

## Essential Apex 4.2 SQL for Oracle 11g

| Section                                    | Title                            | Page               |
|--|----------------------------------|--------------------|
| <b>One</b>                                 | <b>Introduction to SQL</b>       | 2                  |
|  | – Definition of SQL              | 3                  |
|  | – Definition of a Database       | 4                  |
|  | – Application Express            | 5                  |
| <b>Two</b>                                 | <b>Using Application Express</b> | 6                  |
|  | – Introduction                   | 7                  |
|  | – Logging in                     | 9                  |
|  | – The Workspace                  | 12                 |
|  | – The Schema                     | 13                 |
|  | – Dashboard Topography           | 14                 |
|  | – SQL Workshop                   | 15                 |
|  | – Administration                 | 16                 |
|  | – Changing the Password          | 18                 |
|  | – About Administration           | 19                 |
|  | – Exiting the Session            | 20                 |
|  | – Invalid Login Credentials      | 21                 |
|  | – Timeout and Session Expiry     | 22                 |
|  | <b>Three</b>                     | <b>SQL Scripts</b> |
| – Introduction                             |                                  | 24                 |
| – Tables                                   |                                  | 25                 |
| – Views                                    |                                  | 26                 |
| – Materialized Views                       |                                  | 27                 |
| – Interface                                |                                  | 28                 |
| – Actions                                  |                                  | 30                 |
| – Actions (Select Columns)                 |                                  | 31                 |
| – Actions (Filter)                         |                                  | 32                 |
| – Actions (Rows Per Page)                  |                                  | 36                 |
| – Actions (Format)                         |                                  | 37                 |
| – Actions (Sort)                           |                                  | 38                 |
| – Actions (Control Break)                  |                                  | 39                 |
| – Actions (Highlight)                      |                                  | 40                 |
| – Actions (Compute)                        |                                  | 41                 |
| – Actions (Aggregate)                      |                                  | 43                 |
| – Actions (Chart)                          |                                  | 44                 |
| – Actions (Group By)                       |                                  | 45                 |
| – Actions (Flashback)                      |                                  | 46                 |
| – Actions (Save Report)                    |                                  | 48                 |
| – Actions (Reset)                          |                                  | 49                 |
| – Actions (Help)                           |                                  | 50                 |
| – Actions (Download)                       |                                  | 51                 |
| – Actions (Download CSV)                   |                                  | 52                 |
| – Actions (Download HTML)                  |                                  | 54                 |
| – Actions (Download Email)                 |                                  | 56                 |
| – Actions (Subscription)                   |                                  | 58                 |
| – Alternative View of Scripts (View Icons) |                                  | 59                 |
| – Running Scripts                          |                                  | 60                 |
| – Manage Script Results                    |                                  | 62                 |
| – Other Options                            |                                  | 71                 |
| – Upload                                   |                                  | 72                 |
| – Create                                   | 75                               |                    |

## Essential Apex 4.2 SQL for Oracle 11g

| Section     | Title  | Page |
|-------------|--|------|
|             | - Show Quotas                                    | 76   |
|             | - Exporting SQL Scripts from Application Express | 77   |
|             | - Importing SQL into Application Express         | 80   |
|             | - <i>Exercise One</i>                            | 82   |
| <b>Four</b> | <b>Query Builder</b>                             | 89   |
|             | - Introduction                                   | 90   |
|             | - Topography                                     | 93   |
|             | - The Selection Pane                             | 96   |
|             | - The Results Pane – Conditions                  | 99   |
|             | - Results  | 101  |
|             | - Downloading to Excel                           | 102  |
|             | - Viewing the SQL                                | 103  |
|             | - Copying the SQL                                | 104  |
|             | - Sequencing Columns                             | 106  |
|             | - Creating Aliases                               | 107  |
|             | - Conditions                                     | 109  |
|             | - Some Points to Note                            | 120  |
|             | - Ordering Records                               | 121  |
|             | - Saving SQL                                     | 124  |
|             | - Deleting Columns                               | 126  |
|             | - Saving SQL                                     | 124  |
|             | - <i>Exercise Two</i>                            | 127  |
|             | - Using Functions                                | 137  |
|             | - Using Text Functions                           | 139  |
|             | - Using Date Functions                           | 142  |
|             | - Using Number Functions                         | 144  |
|             | - Using Group By                                 | 147  |
|             | - <i>Exercise Three</i>                          | 152  |
| <b>Five</b> | <b>SQL Commands</b>                              | 161  |
|             | - Introduction                                   | 162  |
|             | - Topography                                     | 163  |
|             | - Command Window                                 | 164  |
|             | - Autocommit                                     | 165  |
|             | - Rows   | 166  |
|             | - Clear Command                                  | 167  |
|             | - Find Tables                                    | 168  |
|             | - Find Tables (Rows)                             | 170  |
|             | - Find Tables (Views)                            | 171  |
|             | - Find Tables (Columns)                          | 172  |
|             | - Save   | 174  |
|             | - Results  | 176  |
|             | - Explain  | 178  |
|             | - Describe                                       | 181  |
|             | - History  | 182  |
|             | - Commenting SQL                                 | 183  |
|             | - Oracle Metadata                                | 184  |
|             | - <i>Exercise Four</i>                           | 186  |

## Essential Apex 4.2 SQL for Oracle 11g

| Section                           | Title   | Page                                 |
|-----------------------------------|---|--------------------------------------|
| Six                               | <b>SQL Structure</b>                          | 190                                  |
|                                   | – Amending Query Builder SQL                  | 192                                  |
|                                   | – Column Aliases                              | 193                                  |
|                                   | – Table Aliases                               | 194                                  |
|                                   | – Displaying Literals in a Select statement   | 195                                  |
|                                   | – Using the Sys.Dual table                    | 196                                  |
|                                   | – More SQL Functions                          | 197                                  |
|                                   | – Nesting SQL Functions                       | 200                                  |
|                                   | – Concatenating Columns                       | 201                                  |
|                                   | – Performing Calculations                     | 202                                  |
|                                   | – Performing Calculations on Dates            | 203                                  |
|                                   | – Formatting Output                           | 204                                  |
|                                   | – Ordering Data                               | 206                                  |
|                                   | – <i>Exercise Five</i>                        | 208                                  |
| Seven                             | <b>Developing Where Clauses</b>               | 215                                  |
|                                   | – Limiting Data in Query Builder              | 216                                  |
|                                   | – Combining Conditions                        | 219                                  |
|                                   | – Truncating Values                           | 220                                  |
|                                   | – Using Functions in Where Clauses            | 221                                  |
|                                   | – Sub-Queries                                 | 222                                  |
|                                   | – Correlated Sub-Queries                      | 224                                  |
|                                   | – Case Restrictions in Where Clauses          | 225                                  |
|                                   | – Rownum in SQL Tables                        | 226                                  |
|                                   | – Using Rowid in SQL Tables                   | 227                                  |
|                                   | – <i>Exercise Six</i>                         | 228                                  |
|                                   | Eight   | <b>Oracle Datatypes</b>              |
| – Introduction                    |   | 236                                  |
| – Varchar2                        |   | 237                                  |
| – Varchar2 and Char               |   | 239                                  |
| – Number                          |   | 240                                  |
| – Date                            |   | 241                                  |
| – Float                           |   | 242                                  |
| – Long                            |   | 243                                  |
| – Large Objects                   |   | 244                                  |
| – Large Objects in Object Browser |   | 245                                  |
| – Large Objects in SQL Command    |   | 246                                  |
| – Bfile                           |   | 247                                  |
| Nine                              |   | <b>Developing Aggregating Values</b> |
|                                   | – Group By in Query Builder                   | 249                                  |
|                                   | – Using '*'                                   | 250                                  |
|                                   | – Using Having with Group By                  | 251                                  |
|                                   | – Using Rollup to produce a Grand Total       | 252                                  |
| Ten                               | <b>Tree Walking Tables in SQL</b>             | 253                                  |
|                                   | – Introduction                                | 254                                  |
|                                   | – Syntax for Tree Walking in SQL              | 256                                  |
|                                   | – Example of Tree Walking in SQL              | 257                                  |
|                                   | – Advanced Ordering of Siblings in Tree Walks | 258                                  |
|                                   | – Sys_Connect_By_Path                         | 259                                  |
|                                   | – <i>Exercise Seven</i>                       | 260                                  |

## Essential Apex 4.2 SQL for Oracle 11g

| Section                         | Title                                      | Page |
|---------------------------------|--|------|
| Eleven                          | <b>Joining Tables in SQL</b>               | 264  |
|                                 | – Introduction                             | 265  |
|                                 | – Linking Tables in in Query Builder       | 266  |
|                                 | – Linking Multiple Tables in Query Builder | 269  |
|                                 | – Deleting the Links in Query Builder      | 272  |
|                                 | – Linking Tables in Query Builder Manually | 273  |
|                                 | – Problems with Joining Tables in SQL      | 275  |
|                                 | – Outer Joins in Query Builder             | 276  |
|                                 | – Using Ansi SQL/99 to Join Tables         | 281  |
|                                 | – Ansi SQL/99 Standards (Natural Joins)    | 282  |
|                                 | – Ansi SQL/99 Standards (Cross Joins)      | 283  |
|                                 | – Ansi SQL/99 Standards (Joins/Using)      | 284  |
|                                 | – Ansi SQL/99 Standards (On)               | 285  |
|                                 | – Ansi SQL/99 Standards (Multiple On)      | 286  |
|                                 | – Ansi SQL/99 Standards (Left Outer Join)  | 287  |
|                                 | – Ansi SQL/99 Standards (Right Outer Join) | 288  |
|                                 | – Ansi SQL/99 Standards (Full Outer Join)  | 289  |
|                                 | – Merging Tables in SQL                    | 290  |
|                                 | – 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 Minus to Merge Tables in SQL       | 294  |
|                                 | – Knowledge Check                          | 295  |
| – Using the Merge Syntax in SQL | 300  |      |
| – <i>Exercise Eight</i>         | 301  |      |
| Twelve                          | <b>Advanced SQL Query Techniques</b>       | 305  |
|                                 | – Introduction                             | 306  |
|                                 | – Pivot                                    | 307  |
|                                 | – Adding a Total to a Pivot                | 312  |
|                                 | – Changing the Pivot Headings of X Axis    | 313  |
|                                 | – Rotating the Axis of the Pivot           | 314  |
|                                 | – Unpivot                                  | 315  |
|                                 | – Unpivot and Null values                  | 318  |
|                                 | – Using First_Value/Last_Value in SQL      | 319  |
|                                 | – Ignoring Nulls with First/Last_Value     | 321  |
|                                 | – Window Specification                     | 322  |
|                                 | – Breakdown of Window Specification        | 323  |
|                                 | – Window Specification – The Arguments     | 325  |
|                                 | – Window Specification – Query Partition   | 326  |
|                                 | – Window Specification – The Order By      | 328  |
|                                 | – Window Specification – The Windowing     | 330  |
|                                 | – Window Specification – Rows between      | 332  |
|                                 | – Window Specification – Shortcuts         | 336  |
|                                 | – Difference between Range and Rows        | 337  |
|                                 | – Using Lead and Lag in SQL                | 339  |
|                                 | – Using Rank Function in SQL               | 342  |
|                                 | – Using Ntile Function in SQL              | 349  |
|                                 | – Using Width_Bucket Function in SQL       | 351  |
| – Using Listagg Function in SQL | 354  |      |
| – Using Case Function in SQL    | 356  |      |
| – <i>Exercise Nine</i>          | 360  |      |

## Essential Apex 4.2 SQL for Oracle 11g

| Section         | Title   | Page |
|-----------------|---|------|
| <b>Thirteen</b> | <b>Object Browser in Application Express</b>  | 364  |
|                 | – Introduction                                | 365  |
|                 | – Topography                                  | 366  |
|                 | – Table Structure                             | 371  |
|                 | – Create Table                                | 373  |
|                 | – Create Columns                              | 376  |
|                 | – Table Indexing                              | 378  |
|                 | – Primary Keys                                | 379  |
|                 | – Unique Keys                                 | 381  |
|                 | – Foreign Keys                                | 382  |
|                 | – Foreign Keys and Cascading                  | 384  |
|                 | – Sequences                                   | 385  |
|                 | – Create Primary Key                          | 387  |
|                 | – Create Foreign Key                          | 392  |
|                 | – Create Constraints                          | 397  |
|                 | – Check Constraints                           | 398  |
|                 | – Unique Key                                  | 400  |
|                 | – Confirm                                     | 401  |
|                 | – Table SQL                                   | 403  |
|                 | – Amending Existing Table Structures          | 404  |
|                 | – Add Column                                  | 405  |
|                 | – Modify Column                               | 407  |
|                 | – Rename Column                               | 410  |
|                 | – Drop Column                                 | 411  |
|                 | – Rename (Table)                              | 412  |
|                 | – Copy (Table)                                | 413  |
|                 | – Drop  | 416  |
|                 | – Truncate (Table)                            | 417  |
|                 | – Create Lookup Table                         | 418  |
|                 | – <i>Exercise Ten</i>                         | 426  |
|                 | – Indexes                                     | 430  |
|                 | – Model                                       | 436  |
|                 | – Constraints                                 | 438  |
|                 | – Grants                                      | 443  |
|                 | – Statistics                                  | 446  |
|                 | – UI Defaults and Triggers                    | 447  |
|                 | – Dependencies                                | 448  |
|                 | – Synonyms                                    | 449  |
|                 | – Synonyms                                    | 449  |
|                 | – Synonyms                                    | 449  |
|                 | – Synonyms                                    | 449  |
| <b>Fourteen</b> | <b>Advanced SQL for Tables</b>                | 453  |
|                 | – Creation Syntax for Tables in SQL           | 454  |
|                 | – Syntax for Altering Tables                  | 456  |
|                 | – Virtual Columns                             | 458  |
|                 | – Creating Virtual Columns with new Table     | 459  |
|                 | – Specifying Virtual Column Datatype and Size | 460  |
|                 | – Using Virtual Columns in SQL ...            | 462  |
|                 | – Using Virtual Columns with Functions        | 464  |
|                 | – Limitations of Virtual Columns (ORA-54012)  | 465  |
|                 | – Limitations of Virtual Columns (ORA-54015)  | 466  |

## Essential Apex 4.2 SQL for Oracle 11g

| Section          | Title  | Page       |
|------------------|--|------------|
|                  | – Limitations of Virtual Columns (ORA-54013) | 467        |
|                  | – Index Creation in SQL                      | 468        |
|                  | – Check Constraints                          | 471        |
|                  | – Creating Sequences in SQL                  | 472        |
|                  | – Using Sequences in SQL                     | 473        |
|                  | – Displaying Variables in a Select statement | 474        |
|                  | – Renaming Objects in an Oracle Database     | 475        |
|                  | – Dropping Objects from an Oracle Database   | 478        |
|                  | – Granting Access to other Schemas / Users   | 479        |
|                  | – Granting Access to other Schemas           | 480        |
|                  | – Accessing other Schemas                    | 481        |
|                  | – <i>Exercise Eleven</i>                     | 483        |
| <b>Fifteen</b>   | <b>Populating Tables with Object Browser</b> | <b>486</b> |
|                  | – Introduction                               | 487        |
|                  | – Using Object Browser                       | 488        |
|                  | – Query                                      | 490        |
|                  | – Editing Records                            | 493        |
|                  | – Deleting Records                           | 495        |
|                  | – Count Rows                                 | 496        |
|                  | – Insert Row                                 | 497        |
|                  | – Rules When Populating Tables in SQL        | 499        |
|                  | – SQL Syntax for Inserting into Tables       | 500        |
|                  | – Limitations of Virtual Columns (ORA-54013) | 505        |
|                  | – Using Variables to Populate Tables         | 506        |
|                  | – Updating in Oracle Tables                  | 507        |
|                  | – Deleting Data from Oracle Tables           | 509        |
|                  | – Handling Large Objects                     | 510        |
|                  | – Handling BFiles                            | 512        |
| <b>Sixteen</b>   | <b>Committing Records</b>                    | <b>513</b> |
|                  | – The Difference Between DDL and DML         | 514        |
|                  | – <i>Exercise Twelve</i>                     | 517        |
| <b>Seventeen</b> | <b>Views and Materialized Views</b>          | <b>523</b> |
|                  | – Introduction to Views                      | 524        |
|                  | – SQL Syntax for Views                       | 526        |
|                  | – Object Browser                             | 529        |
|                  | – View                                       | 530        |
|                  | – Compile                                    | 531        |
|                  | – Drop                                       | 534        |
|                  | – Code                                       | 535        |
|                  | – Data                                       | 536        |
|                  | – Query                                      | 537        |
|                  | – Count Rows                                 | 538        |
|                  | – Insert Row                                 | 539        |
|                  | – Grants                                     | 541        |
|                  | – UI Defaults                                | 542        |
|                  | – Dependencies                               | 543        |
|                  | – SQL  | 544        |
|                  | – Creating Views in Object Browser           | 545        |
|                  | – Materialized Views                         | 547        |
|                  | – Object Browser                             | 549        |
|                  | – Materialized View                          | 550        |

## Essential Apex 4.2 SQL for Oracle 11g

| Section         | Title   | Page |
|-----------------|---|------|
|                 | - Drop  | 551  |
|                 | - Data  | 552  |
|                 | - Query   | 553  |
|                 | - Count Rows                                    | 554  |
|                 | - Details                                       | 555  |
|                 | - Grants  | 556  |
|                 | - Dependencies                                  | 557  |
|                 | - SQL   | 558  |
|                 | - Creating Materialized Views in Object Browser | 559  |
|                 | - Syntax for Creating Materialized Views        | 561  |
|                 | - Refreshing Materialized Views                 | 562  |
|                 | - Building Materialized Views                   | 567  |
|                 | - <i>Exercise Thirteen</i>                      | 569  |
| <b>Eighteen</b> | <b>Application Express Utilities</b>            | 571  |
|                 | - Introduction                                  | 572  |
|                 | - Data Workshop                                 | 574  |
|                 | - Data Load                                     | 575  |
|                 | - Text Data                                     | 576  |
|                 | - Loading CSV files into New Table              | 578  |
|                 | - Loading CSV files into Existing Table         | 583  |
|                 | - Copy and Paste into a Table                   | 589  |
|                 | - XML Data                                      | 595  |
|                 | - Spreadsheet Data                              | 599  |
|                 | - Data Unload                                   | 600  |
|                 | - Repository                                    | 604  |
|                 | - Generate DDL                                  | 605  |
|                 | - Schema Comparison                             | 612  |
|                 | - Object Reports                                | 615  |
|                 | - Table Reports                                 | 618  |
|                 | - Exception Reports                             | 622  |
|                 | - Security Reports                              | 625  |
|                 | - All Object Reports                            | 628  |
|                 | - Data Dictionary                               | 633  |
|                 | - PLSQL Reports                                 | 636  |
|                 | - Recycle Bin                                   | 637  |
|                 | - <i>Exercise Fourteen</i>                      | 639  |

### Appendices

**Appendix S1 – SQL Functions**

**Appendix S2 – SQL Number Formats**

**Appendix S3 – SQL Date Formats**

### Delegate Questionnaire