What are the ACID properties of SQL transactions?

1. Atomicity
   1. An all or nothing operation
      1. All changes made to data (insert, update, delete) take place, or none of the changes take place; if one part of the change doesn’t work, all the other changes will fail as a result.
      2. Example: Both an UPDATE and INSERT statement should execute successfully. If the UPDATE command is successful, but the INSERT command fails, the database should undo and rollback the changes made by the UPDATE command.
2. Consistency
   1. Ensures data consistency
      1. Database is never left in a half-completed state
         1. The data will be in a consistent state before a transaction starts and left in a consistent state after a transaction is finished
      2. Example:
3. Isolation
   1. Every transaction is individual
      1. Data modifications made by one transaction must be isolated from the data modifications made by other transactions
      2. Refers to the way multiple transactions occur concurrently within a database in such a way that they don’t affect each other
      3. Example: Shopping on Amazon. Person A wants 5 of x item and person B wants 6 of x item, but there are only 10 x items available. If person A clicks first, they get 5 of x item and person be may only get 5. If person be clicks first, they get 6 of x item and person B only gets 4. Isolation ensures that 11 of item x isn’t sold when there are only 10 units available.
4. Durability
   1. Changes made to the database will be permanent once the transaction is completed
      1. Protects against system failures
      2. Example: Trying to purchase the PS5 on launch day. You’ve managed to add the console to your cart, process your payment, and see the confirmation screen. If the site crashes, your transaction could be lost and your dream of being the cool gamer kid dashed, all due to a lack of durability