

AngusTester 和 JMeter JDBC 测试结果比较

本次测试主要目的是对比 AngusTester 和 JMeter 对 JDBC 协议性能表现。

测试环境

以下测试 AngusTester 和 JMeter 使用相同环境。注意：本次测试是在同一台 PC 机上进行，如果想测试特定配置下数据库的准确性能，需要将测试机和 MySQL 服务器分开部署，或者使用更高配置的测试服务器。

软件

- 数据库：Percona Server MySQL 5.7.34-37
- MySQL 驱动：mysql-connector-j-8.0.31.jar
- Docker：19.03.11 (使用 Docker 部署 MySQL)
- 测试工具
 - AngusTester 1.0.0
 - Apache JMeter 4.0

系统

MacBookPro16 PC

- Processors: 1
- Cores: 8 * 2 Intel Core i9 2.3 GHz
- Memory: 32 GB

MySQL 配置

```
character_set_server = utf8mb4
skip-host-cache
skip-name-resolve
datadir=/var/lib/mysql
socket=/var/lib/mysql/mysql.sock
secure-file-priv=/var/lib/mysql-files
user=mysql
max_allowed_packet=100M
max_connections=2000    # 最大连接数

# Disabling symbolic-links is recommended to prevent assorted security risks
symbolic-links=0
```

```
log-error=/var/log/mysql/error.log
pid-file=/var/run/mysqld/mysqld.pid
```

测试表

```
CREATE TABLE `user` (
  `username` varchar(255) NOT NULL,
  `password` varchar(255) NULL DEFAULT NULL,
  INDEX `idx_username`(`username`) USING BTREE
) ENGINE = InnoDB;
```

测试脚本

- JMeter Insert 脚本 (JDBC_Testing_Insert_AngusTesterVSJMeter.jmx)

```
<?xml version="1.0" encoding="UTF-8"?>
<jmeterTestPlan version="1.2" properties="4.0" jmeter="4.0 r1823414">
  <hashTree>
    <TestPlan guiclass="TestPlanGui" testclass="TestPlan" testname="Jdbc prepared update performance testing" enabled="true">
      <stringProp name="TestPlan.comments"></stringProp>
      <boolProp name="TestPlan.functional_mode">false</boolProp>
      <boolProp name="TestPlan.tearDown_on_shutdown">true</boolProp>
      <boolProp name="TestPlan.serialize_threadgroups">false</boolProp>
      <elementProp name="TestPlan.user_defined_variables" elementType="Arguments" guiclass="ArgumentsPanel" testclass="Arguments" testname="User
Defined Variables" enabled="true">
        <collectionProp name="Arguments.arguments"/>
      </elementProp>
      <stringProp name="TestPlan.user_define_classpath"></stringProp>
    </TestPlan>
  </hashTree>
  <ThreadGroup guiclass="ThreadGroupGui" testclass="ThreadGroup" testname="Thread Group" enabled="true">
    <stringProp name="ThreadGroup.on_sample_error">continue</stringProp>
    <elementProp name="ThreadGroup.main_controller" elementType="LoopController" guiclass="LoopControlPanel" testclass="LoopController"
testname="Loop Controller" enabled="true">
      <boolProp name="LoopController.continue_forever">false</boolProp>
      <intProp name="LoopController.loops">-1</intProp>
    </elementProp>
    <stringProp name="ThreadGroup.num_threads">1<!-- 1/10/50/100/200/500/1000/2000 --></stringProp>
    <stringProp name="ThreadGroup.ramp_time"></stringProp>
    <boolProp name="ThreadGroup.scheduler">true</boolProp>
    <stringProp name="ThreadGroup.duration">60</stringProp>
    <stringProp name="ThreadGroup.delay"></stringProp>
```

```

</ThreadGroup>
<hashTree>
  <JDBCDataSource guiclass="TestBeanGUI" testclass="JDBCDataSource" testname="JDBC Connection Configuration" enabled="true">
    <boolProp name="autocommit">true</boolProp>
    <stringProp name="checkQuery"></stringProp>
    <stringProp name="connectionAge">5000</stringProp>
    <stringProp name="dataSource">test</stringProp>
    <stringProp name="dbUrl">jdbc:mysql://localhost:3306/xcan_mockdata_sample</stringProp>
    <stringProp name="driver">com.mysql.cj.jdbc.Driver</stringProp>
    <boolProp name="keepAlive">true</boolProp>
    <stringProp name="password">123456</stringProp>
    <stringProp name="poolMax">0</stringProp>
    <stringProp name="timeout">100000</stringProp>
    <stringProp name="transactionIsolation">DEFAULT</stringProp>
    <stringProp name="trimInterval">200000</stringProp>
    <stringProp name="username">sample</stringProp>
  </JDBCDataSource>
  <hashTree/>
  <JDBCSampler guiclass="TestBeanGUI" testclass="JDBCSampler" testname="JDBC Request" enabled="true">
    <stringProp name="dataSource">test</stringProp>
    <stringProp name="query">INSERT INTO `user` (username, password) VALUES (?, ?)</stringProp>
    <stringProp
name="queryArguments">${__RandomString(16,0123456789abcdefghijklmnopqrstuvwxyz,)},${__RandomString(32,0123456789abcdefghijklmnopqrstuvwxyz,)}
</stringProp>
    <stringProp name="queryArgumentsTypes">VARCHAR,VARCHAR</stringProp>
    <stringProp name="queryTimeout">60</stringProp>
    <stringProp name="queryType">Prepared Update Statement</stringProp>
    <stringProp name="resultSetHandler">Store as String</stringProp>
    <stringProp name="resultVariable"></stringProp>
    <stringProp name="variableNames"></stringProp>
  </JDBCSampler>
  <hashTree/>
</hashTree>
</hashTree>
</jmeterTestPlan>

```

运行脚本：

```
./jmeter -n -t ~/scripts/JDBC_Testing_Insert_AngusTesterVSJMeter.jmx
```

- AngusTester Insert 脚本 (JDBC_Testing_Insert_AngusTesterVSJMeter.yaml)

```
specification: angus/1.0.0
info:
  name: Jdbc prepared update performance testing
  description: This is an example of a jdbc insert statement testing.
type: TEST_PERFORMANCE
plugin: Jdbc
configuration:
  duration: 60s
  thread:
    threads: 1 # 1/10/50/100/200/500/1000/2000
  priority: 1000
task:
  arguments:
    jdbcSetting:
      type: MYSQL
      driverClassName: com.mysql.cj.jdbc.Driver
      jdbcUrl: jdbc:mysql://localhost:3306/xcan_mockdata_sample
      username: sample
      password: 123456
    ignoreAssertions: true
  pipelines:
    - target: JDBC
      name: UpdateUser
      description: Save user by prepared update statement
      enabled: true
      type: PREPARED_UPDATE
      sql: "INSERT INTO `user` (username, password) VALUES (?, ?)"
      timeoutInSecond: 60
      arguments:
        - type: varchar
          value: "@String(16)" # Mock数据函数
          inout: IN
        - type: varchar
          value: "@String(32)" # Mock数据函数
          inout: IN
```

运行脚本:

```
./startup-runner.sh -s ~/scripts/JDBC_Testing_Insert_AngusTesterVSJMeter.yaml -e 1001
```

- JMeter Select 脚本 (JDBC_Testing_Select_AngusTesterVSJMeter.jmx)

```
<?xml version="1.0" encoding="UTF-8"?>
<jmeterTestPlan version="1.2" properties="4.0" jmeter="4.0 r1823414">
  <hashTree>
    <TestPlan guiclass="TestPlanGui" testclass="TestPlan" testname="Jdbc prepared select performance testing" enabled="true">
      <stringProp name="TestPlan.comments"></stringProp>
      <boolProp name="TestPlan.functional_mode">false</boolProp>
      <boolProp name="TestPlan.tearDown_on_shutdown">true</boolProp>
      <boolProp name="TestPlan.serialize_threadgroups">false</boolProp>
      <elementProp name="TestPlan.user_defined_variables" elementType="Arguments" guiclass="ArgumentsPanel" testclass="Arguments" testname="User
Defined Variables" enabled="true">
        <collectionProp name="Arguments.arguments"/>
      </elementProp>
      <stringProp name="TestPlan.user_define_classpath"></stringProp>
    </TestPlan>
  </hashTree>
  <ThreadGroup guiclass="ThreadGroupGui" testclass="ThreadGroup" testname="Thread Group" enabled="true">
    <stringProp name="ThreadGroup.on_sample_error">continue</stringProp>
    <elementProp name="ThreadGroup.main_controller" elementType="LoopController" guiclass="LoopControlPanel" testclass="LoopController"
testname="Loop Controller" enabled="true">
      <boolProp name="LoopController.continue_forever">false</boolProp>
      <intProp name="LoopController.loops">-1</intProp>
    </elementProp>
    <stringProp name="ThreadGroup.num_threads">1<!-- 1/10/50/100/200/500/1000/2000 --></stringProp>
    <stringProp name="ThreadGroup.ramp_time"></stringProp>
    <boolProp name="ThreadGroup.scheduler">true</boolProp>
    <stringProp name="ThreadGroup.duration">60</stringProp>
    <stringProp name="ThreadGroup.delay"></stringProp>
  </ThreadGroup>
  </hashTree>
  <JDBCDataSource guiclass="TestBeanGUI" testclass="JDBCDataSource" testname="JDBC Connection Configuration" enabled="true">
    <boolProp name="autocommit">true</boolProp>
    <stringProp name="checkQuery"></stringProp>
    <stringProp name="connectionAge">5000</stringProp>
    <stringProp name="dataSource">test</stringProp>
    <stringProp name="dbUrl">jdbc:mysql://localhost:3306/xcan_mockdata_sample</stringProp>
    <stringProp name="driver">com.mysql.cj.jdbc.Driver</stringProp>
    <boolProp name="keepAlive">true</boolProp>
    <stringProp name="password">123456</stringProp>
    <stringProp name="poolMax">0</stringProp>
    <stringProp name="timeout">100000</stringProp>
    <stringProp name="transactionIsolation">DEFAULT</stringProp>
    <stringProp name="trimInterval">200000</stringProp>
    <stringProp name="username">sample</stringProp>
  </JDBCDataSource>
  </hashTree/>
  <JDBCSampler guiclass="TestBeanGUI" testclass="JDBCSampler" testname="JDBC Request" enabled="true">
    <stringProp name="dataSource">test</stringProp>
  </JDBCSampler>
</jmeterTestPlan>
```

```

    <stringProp name="query">SELECT * FROM `user` WHERE username = &apos;FDgcM6u7xwbhkdCnz&apos;</stringProp>
    <stringProp name="queryArguments"></stringProp>
    <stringProp name="queryArgumentsTypes"></stringProp>
    <stringProp name="queryTimeout">60</stringProp>
    <stringProp name="queryType">Prepared Select Statement</stringProp>
    <stringProp name="resultSetHandler">Store as String</stringProp>
    <stringProp name="resultVariable"></stringProp>
    <stringProp name="variableNames"></stringProp>
  </JDBCSampler>
</hashTree/>
</hashTree>
</hashTree>
</jmeterTestPlan>

```

运行脚本：

```
./jmeter -n -t ~/scripts/JDBC_Testing_Select_AngusTesterVSJMeter.jmx
```

- AngusTester Select 脚本 (JDBC_Testing_Select_AngusTesterVSJMeter.yaml)

```

specification: angus/1.0.0
info:
  name: Jdbc prepared select performance testing
  description: This is an example of a jdbc prepared select statement testing.
type: TEST_PERFORMANCE
plugin: Jdbc
configuration:
  duration: 60s
  thread:
    threads: 1 # 1/10/50/100/200/500/1000/2000
  priority: 1000
task:
  arguments:
    ignoreAssertions: true
  jdbcSetting:
    type: MYSQL
    driverClassName: com.mysql.cj.jdbc.Driver
    jdbcUrl: jdbc:mysql://localhost:3306/xcan_mockdata_sample
    username: sample
    password: 123456
  pipelines:
    - target: JDBC
      name: QueryUser

```

```
description: Query user by prepared select statement.  
enabled: true  
type: PREPARED_SELECT  
sql: SELECT * FROM `user` WHERE username = 'FDgcM6u7xwbhkdCnz'  
maxResultRows: 1  
timeoutInSeconds: 60
```

运行脚本：

```
./startup-runner.sh -s ~/scripts/JDBC_Testing_Select_AngusTesterVSJMeter.yaml -e 1002
```

测试结果

Insert 测试

- 1 个线程运行 60 秒测试结果

JMeter 测试结果:

```
Starting the test @ Fri Nov 24 15:37:31 CST 2023 (1700811451582)
Waiting for possible Shutdown/StopTestNow/Heapdump message on port 4445
summary +      1 in 00:00:01 =   1.6/s Avg:   560 Min:   560 Max:   560 Err:    0 (0.00%) Active: 1 Started: 1 Finished: 0
summary + 16697 in 00:00:27 = 611.7/s Avg:    1 Min:    1 Max:   38 Err:    0 (0.00%) Active: 1 Started: 1 Finished: 0
summary = 16698 in 00:00:28 = 598.0/s Avg:    1 Min:    1 Max:   560 Err:    0 (0.00%)
summary + 17045 in 00:00:30 = 568.2/s Avg:    1 Min:    1 Max:   83 Err:    0 (0.00%) Active: 1 Started: 1 Finished: 0
summary = 33743 in 00:00:58 = 582.6/s Avg:    1 Min:    1 Max:  560 Err:    0 (0.00%)
summary +  1080 in 00:00:02 = 504.7/s Avg:    1 Min:    1 Max:   12 Err:    0 (0.00%) Active: 0 Started: 1 Finished: 1
summary = 34823 in 00:01:00 = 579.8/s Avg:    1 Min:    1 Max:  560 Err:    0 (0.00%)
Tidying up ... @ Fri Nov 24 15:38:32 CST 2023 (1700811512140)
... end of run
```

AngusTester 测试结果:

```

=====
*** Task Summary Report @ Jdbc TEST_PERFORMANCE @ 2023-11-24 17:42:25 ***
=====
Exec ID: 1001                      Run Mode: LOCAL                      Memory: 86.11MBM(Used), 9.15GBM(Free)
Bytes: 0.0B(Recv), 2.0MB(Write)    Iterations: 39560                     Cpu: 5.42%(Proc), 460.27%(Sys)
Date: 11/24 05:41:24 to 11/24 05:42:24  Duration: 60 Second                  Threads: 0/1  terminated
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Name | Samples | Mean | Min | Max | P50 | P75 | P90 | P99 | P999 | Trans | Trans/s | Errors | Error% | Recv/s | Write/s |

```

```
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Total | 39560 | 1.5 | 1.0 | 19.0 | 1.0 | 2.0 | 2.0 | 2.0 | 4.0 | 39560 | 659.32 | 0 | 0.0 | 0.0B | 34.13KB |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
*** Sampling Result: SUCCESS
=====
```

- 10 个线程运行 60 秒测试结果

JMeter 测试结果：

```
Starting the test @ Fri Nov 24 17:53:18 CST 2023 (1700819598435)
Waiting for possible Shutdown/StopTestNow/Heapdump message on port 4445
summary + 23829 in 00:00:11 = 2142.7/s Avg: 4 Min: 1 Max: 597 Err: 0 (0.00%) Active: 10 Started: 10 Finished: 0
summary + 61228 in 00:00:30 = 2040.9/s Avg: 4 Min: 2 Max: 45 Err: 0 (0.00%) Active: 10 Started: 10 Finished: 0
summary = 85057 in 00:00:41 = 2068.5/s Avg: 4 Min: 1 Max: 597 Err: 0 (0.00%)
summary + 34121 in 00:00:19 = 1801.2/s Avg: 5 Min: 2 Max: 127 Err: 0 (0.00%) Active: 0 Started: 10 Finished: 10
summary = 119178 in 00:01:00 = 1984.2/s Avg: 4 Min: 1 Max: 597 Err: 0 (0.00%)
Tidying up ... @ Fri Nov 24 17:54:18 CST 2023 (1700819658945)
... end of run
```

AngusTester 测试结果：

```
=====
*** Task Summary Report @ Jdbc TEST_PERFORMANCE @ 2023-11-24 17:56:08 ***
=====
Exec ID: 1001                      Run Mode: LOCAL                      Memory: 101.2MBM(Used), 9.14GBM(Free)
Bytes: 0.0B(Recv), 6.36MB(Write)    Iterations: 125744                     Cpu: 30.14%(Proc), 797.93%(Sys)
Date: 11/24 05:55:08 to 11/24 05:56:08 Duration: 60 Second                Threads: 0/10 terminated
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Name | Samples | Mean | Min | Max | P50 | P75 | P90 | P99 | P999 | Trans | Trans/s | Errors | Error% | Recv/s | Write/s |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Total | 125744 | 4.75 | 1.0 | 1005.0 | 4.0 | 5.0 | 7.0 | 13.0 | 29.0 | 125744 | 2095.66 | 0 | 0.0 | 0.0B | 108.47KB |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
*** Sampling Result: SUCCESS
=====
```

- 50 个线程运行 60 秒测试结果

JMeter 测试结果：

```
Starting the test @ Fri Nov 24 17:57:49 CST 2023 (1700819869164)
Waiting for possible Shutdown/StopTestNow/Heapdump message on port 4445
```



```
summary + 34999 in 00:00:10 = 3342.5/s Avg: 14 Min: 2 Max: 768 Err: 0 (0.00%) Active: 50 Started: 50 Finished: 0
summary + 85981 in 00:00:30 = 2866.0/s Avg: 17 Min: 3 Max: 1051 Err: 0 (0.00%) Active: 50 Started: 50 Finished: 0
summary = 120980 in 00:00:40 = 2989.3/s Avg: 16 Min: 2 Max: 1051 Err: 0 (0.00%)
summary + 50604 in 00:00:20 = 2546.9/s Avg: 19 Min: 3 Max: 379 Err: 0 (0.00%) Active: 0 Started: 50 Finished: 50
summary = 171584 in 00:01:00 = 2843.6/s Avg: 17 Min: 2 Max: 1051 Err: 0 (0.00%)
Tidying up ... @ Fri Nov 24 17:58:49 CST 2023 (1700819929870)
... end of run
```

AngusTester 测试结果:

```
=====
*** Task Summary Report @ Jdbc TEST_PERFORMANCE @ 2023-11-24 18:00:47 ***
=====
Exec ID: 1001                               Run Mode: LOCAL                               Memory: 106.99MBM(Used), 9.13GBM(Free)
Bytes: 0.0B(Recv), 9.68MB(Write)             Iterations: 191423                             Cpu: 65.26%(Proc), 813.71%(Sys)
Date: 11/24 05:59:47 to 11/24 06:00:47       Duration: 60 Second                             Threads: 0/50 terminated
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Name | Samples | Mean | Min | Max | P50 | P75 | P90 | P99 | P999 | Trans | Trans/s | Errors | Error% | Recv/s | Write/s |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Total | 191423 | 15.65 | 2.0 | 908.0 | 12.0 | 19.0 | 30.0 | 57.0 | 92.0 | 191423 | 3190.28 | 0 | 0.0 | 0.0B | 165.12KB |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
*** Sampling Result: SUCCESS
=====
```

- 100 个线程运行 60 秒测试结果

JMeter 测试结果:

```
Starting the test @ Fri Nov 24 18:01:45 CST 2023 (1700820105701)
Waiting for possible Shutdown/StopTestNow/Heapdump message on port 4445
summary + 47439 in 00:00:14 = 3417.5/s Avg: 29 Min: 2 Max: 1275 Err: 0 (0.00%) Active: 100 Started: 100 Finished: 0
summary + 78715 in 00:00:30 = 2623.7/s Avg: 38 Min: 3 Max: 1032 Err: 0 (0.00%) Active: 100 Started: 100 Finished: 0
summary = 126154 in 00:00:44 = 2874.8/s Avg: 34 Min: 2 Max: 1275 Err: 0 (0.00%)
summary + 38058 in 00:00:16 = 2347.5/s Avg: 42 Min: 3 Max: 315 Err: 0 (0.00%) Active: 0 Started: 100 Finished: 100
summary = 164212 in 00:01:00 = 2732.5/s Avg: 36 Min: 2 Max: 1275 Err: 0 (0.00%)
Tidying up ... @ Fri Nov 24 18:02:46 CST 2023 (1700820166215)
... end of run
```

AngusTester 测试结果:

```
=====
*** Task Summary Report @ Jdbc TEST_PERFORMANCE @ 2023-11-24 18:09:05 ***
=====
```

Exec ID: 1001					Run Mode: LOCAL					Memory: 108.9MBM(Used), 9.13GBM(Free)																						
Bytes: 0.0B(Recv), 10.74MB(Write)					Iterations: 212575					Cpu: 54.37%(Proc), 1201.13%(Sys)																						
Date: 11/24 06:08:04 to 11/24 06:09:04					Duration: 60 Second					Threads: 0/100 terminated																						
	Name		Samples		Mean		Min		Max		P50		P75		P90		P99		P999		Trans		Trans/s		Errors		Error%		Recv/s		Write/s	
	Total		212575		28.2		1.0		305.0		21.0		37.0		58.0		110.0		168.0		212575		3542.8		0		0.0		0.0B		183.37KB	
*** Sampling Result: SUCCESS																																

- 200 个线程运行 60 秒测试结果

JMeter 测试结果:

```
Starting the test @ Fri Nov 24 18:10:29 CST 2023 (1700820629673)
Waiting for possible Shutdown/StopTestNow/Heapdump message on port 4445
summary +      1 in 00:00:03 =   0.4/s Avg:  2570 Min:  2570 Max:  2570 Err:    0 (0.00%) Active: 200 Started: 200 Finished: 0
summary + 68344 in 00:00:27 = 2528.4/s Avg:    83 Min:    3 Max:  3374 Err:    0 (0.00%) Active: 200 Started: 200 Finished: 0
summary = 68345 in 00:00:30 = 2299.4/s Avg:    83 Min:    3 Max:  3374 Err:    0 (0.00%)
summary + 85912 in 00:00:30 = 2877.5/s Avg:    71 Min:    2 Max:  1187 Err:    0 (0.00%) Active: 200 Started: 200 Finished: 0
summary = 154257 in 00:01:00 = 2589.1/s Avg:    76 Min:    2 Max:  3374 Err:    0 (0.00%)
summary +  1702 in 00:00:01 = 2676.1/s Avg:    71 Min:    4 Max:   379 Err:    0 (0.00%) Active: 0 Started: 200 Finished: 200
summary = 155959 in 00:01:00 = 2590.0/s Avg:    76 Min:    2 Max:  3374 Err:    0 (0.00%)
Tidying up ... @ Fri Nov 24 18:11:30 CST 2023 (1700820690663)
... end of run
```

AngusTester 测试结果:

[illegible]

- 500 个线程运行 60 秒测试结果

JMeter 测试结果：

```
Starting the test @ Fri Nov 24 18:15:41 CST 2023 (1700820941390)
Waiting for possible Shutdown/StopTestNow/Heapdump message on port 4445
summary + 30277 in 00:00:18 = 1661.8/s Avg: 294 Min: 3 Max: 5927 Err: 0 (0.00%) Active: 500 Started: 500 Finished: 0
summary + 64740 in 00:00:30 = 2157.9/s Avg: 232 Min: 3 Max: 2950 Err: 0 (0.00%) Active: 500 Started: 500 Finished: 0
summary = 95017 in 00:00:48 = 1970.5/s Avg: 252 Min: 3 Max: 5927 Err: 0 (0.00%)
summary + 21322 in 00:00:12 = 1759.8/s Avg: 281 Min: 3 Max: 3268 Err: 0 (0.00%) Active: 0 Started: 500 Finished: 500
summary = 116339 in 00:01:00 = 1928.2/s Avg: 257 Min: 3 Max: 5927 Err: 0 (0.00%)
Tidying up ... @ Fri Nov 24 18:16:42 CST 2023 (1700821002123)
... end of run
```

AngusTester 测试结果：

```
=====
*** Task Summary Report @ Jdbc TEST_PERFORMANCE @ 2023-11-24 18:18:24 ***
=====
Exec ID: 1001                               Run Mode: LOCAL                               Memory: 277.65MBM(Used), 8.96GBM(Free)
Bytes: 0.0B(Recv), 7.36MB(Write)             Iterations: 145556                             Cpu: 74.65%(Proc), 1175.65%(Sys)
Date: 11/24 06:17:24 to 11/24 06:18:24      Duration: 60 Second                            Threads: 0/500 terminated
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Name | Samples | Mean | Min | Max | P50 | P75 | P90 | P99 | P999 | Trans | Trans/s | Errors | Error% | Recv/s | Write/s |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Total | 145556 | 206.02 | 2.0 | 3642.0 | 140.0 | 258.0 | 434.0 | 1165.0 | 2002.89 | 145556 | 2425.69 | 0 | 0.0 | 0.0B | 125.55KB |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
*** Sampling Result: SUCCESS
=====
```

- 1000 个线程运行 60 秒测试结果

JMeter 测试结果：

```
Starting the test @ Fri Nov 24 18:19:04 CST 2023 (1700821144033)
Waiting for possible Shutdown/StopTestNow/Heapdump message on port 4445
summary + 29946 in 00:00:26 = 1170.4/s Avg: 833 Min: 3 Max: 21601 Err: 0 (0.00%) Active: 1000 Started: 1000 Finished: 0
summary + 49145 in 00:00:30 = 1637.7/s Avg: 609 Min: 2 Max: 15572 Err: 0 (0.00%) Active: 1000 Started: 1000 Finished: 0
summary = 79091 in 00:00:56 = 1422.7/s Avg: 694 Min: 2 Max: 21601 Err: 0 (0.00%)
summary + 7287 in 00:00:05 = 1423.0/s Avg: 690 Min: 3 Max: 5303 Err: 0 (0.00%) Active: 0 Started: 1000 Finished: 1000
summary = 86378 in 00:01:01 = 1422.7/s Avg: 694 Min: 2 Max: 21601 Err: 0 (0.00%)
```



```
| Total | 56653 | 2083.02 | 3.0 | 60515.0 | 331.0 | 899.0 | 5566.0 | 30802.46 | 49362.16 | 56653 | 944.14 | 3 | 0.01 | 0.0B | 48.86KB |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
*** Sampling Result: SUCCESS
=====
```

Select 测试

以下测试 AngusTester 和 JMeter 使用同一份表数据。

- 1 个线程运行 60 秒测试结果

JMeter 测试结果：

```
Starting the test @ Fri Nov 24 14:19:05 CST 2023 (1700806745751)
Waiting for possible Shutdown/StopTestNow/Heapdump message on port 4445
summary + 22263 in 00:00:24 = 933.3/s Avg: 1 Min: 0 Max: 390 Err: 0 (0.00%) Active: 1 Started: 1 Finished: 0
summary + 29662 in 00:00:30 = 988.8/s Avg: 0 Min: 0 Max: 50 Err: 0 (0.00%) Active: 1 Started: 1 Finished: 0
summary = 51925 in 00:00:54 = 964.2/s Avg: 1 Min: 0 Max: 390 Err: 0 (0.00%)
summary + 6144 in 00:00:06 = 990.6/s Avg: 0 Min: 0 Max: 10 Err: 0 (0.00%) Active: 0 Started: 1 Finished: 1
summary = 58069 in 00:01:00 = 966.9/s Avg: 1 Min: 0 Max: 390 Err: 0 (0.00%)
Tidying up ... @ Fri Nov 24 14:20:06 CST 2023 (1700806806202)
... end of run
```

AngusTester 测试结果：

```
=====
*** Task Summary Report @ Jdbc TEST_PERFORMANCE @ 2023-11-24 13:37:21 ***
=====
Exec ID: 1002 Run Mode: LOCAL Memory: 82.25MBM(Used), 9.15GBM(Free)
Bytes: 0.0B(Recv), 0.0B(Write) Iterations: 62053 Cpu: 7.67%(Proc), 380.15%(Sys)
Date: 11/24 01:36:21 to 11/24 01:37:21 Duration: 60 Second Threads: 0/1 terminated
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Name | Samples | Mean | Min | Max | P50 | P75 | P90 | P99 | P999 | Trans | Trans/s | Errors | Error% | Recv/s | Write/s |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Total | 62053 | 0.96 | 0.0 | 28.0 | 1.0 | 1.0 | 1.0 | 2.0 | 2.0 | 62053 | 1034.2 | 0 | 0.0 | 0.0B | 0.0B |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
*** Sampling Result: SUCCESS
=====
```

- 10 个线程运行 60 秒测试结果

JMeter 测试结果：

```
Starting the test @ Fri Nov 24 14:13:03 CST 2023 (1700806383302)
Waiting for possible Shutdown/StopTestNow/Heapdump message on port 4445
summary +      1 in 00:00:01 =    1.8/s Avg:   498 Min:   498 Max:   498 Err:    0 (0.00%) Active: 10 Started: 10 Finished: 0
summary + 147477 in 00:00:26 = 5728.6/s Avg:    1 Min:    0 Max:  1008 Err:    0 (0.00%) Active: 10 Started: 10 Finished: 0
summary = 147478 in 00:00:26 = 5608.0/s Avg:    1 Min:    0 Max:  1008 Err:    0 (0.00%)
summary + 188223 in 00:00:30 = 6274.1/s Avg:    1 Min:    0 Max:   241 Err:    0 (0.00%) Active: 10 Started: 10 Finished: 0
summary = 335701 in 00:00:56 = 5962.9/s Avg:    1 Min:    0 Max:  1008 Err:    0 (0.00%)
summary +  20618 in 00:00:04 = 5489.4/s Avg:    1 Min:    1 Max:    7 Err:    0 (0.00%) Active: 0 Started: 10 Finished: 10
summary = 356319 in 00:01:00 = 5933.3/s Avg:    1 Min:    0 Max:  1008 Err:    0 (0.00%)
Tidying up ...    @ Fri Nov 24 14:14:03 CST 2023 (1700806443756)
... end of run
```

AngusTester 测试结果:

```
=====
*** Task Summary Report @ Jdbc TEST_PERFORMANCE @ 2023-11-24 14:24:47 ***
=====
Exec ID: 1002                      Run Mode: LOCAL                      Memory: 87.31MBM(Used), 9.15GBM(Free)
Bytes: 0.0B(Recv), 0.0B(Write)      Iterations: 400707                    Cpu: 334.73%(Proc), 382.61%(Sys)
Date: 11/24 02:23:46 to 11/24 02:24:46  Duration: 60 Second                  Threads: 0/10  terminated
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Name  | Samples | Mean | Min | Max  | P50 | P75 | P90 | P99 | P999 | Trans | Trans/s | Errors | Error% | Recv/s | Write/s |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Total | 400707  | 1.49 | 0.0 | 42.0 | 1.0 | 2.0 | 2.0 | 3.0 | 5.0  | 400707 | 6678.34 | 0      | 0.0    | 0.0B   | 0.0B    |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
*** Sampling Result: SUCCESS
=====
```

- 50 个线程运行 60 秒测试结果

JMeter 测试结果:

```
Starting the test @ Fri Nov 24 14:27:12 CST 2023 (1700807232560)
Waiting for possible Shutdown/StopTestNow/Heapdump message on port 4445
summary + 191458 in 00:00:17 = 11239.8/s Avg:    4 Min:    1 Max:   776 Err:    0 (0.00%) Active: 50 Started: 50 Finished: 0
summary + 312263 in 00:00:30 = 10408.8/s Avg:    4 Min:    1 Max:   212 Err:    0 (0.00%) Active: 50 Started: 50 Finished: 0
summary = 503721 in 00:00:47 = 10709.7/s Avg:    4 Min:    1 Max:   776 Err:    0 (0.00%)
summary + 114747 in 00:00:13 = 8807.7/s Avg:    5 Min:    1 Max:   145 Err:    0 (0.00%) Active: 0 Started: 50 Finished: 50
summary = 618468 in 00:01:00 = 10297.0/s Avg:    4 Min:    1 Max:   776 Err:    0 (0.00%)
Tidying up ...    @ Fri Nov 24 14:28:13 CST 2023 (1700807293029)
... end of run
```

AngusTester 测试结果:

```
*** Task Summary Report @ Jdbc TEST_PERFORMANCE @ 2023-11-24 13:33:43 ***
```

Exec ID: 1002	Run Mode: LOCAL	Memory: 211.14MBM(Used), 9.03GBM(Free)
Bytes: 0.0B(Recv), 0.0B(Write)	Iterations: 636037	Cpu: 120.28%(Proc), 1191.94%(Sys)
Date: 11/24 01:32:43 to 11/24 01:33:43	Duration: 60 Second	Threads: 0/50 terminated

Name	Samples	Mean	Min	Max	P50	P75	P90	P99	P999	Trans	Trans/s	Errors	Error%	Recv/s	Write/s
Total	636037	4.71	1.0	72.0	4.0	5.0	7.0	13.0	26.0	636037	10600.26	0	0.0	0.0B	0.0B

```
*** Sampling Result: SUCCESS
```

- 100 个线程运行 60 秒测试结果

JMeter 测试结果:

```
Starting the test @ Fri Nov 24 14:32:31 CST 2023 (1700807551943)
Waiting for possible Shutdown/StopTestNow/Heapdump message on port 4445
summary +      1 in 00:00:01 =    0.9/s Avg:  1005 Min:  1005 Max:  1005 Err:    0 (0.00%) Active: 100 Started: 100 Finished: 0
summary + 354652 in 00:00:27 = 13346.3/s Avg:    7 Min:    1 Max:  1047 Err:    0 (0.00%) Active: 100 Started: 100 Finished: 0
summary = 354653 in 00:00:28 = 12819.1/s Avg:    7 Min:    1 Max:  1047 Err:    0 (0.00%)
summary + 297778 in 00:00:30 = 9925.6/s Avg:    9 Min:    1 Max:  2452 Err:    0 (0.00%) Active: 100 Started: 100 Finished: 0
summary = 652431 in 00:00:58 = 11313.6/s Avg:    8 Min:    1 Max:  2452 Err:    0 (0.00%)
summary +  20427 in 00:00:02 = 8423.5/s Avg:   11 Min:    2 Max:   126 Err:    0 (0.00%) Active: 0 Started: 100 Finished: 100
summary = 672858 in 00:01:00 = 11196.9/s Avg:    8 Min:    1 Max:  2452 Err:    0 (0.00%)
Tidying up ... @ Fri Nov 24 14:33:32 CST 2023 (1700807612428)
... end of run
```

AngusTester 测试结果:

```
*** Task Summary Report @ Jdbc TEST_PERFORMANCE @ 2023-11-24 13:28:28 ***
```

Exec ID: 1002	Run Mode: LOCAL	Memory: 113.04MBM(Used), 9.12GBM(Free)
Bytes: 0.0B(Recv), 0.0B(Write)	Iterations: 811148	Cpu: 154.38%(Proc), 1271.88%(Sys)
Date: 11/24 01:27:28 to 11/24 01:28:28	Duration: 60 Second	Threads: 0/100 terminated

Name	Samples	Mean	Min	Max	P50	P75	P90	P99	P999	Trans	Trans/s	Errors	Error%	Recv/s	Write/s
------	---------	------	-----	-----	-----	-----	-----	-----	------	-------	---------	--------	--------	--------	---------

```
| Total | 811148 | 7.39 | 1.0 | 1010.0 | 6.0 | 8.0 | 12.0 | 23.0 | 44.0 | 811148 | 13518.68 | 0 | 0.0 | 0.0B | 0.0B |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
*** Sampling Result: SUCCESS
=====
```

- 200 个线程运行 60 秒测试结果

JMeter 测试结果:

```
Starting the test @ Fri Nov 24 14:35:57 CST 2023 (1700807757194)
Waiting for possible Shutdown/StopTestNow/Heapdump message on port 4445
summary + 157 in 00:00:02 = 69.1/s Avg: 784 Min: 4 Max: 2138 Err: 0 (0.00%) Active: 200 Started: 200 Finished: 0
summary + 312258 in 00:00:30 = 10415.9/s Avg: 19 Min: 1 Max: 2669 Err: 0 (0.00%) Active: 200 Started: 200 Finished: 0
summary = 312415 in 00:00:32 = 9687.0/s Avg: 20 Min: 1 Max: 2669 Err: 0 (0.00%)
summary + 301315 in 00:00:28 = 10802.1/s Avg: 18 Min: 1 Max: 899 Err: 0 (0.00%) Active: 0 Started: 200 Finished: 200
summary = 613730 in 00:01:00 = 10204.0/s Avg: 19 Min: 1 Max: 2669 Err: 0 (0.00%)
Tidying up ... @ Fri Nov 24 14:36:57 CST 2023 (1700807817896)
... end of run
```

AngusTester 测试结果:

```
=====
*** Task Summary Report @ Jdbc TEST_PERFORMANCE @ 2023-11-24 13:26:41 ***
=====
Exec ID: 1002                      Run Mode: LOCAL                      Memory: 129.1MBM(Used), 9.11GBM(Free)
Bytes: 0.0B(Recv), 0.0B(Write)      Iterations: 932502                     Cpu: 213.32%(Proc), 1423.54%(Sys)
Date: 11/24 01:25:41 to 11/24 01:26:41 Duration: 60 Second                Threads: 0/200 terminated
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Name | Samples | Mean | Min | Max | P50 | P75 | P90 | P99 | P999 | Trans | Trans/s | Errors | Error% | Recv/s | Write/s |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Total | 932502 | 12.86 | 1.0 | 383.0 | 10.0 | 14.0 | 23.0 | 59.0 | 134.0 | 932502 | 15540.66 | 0 | 0.0 | 0.0B | 0.0B |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
*** Sampling Result: SUCCESS
=====
```

- 500 个线程运行 60 秒测试结果

JMeter 测试结果:

```
Starting the test @ Fri Nov 24 14:39:23 CST 2023 (1700807963131)
Waiting for possible Shutdown/StopTestNow/Heapdump message on port 4445
summary + 26931 in 00:00:06 = 4162.4/s Avg: 117 Min: 1 Max: 5782 Err: 0 (0.00%) Active: 500 Started: 500 Finished: 0
```



```
summary + 330185 in 00:00:30 = 11006.2/s Avg: 44 Min: 1 Max: 2146 Err: 0 (0.00%) Active: 500 Started: 500 Finished: 0
summary = 357116 in 00:00:36 = 9792.0/s Avg: 49 Min: 1 Max: 5782 Err: 0 (0.00%)
summary + 210966 in 00:00:24 = 8725.9/s Avg: 56 Min: 1 Max: 1531 Err: 0 (0.00%) Active: 0 Started: 500 Finished: 500
summary = 568082 in 00:01:01 = 9367.0/s Avg: 52 Min: 1 Max: 5782 Err: 0 (0.00%)
Tidying up ... @ Fri Nov 24 14:40:24 CST 2023 (1700808024178)
... end of run
```

AngusTester 测试结果:

```
=====
*** Task Summary Report @ Jdbc TEST_PERFORMANCE @ 2023-11-24 13:00:22 ***
=====
Exec ID: 1002                      Run Mode: LOCAL                      Memory: 377.07MBM(Used), 8.87GBM(Free)
Bytes: 0.0B(Recv), 0.0B(Write)      Iterations: 758963                  Cpu: 312.98%(Proc), 1481.01%(Sys)
Date: 11/24 12:59:21 to 11/24 01:00:21  Duration: 60 Second              Threads: 0/500 terminated
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Name | Samples | Mean | Min | Max | P50 | P75 | P90 | P99 | P999 | Trans | Trans/s | Errors | Error% | Recv/s | Write/s |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Total | 758963 | 39.51 | 1.0 | 1693.0 | 20.0 | 37.0 | 83.0 | 343.0 | 608.0 | 758963 | 12648.12 | 0 | 0.0 | 0.0B | 0.0B |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
*** Sampling Result: SUCCESS
=====
```

- 1000 个线程运行 60 秒测试结果

JMeter 测试结果:

```
Starting the test @ Fri Nov 24 14:40:35 CST 2023 (1700808035915)
Waiting for possible Shutdown/StopTestNow/Heapdump message on port 4445
summary + 114773 in 00:00:24 = 4849.3/s Avg: 196 Min: 2 Max: 14426 Err: 0 (0.00%) Active: 1000 Started: 1000 Finished: 0
summary + 208145 in 00:00:30 = 6947.4/s Avg: 146 Min: 1 Max: 3737 Err: 0 (0.00%) Active: 1000 Started: 1000 Finished: 0
summary = 322918 in 00:00:54 = 6021.4/s Avg: 164 Min: 1 Max: 14426 Err: 0 (0.00%)
summary + 48142 in 00:00:07 = 6982.2/s Avg: 139 Min: 2 Max: 2640 Err: 0 (0.00%) Active: 0 Started: 1000 Finished: 1000
summary = 371060 in 00:01:01 = 6130.8/s Avg: 161 Min: 1 Max: 14426 Err: 0 (0.00%)
Tidying up ... @ Fri Nov 24 14:41:36 CST 2023 (1700808096896)
... end of run
```

AngusTester 测试结果:

```
=====
*** Task Summary Report @ Jdbc TEST_PERFORMANCE @ 2023-11-24 13:22:12 ***
=====
```

```
Exec ID: 1002                               Run Mode: LOCAL                               Memory: 248.41MBM(Used), 8.99GBM(Free)
Bytes: 0.0B(Recv), 0.0B(Write)              Iterations: 752604                          Cpu: 519.84%(Proc), 1499.72%(Sys)
Date: 11/24 01:21:11 to 11/24 01:22:11      Duration: 60 Second                         Threads: 0/1000  terminated

+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Name | Samples | Mean | Min | Max | P50 | P75 | P90 | P99 | P999 | Trans | Trans/s | Errors | Error% | Recv/s | Write/s |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Total | 752604 | 79.42 | 1.0 | 3352.0 | 33.0 | 65.0 | 181.0 | 810.0 | 1351.0 | 752604 | 12540.06 | 0 | 0.0 | 0.0B | 0.0B |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+

*** Sampling Result: SUCCESS
=====
```

- 2000 个线程运行 60 秒测试结果

JMeter 测试结果：

```
Starting the test @ Fri Nov 24 14:42:32 CST 2023 (1700808152699)
Waiting for possible Shutdown/StopTestNow/Heapdump message on port 4445
summary + 142530 in 00:00:27 = 5301.9/s Avg: 248 Min: 1 Max: 26573 Err: 22 (0.02%) Active: 2000 Started: 2000 Finished: 0
summary + 124608 in 00:00:30 = 4153.6/s Avg: 597 Min: 2 Max: 47158 Err: 0 (0.00%) Active: 2000 Started: 2000 Finished: 0
summary = 267138 in 00:00:57 = 4696.3/s Avg: 411 Min: 1 Max: 47158 Err: 22 (0.01%)
summary + 15477 in 00:00:05 = 3236.5/s Avg: 608 Min: 3 Max: 8756 Err: 0 (0.00%) Active: 0 Started: 2000 Finished: 2000
summary = 282615 in 00:01:02 = 4583.0/s Avg: 422 Min: 1 Max: 47158 Err: 22 (0.01%)
Tidying up ... @ Fri Nov 24 14:43:34 CST 2023 (1700808214784)
... end of run
```

AngusTester 测试结果：

```
=====
*** Task Summary Report @ Jdbc TEST_PERFORMANCE @ 2023-11-24 13:24:44 ***
=====

Exec ID: 1002                               Run Mode: LOCAL                               Memory: 611.72MBM(Used), 8.64GBM(Free)
Bytes: 0.0B(Recv), 0.0B(Write)              Iterations: 401359                          Cpu: 550.80%(Proc), 1347.39%(Sys)
Date: 11/24 01:23:43 to 11/24 01:24:43      Duration: 60 Second                         Threads: 0/2000  terminated

+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Name | Samples | Mean | Min | Max | P50 | P75 | P90 | P99 | P999 | Trans | Trans/s | Errors | Error% | Recv/s | Write/s |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Total | 401359 | 296.03 | 1.0 | 13344.0 | 80.0 | 218.0 | 813.0 | 3054.0 | 6045.4 | 401359 | 6685.86 | 0 | 0.0 | 0.0B | 0.0B |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+

*** Sampling Result: SUCCESS
=====
```

对比结果

- 相同条件下，不断增加并发线程数，AngusTester 性能都要比 JMeter 高。
 - 在 Insert 测试中，JMeter 50 并发时 QPS 达到最高 2843.6/s，AngusTester 100 并发时 QPS 达到最高 3542.8，**最大 QPS 提升了 24.59%**；
 - 在 Select 测试中，JMeter 100 并发时 QPS 达到最高 11196.9/s，AngusTester 200 并发时 QPS 达到最高 15540.66，**最大 QPS 提升了 38.79%**。
- QPS 达到最大后，随着并发线程数继续增加，JMeter 性能下降迅速，AngusTester 性能下降比较平缓，表现平稳。