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**Assignment 6 Report**

The indexes I created are designed to optimize query performance by targeting specific query patterns.

1. **Index on account\_type and balance:** This index improves performance for range queries (for example: WHERE account\_type = 'savings' AND balance > 20000) by organizing rows based on account\_type and sorting balance within each type. Without this index, the database performs a full table scan, which is much slower for large datasets.
2. **Index on branch\_name and balance:** This index optimizes point queries targeting specific branches and balances (for example, WHERE branch\_name = 'Perryridge' AND balance = 5000). The index enables quick lookups by matching both branch\_name and balance directly. Without it, the database scans the entire table to find matching rows, which increases execution time.
3. **Index on branch\_name and account\_type:** This index is beneficial for queries filtering by branch and account type (e.g., WHERE branch\_name = 'Downtown' AND account\_type = 'savings'). It organizes the data to quickly locate rows with the given branch and type combination. Without the index, the database must evaluate each row individually, significantly increasing execution time.

As we can see from the table below, every query, without any exceptions, was faster when we used the appropriate index for that specific query.

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| --- | --- | --- | --- | --- |
| **Query Type** | **Description** | **Dataset Size** | **Index Type** | **Microseconds** |
| Point Query 1 | Finds the number of accounts that are in the “Downtown” branch and are savings an account. | 50,000 | With index on branch name and account type | 16,771 |
|  |  |  | Without index | 32,619 |
| Point Query 2 | Finds the number of accounts that are in the “Perryridge” branch and have a balance of exactly 5000$ | 50,000 | With index on branch name and balance | 187 |
|  |  |  | Without index | 33,335 |
| Range Query 1 | Finds the number of accounts that are a savings account and have a balance greater than 20,000 | 50,000 | With indexes on account type and balance | 14,192 |
|  |  |  | Without index | 21,611 |
| Range Query 2 | Finds the number of counts that are a savings account and have a balance between 5000$ and 20000$ | 50,000 | With index on account type and balance | 19,656 |
|  |  |  | Without index | 26,026 |
| Point Query 1 | Finds the number of accounts that are in the “Downtown” branch and are savings an account. | 100,000 | With index | 36,103 |
|  |  |  | Without index | 196,449 |
| Point query 2 | Finds the number of accounts that are in the “Perryridge” branch and have a balance of exactly 5000$ | 100,000 | With Index | 175 |
|  |  | 100,000 | Without index | 41,488 |
| Range query 1 | Finds the number of accounts that are a savings account and have a balance greater than 20,000 | 100,000 | With index | 24,849 |
|  |  | 100,000 | Without index | 37,262 |
| Range query 2 | Finds the number of counts that are a savings account and have a balance between 5000$ and 20000$ | 100,000 | With index | 38,045 |
|  |  |  | Without index | 48,727 |
| Point query 1 | Finds the number of accounts that are in the “Downtown” branch and are savings an account. | 150,000 | With index | 54,229 |
|  |  |  | Without index | 76,501 |
| Point query 2 | Finds the number of accounts that are in the “Perryridge” branch and have a balance of exactly 5000$ | 150,000 | With index | 3,397 |
|  |  |  | Without index | 65,616 |
| Range query 1 | Finds the number of accounts that are a savings account and have a balance greater than 20,000 | 150,000 | With index | 36,306 |
|  |  |  | Without index | 55,348 |
| Range query 2 | Finds the number of counts that are a savings account and have a balance between 5000$ and 20000$ | 150,000 | With index | 57,280 |
|  |  |  | Without index | 72,954 |
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