# Top 5 Challenges when Managing Cross Platform Database Environment

*Eero Mattila – Principal Systems Consultant*

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# Agenda

- Who is the modern DBA?
- Top 5 Challenges when managing cross-platform database environments
  - Different types of databases
  - Various database editions (e.g. Enterprise, Standard)
  - Large database environments
  - Different locations (both on-premise and cloud)
  - Monitor with no overhead on performance
- Q&A


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# Who is the Modern DBA?

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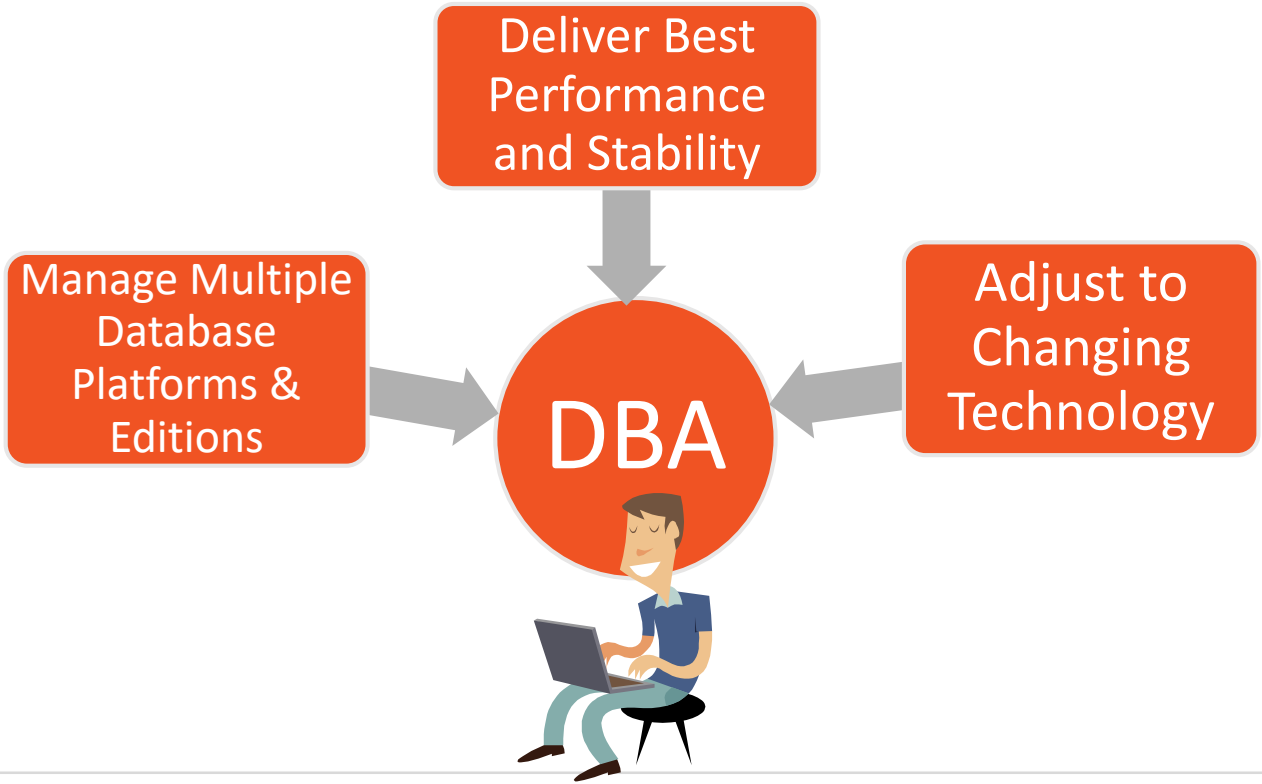
# Modern DBAs Under Pressure





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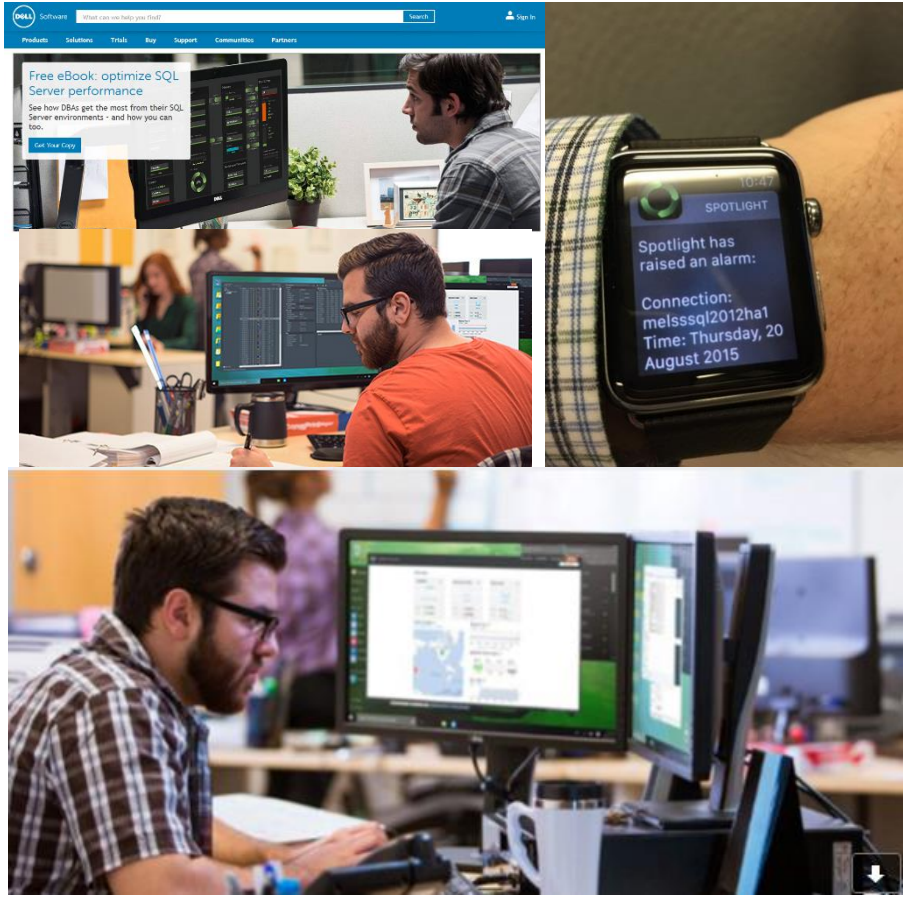
# Who? Todays DBA




- 72% of DBAs replied that the number of databases they are responsible for is **increasing**
- 70% of DBAs consider **performance** their most important responsibility
- 65% see **cloud** as having a major impact on their role

# Challenge #1 – Managing Multiple Platforms

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# **Challenge #1**: Managing Multiple Database Platforms

- Not only are **companies** bringing in multiple database platforms, DBA's are being asked to manage them.
- Some organizations have platform specific DBA's, others are asking DBA's to cross-train.


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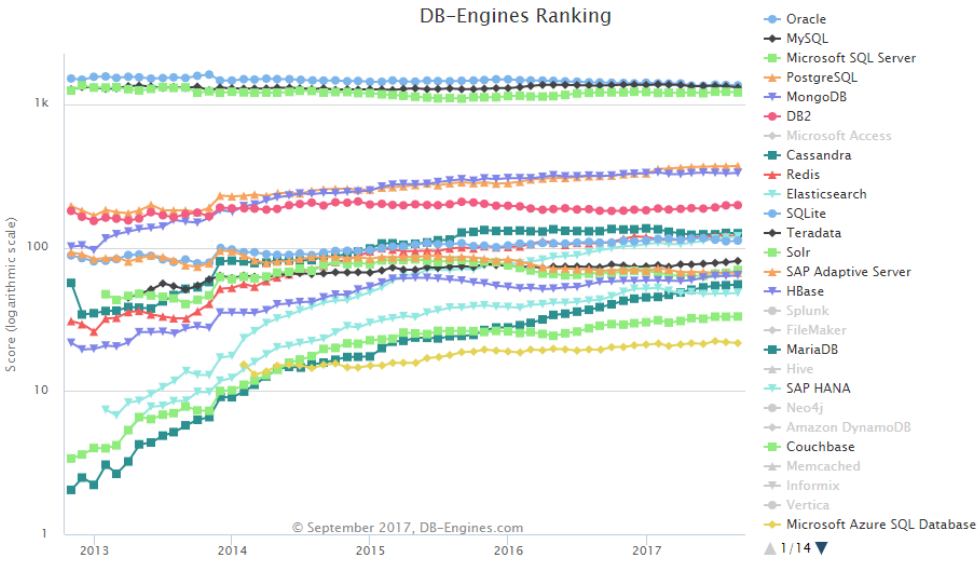
# Database Popularity

334 systems in ranking, September 2017

| Rank Sep 2017 | Rank Aug 2017 | Rank Sep 2016 | DBMS | Database Model | Score Sep 2017 | Score Aug 2017 | Score Sep 2016 |
|---|---|---|---|---|---|---|---|
| 1. | 1. | 1. | Oracle | Relational DBMS | 1359.09 | -8.78 | -66.47 |
| 2. | 2. | 2. | MySQL | Relational DBMS | 1312.61 | -27.69 | -41.41 |
| 3. | 3. | 3. | Microsoft SQL Server | Relational DBMS | 1212.54 | -12.93 | +0.99 |
| 4. | 4. | 4. | PostgreSQL | Relational DBMS | 372.36 | +2.60 | +56.01 |
| 5. | 5. | 5. | MongoDB | Document store | 332.73 | +2.24 | +16.74 |
| 6. | 6. | 6. | DB2 | Relational DBMS | 198.34 | +0.87 | +17.15 |
| 7. | 7. | ↑ 8. | Microsoft Access | Relational DBMS | 128.81 | +1.78 | +5.50 |
| 8. | 8. | ↓ 7. | Cassandra | Wide column store | 126.20 | -0.52 | -4.29 |
| 9. | 9. | ↑ 10. | Redis | Key-value store | 120.41 | -1.49 | +12.61 |
| 10. | 10. | ↑ 11. | Elasticsearch | Search engine | 120.00 | +2.35 | +23.52 |
| 11. | 11. | ↓ 9. | SQLite | Relational DBMS | 112.04 | +1.19 | +3.41 |
| 12. | 12. | 12. | Teradata | Relational DBMS | 80.91 | +1.67 | +7.84 |
| 13. | 13. | ↑ 14. | Solr | Search engine | 69.91 | +2.95 | +2.95 |
| 14. | 14. | ↓ 13. | SAP Adaptive Server | Relational DBMS | 66.75 | -0.16 | -2.41 |
| 15. | 15. | 15. | HBase | Wide column store | 64.34 | +0.82 | +6.53 |
| 16. | 16. | ↑ 17. | Splunk | Search engine | 62.57 | +1.11 | +11.28 |
| 17. | 17. | ↓ 16. | FileMaker | Relational DBMS | 61.00 | +1.35 | +5.64 |
| 18. | 18. | ↑ 20. | MariaDB | Relational DBMS | 55.47 | +0.78 | +16.94 |
| 19. | ↑ 20. | ↓ 18. | Hive | Relational DBMS | 48.62 | +1.31 | -0.21 |
| 20. | ↓ 19. | ↓ 19. | SAP HANA | Relational DBMS | 48.33 | +0.36 | +4.91 |




- Souce: https://db-engines.com/en/ranking_trend



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# Why Is This Hard?

- Most of us would consider one platform “primary”, others “secondary”
- We try to manage our “secondary” platforms like our “primary”
- There are gaps…
  - Knowledge/Training
  - Experience
  - Tools


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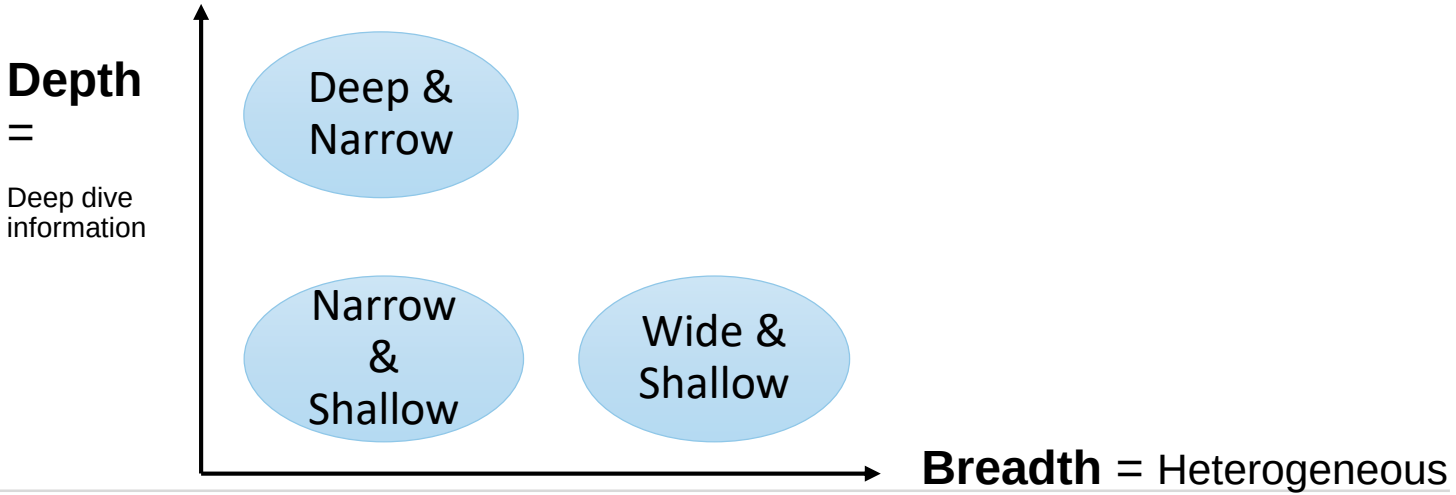
# Database Monitoring Tools Landscape

Most DB monitoring tools offer coverage that is either **wide** (heterogeneous) OR **deep** (advanced workload analytics)





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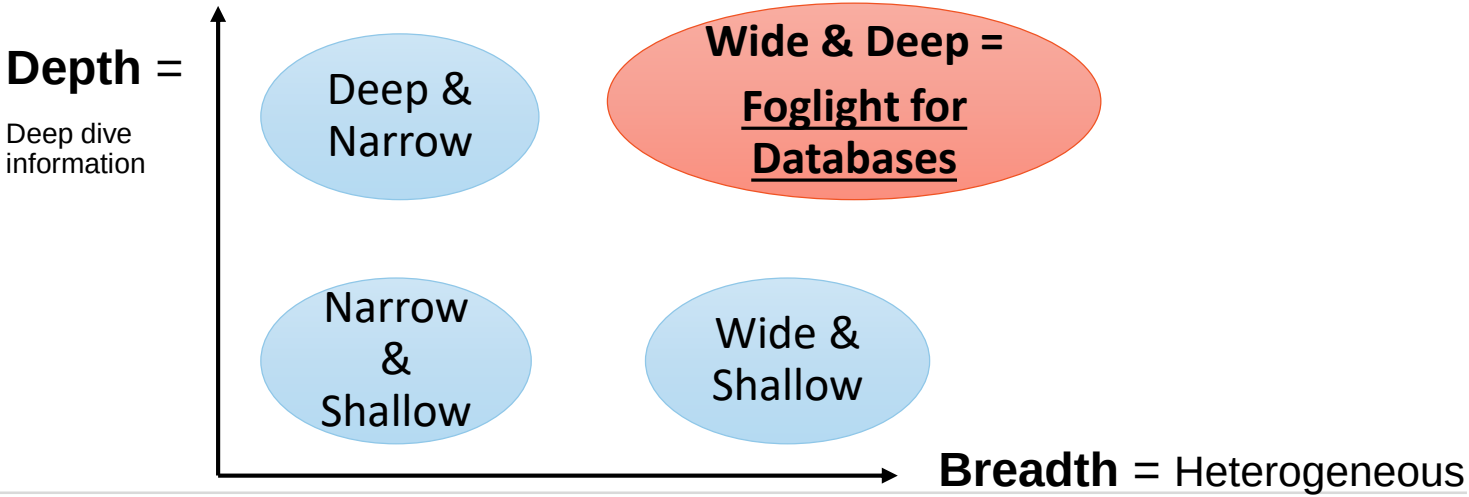
# Why Compromise? Use Foglight for Databases!

**Cross-Platform** coverage **without** sacrificing **depth** of data





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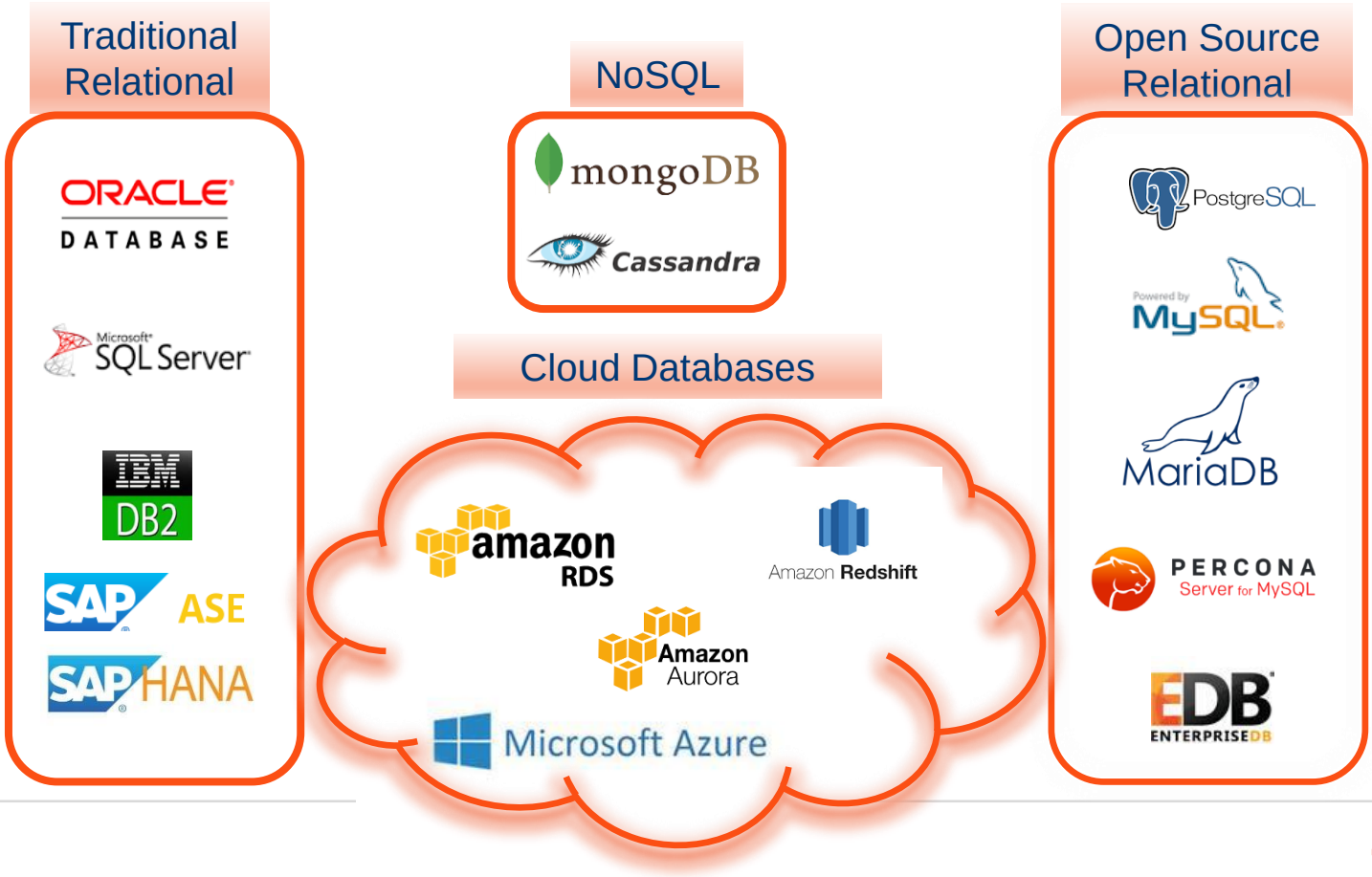
# Which DB Platforms Does Foglight Support?



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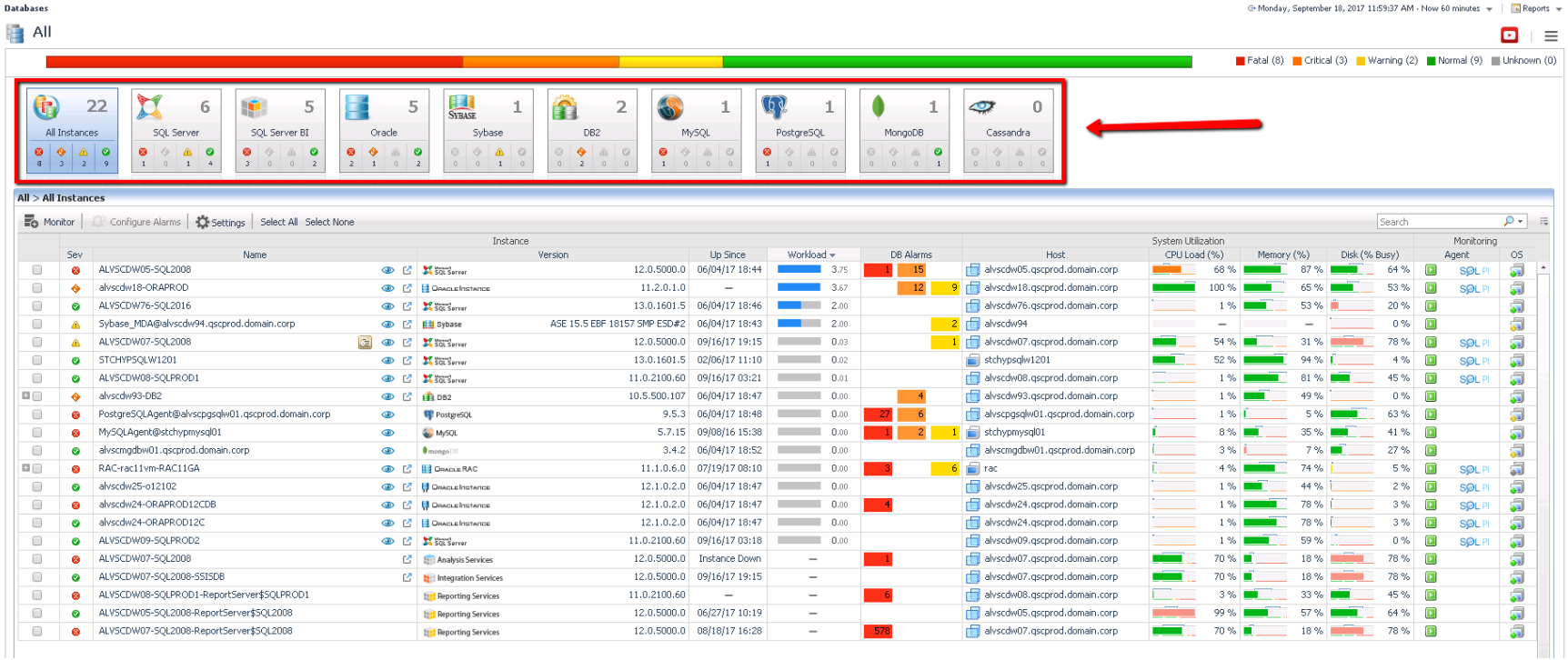
# Foglight for Databases: Cross Platform Visibility



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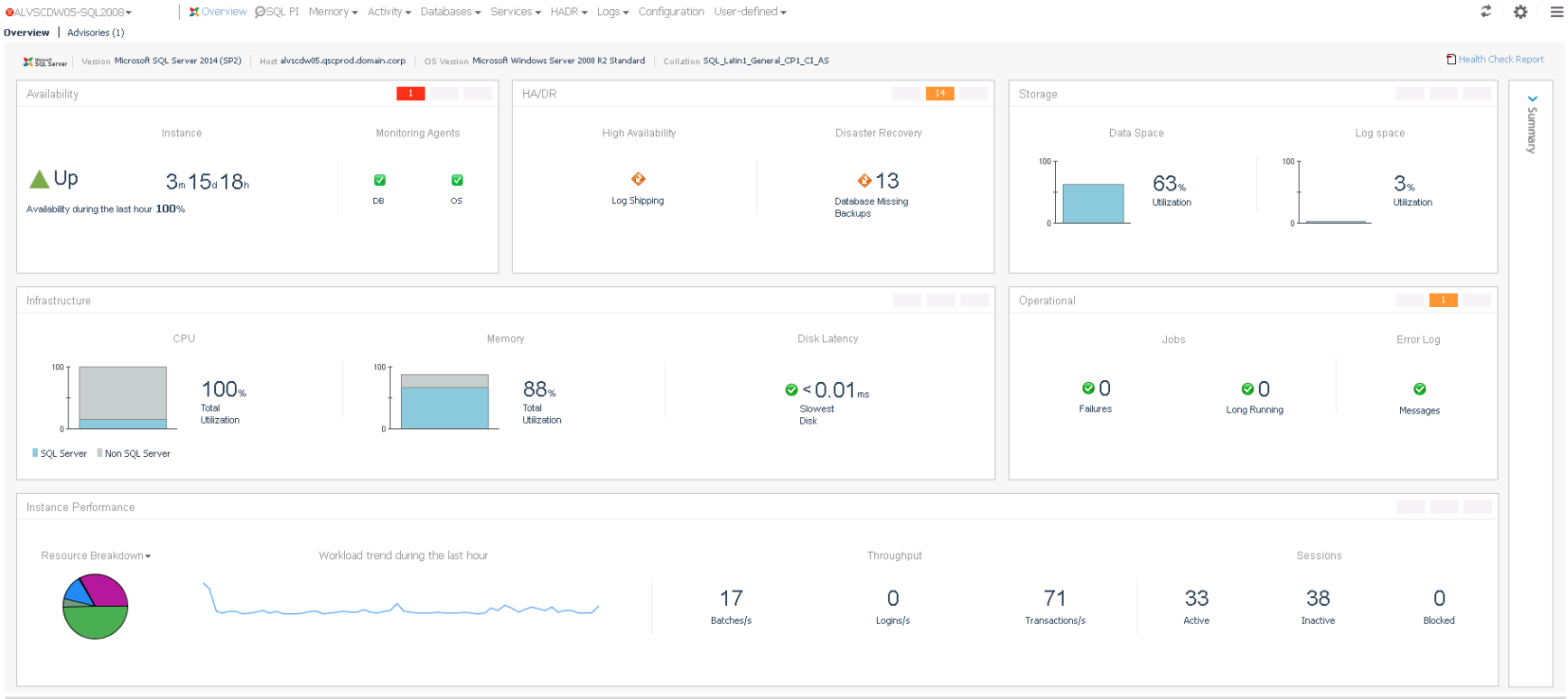
# Foglight for Databases: Consistent Workflows



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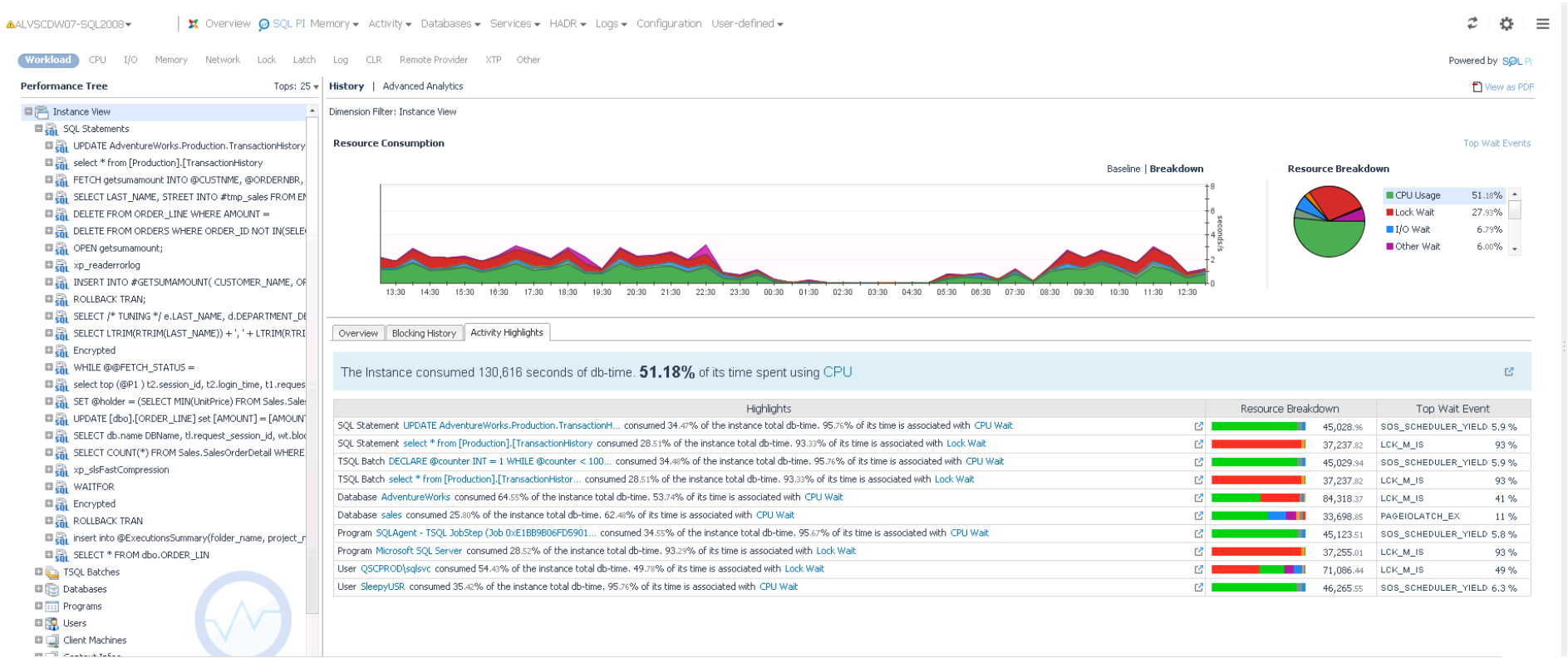
# Foglight for Databases: Consistent Workflows



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# Challenge #2 - Various database editions

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# **Challenge #2:** Various database editions

- Many companies use less expensive database editions to reduce costs
- These editions may have limited performance diagnostics capabilities
- Example : Oracle Diagnostics pack
  - Includes very powerful capabilities (AWR, ADDM, ASH)
  - Problem - extra cost on top of the Enterprise Edition
- DBAs can be frustrated when having limited performance diagnostics capabilities


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# **Challenge #2:** Various database editions (cont'd)

- Foglight Performance Investigator was designed to address this challenge
- Foglight doesn't licensed tables/views/procedures/APIs
- Get all the performance diagnostics you need without spending a fortune
- Let's see how…


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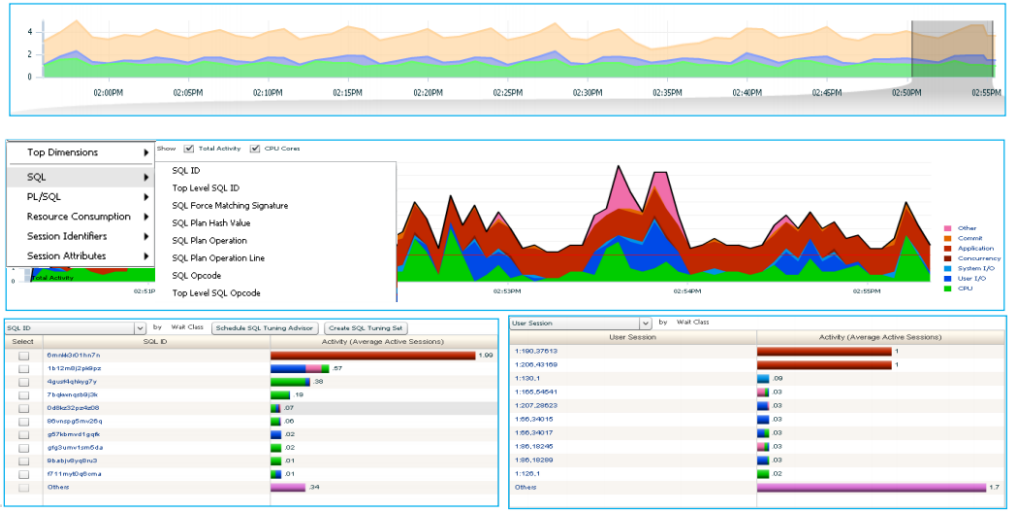
# **Challenge #2:** Real World Scenarios

- **Scenario #1**
  - DBA would like to have deep visibility into database workload activity
  - Oracle's Diagnostics pack provides ASH (Active Session history) Analytics



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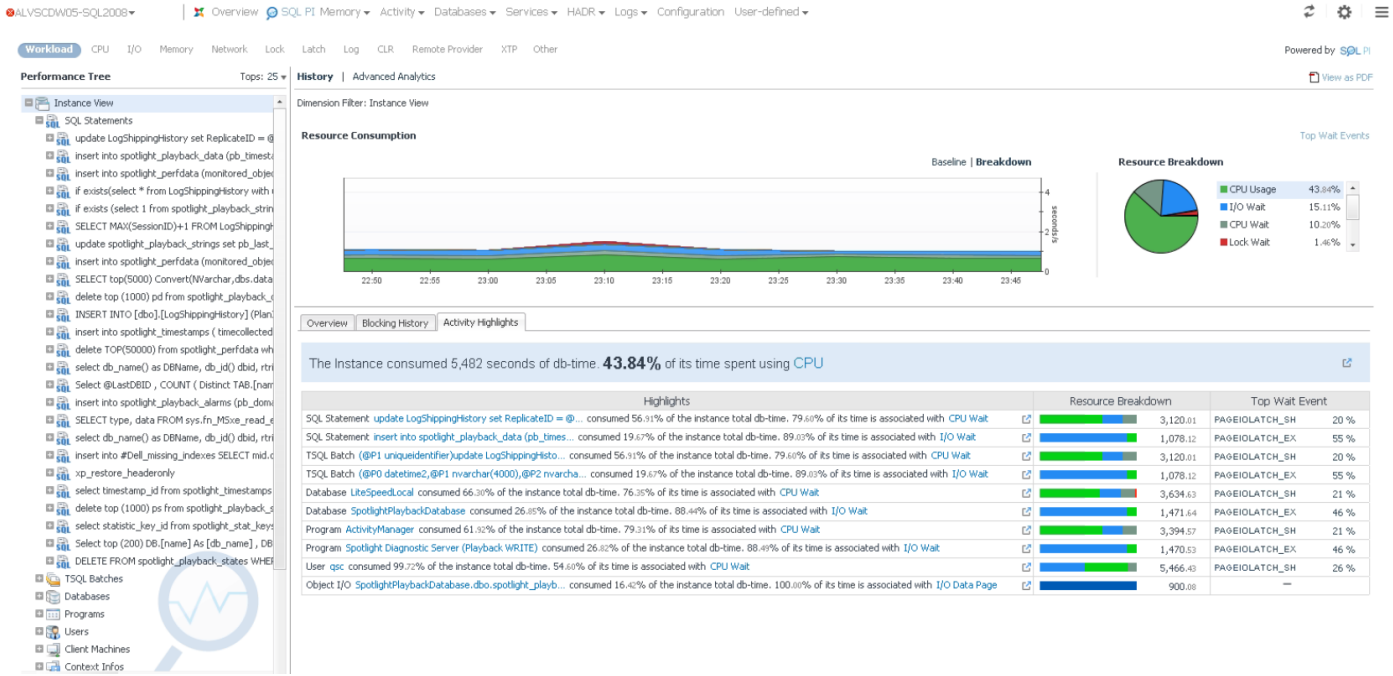
# **Challenge #2** Real World Scenarios

- How DBAs can use Foglight to address this challenge?



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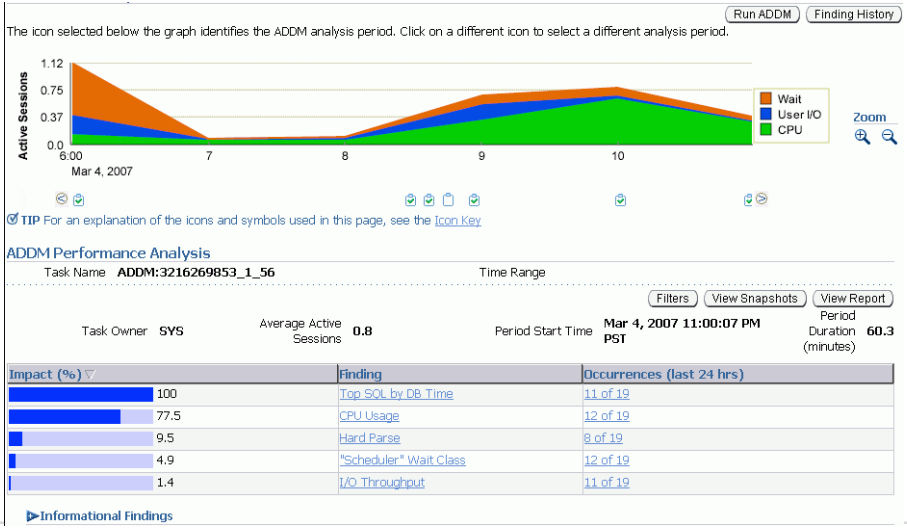
# **Challenge #2:** Real World Scenarios

- **Scenario #2**
  - DBA would like to get advisories that will help him improve performance
  - Oracle's Diagnostics pack provides ADDM (Automatic Database Diagnostic Monitor)





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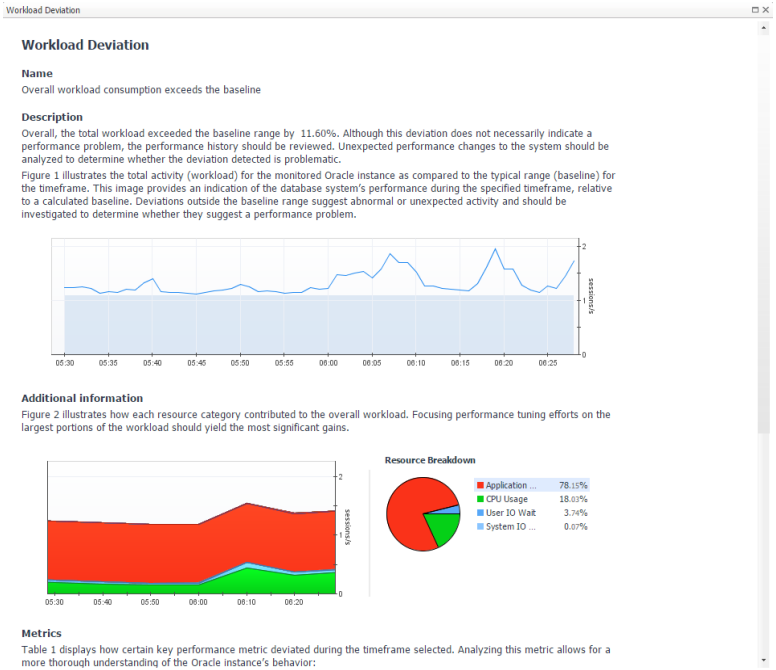
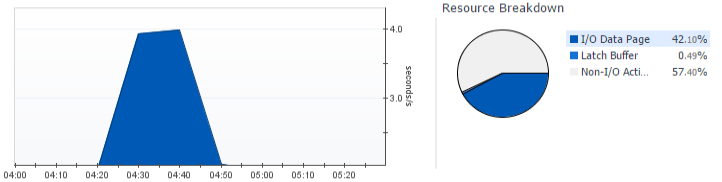
# **Challenge #2:** Real World Scenarios

- How DBAs can use Foglight to address this challenge?




Use the following information to determine the root cause of the I/O contention observed during the analysis period.

**Table 1: Top SQL Statements producing I/O Contention**

Analyze Plan | Tune SQL

| SQL Statements | Number of Executions | Average Active Time (seconds) | % of Active Time | I/O Wait (%) | I/O Data Page Wait (%) |
|---|---|---|---|---|---|
| insert into #Quest_fragmented_indexes select si . name as IndexN... = @1 and si . type < > @2 order by AverageFragmentation desc | - | 0.00 | 39.87 | 81.02 | 80.36 |
| insert into #Dell_fragmented_indexes select si . name as IndexNa... = @1 and si . type < > @2 order by AverageFragmentation desc | - | 0.00 | 12.86 | 18.81 | 18.41 |

Click on a SQL Statement to find out more about the operation of the specific statement.
Press "Analyze Plan" to see information about the execution plan of the statement.
Press "Tune" to launch SQL Tuning for the statement, maintaining database context (if it is installed).

**Table2: Top missing indexes**

Each SQL Server maintains a list of the indexes considered to be missing from each database. The list is updated whenever a query is executed. The table below lists indexes identified in the analyzed timeframe, which are ranked based on the relative improvement they would yield if they existed. The relative impact of each index is based on <average cost of the query(s)> * <average cost-improvement of the query(s)> * <Number of seeks+scans that could have utilized the index>.

| Database | Schema | Object name | Relative Impact | Avg User Impact (%) | Avg Cost | User Seeks | User Scans | Noticed Missing | Statement |
|---|---|---|---|---|---|---|---|---|---|
| SpotlightPlaybackDatabase_batchen | dbo | spotlight_playback_alarms | 88,268.17 | 15.04 | 167.68 | 35.00 | 0.00 | 2/9/17 2:20 AM | CREATE INDEX missi... |
| SpotlightPlaybackDatabase_batchen | dbo | spotlight_playback_alarms | 87,798.66 | 14.96 | 167.68 | 35.00 | 0.00 | 2/9/17 2:20 AM | CREATE INDEX missi... |

Click on the statement to get the full command for creating the index.
Note: Adding indexes adds overhead of maintaining that index. Before creating an index, ensure the overhead is negligible compared to the improvement. You can use the Database Tuning Advisor (DTA) for that.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# Challenge #3 – Managing Large Environments

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# **Challenge #3**: Managing Large Environments

- The necessity of data management at every company has caused a huge increase in the number of instances that an organization has.
- With these large, and sprawling environments, the way that customers manage those environments needs to evolve.


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# DBTA Survey

**Figure 6: Approximately how many database instances does each DBA manage?**

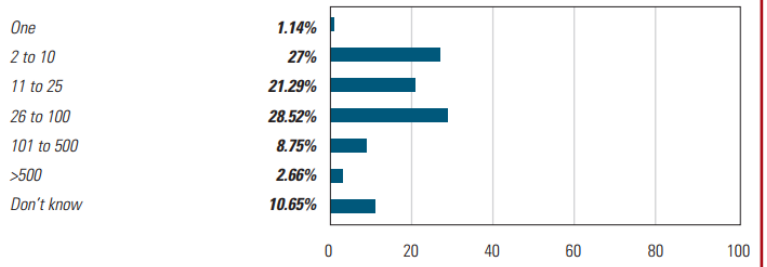
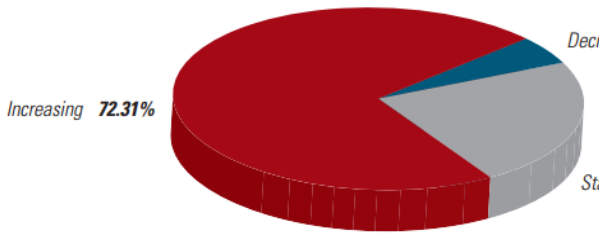



**Figure 7: Is the number of databases for which each DBA is responsible increasing, decreasing, or staying the same?**



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# Challenges With Large Environments

- If you manage a small number of instances, you can focus in on details specific to each instance.
- When your manage a large environment, there may be instances you don’t get “hands on” with for months at a time.
- Challenges faced with large environments, typically include:
  - Inventory Management
    - Installs, upgrades, patching, asset management, etc…
  - Capacity Management
    - Finding over/under utilized systems, consolidation, scaling, etc…
  - Automation
    - Backup strategies, restore testing, database maintenance, etc…


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# Multi-Platform Large Environments

- These environments are complex enough with a single platform…
- When multiple platforms are involved, it’s a huge task for a DBA team


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# Suggestions

- Standardize as much as you can:
  - Standardized reports you can run against any database server
  - Common alert templates that notify you about similar problems
  - Run consistent maintenance jobs when possible so that each server is maintained similarly
  - Create/maintain a “CMDB” where you can quickly look up details about a particular instance
  - Have routine environment “health checks” where the team gets together and looks for “tuning” opportunities
    - Consolidation
    - Decommissioning
    - Etc…


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# How Foglight for Databases Can Help

- Out of the box dashboards and reports, provide enterprise level information
- Dashboards can be securely viewed inside of the browser
- Reports can be scheduled and automatically sent to all stakeholders


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# Report Examples: Enterprise Inventory and Availability

## Enterprise Instance Inventory

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### Summary

| Total | SQL Server | Oracle | DB2 |
|---|---|---|---|
| 12 | 6 (50.00%) | 5 (41.67%) | 1 (8.33%) |

### SQL Server

| Name | Edition | SQL Product Version | Collation | Total Allocated (MB) | | Configuration | # Databases |
|---|---|---|---|---|---|---|---|
| | | | | Data | Log | | |
| ALVSCDW05-SQL2008 | Enterprise Edition (64-bit) | Microsoft SQL Server 2014 (SP2) | SQL_Latin1_General_CP1_CI_AS | 52,129.00 | 5,990.00 | Log Shipping | 24 |
| ALVSCDW07-SQL2008 | Enterprise Edition (64-bit) | Microsoft SQL Server 2014 (SP2) | SQL_Latin1_General_CP1_CI_AS | 48,548.00 | 13,364.00 | Log Shipping, Replication | 28 |
| ALVSCDW08-SQLPROD1 | Enterprise Edition (64-bit) | Microsoft SQL Server 2012 - 11.0.2100.60 (X64) | SQL_Latin1_General_CP1_CI_AS | 10,949.00 | 3,765.00 | Always On, Mirror | 10 |
| ALVSCDW09-SQLPROD2 | Enterprise Edition (64-bit) | Microsoft SQL Server 2012 - 11.0.2100.60 (X64) | SQL_Latin1_General_CP1_CI_AS | 194.00 | 25.00 | Always On, Mirror | 9 |
| ALVSCDW76-SQL2016 | Enterprise Edition (64-bit) | Microsoft SQL Server 2016 (RTM) | SQL_Latin1_General_CP1_CI_AS | 43.00 | 19.00 | | 3 |
| STCHYPSQLW1201 | Enterprise Edition (64-bit) | Microsoft SQL Server 2016 (RTM) | SQL_Latin1_General_CP1_CI_AS | 98.00 | 19.00 | | 3 |

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## Enterprise Availability Summary

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Time Range: Sep 18, 2017 12:46 - Sep 18, 2017 13:46 60 min.

### Instance Summary

| Total | Available | Unavailable | Unknown |
|---|---|---|---|
| 12 | 12 (100.00%) | - | - |

### SQL Server

| Name | Version | Configuration | Start Time | Current Availability | Avg Availability(%) | Avg Connection Time (ms) | Avg Os Availability(%) |
|---|---|---|---|---|---|---|---|
| ALVSCDW05-SQL2008 | 12.0.5000.0 | Log Shipping | 06/04/17 18:44 | Up | 100 | 20 | 100 |
| ALVSCDW07-SQL2008 | 12.0.5000.0 | Log Shipping, Replication | 09/16/17 19:15 | Up | 100 | 7,819 | 100 |
| ALVSCDW08-SQLPROD1 | 11.0.2100.60 | Always On, Mirror | 09/16/17 03:21 | Up | 100 | 16 | 100 |
| ALVSCDW09-SQLPROD2 | 11.0.2100.60 | Always On, Mirror | 09/16/17 03:18 | Up | 100 | 17 | 100 |
| ALVSCDW76-SQL2016 | 13.0.1601.5 | - | 06/04/17 18:46 | Up | 100 | 12 | 100 |
| STCHYPSQLW1201 | 13.0.1601.5 | - | 02/06/17 11:10 | Up | 100 | 27 | 100 |

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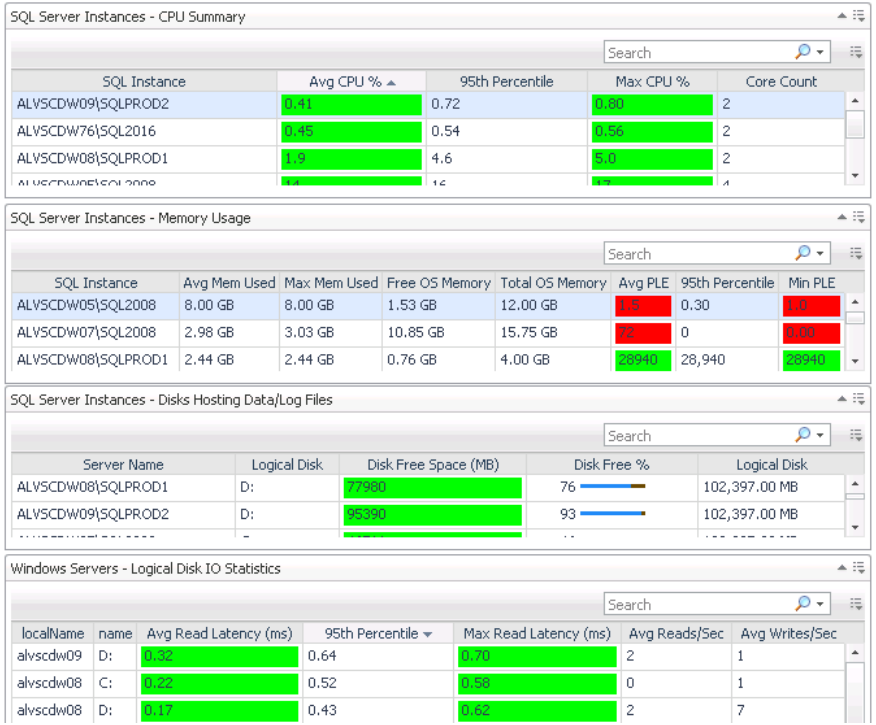
# Custom Dashboards



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# Challenge #4 - Different locations

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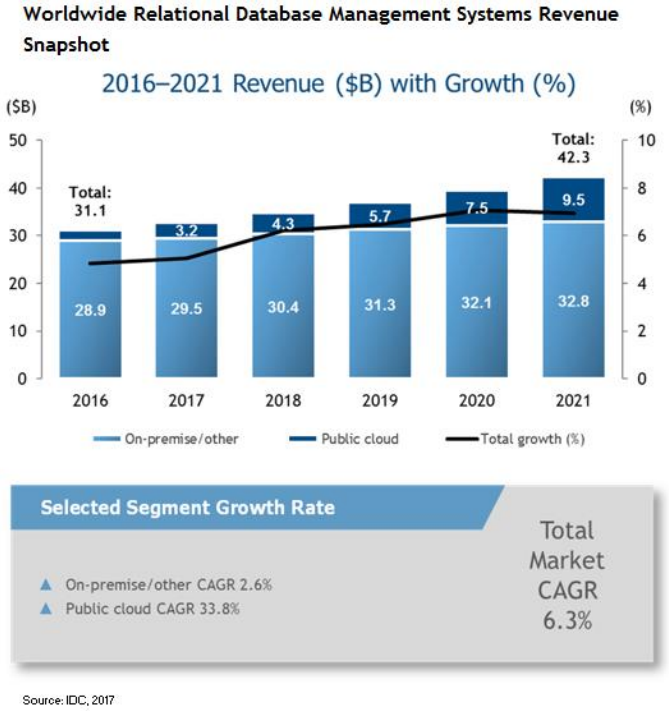
# **Challenge #4:** Different Database Locations

- The Cloud trend is very strong in today's market
- Based on IDC's latest report, the public cloud
- annual growth rate is **33.8%**
- (compared to 2.6% for the on premise)





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# **Challenge #4:** Different Database Locations (cont'd)

- In many companies DBAs are required to manager hybrid environments
  - Traditional On Premise Databases
  - Remote Databases in the Cloud
- **The challenge for the DBAs :**
  - How to monitor all database environments from a single view?
  - How to get performance diagnostics capabilities for your cloud databases?


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# **Challenge #4:** Different Database Locations (cont'd)

- Supports
  - SQL Server
  - SQL Azure
  - Oracle
  - DB2
  - SAP HANA
  - SAP ASE
  - MySQL
  - PostgreSQL
  - EDB PostgreSQL
  - MongoDB
  - Cassandra
  - Amazon RDS
  - Amazon EC2
  - Amazon Aurora
  - Amazon Redshift

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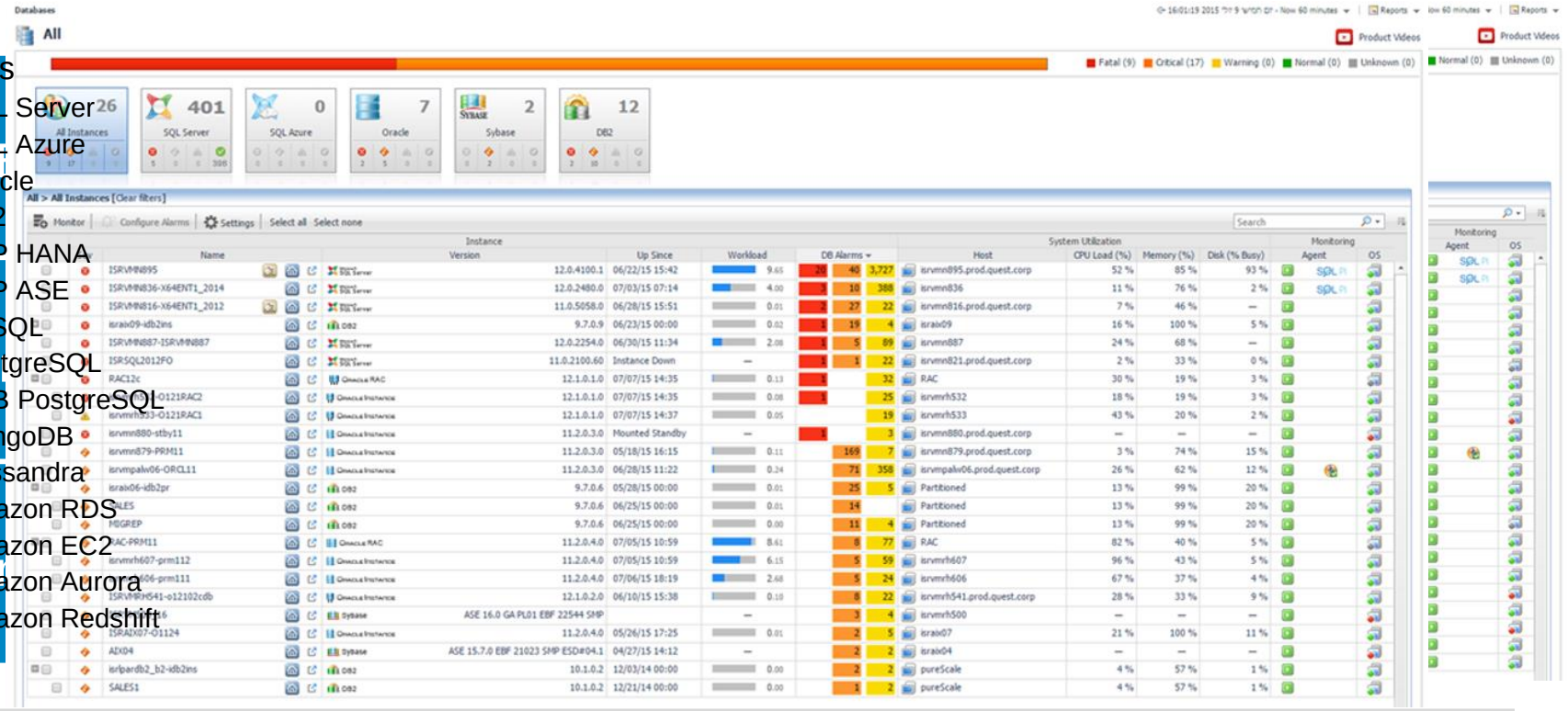




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# Challenge #5 – Minimal Overhead

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# **Challenge #5**: Managing Performance With Minimal Overhead

- There are many API's available for monitoring and managing performance
- Some database platforms even provide multiple options
  - (i.e. SQL Server: Trace, Extended Events, DMV's, etc…)
- Knowing which API is the most appropriate can be a challenge


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# Performance Overhead

- Some API's provided by the database vendors themselves can cause high overhead on a production workload
- Last thing any DBA wants is to be what **caused** a problem because of the API and/or product that they used


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# Solution

- Make sure that before you implement a solution/product designed to monitor for performance that you understand the overhead that it is likely to cause on the server
- Products that store data locally on the database server, and or use “expensive” API’s are likely to cause excessive resource utilization


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# How Foglight for Databases Can Help

- Foglight select's API's for each database platform that ensure a very detailed, yet lightweight data collection.
- Foglight's centralized architecture stores data in a set of central repositories
- For more information:
  - https://www.quest.com/community/b/en/posts/discussing-the-overhead-of-foglight-for-sql-server-and-oracle#


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# Administrative Overhead

- Your job is to manage your companies databases…
- Any amount of time spent installing, configuring, and overall maintaining your monitoring platform, should have a proportional benefit
  - For every hour you spend administering “monitoring”, you should save X hours of manual DBA work
- Products that require local agents to collect data, and/or overly complex architectures can cause more problems than they solve
  - Custom built solutions often fit into this category


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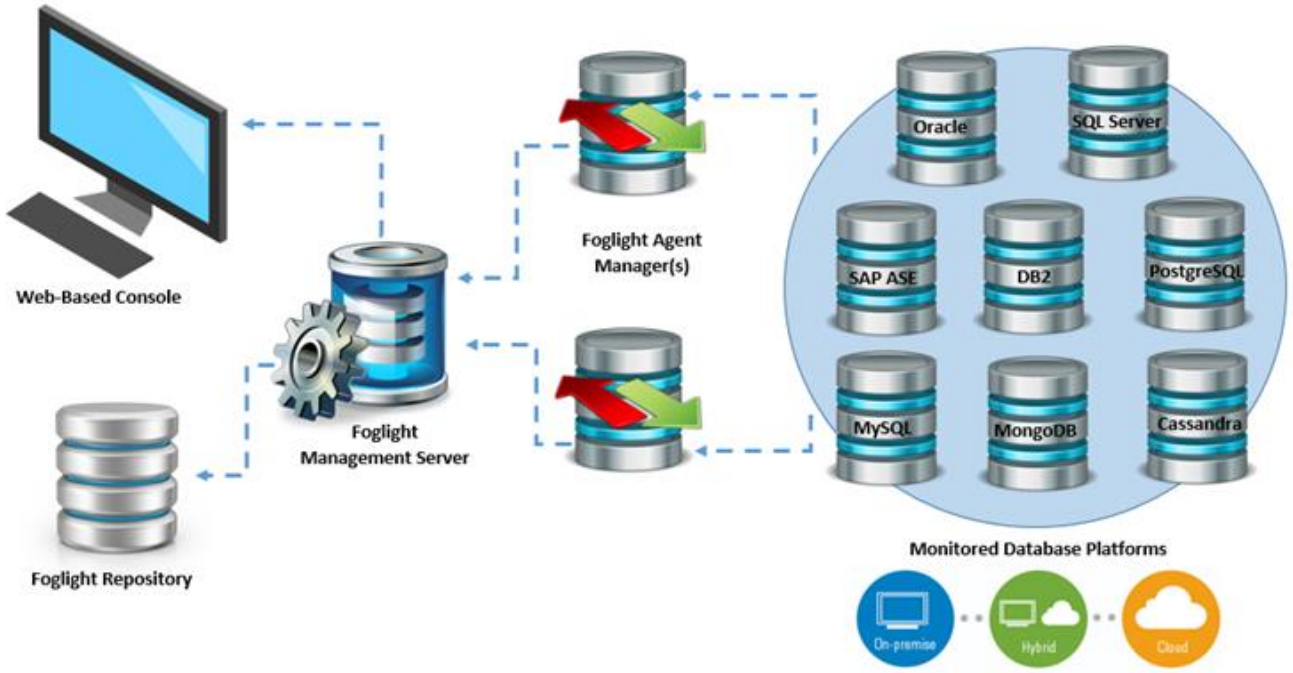
# Foglight for Databases Architecture



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# Additional Resources

- Foglight for Databases Web Page, to download a free 30 day trial

https://www.quest.com/products/foglight-for-cross-platform-databases/

- Foglight for SQL Server Course – Available on ToadWorld

https://www.toadworld.com/training/p/web-based-training


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# Q&A

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