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Denormalization

What is database denormalization?

It is a technique applied to a **previously normalized** database to increase the performance. By adding redundant copies of data or by grouping it which means **duplicated data is okay**, denormalization can improve the read performance of a database however at the expense of losing some write performance.

Advantages of Denormalization

- Minimizing the need for joins
- Reducing the number of tables
- Queries to be retrieved can be simpler.
- Less likely to have bugs
- Precomputing derived values
- Reducing the number of relations
- Reducing the number of foreign keys in relation
- Data modification at the computing time and rather than at the select time
- Retrieving data is faster due to fewer joins.

Disadvantages of Denormalization

- Slow down updates, although maybe speeding up retrievals.
- Make it more complex in others, although simplifying implementation.
- Be inconsistent.
- Sacrifice flexibility.
- Increase the size of relations.
- Make the update and insert codes harder to write.
- Involve Data redundancy which necessitates more storage.

Duplicated data can cause inconsistencies. How to solve?

The data can be changed now in many places, so we must be careful while adjusting the data to avoid data anomalies. In general, we need to make sure all data changed. We can use **triggers, transactions, or procedures** to avoid such inconsistencies.

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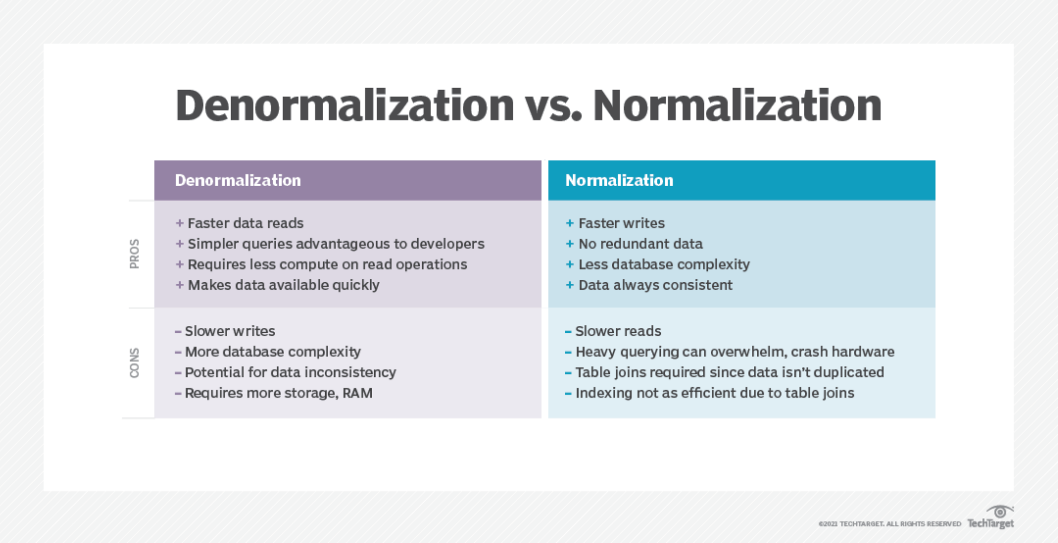
Denormalization vs. Normalization



Denormalization vs. Normalization

	Denormalization	Normalization
PROS	+ Faster data reads + Simpler queries advantageous to developers + Requires less compute on read operations + Makes data available quickly	+ Faster writes + No redundant data + Less database complexity + Data always consistent
CONS	– Slower writes – More database complexity – Potential for data inconsistency – Requires more storage, RAM	– Slower reads – Heavy querying can overwhelm, crash hardware – Table joins required since data isn't duplicated – Indexing not as efficient due to table joins

TechTarget

References:
https://www.xenonstack.com/insights/data-denormalization