

RDS for MySQL

Performance White Paper

Issue 01
Date 2025-10-21



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1 Test Method

RDS for MySQL is fully compatible with native MySQL, combining stability, reliability, and high performance. It features intelligent operations and maintenance, robust security, out-of-the-box usability, and automatic scaling.

Test Environment

The test environment for RDS for MySQL 5.7 and 5.6 is as follows:

- Elastic Cloud Server (ECS): general computing | c3.2xlarge.2 | 8 vCPUs | 16 GB, CentOS 7.4 (64-bit). Bind an elastic IP (EIP) to the ECS because additional compilation tools need to be installed on stress testing tools.

The test environment for RDS for MySQL 8.0 is as follows:

- ECS: general computing-plus | c6.4xlarge.2 | 16 vCPUs | 32 GB, CentOS 7.6 (64-bit). Bind an EIP to the ECS because additional compilation tools need to be installed on stress testing tools.

Test Tool

Sysbench is a multi-threaded benchmark tool based on LuaJIT, allowing you to quickly get an impression of system performance by using a built-in database test model. For details, visit <https://github.com/akopytov/sysbench>.

Sysbench 1.0.18 is used in this test. Run the following commands to install it:

```
# wget -c https://github.com/akopytov/sysbench/archive/1.0.18.zip
# yum install autoconf libtool mysql mysql-devel vim unzip
# unzip 1.0.18.zip
# cd sysbench-1.0.18
# ./autogen.sh
# ./configure
# make
# make install
```

Test Procedure

Replace the database name, connection IP address, and user password based on the site requirements.

Step 1 Import data.

1. Run the following command to log in to a database and create the test database **loadtest**:

```
mysql -u root -P 3306 -h <host> -p -e "create database loadtest"
```

2. Run the following command to import the test background data to the **loadtest** database:

```
sysbench --test=/usr/local/share/sysbench/tests/include/oltp_legacy/oltp.lua --db-driver=mysql --mysql-db=loadtest --mysql-user=root --mysql-password=<password> --mysql-port=3306 --mysql-host=<host> --oltp-tables-count=64 --oltp-table-size=10000000 --num-threads=20 prepare
```

- Step 2** Run the following command to perform a stress testing:

```
sysbench --test=/usr/local/share/sysbench/tests/include/oltp_legacy/oltp.lua --db-driver=mysql --mysql-db=loadtest --mysql-user=root --mysql-password=<password> --mysql-port=3306 --mysql-host=<host> --oltp-tables-count=64 --oltp-table-size=10000000 --max-time=3600 --max-requests=0 --num-threads=200 --report-interval=3 --forced-shutdown=1 run
```

- Step 3** Run the following command to delete the test data:

```
sysbench --test=/usr/local/share/sysbench/tests/include/oltp_legacy/oltp.lua --db-driver=mysql --mysql-db=loadtest --mysql-user=root --mysql-password=<password> --mysql-port=3306 --mysql-host=<host> --oltp-tables-count=64 --oltp-table-size=10000000 --max-time=3600 --max-requests=0 --num-threads=200 cleanup
```

----End

Testing Model

1. Table structure:

```
CREATE TABLE `sbtest` (  
  `id` INTEGER UNSIGNED NOT NULL AUTO_INCREMENT,  
  `k` INTEGER UNSIGNED DEFAULT '0' NOT NULL,  
  `c` CHAR(120) DEFAULT '' NOT NULL,  
  `pad` CHAR(60) DEFAULT '' NOT NULL,  
  PRIMARY KEY (`id`)  
) ENGINE=InnoDB
```

2. Read/write ratio:

The default transaction submitted by sysbench contains 18 SQL statements. The details are as follows:

- Ten primary key SELECT statements:
SELECT c FROM \${rand_table_name} where id=\${rand_id};
- Four range SELECT statements:
SELECT c FROM \${rand_table_name} WHERE id BETWEEN \${rand_id_start} AND \${rand_id_end};
SELECT SUM(K) FROM \${rand_table_name} WHERE id BETWEEN \${rand_id_start} AND \${rand_id_end};
SELECT c FROM \${rand_table_name} WHERE id BETWEEN \${rand_id_start} AND \${rand_id_end} ORDER BY c;
SELECT DISTINCT c FROM \${rand_table_name} WHERE id BETWEEN \${rand_id_start} AND \${rand_id_end} ORDER BY c;
- Two UPDATE statements:
UPDATE \${rand_table_name} SET k=k+1 WHERE id=\${rand_id}
UPDATE \${rand_table_name} SET c=\${rand_str} WHERE id=\${rand_id}
- One DELETE statement:
DELETE FROM \${rand_table_name} WHERE id=\${rand_id}
- One INSERT statement:
INSERT INTO \${rand_table_name} (id, k, c, pad) VALUES (\${rand_id},\${rand_k},\${rand_str_c},\${rand_str_pad})

Test Metrics

- Transactions per second (TPS) refers to the number of transactions executed per second by a database. Each transaction contains 18 SQL statements.

- Queries per second (QPS) refers to the number of SQL statements, including INSERT, SELECT, UPDATE, and DELETE statements, executed per second.

2 RDS for MySQL 5.6 Test Data

2.1 General-Enhanced DB Instances

Test Data

NOTICE

The **Maximum Connections (Stress Testing)** columns in the following tables indicate the results of the RDS performance stress testing. For running services on the live network, set the parameter **max_connections**.

Table 2-1 vCPU:Memory =1:2

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
1	2	800	197.19	3,943.85	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of Elastic Volume Service Overview .
2	4	1,500	470.4	9,400.32	
4	8	2,500	768.23	15,364.64	
8	16	5,000	1,728.84	34,576.84	
16	32	10,000	2,947.42	58,948.35	
32	64	18,000	3,239.9	64,798.05	
60	128	30,000	4,735.63	94,712.67	

Table 2-2 vCPU:Memory = 1:4

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
1	4	1,500	466.73	9,334.62	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of Elastic Volume Service .
2	8	2,500	519.24	10,384.74	
4	16	5,000	1,191.98	23,839.68	
8	32	10,000	2,698.01	53,960.27	
16	64	18,000	3,148.77	62,975.44	
32	128	30,000	4,385.29	87,705.81	
60	256	60,000	4,810.94	95,117.75	

Table 2-3 vCPU:Memory = 1:8

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
1	8	2,500	487.4	9,748.07	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of Elastic Volume Service Overview .
2	16	5,000	617.59	12,351.83	
4	32	10,000	1,374.01	27,480.14	
8	64	18,000	2,824.63	56,492.64	
16	128	30,000	4,215.09	84,301.79	
60	512	100,000	4,838.57	96,771.34	

Test Results

Figure 2-1 vCPU:Memory =1:2

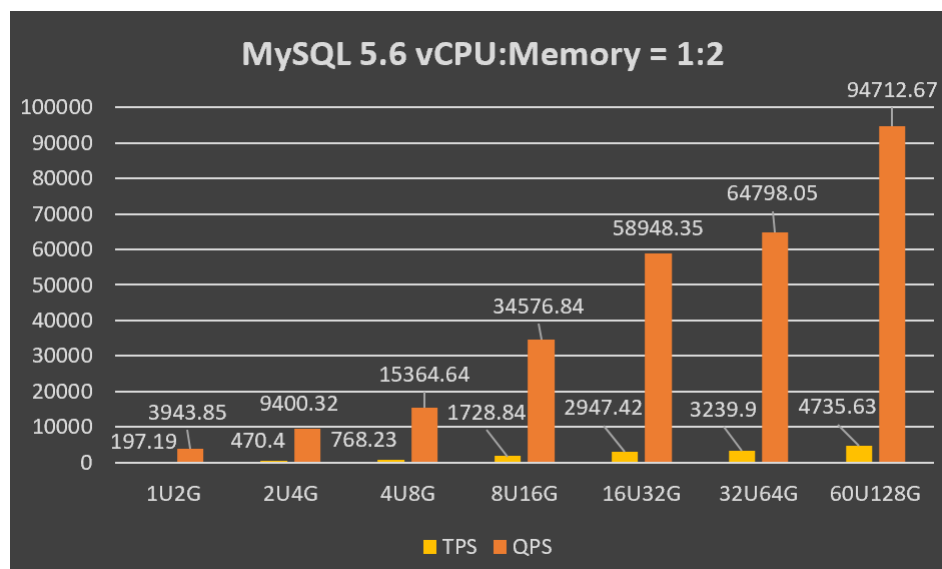


Figure 2-2 vCPU:Memory = 1:4

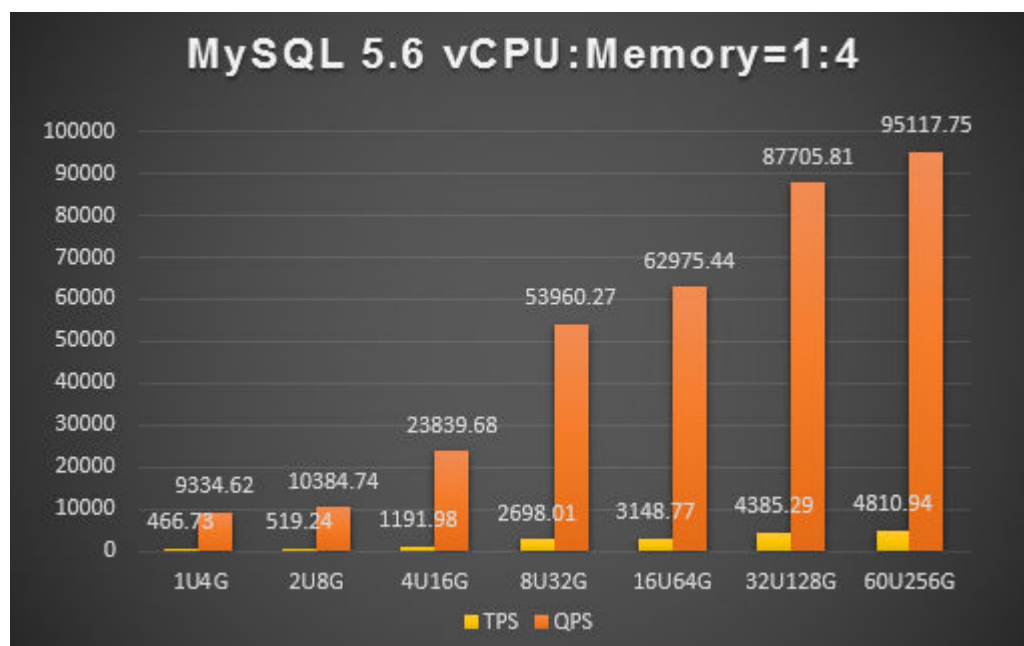
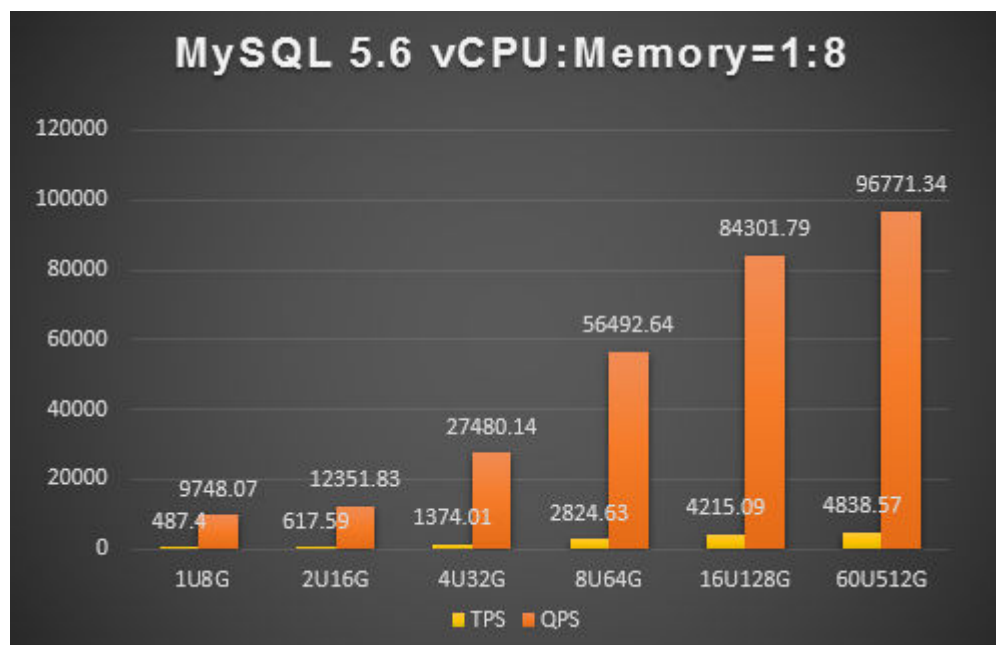


Figure 2-3 vCPU:Memory = 1:8



2.2 General-Purpose DB Instances

Test Data

NOTICE

The **Maximum Connections (Stress Testing)** columns in the following tables indicate the results of the RDS performance stress testing. For running services on the live network, set the parameter **max_connections**.

Table 2-4 vCPU:Memory = 1:2

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
1	2	800	157	3,140	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of Elastic Volume Service <i>Service Overview</i> .
2	4	1,500	362	7,239	
4	8	2,500	834	16,672	
8	16	5,000	1,701	34,016	

Table 2-5 vCPU:Memory = 1:4

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
2	8	2,500	483	9,669	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of Elastic Volume Service Overview .
4	16	5,000	983	19,668	
8	32	10,000	2,045	40,902	

Test Results

Figure 2-4 vCPU:Memory = 1:2

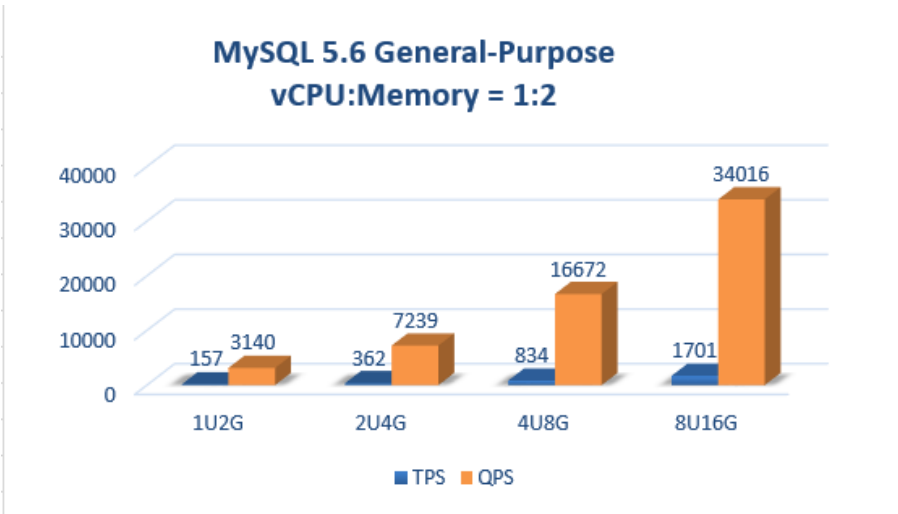
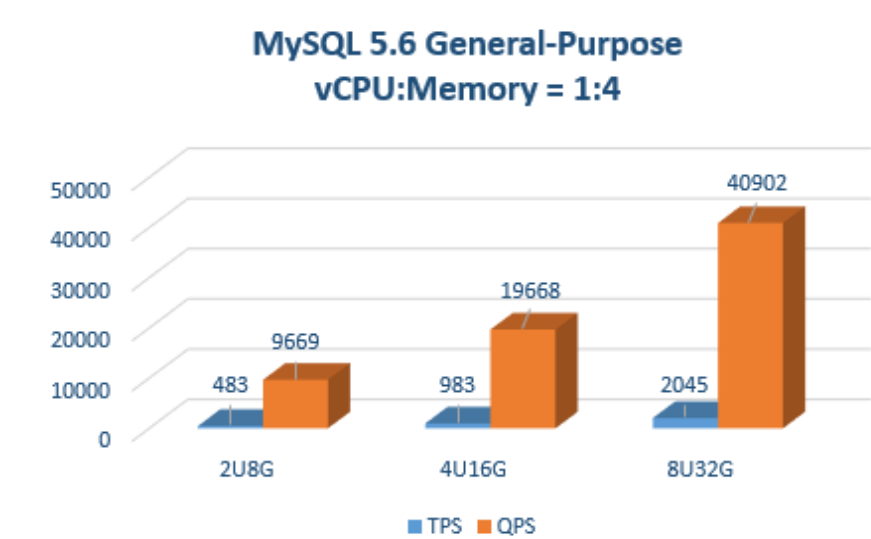


Figure 2-5 vCPU:Memory = 1:4



2.3 Dedicated DB Instances

Test Data

NOTICE

The **Maximum Connections (Stress Testing)** columns in the following tables indicate the results of the RDS performance stress testing. For running services on the live network, set the parameter **max_connections**.

Table 2-6 vCPU:Memory = 1:4

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
2	8	2,500	519	10,385	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of Elastic Volume Service Overview .
4	16	5,000	1,192	23,840	
8	32	10,000	2,698	53,960	
16	64	18,000	3,149	62,975	
32	128	30,000	4,385	87,706	
64	256	60,000	4,811	95,118	

Table 2-7 vCPU:Memory = 1:8

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
4	32	10,000	1,374	27,480	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of Elastic Volume Service <i>Service Overview</i> .
8	64	18,000	2,825	56,493	
16	128	30,000	4,215	84,302	
64	512	100,000	4,839	96,771	

Test Results

Figure 2-6 vCPU:Memory = 1:4

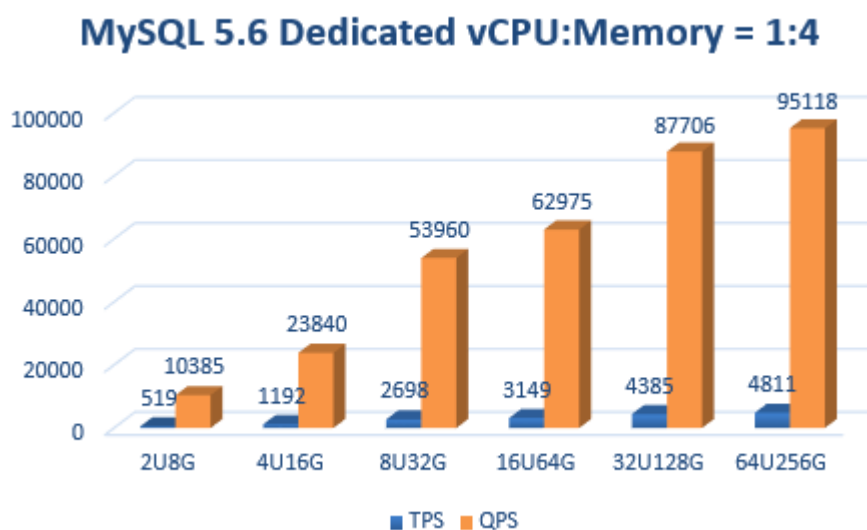
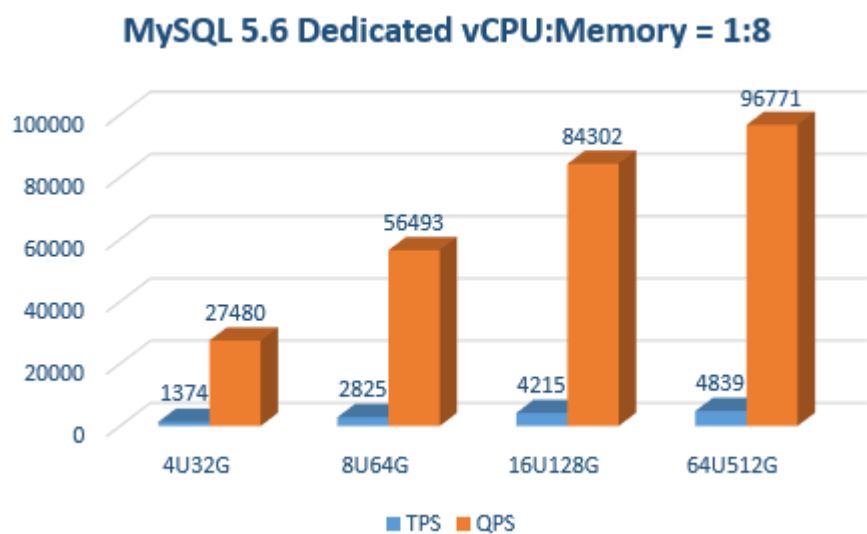


Figure 2-7 vCPU:Memory = 1:8



3 RDS for MySQL 5.7 Test Data

3.1 General-Enhanced DB Instances

Test Data

NOTICE

The **Maximum Connections (Stress Testing)** columns in the following tables indicate the results of the RDS performance stress testing. For running services on the live network, set the parameter **max_connections**.

Table 3-1 vCPU:Memory =1:2

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
1	2	800	236.59	4,731.85	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of Elastic Volume Service Overview .
2	4	1,500	470.35	9,400.04	
4	8	2,500	969.14	19,382.91	
8	16	5,000	1,768.01	35,360.39	
16	32	10,000	2,630.5	52,000.99	
32	64	18,000	3,011.89	60,237.87	
60	128	30,000	4,471.39	88,428.09	

Table 3-2 vCPU:Memory = 1:4

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
1	4	1,500	468.11	9,362.23	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of <i>Elastic Volume Service Overview</i> .
2	8	2,500	620.7	12,393.97	
4	16	5,000	1,230.39	24,607.81	
8	32	10,000	2,514.48	50,289.62	
16	64	18,000	3,016.84	60,336.77	
32	128	30,000	4,367.67	87,353.69	
60	256	60,000	4,536.41	90,728.55	

Table 3-3 vCPU:Memory = 1:8

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
1	8	2,500	612.75	12,255.01	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of Elastic Volume Service .
2	16	5,000	675.66	13,513.18	
4	32	10,000	1,488.25	29,765.06	
8	64	18,000	2,810.79	56,215.81	
16	128	30,000	4,095.49	81,909.79	
60	512	100,000	4,626.18	96,823.95	

Test Results

Figure 3-1 vCPU:Memory =1:2

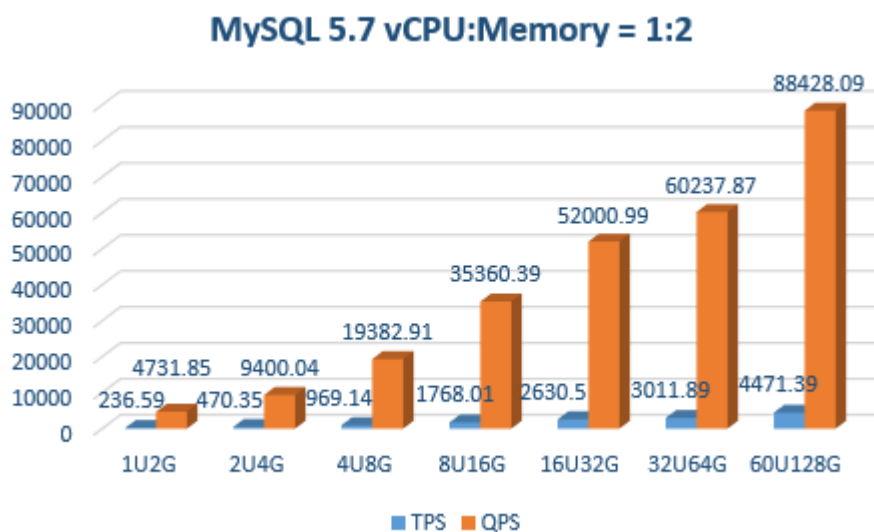


Figure 3-2 vCPU:Memory = 1:4

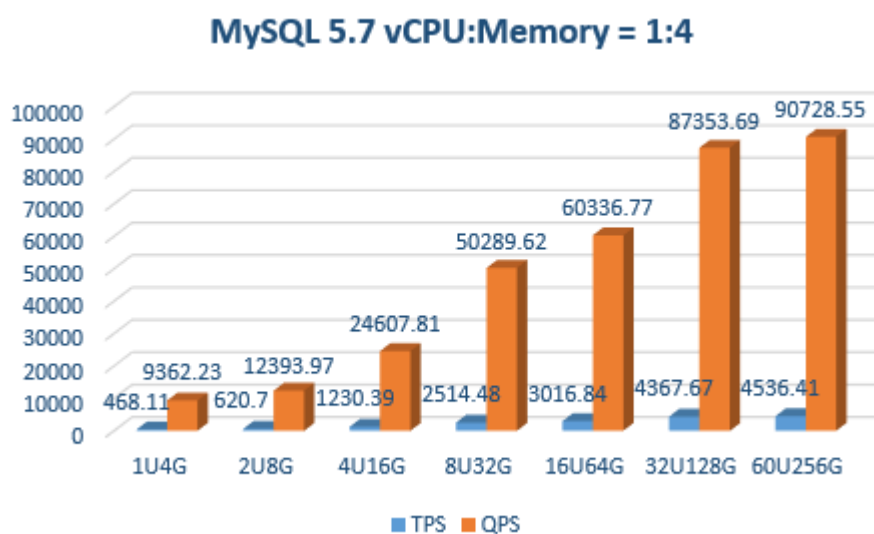
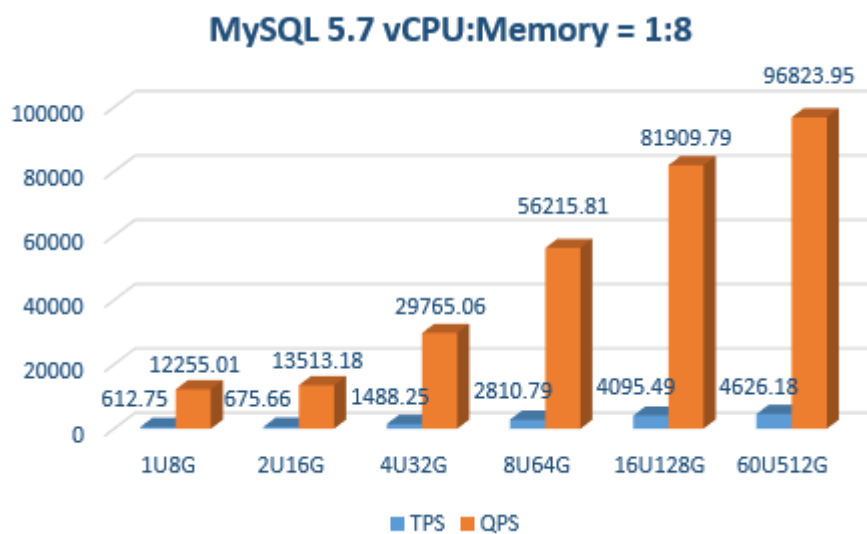


Figure 3-3 vCPU:Memory = 1:8



3.2 General-Purpose DB Instances

Test Data

NOTICE

The **Maximum Connections (Stress Testing)** columns in the following tables indicate the results of the RDS performance stress testing. For running services on the live network, set the parameter **max_connections**.

Table 3-4 vCPU:Memory = 1:2

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
1	2	800	185	3,707	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of Elastic Volume Service <i>Service Overview</i> .
2	4	1,500	334	6,673	
4	8	2,500	756	15,122	
8	16	5,000	1,338	26,756	

Table 3-5 vCPU:Memory = 1:4

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
2	8	2,500	552	11,039	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of Elastic Volume Service Overview .
4	16	5,000	1,062	21,249	
8	32	10,000	2,117	42,335	

Test Results

Figure 3-4 vCPU:Memory = 1:2

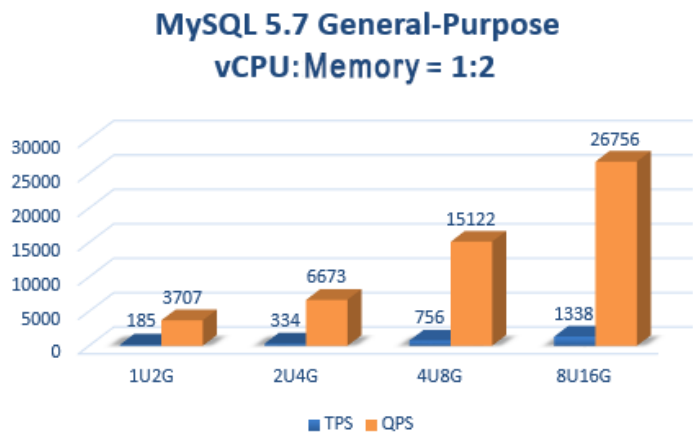
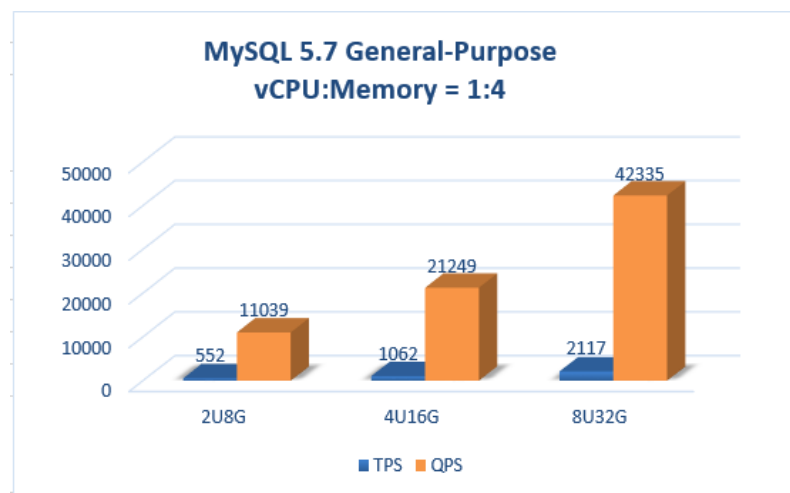


Figure 3-5 vCPU:Memory = 1:4



3.3 Dedicated DB Instances

Test Data

NOTICE

The **Maximum Connections (Stress Testing)** columns in the following tables indicate the results of the RDS performance stress testing. For running services on the live network, set the parameter **max_connections**.

Table 3-6 vCPU:Memory = 1:4

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
2	8	2,500	621	12,394	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of Elastic Volume Service Overview .
4	16	5,000	1,230	24,608	
8	32	10,000	2,514	50,290	
16	64	18,000	3,017	60,337	
32	128	30,000	4,368	87,354	
64	256	60,000	4,536	90,729	

Table 3-7 vCPU:Memory = 1:8

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
4	32	10,000	1,488	29,765	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of Elastic Volume Service <i>Service Overview</i> .
8	64	18,000	2,811	56,216	
16	128	30,000	4,095	81,910	
64	512	100,000	4,626	96,824	

Test Results

Figure 3-6 vCPU:Memory = 1:4

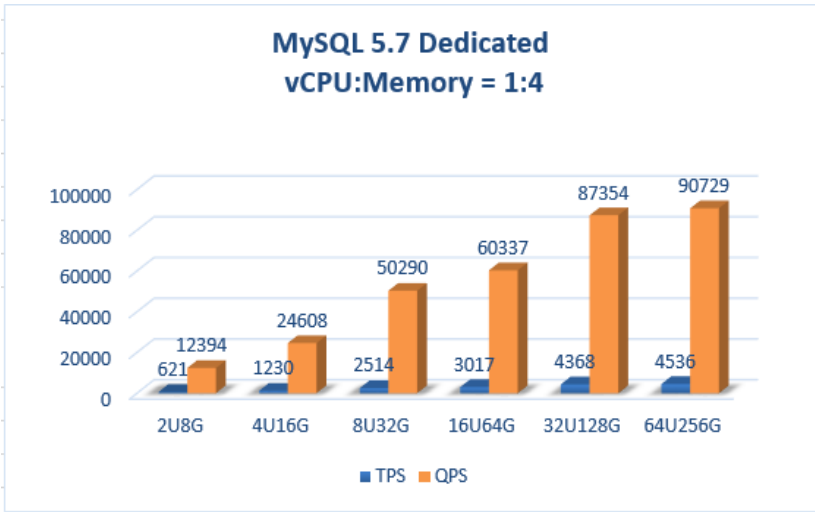
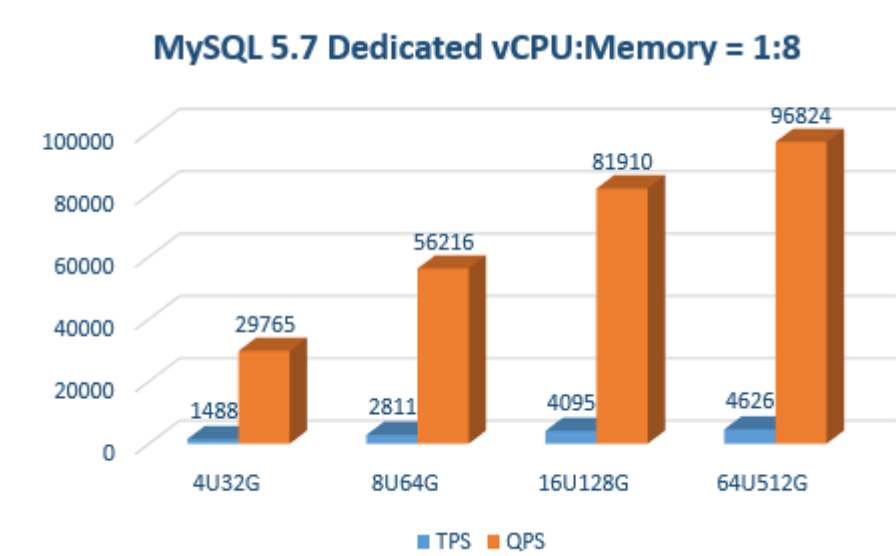


Figure 3-7 vCPU:Memory = 1:8



3.4 Kunpeng General-Enhanced DB Instances

Test Data

NOTICE

The **Maximum Connections (Stress Testing)** columns in the following tables indicate the results of the RDS performance stress testing. For running services on the live network, set the parameter **max_connections**.

Table 3-8 vCPU:Memory = 1:2

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
2	4	1,200	375	7,513	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of Elastic Volume Service Overview .
4	8	2,200	973	19,461	
8	16	4,200	1,462	29,256	
12	24	6,000	1,909	38,182	
16	32	8,600	2,566	51,325	
24	48	13,000	2,764	55,294	
32	64	16,000	2,980	59,608	
48	96	22,000	3,334	66,701	
60	120	30,000	3,858	77,180	

Table 3-9 vCPU:Memory = 1:4

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
2	8	2,000	495	9,918	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of Elastic Volume Service Overview .
4	16	4,000	1,020	20,404	
8	32	8,000	2,017	40,342	
12	48	12,000	2,628	52,565	
16	64	14,400	2,896	57,938	
24	96	21,600	3,061	61,219	
32	128	24,000	3,192	63,853	
48	192	36,000	3,528	70,570	

Test Results

Figure 3-8 vCPU:Memory = 1:2

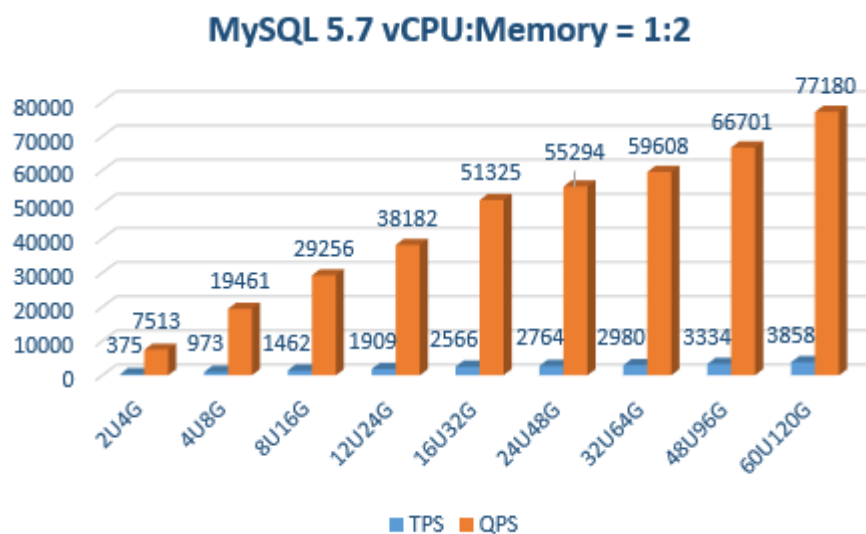
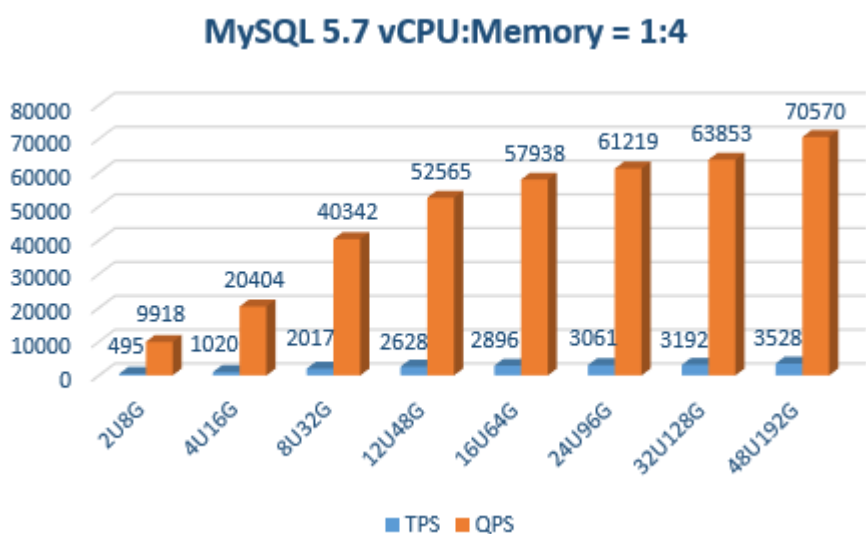


Figure 3-9 vCPU:Memory = 1:4



4 RDS for MySQL 8.0 Test Data

4.1 General-Purpose DB Instances

Test Data

Depending on service scenarios, the test results of RDS for MySQL 8.0 may be lower than those of RDS for MySQL 5.7, which is normal.

NOTICE

The **Maximum Connections (Stress Testing)** columns in the following tables indicate the results of the RDS performance stress testing. For running services on the live network, set the parameter **max_connections**.

Table 4-1 vCPU:Memory = 1:2

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
2	4	1,500	434	8,679	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of Elastic Volume Service <i>Service Overview</i> .
4	8	2,500	1,363	27,252	
8	16	5,000	2,014	40,280	

Table 4-2 vCPU:Memory = 1:4

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
2	8	2,500	645	12,899	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of Elastic Volume Service <i>Service Overview</i> .
4	16	5,000	1,428	28,554	
8	32	10,000	2,422	48,445	

Test Results

Figure 4-1 vCPU:Memory = 1:2

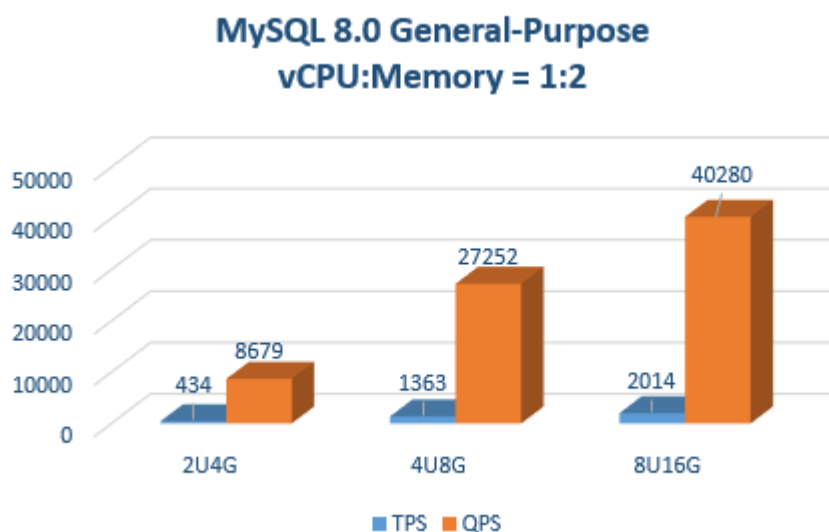
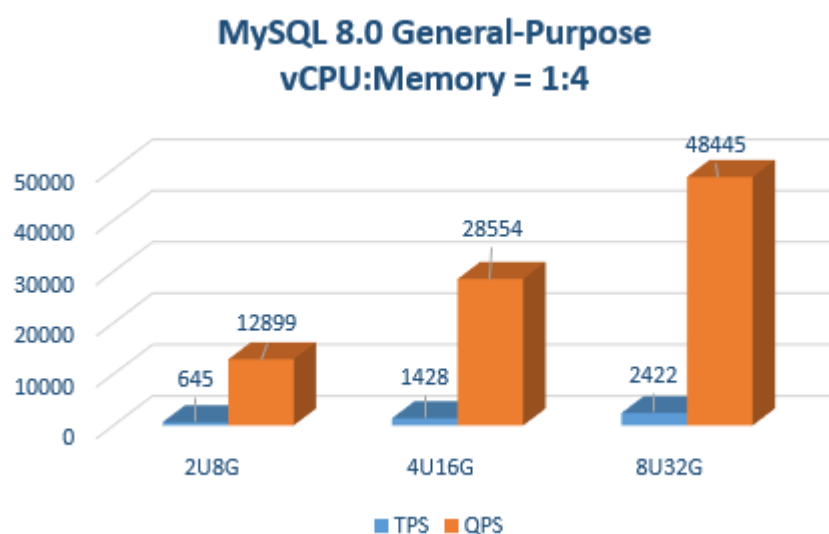


Figure 4-2 vCPU:Memory = 1:4



4.2 Dedicated DB Instances

Test Data

Depending on service scenarios, the test results of RDS for MySQL 8.0 may be lower than those of RDS for MySQL 5.7, which is normal.

NOTICE

The **Maximum Connections (Stress Testing)** columns in the following tables indicate the results of the RDS performance stress testing. For running services on the live network, set the parameter **max_connections**.

Table 4-3 vCPU:Memory = 1:4

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
2	8	2,500	647	12,936	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of Elastic Volume Service <i>Service Overview</i> .
4	16	5,000	1,556	31,117	
8	32	10,000	2,543	50,867	
16	64	18,000	4,006	80,115	
32	128	30,000	5,979	119,575	
64	256	60,000	6,463	129,261	

Table 4-4 vCPU:Memory = 1:8

vCPUs	Memory (GB)	Maximum Connections (Stress Testing)	TPS	QPS	IOPS
4	32	10,000	1,642	32,849	The input/output operations per second (IOPS) supported depends on the I/O performance of Elastic Volume Service (EVS) disks. For details, see Disk Types and Performance of Elastic Volume Service <i>Service Overview</i> .
8	64	18,000	3,102	62,045	
16	128	30,000	5,467	109,349	
64	512	100,000	6,484	129,684	

Test Results

Figure 4-3 vCPU:Memory = 1:4

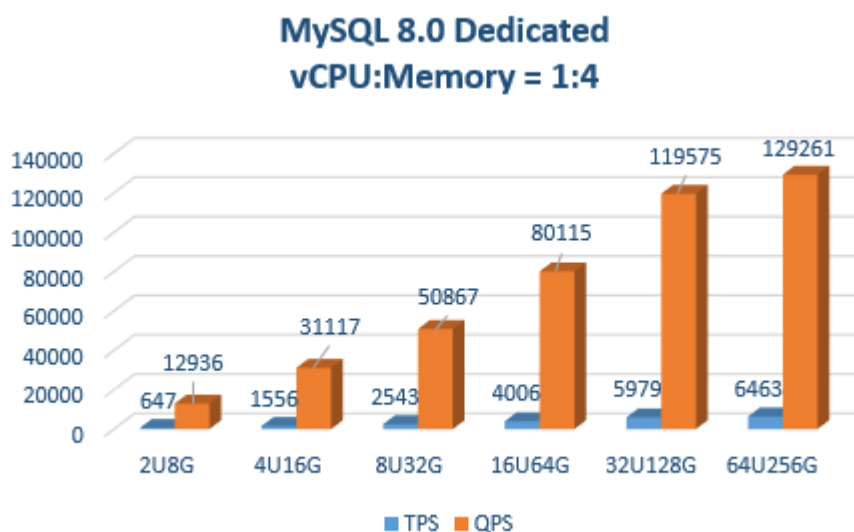


Figure 4-4 vCPU:Memory = 1:8

