Database Security:

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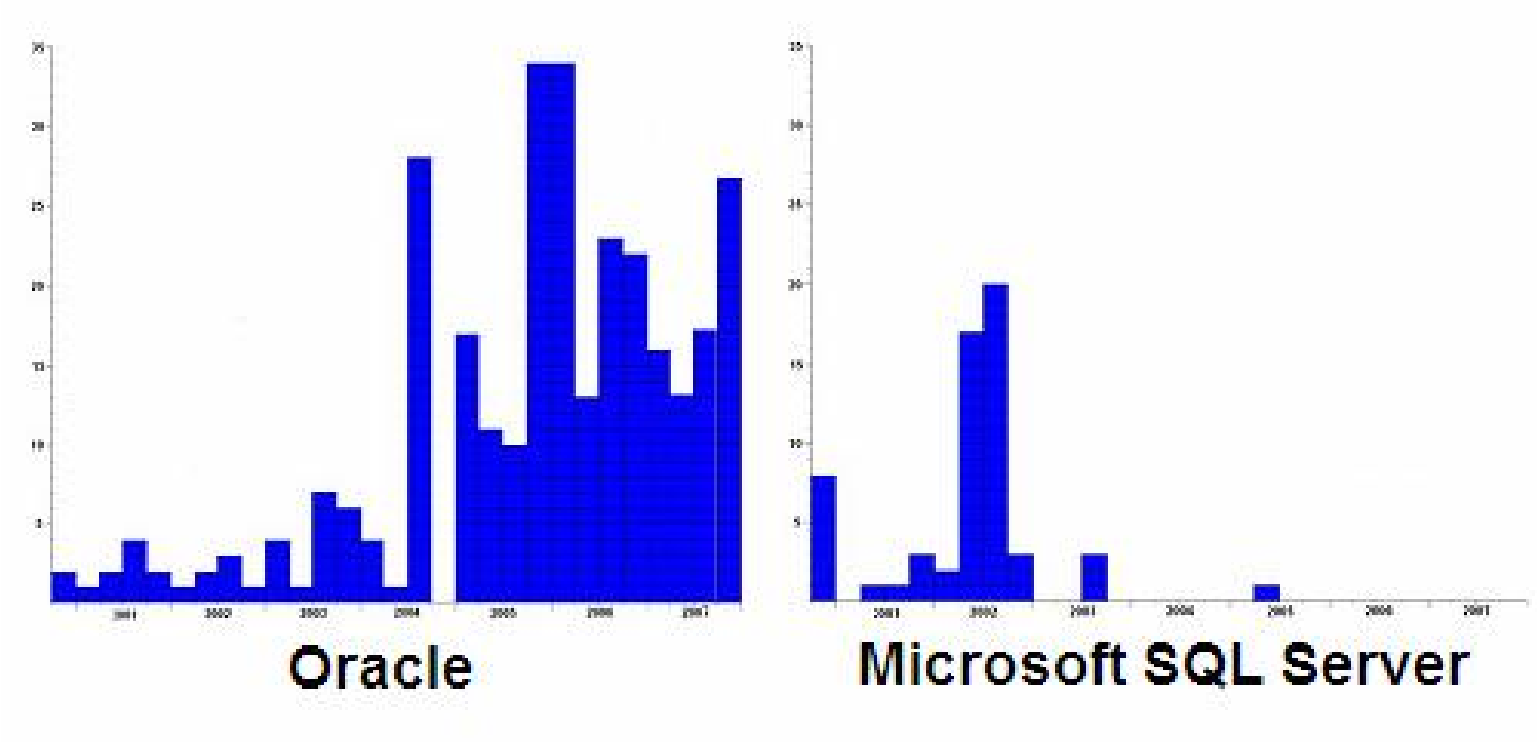
The Past, Present and Future

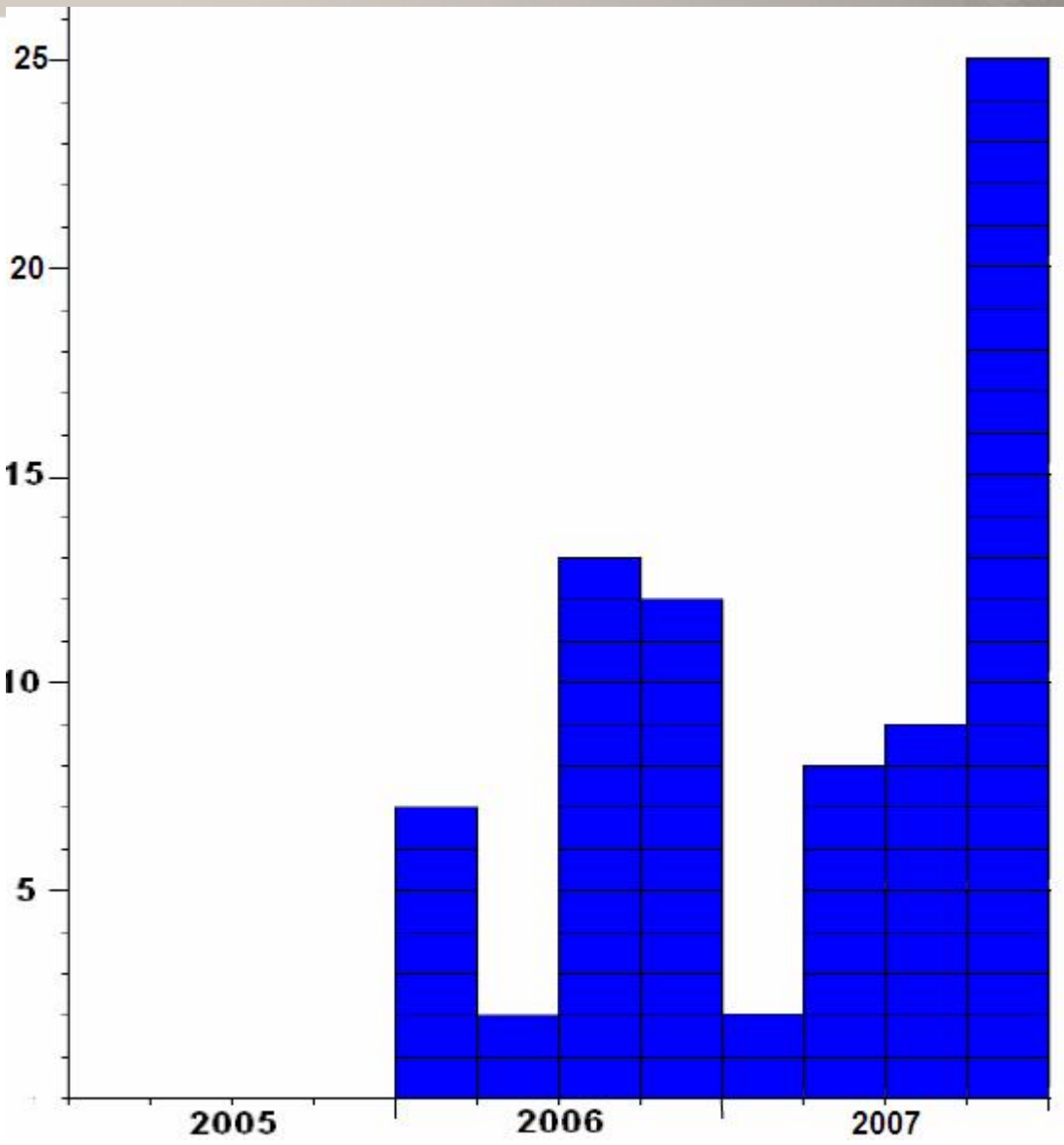
In 2006 there were 335 publicized data breaches in the U.S. So far in 2007 there have been 276. With the 5th anniversary of the SQL Slammer worm drawing near, now is a good a time as any to look back on the past of database security and ask how far have we come since then and is our data any more secure today? And what of

a world of emerging threats? Have we learned our lesson or will we be consigned to the graveyard of statistics?

- Vulnerabilities
- Exposure
- Breaches
- Legislation
- Solutions

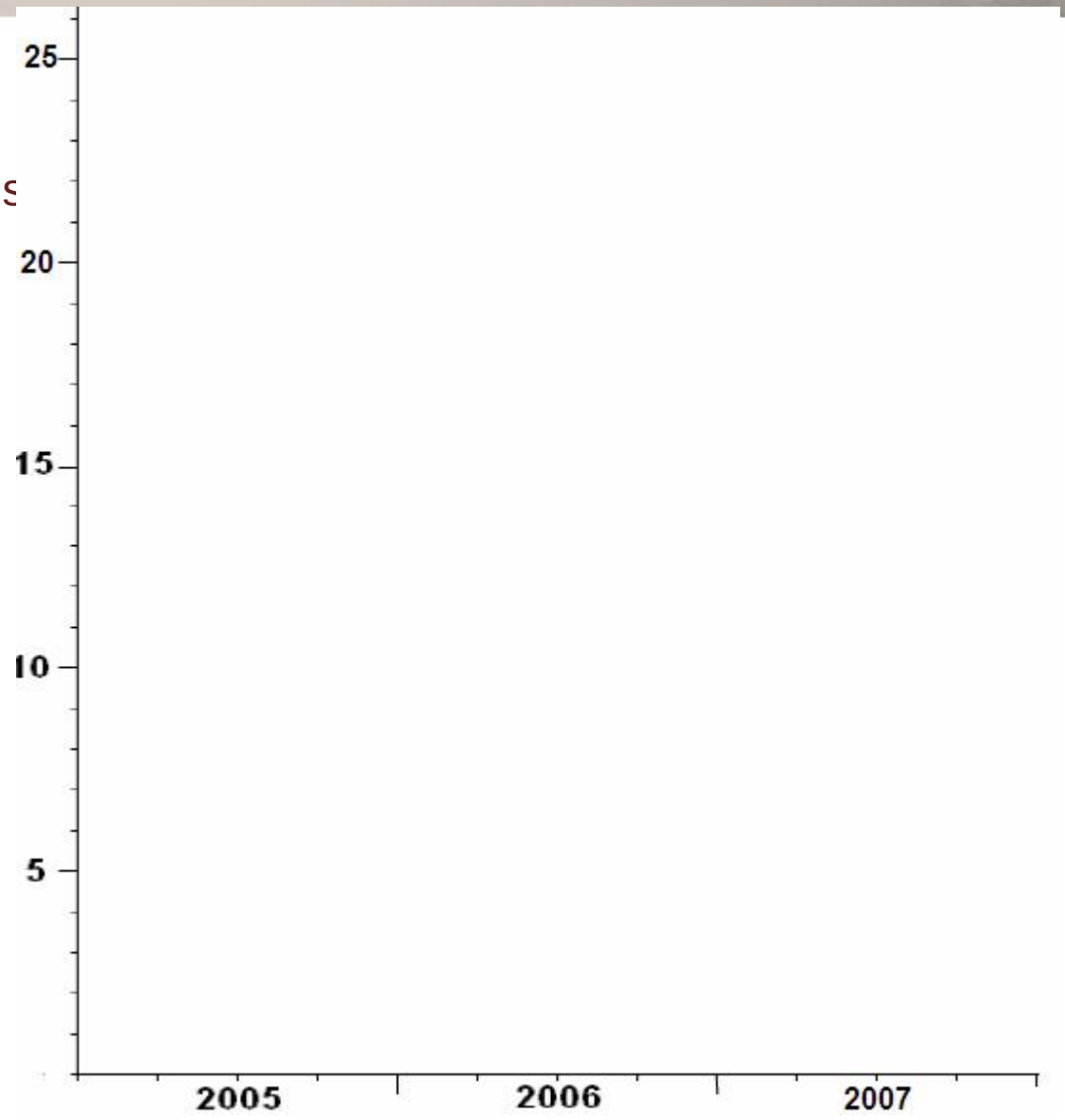
Vulnerabilities fixed in 7 years



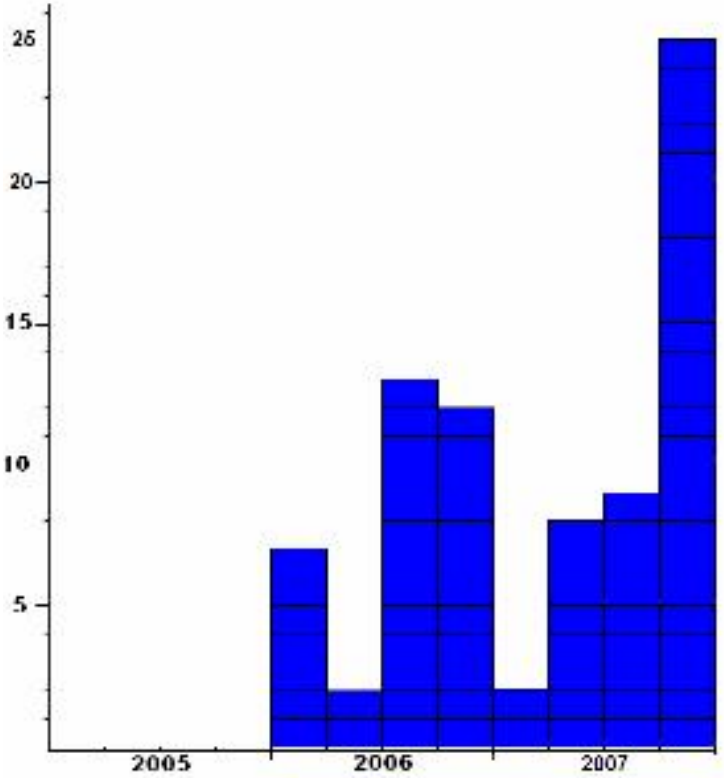


urce Oracle

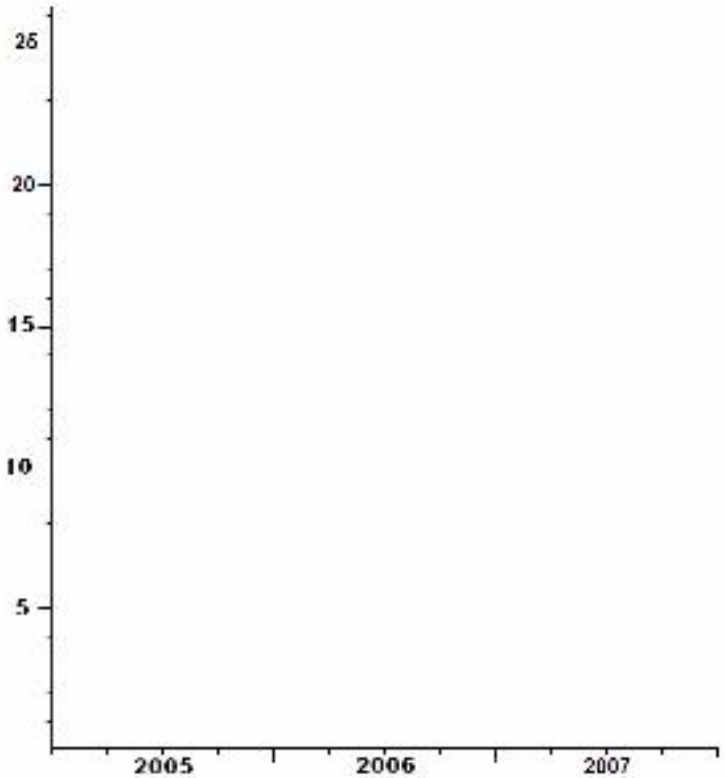
(s Focus)



Microsoft SQL Server 2005 vs Oracle 10g R2



Oracle 10g R2



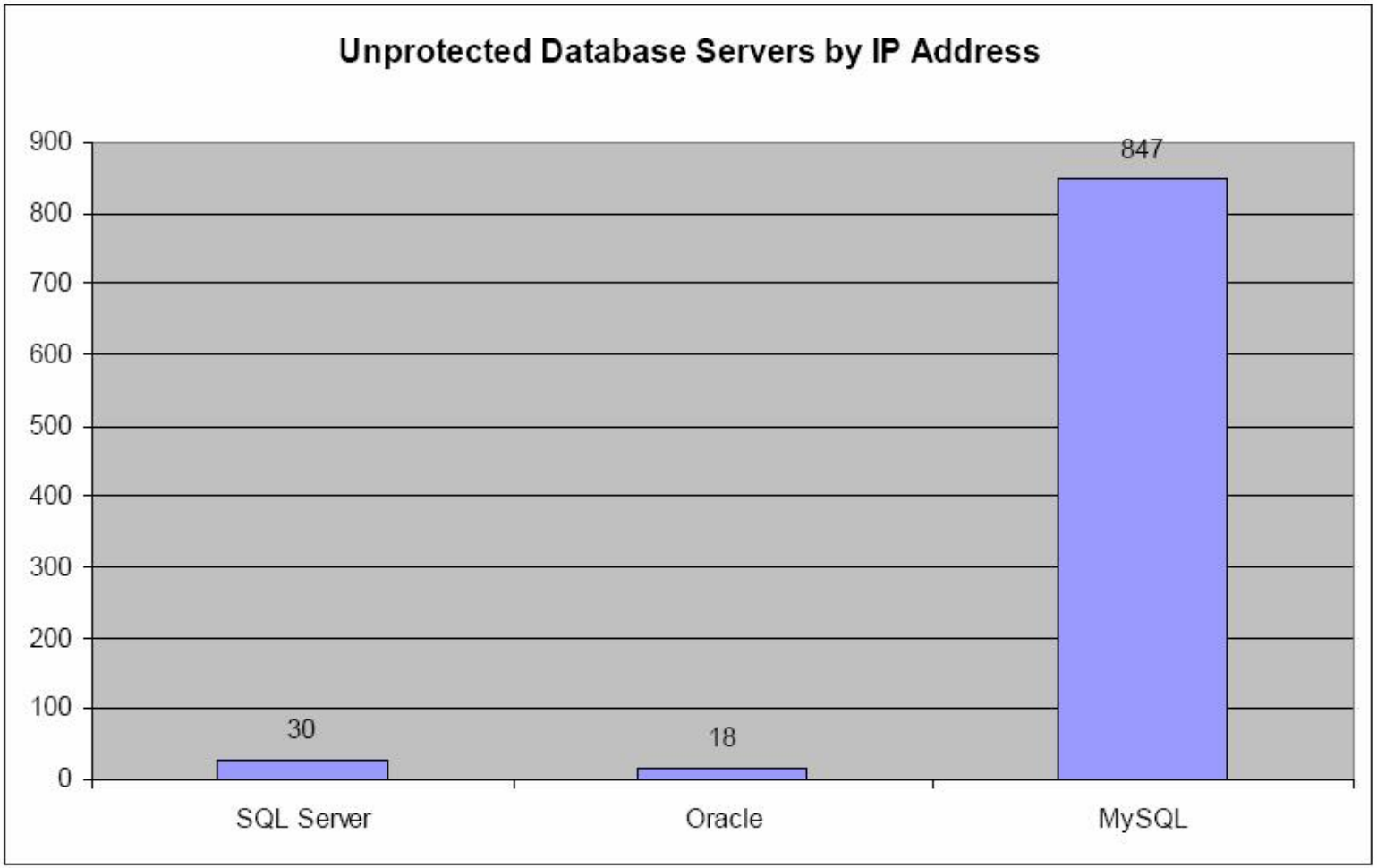
SQL Server 2005

Slammer - timeline

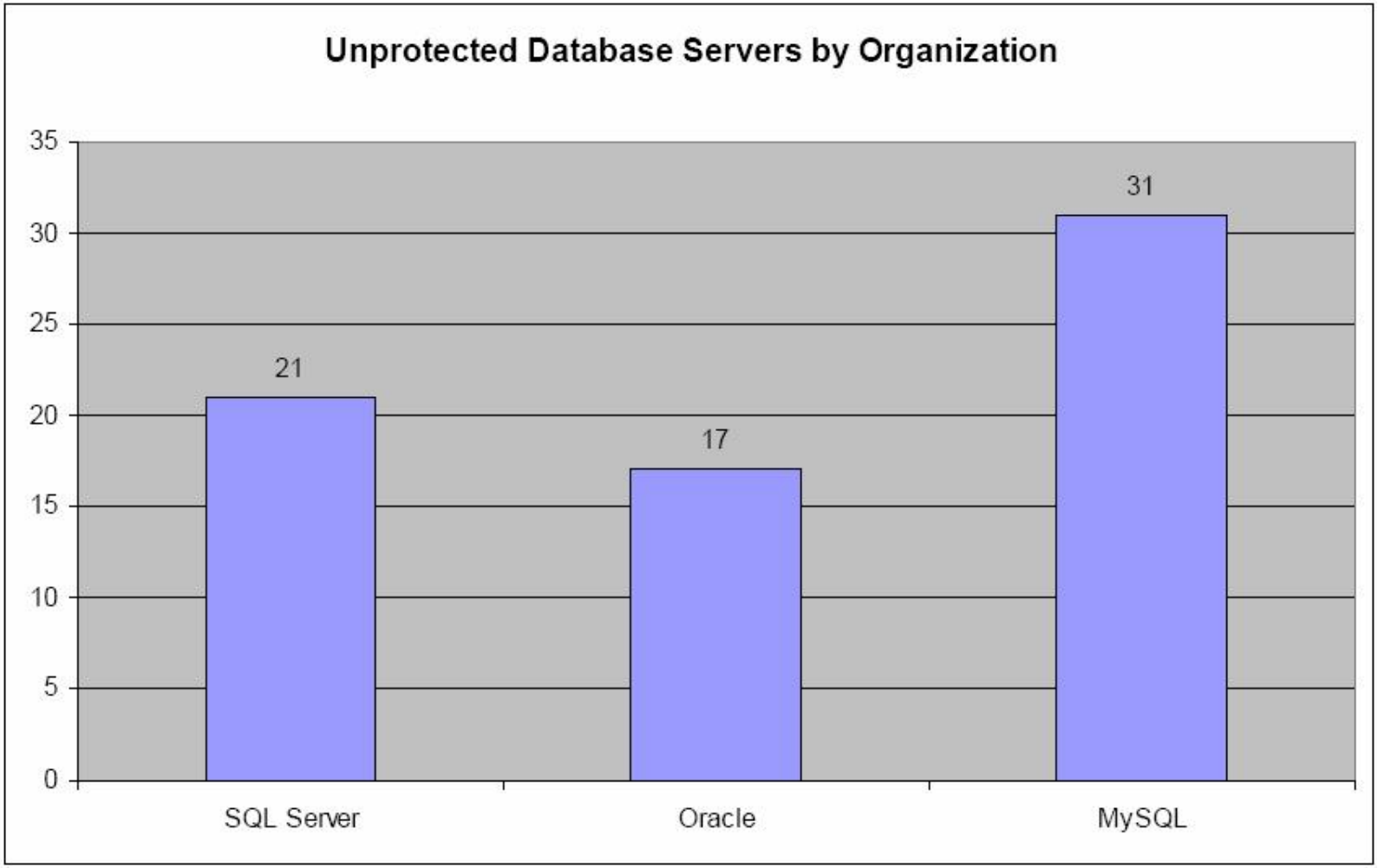
- Flaw found during assessment for bank
- MS02-039 released July 24, 2002
-
- Slammer launched January 25, 2005
- Infection rate doubled every 8.5 seconds
- 10 minutes to reach saturation point

- random
- Total of 480,000 IP addresses checked
- Version check on TCP Ports
  - 1521 – Oracle
  - 1433 – MS SQL Server
  - 3306 – MySQL

Exposed server numbers



Numbers normalized by

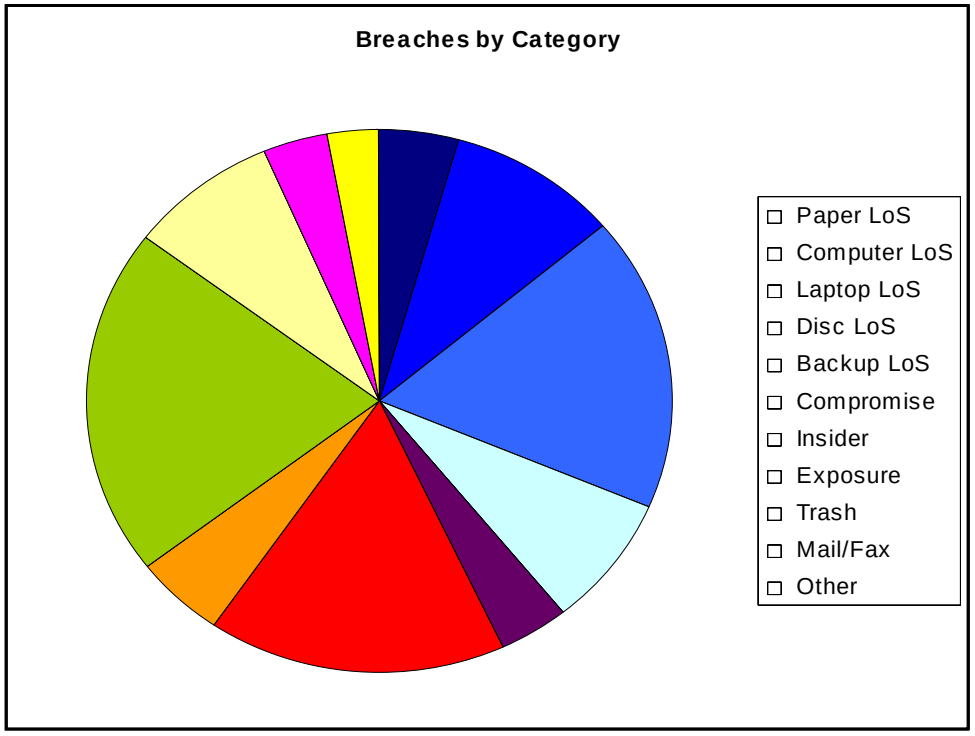


Results

- 140,000 exposed Oracle servers
- 210,000 exposed SQL Server

- http://www.databasesecurity.com/

Breaches



12 Paper
Computer
49 Laptop
21 Disc
11 Backup
45 Compromise
14 Insider
57 Exposure
23 Trash
10 Mail/Fax
8 Other

Guess?, Inc., March 3, 2002

In the February of 2002 a security aware customer, Jeremiah Jacks, whilst using Guess Inc's Web site discovered it was vulnerable to SQL injection [1]. He found that he could trivially gain unauthorized access to 200,000 customers' credit card details. After failing to get Guess to fix the problem Jacks contacted SecurityFocus.com to enlist their help. Within an hour Guess had resolved the problem with company spokeswoman Jennifer Munakash claiming, "It was an easy fix." [1] Indeed, when the Federal Trade Commission filed a complaint on 18th of June, 2003 it stated that "the risk of web-based application attacks is commonly known in the information technology industry, as are simple, publicly available measures to prevent such attacks." [2]. Guess settled the FTC charges on August the 5th, 2003.

[1] http://www.securityfocus.com/news/346
[2] http://www.ftc.gov/os/2003/06/guesscmp.htm

During the November and early December of 2002, in a parameter tampering attack, hackers could gain access to orders purchased on the Tower Records website. The vulnerability (in the orderstatus.asp [1] page of the web application) allowed attackers to cycle through order numbers in their web brower's
the order number was valid, details of the purchaser, such as name, address, phone number, etc were exposed. This vulnerability was actively exploited and details of the flaw appeared in two Internet chat rooms [2]. On the 21st of April, 2004, Tower Records settled Federal Trade Commission charges [3].

[1] http://news.zdnet.co.uk/internet/0,1000000097,2127128,00.htm
[2] http://www.ftc.gov/os/caselist/0323209/040421comp0323209.pdf
[3] http://www.ftc.gov/opa/2004/04/towerrecords.shtm

Petco Animal Supplies, June 30, 2003

Jeremiah Jacks, emboldened by the Guess? hack, struck again, this time at Petco whom he discovered via a Google search of ASP pages [1]. Locating pages with parameters that could be manipulated, Jacks gained access to 500,000 credit card details via a SQL injection flaw that took “less than a minute to find.” He reported the flaws to SecurityFocus.com who then alerted Petco to the issues. Petco moved to close the holes in less than an hour. Not long after this on the 5th of December the Federal Trade Commission started an investigation and issued a “Civil Investigative Demand.” The case was settled

[1] http://www.securityfocus.com/news/6194

[2] http://www.securityfocus.com/news/7581

[3] http://www.ftc.gov/opa/2004/11/petco.shtm

CardSystems

On June 17, 2005, Mastecard alerted some its customers to a breach in the security of CardSystems Solutions, that had taken place between the end of 2004 and the May 2005. At the time, it was the flaw [1] in the company's Web site a hacker gained access to 40 million credit card details, of which they downloaded 264,000. In addition to the fact that CardSystems failed to take simple steps to secure the data, another problem with this breach that made it so egregious was that, in violation of the PCI Data Security Standards, data from each cards' magnetic strip was saved for research purposes. Although CardSystems were PCI certified by Cable and Wireless in June 2004 it seems that this practice was overlooked and not reported to the auditors. Due to this violation, on July 18, VISA said it would drop CardSystems [2] and Mastecard soon ocessor had been dropped. This effectively spelt the end of CardSystems Solutions. In October 2005 the assets of CardSystems were acquired by "Pay by Touch" [3] and on February 23, 2006 they settled Federal Trade Commission charges [4].

Solutions...

This case is interesting for the class-action suit brought on June 27th by Ira Rothken on behalf of California credit card holders and merchants [5]. It sought to discover who, under California civil code section 1798.82, the data breach notification law, had the responsibility to notify the CardSystems, or Visa and Mastercard or Merrick, the issuing bank? Or all of them? The judge, Richard Kramer, ruled that neither Visa nor Mastercard were required to alert individual customers [6].

[1] http://www.ftc.gov/os/caselist/0523148/0523148complaint.pdf
[2] http://www.nytimes.com/2005/07/19/business/19visa.html
[3] http://www.finextra.com/fullstory.asp?id=14395
[4] http://www.ftc.gov/opa/2006/02/cardsystems_r.shtm
[5] http://www.techfirm.com/cardsystems.pdf
[6] http://www.emergentchaos.com/archives/2005/09/cardsystems_bre.html

Guidance Software, Inc., December 20, 2005

It is perhaps with some irony that Guidance Software found itself requiring the use of their own computer forensics software products in the early days of December 2005. Guidance, the developers of EnCase, discovered December 7 that a hacker had

exposing the financial records of 3,800 customers. It is known that some of these records were abused. For example, one customer received a bill from Google for $20,000 worth of pay-per-click advertising [2]. As well as having an insecure Web application, Guidance had failed to encrypt their customers records in the database and had also stored each credit card's CVV number, both

Commission investigation into the compromise was conlcuded on the 17th of November 2006 when Guidance settled the FTC charges [3].

[1] http://www.ftc.gov/os/caselist/0623057/0623057complaint.pdf

[2] http://www.washingtonpost.com/wp-dyn/content/article/2005/12/19/AR2005121900928.html

[3] http://www.ftc.gov/opa/2006/11/guidance.shtm

Ohio State University, April 17, 2007

Ohio State University has the largest enrolment of students in the United States; it also seems to be vying to get the largest number of entries, so far

database [1]. One of the more recent attacks that took place March 31, 2007 involved an SQL injection attack originating from China against a server in the Office of Research [2]. The hacker

former staff members [3].

[1] http://www.privacyrights.org/ar/ChronDataBreaches.htm

[2] http://209.85.129.104/search?q=cache:bKgj9Tx-CSAJ:www.infosec.ohio-en&ct=clnk&cd=3&gl=uk

[3] http://www.osu.edu/news/newsitem1673

In a classic case of an insider job, Certegy, a subsidiary of Fidelity National Information Services, became the victim of data theft by one of its senior database administrators [1]. Named in a suit brought by Certegy, William Sullivan [2], allegedly stole 8.5 million consumer records [3] and sold them to various marketing companies. The investigation was started after one of Certegy's customers linked unsolicited telephone calls and mails to cheque transactions. After finding no evidence of an external compromise

marketers in order to discover the source. The trail led back to a company called S&S Computer Services owned and operated by Sullivan. By all accounts the data was exfiltrated by physical means. On one hand this could have been physical backup tapes or on the other hidden in an iPod.

[1] http://www.fidelityinfoservices.com/FNFIS/NewsRoom/20070703.htm

[2] _CASE=07006271CI&CS__RESULTS__KNT=10

[3] http://www.sec.gov/Archives/edgar/data/1136893/000089256907000950/a32114e8vk.htm

TD Ameritrade, September 14, 2007

TD Ameritrade, a Nebraska-based online trading company, announced on September 14, 2007 that one of its database servers had been compromised by a hacker exposing 6.3 million customer records. The breach came to light when a large number of TD Ameritrade's customers started complaining about receiving investment based spam ("pump and dump"
investigation [1]. The investigation revealed that a hacker gained access to customer information such as their names, email addresses, snail mail addresses and phone numbers. The investigation concluded that no social security numbers, account numbers or dates of birth were taken despited the fact that such details were stored and available in the same database server. This case is interesting as it clearly shows a targetted attack with a specific agenda. The hacker didn't go after SSNs, etc (which would enable them to commit ID theft); they didn't go after the clients' assets (which could enable them to commit financial theft); they harvested email addresses of people known to engage in buying and selling stocks to target them with their spam stock scam program.

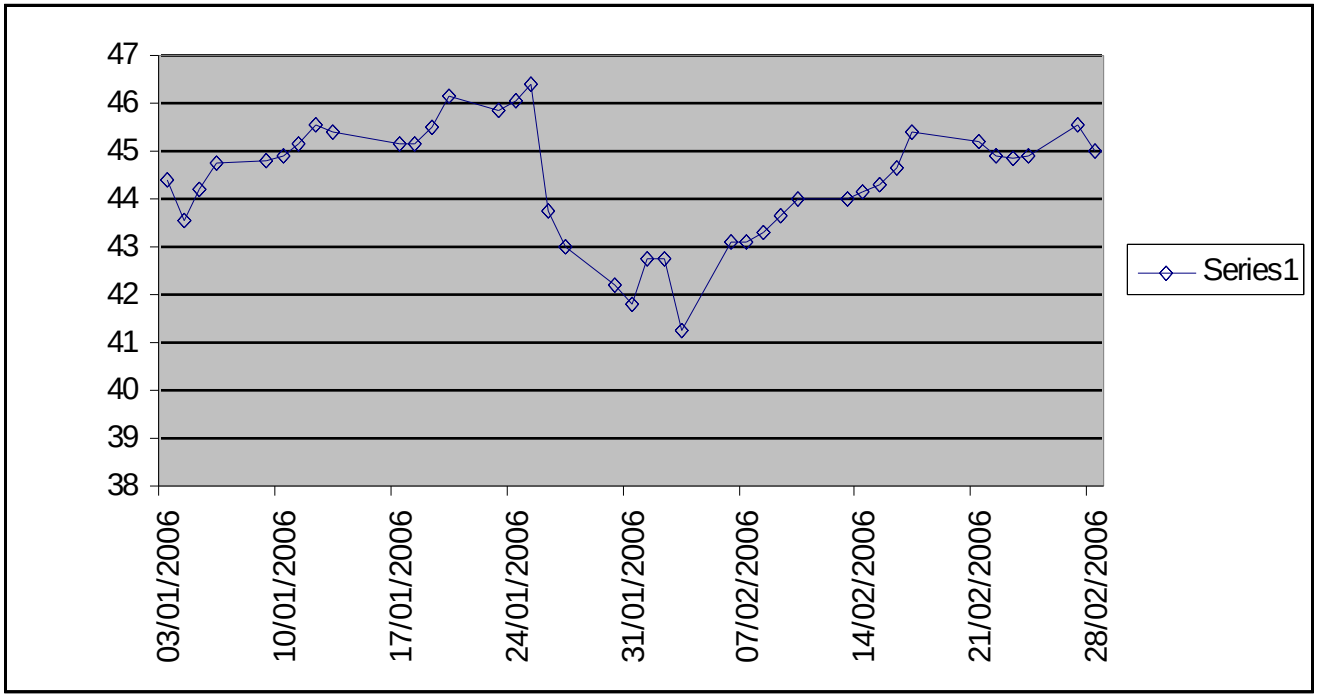
[1] http://www.amtd.com/newsroom/releasedetail.cfm?ReleaseID=264044

Legislation and Contractual

- PCI Data Security Standard
-
  - Section 5(a)
- SOX, HIPAA, GLBA
-
  - California Senate Bill 1386
  - 34 more States since

- Looking after customers' and company's interests should be the motivator
- Doesn't always work like that, though
- Penalties should be much more severe
  - DSW, Choicepoint aside (where financial penalty was imposed) , an FTC slap on the wrist not good enough
  - Perform a security audit biannually. What???
- No one likes the idea of having to punish but examples must be made ~ fear of the punishment must be greater than the fear of the "crime".
- Might be impractical – no-one left???

– FTC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Series1

CardSystems Solutions, Inc – VISA and Mastercard

- Dropped by VISA and Mastercard for PCI DSS violations
-
- Jobs were lost – too harsh?
- Getting the balance right can be difficult!

’t become an FTC case!

- Care about it all!
- Ask, if you were your own customer what would you want?
- Comply with standards, or go beyond, not because you have to but because it’s right to do so.
- Acquire better business ethics

- Ensure your databases are protected by a

- Deploy IDS/IPS
- Change default user IDs and passwords
- Encrypt customer data
- Audit database accesses
- Keep on top of patches
- Perform regular vulnerability assessments
  - Pay close attention to SQL injection in web apps!

Thank You