.<br>• Ability to judge effectiveness and efficiency of solution.<br>• Ability to evaluate and summarize user input, recognize critical issues and analyze communication.<br>• Ability to make recommendations for intervention. |

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| **B9 Produce business and technical documents** | • Business and technical documents are accurate and complete.<br>• Business and technical documents meet user requirements.<br>• Business and technical documents are created, stored and distributed according to company procedures.<br>• Business and technical documents are updated and disseminated as needed. | • Ability to use advanced word processing features.<br>• Ability to translate technical information into user-appropriate formats.<br>• Knowledge of technical document update procedures. | • Ability to create and organize business and technical reports.<br>• Ability to use effective communication and presentation methods.<br>• Ability to document technical procedures for users.<br>• Ability to use integrated/multiple software applications. |

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***Critical Work Function: Perform Administration and Maintenance***

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| **C1 Develop and implement monitoring plan** | • Monitoring criteria are identified and agreed upon with design and user groups, and are consistent with business requirements.<br>• Monitoring criteria are documented completely and accurately.<br>• Monitoring plan is congruent with project scope and resources.<br>• Monitoring information is captured in a timely manner.<br>• System configuration parameters are properly calibrated to tune database design for optimum performance and meet client/user requirements.<br>• System down time is minimized. | • Knowledge of monitoring methodologies.<br>• Ability to evaluate plan for completeness and congruency.<br>• Knowledge of database principles, performance factors, monitoring tools and tuning procedures.<br>• Knowledge of production resources and company production processes.<br>• Knowledge of database software performance and availability.<br>• Knowledge of business requirements. | • Ability to create detailed supporting documents.<br>• Ability to evaluate alternative solutions.<br>• Ability to formulate plan of action.<br>• Ability to create data gathering processes.<br>• Ability to judge system effectiveness and efficiency.<br>• Ability to evaluate impact of resource distribution.<br>• |
| **C2 Analyze monitoring data** | • Problem criticality is relevant to business requirements and properly documented.<br>• Monitoring data is analyzed completely.<br>• Solutions to problems are clearly identified and implemented in a timely manner with minimal disruption to productivity.<br>• Database performance meets design specifications and client/user requirements.<br>• Continuous efforts are made to identify and address problems before they become critical.<br>• Error, performance and availability metrics are accurately documented and demonstrate a trend of improvements. | • Ability to identify solutions to technical and application problems.<br>• Knowledge of database software and ability to understand impact of problem on overall database performance.<br>• Knowledge of productivity factors.<br>• Knowledge of solution implementation planning procedures.<br>• Knowledge of monitoring and tuning processes and procedures.<br>• Knowledge of quality assurance methods and practices. | • Ability to analyze data.<br>• Ability to document analysis in appropriate detail.<br>• Ability to demonstrate innovative thinking and resourcefulness in solving problems. |

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| **C3 Manage backup and recovery both on-site and off-site** | • Backup and recovery plans are identified and agreed upon by technical support group and user.<br>• Backup and recovery plans are documented completely and accurately, and include both on-site and off-site storage.<br>• Backup procedures are implemented on a regular schedule and according to plan.<br>• Recovery plan meets client/user needs.<br>• Unforeseen outages and data loss are effectively resolved.<br>• Production environment is supported to minimize system down time and ensure system availability. | • Knowledge of backup and recovery procedures.<br>• Ability to identify user needs for backup and recovery.<br>• Knowledge of testing tools and procedures and productivity factors.<br>• Knowledge of database software and operating systems.<br>• Knowledge of resources required to implement backup and recovery plans. | • Ability to analyze information to solve problems.<br>• Ability to systematically organize information.<br>• Ability to evaluate criticality of problems, identify possible causes and propose solutions.<br>• Ability to communicate effectively with clients/users.<br>• Ability to evaluate impact of resource distribution.<br>• |
| **C4 Create and implement maintenance plan for regular integrity checks** | • Maintenance plan documents procedures for updates and upgrades.<br>• Database integrity is checked according to plan and corrected when needed.<br>• Production environment is supported to minimize system down time and ensure system availability.<br>• Criteria for determining integrity problems are agreed upon with design and user groups, and are accurately and completely documented. | • Knowledge of maintenance tools and processes.<br>• Knowledge of fault detection and resolution processes.<br>• Ability to translate client/user needs into maintenance requirements.<br>• Knowledge of resources required to implement regular integrity checks. | • Ability to devise and implement plan of action.<br>• Ability to create plan to monitor and correct system.<br>• Ability to evaluate impact of resource distribution. |
| **C5 Maintain physical organization of database objects** | • Database performs efficiently with no unacceptable lags in response.<br>• Fragmentation of database is addressed in a timely manner.<br>• Integrity errors are measured, documented and demonstrate a trend of improvement.<br>• Plan for the detection of integrity problems is congruent with project scope and resources.<br>• Database organization is updated and corrected according to technical specifications, user input and business priorities/requirements. | • Knowledge of how to query and report system objects.<br>• Knowledge of system model.<br>• Knowledge of database software. | • Ability to devise/implement plan of action.<br>• Ability to visually analyze relationship between parts/whole, process/procedure.<br>• Ability to analyze client/user needs and evaluate effectiveness of solutions. |

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| **C6 Apply software upgrades and fixes** | • Software upgrades are applied in a timely manner.<br>• System operation is restored with no unintended consequences.<br>• Software upgrades are based on tangible benefits to clients and business.<br>• Software upgrades are applied with minimal disruptions to clients/users and service. | • Knowledge of system models.<br>• Knowledge of impacts of upgrades.<br>• Knowledge of database software.<br>• Knowledge of operating systems and system administration. | • Ability to integrate systems technology.<br>• Ability to analyze operational problems and recommend solutions.<br>• Ability to predict technological results.<br>• Ability to adapt rules/principles to new applications.<br>• Ability to formulate new approaches and generate unique solutions |
| **C7 Plan and manage physical resource requirements** | • Resource requirements are accurately and completely defined.<br>• Resource utilization is optimized and meets software, client and business needs.<br>• Access issues are properly addressed.<br>• Risk analysis is properly applied.<br>• Trends of resource requirements are correctly measured, utilized and documented. | • Knowledge of resource constraints and capacities.<br>• Knowledge of resource acquisition.<br>• Knowledge of system hardware, network and operating systems.<br>• Knowledge of database software. | • Ability to determine variables and constraints.<br>• Ability to monitor safe and efficient use of materials.<br>• Ability to coordinate acquisition, storage and distribution.<br>• Ability to responsibly challenge existing policies. |
| **C8 Administer and enforce standards** | • Standards are identified and agreed to by applications design groups.<br>• Standards are clearly documented and readily accessible.<br>• Database is monitored to check that production applications meet standards.<br>• Clients and users are educated regarding the standards.<br>• Process, procedures and environment configuration comply with standards.<br>• Automated controls are used whenever possible. | • Ability to monitor database.<br>• Knowledge of requirements and parameters.<br>• Knowledge of how to develop standards.<br>• Knowledge of evolving industry standards. | • Ability to evaluate system performance and diagnose performance deviations.<br>• Ability to distinguish between facts and inferences, and analyze underlying issues to resolve technical issues.<br>• Ability to create detailed supporting documents.<br>• Ability to analyze and integrate information.<br>• Ability to responsibly challenge existing policies. |

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| **C9 Audit database systems** | • Audits are properly performed.<br>• Audits result in increased compliance with standards.<br>• Audits are properly documented.<br>• Results of audits are reported to appropriate personnel. | • Knowledge of database audit procedures.<br>• Knowledge of audit reporting procedures.<br>• Knowledge of performance standards. | • Ability to adhere to standards and demonstrate commitment to excellence.<br>• Ability to recommend ethical course of action.<br>• Ability to create detailed supporting documents.<br>• Ability to use appropriate principles and previous training to predict outcomes. |

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## DATABASE ADMNISTRATION AND DEVELOPMENT

***Critical Work Function: Perform Security Administration***

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| **D1 Gather and document security requirements** | • Security requirements are derived from system specifications.<br>• Security concerns of all participants have been addressed.<br>• Proposed security requirements are complete.<br>• Security requirements are documented, and have been reviewed and approved by appropriate authorities.<br>• Potential security risks are identified and resolved. | • Knowledge of security system tools.<br>• Ability to identify and resolve potential security conflicts.<br>• Knowledge of security issues.<br>• Knowledge of database software. | • Ability to create detailed supporting documents.<br>• Ability to synthesize information.<br>• Ability to apply principles to procedures and use logic to draw conclusions.<br>• Ability to encourage cooperation and negotiation among all participants.<br>• Ability to follow organizational processes and procedures. |
| **D2 Design and document security plan** | • Strategies are thoroughly reviewed and analyzed.<br>• Security design and features are selected to meet client, user and business needs.<br>• Security plan is developed and documented completely and accurately.<br>• Security plan is accessible. | • Knowledge of security strategies.<br>• Ability to select security design.<br>• Knowledge of client, user and business needs.<br>• Knowledge of security plan documentation procedures.<br>• Ability to relate requirements to user privileges. | • Ability to identify and resolve conflicting data.<br>• Ability to analyze information and formulate proposals.<br>• Ability to write detailed supporting documents. |

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| **D3 Implement and enforce security requirements** | • Levels of access and security are clearly identified, standardized and communicated.<br>• Overall plan is considered when implementing and enforcing security requirements.<br>• Implementation of security measures minimizes unauthorized access and addresses security tradeoffs and risks.<br>• Users are notified about changes in their security access in accordance with company procedures.<br>• Accounts are properly audited to determine that security requirements are being met.<br>• Security breaches are accurately identified and communicated effectively to appropriate personnel. | • Knowledge of database security procedures and implementation.<br>• Ability to collect security breach details and communicate to appropriate personnel.<br>• Knowledge of network and operating systems.<br>• | • Ability to present practical alternatives.<br>• Ability to responsibly challenge unethical practices/decisions.<br>• Ability to write detailed supporting documents.<br>• Ability to analyze and respond to client/user needs.<br>• Ability to present security tradeoffs and risks and pose critical questions. |
| **D4 Maintain and improve security in response to industry developments and user** | • User input and practices are analyzed and documented to assess security issues.<br>• Training results in continuous improvement in security awareness.<br>• Security needs are forecast and incorporated in recommendations for system upgrades and/or redesign.<br>• Industry and technology trends are continually monitored and incorporated to support system security. | • Knowledge of business, industry and technology security trends.<br>• Ability to use forecasting methods and tools.<br>• Ability to gather user input and observe user practices.<br>• Knowledge of instructional design principles.<br>• Ability to provide technical training on security procedures. | • Ability to analyze and respond to client/user needs.<br>• Ability to identify issues and resolve technical conflicts.<br>• Ability to organize and present technical information to non-technical users.<br>• Ability to monitor and interpret trends in technology and industry. |

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## DATABASE ADMNISTRATION AND DEVELOPMENT

***Critical Work Function: Provide Client Services***

| KEY ACTIVITY | PERFORMANCE INDICATORS<br>*How do we know when the key activity is performed well?* | TECHNICAL KNOWLEDGE<br>*Skills, Abilities, Tools* | EMPLOYABILITY SKILLS<br>*SCANS Skills and Foundation Abilities* |
|---|---|---|---|
| **E1 Provide and support development environments** | • Guidelines for database application development are identified and application of methodology and modeling techniques are effectively communicated.<br>• Support to client/user is delivered effectively and efficiently.<br>• Changes in the data model are transparent to users.<br>• Solutions that improve functionality/performance are effectively proposed and implemented.<br>• Changes in the database environment are thoroughly tested against user specifications.<br>• Changes in the database are implemented with minimal adverse impact to developers. | • Knowledge of database applications, software, operations and limitations.<br>• Knowledge of user applications and ability to assess user impact.<br>• Ability to define and solve application problems.<br>• Knowledge of change documentation procedures. | • Ability to organize and analyze data.<br>• Ability to work with and demonstrate commitment to the client/user.<br>• Ability to understand goals and constraints, generate alternatives, consider risks and evaluate options. |
| **E2 Plan user training** | • Training is designed to meet user needs.<br>• User skill levels are identified and assessed.<br>• Training materials are developed to meet user specifications. | • Knowledge of user training process.<br>• Knowledge of user level of expertise.<br>• Knowledge of instructional design principles.<br>• Knowledge of database, presentation and word processing software. | • Ability to assess performance of others and provide constructive feedback and reinforcement.<br>• Ability to work cooperatively with others and contribute ideas, suggestions and assistance.<br>• Ability to analyze and respond to client/user needs.<br>• Ability to extract information and use logic to draw conclusions.<br>• Ability to assess user learning needs and plan user training. |

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| **E3 Deliver user training** | • User training sessions are scheduled and conducted according to client/user plan.<br>• Training sessions are presented in a clear, concise and user-friendly manner.<br>• Feedback is gathered to determine additional training and support needs. | • Knowledge of user training process.<br>• Knowledge of user level of expertise.<br>• Knowledge of instructional design principles.<br>• Knowledge of database, presentation and word processing software. | • Ability to help others learn and apply concepts.<br>• Ability to assess performance of others and provide them with constructive feedback and reinforcement.<br>• Ability to work cooperatively with others and contribute ideas, suggestions and assistance.<br>• Ability to assess user learning needs and conduct user training. |
| **E4 Identify additional requirements** | • Additional requirements meet evolving user needs.<br>• New requirements are documented and compared to current specifications.<br>• Access and security trends are assessed and accommodated.<br>• New transactional needs are identified and incorporated.<br>• Requirements are continuously analyzed and appropriate recommendations are made. | • Ability to translate client/user needs into technical requirements.<br>• Knowledge of data-gathering methods.<br>• Knowledge of user community, needs and skill levels.<br>• Knowledge of requirements analysis. | • Ability to clarify, interpret and influence communication.<br>• Ability to identify and resolve conflicts in data and requirements.<br>• Ability to use logic to draw conclusions from available information.<br>• Ability to compare multiple viewpoints and negotiate changes.<br>• Ability to present complex information regarding changes in models. |
| **E5 Adapt existing structure to new business environments** | • Current database structure is assessed for its ability to support changes.<br>• Upgrade schedules are analyzed and forecast.<br>• Client services and vendor reviews are continually evaluated and updated.<br>• Cost/benefit, ROI and risk analysis are conducted to support recommendations | • Knowledge of business structure, policies and procedures.<br>• Ability to use forecasting tools and methods.<br>• Ability to identify trends and relate them to current system.<br>• Ability to present technical recommendations in a user-friendly manner | • Ability to predict technological impacts and results.<br>• Ability to analyze and assess technical information from a variety of sources.<br>• Ability to generate and evaluate solutions.<br>• Ability to relate intent to desired results. |