



Using SQL with SQL Developer 20.4

Section	Title	Page
One	Introduction to SQL	2
	- Usage of SQL	3
	- Definition of a Database	5
	- What is SQL Developer ?	6
Two	The SQL Developer Interface	7
	- Introduction	8
	- SQL Developer Connections	10
	- Connections	12
	- Worksheet	13
- Toolbar and Menus	14	
Three	Connections	15
	- Viewing Objects	16
	- Viewing Object Structure	17
	- Table Structure	18
	- Column Structure	20
	- Mandatory Columns	24
	- Data Default	25
	- The Number Datatype	26
	- The Varchar2 Datatype	27
	- The Date Datatype	28
	- Large Objects	29
	- The BLOB Datatype	32
	- The CLOB Datatype	31
	- Object Details Dialog	32
Four	Object Details Dialog	33
	- Introduction	34
	- Columns Tab	35
	- Columns Tab (Resizing columns)	36
	- Columns Tab (Moving columns)	37
	- Columns Tab (Sorting columns)	38
	- Columns Tab (Filter)	39
	- Columns Tab (Icons)	40
	- Columns Tab (Right Click)	41
	- Data Tab	42
	- Data Tab (Single Record View)	43
	- Data Tab (Count Rows)	45
	- Data Tab (Viewing Blobs and Clobs)	46
	- Data Tab (Viewing Blobs)	47
	- Model Tab	49
	- Constraints Tab	52
	- Grants Tab	53
	- Statistics Tab	54
- Triggers Tab	55	
- Flashback Tab	56	
- Dependencies Tab	57	
- Details Tab	58	
- Partitions Tab	59	



Using SQL with SQL Developer 20.4

Section	Title	Page
	- Indexes Tab	60
	- SQL Tab	61
	- <i>Exercise One</i>	62
Five	Limiting Records in the Data Tab	73
	- Introduction	74
	- Usage	75
	- Using Varchar2 and Dates	76
	- Case Sensitivity	77
	- Limiting Dates	78
	- Invalid Identifier	79
	- Invalid Number	80
	- Direct Comparison	81
	- Value Comparison	83
	- Column Comparison	85
	- Range Comparison	86
	- List Comparison	89
	- Wildcard Comparison	92
	- Null Values	96
	- Combining Filters	97
	- AND Filters	98
	- OR Filters	99
	- Complex Filters	100
	- <i>Exercise Two</i>	101
Six	Ordering Records in the Data Tab	111
	- Ordering Records in the Data Tab – Introduction	112
	- Ordering Records in the Data Tab – Examples	113
Seven	SQL Worksheet	114
	- Introduction	115
	- Opening in SQL Developer	116
	- Creating an SQL Statement	117
	- Executing an SQL Statement	119
	- Formatting the SQL Statement	120
	- SQL Syntax	121
	- Labelling Selected Columns (Column Aliases)	127
	- Using Literals	130
	- Database Variables and Sys.DUAL	128
	- Saving the SQL to a File	130
	- Opening and Executing a File	132
	- Commenting Out Lines	133
	- Identifying Amended Files	135
	- SQL History	136
	- Miscellaneous Commands	137
	- Query Result Buttons	138
	- Find / Highlight	143
	- Searching the Output	144
	- <i>Exercise Three</i>	146



Using SQL with SQL Developer 20.4

Section	Title	Page
Eight	Manipulating SQL Output	151
	- Introduction	152
	- Functions	153
	- Upper and Lower	156
	- Round	157
	- Ceil and Floor	159
	- Count	160
	- Using '*' in Selections	161
	- Sum	162
	- To_Char	163
	- To_Char (Number Examples)	164
	- To_Char (Date Examples)	166
	- Substr	168
	- Substr Examples	169
	- Decode	170
	- Combining Functions	172
	- Concatenating Columns	173
	- Performing Mathematics	175
Nine	Snippets	177
	- Introduction	178
	- Topography	179
	- Using Snippets with the SQL Worksheet	180
	- Adding User Defined Snippets	183
	- Editing User Defined Category	185
	- Editing User Defined Snippets	187
	- <i>Exercise Four</i>	188
Ten	Limiting Data in the SQL Worksheet	197
	- The Where Clause	198
	- Using Functions within the Where Clause	200
	- Using Lower with a Where Clause	201
	- Using Substr with a Where Clause	202
	- Using NVL with a Where Clause	203
	- Using To_Date with a Where Clause	204
	- Using Trunc with a Where Clause	207
	- Using Trunc with a Number	208
	- Using Trunc with a Date	209
	- Sub-Queries with a Where Clause	210
	- Exists with a Where Clause	212
	- Correlated Sub-Queries	214
	- Table Aliases	215
	- Advanced IN Sub-Queries	216
Eleven	Ordering Data in the SQL Worksheet	218
	- Introduction	219
	- Advanced Techniques	220
	- Using Decode in Order By	222
	- <i>Exercise Five</i>	224



Using SQL with SQL Developer 20.4

Section	Title	Page
Twelve	Aggregating Values in SQL Worksheet	229
	- Introduction	230
	- ORA-00937: Not a single-group function	231
	- Using Group By	232
	- Using Where with Group By	234
	- Using Having with Group By	236
	- Using Rollup to Total Grouping	238
	- <i>Exercise Six</i>	243
Thirteen	Joining Tables in an SQL Statement	246
	- Introduction	247
	- Linking Tables in an SQL Statement	249
	- Linking Tables using ANSI SQL/86	253
	- Linking Tables in an SQL Statement	254
	- Cartesian Products in an SQL Statement	255
	- Problems with Joining Tables in SQL	257
	- Linking Tables using ANSI SQL/99	260
	- Natural Join using ANSI SQL/99	261
	- Cross Join using ANSI SQL/99	263
	- Join using ANSI SQL/99	264
	- Join On using ANSI SQL/99	265
	- Outer Joins using ANSI SQL/99	266
	- Left Outer Join using ANSI SQL/99	267
	- Right Outer Join using ANSI SQL/99	268
	- Full Outer Join using ANSI SQL/99	269
- Multiple Joins using ANSI SQL/99	270	
- <i>Exercise Seven</i>	271	
Fourteen	Query Builder in the SQL Worksheet	274
	- Introduction	275
	- Invoking Query Builder	276
	- Query Builder Topography	278
	- Selecting Tables	282
	- Checking Links	283
Fifteen	Using Views	284
	- Using Views – Database Views	285
	- Using Views – Materialized Views	286
Sixteen	Merging Tables in an SQL Statement	287
	- Creating Table Sets in SQL	288
	- Using the Merge / Set Syntax in SQL	289
	- Using Union to Merge Tables in SQL	291
	- Using Union All to Merge Tables in SQL	292
	- Using Intersect to Merge Tables in SQL	293
	- Using Intersect All to Merge Tables in SQL	294
	- Using Minus to Merge Tables in SQL	295
	- Using Minus All to Merge Tables in SQL	296
	- Using Except to Merge Tables in SQL	297
	- Using Except All to Merge Tables in SQL	298
	- Using the Merge Syntax in SQL	299



Using SQL with SQL Developer 20.4

Section	Title	Page
Seventeen	Regular Expressions in Oracle SQL	300
	- Introduction	301
	- Using REGEXP_LIKE in Where Clauses	304
	- Case Sensitivity	306
	- Line Anchors	308
	- Using the Dot (Any Character)	310
	- Counting Characters {Intervals}	314
	- Character Lists	318
	- Excluding Character Lists	324
	- Alternatives to Character Lists	325
	- Class Shorthands	328
	- Or Patterns (Alternatives)	329
	- Or Patterns with Character Lists	330
	- Using the Question Mark (Optional)	331
	- Using the Plus sign (Mandatory)	334
	- Using the Star sign (Optional)	337
	- Backreferencing	338
	- POSIX	340
	- Using POSIX in Oracle - [:upper] example	342
	- Using POSIX in Oracle - [:digit] example	343
	- Using POSIX in Oracle – Character equivalents	344
	- Using Regexp_count in SQL	345
	- Using Regexp_replace in SQL	349
	- Using Regexp_instr in SQL	351
	- Using Regexp_substr in SQL	353
	- Using Regular Expressions in Oracle	355
Eighteen	Exporting Data in SQL Developer	356
	- Introduction	357
	- File Types	359
	- Exporting to CSV	360
	- Exporting to Delimited	362
	- Exporting to Excel	363
	- Exporting to Excel.xml	365
	- Exporting to Fixed	367
	- Exporting to HTML	369
	- Insert	372
	- Json	374
	- Insert	375
	- Loader	376
	- Loader (ldr)	377
	- Loader (ctl)	378
	- PDF	379
	- Text	381
	- XML	383



Using SQL with SQL Developer 20.4

Section	Title	Page
Nineteen	SQL Developer Help Facility	385
	- Introduction	386
	- Search and Table of Contents	387
	- Start Page	388
	- Data Miner	389
	- Check for Updates	390
	- About	391
	- <i>Exercise Eight</i>	392

Section Two

One	Tree Walking Tables in SQL Worksheet	2
	- Introduction	3
	- Syntax for Tree Walking	6
	- Using LPAD with Tree Walking	11
	- Using Order Siblings By in Tree Walks	13
	- Using Sys_Connect_By_Path in Tree Walks	14
	- <i>Exercise Eight</i>	16
Two	Sub-Queries in Oracle SQL	21
	- Introduction	22
	- Using Equals	23
	- In and Not In	26
	- Exists	28
	- Any / Some	29
	- All	30
	- Correlated Queries	31
	- Correlated Updates and Deletes	33
	- Inline Views	34
	- Inline View Example	35
	- Sub-Queries in a Select Statement	36
	- Sub-Query Factoring (Using With)	37
- Sub-Query Factoring Example with Aliases	39	
- Sub-Query Factoring Example with Joins	40	
Three	Advanced SQL Query Techniques	41
	- Introduction	42
	- Using First_Value/Last_Value	43
	- ORA-30484: missing window specification	46
	- Breakdown of Window Specification	47
	- Window Specification - The Arguments	49
	- Window Specification - Query Partition	50
	- Window Specification - The Order By	52
	- Window Specification - The Windowing	54
	- Window Specification - Rows between	56
	- Difference between Range and Rows	63
	- Using Lead and Lag	66
- Using the Rank Function	69	



Using SQL with SQL Developer 20.4

Section	Title	Page
	- Using the Rank Function with partition by	71
	- Using the Ntile Function	72
	- Using Width_Bucket Function	74
	- Using Width_Bucket Function in SQL Worksheet	76
	- Pivot	77
	- Adding a Total to a Pivot	84
	- Changing the Pivot Headings of X Axis	85
	- Unpivot	87
	- Using Listagg Function in SQL	90
	- Using Case Function	92
	- Nesting the Case Function	95
	- Subqueries in the Case Function	96
	- Using Ratio_To_Report Function	97
	- Fetch first rows of a Table (Top-N)	99
	- Using Percent with Fetch	101
	- Using Offset with Fetch	102
	- Using With Ties with Fetch	103
Four	Using Alternative Quoting Mechanism	104
	- Introduction to AQM	105
	- Using Alternative Quoting Mechanism	106
	- <i>Exercise Two</i>	108
Five	Committing Records	116
	- DML Changes	118
	- DML Changes in SQLcl	123
	- DDL Changes	124
Six	Data Manipulation in SQL Developer	125
	- General Comments	127
	- Updating a record in Data	128
	- ORA-00001: unique constraint violated	130
	- Reverting Changes using Refresh	131
	- Updating a table with a trigger in Data	132
	- ORA-04088: error during execution of trigger	133
	- Deleting a record in Data	134
	- ORA-02292: integrity constraint violated	135
	- Rules When Populating Tables	136
	- Inserting a record in Data	137
Seven	Data Manipulation in SQL Worksheet	139
	- Introduction	140
	- SQL Syntax for Populating Tables	142
	- SQL Syntax for Populating Tables (multiple insert)	147
	- Inserting Data using the SQL Worksheet	150
	- Saving the Insert statement	156
	- Substitution Variables	157
	- Updating Data in SQL Worksheet	161
	- Deleting Data in SQL Worksheet	166
	- Deleting Records using Truncate	169
	- <i>Exercise Three</i>	171



Using SQL with SQL Developer 20.4

Section	Title	Page
Eight	SQLcl in SQL Developer	178
	- Introduction	179
	- Running the SQLcl product	180
	- How to log into SQLcl	181
	- Anatomy of SQLcl	185
	- How to exit an SQLcl Session	186
	- Copying and pasting in SQLcl	187
	- Using the Line Editor in SQLcl	189
	- Re-defining Line Editor in SQLcl using define_editor	192
	- SQLcl Environment Settings	192
	- Opening files in SQLcl	194
	- Saving SQL in SQLcl	196
	- Changing the SQLcl Prompt	198
	- Clearing SQLcl screen	201
	- Alias	202
	- Statusbar	207
	- Spool to Zip	210
	- Repeat	211
	- Highlighting	213
	- Help Alias	214
	- glogin.sql, login.sql, startup.sql	215
	- Creating login.sql	216
	- Saving settings within SQLcl	218
	- Using SQLcl within Worksheet	221
	- Help	222
	- Help Set	224
	- Help reserved_words	225
	- The purpose of describe	226
	- Using spool to write the output to files	227
	- Producing DDL	230
	- Info	231
	- SQLFormat	232
	- Load, Unload and LoadFormat	235
	- Displaying all Environment Settings	244
	- Set Heading off	245
	- Set Pause on	246
	- Set Pagesize	247
	- Set Linesize	249
	- Set Wrap	250
	- Show All	251
	- Renaming Columns for the Session	252
	- Wrapping Columns	256
	- Justifying Column Headings	258
	- Suppressing Columns	259
	- Truncate Columns	260
	- Viewing Columns	261
	- Viewing All Columns	262



Using SQL with SQL Developer 20.4

Section	Title	Page
	- Temporarily Disabling Columns	263
	- Clearing Columns	264
	- Using Columns to deal with Nulls	265
	- Using Break in the Output	266
	- Using Aliases with Break	268
	- Using Skip with Break	269
	- Using Skip Row with Break	270
	- Displaying Duplicates with Break	271
	- Viewing/Clearing Breaks	272
	- Using Compute with Break	273
	- Using Compute Labels with Break	275
	- Using Compute Sub-totaling with Break	278
	- Combining Computes	279
	- Setting Titles for the Output	280
	- Using SQL.PNO in the Title	284
	- Using Variables in the Title	286
	- Using Btitle	289
	- Reviewing the Title settings	291
	- Suppressing the Title settings	292
	- <i>Exercise Four</i>	293
Nine	Table Manipulation in SQL Developer	299
	- Creating Columns for Tables	300
	- Naming Tables and Columns	301
	- Creating Tables	303
	- Creating Columns	306
	- Column Datatypes	307
	- Creating Mandatory Columns	309
	- Creating Indexes for Tables	310
	- Default	312
	- Table Creation DDL	314
	- Creation Syntax for Tables	315
	- Comments for Columns	316
	- Comments for Tables	320
	- User_Tab_Comments	323
	- User_Col_Comments	324
	- Renaming a Table	325
	- Creating a Table by copying an existing one	328
	- Copying Tables SQL Syntax	330
	- Dropping Tables	333
	- Dropping Tables (Cascade Constraints)	335
	- Dropping Tables (Purge)	336
	- Dropping Tables (Flashback to Before Drop)	339
	- Dropping Tables SQL Syntax	341
	- Restoring Tables from Recycle SQL Syntax	343
	- Altering Columns	346
	- Renaming Columns	348
	- Renaming Columns Syntax	350



Using SQL with SQL Developer 20.4

Section	Title	Page
	- ORA-00957: Duplicate Column Name	351
	- Adding Columns	352
	- ORA-00910: specified length too long for its datatype	353
	- Adding Columns SQL Syntax	354
	- Dropping Columns	356
	- ORA-12992: Cannot drop parent key column	357
	- Dropping Columns Syntax	358
	- Modifying Columns Syntax	359
	- Rules for Modifying Columns	360
	- Multiple Column Modification	361
	- Normalizing Columns	362
Ten	Table Constraints and Indexes	365
	- Introduction	366
	- Creating Indexes in SQL	369
	- Add Primary Key	372
	- ORA-02260: Table can have only one primary key	374
	- Add Unique Key	375
	- Add Foreign Key	377
	- ORA-02267: column type incompatible with type	379
	- ORA-02270: no matching unique or primary key	380
	- Non-Unique Index	381
	- Primary Key Creation in SQLcl	383
	- Primary Key Creation in SQL	384
	- Foreign Key DDL	385
	- Unique Key Creation in SQL	386
	- Non-Unique Index DDL	388
	- Disabling Indexes in SQL Developer	389
	- Disabling Indexes in SQLcl	391
	- Check Constraints	392
	- Add Check	393
	- ORA-02293: cannot validate— check constraint violated	394
	- Check Constraint Syntax in SQLcl	395
	- Drop	399
Eleven	Sequences	400
	- Introduction	401
	- Creating Sequences	402
	- Viewing Sequences	404
	- Editing Sequences	405
	- Using Sequences	406
	- Dropping Sequences	407
	- <i>Exercise Five</i>	408
Twelve	Views	416
	- Introduction	417
	- Creating Views Syntax	419
	- New View	422
	- Creating Views	423
	- ORA-00936: Missing expression	426



Using SQL with SQL Developer 20.4

Section	Title	Page
	- Check Syntax	427
	- Query Restriction	429
	- Force on Create	431
	- Updating using Views	432
	- ORA-42399: Cannot perform a DML on a read-only	433
	- Renaming Views SQL Syntax	434
	- Renaming Views	435
	- Dropping a View SQL Syntax	436
	- Dropping a View	437
	- Compiling a View	438
Thirteen	Materialized Views	440
	- Introduction	441
	- Creating Simple Materialized Views	443
	- New Materialized View	446
	- Refresh Options	447
	- Refresh Method	457
	- Fast Refresh and Materialized View Logs	459
	- Key Type	466
	- Editing Materialized Views	467
	- Viewing Materialized Views	470
	- Dropping Materialized Views	471
	- Synchronizing Materialized Views	473
	- <i>Exercise Six</i>	475
Fourteen	Accessing Objects	480
	- Introduction	481
	- Privileges	482
	- Granting Privileges	484
	- Revoking Privileges	485
	- Viewing Privileges	486
	- ORA-01031: Insufficient Privileges	487
	- Granting Privileges Syntax	488
	- Revoking Privileges Syntax	490
	- Accessing other Schemas	491
	- Accessing other Schemas with SQL Worksheet	493
	- Accessing other Schemas with Synonyms	494
	- ORA-00955: Name is already used	499
	- Synonym SQL Syntax	500
	- Dropping Synonyms	501
	- Dropping Synonyms Syntax	502
	- Public Synonyms	503
Fifteen	Virtual Columns	504
	- Creating Virtual Columns with new Table	506
	- Adding Virtual Columns to Existing Table	507
	- Using Virtual Columns	510
	- Using Virtual Columns in SQLcl	511
	- Using Virtual Columns with Functions	513
	- ORA-54002: only pure functions can be specified	514



Using SQL with SQL Developer 20.4

Section	Title	Page
	- ORA-54012: virtual column is referenced in a column	515
	- ORA-54015: Duplicate column expression specified	516
	- ORA-54013: INSERT disallowed on virtual columns	517
	- ORA-54017: UPDATE disallowed on virtual columns	518
Sixteen	Invisible Columns	519
	- ORA-54034: column to be dropped or modified is used	524
Seventeen	Oracle Directories	525
	- Introduction	526
	- Creating Directories	527
	- Dropping Directories	532
Eighteen	External Tables	534
	- Introduction	535
	- Creating using SQL Developer	536
	- Columns	538
	- External Table Properties	541
	- Access Parameters	545
	- Access Parameters (Load When)	546
	- Using Load When with Position	549
	- Access Parameters (Audit Tables)	550
	- Access Parameters (Logfile)	553
	- Access Parameters (Badfile)	556
	- Access Parameters (Discardfile)	557
	- Access Parameters (Skip)	558
	- Access Parameters (terminated by)	559
	- Access Parameters (missing field values)	560
	- Access Parameters (Reject Rows With all Null Fields)	561
	- Access Parameters (Tab Separated)	562
	- Access Parameters (Trimming values)	563
	- Access Parameters (external file columns)	564
	- Access Parameters - Defining Fields	566
	- Location Specifier	567
	- Multiple Flat Files	568
	- Creating External Tables Syntax	569
	- Access Parameters for Fixed Length Files	572
	- Editing External Tables	576
	- Using Alter Table with External Tables	577
	- Using Oracle Datapump	579
	- Creating Oracle Datapump flat files	580
	- Accessing Oracle Datapump flat files	584
	- Overwriting the Flat File	585
	- Metadata for External Tables	586
	- <i>Exercise Seven</i>	588
Nineteen	Importing External Data	591
	- Introduction	592
	- Beginning the Import	593
	- Step 1 Using CSV	595
	- Step 1 Using Excel	597



Using SQL with SQL Developer 20.4

Section	Title	Page
	- Step 1	598
	- Step 2	599
	- Step 2 (Insert Script)	600
	- Step 3 (Choose Columns)	602
	- Step 4 (Choose Definitions)	603
	- Step 5 (Finish)	604
	- Step 2 (Staging External Table)	607
	- Step 3 (Column Definition)	608
	- Step 4 (Options)	609
	- Step 5 (Finish)	610
	- Step 2 (SQL Loader Utility)	612
	- Cutting and pasting xls files	613
Twenty	Export the Schema	615
	- Introduction	616
	- Object by Object	617
	- Exporting DDL and DML	618
	- Export Wizard (Step One)	620
	- Pretty Print	621
	- Show Schema / Grants	622
	- Byte	623
	- Terminator	624
	- Force to Views	625
	- Drops	626
	- Cascade Drops	627
	- Storage	628
	- Dependents	629
	- Compatible	631
	- DDL and/or DML	632
	- Export Data	633
	- Exporting to CSV	634
	- Exporting to Delimited	635
	- Exporting to Excel	636
	- Exporting to Excel.xml	637
	- Exporting to Fixed	638
	- Exporting to HTML	639
	- Exporting to Insert	641
	- Exporting to Json	642
	- Exporting to Loader	643
	- Exporting to t2	644
	- Exporting to Text	645
	- Exporting to XML	646
	- Destination	647
	- Specify Data (Step 2)	649
	- Export Summary (Step 3)	653
	- Selection in the Connections Pane	654



Using SQL with SQL Developer 20.4

Section	Title	Page
Twenty One	SQL Developer Reports	656
	- Introduction	657
	- User Defined Reports	659
	- Creating User Defined Reports	660
	- New Report	661
	- Master Report	662
	- Table	664
	- Editing / Advanced Options	667
	- SQL Query	668
	- Binds	669
	- Refreshing	673
	- Child Reports	675
	- Multiple Child Reports	681
	- Drill Down	683
	- Styles	687
	- Chart	688
	- Bar	690
	- Properties	692
	- Pie	693
	- Line	695
	- Area	697
	- Combination	699
	- Scatter	700
	- Bubble	702
	- Stock (Candlestick graph)	703
	- Polar	705
	- Pareto	707
	- Funnel	709
	- 3D	710
	- Gauge	711
	- Code	713
	- Script	716
	- PL/SQL DBMS Output	718
	- Child Reports with Charts	720
	- Refresh	724
	- New Folder	725
Twenty Two	SQL Developer Help Facility	726
	- Introduction	727
	- Search and Table of Contents	728
	- Start Page	729
	- Data Miner	730
	- Check for Updates	731



Using SQL with SQL Developer 20.4

Section	Title	Page
	- About	732
	- <i>Exercise Eight</i>	733

Appendices

- Appendix S1 – SQL Functions**
- Appendix S2 – SQL Number Formats**
- Appendix S3 – SQL Date Formats**

Delegate Questionnaire

