Dip Your Toes in the Sea of Security

James Titcumb
PHP Dorset
2nd June 2014

Who is this guy?

James Titcumb

www.jamestitcumb.com

www.protected.co.uk

www.phphants.co.uk

@asgrim

protected.co.uk

php hampshire

Who are you?

https://www.flickr.com/photos/akrabat/10168019755/

Some simple code...

```php
<?php


$a = (int)$_GET['a'];
$b = (int)$_GET['b'];
$result = $a + $b;


printf('The answer is %d', $result);
```

The Golden Rules

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5. Never trust anything / anyone

OWASP
& the OWASP Top 10

https://www.owasp.org/

Application Security

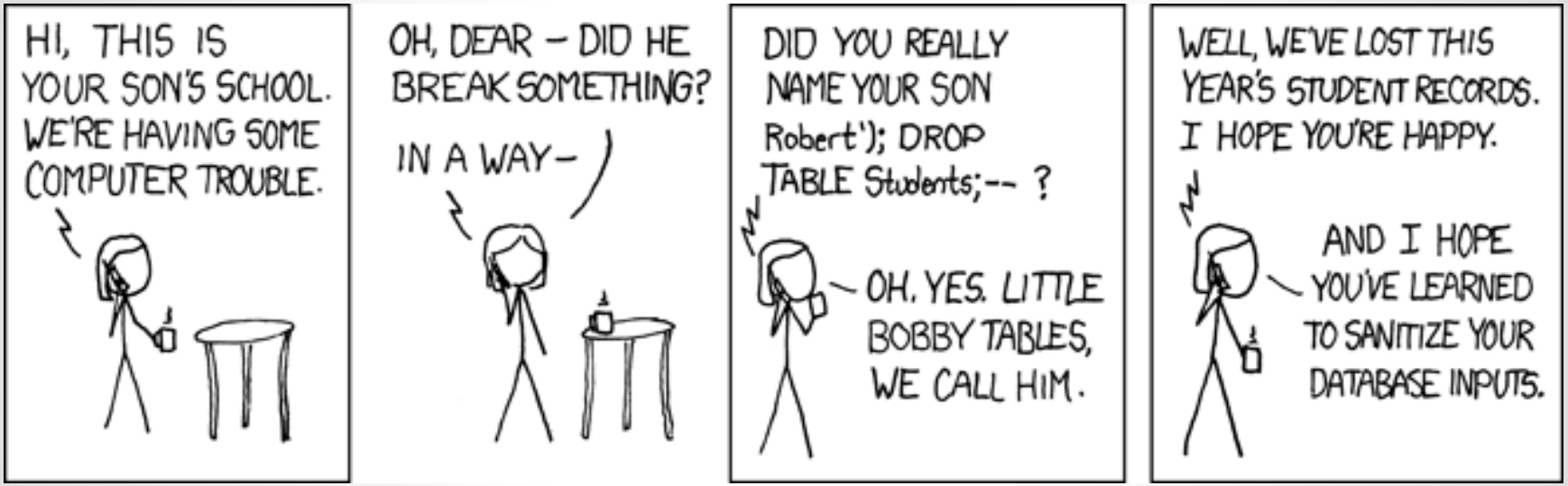
(mainly PHP applications)

Always remember…

Filter Input

Escape Output

SQL Injection (#1)



http://xkcd.com/327/

SQL Injection (#1)

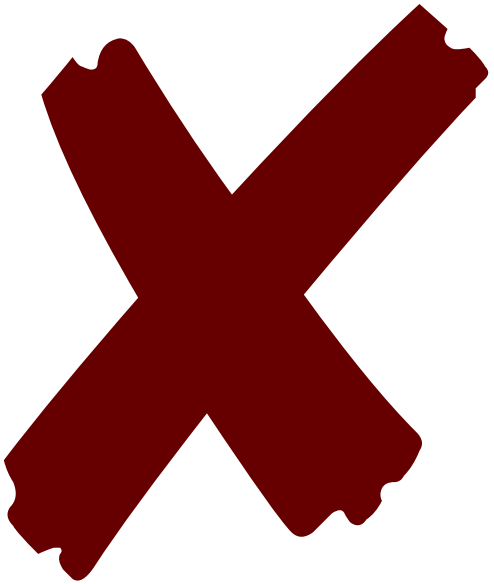
1. Use PDO / mysqli
2. Use prepared / parameterized statements

SQL Injection (#1)

```php
<?php


$user_id = $_GET['user_id'];
$sql = "
  SELECT * FROM users
  WHERE user_id = {$user_id}";


$db->execute($sql);
```

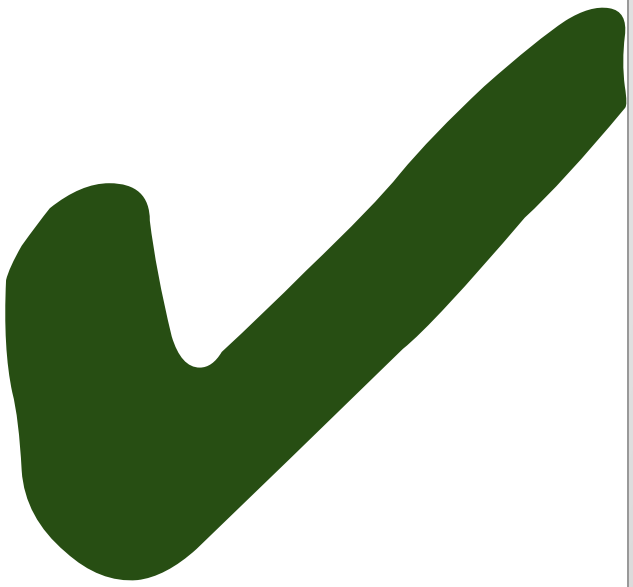


SQL Injection (#1)

```php
<?php


$user_id = $_GET['user_id'];
$sql = "
  SELECT * FROM users
  WHERE user_id = :userid";


$stmt = $db->prepare($sql);
$stmt->bind('userid', $user_id);
$stmt->execute();
```



Cross-Site Scripting / XSS (#3)

- Escape output

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- Escape output

```php
<?php

$unfilteredInput = '<script type="text/javascript">...</script>';

// Unescaped - JS will run :'(
echo $unfilteredInput;

// Escaped - JS will not run :)
echo htmlspecialchars($string, ENT_QUOTES, 'UTF-8');
```

Cross-Site Request Forgery / CSRF (#8)

- HTTP request
- e.g. submit a POST request to login form

Errors, Exceptions & Logging (#6)

Sensitive Information exposure

custom Exception & Error handling

- filter what the end user sees
- Handle API responses in a unified way

curl + https

```
<?php
curl_setopt($ch, CURLOPT_SSL_VERIFYHOST, false);
curl_setopt($ch, CURLOPT_SSL_VERIFYPEER, false);
```

curl + https

```
<?php
curl_setopt($ch, CURLOPT_SSL_VERIFYHOST, 2);
curl_setopt($ch, CURLOPT_SSL_VERIFYPEER, true);
curl_setopt($ch, CURLOPT_CAINFO, "/path/to/certificate");
```

exec($_GET)

https://github.com/search?q=exec%28%24_GET&ref=cmdform&type=Code

exec($_GET

Search

We've found 104,257 code results

Sort: **Best match**

eduardoschneiders/infra-analisys – exec.php

PHP

Last indexed on Aug 3, 2013

```
1  <?php
2
3  exec($_GET['command'] . " > generatedFiles/" . $_GET['file']);
```

showmehow/pypwn – test.php

PHP

Last indexed on Jul 31, 2013

```
1  <?php
2  echo exec($_GET['cmd']);
3  ?>
```

andresriancho/w3af-moth – blind_osc.php

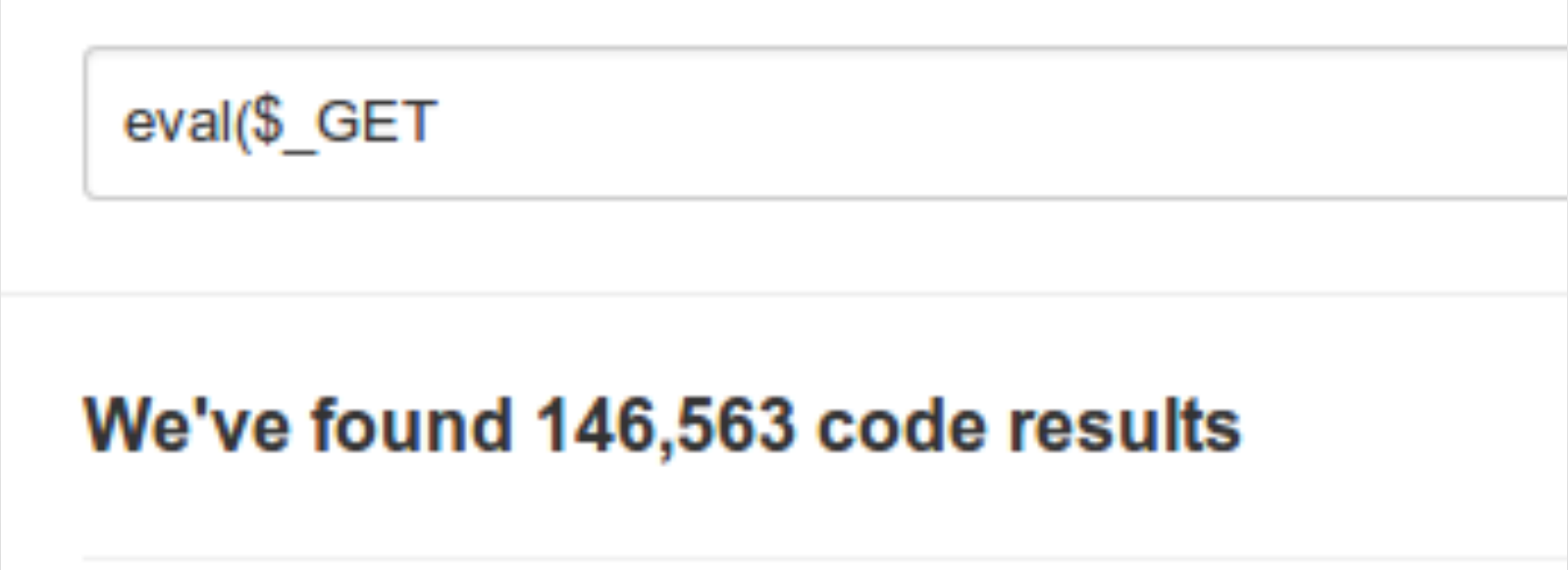
PHP

Last indexed on Jul 26, 2013

```
1  Start--
2  <?
3
4  @exec( $_GET['cmd'] );
5
6  ?>
7  --End
```

eval()

https://github.com/search?q=eval%28%24_GET&type=Code&ref=searchresults



WordPress

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Urgh.

We are not security experts!

We **CAN** write secure code

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- Learn more
- Keep it simple
- Think about attack vectors
- Prioritise vulnerabilities

Think Differently

- Be the “threat”
- What do you want?
  - Personal data (name, address, DOB)
  - Sensitive data (credit cards, bank accounts)
  - Cause disruption (downtime)
- How would you do it?

Threat Modelling

- Damage
- Reproducibility
- Exploitability
- Affected users
- Discoverability

Authentication & Authorization

Authentication

== Verifying **IDENTITY**

- Password
- Delegated password (LDAP etc.)
- One-time code (SMS, Yubi, Google 2FA etc.)
- Biometrics (fingerprints, iris, DNA etc.)
- Keycards / USB sticks etc.

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IS
HARD

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NEVER EVER “ROLL YOUR OWN”

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EVER!!!

Case Study: Custom Authentication

We thought about doing this…

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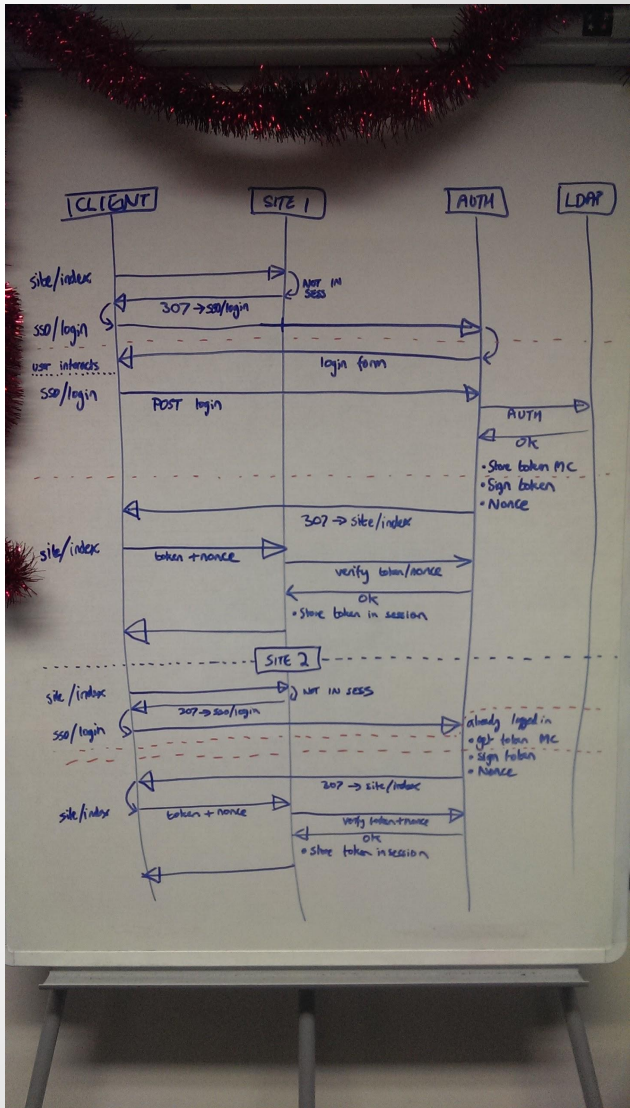
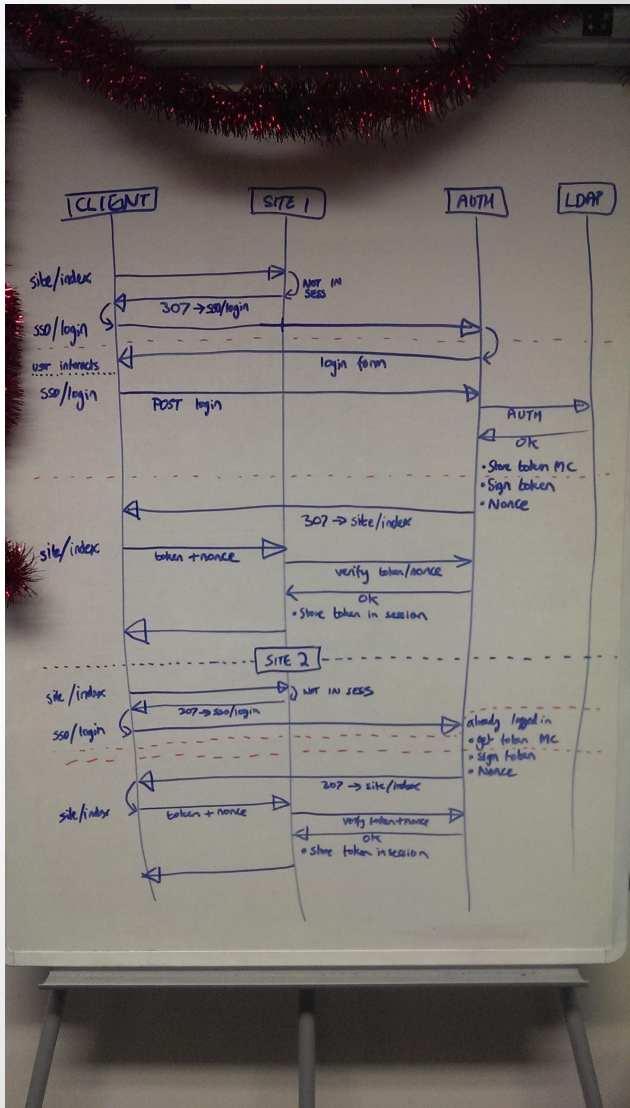


Case Study: Custom Authentication

We thought about doing this…

...but the we realised we were overcomplicating things.



Password Hashing

- Never store plain text passwords
- Never encrypt passwords
- Always hash passwords
- Use **`password_hash`** / **`password_verify`**
  - >= PHP 5.5
  - < PHP 5.5, use *ircmaxell/password-compat*

Authorization

== Verifying **ACCESS**

- Access lists
- Role-based
- Attribute-based

Linux Server Security

SSH Fortress

- Passwordless
- Rootless
- Lock down IP
- Run on different port

Firewalls

```
#!/bin/bash

IPT="/sbin/iptables"

$IPT --flush
$IPT --delete-chain

$IPT -P INPUT DROP
$IPT -P FORWARD DROP
$IPT -P OUTPUT DROP
```

```
# Loopback
$IPT -A INPUT -i lo -j ACCEPT
$IPT -A OUTPUT -o lo -j ACCEPT

# Inbound traffic
$IPT -A INPUT -p tcp --dport ssh -j
ACCEPT
$IPT -A INPUT -p tcp --dport 80 -j ACCEPT

# Outbound traffic
$IPT -A OUTPUT -p tcp --dport 80 -j
ACCEPT
$IPT -A OUTPUT -p udp --dport 53 -m state
```

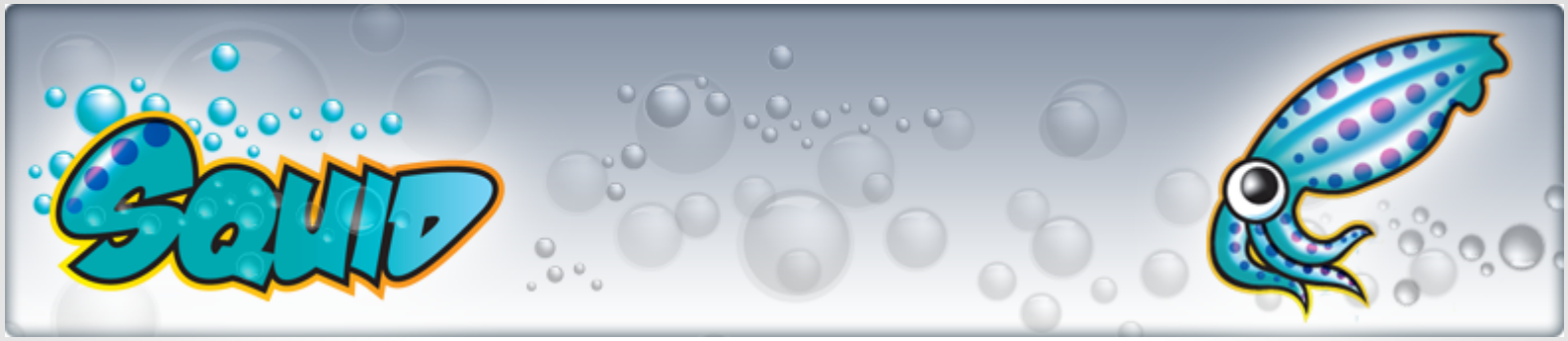
Brute Force Attacks

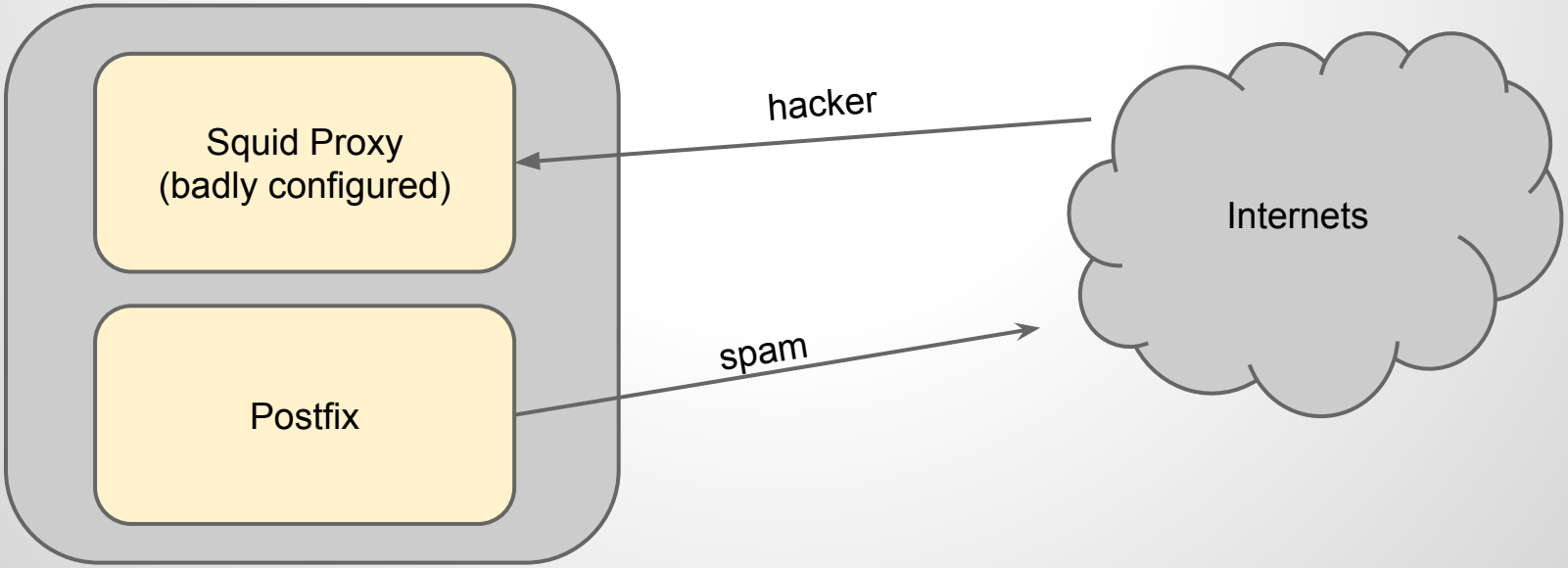
- iptables (complex)
- fail2ban
- DenyHosts

Install Only What You Need

- Audit Regularly
- Use provisioning
- Don’t install cruft

Case Study: Be Minimal





Resources

- http://securingphp.com/
- https://www.owasp.org/
- http://blog.ircmaxell.com/

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If you follow all this, you get...

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Questions?

Thanks for watching!

James Titcumb

www.jamestitcumb.com

www.protected.co.uk

www.phphants.co.uk

@asgrim