Real-Time Database Protection and Monitoring: IBM InfoSphere Guardium Overview

Agenda

- Business drivers for database security
- InfoSphere Guardium architecture
- Common applications
- The InfoSphere portfolio
- Case studies

Database Activity Monitoring: Three Key Business Drivers

1. **Prevent data breaches**
   - Mitigate external and internal threats
2. **Ensure data integrity**
   - Prevent unauthorized changes to sensitive data
3. **Reduce cost of compliance**
   - Automate and centralize controls
     - Across DBMS platforms and applications
     - Across SOX, PCI, SAS70, …
   - Simplify Processes
   - Reduce Cost

Provide insight such as . . .

- Who is changing database schemas or dropping tables?
- When are there any unauthorized source programs changing data?
- What are DBAs or outsourced staff doing to the databases?
- How many failed login attempts have occurred?
- Who is extracting credit card data?
- What data is being accessed from which network node?
- What data is being accessed by which application?
- How is data being accessed?
- What are the access patterns based on time of day?
- What database errors are being generated?
- What is the exposure to sensitive objects?
- When is someone attempting an SQL injection attack?

Database Security Pain Points

- Protecting sensitive enterprise data, typically distributed across a large number of servers and a variety of DBMS platforms, from unauthorized access, theft or changes
- Successfully passing a growing variety of audits (to validate compliance with SOX, PCI DSS, data privacy and other regulatory mandates as well as internal governance controls)
- Reducing the cost of compliance activities, which typically involve resource intensive and error-prone manual controls
- Manually reading through database logs
- Dealing with the performance degradation resulting from turning on native database auditing

Key Questions

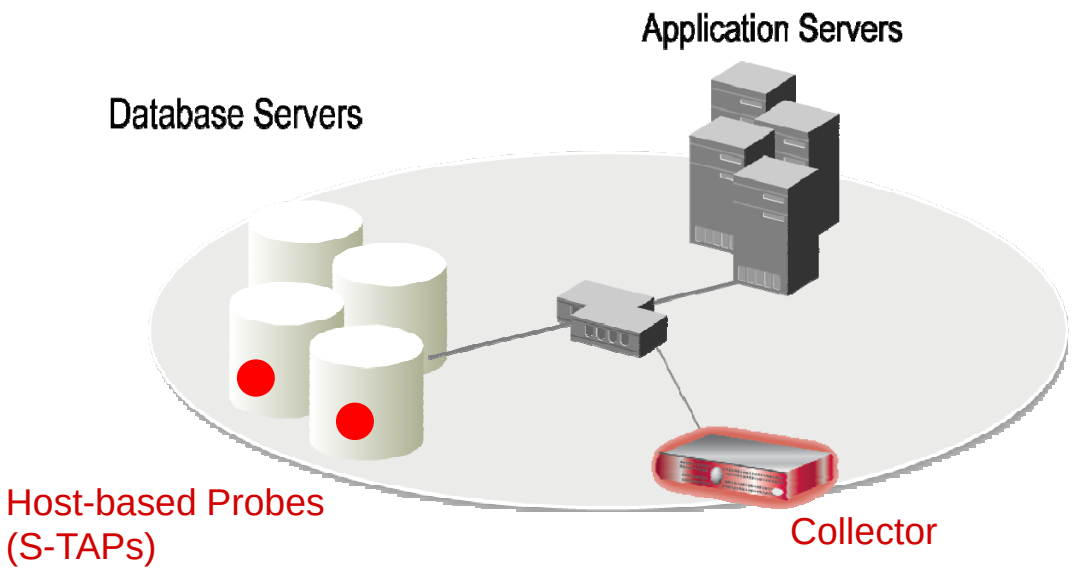
- Have you experienced any database breaches?
- What processes do you have in place to protect high-value enterprise information?
- Are you facing challenges in complying with PCI DSS, SOX, data privacy or other regulatory mandates?
- Are your costs increasing due to the resources required to support audit and compliance activities
- Are you concerned with internal threats to your sensitive data?
- Do you have database or application performance issues resulting from the use of native database logging to support compliance activities?
- Do you always have a view of what changes are occurring in your database and who is accessing what data? How are you alerted to activities out of the ordinary?

The Compliance Mandate

Audit Requirements	COBIT (SOX)	PCI-DSS	ISO 27002	Data Privacy & Protection Laws	NIST SP 800-53 (FISMA)
1. Access to Sensitive Data (Successful/Failed SELECTs)		✓	✓	✓	✓
2. Schema Changes (DDL) (Create/Drop/Alter Tables, etc.)	✓	✓	✓	✓	✓
3. Data Changes (DML) (Insert, Update, Delete)	✓		✓		
4. Security Exceptions (Failed logins, SQL errors, etc.)	✓	✓	✓	✓	✓
5. Accounts, Roles & Permissions (DCL) (GRANT, REVOKE)	✓	✓	✓	✓	✓

DDL = Data Definition Language (aka schema changes)
DML = Data Manipulation Language (data value changes)
DCL = Data Control Language

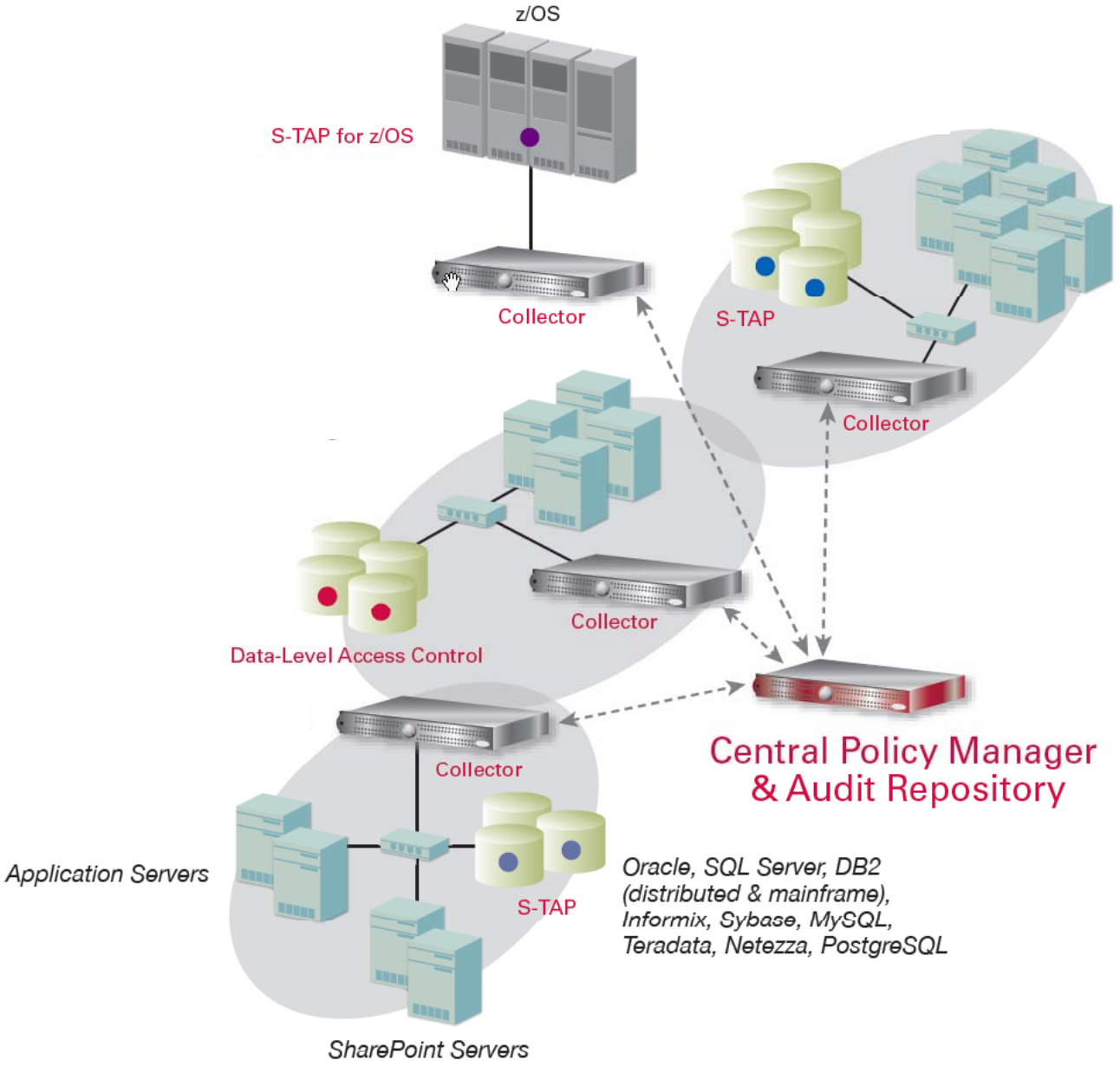
Real-Time Database Monitoring with InfoSphere Guardium



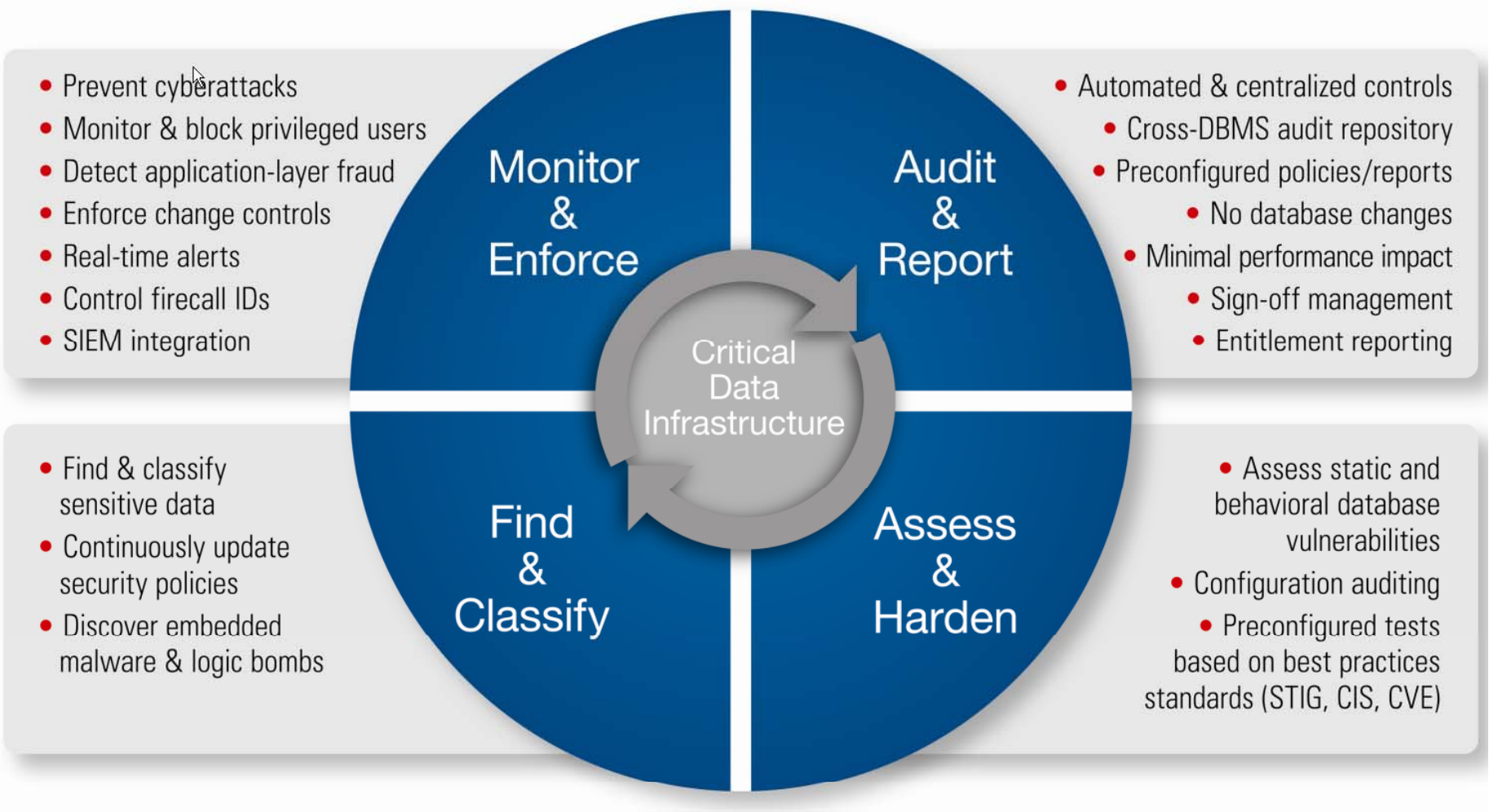
- Non-invasive architecture
  - Outside database
  - Minimal performance impact
  - No DBMS or application changes
- Cross-DBMS solution
- 100% visibility including local DBA access

- Enforces separation of duties
- Does not rely on DBMS-resident logs that can easily be erased by attackers, rogue insiders
- Granular, real-time policies & auditing
  - *Who, what, when, how*
- Automated compliance reporting, sign-offs & escalations (SOX, PCI, NIST, etc.)

Scalable Multi-Tier Architecture



Addressing the Complete Database Security and Compliance Lifecycle



Discover Sensitive Data

Find Cardholder Data

Databases Discovered

Start Date: 2008-06-26 14:48:49 **End Date:** 2008-06-26 15:48:49

Time Probed	Server IP	Server Host Name	DB Type	Port	Port Type
2008-06-26 15:31:00	10.10.9.253	10.10.9.253	Oracle	1521	tcp
2008-06-26 15:30:58	10.10.9.253	10.10.9.253	MSSQL	1433	tcp
-26 15:30:15	10.10.9.55	osprey	Oracle	1521	tcp
-26 15:30:15	10.10.9.55	osprey	Sybase	4200	tcp
-26 15:30:32	10.10.9.56	10.10.9.56	Oracle	1521	tcp
-26 15:30:58	10.10.9.56	10.10.9.56	DB2	50001	tcp

Classification Rule #1 For Classification Policy "find creditcard data"

Rule Name: Send Alert

Category: PCI

https://10.10.9.242:8443/viewClsProcessResult.do?method=view&viewerType=assessmentResults&viewe - Internet Explorer provided by

https://10.10.9.242:8443/viewClsProcessResult.do?method=view&viewerType=assessmentResults&viewedTaskId=-1&noButtons=false&selectedProcessId=20016

Certificate Error

Catalog	Schema	Table Name	Column Name	Rule Description	Comments	Classification Name	Category	Data Source Description
	HR	BIN$RfXc0W/34qTgQAoKNwkbuw==$0	CARDNUMBER	Send Alert	Date: Monday, July 21, 2008 6:30:22 PM EDT Datasource: ORACLE 10.10.9.56:1521 xe Object: TABLE HR.BIN$RfXc0W/34qTgQAoKNwkbuw==$0 VARCHAR2(30) CARDNUMBER Category: 'PCI' Classification: 'Cardholder Data' Rule: Search For Data: Send Alert TABLE_TYPE='TABLE,VIEW', DATA_TYPE='TEXT', SEARCH_VALUE_PATTERN='[0-9]{4}-[0-9]{4}-[0-9]{4}-[0-9]{4}' Action: Send Alert: Send Alert Urgent Flag='false', Receiver='SYSLOG' Action: Log Policy Violation: Send Policy Violation Severity='10' Action: Add To Group Of Objects: add to group Object Group='PCI Cardholder Sensitive objects', Replace Group Content='false'	Cardholder Data	PCI	10-56-sy...

Guardium

Agentless Network Scan 10.10.9.*

Search Like:

Search Expression: [0-9]{4}-[0-9]{4}-[0-9]{4}-[0-9]{4}

Maximum Rows:

Classification Rule Actions: New Action

1 Send Alert (Send Alert)

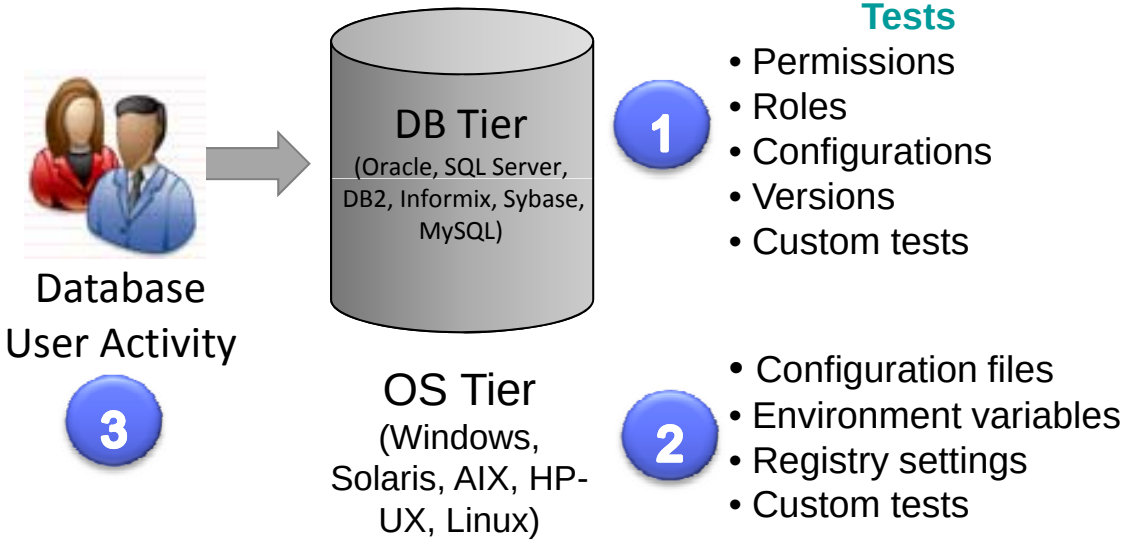
2 Send Policy Violation (Log Policy Violation)

3 add to group (Add To Group Of Objects)

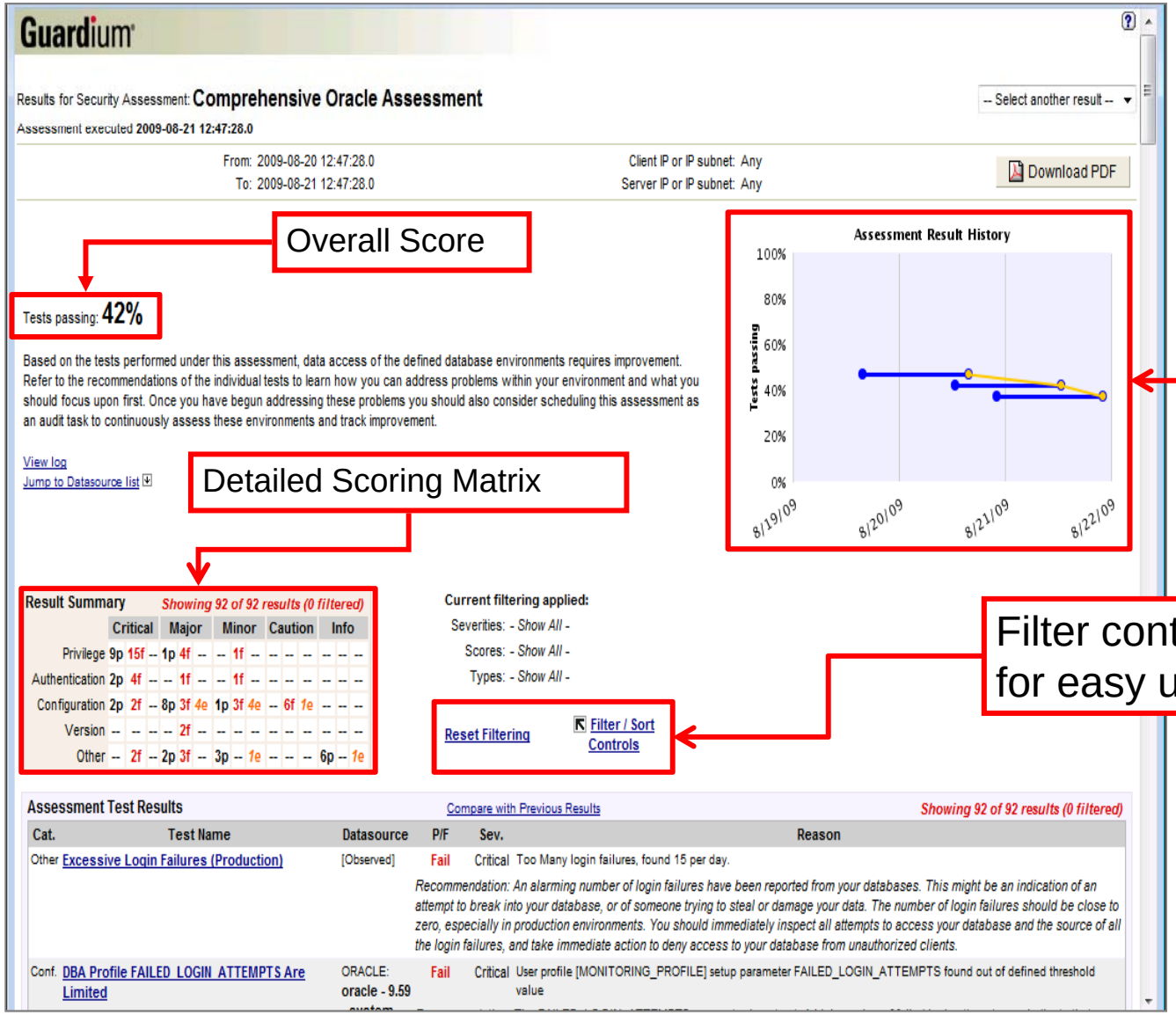
Cancel Accept

Vulnerability & Configuration Assessment Architecture

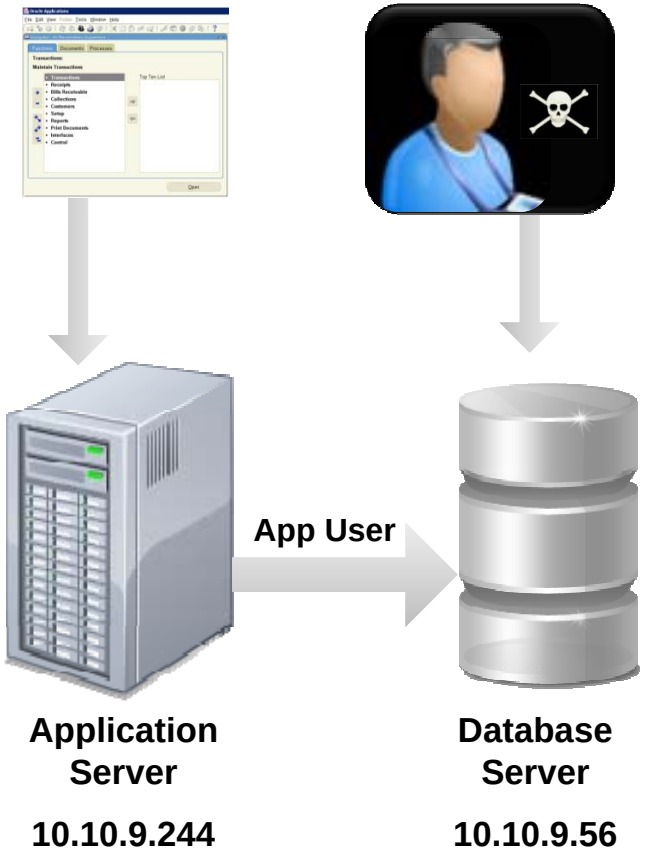
- Based on industry standards (DISA STIG & CIS Benchmark)
- Customizable
  - Via custom scripts, SQL queries, environment variables, etc.
- Combination of tests ensures comprehensive coverage:
  - Database settings
  - Operating system
  - Observed behavior

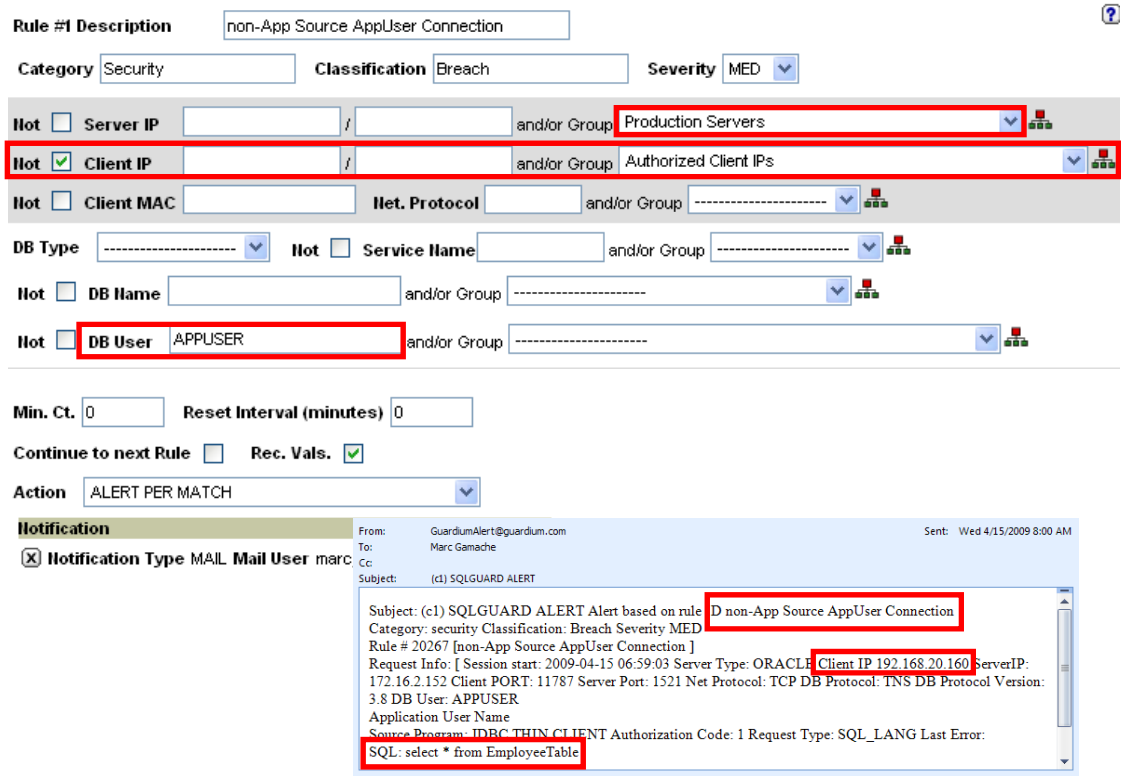


Vulnerability Assessment Example



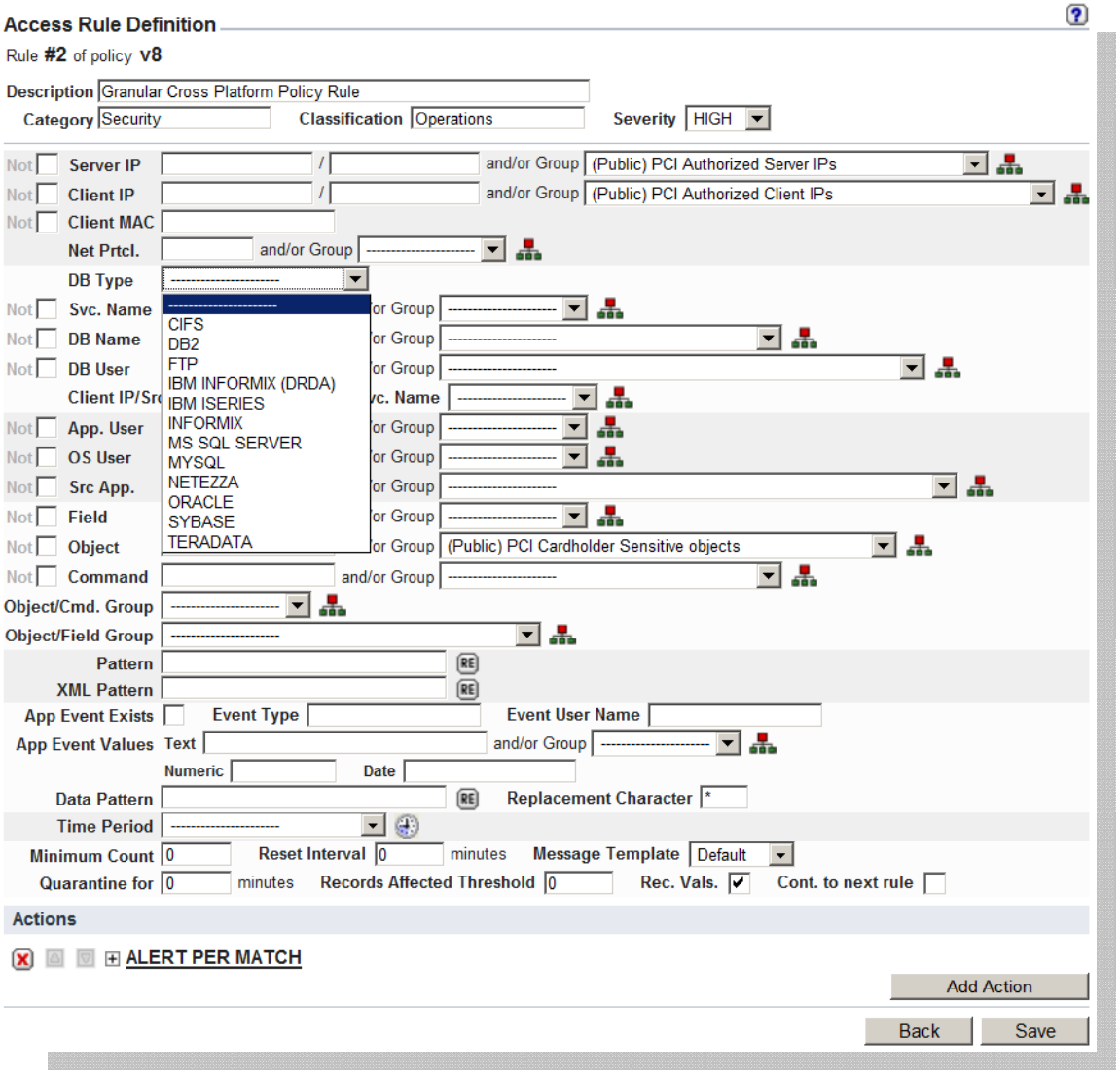
Granular Policies with Real-Time Alerts





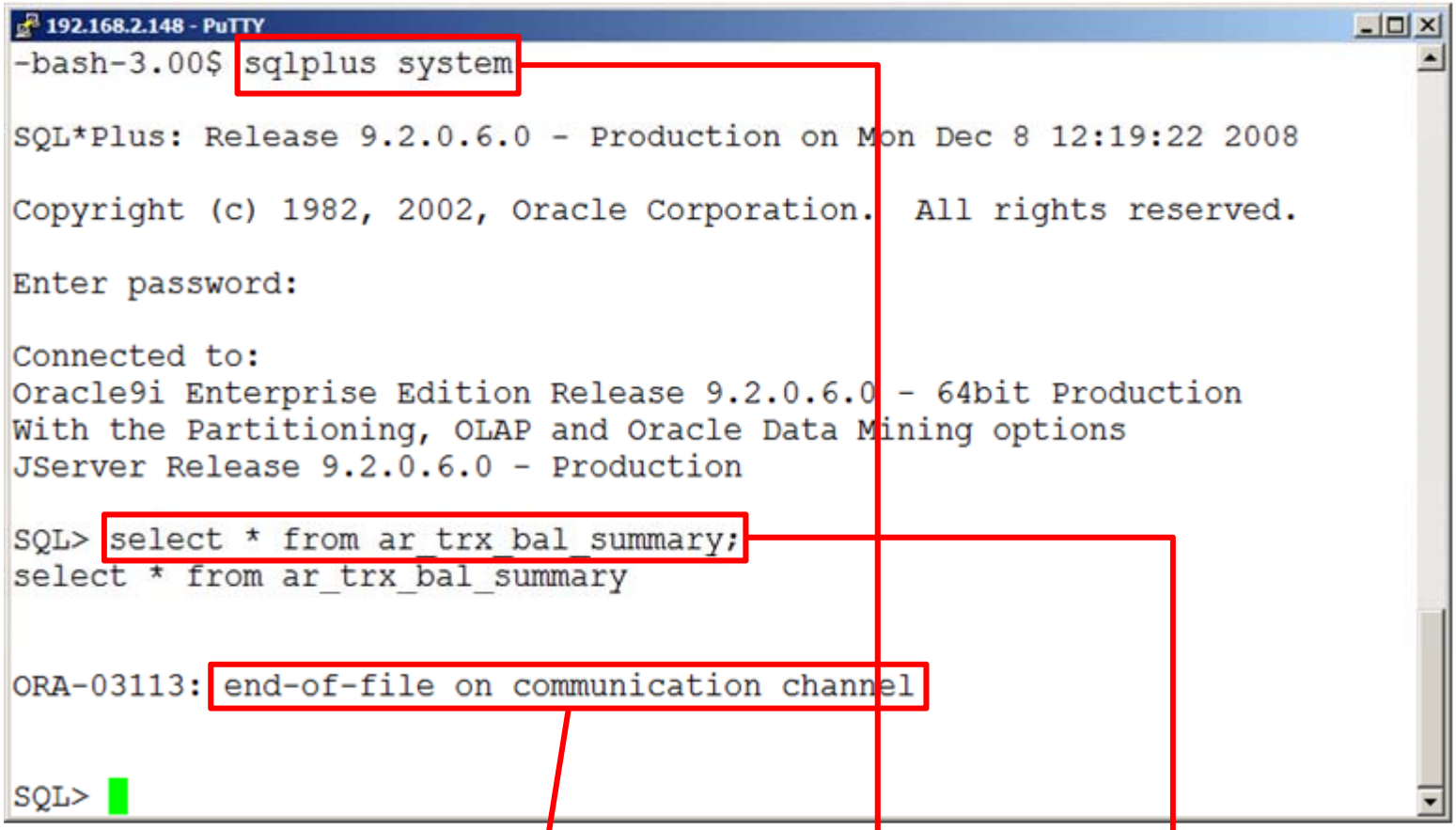
Alert on any login using the application account sourced from a location other than the application!

Cross-DBMS Policies and Auditing



- **Single set of cross-DBMS policies**
- **Single cross-DBMS audit repository for enterprise-wide correlation and reporting**

Capture Audit Data

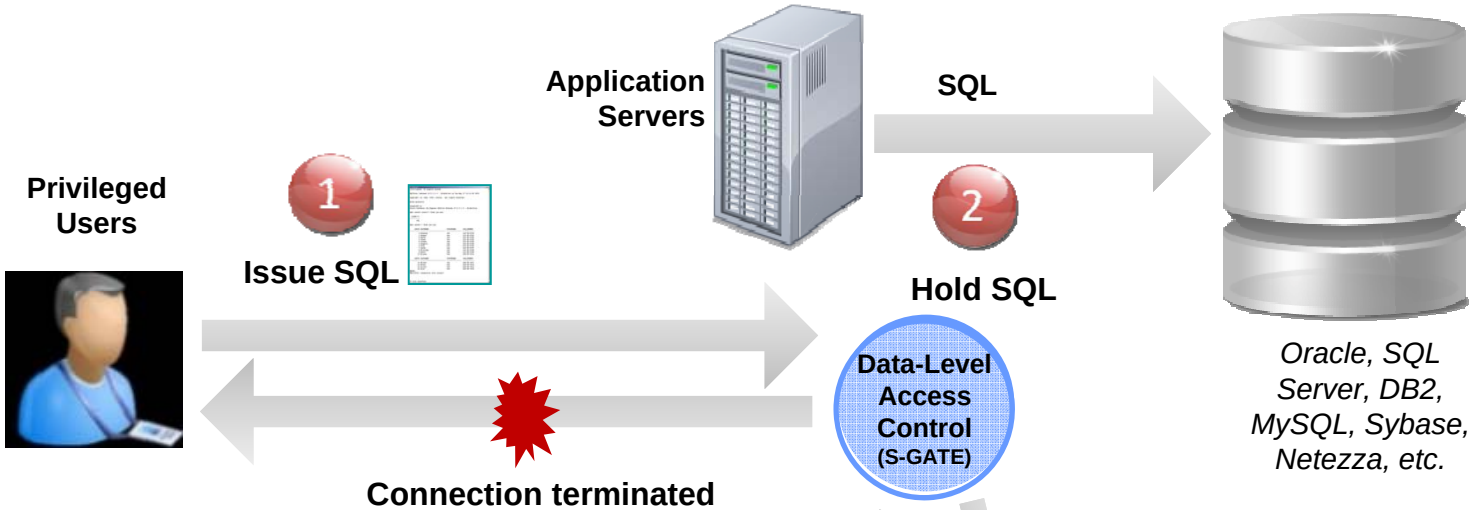


Policy Violations / Incident Management

Start Date: **2008-12-08 10:25:04** End Date: **2008-12-09 11:25:04**

Violation Log Id	Timestamp	Category Name	Access Rule Description	Client IP	Server IP	DB User Name	Full SQL String	Severity Description
758	2008-12-08 12:21:46.0	sox	terminate unauthorized user access to EBS	192.168.2.148	192.168.2.148	SYSTEM	select * from ar_trx_bal_summary	HIGH

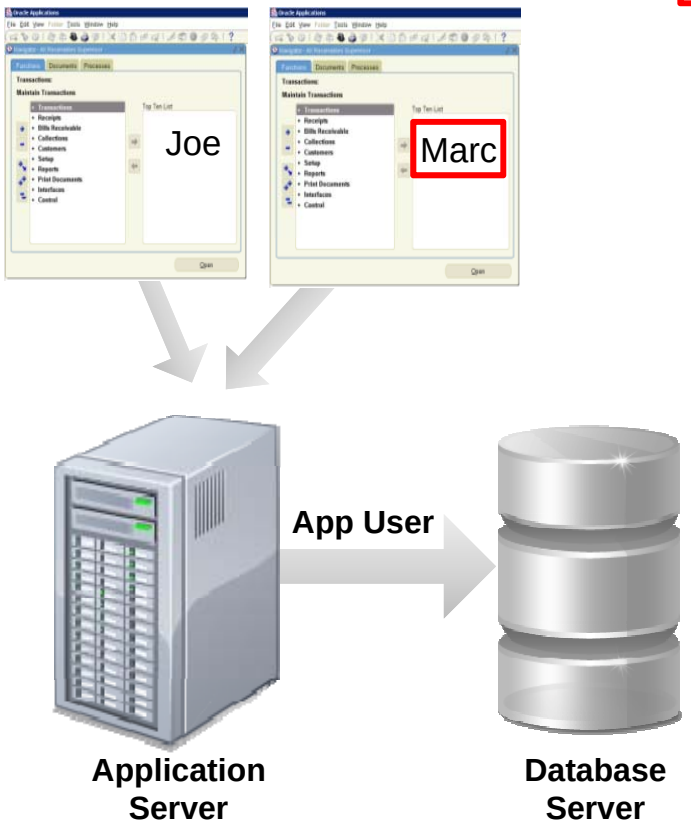
Blocking Access Without Inline Appliances




```
root@osprey:~
[root@osprey ~]# sqlplus system

SQL*Plus: Release 10.2.0.1.0 - Production on Tue May 27 01:13:32 20

Copyright (c) 1982, 2005, Oracle.  All rights reserved.

Enter password:

Connected to:
Oracle Database 10g Express Edition Release 10.2.0.1.0 - Production

SQL> select * from creditcard;
select * from creditcard
*
ERROR at line 1:
ORA-03113: end-of-file on communication channel

SQL>
```

Session Terminated

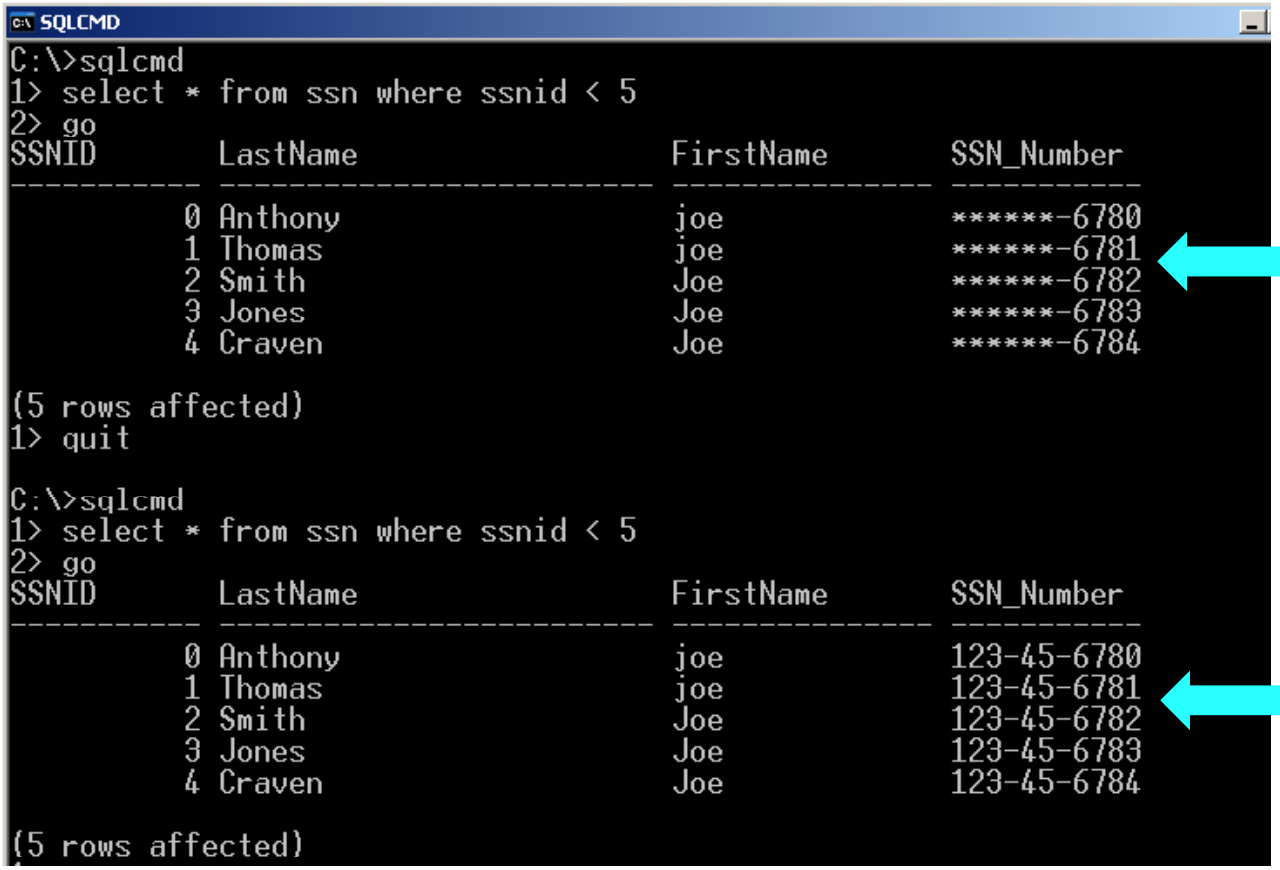
Identifying Fraud in Connection-Pooled Applications



DB User Name	Application User	Sql
APPUSER	joe	select * from EmployeeRoleView where UserName=?
APPUSER	joe	select * from EmployeeTable
APPUSER	marc	insert into EmployeeTable values (?,?,?,?,?,?,?,?,?)

- ***Issue:*** ***App server uses generic service account to access DB - which doesn't identify WHO initiated transaction (connection pooling)***
- *Solution*: Track access to application users associated with specific SQL commands
  - Deterministic identification vs. time-based "best guess"
  - Out-of-the-box support for all major enterprise apps (Oracle EBS, PeopleSoft, SAP, Siebel, Business Objects, Cognos, etc.)
  - Plus custom apps (WebLogic, WebSphere, Oracle AS, etc.)
  - No changes to applications

Mask Sensitive Information From Unauthorized Users

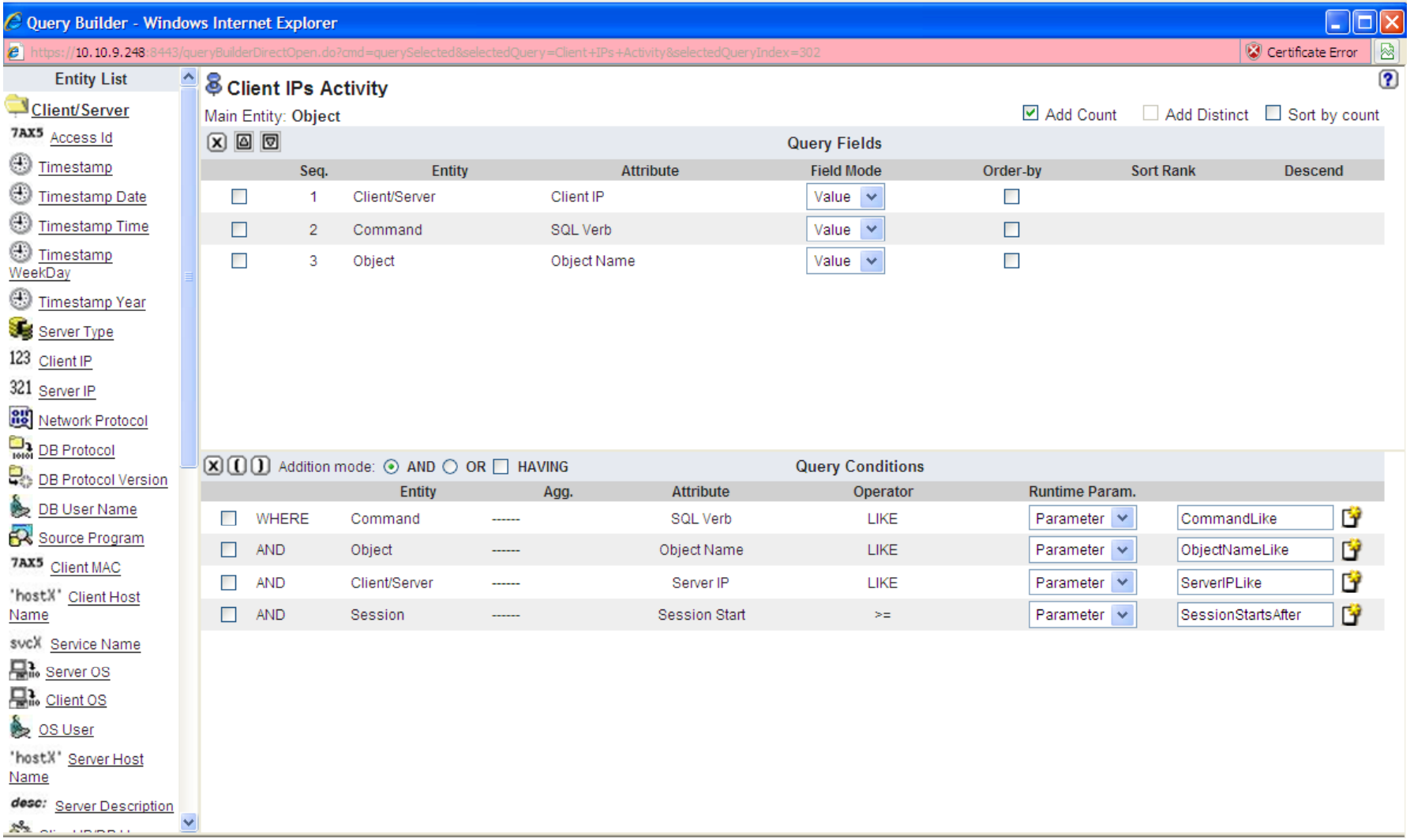


Masked values to database client

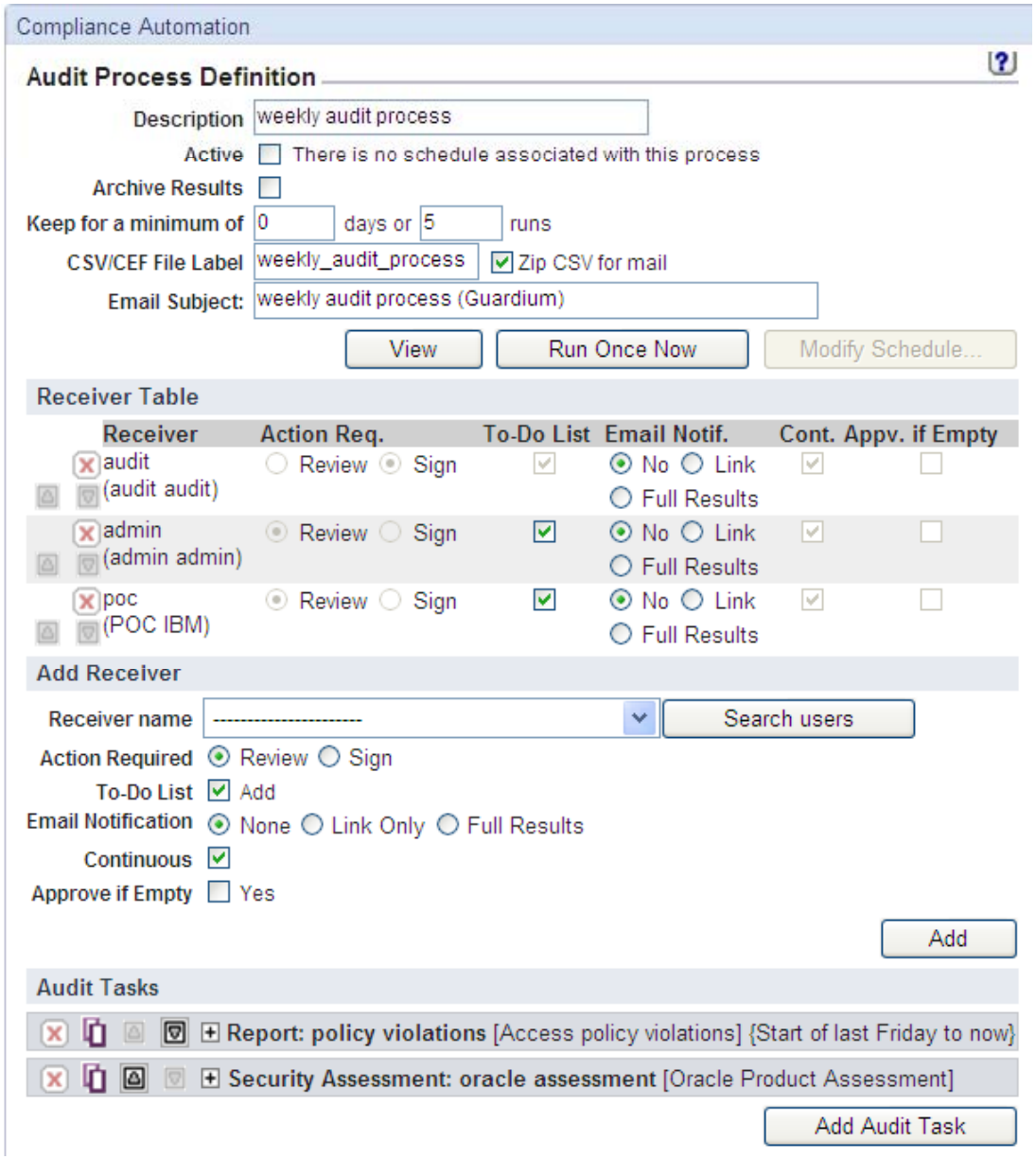
Actual Values in the database server

- Mask data on the fly for production database servers

Report Builder



InfoSphere Guardium Compliance Workflow Automation



Broad Platform Support

Supported Platforms	Supported Versions
Oracle	8i, 9i, 10g (r1, r2), 11g, 11gR2
Oracle (ASO, SSL)	9i,10g (r1,r2), 11g
Microsoft SQL Server	2000, 2003, 2008
Microsoft SharePoint	2007, 2010
IBM DB2 (Linux, Unix, Linux for System z)	9.1, 9.5, 9.7
IBM DB2 for z/OS	7, 8, 9
IBM DB2 (Windows)	9.1, 9.2, 9.5, 9.7
IBM DB2 for iSeries	V5R2, V5R3, V5R4, V6R1
IBM Informix	7, 9, 10,11, 11.5
Oracle MySQL and MySQL Cluster	4.1, 5.0, 5.1
Sybase ASE	12, 15, 15.5
Sybase IQ	12.6, 15
Teradata	6.x, 12,13
Netezza	4.5
PostgreSQL	8

InfoSphere Guardium: Chosen by Leading Organizations Worldwide

- 5 of the top 5 global banks
- 2 of the top 3 global retailers
- 3 of the top 5 global insurers
- 2 of the world's favorite beverage brands
- The most recognized name in PCs
- 15 of the world's leading telcos
- Top government agencies
- Top 3 auto maker
- #1 dedicated security company
- Leading energy suppliers
- Major health care providers
- Media & entertainment brands

Summary & Conclusions

- Traditional log management, network scanners, SIEM and DLP insufficient to secure high-value databases
  - No real-time monitoring at data level to detect unauthorized access
  - Inability to detect fraud at application layer
  - Native logging/auditing require database changes & impact performance
  - No knowledge about DBMS commands, vulnerabilities & structures
- Guardium is the most widely-deployed solution, with ongoing feedback from the most demanding data center environments worldwide
  - Scalable enterprise architecture
  - Broad heterogeneous support
  - 100% visibility and granular control
  - Deep automation to reduce workload
  - Holistic approach