# Customer Case Study
Real Application Testing Usage at Bank of America

RAM Migration Challenge

Challenge

- Complexity - **7500 nightly batch jobs requiring 24x6 support**

- Scale - RAM **production** platform spread across **3 DB clusters** and <u>**18 separate Oracle databases**</u>

- Older Solaris Oracle 9i Platform was at or **near CPU capacity** – 700+ minutes of sustained DB utilization above 95%

- Critical business need: Upgrade for both support (since 9i) and capacity reasons

- Several hundred-thousand individual SQL Statements to potentially tune for 10g

- Minimal instrumentation to capture production SQL Statement and binds

Host CPU Utilization - %Busy

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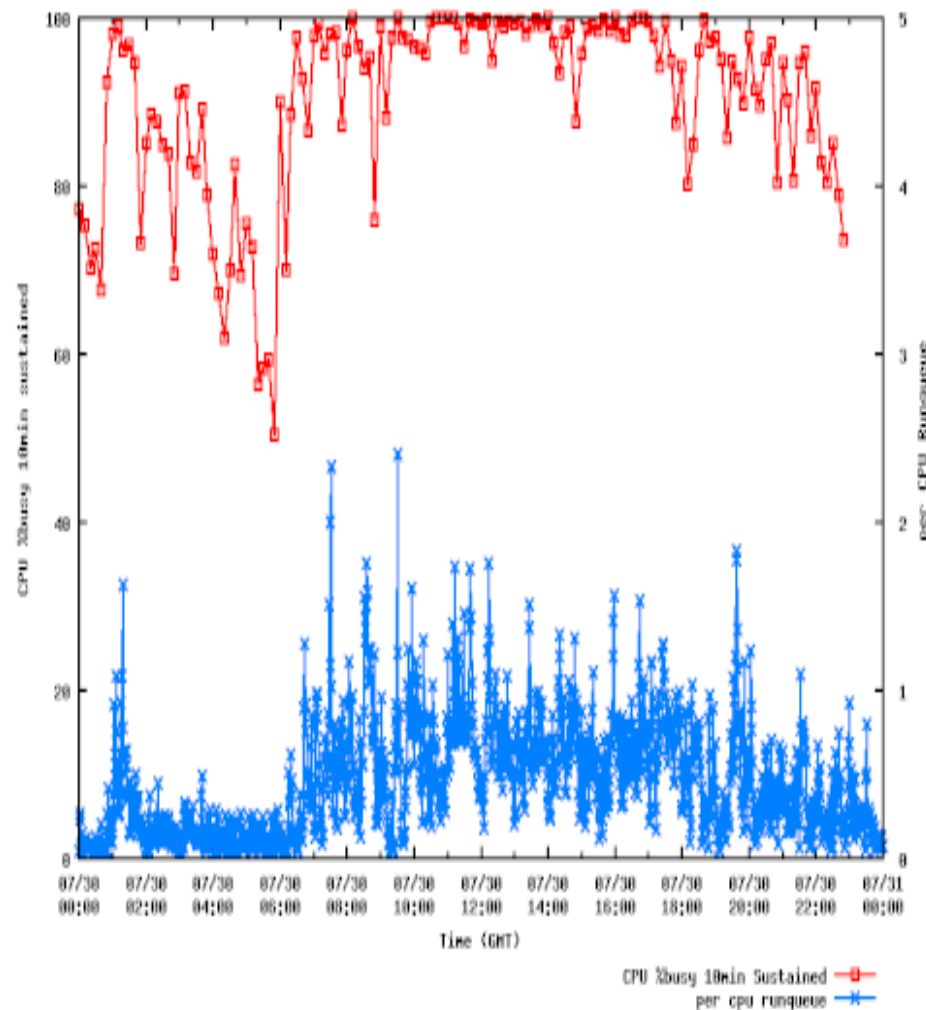
Solution

- A combined dual migration involving
  - Solaris → Linux
  - Oracle Database 9i → 10.2.0.4
- Phased migration plan: 1. Reporting, 2. Batch, 3. "Live" environment
- Captured production SQL using network appliance or sniffer
  - Since system utilization was near maximum capacity, enabling SQL Trace was not feasible
  - This will no longer be an issue for us from Oracle Database 10g
- Setup performance environment databases similar to production
- Re-played statements in performance environment against databases 9i and 10g using homegrown load scripts
- Performance environment provided flexibility to enable SQL trace, yet capture production SQL

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Solution (contd.)

- Enable SQL Trace on Oracle Database 9i in the performance environment for bind capture
- Use SQL Performance Analyzer (SPA) methodology for Oracle Database 9i:
  - Convert SQL trace to SQL Tuning Set (STS)
  - Test execute on Oracle Database 10.2.0.4 in performance environment
  - Perform SQL and detailed plan change analysis
  - Tune identified regressions
- Results:
  - 50 regressions discovered out of 1 million SQL, cause of regression
  - Tuned through working with Oracle Support and several changes
    - Stored Outline (1 query)
    - _b_tree_bitmap_plans = FALSE (to force 9i 'OR expansion' behavior)
    - alter session set "_FIX_CONTROL"='4600710:OFF'; (for 9i in-list behavior)
    - Index creation (1 query)

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Summary of Success

- Nearly flawless transition to 10g
  - Only 1 undiscovered plan regression in 1 million unique SQL
- Achieved goal of minimizing risk to our business partners of slow or unresponsive application.
- Live for 1 month now with no issues.
- Book marking process was between 30-50% faster on 10g
- 10g test ran 169% faster than 9i (53 minutes vs. 143 minutes)
- SPA enabled
  - Improved productivity of DBA and Developers
    - Time to solve core issues, rather than file gathering, filtering, looking for individual plan changes and analysis
    - Focus on more strategic issues
  - More thorough analysis
  - More rounds of testing in a shorter timeframe due to efficient testing and analysis process
- SPA resulted in savings of 3-4 weeks of tedious SQL analysis, about 90% reduction in effort!

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