

MySQL 性能优化

-- 任志强

目录

非自动提交

InnoDB 主键

左关联查询

分页查询

非自动提交 1/3

▶ 案例

添加表字段时，该操作处于等待状态，等待metadata锁，当时数据库无其它任何操作。

```
mysql> show processlist;
```

Id	User	Host	db	Command	Time	State	Info
75	root	localhost	test	Sleep	174		NULL
76	root	localhost	test	Sleep	126		NULL
77	root	localhost	test	Sleep	80		NULL
78	root	localhost	test	Query	22	Waiting for table metadata lock	alter table trans_order add ext4 varchar(50)
79	root	localhost	NULL	Query	0	init	show processlist

```
5 rows in set (0.00 sec)
```

非自动提交 2/3

show engine innodb status \G

```
-----
TRANSACTIONS
-----
Trx id counter 195325652
Purge done for trx's n:o < 195325643 undo n:o < 0 state: running but idle
History list length 1392
LIST OF TRANSACTIONS FOR EACH SESSION:
---TRANSACTION 0, not started
MySQL thread id 79, OS thread handle 0x7fc8a23ad700, query id 367247408 localhost root init
show engine innodb status
---TRANSACTION 0, not started
MySQL thread id 78, OS thread handle 0x7fc8ac104700, query id 367247392 localhost root Waiting for table metadata lock
alter table trans_order add ext4 varchar(50)
---TRANSACTION 195325651, ACTIVE 830 sec
MySQL thread id 77, OS thread handle 0x7fc8ac041700, query id 367247382 localhost root cleaning up
---TRANSACTION 195325650, ACTIVE 876 sec
MySQL thread id 76, OS thread handle 0x7fc8ac28a700, query id 367247373 localhost root cleaning up
---TRANSACTION 195325649, ACTIVE 924 sec
MySQL thread id 75, OS thread handle 0x7fc8ac38e700, query id 367247363 localhost root cleaning up
-----
```

非自动提交 3/3

► 注意事项

- 1、关闭自动提交模式，查询语句后一定要加commit
- 2、合理修改“lock_wait_timeout”参数值

目录

非自动提交

InnoDB 主键

左关联查询

分页查询

Innodb主键 1/6

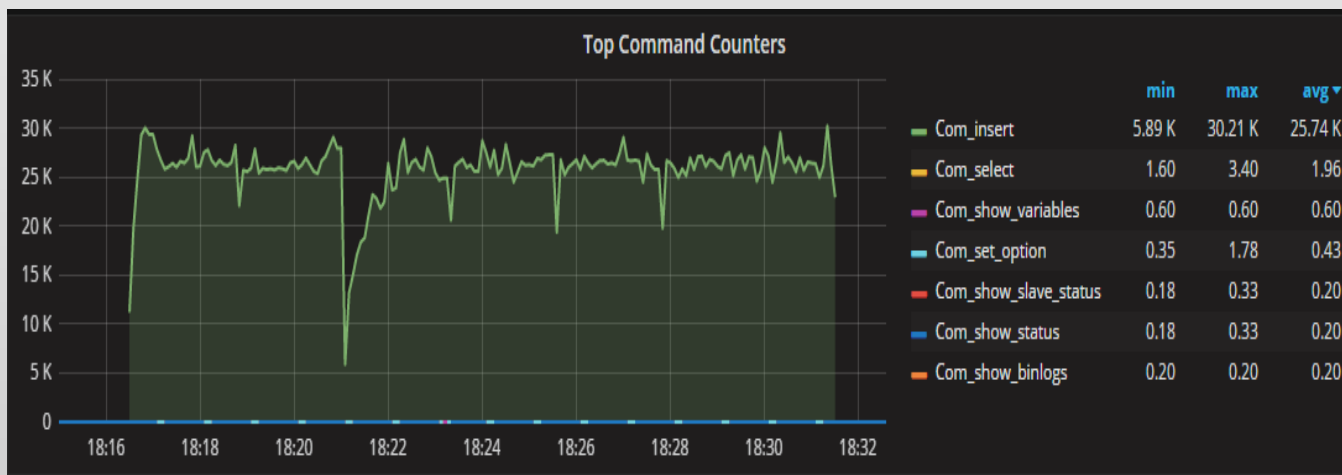
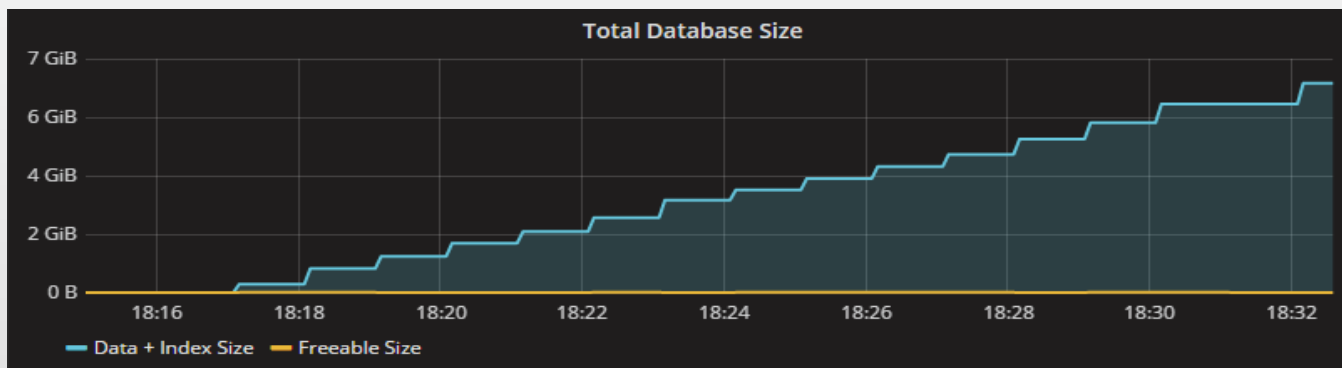
► 案例

应用并发插入一张innodb表，但响应慢、效率低，该表有如下特征：

- 1、主键明确
- 2、主键为数字类型
- 3、录入值随机

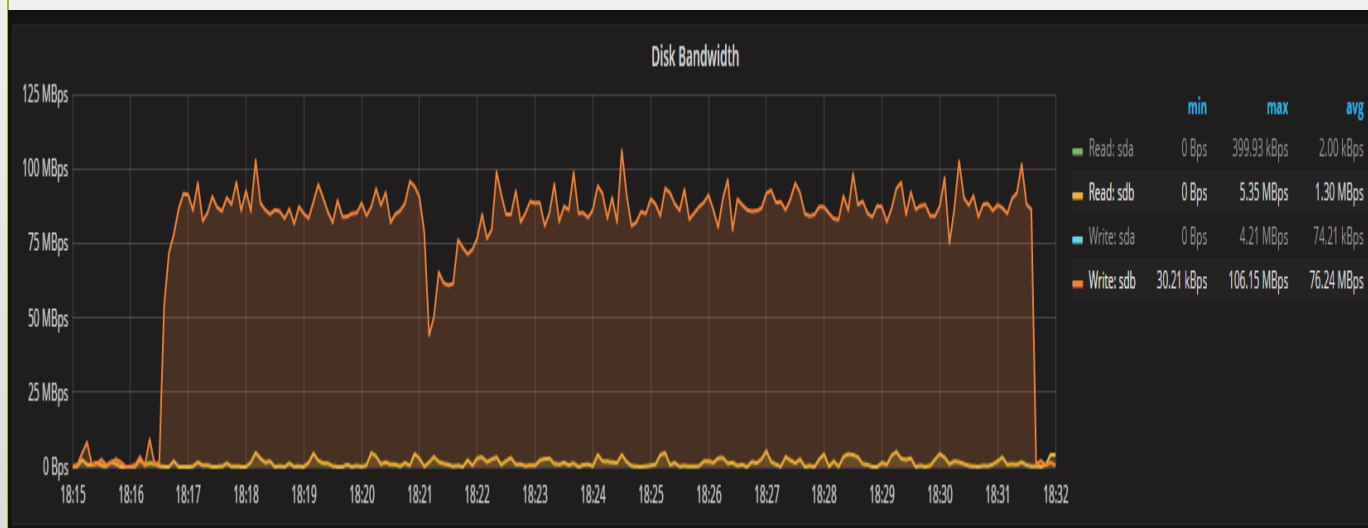
Innodb主键 2/6

1、自增、数字主键压测



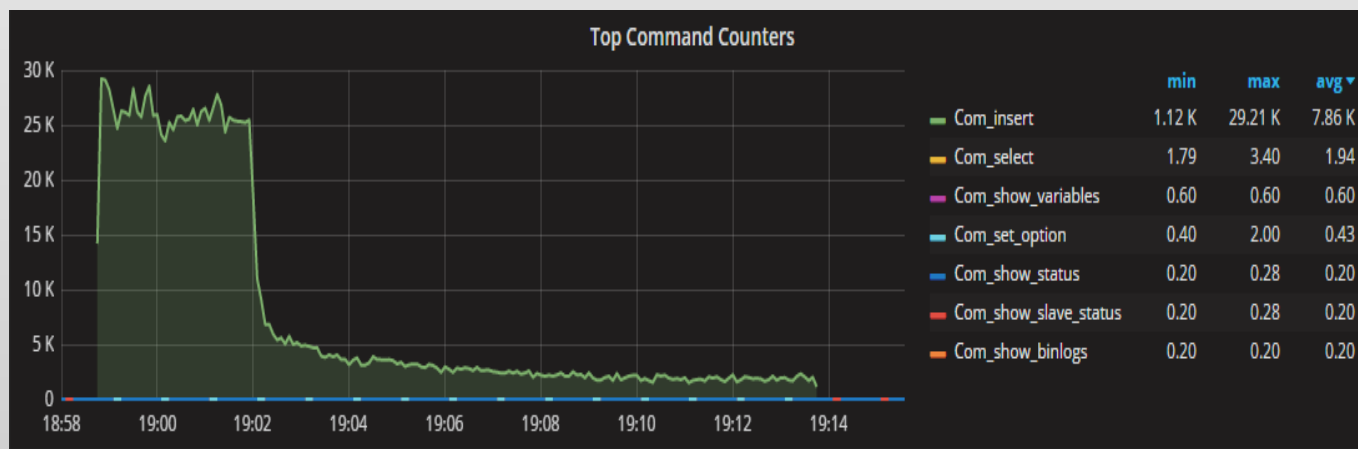
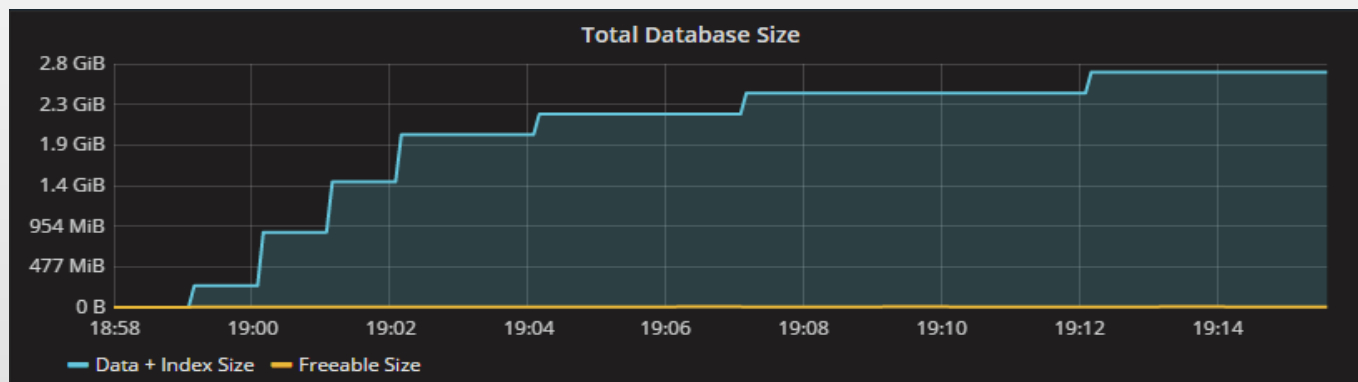
Innodb主键 3/6

IO使用情况



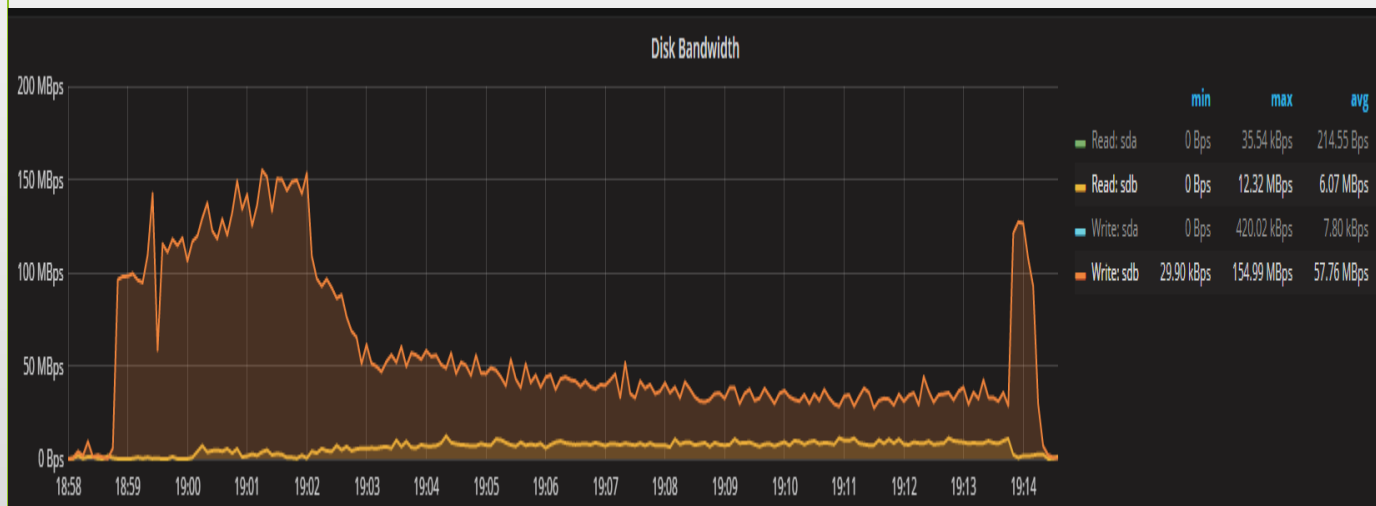
Innodb主键 4/6

2、随机、数字主键压测



Innodb主键 5/6

IO使用情况



InnoDB主键 6/6

► 使用事项

- 1、传入值有序
- 2、主键字段类型为数字
- 3、主键字段数为1

目录

非自动提交

InnoDB 主键

左关联查询

分页查询

左关联查询 1/3

▶ 案例

4张表左关联查询，效率低下

```
SELECT case when t3.OLD_ORGAID is not null then t3.OLD_ORGAID else t1.AUTHOBJECTID end as AUTHOBJECTID,t1.AUTHTYPEID
FROM t1
left join t4 on t4.STAFFID = t1.STAFFID
left join t2 on t1.STAFFID = t2.STAFFID
left join t3 on t1.AUTHOBJECTID = t3.ORGAIID
WHERE
(t2.OLD_USERID = '20160317111433371232071' OR t4.STAFFID = '20160317111433371232071')
AND t1.AUTHTYPEID IN
( '001008001' , '118002' )|
```

左关联查询 2/3

相应执行计划：

id	select_type	table	type	possible_keys	key	key_len	ref	rows	filtered	Extra
1	SIMPLE	t1	range	IX_UCP_USERDATAAUTH_AUTHTYPEID	IX_UCP_USERDATAAUTH_AUTHTYPEID	62	NULL	4129	100.00	Using where; Using index
1	SIMPLE	t4	eq_ref	PRIMARY	PRIMARY	62	ngmtt.t1.STAFFID	1	100.00	Using index
1	SIMPLE	t2	eq_ref	PRIMARY	PRIMARY	62	ngmtt.t1.STAFFID	1	100.00	Using where
1	SIMPLE	t3	ref	PRIMARY	PRIMARY	122	ngmtt.t1.AUTHOBJECTID	1	100.00	Using index

4 rows in set, 1 warning (0.00 sec)

id	select_type	table	type	possible_keys	key	key_len	ref	rows	filtered	Extra
1	SIMPLE	t2	index_merge	PRIMARY,old_userId	old_userId,PRIMARY	128,62	NULL	2	100.00	Using union(old_userId,PRIMARY); Using where
1	SIMPLE	t1	ref	PRIMARY,IX_UCP_USERDATAAUTH_STAFFID,IX_UCP_USERDATAAUTH_AUTHTYPEID	PRIMARY	62	ngmtt.t2.STAFFID	1	100.00	Using where; Using index
1	SIMPLE	t3	ref	PRIMARY	PRIMARY	122	ngmtt.t1.AUTHORJECTID	1	100.00	Using index
1	SIMPLE	t4	eq_ref	PRIMARY	PRIMARY	62	ngmtt.t2.STAFFID	1	100.00	Using index

4 rows in set, 1 warning (0.01 sec)

目录

非自动提交

InnoDB 主键

左关联查询

分页查询

分页查询 1/5

► 案例

```
select
  f.tid, f.position, f.pid, f.fid, f.first, f.author,
  f.authorid, f.subject, f.dateline, f.message, f.invisible, f.anonymous,
  f.rate, f.ratetimes, f.status, f.tags, f.comment, f.replycredit,
  f.hidden, f.favour_num, f.replies, p.userimgurl, u.grouptitle
from
  (select fop.tid, fop.position, fop.pid, fop.fid, fop.first,
    fop.author, fop.authorid, fop.subject, fop.dateline, fop.message,
    fop.invisible, fop.anonymous, fop.rate,
    fop.ratetimes, fop.status, fop.tags, fop.comment, fop.replycredit,
    fop.hidden, fop.favour_num, fop.replies
  from fop
  where fop.tid='fc33dbd4-ef5d-4ae1-9e0c-aad63b1c6bfa'
  order by fop.dateline asc
  limit 3000,10
  ) f
inner join p on p.id = f.authorid
inner JOIN c ON c.id=f.authorid
inner JOIN u ON c.groupid = u.groupid;
```

分页查询 2/5

执行计划

id	select_type	table	type	possible_keys	key	key_len	ref	rows	Extra
1	PRIMARY	<derived2>	ALL	NULL	NULL	NULL	NULL	1570	NULL
1	PRIMARY	p	eq_ref	PRIMARY,uid	PRIMARY	122	f.authorid	1	NULL
1	PRIMARY	c	eq_ref	idbtree,groupidbtree	idbtree	122	f.authorid	1	NULL
1	PRIMARY	u	eq_ref	PRIMARY,groupid	PRIMARY	122	c.groupid	1	NULL
2	DERIVED	fop	ref	displayorder,idx_forum_post_tid_authorid	displayorder	127	const	641944	Using where

分页查询 3/5

优化方案1

失败

每次分页后，记录当页的最大日期

```
select
  f.tid, f.position, f.pid, f.fid, f.first, f.author,
  f.authorid, f.subject, f.dateline, f.message, f.invisible, f.anonymous,
  f.rate, f.ratetimes, f.status, f.tags, f.comment, f.replycredit
, f.hidden, f.favour_num, f.replies, p.userimgurl, u.grouptitle
from
  (select fop.tid, fop.position, fop.pid, fop.fid, fop.first,
    fop.author, fop.authorid, fop.subject, fop.dateline, fop.message,
    fop.invisible, fop.anonymous, fop.rate,
    fop.ratetimes, fop.status, fop.tags, fop.comment, fop.replycredit,
    fop.hidden, fop.favour_num, fop.replies
  from fop
  where fop.tid='fc33dbd4-ef5d-4ae1-9e0c-aad63b1c6bfa'
    and fop.dateline > '2017-01-05 09:15:00'
    order by fop.dateline
    limit 10
  ) f
inner join p on p.id = f.authorid
inner JOIN c ON c.id=f.authorid
inner JOIN u ON c.groupid = u.groupid;
```

分页查询 4/5

优化方案2

利用楼层字段替换日期字段

```
select
  f.tid, f.position, f.pid, f.fid, f.first, f.author,
  f.authorid, f.subject, f.dateline, f.message, f.invisible,
  f.anonymous, f.rate, f.ratetimes, f.status, f.tags, f.comment, f.replycredit,
  f.hidden, f.favour_num, f.replies, p.userimgurl, u.grouptitle
from
  (select fop.tid, fop.position, fop.pid, fop.fid, fop.first,
    fop.author, fop.authorid, fop.subject, fop.dateline, fop.message,
    fop.invisible, fop.anonymous, fop.rate,
    fop.ratetimes, fop.status, fop.tags, fop.comment, fop.replycredit,
    fop.hidden, fop.favour_num, fop.replies
  from fop
  where fop.tid='fc33dbd4-ef5d-4ae1-9e0c-aad63b1c6bfa'
    and fop.position between 3000 and 3010
    order by fop.position ) f
inner join p on p.id = f.authorid
inner JOIN c ON c.id=f.authorid
inner JOIN u ON c.groupid = u.groupid;
```

分页查询 5/5

执行计划

id	select_type	table	type	possible_keys	key	key_len	ref	rows	Extra
1	PRIMARY	<derived2>	ALL	NULL	NULL	NULL	NULL	10	NULL
1	PRIMARY	p	eq_ref	PRIMARY,uid	PRIMARY	122	f.authorid	1	NULL
1	PRIMARY	c	eq_ref	idbtree,groupidbtree	idbtree	122	f.authorid	1	NULL
1	PRIMARY	u	eq_ref	PRIMARY,groupid	PRIMARY	122	c.groupid	1	NULL
2	DERIVED	fop	range	displayorder,idx_forum_post_tid_hfp,idx_forum_post_tid_authorid	idx_forum_post_tid_hfp	131	NULL	10	Using index condition

谢谢