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Input 1:
----
b1;
r1 (Y);
w1 (Y);
r1 (Z);
b2;
r2 (X);
w2 (X);
w1 (Z);
e1;
r2 (Y);
b3;
r3 (Z);
w3 (Z);
w2 (Y);
e2;
b4;
w4(Y);
r3 (X);
w3 (X);
e3;
w4(X);
e4;

Output 1:
----
b1
Begin Transaction 1
TransactionID - 1, Timestamp - 1, State - Active

r1(Y)
Operation Successful
Read Lock obtained for Y
Updated Lock table for Y: Locking Transactions - [1] Lock State - RL
Updated Tansaction table for transaction 1: Locked items by Transaction -
[Y]

w1(Y)
Operation successful
Transaction 1 upgraded item Y to WL
Updated Lock table for Y: Locking Transaction - [1] Lock state - WL
Updated Transaction table for Transaction 1: Locked items by transaction
- [Y]

r1(Z)
Operation Successful

Read Lock obtained for Z
Updated Lock table for Z: Locking Transactions - [1] Lock State - RL
Updated Tansaction table for transaction 1: Locked items by Transaction -
[Y, Z]

b2
Begin Transaction 2
TranasctionID - 2, Timestamp - 2, State - Active

r2(X)
Operation Successful
Read Lock obtained for X
Updated Lock table for X: Locking Transactions - [2] Lock State - RL
Updated Tansaction table for transaction 2: Locked items by Transaction -
[X]

w2(X)
Operation successful
Transaction 2 upgraded item X to WL
Updated Lock table for X: Locking Transaction - [2] Lock state - WL
Updated Transaction table for Transaction 2: Locked items by transaction
- [X]

w1(Z)
Operation successful
Transaction 1 upgraded item Z to WL
Updated Lock table for Z: Locking Transaction - [1] Lock state - WL
Updated Transaction table for Transaction 1: Locked items by transaction
- [Y, Z]

e1
End transaction 1
Transaction 1 is committed
Lock held by Transaction 1 for item Y is released
As there are no waiting transaction item Y is unlocked
Lock held by Transaction 1 for item Z is released
As there are no waiting transaction item Z is unlocked

r2(Y)
Operation Successful
Read Lock acquired for Y
Updated lock table for Y: Locking Transaction - [2] Lock state - RL
Updated Tansaction table for transaction 2: Locked items by Transaction -
[X, Y]

b3
Begin Transaction 3
TranasctionID - 3, Timestamp - 3, State - Active

r3(Z)
Operation Successful
Read Lock acquired for Z
Updated lock table for Z: Locking Transaction - [3] Lock state - RL
Updated Tansaction table for transaction 3: Locked items by Transaction -
[Z]

w3(Z)
Operation successful
Transaction 3 upgraded item Z to WL
Updated Lock table for Z: Locking Transaction - [3] Lock state - WL

Updated Transaction table for Transaction 3: Locked items by transaction
- [Z]

w2(Y)
Operation successful
Transaction 2 upgraded item Y to WL
Updated Lock table for Y: Locking Transaction - [2] Lock state - WL
Updated Transaction table for Transaction 2: Locked items by transaction
- [X, Y]

e2
End transaction 2
Transaction 2 is committed
Lock held by Transaction 2 for item X is released
As there are no waiting transaction item X is unlocked
Lock held by Transaction 2 for item Y is released
As there are no waiting transaction item Y is unlocked

b4
Begin Transaction 4
TransasctionID - 4, Timestamp - 4, State - Active

w4(Y)
Operation successful
Transaction 4 acquired WL on item Y
Updated Lock table for Y: Locking Transaction - [4] Lock state - WL
Updated Transaction table for Transaction 4: Locked items by transaction
- [Y]

r3(X)
Operation Successful
Read Lock acquired for X
Updated lock table for X: Locking Transaction - [3] Lock state - RL
Updated Tansaction table for transaction 3: Locked items by Transaction -
[Z, X]

w3(X)
Operation successful
Transaction 3 upgraded item X to WL
Updated Lock table for X: Locking Transaction - [3] Lock state - WL
Updated Transaction table for Transaction 3: Locked items by transaction
- [Z, X]

e3
End transaction 3
Transaction 3 is committed
Lock held by Transaction 3 for item X is released
As there are no waiting transaction item X is unlocked
Lock held by Transaction 3 for item Z is released
As there are no waiting transaction item Z is unlocked

w4(X)
Operation successful
Transaction 4 acquired WL on item X
Updated Lock table for X: Locking Transaction - [4] Lock state - WL
Updated Transaction table for Transaction 4: Locked items by transaction
- [Y, X]

e4
End transaction 4

Transaction 4 is committed
Lock held by Transaction 4 for item X is released
As there are no waiting transaction item X is unlocked
Lock held by Transaction 4 for item Y is released
As there are no waiting transaction item Y is unlocked

End of file

Input 2:

----
b1;
r1 (Y);
w1 (Y);
r1 (Z);
b2;
r2 (X);
w2 (X);
w1 (Z);
r2 (Y);
e1;
b3;
r3 (Z);
w3 (Z);
w2 (Y);
e2;
r3 (X);
w3 (X);
b4;
w4(X);
e3;
e4;

Output 2:

----
b1
Begin Transaction 1
TranasctionID - 1, Timestamp - 1, State - Active

r1(Y)
Operation Successful
Read Lock obtained for Y
Updated Lock table for Y: Locking Transactions - [1] Lock State - RL
Updated Tansaction table for transaction 1: Locked items by Transaction -
[Y]

w1(Y)
Operation successful
Transaction 1 upgraded item Y to WL
Updated Lock table for Y: Locking Transaction - [1] Lock state - WL
Updated Transaction table for Transaction 1: Locked items by transaction
- [Y]

```
r1(Z)
Operation Successful
Read Lock obtained for Z
Updated Lock table for Z: Locking Transactions - [1] Lock State - RL
Updated Tansaction table for transaction 1: Locked items by Transaction -
[Y, Z]

b2
Begin Transaction 2
TransactionID - 2, Timestamp - 2, State - Active

r2(X)
Operation Successful
Read Lock obtained for X
Updated Lock table for X: Locking Transactions - [2] Lock State - RL
Updated Tansaction table for transaction 2: Locked items by Transaction -
[X]

w2(X)
Operation successful
Transaction 2 upgraded item X to WL
Updated Lock table for X: Locking Transaction - [2] Lock state - WL
Updated Transaction table for Transaction 2: Locked items by transaction
- [X]

w1(Z)
Operation successful
Transaction 1 upgraded item Z to WL
Updated Lock table for Z: Locking Transaction - [1] Lock state - WL
Updated Transaction table for Transaction 1: Locked items by transaction
- [Y, Z]

r2(Y)
Write Read Conflict! between Transaction 1 and Transaction 2
Operation unsuccessful
Transaction 2 Aborts as Timestamp of 2 is greater than Transaction1
Lock held by Transaction 2 for item X is released
 The item X is unlocked as there are no waiting transactions

e1
End transaction 1
Transaction 1 is committed
Lock held by Transaction 1 for item Y is released
As there are no waiting transaction item Y is unlocked
Lock held by Transaction 1 for item Z is released
As there are no waiting transaction item Z is unlocked

b3
Begin Transaction 3
TransactionID - 3, Timestamp - 3, State - Active

r3(Z)
Operation Successful
Read Lock acquired for Z
Updated lock table for Z: Locking Transaction - [3] Lock state - RL
Updated Tansaction table for transaction 3: Locked items by Transaction -
[Z]

w3(Z)
Operation successful
```

Transaction 3 upgraded item Z to WL
Updated Lock table for Z: Locking Transaction - [3] Lock state - WL
Updated Transaction table for Transaction 3: Locked items by transaction
- [Z]

w2(Y)
Operation unsuccessful
Transaction 2 is already aborted

e2
Operation unsuccessful
Transaction 2 is already aborted

r3(X)
Operation Successful
Read Lock acquired for X
Updated lock table for X: Locking Transaction - [3] Lock state - RL
Updated Tansaction table for transaction 3: Locked items by Transaction -
[Z, X]

w3(X)
Operation successful
Transaction 3 upgraded item X to WL
Updated Lock table for X: Locking Transaction - [3] Lock state - WL
Updated Transaction table for Transaction 3: Locked items by transaction
- [Z, X]

b4
Begin Transaction 4
TransactionID - 4, Timestamp - 4, State - Active

w4(X)
Write Write Conflict between Transaction 3 and Transaction 4
Operation unsuccessful
Transaction 4 Aborts as Timestamp of 4 is greater than Transaction3

e3
End transaction 3
Transaction 3 is committed
Lock held by Transaction 3 for item X is released
As there are no waiting transaction item X is unlocked
Lock held by Transaction 3 for item Z is released
As there are no waiting transaction item Z is unlocked

e4
Operation unsuccessful
Transaction 4 is already aborted

End of file

Input 3:

----
b1;
r1 (Y);
w1 (Y);

```
r1 (Z);
b2;
r2 (X);
w2 (X);
w1 (Z);
r2 (Y);
e1;
b3;
r3 (Z);
w3 (Z);
w2 (Y);
e2;
b4;
w4(X);
r3 (X);
e4;
w3 (X);
e3;
```

Output 3:


```
b1
Begin Transaction 1
TransactionID - 1, Timestamp - 1, State - Active

r1(Y)
Operation Successful
Read Lock obtained for Y
Updated Lock table for Y: Locking Transactions - [1] Lock State - RL
Updated Tansaction table for transaction 1: Locked items by Transaction -
[Y]

w1(Y)
Operation successful
Transaction 1 upgraded item Y to WL
Updated Lock table for Y: Locking Transaction - [1] Lock state - WL
Updated Transaction table for Transaction 1: Locked items by transaction
- [Y]

r1(Z)
Operation Successful
Read Lock obtained for Z
Updated Lock table for Z: Locking Transactions - [1] Lock State - RL
Updated Tansaction table for transaction 1: Locked items by Transaction -
[Y, Z]

b2
Begin Transaction 2
TransactionID - 2, Timestamp - 2, State - Active

r2(X)
Operation Successful
Read Lock obtained for X
Updated Lock table for X: Locking Transactions - [2] Lock State - RL
Updated Tansaction table for transaction 2: Locked items by Transaction -
[X]

w2(X)
Operation successful
```

Transaction 2 upgraded item X to WL
Updated Lock table for X: Locking Transaction - [2] Lock state - WL
Updated Transaction table for Transaction 2: Locked items by transaction
- [X]

w1(Z)
Operation successful
Transaction 1 upgraded item Z to WL
Updated Lock table for Z: Locking Transaction - [1] Lock state - WL
Updated Transaction table for Transaction 1: Locked items by transaction
- [Y, Z]

r2(Y)
Write Read Conflict! between Transaction 1 and Transaction 2
Operation unsuccessful
Transaction 2 Aborts as Timestamp of 2 is greater than Transaction1
Lock held by Transaction 2 for item X is released
 The item X is unlocked as there are no waiting transactions

e1
End transaction 1
Transaction 1 is committed
Lock held by Transaction 1 for item Y is released
As there are no waiting transaction item Y is unlocked
Lock held by Transaction 1 for item Z is released
As there are no waiting transaction item Z is unlocked

b3
Begin Transaction 3
TransactionID - 3, Timestamp - 3, State - Active

r3(Z)
Operation Successful
Read Lock acquired for Z
Updated lock table for Z: Locking Transaction - [3] Lock state - RL
Updated Tansaction table for transaction 3: Locked items by Transaction -
[Z]

w3(Z)
Operation successful
Transaction 3 upgraded item Z to WL
Updated Lock table for Z: Locking Transaction - [3] Lock state - WL
Updated Transaction table for Transaction 3: Locked items by transaction
- [Z]

w2(Y)
Operation unsuccessful
Transaction 2 is already aborted

e2
Operation unsuccessful
Transaction 2 is already aborted

b4
Begin Transaction 4
TransactionID - 4, Timestamp - 4, State - Active

w4(X)
Operation successful
Transaction 4 acquired WL on item X

Updated Lock table for X: Locking Transaction - [4] Lock state - WL
Updated Transaction table for Transaction 4: Locked items by transaction
- [X]

r3(X)
Write Read Conflict! between Transaction 4 and Transaction 3
Operation Successful
Transaction 3 Waits as Timestamp of 3 is less than Transaction4
Current transaction is blocked and operation r3(X); is added to waiting
Operations
Waiting operations of Transaction3 are[r3(X);]

e4
End transaction 4
Transaction 4 is committed
Lock held by Transaction 4 for item X is released
Started waiting transaction 3
Transaction State - Blocked .Waiting operation of the transaction -
[r3(X);]

r3(X)
Operation Successful
Read Lock obtained for X
Updated Lock table for X: Locking Transactions - [3] Lock State - RL
Updated Tansaction table for transaction 3: Locked items by Transaction -
[Z, X]

w3(X)
Operation successful
Transaction 3 upgraded item X to WL
Updated Lock table for X: Locking Transaction - [3] Lock state - WL
Updated Transaction table for Transaction 3: Locked items by transaction
- [Z, X]

e3
End transaction 3
Transaction 3 is committed
Lock held by Transaction 3 for item X is released
As there are no waiting transaction item X is unlocked
Lock held by Transaction 3 for item Z is released
As there are no waiting transaction item Z is unlocked

End of file

Input 4:

----
b1;
r1 (Z);
b2;
r2 (X);
w2 (X);
w1 (Z);
r2 (Y);
r1 (Y);
w1 (Y);

```
b3;
r3 (Z);
e1;
w3 (Z);
w2 (Y);
e2;
r3 (X);
w3 (X);
e3;
```

Output 4:

----

b1
Begin Transaction 1
TranasctionID - 1, Timestamp - 1, State - Active

r1(Z)
Operation Successful
Read Lock obtained for Z
Updated Lock table for Z: Locking Transactions - [1] Lock State - RL
Updated Tansaction table for transaction 1: Locked items by Transaction -
[Z]

b2
Begin Transaction 2
TranasctionID - 2, Timestamp - 2, State - Active

r2(X)
Operation Successful
Read Lock obtained for X
Updated Lock table for X: Locking Transactions - [2] Lock State - RL
Updated Tansaction table for transaction 2: Locked items by Transaction -
[X]

w2(X)
Operation successful
Transaction 2 upgraded item X to WL
Updated Lock table for X: Locking Transaction - [2] Lock state - WL
Updated Transaction table for Transaction 2: Locked items by transaction
- [X]

w1(Z)
Operation successful
Transaction 1 upgraded item Z to WL
Updated Lock table for Z: Locking Transaction - [1] Lock state - WL
Updated Transaction table for Transaction 1: Locked items by transaction
- [Z]

r2(Y)
Operation Successful
Read Lock obtained for Y
Updated Lock table for Y: Locking Transactions - [2] Lock State - RL
Updated Tansaction table for transaction 2: Locked items by Transaction -
[X, Y]
```

```
r1(Y)
Operation Successful
Read Lock obtained for Y
Updated lock table for Y: Locking Transactions - [2, 1] Lock state - RL
Updated Transaction table for transaction 1: Locked items by Transaction
1 are - [Z, Y]

w1(Y)
Read Write Conflict! between Transaction [2, 1] and Transaction 1
Operation Successful
Transaction  1 Waits as Timestamp of 1 is less than Transaction2
Current transaction is blocked and operation w1(Y); is added to waiting
Operations
Waiting operations of Transaction1 are[w1(Y);]

b3
Begin Transaction 3
TransasctionID - 3, Timestamp - 3, State - Active

r3(Z)
Write Read Conflict! between Transaction 1 and Transaction 3
Operation unsuccessful
Transaction 3 Aborts as Timestamp of 3 is greater than Transaction1

e1
Current transaction is blocked and operation e1; is added to waiting
Operations
Waiting operations of Transaction1 are[w1(Y);, e1;]

w3(Z)
Operation unsuccessful
Transaction 3 is already aborted

w2(Y)
Read Write Conflict! between Transaction [2, 1] and Transaction 2
Operation unsuccessful
Transaction 2 Aborts as Timestamp of 2 is greater than Transaction1
Lock held by Transaction 2 for item X is released
 The item X is unlocked as there are no waiting transactions
Lock held by Transaction 2 for item Y is released
Started waiting transaction 1
Transaction State - Blocked .Waiting operation of the transaction -
[w1(Y);, e1;]

w1(Y)
Operation successful
Transaction 1 upgraded item Y to WL
Updated Lock table for Y: Locking Transaction - [1] Lock state - WL
Updated Transaction table for Transaction 1: Locked items by transaction
- [Z, Y]

e1
End transaction 1
Transaction 1 is committed
Lock held by Transaction 1 for item Y is released
As there are no waiting transaction item Y is unlocked
Lock held by Transaction 1 for item Z is released
As there are no waiting transaction item Z is unlocked

e2
```

Operation unsuccessful
Transaction 2 is already aborted

r3(X)
Operation unsuccessful
Transaction 3 is already aborted

w3(X)
Operation unsuccessful
Transaction 3 is already aborted

e3
Operation unsuccessful
Transaction 3 is already aborted

End of file

Input 5:

----
b1;
r1 (Y);
r1 (Z);
b2;
r2 (Y);
b3;
r3 (Y);
w1 (Z);
w3 (Y);
e1;
e3;
w2 (Y);
r2 (X);
w2 (X);
e2;

Output 5:

----
b1
Begin Transaction 1
TransactionID - 1, Timestamp - 1, State - Active

r1(Y)
Operation Successful
Read Lock obtained for Y
Updated Lock table for Y: Locking Transactions - [1] Lock State - RL
Updated Tansaction table for transaction 1: Locked items by Transaction -
[Y]

r1(Z)
Operation Successful
Read Lock obtained for Z
Updated Lock table for Z: Locking Transactions - [1] Lock State - RL
Updated Tansaction table for transaction 1: Locked items by Transaction -
[Y, Z]

```
b2
Begin Transaction 2
TransactionID - 2, Timestamp - 2, State - Active

r2(Y)
Operation Successful
Read Lock obtained for Y
Updated lock table for Y: Locking Transactions - [1, 2] Lock state - RL
Updated Transaction table for transaction 2: Locked items by Transaction
2 are - [Y]

b3
Begin Transaction 3
TransactionID - 3, Timestamp - 3, State - Active

r3(Y)
Operation Successful
Read Lock obtained for Y
Updated lock table for Y: Locking Transactions - [1, 2, 3] Lock state -
RL
Updated Transaction table for transaction 3: Locked items by Transaction
3 are - [Y]

w1(Z)
Operation successful
Transaction 1 upgraded item Z to WL
Updated Lock table for Z: Locking Transaction - [1] Lock state - WL
Updated Transaction table for Transaction 1: Locked items by transaction
- [Y, Z]

w3(Y)
Read Write Conflict! between Transaction [1, 2, 3] and Transaction 3
Operation unsuccessful
Transaction 3 Aborts as Timestamp of 3 is greater than Transaction1
Lock held by Transaction 3 for item Y is released
Operation unsuccessful
Transaction 3 Aborts as Timestamp of 3 is greater than Transaction2

e1
End transaction 1
Transaction 1 is committed
Lock held by Transaction 1 for item Y is released
Lock held by Transaction 1 for item Z is released
As there are no waiting transaction item Z is unlocked

e3
Operation unsuccessful
Transaction 3 is already aborted

w2(Y)
Operation successful
Transaction 2 upgraded item Y to WL
Updated Lock table for Y: Locking Transaction - [2] Lock state - WL
Updated Transaction table for Transaction 2: Locked items by transaction
- [Y]

r2(X)
Operation Successful
Read Lock obtained for X
```

Updated Lock table for X: Locking Transactions - [2] Lock State - RL
Updated Tansaction table for transaction 2: Locked items by Transaction -
[Y, X]

w2(X)
Operation successful
Transaction 2 upgraded item X to WL
Updated Lock table for X: Locking Transaction - [2] Lock state - WL
Updated Transaction table for Transaction 2: Locked items by transaction
- [Y, X]

e2
End transaction 2
Transaction 2 is committed
Lock held by Transaction 2 for item X is released
As there are no waiting transaction item X is unlocked
Lock held by Transaction 2 for item Y is released
As there are no waiting transaction item Y is unlocked

End of file

Input 6:

----
b1;
r1 (Y);
r1 (Z);
b2;
r2 (Y);
b3;
r3 (Y);
w1 (Z);
w3 (Y);
w2 (Y);
r2 (X);
e1;
e3;
w2 (X);
e2;

Output 6:

----
b1
Begin Transaction 1
TransactionID - 1, Timestamp - 1, State - Active

r1(Y)
Operation Successful
Read Lock obtained for Y
Updated Lock table for Y: Locking Transactions - [1] Lock State - RL
Updated Tansaction table for transaction 1: Locked items by Transaction -
[Y]

```
r1(Z)
Operation Successful
Read Lock obtained for Z
Updated Lock table for Z: Locking Transactions - [1] Lock State - RL
Updated Tansaction table for transaction 1: Locked items by Transaction -
[Y, Z]

b2
Begin Transaction 2
TranasctionID - 2, Timestamp - 2, State - Active

r2(Y)
Operation Successful
Read Lock obtained for Y
Updated lock table for Y: Locking Transactions - [1, 2] Lock state - RL
Updated Transaction table for transaction 2: Locked items by Transaction
2 are - [Y]

b3
Begin Transaction 3
TranasctionID - 3, Timestamp - 3, State - Active

r3(Y)
Operation Successful
Read Lock obtained for Y
Updated lock table for Y: Locking Transactions - [1, 2, 3] Lock state -
RL
Updated Transaction table for transaction 3: Locked items by Transaction
3 are - [Y]

w1(Z)
Operation successful
Transaction 1 upgraded item Z to WL
Updated Lock table for Z: Locking Transaction - [1] Lock state - WL
Updated Transaction table for Transaction 1: Locked items by transaction
- [Y, Z]

w3(Y)
Read Write Conflict! between Transaction [1, 2, 3] and Transaction 3
Operation unsuccessful
Transaction 3 Aborts as Timestamp of 3 is greater than Transaction1
Lock held by Transaction 3 for item Y is released
Operation unsuccessful
Transaction 3 Aborts as Timestamp of 3 is greater than Transaction2

w2(Y)
Read Write Conflict! between Transaction [1, 2] and Transaction 2
Operation unsuccessful
Transaction 2 Aborts as Timestamp of 2 is greater than Transaction1
Lock held by Transaction 2 for item Y is released

r2(X)
Operation unsuccessful
Transaction 2 is already aborted

e1
End transaction 1
Transaction 1 is committed
Lock held by Transaction 1 for item Y is released
As there are no waiting transaction item Y is unlocked
```

```
Lock held by Transaction 1 for item Z is released
As there are no waiting transaction item Z is unlocked

e3
Operation unsuccessful
Transaction 3 is already aborted

w2(X)
Operation unsuccessful
Transaction 2 is already aborted

e2
Operation unsuccessful
Transaction 2 is already aborted

End of file


----------------------------------------------------------------------
----------------

Input 7:
----------------------------------------------------------------------
----------------
b1;
r1 (Y);
w1 (Y);
r1 (Z);
b2;
r2 (Y);
b3;
r3 (Z);
w1 (Z);
w2 (Y);
r2 (X);
e1;
w3 (Z);
e3;
w2 (X);
e2;


Output 7:
----------------------------------------------------------------------
------------------

b1
Begin Transaction 1
TranasctionID - 1, Timestamp - 1, State - Active

r1(Y)
Operation Successful
Read Lock obtained for Y
Updated Lock table for Y: Locking Transactions - [1] Lock State - RL
Updated Tansaction table for transaction 1: Locked items by Transaction -
[Y]

w1(Y)
Operation successful
Transaction 1 upgraded item Y to WL
```

Updated Lock table for Y: Locking Transaction - [1] Lock state - WL
Updated Transaction table for Transaction 1: Locked items by transaction - [Y]

r1(Z)
Operation Successful
Read Lock obtained for Z
Updated Lock table for Z: Locking Transactions - [1] Lock State - RL
Updated Tansaction table for transaction 1: Locked items by Transaction - [Y, Z]

b2
Begin Transaction 2
TranasctionID - 2, Timestamp - 2, State - Active

r2(Y)
Write Read Conflict! between Transaction 1 and Transaction 2
Operation unsuccessful
Transaction 2 Aborts as Timestamp of 2 is greater than Transaction1

b3
Begin Transaction 3
TranasctionID - 3, Timestamp - 3, State - Active

r3(Z)
Operation Successful
Read Lock obtained for Z
Updated lock table for Z: Locking Transactions - [1, 3] Lock state - RL
Updated Transaction table for transaction 3: Locked items by Transaction 3 are - [Z]

w1(Z)
Read Write Conflict! between Transaction [1, 3] and Transaction 1
Operation Successful
Transaction 1 Waits as Timestamp of 1 is less than Transaction3
Current transaction is blocked and operation w1(Z); is added to waiting Operations
Waiting operations of Transaction1 are[w1(Z);]

w2(Y)
Operation unsuccessful
Transaction 2 is already aborted

r2(X)
Operation unsuccessful
Transaction 2 is already aborted

e1
Current transaction is blocked and operation e1; is added to waiting Operations
Waiting operations of Transaction1 are[w1(Z);, e1;]

w3(Z)
Read Write Conflict! between Transaction [1, 3] and Transaction 3
Operation unsuccessful
Transaction 3 Aborts as Timestamp of 3 is greater than Transaction1
Lock held by Transaction 3 for item Z is released
Started waiting transaction 1
Transaction State - Blocked .Waiting operation of the transaction - [w1(Z);, e1;]

```
w1(Z)
Operation successful
Transaction 1 upgraded item Z to WL
Updated Lock table for Z: Locking Transaction - [1] Lock state - WL
Updated Transaction table for Transaction 1: Locked items by transaction
- [Y, Z]

e1
End transaction 1
Transaction 1 is committed
Lock held by Transaction 1 for item Y is released
As there are no waiting transaction item Y is unlocked
Lock held by Transaction 1 for item Z is released
As there are no waiting transaction item Z is unlocked

e3
Operation unsuccessful
Transaction 3 is already aborted

w2(X)
Operation unsuccessful
Transaction 2 is already aborted

e2
Operation unsuccessful
Transaction 2 is already aborted

End of file
```