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# Using Google to Find Vulnerabilities In Your IT Environment

Attackers are increasingly using a simple method for finding flaws in websites and applications: they Google them. Using Google code search, hackers can identify crucial vulnerabilities in application code strings, providing the entry point they need to break through application security. Sound scary? It is, but there is good news: You can use these same methods to find flaws before the bad guys do. In this special report, we outline methods for using search engines such as Google and Bing to identify vulnerabilities in your applications, systems and services—and to fix them before they can be exploited.

**By Francis Brown**

Presented in conjunction with

SECURITY dark READING
Protect The Business Enable Access

Report ID: S4440312

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**Francis Brown**
*Stach & Liu*

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# EXECUTIVE SUMMARY

**Google, Bing and other major search engines,** have made it easy to find all manner of information—including everything from exposed password files to SQL injection points. This led to the emergence of Google hacking, a technique used to identify and then exploit system and data vulnerabilities. Google hacking's popularity waned in the last few years, due in large part to Google shutting down the Google SOAP API. However, with aggressive R&D efforts fueled by innovative thinking, as well as significantly more data available on the Web and stored in the cloud, Google hacking is on the rise again. While this gives IT security professionals yet another battle to fight, the good news is that they can leverage the very tools and techniques hackers use to identify and fix any vulnerabilities their companies may have. In other words, they can Google themselves to find security problems before the bad guys do. In this report we will examine a slew of new tools and techniques that will allow security professionals to leverage Google, Bing, Baidu and other open search interfaces to proactively track down and eliminate sensitive information disclosures and vulnerabilities in public systems and also take a look at defensive tools designed to pull thousands of real-time RSS updates from search engines to provide users with alerts—a sort of intrusion detection system (IDS) for Google hacking. Malicious hackers have already embraced search engine hacking as an effective way to target and exploit vulnerabilities on a massive scale. It is imperative that security professionals learn to take equal advantage of these techniques to help safeguard their organizations.

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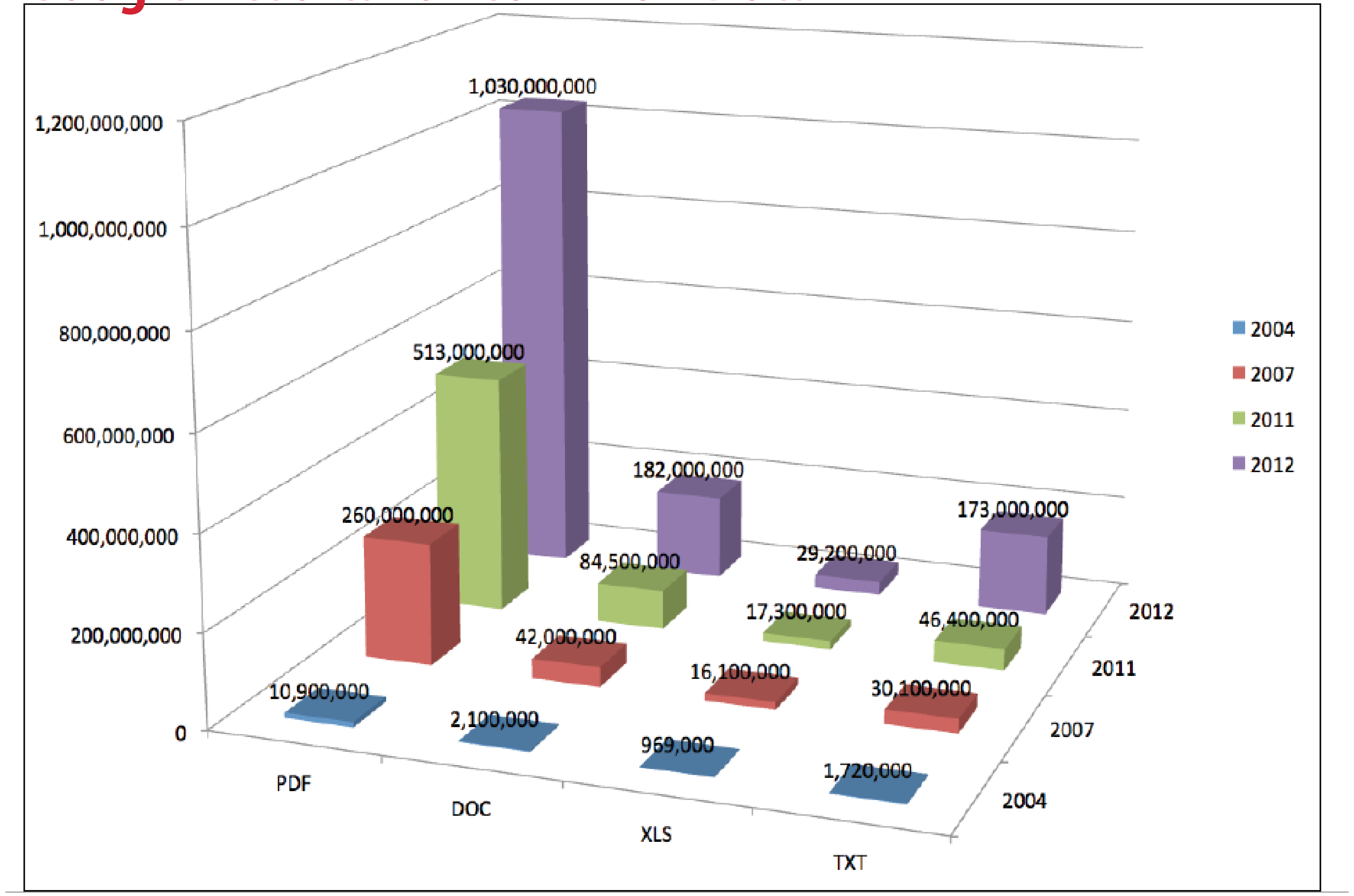
## The Search is on for Vulnerabilities

The vast volumes of information available on the Internet are of great value to businesses—and to hackers. For years, hackers have been using Google and other search engines to identify vulnerable systems and sensitive data on publicly exposed networks. The practice, known as Google hacking, has seen a resurgence of late, providing new challenges for IT professionals striving to protect their companies from threats growing in number and sophistication.

Google hacking—a term used for penetration testing using any search engine—surged in popularity around 2004, when computer security expert Johnny Long first released his book *Google Hacking for Penetration Testers* and the Google Hacking Database (GHDB). The database was designed to serve as a repository for search terms, called Google-Dorks, that exposed sensitive information, vulnerabilities, passwords and much more. The beginning of the end for the Google hacking tools available at the time came when Google stopped issuing new Google Simple Object Access Protocol

Figure 1

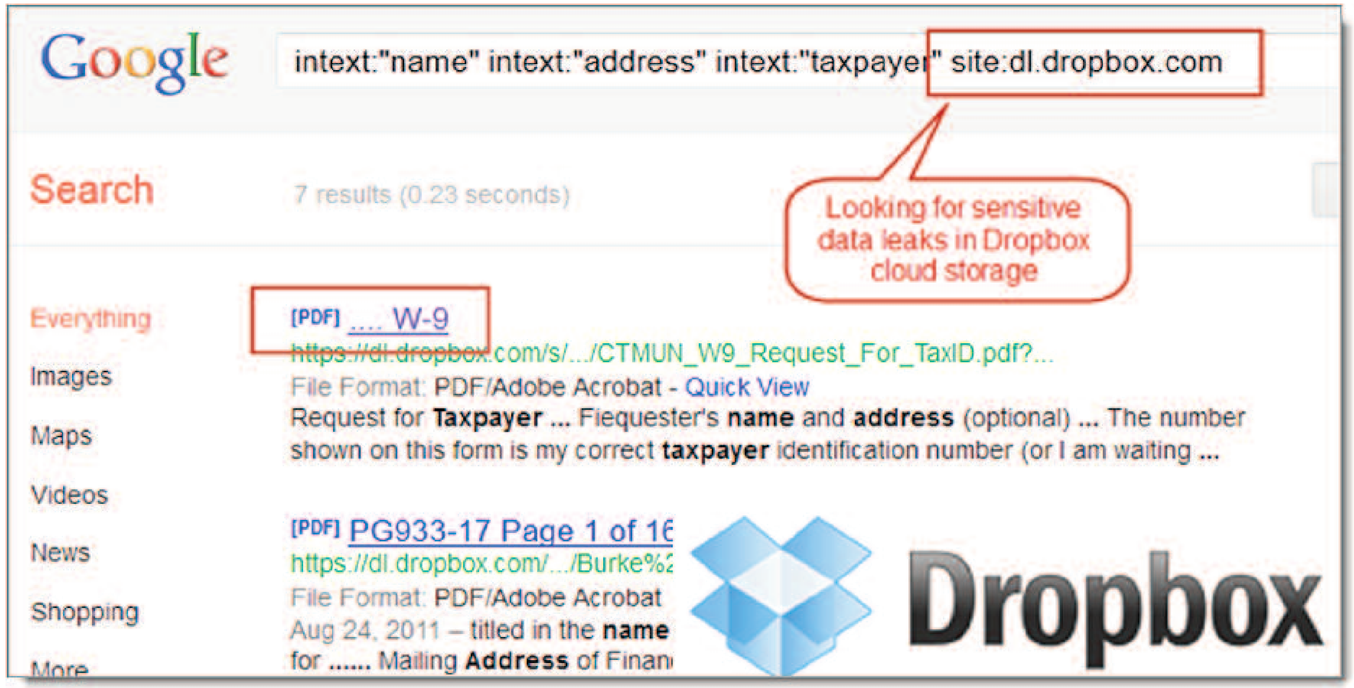
### Google Results for Common Docs



The rate of growth of the documents available for data mining via Google has risen exponentially in the last few years. Source: Stach & Liu

(SOAP) API keys in. The Google SOAP API was the interface that hacking tools used to make Google queries. Google retired the SOAP API to make room for its Google Asynchronous JavaScript and XML (AJAX) API. Google hacking tools hobbled along until September 2009, when Google closed down the Google SOAP API entirely.

There recently has been an upswing in Google hacking, with a few factors playing a role in the practice's growth. For one thing, the amount of data indexed and searchable by Google and other search engines has skyrocketed in the last few years. Simply put, this has given hackers much more to work with. The rate of growth of the documents available for data mining via Google is illustrated in Figure 1, page 5. There has also been a significant increase in new search engine interfaces to various types of data. Examples include Google Health and Google Code Search (recently shut down), which have allowed users to search through patient health records and open source code projects, respectively. We've also seen the emergence of security-specific search engines such as Shodan come into play. These search engines were created specifically for use by penetration testers to identify vulnerable Web applications on the Internet.



intext:"name" intext:"address" intext:"taxpayer" site:dl.dropbox.com

7 results (0.23 seconds)

Looking for sensitive data leaks in Dropbox cloud storage

[PDF] .... W-9
https://dl.dropbox.com/s/.../CTMUN_W9_Request_For_TaxID.pdf?...
File Format: PDF/Adobe Acrobat - Quick View
Request for **Taxpayer** ... Fiequester's **name** and **address** (optional) ... The number shown on this form is my correct **taxpayer** identification number (or I am waiting ...

[PDF] PG933-17 Page 1 of 16
https://dl.dropbox.com/.../Burke%2
File Format: PDF/Adobe Acrobat
Aug 24, 2011 – titled in the **name**
for ...... Mailing **Address** of Finan

As the trend of moving data storage to the cloud continues, so does the risk of data loss. Most cloud-based storage offerings are not immune to Google hacking. As shown in the screen, Google can be used to find documents stored in major cloud providers such as Dropbox.

We saw a frightening example last year of just how effective Google hacking can be when the group LulzSec used Google hacking techniques to go on an epic spree that left in its wake a number of victims, including Sony, PBS, Arizona's Department of Public Safety, FBI affiliate InfraGard and the CIA. In other news, the recent LizaMoon mass SQL injection attack was reported to have affected as many as 4 million websites, a large step up in scale from the few hundred thousand sites affected by the mass SQL injection attack from the previous June that most notably compromised *The Wall Street Journal* and *The Jerusalem Post* websites.

**New Weapons of Choice**

With the retirement of Google's SOAP API in 2009, most of the security utilities available for Google hacking ceased to function, leaving the security industry with a need for new and innovative tools. It did not take long for the vacuum to be filled. For example, in November 2010, the Exploit Database (exploit-db.com) took over maintenance of the Google Hacking Database and began adding new Google Dorks, the search terms that reveal vulnerabilities and sensitive information disclosures.

**Security professionals can expect to see a continued increase in development of new tools being released that tap into data indexed by search engines such as Google and Bing.**

However, what's good for hackers is also good for corporate security professionals, who can make use of Google hacking tools and other resources to identify—and then eliminate—vulnerabilities in their data systems. The majority of these tools are free and easy to use, although experience and skills associated with Web application security are helpful in validating scan results and identifying which results are real security issues and which are not.

There is no one tool that will serve as a silver bullet in eliminating search engine exposures. We encourage security professionals to try out and regularly use as many as possible to gain as much security coverage as possible over their network perimeter.

Here is an overview of some of the tools currently available.

**>> GoogleDiggity**

GoogleDiggity is a utility from Stach & Liu's Google Hacking Diggity Project that leverages the Google JSON/ATOM Custom Search API, which means users will not be blocked by Google bot detection while scanning. Also, unlike other Google hacking tools available, GoogleDiggity allows users to specify a Google Custom Search Engine (CSE) ID. This allows Google hacking vulnerability checks to be run against a customized version of Google that will return results tailored to specific organizations.

**>> BingDiggity**

Also from the Google Hacking Diggity Project, BingDiggity uses the Bing 2.0 API and Stach & Liu's newly developed Bing Hacking Database (BHDB) to find vulnerabilities and sensitive information disclosures that are exposed via Microsoft's Bing search engine. This utility also provides footprinting capabilities that allow users to enumerate URLs, hosts, domains and IP-to-virtual host mappings for target companies. In the past, MSN/Bing hacking utilities were limited to footprinting techniques because Microsoft took steps to prevent traditional hacking techniques via Bing back in 2007. The BHDB

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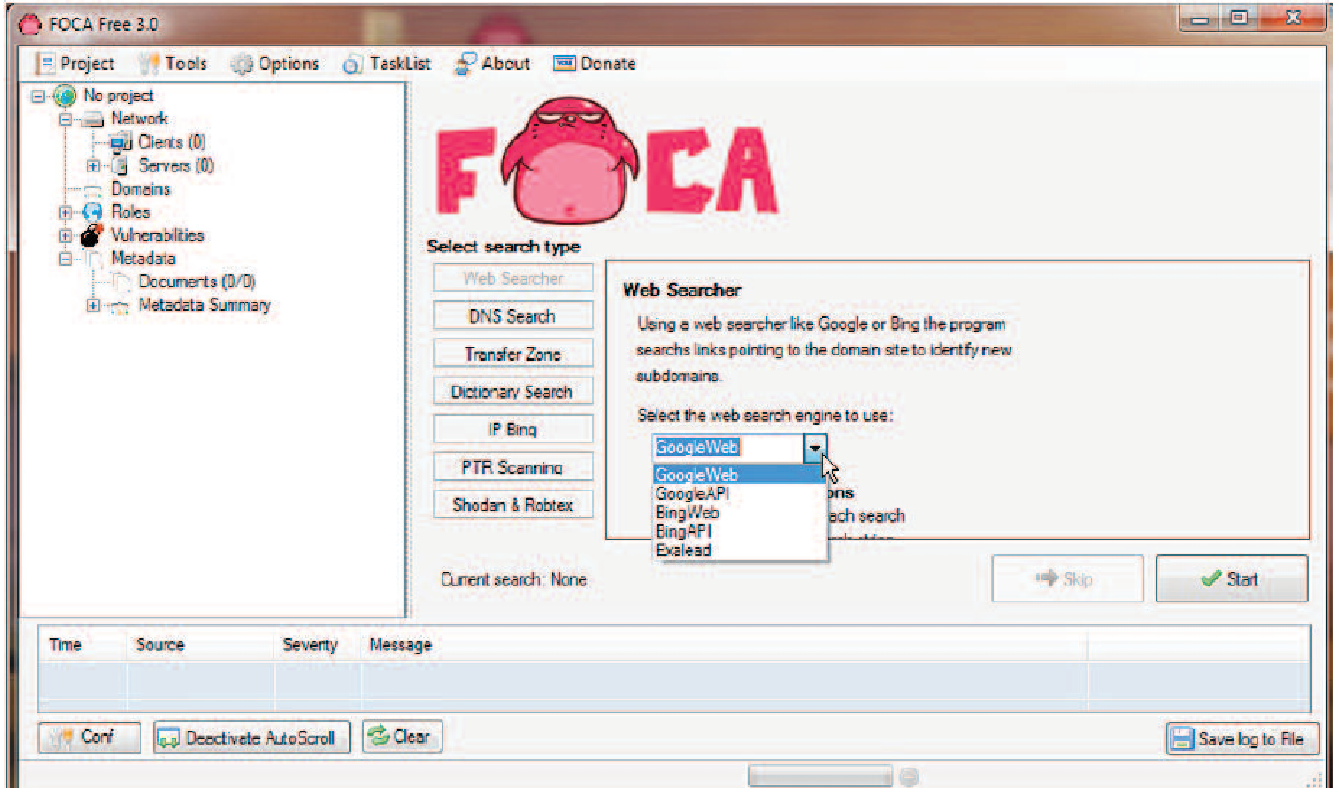
was created so that the Bing search engine could be used to discover vulnerabilities within target applications and infrastructure. It provides more than 1,300 Bing searches that return vulnerability data.

### >> DLPDiggity

DLPDiggity is a data loss prevention (DLP)tool that leverages Google/Bing to identify exposures of sensitive information, such as Social Security and credit card numbers, via common document formats including.doc, .xls and .pdf. GoogleDiggity or BingDiggity are first used to locate and download files belonging to target domains/sites on the Internet, then DLPDiggity is used to analyze those downloaded files for sensitive information disclosures. DLPDiggity uses iFilters to search through the actual contents of files, as opposed to just the metadata. Using .NET regular expressions, DLPDiggity can find almost any type of sensitive data within common document file formats.



Web Searcher

Using a web searcher like Google or Bing the program searchs links pointing to the domain site to identify new subdomains.

Select the web search engine to use: GoogleWeb

Current search: None

FOCA is a free fingerprinting tool that can be used for information gathering on the Web.

### >> FOCA

FOCA FREE 3.0.2 is a tool used to carry out information gathering fingerprinting in Web audit work. The free version of the tool enables users to find servers, domains, URLs and documents published, as well as versions of software on servers and clients. FOCA became famous for extracting meta-

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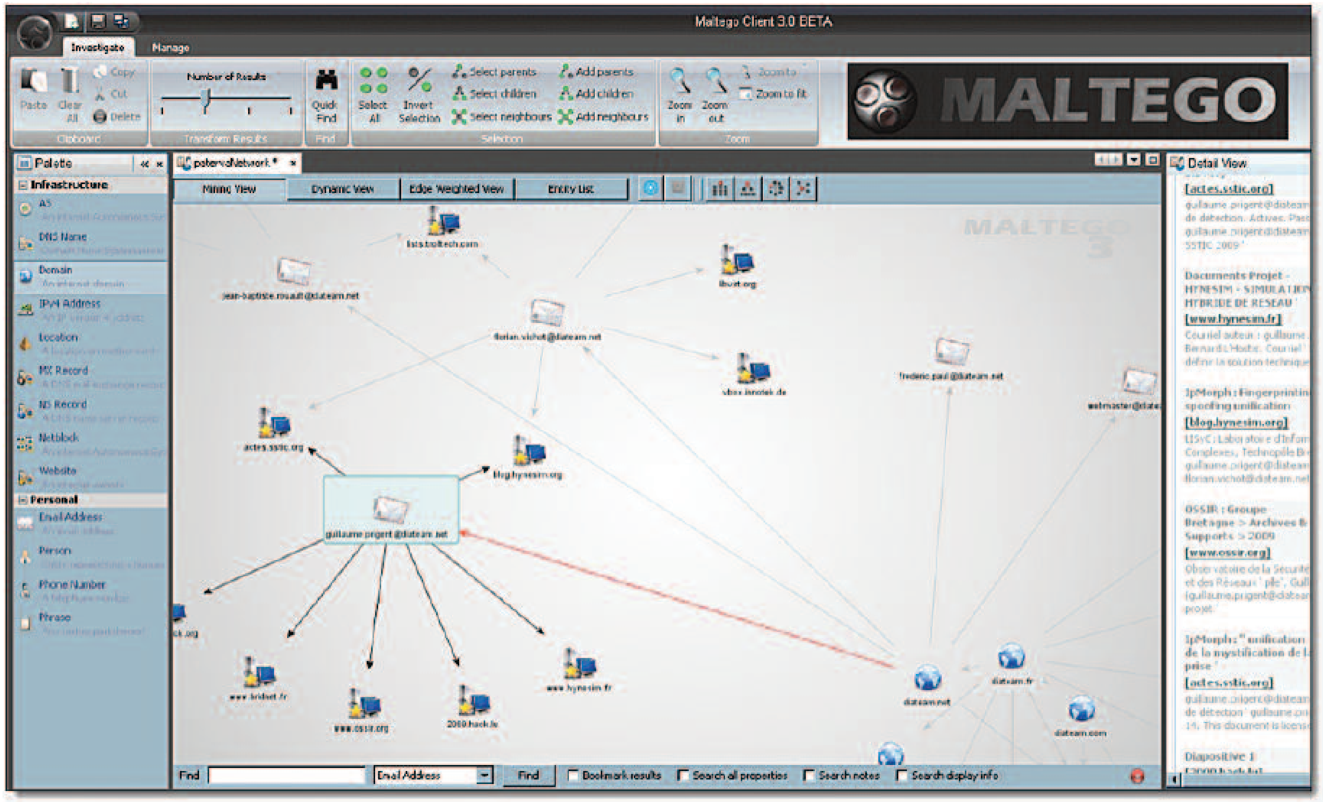
data of public documents, but today the tool is capable of much more than that.

### >> TheHarvester

Users have always been, and will always be, the weakest link in the security chain. In the past few years, there has been an explosion of personal information made readily available on the Web. That information is easily searchable on sites such as LinkedIn and Facebook. Getting a list of executives, network administrators, developers or even IT security staff associated with a target company is now a pretty trivial thing to do. TheHarvester gathers emails, subdomains, hosts, employee names, open ports and banners from different public sources, including search engines, PGP key servers and the SHODAN computer database.



Tools like Maltego reduce the complexities involved with phishing and social engineering attacks.

### >> Maltego

We've seen the emergence of several new toolkits, such as the Social Engineering Toolkit (SET), that have helped automate (and dumb down) the process of mounting what were once highly sophisticated phishing and social engineering attacks. Maltego is an open source intelligence and forensics application that enables the mining and gathering of information, as well as the representation of this information in a meaningful way. The unique perspective that Maltego offers to both network- and resource-based entities is the aggregation of information posted all over the Internet. Whether it's the current configuration of a router poised on the edge of your network or the current whereabouts of a company vice president on an international visit, Maltego can locate, aggregate and visualize this information.

## >> DeepMagic

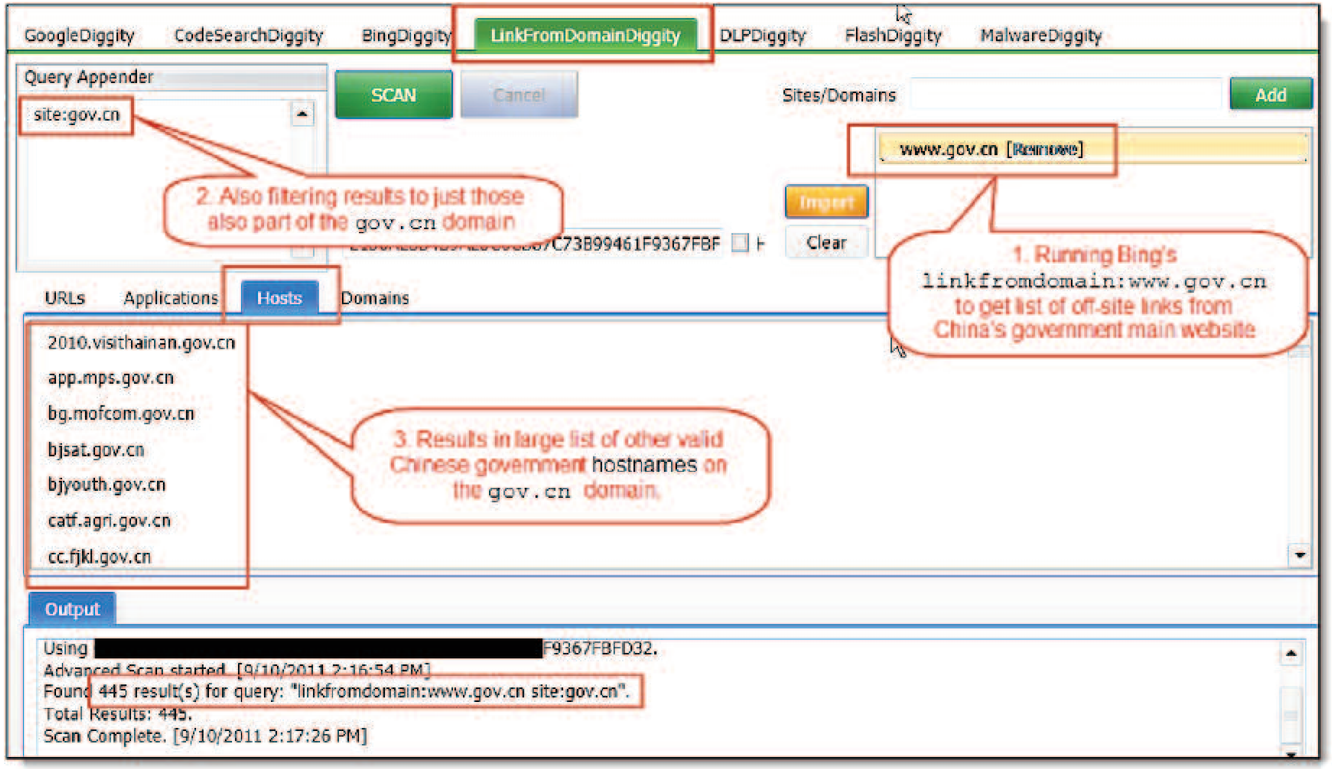
DeepMagic DNS is a security-specific search engine that allows attackers to quickly build a footprint of a target organization by allowing them to easily develop a list of odds names and live hosts.

## >> Bing LinkFromDomainDiggity—Footprinting Tool

Bing LinkFromDomainDiggity is an attack footprinting tool that leverages Bing's linkfromdomain: directive to find off-site links. From those results, the tool then enumerates lists of applications, host names, domains and subdomains related to an attack target. We used Bing LinkFromDomainDiggity to build out a list of targets on the Chinese government's domains by analyzing the offsite links of the Chinese government's main website. (see screenshot at right)

## >> Shodan

Shodan is a search engine that lets users find specific computers (such as routers or servers) using a variety of filters. Some have also described Shodan as a public port scan directory or a search engine of banners. Shodan can be used, for example to target supervisory control and data acquisition (SCADA) systems that control the critical infrastructure of a country.



Query Appender: site:gov.cn

Sites/Domains: www.gov.cn [Remove]

1. Running Bing's linkfromdomain:www.gov.cn to get list of off-site links from China's government main website

2. Also filtering results to just those also part of the gov.cn domain

3. Results in large list of other valid Chinese government hostnames on the gov.cn domain.

Hosts:

- 2010.visithainan.gov.cn
- app.mps.gov.cn
- bg.mofcom.gov.cn
- bjsat.gov.cn
- bjyouth.gov.cn
- catf.agri.gov.cn
- cc.fjkl.gov.cn

```
Using [redacted]F9367FBFD32.
Advanced Scan started. [9/10/2011 2:16:54 PM]
Found 445 result(s) for query: "linkfromdomain:www.gov.cn site:gov.cn".
Total Results: 445.
Scan Complete. [9/10/2011 2:17:26 PM]
```

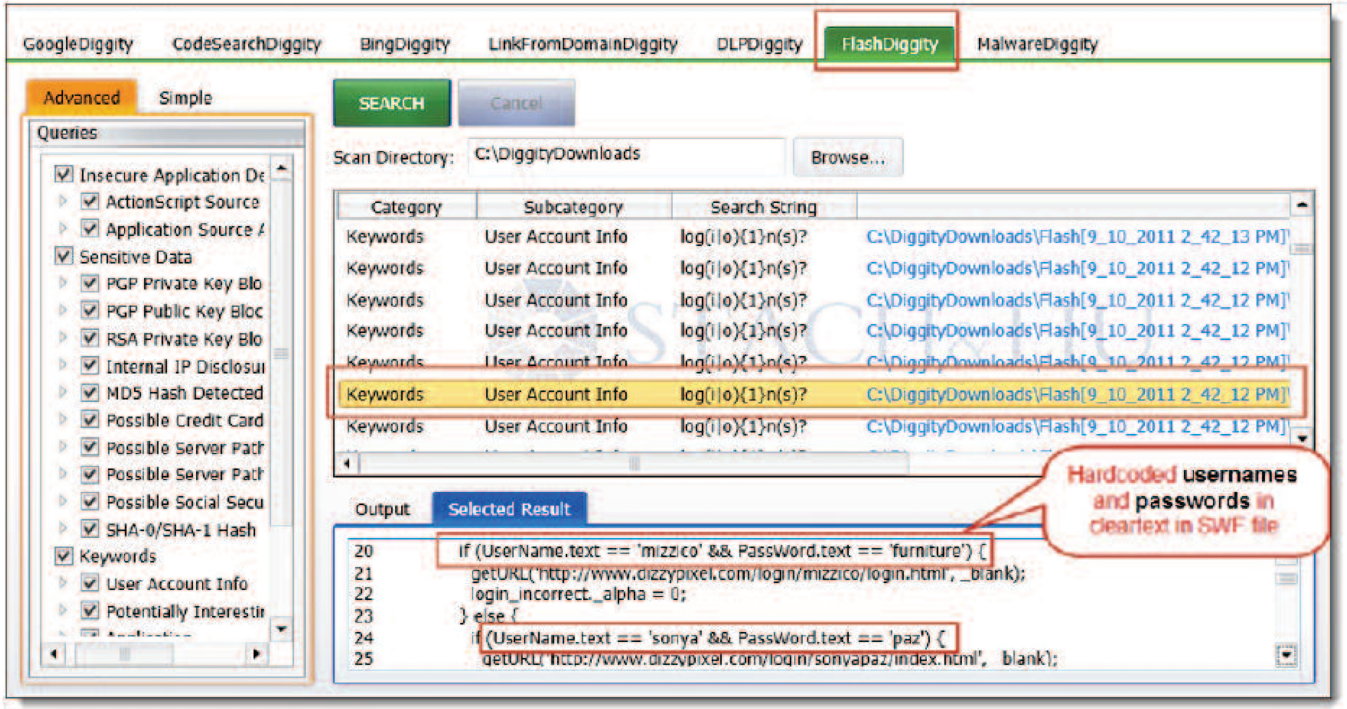
We used Bing LinkFromDomainDiggity to build out a list of targets on the Chinese government's domains.

### >> FlashDiggity

FlashDiggity automates Google searching/downloading/decompiling/analysis of SWF files to identify Flash vulnerabilities and information disclosures. FlashDiggity first leverages the GoogleDiggity tool to identify Adobe Flash SWF applications for target domains via Google searches, such as ext:swf. Next, the tool is used to download all of the SWF files in bulk for analysis. The SWF files are disassembled back to their original ActionScript source code, and then analyzed for code-based vulnerabilities.

### >> PasteBin Leaks

Information disclosures for your organization may occur on sites unrelated to your organization. For example, PasteBin leaks is a Twitter feed that tracks the disclosure of sensitive information via the Pastebin.com website.



Queries

- ☑ Insecure Application De
  - ☑ ActionScript Source
  - ☑ Application Source A
- ☑ Sensitive Data
  - ☑ PGP Private Key Blo
  - ☑ PGP Public Key Bloc
  - ☑ RSA Private Key Blo
  - ☑ Internal IP Disclosu
  - ☑ MD5 Hash Detected
  - ☑ Possible Credit Card
  - ☑ Possible Server Path
  - ☑ Possible Server Path
  - ☑ Possible Social Secu
  - ☑ SHA-0/SHA-1 Hash
- ☑ Keywords
  - ☑ User Account Info
  - ☑ Potentially Interestir

Scan Directory: C:\DiggityDownloads

| Category | Subcategory | Search String | |
|---|---|---|---|
| Keywords | User Account Info | log(i\|o){1}n(s)? | C:\DiggityDownloads\Flash[9_10_2011 2_42_13 PM]\ |
| Keywords | User Account Info | log(i\|o){1}n(s)? | C:\DiggityDownloads\Flash[9_10_2011 2_42_12 PM]\ |
| Keywords | User Account Info | log(i\|o){1}n(s)? | C:\DiggityDownloads\Flash[9_10_2011 2_42_12 PM]\ |
| Keywords | User Account Info | log(i\|o){1}n(s)? | C:\DiggityDownloads\Flash[9_10_2011 2_42_12 PM]\ |
| Keywords | User Account Info | log(i\|o){1}n(s)? | C:\DiggityDownloads\Flash[9_10_2011 2_42_12 PM]\ |
| Keywords | User Account Info | log(i\|o){1}n(s)? | C:\DiggityDownloads\Flash[9_10_2011 2_42_12 PM]\ |
| Keywords | User Account Info | log(i\|o){1}n(s)? | C:\DiggityDownloads\Flash[9_10_2011 2_42_12 PM]\ |

```
    if (UserName.text == 'mizzico' && PassWord.text == 'furniture') {
      getURL('http://www.dizzypixel.com/login/mizzico/login.html', _blank);
      login_incorrect._alpha = 0;
    } else {
      if (UserName.text == 'sonya' && PassWord.text == 'paz') {
        getURL('http://www.dizzypixel.com/login/sonyapaz/index.html', _blank);
```

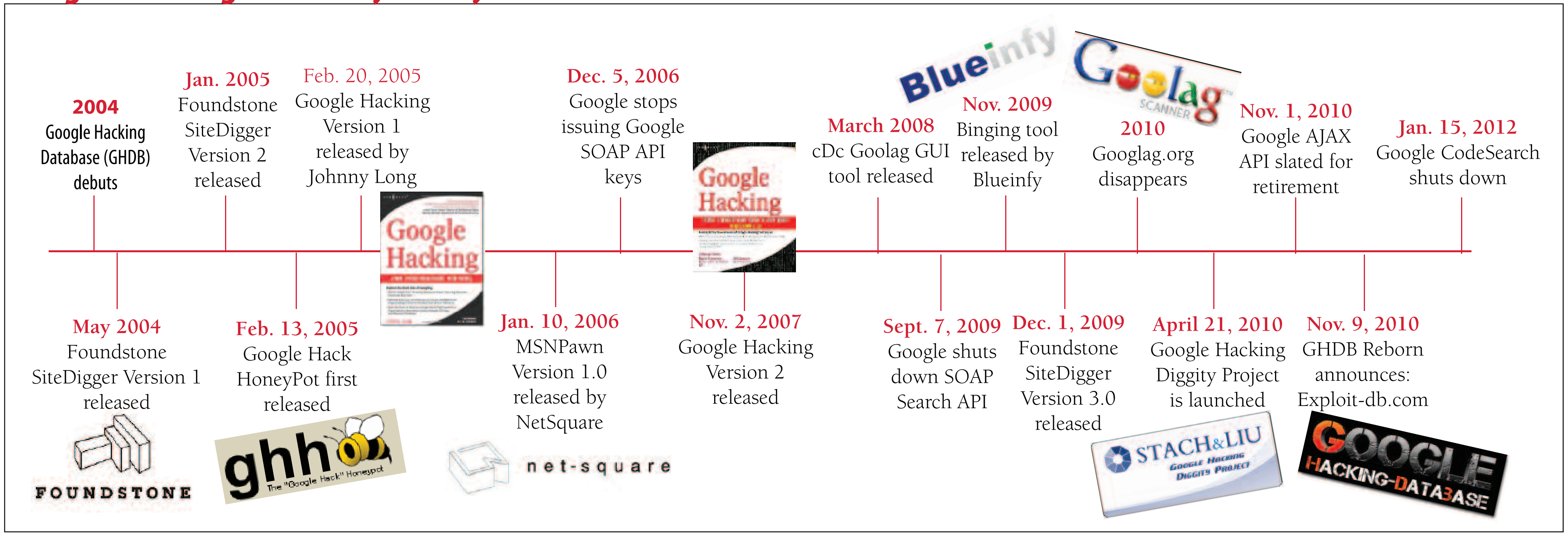
FlashDiggity can be used to identify vulnerabilities in Flash applications.

### Conclusion

Security professionals can expect to see a continued increase in development of both innovative methods and new tools being publically released that tap into the vast amounts of data indexed by search engines such as Google and Bing. Opportunistic hackers will undoubtedly be employing these new tools to target the low-hanging (and not-so-low-hanging) fruit of vulnerabilities exposed on the Web. It is therefore imperative that security professionals learn to take equal advantage of these techniques to help safeguard their organizations.

Figure 2

## Google Hacking: A History of Key Events



**2004** Google Hacking Database (GHDB) debuts

**May 2004** Foundstone SiteDigger Version 1 released

**Jan. 2005** Foundstone SiteDigger Version 2 released

**Feb. 13, 2005** Google Hack HoneyPot first released

**Feb. 20, 2005** Google Hacking Version 1 released by Johnny Long

**Jan. 10, 2006** MSNPawn Version 1.0 released by NetSquare

**Dec. 5, 2006** Google stops issuing Google SOAP API keys

**Nov. 2, 2007** Google Hacking Version 2 released

**March 2008** cDc Goolag GUI tool released

**Sept. 7, 2009** Google shuts down SOAP Search API

**Nov. 2009** Binging tool released by Blueinfy

**Dec. 1, 2009** Foundstone SiteDigger Version 3.0 released

**2010** Googlag.org disappears

**April 21, 2010** Google Hacking Diggity Project is launched

**Nov. 1, 2010** Google AJAX API slated for retirement

**Nov. 9, 2010** GHDB Reborn announces: Exploit-db.com

**Jan. 15, 2012** Google CodeSearch shuts down

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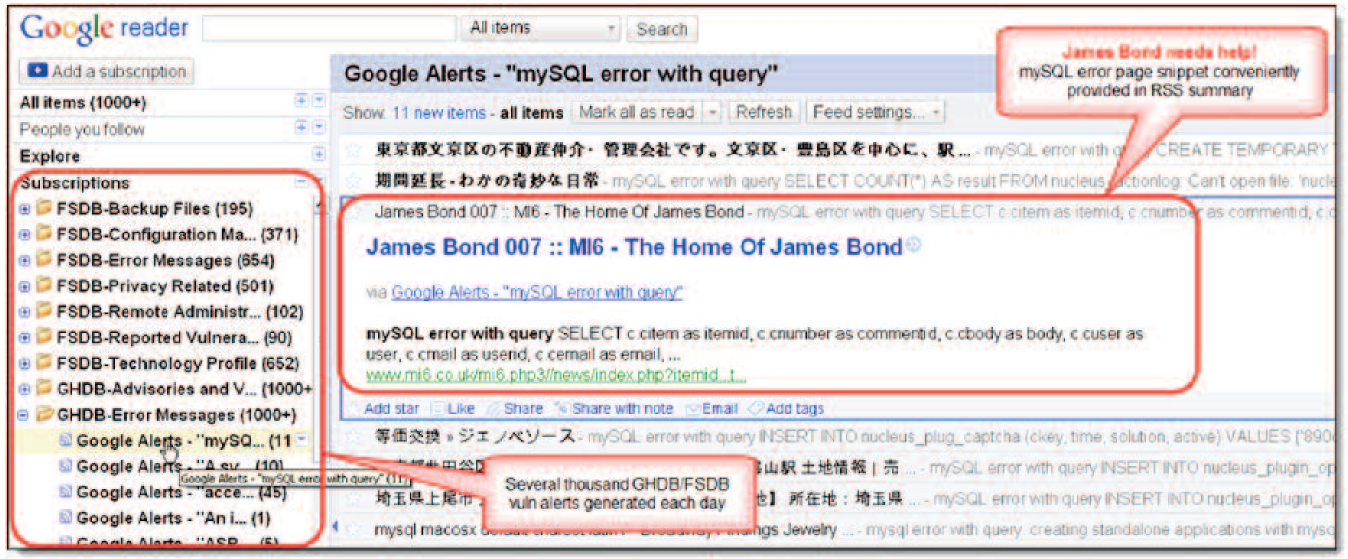
## Defensive Alerts Provide New Protections

Defensive strategies for protecting your organization from Google hacking attacks traditionally have been limited, mostly falling back on the approach of "Google hack yourself." This approach has several shortcomings. While a few free tools exist that allow security professionals to Google hack their organization, they are typically inconvenient, utilizing only one search engine and providing only a snapshot in time of your organization's exposure. Security consultancy Stach & Liu, which works with *Fortune* 500 and government agencies, has created free defensive tools to help protect your organization from exposing vulnerabilities via Google, Bing and other popular search engines. The tools fall into two major categories—alert RSS feeds and alert RSS monitoring tools. Together, they form a type of intrusion detection system (IDS) for Google hacking.

### Diggity Alert Feeds

Google Hacking Alerts provide real-time vulnerability updates via convenient RSS feeds.


Google reader
All items
Search
Add a subscription
All items (1000+)
People you follow
Explore
Subscriptions
FSDB-Backup Files (195)
FSDB-Configuration Ma... (371)
FSDB-Error Messages (654)
FSDB-Privacy Related (501)
FSDB-Remote Administr... (102)
FSDB-Reported Vulnera... (90)
FSDB-Technology Profile (652)
GHDB-Advisories and V... (1000+
GHDB-Error Messages (1000+)
Google Alerts - "mySQ... (11
Google Alerts - "A sy... (10)
Google Alerts - "mySQL error with query" (11)
Google Alerts - "acce... (45)
Google Alerts - "An i... (1)
Google Alerts - "ASP... (5)
Show: 11 new items - all items
Mark all as read
Refresh
Feed settings...
Add star
Like
Share
Share with note
Email
Add tags

Google Alerts - "mySQL error with query"

東京都文京区の不動産仲介・管理会社です。文京区・豊島区を中心に、駅 ... - mySQL error with q... CREATE TEMPORARY

期間延長 - わかの奇妙な日常 - mySQL error with query SELECT COUNT(*) AS result FROM nucleus_actionlog: Can't open file: 'nucle

James Bond 007 :: MI6 - The Home Of James Bond - mySQL error with query SELECT c.citem as itemid, c.cnumber as commentid, c.c

James Bond 007 :: MI6 - The Home Of James Bond

via Google Alerts - "mySQL error with query"

**mySQL error with query** SELECT c.citem as itemid, c.cnumber as commentid, c.cbody as body, c.cuser as user, c.cmail as userid, c.cemail as email, ...
www.mi6.co.uk/mi6.php3//news/index.php?itemid...t...

等価交換 » ジェノベソース - mySQL error with query INSERT INTO nucleus_plug_captcha (ckey, time, solution, active) VALUES ('890

...山駅 土地情報 | 売 ... - mySQL error with query INSERT INTO nucleus_plugin_op

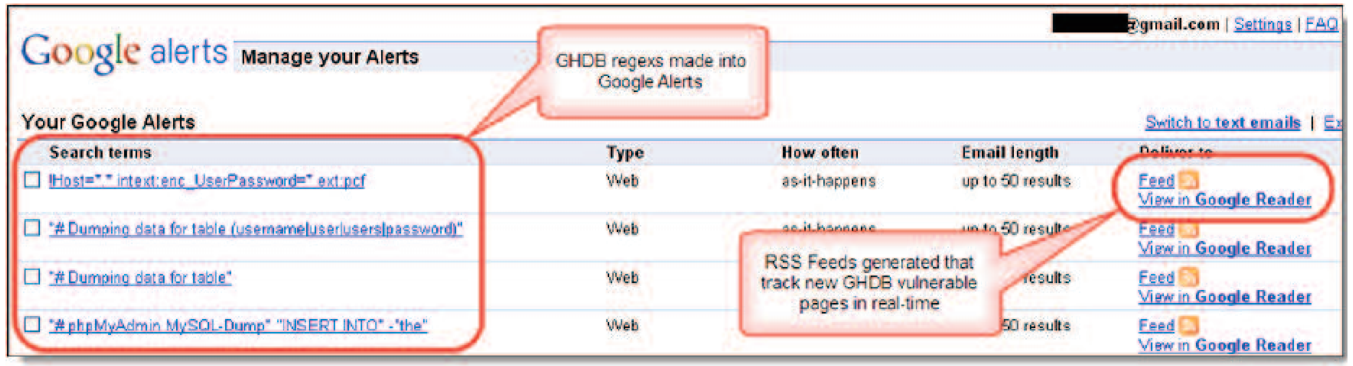
埼玉県上尾市 ... 】 所在地：埼玉県 ... - mySQL error with query INSERT INTO nucleus_plugin_op

mysql macosx ... ngs Jewelry ... - mysql error with query. creating standalone applications with myso

James Bond needs help!
mySQL error page snippet conveniently provided in RSS summary

Several thousand GHDB/FSDB vuln alerts generated each day

Bing Hacking Alerts employs a similar approach, but instead leverage Stach & Liu's Bing Hacking Database (BHDB) in conjunction with Microsoft Bing's &format=rss directive to turn Bing searches into RSS feeds.



[redacted]@gmail.com | Settings | FAQ

Your Google Alerts

| | Search terms | Type | How often | Email length | Deliver to |
|---|---|---|---|---|---|
| □ | IHost="*" intext:enc_UserPassword=* ext:pcf | Web | as-it-happens | up to 50 results | Feed<br>View in Google Reader |
| □ | "# Dumping data for table (username\|user\|users\|password)" | Web | as-it-happens | up to 50 results | Feed<br>View in Google Reader |
| □ | "# Dumping data for table" | Web | | results | Feed<br>View in Google Reader |
| □ | "# phpMyAdmin MySQL-Dump" "INSERT INTO" -"the" | Web | | 50 results | Feed<br>View in Google Reader |

GHDB regexs made into Google Alerts

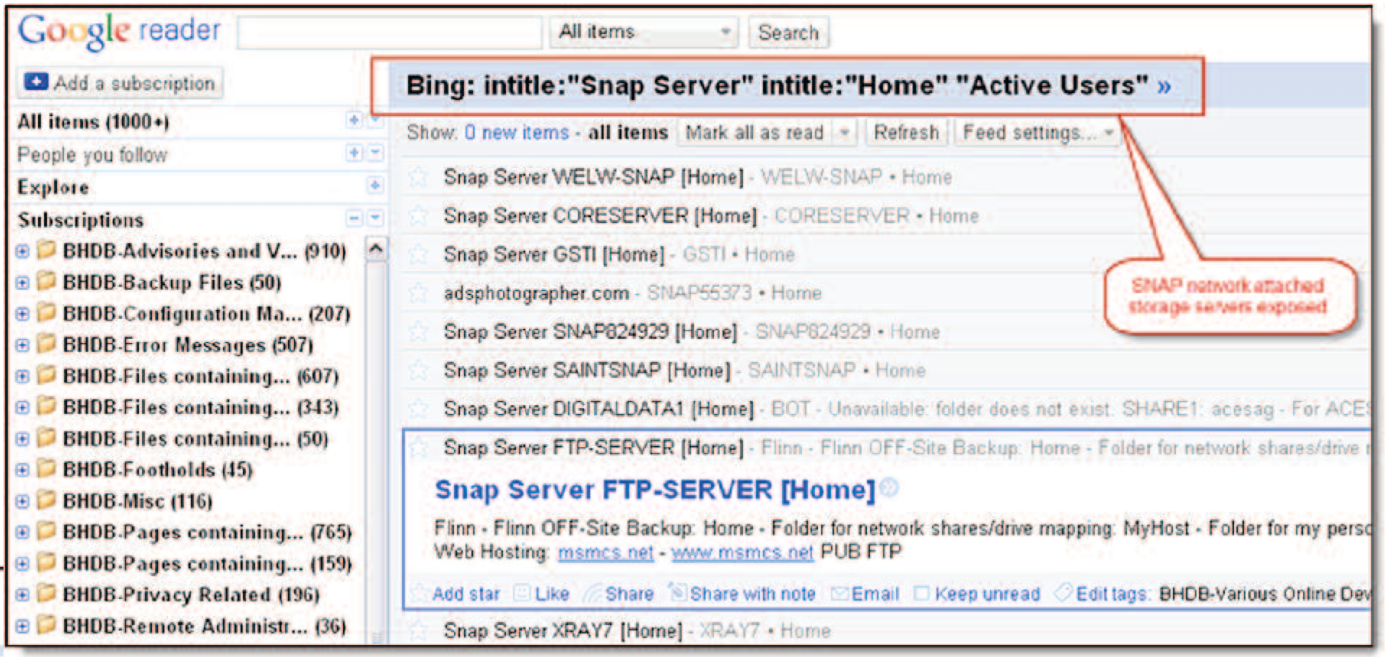
RSS Feeds generated that track new GHDB vulnerable pages in real-time

These feeds in turn produce RSS entries that identify vulnerable Web applications on the Internet.

Google Alerts have been created for all 1,623 GHDB/FSDB search strings, generating a new alert each time newly indexed pages match regular expressions.

## Diggity Alert Clients

If you would like to filter these alerts on domains and other criteria, making them more relevant to sites you care about, you can use either the Microsoft Windows desktop client (AlertDiggity) or iPhone client (iDiggity Alerts) to filter these alerts. —*Francis Brown*



BHDB-Advisories and V... (910)
BHDB-Backup Files (50)
BHDB-Configuration Ma... (207)
BHDB-Error Messages (507)
BHDB-Files containing... (607)
BHDB-Files containing... (343)
BHDB-Files containing... (50)
BHDB-Footholds (45)
BHDB-Misc (116)
BHDB-Pages containing... (765)
BHDB-Pages containing... (159)
BHDB-Privacy Related (196)
BHDB-Remote Administr... (36)

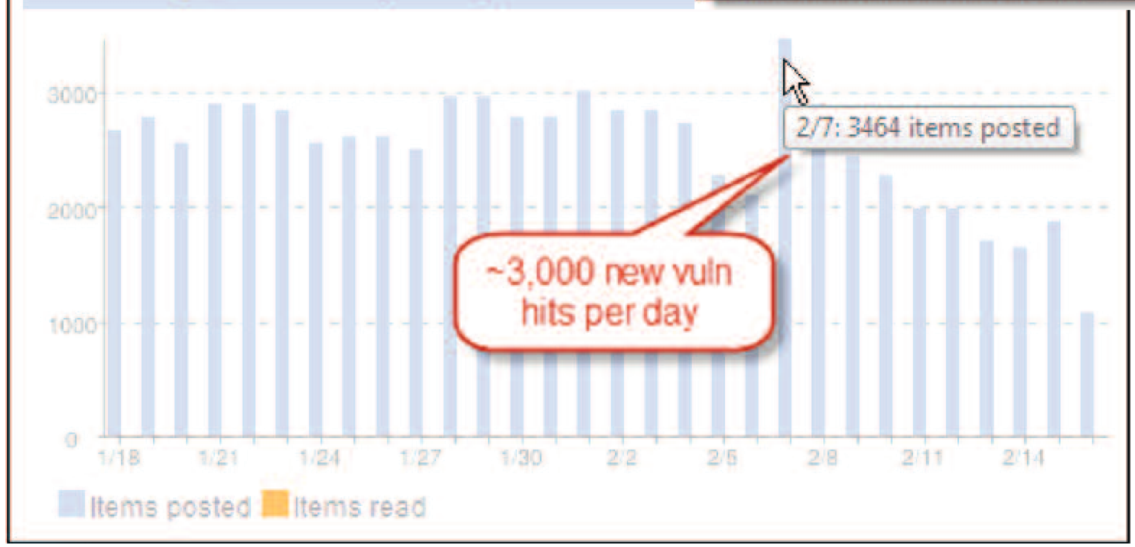
Bing: intitle:"Snap Server" intitle:"Home" "Active Users" »

Snap Server WELW-SNAP [Home] - WELW-SNAP • Home
Snap Server CORESERVER [Home] - CORESERVER • Home
Snap Server GSTI [Home] - GSTI • Home
adsphotographer.com - SNAP55373 • Home
Snap Server SNAP824929 [Home] - SNAP824929 • Home
Snap Server SAINTSNAP [Home] - SAINTSNAP • Home
Snap Server DIGITALDATA1 [Home] - BOT - Unavailable: folder does not exist. SHARE1: acesag - For ACE
Snap Server FTP-SERVER [Home] - Flinn - Flinn OFF-Site Backup: Home - Folder for network shares/drive

Snap Server FTP-SERVER [Home]

Flinn - Flinn OFF-Site Backup: Home - Folder for network shares/drive mapping: MyHost - Folder for my pers
Web Hosting: msmcs.net - www.msmcs.net PUB FTP

Snap Server XRAY7 [Home] - XRAY7 • Home



These alerts have accumulated several thousand hits per day, and now form what is likely the largest repository of live vulnerabilities on the Internet.

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