

# **TencentDB for SQL Server**

## **General Reference**

### **Product Documentation**



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General Reference

Performance Test Report

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## Performance Test Report

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### Test Tool

The performance test in this document is conducted with the TPC-C benchmark load built in HammerDB. TPC-C is a typical OLTP workload that simulates a scenario where a wholesaler with multiple warehouses ships goods to a large number of customers. The adjustment of the number of warehouses can reflect the data size that the database can sustain in the test.

- [HammerDB download address](#)
- [HammerDB user guide](#)
- [Introduction to OLTP Testing \(TPROC-C derived from TPC-C\)](#)

### Test Environment and Parameters

#### Test instance editions

The test instances are of 2008 R2 Enterprise Edition, 2012 Enterprise Edition, 2014 Enterprise Edition, 2016 Enterprise Edition, 2017 Enterprise Edition, and 2019 Enterprise Edition.

#### Test instance specifications

##### High-availability edition

The test instances of high availability edition cover all purchasable specifications, including 1-core 2 GB MEM, 1-core 4 GB MEM, 1-core 8 GB MEM, 2-core 16 GB MEM, 4-core 32 GB MEM, 8-core 64 GB MEM, 12-core 96 GB MEM, 16-core 128 GB MEM, 24-core 192 GB MEM, 32-core 256 GB MEM, 48-core 384 GB MEM, 64-core 512 GB MEM, and 90-core 720 GB MEM.

##### Basic edition

The test instances of basic edition cover all purchasable specifications, including 1-core 2 GB MEM, 1-core 4 GB MEM, 2-core 4 GB MEM, 2-core 8 GB MEM, 4-core 8 GB MEM, 4-core 16 GB MEM, 8-core 16 GB MEM, 8-core 32 GB MEM, 16-core 32 GB MEM, 16-core 64 GB MEM, 24-core 48 GB MEM, and 24-core 96 GB MEM.

#### Load generation environment

The machines on which HammerDB is installed are of the same models as the SQL Server instances, ensuring that the performance of the instances can be fully measured in the stress test.

## TPC-C benchmark parameters

- Number of Warehouses = 100: Sets the number of warehouses to 100.
- Minutes of Rampup Time = 2: Sets the rampup time before the test to 2 minutes.
- Minutes Test Duration = 5: Sets the test duration to 5 minutes.

## Number of virtual users

The number of virtual users is the number of concurrent connections. In this document, different numbers of concurrent connections are tested on instances of different editions with different specifications.

### High-availability edition

Concurrent Connections	2	4	8	16	32	64	128	256	512	1024
1-core 2 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	-	-
1-core 4 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	-	-
1-core 8 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	-	-
2-core 16 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
4-core 32 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
8-core 64 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
12-core 96 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
16-core 128 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
24-core 192 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
32-core 256 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
48-core 384 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
64-core 512 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
90-core 720 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

### Basic edition

Concurrent Connections	2	4	8	16	32	64	128	256	512	1024
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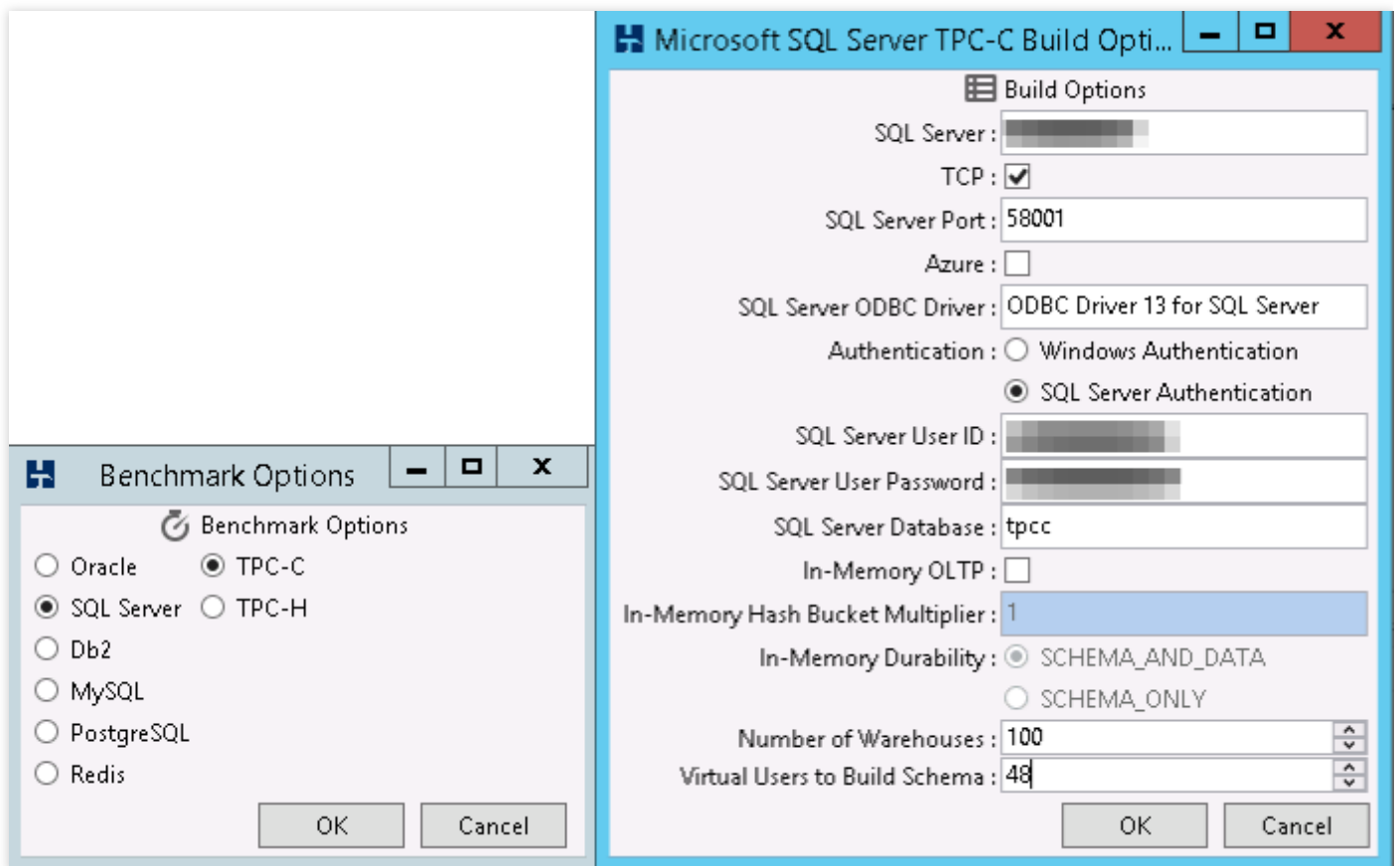
Concurrent Connections	2	4	8	16	32	64	128	256	512	1024
1-core 2 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	-	-
1-core 4 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	-	-
2-core 4 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
2-core 8 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
4-core 8 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
4-core 16 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
8-core 16 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
8-core 32 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
16-core 32 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
16-core 64 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
24-core 48 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
24-core 96 GB MEM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

## Test Method

### 1. Prepare the TPC-C workload.

- Number of Warehouses: The number of warehouses, which will affect the size of the test database generated.
- Virtual Users to Build Schema: The number of concurrent connections when generating the load data, which cannot be larger than the number of warehouses. This value affects the efficiency of load data generation, so we

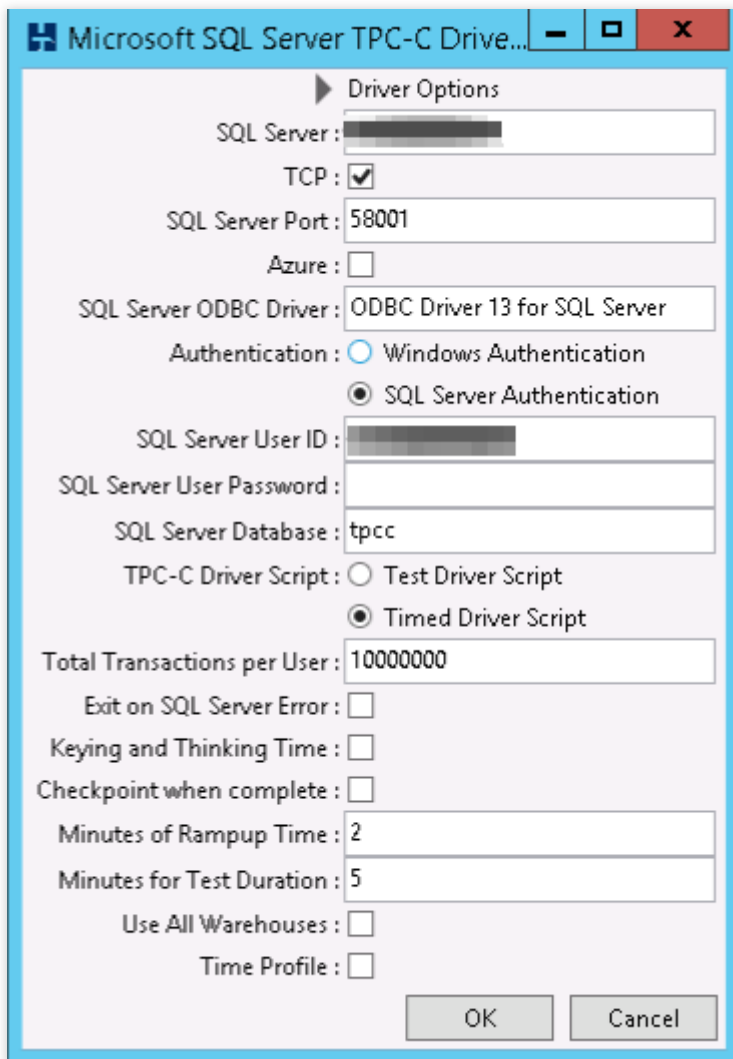
recommend you make it the same as the number of CPU cores of the load generating device.



## 2. Set the test script.

- Total Transactions per User: The total number of transactions per user. We recommend you set this parameter to a higher value so as to ensure that the user will not exit due to the completion of transactions during the stress test.
- Minutes of Rampup Time: Rampup time for the stress test.

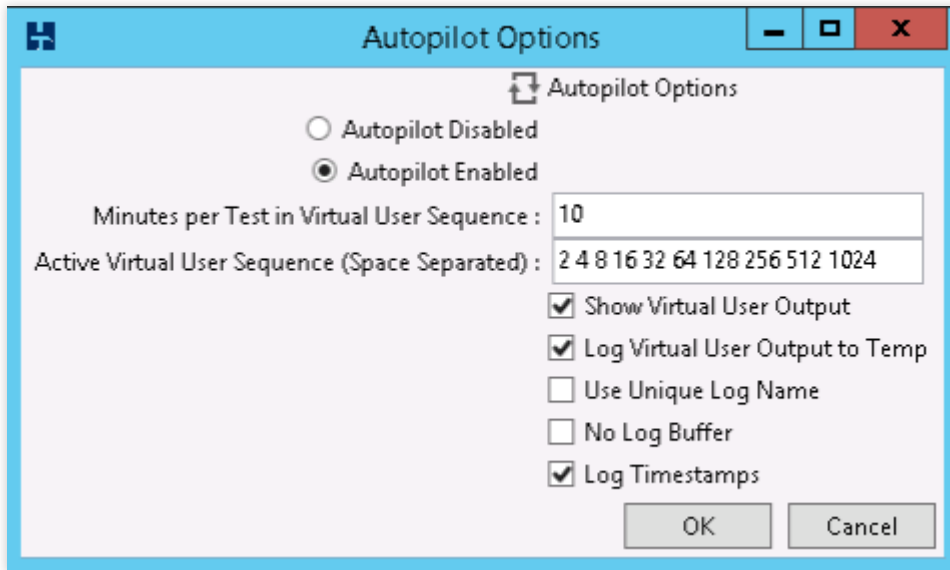
- Minutes for Test Duration: Duration of the stress test.



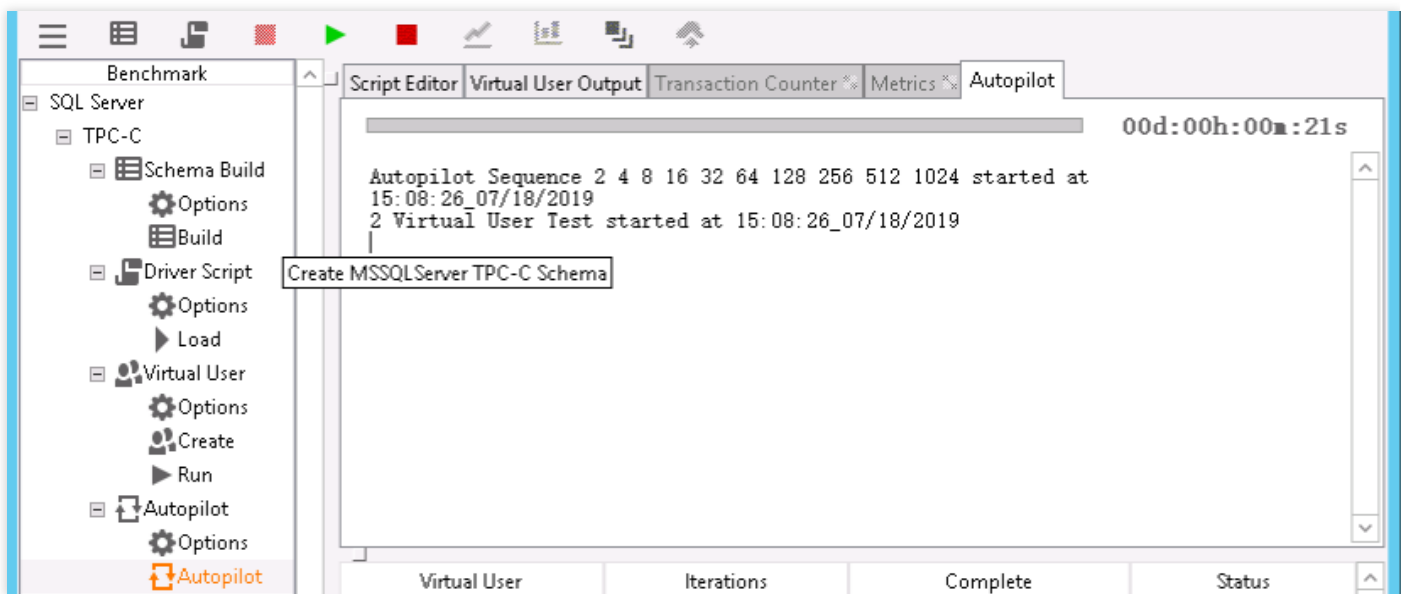
### 3. Set the automated test script.

- Minutes per Test in Virtual User Sequence: The interval between two automated test sessions during which the program completes various tasks such as creating virtual users, ramping up, running the test, and stopping the test. This value should be greater than the sum of "Minutes of Rampup Time" and "Minutes for Test Duration".
- Active Virtual User Sequence (Space Separated): The number of virtual users generated by each iteration of the automated test. It can be understood as the number of concurrent connections.

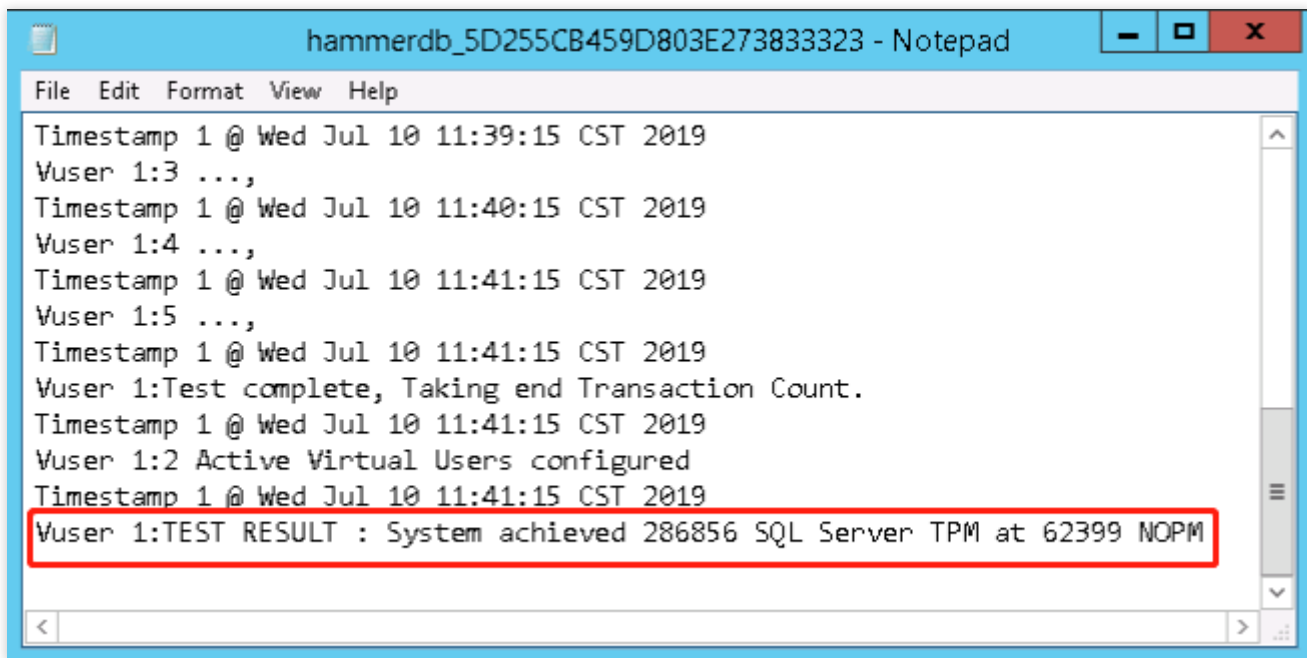




4. Select **Autopilot > Autopilot** in the left pane to start the test.



5. The test result will be output in the hammerdb.log file.



```
hammerdb_5D255CB459D803E273833323 - Notepad
File Edit Format View Help
Timestamp 1 @ Wed Jul 10 11:39:15 CST 2019
Vuser 1:3 ...,
Timestamp 1 @ Wed Jul 10 11:40:15 CST 2019
Vuser 1:4 ...,
Timestamp 1 @ Wed Jul 10 11:41:15 CST 2019
Vuser 1:5 ...,
Timestamp 1 @ Wed Jul 10 11:41:15 CST 2019
Vuser 1:Test complete, Taking end Transaction Count.
Timestamp 1 @ Wed Jul 10 11:41:15 CST 2019
Vuser 1:2 Active Virtual Users configured
Timestamp 1 @ Wed Jul 10 11:41:15 CST 2019
Vuser 1:TEST RESULT : System achieved 286856 SQL Server TPM at 62399 NOPM
```

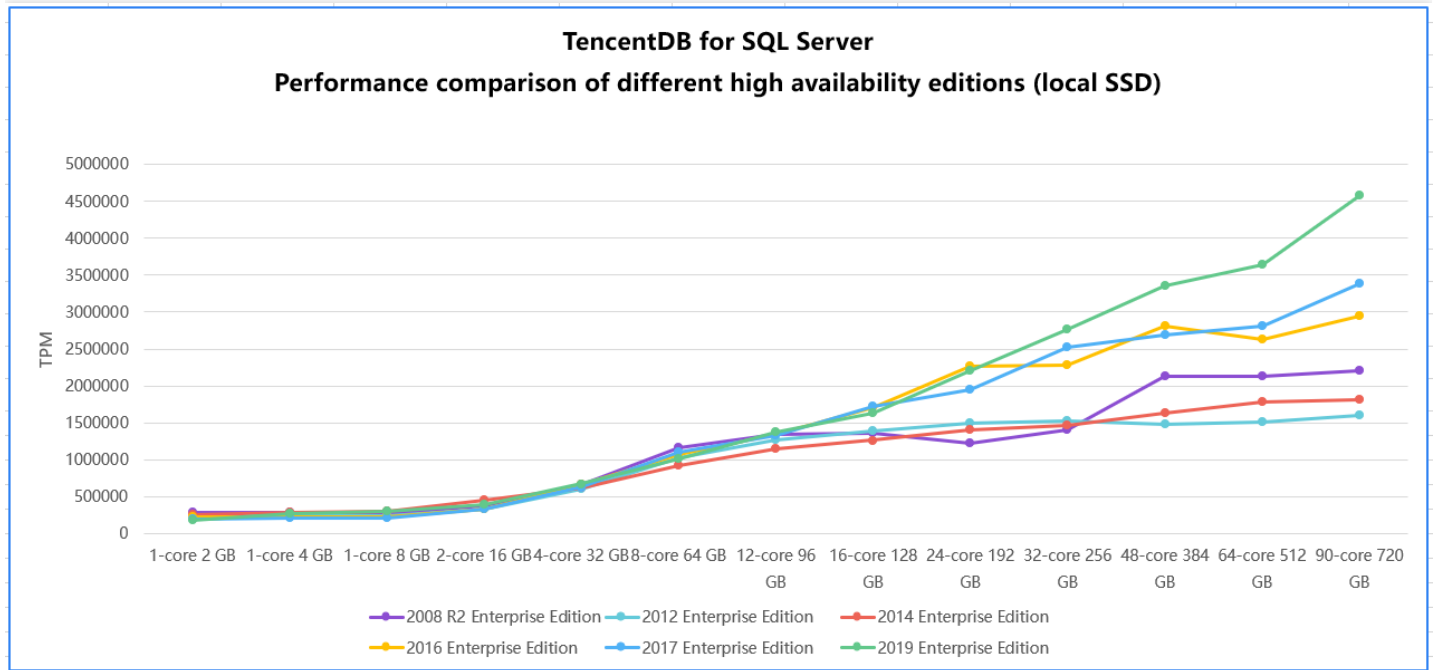
## Test Results

Note :

- The TPM in HammerDB is obtained through the SQL Server performance counter "batch requests/sec", so the TPM actually refers to the batch requests per minute.
- The size of test data set for a instance specification is larger than the memory size of the specification.

### High availability edition (local SSD)

#### Performance comparison of different high availability editions (local SSD)



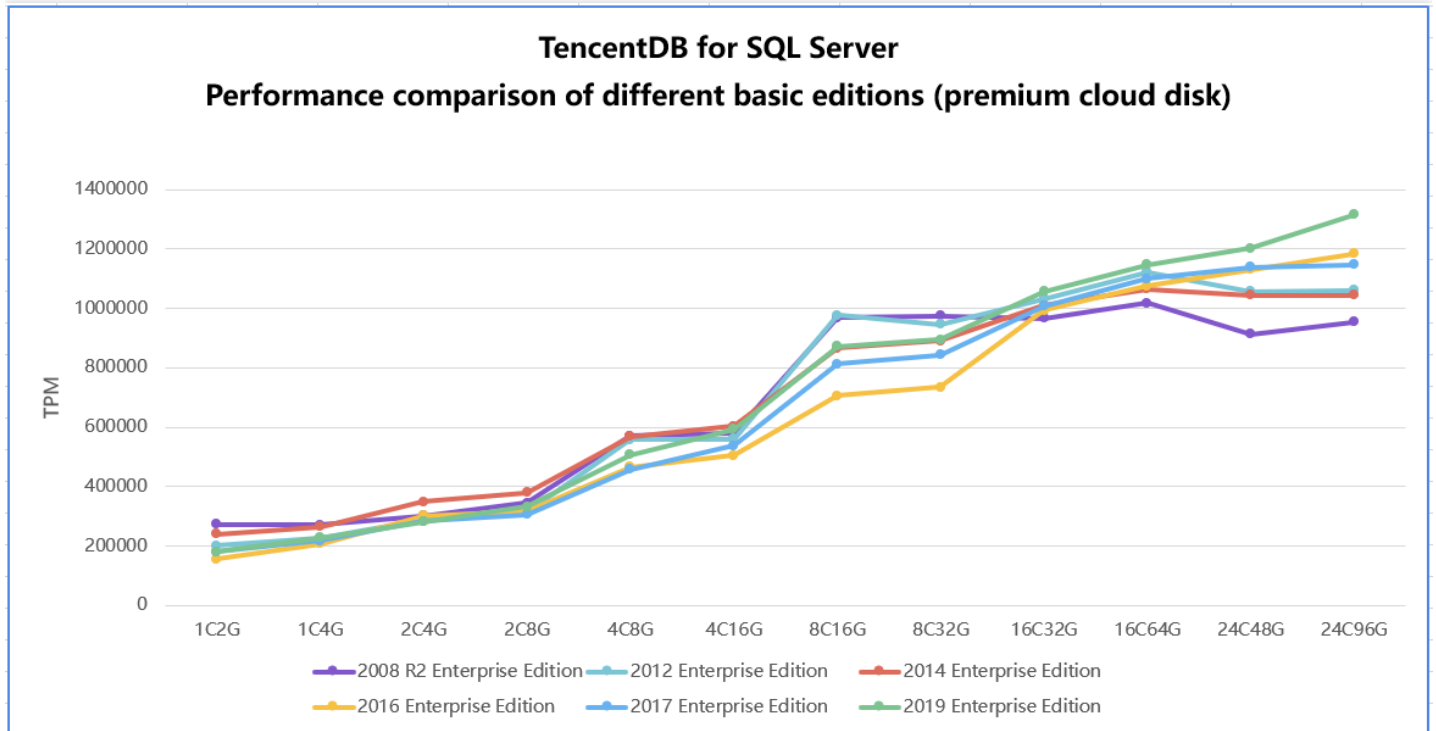
**TPM comparison of different high availability editions (local SSD)**

High Availability Edition Instance Specification	Concurrent Connections	2008 R2 Enterprise Edition	2012 Enterprise Edition	2014 Enterprise Edition	2016 Enterprise Edition	2017 Enterprise Edition	2019 Enterprise Edition
1-core 2 GB MEM	256	279798	229854	261396	219142	201851	181198
1-core 4 GB MEM	256	284680	234401	288282	222796	202510	268330
1-core 8 GB MEM	256	269039	236773	303002	219676	208685	300381
2-core 16 GB MEM	256	368366	333797	446344	336843	331650	390540
4-core 32 GB MEM	256	657641	608801	621186	665065	625370	670660
8-core 64 GB MEM	256	1164062	1020500	924915	1070826	1102296	1007600

High Availability Edition Instance Specification	Concurrent Connections	2008 R2 Enterprise Edition	2012 Enterprise Edition	2014 Enterprise Edition	2016 Enterprise Edition	2017 Enterprise Edition	2019 Enterprise Edition
12-core 96 GB MEM	1024	1348121	1266868	1153585	1337473	1325010	136721
16-core 128 GB MEM	1024	1357678	1385158	1260322	1705660	1716818	162958
24-core 192 GB MEM	1024	1226621	1500900	1406203	2261815	1950871	219868
32-core 256 GB MEM	1024	1401600	1526762	1462100	2280252	2520856	277178
48-core 384 GB MEM	1024	2127159	1486582	1637912	2806496	2683302	335818
64-core 512 GB MEM	1024	2136500	1512763	1789105	2630581	2814599	363518
90-core 720 GB MEM	1024	2205323	1602736	1813094	2948427	3391680	457998

### Basic edition (premium cloud disk)

#### Performance comparison of different basic editions (premium cloud disk)



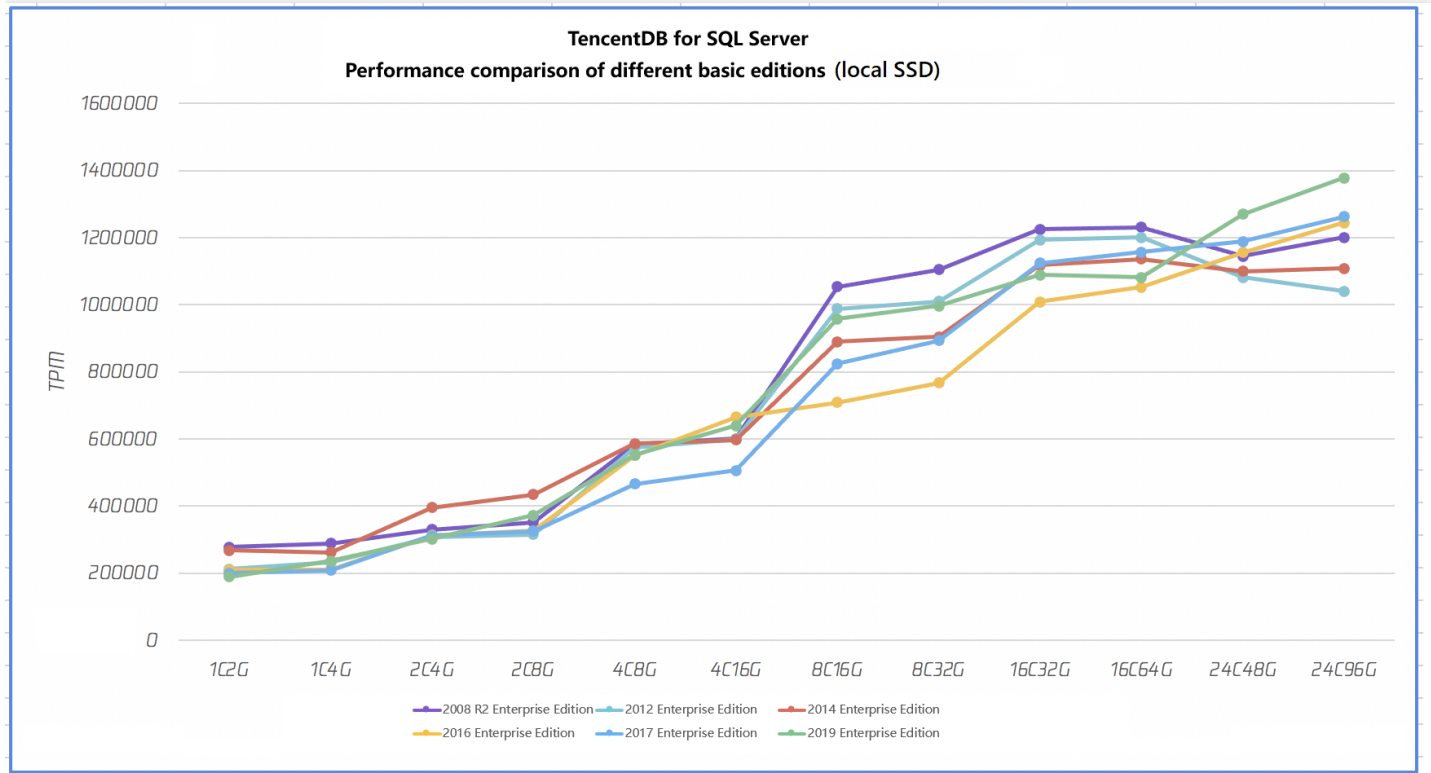
**TPM comparison of different basic editions (premium cloud disk)**

Basic Edition Instance Specification	Concurrent Connections	2008 R2 Enterprise Edition	2012 Enterprise Edition	2014 Enterprise Edition	2016 Enterprise Edition	2017 Enterprise Edition	2019 Enterprise Edition
1-core 2 GB MEM	256	271822	201348	239864	155318	180204	181062
1-core 4 GB MEM	256	271311	224851	263445	206871	218065	226522
2-core 4 GB MEM	256	300573	286984	349251	301520	282145	280962
2-core 8 GB MEM	256	343630	312184	379705	315539	304840	331574
4-core 8 GB MEM	256	569589	557047	567886	464900	457702	507042
4-core 16 GB MEM	256	578367	560981	602897	504379	537819	592712

Basic Edition Instance Specification	Concurrent Connections	2008 R2 Enterprise Edition	2012 Enterprise Edition	2014 Enterprise Edition	2016 Enterprise Edition	2017 Enterprise Edition	2019 Enterprise Edition
8-core 16 GB MEM	256	968175	977350	866079	705806	812833	871514
8-core 32 GB MEM	256	974293	945406	890642	734445	842877	895227
16-core 32 GB MEM	1024	965995	1033233	1008835	993027	1007447	105607
16-core 64 GB MEM	1024	1017271	1122514	1064300	1075603	1100160	114724
24-core 48 GB MEM	1024	912623	1055985	1045071	1129963	1139872	120307
24-core 96 GB MEM	1024	954747	1061295	1044175	1184654	1147836	131584

### Basic editions (SSD cloud disk)

#### Performance comparison of different basic editions (SSD cloud disk)



**TPM comparison of different basic editions (SSD cloud disk)**

Basic Edition Instance Specification	Concurrent Connections	2008 R2 Enterprise Edition	2012 Enterprise Edition	2014 Enterprise Edition	2016 Enterprise Edition	2017 Enterprise Edition	2019 Enterprise Edition
1-core 2 GB MEM	256	277486	212148	268084	209753	198943	188967
1-core 4 GB MEM	256	287696	230418	261590	210630	207538	236449
2-core 4 GB MEM	256	329331	307056	395540	312891	311241	301509
2-core 8 GB MEM	256	351604	314275	434242	325675	324843	371499
4-core 8 GB MEM	256	582886	574929	585404	550150	464908	551349
4-core 16 GB MEM	256	600462	599149	596735	664131	505928	638929

Basic Edition Instance Specification	Concurrent Connections	2008 R2 Enterprise Edition	2012 Enterprise Edition	2014 Enterprise Edition	2016 Enterprise Edition	2017 Enterprise Edition	2019 Enterprise Edition
8-core 16 GB MEM	256	1053565	987506	889740	708025	824114	957938
8-core 32 GB MEM	256	1104104	1009945	903942	767060	892721	995938
16-core 32 GB MEM	1024	1224515	1193629	1118041	1009075	1123299	1088041
16-core 64 GB MEM	1024	1230516	1200651	1136268	1052159	1156376	1081451
24-core 48 GB MEM	1024	1145090	1080964	1099758	1155533	1187867	1269451
24-core 96 GB MEM	1024	1200990	1040499	1108077	1243883	1262611	1377181