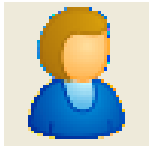
J2EE: Black Box in the Oracle World

December 2005

DBA Hot Seat: Have these things ever happened to you?

DBA



Application Owner

IT Manager

Software Vendor

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Hotseat comes from Unclear Ownership

It's an Application issue!

It's a Database issue!

DBA

App Owner

Need evidence to show where the problem exists, avoid "Finger Pointing" to the database

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Unclear where to add capacity investment?

Where do we put the hardware investment – Database or App Server?

Management

I need it...

DBA

I need it...

J2EE Owner

Need to idendtify what improvement will occur before expenditures or tuning projects...

00:08:29	**Time waiting for 'db file scattered read'**
25%	**Percent of Time Period wait time**

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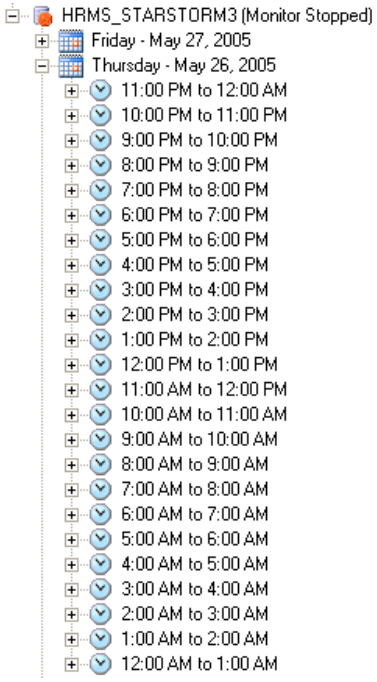
Problems must occur multiple times

Why did we have poor performance this morning?

Management 

 DBA

Not sure, we need to wait for it to happen again



Need to watch production transactions, not just synthetic/test transactions

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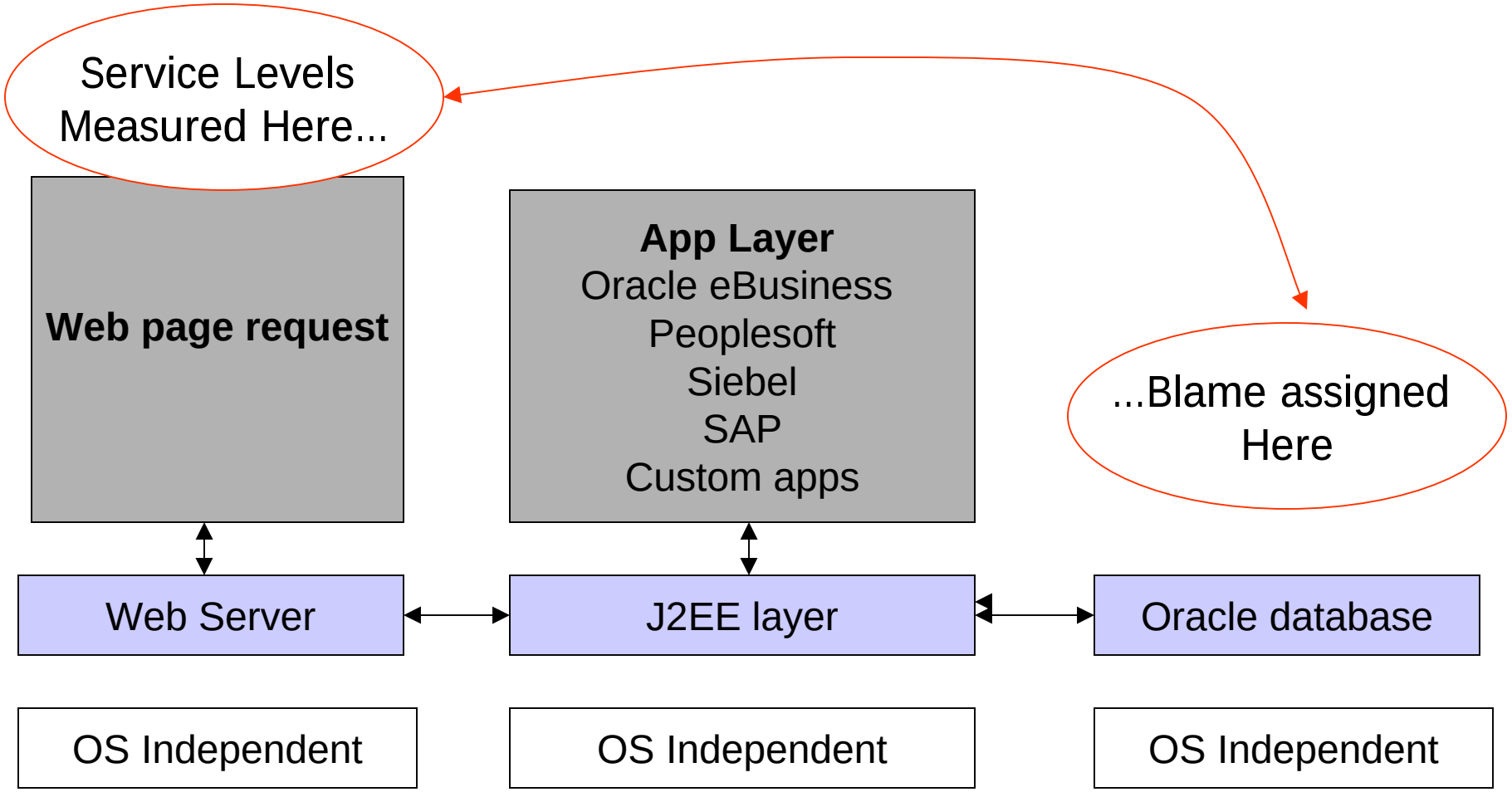
Typical Multi-Tier System



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Typical Java tools

- Focus on system measurement, not Wait Time/Service Time
- Java details, no database visibility – but most Java delays are due to database
- No real time/constant monitoring

Typical Oracle Database Tools

- Focus on database in isolation – no connection to the J2EE application
- Look system wide, not at individual SQLs
- Count executions, not Wait Time
- Traces for special sessions, no continuous monitoring

System Centric Monitoring: How Can You Manage Performance this Way?

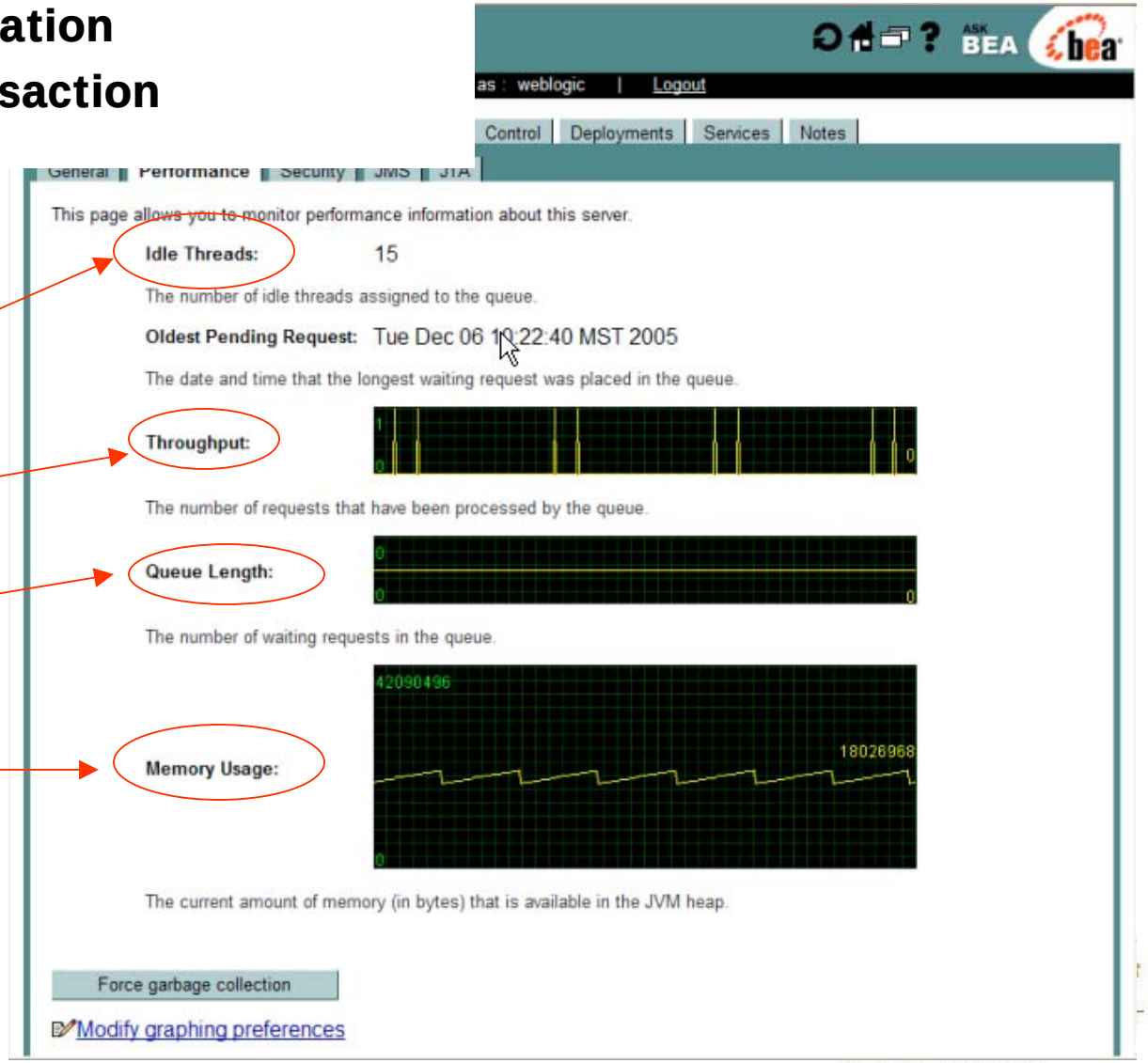
- **Focus on system operation**
- **No correlation to transaction performance**

Idle threads

Number of requests

Waiting Requests

Memory Usage



Wait-Time Based Performance Analysis

- Emerging best-practice for database tuning
  - "You can't tell how long something took by counting how many times it happened. ... If you're only measuring event counts, then you're not measuring what the users care about."
    —*Optimizing Oracle Performance, O'Reilly Press*
- Oracle is starting to build wait-based tuning tools into the database particularly in 10g
- Tune by determining where processing time is spent

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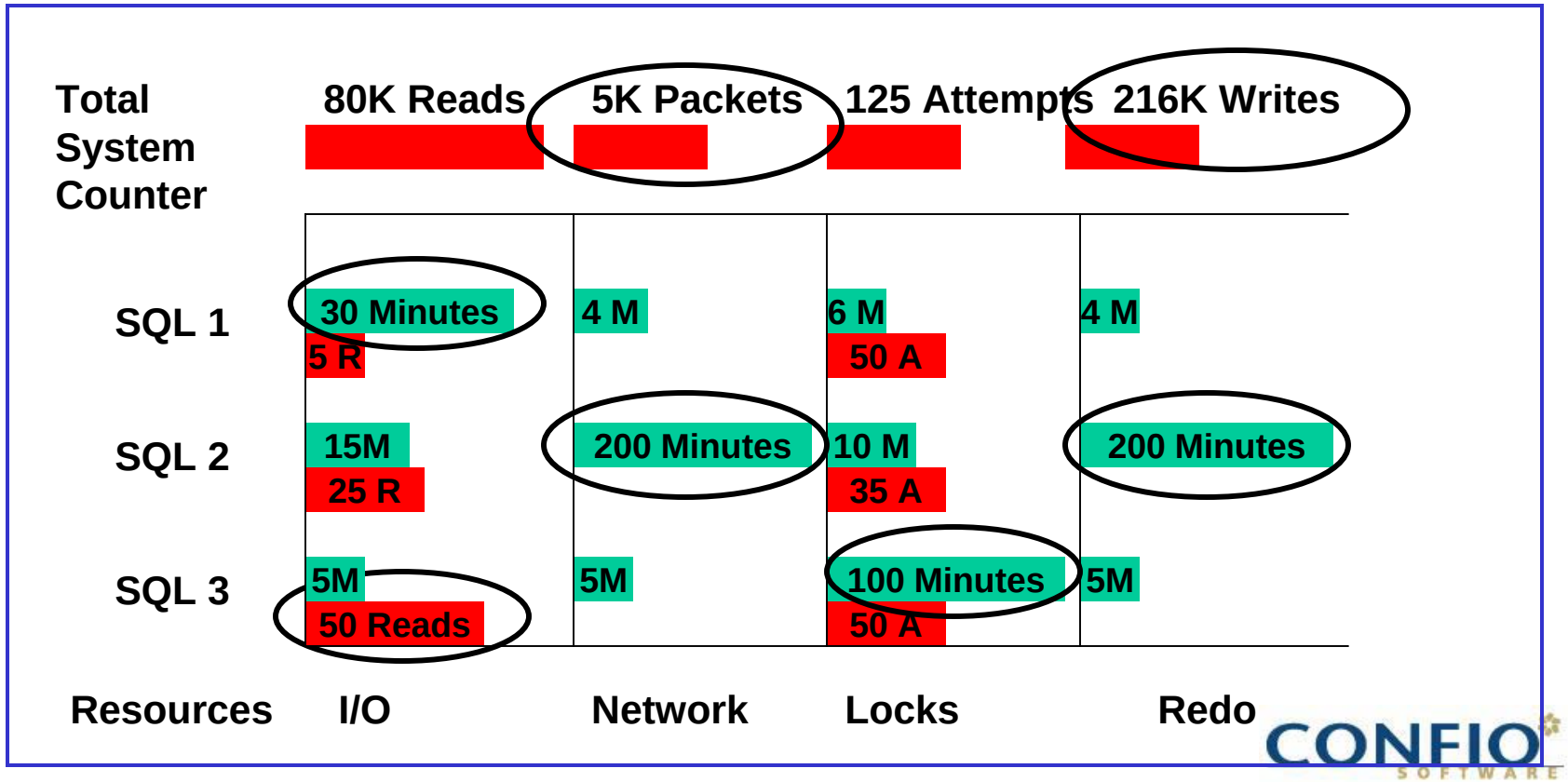
Track Wait Time, Not System Counters

- Watching Counters leads to wrong conclusions: Time is more relevant
- Total System Counters hide information: Need breakdown to individual steps in your transaction



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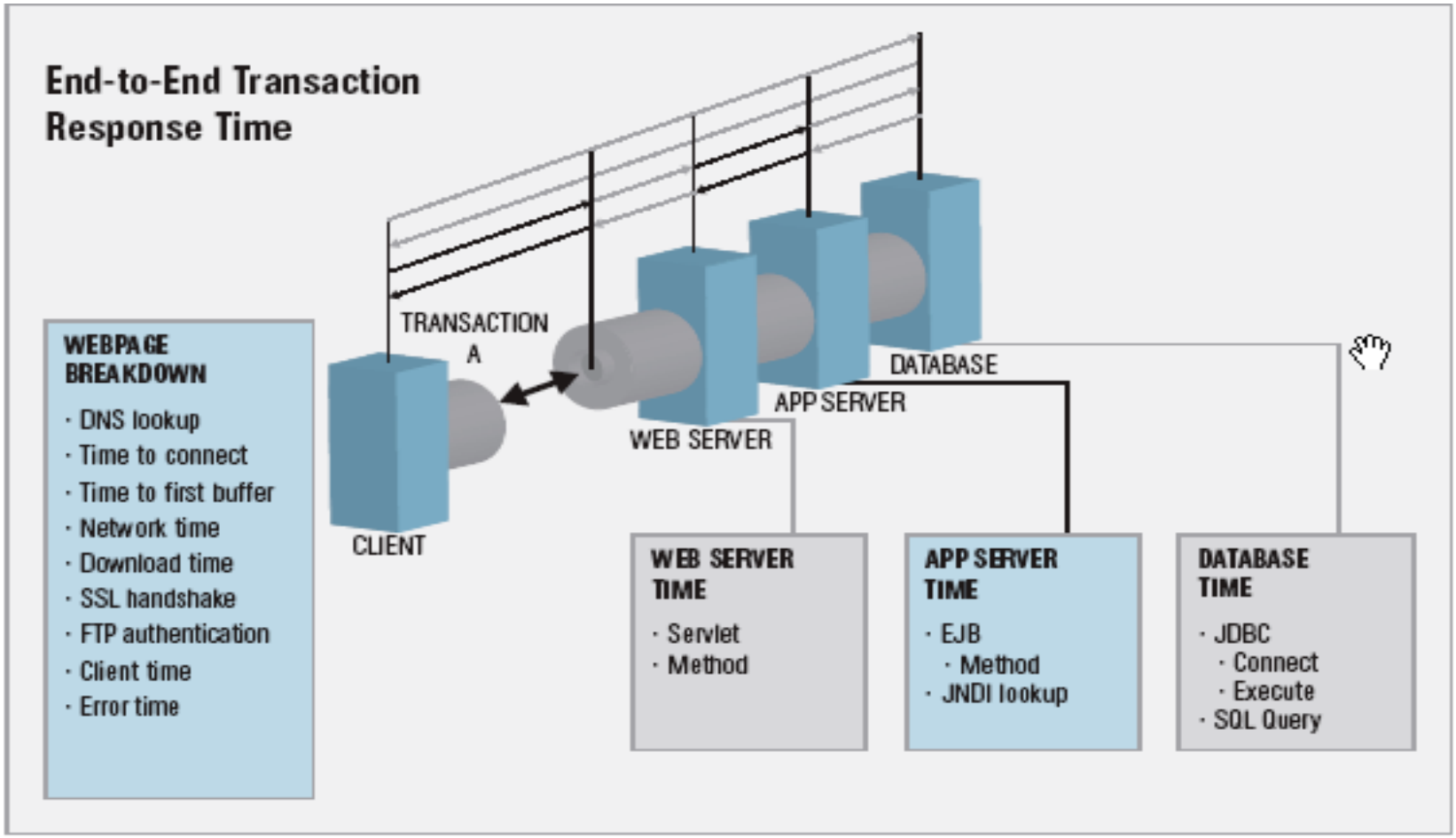
1st Step: Course Grained Measure of Time Between Systems



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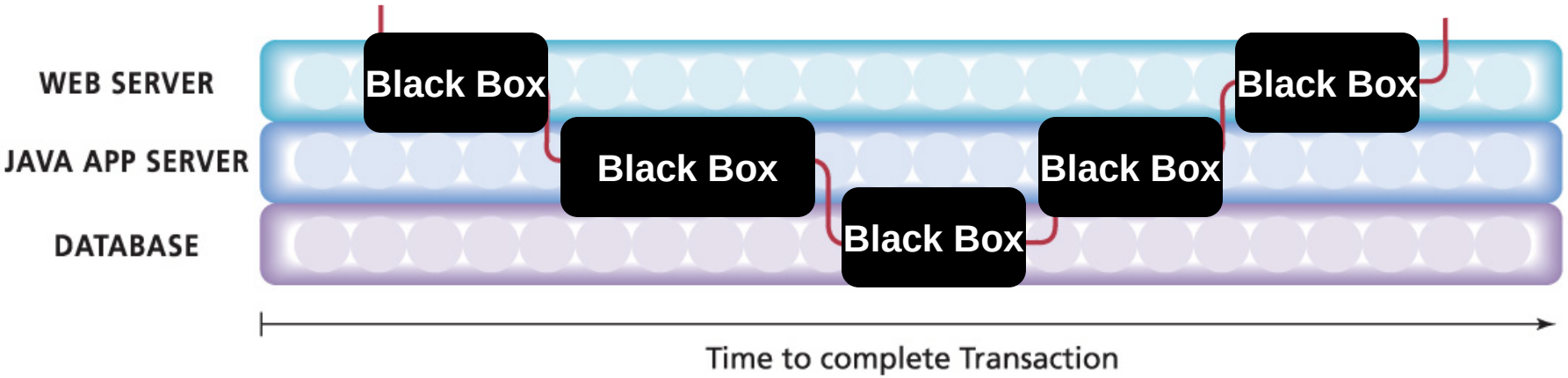
Many Tools Never See Inside Your Multi-Tier Application

Web – J2EE - Oracle

- Standard approach: Treat each system as a Black Box
- No detail inside the system
- Where are the bottlenecks, and who is responsible?



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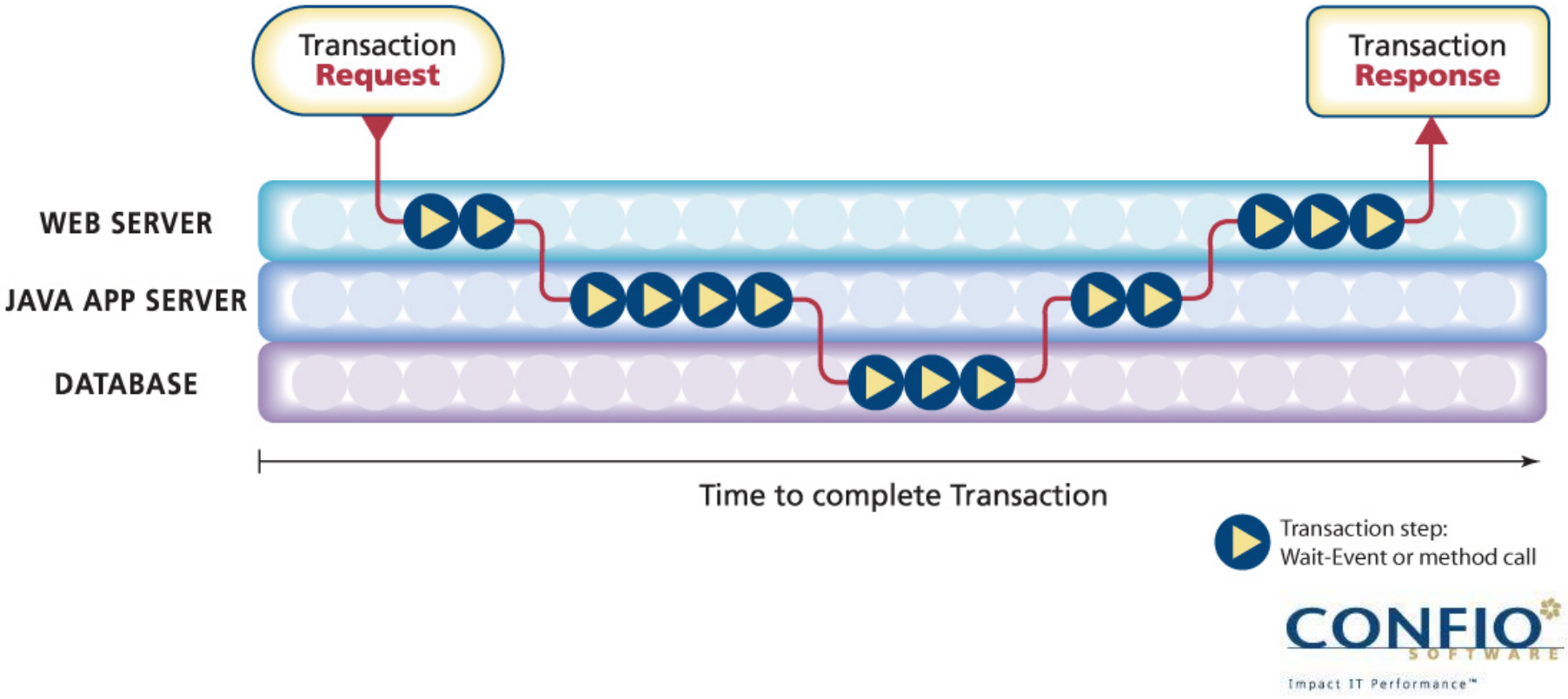
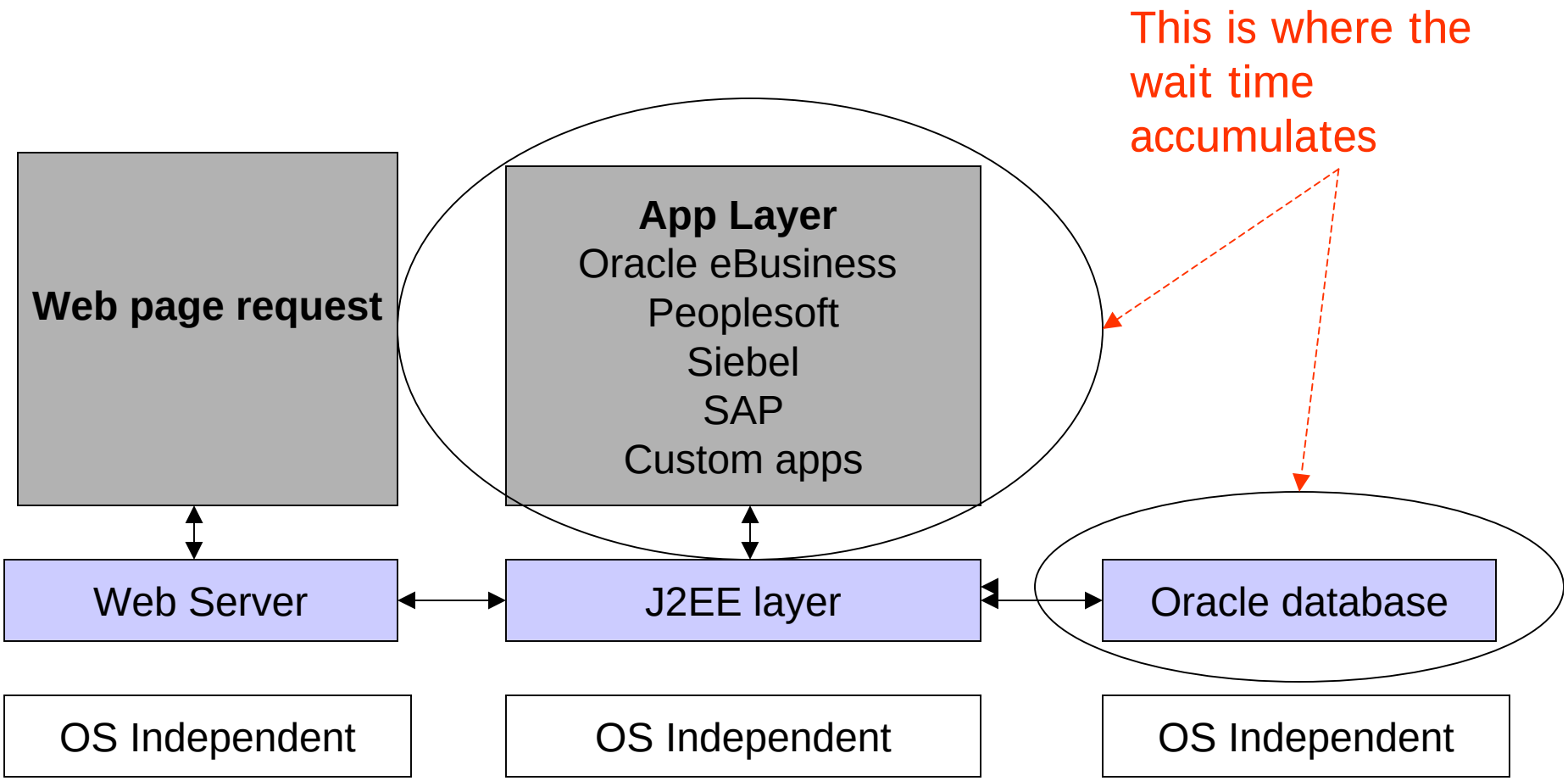
3 Requirements for J2EE to Oracle Visibility

- Every Transaction
- Every Step inside each layer
- Measure Time – That's what users care about



Performance Monitoring where it Matters Most



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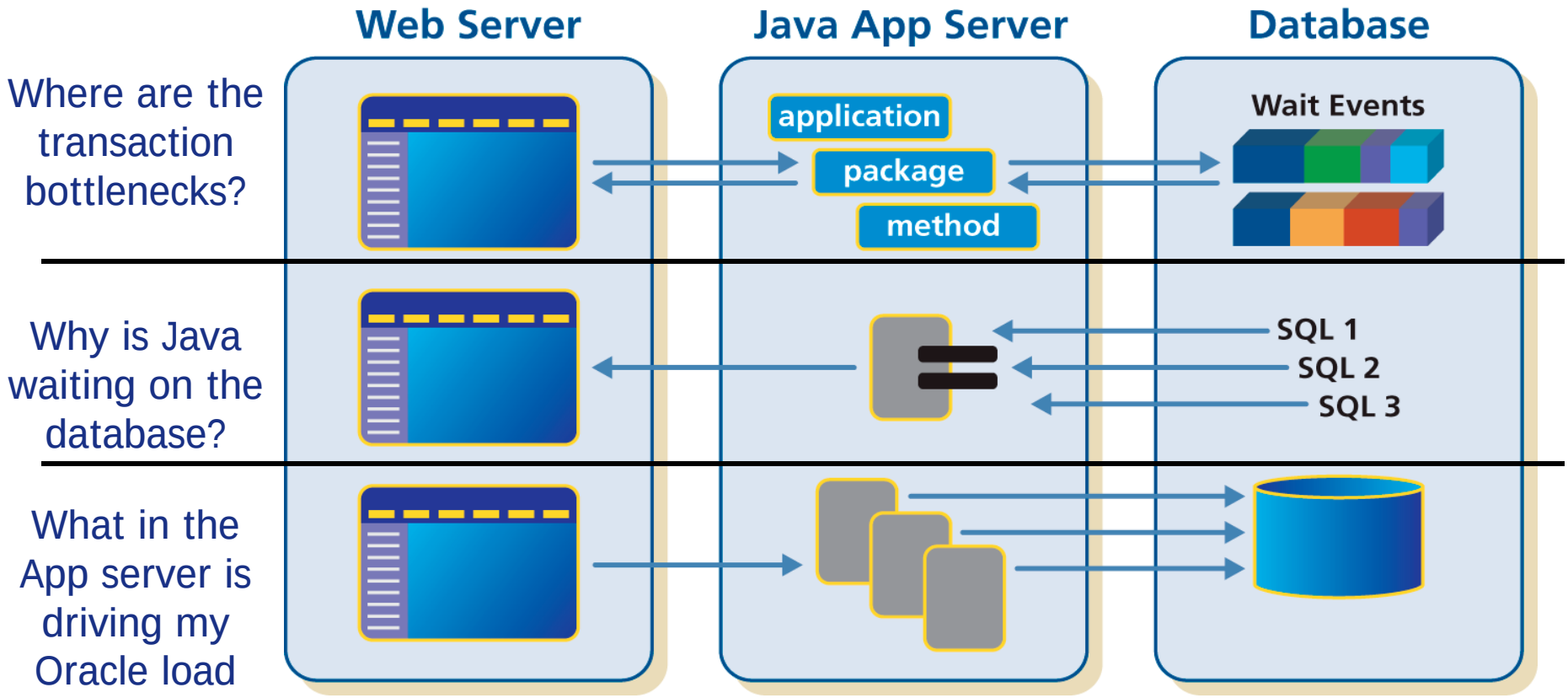
Desired Correlation Between Java and Oracle

Key Questions to Answer



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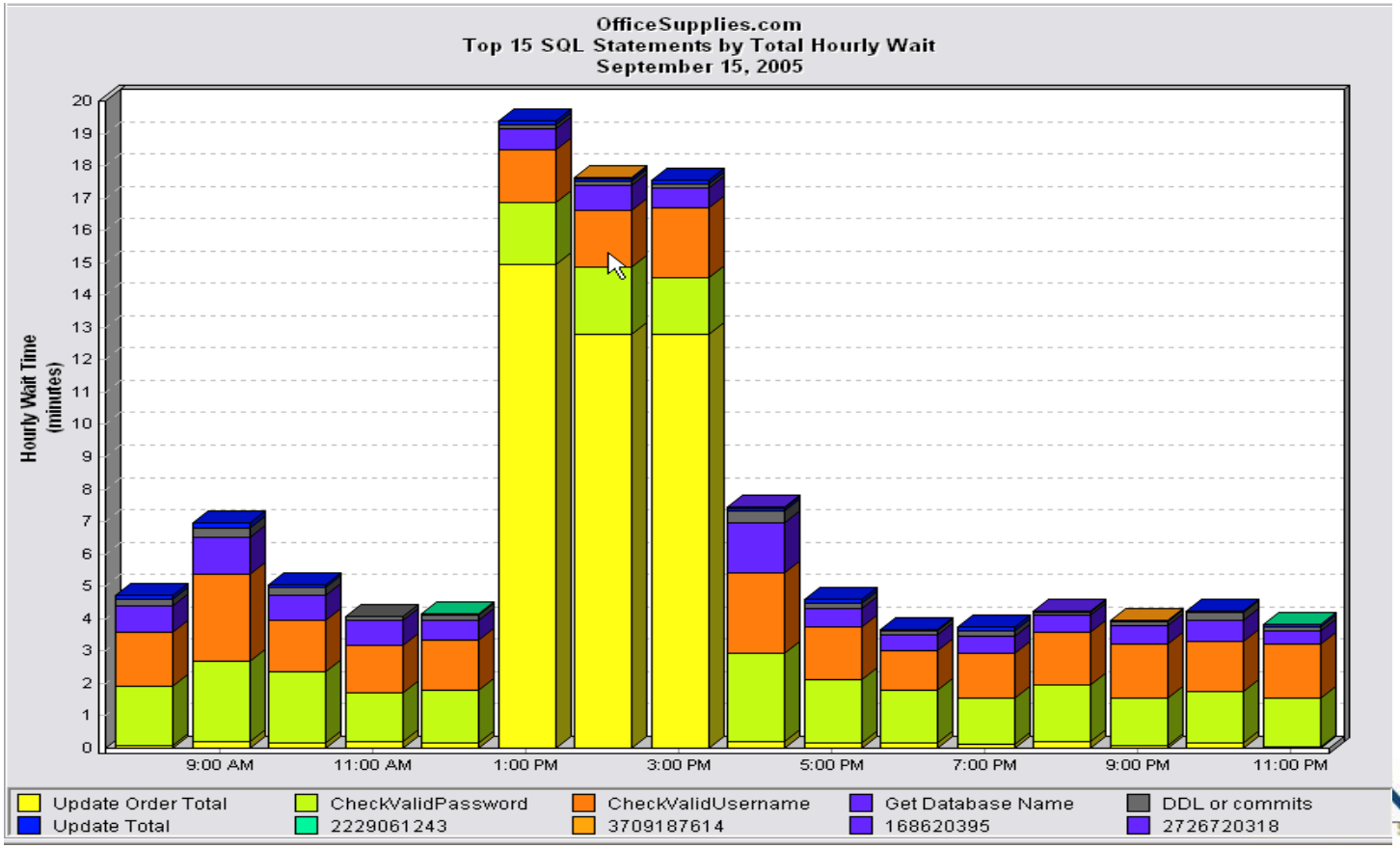
Essential Step: Correlate Application Wait Time to SQL Waits

Question: Which SQL statements are causing Wait Time for my application?



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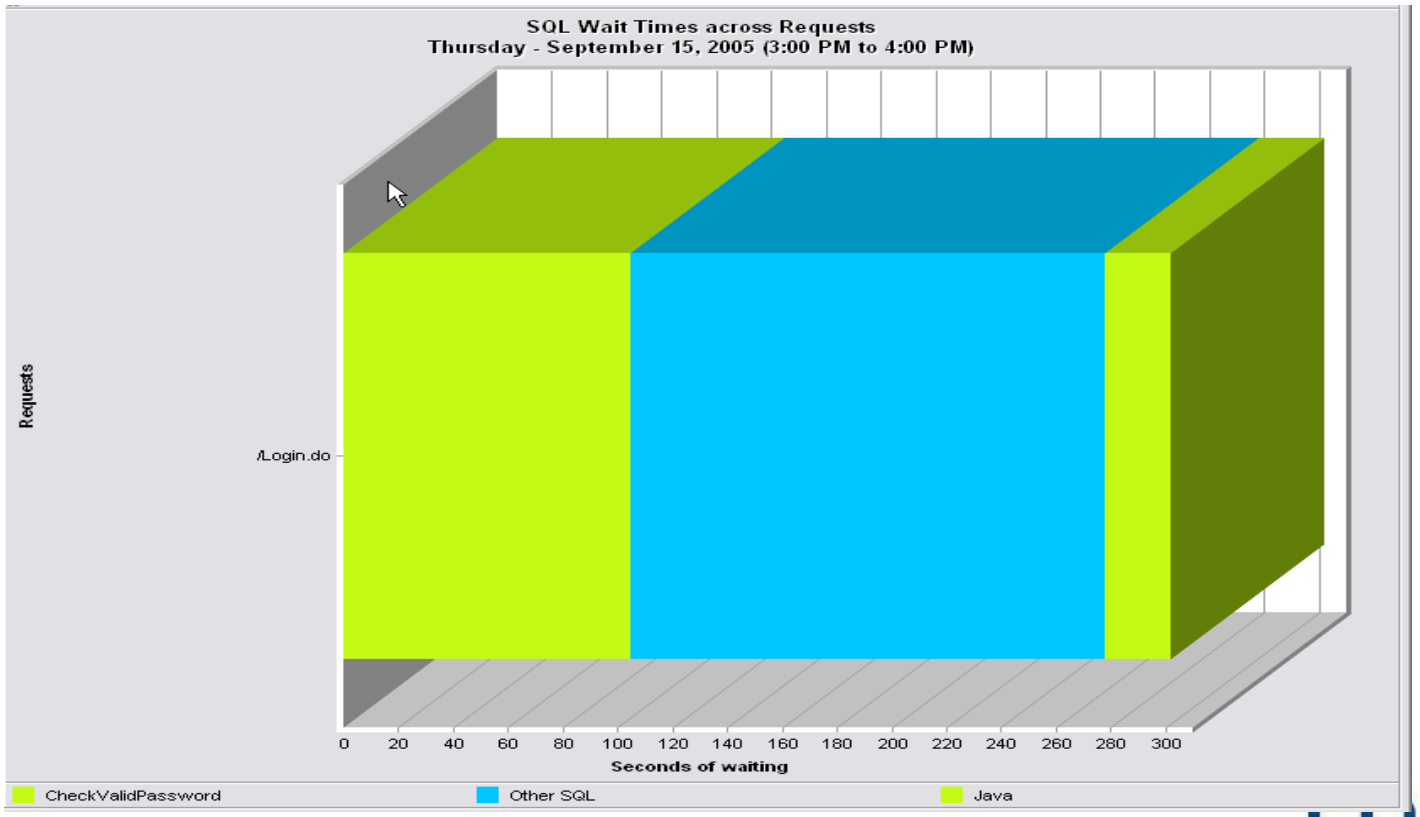
Correlate URL Requests to Specific SQLs

Question: Which User Requests are responsible for driving SQL Wait Times?



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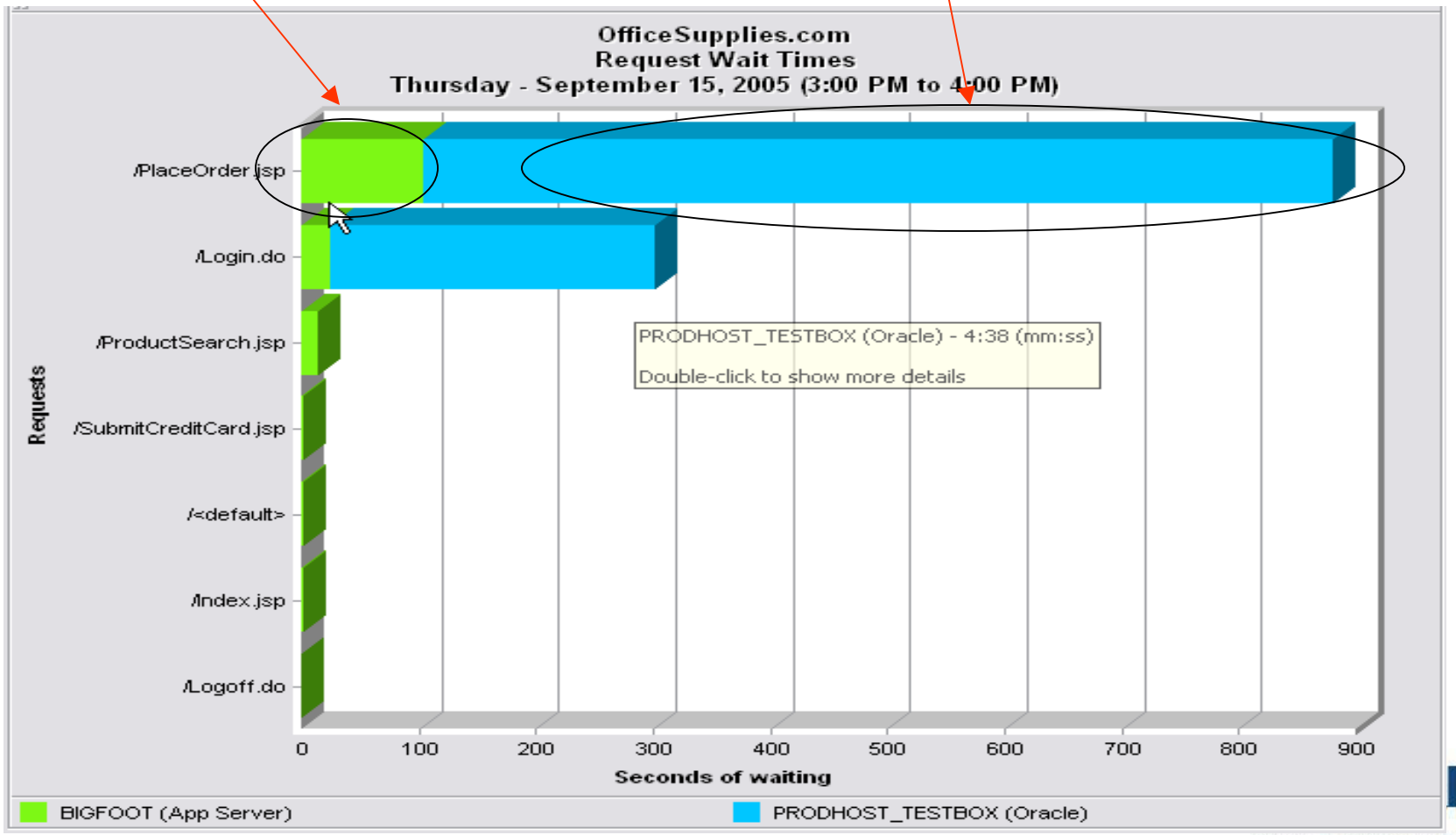
Result: Identify Where the Bottlenecks Occur

App Server

Oracle Database



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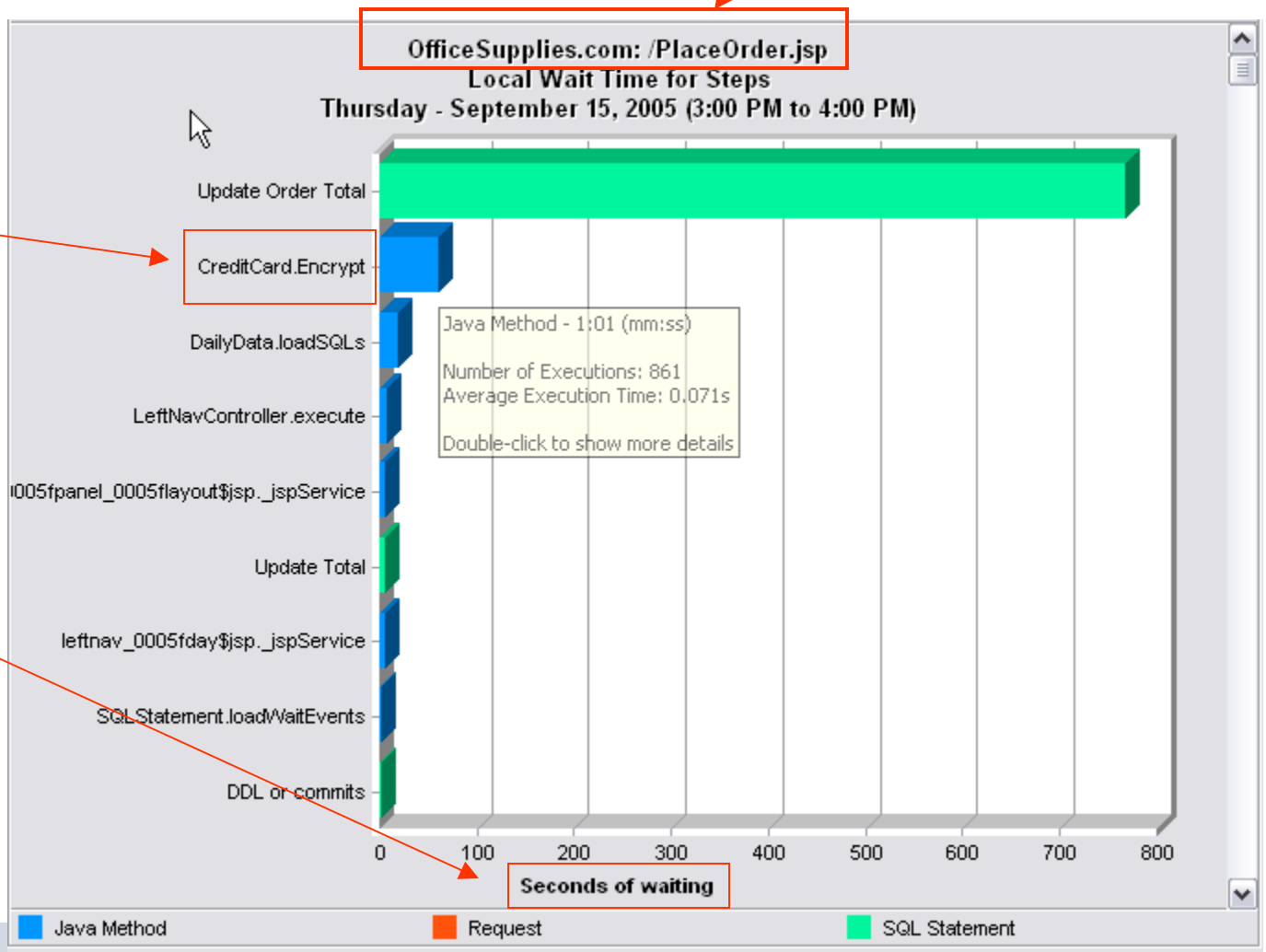
Get down to Details

- Recall 3 requirements:

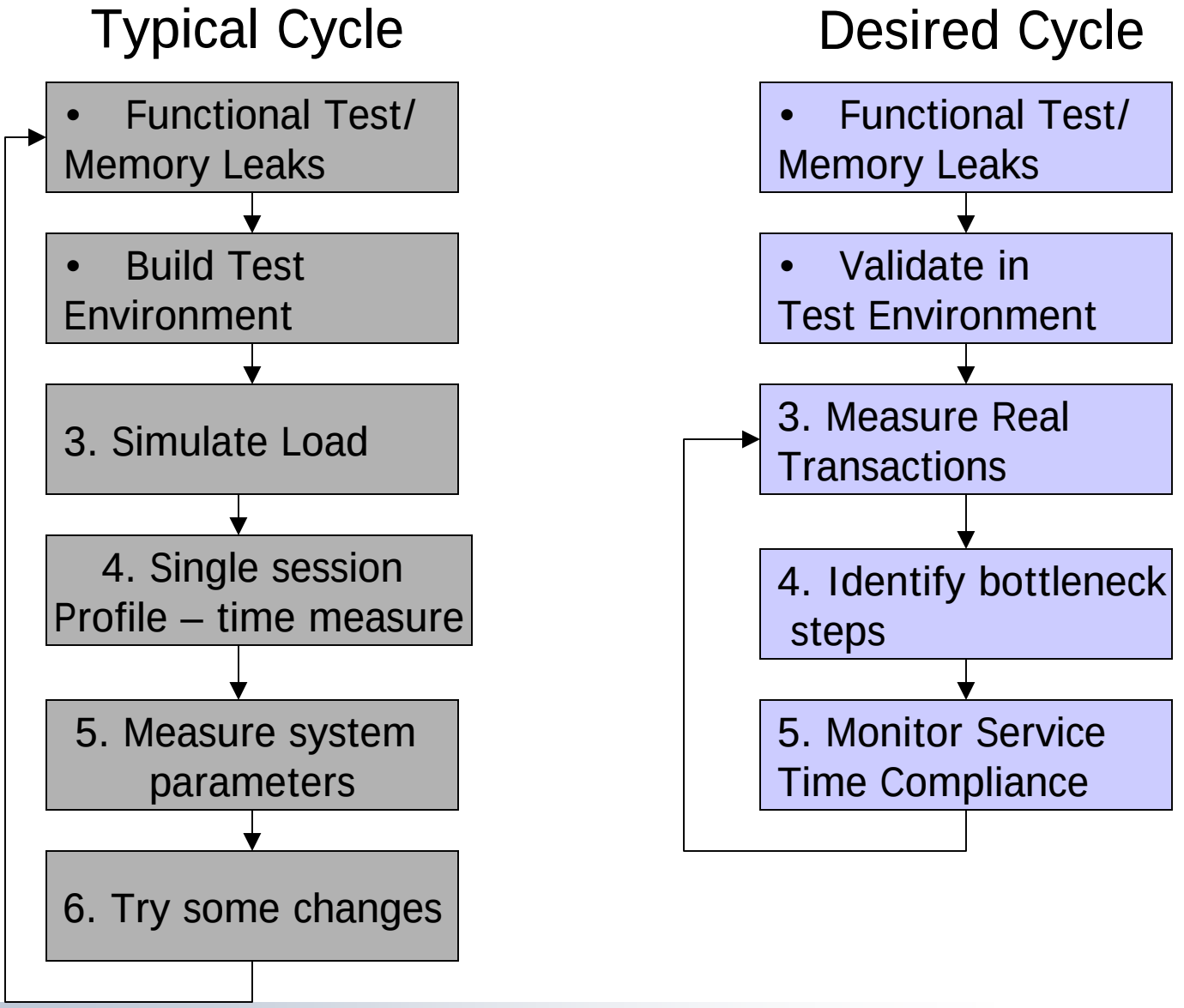
1. Individual request

2. Every step

3. Wait time



Typical J2EE Performance Test Setup – Trial and Error to Find Bottleneck



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Java Measurement Techniques

- JMX – Heavy Load
- Profiler – Test transactions only
- Byte code instrumentation – Production Monitoring
  - Insert monitor byte into selected Java methods
  - Jar file pre-processor = No runtime intrusion
  - Test/validate instrumented jars on integration system
  - Download to production environment
- Method execution correlates with JDBC/SQL

Identify Execution Paths

- SQL – Method Call – URL Request
- Allocate Wait Time to each

Execution Paths	Execution Time Attributed to Node	Number of Executions
SQL Update Order Total	768.000 s	1439
DailyData.loadSQLs	768.000 s	3448
DailyData.getSQLMap	768.000 s	3448
DailyData.getSql	0.000 s	1724
Repository.getSQL	0.000 s	1724
Repository.getWaitEvents	0.000 s	1724
WaitEventAction.execute	0.000 s	1724
LoginFilter.doFilter	0.000 s	1724
fficeSupplies.com//PlaceOrder.jsp	0.000 s	1724
DailyData.getSqls	0.000 s	1724

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Conclusions

- DBA does not have to take the blame
- Solve database problems by understanding the other systems
- Look for Wait Time – that's where the action is
- Connect SQL Waits with J2EE application time
- Watch production data, not synthetic transactions

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About the Author

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