

Acid Properties:

ACID is the abbreviation of atomicity, consistency, isolation and durability. Together all these properties ensure that set of database operations done by users (grouped together in a transaction) leave the database in a valid state even in the event of unexpected errors.

```
-- Begin the transaction

BEGIN TRANSACTION;

-- Deduct 5 units of product with ID 123 from inventory

UPDATE Products

SET Quantity = Quantity - 5

WHERE ProductID = 123;

-- Check if the updated quantity is valid (greater than or equal to 0)

SELECT Quantity FROM Products WHERE ProductID = 123;

-- If the quantity is negative, rollback the transaction

IF (SELECT Quantity FROM Products WHERE ProductID = 123) < 0

BEGIN

    PRINT 'Rolling back transaction';

    ROLLBACK;

END

ELSE

BEGIN

    -- If the quantity is valid, commit the transaction

    PRINT 'Committing transaction';

    COMMIT;

END
```

Creating two tables Products and logs and inserting values in them

-- Create Products table

```
CREATE TABLE Products (  
    ProductID INT PRIMARY KEY,  
    Quantity INT  
);
```

-- Insert sample data into Products table

```
INSERT INTO Products (ProductID, Quantity)  
VALUES (1, 10); -- Product with ID 1 and initial quantity 10
```

-- Create Logs table

```
CREATE TABLE Logs (  
    LogID INT PRIMARY KEY,  
    ProductID INT,  
    OldQuantity INT,  
    NewQuantity INT,  
    TransactionID VARCHAR(10)  
);
```

Now, let's simulate the transactions T1 and T2 under different isolation levels:

-- Set isolation level to READ COMMITTED for Transaction T1

```
SET TRANSACTION ISOLATION LEVEL READ COMMITTED;
```

-- Transaction T1: Update the quantity of ProductID = 1

```
BEGIN TRANSACTION;
```

```
UPDATE Products SET Quantity = Quantity - 5 WHERE ProductID = 1;
```

```
INSERT INTO Logs (ProductID, OldQuantity, NewQuantity, TransactionID)
```

```
VALUES (1, (SELECT Quantity + 5 FROM Products WHERE ProductID = 1), (SELECT Quantity  
FROM Products WHERE ProductID = 1), 'T1');
```

COMMIT;

-- Set isolation level to REPEATABLE READ for Transaction T2

SET TRANSACTION ISOLATION LEVEL REPEATABLE READ;

-- Transaction T2: Update the quantity of ProductID = 1

BEGIN TRANSACTION;

UPDATE Products SET Quantity = Quantity - 3 WHERE ProductID = 1;

INSERT INTO Logs (ProductID, OldQuantity, NewQuantity, TransactionID)

VALUES (1, (SELECT Quantity + 3 FROM Products WHERE ProductID = 1), (SELECT Quantity
FROM Products WHERE ProductID = 1), 'T2');

COMMIT;