

IBM



Component-Based
Software-Engineering
7. Vorlesung

Thomas Gschwind <thg@zurich....>

| SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Agenda

- Performance Issues
- Clustering

2 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Performance Issues

- Define the performance requirements from the start
- Tuning an application involves several layers
 - OS, JVM, database, application server, etc.
- Be careful with memory resources
 - Make sure to release objects that are no longer needed

3 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Performance Issues

- Stateful versus Stateless Beans
- Capacity Planning
- Performance Tuning
- Debugging
- Reuse

4 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Stateful versus Stateless

- Stateless beans
 - May be pooled easily
 - Send client state for each call
 - Store state persistently
 - Require client to pass session id
 - Easier to convert to a Web Service
- Stateful beans
 - State is lost if bean crashes
 - Good if multiple invocations required
 - Bean needs to be aware of transactions

5 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Tune Entity Beans

- Tune pool size
- Tune cache size (entities typically have bigger caches)
- Use lazy loading
- Using JDBC directly
 - If so use CallableStatement

7 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Tuning Session Beans

- Stateless
 - Tune pool size
 - Efficient resource caching
- Stateful
 - Tune pool size
 - Tune caching
 - Control serialization
 - Clients should release them if no longer needed

6 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Wrap Entity Beans

- Should only be accessed through session beans
- Avoids expensive remote calls
- Session bean performs bulk create/read/... Operations for client

8 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

MDB Tuning

- Tune pool size

9 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Performance Tuning

- Use local interfaces when possible
- Transactions
 - Keep transactions short
 - Isolation levels
- Use caching
- Use CMP instead of BMP (less SQL requests)
- Use lazy loading if you do not use entire bean's data

11 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Capacity Planning

- Necessary if response time is to be guaranteed
- Throttle machine so that it won't be overloaded
- Keep spare machine for peak times

10 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Debugging

- A user error occurs
 - E.g., an error in JDBC statement
 - JDBC statements interpreted => not checked by compiler
- Container generated classes incorrect
 - Error in deployment descriptor
 - Hard to debug
 - OK, should happen rarely
- What to do?
 - Check log files, use JDBC wrapper, keep container generated files around, container supports debugging

12 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Reuse Options

- Reuse as given
- Reuse by customization
- Reuse by extension

13 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Agenda

- Performance Issues ✓
- Clustering

15 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Legacy Integration

- Rewrite the system (yeah right!)
- Provide an EJB facade to be used
 - System can be migrated more easily
- Bridge into the system
 - JNI
 - CORBA
 - JMS
 - Web Services
 - JCA

14 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Large-Scale System

- Large-scale system requires the application server to be clustered
- Terminology
 - Reliability
 - Availability
 - Serviceability
- Think of the growth of your system right away

16 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Clustering

- Load-balancing performed by web or application server
- JNDI Driver
- Container
- Home Stub
- Remote Stub

17 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Idempotence

- Independently how often a method is being invoked it has the same effect

19 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Clustering

- Pure load balancing does not deal with failures
- Dealing with failures
 - Request-level fail over
 - Session-level fail over
- Requires replicated servers

18 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Stateless Session Bean Clustering

- Load Balancing
 - No state => may always call a different bean
- Fail-over
 - ejbCreate() fine
 - Remote methods only if they are idempotent

20 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Stateful Session Bean Clustering

- Typically a primary bean is created
 - Serves all client requests
 - State replicated to other servers
 - At the end of methods
 - At the end of transaction
- Coarse grain load balancing
 - Backup only contacted if primary copy fails (external resources)
- Fail-over
 - Between method-calls (idempotent methods may be restarted)
 - Between transactions

21 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Message Driven Bean Clustering

- Load balancing
 - Pull themselves messages when ready
 - Works fine with queues
- Fail-over
 - Problems handling the message?
 - Don't acknowledge until done
 - Be careful to undo data
 - Be careful to live with partially executed message handlers

23 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Entity Bean Clustering

- Load Balancing
 - Contacted *only* by session beans
 - Contacted *only* through local interface
 - Load balanced as a consequence of session bean
- Fail-over
 - No, only in combination with session bean
 - Otherwise, fail-over from local to remote interface
- Caching
 - Read-only caches
 - ...

22 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Other Clustering Issues

- Use JNDI service to look up data
 - Centralized
 - JNDI service may fail
 - Shared/replicated
 - Each node has a name server
 - Contains replicated objects on other servers
 - Replicates those servers contents
- Initial Access Logic
 - Round Robin DNS
 - Software Proxies
 - Hardware Proxies

24 | Th. Gschwind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Summary

- Performance Issues
- Clustering

25 | Th. Geiswind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation

IBM Research, Zurich

Outlook

- Planning an EJB Project
- CORBA

See you on Friday!

26 | Th. Geiswind, Component-Based Software-Engineering, | SS2007 | © 2007 IBM Corporation