# Table of Contents

**Introduction**  
1

1 **Database Basics**  
What Is a Database? ............................................................... 5  
What Is a Table? ..................................................................... 5  
What Is a Database Diagram?.................................................. 6  
What Is a View? ...................................................................... 7  
What Is a Stored Procedure? ................................................... 8  
What Is a User-Defined Function? ............................................. 9  
What Is a Trigger? ................................................................. 10

2 **SQL Server Basics**  
Versions of SQL Server 2014 Available................................... 13  
SQL Server Components........................................................ 16  
Introduction to Microsoft SQL Server Management Studio....... 19  
Connecting to a Database Server ........................................... 25  
Installing the Sample Files..................................................... 27

3 **Creating a SQL Server Database**  
Creating the Database........................................................... 33  
Defining Database Options .................................................... 36  
The Transaction Log .............................................................. 39  
Attaching to an Existing Database ......................................... 40

4 **Working with SQL Server Tables**  
Creating SQL Server Tables.................................................... 45  
Adding Fields to the Tables You Create ................................ 46  
Working with Constraints ....................................................... 50  
Creating an Identity Specification ................................. 56
Adding Computed Columns .................................................... 57
Working with User-Defined Data Types........................................ 58
Adding and Modifying Indexes .................................................. 60
Saving Your Table .................................................................. 64

5 Working with Table Relationships ........................................ 67
An Introduction to Relationships................................................ 67
Creating and Working with Database Diagrams ......................... 70
Working with Table Relationships............................................. 77
Designating Table and Column Specifications............................ 79
Adding a Relationship Name and Description ............................ 81
Determining When Foreign Key Relationships Constrain the Data Entered in a Column ...................................................... 81
Designating Insert and Update Specifications .............................. 84

6 Getting to Know the SELECT Statement ............................ 89
Introducing T-SQL ................................................................ 89
Working with the SELECT Statement ....................................... 90
Adding on the FROM Clause ................................................ 92
Including the WHERE Clause ............................................... 93
Using the ORDER BY Clause ............................................... 101

7 Taking the SELECT Statement to the Next Level ............... 105
Adding the DISTINCT Keyword .......................................... 105
Working with the FOR XML Clause ..................................... 107
Working with the GROUP BY Clause .................................... 109
Including Aggregate Functions in Your SQL Statements .......... 110
Taking Advantage of the HAVING Clause .............................. 117
Creating Top Values Queries .............................................. 118

8 Building SQL Statements Based on Multiple Tables ......... 121
Working with Join Types .................................................. 121
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Powerful Join Techniques</td>
<td>129</td>
</tr>
<tr>
<td></td>
<td>Utilizing Full Joins</td>
<td>129</td>
</tr>
<tr>
<td></td>
<td>Taking Advantage of Self-Joins</td>
<td>130</td>
</tr>
<tr>
<td></td>
<td>Exploring the Power of Union Queries</td>
<td>133</td>
</tr>
<tr>
<td></td>
<td>Working with Subqueries</td>
<td>136</td>
</tr>
<tr>
<td></td>
<td>Using the <strong>INTERSECT</strong> Operator</td>
<td>137</td>
</tr>
<tr>
<td></td>
<td>Working with the <strong>EXCEPT</strong> Operator</td>
<td>138</td>
</tr>
<tr>
<td>10</td>
<td>Modifying Data with Action Queries</td>
<td>141</td>
</tr>
<tr>
<td></td>
<td>The <strong>UPDATE</strong> Statement</td>
<td>141</td>
</tr>
<tr>
<td></td>
<td>The <strong>INSERT</strong> Statement</td>
<td>143</td>
</tr>
<tr>
<td></td>
<td>The <strong>SELECT INTO</strong> Statement</td>
<td>145</td>
</tr>
<tr>
<td></td>
<td>The <strong>DELETE</strong> Statement</td>
<td>146</td>
</tr>
<tr>
<td></td>
<td>The <strong>TRUNCATE</strong> Statement</td>
<td>147</td>
</tr>
<tr>
<td>11</td>
<td>Getting to Know the T-SQL Functions</td>
<td>149</td>
</tr>
<tr>
<td></td>
<td>Working with Numeric Functions</td>
<td>149</td>
</tr>
<tr>
<td></td>
<td>Taking Advantage of String Functions</td>
<td>151</td>
</tr>
<tr>
<td></td>
<td>Exploring the Date/Time Functions</td>
<td>163</td>
</tr>
<tr>
<td></td>
<td>Working with Nulls</td>
<td>170</td>
</tr>
<tr>
<td>12</td>
<td>Working with SQL Server Views</td>
<td>177</td>
</tr>
<tr>
<td></td>
<td>An Introduction to Views</td>
<td>177</td>
</tr>
<tr>
<td></td>
<td>Using T-SQL to Create or Modify a View</td>
<td>185</td>
</tr>
<tr>
<td>13</td>
<td>Using T-SQL to Design SQL Server Stored Procedures</td>
<td>191</td>
</tr>
<tr>
<td></td>
<td>The Basics of Working with Stored Procedures</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td>Declaring and Working with Variables</td>
<td>198</td>
</tr>
<tr>
<td></td>
<td>Controlling the Flow</td>
<td>200</td>
</tr>
</tbody>
</table>
14 Stored Procedure Techniques Every Developer Should Know 215
   The SET NOCOUNT Statement .................................................. 215
   Using the @@ Functions ........................................................ 216
   Working with Parameters ...................................................... 221
   Errors and Error Handling .................................................... 227

15 Power Stored Procedure Techniques 233
   Modifying Data with Stored Procedures .................................... 233
   Stored Procedures and Transactions ....................................... 237

16 Stored Procedure Special Topics 243
   Stored Procedures and Temporary Tables .................................. 243
   Stored Procedures and Cursors ............................................. 245
   Stored Procedures and Security ........................................... 250

17 Building and Working with User-Defined Functions 253
   Scalar Functions .................................................................. 253

18 Creating and Working with Triggers 263
   Creating Triggers .................................................................. 263
   Creating an Insert Trigger .................................................... 266
   Creating an Update Trigger ................................................... 269
   Creating a Delete Trigger ...................................................... 272
   Downsides of Triggers .......................................................... 274

19 Authentication 277
   The Basics of Security ......................................................... 277
   Types of Authentication ....................................................... 278
   Creating Logins ................................................................. 280
   Creating Roles ................................................................. 285
# Table of Contents

## 20 SQL Server Permissions Validation  
Types of Permissions .......................................................... 299  
Getting to Know Table Permissions ...................................... 309  
Getting to Know View Permissions ...................................... 312  
Getting to Know Stored Procedure Permissions ..................... 314  
Getting to Know Function Permissions .................................. 315  
Implementing Column-Level Security .................................... 315

## 21 Configuring, Maintaining, and Tuning SQL Server  
Selecting and Tuning Hardware ........................................... 321  
Configuring and Tuning SQL Server .................................... 324

## 22 Maintaining the Databases You Build  
Backing Up Your Databases ................................................... 335  
Restoring a Database .......................................................... 338  
The Database Engine Tuning Advisor .................................... 341  
Creating and Working with Database Maintenance Plans .......... 344

## 23 Performance Monitoring  
Executing Queries in SQL Server Management Studio .......... 355  
Displaying and Analyzing the Estimated Execution Plan .......... 358  
Adding Indexes to Allow Queries to Execute More Efficiently ... 362  
Setting Query Options ......................................................... 364  
SQL Server Profiler .............................................................. 367

## 24 Installing and Upgrading SQL Server  
Installing SQL Server 2014 Enterprise Edition ..................... 377  
Installing SQL Server Management Studio ............................ 385

| Index | 389 |
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Dedication

Many people are important in my life, but there is no one as special as my husband Dan. I dedicate this book to Dan. Thank you for your ongoing support, for your dedication to me, for your unconditional love, and for your patience. Without you, I’m not sure how I would make it through life. Thank you for sticking with me through the good times and the bad! There’s nobody I’d rather spend forever with than you.

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We Want to Hear from You!

As the reader of this book, you are our most important critic and commentator. We value your opinion and want to know what we’re doing right, what we could do better, what areas you’d like to see us publish in, and any other words of wisdom you’re willing to pass our way.

We welcome your comments. You can email or write to let us know what you did or didn’t like about this book—as well as what we can do to make our books better.

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Introduction

Many excellent books about T-SQL are available, so how is this one different? In talking to the many people I meet in my travels around the country, I have heard one common complaint. Instead of the host of wonderful books available to expert database administrators (DBAs), most SQL Server readers yearn for a book targeted toward the beginning-to-intermediate DBA or developer. They want a book that starts at the beginning, ensures that they have no gaps in their knowledge, and takes them through some of the more advanced aspects of SQL Server. Along the way, they want to acquire volumes of practical knowledge that they can easily port into their own applications. I wrote *Sams Teach Yourself T-SQL in One Hour a Day* with those requests in mind.

This book begins by providing you with some database basics. In Lesson 1, “Database Basics,” you get a summary of all the components that are covered through the remainder of the book.

Lesson 2, “SQL Server Basics,” teaches you the basics of working with SQL Server Management Studio. You learn about the versions of SQL Server available. You then find out how to connect with a database server and install the sample files.

In Lesson 3, “Creating a SQL Server Database,” you see how to create a new SQL Server database. The SQL Server database is a container within which you will place all the other objects you learn about throughout the book.

Lessons 4 through 18 cover tables, relationships, the T-SQL language, views, stored procedures, functions, and triggers. These objects are at the heart of every SQL Server database. Lesson 4, “Working with SQL Server Tables,” explains how to work with tables. Then you move on to Lesson 5, “Working with Table Relationships,” which covers how to work with table relationships.

Knowledge of the T-SQL language is an important aspect of SQL Server. Probably the most used keyword used in T-SQL is `SELECT`. Lesson 6,
“Getting to Know the SELECT Statement,” delves into the SELECT statement in quite a bit of detail. Lesson 7, “Taking the SELECT Statement to the Next Level,” expands on Lesson 6 by covering some more sophisticated T-SQL techniques. You then move on to Lesson 8, “Building SQL Statements Based on Multiple Tables,” where you find out how you can build T-SQL statements based on data from multiple tables. Lesson 9, “Powerful Join Techniques,” builds on Lesson 8 to provide you with different techniques you can use to join tables. Not only can you use T-SQL to retrieve data, but you can also use it to modify data. Lesson 10, “Modifying Data with Action Queries,” shows you how to modify data with action queries. Lesson 11, “Getting to Know the T-SQL Functions,” introduces you to many of the built-in T-SQL functions, such as DataAdd, DateDiff, and Upper. These built-in functions prove invaluable for building database applications.

Another important SQL Server object is the view. Lesson 12, “Working with SQL Server Views,” shows you how to build and work with views. Lesson 13, “Using T-SQL to Design SQL Server Stored Procedures,” begins the in-depth coverage of stored procedures. Lessons 14, 15, and 16 continue to build on each other, each providing more sophisticated coverage of stored procedures and their uses.

Lesson 17, “Building and Working with User-Defined Functions,” provides you with an alternative to stored procedures: user-defined functions. Lesson 18, “Creating and Working with Triggers,” shows you how you can use triggers to respond to inserts, updates, and deletes.

The last six lessons cover security and administration. You learn about SQL Server authentication and permissions validation and how you can take advantage of both to properly secure your databases. The lessons in Part III also show you how to configure, maintain, and tune the SQL Servers that you manage. Without proper care, even the fastest hardware could run a database that is abysmally slow!

Finally, this book uses the sample database called AdventureWorks2014. Lesson 2 covers the process of installing the sample database. Also, all the sample code created in this book are available in a script file that you can open and execute from a SQL Server Management Studio query.
SQL Server, and the T-SQL language, are powerful and exciting. With the keys to deliver all that it offers, you can produce applications that provide much satisfaction as well as many financial rewards. After poring over this hands-on guide and keeping it nearby for handy reference, you too can become masterful at working with SQL Server and T-SQL. This book is dedicated to demonstrating how you can fulfill the promise of making SQL Server perform up to its lofty capabilities. As you will see, you have the ability to really make SQL Server shine in the everyday world!
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LESSON 3

Creating a SQL Server Database

Databases are at the heart of every SQL Server system. They contain the tables, database diagrams, views, stored procedures, functions, and triggers that comprise the system. This lesson covers:

- How to create a SQL Server database
- How to set database options
- How to work with the Transaction Log
- How to attach to an existing database

Creating the Database

Before you can build tables, views, stored procedures, triggers, functions, and other objects, you must create the database in which they will reside. A database is a collection of objects that relate to one another. An example would be all the tables and other objects necessary to build a sales order system. To create a SQL Server database, follow these steps:

1. Right-click the Databases node and select New Database. The New Database dialog box appears (see Figure 3.1).

2. Enter a name for the database.

3. Scroll to the right to view the path for the database.
4. Click the Ellipsis button. The Locate Folder dialog box appears.
5. Select a path for the database (see Figure 3.2).
6. Click OK to close the Locate Folder dialog box.
7. Click to select the Options page and change any options as desired (see Figure 3.3).
8. Click OK to close the New Database dialog box and save the new database. The database now appears under the list of databases (see Figure 3.4) under the Databases node of SQL Server Management Studio. If the database does not appear, right-click the Databases node and select Refresh.

FIGURE 3.1 The New Database dialog box enables you to create a new database.
FIGURE 3.2  You can opt to accept the default path, or you can designate a path for the database.

FIGURE 3.3  The Options page of the New Database dialog box enables you to set custom options for the database.
Defining Database Options

In the previous section, you created a new SQL Server database. You accepted all the default options available on the General page of the New Database dialog box. Many important options are available on the General page. They include the Logical Name, File Type, Filegroup, Initial Size, Autogrowth, Path, and File Name (see Figure 3.5).

The logical name is the name that SQL Server will use to refer to the database. It is also the name you will use to refer to the database when writing programming code that accesses it.

The File Type is Data or Log. As its name implies, SQL Server stores data in data files. The file type of Log indicates that the file is a transaction log file.

The initial size is very important. You use it to designate the amount of space you will allocate initially to the database.
NOTE: I like to set this number to the largest size that I ever expect the data database and log file to reach. Whereas disk space is very cheap, performance is affected every time that SQL Server needs to resize the database.

Related to the initial size is the Autogrowth option. When you click the build button (ellipsis) to the right of the currently selected Autogrowth option, the Change Autogrowth dialog box appears (see Figure 3.6).

The first question is whether you want to support autogrowth at all. Some database designers initially make their databases larger than they ever think they should be and then set autogrowth to false. They want an error to occur so that they will be notified when the database exceeds the allocated size. The idea is that they want to check things out to make sure everything is okay before allowing the database to grow to a larger size.
The second question is whether you want to grow the file in percentage or in megabytes. For example, you can opt to grow the file 10% at a time. This means that if the database reaches the limit of 5,000 megabytes, then 10% growth would grow the file by 500 megabytes. If instead the file growth were fixed at 1,000 megabytes, the file would grow by that amount regardless of the original size of the file.

The final question is whether you want to restrict the amount of growth that occurs. If you opt to restrict file growth, you designate the restriction in megabytes. Like the Support Autogrowth feature, when you restrict the file size, you essentially assert that you want to be notified if the file exceeds that size. With unrestricted file size, the only limit to file size is the amount of available disk space on the server.
File Groups
One great feature of SQL Server is that you can span a database’s objects over several files, all located on separate devices. We refer to this as a file group. By creating a file group, you improve the performance of the database because multiple hardware devices can access the data simultaneously.

The Transaction Log
SQL Server uses the transaction log to record every change that is made to the database. In the case of a system crash, you use the transaction log, along with the most recent backup file, to restore the system to the most recent data available. The transaction log supports the recovery of individual transactions, the recovery of all incomplete transactions when SQL Server is once again started, and the rolling back of a restored database, file, filegroup, or page forward to the point of failure. Specifying information about the transaction log is similar to doing so for a database. Follow these steps:

1. While creating a new database, you can also enter information about the log file. To begin, enter a logical name for the database. I recommend you use the logical name of the database along with the suffix _log.
2. Specify the initial size of the log file.
3. Indicate how you want the log file to grow.
4. Designate the path within which you want to store the database.
5. Continue the process of creating the database file.

WARNING: Do not move or delete the transaction log unless you are fully aware of all the possible ramifications of doing so.
Attaching to an Existing Database

There are times when someone will provide you with a database that you want to work with on your own server. To work with an existing database, all you have to do is attach to it. Here’s the process:

1. Right-click the Databases node and select Attach. The Attach Databases dialog box appears (see Figure 3.7).

2. Click Add. The Locate Database Files dialog box appears (see Figure 3.8).

3. Locate and select the .mdf to which you want to attach.
4. Click OK to close the Locate Database Files dialog box.

5. Click OK to close the Attach Databases dialog box. The database appears in the list of user databases under the Databases node of SQL Server Management Studio.

Summary

The ability to create a database is fundamental to working with SQL Server. The process of creating a database involves understanding what a log file is and how to configure it. After you have created both the database and the log file, you are ready to create and work with the other database objects.
Q&A

Q. What objects does a SQL Server database contain?
A. A SQL Server database contains the tables, database diagrams, views, stored procedures, functions, and other objects required to support the database’s operations.

Q. Explain what a log file is and why it is important.
A. The log file keeps track of all transactions that occur as the database is used. It is necessary when restoring system information.

Q. Explain why you would want to attach to an existing database.
A. The ability to attach to an existing database allows you to easily utilize a database from another server.

Workshop

Quiz

1. What is autogrowth?
2. The autogrowth feature improves the performance of a database (true/false).
3. You attach to a backup file (true/false).
4. It is always okay to delete a log file (true/false).
5. What are the two options for growing a database?

Quiz Answers

1. Autogrowth provides the ability for a database or log file to grow automatically as necessary.
2. False. The autogrowth feature degrades performance. It is best to set the sizes of the database and log files to values larger than you expect you will need.
3. False. You attach to a database file (.mdf).
4. False.
5. By percentage or in megabytes.

**Activities**

Create a new SQL Server database. Designate sizes for both the database and the log file, indicating you do not want to allow autogrowth. View the database in the Object Explorer. Notice that the database does not yet contain any user objects.
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Index

Symbols

@@ functions, 231
@@ Error, 219-220
@@ Identity, 218
@@ RowCount, 217
@@ TranCount function, 218
explained, 216
% (percent) sign, 104
_ (underscore), 95, 104

A

accounts, dbo, 295
action queries
  DELETE statement, 146
  INSERT statement, 143-144
  SELECT INTO statement, 145
  TRUNCATE statement, 147
  UPDATE statement, 141-142
Activity Monitor, 25
Actual Execution Plan button, 361
Add Features to an Existing
Installation option, 379
Add Objects dialog box, 306-307
Add Table dialog box, 70-71, 76,
180, 192-193
administration
  column permissions, 315-316
  function permissions, 315
  object permissions, 302-309
    assigning permissions
to particular objects,
302-305
    assigning permissions to
users or roles, 305-309
stored procedure
  permissions, 314
  table permissions, 310-312
  view permissions, 312-314
Windows Administrators
group, 296
advanced options (SQL Server),
330-331
Advanced page (Query Options
dialog), 365
AdventureWorks2014 database, installing, 27-29
Agent (SQL Server), 17
aggregate functions
  AVG, 113-114
  COUNT, 111-112
  COUNT_BIG, 112
  explained, 110
  MAX, 115
  MIN, 114
  SUM, 112-113
aggregating data with views.
  See views
aliases, table aliases, 92
ALTER permissions, 309
ALTER VIEW statement, 187
analyzing
  Estimated Execution Plan,
    358-359
  queries, 374
  trace output, 372-373
ANSI page (Query Options dialog),
  366
Application role, 293
assigning
  column permissions, 315-316
  function permissions, 315
  object permissions
    for particular objects,
      302-305
    to users or roles, 305-309
stored procedure
  permissions, 314
table permissions, 310-312
view permissions, 312-314
Attach command, 40
Attach Databases dialog box, 40-41
attaching to existing database, 40-41
audit logs, inserting data into
  Delete triggers, 272-274
  Insert triggers, 266-268
  Update triggers, 269-270
authentication
  explained, 277-278
logins
  granting database access
    to logins, 284
  SA Login, 285, 296
  SQL Server logins,
    283-284
  Windows logins, 280-282
ownership, 295
roles
  explained, 285-286
  fixed database roles,
    289-292
  fixed server roles, 286-288
  user-defined database
    roles, 293-294
types of, 278-279, 296
Autogrowth option (New Database
dialog box), 37
@AverageFreight variable, 209
averaging data, 113-114
AVG function, 113-114

B
backing up databases, 335-338
Back Up Database dialog box,
  336-338
backup devices, 23
BEGIN...END construct, 202
BEGIN TRANSACTION statement, 239
Bigint data type, 47
Binary data type, 47
Bit data type, 47
Books Online, 149
Browse for Objects dialog box, 288-292, 308, 312-313
bulkadmin, 286
Bulk Insert Administrators (bulkadmin), 286
bulk logged recovery, 336, 352
Business Intelligence Edition (SQL Server), 15

C

calculating summary statistics, 109-110
cascading deletes, 85
CASE statement, 207-209, 212
Change Autogrowth dialog box, 37-38
changing sort direction, 102
Char data type, 47
check constraints, 54-55, 65
Check Constraints dialog box, 54-55
Choose Name dialog box, 64, 73
choosing recovery model, 336
clauses. See also keywords; statements
  FOR XML, 107-109
  FROM, 92
  GROUP BY, 109-110
  HAVING, 117-118
ORDER BY, 101-102
  changing sort direction, 102
  syntax, 101
TOP, 118-119
WHERE, 119
data filtering rules, 95-96
IN keyword, 100-101
NOT keyword, 100-101
NULL keyword, 100
syntax, 93-94
Clear Trace Window command, 372
Client Statistics tab (Management Studio), 359-361
COALESCE function, 172
column-level permissions, 315-316
Column Permissions dialog box, 316-317
columns, 45
  adding data in, 112-113
  column-level permissions, 315-316
  computed columns, 57-58
  constraints. See constraints
data types available, 46
  explained, 5
  finding maximum values in, 115
  finding minimum values in, 114
  identity specifications, 56
  indexes, 60-62
  maximum values, 115
  selecting, 90
  Tables and Columns specifications, 79-81
  user-defined data types, 58-60
COMMIT TRANSACTION statement, 239
computed columns, creating, 57-58
configuring SQL Server
  advanced options, 330-331
  connections options, 328-329
  database settings, 329-330
  memory options, 324-325
  permissions options, 331-332
  processor options, 326-327
  security options, 327-328
connecting to database servers, 25-26
connections options (SQL Server), 328-329
Connect to Server dialog box, 25-26, 342
constraints, 50
  check, 54-55, 65
  default, 53
  foreign key, 51, 65, 68
  Not Null, 54
  primary key, 51, 65
  rules, 55
  unique, 56
controlling flow of stored procedures
  BEGIN...END construct, 202
  CASE statement, 207-209, 212
  GOTO statement, 203-206
  IF...ELSE construct, 200-201
  labels, 203-206
  overview, 200
  RETURN statement, 203-206, 212
  WHILE statement, 210-211
CONTROL permissions, 310, 318
counting rows, 111-112
COUNT_BIG function, 112
CREATE VIEW statement, 185-187
creating
cursors, 245
databases, 33-34
fields, 46
foreign key relationships, 79
indexes, 362-364
joins
  full joins, 129
  inner joins, 121-124
  outer joins, 124-125
  self-joins, 130-132
logins
  granting database access to logins, 284
  SQL Server logins, 283-284
  Windows logins, 280-282
stored procedures
  in Query Editor, 192-195
  with T-SQL, 196
tables
  adding to database diagrams, 76
  SELECT INTO statement, 145
triggers, 263-266
  Delete triggers, 272-274
  Insert triggers, 266-268
  syntax, 266
  Update triggers, 269-270
users, 300-302
variables, 198-199
views, 179
  with Management Studio
    Query Builder, 179-185
  with T-SQL, 185-187
workloads, 343-344
credentials, 23
Credentials node (Management Studio), 23
Cursor data type, 47
@Cursor variable, 249
cursors
  defining, 245
  looping through records with, 246-249
  populating, 246

D

data
deleting
  DELETE statement, 146
inserting
  INSERT statement, 143-144
  stored procedures, 233-235
updating, 141-142
Database Creators (dbcreator), 286
database diagrams
  adding tables, 76
  creating, 70-74
definition of term, 6
editing, 75-76
purpose of, 10
relationships versus, 77
removing tables, 77
Database Engine, 387
Database Engine Configuration step
  (SQL Server installation), 382
Database Engine Tuning Advisor,
  18-19, 341-344
  accessing, 341
  creating workloads, 343-344
  purpose of, 352
  tuning databases, 342-343
database maintenance plans, 344-351
Database Role – New dialog box, 294
Database Role Properties dialog box, 290-291
databases
  AdventureWorks2014,
    installing, 27-29
  attaching to existing database, 40-41
authentication
  explained, 277-278
  logins, 280-285
  ownership, 295
  roles, 285-295
  types of, 278-279, 296
backing up, 335-338
creating, 33-34
database diagrams
  adding tables, 76
  creating, 70-74
definition of term, 6
  editing, 75-76
  purpose of, 10
  relationships versus, 77
  removing tables, 77
Databases

Database Engine Tuning Advisor, 341-344
accessing, 341
creating workloads, 343-344
purpose of, 352
tuning databases, 342-343
database maintenance plans, 344-351
definition of term, 5
design master, 24
indexes, 362-364
logins
granting database access to logins, 284
SA Login, 285, 296
SQL Server logins, 283-284
Windows logins, 280-282
master database, 20
Model, 20-21
MSDB, 21
options, 36-39
recovery models, 336, 352
restoring, 338-341
roles
explained, 285-286
fixed database roles, 289-292
fixed server roles, 286-288
user-defined database roles, 293-294
settings (SQL Server), 329-330
tables. See tables
TempDB, 21, 243-244
transaction log, 39
users, adding, 300-302
views
advantages of, 177, 188
creating, 179-187
customizing user data with, 188
definition of term, 7
explained, 177-179
indexed views, 7
modifying, 184-187
permissions, 312-314
security, 188
database servers, connecting to, 25-26
Databases node (Management Studio), 19-21
explained, 19-20
master database, 20
Model database, 20-21
MSDB database, 21
TempDB database, 21
Database User dialog box, 305-306, 308-309
Database User – New dialog box, 300-301
Data Definition Language (DDL), 24
Data Directories tab (SQL Server installation), 382-384
data filtering, 95-96
data replication, 24-25
data types
fields, 46
user-defined, 58-60
DATEADD function, 98-99, 168
Date data type, 47
DATEDIFF function, 98-99, 169
DATENAME function, 167
DATEPART function, 98, 166, 174
DateTime2 data type, 47
dateTime data type, 47

date/time functions, 96-98, 163
   DATEADD, 168
   DATEDIFF, 98-99, 169
   DATENAME, 167
   DATEPART, 98, 166, 174
   DAY, 164
   GETDATE, 96-97, 163
   MONTH, 163
   YEAR, 165

dateTimeOffset data type, 47
day function, 164
db_accessadmin, 290
db_backupoperator, 290
dbcreatore, 286
db_datareader, 290
db_datawriter, 290
db_dlldadmin, 290
db_denydatareader, 290
db_denydatawriter, 290
dbo account, 295
db_owner, 290
db_securityadmin, 290

DDL (Data Definition Language), 24
decimal data type, 48
DECLARE CURSOR statement, 245
DECLARE keyword, 198-199
declarating. See creating
default constraints, 53
defining. See creating
DELETE permissions, 310
DeletePerson trigger, 272
Delete rule (relationships), 84-85
DELETE statement
   compared to TRUNCATE, 147
   explained, 146
Delete triggers, 272-274

deleting
   foreign key relationships, 79
   spaces from strings
      leading spaces, 162
      trailing spaces, 163

table data
   DELETE statement, 146
   Delete triggers, 272-274
   stored procedures, 237
   TRUNCATE statement, 147

tables from database
diagrams, 77

DENY statement, 302, 317
descriptions for foreign key
relationships, 81
designing stored procedures
   in Query Editor, 192-195
   with T-SQL, 196
design master, 24
diagram pane (View Builder), 184
diagrams, database diagrams
   adding tables, 76
   creating, 70-74
   definition of term, 6
   editing, 75-76
   purpose of, 10
   relationships versus, 77
   removing tables, 77
dialog boxes
   Add Objects, 306-307
   Add Table, 70-71, 76, 180, 192-193
   Attach Databases, 40-41
   Back Up Database, 336-338
   Browse for Objects, 288-292, 308, 312-313
   Change Autogrowth, 37-38
   Check Constraints, 54-55
Choose Name, 64, 73
Column Permissions, 316-317
Connect to Server, 25-26, 342
Database Role – New, 294
Database Role Properties, 290-291
Database User, 305-306, 308-309
Database User – New, 300-301
Edit Filter, 371
Execute Procedure, 197, 222
Foreign Key Relationships, 73-76, 84-86
Index Columns, 61-62
Indexes/Keys, 61-63
Index Properties, 62-63
Job Properties, 351
Locate Backup File, 28, 339
Locate Database Files, 40-41
Locate Folder, 34
Login – New, 281-283
New Database
creating databases, 33-34
defining database options, 36-39
New Job Schedule, 346
New User-defined Data Type, 58-59
Query Options, 364-367
Advanced page, 365
ANSI page, 366
General page, 365
Grid page, 366
Text page, 367
Relationships, 75
Restore Database, 28, 338-341
Save, 74
Select Backup Device, 28, 339-340
Select Login, 301
Select Objects, 306-308
Select Object Types, 306-307
Select Server Login or Role, 288-289
Select User or Group, 282
Select Users or Roles, 303, 315-316
Server Properties
Advanced page, 330-331
Connections page, 328-329
Database Settings page, 329-330
Memory page, 324-325
Permissions page, 331-332
Processors page, 326-327
Security page, 327-328
Server Role Properties, 288
SQL Server Login Properties, 285
Table Properties, 302-304
Tables and Columns, 70-72, 80
Trace Properties, 369-371
View Properties, 312-313
differential database backups, 335
diskadmin, 286
Disk Administrators (diskadmin), 286
Display Estimated Execution Plan button, 358
displaying Estimated Execution Plan, 358-359
DISTINCT keyword, 105-107, 119
documents (XML), returning data as, 107-109
DROP statement, 147
extracting
characters from string
  left of string, 152
  right of string, 152-153
parts of dates, 166
substrings, 159

E
Edit Filter dialog box, 371
editing. See modifying
eliminating xx row(s) affected
message, 215-216
EmpGetByTitle function, 257-258
Enterprise Edition (SQL Server), 16
@@Error function, 219-220
tables and columns
specifications, 79-81
user-defined data types, 58-60
file groups, 39
AdventureWorks2014 sample files, 27-29
file groups, 39
file types, 36
ISO file, mounting, 377-378

F
failure information, returning from stored procedures, 229-231
FC (Fibre Channel), 322
fields, 45
adding data in, 112-113
column-level permissions, 315-316
computed columns, 57-58
constraints. See constraints
data types available, 46
explained, 5
finding maximum values in, 115
finding minimum values in, 114
identity specifications, 56
indexes, 60-62
maximum values, 115
selecting, 90
Tables and Columns specifications, 79-81
user-defined data types, 58-60
file groups, 39
Express Edition (SQL Server), 14, 30
expressions
first non-null expression, returning, 172
rounding to specified length, 150-151
in SELECT statements, 90-91
error handling
explained, 227
returning success/failure information, 229-231
runtime errors, 227-228
tables and columns
specifications, 79-81
user-defined data types, 58-60
file groups, 39
AdventureWorks2014 sample files, 27-29
file groups, 39
file types, 36
ISO file, mounting, 377-378

F
failure information, returning from stored procedures, 229-231
FC (Fibre Channel), 322
fields, 45
adding data in, 112-113
column-level permissions, 315-316
computed columns, 57-58
constraints. See constraints
data types available, 46
explained, 5
finding maximum values in, 115
finding minimum values in, 114
identity specifications, 56
indexes, 60-62
maximum values, 115
selecting, 90
Tables and Columns specifications, 79-81
user-defined data types, 58-60
file groups, 39
Express Edition (SQL Server), 14, 30
expressions
first non-null expression, returning, 172
rounding to specified length, 150-151
in SELECT statements, 90-91
error handling
explained, 227
returning success/failure information, 229-231
runtime errors, 227-228
error messages, referential integrity, 83
Estimated Execution Plan, 358-359
EXCEPT operator, 138-139
EXEC permissions, 312
Execute button, 355
Execute Procedure dialog box, 197, 222
Execute Stored Procedure command, 197
executing
queries in SQL Server Management Studio, 355-358
stored procedures, 197-198
Execution Plan tab (Management Studio), 39-362
explicit transactions, 237-238
Express Edition (SQL Server), 14, 30
error messages, referential integrity, 83
Estimated Execution Plan, 358-359
EXCEPT operator, 138-139
EXEC permissions, 312
Execute button, 355
Execute Procedure dialog box, 197, 222
Execute Stored Procedure command, 197
executing
queries in SQL Server Management Studio, 355-358
stored procedures, 197-198
Execution Plan tab (Management Studio), 39-362
Explicit transactions, 237-238
Express Edition (SQL Server), 14, 30
expressions
first non-null expression, returning, 172
rounding to specified length, 150-151
in SELECT statements, 90-91
log files, 25
  explained, 42
inserting data with
triggers, 266-274
transaction log, 39
filtering data, 95-96
FindReports function, 258-260
first non-null expression,
returning, 172
fixed database roles, 289-292
fixed server roles, 286-288
Float data type, 48
flow of stored procedures, controlling
  BEGIN...END construct, 202
  CASE statement, 207-209, 212
  GOTO statement, 203-206
  IF...ELSE construct, 200-201
  labels, 203-206
  overview, 200
  RETURN statement,
  203-206, 212
  WHILE statement, 210-211
foreign key relationships, 51, 65
  adding, 79
  deleting, 79
  naming, 81
  in one-to-many relationships, 68
Tables and Columns
  specifications, 79-81
  viewing, 77-79
Foreign Key Relationships dialog box, 73-76
  Delete rule, 84-85
  Update rule, 85-86
FOR XML clause, 107-109
FROM clause, 92
full database backups, 335
full joins, 129
FullName function, 253-254
full recovery, 336, 352
function permissions, 315
functions, 149
  @@ functions, 231
    @@Error, 219-220
      explained, 216
    @@Identity, 218
    @@RowCount, 217
    @@TranCount
      function, 218
AVG, 113-114
COALESCE, 172
COUNT, 111-112
COUNT_BIG, 112
DATEADD, 168
DATEDIFF, 98-99, 169
DATENAME, 167
DATEPART, 98, 166, 174
DAY, 164
EmpGetByTitle, 257-258
FindReports, 258-260
FullName, 253-254
GetAncestor, 259
GETDATE, 96-97, 163
GetTotalInventory, 254-255
inline table-valued functions,
257-258
ISNULL, 170-171, 174
IsNumeric, 149-150
LEFT, 152
LEN, 153
LOWER, 160
LTRIM, 162
MAX, 115
MIN, 114
MONTH, 163
multi-statement table-valued functions, 258-260
NULLIF, 171
permissions, 315
REPLACE, 154
REPLICATE, 156
REVERSE, 155
RIGHT, 152-153
ROUND, 150-151
RTRIM, 163
scalar functions, 253-256
  advantages/disadvantages, 255-256
  FullName, 253-254
  GetTotalInventory, 254-255
SPACE, 158
STUFF, 157, 173
SUBSTRING, 159
SUM, 112-113
UPPER, 161
user-defined functions, 9
YEAR, 165

G
  General page (Query Options dialog), 365
  Geography data type, 48
  Geometry data type, 48
  GetAncestor function, 259
  GETDATE function, 96-97, 163
  GetTotalInventory function, 254-255
global variables
    @@Error, 219-220
    explained, 216

H
  hardware, performance tuning
    memory, 321-322
    networks, 324
    overview, 321
    processors, 322
    storage, 322-324
  HAVING clause, 117-118, 119
  help, Books Online, 149
  Hierarchyid data type, 48

I
  @@Identity function, 218
  identity increments, 56
  identity seeds, 56
  identity specifications, 56
  IF..ELSE construct, 200-201
  Image data type, 48
  implicit transactions, 237-238
implied permissions, 300
Include Actual Execution Plan button, 359
Include Client Statistics button, 359-361
Index Columns dialog box, 61-62
indexed views, 7
indexes, creating, 60-62, 362-364
Indexes/Keys dialog box, 61-63
Index Properties dialog box, 62-63
inherited/implied permissions, 300, 317
initial size of databases, 36
IN keyword, 100-101
inline table-valued functions, 257-258
inner joins
creating, 121-124
explained, 126
input parameters, 221-225
INSERT and UPDATE Specification node (relationships), 84-86
  Delete rule, 84-85
  Update rule, 85-86
INSERT permissions, 310
InsertPerson trigger, 267
INSERT statement, 143-144
Insert triggers, 266-268
installation
AdventureWorks2014 database, 27-29
Management Studio, 385-386
SQL Server, 377-382
  Add Features to an Existing Installation, 379
  Database Engine Configuration step, 382
Data Directories tab, 382-384
mounting ISO file, 377-378
New SQL Server Standalone Installation, 379-380
Ready to Install step, 382-384
Server Configuration step, 381-382
SQL Server Feature Installation step, 381
SQL Server Installation Center, 379-380
Int data type, 48
INTERSECT operator, 137
ISNULL function, 170-171, 174
IsNumeric function, 149-150
ISO file, mounting, 377-378

J-K
Job Properties dialog box, 351
jobs, 17
joining data. See joins; views
joins
explained, 121, 188
full joins, 129, 139
inner joins
  creating, 121-124
  explained, 126
outer joins, 124-125
explained, 127
left outer joins, 124
right outer joins, 125
purpose of, 126
self-joins, 130-132
junction tables, 70
logins
granting database access to
logins, 284
SA Login, 285, 296
SQL Server logins, 283-284
Windows logins, 280-282

Logins node (Management Studio), 22
looping through records with cursors,
247-249
@LoopText variable, 211
@LoopValue variable, 211
lowercase, converting strings to, 160
LOWER function, 160
LTRIM function, 162

M
maintaining databases
backing up, 335-338
Database Engine Tuning
Advisor, 341-344, 352
database maintenance plans,
344-351
restoring, 338-341
Maintenance Plan Wizard, 344-351
Management node (Management Studio), 25
Management Studio, 19
Databases node, 19-21
explained, 19-20
master database, 20
Model database, 20-21
MSDB database, 21
TempDB database, 21
executing queries in, 355-358
installation, 385-386
Management node, 25
Query Builder
  creating views with, 179-185
  modifying views, 184-185
Replication node, 24-25
Security node
  Credentials, 23
  explained, 21-22
  Logins, 22
  Server Roles, 22
Server Objects node, 23
  backup devices, 23
  linked servers, 24
  server triggers, 24
many-to-many relationships, 70, 87
master database, 20
MAX function, 115
maximum values, finding, 115
memory
  importance of, 333
  performance tips, 321-322
  SQL Server options, 324-325
Messages tab (Management Studio), 358
MIN function, 114
minimum values, finding, 114
Model database, 20-21
modifying
  database diagrams, 75-76
  triggers, 263-266
  views
    with Management Studio Query Builder, 184-185
    with T-SQL, 185-187
Money data type, 48
monitoring performance. See performance monitoring
MONTH function, 163
Mount command, 377
mounting ISO file, 377-378
MSDB database, 21
multi-statement table-valued functions, 258-260
@MyMessage parameter, 226

N

naming foreign key relationships, 81
NChar data type, 48
networks
  performance tips, 324
  SANs (Storage Area Network), 323
New Database command, 33
New Database dialog box
  creating databases, 33-34
  defining database options, 36-39
New Job Schedule dialog box, 346
New Query button, 355-356
New Query toolbar, 223
New SQL Server Stand-alone Installation option, 379-380
New Trigger command, 263
New User-defined Data Type dialog box, 58-59
NoDeleteActive trigger, 273-274
NOT keyword, 100-101
Not Null constraints, 54
NText data type, 48
NULLIF function, 171
NULL keyword, 100
nulls, 170
  COALESCE function, 172
  identifying, 170-171
ISNULL function, 170-171, 174
NULLIF function, 171
replacing values with, 171
Numeric data type, 48
numeric functions
IsNumeric, 149-150
ROUND, 150-151
numeric values, identifying, 149-150
NVARCHAR data type, 48
NVARCHAR(MAX) data type, 49

O
Object Explorer, 64
object permissions
assigning for particular objects, 302-305
assigning to users or roles, 305-309
explained, 299
one-to-many relationships, 68
one-to-one relationships, 68-69, 87
operators
EXCEPT, 138-139
INTERSECT, 137
options (database), 36-39
ORDER BY clause, 101-102
changing sort direction, 102
syntax, 101
outer joins, 124-125
explained, 127
left outer joins, 124
right outer joins, 125
output parameters, 225-226
ownership, 295

P
parameters of stored procedures, 221
explained, 231
input parameters, 221-225
output parameters, 225-226
percent (%) sign, 104
performance monitoring
indexes, creating, 362-364
overview, 355
queries
Estimated Execution Plan, 358-359
executing in SQL Server Management Studio, 355-358
query options, 364-367
SQL Server Profiler, 367-373
analyzing trace output, 372-373
creating traces, 367-372
performance tuning
hardware
memory, 321-322
networks, 324
overview, 321
processors, 322
storage, 322-324
SQL Server
advanced options, 330-331
connections options, 328-329
database settings, 329-330
memory options, 324-325
overview, 324
permissions options, 331-332
processor options, 326-327
security options, 327-328
Perform a New Installation of SQL Server 2014 option, 379-380
permissions options (SQL Server), 331-332
permission statements, 302
permissions validation, 299
column-level permissions, 315-316
database users, adding, 300-302
definition of term, 278
function permissions, 315
inherited/implied permissions, 300, 317
object permissions
assigning for particular objects, 302-305
assigning to users or roles, 305-309
explained, 299
permission statements, 302
statement permissions, 299
stored procedure permissions, 314
table permissions, 309-312
assigning, 310-312
types of, 309-310
view permissions, 312-314
plans, Estimated Execution Plan, 358-359
populating cursors, 246
primary key constraints, 51, 65
procedures, stored. See stored procedures
procEmployeeGetByTitleAndBirthDateOpt stored procedure, 224-225
procEmployeeGetByTitleAndBirthDate stored procedure, 221
procEmployeeGetYoungSalesReps stored procedure, 221
procEmployeesGetByJobTitleAndHireDate stored procedure, 244
procEmployeesGetByTitleAndBirthDateOutput stored procedure, 225-226
procEmployeesGetCursor stored procedure, 246
procEmployeesGetTemp stored procedure, 243-244
processadmin, 286
Process Administrators (processadmin), 286
processors, 322, 326-327
procGetString stored procedures, 247-248
procOrderDetailAddHandleErrors2 stored procedure, 229
procOrderDetailAddHandleErrors3 stored procedures, 230-231
procOrderDetailAddOutput stored procedure, 234
procOrderDetailAdd stored procedure, 234
procOrderDetailAddTransaction stored procedure, 238
procSalesOrderDetailDelete stored procedure, 237
procSalesOrderDetailUpdate stored procedure, 235-236
procSalesOrderHeaderUpdate stored procedure, 235
Profiler, 16-17, 367-373
analyzing trace output, 372-373
creating traces, 367-372
when to use, 374
properties, Server Properties dialog box
  Advanced page, 330-331
  Connections page, 328-329
  Database Settings page, 329-330
  Memory page, 324-325
  Permissions page, 331-332
  Processors page, 326-327
  Security page, 327-328
Public role, 292

queries. See also clauses; statements
  analyzing, 374
  Estimated Execution Plan, 358-359
  executing in SQL Server Management Studio, 355-358
joins
  explained, 121
  full joins, 129, 139
  inner joins, 121-124
  outer joins, 124-125
  purpose of, 126
  self-joins, 130-132
Query Options, 364-367
  Advanced page, 365
  ANSI page, 366
  General page, 365
  Grid page, 366
  Text page, 367
subqueries, 136-137
Top Values queries, 118-119
union queries, 133-135
Query Builder, 179-185
Query Editor, 192-195
Query Options command (Query menu), 364
Query Options dialog box, 364-367
  Advanced page, 365
  ANSI page, 366
  Grid page, 366
  Text page, 367

R
RAID (Redundant Array of Independent Disks), 323
RAM (random access memory)
  importance of, 333
  performance tips, 321-322
  SQL Server options, 324-325
Ready to Install step (SQL Server installation), 382-384
Real data type, 49
records
  deleting
    DELETE statement, 146
    Delete triggers, 272-274
    TRUNCATE statement, 147
  deleting data in, 272-274
  explained, 5-6
  inserting, 266-268
  looping through, 246-249
  updating, 269-270
recovery models, 336, 352
Redundant Array of Independent Disks (RAID), 323
REFERENCES permissions, 310
referential integrity, 81-84
refreshing tables list, 64
relationships, 67
database diagrams versus, 77
Delete rule, 84-85
establishing referential integrity, 81-84
foreign key relationships
  adding, 79
deleting, 79
naming, 81
  Tables and Columns specifications, 79-81
viewing, 77-79
many-to-many, 70, 87
one-to-many, 68
one-to-one, 68-69, 87
Update rule, 85-86
Relationships dialog box, 75
removing
  foreign key relationships, 79
spaces from strings
    leading spaces, 162
    trailing spaces, 163
table data
  DELETE statement, 146
  Delete triggers, 272-274
  stored procedures, 237
  TRUNCATE statement, 147
tables from database diagrams, 77
REPLACE function, 154
replacing
  characters in strings, 157
strings
  REPLACE function, 154
  REPLICATE function, 156
values with nulls, 171
replicas, 24
REPLICATE function, 156
replication, 24-25
Replication node (Management Studio), 24-25
Restore Database dialog box, 28, 338-341
restoring databases, 338-341
results pane (View Builder), 184
RETURN statement, 203-206, 212
@return variable, 255
REVERSE function, 155
reversing strings, 155
RIGHT function, 152-153
right outer joins, 125, 127
roles
  explained, 22, 285-286
  fixed database roles, 289-292
  fixed server roles, 286-288
permissions. See permissions validation
  server roles, 22
  user-defined database roles, 293-294
ROLLBACK TRANSACTION statement, 238-239
ROUND function, 150-151
rounding expressions to specified length, 150-151
@@RowCount variable, 217
rows
  counting, 111
deleting
  DELETE statement, 146
  Delete triggers, 272-274
  TRUNCATE statement, 147
explained, 5-6
inserting, 266-268
looping through, 246-249
RTRIM function, 163
rules, 55
check constraints versus, 65
data filtering, 95-96
runtime errors, handling, 227-228
permissions validation, 299
column-level permissions, 315-316
CONTROL permissions, 318
database users, adding, 300-302
function permissions, 315
inherited/implied permissions, 300, 317
object permissions, 299, 302-309
permission statements, 302
statement permissions, 299
stored procedure permissions, 314
table permissions, 309-312
view permissions, 312-314
roles explained, 285-286
fixed database roles, 289-292
fixed server roles, 286-288
user-defined database roles, 293-294
server roles, 22
SQL Server, 327-328, 333
views, 188
security authentication
logins, 280-285
ownership, 295
roles, 285-295
types of, 278-279, 296
credentials, 23
logins, 22
granting database access to logins, 284
SA Login, 285, 296
SQL Server logins, 283-284
Windows logins, 280-282
SA Login, 285, 296
sample files, installing, 27-29
SANs (Storage Area Network), 323
SAS (Serial Attached Small Computer System Interface), 322
SATA (Serial AT Attachment), 322
Save dialog box, 74
saving tables, 64
scalar functions, 253-256
advantages/disadvantages, 255-256
FullName, 253-254
GetTotalInventory, 254-255
security
SA Login, 285, 296
sample files, installing, 27-29
SANs (Storage Area Network), 323
SAS (Serial Attached Small Computer System Interface), 322
SATA (Serial AT Attachment), 322
Save dialog box, 74
saving tables, 64
scalar functions, 253-256
advantages/disadvantages, 255-256
FullName, 253-254
GetTotalInventory, 254-255
security
authentication
logins, 280-285
ownership, 295
roles, 285-295
types of, 278-279, 296
credentials, 23
logins, 22
granting database access to logins, 284
SA Login, 285, 296
SQL Server logins, 283-284
Windows logins, 280-282
permissions validation, 299
column-level permissions, 315-316
CONTROL permissions, 318
database users, adding, 300-302
function permissions, 315
inherited/implied permissions, 300, 317
object permissions, 299, 302-309
permission statements, 302
statement permissions, 299
stored procedure permissions, 314
table permissions, 309-312
view permissions, 312-314
roles explained, 285-286
fixed database roles, 289-292
fixed server roles, 286-288
user-defined database roles, 293-294
server roles, 22
SQL Server, 327-328, 333
views, 188
securityadmin, 286
Security Administrators (securityadmin), 286
Security node (Management Studio).
See also logins; roles
Credentials node, 23
explained, 21-22
Logins, 22
Server Roles, 22
Select Backup Devices dialog box, 28, 339-340
SELECT INTO statement, 145
Select Login dialog box, 301
Select Objects dialog box, 306-308
Select Object Types dialog box, 306-307
SELECT permissions, 310
Select Server Login or Role dialog box, 288-289
SELECT statement. See also aggregate functions
@@ functions, 231
@@Error, 219-220
explained, 216
@@Identity, 218
@@RowCount, 217
@@TranCount, 218
date and time functions, 96-98
DISTINCT keyword, 105-107, 119
EXCEPT operator, 138-139
expressions, 90-91
FOR XML clause, 107-109
FROM clause, 92
GROUP BY clause, 109-110
HAVING clause, 117-119
IN keyword, 100-101
INTERSECT, 137
NOT keyword, 100-101
ORDER BY clause, 101-102
changing sort
direction, 102
syntax, 101
overview, 89
selecting all fields, 90
SELECT permissions, 310
Select Server Login or Role dialog box, 288-289
SELECT statement. See also aggregate functions
@@ functions, 231
@@Error, 219-220
explained, 216
@@Identity, 218
@@RowCount, 217
@@TranCount, 218
date and time functions, 96-98
DISTINCT keyword, 105-107, 119
EXCEPT operator, 138-139
expressions, 90-91
FOR XML clause, 107-109
FROM clause, 92
GROUP BY clause, 109-110
HAVING clause, 117-119
IN keyword, 100-101
INTERSECT, 137
NOT keyword, 100-101
ORDER BY clause, 101-102
changing sort
direction, 102
syntax, 101
overview, 89
selecting all fields, 90

---

Select Backup Devices dialog box

Select Backup Devices dialog box, 28, 339-340
SELECT INTO statement, 145
Select Login dialog box, 301
Select Objects dialog box, 306-308
Select Object Types dialog box, 306-307
SELECT permissions, 310
Select Server Login or Role dialog box, 288-289
SELECT statement. See also aggregate functions
@@ functions, 231
@@Error, 219-220
explained, 216
@@Identity, 218
@@RowCount, 217
@@TranCount, 218
date and time functions, 96-98
DISTINCT keyword, 105-107, 119
EXCEPT operator, 138-139
expressions, 90-91
FOR XML clause, 107-109
FROM clause, 92
GROUP BY clause, 109-110
HAVING clause, 117-119
IN keyword, 100-101
INTERSECT, 137
NOT keyword, 100-101
ORDER BY clause, 101-102
changing sort
direction, 102
syntax, 101
overview, 89
selecting all fields, 90
SQL Server

Processors page, 326-327
Security page, 327-328
Server Role Properties dialog box, 288
Server Roles node (Management Studio), 22
Server Roles subnode. See roles servers
  connecting to, 25-26
SQL Server. See SQL Server
erver triggers, 24
SET NOCOUNT statement,
  215-216, 231
SET statement, 248
setadmin, 286
Setup Administrators (setupadmin),
  286
short (constraints), 51
simple (constraints), 51
simple recovery, 336, 352
size of databases, 36
SmallDateTime data type, 49
SmallInt data type, 49
SmallMoney data type, 49
Solid State Disks (SSDs), 323-324
sort direction, changing, 102
SPACE function, 158
spaces
  returning, 158
  removing from strings
    leading spaces, 162
    trailing spaces, 163
sp_changeobjectowner stored procedure, 295
sp_changeobjectowner system-stored procedure, 295
@SQLCommand variable, 248
SQL pane (View Builder), 184
SQL Profiler, 16-17, 367-373
  analyzing trace output, 372-373
  creating traces, 367-372
  when to use, 374
SQL Server
Activity Monitor, 25
authentication
  explained, 277-278
  logins, 280-285
  ownership, 295
  roles, 285-295
  types of, 278-279, 296
Database Engine Tuning Advisor, 18-19
databases. See databases
installation, 377-382
  Add Features to an Existing Installation, 379
  Database Engine
    Configuration step, 382
  Data Directories tab,
    382-384
  mounting ISO file, 377-378
  New SQL Server
    Stand-alone Installation,
    379-380
  Ready to Install step,
    382-384
  Server Configuration step,
    381-382
  SQL Server Feature
    Installation step, 381
  SQL Server Installation Center, 379-380
log files, 25
explained, 42
inserting data with triggers, 266-274
transaction log, 39

logins
creating, 283-284
granting database access to logins, 284
SA Login, 285, 296
SQL Server logins, 283-284
Windows logins, 280-282

Management Studio, 19
Databases node, 19-21
executing queries in, 355-358
installation, 385-386
Management node, 25
Replication node, 24-25
Security node, 21-23
Server Objects node, 23-24

performance tuning
advanced options, 330-331
connections options, 328-329
database settings, 329-330
memory options, 324-325
overview, 324
permissions options, 331-332
processor options, 326-327
security options, 327-328
Profiler, 16-17, 367-373
analyzing trace output, 372-373
creating traces, 367-372
when to use, 374

roles
explained, 285-286
fixed database roles, 289-292
fixed server roles, 286-288
user-defined database roles, 293-294
Security node, 21-23
SQL Server Agent, 17
SQL Server Database Engine, 387

versions
overview, 13
SQL Server 2014 Business Intelligence Edition, 15
SQL Server 2014 Enterprise Edition, 16
SQL Server 2014 Express, 14
SQL Server Express Edition, 30
SQL Server Standard Edition, 15
SQL Server Web Edition, 14-15

views
advantages of, 188
creating with Management Studio Query Builder, 179-185
creating with T-SQL, 185-187
explained, 177-179
security, 188
SQL Server 2014 Business Intelligence Edition, 15
SQL Server 2014 Enterprise Edition
installing
Add Features to an Existing Installation, 379
Database Engine
Configuration step, 382
Data Directories tab, 382-384
mounting ISO file, 377-378
New SQL Server Stand-alone Installation, 379-380
Ready to Install step, 382-384
Server Configuration step, 381-382
SQL Server Feature Installation step, 381
SQL Server Installation Center, 379-380
overview, 16
SQL Server 2014 Express, 14
SQL Server Agent, 17
SQL Server and Windows (Mixed) authentication, 278-279, 296
SQL Server Database Engine, 387
SQL Server Express Edition, 30
SQL Server Feature Installation step (SQL Server installation), 381
SQL Server Installation Center, 379
SQL Server Login Properties dialog box, 285
SQL Server Standard Edition, 15
SQL Server Web Edition, 14-15
SQL_Variant data type, 49
SSDs (Solid State Disks), 323-324
stable (constraints), 51
Standard Edition (SQL Server), 15
Standard role, 293
statement permissions, 299
statements. See also clauses; functions; keywords
ALTER VIEW, 187
BEGIN TRANSACTION, 239
COMMIT TRANSACTION, 239
CREATE VIEW, 185-187
DECLARE CURSOR, 245
DELETE compared to TRUNCATE, 147 explained, 146
DENY, 302, 317
DROP, 147
flow control constructs
BEGIN...END, 202
CASE, 207-209, 212
GOTO, 203-206
IF...ELSE, 200
RETURN, 203-206, 212
WHILE statement, 210-211
GRANT, 302
INSERT, 143-144
permissions, 299
ROLLBACK TRANSACTION, 239
SELECT date and time functions, 96-98
DISTINCT keyword, 105-107, 119
EXCEPT operator, 138-159
expressions, 90-91
FOR XML clause, 107-109
FROM clause, 92
@@ functions, 216-220
GROUP BY clause, 109-110
HAVING clause, 117-119
IN keyword, 100-101
INTERSECT operator, 137
NOT keyword, 100-101
ORDER BY clause, 101-102
overview, 89
selecting all fields, 90
selecting specific fields, 90
SET NOCOUNT, 231
syntax, 90
TOP clause, 118-119
when to use, 103
WHERE clause, 93-96, 119
wildcard characters, 104
SELECT INTO, 145
SET, 248
SET NOCOUNT, 215-216, 231
TRUNCATE, 147
UPDATE, 141-142
WITH GRANT, 302, 317
stopping traces, 372
Stop Selected Trace command, 372
storage, 322-324
Storage Area Network (SANs), 323
stored procedure permissions, 314
stored procedures. See also triggers
benefits of, 191-192
compared to triggers, 10
controlling flow of
BEGIN...END
construct, 202
CASE statement, 207-209, 212
GOTO statement, 203-206
IF...ELSE construct, 200-201
labels, 203-206
overview, 200
RETURN statement, 203-206, 212
WHILE statement, 210-211
creating
in Query Editor, 192-195
with T-SQL, 196
cursors, 245-249
defining, 245
looping through records with, 246-249
populating, 246
definition of term, 8
deleting data with, 237
error handling
explained, 227
returning success/failure information, 229-231
runtime errors, 227-228
executing, 197-198
inserting data with, 233-235
parameters, 221
explained, 231
input parameters, 221-225
output parameters, 225-226
permissions, 314
procEmployeeGetByTitleAndBirthDate, 221
procEmployeeGetByTitleAndBirthDateOpt, 224-225
procEmployeeGetYoungSalesReps, 221
procEmployeesGetByJobTitleAndHireDate, 244
strings

procEmployeesGetByTitleAndBirthDateOutput, 225-226
procEmployeesGetCursor, 246
procEmployeesGetTemp, 243-244
procGetString, 247-248
procOrderDetailAdd, 234
procOrderDetailAddHandleErrors2, 229
procOrderDetailAddHandleErrors3, 230-231
procOrderDetailAddOutput, 234
procOrderDetailAddTransaction, 238
procSalesOrderDetailDelete, 237
procSalesOrderDetailUpdate, 235-236
procSalesOrderHeaderUpdate, 235
returning success/failure information from, 229-231
security, 250
SET NOCOUNT statement, 215-216
sp_changeobjectowner, 295
temporary tables, 243-244
transactions, 237
implementing, 238-239
implicit versus explicit, 237-238
updating data with, 235-236
variables, 198-199
string functions, 151
LEFT, 152
LEN, 153
LOWER, 160
LTRIM, 162
REPLACE, 154
REPLICATE, 156
REVERSE, 155
RIGHT, 152-153
RTRIM, 163
SPACE, 158
STUFF, 157
SUBSTRING, 159
UPPER, 161
strings
correcting to lowercase, 160
correcting to uppercase, 161
determining length of, 153
extracting characters from left, 152
extracting characters from right, 152-153
extracting substrings from, 159
removing spaces from leading spaces, 162
trailing spaces, 163
replacing
REPLACE function, 154
REPLICATE function, 156
replacing characters in, 157
returning spaces in, 158
reversing, 155
string functions, 151
LEFT, 152
LEN, 153
LOWER, 160
LTRIM, 162
REPLACE, 154
REPLICATE, 156
REVERSE, 155
RIGHT, 152-153
MAX function, 115
SUM, 112-113
aliases, 92
columns, 45
adding data in, 112-113
column-level permissions, 315-316
computed columns, 57-58
constraints. See constraints
data types available, 46
explained, 5
finding maximum values
in, 115
finding minimum values
in, 114
identity specifications, 56
indexes, 60-62
maximum values, 115
selecting, 90
Tables and Columns
specifications, 79-81
user-defined data types,
58-60
constraints. See constraints
creating, 45-46, 145
definition of term, 5-6
deleting data from
DELETE statement, 146
stored procedures, 237
TRUNCATE statement, 147
identity specifications, 56
indexes, 60-62, 362-364
inserting data into
INSERT statement, 143-144
Insert triggers, 266-268
stored procedures, 233-235
time/date functions

joins, 188
  explained, 121
  full joins, 129, 139
  inner joins, 121-124
  outer joins, 124-127
  purpose of, 126
  self-joins, 130-132
junction tables, 70
nulls, 170
  COALESCE function, 172
  ISNULL function, 170-171, 174
  NULLIF function, 171
permissions, 309-312
  assigning, 310-312
  types of, 309-310
refreshing list, 64
relationships, 67
  database diagrams versus, 77
  Delete rule, 84-85
  establishing referential integrity, 81-84
  foreign key relationships, 77-81
  many-to-many, 70, 87
  one-to-many, 68
  one-to-one, 68-69, 87
  Update rule, 85-86
removing from database diagrams, 77
rows
  counting, 111
  deleting, 146-147, 272-274
  explained, 5-6
  inserting, 266-268
  looping through, 246-249
  updating, 269-270
saving, 64
table aliases, 92
Tables and Columns specifications, 79-81
temporary tables
  stored procedures, 243-244
  when to use, 250
union queries, 133-135
updating
  stored procedures, 235-236
  UPDATE statement, 141-142
  Update triggers, 269-270
Tables and Columns dialog box, 70, 72, 80
Tables and Columns specifications, 79-81, 86
table-valued functions
  inline table-valued functions, 257-258
  multi-statement table-valued functions, 258-260
TAKE OWNERSHIP permissions, 310
TempDB, 243-244
TempDB database, 21
temporary tables
  stored procedures, 243-244
  when to use, 250
Text data type, 49
Text page (Query Options dialog), 367
Time data type, 49
time/date functions, 96-98, 163
  DATEADD, 168
  DATEDIFF, 98-99, 169
time/date functions

DATENAME, 167
DATEPART, 98, 166, 174
DAY, 164
GETDATE, 96-97, 163
MONTH, 163
YEAR, 165

TimeSpan data type, 50
TinyInt data type, 50
toolbars, New Query, 223
TOP clause, 118-119
Top Values queries, 118-119
Trace Properties dialog box, 369-371

traces
- analyzing trace output, 372-373
- creating, 367-372
- stopping, 372
- trace window, 372-373

trace window, 372-373

trailing spaces, removing from strings, 163
@@TranCount function, 218

transaction log, 39

transactions, 237

- implementing, 238-239
- implicit versus explicit, 237-238
- transaction log, 39
- when to use, 240

triggers. See also stored procedures compared to stored procedures, 10
creating, 263-266
- Delete triggers, 272-274
- Insert triggers, 266-268
- syntax, 266
- Update triggers, 269-270
definition of term, 10, 263, 275
disadvantages of, 274-275

modifying, 263-266

server triggers, 24
when to use, 275

TRUNCATE statement, 147
tuning performance. See performance tuning

underscore (_), 95, 104
union queries, 133-135
unique constraints, 56
UniqueIdentifier data type, 50
UPDATE permissions, 310
UpdatePerson trigger, 269-270
Update rule (relationships), 85-86
UPDATE statement, 141-142
Update triggers, 269-270

upcase, converting strings to, 161
UPPER function, 161

user-defined database roles, 293-294
user-defined data types, 58-60
user-defined functions
- benefits of, 9
definition of term, 9
EmpGetByTitle, 257-258
FindReports, 258-260
FullName, 253-254
GetTotalInventory, 254-255
inline table-valued functions,
257-258
multi-statement table-valued functions, 258-260
versions of SQL Server

validating permissions. See permissions validation
values, null
   COALESCE function, 172
   ISNULL function, 170-171
   NULLIF function, 171
VarBinary data type, 50
VarBinary(MAX) data type, 50
VarChar data type, 50
VarChar(MAX) data type, 50
variables
   @AverageFreight, 209
   @Country, 201
creating in stored procedures, 198-199
   @Cursor, 249
global variables
   @@Error, 219-220
   explained, 216
   @@Identity, 218
   @@RowCount, 217
   @@TranCount, 218
@Locale, 201
@LocalError, 239
@LocalRows, 239
@LoopText, 211
@LoopValue, 211
@return, 255
@SQLCommand, 248

versions of SQL Server
overview, 13
SQL Server 2014 Business Intelligence Edition, 15


eventing permissions, validating permissions. See permissions validation
values, null
   COALESCE function, 172
   ISNULL function, 170-171
   NULLIF function, 171
VarBinary data type, 50
VarBinary(MAX) data type, 50
VarChar data type, 50
VarChar(MAX) data type, 50
variables
   @AverageFreight, 209
   @Country, 201
creating in stored procedures, 198-199
   @Cursor, 249
global variables
   @@Error, 219-220
   explained, 216
   @@Identity, 218
   @@RowCount, 217
   @@TranCount, 218
@Locale, 201
@LocalError, 239
@LocalRows, 239
@LoopText, 211
@LoopValue, 211
@return, 255
@SQLCommand, 248

versions of SQL Server
overview, 13
SQL Server 2014 Business Intelligence Edition, 15

over view, 253
scalar functions, 253-256
   advantages/disadvantages, 255-256
   FullName, 253-254
   GetTotalInventory, 254-255
users
   adding, 300-302
authentication
   explained, 277-278
   logins, 280-285, 296
   ownership, 295
   roles, 285-294
   types of, 278-279, 296
ownership, 295
permissions validation, 299
   column-level permissions, 315-316
   CONTROL permissions, 318
   database users, adding, 300-302
function permissions, 315
inherited/implied permissions, 300, 317
object permissions, 299, 302-309
permission statements, 302
statement permissions, 299
stored procedure permissions, 314
table permissions, 309-312
view permissions, 312-314
SQL Server 2014 Enterprise Edition, 16
SQL Server 2014 Express, 14
SQL Server Express Edition, 30
SQL Server Standard Edition, 15
SQL Server Web Edition, 14-15
View Builder, 184-185
VIEW DEFINITION permissions, 310
view permissions, 312-314
View Properties dialog box, 312-313
views
advantages of, 177, 188
creating, 179
with Management Studio Query Builder, 179-185
with T-SQL, 185-187
customizing user data with, 188
definition of term, 7
explained, 177-179
indexed views, 7
modifying
with Management Studio Query Builder, 184-185
with T-SQL, 185-187
permissions, 312-314
security, 188

W

Web Edition (SQL Server), 14-15
WHERE clause, 119
data filtering rules, 95-96
IN keyword, 100-101
NOT keyword, 100-101

NULL keyword, 100
syntax, 93-94
WHILE statement, 210-211
wildcard characters, 104
Windows Administrators group, 287, 296
Windows logins, 280-282
Windows Only authentication, 278-279, 296
WITH GRANT statement, 302, 317
wizards, Maintenance Plan Wizard, 344-351
workloads, creating, 343-344

X-Y-Z

XML data type, 50
XML documents, returning data as, 107-109
xx row(s) affected message, eliminating, 215-216

YEAR function, 165