Auditing WebObjects applications

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Who am I?

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Agenda

- Why ?
- Introduction
- WebObjects ?
- Components
  - html
  - wod
  - java
- Direct actions
- what do Direct actions and Component requests look like ?
- response splitting
- escaping data

- Escaping data
- Deployment issues
- todo
- conclusion
- Q&A

Why ?

- not really all that common
- I’ve had to codereview and pentest WebObject webapps
- there is virtually _NOTHING_ published about WebObjects (in terms of security)
- These are my notes (in a more coherent form)

Introduction

- This talk is about WebObjects
- How it looks from an code reviewing perspective ...
- ... and a pentesting perspective
- not about new types of webbugs or attackvectors

Introduction

- Will walk through how most WebObjects more or less look and feel
- what's required to make it work
- what you care about from a security point of view
- will only consider WebObject specifics.
  - if it ain't related to WebObject api's and classes I'm not covering it
- limited to rendering (for now)

WebObjects ?

- An application server
- By Apple
- Application server
- Web Application framework

WebObjects ?

- Early versions (up untill 4.x) used objective-c
  - MacOSX only
- later versions (5.x) are pure java
- and can be deployed anywhere
- this talk will only cover the later versions

Components

- Rather object orientated way of making web applications
- each web application is seen as a collection of components
- each component exist out of 3 basic things:
  - html file (.html)
  - object definition file (.wod)
  - java source code files (.java)

components example

hw.html

```
<html>
    <head>
        <title>Untitled</title>
    </head>
    <body>
Hello World
<webobject name = "Now"> </webobject>
    </body>
</html>
```

hw.wod

```
Now: WOString {
    value = now;
    dateformat = "%m%d%Y";
}
```

hw.java

```
package your.app.components;
import com.webobjects.foundation.*;

public class hw extends WOComponent {
    private static final long serialVersionUID = 1L;

    public hw(WOContext context) {
        super(context);
    }

    public NSTimestamp now() {
        return new NSTimestamp();
    }
```

.html file

- WebObject html files also support a <webobject> tag
- <webobject name=”name”>...</webobject>
- only a name is given, nothing else
- it’s defined in the .wod file

.wod

- .wod file specifies what type of objects
- there’s quite a few of them
  - WOString
  - WOHyperlink
  - WOImage
  - WOTextField
  - WOForm
  - WOButton
  - ...
  - you can also embed your own objects in there

.wod

- Each of these types has attributes
- most of these types get rendered into html eventually
- not really any consistency among them
- some do encode, some dont
  - not documented at all !
- the attributes can be static
- or can all into java code

- WOString
- does html escaping by default
- has an attribute HTMLescape
- set to True by default
- XSS possible if set to false

```
name1: WOString {
    value = getvalue;
}
```

Not vuln to xss

```
name2: WOString {
    value = getvalue;
    escapeHTML = false;
}
```

Vulnerable to xss

- WOHyperlink
- href attribute
- does not encode with absolute url’s
- does encode with relative ones

- WOImage
- src attribute like WOHyperlink’s href
- filename is properly encoded
- value is properly encoded aswell

- WOTextField
- both value and name are properly encoded

- WOForm
- href never encoded, vuln to xss
- has an attribute named queryDictionary
  - callback returns a dict of key/value pairs
  - will be used as <input> tags inside the form
  - key is not encoded!
  - value is properly encoded
- name is not encoded

- many more
- none are documented (as in, how is encoding handled)
- can also include other WOComponents

.java file

- Each components is seen as a class
- extends from WOComponent
- it's constructor has 1 argument WOContext
- basically an http context (contains stuff like request, response, session, ...)
- all it's methods can call context() to get the current WOContext

.java file

- Classes you want to know about:
  - WORequest is class for the http request
  - WOResponse is class for http response
  - WOSession holds the session
    - all methods can call session() to get it
  - WOContext is the http context

WOComponent

- all components inherit from this one
- some of it’s methods (always) get called
- can be seen as entry- and exit-points
- Constructor
- AppendToResponse() (if derived class overwrote it)

```java
public class Main extends WOComponent {
   public Main(WOContext context) {
      super(context);
   }

   public void appendToResponse(WOResponse response, WOContext ctx) {
      super.appendToResponse(response, ctx);
      response.setContent(ctx.request().stringFormValueForKey("xss") );
   }
}
```

Direct actions

- More light weight than Component based
- easier to wrap your head around
- class that extends from WODirectAction
- no .html file
- no .wod file
- pretty straight forward

Direct actions

- implements methods that look like
  - public WOActionResults NameAction() {
    ....
    }
- basically <anything>Action() that looks like that can directly get called with GET or POST

Direct actions

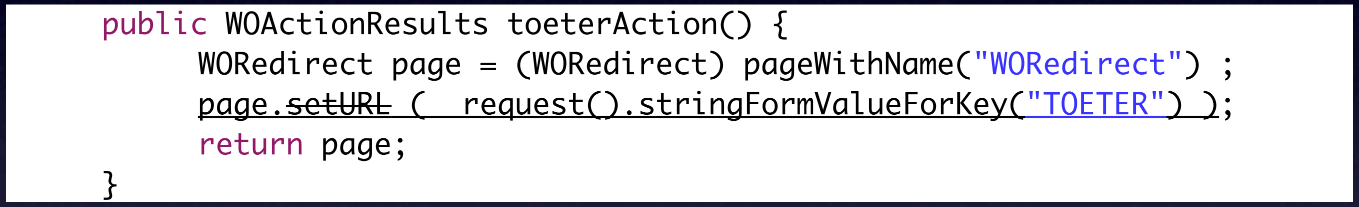
- method request() available
- which provides the current WORequest

what does it look like

- Calling Component action directly:
  - http://site/cgi-bin/WebObjects/applicationname.woa/wo/component.wo?...
- Calling Direct action directly:
  - http://site/cgi-bin/WebObjects/applicationname.woa/wa/action?...

response splitting

- Default redirect object WORedirect



```
public WOActionResults toeterAction() {
      WORedirect page = (WORedirect) pageWithName("WORedirect") ;
      page.~~setURL~~ (  request().stringFormValueForKey("TOETER") );
      return page;
}
```

- Vulnerable to http response splitting
- does not url encode \r or \n
-

response splitting

- yes, cookies too

```
public void appendToResponse(WOResponse response, WOContext ctx) {
     super.appendToResponse(response, ctx);
     WOCookie aCookie = new WOCookie("key", ctx.request().stringFormValueForKey("cookieval"));
     response.addCookie(aCookie);
}
```

- also, no encoding of ;
- allows for cookie injection
- same thing with all of WOCookie's set*() methods

response splitting

- Works on response.setHeader() too ....

escaping data

- WOResponse.appendContentHtmlString()
- WOResponse.appendContentHTMLAttributeValue()
    - does not encode single quote (‘)
    - think of apps doing:
    - <... blah=’ [append here] ‘ ...>
    - can still break out of quotes, maybe inject onclick, onload, ..., depends on tag

Deployment issues

- a whole bunch of standard applications
- http://host:1085/cgi-bin/WebObjects/wotaskd.woa/woconfig
- cgi-bin/WebObjects/Monitor
- cgi-bin/WebObjects/WOAdapterInfo
- cgi-bin/WebObjects/<app>.woa/
  - wa/WOStats
  - wa/WOEventDisplay
  - wa/WOEventSetup
- Should be password protected on any decent deployment ...

todo

- should I ever revisit WebObjects
- anything that’s not rendering
- Enterprise objects (database integration)

Conclusion

- hard to wrap your head around
  - turns out, browsing webpages really isn't object orientated !
- framework feels old (web 1.0).
- Security wise it's not up to par with others
  - no easy XSRF protection
  - almost everything is XSS'able
  - Response splitting is everywhere

Questions ?