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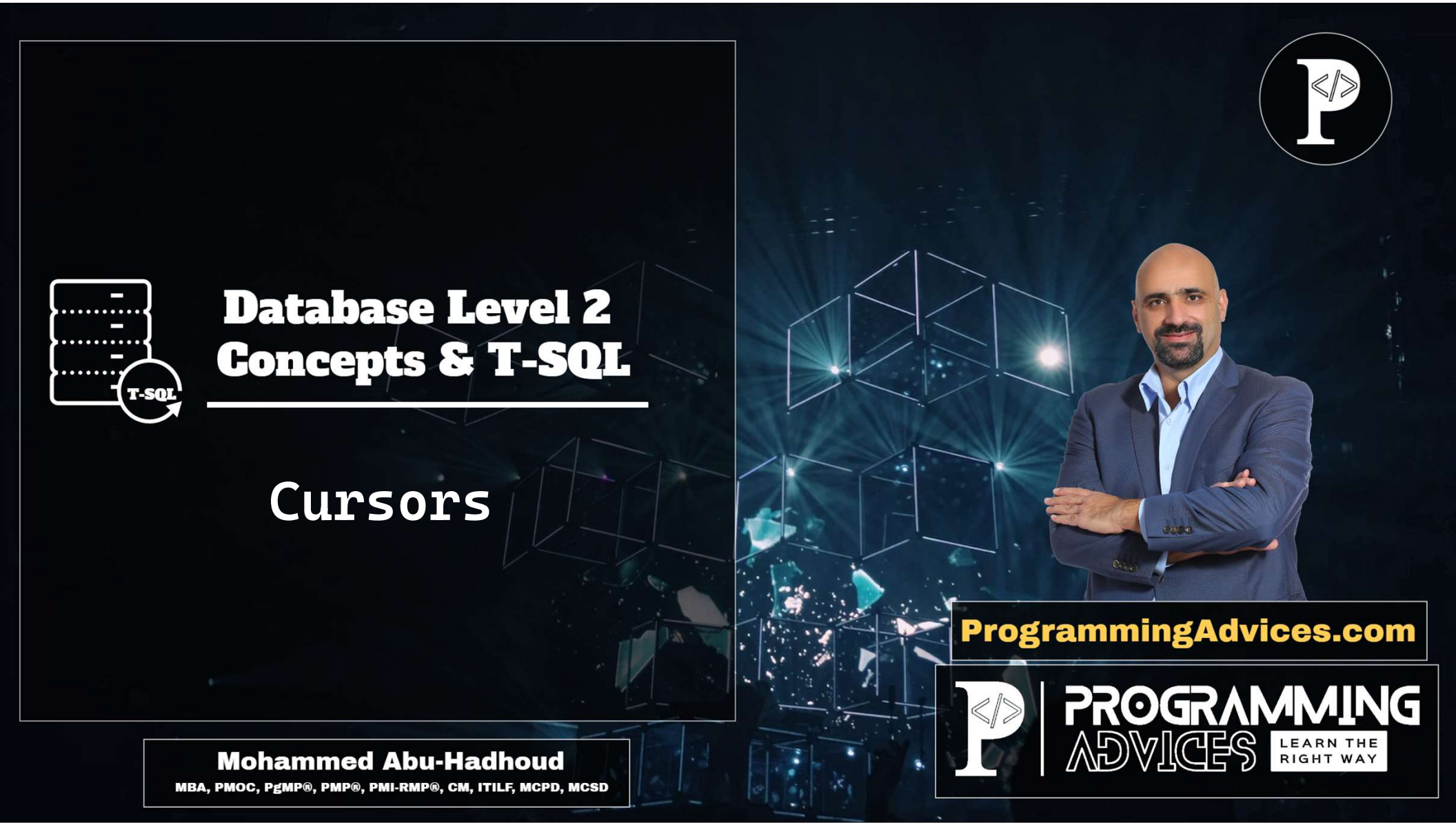
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What are Cursors?

- In T-SQL, a cursor is a database object used to manipulate data in a set on a row-by-row basis.
- Essentially, it allows you to iterate over rows returned by a query and perform operations on each row individually.
- This is different from the typical set-based operations in SQL, where you manipulate entire sets of data at once without focusing on individual rows.

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Why Use Cursors?

While SQL is inherently designed for set-based operations, there are scenarios where you might need to work with data one row at a time. This is where cursors come into play. They are particularly useful when:

1. Sequential Processing is Required: You need to process data in a specific order, one row at a time.
2. Complex Logic per Row: Each row requires complex processing or decision-making that cannot be easily or efficiently expressed in a set-based approach.
3. Interactivity: Situations where the data needs to be processed interactively, such as in applications that allow users to scroll through individual rows.

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Types of Cursors

1. Static Cursors: These create a snapshot of the data when the cursor is opened. Changes made to the data in the database after the cursor is opened are not reflected in the cursor.
2. Dynamic Cursors: These reflect changes made to the data in the database while the cursor is open.
3. Forward-Only Cursors: As the name suggests, these cursors can only move forward through the data.
4. Scrollable Cursors: These allow movement both forward and backward through the data and can jump to specific rows.

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Performance Considerations

Cursors can be resource-intensive and potentially lead to performance issues, particularly in high-volume databases. They should be used judiciously, and it's often recommended to explore set-based alternatives before resorting to cursors. Some key considerations include:

1. Overhead: Cursors can involve significant overhead, especially when dealing with large datasets.
2. Locking and Concurrency: Using cursors can lead to extended locking of rows or tables, potentially affecting concurrency.
3. Alternatives: Often, tasks requiring cursors can be restructured into set-based operations, which are typically more efficient in SQL.

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Best Practices

When using cursors, follow these best practices to minimize performance issues:

1. Minimize Cursor Use: Only use cursors when absolutely necessary.
2. Keep Transactions Short: If you use cursors within transactions, keep the transaction duration as short as possible to minimize locking.
3. Optimize Cursor Type: Choose the cursor type that best suits your needs to minimize resource usage.
4. Close and Deallocate: Always ensure cursors are closed and deallocated after use to free up resources.

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