3

SQL Editing Reimagined

Database developers typically spend a great deal of time creating and editing SQL queries, so it only makes sense to make this experience as helpful, convenient and productive as possible. Azure Data Studio has truly reimagined how developers interact with SQL coding, and for that matter, all the languages supported on the platform.

This is accomplished in large part by focusing directly on keyboard interactions, which incorporate IntelliSense, keywords, code snippets, and database object definitions. Much of the ADS User Interface is also configurable, providing customizable color themes, zoom levels, fonts, icons, as well as busy to minimal display panels.

# IntelliSense, Snippets and Object Definitions

To get started with entering SQL queries, you can either click on ‘New query’ from the Welcome page, or for more context specificity, right click on your target Database in the ‘Side Bar’, and choose ‘New Query’ as shown in figure 3-1:

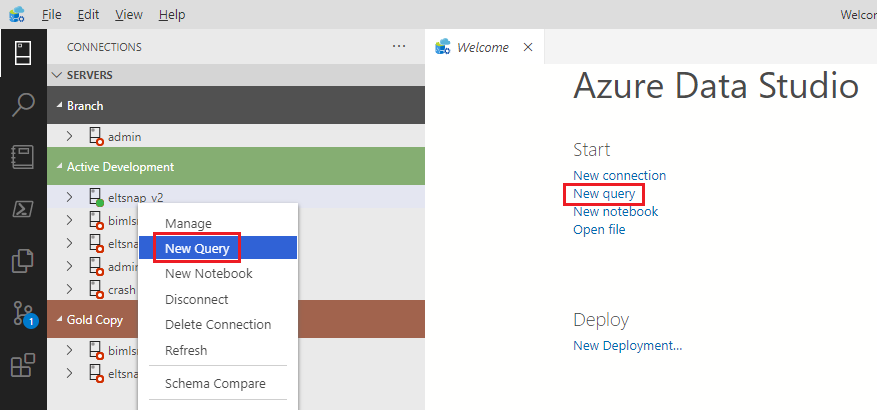


Figure 3-1. Create a New SQL Query

This will open a blank editing window where you can simply start typing. As you do type, each keystroke may pop-up with IntelliSense suggestions as shown in the Figure 3-2. Notice that the FROM keyword is highlighted in the sorted pop-up list indicating that you only need to hit the ‘tab’ key to accept the substitution.

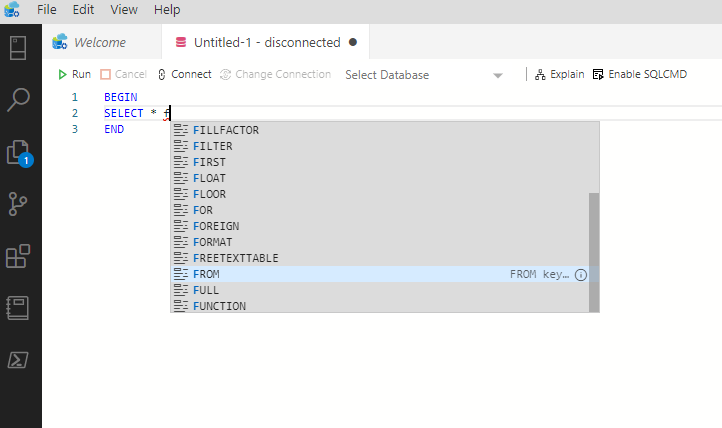


Figure 3-2. IntelliSense Keyword Pop-up

The up and down arrows provide navigation within this pop-up list, or you can use a mouse-click directly on the desired keyword. Also notice that figure 3-2 has the ‘Side Bar’ hidden, yielding a bit cleaner presentation. You can toggle the ‘Side Bar’ off and on by pressing the key sequence ‘Ctrl+B’. To accomplish the same with your pointing device, simply click on the ‘server icon’ in the ‘Activity Bar’ or use the ‘Menu Bar’ selections: View, Appearance, Show Side Bar.

## Code Snippets

One of my favorite editing features in ADS are powered by ‘Code Snippets’. These can be a huge timesaver, are fully integrated with IntelliSense, and are user customizable. Let us walk through a quick Snippet example. Let’s say you wanted to create a table. By typing createtable you will see the ‘camel cased’ snippet sqlCreatTable pop-up. You just hit ‘Tab’ when highlighted, or optionally click on the snippet in the pop-up, and you will get the ‘Create Table’ template as displayed in figure 3-3:

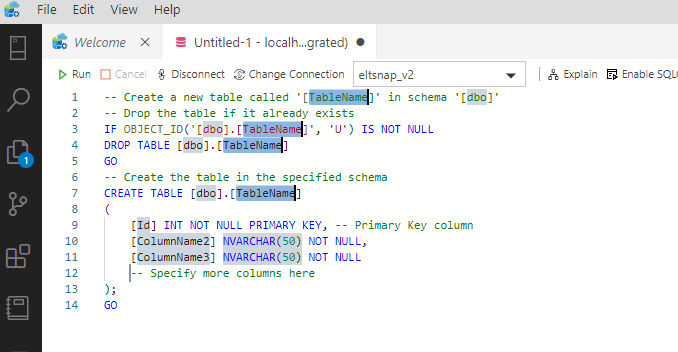


Figure 3-3. Create Table (Default) Snippet

You may be surprised to now see 4 blinking cursors! This is because you are automatically placed in the process of completing the pre-defined variable placeholders. The reason you have 4 blinking cursors is because the first ‘placeholder’ (TableName) has a total of 4 instances. If you were to next type ‘product’, the variable replacement would occur 4 times and figure 3-4 would be the result.

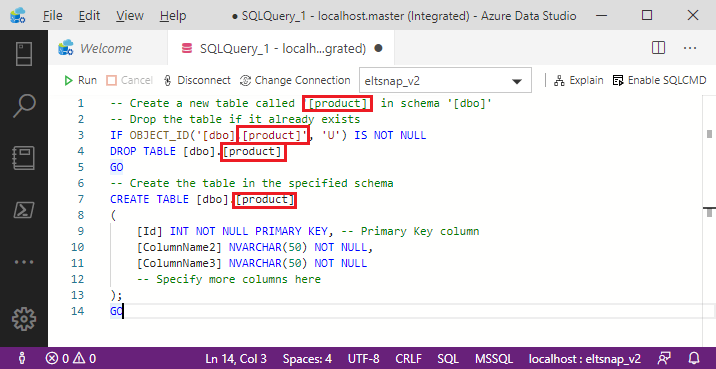


Figure 3-4. Snippet Variable Replacement

To move to the next defined variable, press the ‘Tab’ key again and you will see the next variable highlighted (this one used for the schema name) which also has 4 occurrences that are changed simultaneously. The next ‘Tab’ will take you to the first table column (in this case: [Id]), and so on until all variables have been visited, and likely replaced.

This ‘default’ (built-in) snippet is a nice start to creating a table, but you may be thinking “I’d like my snippet customized for our organization’s common code patterns”. Not to worry, later in this chapter (as well as in chapter 9), we will cover how you can easily create your own snippets. Just like the built-in snippets, these will readily surface in your SQL editor, based on the same IntelliSense driven keystrokes.

## Object Definitions

While you are editing your SQL Queries, it is a common requirement to reference ‘Object Definitions’ within your database model. For example, say you are writing a query using a certain table column, and need to know if it could contain NULL values. In this case, the standard IntelliSense capability of suggesting ‘column names’ falls a bit short. Instead, what is needed is the full definition of the table object.

Since your database could contain hundreds of tables, each of which could store numerous columns, it is often a pain to ‘quickly’ retrieve table and column definitions by browsing for these object definitions in the ‘Side Bar’. To remedy this situation, ADS provides direct access to object definitions, without leaving the editor window. Simply ‘right click’ on any table name in your query, and a couple options will pop-up. Figure 3-5 captures this pop-up when drilling into the table named: oledb\_connection:

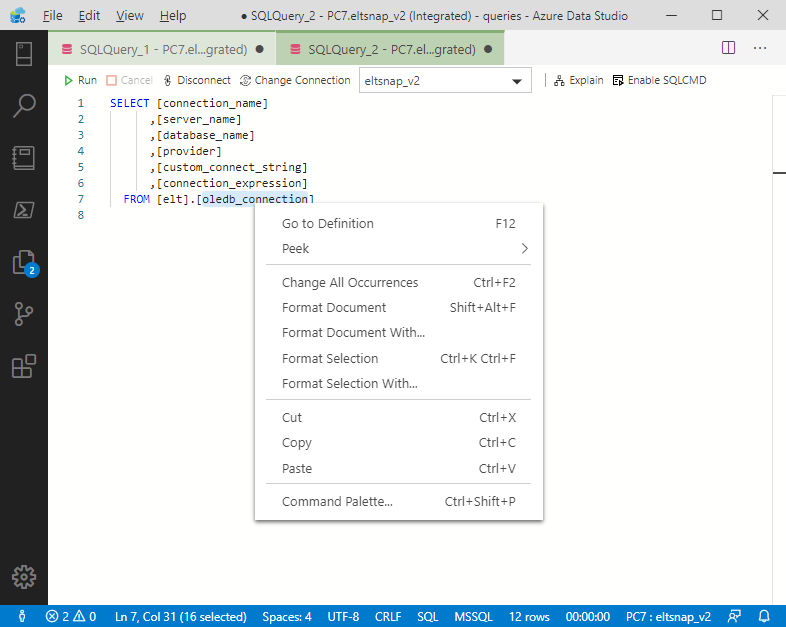


Figure 3-5. Accessing ‘Object Definitions’

The top two options on this pop-up will provide you with table definitions. The first “Go to Definition” will open a new editor window with the table definition in the form of an official table create statement. Since this is an almost runnable script, this method provides a convenient way to change the definition of the table if needed. I mention almost runnable since an execution of this statement would fail because the table already exists. Assuming you are not concerned with losing the data contained in this table, you could precede this code block with a DROP TABLE… statement.

The second option “Peek Definition”, will furnish you with the same definition, but in this case rendered in the existing editor window as shown in the figure 3-6:

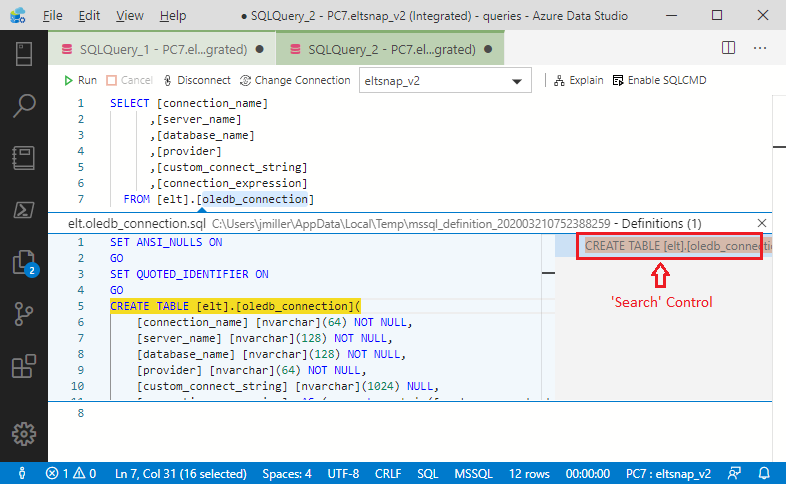


Figure 3-6. Peek ‘Object Definitions’ Option

In the event the table definition has many columns, you can use the ‘Search Control’ located on the right side of the screen, to search for a ‘specific’ column definition.

### Creating a Snippet for Column Definitions

You may be thinking, “This is helpful for retrieving a column definition located a single table”, but what if I want to see how the same column is defined in all tables?”. This is a good question, and one that could be answered by creating a custom snippet.

A good place to start when creating a snippet is to write the base query, which for our case will employ the INFORMATION\_SCHEMA.COLUMNS system view, run initially against the msdb ‘system’ database. In the query, we will be searching for all definitions of the plan\_name column located in this database:

select \* from msdb.INFORMATION\_SCHEMA.COLUMNS where COLUMN\_NAME = 'plan\_name'

A subset of the columns returned from running the above query are shown in figure 3-7:

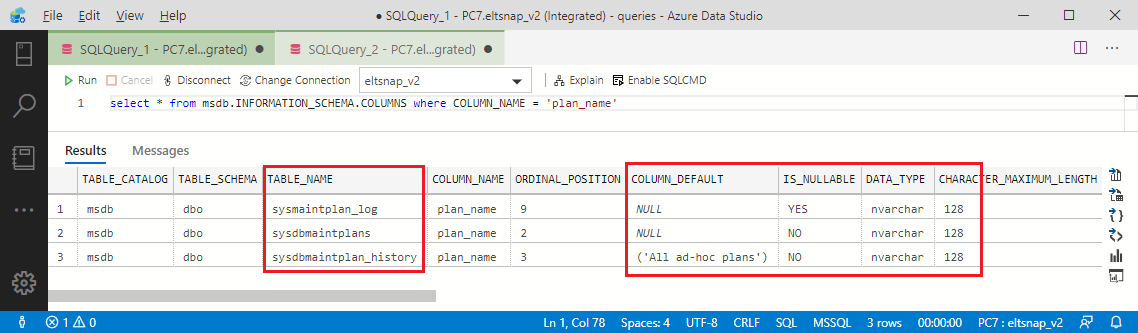


Figure 3-7. Sample Query using Information\_Schema.Columns

The result shown above reveals that the column plan\_name is found in 3 tables within the msdb database. We discover that the column is defined with a consistent data type of ‘nvarchar’, but varies in terms of ‘nullability’ as well as ‘default’ values.

You could now save this helpful little snippet (or ‘template’) as a stand-alone query residing in your file system, or convert it to a formal ‘ADS Snippet’. The former would be accessed when needed by navigating within the file system (i.e., File, Open), and the later would be retrieved by keystrokes directly in the SQL editor window. Another consideration is a formal ‘ADS Snippet’ can optionally provide variable substitution, which can greatly simplify the re-use of your custom snippet.

Regardless of your choice, the next section will cover how to save your ADS queries into the File System, and how to save customized ADS Snippets.

# Saving Queries and Snippets

When working with multiple ‘file based’ queries, it is helpful to organize related scripts into a common folder structure. To achieve this, you simply select (or optionally create) a folder using the ‘Menu Bar’ File, Open Folder command as shown in figure 3-8. This will establish your ‘current’ folder context:

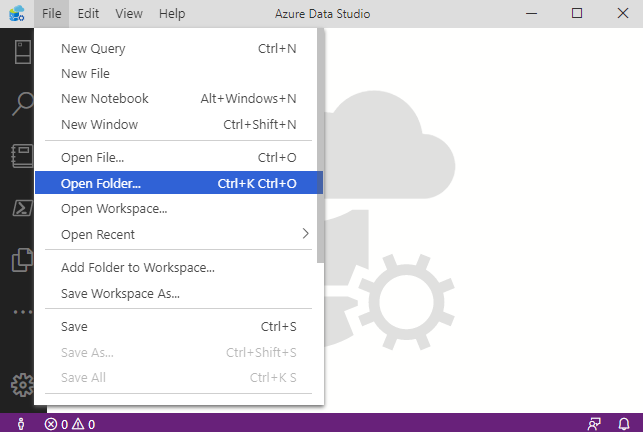


Figure 3-8. File, Open Folder Command

In the case you need to create a New folder, you can still use the ‘Open Folder’ dialog box. This is done by clicking in the ‘white space’ (next to the existing folders) where you will be able to enter a new folder name via a pop-up window. The navigation for this user action is presented in figure 3-9:

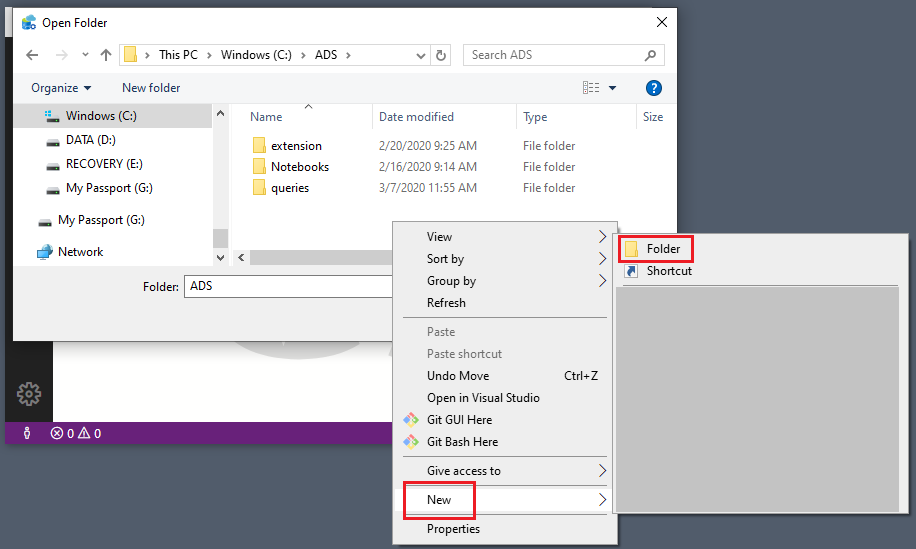


Figure 3-9. Specifying a Folder Name for Queries

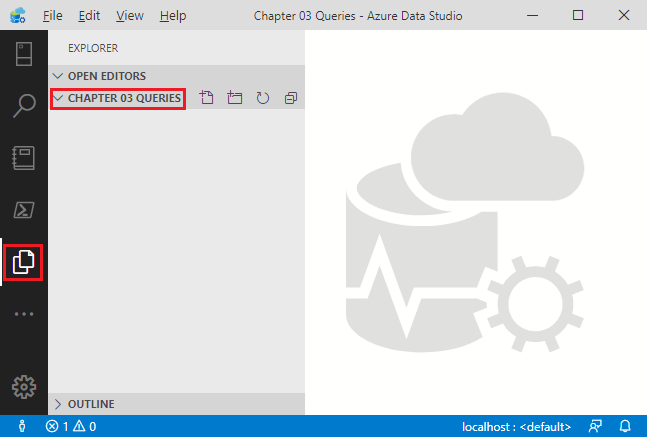
Once you have selected your ‘current’ folder context, queries and scripts that you later save will be placed in this folder by default. The File icon in the ‘Activity Bar’ as shown in Figure 3-10 provides the name of your current folder context.

Figure 3-10. Current Folder Context

Keep in mind that your working folders could later be tied to GitHub or other source control system. Consequently, your folder organization and naming conventions should be as intuitive as possible. Even if you are not sharing with others, you may find that GitHub is a convenient repository to store your personal queries and scripts. This is both for safe keeping, as well as accessibility in the event you are away from your primary workstation (see Chapter 13 for a ‘Deep Dive’ into GitHub and ADS).

Now that we have a ‘current’ folder, let us tweak and then save our earlier INFORMATION\_SCHEMA.COLUMNS query into the file system. Following is a bit more generic version of the earlier query:

select \* from INFORMATION\_SCHEMA.COLUMNS where COLUMN\_NAME = 'column\_name'

As you might have guessed, pressing CTRL + S will open the ‘Save’ dialog box, or you could use File, Save, from the ‘Menu Bar’. In either case you will receive the dialog box shown in figure 3-11 where you can name your file-based query:

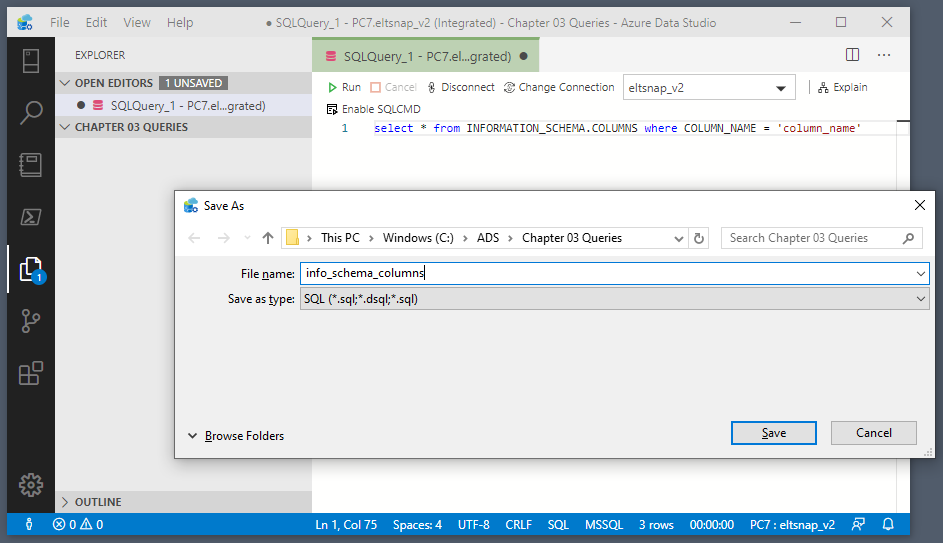


Figure 3-11. Save Query File

Ok, saving a file is admittedly a pretty basic user action. However, what if you would like to save this query as a reusable ADS Snippet? Well for starters we will want to make another tweak to this script which will invoke ‘variable substitution’ logic on re-use. This is achieved by replacing 'column\_name' with the parameter syntax ${1:ColumnName}:

select \* from INFORMATION\_SCHEMA.COLUMNS

where COLUMN\_NAME = '${1:ColumnName}'

Note: for simpler snippet coding, we will place this query on a single line in the full json snippet syntax:

{ "Information Schema for Columns": {

"prefix": "InfoSchemaColumns",

"body": "select \* from INFORMATION\_SCHEMA.COLUMNS where COLUMN\_NAME = '${1:ColumnName}'" } }

To break down the above json code, the first line containing the literal "Information Schema for Columns " is the snippet name. The next line contains the prefix “InfoSchemaColumns” and will cause this snippet to surface based on similar keystrokes made in the SQL editor. These keystrokes do not necessarily need to be keyed exactly as shown in the prefix. For example, the snippet above, would be found by just typing ‘infcol’. The third line is the snippet code itself, which will be placed directly in the editor window upon pop-up selection.

Note: we will go into much more detail on snippets in Chapter 09.

To save the snippet, press CTRL+SHIFT+P (or from the ‘Menu Bar’ click on View, Command Palette), enter ‘snippet’ in the search box, and select “Preferences: Configure User Snippets” as shown in figure 3-12

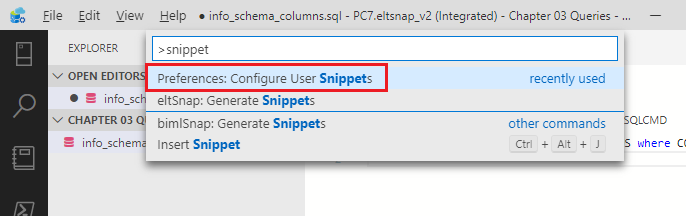


Figure 3-12. Configure User Snippets

Next enter ‘sql’ into the snippet search, and select the file: sql.json as displayed in figure 3-13:

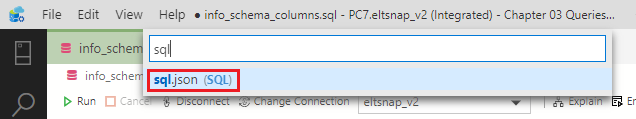


Figure 3-13. sql.json Snippets File

And then paste in your json script as shown in figure 3-14:

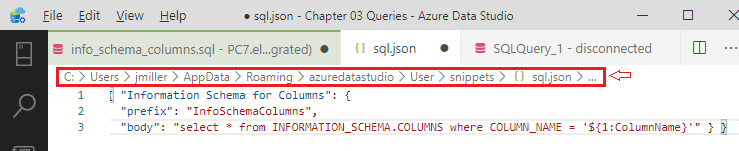


Figure 3-14. A Sample sql.json Snippet

Notice the above window (outlined in red) also provides the physical location of the ‘sql.json’ file that you are modifying[[1]](#footnote-1). Press CTRL+S to save your changes and enable your new snippet to be used. To test, press CTRL+N to create a new query window and then type the character sequence: ‘infcol’. You should see the snippet pop-up as rendered in figure 3-15:

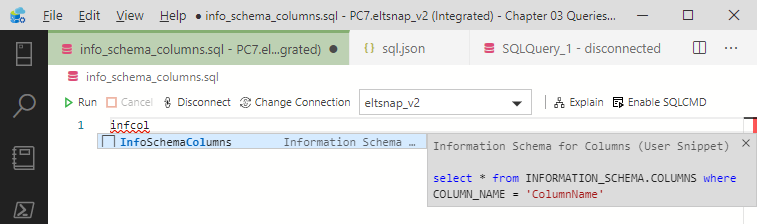


Figure 3-15. Using IntelliSense to Find a Snippet

Selecting this snippet will produce the SQL code in your editor window, with the cursor highlighting the field (in this case ‘ColumnName’) allowing you to replace with the actual column name you are examining. Figure 3-16 displays the snippet as placed in the editor window:

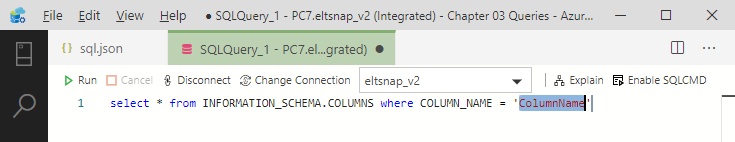


Figure 3-16. Variable Highlighting for a Snippet

As mentioned earlier, we have much more content to come later in the book on ‘ADS Snippets’, which by the way can apply to any of the Azure Data Studio supported languages, including PowerShell and Python.

# Top Down View with Minimap

Life at times can be detailed and complex. The same can be true of ‘SQL code’, or for that matter ‘code’ written in any language. Most database developers have written, reviewed, or maintained SQL code that exceeds hundreds, or perhaps even a thousand lines. While ‘big code’ can be intimidating, ADS has a Minimap feature that can at least ease the pain of working with large SQL scripts.

For the following example you can use any SQL code sample. If more lines are needed for visual effect, just use copy/paste to multiply your lines of SQL code.

To get started with Minimap, you will first want to turn this feature on via the ‘Command Palette” by pressing CRTL+SHIFT+P, entering ‘minimap’, and selecting “View: Toggle Minimap” as shown in figure 3-17:

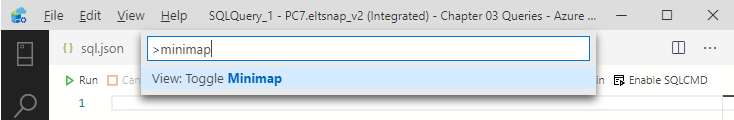


Figure 3-17. Toggle Minimap On

With any SQL script in place, and with Minimap turned on, you will see a birds-eye outline of your code on the right side of the editor window. Your current ‘cursor position’ will be highlighted as a thin blue line as displayed in figure 3-18:

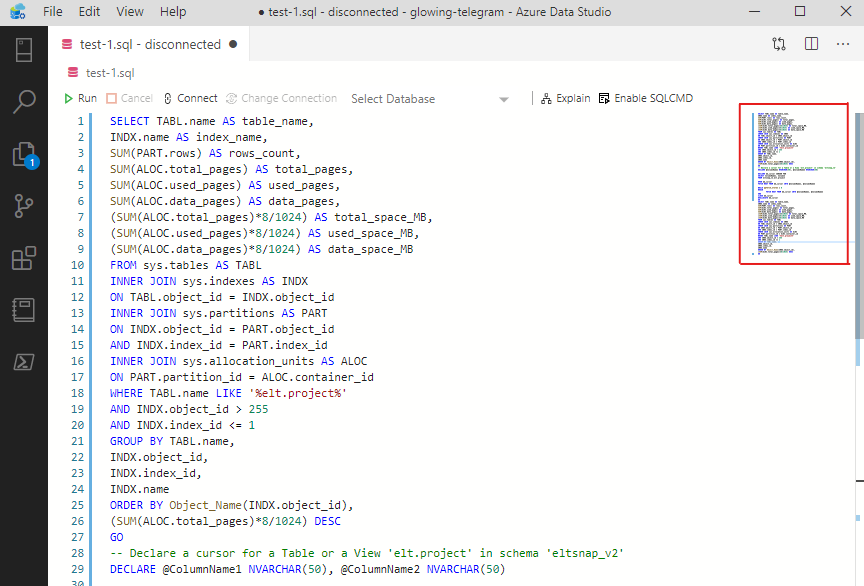


Figure 3-18. SQL Editing with Minimap Outline

Syntax error are reflected in the Minimap with red highlighting as shown in figure 3-19. This is helpful as it gives immediate feedback, as well as proximity of the error, even if the actual (readable) SQL code located somewhere ‘off screen’.

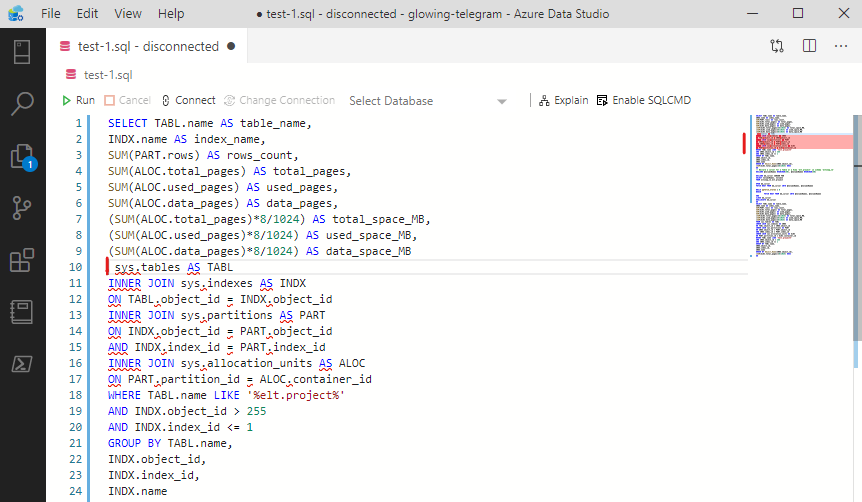


Figure 3-19. Minimap Syntax Errors

Another nice feature of Minimap is the ability to view a large selection of your code, even spanning hundreds of lines. This reduces the excess ‘scrolling’ otherwise needed to visualize the begin and end of your selection. Figure 3-20 demonstrates this capability, albeit on a smaller scale.

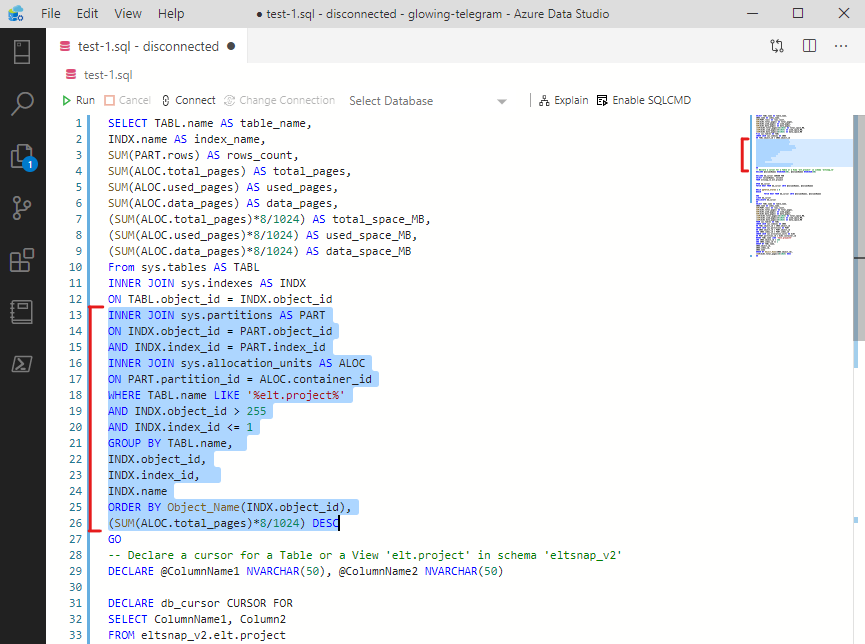


Figure 3-20. Minimap Code Selection

Finally, Minimap provides a convenient way to visualize all locations containing the text you are searching for in the script. Figure 3-21 illustrates the result of searching for a table called elt.projects within a script.

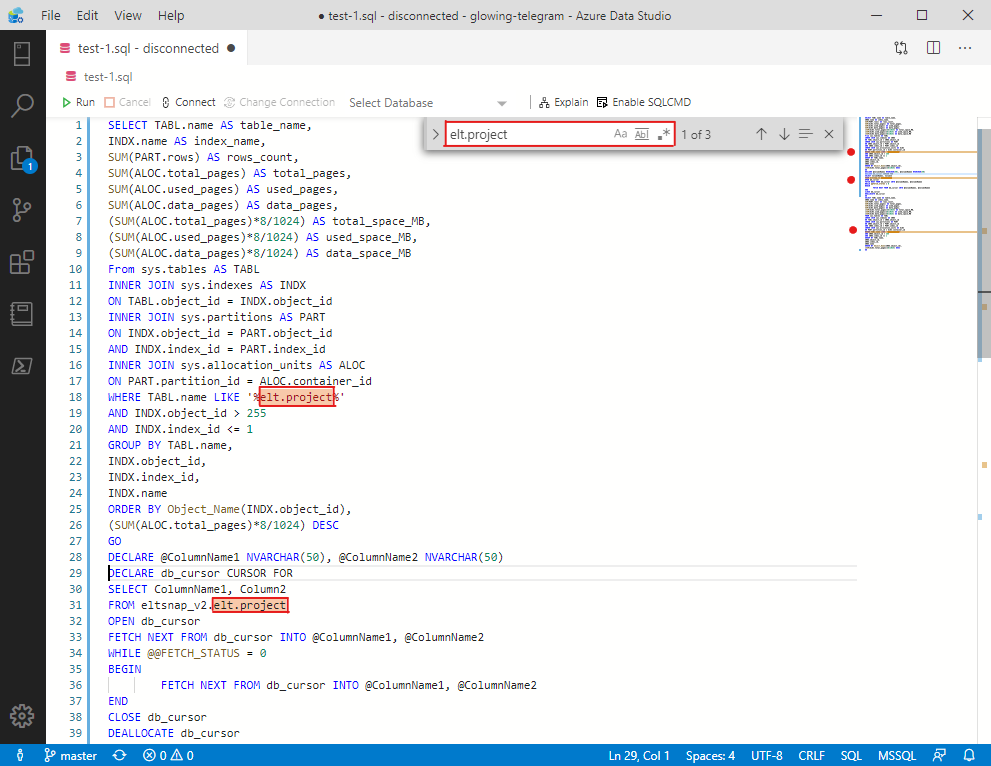


Figure 3-21. Minimap Search Results

So, the next time you find yourself editing a painfully large block of SQL code, remember to ‘toggle on’ Minimap to make your task at least a little more manageable.

# SQL Queries via the Command Terminal

An interesting capability of Azure Data Studio is the integration of a standard SQL editor with other language options. These language options are available by using Notebooks (introduced beginning in Chapter 5), as well as by the integrated Terminal window which we will introduce next.

To open the Terminal window, press CTRL+` (backtick), or when using the ‘Menu bar’, select View, Terminal. Once opened, you will see the Terminal pane on the bottom right section of the ADS application as shown in figure 3-22:

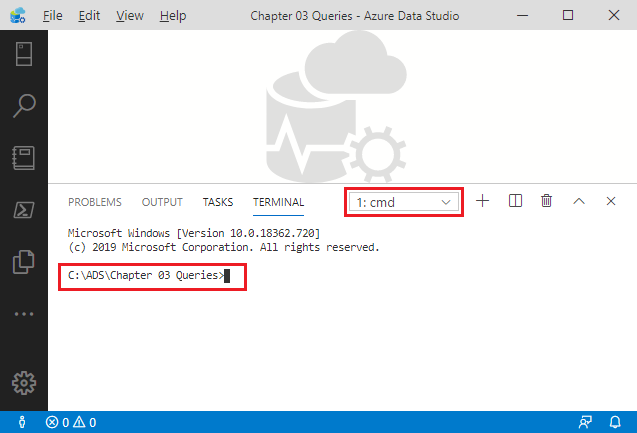


Figure 3-22. ADS Terminal Window

Notice the Terminal opens in the context of the ‘Windows Command Prompt’ which also inherits the Folder context that was previously opened in ADS (in our case it was named “Chapter 03 Queries”). Although we could query SQL via the Windows Command Prompt, we will have more options when using PowerShell. To switch the context to PowerShell, you can simply type ‘PowerShell’ into the Terminal window to get the results displayed in Figure 3-23:

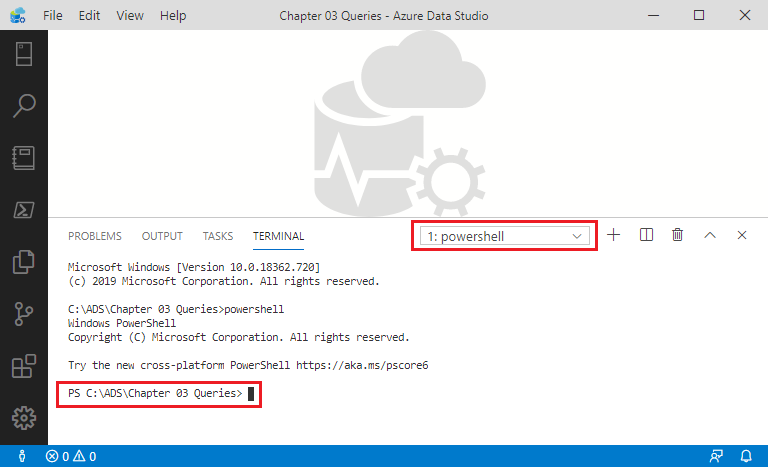


Figure 3-23. PowerShell Terminal Window

Note: In Chapter 15 we will use the new “PowerShell Integrated Console” activated by using the ‘Activity Bar’ PowerShell Icon.

To query your ‘local instance’ of SQL Server, enter the following command into the PowerShell command prompt

Invoke-Sqlcmd -Query "select \* from INFORMATION\_SCHEMA.TABLES" -ServerInstance "localhost"

And hit enter. You should see the SQL query results shown in figure 3-24:

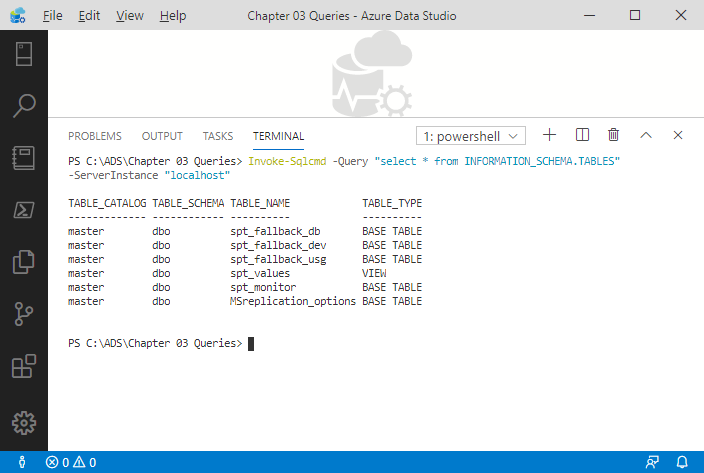


Figure 3-24. Running a SQL Query in PowerShell

Since we are in PowerShell, we have many other options for our result set, such as exporting as a CSV file. This can be accomplished by running the following PowerShell script:

Invoke-Sqlcmd -Query "select \* from INFORMATION\_SCHEMA.TABLES" -ServerInstance "localhost" | export-csv -Delimiter ',' -Path "tables.csv" -NoTypeInformation

When running this PowerShell script in the Terminal, the prior results are now are piped to an Operating System file called ‘tables.csv’. To verify that the file was created, click on the ‘Explorer’ Icon in the ‘Activity Bar’. The file should now be visible in the ‘Side Bar’ as shown in figure 3-25:

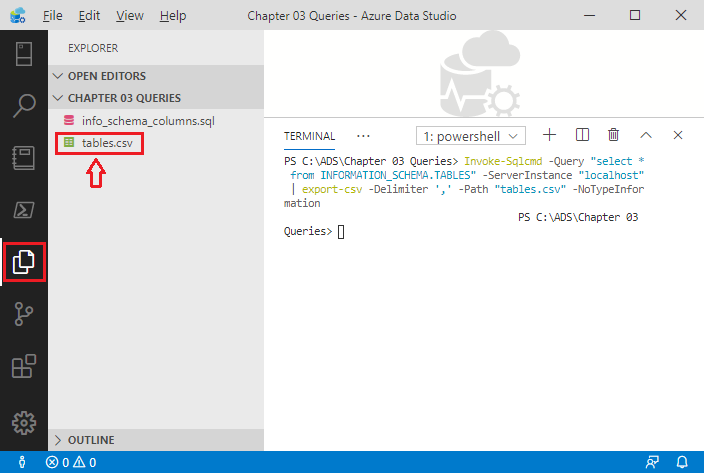


Figure 3-24. Exporting a Query using PowerShell

This is a simple but instructive example of the ‘synthesis’ of traditional SQL queries, with the extended language support built into Azure Data Studio. This illustration leveraged the ADS Terminal window running PowerShell, that leveraged a SQL script. But read on as deeper and even surprising capabilities lie ahead when fusing SQL code with other ADS supported languages!

1. This file could be updated using any editor, or json code generator [↑](#footnote-ref-1)