SQL审计日志向用户提供其应用系统中SQL查询的统计信息，能够满足用户记录针对包含个人身份信息（PII）的表所有查询的需求。

本小节将展示以下内容：

* 如何开启或关闭SQL审计功能
* 审计日志文件的位置
* 审计日志文件的输出内容

**TIPS:** 关于输出内容格式，用户也查看[ALTER TABLE ... EXPERIMENTAL\_AUDIT](https://www.cockroachlabs.com/docs/stable/experimental-audit.html)语句的相关介绍。  
**WARNING:** 该功能仍处于实验阶段，对应的接口和输出在后续版本可能有所变更。

Step 1: 创建测试表

测试表包含：

* customers表，包含名字、住址等个人身份信息。

**CREATE** **TABLE** customers (

id **UUID** **PRIMARY** **KEY** **DEFAULT** gen\_random\_uuid(),

name **STRING** **NOT** NULL,

address **STRING** **NOT** NULL,

national\_id INT **NOT** NULL,

telephone INT **NOT** NULL,

email **STRING** **UNIQUE** **NOT** NULL

);

* orders表，不包含个人信息，有customers表的外键引用。

**CREATE** **TABLE** orders (

id **UUID** **PRIMARY** **KEY** **DEFAULT** gen\_random\_uuid(),

product\_id INT **NOT** NULL,

delivery\_status **STRING** **check** (delivery\_status='processing' **or** delivery\_status='in-transit' **or** delivery\_status='delivered') **NOT** NULL,

customer\_id **UUID** **NOT** NULL **REFERENCES** customers (id)

);

Step 2: 开启customers表的SQL审计功能

执行ALTER TABLE语句修改相关配置：

**ALTER** **TABLE** customers EXPERIMENTAL\_AUDIT **SET** **READ** **WRITE**;

**NOTE:** ALTER语句应用到多个表格，可用逗号隔开。

Step 3: 填充customers表数据

执行以下命令填充数据：

**INSERT** **INTO** customers (name, address, national\_id, telephone, email) **VALUES** (

'Pritchard M. Cleveland',

'23 Crooked Lane, Garden City, NY USA 11536',

778124477,

12125552000,

'pritchmeister@aol.com'

);

**INSERT** **INTO** customers (name, address, national\_id, telephone, email) **VALUES** (

'Vainglorious K. Snerptwiddle III',

'44 Straight Narrows, Garden City, NY USA 11536',

899127890,

16465552000,

'snerp@snerpy.net'

);

查询customers表：

**SELECT** \* **FROM** customers;

+*--------------------------------------+----------------------------------+------------------------------------------------+-------------+-------------+-----------------------+*

| id | name | address | national\_id | telephone | email |

+*--------------------------------------+----------------------------------+------------------------------------------------+-------------+-------------+-----------------------+*

| 4bd266fc-0b62-4cc4-8c51-6997675884cd | Vainglorious K. Snerptwiddle III | 44 Straight Narrows, Garden City, NY USA 11536 | 899127890 | 16465552000 | snerp@snerpy.net |

| 988f54f0-b4a5-439b-a1f7-284358633250 | Pritchard M. Cleveland | 23 Crooked Lane, Garden City, NY USA 11536 | 778124477 | 12125552000 | pritchmeister@aol.com |

+*--------------------------------------+----------------------------------+------------------------------------------------+-------------+-------------+-----------------------+*

(2 rows)

Step 4: 检查审计日志

默认情况下，CockroachDB将审计日志写入cockroach-sql-audit.log文件，并将该文件存放在标准日志文件夹里。用户也可以在执行[cockroach start](http://doc.cockroachchina.baidu.com/#deploy/start-a-node/)命令启动节点的时候使用--sql-audit-dirFlag指定审计日志存储的专用文件夹。同时类似于其他日志文件，审计日志的文件大小受配置项--log-file-max-size的约束。

启动审计功能以后，针对特定表的每条SQL语句将输出一条审计日志，样例如下：

I180321 20:54:21.381565 351 sql/exec\_log.go:163 [n1,client=127.0.0.1:60754,user=root] 2 exec "psql" {"customers"[76]:READWRITE} "ALTER TABLE customers EXPERIMENTAL\_AUDIT SET READ WRITE" {} 4.811 0 OK

I180321 20:54:26.315985 351 sql/exec\_log.go:163 [n1,client=127.0.0.1:60754,user=root] 3 exec "psql" {"customers"[76]:READWRITE} "INSERT INTO customers(\"name\", address, national\_id, telephone, email) VALUES ('Pritchard M. Cleveland', '23 Crooked Lane, Garden City, NY USA 11536', 778124477, 12125552000, 'pritchmeister@aol.com')" {} 6.319 1 OK

I180321 20:54:30.080592 351 sql/exec\_log.go:163 [n1,client=127.0.0.1:60754,user=root] 4 exec "psql" {"customers"[76]:READWRITE} "INSERT INTO customers(\"name\", address, national\_id, telephone, email) VALUES ('Vainglorious K. Snerptwiddle III', '44 Straight Narrows, Garden City, NY USA 11536', 899127890, 16465552000, 'snerp@snerpy.net')" {} 2.809 1 OK

I180321 20:54:39.377395 351 sql/exec\_log.go:163 [n1,client=127.0.0.1:60754,user=root] 5 exec "psql" {"customers"[76]:READ} "SELECT \* FROM customers" {} 1.236 2 OK

**NOTE:** 关于审计日志的输出内容格式，详见[ALTER TABLE ... EXPERIMENTAL\_AUDIT](https://www.cockroachlabs.com/docs/stable/experimental-audit.html)语句相关介绍。

Step 5: 填充orders表数据

orders表与customers表不同，没有任何个人身份信息，只包含产品ID和交易状态。

使用[CREATE SEQUENCE](https://www.cockroachlabs.com/docs/stable/create-sequence.html)语句为orders表填充测试数据：

**CREATE** SEQUENCE product\_ids\_asc **START** 1 INCREMENT 1;

#使用product\_ids\_asc序列生成数据

**INSERT** **INTO** orders (product\_id, delivery\_status, customer\_id) **VALUES** (

nextval('product\_ids\_asc'),

'processing',

(**SELECT** id **FROM** customers **WHERE** name ~ 'Cleve')

);

查询orders表：

**SELECT** \* **FROM** orders **ORDER** **BY** product\_id;

+*--------------------------------------+------------+-----------------+--------------------------------------+*

| id | product\_id | delivery\_status | customer\_id |

+*--------------------------------------+------------+-----------------+--------------------------------------+*

| 6e85c390-3bbf-48da-9c2f-a73a0ab9c2ce | 1 | processing | df053c68-fcb0-4a80-ad25-fef9d3b408ca |

| e93cdaee-d5eb-428c-bc1b-a7367f334f99 | 2 | processing | df053c68-fcb0-4a80-ad25-fef9d3b408ca |

| f05a1b0f-5847-424d-b8c8-07faa6b6e46b | 3 | processing | df053c68-fcb0-4a80-ad25-fef9d3b408ca |

| 86f619d6-9f18-4c84-8ead-68cd07a1ee37 | 4 | processing | df053c68-fcb0-4a80-ad25-fef9d3b408ca |

| 882c0fc8-64e7-4fab-959d-a4ff74f170c0 | 5 | processing | df053c68-fcb0-4a80-ad25-fef9d3b408ca |

+*--------------------------------------+------------+-----------------+--------------------------------------+*

(5 rows)

Step 6: 检查审计日志

**Step 5**当中针对orders表执行了查询customers表的INSERT语句，则在审计日志中将输出：

I180321 21:01:59.677273 351 sql/exec\_log.go:163 [n1,client=127.0.0.1:60754,user=root] 7 exec "psql" {"customers"[76]:READ, "customers"[76]:READ} "**INSERT** **INTO** orders(product\_id, delivery\_status, customer\_id) **VALUES** (nextval('product\_ids\_asc'), 'processing', (**SELECT** id **FROM** customers **WHERE** \"name\" ~ 'Cleve'))" {} 5.183 1 OK

I180321 21:04:07.497555 351 **sql**/exec\_log.**go**:163 [n1,client=127.0.0.1:60754,**user**=root] 8 **exec** "psql" {"customers"[76]:**READ**, "customers"[76]:**READ**} "INSERT INTO orders(product\_id, delivery\_status, customer\_id) VALUES (nextval('product\_ids\_asc'), 'processing', (SELECT id FROM customers WHERE \"name\" ~ 'Cleve'))" {} 5.219 1 OK

I180321 21:04:08.730379 351 **sql**/exec\_log.**go**:163 [n1,client=127.0.0.1:60754,**user**=root] 9 **exec** "psql" {"customers"[76]:**READ**, "customers"[76]:**READ**} "INSERT INTO orders(product\_id, delivery\_status, customer\_id) VALUES (nextval('product\_ids\_asc'), 'processing', (SELECT id FROM customers WHERE \"name\" ~ 'Cleve'))" {} 5.392 1 OK

**NOTE:** 关于审计日志的输出内容格式，详见[ALTER TABLE ... EXPERIMENTAL\_AUDIT](https://www.cockroachlabs.com/docs/stable/experimental-audit.html)语句相关介绍。