# BTECH450

Flex/Silverlight Project

End of Year Semester

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Industry Company: futuretech

# OVERVIEW

- Project goals
- RIA
  - Portability
  - Performance
    - Benchmarks
    - Multi-threading
  - Security
- Auto Code Generator
- Achievement
- Future work

# PROJECT GOALS

- Explore and Research on the two RIA languages – Silverlight and Flex
- Define a set of guidelines and policies to enable the company to create the building blocks of a Silverlight version equivalent of the company's Flex based applications

# WORK CARRIED OUT

- Usability
- Portability
- Performance
- Security
- Auto code generator

# PORTABILITY

- Silverlight
  - Fully supported in Windows, Mac OS
  - Available on Linux & Unix-based OS through 'Moonlight'
    - SUSE Linux Enterprise Desktop 11, openSUSE 11.x, Ubuntu 9.10, and Fedora 12
    - 'tracking' on the release of official Silverlight
  - Supported on mobile devices ??? e.g. Windows Phone 7
    - Toolkits & Developer Tools available
    - But latest news says no

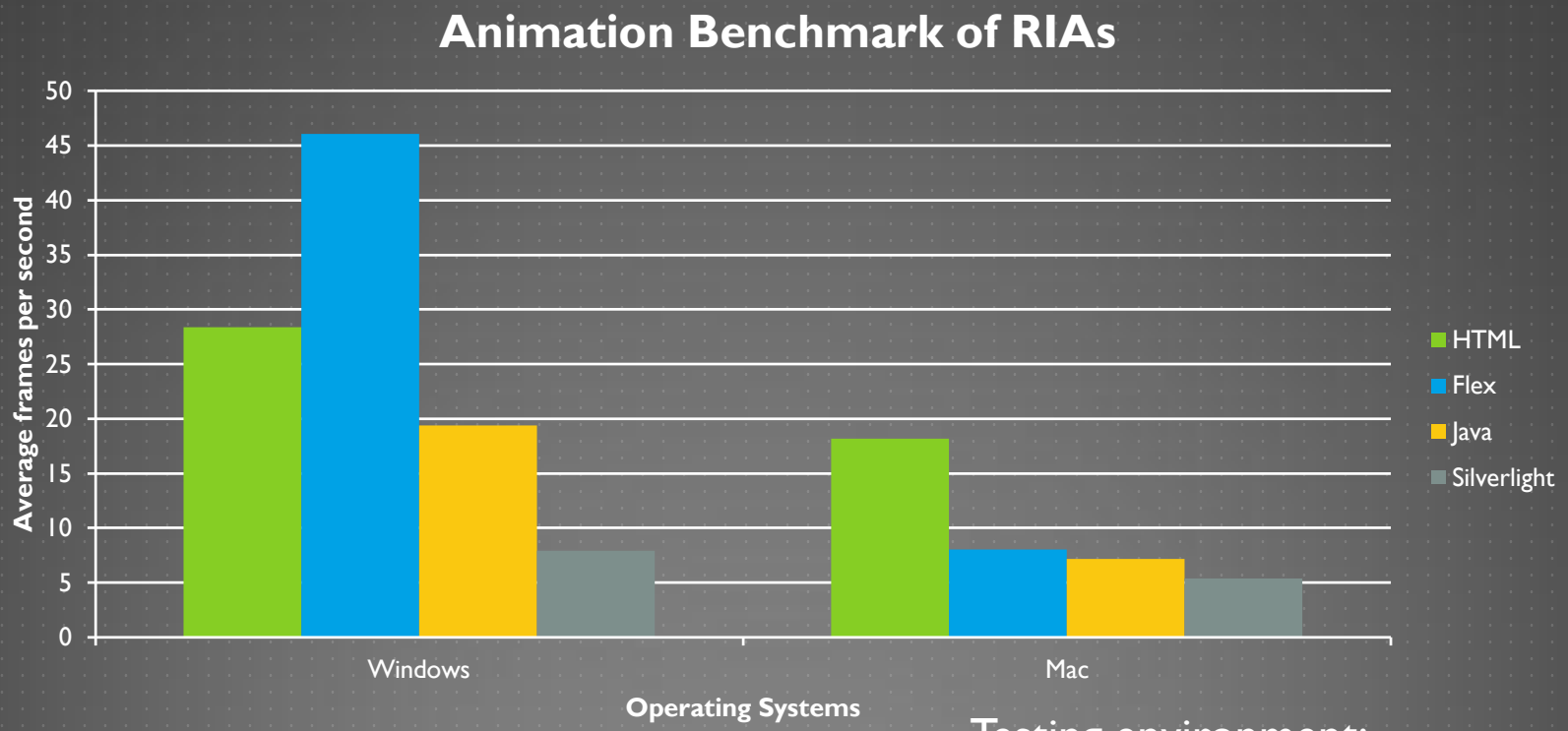
# PORTABILITY (CONT'D)

- Flex
  - Supported in almost all OS
    - Windows, Mac OS 9/X, Linux, Solaris, HP-UX, Pocket PC/Windows CE, OS/2, QNX, Symbian, Palm OS, BeOS, and IRIX
  - Adobe Flash Lite (light/mobile version of Flash) available for mobile devices
    - Not on Apple devices (iPad, iPhone)
- Major mobile platforms (Apple & Windows Phone 7) are not supporting Silverlight and Flash
  - Stability
  - Security
  - Battery Life

# PERFORMANCE

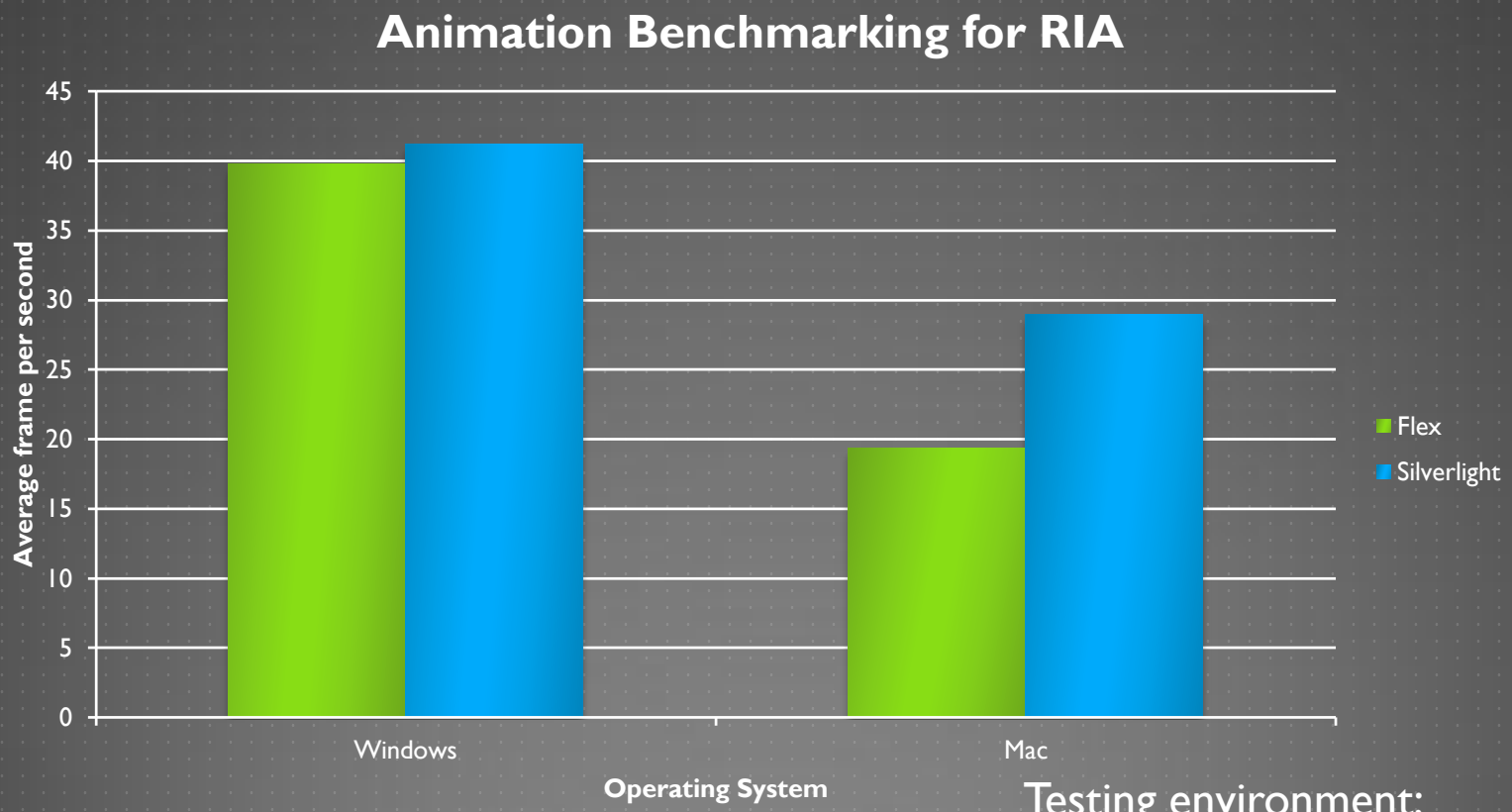
- Performance of RIA running on different environments
- Researched on RIA Benchmarking
  - GUIMark
  - BubbleMark
- Look into the graphics & multi-threading computation performance

# GUIMARK RESULTS (2008)




Testing environment:
OS: Windows XP, Mac OS X 10.5
CPU: Intel Core 2 Duo 2.33 GHz
RIA: Flex 3, Silverlight 2

# GUIMARK RESULTS (2010)




Testing environment:
OS: Windows 7, Mac OS X 10.6
CPU: Intel Core 2 Duo 2.4 GHz
RIA: Flex 4, Silverlight 4

# LIMITATIONS & INTERESTING POINTS

- Only performance based on graphics
- Just a rendering tests
- Limited by Monitor's re-fresh rate
- Result varies largely between OS and Browsers

# MULTI-THREADING

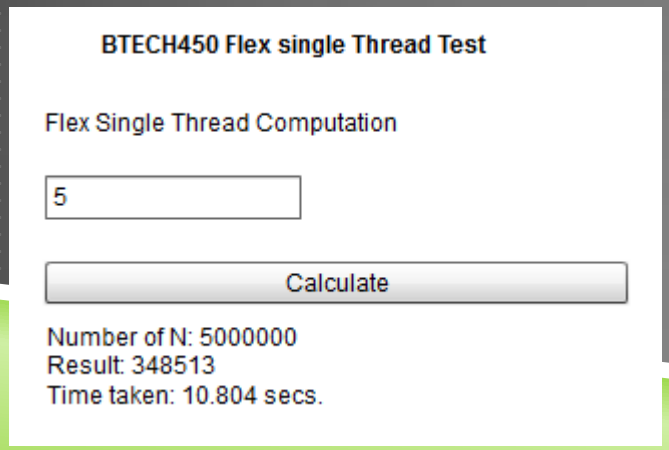
- Silverlight's attempt to enhance performance
  - Modern multi-core CPUs
- Flex lacks REAL multithreading

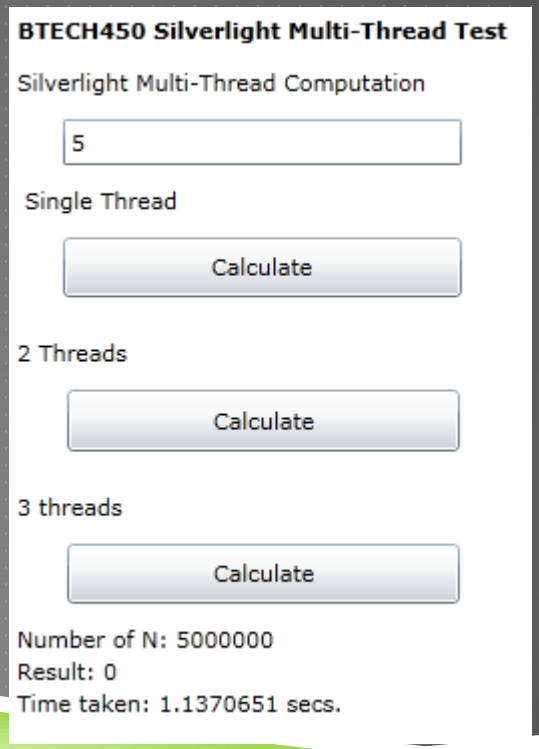
# MULTI-THREADING

- Silverlight Multi-Thread Example
  - Based on BackgroundWorker
  - Separate from Silverlight application UI
  - Threads are created Explicitly
  - Identical to WPF program codes
- Flex
  - Single thread, no native support for multi-thread
  - Can be done through pseudo-thread

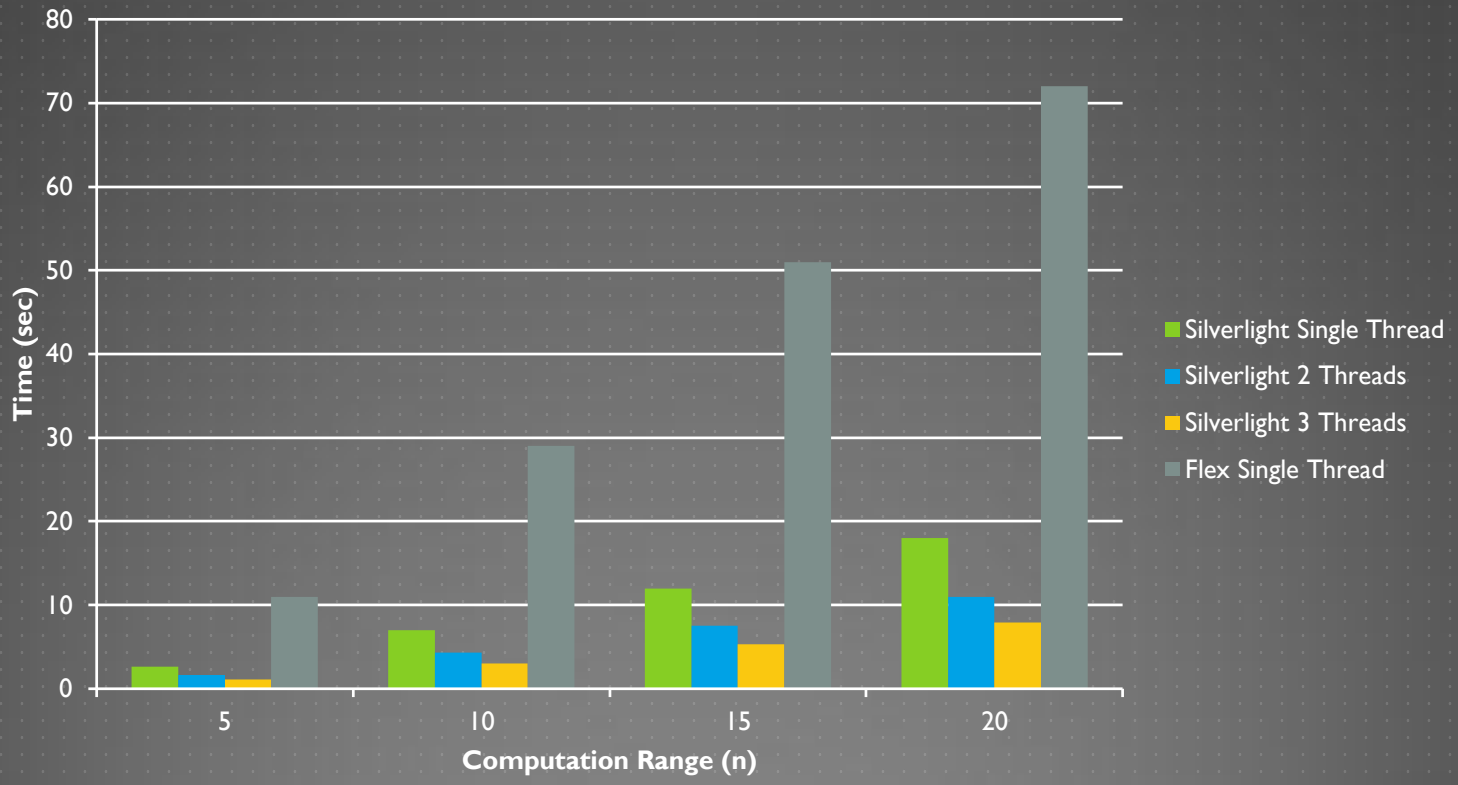
# TESTING PROGRAM

- Based on nested loops Calculations
- Silverlight result collected from different number of threads
- Flex result only on single thread
- Testing environment
  - Quad-core CPU @ 2.33GHz
  - 4GB RAM
  - Windows 7 OS



# Multithreading Computation



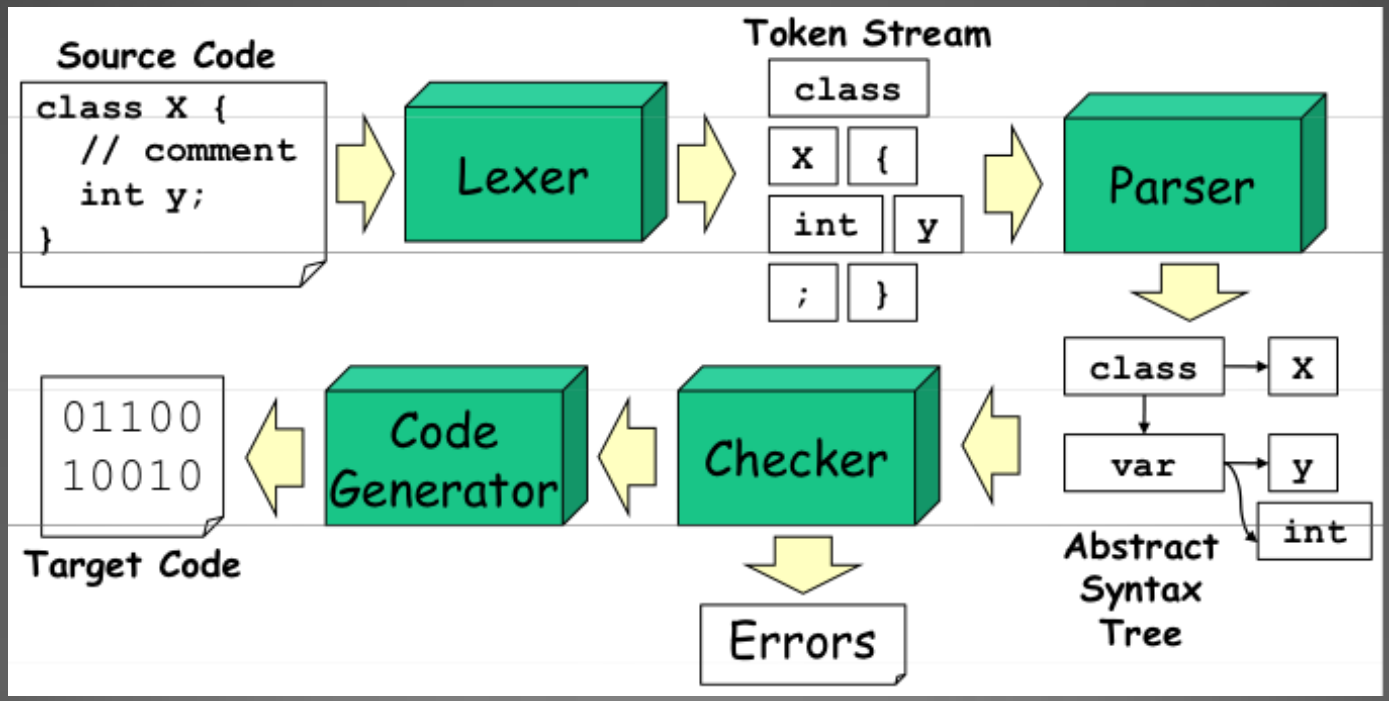
# SECURITY

- Authentication & Authorisation provided by the RIA framework
- Silverlight
  - Same methods as ASP.NET
  - Authentication methods
    - Windows
    - Forms
    - Passport
- Flex
  - Authentication methods
    - Basic
    - Custom (form)
  - Additional Authentication provided by 3rd Party framework, e.g. Spring
  - Can be used with ASP.NET authentication features

# AUTO CODE GENERATOR

- Normal string parsing can't achieve the goal
- Need a compiler tool
- Choice of
  - Coco/R
  - ANLTR

# COMPILER TOOL



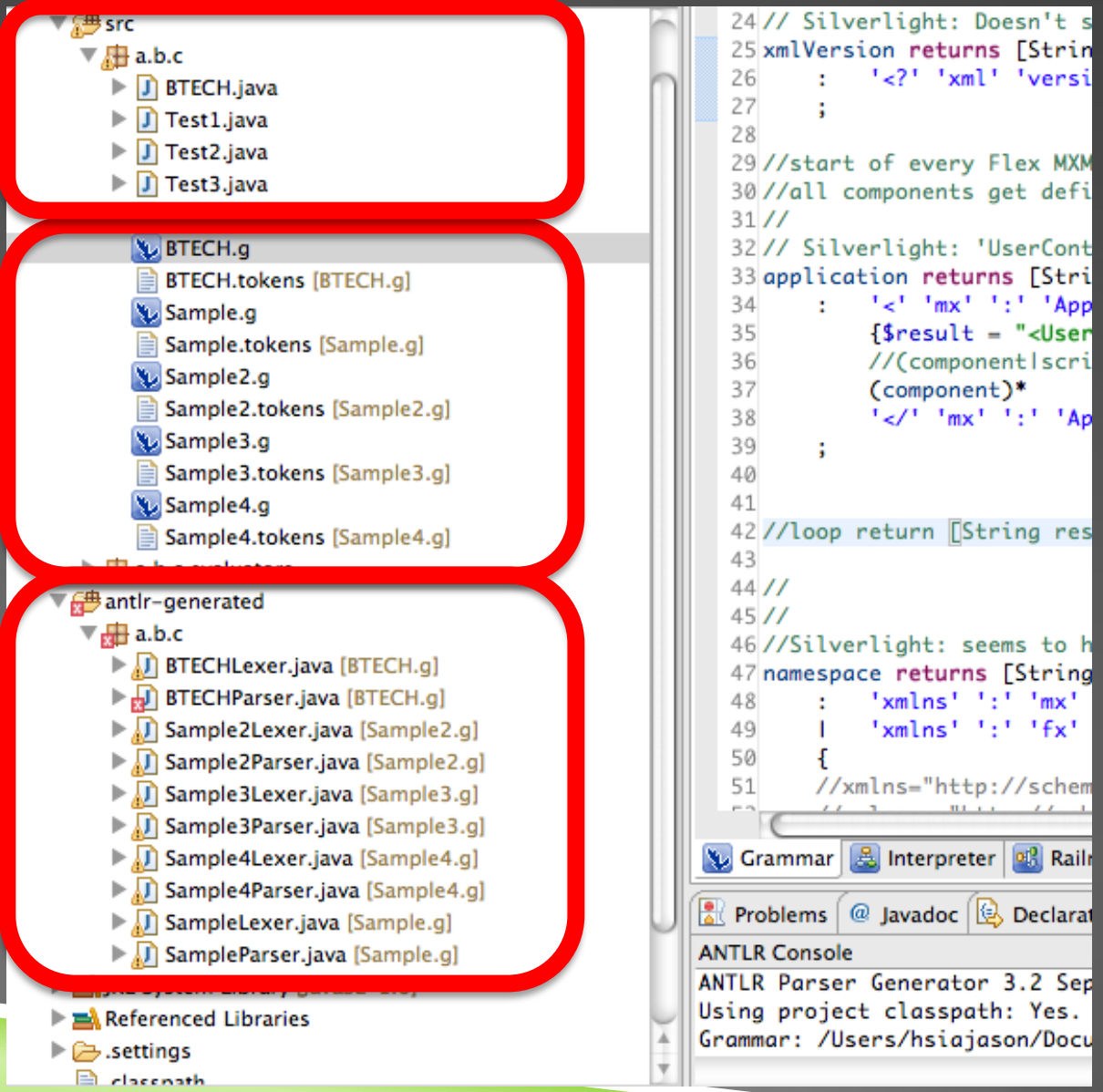
# ANTLR

- Compiler Tool
- Written in Java
- Eclipse IDE environment
- Supported almost on every platform
- Generates Parser and Lexer based on an user-defined grammar

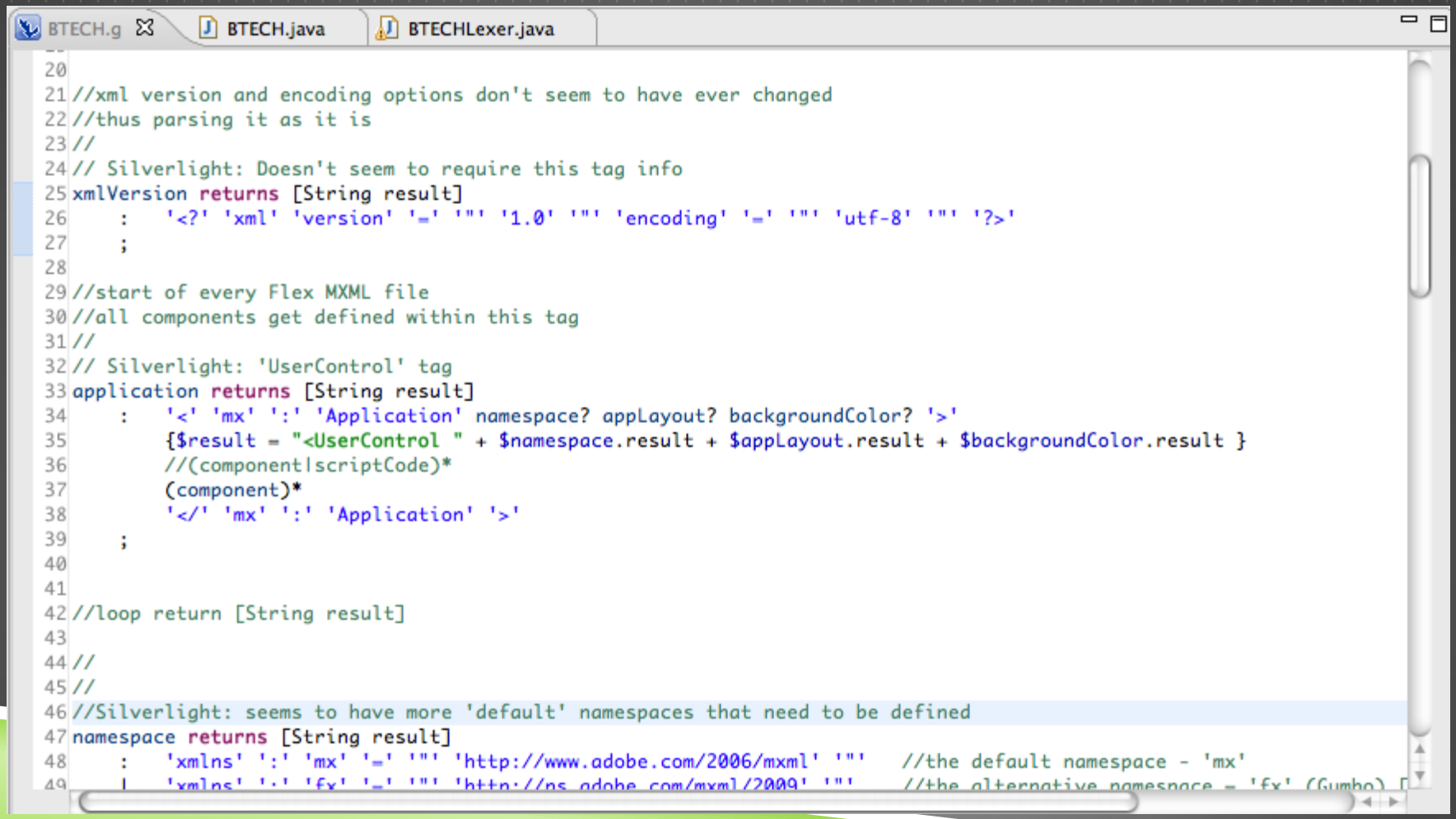
Java application

Grammar files

Generated Parser and Lexer



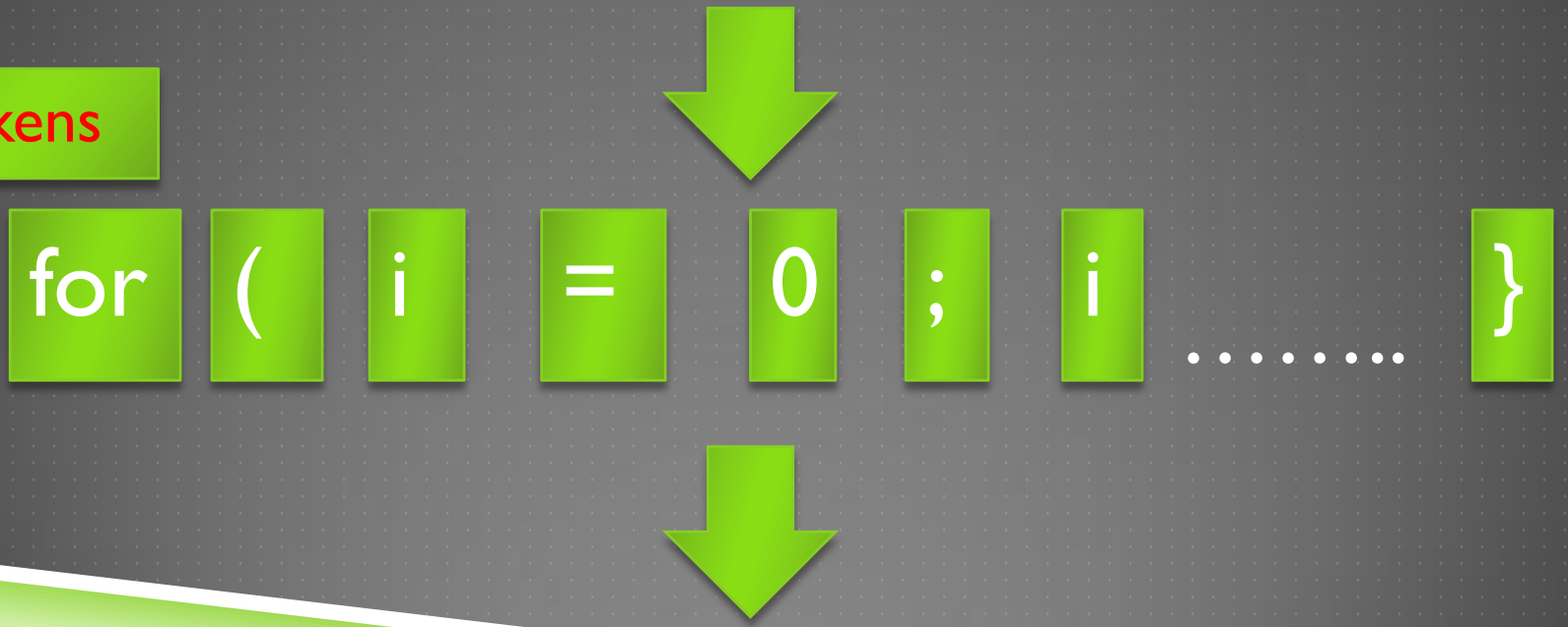
# GRAMMAR


BTECH.g
BTECH.java
BTECHLexer.java
20
21 //xml version and encoding options don't seem to have ever changed
22 //thus parsing it as it is
23 //
24 // Silverlight: Doesn't seem to require this tag info
25 xmlVersion returns [String result]
26 : '<?' 'xml' 'version' '=' '"' '1.0' '"' 'encoding' '=' '"' 'utf-8' '"' '?>'
27 ;
28
29 //start of every Flex MXML file
30 //all components get defined within this tag
31 //
32 // Silverlight: 'UserControl' tag
33 application returns [String result]
34 : '<' 'mx' ':' 'Application' namespace? appLayout? backgroundColor? '>'
35 {$result = "<UserControl " + $namespace.result + $appLayout.result + $backgroundColor.result }
36 //(component|scriptCode)*
37 (component)*
38 '</' 'mx' ':' 'Application' '>'
39 ;
40
41
42 //loop return [String result]
43
44 //
45 //
46 //Silverlight: seems to have more 'default' namespaces that need to be defined
47 namespace returns [String result]
48 : 'xmlns' ':' 'mx' '=' '"' 'http://www.adobe.com/2006/mxml' '"' //the default namespace - 'mx'

# GRAPHICAL REPRESENTATION (1)

Flex Source Code

```
for (i = 0 ; i < 10 ; i++) {
total += i;
}
```



# GRAPHICAL REPRESENTATION (2)

Recognised by the parser this is a “for” loop rule

```
forLoop returns [String result]
:'for' '(' startCondition=assignmentStatement
endCondition=comparisonStatement
increment=variableIncrement ')'
 '{'

{$result+= "for" + "("  + $startCondition.result +
$endCondition.result + $increment.result + ")" + "{";}
(' 'anyStatement=statement {$result+= $anyStatement.result;})*
'}'
{$result+= "}";}
;
```

Grammar Rule

# GRAPHICAL REPRESENTATION (3)

Equivalent Silverlight Code

```
for (i = 0 ; i < 10 ; i++) {
total += i;
}
```

# ACHIEVEMENTS

- Knowledge in RIA & the frameworks (Silverlight & Flex)
- Guidelines & comparisons between the basic controls and code structure in Silverlight and Flex
- Better understanding in different aspects of RIA
  - Portability
  - Performance
  - Usability
  - Security
- Auto code generator development

# FUTURE WORKS

- More complete work on auto code generator
  - Such as error detection on the semantic meaning of code
- Research on other aspects of RIA technologies & HTML5

# THANK YOU