

Dylan

# SQL SERVER 索引效能優化

什麼是Index(索引)?

資料庫中的書籤

使資料庫能夠更快速的查詢到所需的資料

# 索引的效果

建立一個百萬筆假資料的Table

查詢這個會員的點數

```
SELECT get_point, create_time  
FROM Point  
WHERE member_card_number = 'M1265920'
```

無索引 525ms

結果	訊息	執行計畫
----	----	------

```
SQL Server Execution Times:  
CPU time = 531 ms, elapsed time = 525 ms.  
SQL Server parse and compile time:  
CPU time = 0 ms, elapsed time = 0 ms.
```



有索引 1ms

結果	訊息	執行計畫
----	----	------

```
SQL Server Execution Times:  
CPU time = 16 ms, elapsed time = 1 ms.  
SQL Server parse and compile time:  
CPU time = 0 ms, elapsed time = 0 ms.
```

# 常見的加速用索引

```
SELECT get_point, create_time  
FROM Point  
WHERE member_card_number = 'M1265920'
```

## 主索引(PK、叢集索引)

資料列的物理排序，也是查詢速度最快的索引  
通常設為這張表的主鍵、流水號欄位

## 單一、複合索引

單一欄位或多欄位索引  
若Select欄位沒有在索引欄位內  
會觸發KeyLookup查找

```
CREATE INDEX IDX_POINT_MEMBER  
ON [Point] ([member_card_number], [get_point], [create_time]);
```

## 涵蓋索引

將要用的欄位直接包含在索引中  
效率比複合索引好  
但相對適用範圍會比較小

```
CREATE INDEX IDX_POINT_MEMBER  
ON [Point] ([member_card_number])  
INCLUDE([get_point], [create_time]);
```

# 如何評估性能

## 顯示執行計畫

The screenshot displays the Microsoft SQL Server Management Studio interface. The title bar indicates the file is 'SQLQuery6.sql - 61.61.99.79.Mercuries (sa (107))'. The menu bar includes File, Edit, View, Query, Project, Tools, Window, and Help. The toolbar contains various icons for file operations, query execution, and formatting. A red arrow points from the '顯示執行計畫' (Show Execution Plan) icon in the toolbar to the 'Execution plan' tab in the Results pane.

The Object Explorer on the left shows a tree view of the database structure, including folders for 'famiAppTest', 'FamilyStamp', 'FamilyStamp\_1', 'FeasttogetherMar', 'HumbleHouse', 'lunchking\_UAT', 'lunchkingB', and 'Mercuries'. The 'Mercuries' folder is expanded, showing 'Database Dia', 'Tables', and a list of tables including 'System Ta', 'FileTables', 'External T', 'Graph Tab', 'dbo.activi', 'dbo.api\_lc', 'dbo.app\_', 'dbo.bann', 'dbo.bran', and 'Colum'. The 'id' column is selected in the 'Colum' table.

The main query editor shows the following SQL query:

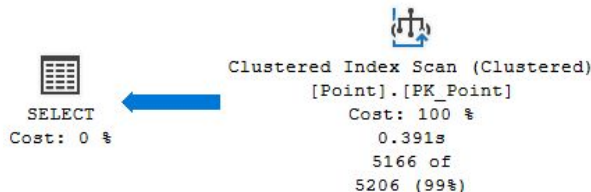
```
1  
2 SELECT TOP(50)* FROM dish_category dc LEFT JOIN brand b on dc.brand_id = b.id  
3 WHERE DATEADD(day, 1, dc.create_date) > '2022-01-01'  
4 AND b.id IN(SELECT id FROM banner WHERE banner.displayed_on = '1')  
5 AND ISNULL(b.modify_id, 0) > 0
```

The Results pane shows the 'Execution plan' tab. The query cost is 100% (relative to the batch). The execution plan diagram shows the following components:

- SELECT**: Cost: 0 %
- Nested Loops (Inner Join)**: Cost: 0 %
- Nested Loops (Inner Join)**: Cost: 0 %
- Clustered Index Scan (Clustered) [dish\_category].[PK\_dish\_category]...**: Cost: 30 %
- Clustered Index Seek (Clustered) [brand].[PK\_brand] [b]**: Cost: 35 %
- Clustered Index Seek (Clustered) [banner].[PK\_banner]**: Cost: 35 %

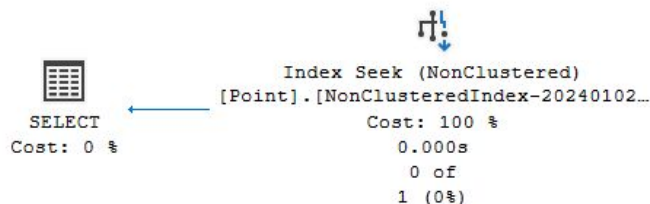
The status bar at the bottom indicates 'Query executed successfully.' and provides details about the server (61.61.99.79 (15.0 RTM)), user (sa (107)), database (Mercuries), and execution time (00:00:00) with 0 rows returned.

# 執行計畫



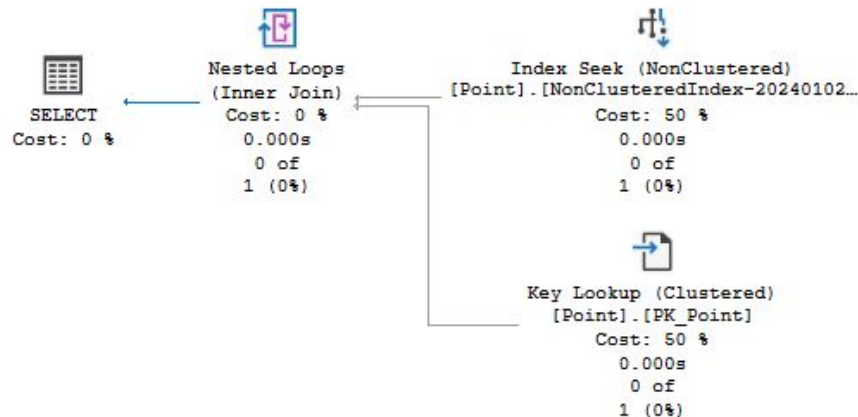
## Scan(掃描)

逐行搜尋, 效率最差



## Seek(搜尋)

成功從索引查詢, 效率最好



## KeyLookup(索引鍵查找)

成功套用索引但未包含必要資料  
回資料表取得剩餘欄位  
會比單純Index Seek慢

# SARG原則

SARGable : 「可以透過索引來尋找的語句」。  
可用於描述一個查詢是否符合此條件。

[\(維基百科\)](#)

符合：

=、<、>、>=、<=、BETWEEN、LIKE

不符合：

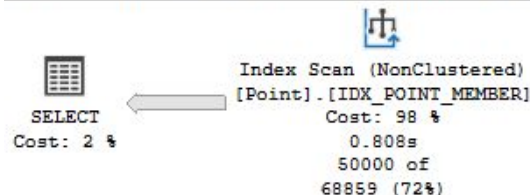
NOT、!=、<>、!>、!<、NOT EXISTS、NOT IN、NOT LIKE、位元運算、函數運算

# 優化案例

## 不符合SARG語法(對搜尋欄位使用函數)

```
SELECT [member_card_number], [get_point]
FROM [Point]
WHERE DATEADD(DAY, 1, [create_time]) > '2023-01-31'
```

Query 1: Query cost (relative to the batch): 97%  
SELECT [member\_card\_number], [get\_point] FROM [Point]

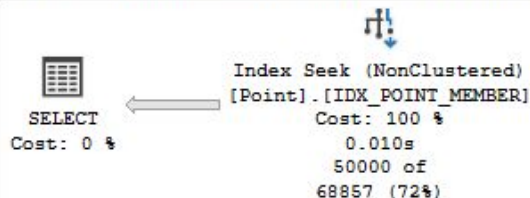


## 符合SARG語法

```
SELECT [member_card_number], [get_point]
FROM [Point]
WHERE [create_time] > DATEADD(DAY, -1, '2023-01-31')
```

```
SELECT [member_card_number], [get_point]
FROM [Point]
WHERE [create_time] > '2023-01-30'
```

Query 3: Query cost (relative to the batch): 1%  
SELECT [member\_card\_number], [get\_point] FROM [Point]



# 總結

1. 為有效能需求的查詢語法建立索引
2. 不要查詢沒有用到的欄位 會影響索引的使用  
( ex. SELECT \*、EF直接First() ToList() )
3. 讓查詢語法符合SARG原則以利套用索引