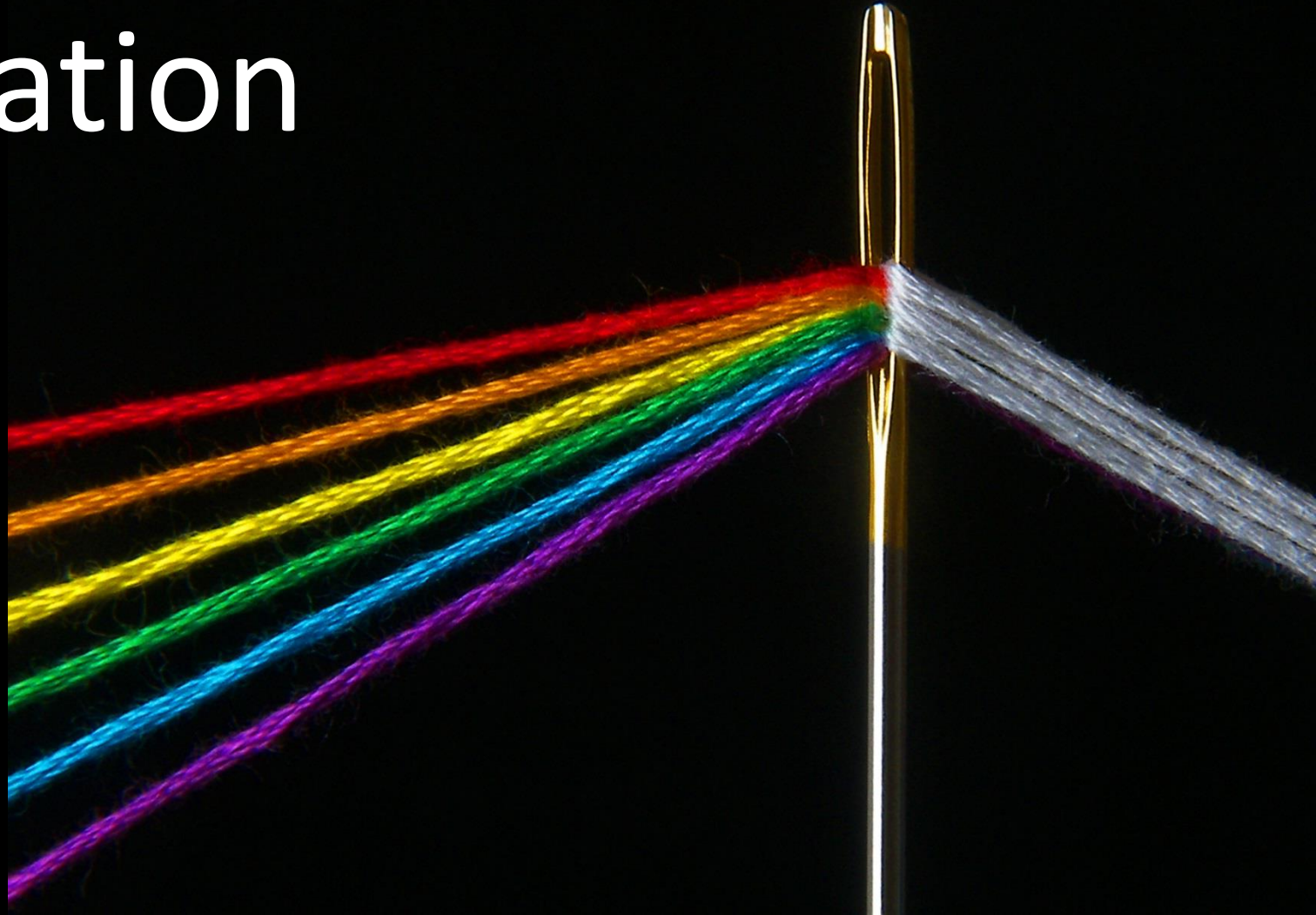


Correlated Concatenation In SQL

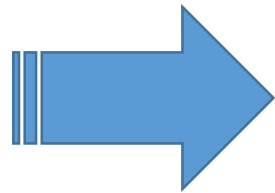
@RileyMajor



Concatenation

(Shoving stuff together.)

Animal	Trait
Cat	Cuddly
Cat	Curious
Cow	Large
Dog	Loyal
Dog	Playful



Animal	Traits
Cat	Cuddly, Curious
Cow	Large
Dog	Loyal, Playful

Don't do it.




“Yeah, yeah, yeah, let's get this out of the way right from the start: Don't concatenate rows into delimited strings in SQL Server. Do it client side.”

Adam Machanic

July 12, 2006

http://sqlblog.com/blogs/adam_machanic/archive/2006/07/12/rowset-string-concatenation-which-method-is-best.aspx

A close-up photograph of a hammer and a screw on a wooden surface. The hammer has a dark, textured head and a red handle. The screw is silver and lies on the wood. The background is blurred.

Built-in
Function?
Nope.

Oracle Does

- LISTAGG
- Supports Ordering
- Supports Partitioning
- No DISTINCT
- Version 11g Release 2 (August 2013)

```
SELECT      Animal,  
            LISTAGG(Trait, ',')  
              WITHIN GROUP (ORDER BY Trait)  
              AS Traits  
  
FROM        Animals  
GROUP BY    Animal;
```



MySQL Does

- GROUP_CONCAT
- Supports Ordering
- No Partitioning
- Supports DISTINCT
- Version 4.1 (February 2005)

```
SELECT      Animal,  
            GROUP_CONCAT(DISTINCT Trait  
            ORDER BY Traits  
                        SEPARATOR ', ') AS Traits  
FROM        Animals  
GROUP BY    Animal;
```



PostgreSQL Does

- string_agg
- No Ordering
- No Windowing
- No DISTINCT
- Version 8.4.22 (July 2009)

```
SELECT      Animal,  
            string_agg(Trait, ', ') AS Traits  
FROM        Animals  
GROUP BY   Animal;
```



Even SQLite Does





It's
ok...

Concatenation?

That's what the + operator is for!

N
o
p
e



Demo

Dude, where's my data?



How about a recursive CTE?

- Confusing Syntax
- Deceptively Slow
- Limited Depth
 - (without `OPTION MAXRECURSION`)

How about a cursor?

Just... No.



XML



The image shows a close-up of a piece of white fabric, likely a towel or cloth, featuring several rows of embroidery. The stitches include a dark blue/black cable stitch, an orange cable stitch, a grey cable stitch, an orange cable stitch, a grey cable stitch, a black and orange cable stitch, a black cable stitch, and an orange cable stitch. There are also some decorative floral or star-like patterns in orange, green, blue, and purple at the top. The text 'Demo' is overlaid on the right side of the image.

Demo

Stitching
with
XML

Key Points

- No Built-In Function
- But Others Have It
- Don't Use + Operator
- Don't Use Cursor or Recursive CTE
- Use FOR XML with Type
- Use .query to Isolate Lists



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Manna Freight Systems, Inc.

<http://www.MFSCorporate.com/>



Photo Credits:

The Dark Side of the Loom

Aldo Cavini Benedetti

<http://www.flickr.com/photos/aldoaloz/5633823568/>

Retrieved 2014-09-12

cows of nirona

anurag agnihotri

<https://www.flickr.com/photos/agnihot/6049582522/>

Retrieved 2014-09-12

Do Not Enter.

Goodiez

<https://www.flickr.com/photos/thagoodiez/4354676748/>

Retrieved 2014-09-12

DSC_1607 [Hammer/Screw/Board]

Justin Baeder

<https://www.flickr.com/photos/justinbaeder/5317820857/>

Retrieved 2014-09-12

140:365 – Left Out

charamelody

<https://www.flickr.com/photos/charamelody/4757913318>

Retrieved 2014-09-12

want ride bus, too

Jessica Lucia

<https://www.flickr.com/photos/theloushe/3907093074>

Retrieved 2014-09-12

Missing Post

Yorkd

<https://www.flickr.com/photos/thedza/2518535531>

Retrieved 2014-09-15

One is missing

Jules Holleboom

<https://www.flickr.com/photos/holleboom/4080749814>

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Keys to Nowhere

Daniel Lee

<https://www.flickr.com/photos/dlee13/9022016145>

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Fondue enchaînée

Alexandre Duret-Lutz

<https://www.flickr.com/photos/gadl/275479322>

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More Photo Credits:

Dominos Sackboy 101/365

Louish Pixel

<https://www.flickr.com/photos/louish/5611657857>

Retrieved 2014-09-15

20130730-152-of-365 (corkscrew profile)

<https://www.flickr.com/photos/wilsonhui/9403633035>

Retrieved 2014-09-15

TAST #32 Linked Double Chain Stitch

Audrey B.

<https://www.flickr.com/photos/hetkabinet/12543174044>

Retrieved 2014-09-16

Reference: + Operator Demo (Dude, where's my data?)

```
DECLARE
    @Animals TABLE (Animal varchar(50), Trait varchar(50));

INSERT INTO @Animals (Animal, Trait)
    SELECT 'Cat', 'Cuddly' UNION ALL
    SELECT 'Cat', 'Curious';

DECLARE
    @TraitList_NoOrder varchar(max), @TraitList_Ordered varchar(max);

SELECT
    @TraitList_NoOrder = '', @TraitList_Ordered = '';

SELECT
    @TraitList_NoOrder = @TraitList_NoOrder + LTRIM(RTRIM(Trait)) + ', '
FROM
    @Animals
ORDER BY
    Trait;

SELECT
    @TraitList_Ordered = @TraitList_Ordered + LTRIM(RTRIM(Trait)) + ', '
FROM
    @Animals
ORDER BY
    LTRIM(RTRIM(Trait));

SELECT
    @TraitList_NoOrder AS 'TraitList Without ORDER BY',
    @TraitList_Ordered AS 'TraitList With ORDER BY';
```


Reference: + Operator Demo (Dude, where's my data?)

Microsoft KB 287515

<http://support.microsoft.com/kb/287515>

```
DECLARE
    @Animals TABLE (Animal varchar(50), Trait varchar(50));

INSERT INTO @Animals (Animal, Trait)
    SELECT 'Cat', 'Cuddly' UNION ALL
    SELECT 'Cat', 'Curious';

DECLARE
    @TraitList_NoOrder varchar(max), @TraitList_Ordered varchar(max);

SELECT
    @TraitList_NoOrder = '', @TraitList_Ordered = '';

SELECT
    @TraitList_NoOrder = @TraitList_NoOrder + LTRIM(RTRIM(Trait)) + ', '
FROM
    @Animals
ORDER BY
    Trait;

SELECT
    @TraitList_Ordered = @TraitList_Ordered + LTRIM(RTRIM(Trait)) + ', '
FROM
    @Animals
ORDER BY
    LTRIM(RTRIM(Trait));

SELECT
    @TraitList_NoOrder AS 'TraitList Without ORDER BY',
    @TraitList_Ordered AS 'TraitList With ORDER BY';
```

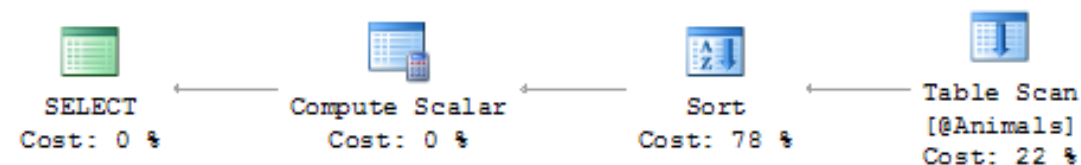
177 %

Results		Messages	
TraitList Without ORDER BY		TraitList With ORDER BY	
1	Cuddly, Curious,	Curious,	

Reference: + Operator Demo (Dude, where's my data?)

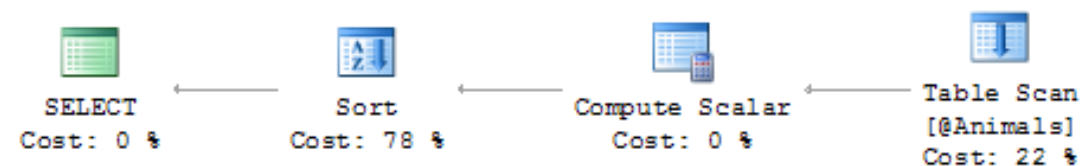
Query 2: Query cost (relative to the batch): 37%

```
SELECT @TraitList_NoOrder = @TraitList_NoOrder + LTRIM(RTRIM(Trait)) + ', ' FROM @Animals ORDER BY Trait;
```



Query 3: Query cost (relative to the batch): 37%

```
SELECT @TraitList_Ordered = @TraitList_Ordered + LTRIM(RTRIM(Trait)) + ', ' FROM @Animals ORDER BY LTRIM(RTRIM(Trait));
```



Reference: Recursive CTE

```
DECLARE
    @Animals TABLE (Animal varchar(50), Trait
varchar(50));

INSERT INTO @Animals (Animal, Trait)
    SELECT 'Cat', 'Cuddly' UNION ALL
    SELECT 'Cat', 'Curious' UNION ALL
    SELECT 'Cow', 'Large' UNION ALL
    SELECT 'Dog', 'Loyal' UNION ALL
    SELECT 'Dog', 'Playful';

WITH Animals AS
(
    SELECT
        Animal,
        CONVERT(varchar(max), Trait) AS Trait,
        ROW_NUMBER() OVER (PARTITION BY
Animal ORDER BY Trait) AS TraitNum
    FROM
        @Animals
), RecursiveCTE AS
(
    -- Anchor Query
    SELECT
        Animal,
        Trait,
        TraitNum
    FROM
        Animals
    WHERE
        TraitNum = 1

    UNION ALL
```

```
        -- Recursive Part
    SELECT
        Animals.Animal,
        Animals.Trait + ', ' +
RecursiveCTE.Trait AS TraitList,
        Animals.TraitNum
    FROM
        Animals
    JOIN
        RecursiveCTE
    ON
        Animals.Animal = RecursiveCTE.Animal
    AND
        Animals.TraitNum =
RecursiveCTE.TraitNum + 1
), RecursiveCTEWithMaxTraitNum AS
(
    SELECT
        *,
        MAX(TraitNum) OVER (PARTITION BY
Animal) AS MaxTraitNum
    FROM
        RecursiveCTE
)
SELECT
    Animal,
    Trait AS TraitList
FROM
    RecursiveCTEWithMaxTraitNum
WHERE
    TraitNum = MaxTraitNum
ORDER BY
    Animal;
```

Reference: Basic XML

```
DECLARE
    @Animals TABLE (Animal varchar(50), Trait varchar(50));

INSERT INTO @Animals (Animal, Trait)
    SELECT 'Cat', 'Cuddly' UNION ALL
    SELECT 'Cat', 'Curious' UNION ALL
    SELECT 'Cow', 'Large' UNION ALL
    SELECT 'Dog', 'Loyal' UNION ALL
    SELECT 'Dog', 'Playful';

WITH AnimalsDistinct AS
(
    SELECT
        DISTINCT Animal
    FROM
        @Animals
)
SELECT
    Animal,
    (
        SELECT
            Trait + ', ' AS Trait
        FROM
            @Animals a
        WHERE
            a.Animal = AnimalsDistinct.Animal
        FOR XML PATH (''), TYPE
    ).value('(.)[1]', 'varchar(max)')
FROM
    AnimalsDistinct;
```