



MICROSOFT TECHNOLOGY ASSOCIATE

Student Study Guide

EXAM 98-364

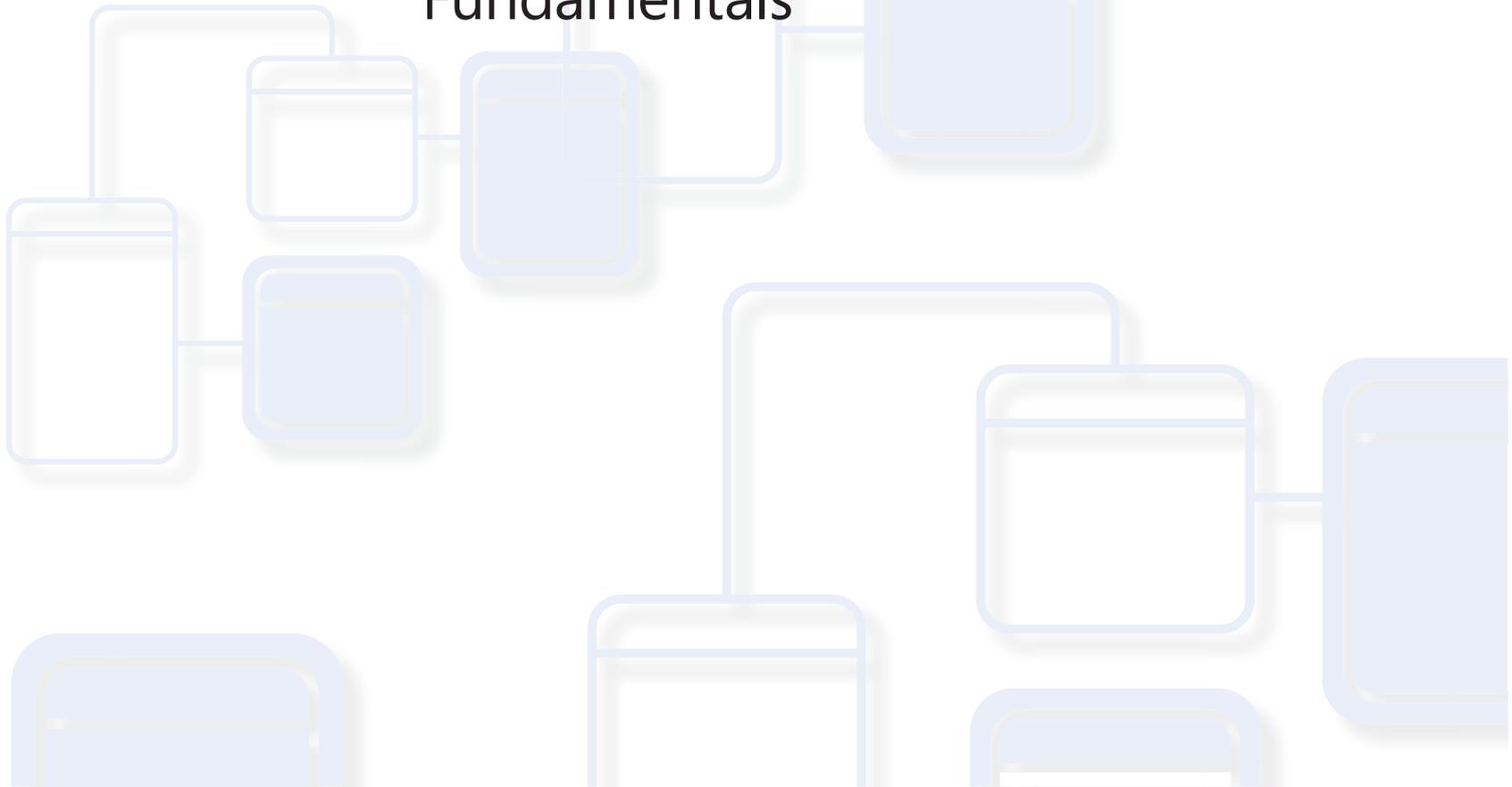
Database Administration Fundamentals



Preparing for MTA Certification

**MICROSOFT TECHNOLOGY ASSOCIATE (MTA)
STUDENT STUDY GUIDE FOR DEVELOPERS**

98-364 Database Administration Fundamentals



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Introduction



MTA validates building-block technology concepts and helps students explore, discover and pursue successful careers in Information Technology (IT) in an exciting and rewarding way! As the first step in the Microsoft® Technology Certification Series, this new, entry-level certification provides students with confidence, credibility, and differentiation.

Explore IT career options without committing a lot of time and resources MTA exams validate the core technology knowledge that is in demand today by businesses around the world. Whether you want to explore becoming a network administrator, software engineer, web developer, or database analyst, MTA gets you started on the right path.

Prepare to compete A little investment in IT can go a long way in today's job market. Becoming MTA certified helps you build a solid foundation to prepare for intermediate technology studies and for Microsoft Certified Technology Specialist (MCTS) certifications. It can also help you compete on college admissions and jumpstart your IT career planning!

Empower yourself As the first step toward becoming an MCTS, MTA shows your commitment to technology while connecting you with a community of more than five million Microsoft Certified Professionals. Learn from them and show them what you know by becoming MTA certified!

This MTA Student Study Guide serves as a study tool to help students prepare for their MTA certification exam. Students are challenged with real-life situations for each of the major topics covered in the exam. Although successful completion of the study guide exercises does not guarantee that you will pass your MTA exam, it is an excellent way to gauge your readiness to take the exam and build confidence that you know your stuff on exam day.

I wish you all the best as you prepare for a successful career in technology!

Victoria Pohto

Victoria Pohto
MTA Product Marketing Manager

Career Planning

Most IT solutions or infrastructure built on Microsoft technologies require proficiency with one or all of the following products, often referred to as “The Microsoft Stack.”

- Microsoft Windows Server® as the data center or development platform
- Microsoft SQL Server® as the data and business intelligence (BI) platform
- Microsoft Visual Studio® as the suite of application life-cycle management tools

MTA is the starting point of Microsoft® technology certifications, providing aspiring technologists with the fundamental knowledge essential to succeed with continued studies and a successful career with technology.

Preparing for and becoming MTA certified helps you explore a variety of career paths in technology without investing a lot of time and money in a specialized career path. When you find a path that is right for you, Microsoft learning products and certification can help you prepare and guide your longer-term career planning.

If you already know that you want to start building a career in technology, MTA preparation and certification is the recommended entry point. Becoming MTA certified shows that you have a firm working

knowledge of the fundamental IT concepts critical for success with intermediate learning and certifications such as Microsoft Certified Technology Specialist (MCTS). Moreover, Microsoft certifications demonstrate an individual’s commitment of self-investment and confidence to take his or her knowledge and skills to the next level with an industry-recognized credential.

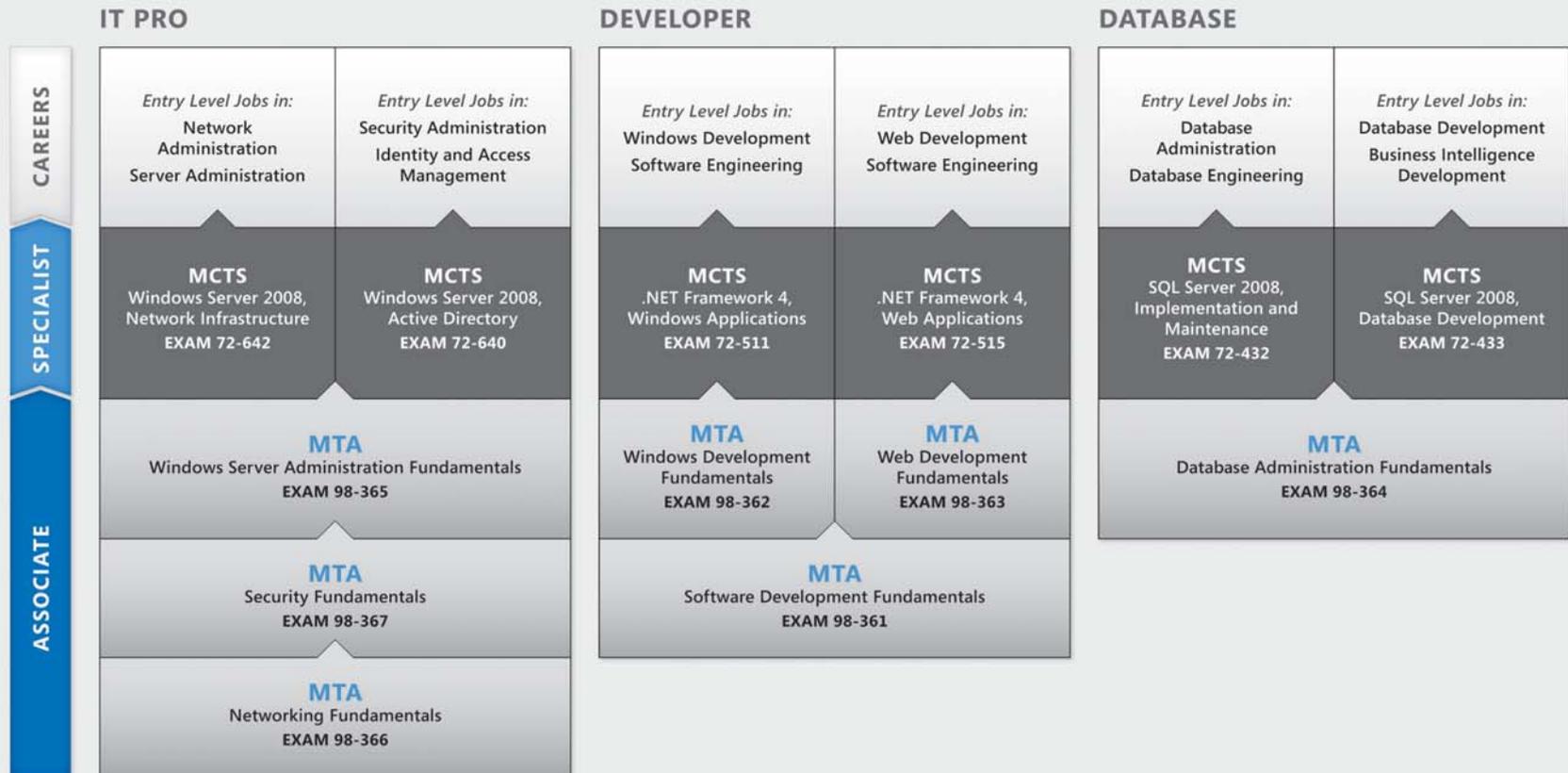
MTA is not a “career certification,” meaning that employers recognize you as “job ready,” but it is the first step toward that career goal and can help differentiate you for an internship or to college admissions committees. As you prepare for your first job focusing on technology, be sure that you are equipped with an MCTS credential—the intermediate level certification that validates Microsoft product and technology skills.

The MTA Certification path on the next page shows you the MTA exams that are recommended prior to taking on some of Microsoft’s intermediate technology certification, MCTS.



Microsoft Technology Associate Certification Paths

MTA is the recommended first step in the Microsoft IT Certification Program, and does not require pre-requisite exams. MTA certifications are not a pre-requisite for MCTS exams. *One MTA exam = One certification.*



For full Microsoft Certification roadmaps, visit <http://www.microsoft.com/learning/certification>

Exploring Job Roles

Choosing a career path is a big decision and it's not always easy, but you're not alone! Microsoft created a career site to help students understand the options and possibilities of pursuing a career in IT. The site also connects you with learning resources, student techie communities, and much more to help you prepare for a career in technology.

To chart your career with Microsoft® technology, visit www.microsoft.com/learning/career/en/us/career-org-charts.aspx.

Database Administrator



As a database administrator, you are in charge of important databases that span multiple platforms and environments. You are a strong team player who thrives in a fast-paced environment. You build complex, highly scalable databases that meet business needs and security requirements. You are an expert in optimizing, maintaining, and troubleshooting databases, but also in designing archival, data distribution, and high-availability solutions.

Server Administrator



As a server administrator, you are in charge of implementing and managing some of the most important technology in your organization—the servers. You use extensive monitoring and profiling tools to manage the network and tune systems so they perform at optimal levels. You are an expert in Active Directory®, and you have an in-depth understanding of network protocols, and file and directory security.

Computer Support Technician



Consider starting your IT career by becoming a consumer support technician. You don't need any formal work experience, but a company might require that you know how to install, administer, and troubleshoot operating systems in a home network environment that has desktop computers, laptops, and printers. As a consumer support technician, you'll also handle network, virus, malicious software, and hardware support issues. You'll typically find this position in small to medium-sized organizations.

Exploring Job Roles

Web Developer



As a web developer, you are an expert in using the dynamic programming tools and languages that fuel the web. You might work independently or be part of a team that builds and integrates interactive web sites, applications, and services for both internal and public sites. Your role is to make it work, which means developing web applications and testing them on various browsers, enhancing and modifying them as necessary to ensure the best experience for the user. As a web developer, you might also architect websites, design data-driven applications, and find efficient client-server solutions. You must have an in-depth understanding of the software development life cycle and be able to communicate project status, issues, and resolutions.

Windows Developer



As a Windows client developer, knowing how to optimize Windows code and track bugs is a given. But you also know how to use Microsoft Visual Studio® and the Microsoft .NET framework to design, develop, test, and deploy Windows®-based applications that run on both corporate servers and desktop computers. Your key talents include understanding multiple Windows application models

and n-tier applications, and knowing how to work with object-oriented programming, algorithms, data structures, and multithreading. Windows developers have an in-depth understanding of software engineering principles, software life cycles, and security principles.

Additional Online Resources for New Developers:

<http://msdn.microsoft.com/beginner>

<http://msdn.microsoft.com/rampup>

Imagine Cup



The Imagine Cup is the world's premier student technology competition where students from around the world can learn new skills, make new friends, and change the world. Competitions include Software Design, Embedded Development, Game Design, Digital Media and Windows Phone 7. The brightest young minds harness the power of technology to take on the world's toughest problems.

www.imaginecup.com

Value of Certification



Technology plays a role in virtually everything we do. In the 20-plus years since Microsoft® has been certifying people on its products and technologies, millions of people have gained the knowledge, expertise, and credentials to enhance their careers, optimize business solutions, and create innovation within just about every business and social sector imaginable. Today's Information Technology (IT) hiring managers are more often using professional credentials, such as Microsoft certification, to identify properly skilled IT candidates. Certification becomes a way to easily differentiate qualified candidates in a sea of resumes.

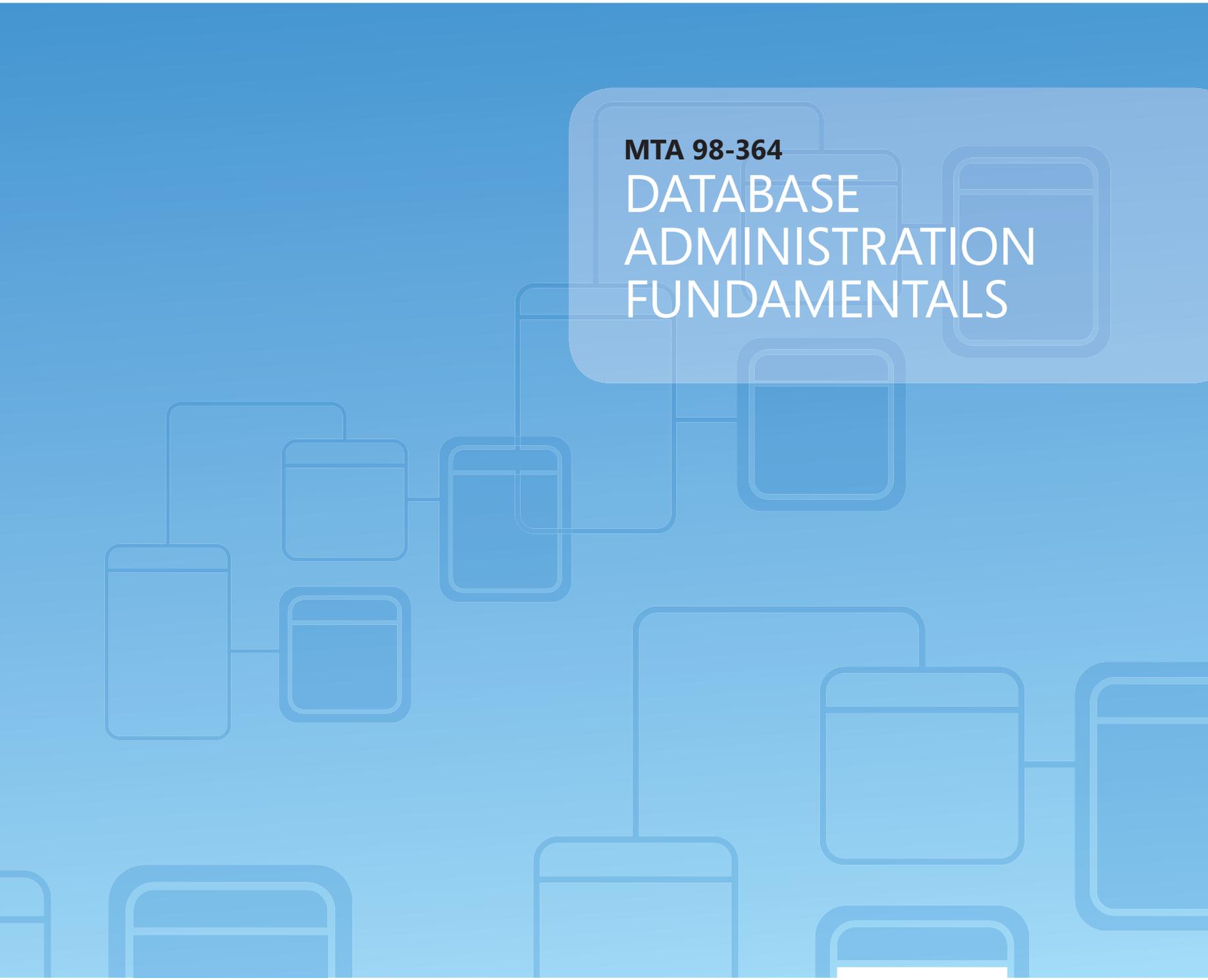
The job outlook for IT professionals, as reported in a study prepared by the U.S. Department of Labor's Bureau of Labor Statistics (BLS), is positive! The BLS indicates an increase that will be "faster than the average for all occupations through 2014" for Computer Support Specialists, Systems Engineers, Database Administrators, and Computer Software Engineers. One significant message resulting from this study is that information and communications

technology (ICT) skills are the entry ticket to the job market, regardless of the country, industry, or job function. Information Technology is clearly an area worth investing time, resources, and education in – and technology certification is a key part of the education process, validating product and technology expertise as a result of their learning experiences.

Microsoft IT Certifications provide objective validation of the ability to perform critical IT functions successfully for worldwide IT professionals, developers, and information workers. Microsoft certifications represent a rich and varied spectrum of knowledge, job roles, and responsibilities. Further, earning a specific certification provides objective validation of the candidate's ability to perform critical IT functions successfully. Embraced by industry professionals worldwide, Microsoft certification remains one of the most effective ways to help reach long-term career goals.

MTA 98-364

DATABASE ADMINISTRATION FUNDAMENTALS



1

Understanding Core Database Concepts

IN THIS CHAPTER

- 1.1 Understand how data is stored in tables
- 1.2 Understand relational database concepts
- 1.3 Understand data manipulation language (DML)
- 1.4 Understand data definition language (DDL)



Understand how data is stored in tables

SCENARIO: High-school student Rajesh M. Patel works part-time in his dad's cycle shop in Pune, India. Pune was the first city in India to have dedicated lanes for cycles.

Raj's dad currently keeps track of his inventory using pencil and paper. Ordering parts and accessories or counting inventory takes several days. Raj is taking a database management class in school and he realizes that his dad's business could benefit greatly by implementing a database management system.

Raj needs to review a few basic concepts before he starts, and has made a list of topics he knows will be important in the first steps of the project.

- 1. Identify tables that Raj might create for the database.**
 - a. a parts table, a cycle table, and an accessories table
 - b. one table for all parts, cycles, and accessories
 - c. a table for each part, each cycle, and each type of accessory (a helmet table, a biking glove table, and so on)
- 2. Identify the fields that Raj should use for column headings of the parts table.**
 - a. part number, part name, cycle number, and cycle name
 - b. part number and quantity sold
 - c. part number, part name, quantity, color, and cycle identifier
- 3. What is the name of the data located at the intersection of a row and column?**
 - a. field
 - b. record
 - c. variable

hint

Think of a database table as an Excel® spreadsheet that contains rows and columns. The data in one table may need to reference data in another.

Answers

1. Raj will need these tables:
 - a. **a parts table, a cycle table, and an accessories table**
2. Raj should use these fields for the column headings of the parts table:
 - c. **part number, part name, quantity, color, and cycle number**
3. The name of the data located at the intersection of a row and column is:
 - a. **field**

Essential details

- A **field** is a location in a record in which a particular type of data is stored.
- A **column** is an attribute for a row or record.
- A **row** is a record within a table.
- A **table** is a database object consisting of rows and columns.
- A **record** is a data structure that is a collection of fields (elements), each with its own name and type that appear in a table as group of fields across one row.

FAST TRACK HELP

- [http://msdn.microsoft.com/en-us/library/aa174501\(SQL.80\).aspx](http://msdn.microsoft.com/en-us/library/aa174501(SQL.80).aspx)
- <http://msdn.microsoft.com/en-us/library/ms189104.aspx>



Understand relational database concepts

SCENARIO: The next step for Raj in the design of the database to streamline his father's cycle business is to determine the most useful relationships between the tables. He knows that he needs to create a relational database because it will be important to conduct searches by using data in one table to find additional data in another table. Figuring out a design that best meets the needs of the cycle shop is a critical step. While reviewing his current business requirements, he realizes that he needs to add another table to include the suppliers of the parts for the cycles. This new table requires Raj to update the parts table to include a foreign key to the supplier table.

1. **What is the relationship between the supplier table and the parts table?**
 - a. one-to-one
 - b. one-to-many
 - c. many-to-many
2. **What is a good foreign key for the relationship between the cycle table and the parts table?**
 - a. part number
 - b. cycle model number
 - c. part name
3. **What is a suggested primary key for the accessory table?**
 - a. accessory number
 - b. accessory name
 - c. accessory model

hint

The primary key must be a value that is unique to each record in the table.

Answers

1. The relationship between the supplier table and the parts table is:
 - a. **one-to-many**. Every supplier provides one-to-many parts.
2. A good foreign key for the relationship between the cycle table and the parts table is:
 - a. **part number**. Each cycle will have many unique parts.
3. A primary key for the accessory table is:
 - a. **accessory number**. Many accessories might have the same name and model.

Essential details

- Most modern database management systems implement a **relational model** in which the data is organized in relations (tables).
- A **one-to-one relationship** is an association between two tables in which the primary key value of each record in the primary table corresponds to the value in the matching field of one, and only one, record in the related table.
- A **many-to-many relationship** is a complex association between two sets of parameters in which many parameters of each set can relate to many others in the second set.
- A **parent/child relationship** is a relationship between nodes in a tree data structure in which the parent is one step closer to the root (that is, one level higher) than the child.
- **Primary Keys** are unique data identifiers.

FAST TRACK HELP

- [http://msdn.microsoft.com/en-us/library/aa174501\(SQL.80\).aspx](http://msdn.microsoft.com/en-us/library/aa174501(SQL.80).aspx)
- <http://www.asp.net/sql-server/videos/designing-relational-database-tables>
- [http://msdn.microsoft.com/en-us/library/aa224764\(SQL.80\).aspx](http://msdn.microsoft.com/en-us/library/aa224764(SQL.80).aspx)



Understand data manipulation language (DML)

SCENARIO: Raj has the cycle database setup for his dad's cycle shop in India. The next step is to work with his dad to learn what operations he will need to perform with the database. These are called **user requirements**. His dad needs the new application to perform these initial tasks (other requirements will be defined later):

- Create various inventory reports
- Produce sales reports (by cycle model, price, and so on)
- Add new inventory to the system when it arrives
- Change the cost of cycles and parts as necessary
- Remove cycles from the database when they are sold

1. What DML (data manipulation language) command must be used to indicate that a cycle was sold and should be removed from the Cycle table?

- a. `DELETE FROM Cycle WHERE cycle_id = T1234`
- b. `REMOVE FROM Cycle WHERE cycle_id = T1234`
- c. `ERASE FROM Cycle WHERE cycle_id = T1234`

2. What command is used to report on the current on-hand quantities of red cycles?

- a. `SELECT cycle_model WHERE cycle_color = 'red'`
- b. `SELECT * FROM Cycle WHERE cycle_color = 'red'`
- c. `FIND * FROM Cycle WHERE cycle_color = 'red'`

3. How is a new cycle added to the Cycle table in the database?

- a. `INSERT INTO Cycle (C3425, 'Rockrider', 'red', 9999.00)`
- b. `ADD INTO Cycle VALUES (C3425, 'Rockrider', 'red', 9999.00)`
- c. `INSERT INTO Cycle VALUES (C3425, 'Rockrider', 'red', 9999.00)`

hint

Be very careful when using the `DELETE` command; it is easy to accidentally delete all rows in a table. Use a `WHERE` clause unless you want the table erased.

Answers

1. The DML (data manipulation language) command used to indicate that a cycle was sold and should be removed from the Cycle table is:
 - a. `DELETE FROM Cycle WHERE cycle _ number = T1234`
2. The command used to report on the current on-hand quantities of red cycles is:
 - b. `SELECT * FROM Cycle WHERE cycle _ color = 'red'`
3. A new cycle is added to the Cycle table in the database with:
 - c. `INSERT INTO Cycle VALUES (C3425, 'Rockrider', 'red', 9999.00)`

Essential details

- Structured query language (**SQL**) is a relational database language used in querying, updating, and managing relational databases and is the de facto standard for database products.
- Data manipulation language (**DML**) is used to insert, update, and delete data and to query a database.
- Data definition language (**DDL**) is used to create, modify, or drop relational databases, entities, attributes, and other objects (e.g. views).

FAST TRACK HELP

- <http://msdn.microsoft.com/en-us/library/ms191524.aspx>
- [http://msdn.microsoft.com/en-us/library/dd787894\(BTS.10\).aspx](http://msdn.microsoft.com/en-us/library/dd787894(BTS.10).aspx)
- <http://msdn.microsoft.com/en-us/rampup/ee832799.aspx>



Understand data definition language (DDL)

SCENARIO: Raj is making excellent progress automating his dad's cycle shop. He has reduced the amount of paperwork and provided more accurate information for his dad to maintain the current inventory.

As a result of the automation, his dad has decided that he wants to use a website to advertise and sell cycles. Raj is in charge of the next phase of this exciting change to the cycle shop business.

Raj immediately realizes that the current database schema needs to be changed. If they are going to allow users to buy from the internet, he needs to have photos of all their products, including cycles, accessories, and parts.

1. Which DDL command can Raj use to add a new field to the Cycle table to store the filename of the photo?

- a. ALTER TABLE Cycle ADD photo_file_name CHAR (30) NULL
- b. ADD photo_file_name TO TABLE Cycle
- c. ALTER Cycle TABLE USING photo_file_name CHAR(30) NULL

2. In the example in the previous question, what effect does the word NULL have when adding a new cycle to the table?

- a. requires the user to enter a filename for the photo
- b. does not require the user to enter a filename for the photo
- c. automatically enters a filename for the photo

3. What is the main difference between the DML command DELETE and the DDL command DROP?

- a. They accomplish the same task; therefore, there is no difference
- b. DELETE removes all (or a subset of) records from the table only; it does not remove the table
- c. DROP removes all records from the table only; it does not remove the table

hint

The ALTER command can be used to add new fields or change the format of existing fields. Example: CHAR(20) to VARCHAR(35).

Answers

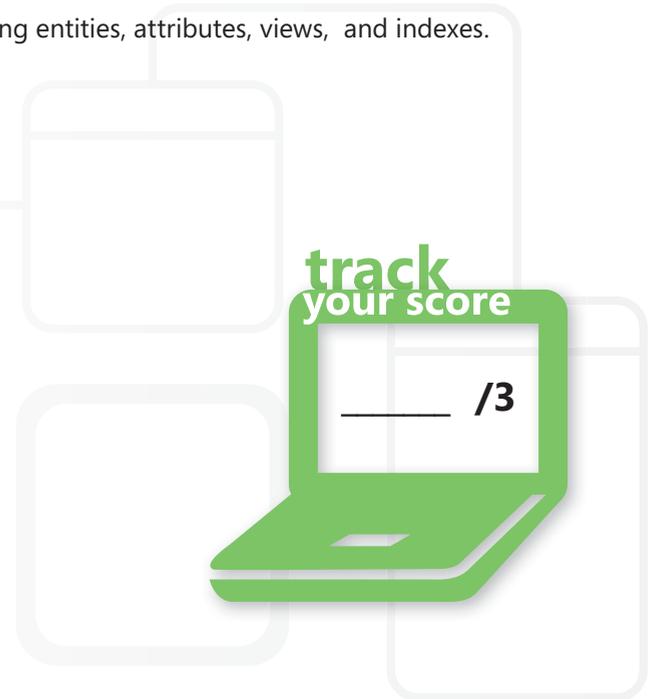
1. Raj can add a new field to the Cycle table to hold the file name of the photo with:
 - a. `ALTER TABLE Cycle ADD photo _ file _ name CHAR (30) NULL`
2. When adding a new cycle to the table, the word `NULL`:
 - b. **does not require the user to enter a file name for the photo**
3. The main difference between the DML command `DELETE` and the DDL command `DROP` is:
 - b. **`DELETE` removes all (or a subset of) records from the table only; it does not remove the table**

Essential details

- A **schema** is a description of a database to a database management system (DBMS) in the language provided by the DBMS.
- Data definition language (**DDL**) defines database objects including entities, attributes, views, and indexes.
- **CREATE** adds databases or objects.
- **ALTER** changes databases or objects.
- **DROP** removes databases or objects.

FAST TRACK HELP

- <http://msdn.microsoft.com/en-us/library/ms175941.aspx>
- <http://support.microsoft.com/kb/180841>
- <http://msdn.microsoft.com/en-us/library/ms734677.aspx>



2

Creating Database Objects

IN THIS CHAPTER

- 2.1 Choose data types
- 2.2 Understand tables and how to create them
- 2.3A Create views T-SQL
- 2.3B Create views using a graphical designer
- 2.4 Create stored procedures and functions



Choose data types

SCENARIO: Yuhong Li's son, Yan, is taking a programming course in school and he asked her advice on selecting a project for class. Yuhong suggests that Yan create a program to help organize her CD collection that she has accumulated over the years.

Yan likes the idea. He can create a database table to store all of data related to his mother's collection and use C# or Visual Basic to create a user interface to search, add, and delete information from the table.

Yan knows that defining the table fields is very important and selecting the right data type for each field is critical.

- 1. What data type should Yan use to store the CD label name?**
 - a. char or variable char
 - b. name
 - c. integer
- 2. What data type should he use to store the number of tracks on each CD?**
 - a. real number
 - b. integer
 - c. char
- 3. What data type should Yan use to store the duration of the song in total seconds?**
 - a. byte
 - b. integer
 - c. Boolean

hint

To avoid performance degradation, always use the smallest data type that matches the data to be stored.

Answers

1. To store the CD label name Yan should use:
 - a. **char or variable char**
2. To store the number of tracks on each CD Yan should use:
 - b. **integer.** You can't have a decimal portion of a song, and the value may be used in a math calculation such as total tracks on all albums.
3. To store the duration of the song Yan should use:
 - b. **integer.** The duration can be saved as total seconds and the application can change it back to minutes and seconds if needed.

Essential details

- **Data types** specify the possible range of values of the set, the operations that can be performed on the values, and the way in which the values are stored in memory.
- **Integer** data types store whole numbers.
- **Floating-point** data types store any real numbers.
- **Character** stores A-Z or 0-9—any digit or letter that math functions will not be applied to.
- **Boolean** stores 1 or 0, true or false.

FAST TRACK HELP

- <http://msdn.microsoft.com/en-us/beginner/ff715351.aspx>
- [http://msdn.microsoft.com/en-us/library/aa258271\(SQL.80\).aspx](http://msdn.microsoft.com/en-us/library/aa258271(SQL.80).aspx)
- [http://msdn.microsoft.com/en-us/library/aa716185\(VS.60\).aspx](http://msdn.microsoft.com/en-us/library/aa716185(VS.60).aspx)



Understand tables and how to create them

SCENARIO: Yan has gathered together all of the CDs in his mother's collection – she has more than he imagined! He has identified the data fields he needs in his database table and the best data type for each piece of data, so he is ready to create the database tables. Yan plans to set up the table using proper ANSI SQL syntax and wants to brush up on the details before he begins.

- 1. Proper ANSI SQL syntax refers to a set of rules that:**
 - a. decide if a field can contain a blank value or not
 - b. determine the size of all the data fields
 - c. govern the structure and content of statements
- 2. Which SQL command is used to add a new table?**
 - a. CREATE TABLE table_name (column_name data type null/not null, column_name data type null/not null, and so on)
 - b. ADD TABLE table_name (column_name data type null/not null, column_name data type null/not null, and so on)
 - c. INSERT TABLE table_name (column_name data type null/not null, column_name data type null/not null, and so on)
- 3. Based on the information Yan has gathered, what data field can he use for a unique key to access the data in the table?**
 - a. artist name
 - b. CD label name
 - c. track name

hint

When choosing a key to the table, make sure it is unique among all of the records in your table.

Answers

1. Proper ANSI SQL syntax refers to a set of rules that:
 - c. **govern the structure and content of statements**
2. The SQL command used to add a new table is:
 - a. `CREATE TABLE table _ name (column _ name data type null/not null, column _ name data type null/not null, etc.)`
3. The data field Yan can use for a unique key to access the data in the table is:
 - b. **CD label name**

Essential details

- **ANSI SQL syntax** is the grammar and rules governing the structure and content of statements.
- A **table** is a data structure usually consisting of a list of entries.
- An identifier for a record in a data file that is unique and found in only one record is called a **key**. A Social Security number may serve as a key in an database of employees.

FAST TRACK HELP

- <http://msdn.microsoft.com/en-us/library/ms365315.aspx>
- [http://msdn.microsoft.com/en-us/library/aa258255\(SQL.80\).aspx](http://msdn.microsoft.com/en-us/library/aa258255(SQL.80).aspx)
- [http://msdn.microsoft.com/en-us/library/aa977477\(VS.71\).aspx](http://msdn.microsoft.com/en-us/library/aa977477(VS.71).aspx)



Create views using T-SQL

SCENARIO: Yan is learning about views in his database management class. His instructor explained that there are two approaches to creating views: using a command line language T-SQL (Transact-SQL) or by using a graphical designer.

Yan wants to apply his new learning to the database project he is creating for his mother's CD collection. He has identified the following requirements for his application and will use T-SQL to create views:

- View all CDs sorted in alphabetical order
- Report on all CDs with a certain number of tracks
- Create a list of CDs by artist
- Calculate a count of all CDs

1. What is the best application of views and T-SQL for this project?

- a. create separate views with the information for each request
- b. create a new table for each of requirements in the list
- c. add data to the existing tables when more CDs are purchased

2. Which of the following is an important benefit of using views?

- a. allow the user to access the data in the tables directly
- b. reduce the storage requirements for the application and database
- c. use to represent summation data

3. Which code segment creates a view containing the title, artist, and year for all CDs with more than 10 tracks?

- a. `CREATE VIEW CD_More_than_10 AS SELECT CD_Title, CD_Art-
CD_Year FROM CD_Collection WHERE Tracks > 10`
- b. `CREATE TABLE CD_More_than_10 AS SELECT CD_Title, CD_Artist,
CD_Year FROM CD_Collection WHERE Tracks > 10`
- c. `CREATE VIEW AS CD_More_than_10 FROM CD_Collection WHERE Tracks > 10`

hint

Use views to restrict access. Create a view for an employee to see only his or her payroll information in a table that contains all employees.

Answers

1. The best application of views and T-SQL for this project is to:
 - a. **create separate views with the information for each request**
2. An important benefit of using views is that views:
 - c. **can be used to represent summation data**
3. The following code creates a view containing the title, artist, and year for all CDs with more than 10 tracks:
 - a.

```
CREATE VIEW CD _ More _ than _ 10 AS SELECT CD _ Title, CD _ Artist, CD _ Year
FROM CD _ Collection WHERE Tracks > 10
```

Essential details

- A **view** is a saved query that creates a virtual table from the result set of the query.
- A **query** is a specific set of instructions for extracting/selecting particular data.
- A **graphical designer** is an application, such as Microsoft Access®, that is object-oriented and drag-and-drop driven.
- Transact-SQL (**T-SQL**) is a sophisticated query language with additional features beyond what is defined in the ANSI SQL.

FAST TRACK HELP

- [http://msdn.microsoft.com/en-us/library/aa260642\(v=SQL.80\).aspx](http://msdn.microsoft.com/en-us/library/aa260642(v=SQL.80).aspx)
- <http://msdn.microsoft.com/en-us/library/bb510741.aspx>
- <http://msdn.microsoft.com/en-us/data/ff687144.aspx>



Create views using a graphical designer

SCENARIO: The views that Yan created using T-SQL were very useful for his mother. She can easily identify CDs that are in her collection using lists that can be sorted in a variety of ways. This is so much easier than creating piles of CDs on the living room floor!

Now that Yan has practice in creating views using T-SQL, he wants to create the same queries using a graphical designer. Practice with both approaches will certainly help him in his certification exam.

- 1. How is a graphical designer such as *JetSQL* different from T-SQL?**
 - a. Graphical designers use a command-line interface
 - b. Graphical designers are object-oriented
 - c. Graphical designers are only used for SQL Server databases
- 2. Identify the correct sequence of steps to create a view in *Access*[®] that uses *JetSQL*:**
 - a. Create a query, identify source table(s) and/or query(s), select fields, set criteria, run, and display
 - b. Create a query, identify data fields, select table(s), set criteria, run, and display
 - c. Create a query, identify criteria, select table(s), select fields, run, and display
- 3. What additional criteria must be specified to retrieve all CDs in alphabetical order?**
 - a. ORDER BY
 - b. WHERE
 - c. SELECT

hint

With a graphical designer such as Microsoft Access[®], a query can select fields from tables and from previous queries.

Answers

1. A graphical designer such as *JetSQL* is different from T-SQL in that:
 - b. **graphical designers are object-oriented**
2. The correct sequence of steps to create a view in *Access* is:
 - a. **create a query, identify source table(s) and/or query(s), select fields, set criteria, run, and display**
3. The additional criteria to retrieve all CDs in alphabetical order is:
 - a. **ORDER BY**

Essential details

- A **view** is a saved query creating a virtual table of the result set of that query.
- A **query** is a specific set of instructions for extracting particular data.
- **Graphical designers** include applications such as Microsoft Access, which are object-oriented and drag-and-drop driven.

FAST TRACK HELP

- [http://msdn.microsoft.com/en-us/library/aa196232\(SQL.80\).aspx](http://msdn.microsoft.com/en-us/library/aa196232(SQL.80).aspx)
- [http://msdn.microsoft.com/en-us/library/aa140011\(office.10\).aspx](http://msdn.microsoft.com/en-us/library/aa140011(office.10).aspx)
- <http://msdn.microsoft.com/en-us/library/ms365414.aspx>



Create stored procedures and functions

SCENARIO: After having gone through the process of creating the CD collection database for his mother, Yan realizes that this type of structure can be used for many other inventory databases.

He has discovered that some common functionality is available in predefined SQL functions. By utilizing these built-in, ready-to-use functions, he can increase his productivity and spend his time creating any other necessary user-defined functions. Yan has also learned to distinguish between aggregate and scalar functions.

- 1. What aggregate function can Yan use to calculate the total number of CDs in the CD collection database?**
 - a. SUM(column name)
 - b. COUNT(column name)
 - c. AVG(column name)
- 2. Yan is not quite sure how scalar functions work. Which of the following is a scalar function?**
 - a. FIRST(column name) returns the first field in the specified column
 - b. SUM(column name) returns the total of all values in the column
 - c. UCASE(column name) returns the value of the field in all uppercase letters
- 3. How is a stored procedure invoked?**
 - a. RUN (procedure name, input values)
 - b. EXECUTE (procedure name, input values)
 - c. PERFORM (procedure name, input values)

hint

To enforce data integrity, grant permissions for stored procedures but restrict access to the underlying tables.

Answers

1. The aggregate function Yan can use to calculate the total number of CDs in the CD collection database is:
 - b. `COUNT(column name)`
2. The following example is a scalar function:
 - c. `UCASE(column name)` returns the value of the field in all uppercase letters
3. A stored procedure is invoked with:
 - b. `EXECUTE (procedure name, input values)`

Essential details

- **Functions** are one-word commands that return a single value written in the command set of SQL.
- **Aggregate functions** return a single value, calculated from values in a column.
- **Scalar functions** return a single value, based on the input value of a single field.
- **User-defined functions** are compact segments of user-written SQL code that can accept parameters and return either a value or a table.
- **Stored procedures** are precompiled groups of SQL statements saved to the database.

FAST TRACK HELP

- [http://msdn.microsoft.com/en-us/library/aa258901\(SQL.80\).aspx](http://msdn.microsoft.com/en-us/library/aa258901(SQL.80).aspx)
- <http://msdn.microsoft.com/en-us/library/ms177499.aspx>
- [http://msdn.microsoft.com/en-us/library/aa214363\(SQL.80\).aspx](http://msdn.microsoft.com/en-us/library/aa214363(SQL.80).aspx)



3

Manipulating Data

IN THIS CHAPTER

- 3.1A Select data utilizing SELECT with simple queries
- 3.1B Select data utilizing SELECT with complex queries
- 3.2 Insert data
- 3.3 Update data
- 3.4 Delete data



Select data utilizing SELECT with simple queries

SCENARIO: Katarina Larsson has always been very athletic; she enjoys kayaking, hiking, swimming, cycling, and more. So, Katarina was thrilled when she was hired as an intern in the information systems division of Adventure Works. Katarina is studying database management in college, so this internship is a valuable experience with the benefits of experiencing athletic adventures in Nova Scotia, Canada.

Part of her new position includes writing SQL queries to analyze data about current trends in the recreational activities on the island enjoyed by residents and tourists. Katarina is ready to start creating reports on the following activities:

- hiking
- whale watching
- kayaking
- camping
- golfing

1. Which command would ensure that return visitors are only counted once when running a query against the reservation system?

- SELECT ONLY
- SELECT DISTINCT
- SELECT UNIQUE

2. For some of the reports it will be useful to see the results in alphabetical order. Which command will produce an alphabetical list?

- ORDER BY column_name (either ASC or DESC)
- SORT BY column_name (either ASC or DESC)
- ARRANGE BY column_name (either ASC or DESC)

3. A truth table is helpful in visualizing the results of logical operators. When comparing two fields, which condition *always* results in TRUE?

- the AND operator and only one field = TRUE
- the OR operator and at least one field = TRUE
- the AND operator and at least one field = FALSE

hint

The SELECT statement can retrieve data from one or many tables or views; the result is stored in a result table called result_set.

Answers

1. The command that would ensure that return visitors are only counted once is:
 - a. `SELECT DISTINCT`
2. The command that returns an alphabetical list is:
 - a. `ORDER BY column _ name (either ASC or DESC)`
3. The condition that *always* results in `TRUE` is:
 - b. **the OR operator and at least one field = TRUE**

Essential details

- **SELECT** is the most-used SQL command for selecting the data from the database.
- **DISTINCT** returns only distinct (unique) values.
- **WHERE** specifies which rows to retrieve.
- **ORDER BY** specifies an order in which to return the rows.
- **Boolean logical operators**
 - **AND** displays a record if both the first condition *and* the second condition are true.
 - **OR** displays a record if either the first condition *or* the second conditions are true.
 - **Truth tables** show the relationships of the Boolean logical operators.

FAST TRACK HELP

- [http://msdn.microsoft.com/en-us/library/aa393276\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/aa393276(VS.85).aspx)
- [http://msdn.microsoft.com/en-us/library/aa259187\(SQL.80\).aspx](http://msdn.microsoft.com/en-us/library/aa259187(SQL.80).aspx)
- [http://msdn.microsoft.com/en-us/library/ms691985\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms691985(VS.85).aspx)



Select data utilizing **SELECT** with complex queries

SCENARIO: Nova Scotia is a beautiful location and Katrina is enjoying a variety of outdoor activities in her free time. She loves her new job at Adventure Works because it is challenging and she is learning a great deal!

She is three weeks into her internship and realizes that by applying some complex queries to the recreational trends database she will be able to produce some very enlightening reports. She decides to take some time to review the concepts for subqueries (predicate, scalar, and table), **UNIONS**, **JOINS**, and **INTERSECTS**.

- 1. Which statement best defines a predicate subquery?**
 - a. returns a single value; can be used in **CASE** expressions, **WHERE** clauses, **ORDER BY**, and **SELECT**
 - b. returns a table based on the queries nested in the **FROM** clause
 - c. uses extended logical constructs in the **WHERE** clause using **AND**, **OR**, **LIKE**, **BETWEEN**, **AS**, and **TOP**
- 2. What is the difference between **UNION** and **JOIN**?**
 - a. **UNION** combines the results of two SQL queries when there is the same number of columns and data types; **JOIN** returns rows when there is at least *one* column match.
 - b. **UNION** combines the results of two SQL queries when there is at least *one* column match; **JOIN** returns rows when there is the same number of columns and data types.
 - c. **UNION** only returns rows that appear in both tables; **JOIN** returns rows when there is at least *one* column match.
- 3. When should the **INTERSECT** query be used?**
 - a. to find all rows from the left table even if there are no matches
 - b. to return all rows that appear in both tables, similar to a Boolean **OR**
 - c. to return only the rows that appear in both tables, similar to a Boolean **AND**

hint

*When using the **UNION** query, duplicates are automatically removed unless you specify **UNION ALL**.*

Answers

1. A predicate subquery:
 - c. **uses extended logical constructs in the WHERE clause using AND, OR, LIKE, BETWEEN, AS, and TOP**
2. The difference between UNION and JOIN is:
 - a. **UNION combines the results of two SQL queries when there is the same number of columns and data types; JOIN returns rows when there is at least one column match**
3. The INTERSECT query is used:
 - c. **to return only the rows that appear in both tables, similar to a Boolean AND**

Essential details

- **UNION** combines two or more SELECT statements with an OR function.
- **JOIN** is used to query data from two or more tables.
- **Subqueries** nest inside another query.
- **INTERSECT** combines two or more SELECT statements with an AND function.

FAST TRACK HELP

- [http://msdn.microsoft.com/en-us/library/aa393276\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/aa393276(VS.85).aspx)
- [http://msdn.microsoft.com/en-us/library/aa259187\(SQL.80\).aspx](http://msdn.microsoft.com/en-us/library/aa259187(SQL.80).aspx)
- <http://msdn.microsoft.com/en-us/library/ms190659.aspx>



Insert data

SCENARIO: Katarina gained a better understanding of the database layout through her reporting project at Adventure Works. The database manager for the team has given her a new assignment. She will be responsible for writing the SQL stored procedures that can be used by the programmers to insert, update, and delete data from the database.

Adventure Works has gathered lots of new data from tourists about their preferences for recreational activities in Nova Scotia. Katarina's first task is to insert new rows into the database to store this data. Katarina wants to refresh her memory on how to efficiently and correctly insert data into a database before she attempts this very important task.

- 1. When designing the `INSERT SQL`, what happens if data is missing for a particular column?**
 - a. The `INSERT` statement returns a syntax error.
 - b. The `INSERT` statement uses the default value for the column.
 - c. The `INSERT` statement inserts a `NULL` value in the column.
- 2. How can Katarina set up the `INSERT` to allow the programmer to copy rows from other tables?**
 - a. She can use the `INSERT INTO` with a `SELECT . . . FROM` clause.
 - b. This cannot be done with an `INSERT` command; she must use a `JOIN`.
 - c. She can use row value constructors.
- 3. What is the correct syntax for inserting multiple rows at one time?**
 - a. `INSERT INTO table (column1, val1a), (column2, val2a);`
 - b. `INSERT (column1, column2) VALUES (val1a, val1b), (val2a, val2b) INTO table;`
 - c. `INSERT INTO table (column1, column2) VALUES (val1a, val1b), (val2a, val2b);`

hint

Be aware of the default values for each column when inserting new rows. If new data is not specified the default value is used.

Answers

1. If data is missing for a column:
 - b. **the `INSERT` statement uses the default value for the column**
2. To set up the `INSERT` to allow the programmer to copy rows from other tables:
 - a. **use the `INSERT INTO` with a `SELECT . . . FROM` clause**
3. The correct syntax for inserting multiple rows at one time is:
 - c. **`INSERT INTO table (column1, column2) VALUES (val1a, val1b), (val2a, val2b);`**

Essential details

- The `INSERT INTO` statement is used to insert a new row in a table.
- The `INSERT INTO` with `SELECT` statement is used to insert a new row in a table when a sub-select is used instead of the `VALUES` clause.

FAST TRACK HELP

- <http://msdn.microsoft.com/en-us/library/ms365309.aspx>
- <http://msdn.microsoft.com/en-us/library/ms188263.aspx>



Update data

SCENARIO: Because of her extensive work in adding data and creating reports from the Adventure Works database on recreational activities, Katarina has a better understanding of the company's database organization.

The database manager for the team is pleased with her progress and has given her a new assignment. She will be responsible for writing the SQL stored procedures that will be used by the developers to insert, update, and delete data from the database.

- 1. The developer wants to update all records in a database to reflect an increase in the provincial value-added tax from 8 percent to 10 percent. Which of the following is the correct syntax?**
 - a. `UPDATE RENTALS SET value_added_tax = .10;`
 - b. `SET sales_tax_rate = .10 IN RENTALS;`
 - c. `UPDATE sales_tax_rate = .10 IN RENTALS;`
- 2. Katarina wants to update data if a condition is true and perform an alternative update if the condition is false. Which of the following is the best choice?**
 - a. CASE statement
 - b. LIKE statement
 - c. IF/THEN/ELSE statement
- 3. One of the developers mentioned that sometimes he needs to update data in one table from another table. Which of the following is the correct syntax for this type of update?**
 - a. `UPDATE SET kayak = RENTALS.kayak + EQUIPMENT.kayak
FROM RENTALS, EQUIPMENT;`
 - b. `UPDATE RENTALS SET RENTALS.kayak + EQUIPMENT.kayak;`
 - c. `UPDATE RENTALS SET kayak = RENTALS.kayak + EQUIPMENT.kayak
FROM RENTALS, EQUIPMENT;`

hint

When using a CASE statement, the ELSE statements (which returns NULL) can be omitted.

Answers

1. To update all records in a database to reflect an increase in the provincial value-added tax from 8 percent to 10 percent the developer should use:
 - a. `UPDATE RENTALS SET value _ added _ tax = .10`
2. Katarina can update data if a condition is true and perform an alternative update if the condition is false with the:
 - a. **CASE statement**
3. To update data in one table from another table, the developer should use:
 - c. `UPDATE RENTALS SET kayak = RENTALS.kayak + EQUIPMENT.kayak FROM RENTALS, EQUIPMENT`

Essential details

- **UPDATE** is used to update existing records in a table.
- The **WHERE** clause in an **UPDATE** statement specifies the rows to update.
- **CASE** creates when-then-else functionality (**WHEN** this condition is met **THEN** do this).
- The value of the case expression is the value of the first **WHEN** clause that is true. If none is true, the result is the **ELSE**.

FAST TRACK HELP

- <http://msdn.microsoft.com/en-us/library/ms189074.aspx>
- [http://msdn.microsoft.com/en-us/library/aa275660\(SQL.80\).aspx](http://msdn.microsoft.com/en-us/library/aa275660(SQL.80).aspx)



Delete data

SCENARIO: Katarina learned a great deal about the Adventure Works database in her last few assignments and is ready to finish her assignment of writing the SQL stored procedures that can be used by the programmers to insert, update, and delete data from the database.

The last task in this assignment is for Katarina to use SQL to delete existing data in the database. The procedures must allow for the deletion of data from single or multiple tables and these transactions must ensure data and referential integrity.

- 1. What happens if a WHERE statement is not included with the DELETE statement?**
 - a. The entire table is deleted
 - b. The data from the table is deleted
 - c. The user receives a syntax error
- 2. How are transactions useful when updating/deleting/adding records to a database?**
 - a. They allow multiple statements to be grouped together to avoid data integrity errors
 - b. They count the number of changes to records in the table
 - c. They restrict updates to only allow one statement to execute at a time
- 3. How can a programmer enforce data integrity rules when making changes to the records in a database?**
 - a. When all statements in a transaction have successfully completed, issue a commit statement
 - b. When all statements in a transaction have successfully completed, issue a rollback statement
 - c. When an error occurs in one statement inside a transaction, issue a commit statement and continue to the next statement

hint

To enforce data integrity when updating the database, group statements in a transaction using a commit statement.

Answers

1. If you do not include a WHERE statement in the DELETE statement:
 - b. **the data from the table is deleted**
2. Transactions are useful when updating/deleting/adding records to a database because:
 - a. **they allow multiple statements to be grouped together to avoid data integrity errors**
3. A programmer can enforce data integrity rules when making changes to the records in a database by:
 - a. **when all statements in a transaction have successfully completed, issuing a commit statement**

Essential details

- **DELETE FROM** deletes rows in a table.
- **TRANSACTIONS** are a set of two or more statements grouped into a single unit.
- **ROLLBACK** reverses changes.
- If all statements are correct within a single transaction the **COMMIT** command records the changes to the database.

FAST TRACK HELP

- [http://msdn.microsoft.com/en-us/library/ms233823\(VS.80\).aspx](http://msdn.microsoft.com/en-us/library/ms233823(VS.80).aspx)
- <http://msdn.microsoft.com/en-us/library/ms233823.aspx>
- [http://msdn.microsoft.com/en-us/library/aa213068\(v=SQL.80\).aspx](http://msdn.microsoft.com/en-us/library/aa213068(v=SQL.80).aspx)



4

Understanding Data Storage

IN THIS CHAPTER

- 4.1 Understand normalization
- 4.2 Understand primary, foreign, and composite keys
- 4.3 Understand indexes



Understand normalization

SCENARIO: Natasha A. Desai is a student at Ohio State University and a member of Epsilon Pi Tau, an honor society for professions in technology. The Epsilon Pi Tau chapter is conducting a fundraising campaign with alumni to raise money for their organization.

Currently all records are kept manually in filing cabinets located in the Epsilon Pi Tau house on campus. Natasha has recently completed a class in database design and has volunteered to create a database to digitally store alumni information and generate an automated mailing.

The first step was gathering the data requirements, including:

- full name and maiden name if applicable
- email address (preference for email or postal mail)
- degree(s) obtained
- street address, city, state, and zip
- year of graduation
- previous year donation(s)

Natasha wants to create the database in Microsoft Access[®], but she realizes that the information is not in normalized form. Answer the questions to help normalize her database design.

- 1. What is the goal of First Normal Form?**
 - a. minimize the inclusion of duplicate information
 - b. identify primary and foreign keys
 - c. remove columns not dependent on primary keys
- 2. Based on the requirements listed above, what subset(s) of data must be removed to make the database in Second Normal Form?**
 - a. city and state
 - b. year of graduation
 - c. previous year donation(s)
- 3. What is *not* a benefit of enforcing Second and Third Normal Forms?**
 - a. reduced storage requirements
 - b. simplified query and update management
 - c. indexed data for easy retrieval

hint

A database of addresses can be simplified by storing the zip code only in the primary table and creating a separate table of city, state, and zip.

Answers

1. The goal of First Normal Form is:
 - a. **minimize the inclusion of duplicate information**
2. To make the database in Second Normal Form, the subsets of data to remove are:
 - a. **city and state**
3. Enforcing Second and Third Normal Forms has the benefit of all except:
 - c. **indexed data for easy retrieval**

Essential details

- **Normalization** involves applying a body of techniques to a relational database to minimize the inclusion of duplicate information.
- **Normal Form** is the result of structuring (organizing) information to avoid redundancy and inconsistency and to promote efficient maintenance, storage, and updating.
- The First Normal Form (**1NF**) sets a few basic rules for a database: eliminate duplicative columns from the same table.
- The Second Normal Form (**2NF**) = 1NF + removing subsets of data that apply to multiple rows of a table and place them in separate tables.
- The Third Normal Form (**3NF**) = 2NF + removing columns that are not dependent upon the primary key.

FAST TRACK HELP

- [http://msdn.microsoft.com/en-us/library/aa200276\(office.11\).aspx](http://msdn.microsoft.com/en-us/library/aa200276(office.11).aspx)
- [http://msdn.microsoft.com/en-us/library/aa139981\(office.10\).aspx](http://msdn.microsoft.com/en-us/library/aa139981(office.10).aspx)



Understand primary, foreign, and composite keys

SCENARIO: The database of Epsilon Pi Tau alumni is progressing nicely! Natasha has applied the concepts of normalization to reduce storage requirements and simplify query and update procedures. The result of putting the database into Third Normal Form was four separate tables: demographic, zip code, degree, and donation.

The next step is to create primary, foreign, and composite keys for each table. This step will ensure a high level of data integrity and that the information is consistent and usable.

- 1. Identify the best primary key for the demographic table:**
 - a. last name
 - b. alumni ID (auto-generated by the system)
 - c. last name plus first name
- 2. Which of the following is an example of a foreign key?**
 - a. zip code
 - b. year of graduation
 - c. last name
- 3. What is *not* a rule for the primary key?**
 - a. must be unique
 - b. must be numeric
 - c. must contain a value other than NULL

hint

Three types of data integrity: entity focuses on the primary key, referential focuses on the foreign key, and domain specifies that values must be declared.

Answers

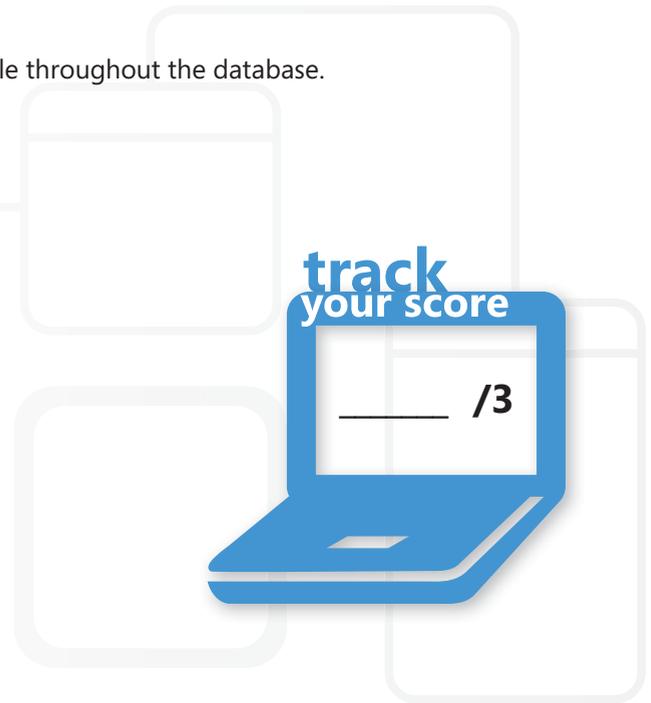
1. Identify the best primary key for the demographic table:
b. alumni id (auto generated by the system)
2. Which of the following is an example of a foreign key?
a. zip code
3. What is *not* a rule for the primary key?
b. must be numeric

Essential details

- A **primary key** serves as the unique identifier of a specific row and uniquely defines a relationship within a database.
- A **foreign key** references the primary key in another table.
- **Data integrity** ensures that data is consistent, correct, and usable throughout the database.

FAST TRACK HELP

- <http://msdn.microsoft.com/en-us/library/ms191236.aspx>
- <http://msdn.microsoft.com/en-us/library/ms175464.aspx>



Understand indexes

SCENARIO: Natasha has almost finished the design and setup of the Epsilon Pi Tau alumni database. She is at the point of determining the need for indexes that would help honor society leaders retrieve data when they plan various events and promotions or when they need to contact members.

A quick review of the goals and advantages of indexes will help Natasha decide whether indexes will be valuable for the database and worth the time it will take to create them.

1. **Because the primary key for the demographic table is a system-defined number, what should a good clustered index be based upon?**
 - a. last name
 - b. gender
 - c. first name
2. **Which is a characteristic of a non-clustered index?**
 - a. contains the actual data pages or records
 - b. has keywords and pointers to the data
 - c. includes foreign keys
3. **Which is *not* a result of using indexes?**
 - a. increased speed of data retrieval
 - b. increased storage requirements
 - c. increased speed of writing records

hint

Rule of thumb: If the database will contain a large number of records, the benefits of adding an index outweigh the necessary time and effort.

Answers

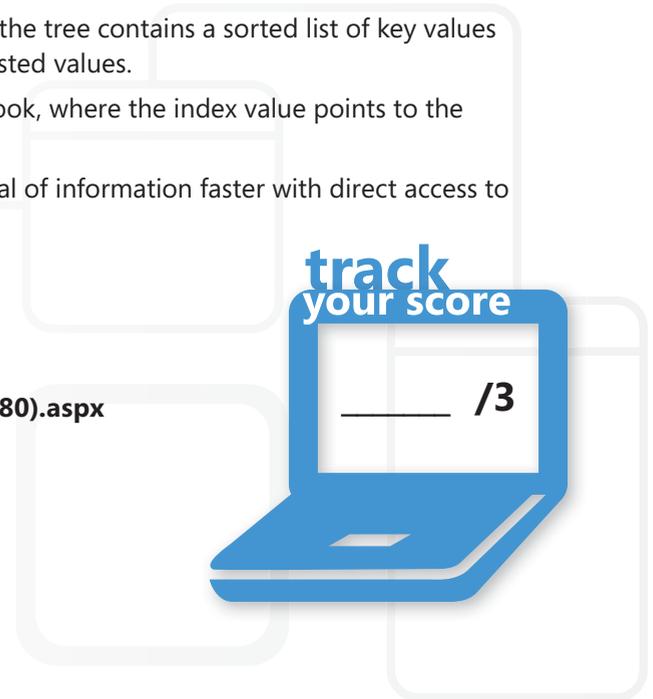
1. A good clustered index for this table should be based upon:
 - a. **last name**
2. A non-clustered index:
 - b. **has keywords and pointers to the data**
3. Using indexes does not result in:
 - c. **increased speed of writing records**

Essential details

- An **index** contains keywords and associated data that point to the location of more comprehensive information, such as files and records on a disk or record keys in a database.
- In a **b-tree** structure for storing database indexes, each node in the tree contains a sorted list of key values and links that correspond to ranges of key values between the listed values.
- A **non-clustered index** is arranged similarly to the index of a book, where the index value points to the actual information.
- A **clustered index** is arranged in a special order to make retrieval of information faster with direct access to the information.

FAST TRACK HELP

- <http://msdn.microsoft.com/en-us/library/ms180978.aspx>
- [http://msdn.microsoft.com/en-us/library/aa933129\(v=SQL.80\).aspx](http://msdn.microsoft.com/en-us/library/aa933129(v=SQL.80).aspx)



5

Administering a Database

IN THIS CHAPTER

- 5.1 Understand database security concepts
- 5.2 Understand database backup and restore



Understand database security concepts

SCENARIO: Recently there has been a great deal of media coverage about companies losing the records of customers and clients through a variety of security breaches. The Humongous Insurance Company does not want to see its name in the headlines, so officers decided to complete an internal audit to identify any possible security risks in their information systems. The team of analysts is very familiar with possible areas of risk such as physical security, internal security, and external security.

According to the auditors, the company has a sound security plan to ensure data integrity by identifying users and the actions they can perform, and to protect data from hackers. But other aspects need to be considered in a comprehensive security plan.

1. What should be included in the *physical* security plan?
 - a. location of the stored user accounts and passwords
 - b. location of the database administrators
 - c. location of servers with restricted access
2. Which strategy is *not* related to an *internal* security plan?
 - a. provide backups and operational continuity
 - b. delete old and unused user accounts
 - c. enforce user accounts to have strong passwords
3. Which of the following is *not* an example of a security attack?
 - a. applying roles to grant access
 - b. privilege escalation
 - c. SQL injection

hint

In large organizations, group users by role. Use the GRANT statement to provide access according to their role.

Answers

1. The physical security plan should include the:
 - c. **location of servers with restricted entry access**
2. A strategy *not* related to internal security is:
 - a. **provide backups and operational continuity**
3. The following is *not* an example of a security attack:
 - a. **applying roles to grant access**

Essential details

- A **security plan** identifies which users can do what action(s) to data in the database.
- A **physical security plan** addresses the safety of the actual location of the database.
- **Access control** ensures and restricts who can connect and what they can do.
- A **user account** provides users with access to the database.
- **Roles** grant permissions to the database. Defined roles give all users within a group the same permissions.

FAST TRACK HELP

- [http://msdn.microsoft.com/en-us/library/aa291801\(VS.71\).aspx](http://msdn.microsoft.com/en-us/library/aa291801(VS.71).aspx)
- <http://msdn.microsoft.com/en-us/library/dd568741.aspx>



Understand database backup and restore

SCENARIO: The team of analysts has completed the internal security audit of the Humongous Insurance Company. They identified a few weaknesses in the system and recommended corrective measures to minimize the associated risks. But before they can complete their final report, they need to understand the backup and recovery plan.

Before meeting with the database administrator, the group reviewed database backup and restore concepts to better understand these processes as they relate to the unique situations of the Humongous Insurance Company.

- 1. Which of the following backup strategies only copies files that have changed since the last full backup?**
 - a. partial backup
 - b. incremental backup
 - c. differential backup
- 2. In which situation is the use of a replication service recommended?**
 - a. The database must be available 24 hours a day, 7 days a week.
 - b. The database is very resource-intensive.
 - c. The company uses offsite storage for database backups.
- 3. When performing a full backup, what information is optional?**
 - a. data that has not changed
 - b. server files such as user security NAT
 - c. data that has not changed since the last full backup

hint

It is important that backup software works with locked records.

Answers

1. The backup strategies that only copies files that have changed since the last full backup is:
 - c. **differential backup**
2. Replication services are recommended when:
 - a. **the database must be available 24 hours a day, 7 days a week**
3. Optional information for a full backup includes:
 - b. **server files such as user security NAT**

Essential details

- **Backup** is a process of saving all critical data to re-create the database in useful form in a relatively short time.
- In a **full backup** all files are copied for possible future retrieval.
- In an **incremental backup** only files that have been changed since the last backup are copied.
- In a **differential backup** only files that have been changed since the last *full_backup* are copied.
- **Replicated services** re-create a full or incremental reproduction of the database.

FAST TRACK HELP

- <http://msdn.microsoft.com/en-us/library/ms187510.aspx>
- <http://msdn.microsoft.com/en-us/library/ms188312.aspx>



6

Database Concepts Review

IN THIS CHAPTER

- Database administration fundamentals review



Database administration fundamentals review

SCENARIO: Congratulations! You have reached the end of the Student Study Guide for database administration. We hope you enjoyed the scenarios and are now aware of how databases touch many aspects of life in today's exciting technical world. Skills in data base administration can open doors to your future career.

The questions and hints included in this study guide will be helpful in preparation for the Database Administration certification exam.

- 1. Knowledge of which core database concepts will ensure that you are prepared for the Database Administration certification exam?**
 - a. Relational Database Management System, Data Manipulation Language, Data Definition Language, SQL
 - b. electrical engineering, data types, views, and graphical designers
 - c. database backups, development languages, and restoration techniques
- 2. Which of the following are *not* methods to manipulate data?**
 - a. select, insert, update, and delete
 - b. creation of stored procedures and functions
 - c. creation of primary and foreign keys
- 3. What is normalization?**
 - a. a technique to minimize the inclusion of duplicate information
 - b. a process used to backup and restore the database
 - c. a strategy to provide keywords and pointers to stored data

hint

Review the concepts and practice your database administration skills. Use the Fast Track links provided in each lesson to solidify your knowledge.

Answers

1. Core database concepts include:
 - a. RDBMS, DML, DDL, SQL
2. Data is not manipulated by:
 - c. creating primary and foreign keys
3. Normalization is a:
 - a. a technique to minimize the inclusion of duplicate information

Essential details

- Most modern database management systems implement a **relational model** in which the data is organized in relations (tables).
- **RDBMS** is the acronym for **R**elational **D**ata **B**ase **M**anagement **S**ystem.
- Structured query language (**SQL**) is a database sublanguage used in querying, updating, and managing relational databases.
- Data manipulation language (**DML**) is used to insert data in, update, and query a database.
- Data definition language (**DDL**) defines all attributes and properties of a database, especially record layouts, field definitions, key fields, file locations, and storage strategy.
- **Normal Form** is the result of structuring (organizing) information to avoid redundancy and to promote efficient maintenance, storage, and updating.

FAST TRACK HELP

- <http://msdn.microsoft.com/en-us/data/default.aspx>
- <http://msdn.microsoft.com/en-us/sqlserver/default.aspx>

