

Comprehensive Guide to Oracle ORA Exceptions Related to Performance

Oracle ORA exceptions related to performance typically indicate issues such as resource exhaustion, memory allocation problems, contention, inefficient queries, and I/O bottlenecks. Addressing these exceptions is crucial for maintaining optimal database performance. Below is a comprehensive list of common performance-related Oracle ORA exceptions, categorized for clarity:

Memory and Resource Allocation Errors

1. **ORA-04031:** *Unable to allocate %s bytes of shared memory*
 - **Cause:** The Shared Pool or another memory area is full and cannot allocate additional memory. This can result from insufficient memory allocation or memory leaks.
 - **Impact:** Can lead to failed operations and degraded performance due to lack of available memory for executing SQL statements or PL/SQL blocks.
 2. **ORA-01652:** *Unable to extend temp segment by %s in tablespace %s*
 - **Cause:** Temporary tablespace cannot be extended, often due to large sorts or hash joins requiring more temporary space than available.
 - **Impact:** Operations that require sorting or temporary storage may fail or slow down significantly.
 3. **ORA-01555:** *Snapshot too old: rollback segment number with name "" too small*
 - **Cause:** A long-running query tries to access older data that has been overwritten in the undo segments, often due to insufficient undo tablespace or high DML activity.
 - **Impact:** Causes queries to fail unexpectedly, impacting application performance and user experience.
 4. **ORA-04061:** *Existing state of packages has been discarded*
 - **Cause:** Packages are being recompiled or modified while in use, leading to the invalidation of their state.
 - **Impact:** Can cause delays and additional overhead as the package state needs to be reinitialized, affecting performance.
 5. **ORA-04068:** *Existing state of packages has been discarded*
 - **Cause:** Similar to ORA-04061, it occurs when a package state is invalidated unexpectedly.
 - **Impact:** May lead to performance degradation due to the need to reinitialize package states.
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Locking and Contention Errors

6. **ORA-00054:** *Resource busy and acquire with NOWAIT specified*
 - **Cause:** A resource (e.g., table or row) is locked and cannot be acquired immediately because another session holds the lock.
 - **Impact:** Operations fail immediately if NOWAIT is specified, potentially leading to transaction rollbacks and retries, affecting throughput.
7. **ORA-00060:** *Deadlock detected while waiting for resource*
 - **Cause:** Two or more sessions are waiting for each other to release resources, creating a cycle of dependencies.
 - **Impact:** Causes one of the transactions to be rolled back to resolve the deadlock, disrupting workflow and performance.
8. **ORA-02049:** *Timeout: distributed transaction waiting for lock*
 - **Cause:** A distributed transaction is waiting too long for a lock to be released by another transaction.
 - **Impact:** Leads to transaction timeouts, which can degrade performance and user experience.

I/O and Storage Errors

9. **ORA-01653:** *Unable to extend table (%s) by %s in tablespace %s*
 - **Cause:** A table cannot be extended due to insufficient space in the specified tablespace.
 - **Impact:** Prevents data insertion or updates, leading to application errors and potential performance bottlenecks.
10. **ORA-01658:** *Unable to extend lob segment (%s) by %s in tablespace %s*
 - **Cause:** Similar to ORA-01653 but specific to LOB (Large Object) segments.
 - **Impact:** Affects operations involving large objects, potentially causing failures and slow performance.
11. **ORA-00257:** *Archiver error. Connect as SYSDBA to fix.*
 - **Cause:** The archive log destination is full, preventing further archiving of redo logs.
 - **Impact:** Halts database operations that require archiving, severely impacting performance and availability.

Memory Optimization and Parallel Execution Errors

12. **ORA-40211:** *The procedure or function is not enabled for parallel execution*
- **Cause:** Attempting to execute a procedure or function in parallel mode when it is not supported.
 - **Impact:** Limits the ability to leverage parallel processing for performance gains, potentially slowing down large operations.
13. **ORA-30899:** *Operations that use hash join operators must not use hash compression*
- **Cause:** Conflicts in execution plan settings, particularly involving hash joins and compression.
 - **Impact:** Can lead to suboptimal execution plans, reducing query performance.
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Internal and System Errors

14. **ORA-00600:** *Internal error code, arguments: [%s]*
- **Cause:** Indicates a bug or unexpected condition within the Oracle Database.
 - **Impact:** Can cause unpredictable behavior, crashes, and severe performance degradation. Often requires Oracle support for resolution.
15. **ORA-07445:** *Exception encountered: core dump [%s]*
- **Cause:** Critical internal error leading to a core dump.
 - **Impact:** Results in abrupt termination of processes, leading to significant performance issues and potential data loss.
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Networking and Communication Errors

16. **ORA-12514:** *TNS: listener does not currently know of service requested in connect descriptor*
- **Cause:** The listener is not aware of the specified service, possibly due to incorrect configuration.
 - **Impact:** Prevents client connections, leading to application downtime and performance issues.
17. **ORA-12170:** *TNS: Connect timeout occurred*
- **Cause:** Network issues causing connection attempts to timeout.
 - **Impact:** Delays in establishing database connections, affecting application responsiveness and user experience.
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Other Performance-Related Errors

18. **ORA-28009:** *Connection as SYS should be as SYSDBA or SYSOPER*
 - **Cause:** Attempting to connect as SYS without the proper privilege.
 - **Impact:** While not directly a performance issue, misconfigured connections can lead to restricted access and potential performance constraints.
19. **ORA-06550:** *PL/SQL: Compilation unit analysis terminated*
 - **Cause:** Errors in PL/SQL code compilation.
 - **Impact:** Can prevent execution of stored procedures and functions, affecting application logic and performance.
20. **ORA-04090:** *'string' encountered during execution of trigger '%s.%s'*
 - **Cause:** Errors encountered during trigger execution.
 - **Impact:** Faulty triggers can cause transaction delays and degrade overall database performance.

Best Practices for Addressing Performance-Related ORA Exceptions

1. **Monitor and Tune Memory Allocation:**
 - Regularly monitor the Shared Pool, PGA, and SGA.
 - Adjust memory parameters based on workload and performance metrics.
2. **Optimize Temporary Tablespace Usage:**
 - Allocate sufficient temporary tablespace to handle peak sorting and hashing operations.
 - Regularly monitor and clean up temporary segments.
3. **Manage Undo Tablespace Effectively:**
 - Ensure adequate undo tablespace to support long-running queries.
 - Implement proper transaction management to minimize undo space consumption.
4. **Resolve Locking and Contention Issues:**
 - Identify and optimize long-running transactions that hold locks.
 - Implement appropriate isolation levels and use efficient locking strategies.
5. **Ensure Sufficient Storage and I/O Capacity:**
 - Allocate adequate space for tablespaces and monitor storage usage.
 - Optimize I/O performance by using fast storage solutions and distributing data across multiple disks.
6. **Handle Internal Errors Promptly:**
 - For ORA-00600 and ORA-07445 errors, contact Oracle Support with detailed trace information.
 - Apply relevant patches and updates to address known bugs.
7. **Optimize Network Configuration:**

- Ensure reliable and high-speed network connections between clients and the database server.
 - Configure listeners correctly to prevent connection-related performance issues.
- 8. Regularly Review and Optimize PL/SQL Code:**
- Optimize stored procedures, functions, and triggers for efficient execution.
 - Avoid unnecessary recompilations and ensure code is free from errors that can impact performance.
- 9. Leverage Parallel Execution Wisely:**
- Enable parallel execution for suitable operations to enhance performance.
 - Ensure that procedures and functions are compatible with parallel processing.

Conclusion

Performance-related ORA exceptions are critical indicators of underlying issues that can significantly impact the efficiency and responsiveness of your Oracle Database. Proactive monitoring, proper resource allocation, efficient query and code optimization, and timely resolution of errors are essential strategies for maintaining optimal database performance.