inserted at the end of the data file. In this case, you can freely mix concurrent `INSERT` and `SELECT` statements for a `MyISAM` table without locks. That is, you can insert rows into a `MyISAM` table at the same time other clients are reading from it. Holes can result from rows having been deleted from or updated in the middle of the table. If there are holes, concurrent inserts are disabled but are enabled again automatically when all holes have been filled with new data. To control this behavior, use the `concurrent_insert` system variable. See Section 8.11.3, "Concurrent Inserts".

If you acquire a table lock explicitly with `LOCK TABLES`, you can request a `READ LOCAL` lock rather than a `READ` lock to enable other sessions to perform concurrent inserts while you have the table locked.

To perform many `INSERT` and `SELECT` operations on a table `t1` when concurrent inserts are not possible, you can insert rows into a temporary table `temp_t1` and update the real table with the rows from the temporary table:

```
mysql> LOCK TABLES t1 WRITE, temp_t1 WRITE;
mysql> INSERT INTO t1 SELECT * FROM temp_t1;
mysql> DELETE FROM temp_t1;
mysql> UNLOCK TABLES;
```

## Choosing the Type of Locking

Generally, table locks are superior to row-level locks in the following cases:

- Most statements for the table are reads.

- Statements for the table are a mix of reads and writes, where writes are updates or deletes for a single row that can be fetched with one key read:

```
UPDATE tbl_name SET column=value WHERE unique_key_col=key_value;
DELETE FROM tbl_name WHERE unique_key_col=key_value;
```

- `SELECT` combined with concurrent `INSERT` statements, and very few `UPDATE` or `DELETE` statements.

- Many scans or `GROUP BY` operations on the entire table without any writers.

With higher-level locks, you can more easily tune applications by supporting locks of different types, because the lock overhead is less than for row-level locks.

Options other than row-level locking:

- Versioning (such as that used in MySQL for concurrent inserts) where it is possible to have one writer at the same time as many readers. This means that the database or table supports different views for the data depending on when access begins. Other common terms for this are "time travel," "copy on write," or "copy on demand."

- Copy on demand is in many cases superior to row-level locking. However, in the worst case, it can use much more memory than using normal locks.

- Instead of using row-level locks, you can employ application-level locks, such as those provided by `GET_LOCK()` and `RELEASE_LOCK()` in MySQL. These are advisory locks, so they work only with applications that cooperate with each other. See Section 12.15, "Locking Functions".

## 8.11.2 Table Locking Issues

`InnoDB` tables use row-level locking so that multiple sessions and applications can read from and write to the same table simultaneously, without making each other wait or producing inconsistent results. For this storage engine, avoid using the `LOCK TABLES` statement, because it does not offer any extra protection,