CLIENT/SERVER PERFORMANCE

DB/EXPO' 93
May 4, 1993
2:00 P.M.

David McGoveran
Alternative Technologies
13150 Highway 9, Suite 123
Boulder Creek, CA 95006
Telephone: 408/425-1859

DEFINING CLIENT/SERVER

- What is a server?
  - PROVIDES SERVICES IN RESPONSE TO CLIENT REQUESTS
  - TYPES OF SERVERS: PRINT, TERMINAL, FILE, DATABASE, etc.
- What is a client?
  - A CLIENT REQUESTS SERVICES FROM A SERVER
  - IT IS INDEPENDENT OF THE SERVER, BUT CAN BE ON THE SAME PLATFORM

KEY COMPONENTS

- DBMS
- Application software
  - RESIDES ON THE CLIENT
  - HANDLES THE APPLICATION LOGIC AND USER INTERFACE
- Database connectivity software
  - PROVIDES THE CONNECTION BETWEEN CLIENT AND SERVER
  - USES COMMUNICATIONS LINKS: NETWORK, SHARED MEMORY, etc.

WHAT IS C/S PERFORMANCE?

- Response time
- Throughput
- Concurrency

KEY SERVER FEATURES

- Storage management and Access methods
- Buffer management
- Processor support
- Concurrency control
- Optimization, DML, and set processing support

APPLICATION SOFTWARE

- Set processing support
- Transaction processing support
  - ASYNCHRONOUS, NESTED
- Error handling
- Column vs. row vs. table

APPLICATION SOFTWARE (cont'd)

- Memory management
- Static vs. dynamic
- Object orient vs. function
- User interfaces

DATABASE CONNECTIVITY SOFTWARE

- Communications link support
  - LOAD, COLLISIONS, NUMBER OF USERS, NUMBER OF SESSIONS, RECOVERY
- Complete support of the DBMS product
- Overhead
  - CLIENT SIDE, SERVER SIDE, NETWORK, DEVELOPMENT COSTS
- The least understood element
- Bad database connectivity can destroy performance

DESIGN ISSUES

- **Architecture**
- **Application type and design**
  - USE STATELESS SESSIONS,
  - AVOID CONVERSATIONAL DATABASE INTERACTIONS
  - CONSIDER MULTIPLE SESSIONS (CHECK OVERHEAD FIRST)
  - USE SET PROCESSING

DESIGN ISSUES

- **Database design**
  - AVOID NULLS
  - TRY NOT TO DENORMALIZE
  - DESIGN FOR STORED PROCEDURES
  - USE ASSOCIATION TABLES AND LOOKUP TABLES
  - USE SURROGATE KEYS

"ACADEMIC" BENCHMARKS

- Wisconsin, Set Query, AS3AP, etc.
- Carefully designed
- Test mostly ideal characteristics
- Repeatable results

"INDUSTRY" BENCHMARKS

- TPC Benchmarks (A, B, C, ...)
- Designed/controlled by vendor marketing folks
- Report best numbers from ideal configurations
- Non-repeatable results
- Useless for evaluating performance capabilities

DCB

- Database Connectivity Benchmark
- Builds on TPC-C
- Measures performance under multiple workloads
  - DSS, OLTP, BATCH, OLCP, AD HOC
- Characterizes support for a DBMS product

DCB

- Repeatable and comparatively low-cost to run
  - STATISTICALLY DERIVED AND CHARACTERIZED RESULTS
  - FULL DOCUMENTATION REQUIRED
  - PORTABLE DRIVER, LOADER, REPORT GENERATOR
  - SMALL AMOUNT OF PRODUCT SPECIFIC CODE
  - SCRIPT DRIVEN

TIPS

- Don't tune the DBMS for any application *per se*
- Capitalize on relational strengths
  - LOGICAL ACCESS ONLY
- Minimize the amount of database communication
  - AVOID FIELD BY FIELD VALIDATION OR LOOKUP FROM THE DATABASE
  - AVOID TRANSACTION ROLLBACK
  - SEND TRANSACTIONS
  - USE SET PROCESSING

MORE TIPS

- Write context-free applications, use stateless sessions
- Most optimistic concurrency control doesn't work
- Avoid the conversational approach
- Avoid field by field validation from the database

SUMMARY

- Good C/S application design is different!
  - DON'T LET OLD HABITS GET IN THE WAY OF SUCCESS
- Use the right products for the job
  - DATABASE CONNECTIVITY MAY BE MORE IMPORTANT THAN YOU THINK
  - INSIST THAT YOUR DBMS BECOME MORE AND MORE RELATIONAL

Biography

- David McGoveran is a well-known relational database consultant and president of Alternative Technologies (Boulder Creek, CA), specialists in solving difficult relational applications problems since 1981. He publishes The Database Product Evaluation Report Series; authored (with Chris Date) A Guide to SYBASE and SQL Server; and is completing An Advanced Guide to Client/Server Applications. This presentation is based on his workship: Building Effective Client/Server Applications.

