Worldwide Trends in Database Threats and Database Security

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The basics

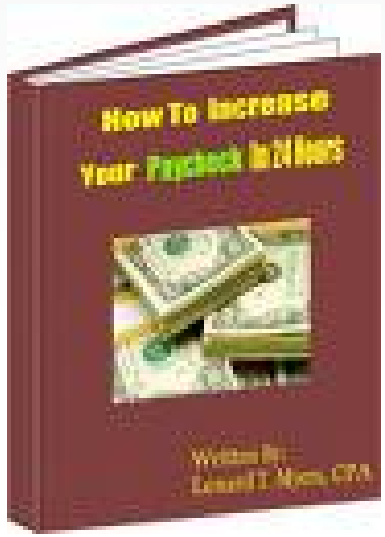
No-one is going to say to a DBA:

"Congratulations, no-one stole data from us this year. Here's a 10% pay raise"

Instead they say:

"Great, we reduced the number of days the database was down for maintenance by 5%"

Source: Anonymous contributor to the "Eye on Oracle" blog



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What happened in the last 3 years?

- **February 2005: ChoicePoint Breach**
  - **Credit history information**
  - **Classic social engineering attack**
  - **Result: 163k consumer records stolen, $15M in penalties and charges, security audits until 2026…**
- **December 2005: Guidance Software Inc. Breach**
  - **3,800 Credit cards, names and more of professionals from NSA, FBI, CIA…**
  - **Probably SQL injection attack via the web**
- **Also in 2005 - -- University of Southern California, Boston College, California State University, Chico and the University of Georgia, Lexis Nexis, PayMaxx, San Jose medical, DSW all suffered high profile data breaches …**

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This Year

- July 2005 – January 2007: TJX
  - 45.7M+ credit/debit card records stolen
  - Sophisticated attack (WiFi -> Internal Network -> DB)
  - Result: data sold to data brokers and used in many scams, TJX faces lawsuits and losses of $25M until May 07 (will grow considerably)
- July 2007 – Fidelity National Information Services
  - Bank and credit data of 2.3M customers
  - Stolen by a DBA
- And many more breaches… not only in the U.S. (e.g. Home Office breach in the U.K.)
- Many breaches are unknown or not made public
- Many breaches remain undetected

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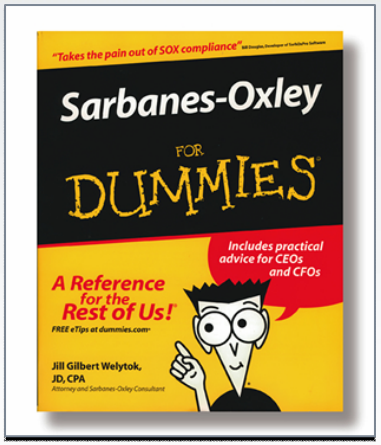
What else happened during these years?

- Regulations kicking in:
  - SB 1386
  - Sarbanes Oxley
  - PCI-DSS
  - SAS 70
  - and more...



- Bad guys are getting more "professional"
- Perimeter firewalls are doing a better job at protecting databases from external threats
- Outsourcing IT is the norm
- Many databases get closer to the Internet
- Database vendors begin to ackgnowledge vulnerabilities

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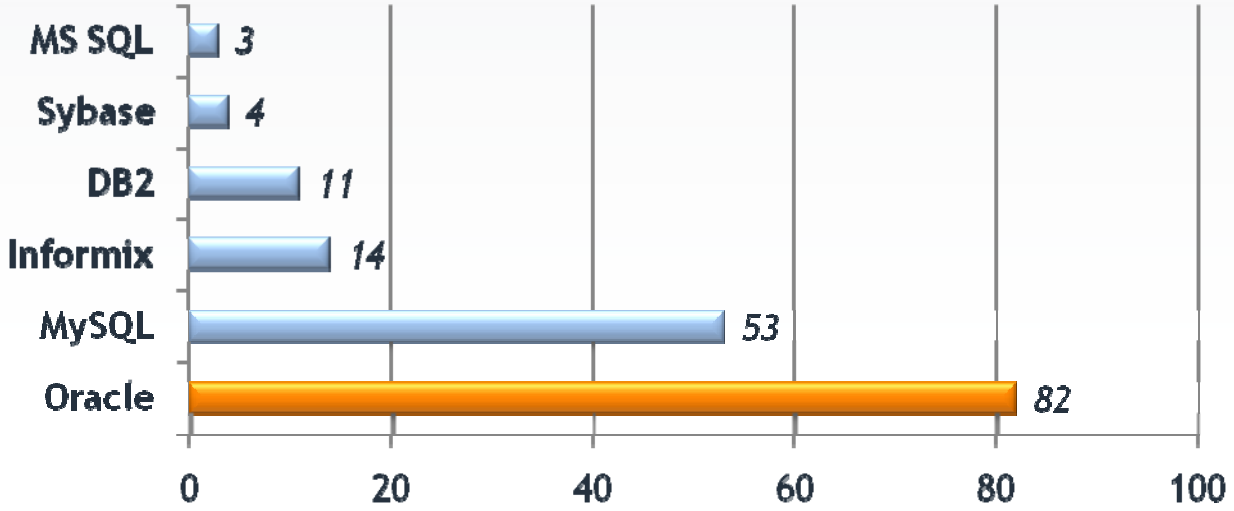
Vulnerabilities abound

- The most widely used, diverse and complicated DBMS – Oracle is the center of attention as regards DBMS security threats
- CVE *(Common Vulnerabilities and Exposures, an independent security website)* lists the no. of vulnerabilities for DBMSs as follows:



No. of vulnerabilities reported since Jan 2006

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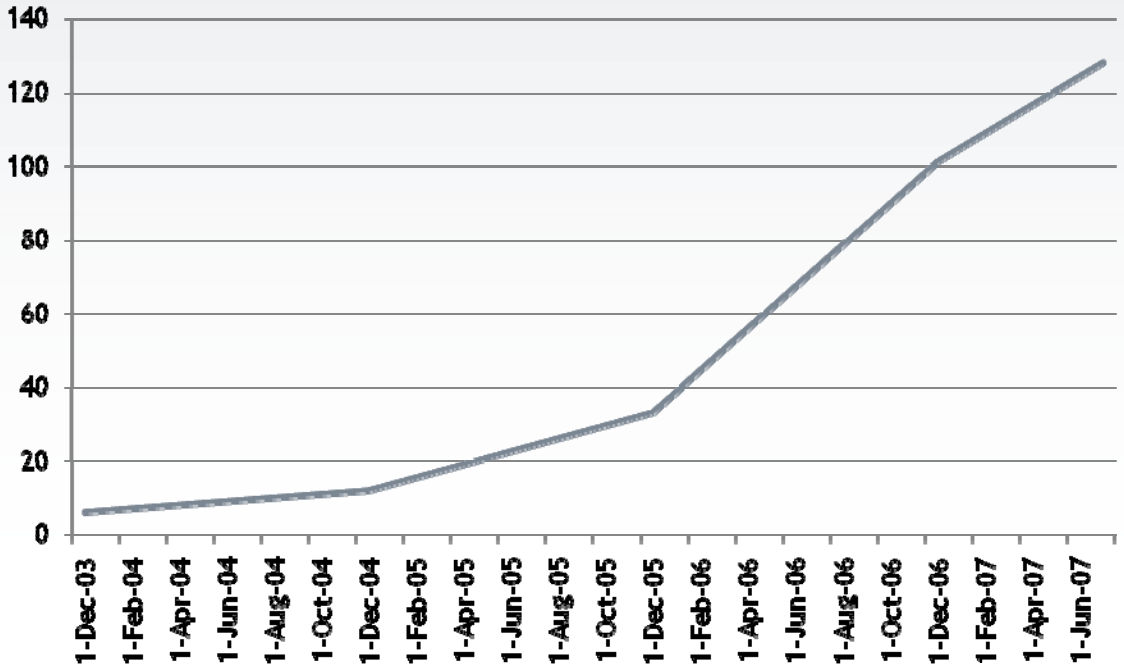
Oracle database CVEs (Common Vulnerabilities and Exposures)

Total Number of CVEs from 2003 (accumulated)



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What are the attack trends we predict?

- **Internet attacks** on databases will have less impact:
  - Better perimeter protection in place
  - Customer awareness to risks higher
- **Insider attacks** on databases have always happened but now have higher exposure
  - Exposure will lead to more attacks
  - Like network based attacks, benevolent hackers will be replaced by criminals
  - Loyalty of insiders cannot be counted on
- Attacks will become more **sophisticated**
  - We are still in initial stages of evolution
  - Last Black Hat showed that more sophiticated attacks are possible and vicious

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Database security products

- Most are firewalls on steroids:
  - Take the firewall paradigm, apply it to database
  - Based on finding the SQL within network protocol and applying policy to it
  - Yet another appliance to worry about
  - Targeted at security professionals, not DBAs
  - Some add agents to compensate for major blind spots
  - Will end up integrating into perimeter products
- Many homegrown solutions that focus on compliance rather than real security

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Another word about compliance

- Important for many reasons
- Often a lot of interpretation is involved
- But it is not security – you can be 100% compliant with any or all regulations but still exposed
- Securing your database, requires a deep understanding of your environment

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Hedgehog: Real Database Security

- A host-based software solution that monitors *all* DB transactions in real time
- Prevents improper use by privileged users as well as intruders from the outside
- Preset and administrator-defined rules
- Minimal impact on performance – uses less than 5% of a single CPU
- Full audit trail

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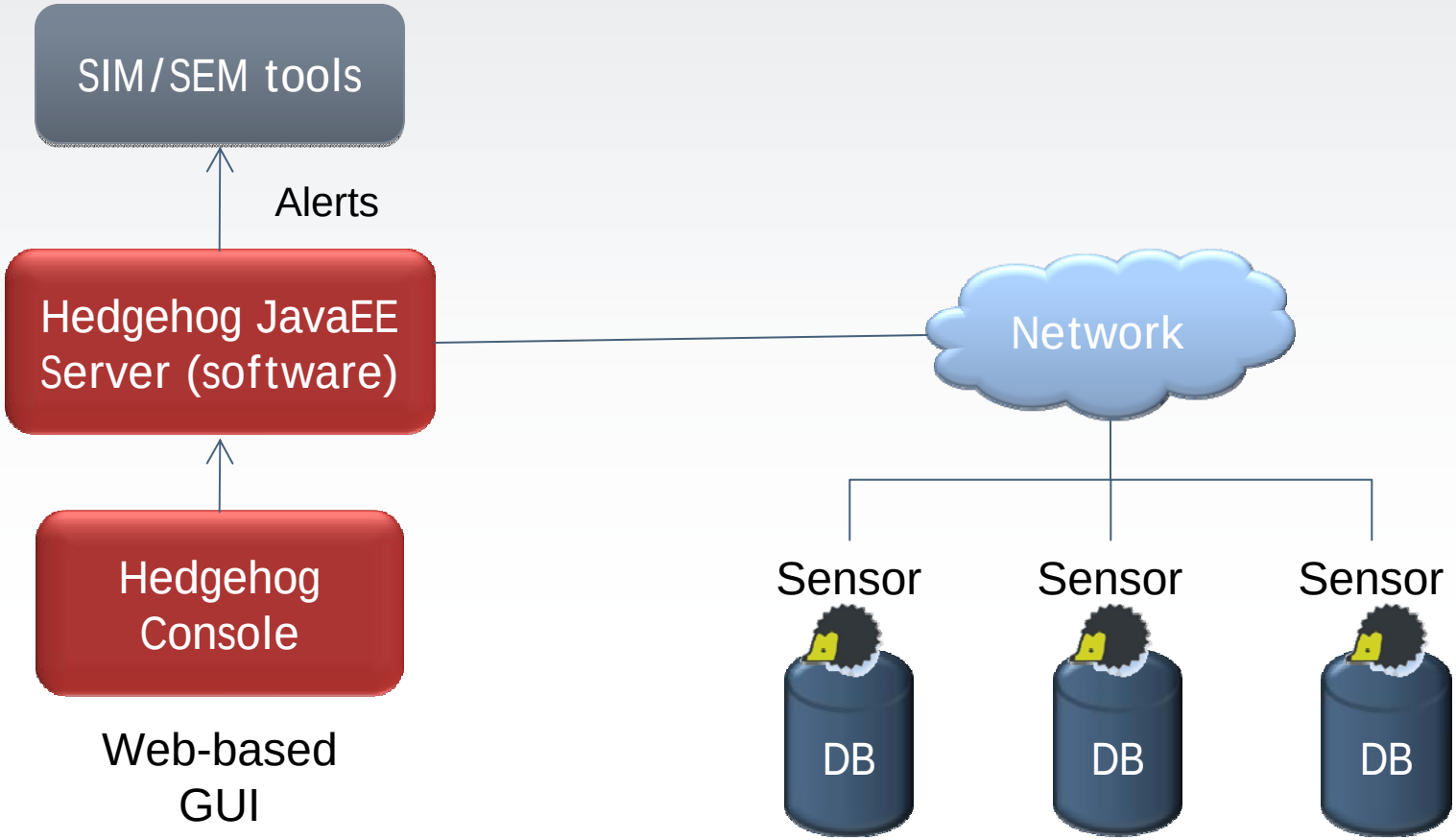
Hedgehog Logical Architecture



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Thank You!

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How about the bad guys?

2007	
25-mar-2007	SQL Injection in KUPV$FT - [Become DBA] - via cursor
25-mar-2007	Local Privilege Escalation (win32) - [Become DBA]
25-mar-2007	SQL Injection in KUPM$MCP - [Become DBA] - via cursor
25-mar-2007	SQL Injection in KUPW$WORKER - [Become DBA] - cursor
2006	
17-nov-2006	SQL Injection in KUPW$WORKER - [Become DBA]
20-apr-2006	SQL Injection in dbms_export_extension - [Become DBA]
2005	
27-jan-2006	Buffer overflow DBMS_XMLSCHEMA - [Crash File on Database Server]
27-jan-2006	Buffer overflow DBMS_XMLSCHEMA_INT - [Create Remote Shell]
01-may-2005	OS command injection in DBMS_SCHEDULER - [Become DBA]
18-apr-2005	SQL Injection vulnerability in DBMS_METADATA - [Become DBA]
18-apr-2005	SQL Injection vulnerability in DBMS_CDC_SUBSCRIBE / DBMS_CDC_ISUBSCRIBE - [Become DBA]
18-apr-2005	Denial of service vulnerability in Oracle Intermedia [Denial of Service]
2-may-2005	Become DBA via DBMS_SYS_SQL [Become DBA]
2-may-2005	Switch username to SYS after executing a job via DBMS_SCHEDULER [Switch Username]

- Exploits for Oracle 10g only
- Only exploits that are already patched presented here, and this is a good site…
- Source: red database security