Security in knowledge

What? Me, Worry? I've Already Been Hacked. Haven't You?

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RSA CONFERENCE 2013

Session ID: DSP-F43
Session Classification: General Interest

#1 Global Security Challenge

Sophisticated attacks: - executed by financially-motivated cybercriminals, state- sponsored espionage groups, hacktivists and insiders/Privileged users

Information theft – In 2011 174M Records Exposed in the USA. The average cost of a data breach **$214** per record (Source: DataLossDB, Ponemon Institute, 2010, Verizon - 2012 Data Breach Investigations Report).

Compliance - 96% of victims subject to PCI Dss had not achieved compliance (Source: Verizon - 2012 Data Breach Investigations Report)

FBI - Organized data theft bigger criminal industry than drug trading (source FBI)

2011 database servers accounted for 96% of all records breached.
(Source: Verizon - 2012 Data Breach Investigations Report)

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It’s not getting any better…

- Jun 2012 - **Amazon’s Zappos.com -** data breach exposed personal information of 24 million customers. (Amazon acquired Zappos for more than $1 billion.)
- Feb 2012 - **University of North Carolina**, 350,000 records, exposed Social Security numbers and financial information online
- March 2012 - **VISA and MasterCard** alerted banks about a recent breach at a **Global Payment Systems.** 7 million records, including 1.5 million credit cards
- April 2012 **- South Carolina Health and Human Services** 228,435 records of patient records, including Medicaid ID numbers

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It’s not getting any better…

- May 2012 **University of Nebraska breach -** 654,000 Social Security numbers, addresses, grades, financial aid information for current and former NU students
- May 2012 – **University of Nebraska** Breach Highlights Education In Crosshairs Database containing 654,000 exposed
- June 2012 - **LinkedIn** reported a breach of at least **6.5 Million** passwords.
- July 2012 – **KT Mobile**(South Korea) **8.7 million** customer records stolen
- Sep 2012 - **Saudi Arabia's national oil company** Most of the databases
- Nov 2012 - **Adobe** 150,000 User Accounts Exposed

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Motivation for Database Security

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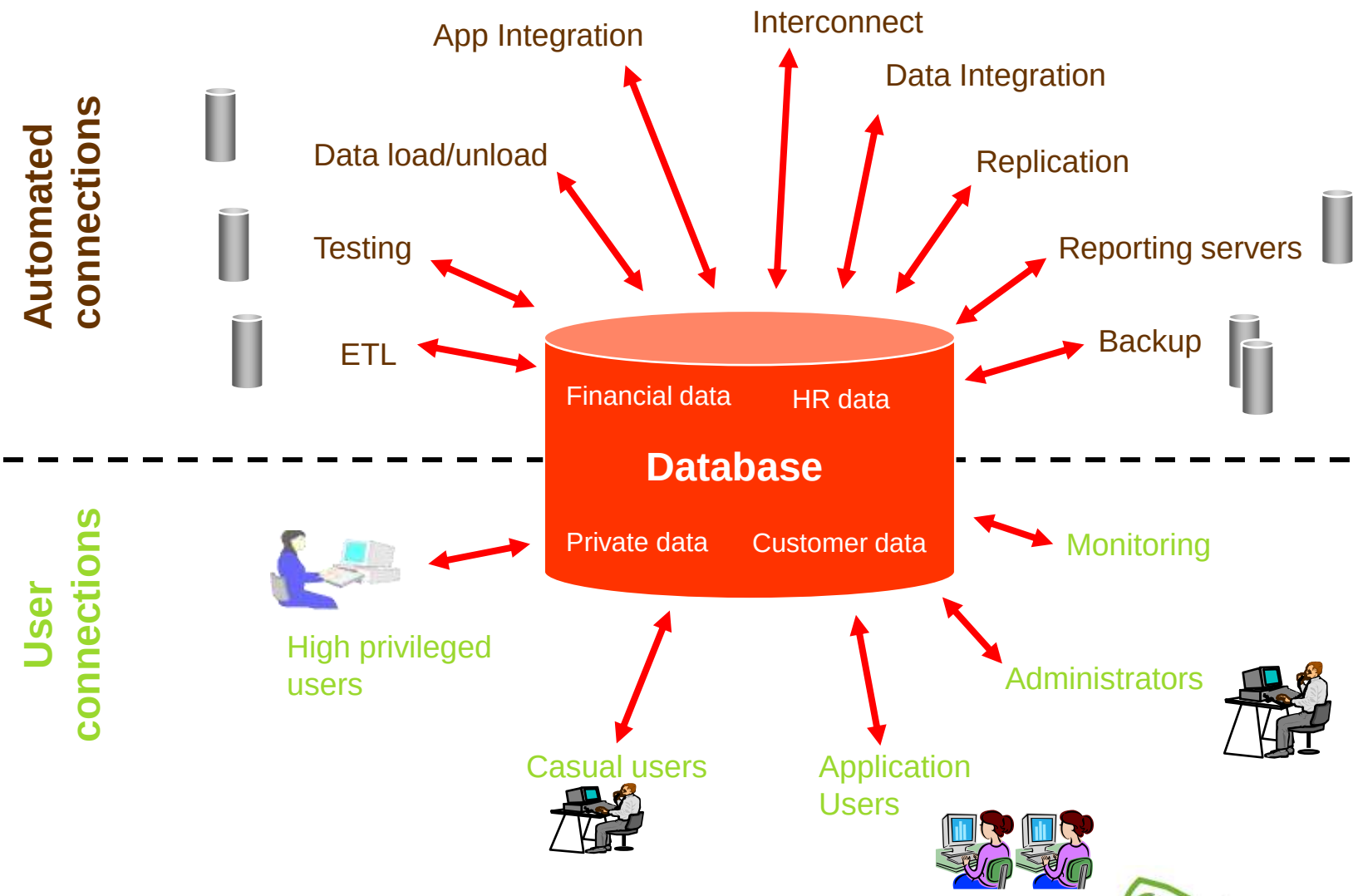
Who uses the Database?



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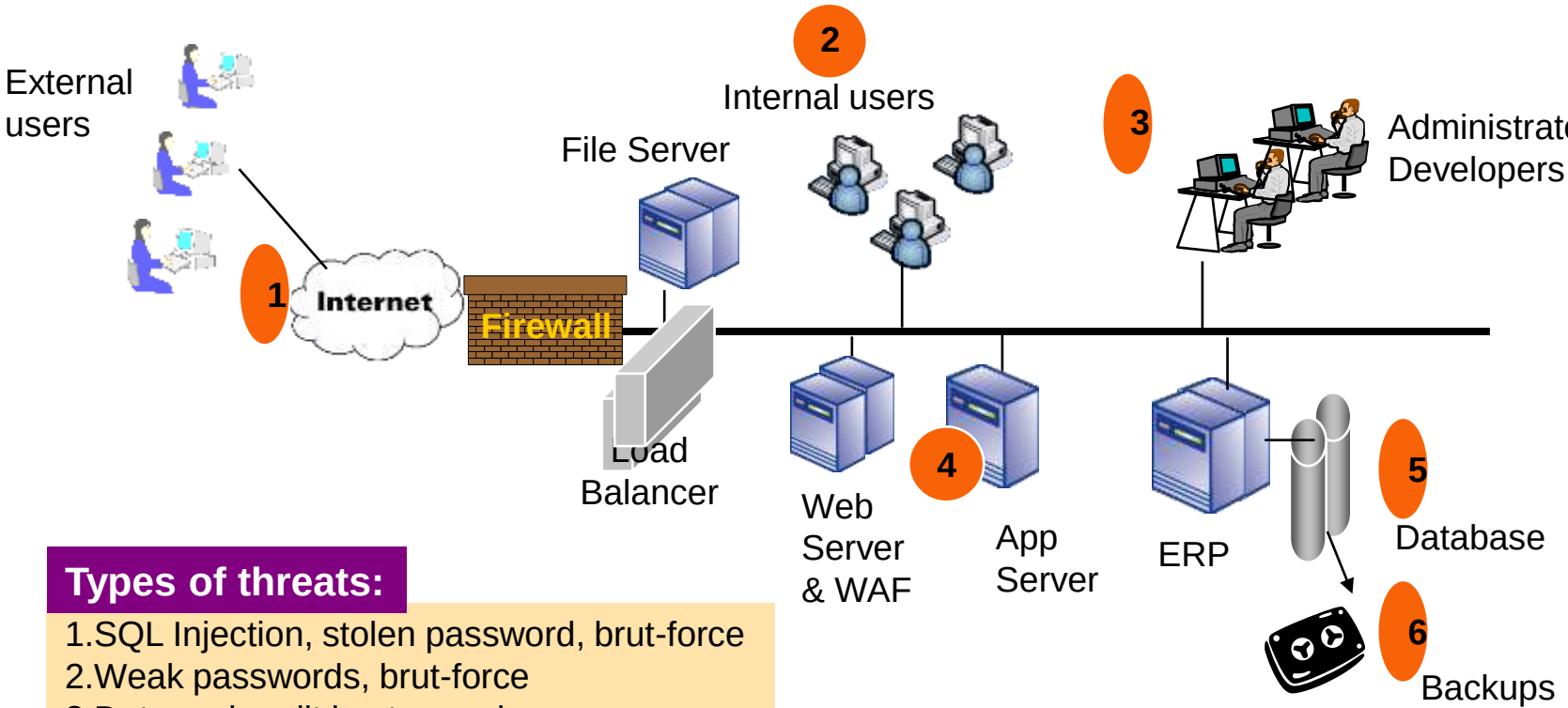
Threats..



Types of threats:

1. SQL Injection, stolen password, brut-force
2. Weak passwords, brut-force
3. Data and audit log tampering
4. Vulnerabilities, password exposed
5. Weak AAA and database security
6. Tapes stolen/lost

Insider threats a concern:

80% of threats come from insiders
75% of internal threats are undetected
25% of enterprises detected security breaches
60% of data loss/corruption caused by human error

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Information Theft

- Hackers have become professional
- Business models finance them
- SQL Injection attacks are becoming increasingly sophisticated and difficult to prevent
- SQL Injections discovered in “close source” apps
- It uses stealth techniques to go unnoticed for as long as possible
- Database attacks are getting to be more and more valuable for hackers and Crime organizations

Pricelist

Address	$0.50
Phone number	$0.25
Unpublished phone number	$17.50
Cell phone number	$10
Date of birth	$2
Social Security number	$8
Driver's license	$3
Education	$12
Credit history	$9
Bankruptcy details	$26.50
Lawsuit information	$2.95
Sex offender	$13
Workers' comp history	$16
Military record	$35

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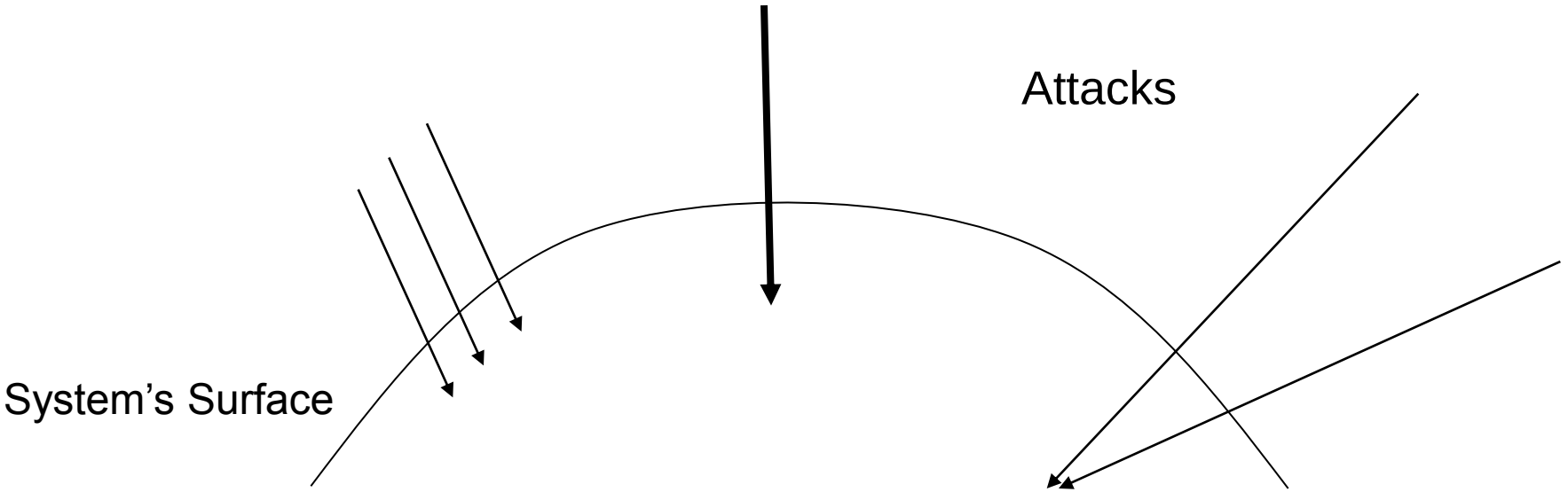
Attackability



How to reduce the ways attackers can penetrate surface

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Windows Attack Vectors

- Open sockets
- Open RPC endpoints
- Open named pipes
- Services
- Services running by default
- Services running as SYSTEM
- Active Web handlers
- Active ISAPI Filters
- Dynamic Web pages
- Executable vdirs
- Enabled accounts
- Enabled accounts in admin group
- Null Sessions to pipes and shares
- Guest account enabled
- Weak ACLs in FS
- Weak ACLs in Registry
- Weak ACLs on shares
- *VBScript enabled*
- *Jscript enabled*
- *ActiveX enabled*
- *Third party application*

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What is SQL Injection?

- SQL Injections attacks goes directly after your most valuable asset – The Database
- Uses the same connectivity as legitimate web and other application usage
- Network and OS security won't help
- Many systems and close source applications vulnerable, even among the big names
- Extremely easy to learn / attempt
- Endless amount of information is available

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How common is SQL Injection?

- It is probably the most common vulnerability today!
- SQL Injections discovered in Close source applications!
- It is a flaw in "web application" development, it is not a database or web server problem
  - Most programmers are still not aware of this problem
  - A lot of the tutorials & demo “templates” are vulnerable
  - Even worse, a lot of solutions posted on the Internet are not good enough
- Some pen tests at the wild shows over 65% of clients turn out to be vulnerable to some sort SQL Injection attacks.

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What is SQL?

"Users" Table

UserName	FirstName	LastName	Password
CJONES	Cynthia	Jones	XXXXXX
BSMITH	Bill	Smith	YYYYYY
SKING	Susan	King	ZZZZZZZ
RSMITH	Rob	Smith	AAAAA

Column data returned

```
SELECT UserName, Password
FROM Users
WHERE LastName = 'Smith'
```

Table containing data

Criteria rows must meet

UserName	Password
BSMITH	YYYYYY
RSMITH	AAAAA

Query Results

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The Trick

- SQL statements created by concatenating SQL code fragments with user-supplied values
- What if user-supplied values were constructed to contain SQL code fragments that changed the meaning of the statement?
- What if we could turn it into a statement that matched records without matching on the username and password, as was intended?

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Vulnerable Applications

- Almost all SQL databases and programming languages are potentially vulnerable
  - MS SQL Server, Oracle, MySQL, Postgres, DB2, MS Access, Sybase, Informix, etc

- Accessed through applications developed using:
  - Perl and CGI scripts that access databases
  - ASP, JSP, PHP
  - XML, XSL and XSQL
  - Javascript
  - VB, MFC, and other ODBC-based tools and APIs
  - DB specific Web-based applications and API's
  - Reports and DB Applications
  - 3 and 4GL-based languages (C, OCI, Pro*C, and COBOL)
  - many more

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SQL Injection Characters

- ' or " character String Indicators
- -- or # single-line comment
- /*…*/ multiple-line comment
- + addition, concatenate (or space in url)
- || (double pipe) concatenate
- % wildcard attribute indicator
- ?Param1=foo&Param2=bar URL Parameters
- PRINT useful as non transactional command
- *@variable* local variable
- *@@variable* global variable
- waitfor delay '0:0:10‘ time delay

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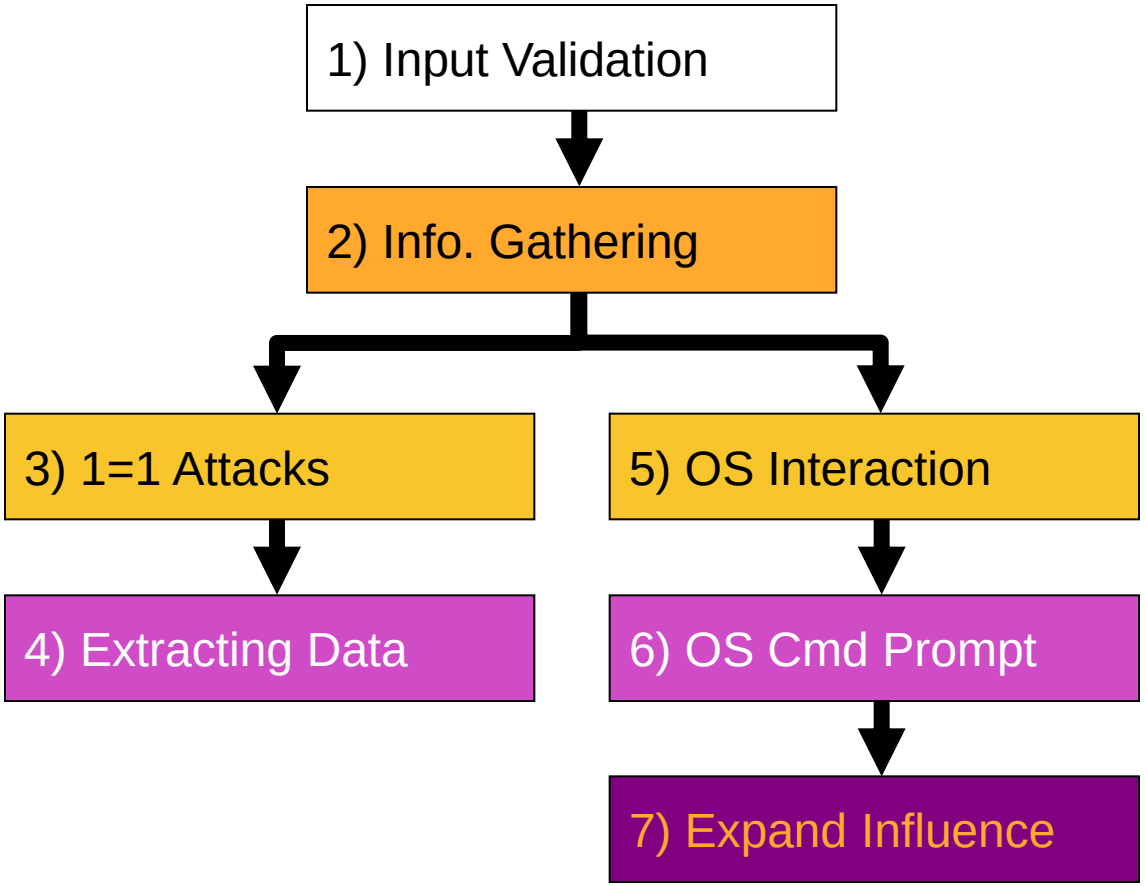
SQL Injection Methodology



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SQL Injection results

- Bypass login page
- DOS - Deny of service
- Install web shell
- Iframe injection
- Access system files
- Install db backdoor
- Theft of sensitive information / credit cards
- Additional step of the attack:
  - Attack additional servers and computers on the LAN

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The Database Layers

Applications

SQL Database Grammar

Database Application protocol layer (TDS, MySQL)

Connections Layer

Database

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WAF vs. Database security

- Web Application Firewall solutions are providing security to the Web Application layer
- HTTP traffic is inspected and enforced by the Web Application Firewall.
- Over the HTTP traffic you can only try and detect signatures for SQL injection attacks.
- WAF is a very important part of your security!
- Database Firewall analyses SQL!
- A true database architecture and policy is enforced inside the Database Firewall!

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What do I need to do..

Security

- Stops SQL Injection attacks
- Separation Of Duties
- Database firewall
- Intrusion detection/prevention
- Virtual Patching

Performance

- Protection from denial of service
- Reduce Network Connections
- Increasing Database efficiency
- Increase user experience

Auditing

- DAM (Database Activity Monitoring)
- Advanced Auditing – Before/After
- Up to a column level policy
- PCI-DSS,SOX,HIPPA reports
- Email/SYSLOG Alerts

Masking

- Up to a column level masking
- Mask per user, IP or application
- Hide sensitive data

(Credit Card/ Salaries/ Medical Information/ Other)

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SQL Injection prevention

GreenSQL Take: SQL injection/Attacks preventions

- Enforcing Database Firewall!
- Enforcing Separation of Duties!
- Enforcing Risk Based polices!
- Enforcing Masking on sensitive information!
- Enforcing Learning Mode with SQL Injection query grouping!
- Enforcing Auditing to Administrative commands and Auditing to sensitive information access!

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Database in the Cloud

As everything else, the database is migrating to the cloud

- Installed on a dedicated VPS with the application server.
- Installed on a dedicated server inside the private cloud serving application servers
- Database as a service (Microsoft SQL Azure, etc)

All Database needs protection, even more when using a cloud service!

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Thank You!

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For more information please visit

http://www.greensql.com

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