



GEMTALK
SYSTEMS

SQL Queries On Smalltalk Objects

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Agenda

- **Introduction to GemStone Smalltalk**
- SQL & ODBC
- Code Review & Demo
- Questions

“Image-based” development

- Smalltalk is a programming environment (not merely a language)
 - An **Object** represents a combination of behavior and properties (code and data)
 - Each object is an instance of a **Class**
 - **Object Space** represents RAM
 - **Virtual Machine** represents CPU
 - **Image** represents disk
 - Persist copy of memory when system is not active

All-inclusive environment

- Open an “image” and step into a magical world
- Develop by modifying an existing environment
 - New environment created by copying (cloning)
- Environment contains all your tools
 - Schema definition tools, source code editor, runtime code debugger, object inspector, source code management, etc.
- Save an “image” to create a snapshot

Advantages of Smalltalk

- Pure object system
 - “Everything” is an Object
- Simple, elegant language
- Powerful class libraries

Limitations of traditional Smalltalks

- Object space (image) must fit in (virtual) RAM
- Object space visible to only one VM
- Sharing objects between VMs is difficult
 - Convert to non-object format (binary, XML, SQL)
 - No built-in object identity for multiple exports
- Object state is lost when VM exits

What is GemStone/S?

- Multi-User Object Space
 - Scalable
 - Concurrency
 - User-based Security
- Programmable Object Server
- Large-scale Object Space
- Transaction Semantics
- System Management

Multi-User Object Server - 1

- Scalable
 - Thousands of concurrent user sessions
 - VMs on hundreds of hosts
 - Object space (image) of terabytes
 - Thousands of transactions per second

Multi-User Object Server - 2

- Concurrency
 - Multiple user sessions can be active
 - Each user may have multiple sessions
 - Separate or shared namespaces per user
 - Changes to objects are committed in transaction
 - Concurrency controls and locks for coordination

Multi-User Object Server - 3

- User-based Security
 - Login (password)
 - Namespace: global lookup visibility
 - System operations (backup, change password, ...)
 - Per-object read/write access by user/group

Programmable Object Server

- Smalltalk
 - Data definition
 - Object manipulation
 - Query facilities
 - Concurrency management
 - System management

Large-Scale Object Space

- Object space limited only by disk size
 - System handles RAM caching
- Object space shared by all connected sessions
 - View based on point of last commit/abort
- Persistence by reachability from root object
 - Attach new objects to an existing collection
- On commit, new & changed objects are visible
 - Other sessions must commit/abort to see changes

Transaction Semantics

- Database view is ***isolated*** with ***repeatable reads***
 - Changes made before a commit are not shared
 - Committed changes made by others since current view was obtained are not visible until current session does an abort/commit
 - On abort the current view is reset to current state, including any persistent objects for which changes were made and abandoned

System Management

- On-line (live system) backup
- Database restore, including transaction logs
- Use shared memory to cache disk pages
- Use asynchronous I/O to parallelize disk writes
- Allow hosts to be added and removed
- Monitor and tune system for performance

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What is SQL?

- Structured Query Language
 - Data Definition Language
 - Data Manipulation Language
- Developed at IBM in the early 1970s
- Various ANSI Standards
 - SQL-92

What is ODBC?

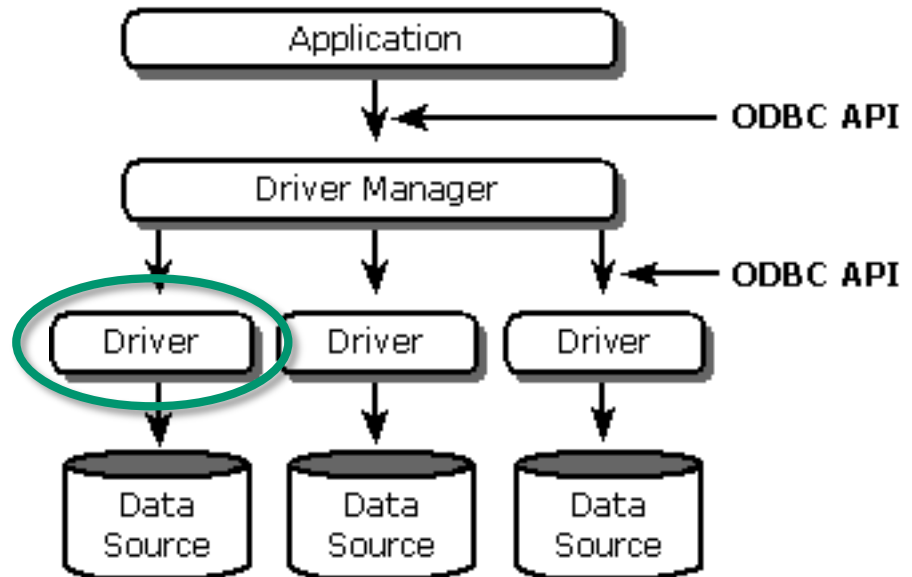
- Open Database Connectivity
- Standard API calls from generic library
- Started by Microsoft in the early 1990s

ODBC Incentives

- "Standard" database tools (Crystal Reports)
- Cross-platform
- Vendor-neutral
- Supported by many applications and DBMSs
- Encapsulate (hide) "strangeness" of OODBMS
- Avoid language lock-in (use from non-Smalltalk)

ODBC Architecture

- Vendor provides:
 - Setup executable
 - Setup DLL
 - Driver DLL

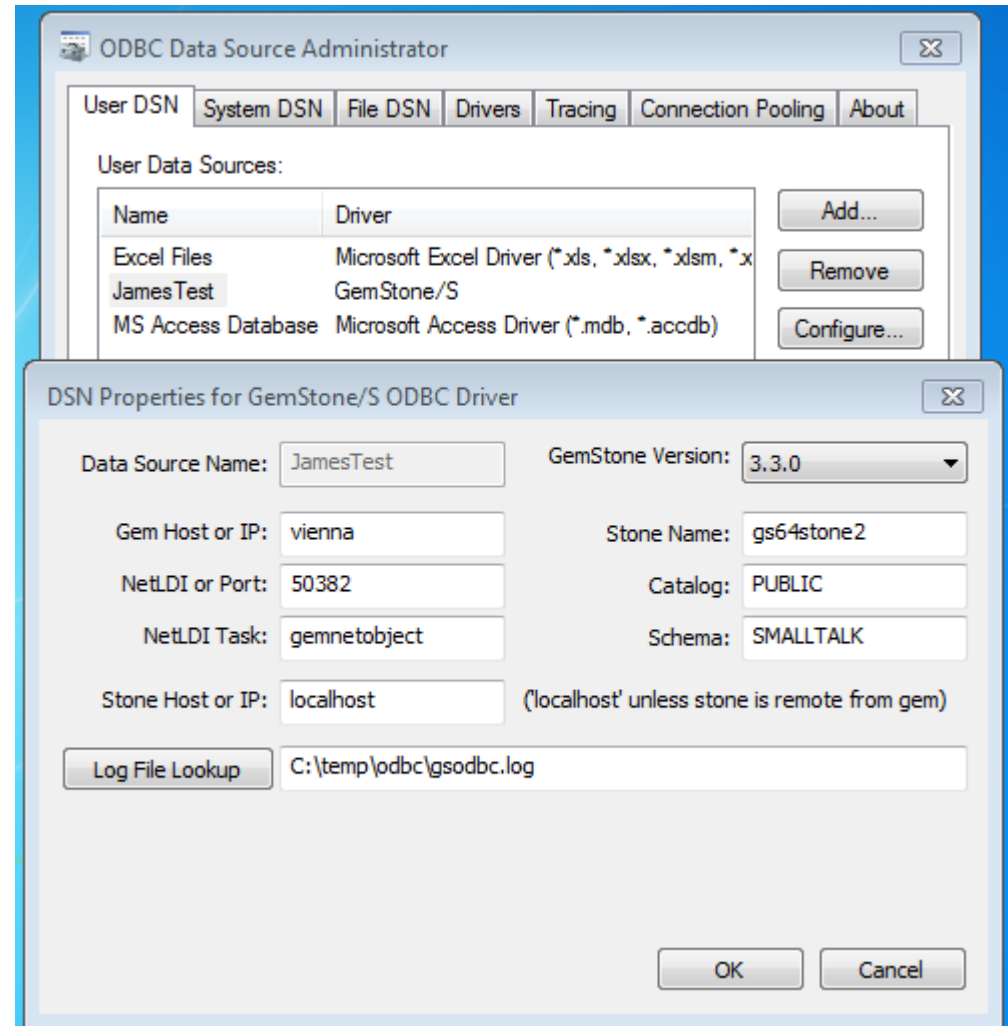


ODBC Setup Executable

- Vendor-supplied executable
- Register DLLs with OS
 - HKEY_LOCAL_MACHINE\SOFTWARE\ODBC\ODBCINST.INI\
- Copy DLLs to designated directory
- Update file usage count
- We have an executable built using Dolphin

ODBC Setup DLL

- ConfigDriver()
- ConfigDSN()



ODBC Driver DLL

- Implements specified functions
 - SQLConnect()
 - SQLExecDirect()
 - SQLFetch()
 - SQLDisconnect()
 - (and many more...)

SQL Parsing in Smalltalk

- ConfigurationOfSqlEvaluator
- Available on smalltalkhub.com

```
MCHttpRepository
```

```
location: 'http://smalltalkhub.com/' ,  
          'mc/Moose/PetitParser/main'
```

```
user: ''
```

```
password: ''
```

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Questions?

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