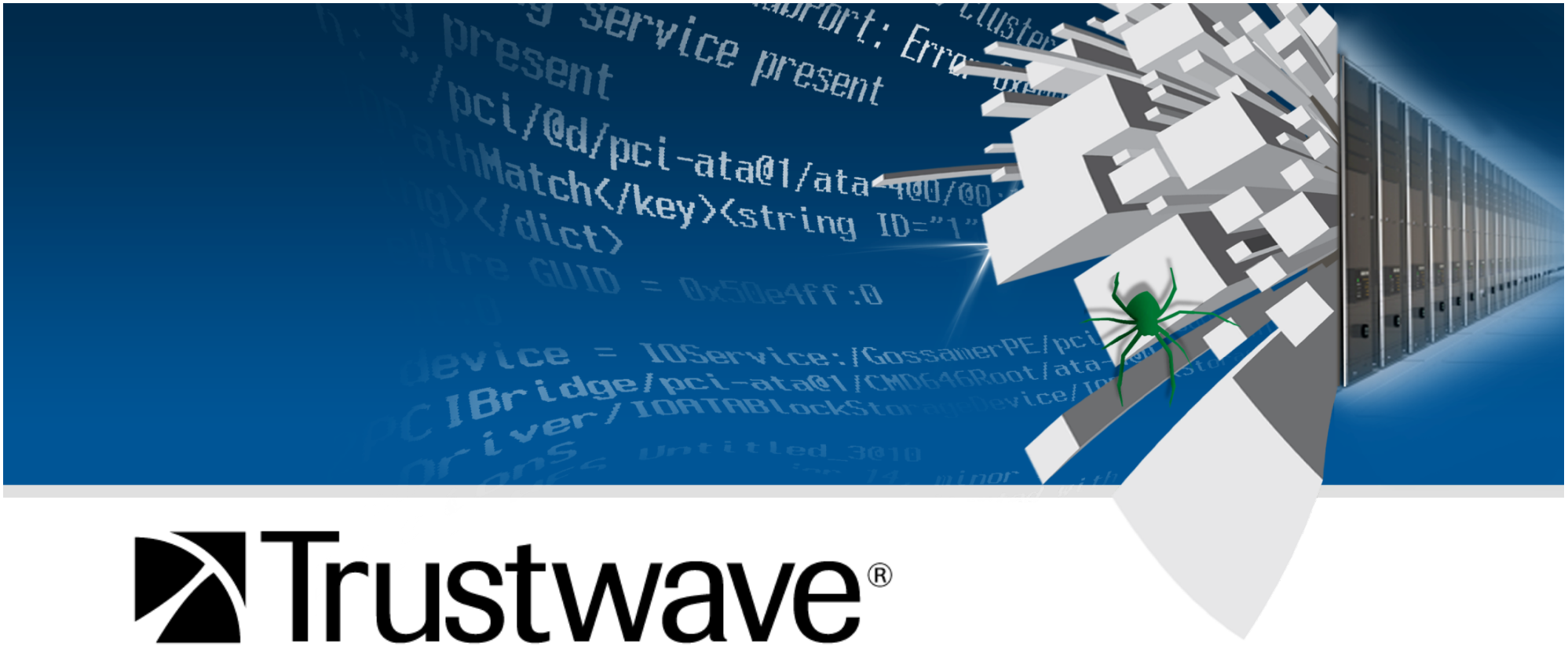

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Testing and Fuzzing FLEX: More fun with RIA

Christophe De La Fuente

Outline

1. What is Flex?
2. Connecting to back-end
3. Remote Object & AMF
4. What about Security?
5. Testing Flex

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What is Flex?

Flex?

… or maybe?

Flex framework

Free & open source

Rich Internet Application

Browser (Adobe Flash Player)

Standalone (Adobe AIR®)

MXML (XML-based language)

ActionScript® (OO language)

MXML

```
<?xml version="1.0" encoding="utf-8"?>
<mx:Application xmlns:mx="http://www.adobe.com/2006/mxml" xmlns="*"
                layout="horizontal"
                creationComplete="srv.getProducts()">

    <mx:RemoteObject id="srv”
                     destination="product"/>

    <mx:Panel title="Catalog”
              width="100%" height="100%">

       <mx:DataGrid id="list”
                    dataProvider="{srv.getProducts.lastResult}”
                    width="100%" height="100%"/>
    </mx:Panel>

    <ProductForm product="{Product(list.selectedItem)}"/>

</mx:Application>
```

ActionScript

```
package events
{
    import flash.events.Event;

    public class ShowPreview extends Event
    {
        public var employeeInfo:Object;
        public var message:String;

        public function ShowPreview(type:String, employeeInfo:Object,
                                    message:String)
        {
            super(type);
            this.employeeInfo = employeeInfo;
            this.message = message;
        }

        override public function clone() : Event
        {
            return new ShowPreview(type, employeeInfo, message);
        }
    }
}
```

Compilation

Flash Builder (Eclipse plug-in)

Command line

- mxmlc (MXML) → SWF
- compc (ActionScript component compiler) → SWC

ABC (ActionScript Bytecode)

Executed in a Virtual Machine (AVM2)

Easy decompilation

Flex 4

Requires Flash Player 10 support

UI improvements

- new skinning & component architecture (Spark)
- 2D & 3D improvements
- support for FXG (vector-based graphics)
- effects and transitions

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Connecting to back-end

Communication

URL Loader

ActionScript Binary Socket

XML Socket

Remote Object

- invoke server objects
- serialization

HTTP Service

- any HTTP method

Web Service

Servers

BlazeDS

- remoting and web messaging
- connect to back-end

LiveCycle Data Services ES2

- infrastructure for enterprise Flex and AIR applications

BlazeDS

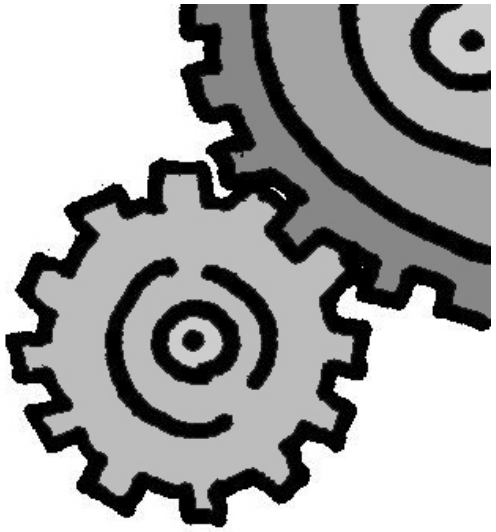
Remoting

- RPC calls
- call ColdFusion or Java classes
- mapping of Value Object types

Messaging

- publish/subscribe
- asynchronous communication
- producers and consumers
- clients ←→ servers

BlazeDS - Components



Destination

- server-side class
- message topic
- proxy

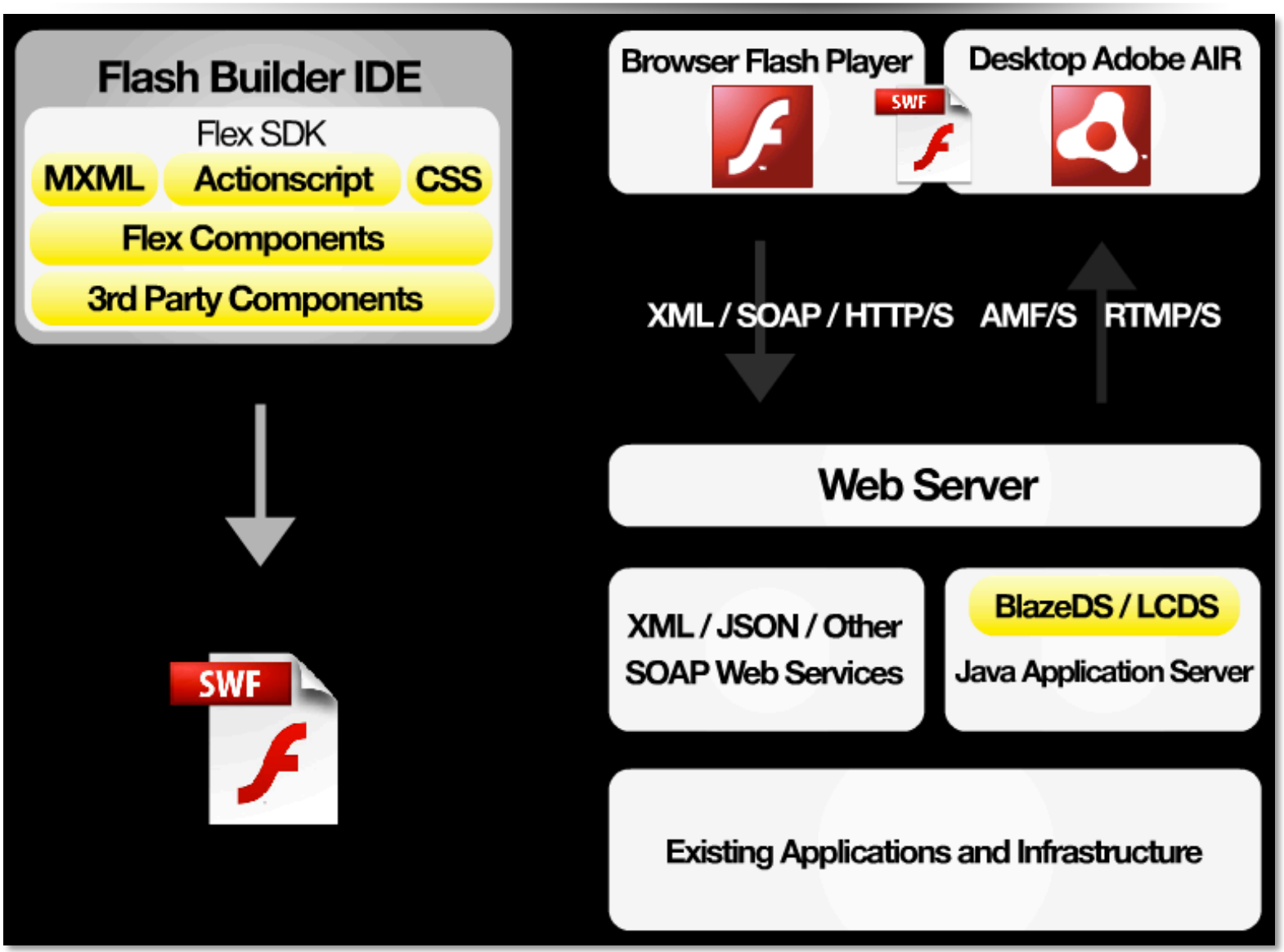
Channel

- communication protocol (amf, amf-secure, http,…)
- multiple channels per service

Service Adapters

- integrate with the back-end
- many provided
- customizable

Summarizing…



http://flex.org/what-is-flex

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Remote Object & AMF

AMF

AMF0/3

Open source

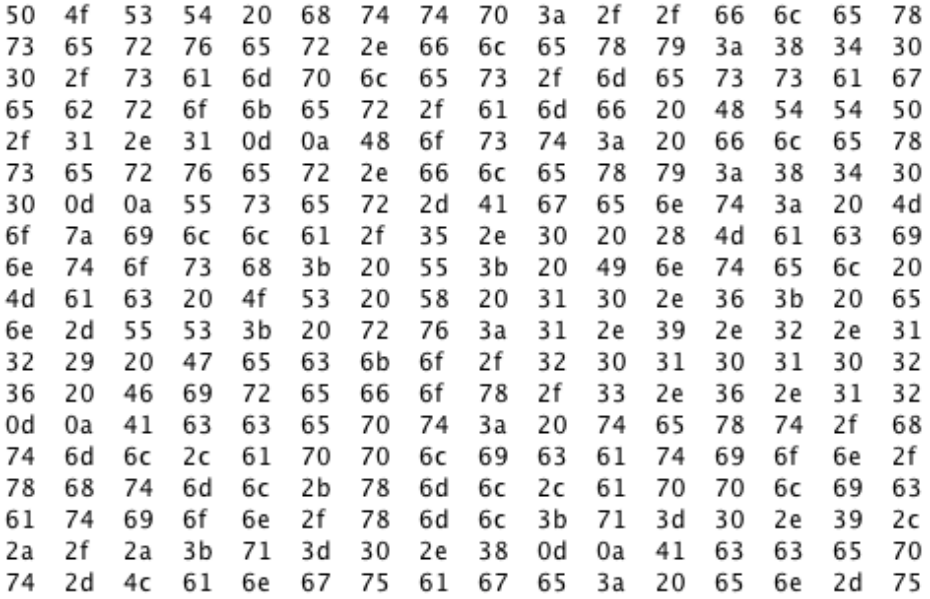
Compact binary format

Object serialization

One byte marker

Object by value or by Reference

Implementations (ruby, python, java,...)



Remoting with BlazeDS

DEMO

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What about Security?

What about security?

Large attack surface

- Channels
- Adapters
- Back-end components

All public method accessible by default

Same-Domain Policy

Enforced by Flash Player from version 7

Access resources from the domain it was loaded from

Granting access

- Security.allowDomain() method
- URL/socket policy file (crossdomain.xml)

```
<?xml version="1.0"?>
<!DOCTYPE cross-domain-policy SYSTEM "http://www.macromedia.com/xml/dtds/
cross-domain-policy.dtd">
    <cross-domain-policy>
        <allow-access-from domain="*.trustwave.com" to-ports="507,516"/>
    </cross-domain-policy>
```

Sanboxing

Assets put in the same security sandbox

Different rules for:

- loading content (images, HTML, SWF,…)
- accessing data (accessible only to code)

Remote Sandbox

- cannot load any local files or resources

Local Sandbox

- local-with-filesystem
- local-with-networking
- local-trusted
- AIR application sandbox

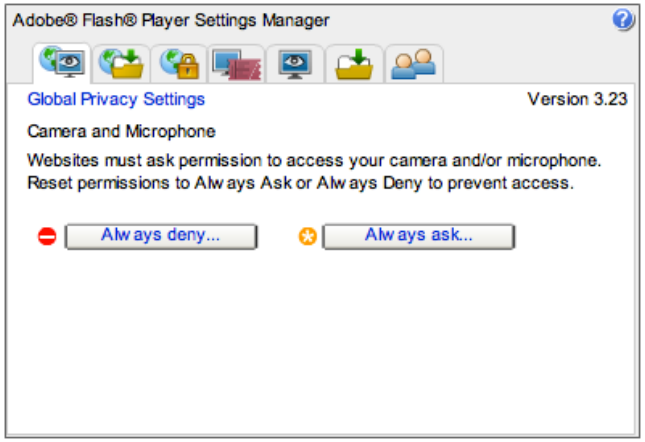
Permission Controls

Administrator (User Institution) settings

The mms.cfg file
The Global Flash Player Trust directory

User settings

Settings UI / Manager
User Flash Player Trust directory



Website settings

Policy file (crossdomain.xml)

Author settings

Security.allowDomain("www.example.com")

Other Security Features

Disk space constrained (100k)

Outbound port filter

- commonly reserved ports is blocked (21, 22,…)

BlazeDS Security

- authentication (custom/built-in)
- authorization (role-based) on destinations and methods

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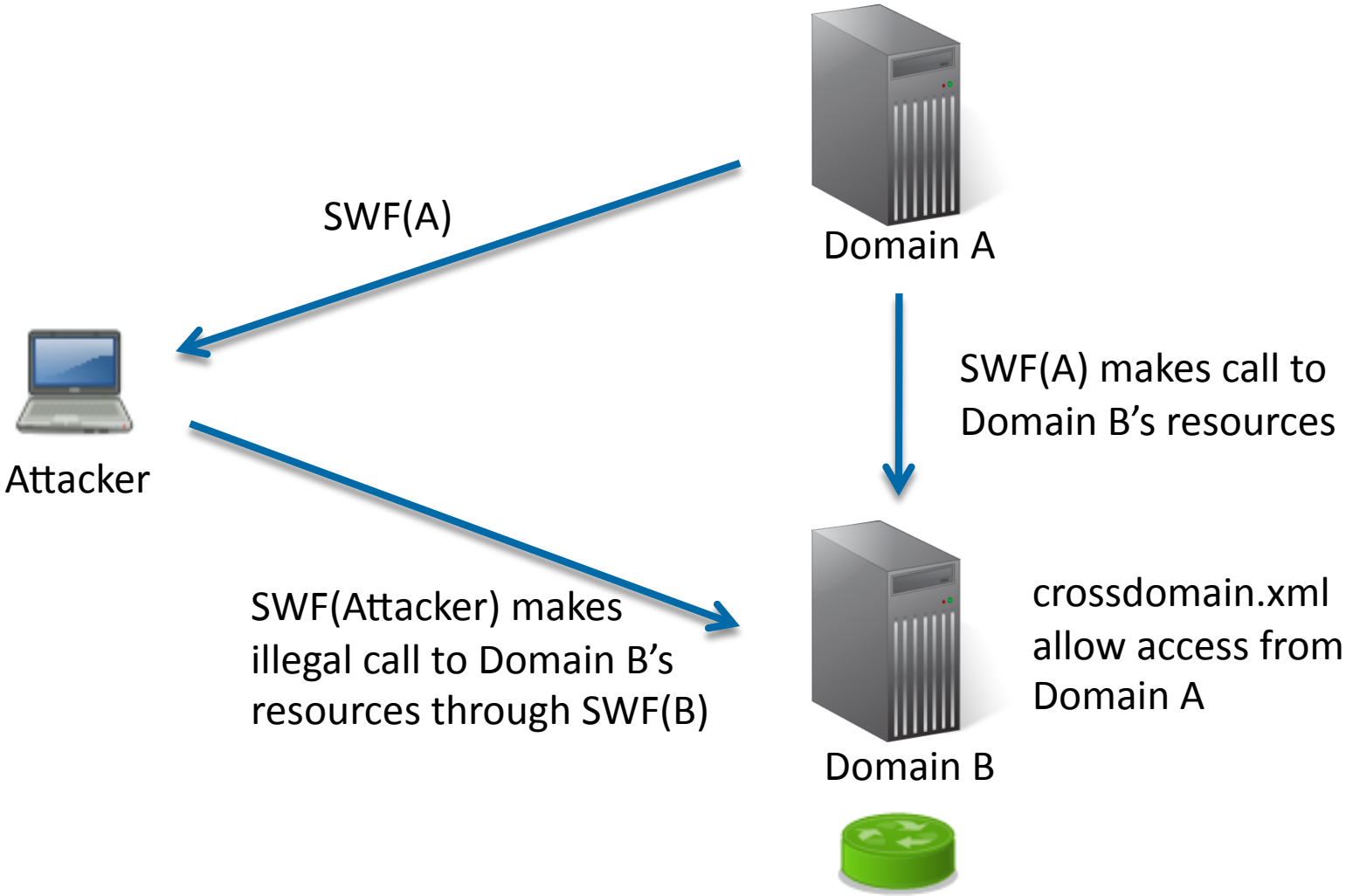
Testing Flex

Cross Domains Attacks



Cross-scripting

"Code defined in one file can examine and modify variables, objects, properties, methods, and so on in the other, and vice versa"

Domain restriction

- permission granted with Security.allowDomain()

Version restriction

- Not supported between AVM1 SWF files & AVM2 SWF files

HTML-to-SWF

- Scripting can occur with callbacks established through the ExternalInterface.addCallback() method

Cross-scripting

DEMO

Tools

Decompilers

- swfdump (SWFTools)
- Sothink

Debuggers

- fdb
- Flash Player debug build

Web Proxy

- BurpSuite
- Charles Proxy

Eclipse (Flash Builder plug-in)

Fuzzer / Bruteforce

Standard vulnerabilities

- SQL injection
- XSS (when using ExternalInterface.addCallback())
- Password brute forcing
- etc…

Tool to call remote objects via AMF

- Deblaze (Jon Rose)
- Integration with Burp Suite and interactivity needed…

… I wrote mine

Flexible Fuzzer

Ruby

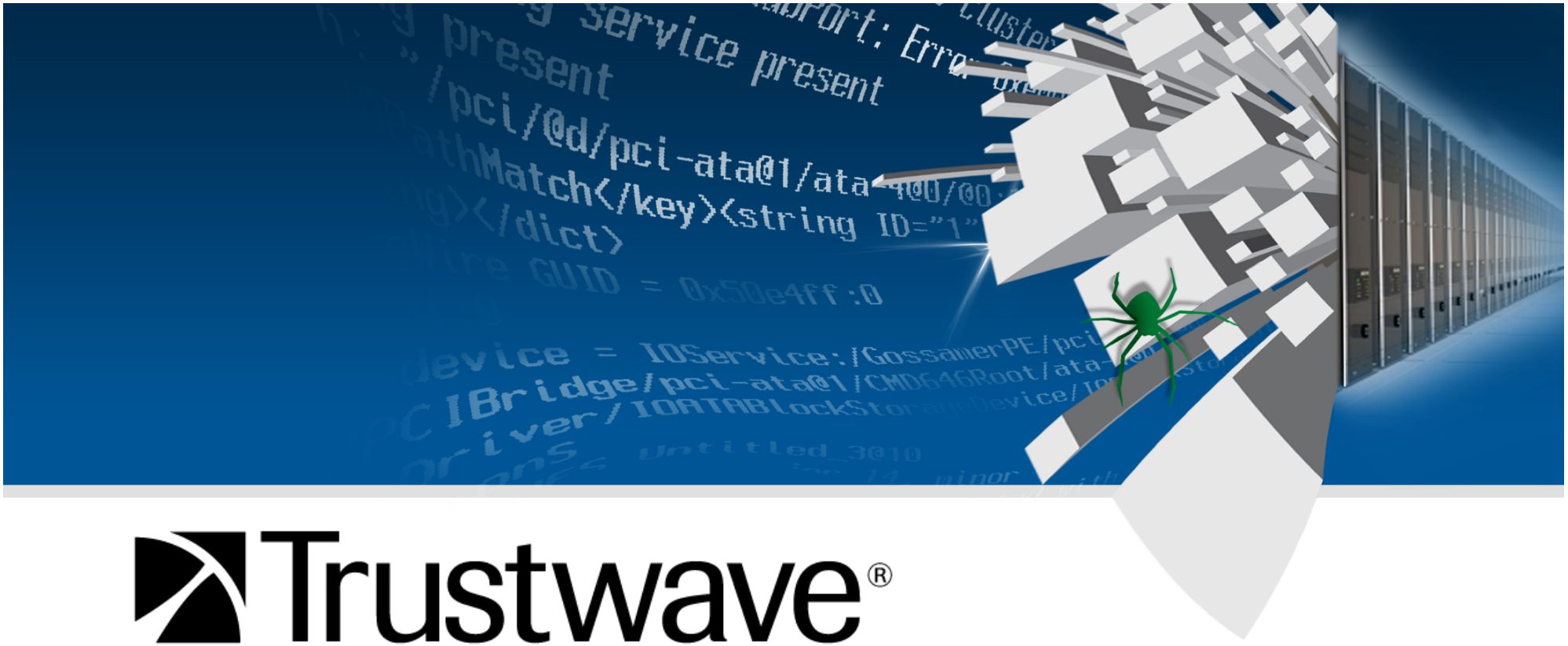
RocketAMF (AMF serializer/deserializer)

Burp Suite integration thanks to Buby (Eric Monti)

Will be added to the OWASP Web Testing Environment (WTE)

Flexible Fuzzer

DEMO



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Thanks!
Questions?