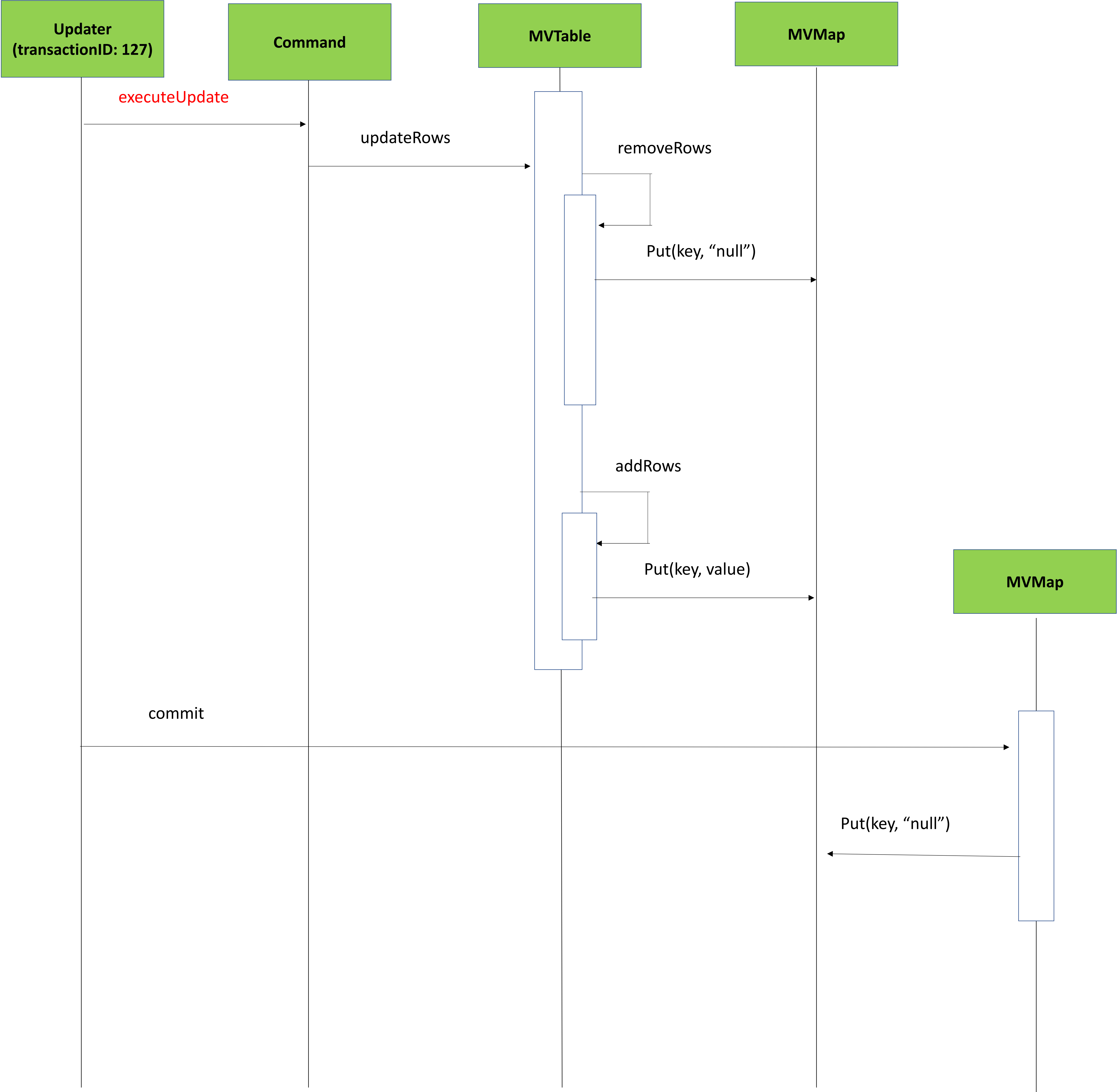


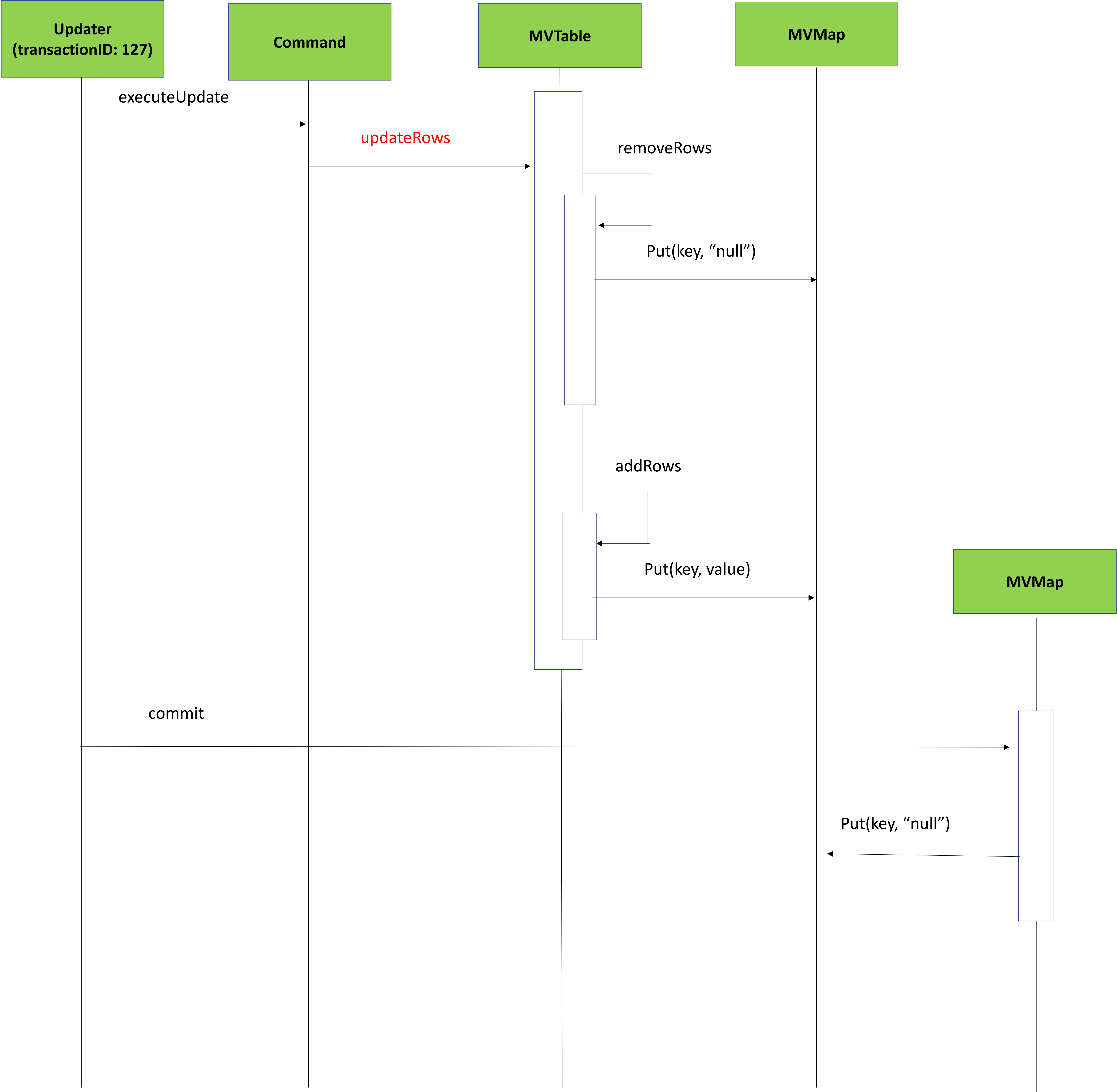
# Normal Behavior of the updater

```
sql = "UPDATE test SET lastUpdated = 101";  
  
executeUpdate(sql);  
  
c.commit();
```



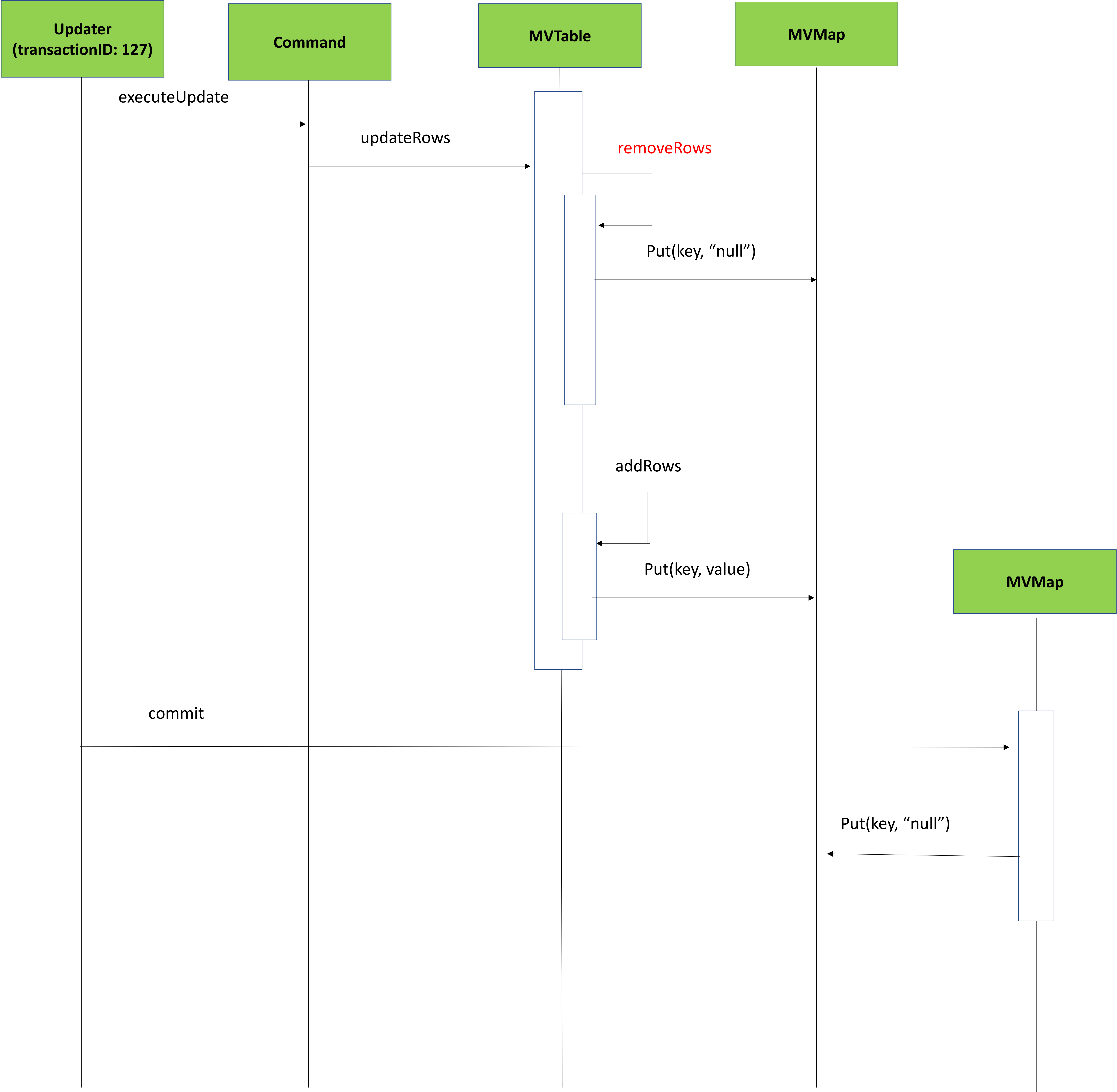
Key	Value	operator
0	100	128
1	100	128
2	100	128
3	100	128
4	100	128

```
sql = "UPDATE test SET lastUpdated = 101");
executeUpdate(sql);
c.commit();
```



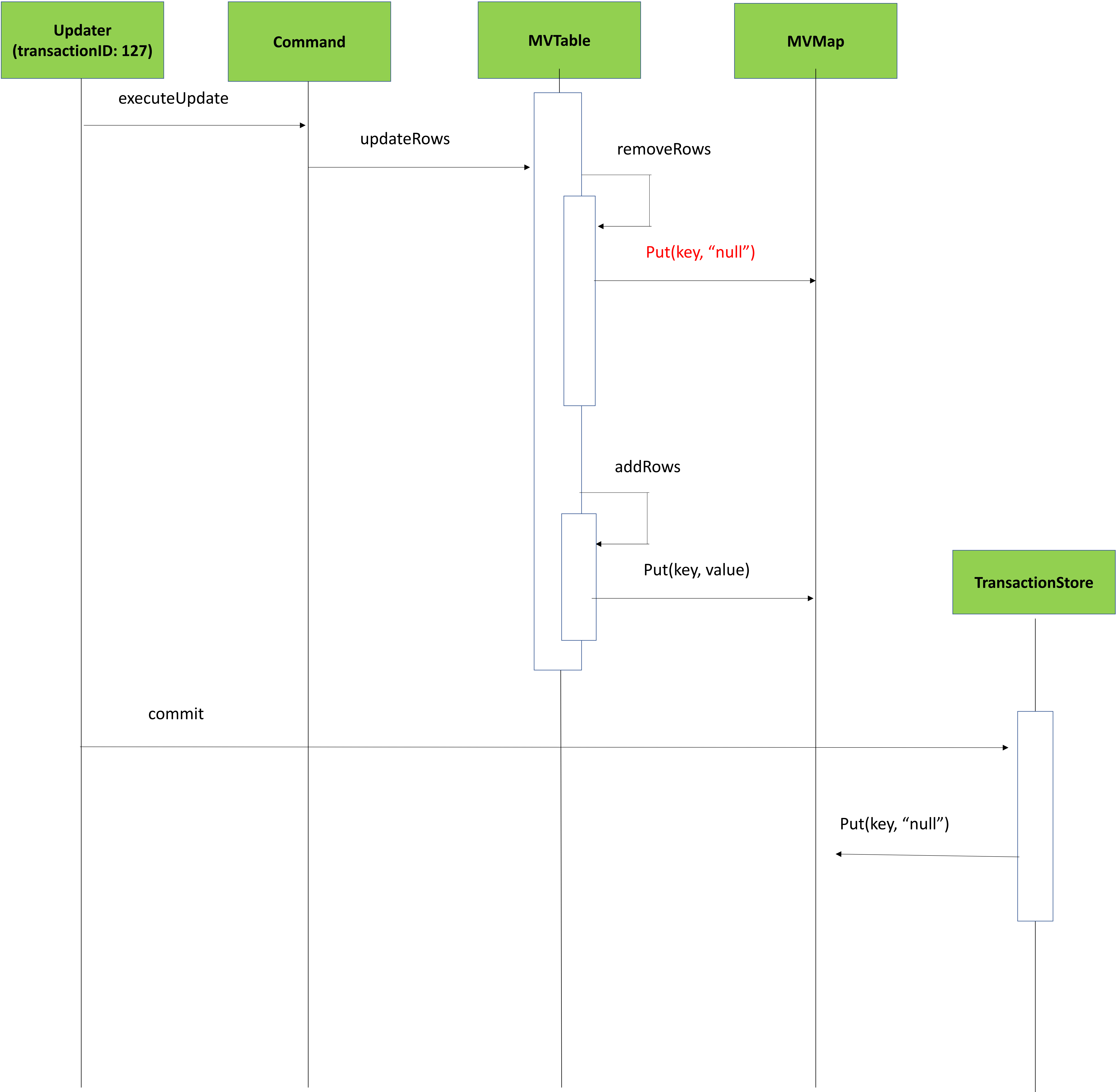
Key	Value	operator
0	100	128
1	100	128
2	100	128
3	100	128
4	100	128

```
sql = "UPDATE test SET lastUpdated = 101");
executeUpdate(sql);
c.commit();
```



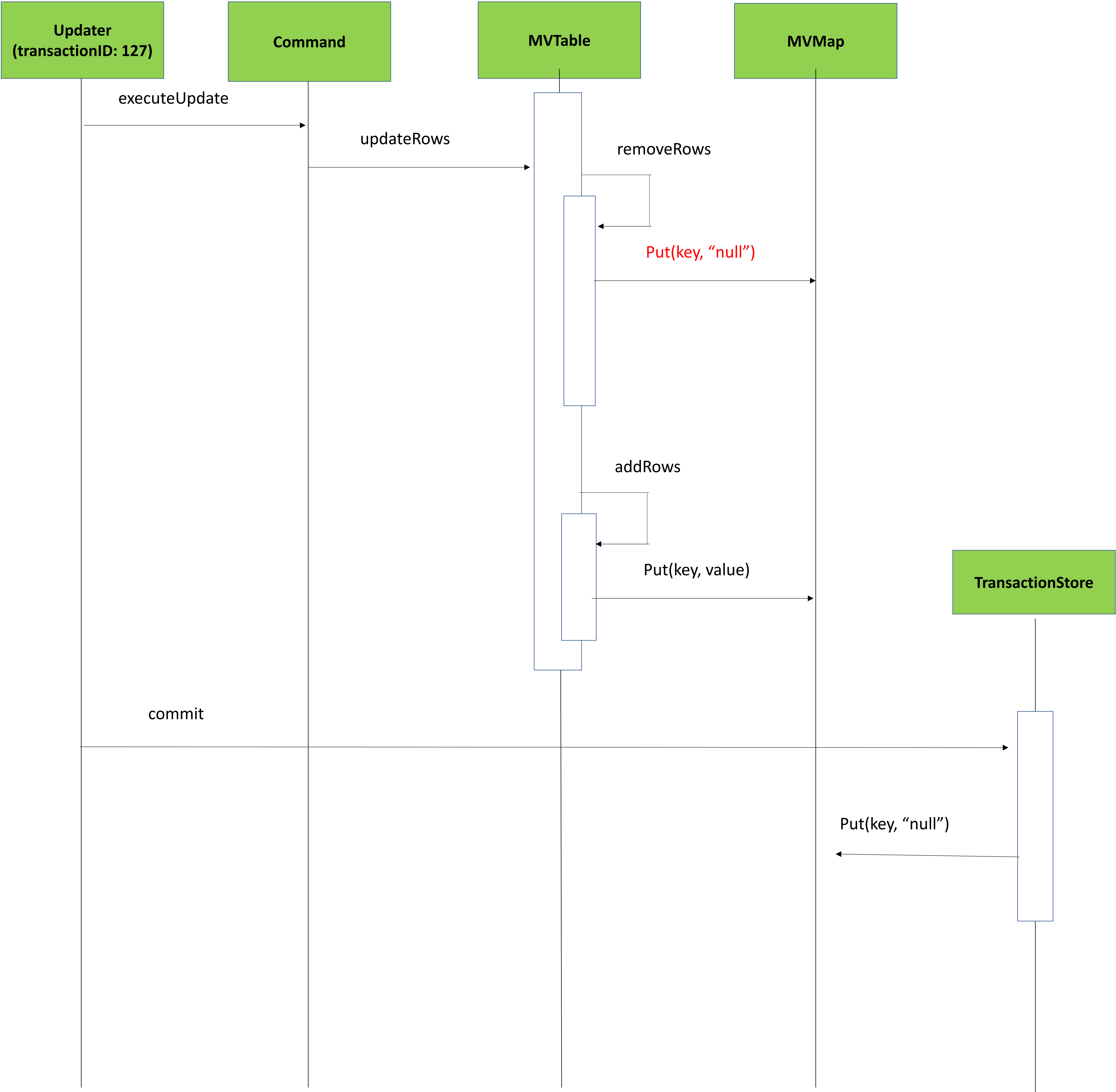
Key	Value	operator
0	100	128
1	100	128
2	100	128
3	100	128
4	100	128

```
sql = "UPDATE test SET lastUpdated = 101");
executeUpdate(sql);
c.commit();
```



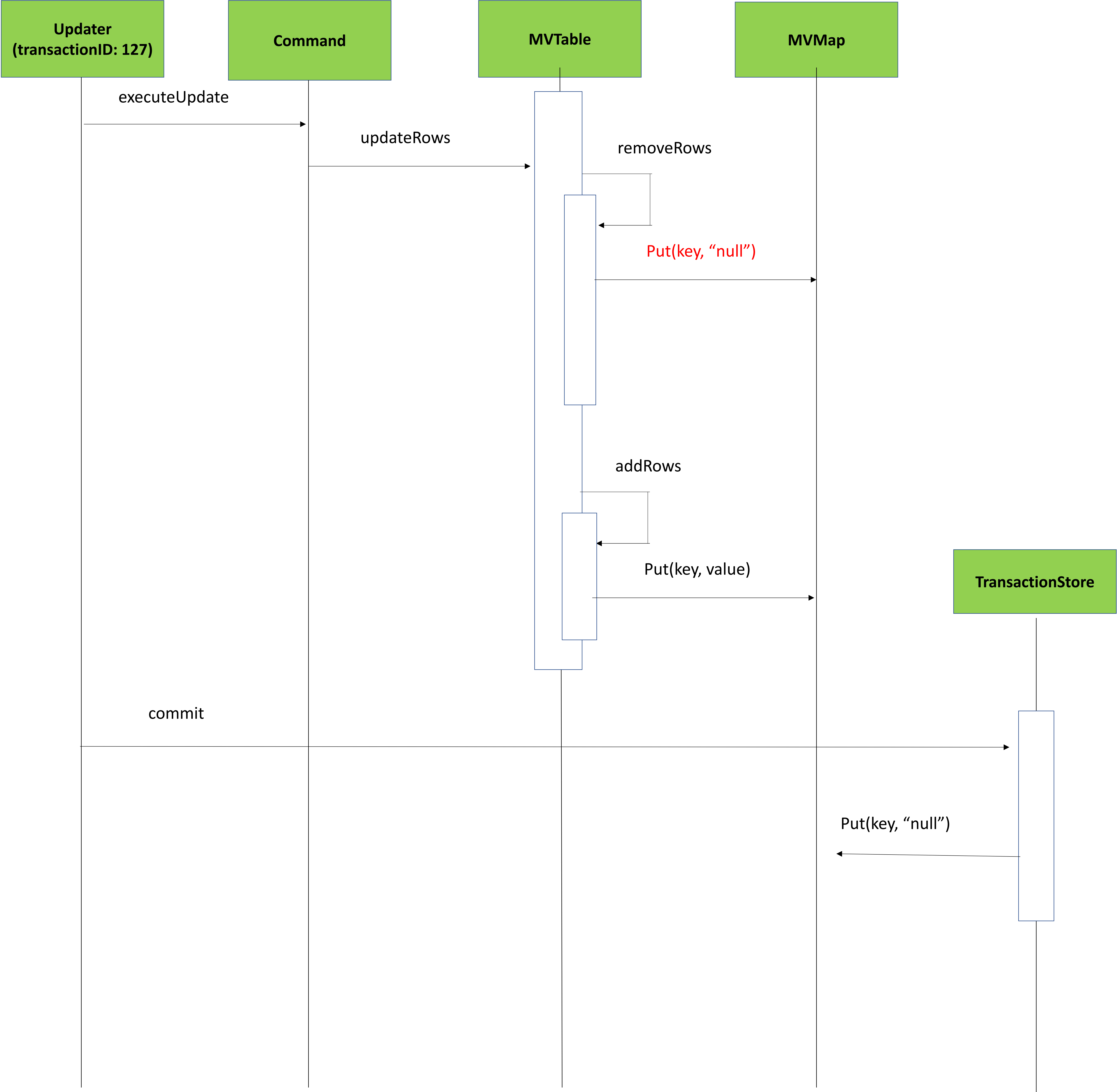
Key	Value	operator
0	null	127
1	100	128
2	100	128
3	100	128
4	100	128

```
sql = "UPDATE test SET lastUpdated = 101");
executeUpdate(sql);
c.commit();
```



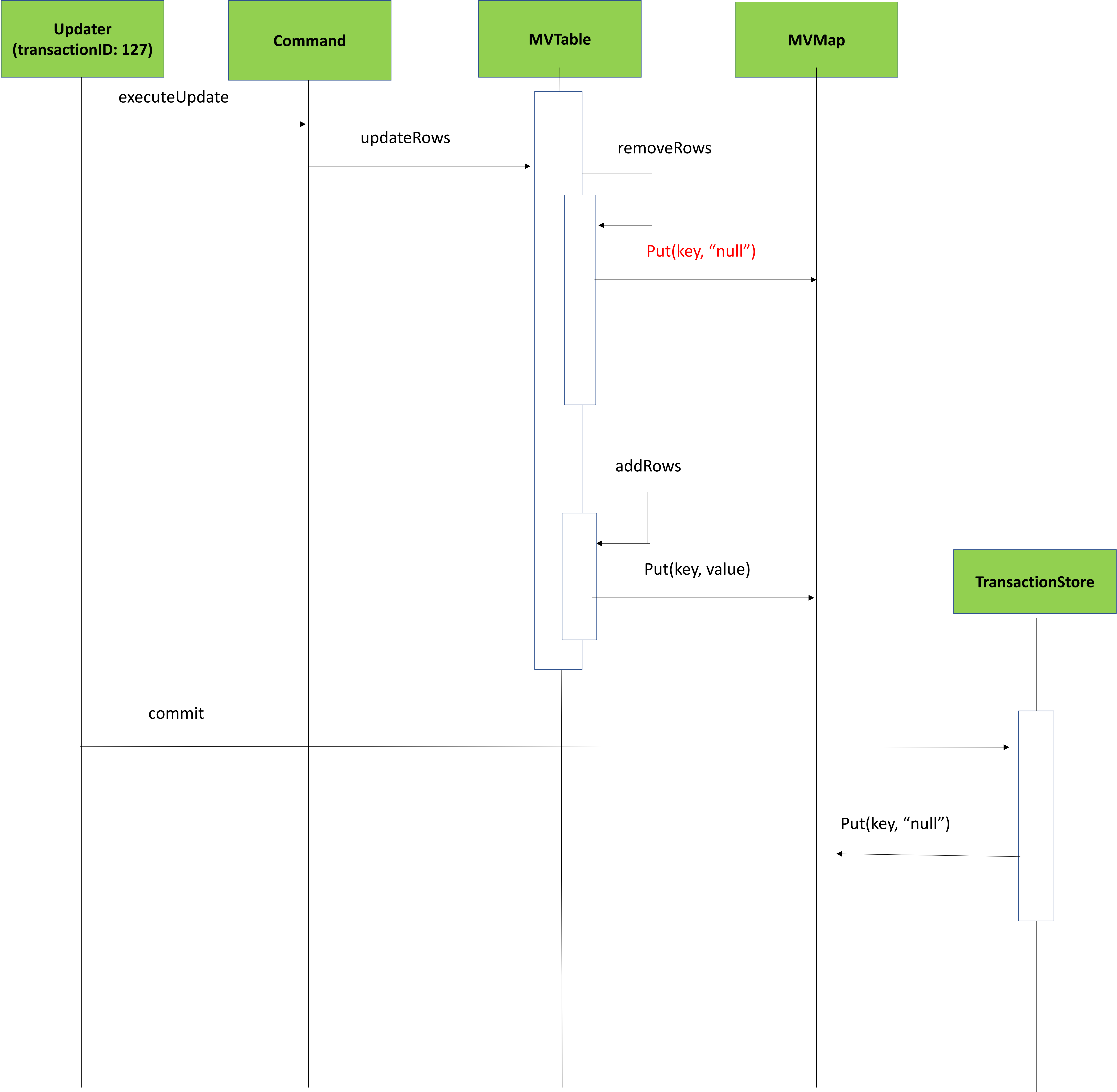
Key	Value	operator
0	null	127
1	null	127
2	100	128
3	100	128
4	100	128

```
sql = "UPDATE test SET lastUpdated = 101");
executeUpdate(sql);
c.commit();
```



Key	Value	operator
0	null	127
1	null	127
2	null	127
3	100	128
4	100	128

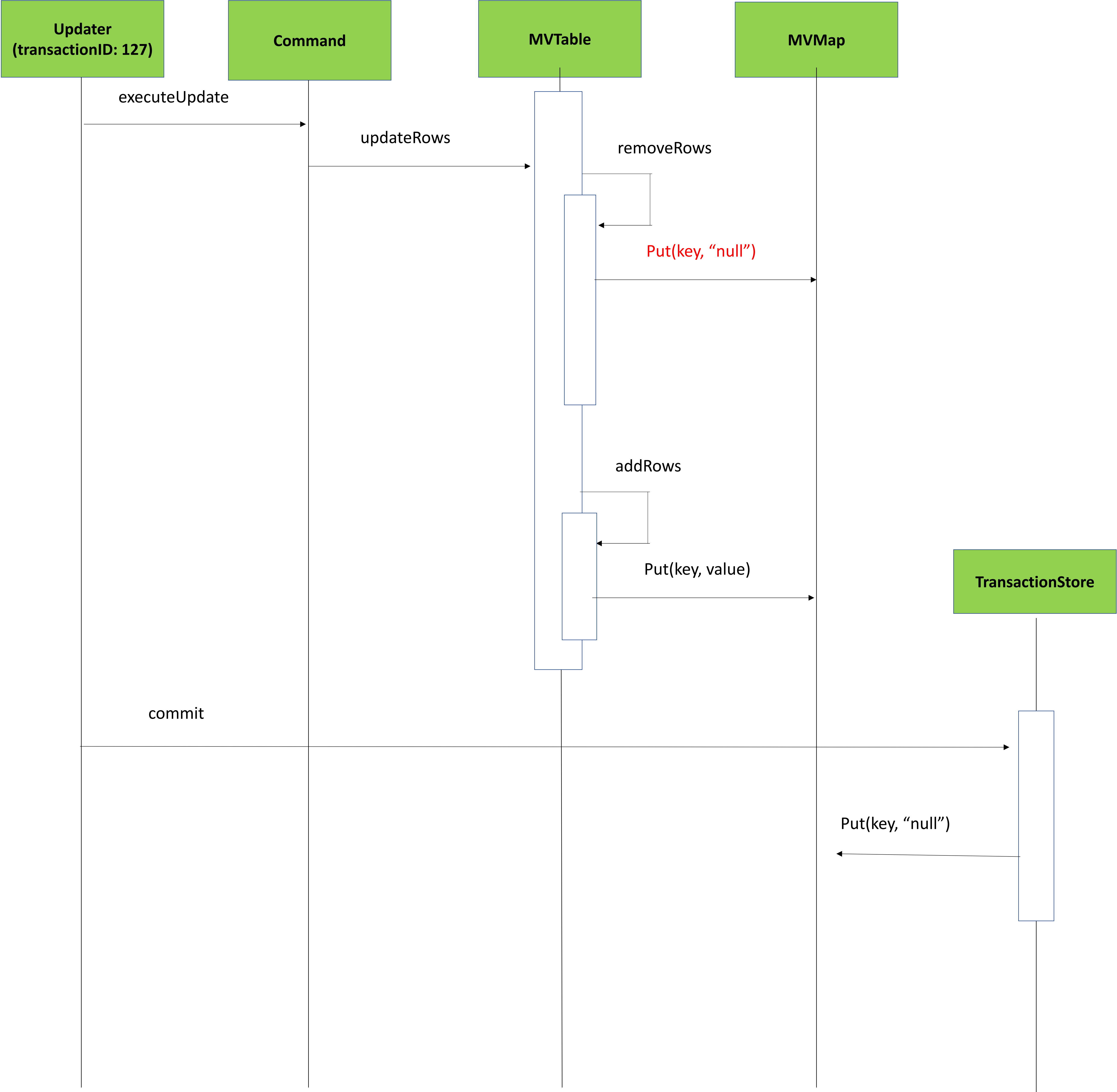
```
sql = "UPDATE test SET lastUpdated = 101");
executeUpdate(sql);
c.commit();
```



Key	Value	operator
0	null	127
1	null	127
2	null	127
3	null	127
4	100	128

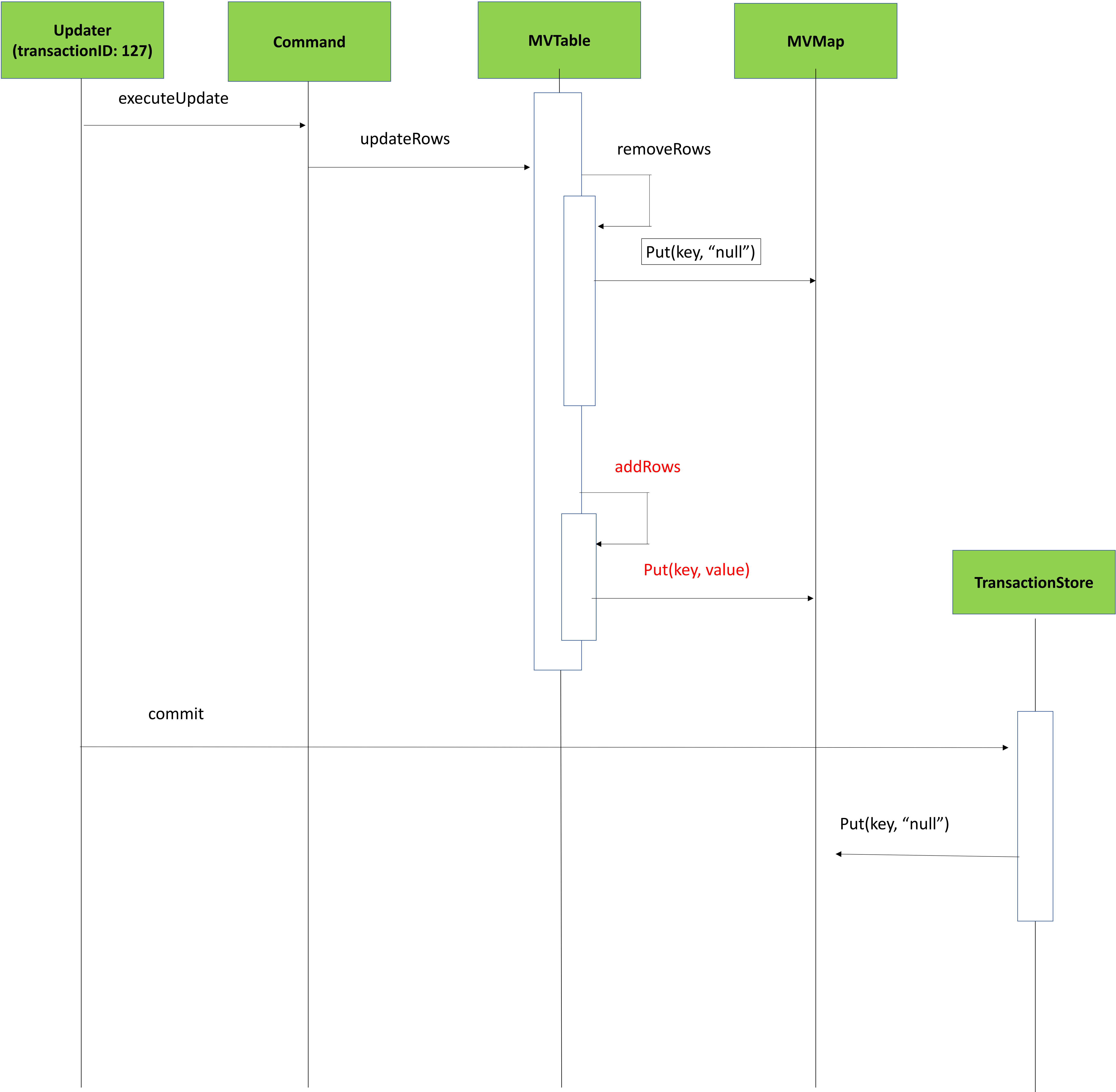
```
sql = "UPDATE test SET lastUpdated = 101");
executeUpdate(sql);
c.commit();
```





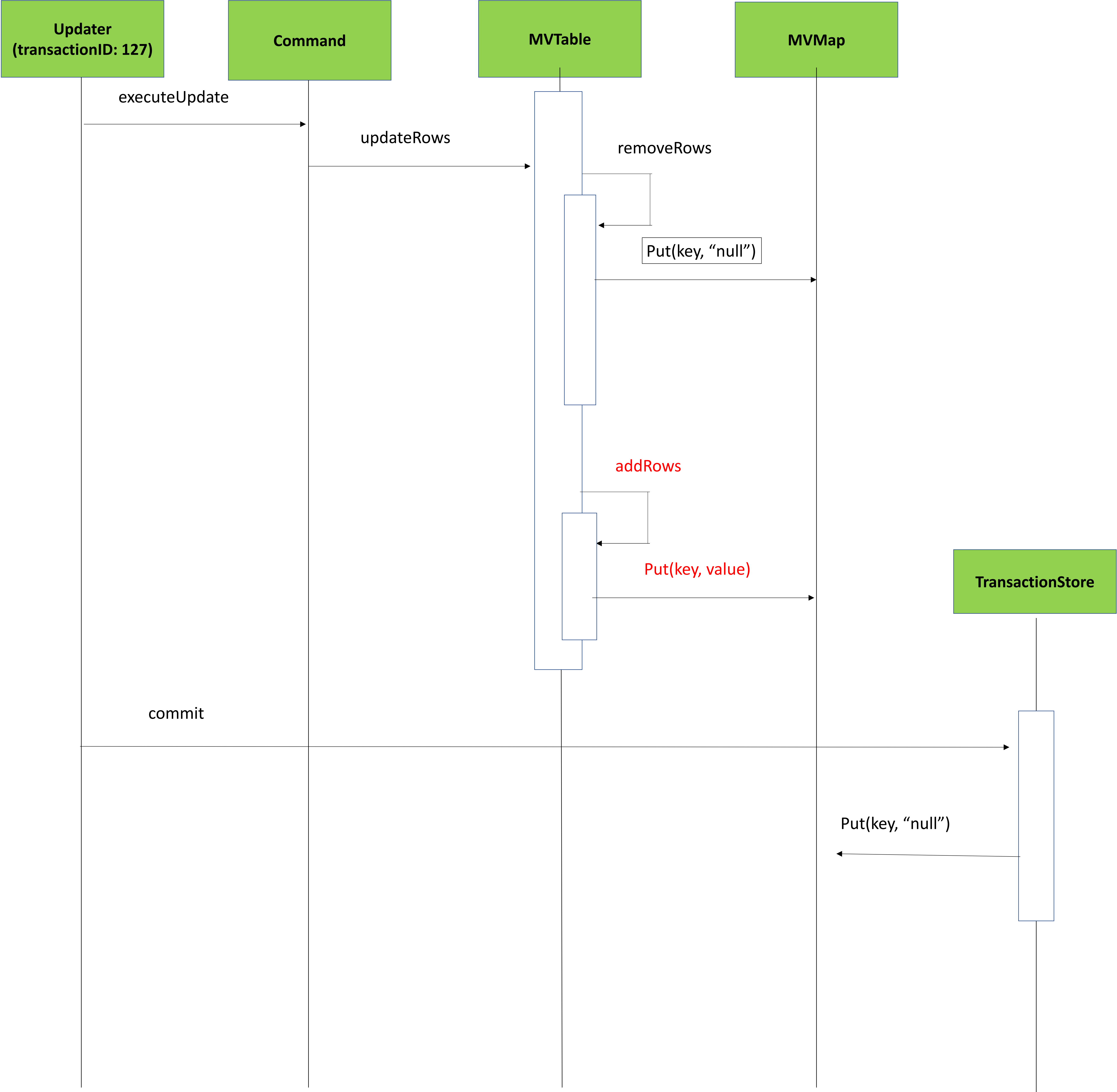
Key	Value	operator
0	null	127
1	null	127
2	null	127
3	null	127
4	null	128

```
sql = "UPDATE test SET lastUpdated = 101");
executeUpdate(sql);
c.commit();
```



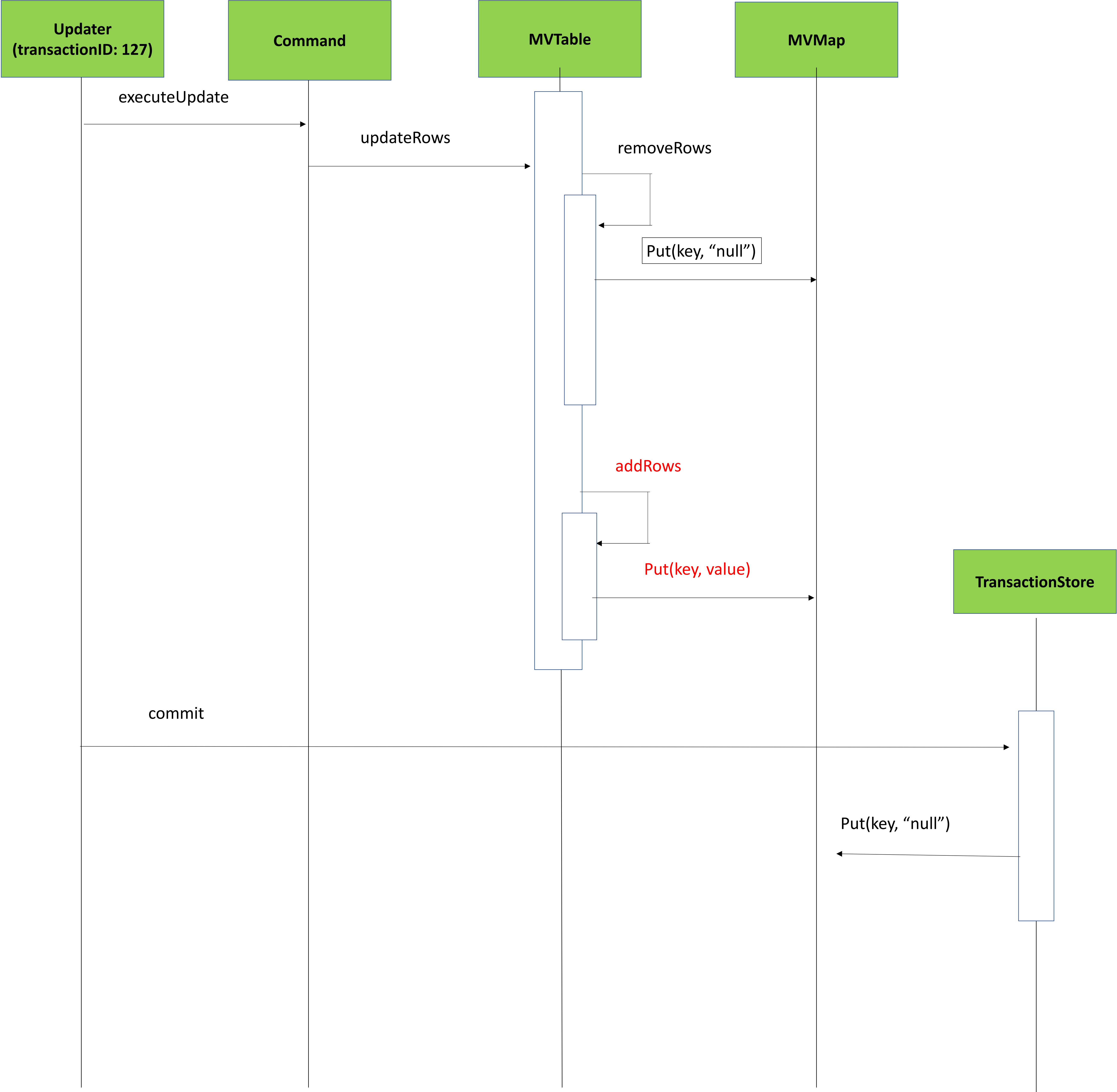
Key	Value	operator
0	101	127
1	null	127
2	null	127
3	null	127
4	null	128

```
sql = "UPDATE test SET lastUpdated = 101");
executeUpdate(sql);
c.commit();
```



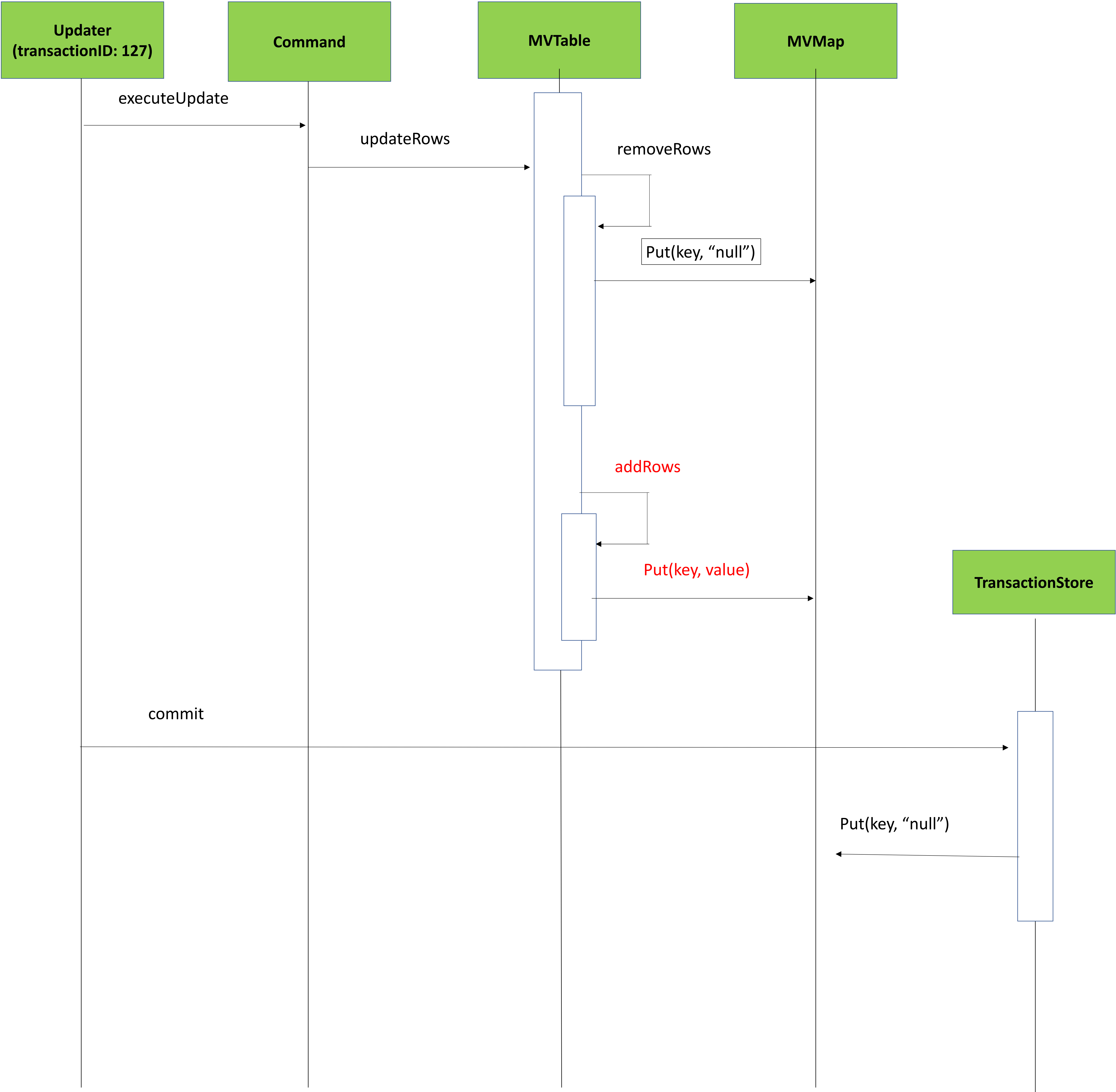
Key	Value	operator
0	101	127
1	101	127
2	null	127
3	null	127
4	null	128

```
sql = "UPDATE test SET lastUpdated = 101");
executeUpdate(sql);
c.commit();
```



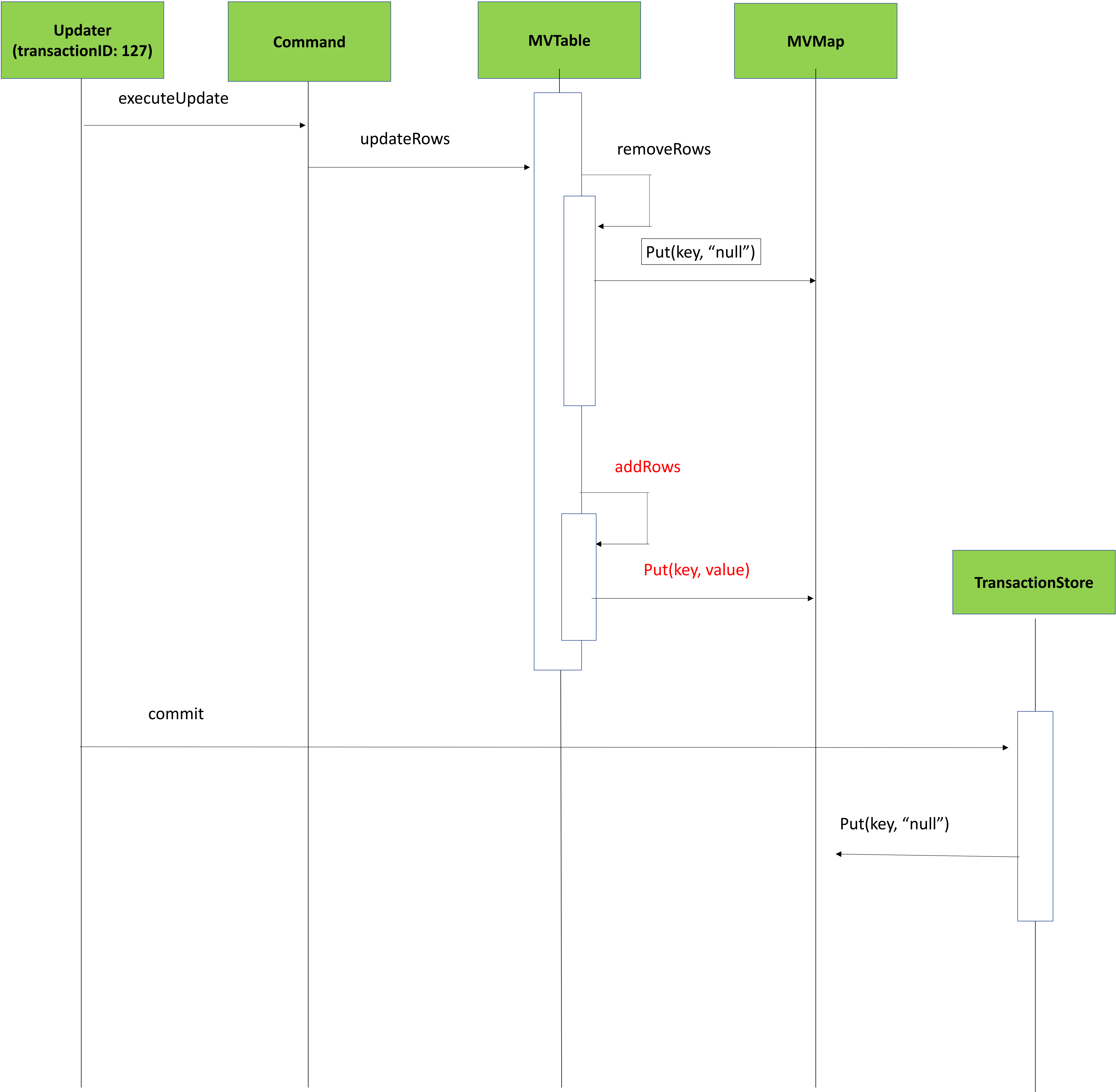
Key	Value	operator
0	101	127
1	101	127
2	101	127
3	null	127
4	null	128

```
sql = "UPDATE test SET lastUpdated = 101");
executeUpdate(sql);
c.commit();
```



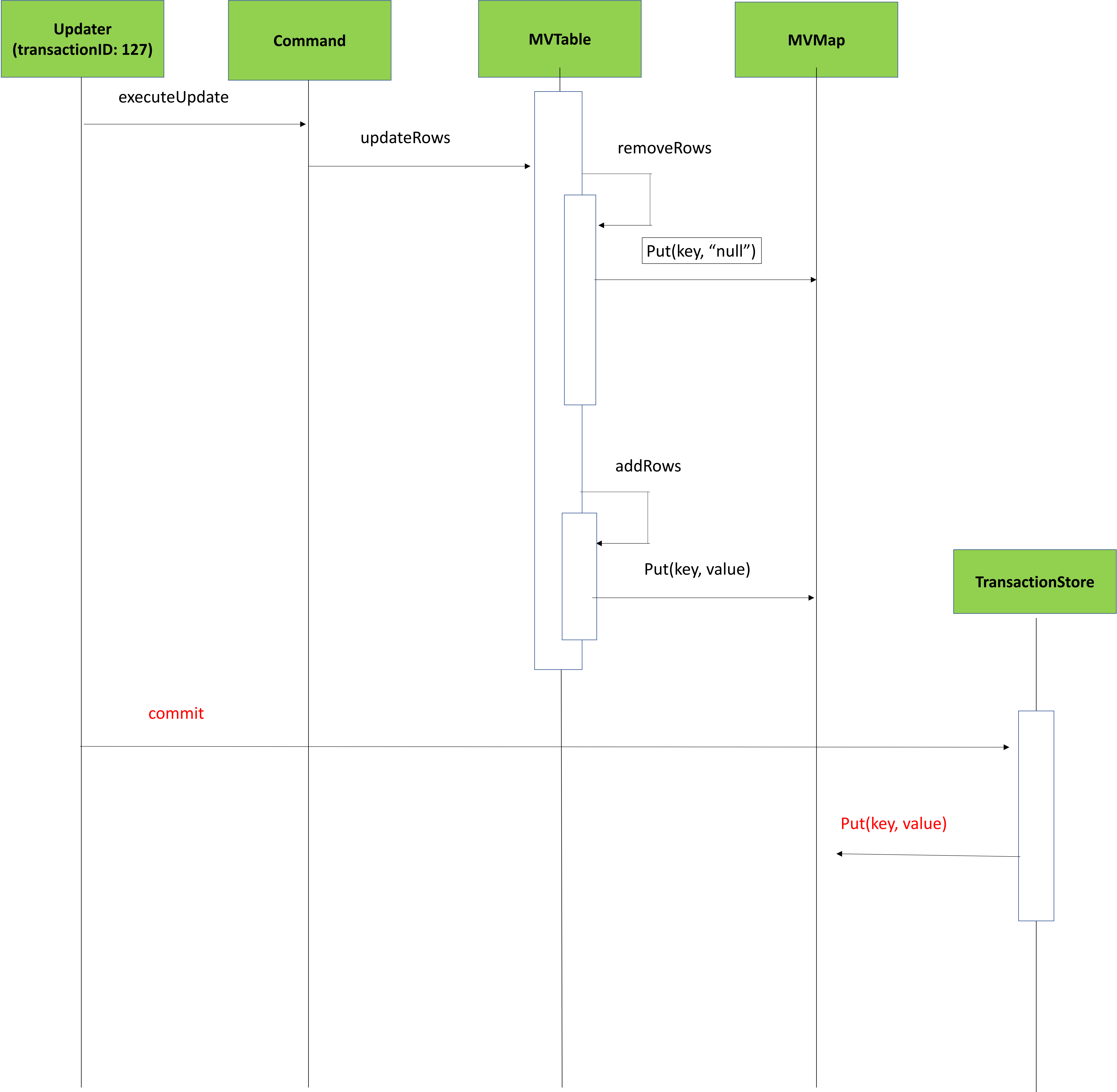
Key	Value	operator
0	101	127
1	101	127
2	101	127
3	101	127
4	null	128

```
sql = "UPDATE test SET lastUpdated = 101");
executeUpdate(sql);
c.commit();
```



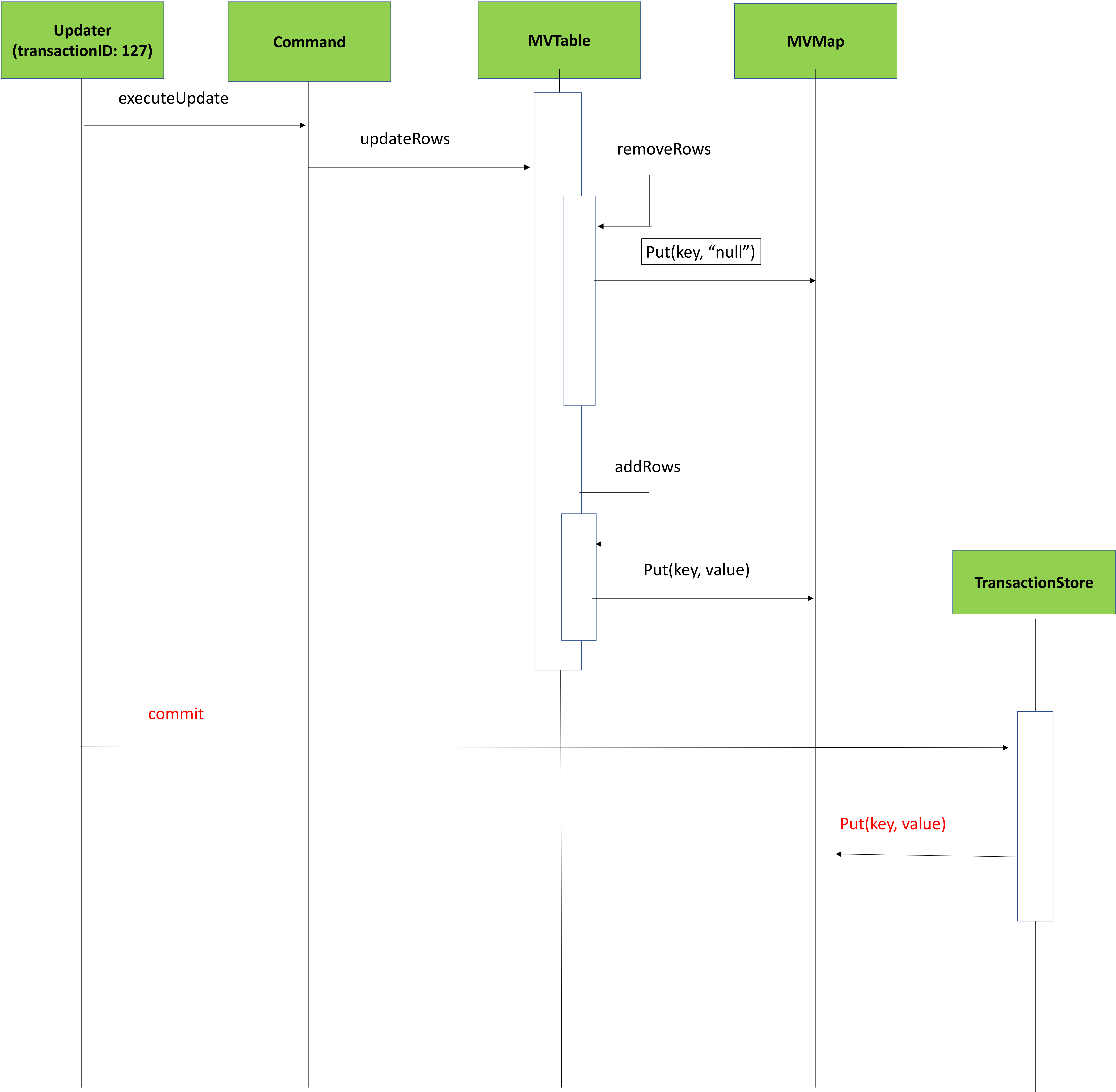
Key	Value	operator
0	101	127
1	101	127
2	101	127
3	101	127
4	101	128

```
sql = "UPDATE test SET lastUpdated = 101");
executeUpdate(sql);
c.commit();
```



Key	Value	operator
0	101	127
1	101	127
2	101	127
3	101	127
4	101	128

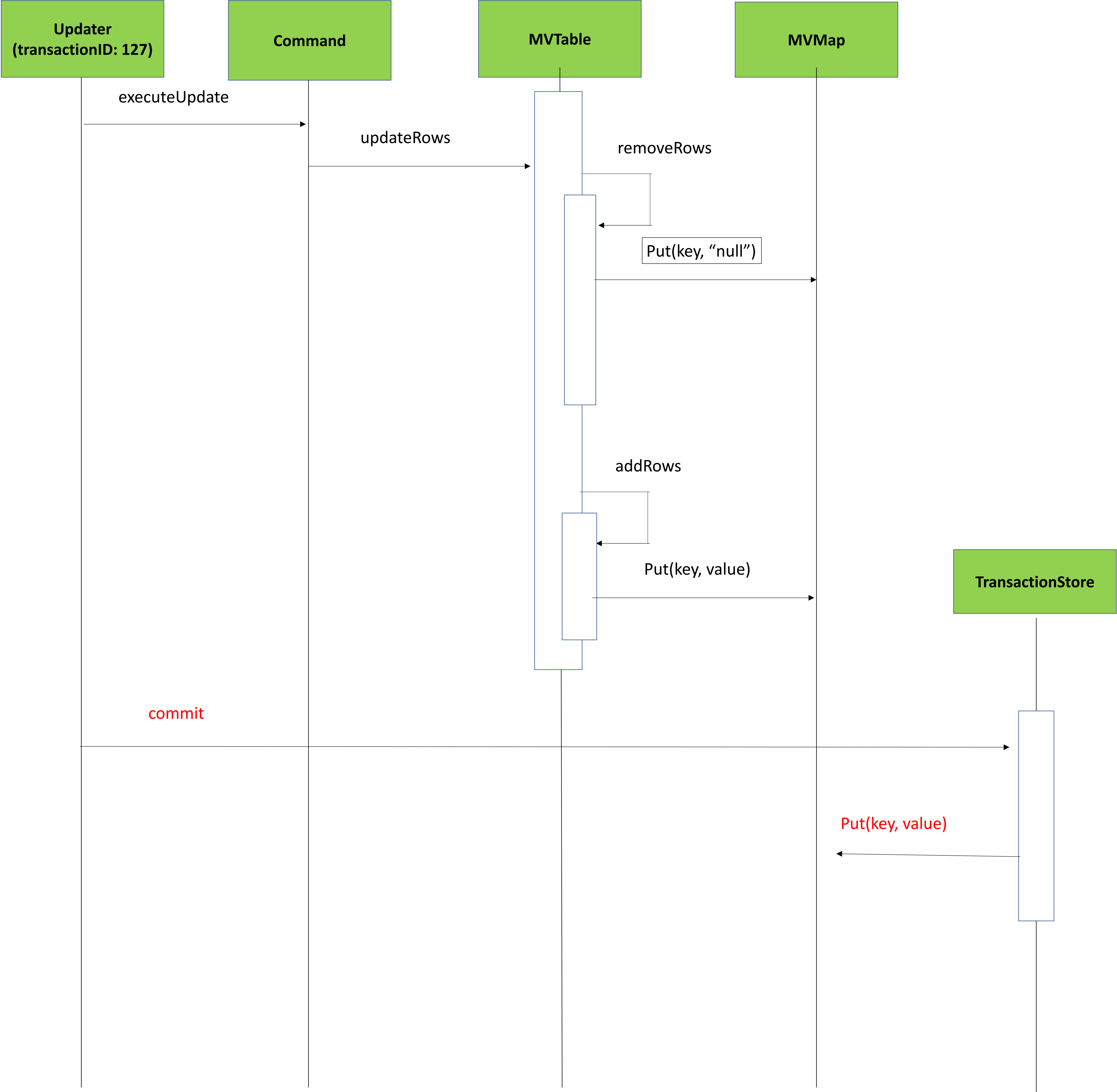
```
sql = "UPDATE test SET lastUpdated = 101");
executeUpdate(sql);
c.commit();
```



Key	Value	operator
0	101	127
1	101	127
2	101	127
3	101	127
4	101	128

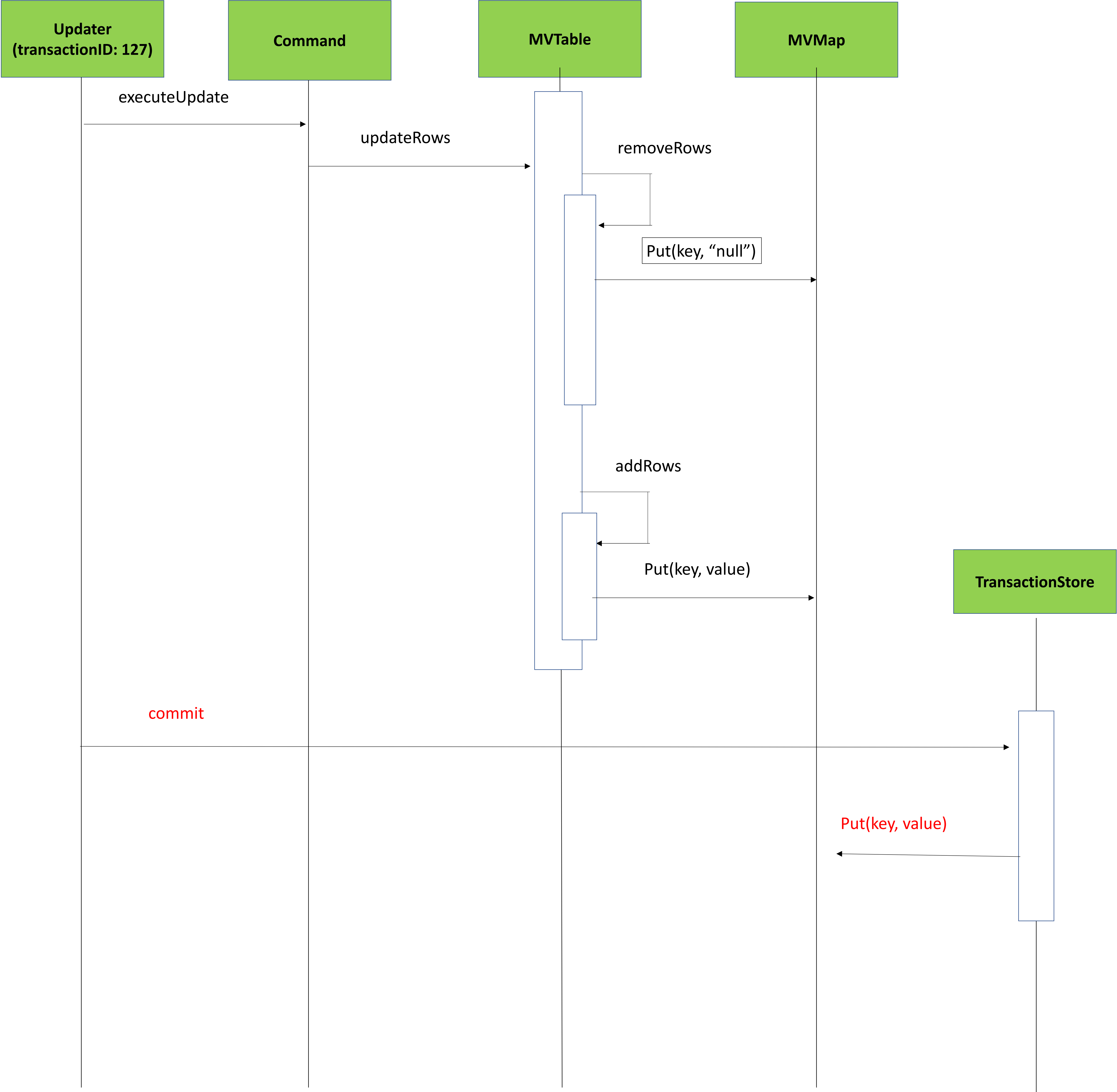
```
sql = "UPDATE test SET lastUpdated = 101");
executeUpdate(sql);
c.commit();
```





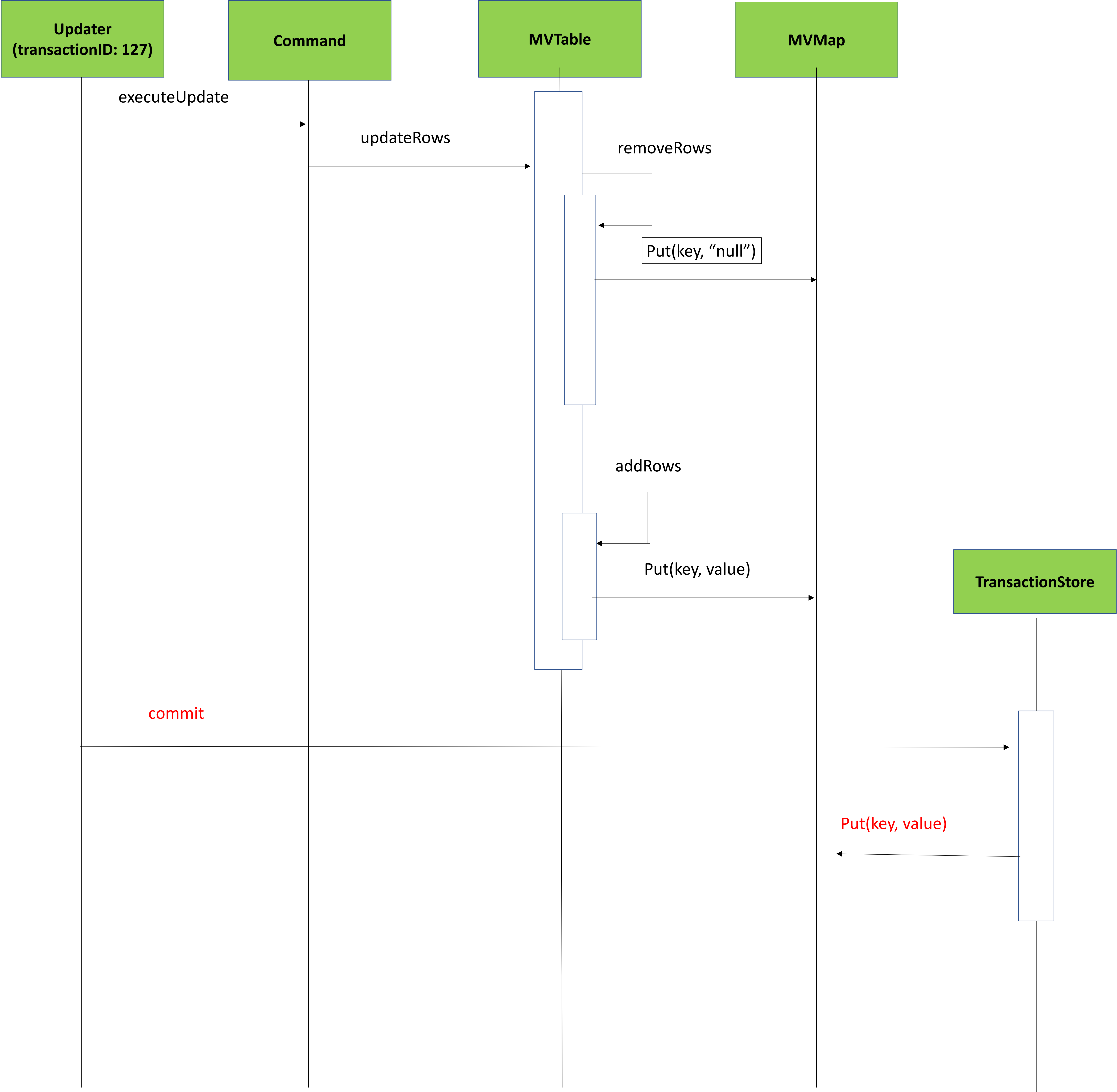
Key	Value	operator
0	101	127
1	101	127
2	101	127
3	101	127
4	101	128

```
sql = "UPDATE test SET lastUpdated = 101");
executeUpdate(sql);
c.commit();
```



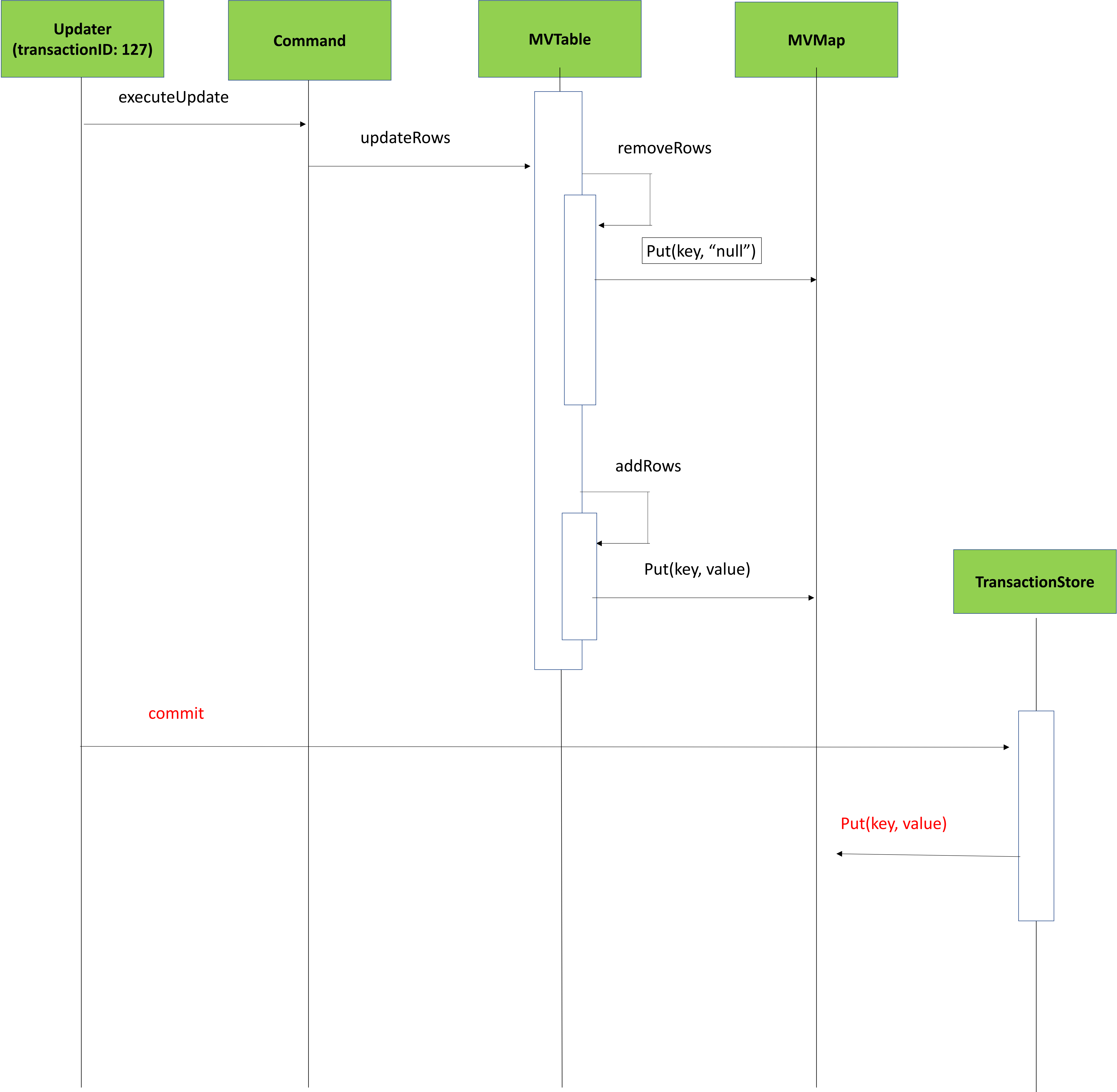
Key	Value	operator
0	101	127
1	101	127
2	101	127
3	101	127
4	101	128

```
sql = "UPDATE test SET lastUpdated = 101");
executeUpdate(sql);
c.commit();
```



Key	Value	operator
0	101	127
1	101	127
2	101	127
3	101	127
4	101	128

```
sql = "UPDATE test SET lastUpdated = 101");
executeUpdate(sql);
c.commit();
```



Key	Value	operator
0	101	127
1	101	127
2	101	127
3	101	127
4	101	128

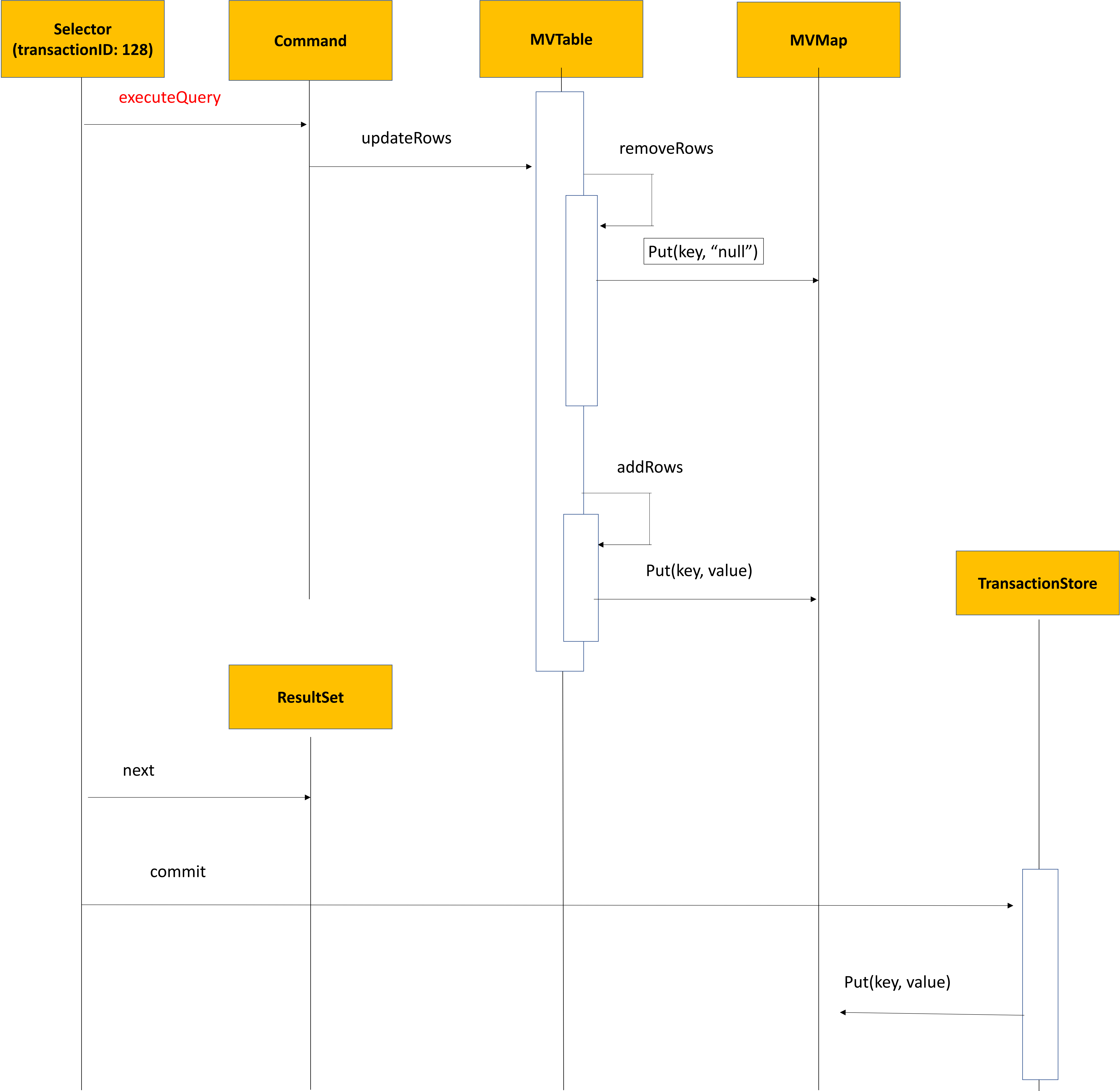
```
sql = "UPDATE test SET lastUpdated = 101");
executeUpdate(sql);
c.commit();
```

# Normal Behavior of the selector

```
sql = "SELECT * FROM test WHERE entity_id = 1 FOR UPDATE";  
ResultSet set = executeQuery(sql);
```

```
if (!set.next()) {  
    // BUG!  
}
```

```
commit();
```

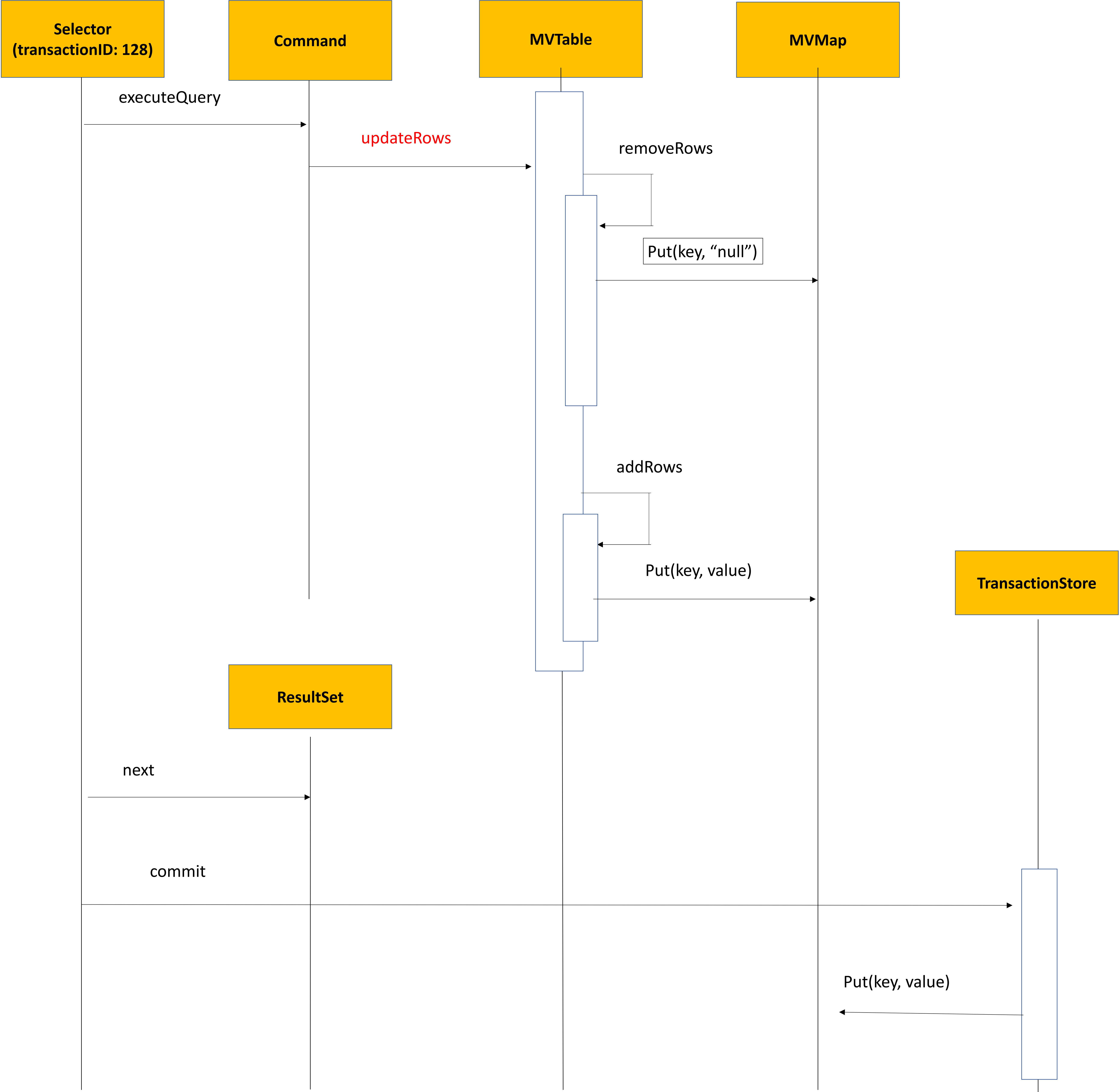


Key	Value	operator
0	101	127
1	101	127
2	101	127
3	101	127
4	101	128

```
sql = "SELECT * FROM test WHERE entity_id = 1 FOR UPDATE";
ResultSet set = executeQuery(sql);

if (!set.next()) {
    // BUG!
}

commit();
```

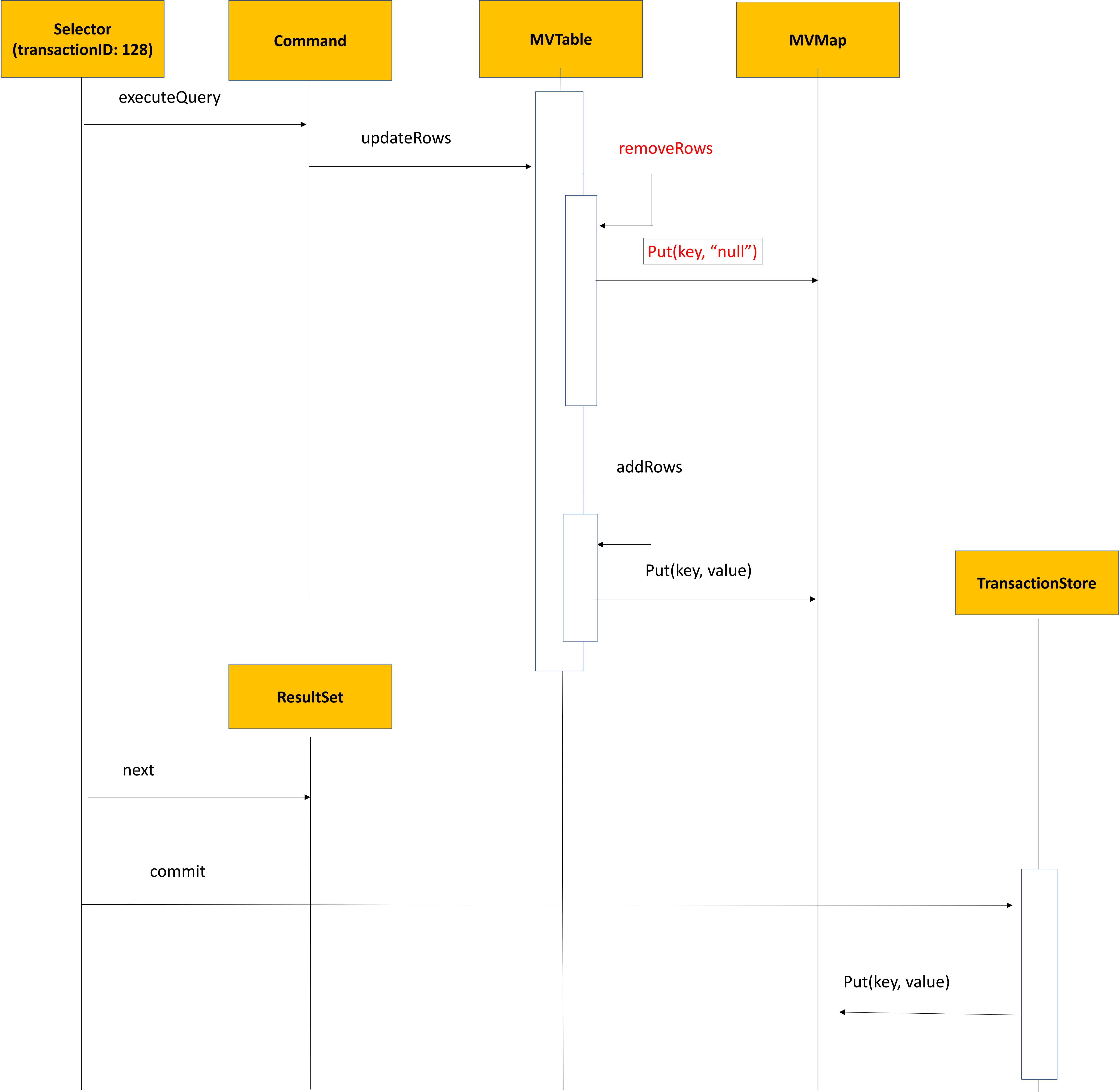


Key	Value	operator
0	101	127
1	101	127
2	101	127
3	101	127
4	101	128

```
sql = "SELECT * FROM test WHERE entity_id = 1 FOR UPDATE";
ResultSet set = executeQuery(sql);

if (!set.next()) {
    // BUG!
}

commit();
```



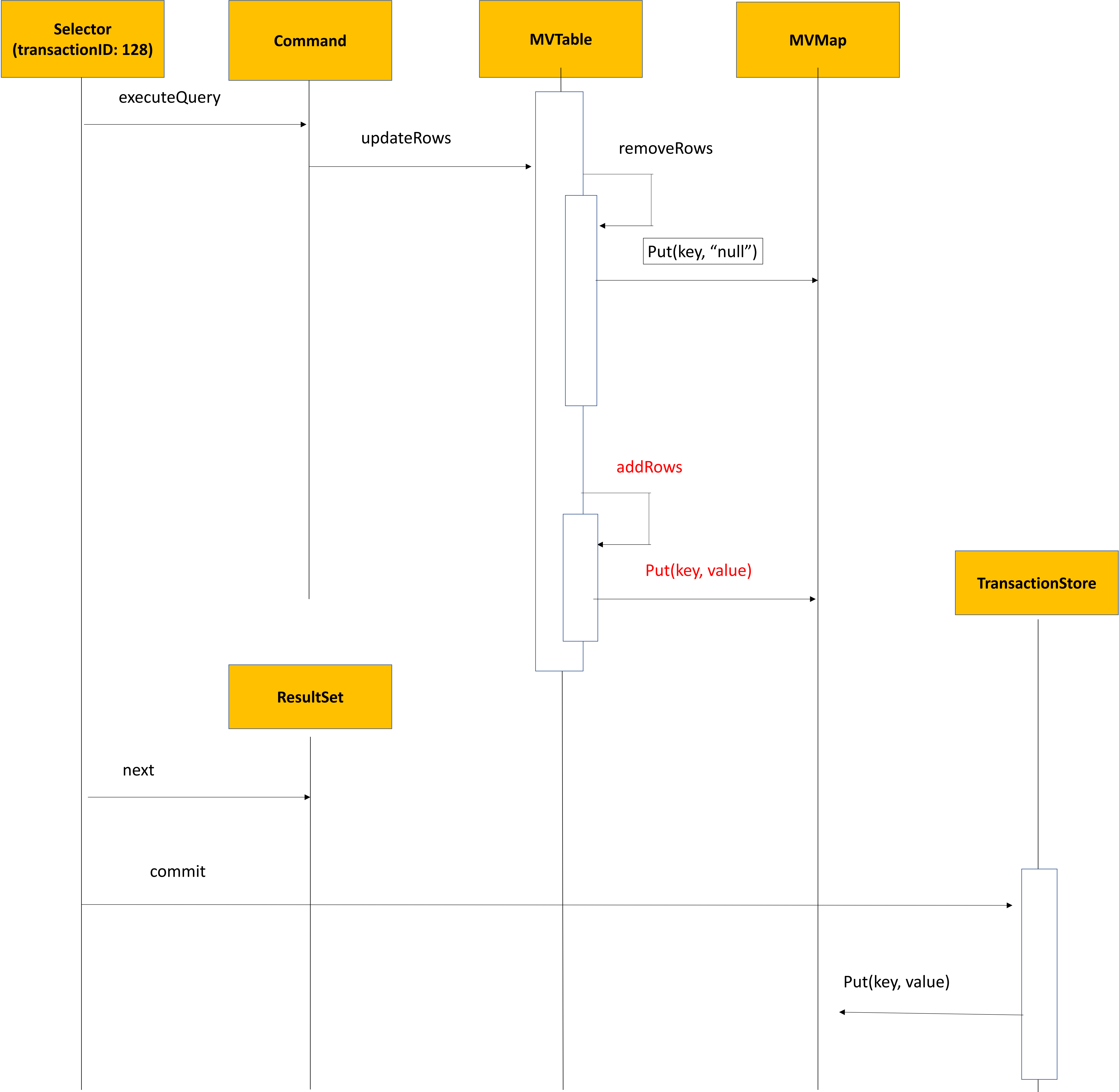
Key	Value	operator
0	101	127
1	null	127
2	101	127
3	101	127
4	101	128

```
sql = "SELECT * FROM test WHERE entity_id = 1 FOR UPDATE";
ResultSet set = executeQuery(sql);

if (!set.next()) {
    // BUG!
}

commit();
```



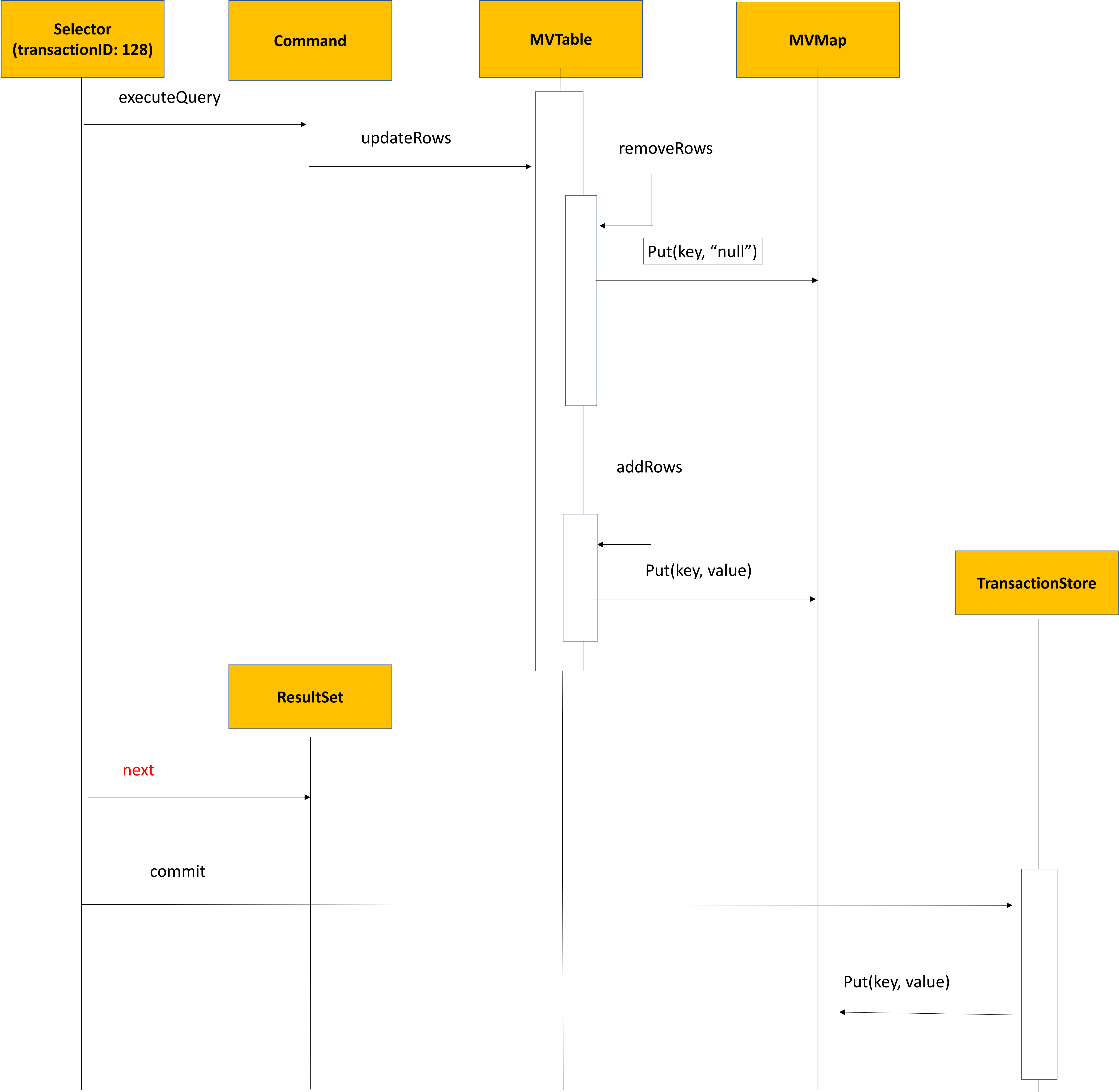


Key	Value	operator
0	101	127
1	101	127
2	101	127
3	101	127
4	101	128

```
sql = "SELECT * FROM test WHERE entity_id = 1 FOR UPDATE";
ResultSet set = executeQuery(sql);

if (!set.next()) {
    // BUG!
}

commit();
```

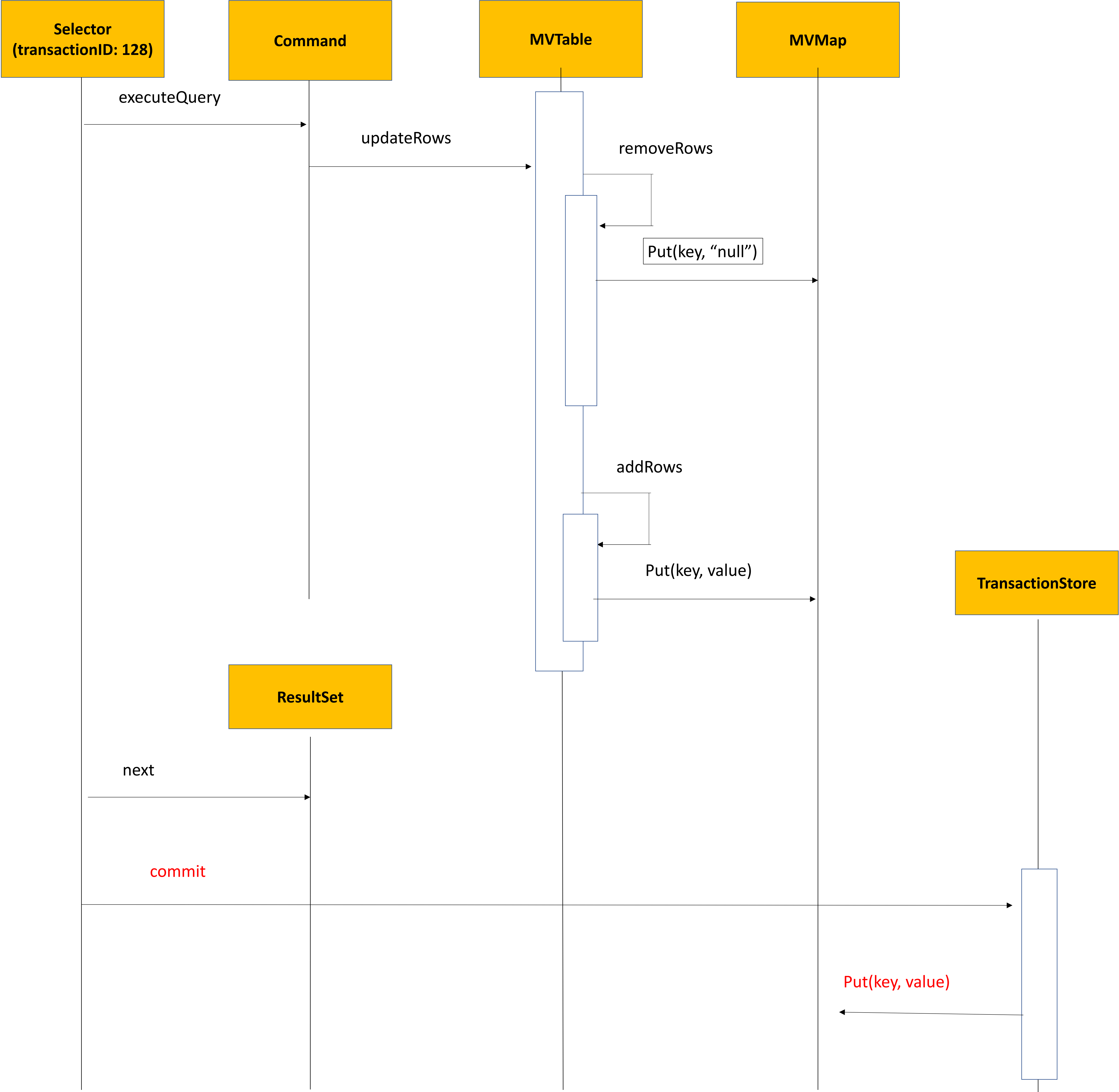


Key	Value	operator
0	101	127
1	101	127
2	101	127
3	101	127
4	101	128

```
sql = "SELECT * FROM test WHERE entity_id = 1 FOR UPDATE";
ResultSet set = executeQuery(sql);

if (!set.next()) {
    // BUG!
} else {
    // NO BUG!
}

commit();
```



Key	Value	operator
0	101	127
1	101	127
2	101	127
3	101	127
4	101	128

```
sql = "SELECT * FROM test WHERE entity_id = 1 FOR UPDATE";
ResultSet set = executeQuery(sql);

if (!set.next()) {
    // BUG!
} else {
    // NO BUG!
}

commit();
```

# Problematic Behavior of the selector

```
// Updater
```

```
sql = "UPDATE test SET lastUpdated = 101";
```

```
executeUpdate(sql);
```

```
c.commit();
```

```
// Selector
```

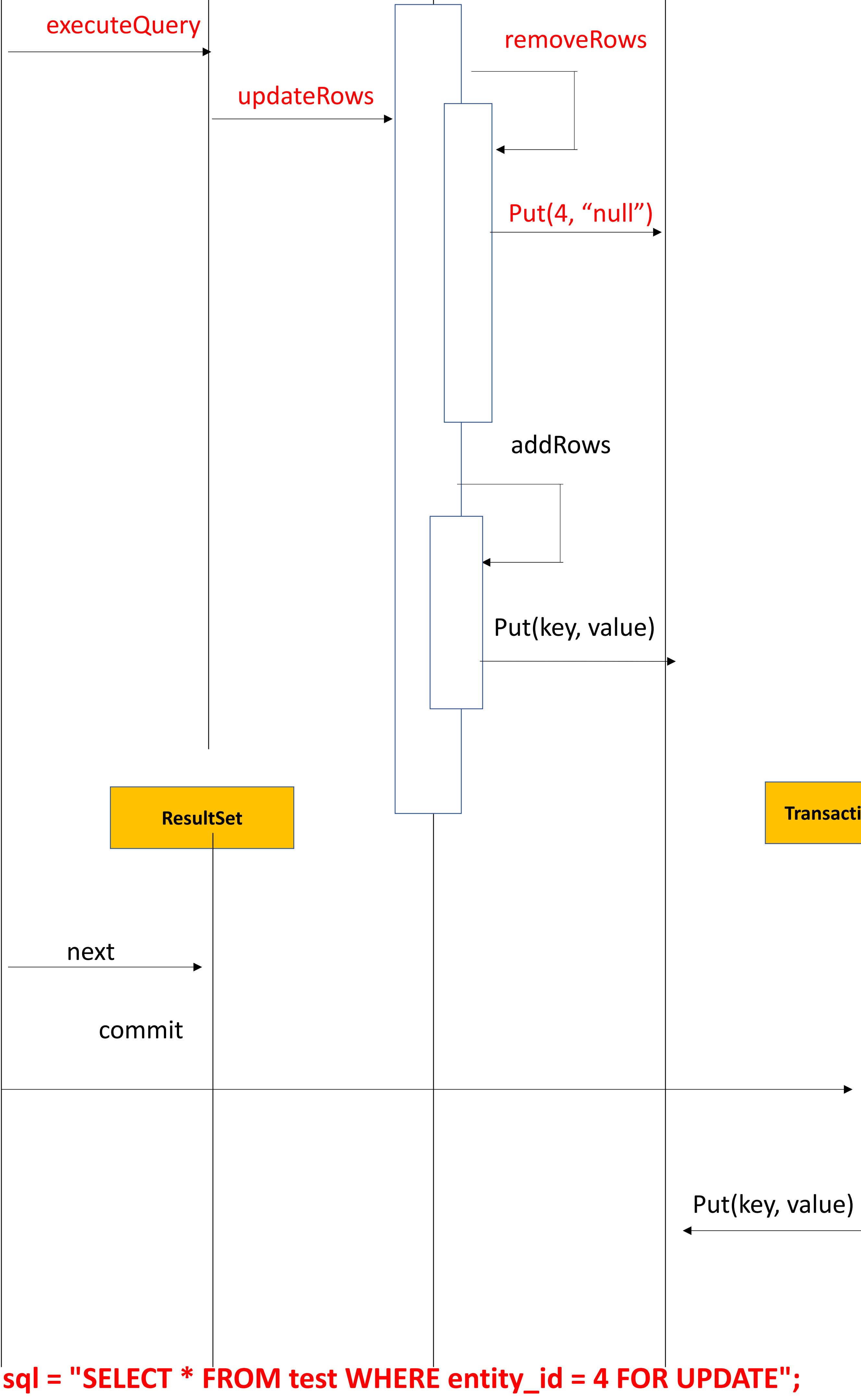
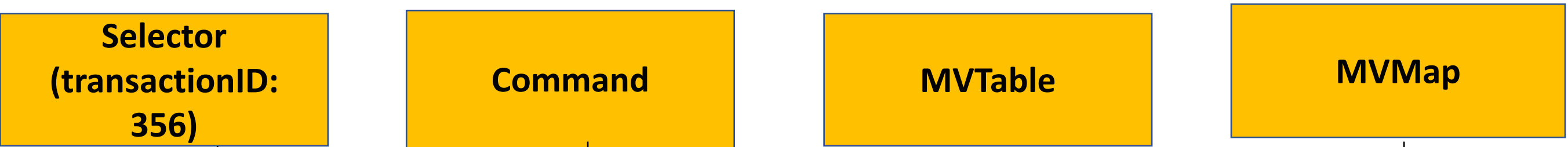
```
sql = "SELECT * FROM test WHERE entity_id = 1 FOR UPDATE";  
ResultSet set = executeQuery(sql);
```

```
if (!set.next()) {
```

```
    // BUG!
```

```
}
```

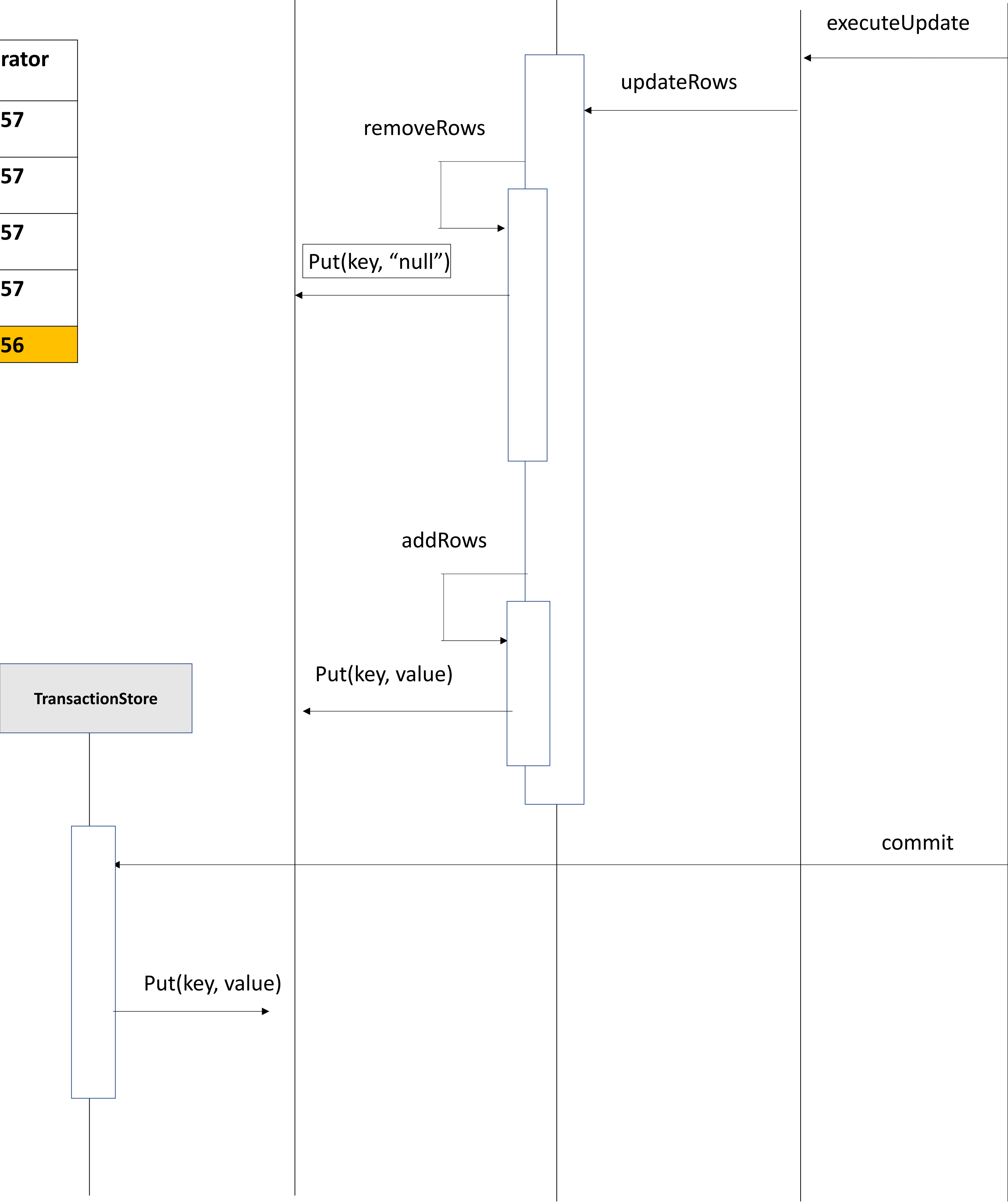
```
commit();
```



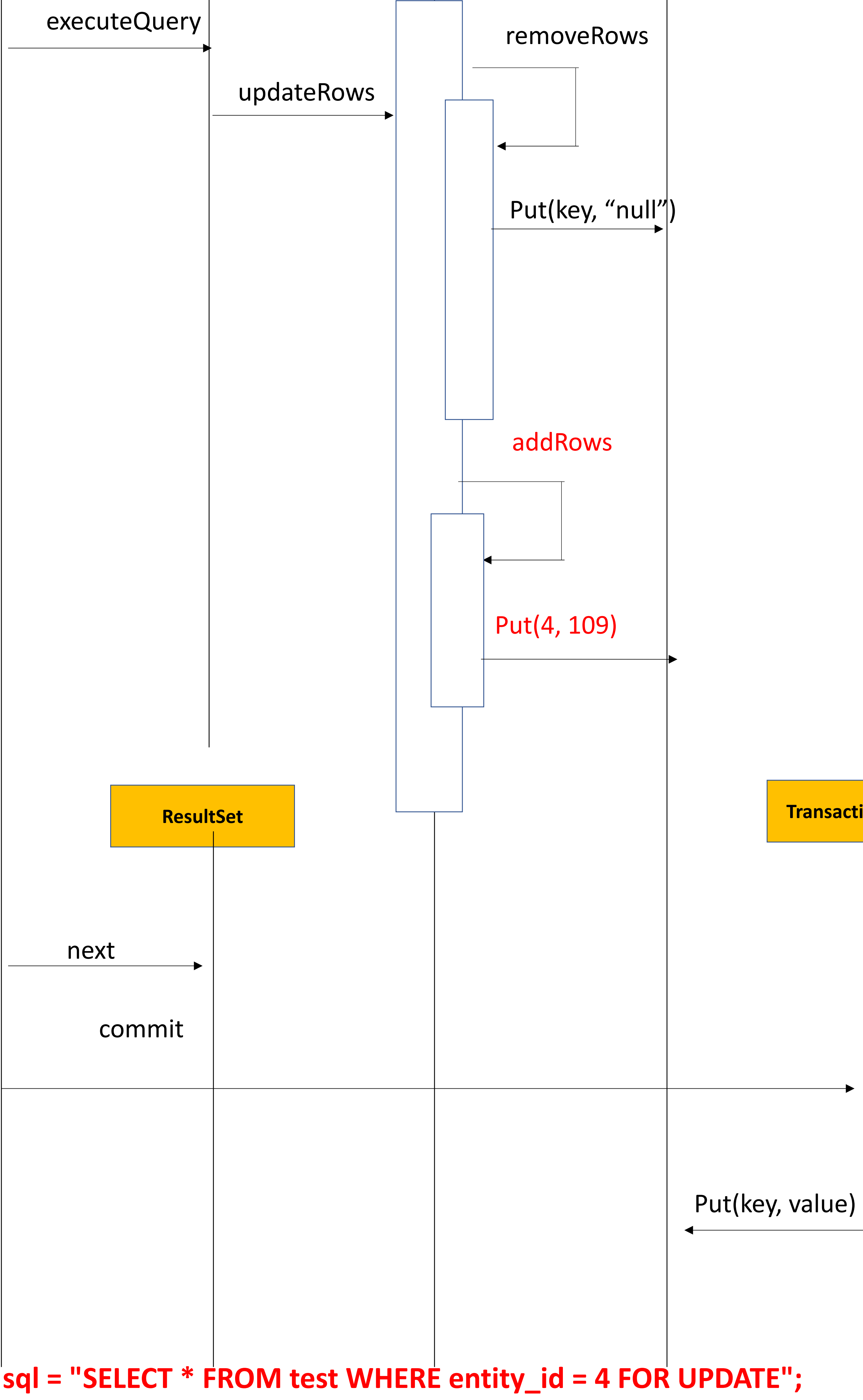
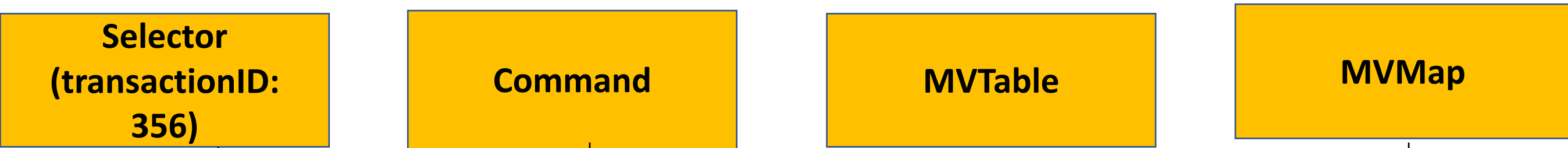
sql = "SELECT \* FROM test WHERE entity\_id = 4 FOR UPDATE";  
ResultSet set = executeQuery(sql);

```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

Key	Value	operator
0	109	357
1	109	357
2	109	357
3	109	357
4	null	356



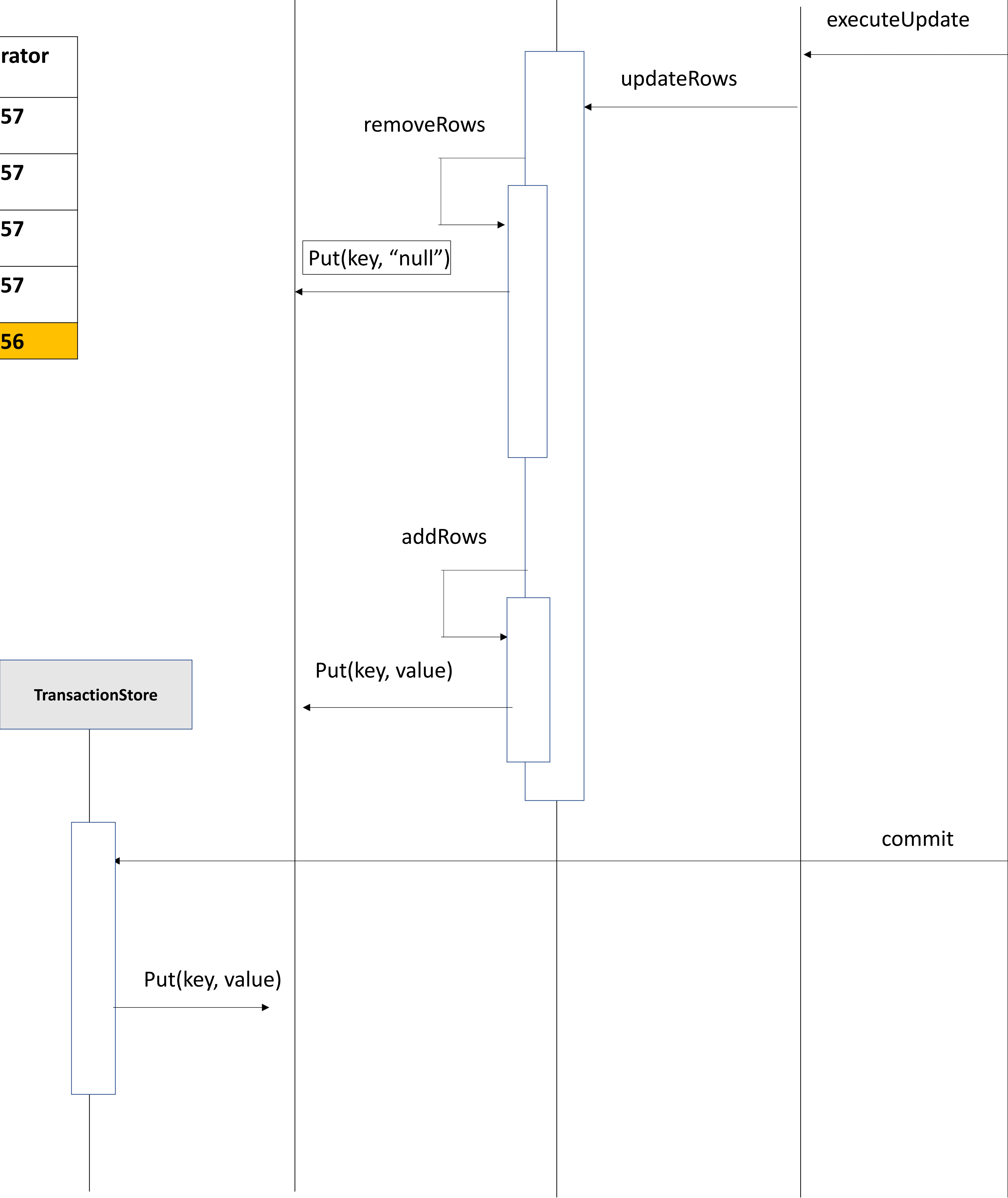
sql = "UPDATE test SET lastUpdated = 101");  
  
executeUpdate(sql);  
  
c.commit();



sql = "SELECT \* FROM test WHERE entity\_id = 4 FOR UPDATE";  
ResultSet set = executeQuery(sql);

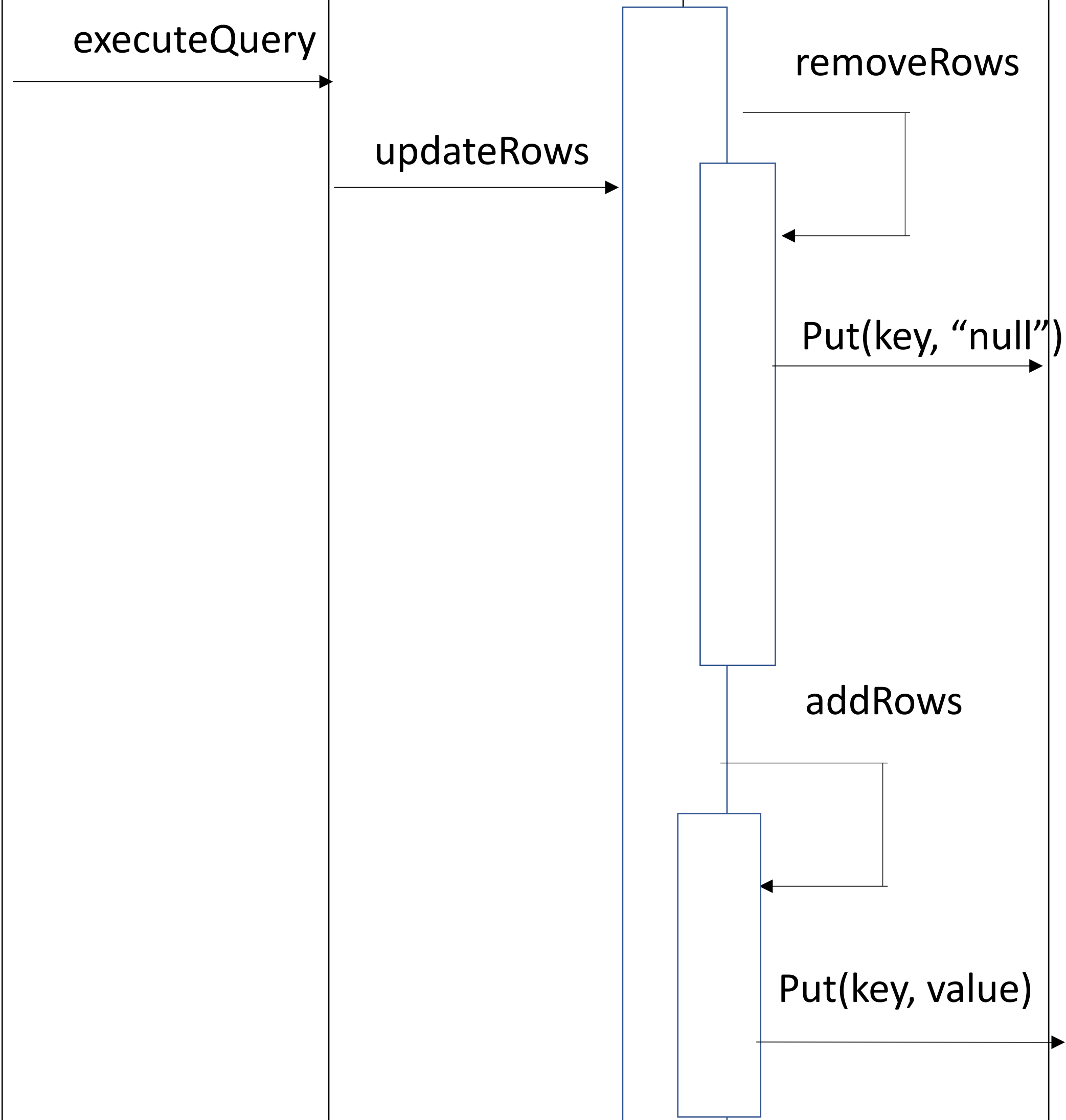
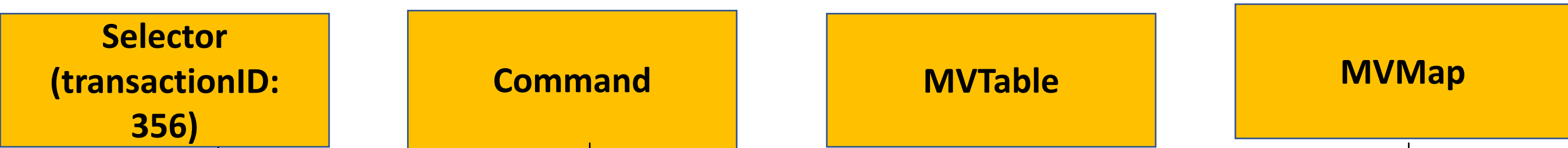
```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

Key	Value	operator
0	109	357
1	109	357
2	109	357
3	109	357
4	109	356



```
sql = "UPDATE test SET lastUpdated = 101");  
  
executeUpdate(sql);  
  
c.commit();
```



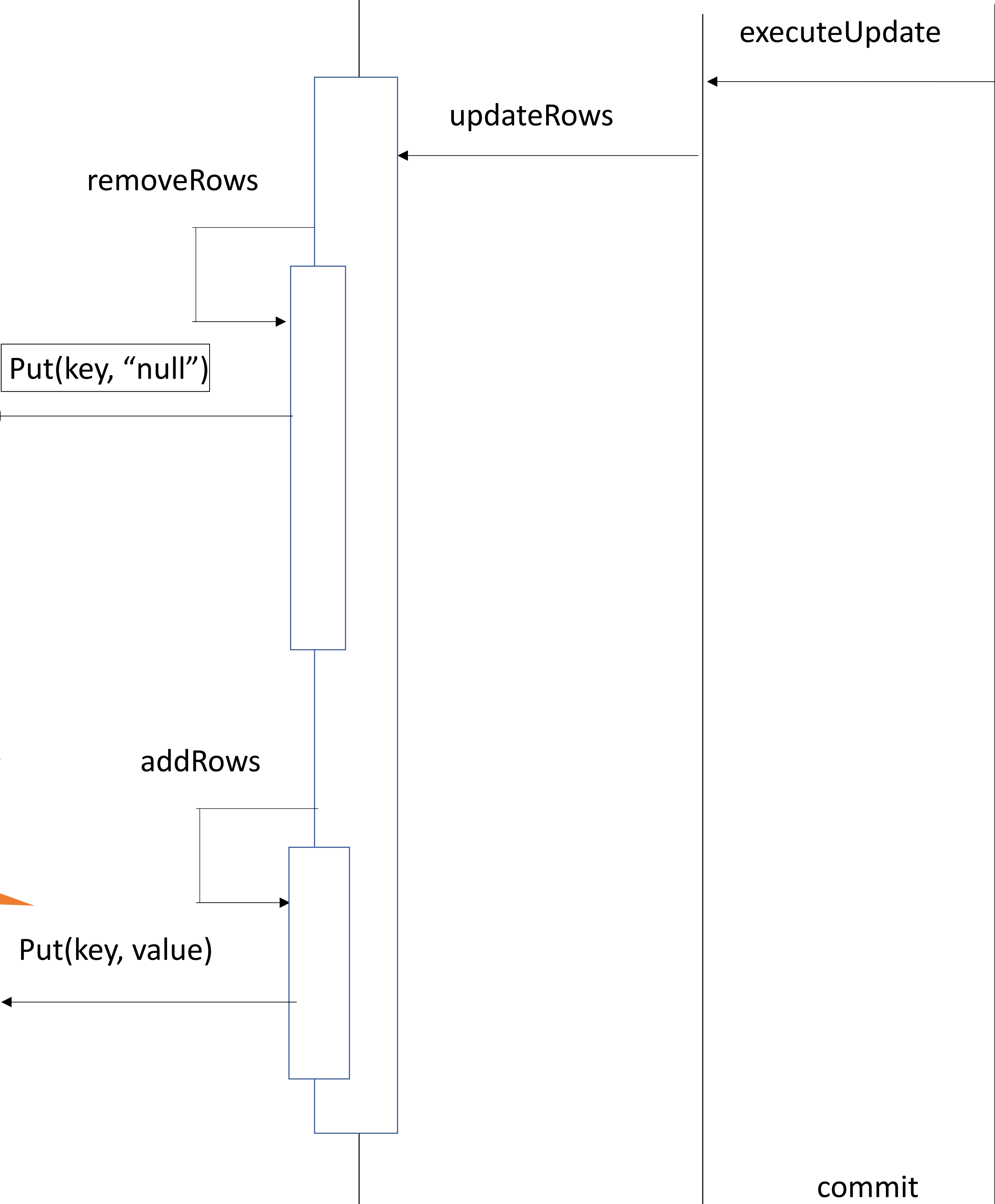
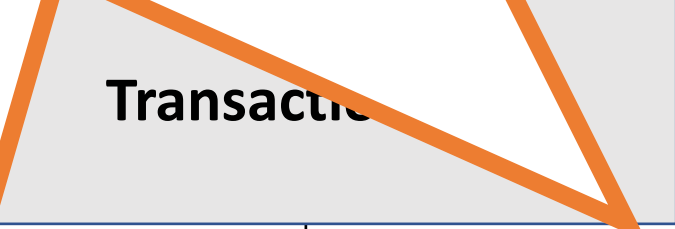


sql = "SELECT \* FROM test WHERE entity\_id = 4 FOR UPDATE";  
ResultSet set = executeQuery(sql);

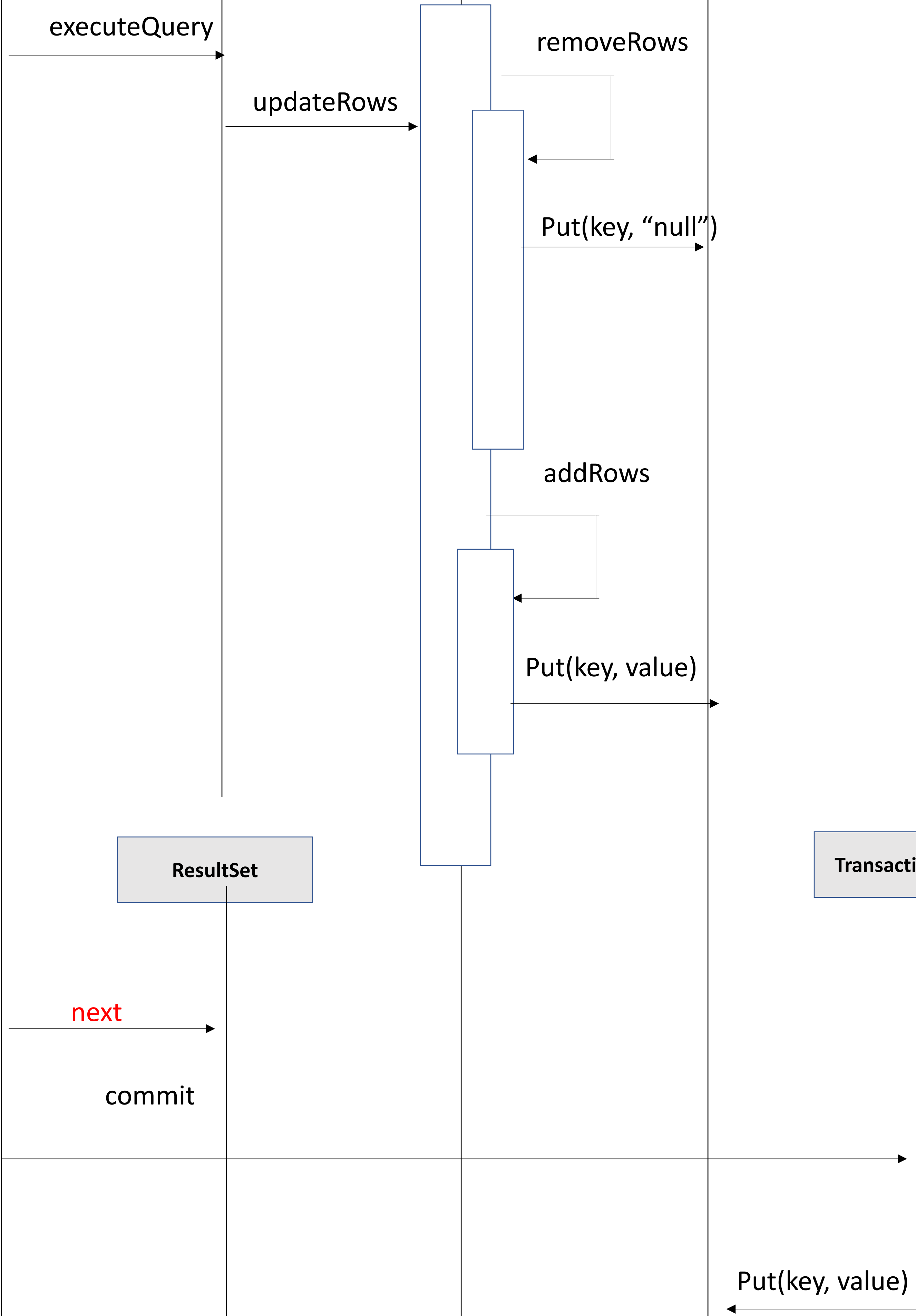
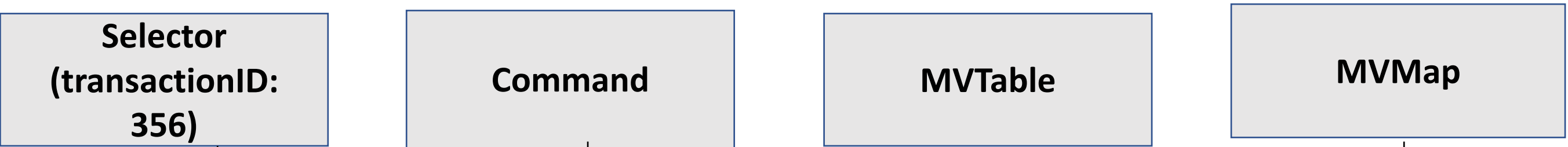
```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

Key	Value	operator
0	109	357
1	109	357
2	109	357
3	109	357
4	109	356

Row for key 4 will be  
returned. Good!



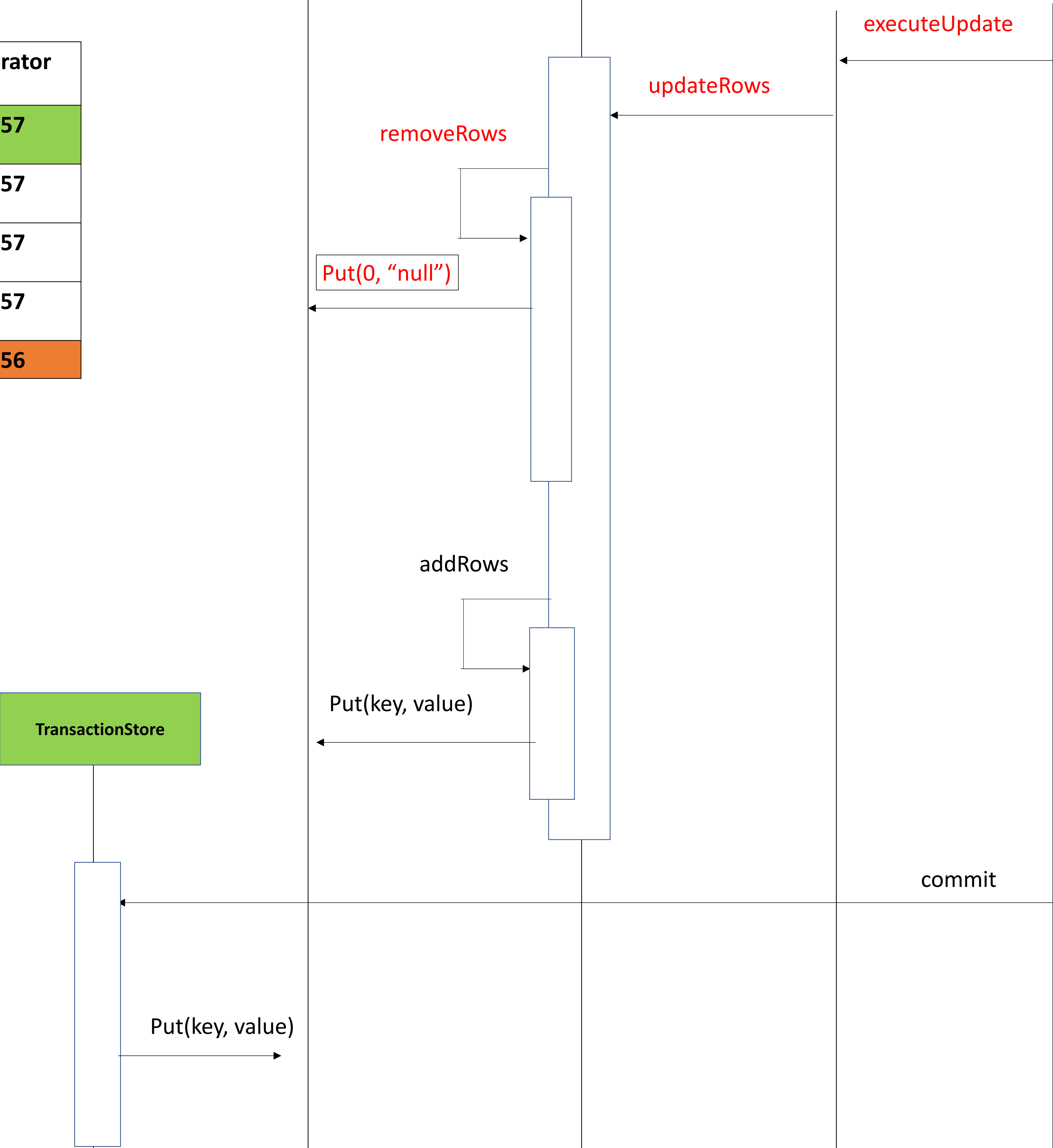
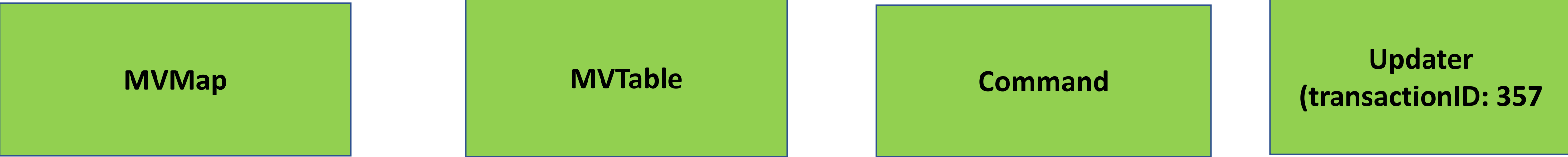
```
sql = "UPDATE test SET lastUpdated = 101");  
  
executeUpdate(sql);  
  
c.commit();
```



sql = "SELECT \* FROM test WHERE entity\_id = 4 FOR UPDATE";  
ResultSet set = executeQuery(sql);

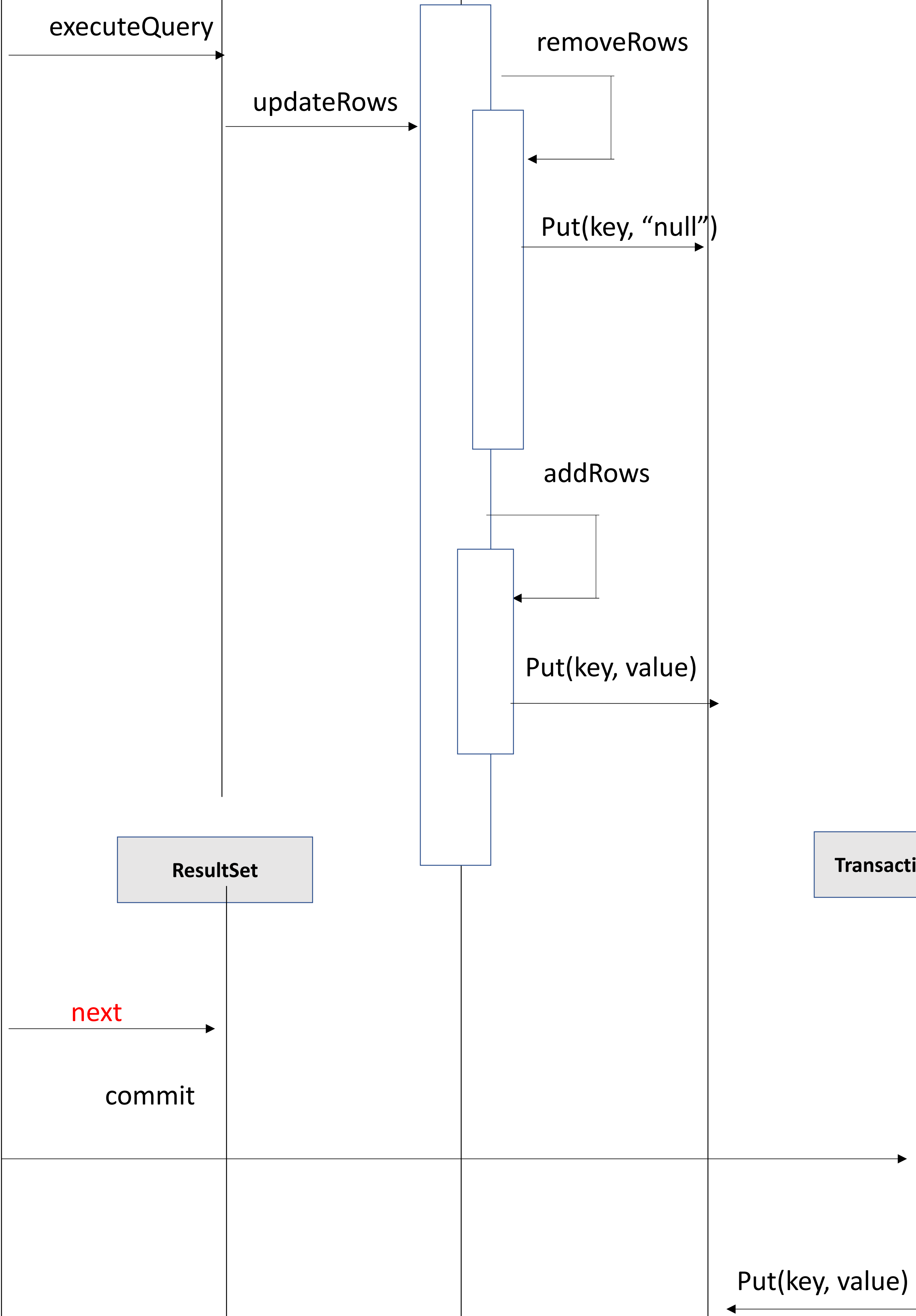
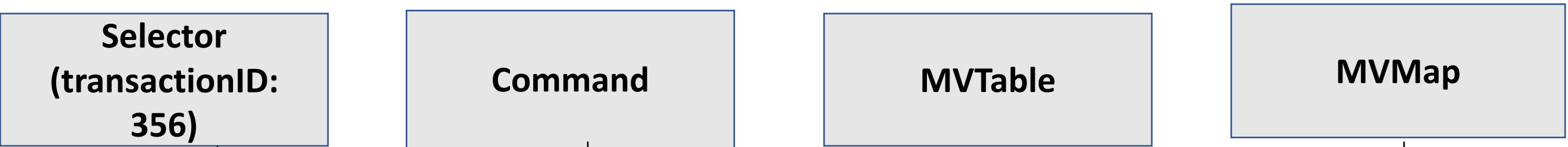
```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

Key	Value	operator
0	null	357
1	109	357
2	109	357
3	109	357
4	109	356



```
sql = "UPDATE test SET lastUpdated = 101");  
executeUpdate(sql);  
c.commit();
```

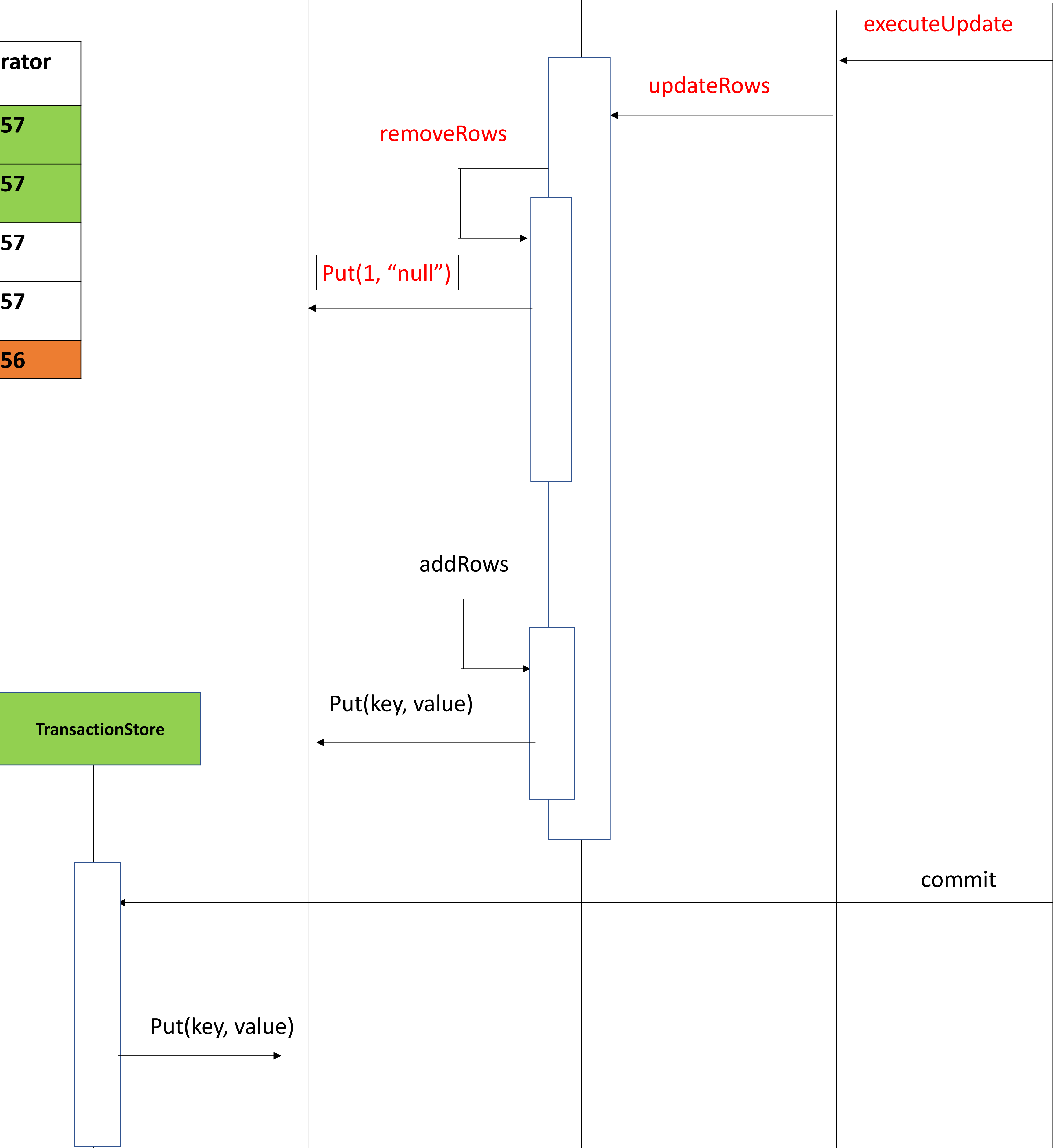
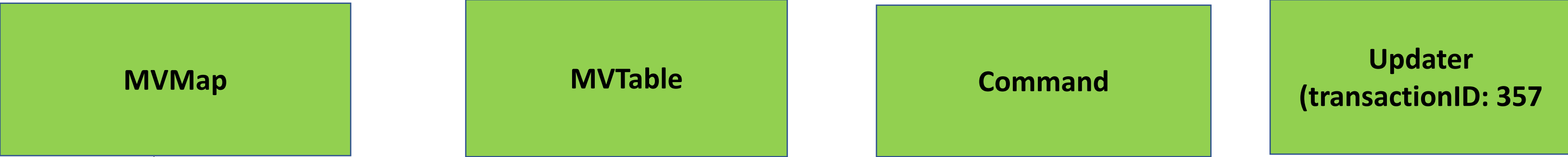




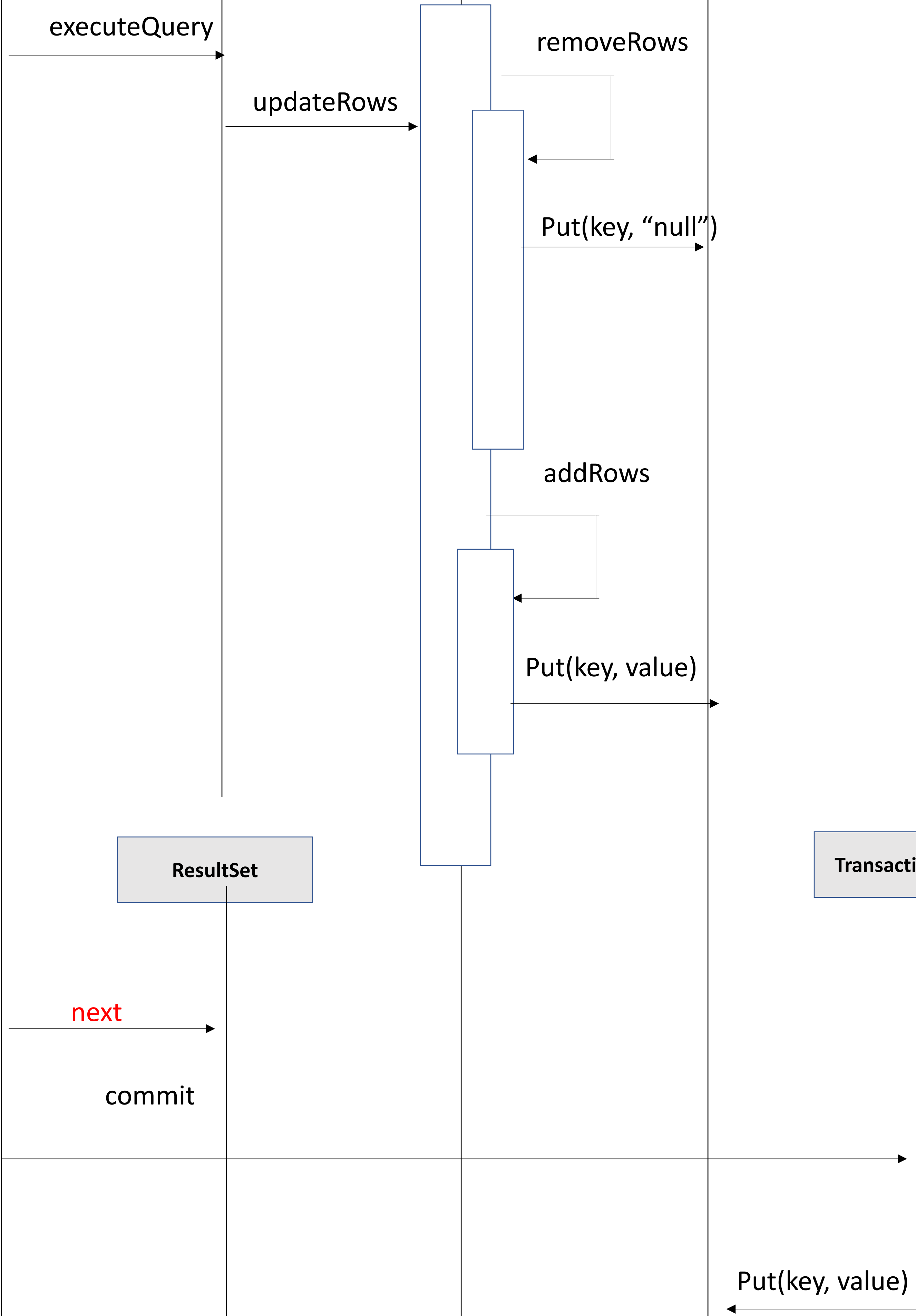
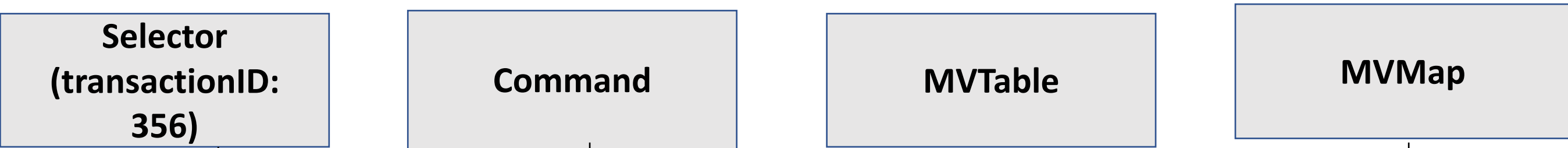
Key	Value	operator
0	null	357
1	null	357
2	109	357
3	109	357
4	109	356

sql = "SELECT \* FROM test WHERE entity\_id = 4 FOR UPDATE";  
ResultSet set = executeQuery(sql);

```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```



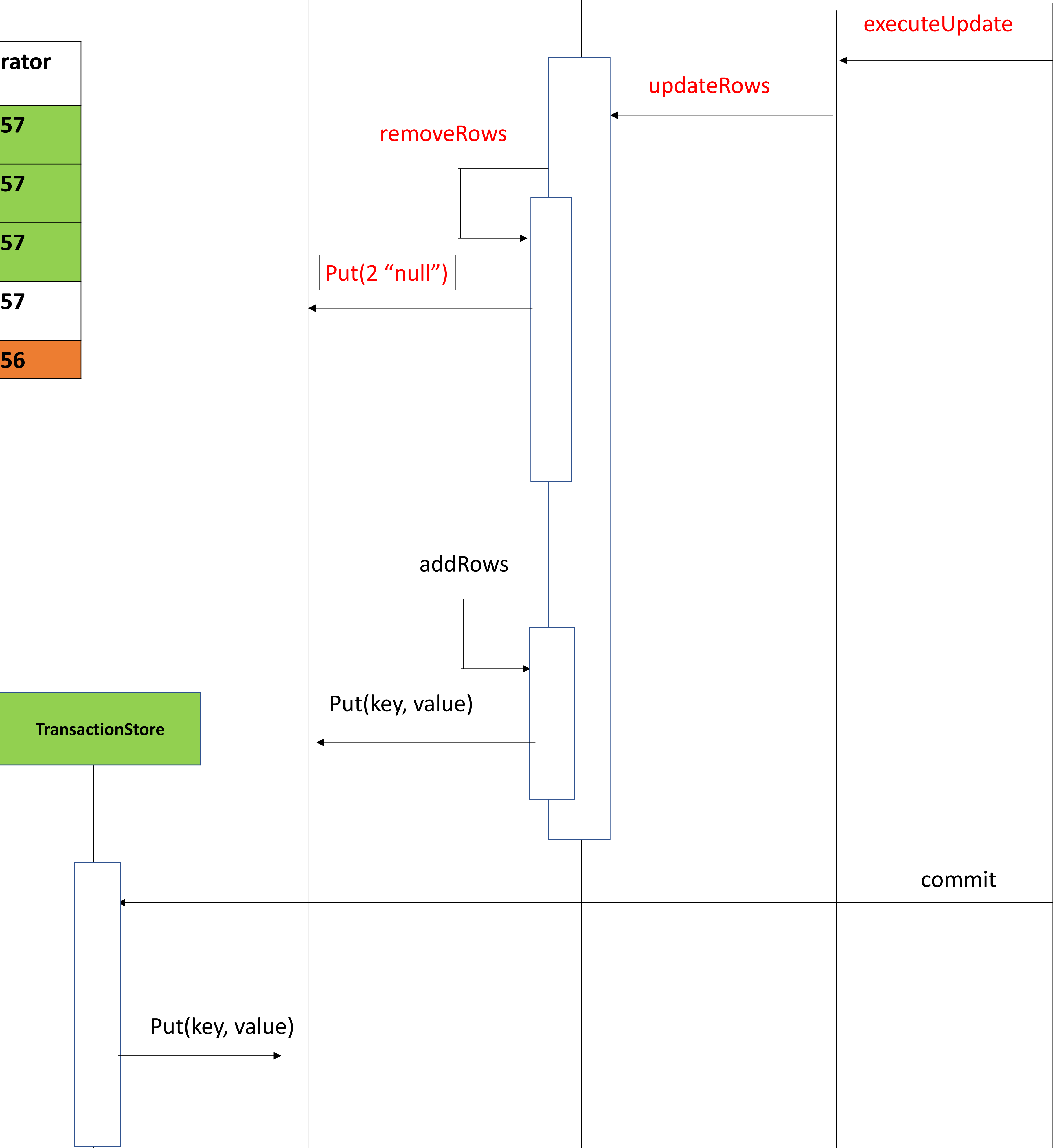
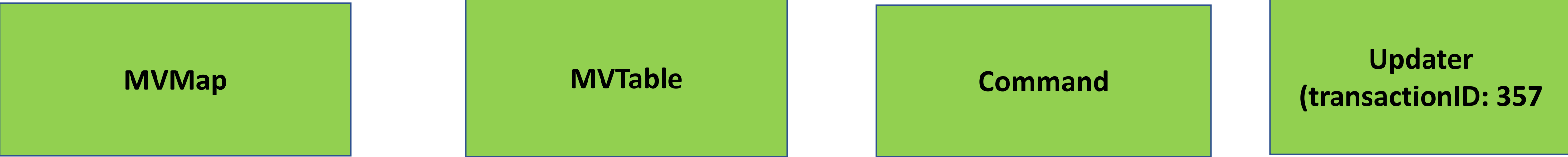
```
sql = "UPDATE test SET lastUpdated = 101");  
executeUpdate(sql);  
c.commit();
```



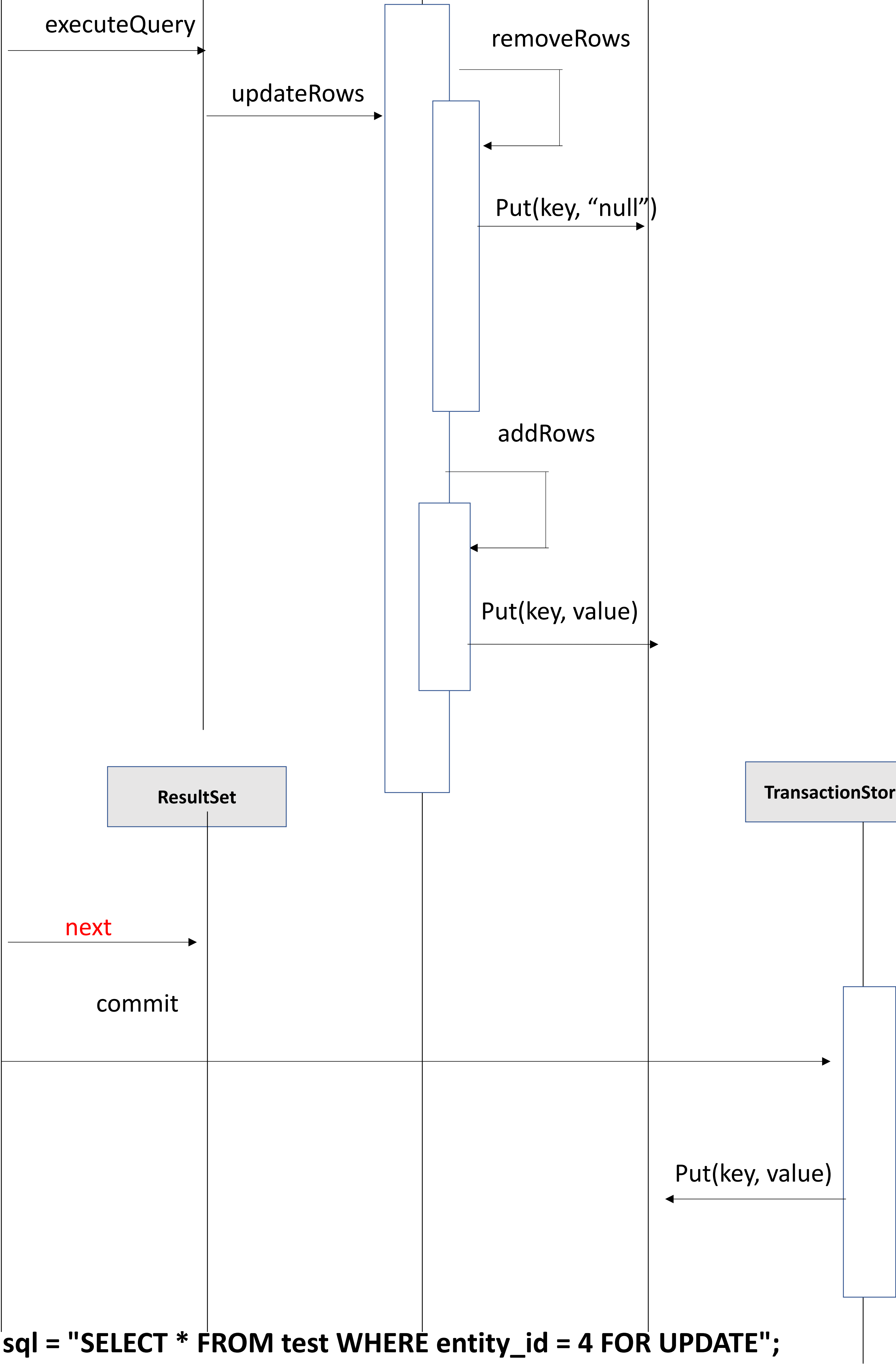
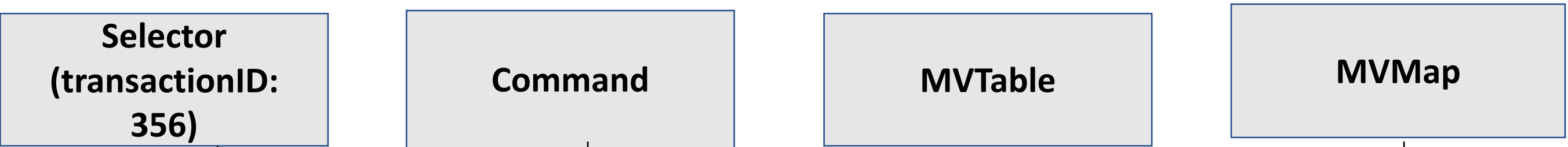
Key	Value	operator
0	null	357
1	null	357
2	null	357
3	109	357
4	109	356

sql = "SELECT \* FROM test WHERE entity\_id = 4 FOR UPDATE";  
ResultSet set = executeQuery(sql);

```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```



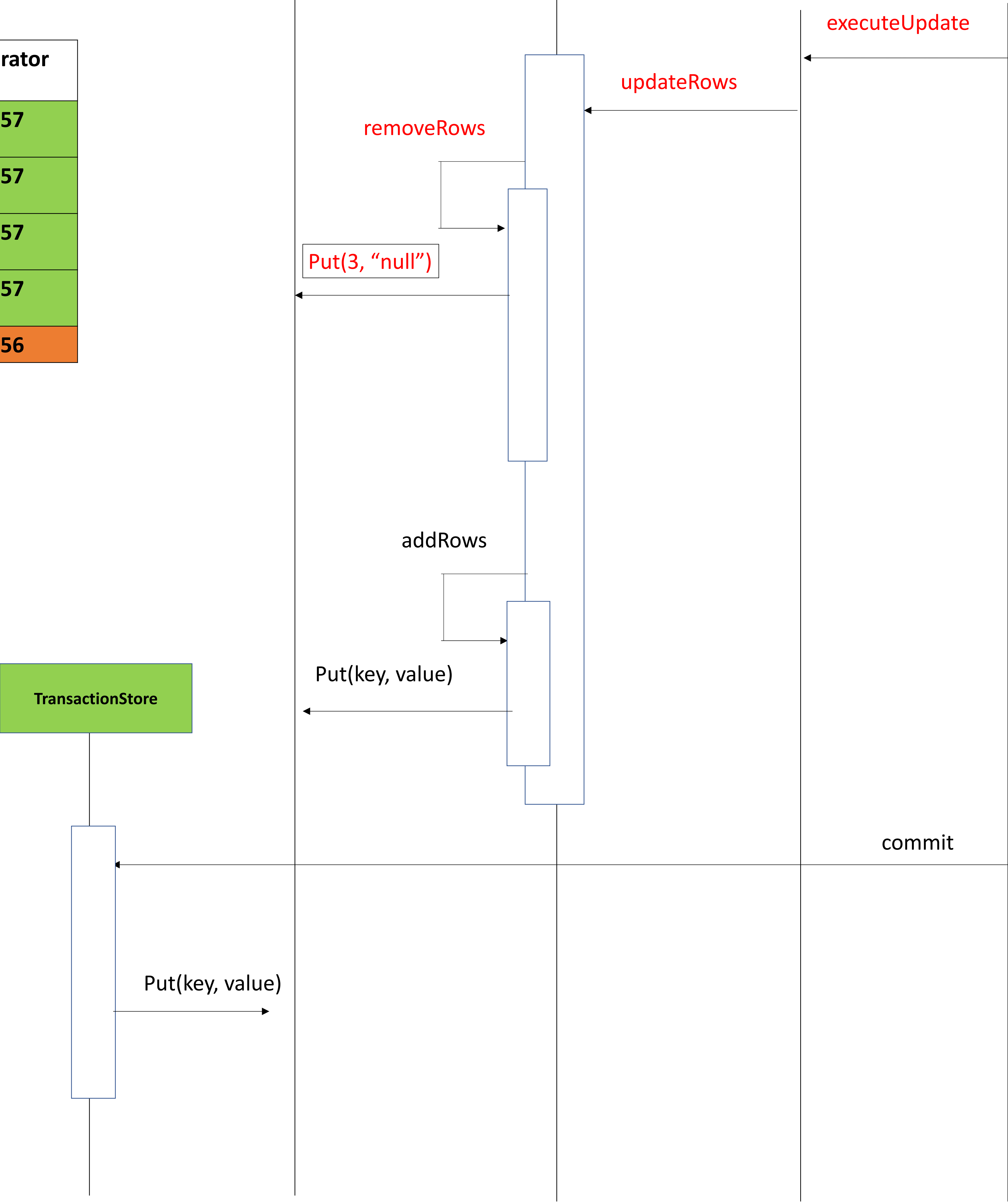
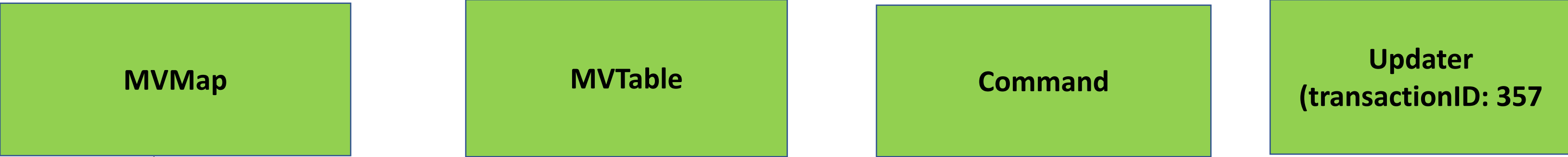
```
sql = "UPDATE test SET lastUpdated = 101");  
executeUpdate(sql);  
c.commit();
```



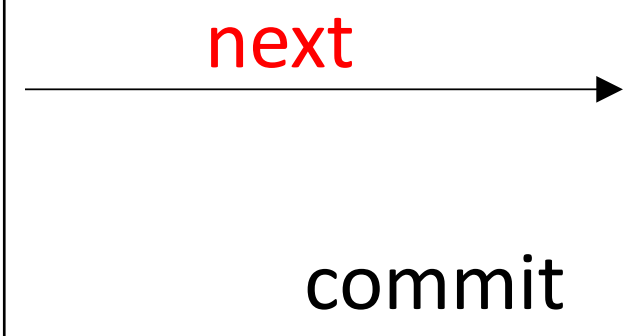
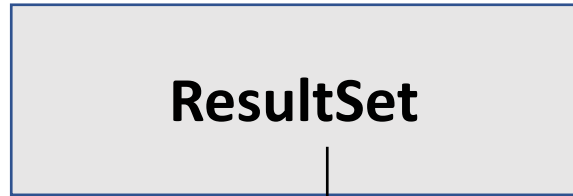
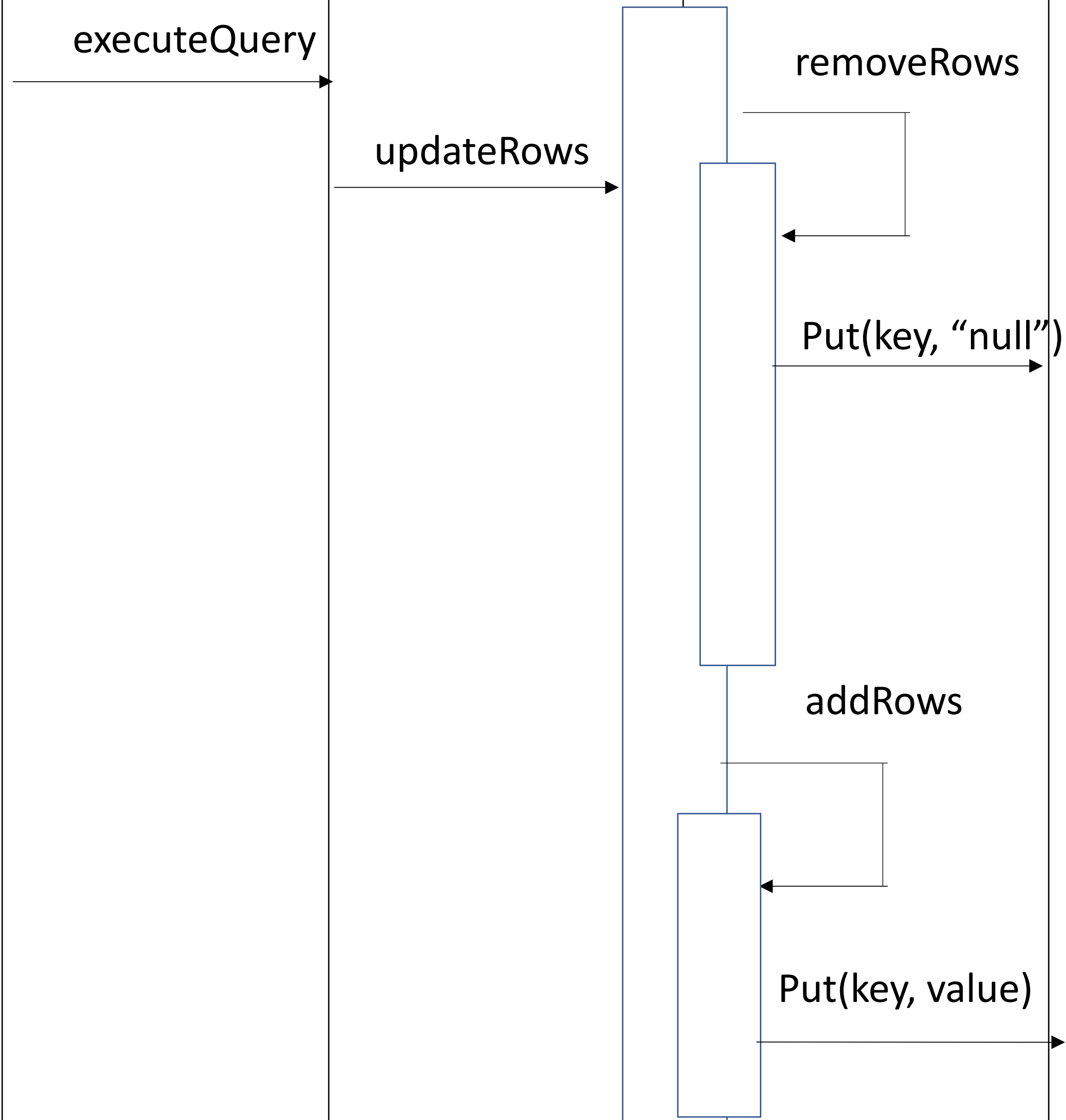
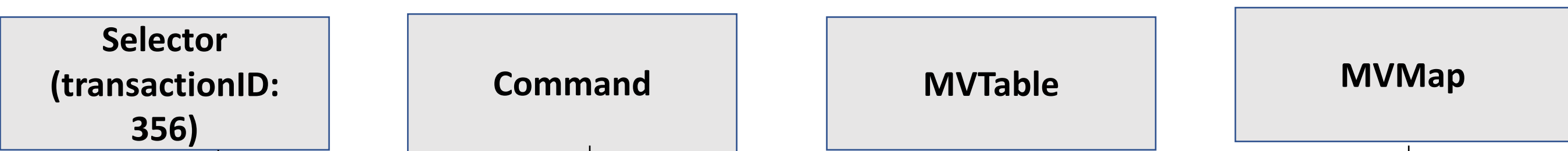
sql = "SELECT \* FROM test WHERE entity\_id = 4 FOR UPDATE";  
ResultSet set = executeQuery(sql);

```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

Key	Value	operator
0	null	357
1	null	357
2	null	357
3	null	357
4	109	356



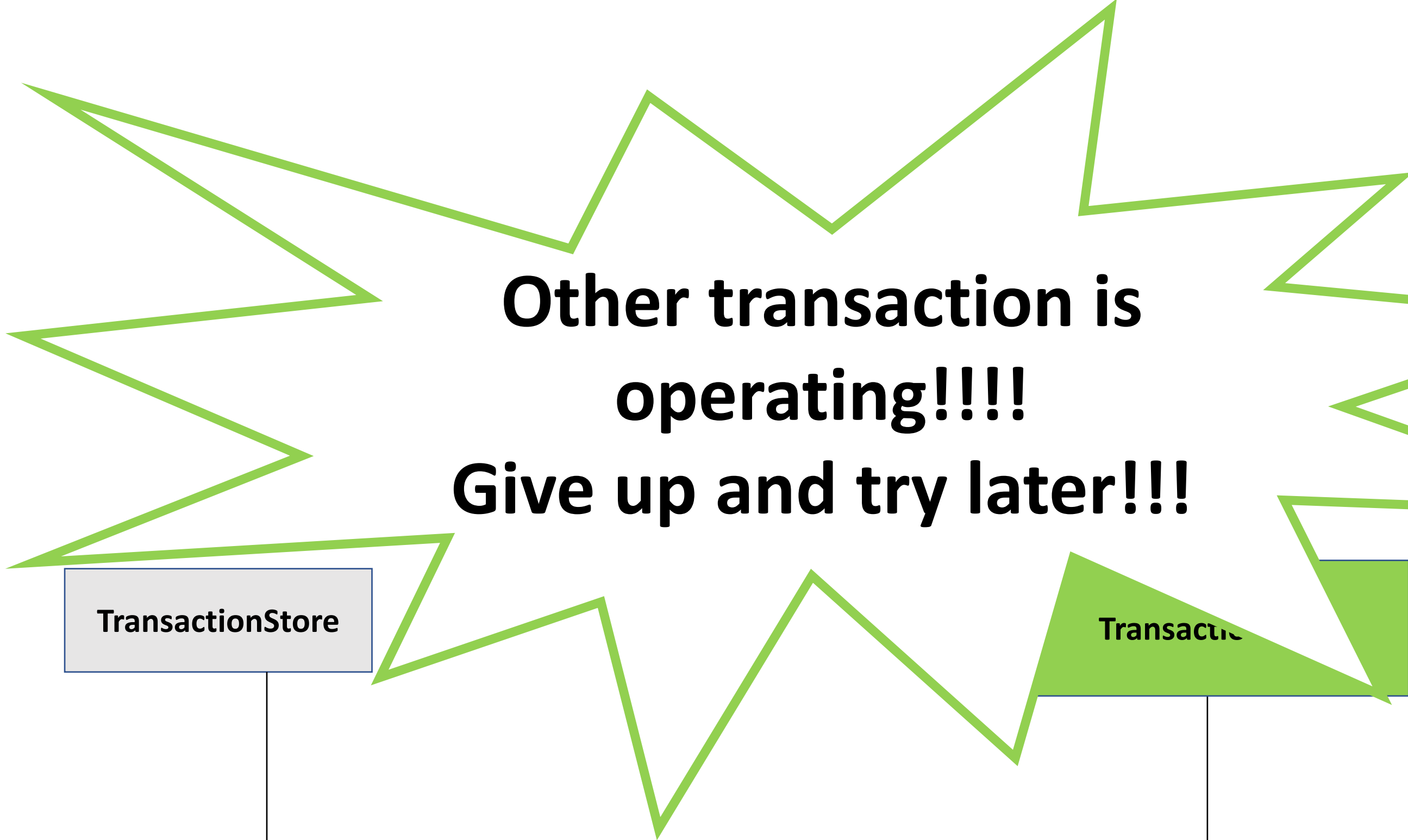
```
sql = "UPDATE test SET lastUpdated = 101");  
executeUpdate(sql);  
c.commit();
```



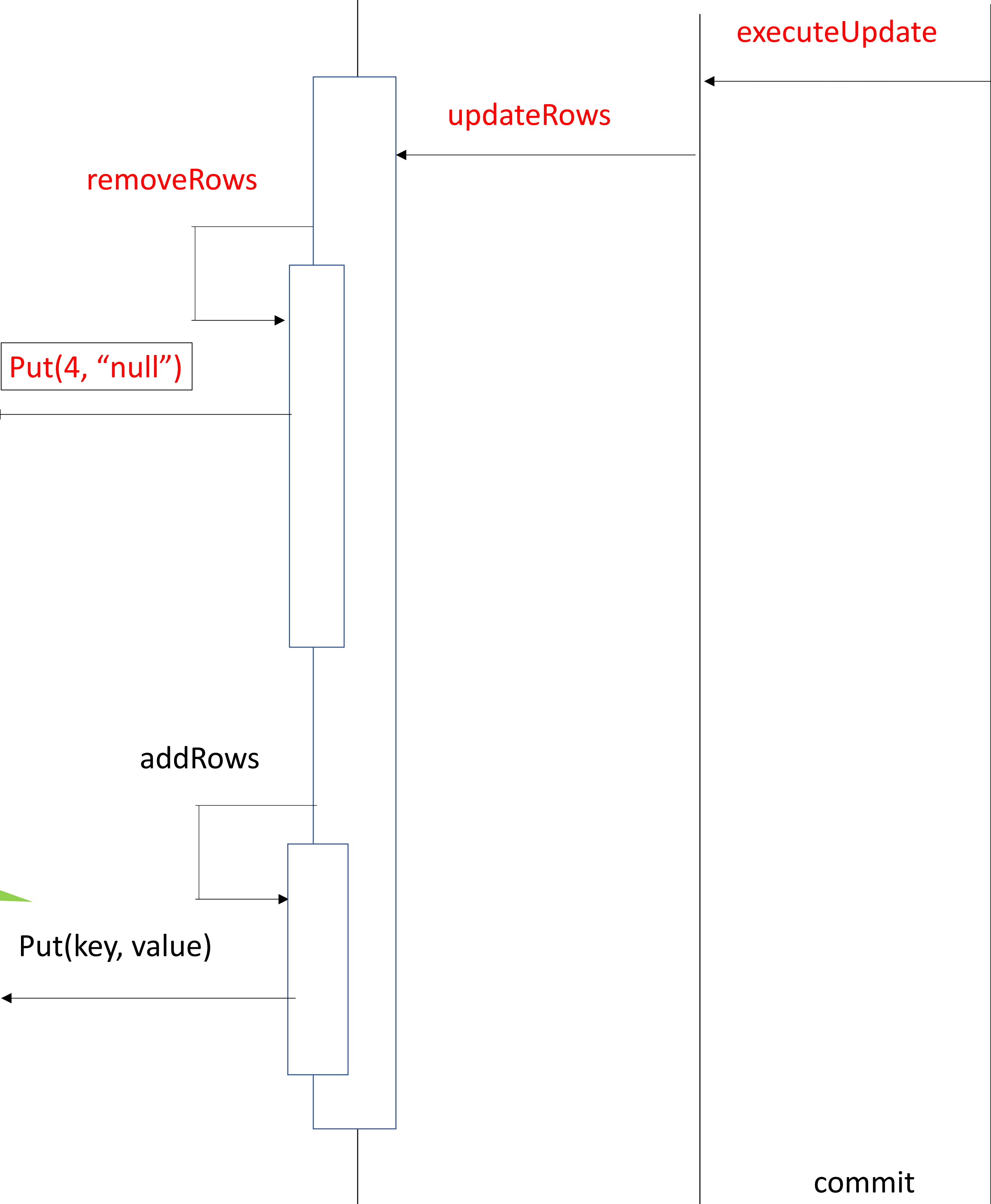
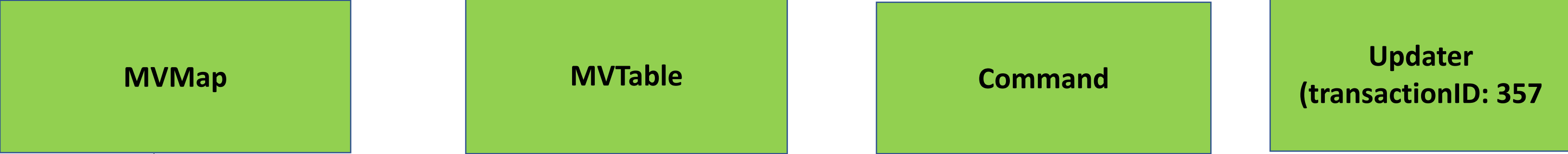
sql = "SELECT \* FROM test WHERE entity\_id = 4 FOR UPDATE";  
ResultSet set = executeQuery(sql);

```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

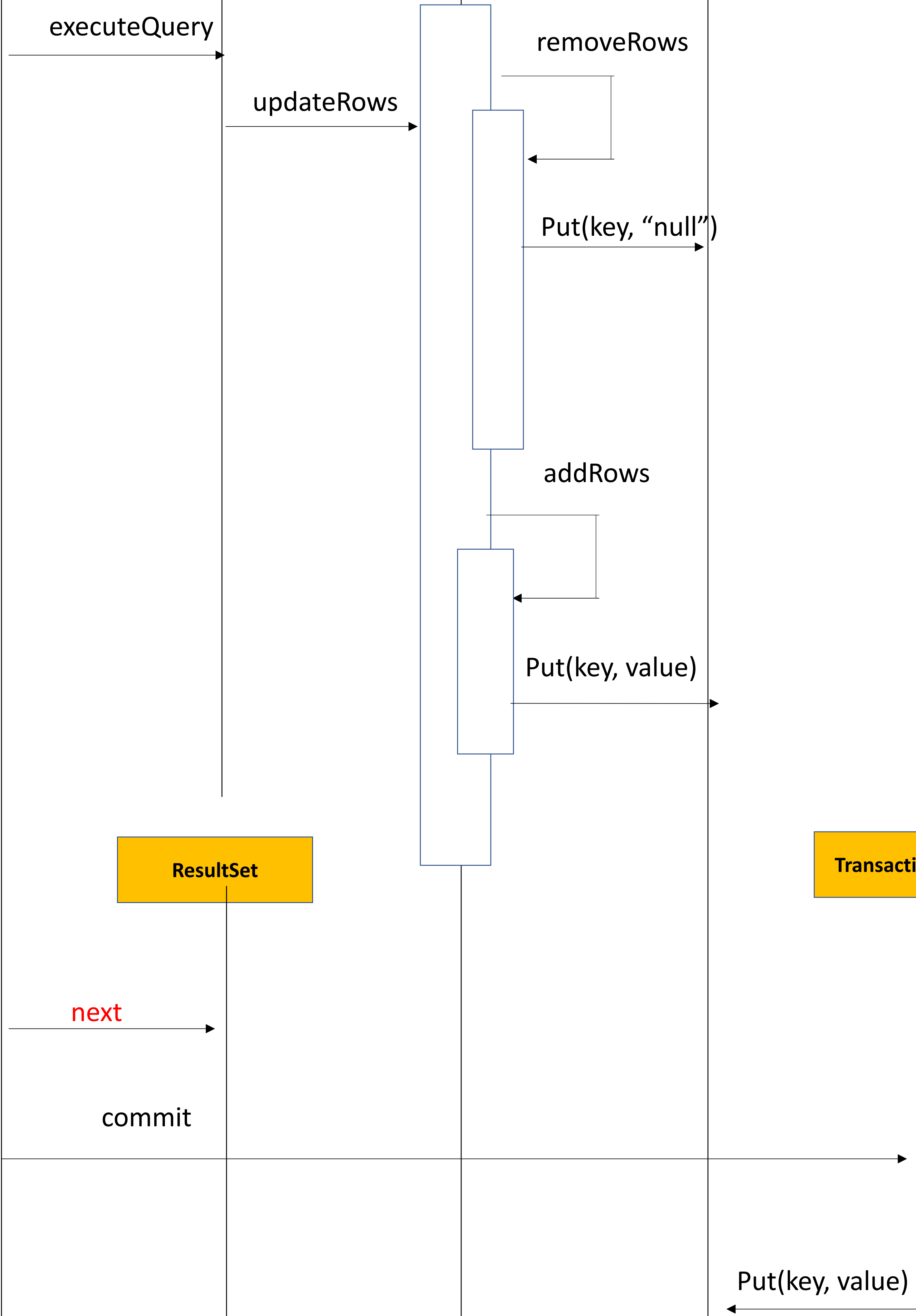
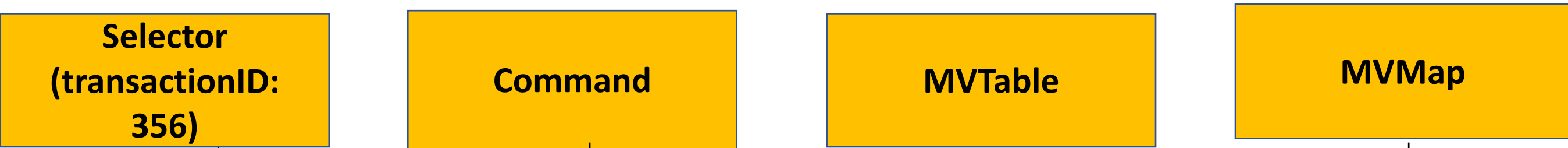
Key	Value	operator
0	null	357
1	null	357
2	null	357
3	null	357
4	109	356



Put(key, value)



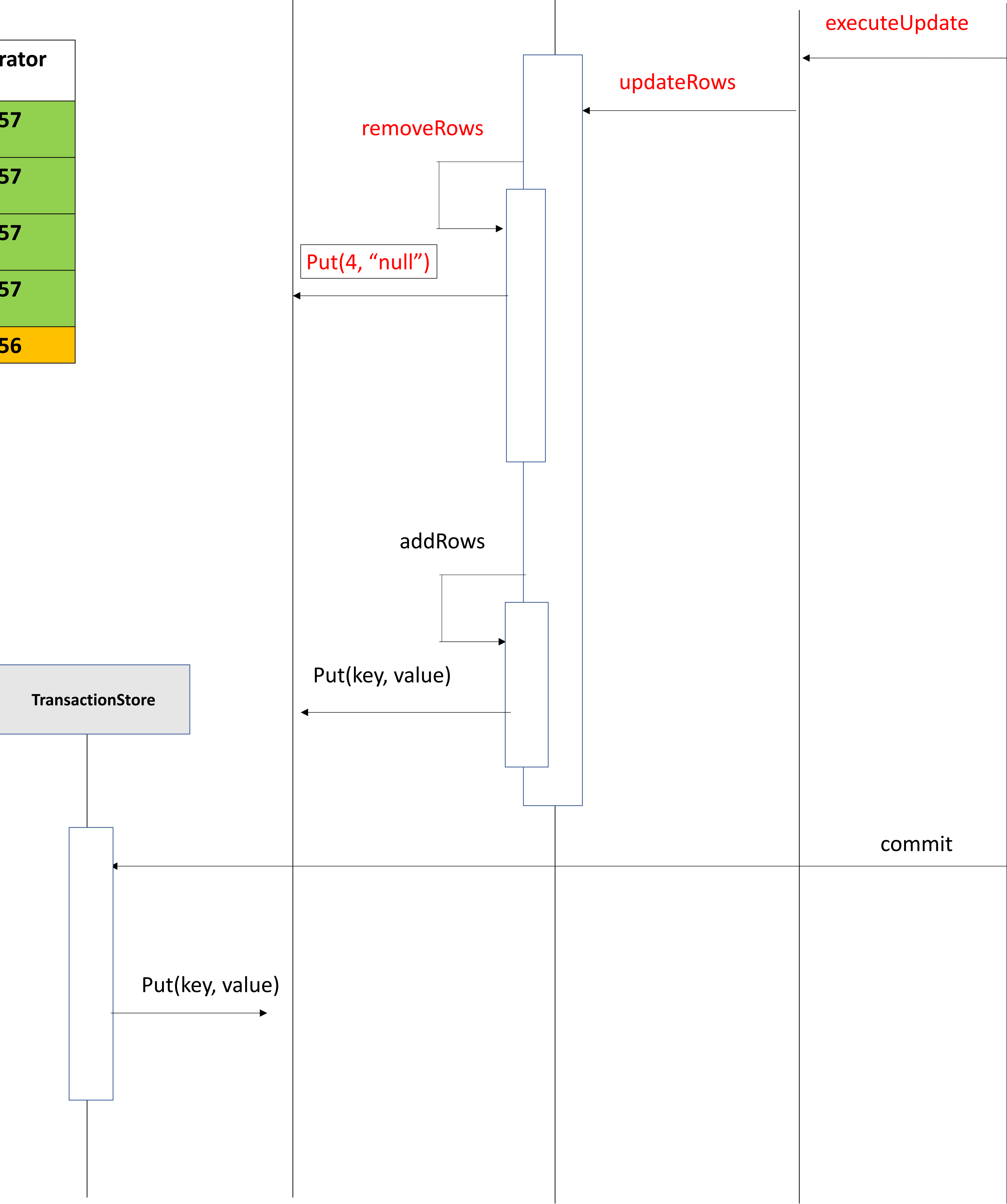
```
sql = "UPDATE test SET lastUpdated = 101");  
executeUpdate(sql);  
c.commit();
```



sql = "SELECT \* FROM test WHERE entity\_id = 4 FOR UPDATE";  
ResultSet set = executeQuery(sql);

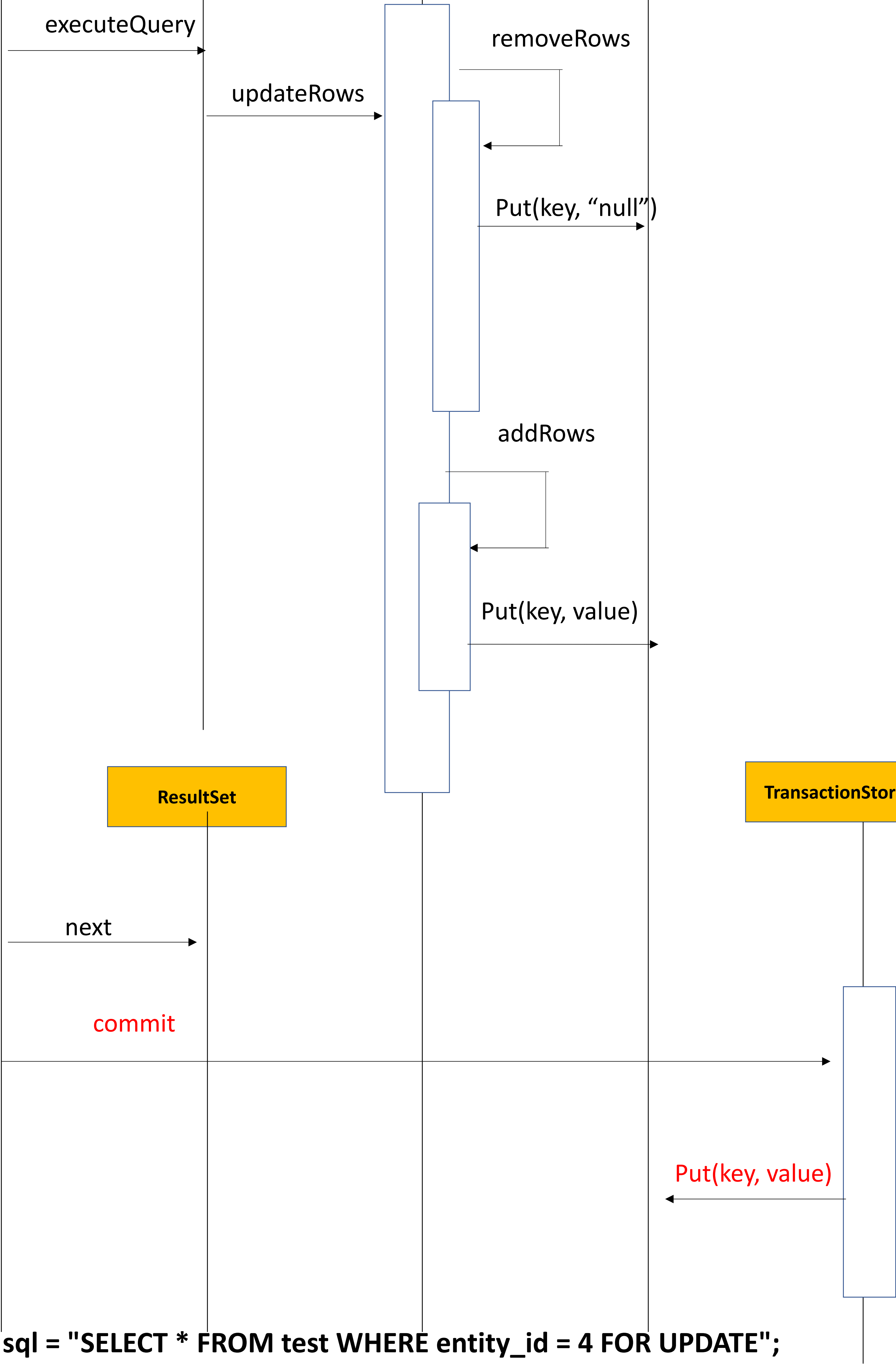
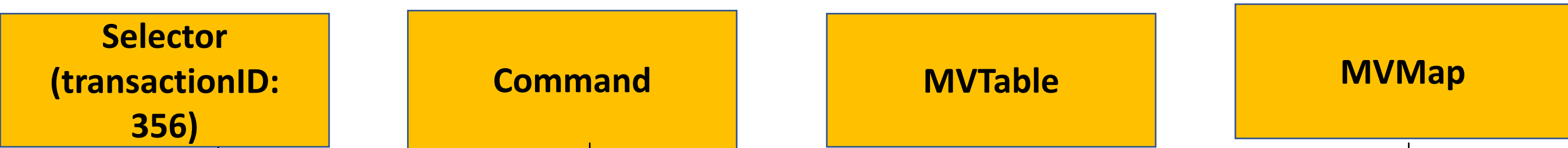
```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

Key	Value	operator
0	null	357
1	null	357
2	null	357
3	null	357
4	109	356



```
sql = "UPDATE test SET lastUpdated = 101");  
executeUpdate(sql);  
c.commit();
```

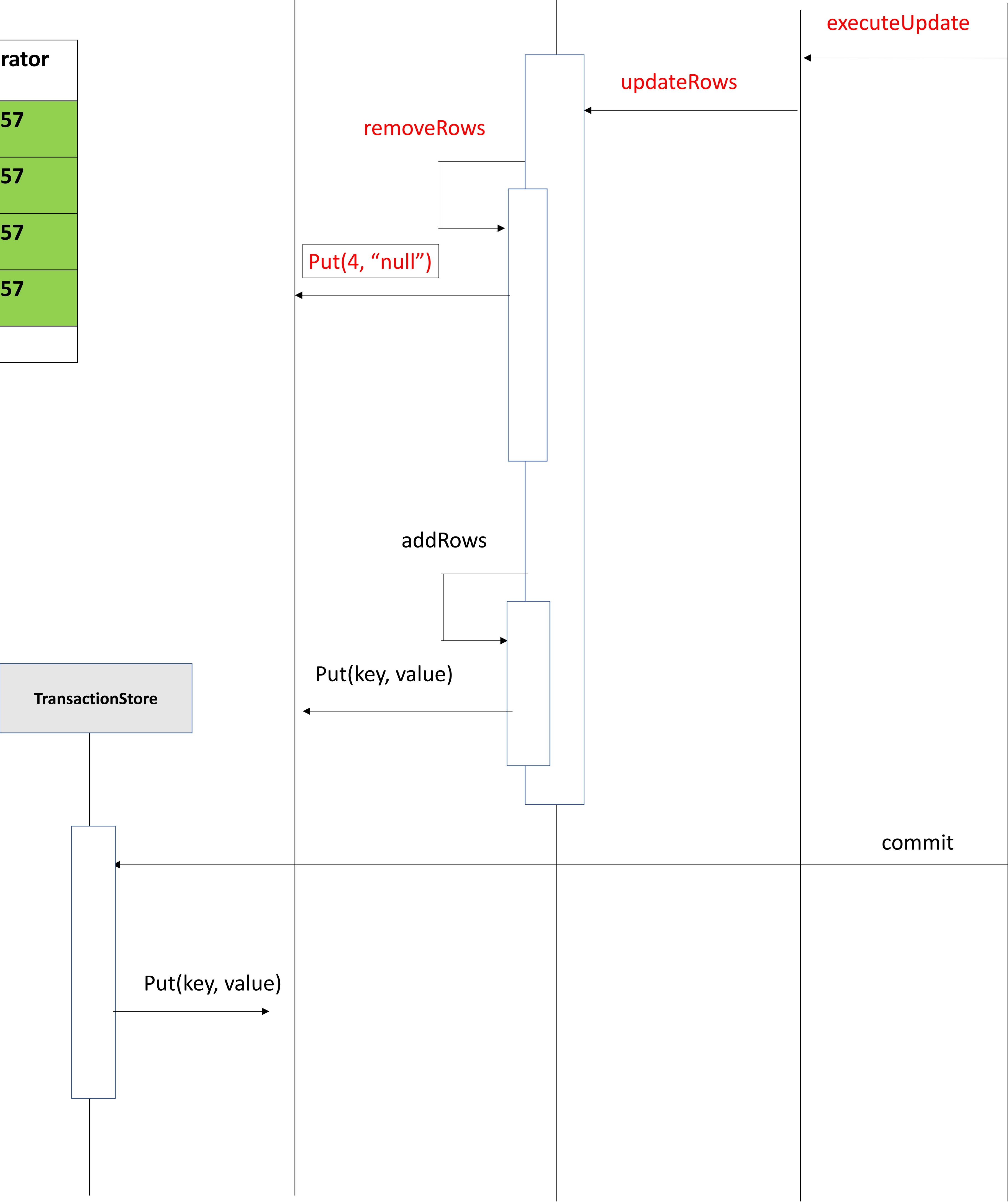




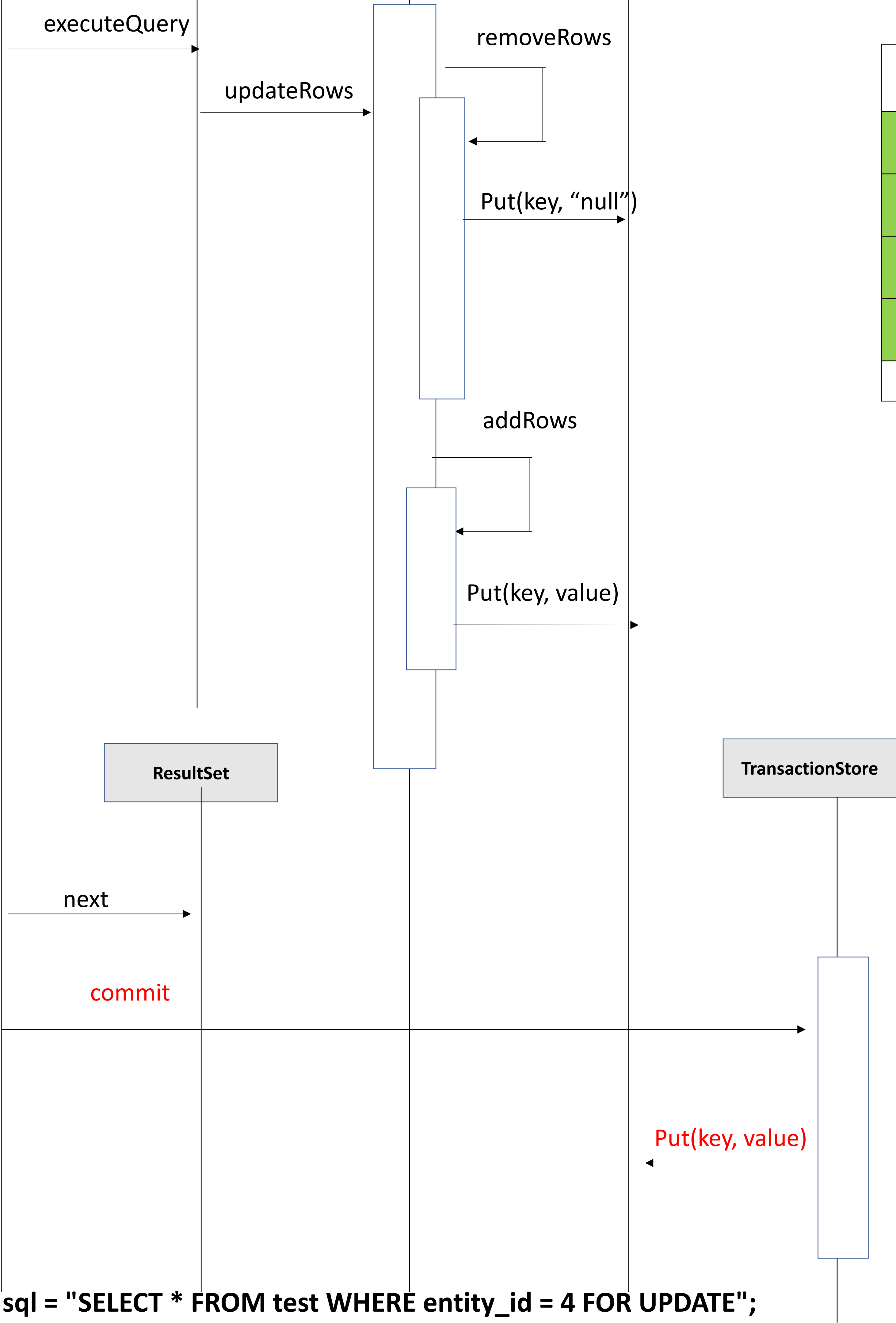
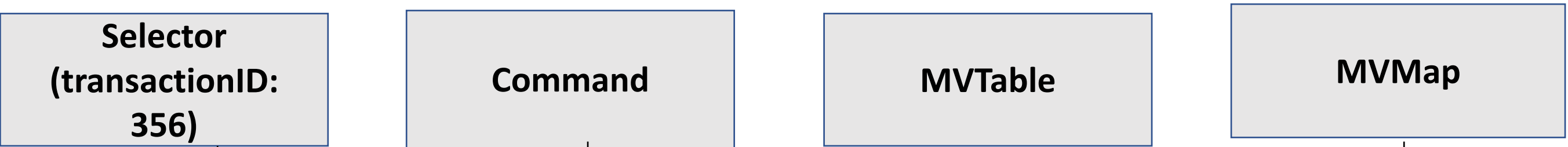
sql = "SELECT \* FROM test WHERE entity\_id = 4 FOR UPDATE";  
ResultSet set = executeQuery(sql);

```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

Key	Value	operator
0	null	357
1	null	357
2	null	357
3	null	357
4	109	



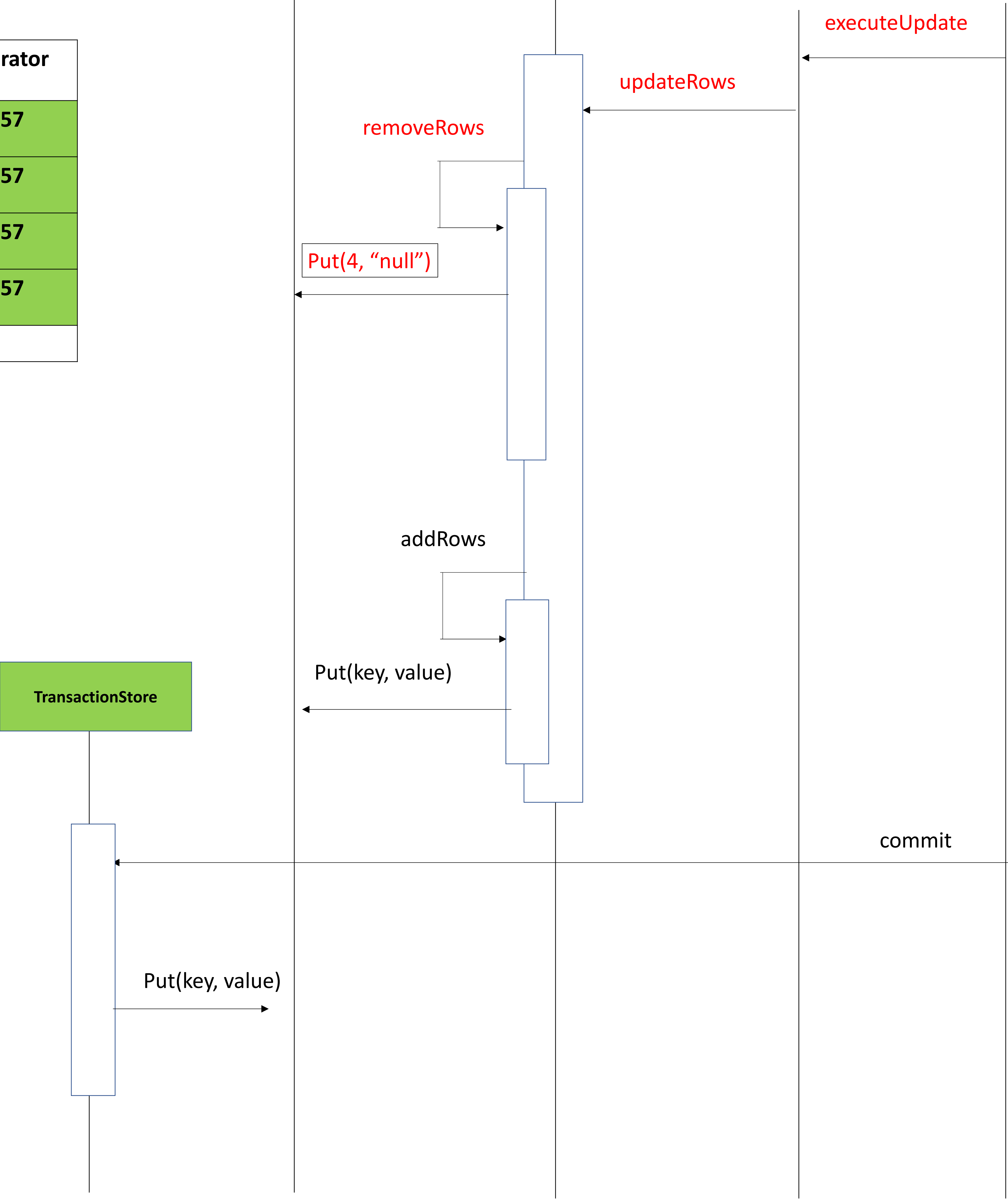
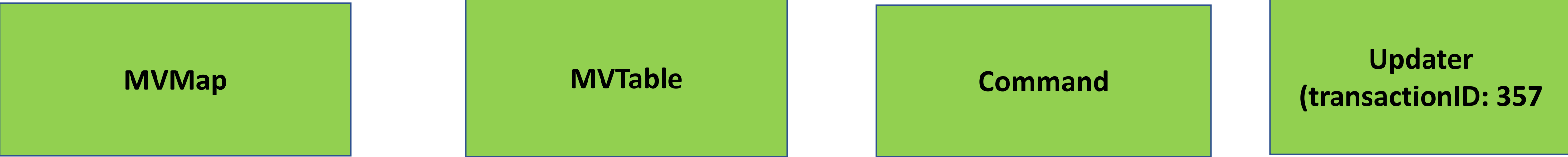
```
sql = "UPDATE test SET lastUpdated = 101");  
executeUpdate(sql);  
c.commit();
```



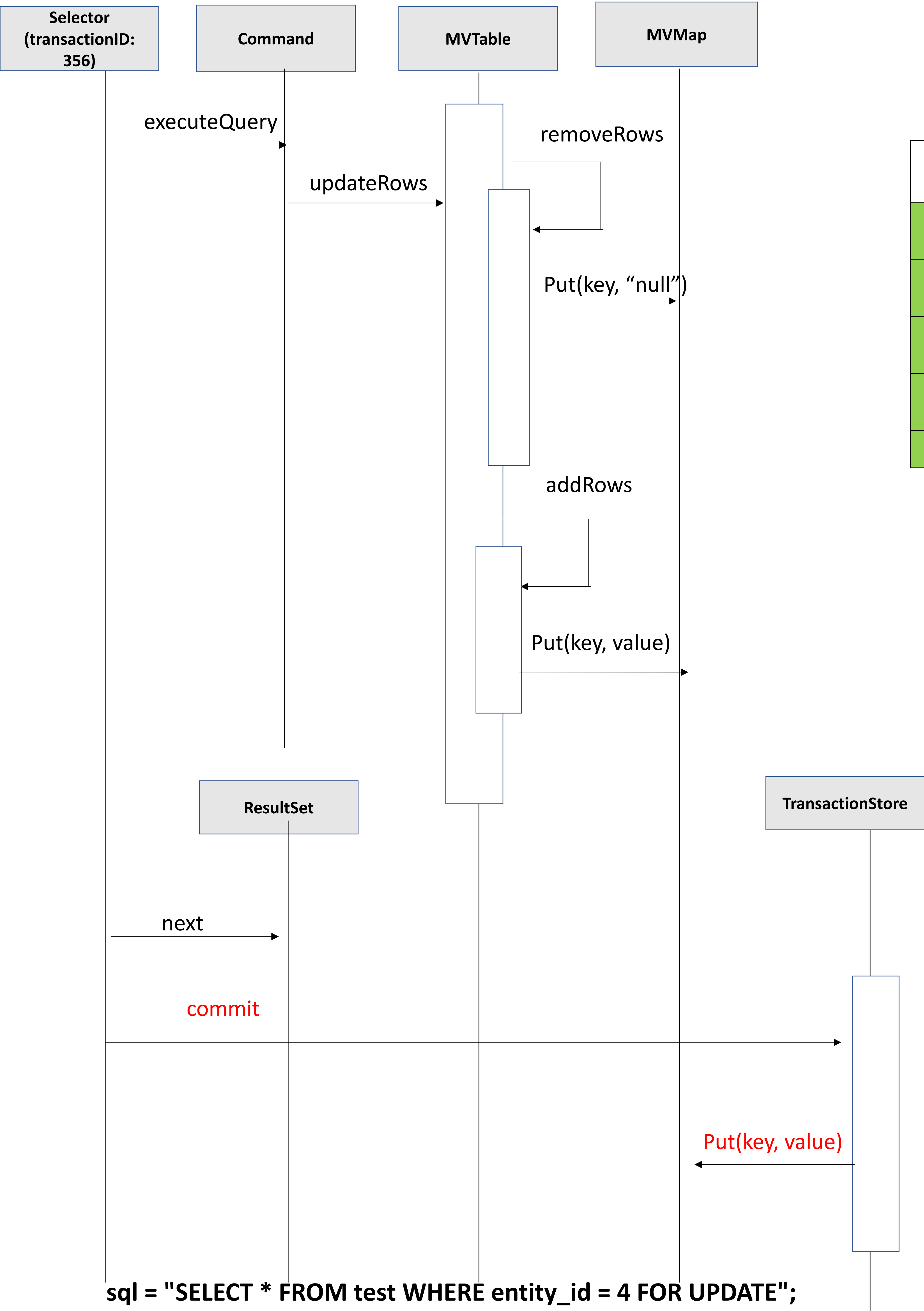
sql = "SELECT \* FROM test WHERE entity\_id = 4 FOR UPDATE";  
ResultSet set = executeQuery(sql);

```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

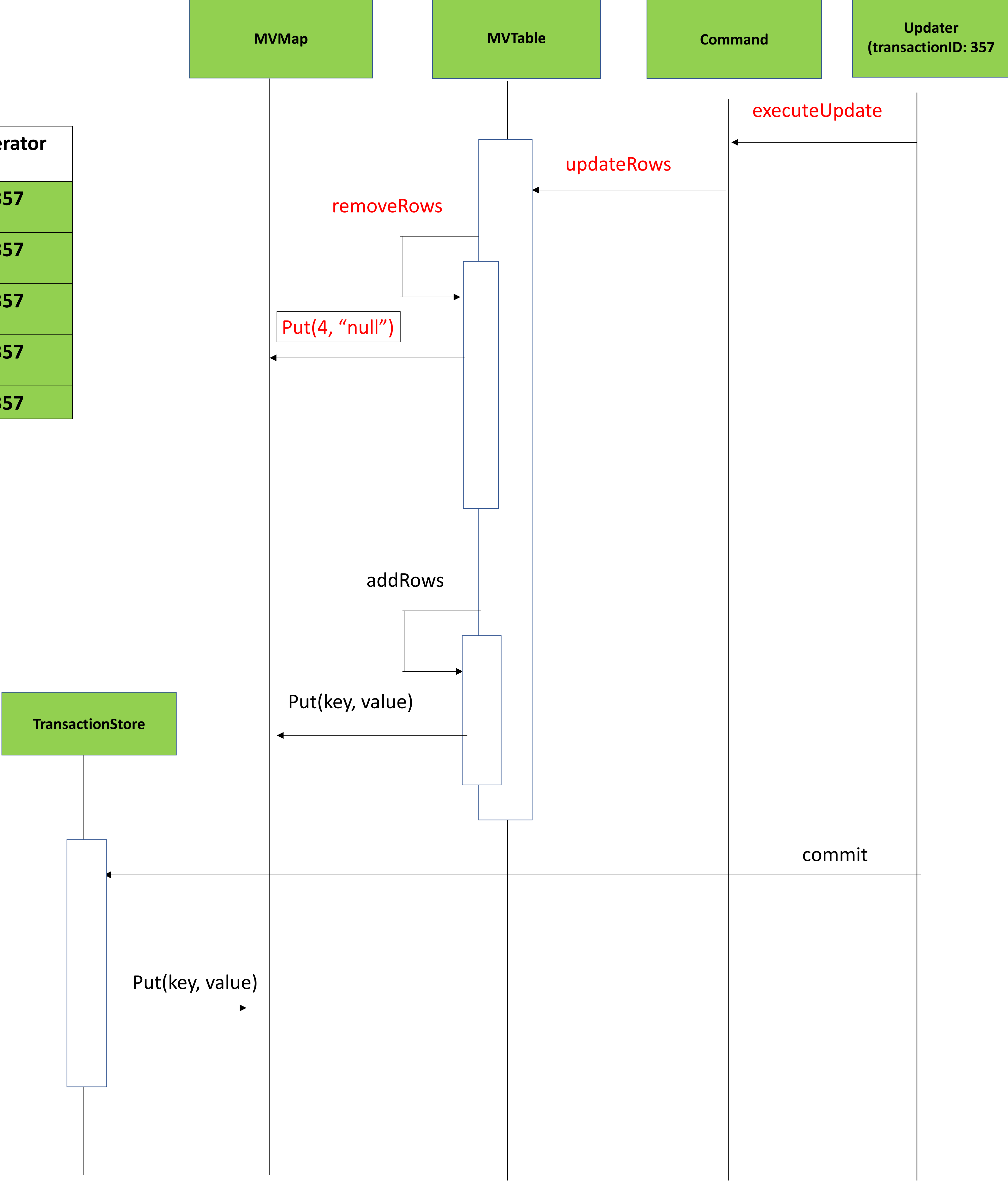
Key	Value	operator
0	null	357
1	null	357
2	null	357
3	null	357
4	109	



```
sql = "UPDATE test SET lastUpdated = 101");  
executeUpdate(sql);  
c.commit();
```



Key	Value	operator
0	null	357
1	null	357
2	null	357
3	null	357
4	null	357

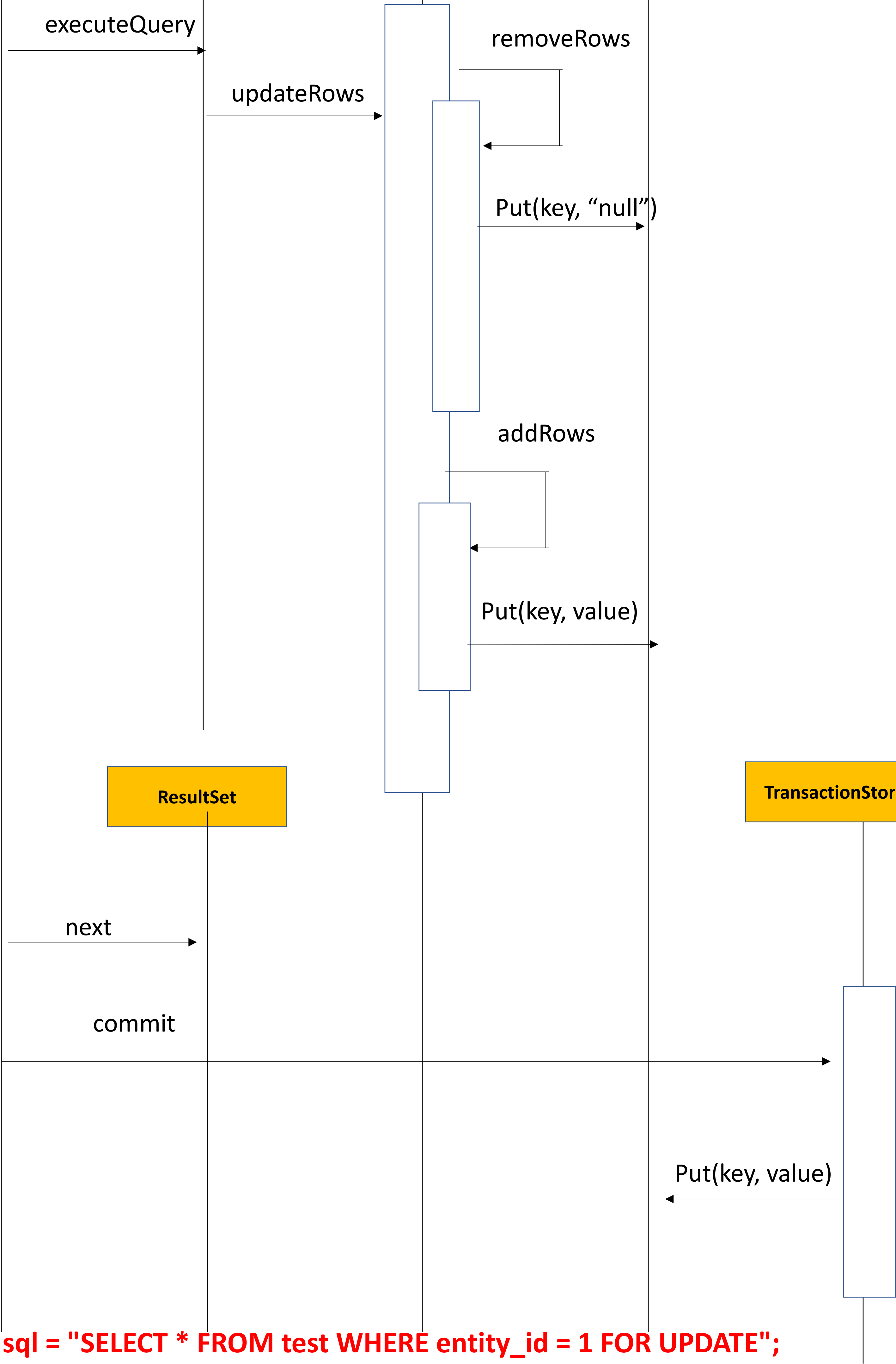
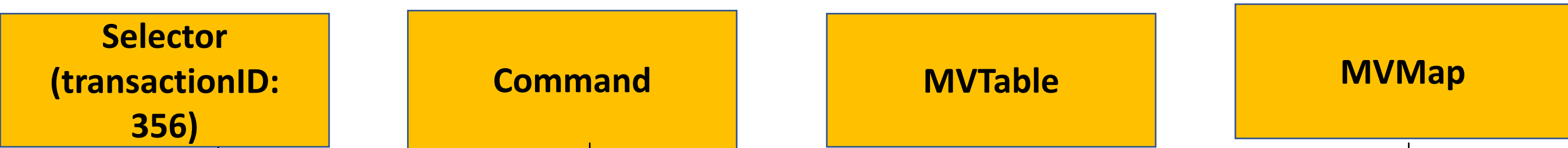


sql = "SELECT \* FROM test WHERE entity\_id = 4 FOR UPDATE";  
ResultSet set = executeQuery(sql);

```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

```
sql = "UPDATE test SET lastUpdated = 101");  
executeUpdate(sql);  
c.commit();
```

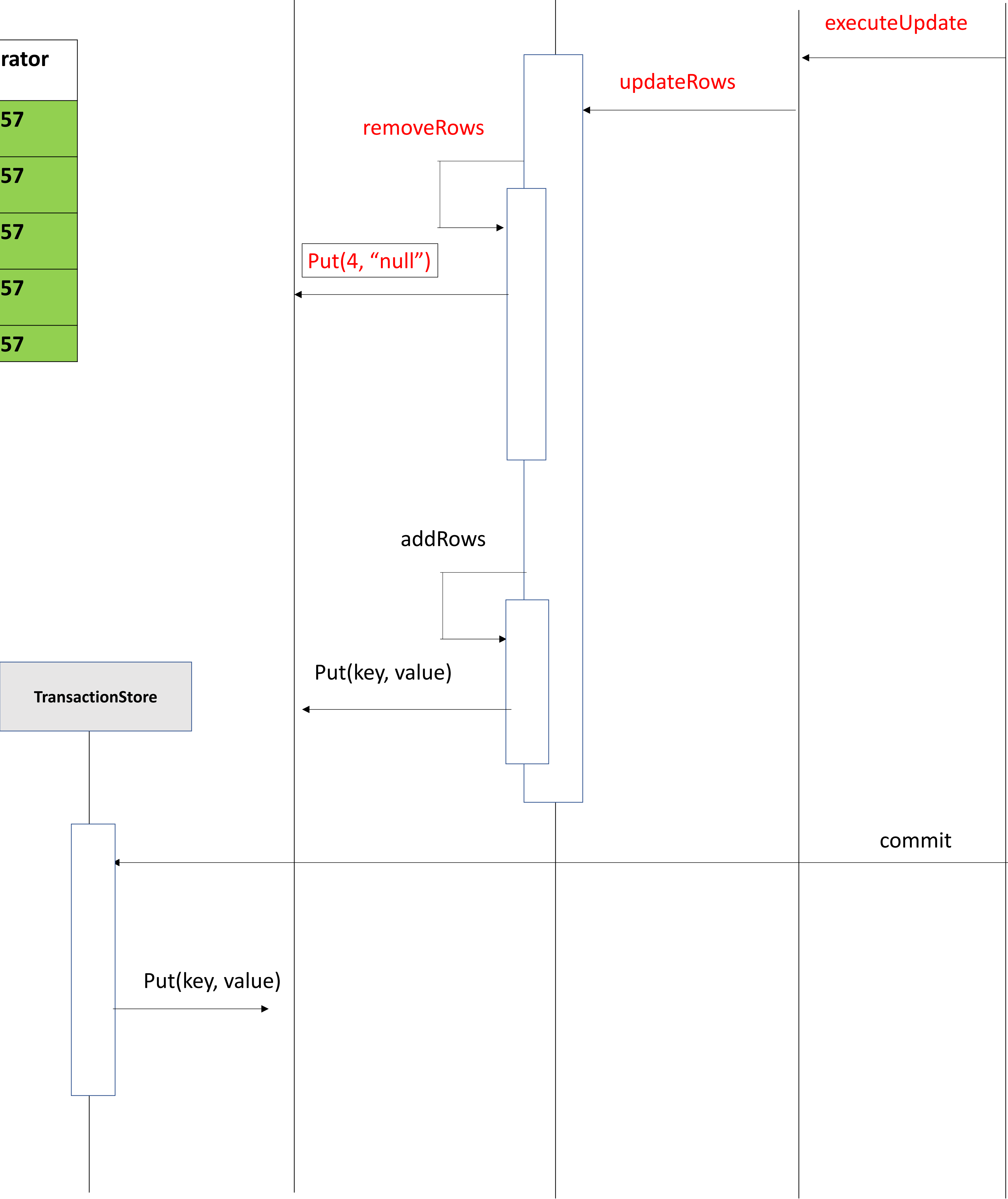




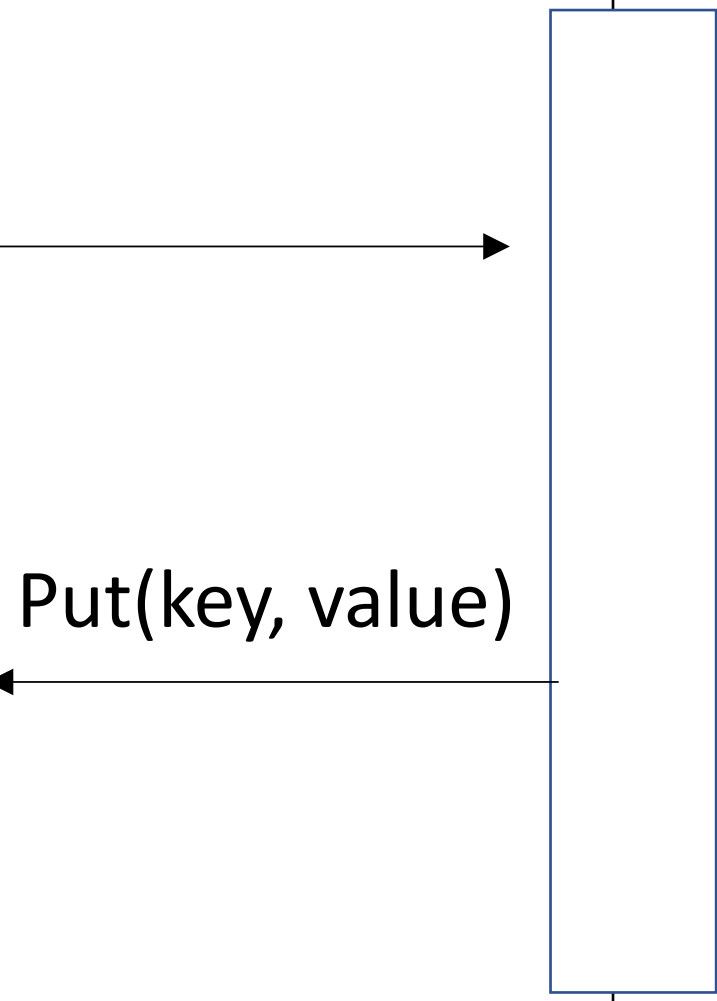
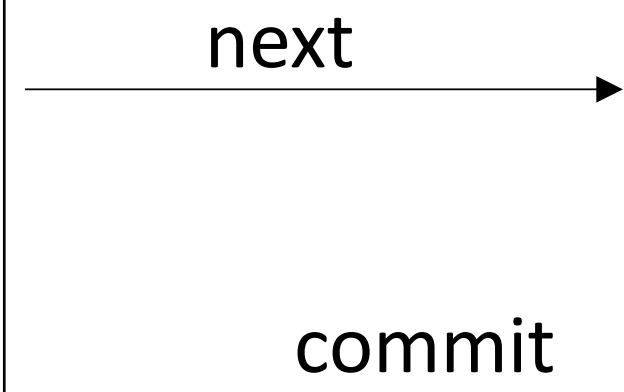
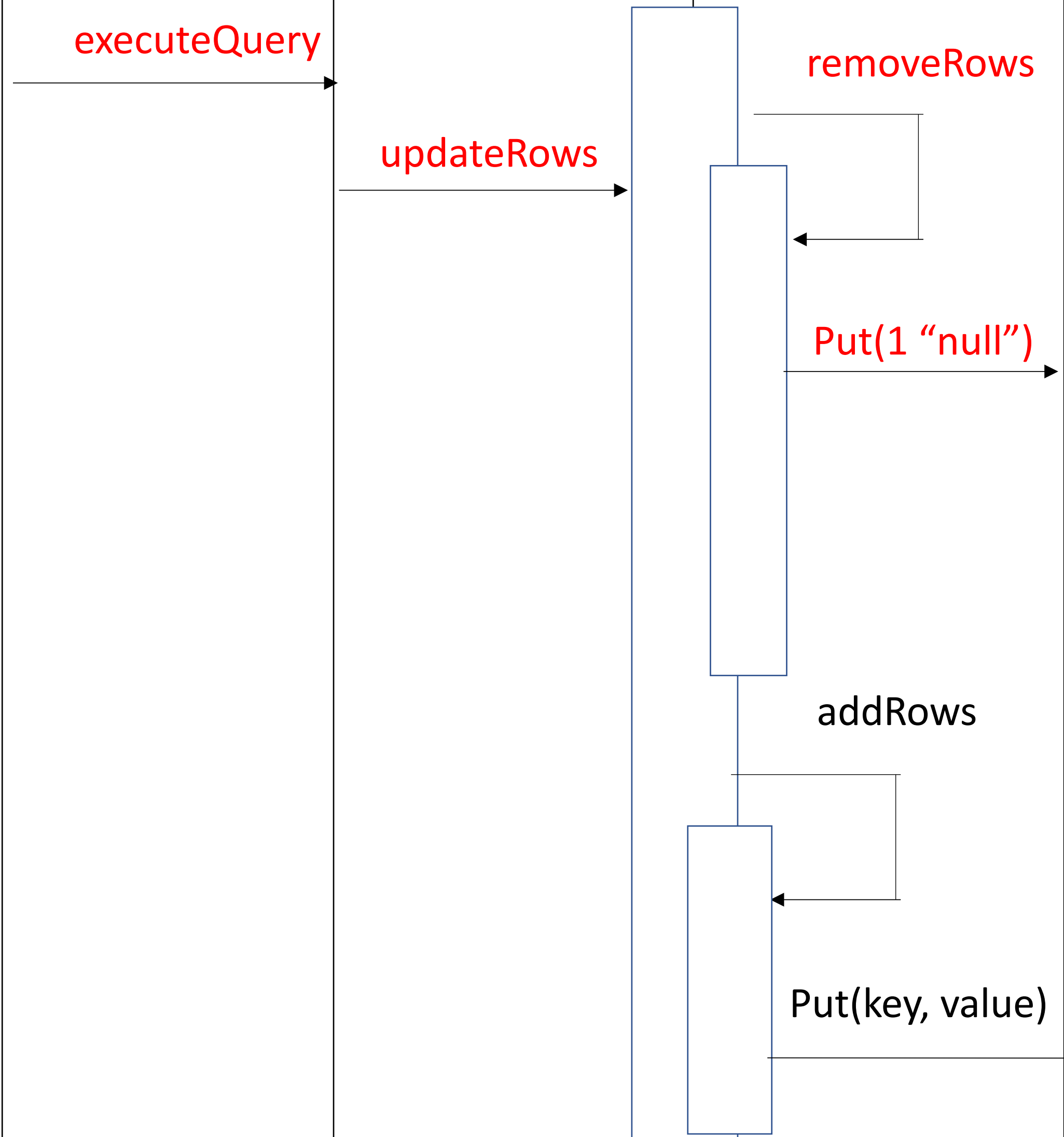
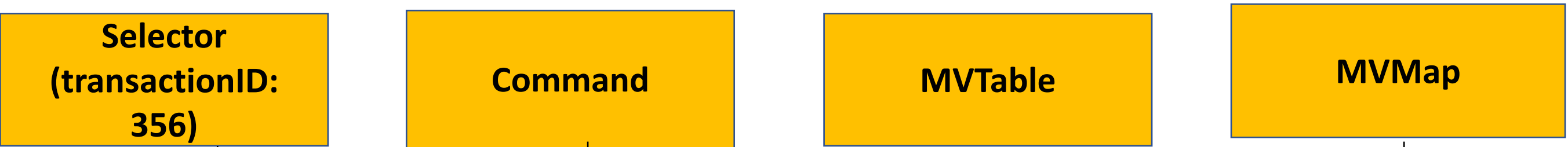
sql = "SELECT \* FROM test WHERE entity\_id = 1 FOR UPDATE";  
ResultSet set = executeQuery(sql);

```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

Key	Value	operator
0	null	357
1	null	357
2	null	357
3	null	357
4	null	357



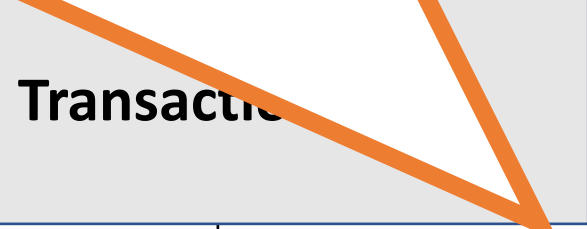
sql = "UPDATE test SET lastUpdated = 101");  
executeUpdate(sql);  
c.commit();



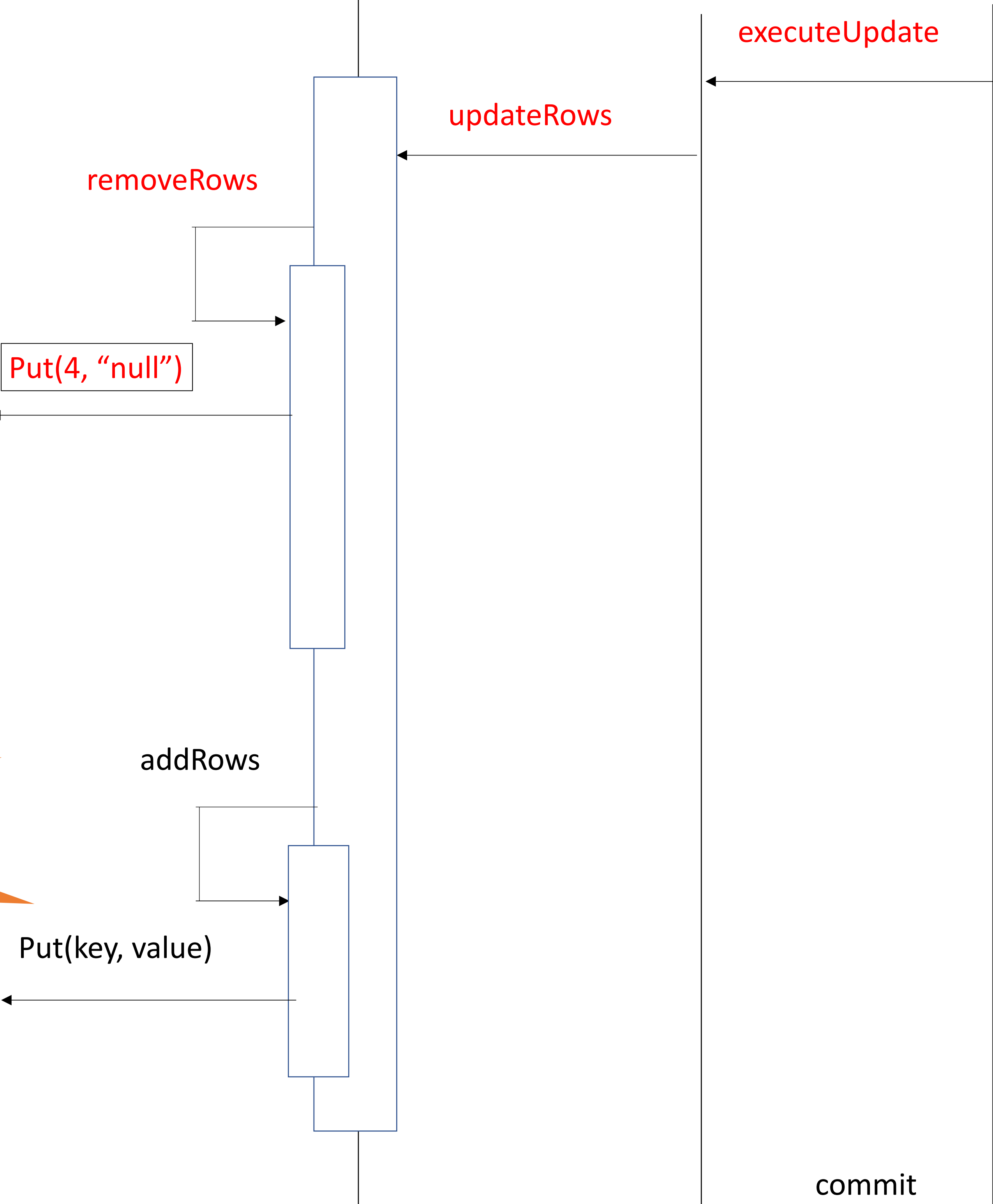
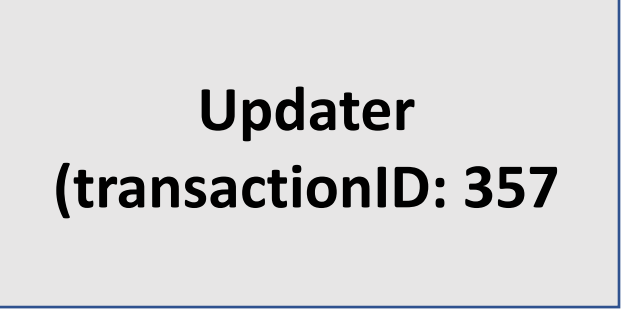
Put(key, value)

Key	Value	operator
0	null	357
1	null	357
2	null	357
3	null	357
4	null	357

Other transaction is  
operating!!!!  
Give up and try later!!!



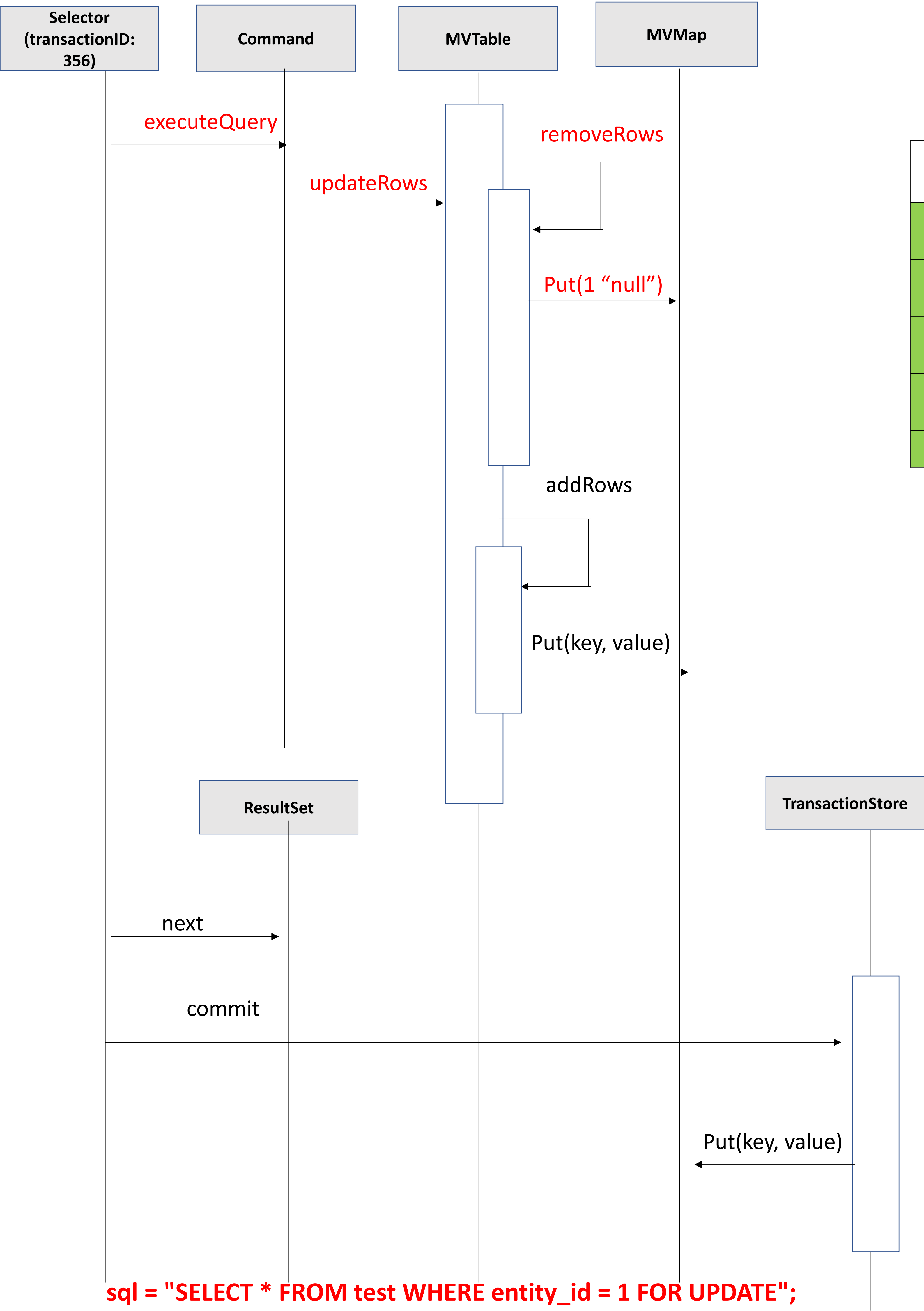
Put(key, value)



sql = "SELECT \* FROM test WHERE entity\_id = 1 FOR UPDATE";  
ResultSet set = executeQuery(sql);

```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

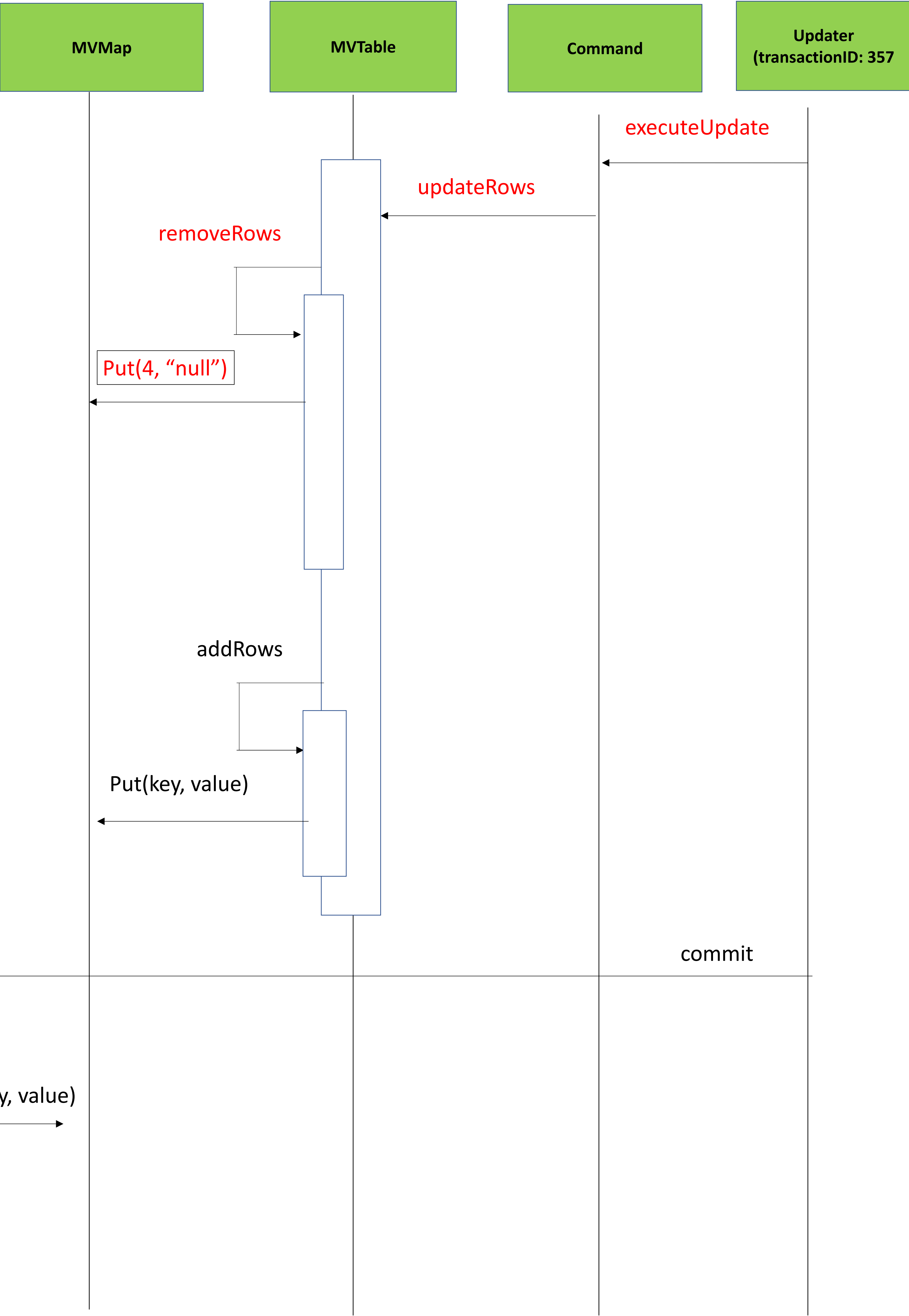
```
sql = "UPDATE test SET lastUpdated = 101");  
executeUpdate(sql);  
c.commit();
```



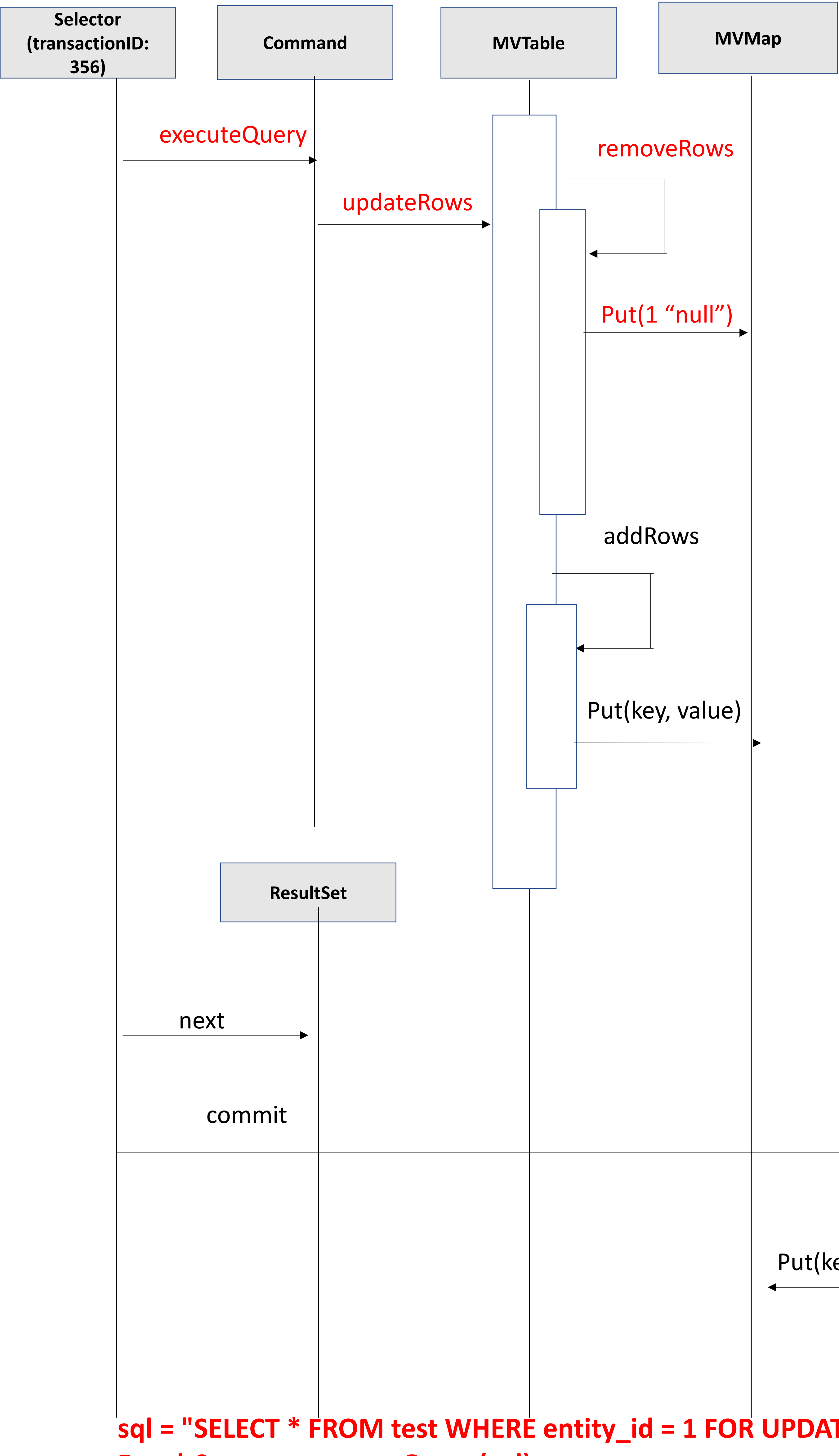
sql = "SELECT \* FROM test WHERE entity\_id = 1 FOR UPDATE";  
ResultSet set = executeQuery(sql);

```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

Key	Value	operator
0	null	357
1	null	357
2	null	357
3	null	357
4	null	357

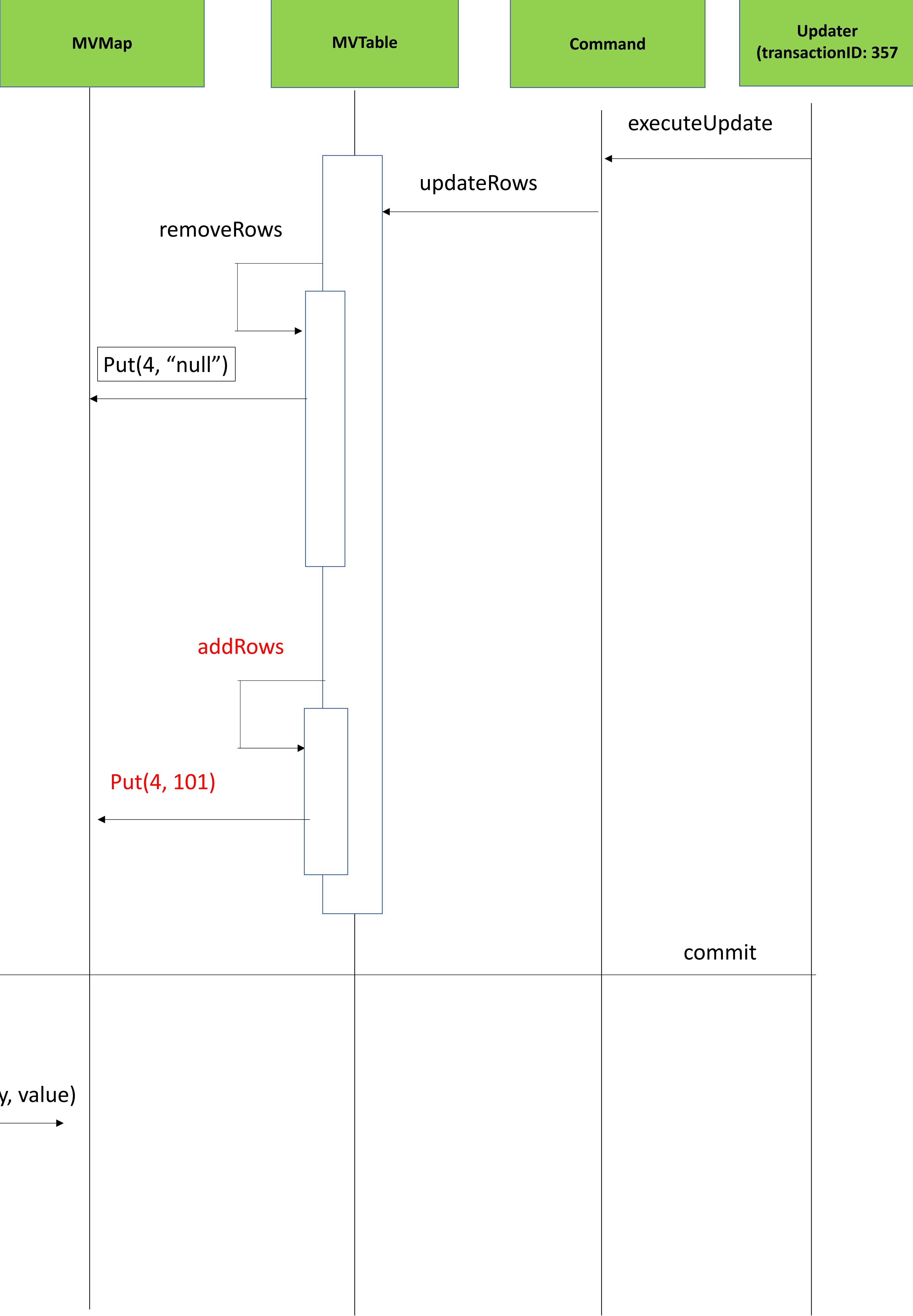


sql = "UPDATE test SET lastUpdated = 101");  
executeUpdate(sql);  
c.commit();

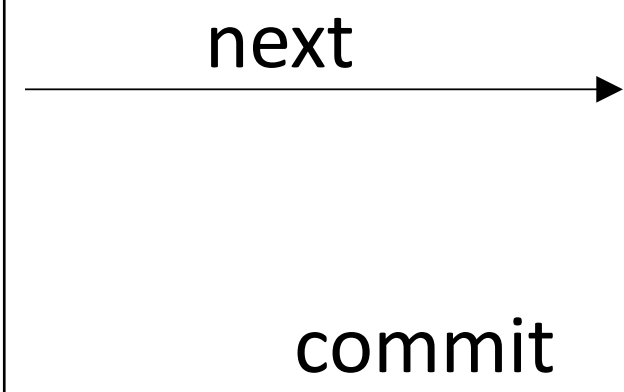
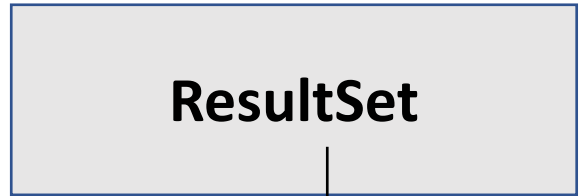
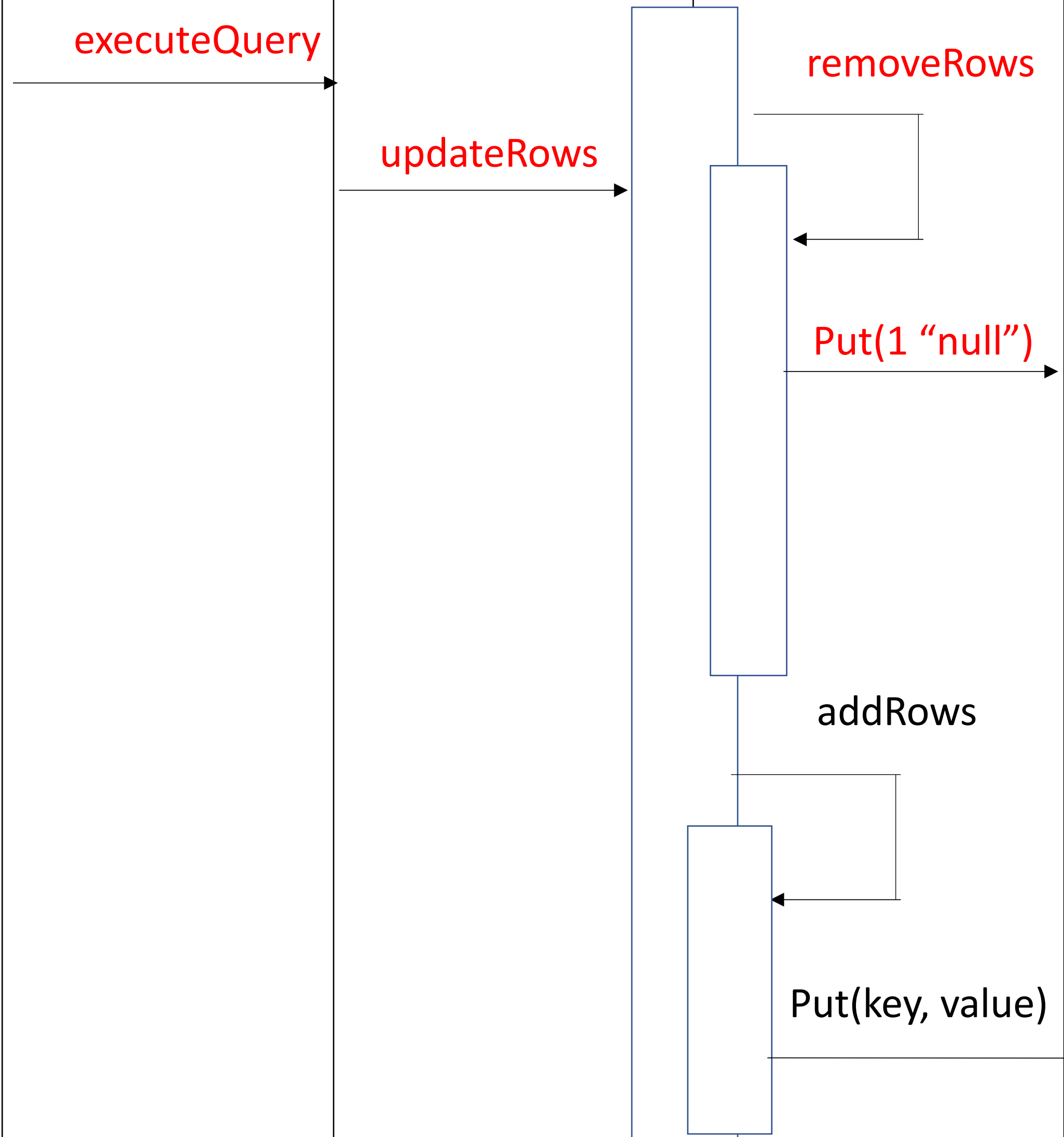
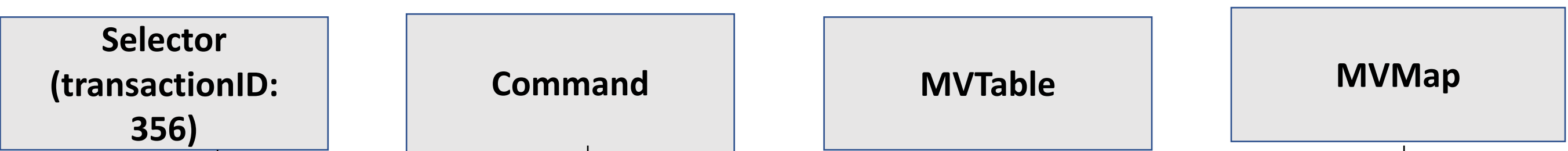


```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

Key	Value	operator
0	null	357
1	null	357
2	null	357
3	null	357
4	101	357



```
sql = "UPDATE test SET lastUpdated = 101");  
executeUpdate(sql);  
c.commit();
```



Put(key, value)

sql = "SELECT \* FROM test WHERE entity\_id = 1 FOR UPDATE";  
ResultSet set = executeQuery(sql);

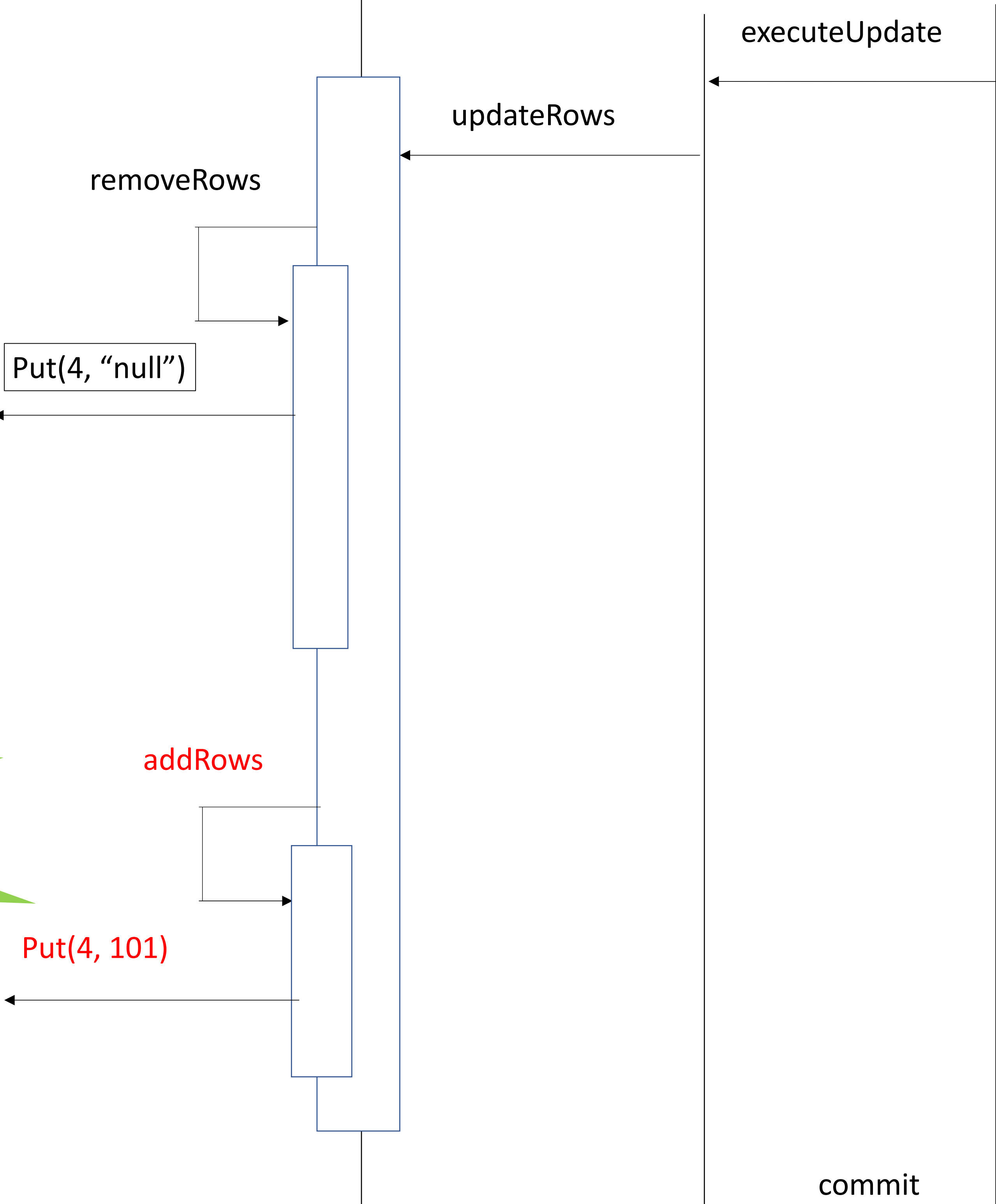
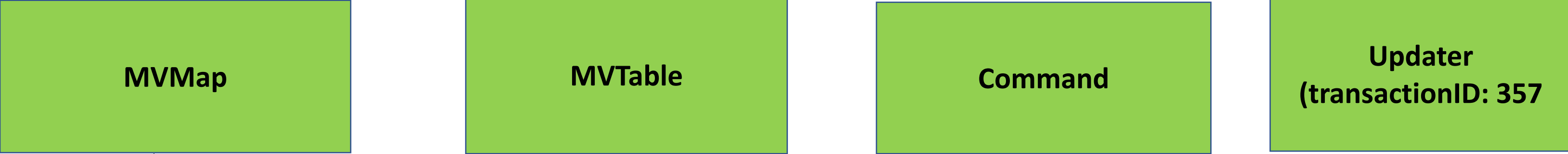
```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

Key	Value	operator
0	null	357
1	null	357
2	null	357
3	null	357
4	101	357

Why is not updated the  
rest of rows?  
(possibly bug?)

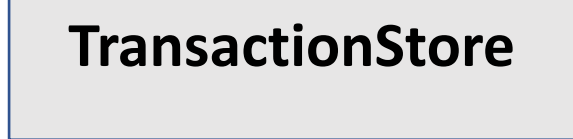
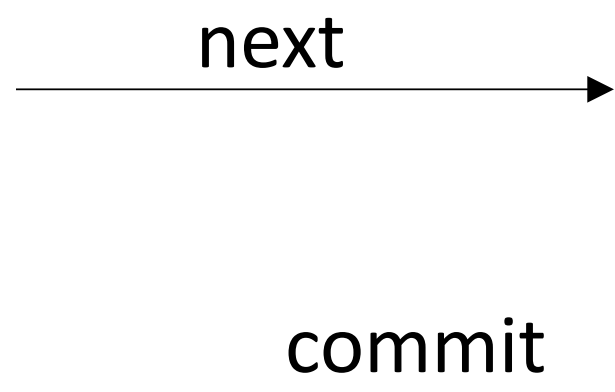
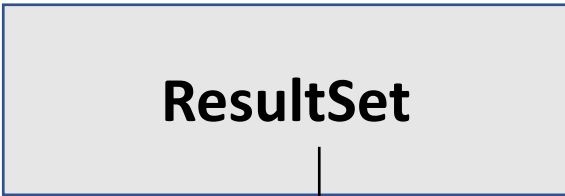
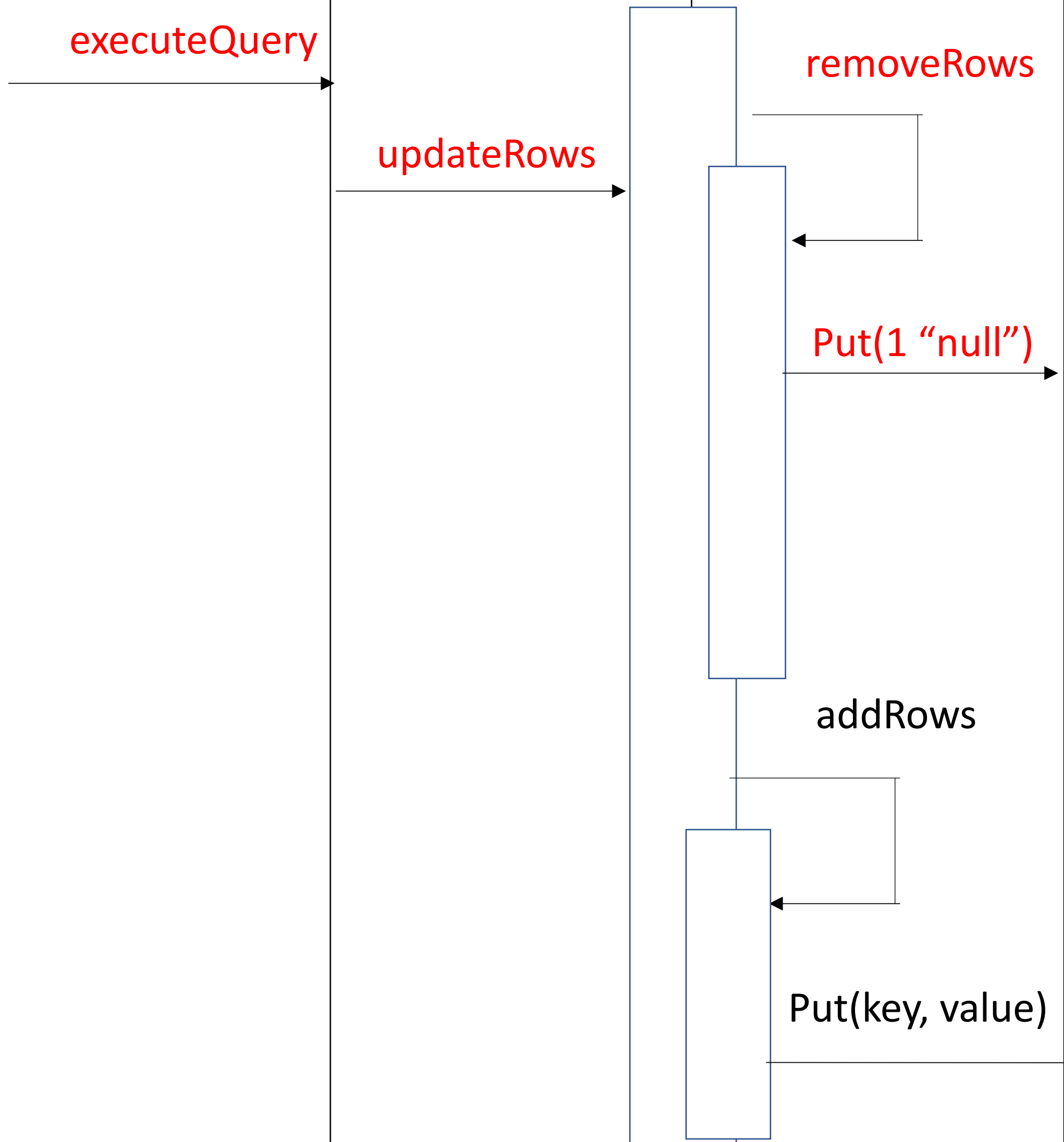
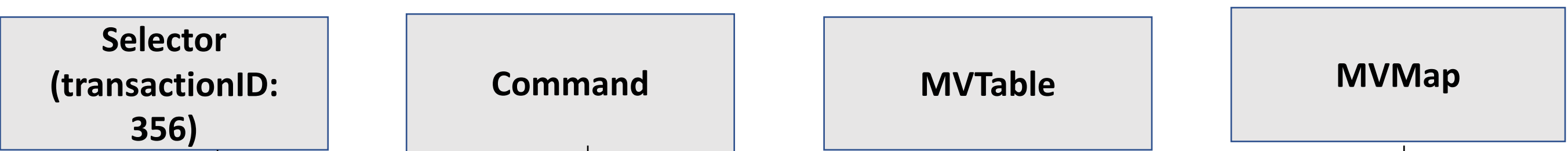
Transaction

Put(key, value)

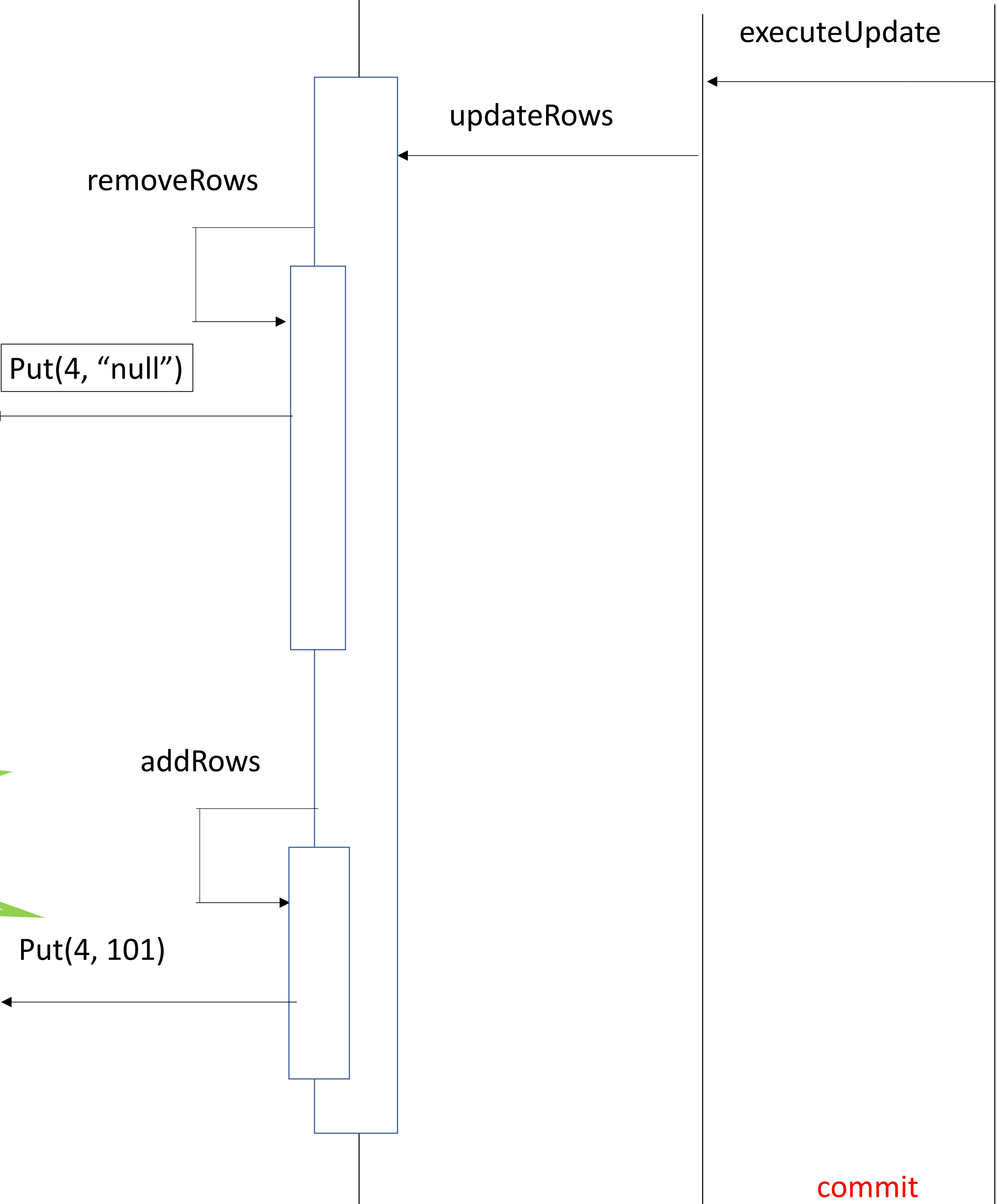
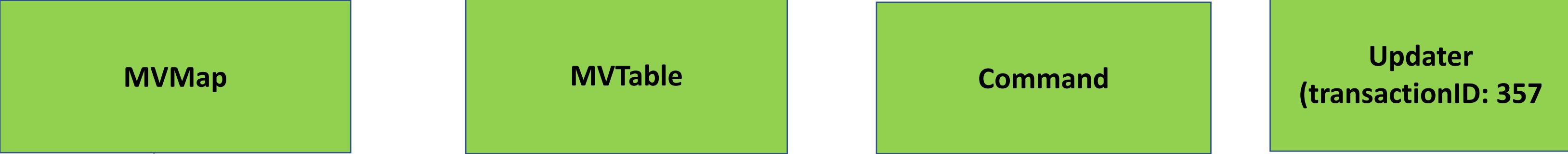
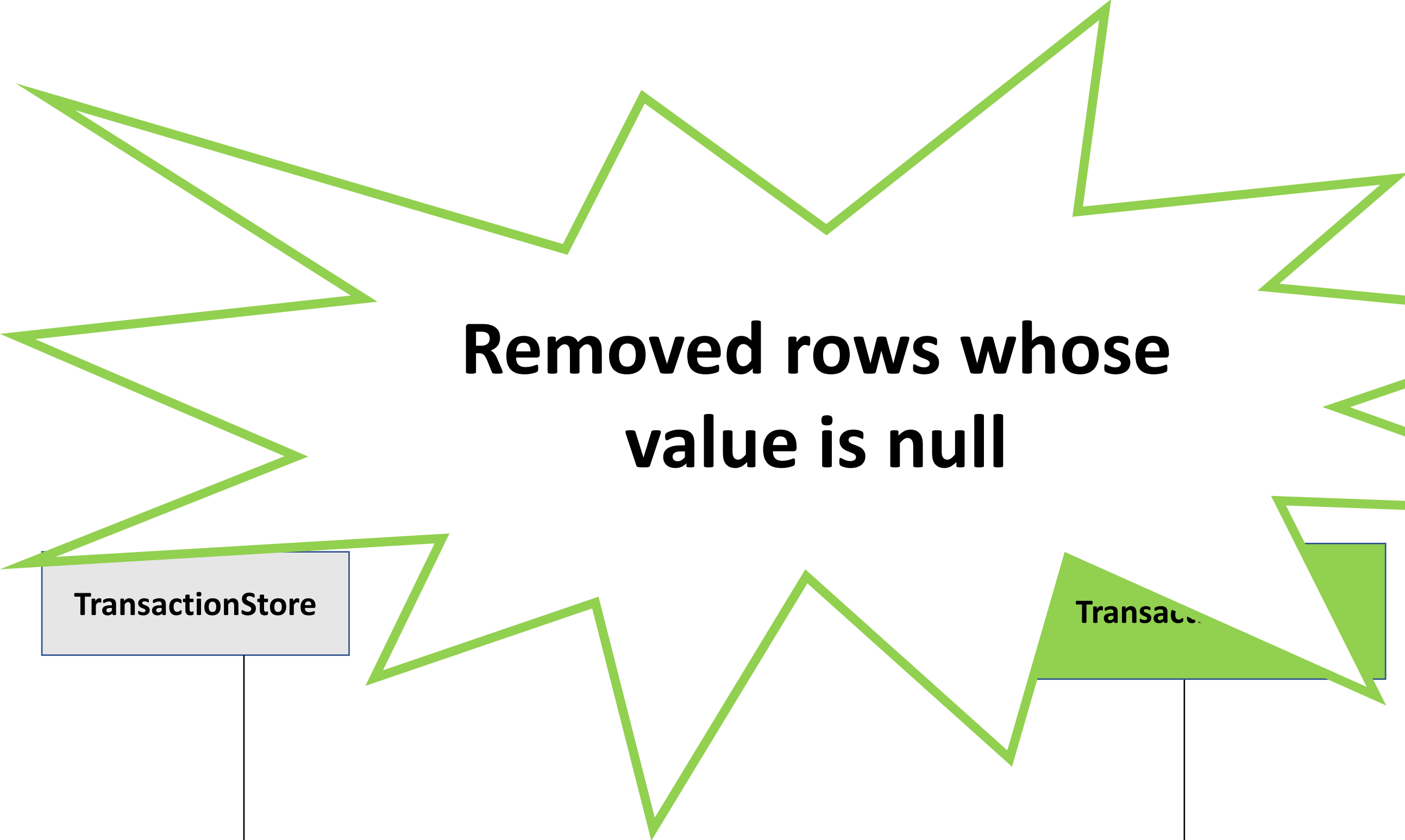


sql = "UPDATE test SET lastUpdated = 101");  
  
executeUpdate(sql);  
  
c.commit();





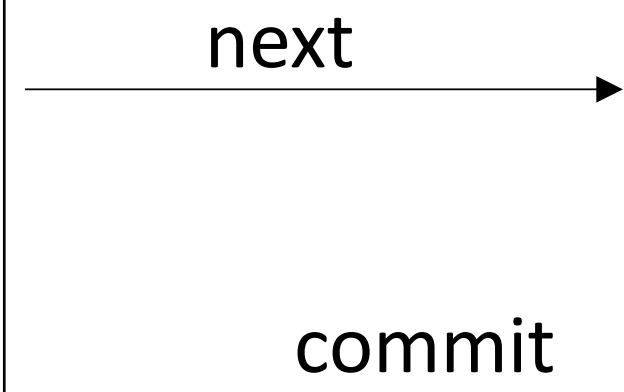
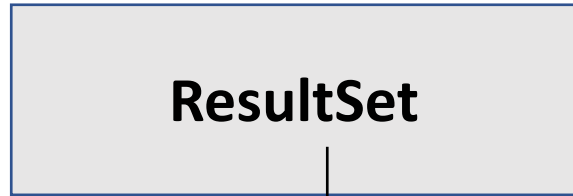
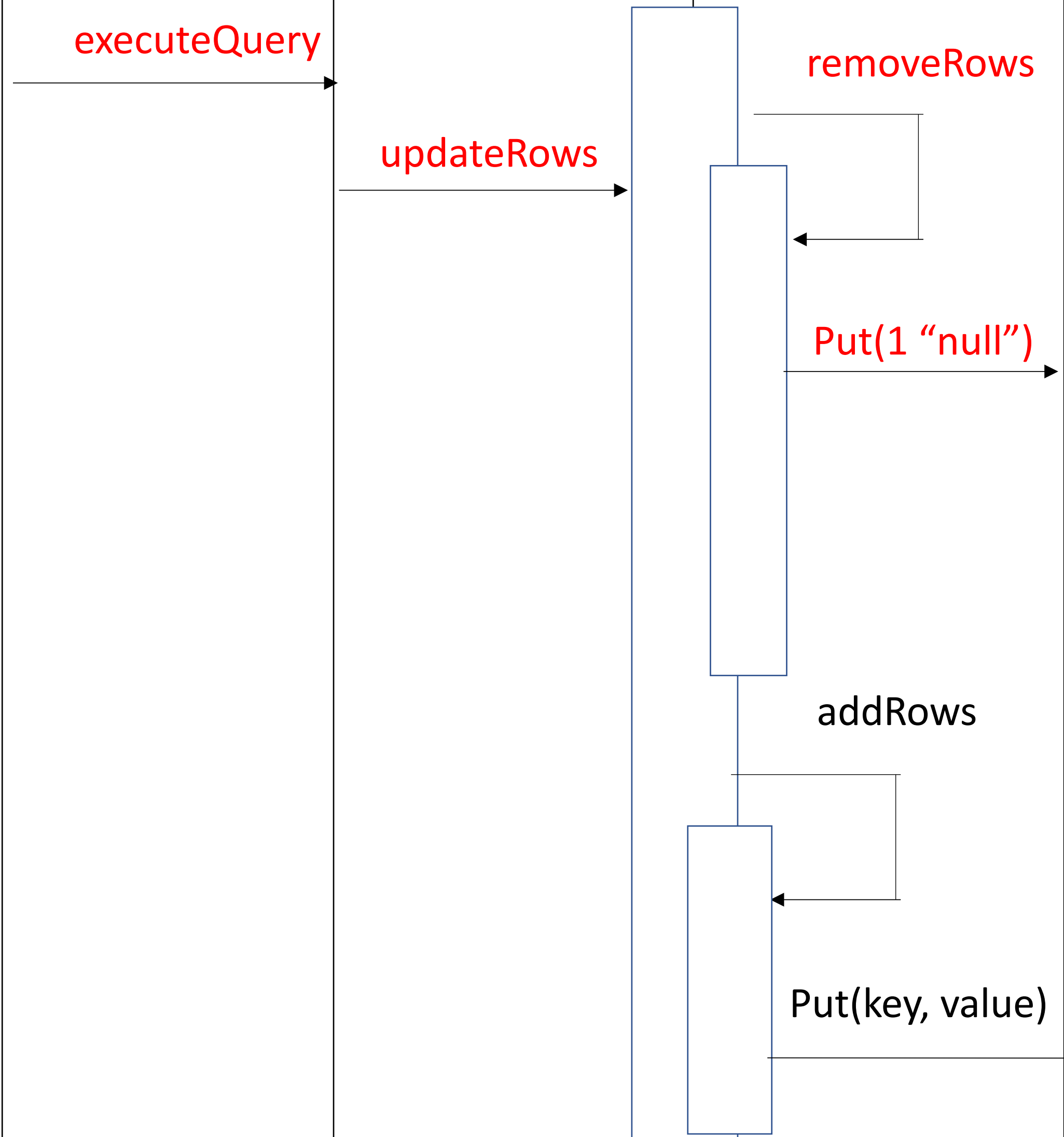
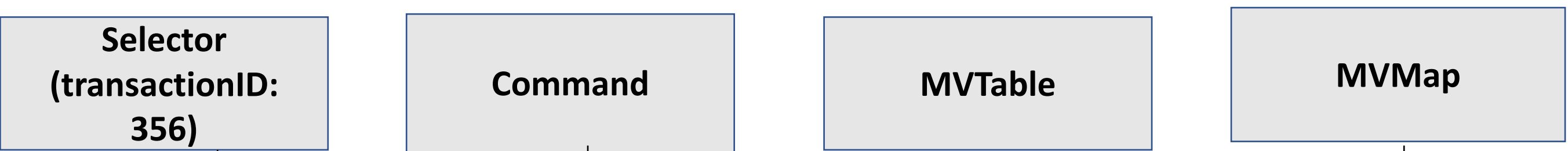
Key	Value	operator
1	null	357
2	null	357
3	null	357
4	101	357



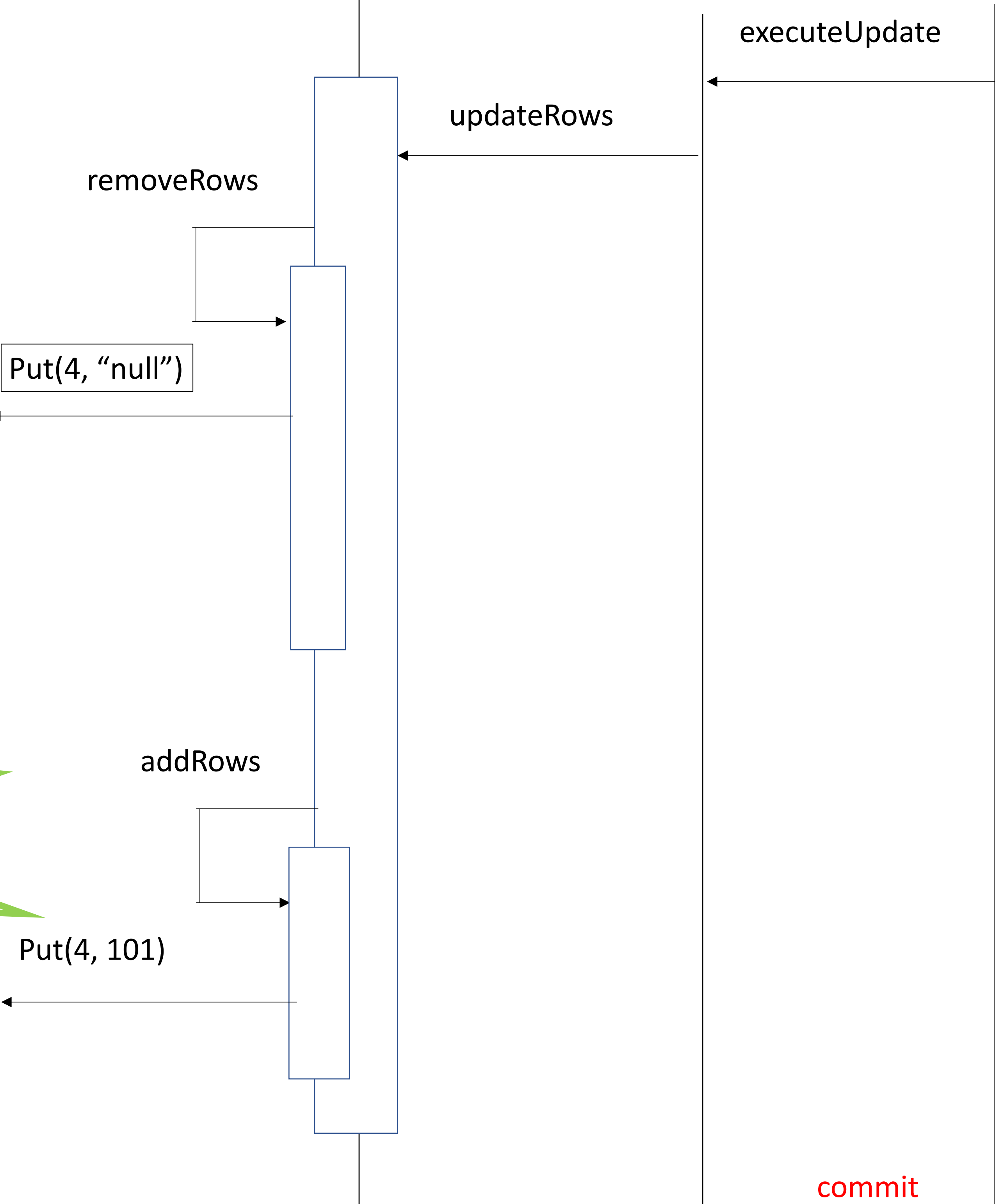
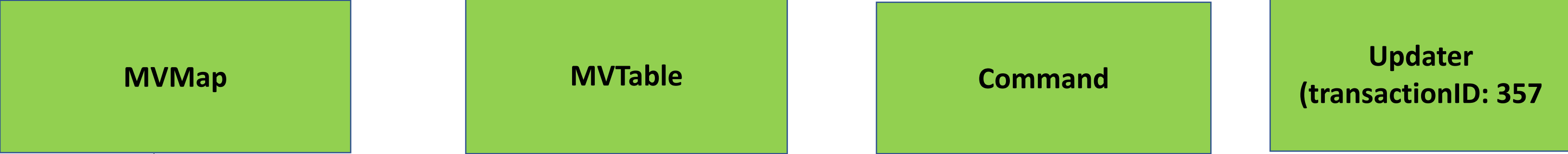
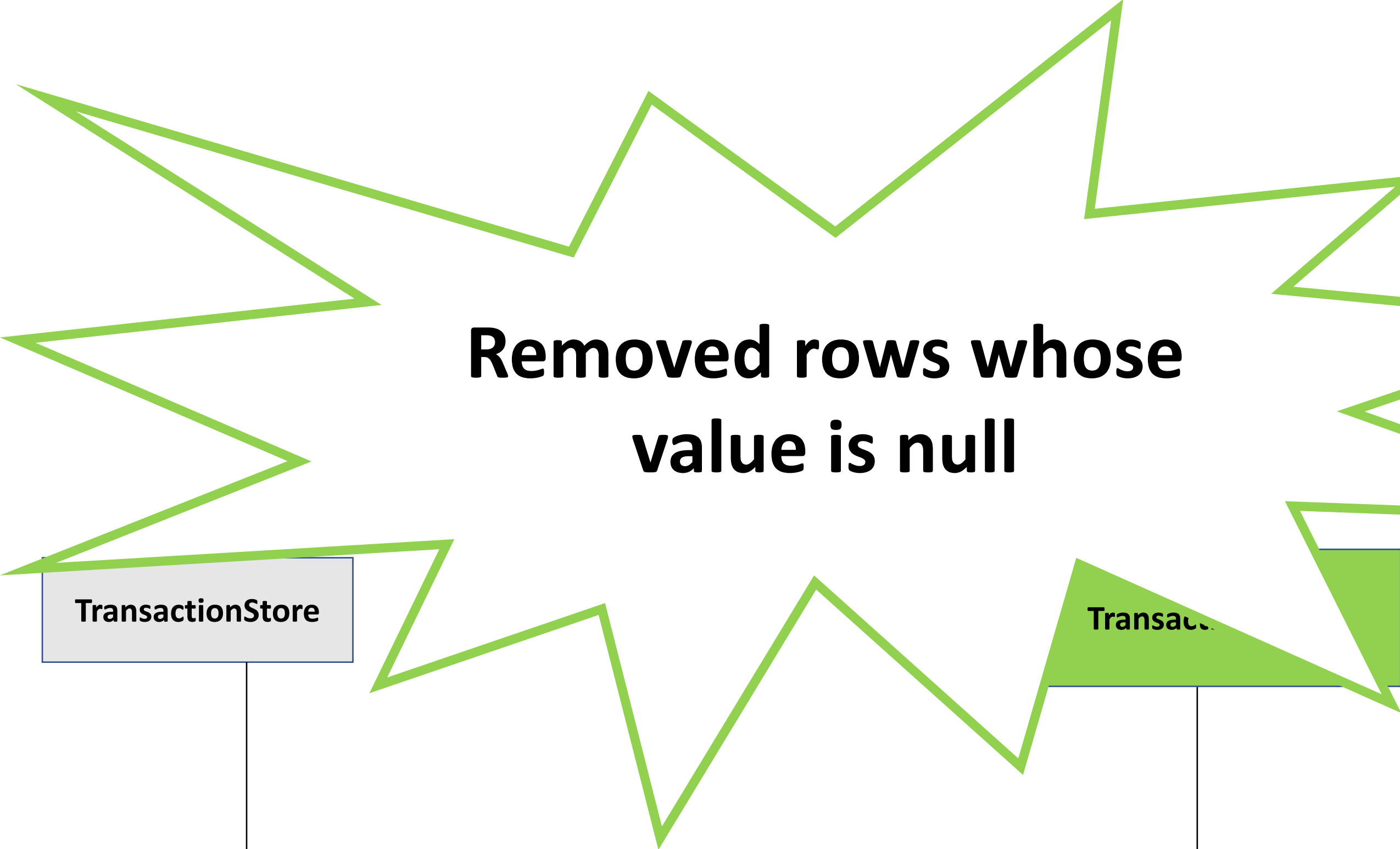
sql = "SELECT \* FROM test WHERE entity\_id = 1 FOR UPDATE";  
ResultSet set = executeQuery(sql);

```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

```
sql = "UPDATE test SET lastUpdated = 101");  
executeUpdate(sql);  
c.commit();
```



Key	Value	operator
2	null	357
3	null	357
4	101	357

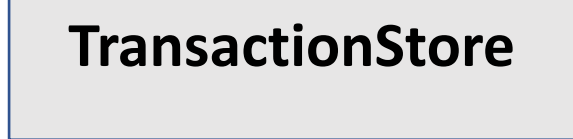
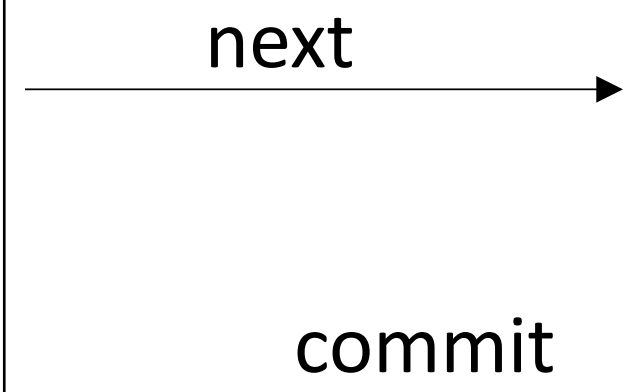
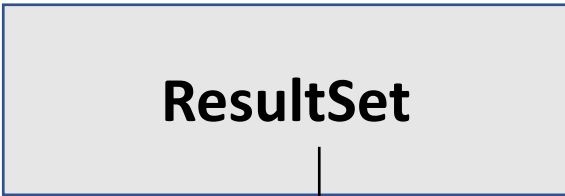
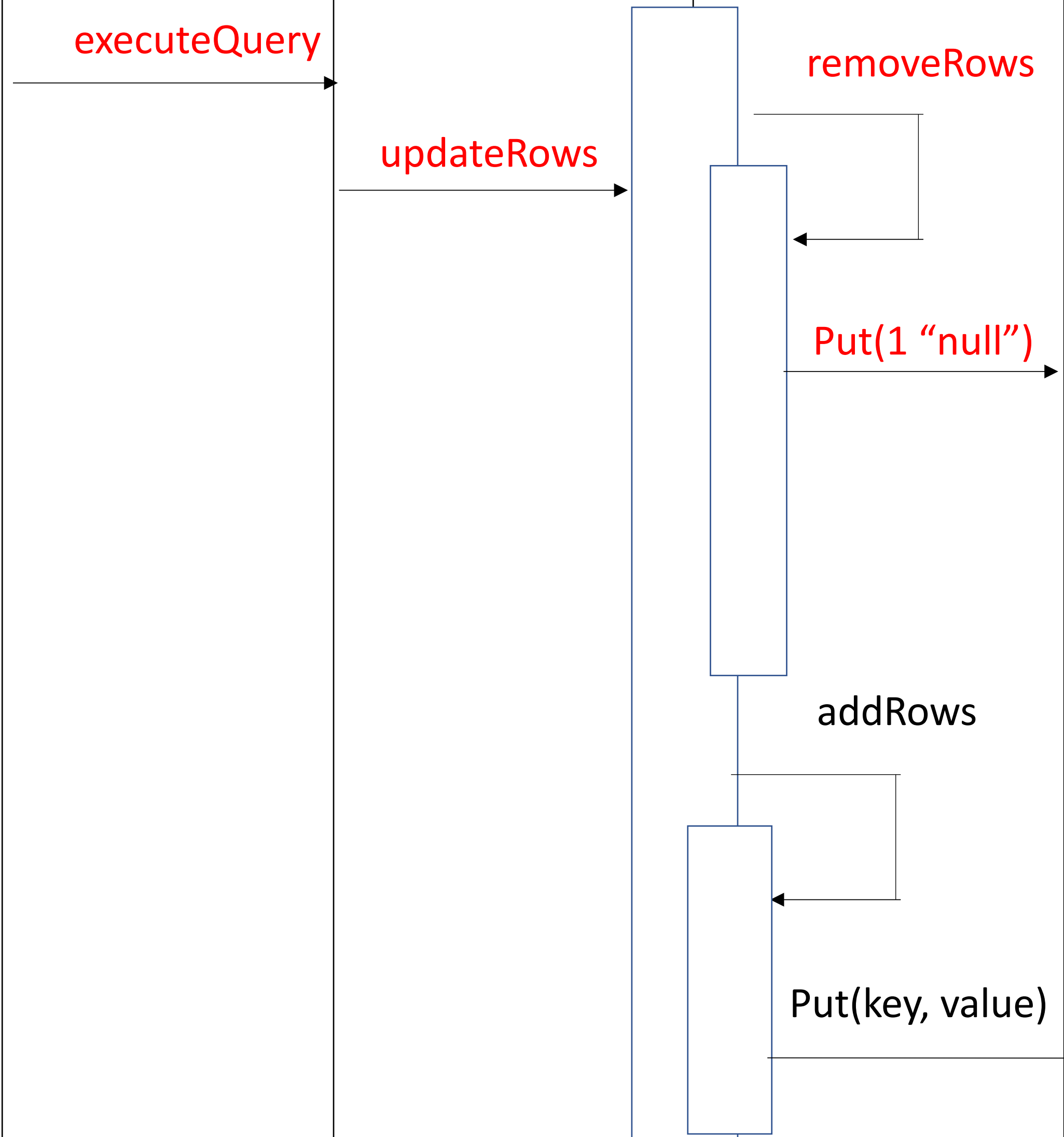
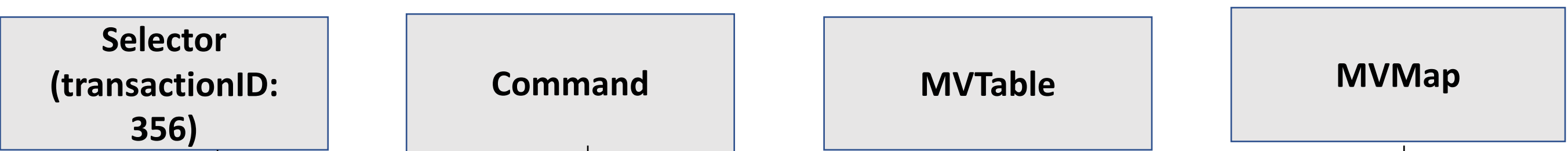


sql = "SELECT \* FROM test WHERE entity\_id = 1 FOR UPDATE";  
ResultSet set = executeQuery(sql);

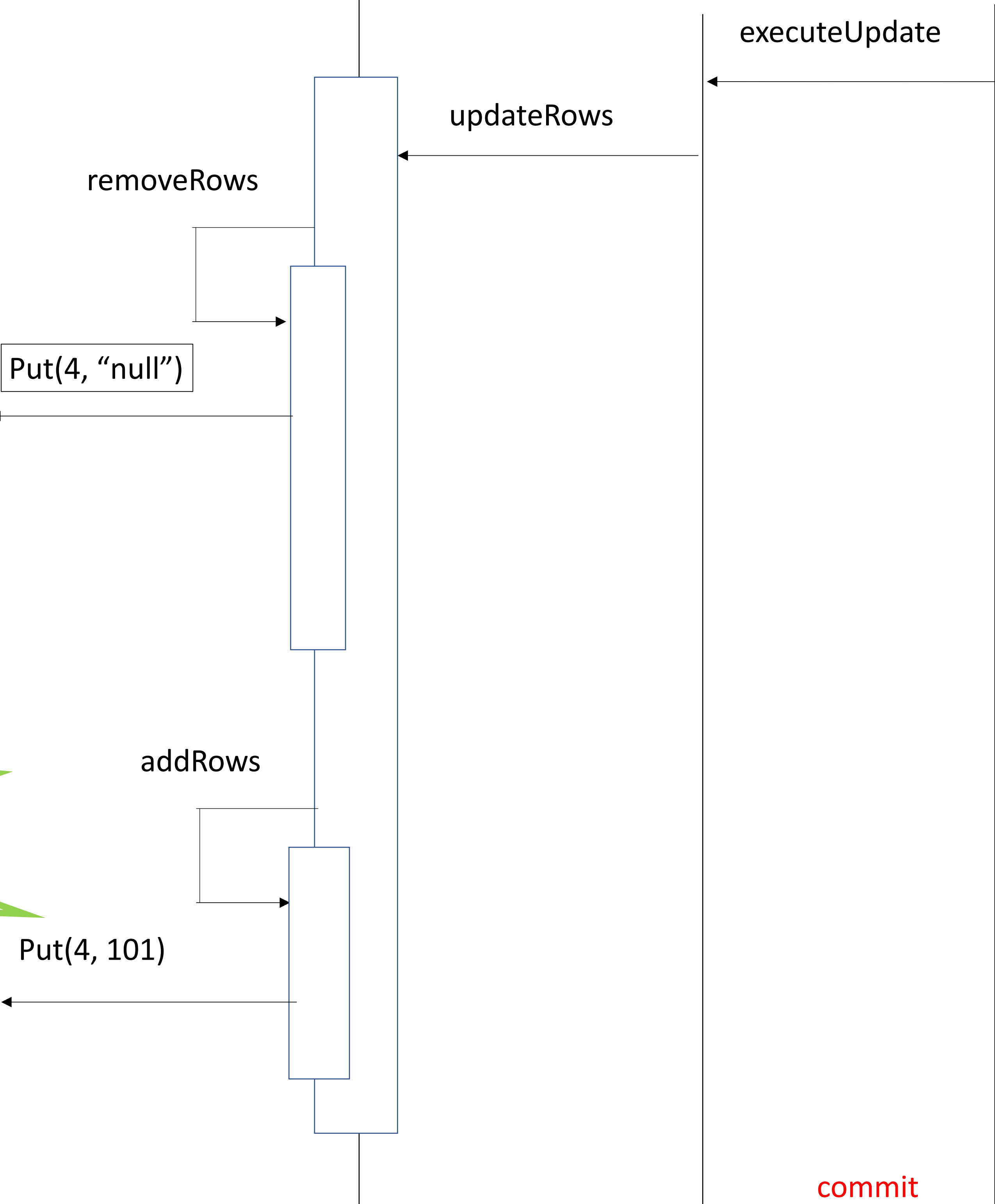
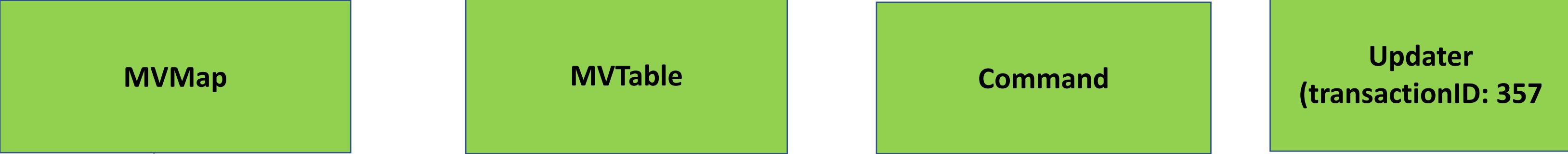
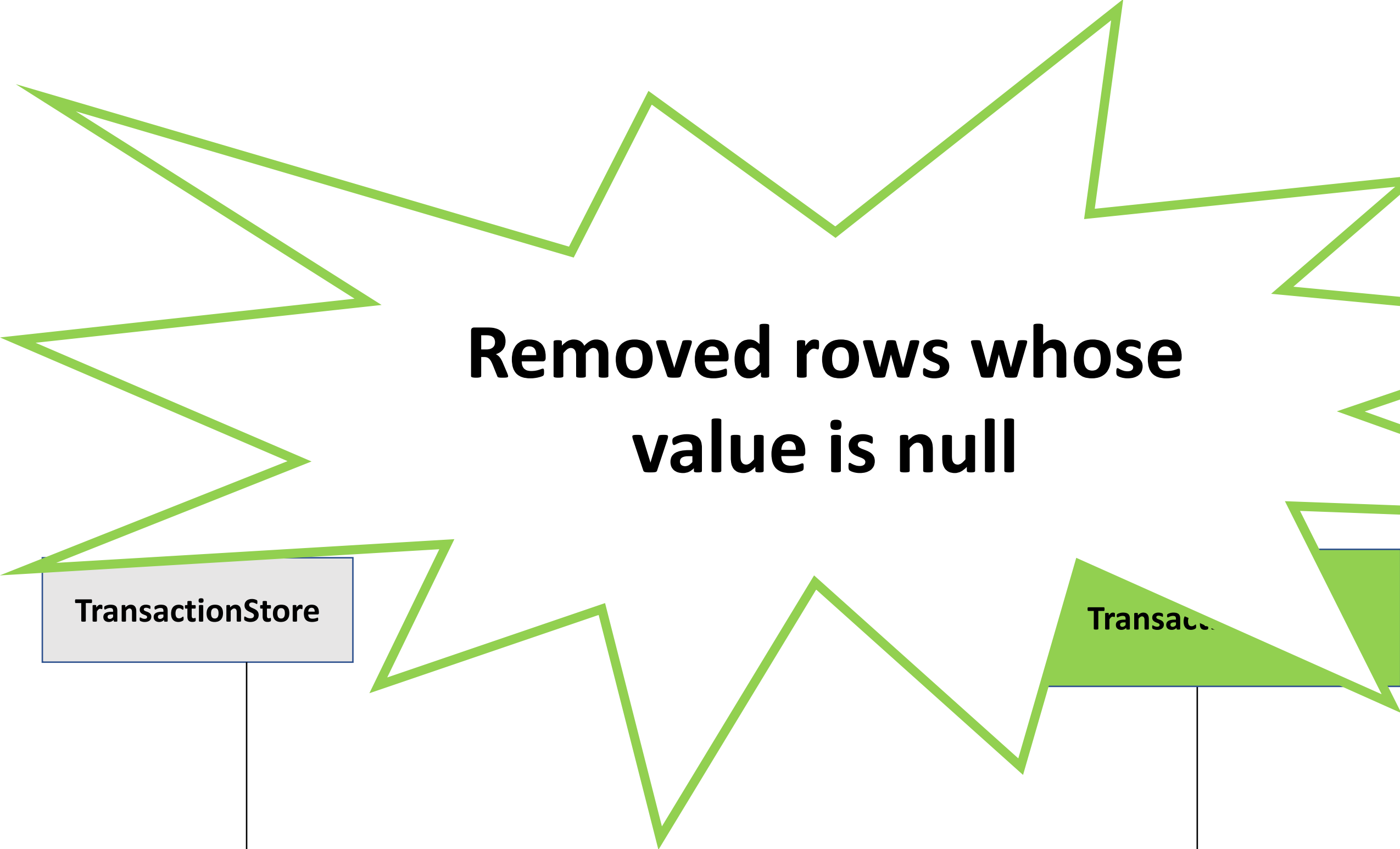
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if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

```
sql = "UPDATE test SET lastUpdated = 101");  
  
executeUpdate(sql);  
  
c.commit();
```





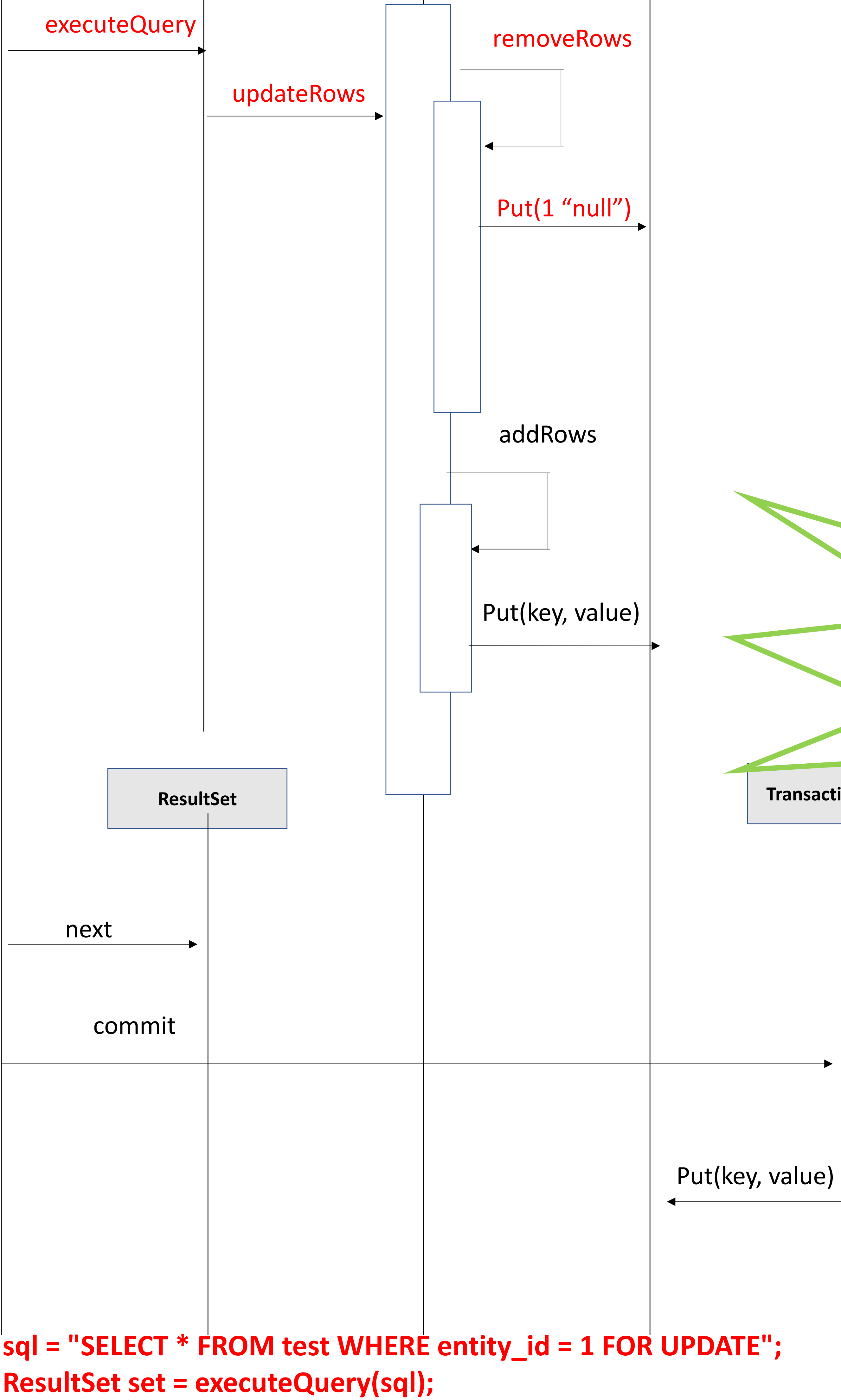
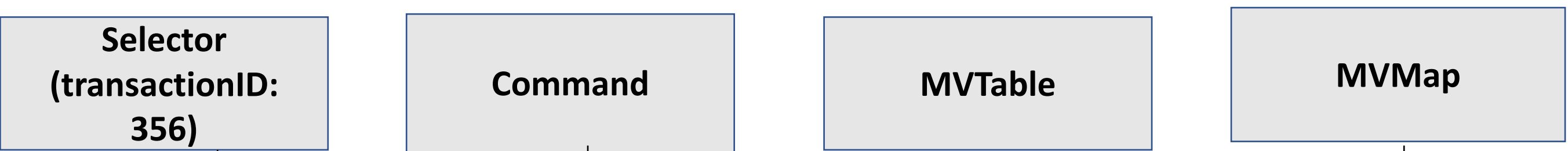
Key	Value	operator
3	null	357
4	101	357



sql = "SELECT \* FROM test WHERE entity\_id = 1 FOR UPDATE";  
ResultSet set = executeQuery(sql);

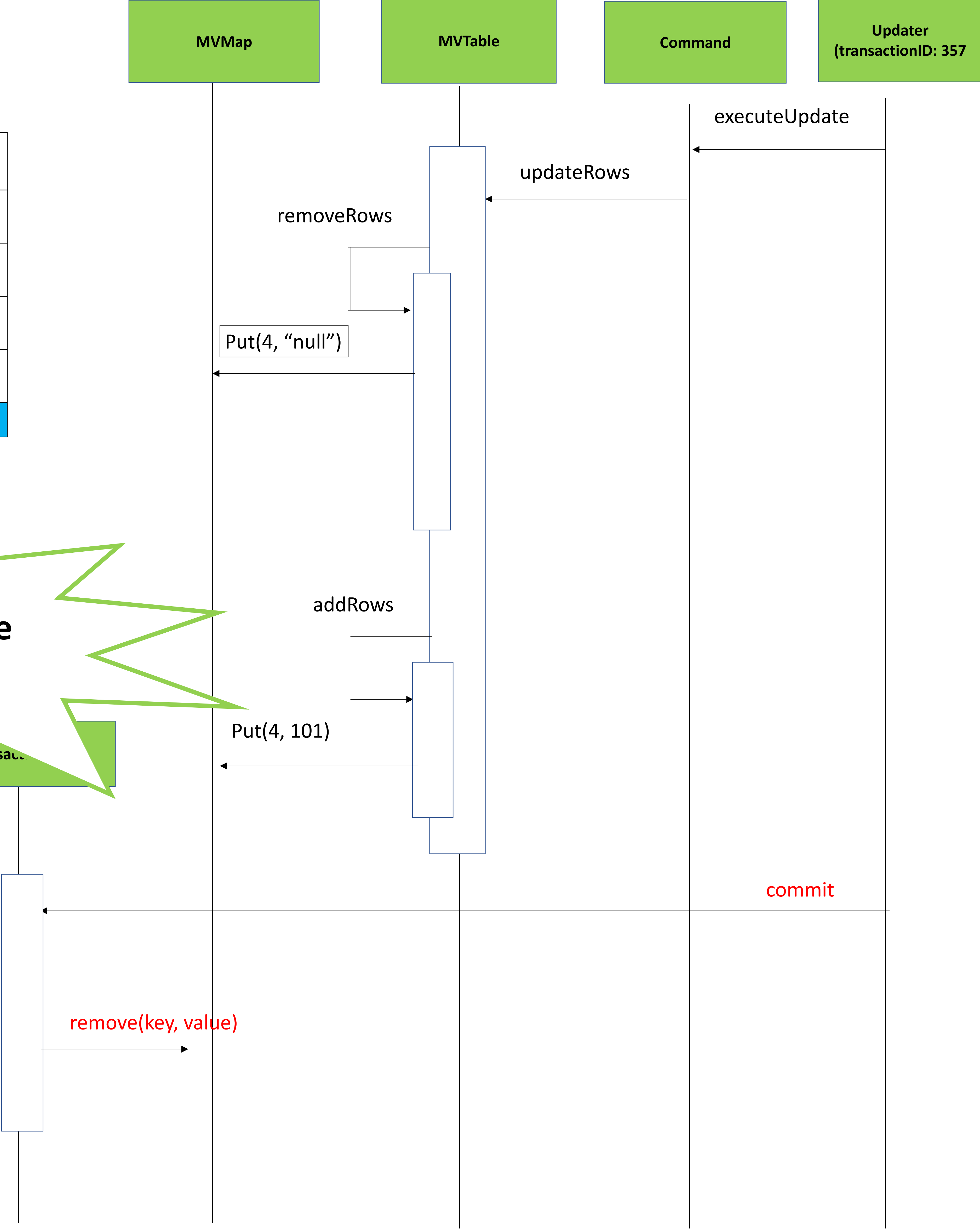
```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

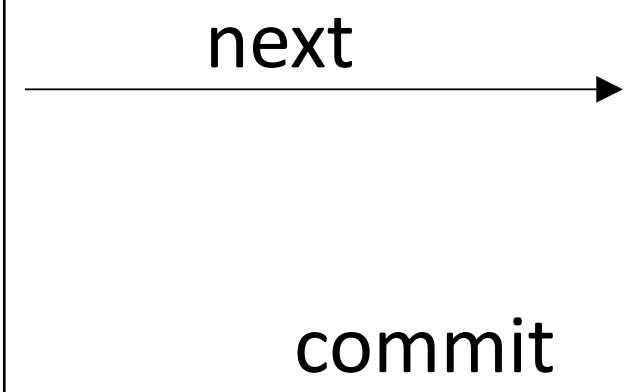
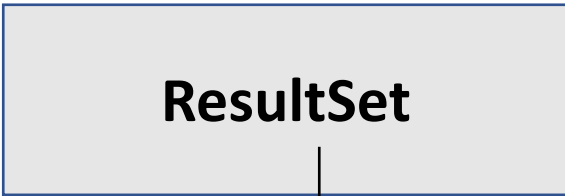
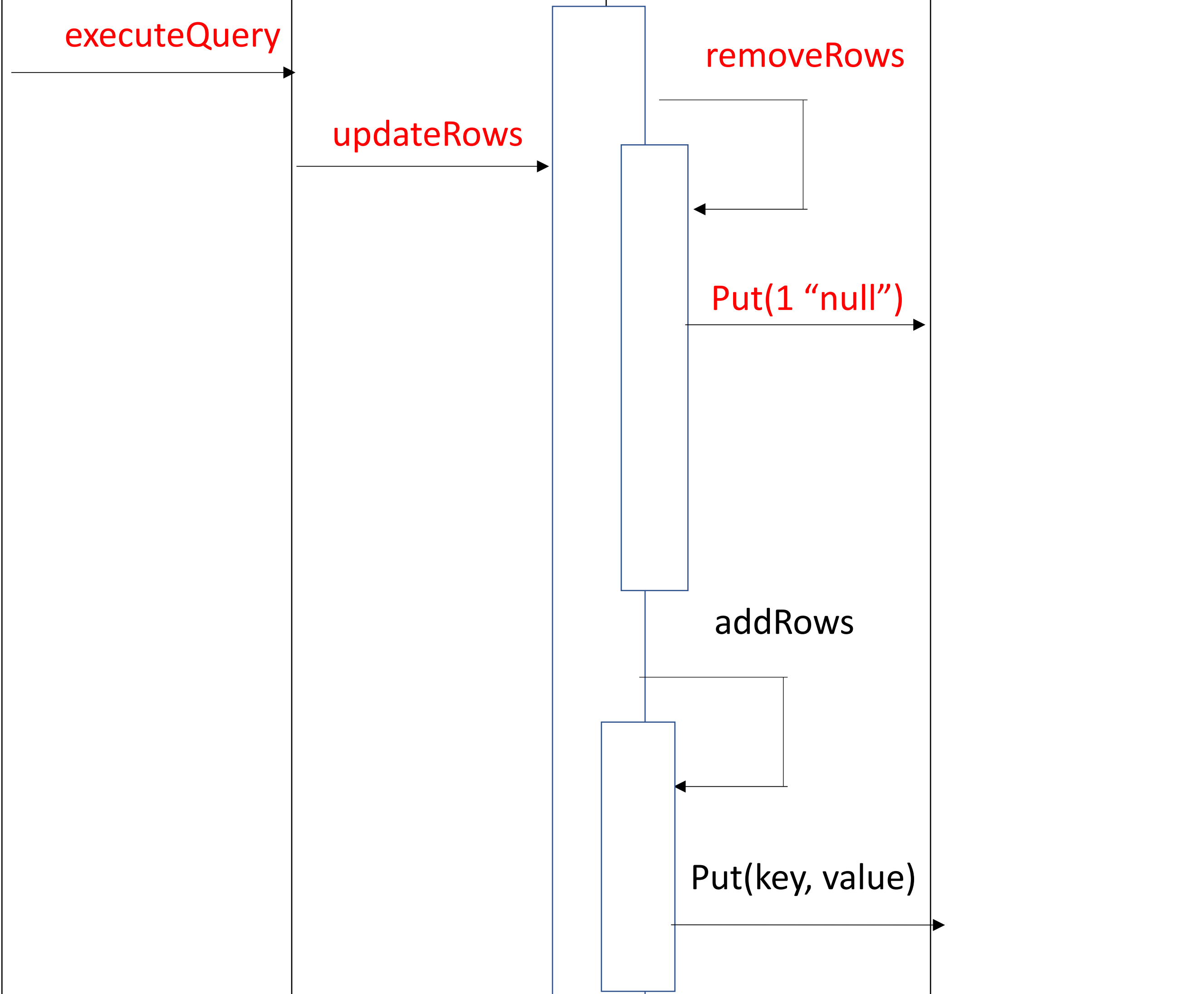
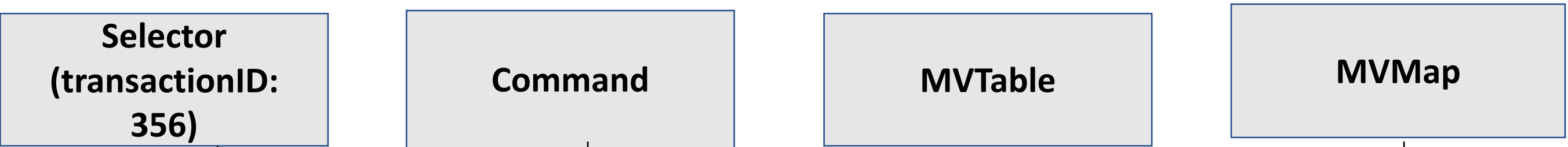
```
sql = "UPDATE test SET lastUpdated = 101");  
  
executeUpdate(sql);  
  
c.commit();
```



Key	Value	operator
4	101	357

Removed rows whose value is null

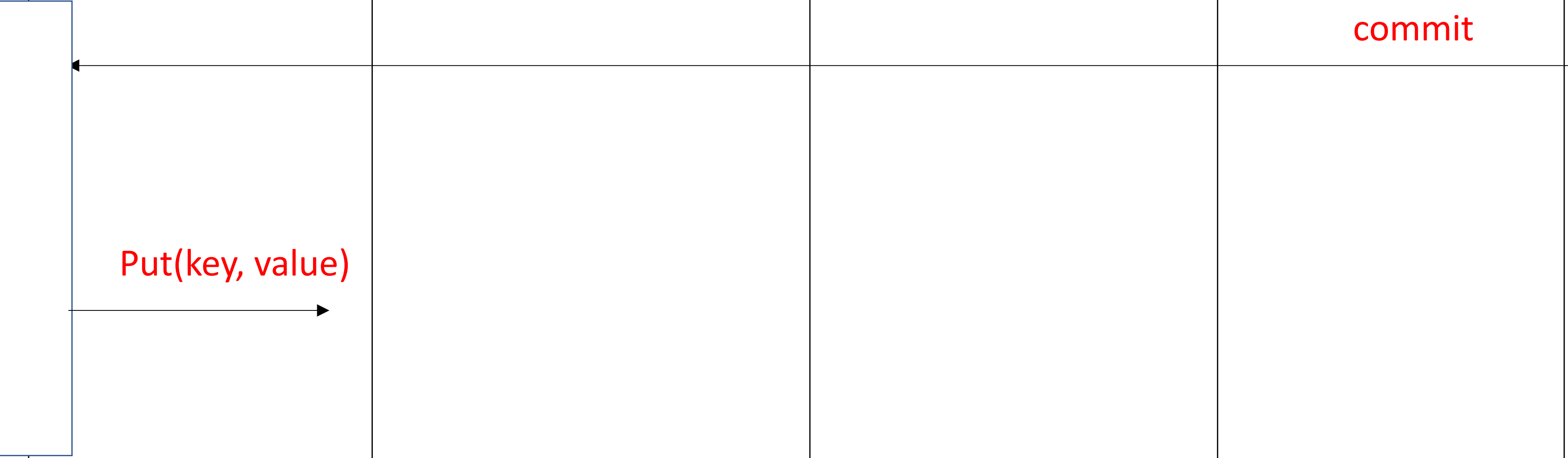
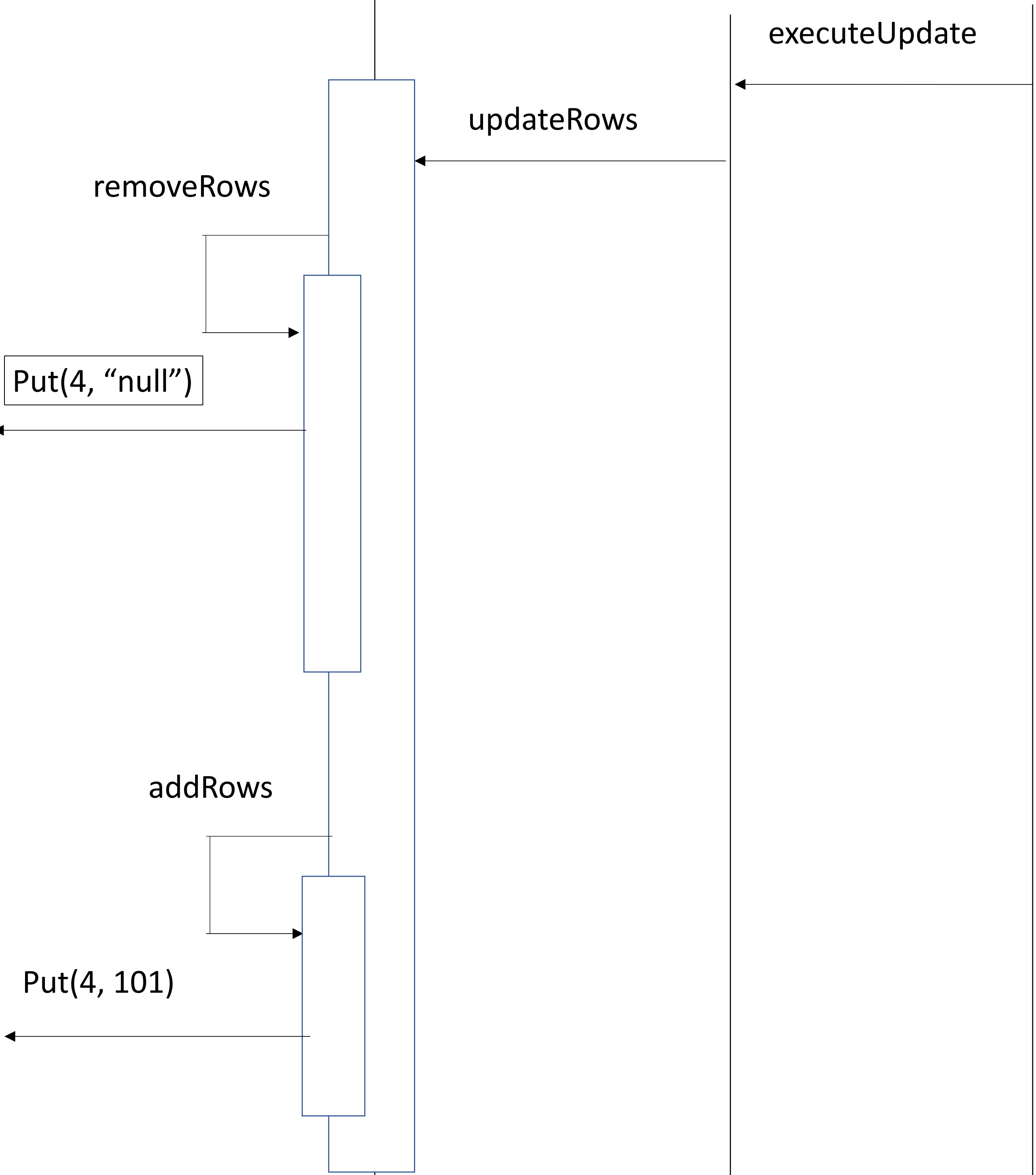
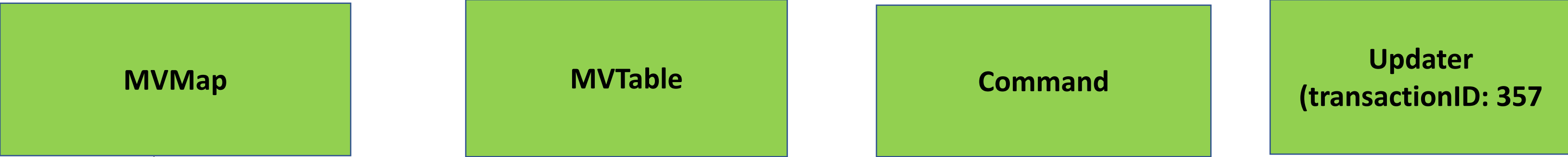




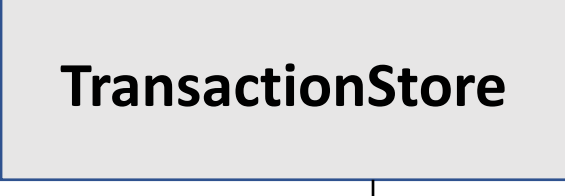
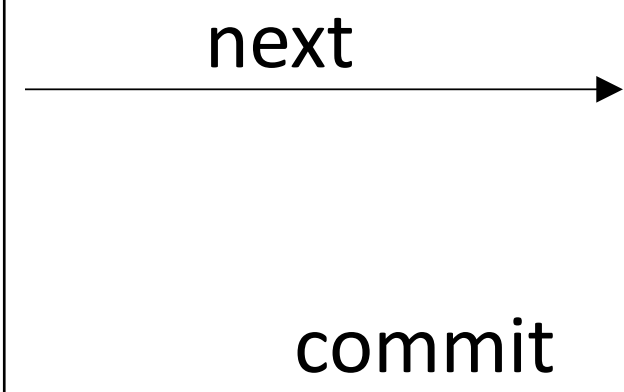
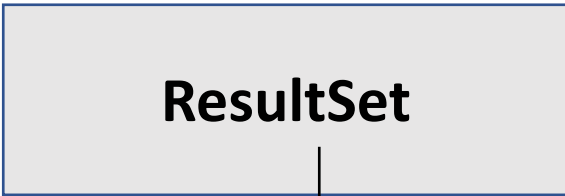
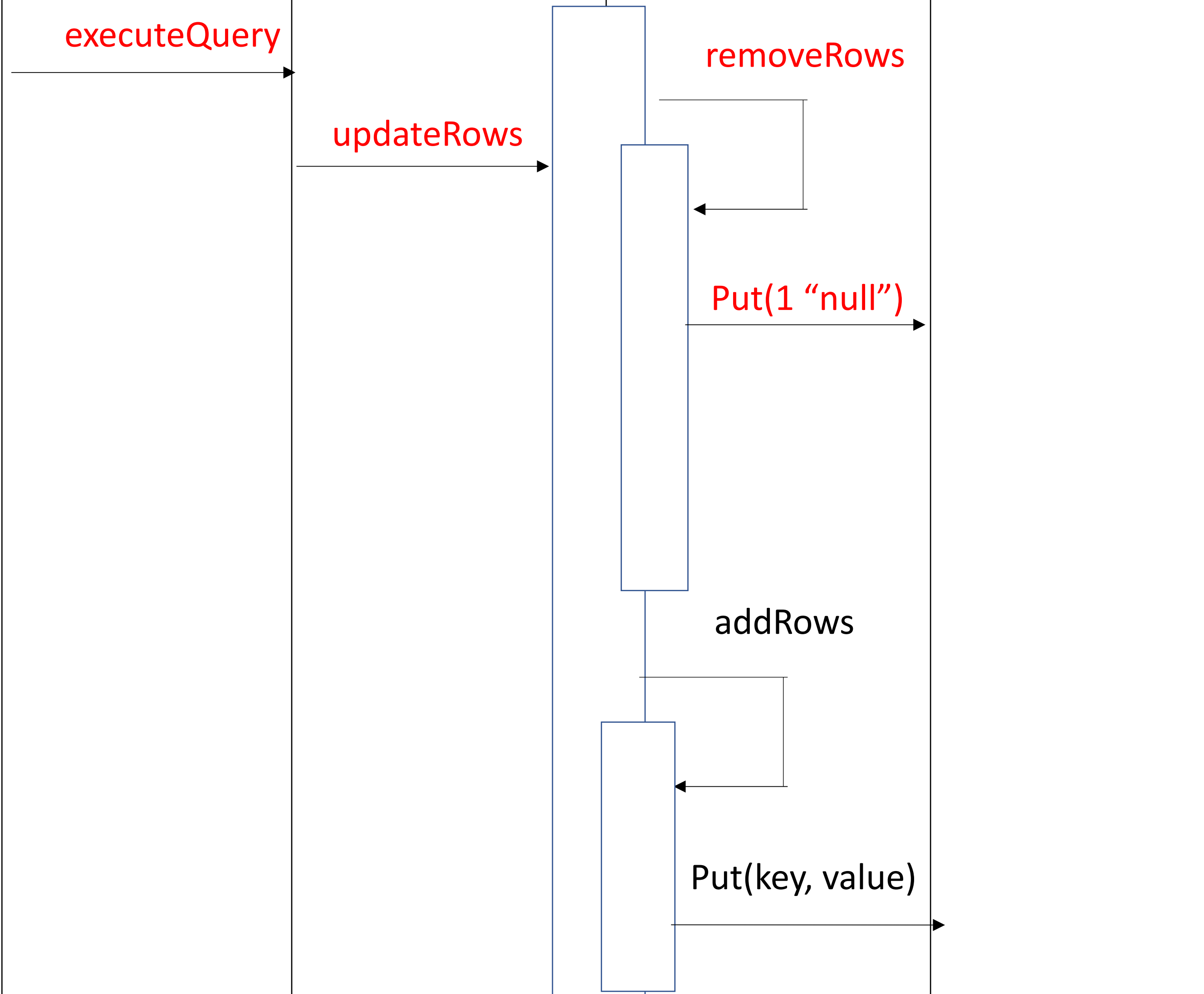
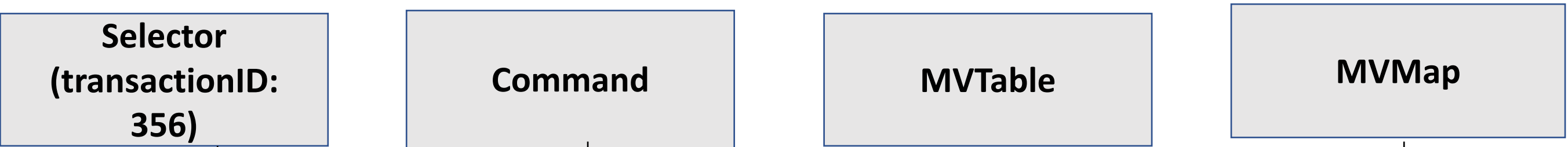
sql = "SELECT \* FROM test WHERE entity\_id = 1 FOR UPDATE";  
ResultSet set = executeQuery(sql);

```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

Key	Value	operator
4	101	357



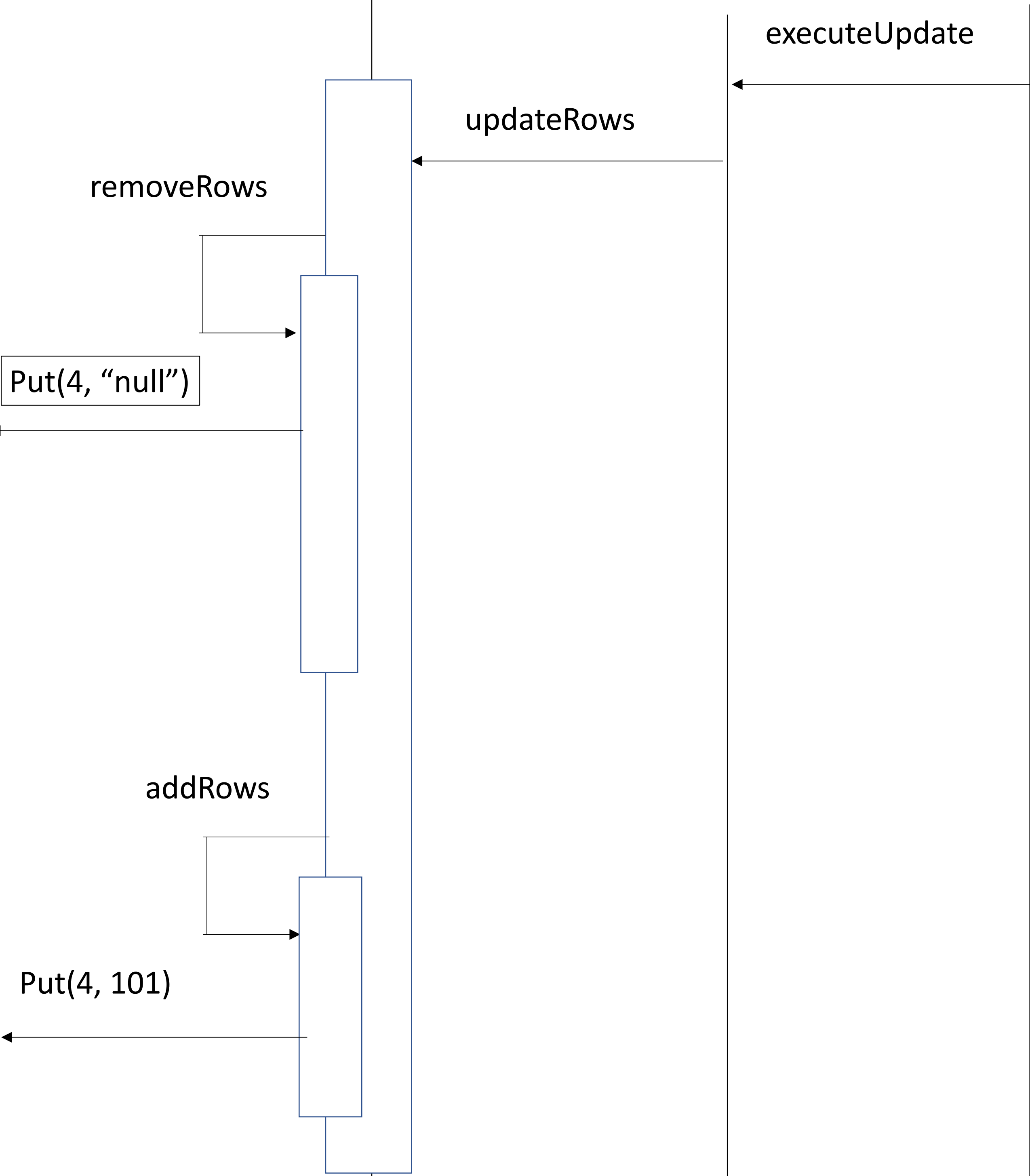
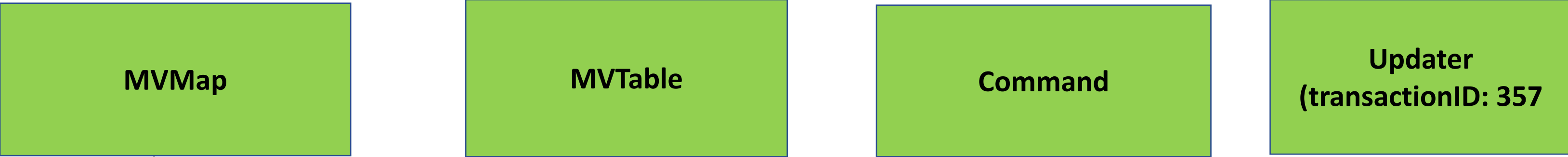
```
sql = "UPDATE test SET lastUpdated = 101");  
executeUpdate(sql);  
c.commit();
```



sql = "SELECT \* FROM test WHERE entity\_id = 1 FOR UPDATE";  
ResultSet set = executeQuery(sql);

```
if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();
```

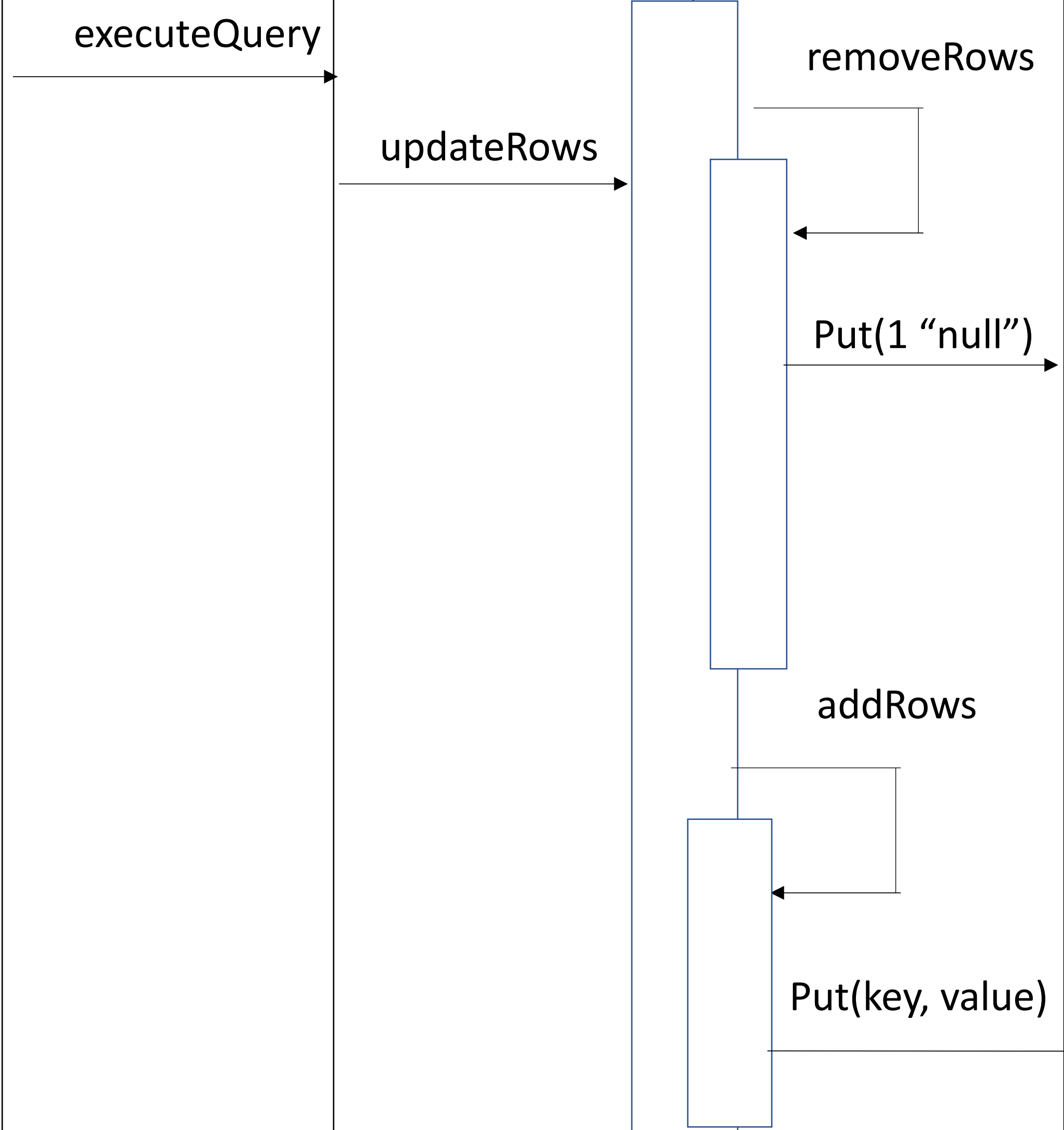
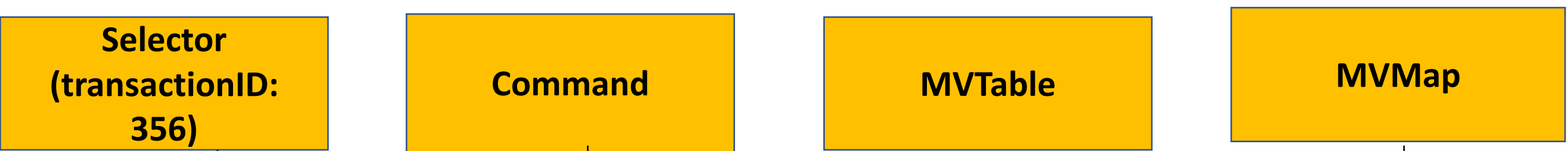
Key	Value	operator
4	101	



```
sql = "UPDATE test SET lastUpdated = 101");  
executeUpdate(sql);  
c.commit();
```





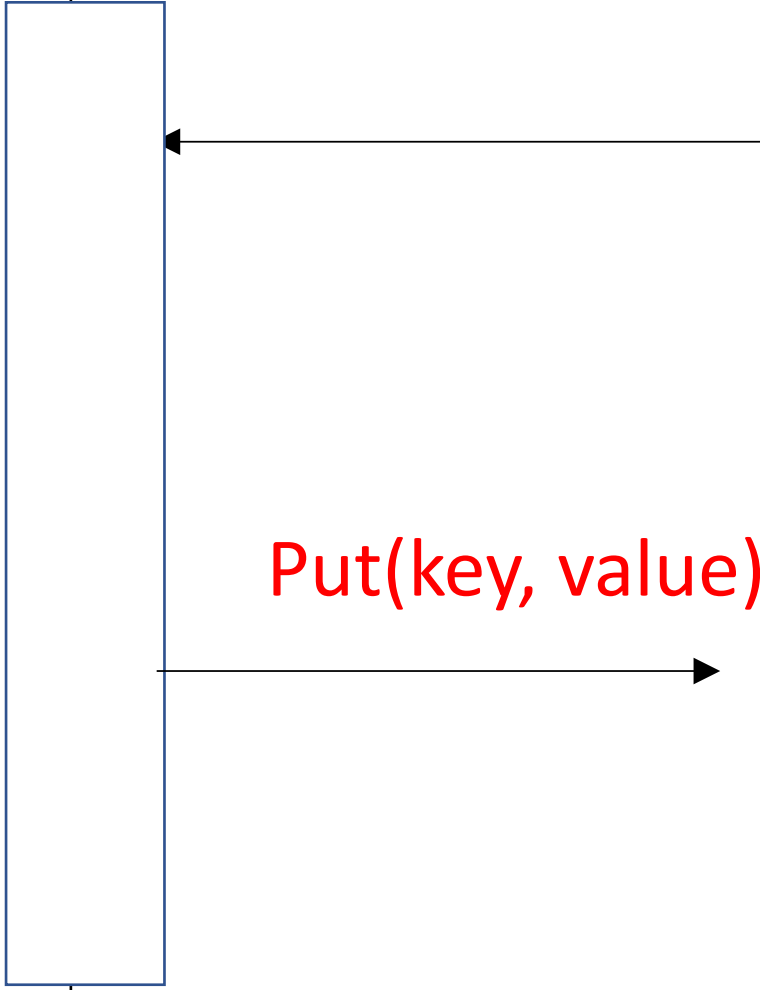
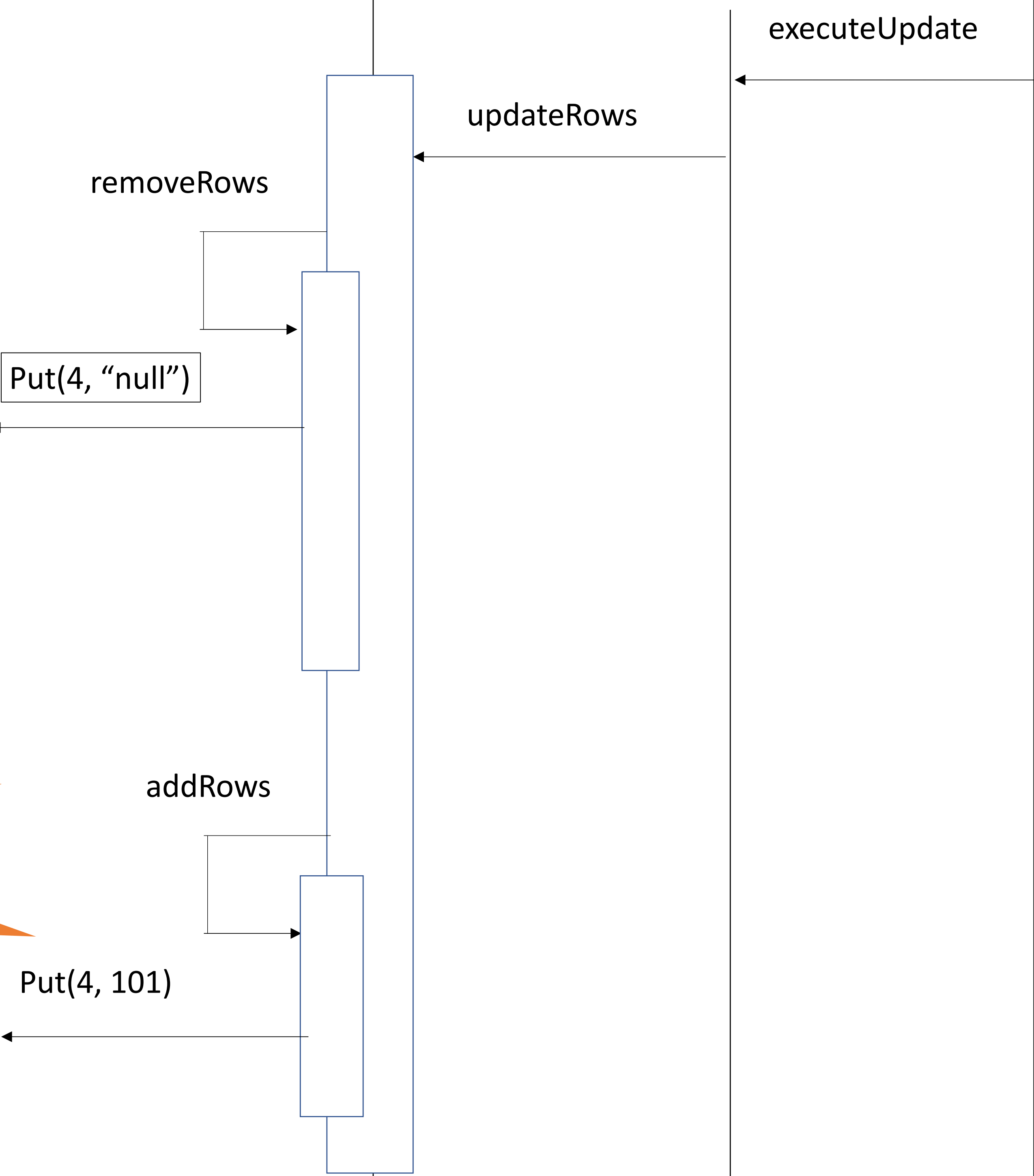
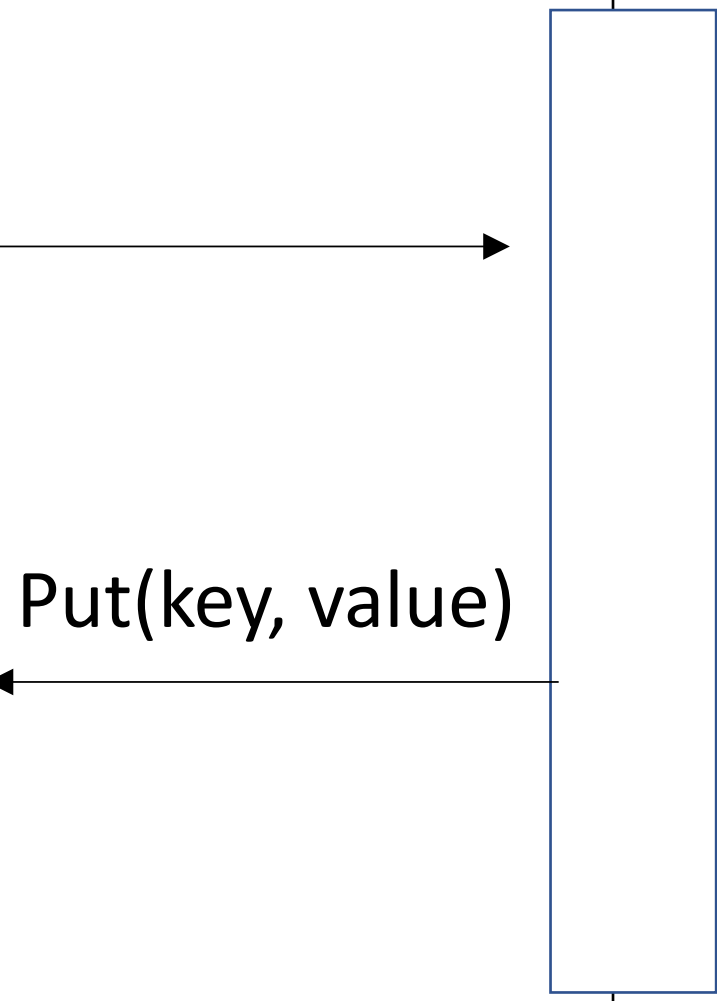


sql = "SELECT \* FROM test WHERE entity\_id = 1 FOR UPDATE";  
ResultSet set = executeQuery(sql);

if (!set.next()) {  
    // BUG!  
} else {  
    // NO BUG!  
}  
commit();

Key	Value	operator
4	101	

No MVMap for key 1 !!  
Empty Result returned!!



sql = "UPDATE test SET lastUpdated = 101");  
executeUpdate(sql);  
c.commit();