[Finding Performance Bottlenecks in SQL Server](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live" \t "psplayer)

[Introduction](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live)

[Hello. My name is David Berry. Welcome to this module on Finding Performance Bottlenecks in SQL Server.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=0) [One of the best features about SQL Server is that internally it is always taking data about SQL statements](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=9) [that are being run in the database and other events that are happening, and we can access this data to give](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=16) [us an overall picture of what is happening inside of SQL Server with regards to our application.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=21) [For example, SQL Server will give us statistics on all of the SQL statements that have been executed in our](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=27) [application database over the last several hours, including how many times a statement has been executed,](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=33) [how long the statement took on average to run, how much CPU the statement consumed, and how much average I/O](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=38) [needed to be performed. With data like this, we can quickly identify what statements in our application are](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=44) [running well, and which ones we might need to do some performance tuning on.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=50) [Now you might think that you need some fancy, expensive tools to do all of this, and indeed there are a lot](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=56) [of tools out there on the market that expose this information to you in a nice user interface.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=61) [However, these tools are just looking at data that is already inside of SQL Server, and all you have to do](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=67) [is to know where to look to find this data, and then you can just write queries to get all of the information](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=73) [that you need.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=78) [The source of this data is a series of views in SQL Server known as the Dynamic Management Views, often](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=79) [referred to as the DMVs for short. If you go to this page on the Microsoft website, you can navigate through](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=85) [all of the different DMVs that are available, and the data they contain.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=92) [What we are going to do in this module is just concentrate on a few use cases that are the most important](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=96) [to us as developers, and the DMVs that we need to solve these use cases.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=101) [We're going to start off in this module by talking about the permissions that you need to query the DMVs.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=108) [Then we're going to talk about how to use the DMVs to see information like who is connected to SQL Server](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=114) [and how many resources each session is using. Then we're going to talk about how we can find what SQL](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=119) [statements are currently executing against our server. Then we'll talk about how to find the most expensive](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=124) [statements that are running against our database. Next, we'll talk about how we can query SQL Server to see](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=130) [if it has any recommendations about indexes that might be missing in our database, that we need to create.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=135) [And finally, we'll discuss how we can find if our current indexes are being used, and how often.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=141) [Altogether, this gives us a good data base level summary of how our application is interacting with](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=147) [SQL Server, and it makes it easy for us to spot any performance bottlenecks that may exist.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=152) [One last item I do want to mention is that all of the queries you're going to see in this module are](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=158) [located on my blog, so if you go to the link that you see here on the screen, all these queries will be there,](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=164) [so you don't need to worry about pausing the video and trying to type these queries in on your own.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=170) [So with that, let's start by talking about the permissions we need in SQL Server in order to access the DMVs](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=175) [and run the queries that we're going to see in this module.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=0&mode=live&start=181)

[Required Permissions for Querying Dynamic Management Views](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=1&mode=live)

[In order to query the Dynamic Management Views, your SQL Server user needs to have the View Server State](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=1&mode=live&start=0.799) [permission granted to it, and unless you are a DBA you are unlikely to have this permission by default.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=1&mode=live&start=7.2) [Traditionally, SQL Server's Dynamic Management Views have been thought of as a tool for the DBA because](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=1&mode=live&start=13.799) [they contain information not just related to performance, but also about system health and configuration.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=1&mode=live&start=19.799) [The View Server State permission gives you access to all of this information, and for some DBAs this creates](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=1&mode=live&start=25.799) [some security concerns to give away that level of access. It may be possible to get this level of access in](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=1&mode=live&start=31.799) [your development and test environments, but it really varies by company whether this level of access will be](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=1&mode=live&start=38.799) [available to you as a non-DBA user in a production database system.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=1&mode=live&start=44.799) [If you are at a company that is not comfortable granting this access in production to developers, you still](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=1&mode=live&start=49.799) [have a couple of options though. First, you could have your DBA execute the queries shown in this module](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=1&mode=live&start=55.799) [and forward those results to you. The second option is that you could work with your DBA team to create](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=1&mode=live&start=61.799) [some views over the top of the SQL Server DMVs that only expose a specific subset of the DMV data to you,](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=1&mode=live&start=67.799) [which would alleviate any security concerns.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=1&mode=live&start=74.799) [I'm not going to show how to create these views in this module, but I do have a comprehensive blog post](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=1&mode=live&start=78.799) [on how to do this, that you and your DBA could read, and this blog post has all of the necessary steps](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=1&mode=live&start=83.799) [contained within it. For this module, I'm going to assume that you do have the View Server State permission](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=1&mode=live&start=88.799) [available to you as I show you these queries. So with that being said, let's start taking a look at some](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=1&mode=live&start=94.799) [of the information SQL Server can provide to us around connections and sessions in the database.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=1&mode=live&start=99.799)

[Getting Information About SQL Server Sessions and Resource Usage](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live)

[The first query we are going to look at is a query that uses the dm\_exec\_sessions DMV in SQL Server to get](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=0) [a list of all of the clients that are connected to our SQL Server database.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=7.399) [On my laptop, I will get some results from another process that I have running, so let's go ahead and run this](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=12.399) [query right now. So we see we get back some information like the session\_id and the database that the](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=16.399) [session is currently connected to. We also get a status if this session is doing anything at the moment,](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=22.399) [either running or sleeping, and we also get when the session was initiated.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=28.399) [Then we get some performance stats about each session. The cpu\_time here is in milliseconds, memory\_usage is](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=34.399) [in 8KB blocks, and we also have reads, writes, and logical\_reads.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=40.399) [So if we had a session that was consuming a lot of resources and maybe slowing every one else down that was](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=45.399) [connected to SQL Server, we'd be able to tell that from this data.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=50.399) [Next we see that we have some information about the client process that owns this session, including the](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=54.399) [host\_name, the program\_name, and the host\_process\_id. So if we need to know where a session was coming from,](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=60.399) [this would be enough information to help us figure that out. Now a lot of times what you're going to see in](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=66.399) [this program\_name column is something like we see here, .Net SqlClient Data Provider, and not the actual name](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=72.399) [of the program that's making the connection. For any .NET program, it's this string that is put in by default.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=79.399) [What you can do, though, is in the connection string of your program you can include this property,](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=86.399) [Application Name, and then the value that you specify here in the Application Name property will be used](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=91.399) [to populate that program\_name in the column in SQL Server. When you have multiple applications that are](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=97.399) [using the same database, this can be really useful because then you can very easily tell which session is](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=103.399) [coming from which application.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=109.399) [The results of this query are useful in two situations. One, like we said, when there is a session that is](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=112.399) [consuming a lot of resources on SQL Server and you want to identify that session.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=117.399) [Second, we're also getting a lot of connectivity information here in terms of what clients are connected,](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=122.399) [and how many connections each client is using. So, for example, if I have a four-server web cluster I would](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=127.399) [expect to see about the same number of connections from each one of those machines.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=134.399) [If I saw that one of those web servers didn't have any connections to SQL Server, I would want to go and](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=140.399) [check the connection string on that machine, and also make sure that that server was actually receiving](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=144.399) [and processing web requests. So there's actually quite a bit that you can tell just by looking at the](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=149.399) [session information. Now another question you might want to answer is what SQL statements are currently](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=155.399) [executing in SQL Server right now, so we'll look at how to answer that question next.](https://app.pluralsight.com/player?course=sql-server-performance-every-developer-should-know&author=david-berry&name=sql-server-performance-every-developer-should-know-m4&clip=2&mode=live&start=161.399)