TechEd 2013

Microsoft

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Back to Indexes: The Original Culprit

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Image Source: http://www.jeffcubos.com/2011/10/18/load-em-up/

Takeaways…

Lessons you will learn

- Missing Index feature: When, Why, How?
- Left-based subset: is it so easy?
- Database Tuning Advisor: When, Why, How?
- Suspense ☺
- In a nutshell: The optimizer's choice of indexes !

Demo 1: Mistake No. 1

Missing Index feature

Missing Index feature

Lessons Learnt

- Please do not follow the recommendations ‘blindly’
- Review before implementation
- What just happened in the demo was: a redundant index
  - (unless you have variety of selectivity)
- Keep an eye on unused indexes ! (redundant & duplicates)

Demo 2: Mistake No. 2

Left-based subset

Left-based subset

Lessons Learnt

- Understand the index key column order (very critical)
- Query filter happens using a Left-based subset mechanism
  - An index is ‘fully seekable’ by a query if all the ‘predicate columns’ of the query are also index key columns in a left-ordered fashion starting with the first column (one exception though)
- And that’s why looking at the operator tool-tip is so important ☺

Demo 3: Mistake No. 3

Suspense ☺

Design an index…

```
SELECT C.ContactID, C.FirstName,
C.EmailPromotion
FROM Person.Contact2 AS C
WHERE C.FirstName LIKE N'L%'            ←——   4.3 % (872)
        AND C.EmailPromotion = 1        ←——   25.2 % (5044)
        AND C.ContactID < 10000         ←——   50.04 % (9994)
OPTION (MAXDOP 1)

--returns 77 out of 19972 records
```

Design an index…

```
SELECT C.ContactID, C.FirstName, C.EmailPromotion
FROM Person.Contact2 AS C
WHERE C.FirstName LIKE 'L%'
        AND C.EmailPromotion = 1
        AND C.ContactID < 10000
OPTION (MAXDOP 1)
------------------------------------------------------------------------------------
-- Option 1
CREATE INDEX ContactComposite4
ON Person.Contact2(FirstName, EmailPromotion)
-- Option 2
CREATE INDEX ContactComposite5
ON Person.Contact2(EmailPromotion, FirstName)
```

Design an index…

```
SELECT C.ContactID, C.FirstName, C.EmailPromotion
FROM Person.Contact2 AS C
WHERE C.FirstName LIKE 'L%'
        AND C.EmailPromotion = 1
        AND C.ContactID < 10000
OPTION (MAXDOP 1)
------------------------------------------------------------
-- Option 1
CREATE INDEX ContactComposite4
ON Person.Contact2(FirstName, EmailPromotion)
-- Option 2
CREATE INDEX ContactComposite5
ON Person.Contact2(EmailPromotion, FirstName)
```

Let's ask DTA

The Optimizer's choice of Indexes

Lessons Learnt

- Multi-column index:
  - The index can be used to seek on the second column if there is an equality predicate on the first column
  - True:
    - FirstName = 'L' AND EmailPromotion = 1
  - Partially True:
    - FirstName LIKE 'L%' AND EmailPromotion = 1
  - False
    - FirstName LIKE '%L' AND EmailPromotion = 1

The Optimizer’s choice of Indexes

Lessons Learnt

- Single column index:
  - True:
    - FirstName LIKE 'L%'
    - EmailPromotion = 1
    - ContactID < 10000
  - False:
    - FirstName LIKE ‘%L'
    - ABS(EmailPromotion) = 1
    - ContactID + 1 < 10000

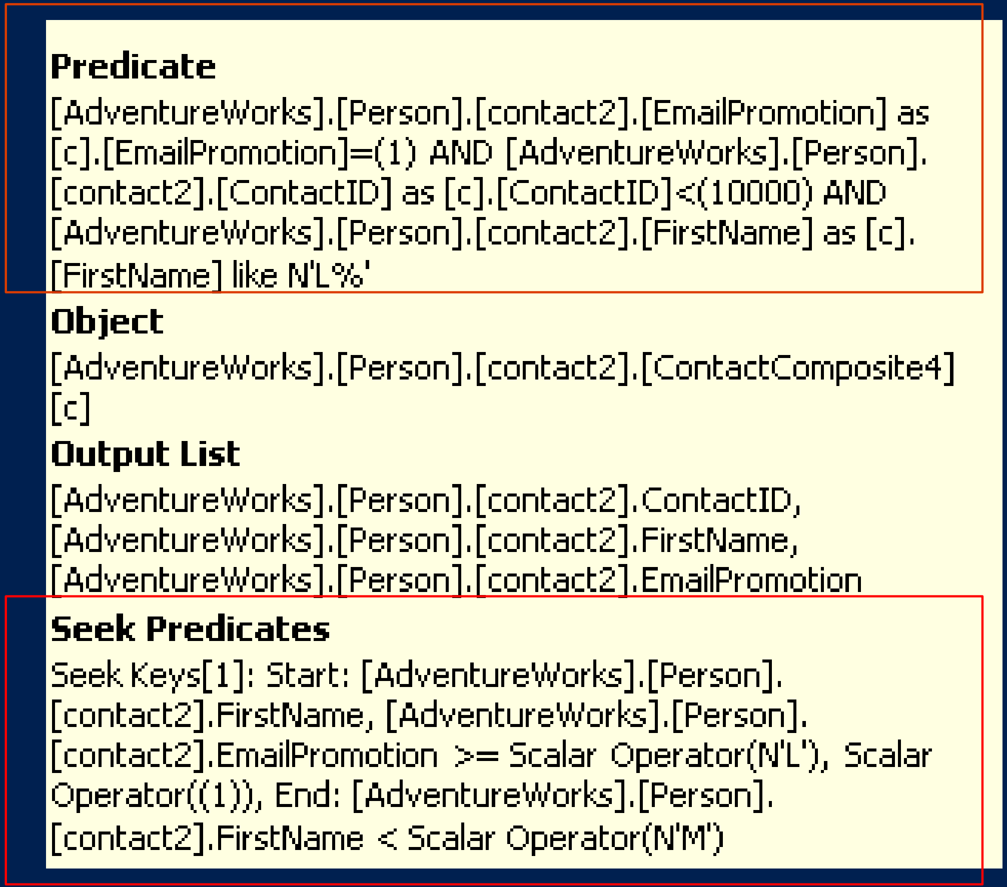
The Optimizer's choice of Indexes

Lessons Learnt

- Common guideline (as it is):
  - Most selective column should be the first column
- Common guideline (as it should be):
  - Most selective column should be the first column when all other column predicates use the equality operator
- SQL maintains HISTOGRAM only for the first column of the index

The Optimizer's choice of Indexes

Lessons Learnt

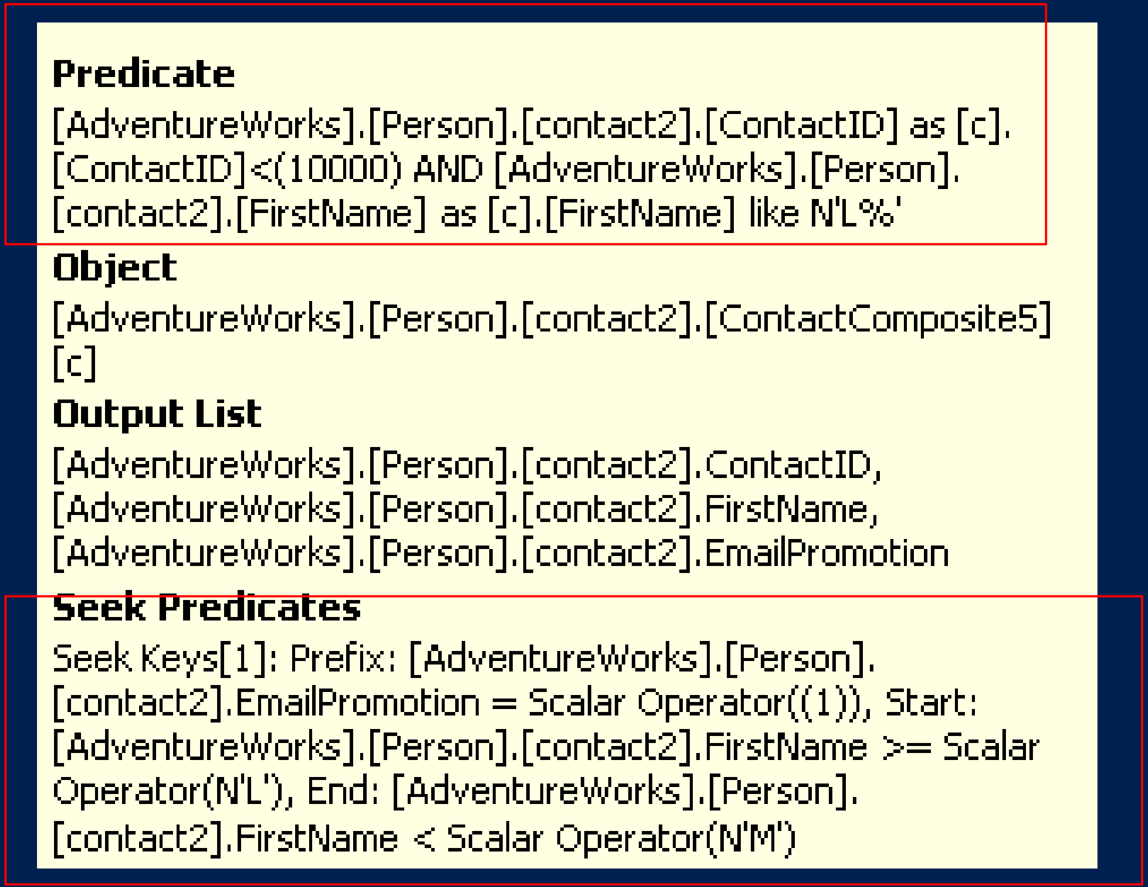


Predicate
[AdventureWorks].[Person].[contact2].[EmailPromotion] as [c].[EmailPromotion]=(1) AND [AdventureWorks].[Person].[contact2].[ContactID] as [c].[ContactID]<(10000) AND [AdventureWorks].[Person].[contact2].[FirstName] as [c].[FirstName] like N'L%'

Object
[AdventureWorks].[Person].[contact2].[ContactComposite4] [c]

Output List
[AdventureWorks].[Person].[contact2].ContactID, [AdventureWorks].[Person].[contact2].FirstName, [AdventureWorks].[Person].[contact2].EmailPromotion

Seek Predicates
Seek Keys[1]: Start: [AdventureWorks].[Person].[contact2].FirstName, [AdventureWorks].[Person].[contact2].EmailPromotion >= Scalar Operator(N'L'), Scalar Operator((1)), End: [AdventureWorks].[Person].[contact2].FirstName < Scalar Operator(N'M')



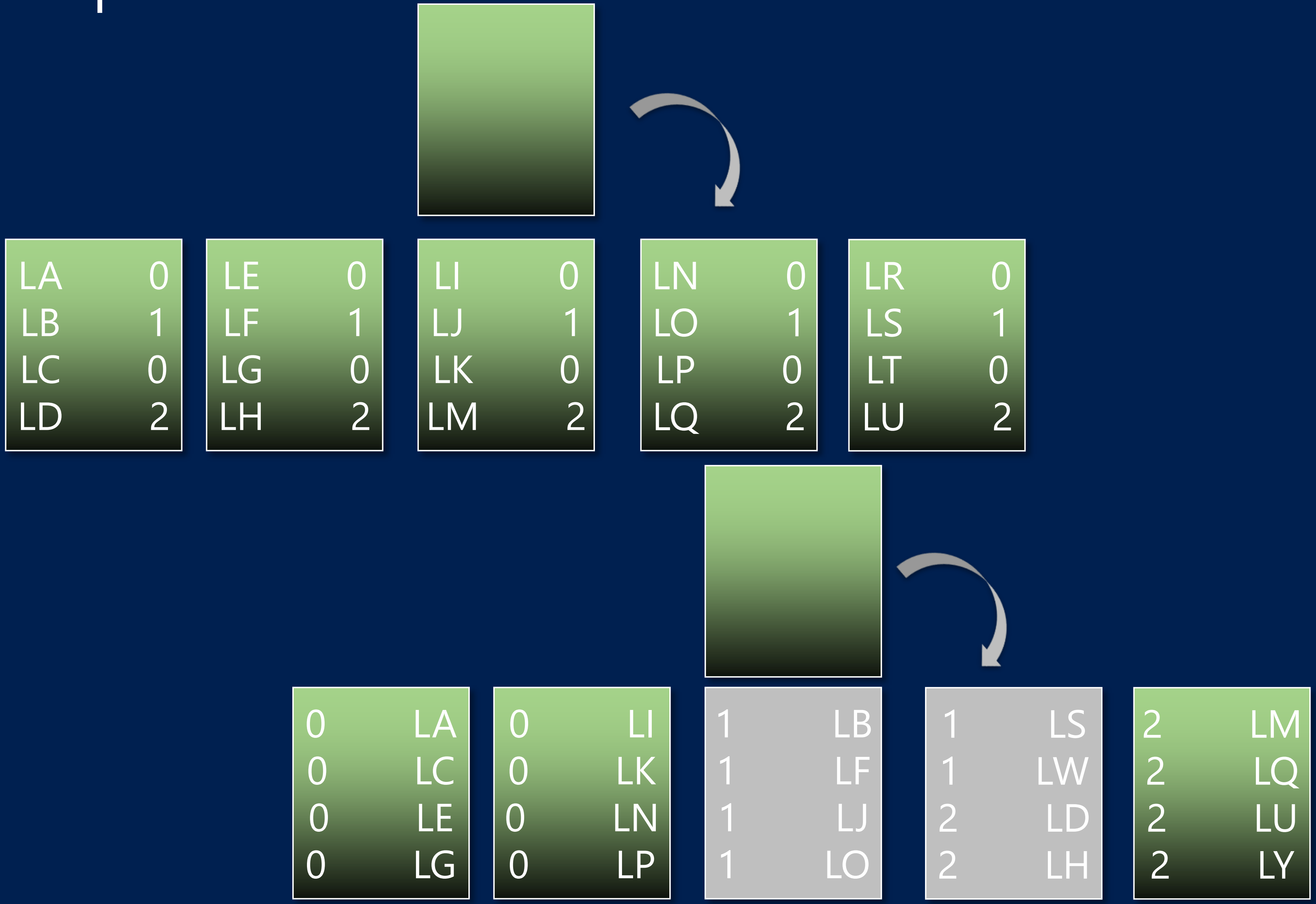
Predicate
[AdventureWorks].[Person].[contact2].[ContactID] as [c].[ContactID]<(10000) AND [AdventureWorks].[Person].[contact2].[FirstName] as [c].[FirstName] like N'L%'

Object
[AdventureWorks].[Person].[contact2].[ContactComposite5] [c]

Output List
[AdventureWorks].[Person].[contact2].ContactID, [AdventureWorks].[Person].[contact2].FirstName, [AdventureWorks].[Person].[contact2].EmailPromotion

Seek Predicates
Seek Keys[1]: Prefix: [AdventureWorks].[Person].[contact2].EmailPromotion = Scalar Operator((1)), Start: [AdventureWorks].[Person].[contact2].FirstName >= Scalar Operator(N'L'), End: [AdventureWorks].[Person].[contact2].FirstName < Scalar Operator(N'M')

If time permits…



What about the DTA & Missing Index feature?

Sr. DBA

Jr. DBA

New to SQL Server

[Image source: www.tumblr.com](http://www.tumblr.com)

Takeaways…

Lessons you have learnt

- Missing Index feature: When, Why, How?
- Left-based subset: is it so easy?
- Database Tuning Advisor: When, Why, How?
- Suspense ☺ (Column Order in a Multi-column Index with equality & inequality operators
- In a nutshell: The optimizer's choice of indexes !

Last, but not the least…

- There is no substitute to your deep knowledge about the optimizer and indexes. Period.

Summary/Call to Action

Follow me @A_Bansal

- Browse this recording once again ☺
- Download the slides & code snippets from www.SQLMaestros.com
- Try out the code snippets yourself
- Review your indexing strategies
- Implement the knowledge
- Try out various combinations in your ‘test environment’

Evaluate this session

Scan this QR code to evaluate this session.

4G
11:23
People
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West Mercer
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Mon 26
"Grabbing a bite at Purple tonight! Kari, you should come join us after school!"

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