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7. API Pagination

Scenario: You need to implement pagination for an endpoint that returns a list of products. The endpoint should support pagination using `limit` and `offset` query parameters.

Requirements:

- Write a brief description of how you would implement pagination in a Node.js REST API.
- Explain how you would handle large data sets and ensure that pagination is efficient.

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1) Pagination allows you to retrieve data in smaller, manageable chunks, preventing overwhelming the client with excessive data. Here's a basic approach to implement pagination using limit and offset query parameters:

   Query Parameters:

   limit: Specifies the maximum number of items to return per page.
   offset: Indicates the starting index of the items to return.

   Data Retrieval:

   Fetch data from the underlying data source (e.g., database, API).
   Apply the limit and offset parameters to retrieve the desired subset of data.

   Response:

   Return the retrieved data as part of the API response, along with additional information about the pagination (e.g., total number of items, current page, total pages).

2) Efficient handling of large datasets for pagination –

Database Optimization:

- **Indexing:** Create indexes on frequently queried fields to improve query performance.
- **Pagination Support:** If your database supports pagination natively (e.g., SQL databases), leverage its features to optimize the retrieval process.

Efficient Data Retrieval:

- **Limit the Result Set:** Ensure that the query returns only the necessary data to avoid unnecessary overhead.
- **Caching:** Consider caching frequently accessed data to reduce the load on the database

Pagination Links:

- Include pagination links in the response headers or body to allow clients to easily navigate between pages.
- Use standard link relations (e.g., first, last, prev, next) to provide clear navigation.

Error Handling:

- Handle cases where the limit or offset parameters are invalid or exceed the total number of items. Return appropriate error responses.