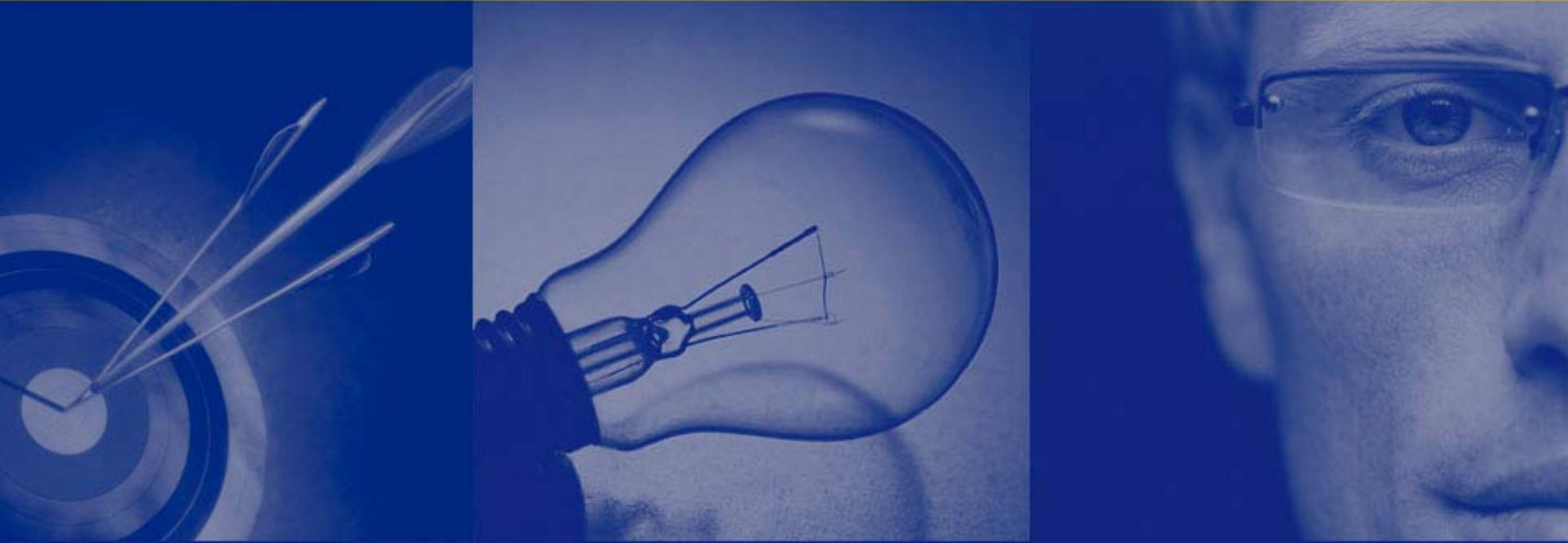


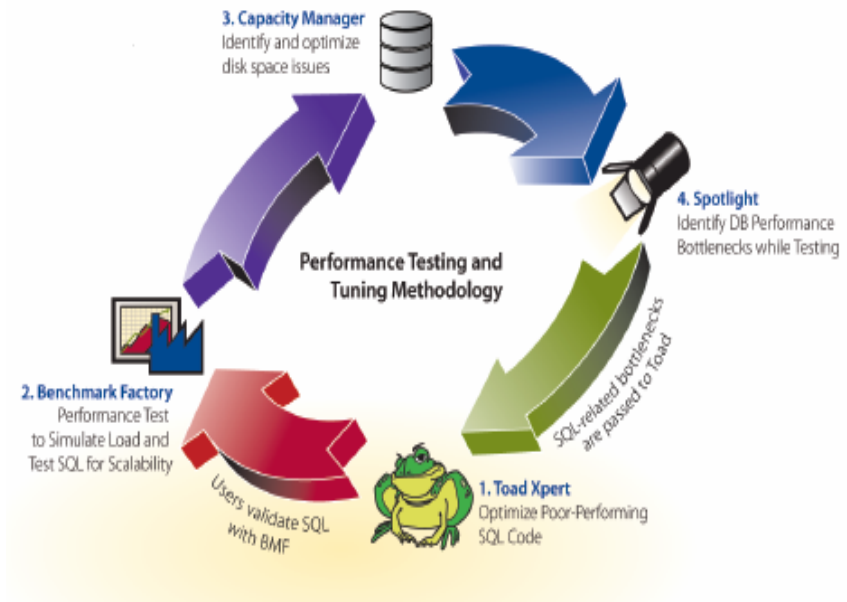
Best Practices for Stored Procedures



Presented by Kevin Kline
SQL Server MVP since 2004

Agenda

- → **Speaker Bio**
- **About Quest Software**
- **Accolades & Awards**
- **Stored Procedure Best Practices**
- **Call to Action**
- **Q & A**



Kevin Kline



- *Technical Strategy Manager for SQL Server Solutions, Quest Software Inc.*
- Microsoft SQL Server MVP
- President of the International SQL Server User's Group – PASS
- SQL Server expert and author of the O'Reilly titles "SQL in a Nutshell" and "Transact-SQL Programming"

Interactive Audience Poll

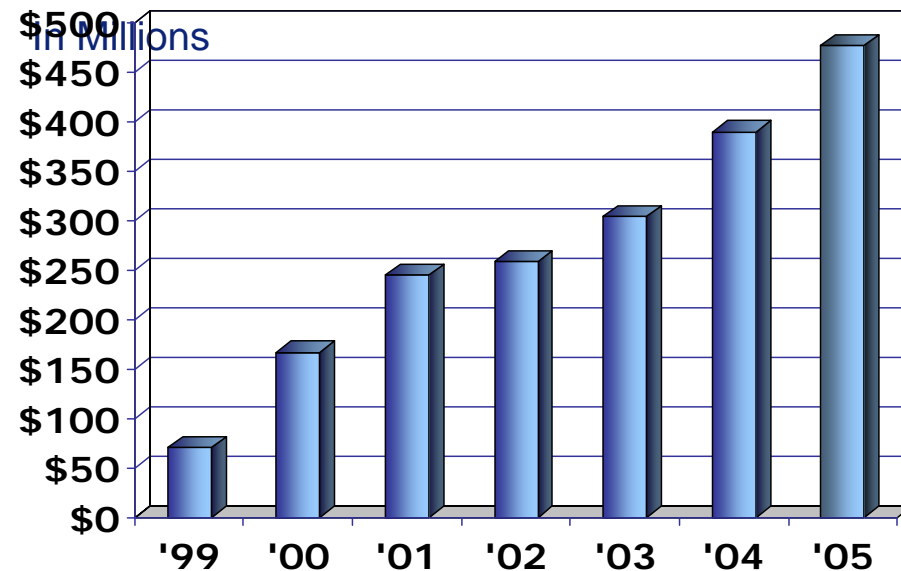
- What is your primary job duty?
 - DBA, Dev, BI, Architect, IT Pro, Mgr, Other?
 - Helps me tailor the content
- When will you use SQL Server 2005?
 - Already using it, 1-3 months, 4-6 months, More than 6 months but less than one year, Later
- How much SQL Server 2005 are you using?
 - No production systems on SQL2005, 1 or 2 production systems on SQL2005, as much as 50% on SQL2005, 100%!
- When will you use 64-bit platforms?
 - Already using it, 1-3 months, 4-6 months , More than 6 months but less than one year, Later

Speaker Bio – Kevin Kline

- Started in IT in 1986. BS in MIS in 1989 from University of Alabama.
- Microsoft SQL Server MVP since 2004
- Author of 7 database books
 - 1 on Oracle, 2 on SQL Server, 2 on SQL, 1 on DB design, 1 on DB benchmarking
- President of PASS (www.sqlpass.org)
 - Conference is next Sept in Denver, CO
 - Over 130 sessions on SQL Server, BI & Dev
- Blogs for SQLMag.com and SQLBlog.com
- Writes monthly columns for Database Trends & Applications and SQL Server Magazine
- Worked for NASA, US Army, and Deloitte & Touche before Quest Software.

About Quest Software

- Profitable & Growing
 - Over a half-billion in '06 revenues
 - Continued growth in '01 through '06 against sector trends
- Founded in 1987
- Public in 1999; Nasdaq: QSFT
- Customers: 18,000 Worldwide
 - Including 75 percent of the Fortune 500
- over 2,750 employees
 - Over 950 in R&D
 - Nearly a dozen R&D centers around the globe
- Headquarters: Aliso Viejo, CA



Accolades & Awards

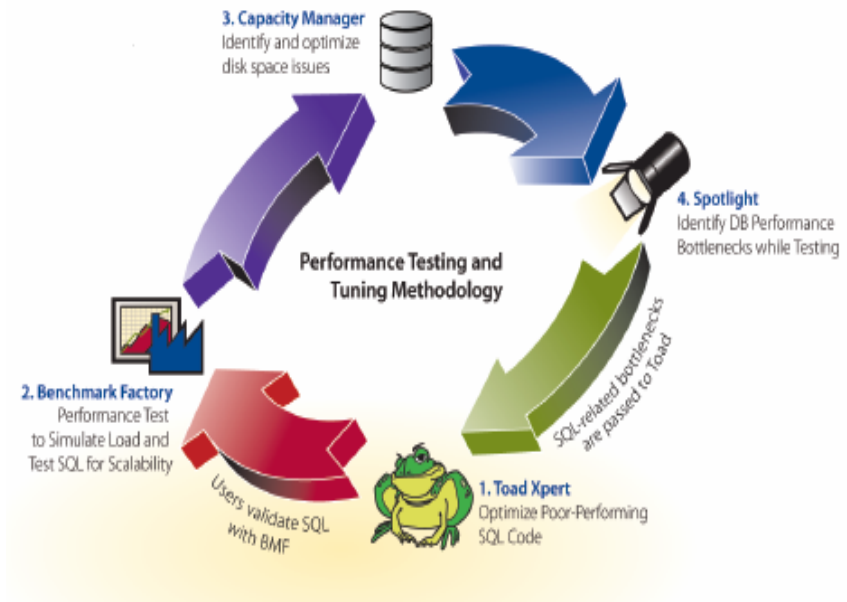
- Best of Tech Ed award 2006 with Spotlight on SQL Server
- SQL Server Magazine, Platinum reader's choice award
- SQL Server Magazine Readers Choice Awards, winner in 11 categories, 2005
- No. 1 vendor in Distributed Data Management Facilities, IDC, 2005
- Microsoft ISV Partner of the Year, 2004
- Microsoft TechEd Best of Show Winner, 2004
- Microsoft TechEd Europe Best of Show Winner, 2005
- No. 1 vendor in Application Management Software, Gartner Dataquest, 2005
- Jolt Productivity Award Winner
- Network Computing Editor's Choice Winner
- No. 8 in the "Who's Who in Enterprise Software," Investor's Business Daily





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Naming Procs

- Do NOT use sp_xxx as a naming convention.
- Causes additional searches and added I/O.
 - SQL Server will scan the procedure cache for Master, no matter what database the procedure was executed from
 - SQL Server will then acquire an exclusive COMPILER lock to perform a second search in the local database
 - If a user stored procedure has same name as an sp_xxx stored procedure in MASTER, then the user procedure will NEVER be used.

Calling Procs

- Use stored procedure calls rather than embedded SQL
- EXEC versus SP_EXECUTESQL
 - same behavior with regard to batches, the scope of names, and database context
 - EXEC compiles entire SQL at one time
 - SP_EXECUTE compiles and executes as an execution plan separate from the execution plan of the batch that called **sp_executesql** itself.
 - SP_EXECUTESQL executes a Transact-SQL statement or batch that can be reused many times, or that has been built dynamically, using a single execution plan.
 - Often better than EXEC.

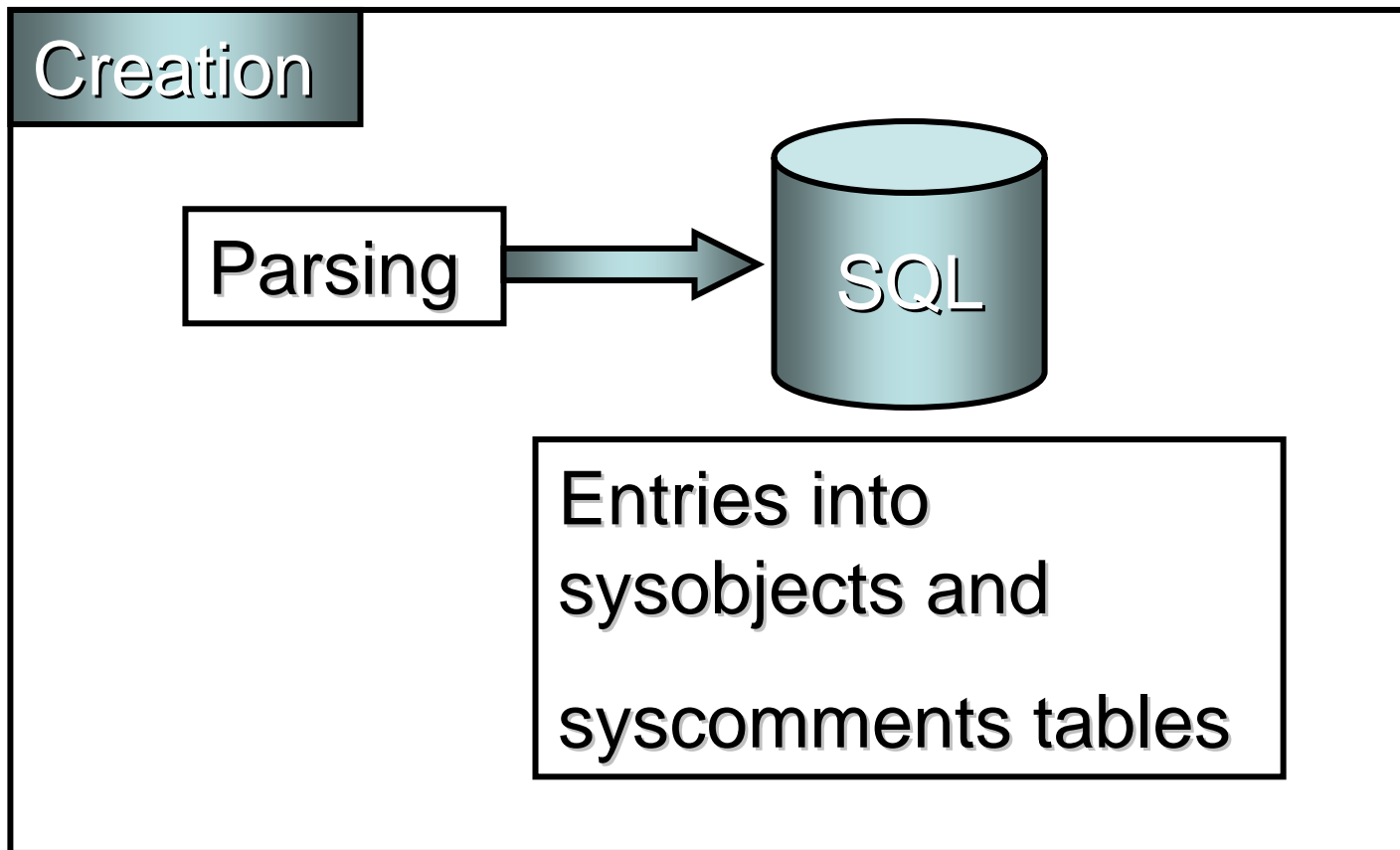
Common Problems

- Un-necessary network communication
- Execution Plans
 - Not Enough Sharing
 - Too Much Sharing
 - Inadequate plan
- Recompilation
- Transactions
- Row Theory when Set Theory is better
- Other Delays

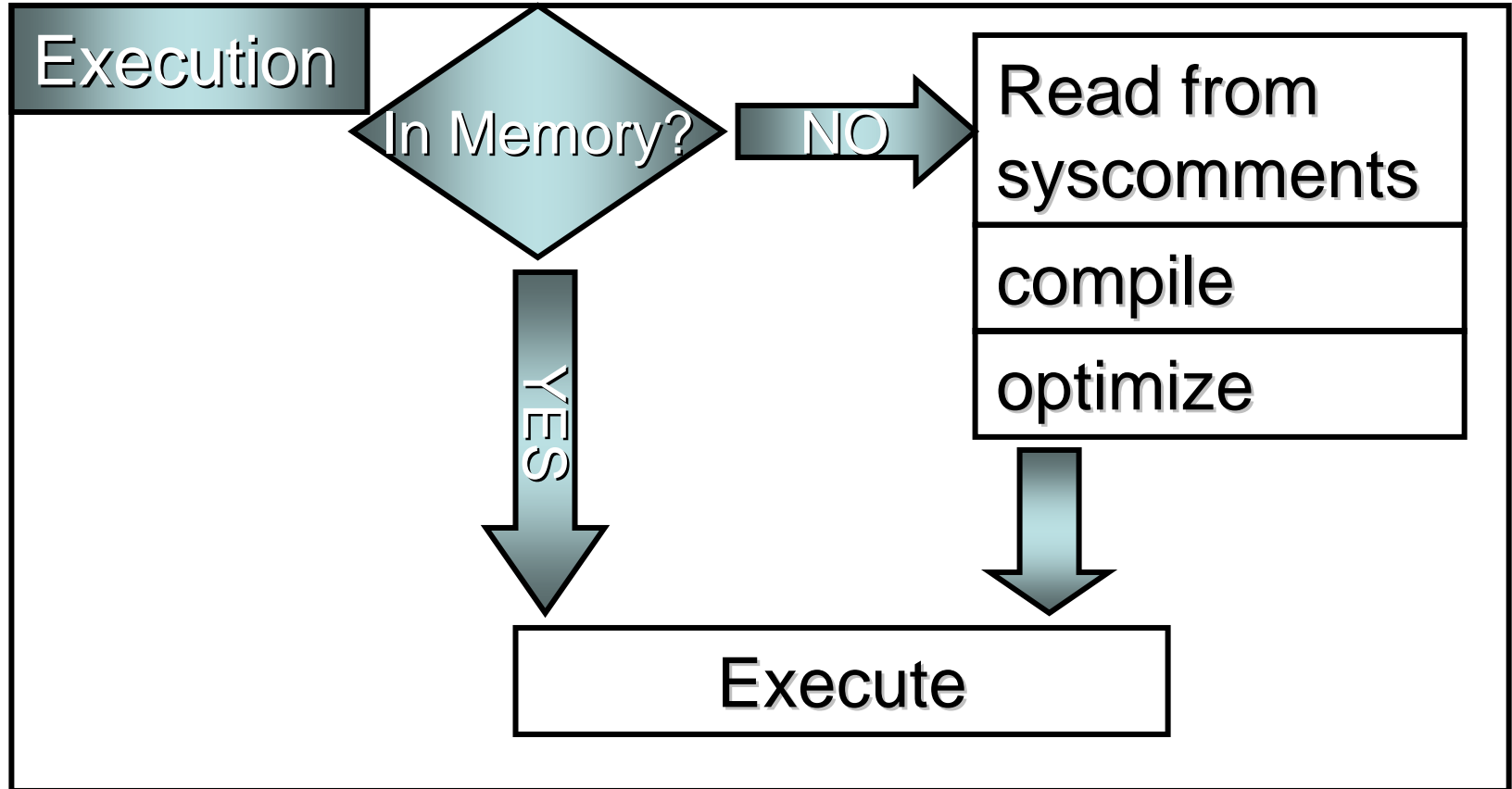
Set Nocount On

- No done_in_proc messages
 - <10 rows affected>
 - Extra network trip
- Server setting via Trace 3640
 - -T3640
 - sp_configure 'user options', 512

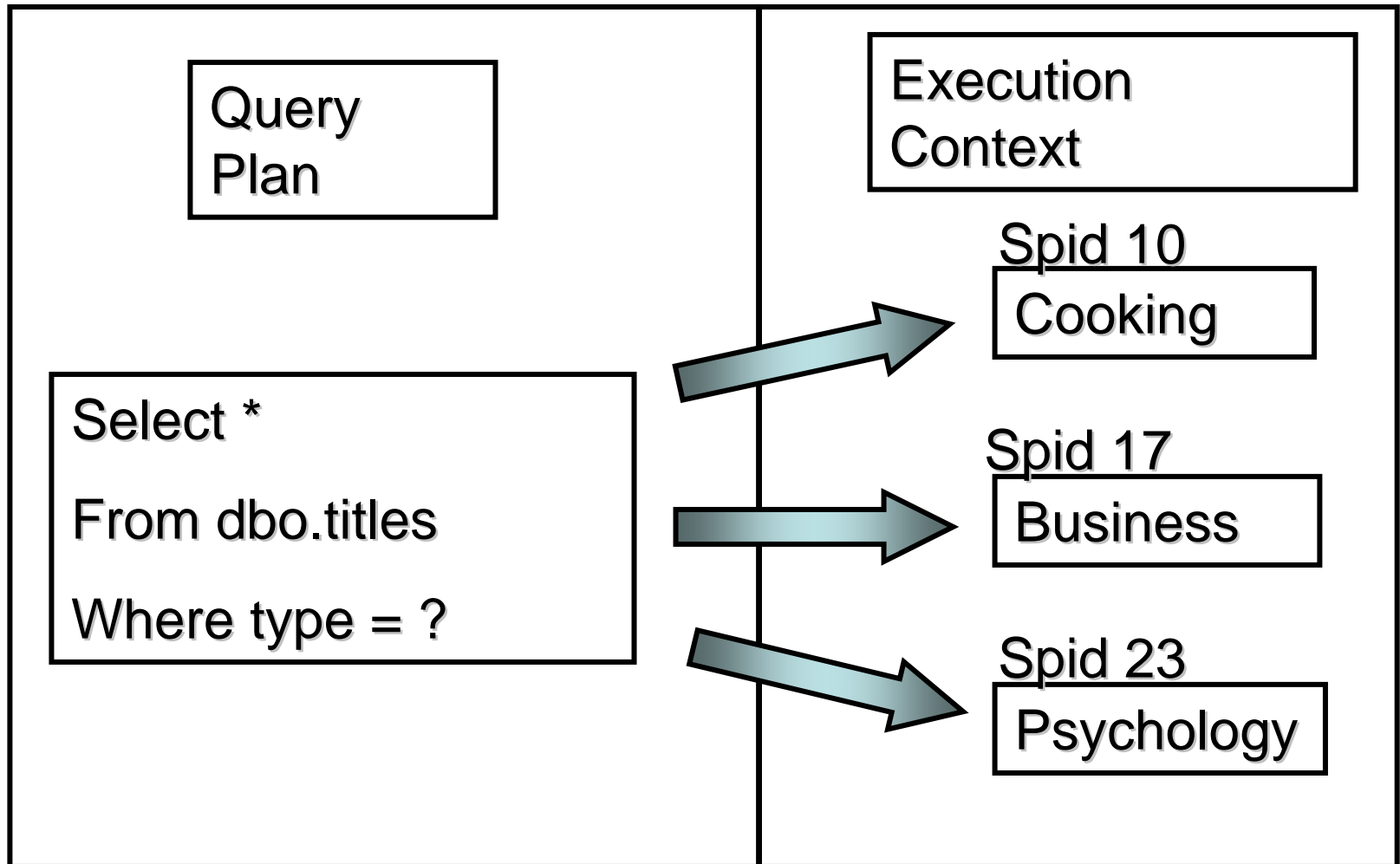
Create Stored Procedure



Exec Stored Procedure



SP Plan Sharing



Not Enough Plan Sharing

- Set Options
- Language used by the login
- Dateformat for the connection

	ON	OFF	Setable By:	
Arithabort	▽		S,D,A	
Concat_null_yields_null	▽		S,D,A	
Quoted_Identifier**	▽		S,D,A	
Ansi_nulls**	▽▲		S,D,A	
Ansi_Padding	▽		S,D,A	
Ansi_Warnings	▽▲		S,D,A	
Numeric_roundabort		▽	S,D,A	
Forceplan			SET only	
Ansi_Null_Dflt_On			S,D,A	
Ansi_Null_Dflt_Off			S,D,A	

▽ = required for index views or computed columns

▲ = required for distributed queries

S, D, A = sp_configure, sp_dboption, alter database

Option Hierarchy

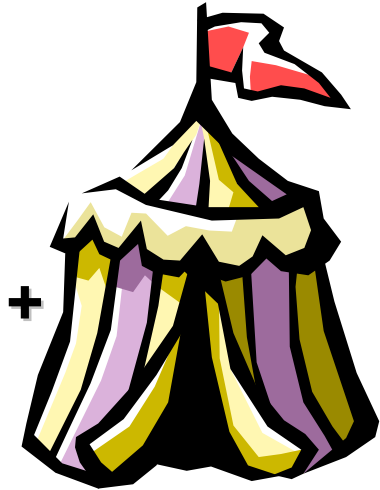
- Set Statement in code
- OLEDB/ODBC Connection string
- ODBC
 - Control Panel
 - SQLConfigDatasource
- OLEDB/ODBC auto set of 7
 - DB-Library/Embedded SQL for C-NOT
- Database Level Settings (alter database)
- Server Wide Settings (sp_configure)



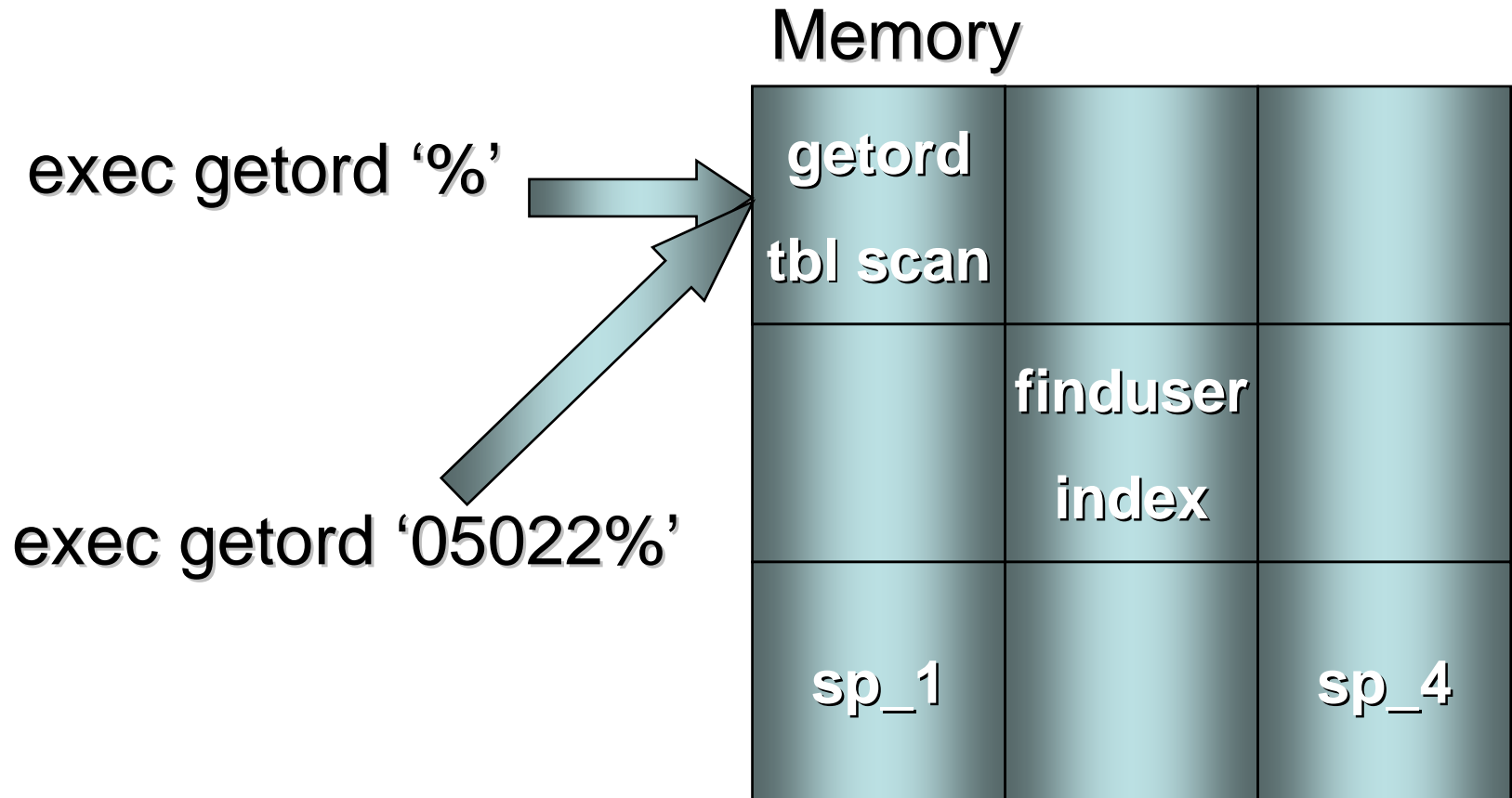
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SIS

+



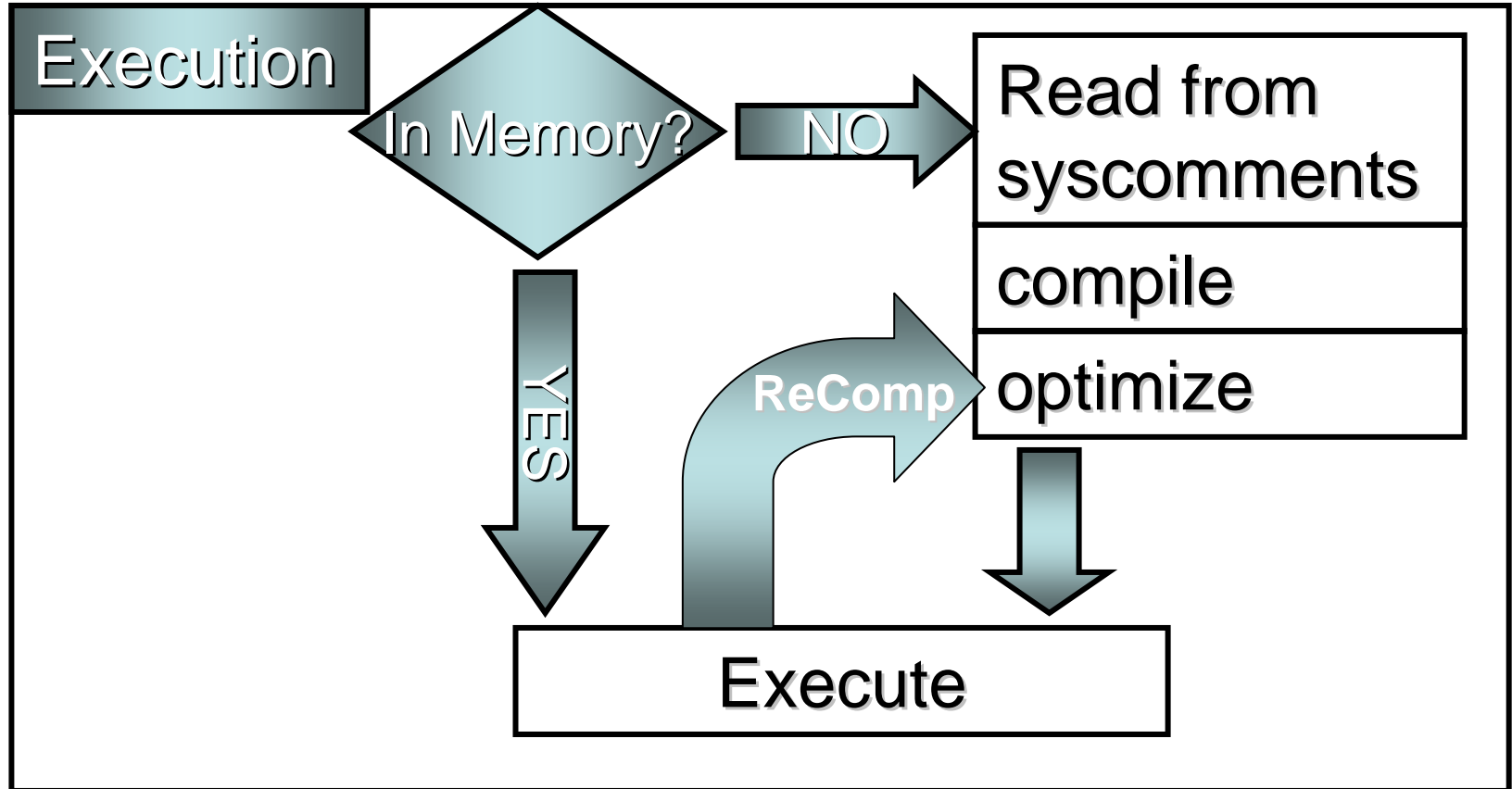
Too Much Plan Sharing



Monitoring Plan Caching

- DBCC FreeProcCache
- DBCC FlushProcInDB(<dbid>)
- DBCC DropCleanBuffers
- Actual Query Plan
- SQL Profiler
- Syscacheobjects

Too Many Recompiles



Proc Recompiles

- Because we request it
- Previous plan aged out of memory
- Interleaved DDL and DML
- Schema changes to objects in Proc
- New index statistics
- Cursor on temp table (SQL 7.0)
- Sp_configure

Requested Recompile

- Create proc ... with recompile as
- Exec myproc ... with recompile
- sp_recompile titles

Proc Plan Aging



Memory

getord		
16	12	
	finduser	
	7	4

Interleaved DDL and DML

create proc testDDLDDL as

create table testdml (DDL)

insert into testdml (DML – RECOMPILE)

alter table testdml (DDL)

insert into testdml (DML – RECOMPILE)

drop table testdml

Schema Changes to Objects

- **Sysobjects.schema_ver**
 - Column additions, deletions
 - Data type changes
 - Constraint additions, deletions
 - Rule/Default bindings
- Query plan index dropped
- Related concept: always declare columns
 - Avoid using `SELECT * FROM foo`
 - Especially avoid `INSERT` without declared columns

New Index Statistics

- Auto_update statistics
- Auto_create statistics
- Update statistics

Inner proc Recompiles

- When it uses the outer procs temp table
 - First time (if called multi times)

Using Wildcards in WHERE clauses with Params

- Found in constructs like:

```
SELECT *  
FROM foo  
WHERE emp_ID = '%'
```

- Optimizer guesses percentage of rows returned

Operator	%
=	10
>	30
<	30
Between	10

Transactions

- Avoid nested transactions. They aren't truly nested:
 - COMMIT only saves data from the outermost transaction
 - ROLLBACK nukes *ALL* transactions, both innermost and outermost
- Orphaned Transactions
 - Errors don't usually abort a transaction except for deadlocks
 - Returning from a procedure or batch does NOT commit a transaction. Once a transaction is started, it remains open until:
 - The transaction is committed
 - The transaction is rolled back
 - The connection ends
- Use @@TRANCOUNT or sys.dm_tran_active_transactions to look for orphaned transactions when entering a new routine
- Keep transactions as short as possible!
- Keep transactions explicit!
- Remember lock escalation!

Row Theory when Set Theory is Better

- C#, VB, VB.NET, etc are procedural languages where you tell the program what to do
- SQL is a declarative language where you tell it what you want
- SQL becomes inefficient when you tell it what to do using CURSORS or LOOPS
- Learn to think in *sets*!
 - One pass through a table or tables
 - Let the computer process joins and filters

Best Practices

- Owner qualify all names (2-part)
- Standardize user options, language
- Minimize use of tempdb
 - Use table variable or smart structures instead
- Help the optimizer cache plans
- Avoid using wildcards with parameters in WHERE clause
- Don't interleave DDL and DML
- TEST,TEST, TEST



(Kev) Exec sptest

dbo.sptest

select * from test



dbo.test

dbo stuff

Kev.test

Kev stuff

Resources

- SQL Server Books Online
 - “Execution Plan Caching and Reuse”
- “Analyzing Optimal Compiled Plan Caching” - Sajal Dam
- Knowledge Base
 - Q243588, “INF: Troubleshooting Performance of Ad Hoc Queries”
 - Q243586, “INF: Troubleshooting Stored Procedure Recompilation”
 - Q263889, “INF: SQL Blocking Due to [COMPILE] locks”
- Inside SQL Server 2000 – Kalen Delaney
- Guru’s Guide to ... - Ken Henderson

(Don’t forget the drawing)

Call to Action – Next Steps

- Attend a live demo, especially **Spotlight on SQL Server** and **Performance Analysis**:
http://www.quest.com/landing/qc_demos.asp
- Download white papers:
<http://www.quest.com/whitepapers>
- Get a trial versions:
<http://www.quest.com/solutions/download.asp>
- Email us with your questions: sales@quest.com or call 949.754.8000

DRAWING FOR GOODIES!

Questions & Answers

Thank you for attending this session and the

More questions? Email me at kevin.kline@quest.com