National Institute of Standards and Technology NIST

GSC Conformance Test Suite Architecture and Implementation

Elizabeth Fong and Eric Dalci

NIST

Smart Card Interoperability Workshop CTST 2003

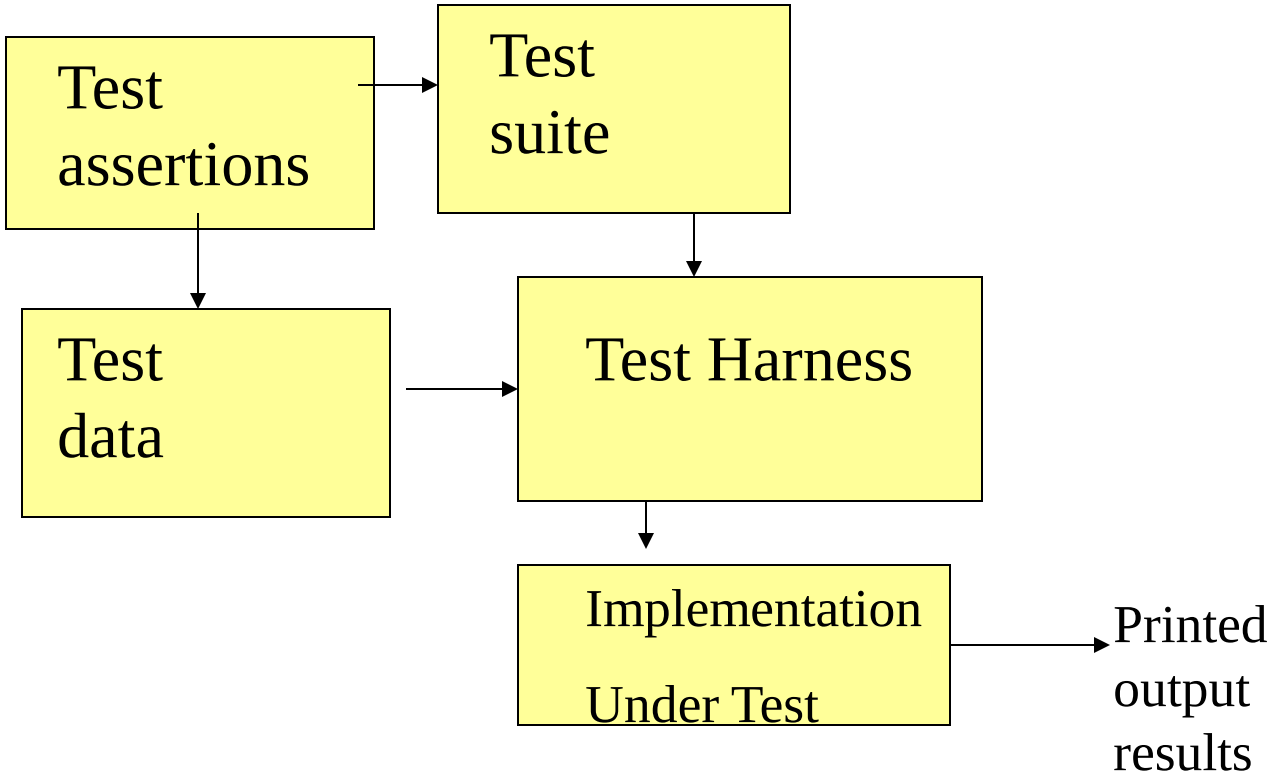
2PM. May 12, 2003

Outline

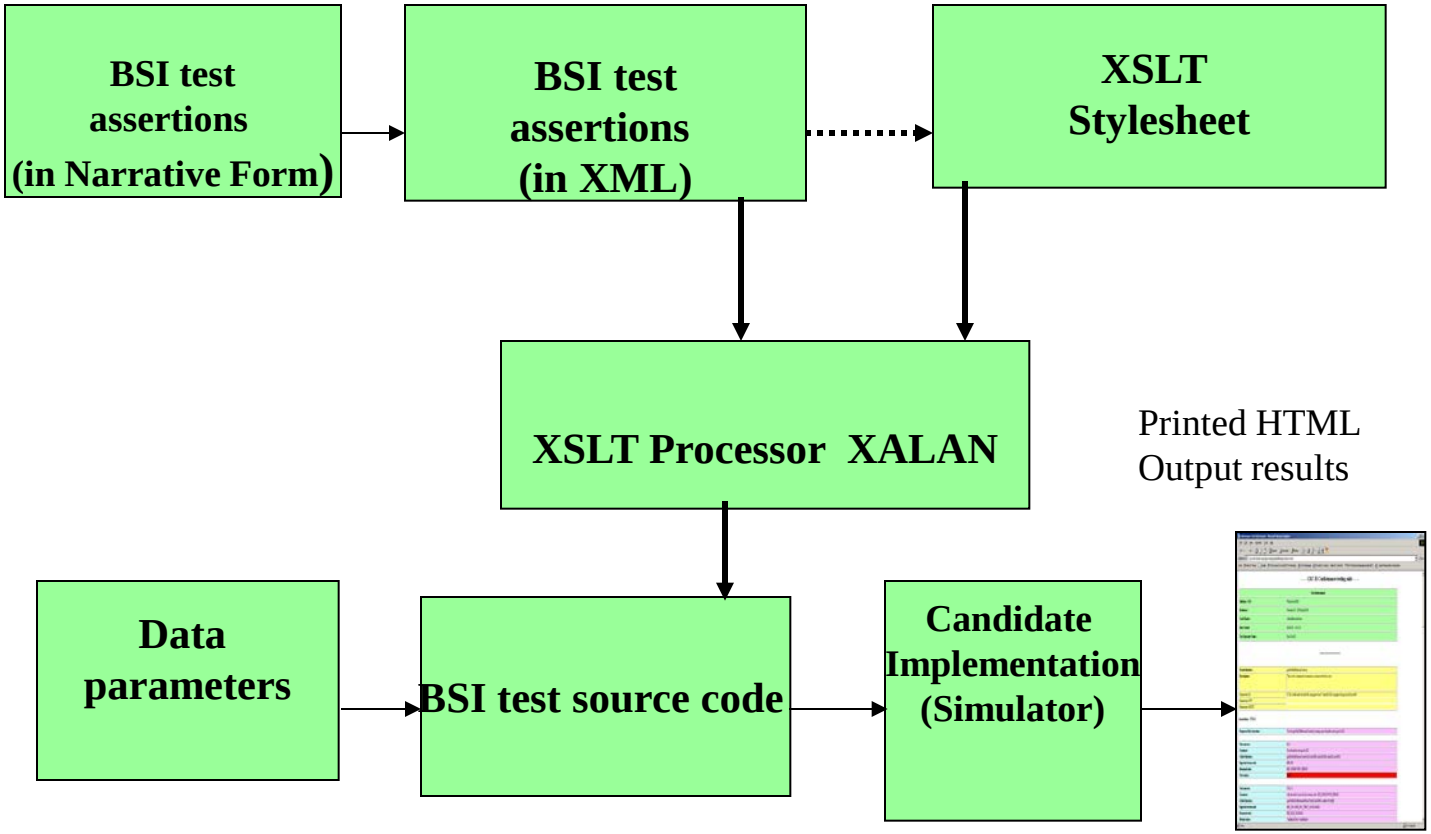
- Conformance Test System
- Conformance Test System for the GSC-IS BSI
- Benefits of the Architectural Approach
- Step-by-Step Illustrations of the Demonstration

Disclaimer: Any commercial product mentioned is for information only; it does not imply recommendation or endorsement by NIST nor does it imply that the products mentioned are necessary the best available for the purpose.

Conformance Test System



GSC-IS Conformance Test System for BSI



Benefits of Architectural Approach

- XML document provides a single source for maintenance and modification to test suites.
- Test source code is automatically generated by XSLT.
- XML document provides traceability and flexibility.
- Can reuse the XSLT for additional BSI commands.
- Fast development of tests for additional language bindings.

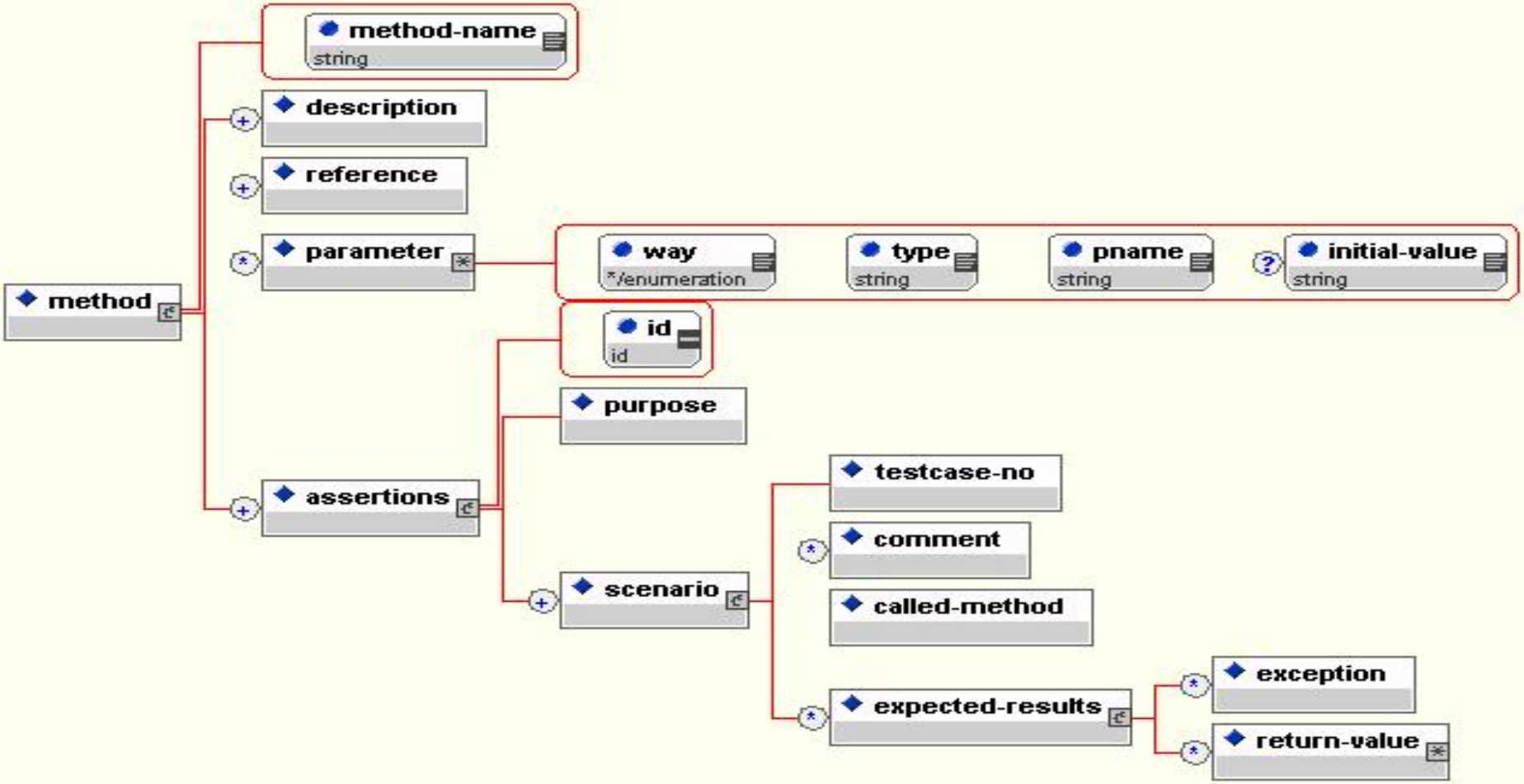
Step-by-Step Illustration of the Demonstration

- Test assertions in narrative form are testable statements and result in one or more test cases.
- Test Assertions in XML according to the DTD.
- XSLT Processor
- Automatic Generation of C or Java Source Code.
- Test Output Results.

Test Assertions in XML

- Document Type Definition (DTD) provides tags and attributes to be used to structure XML documents.
- 21 BSI test assertions are converted into 21 XML documents using the DTD.
- XML authoring tool – XML Spy™ is used.

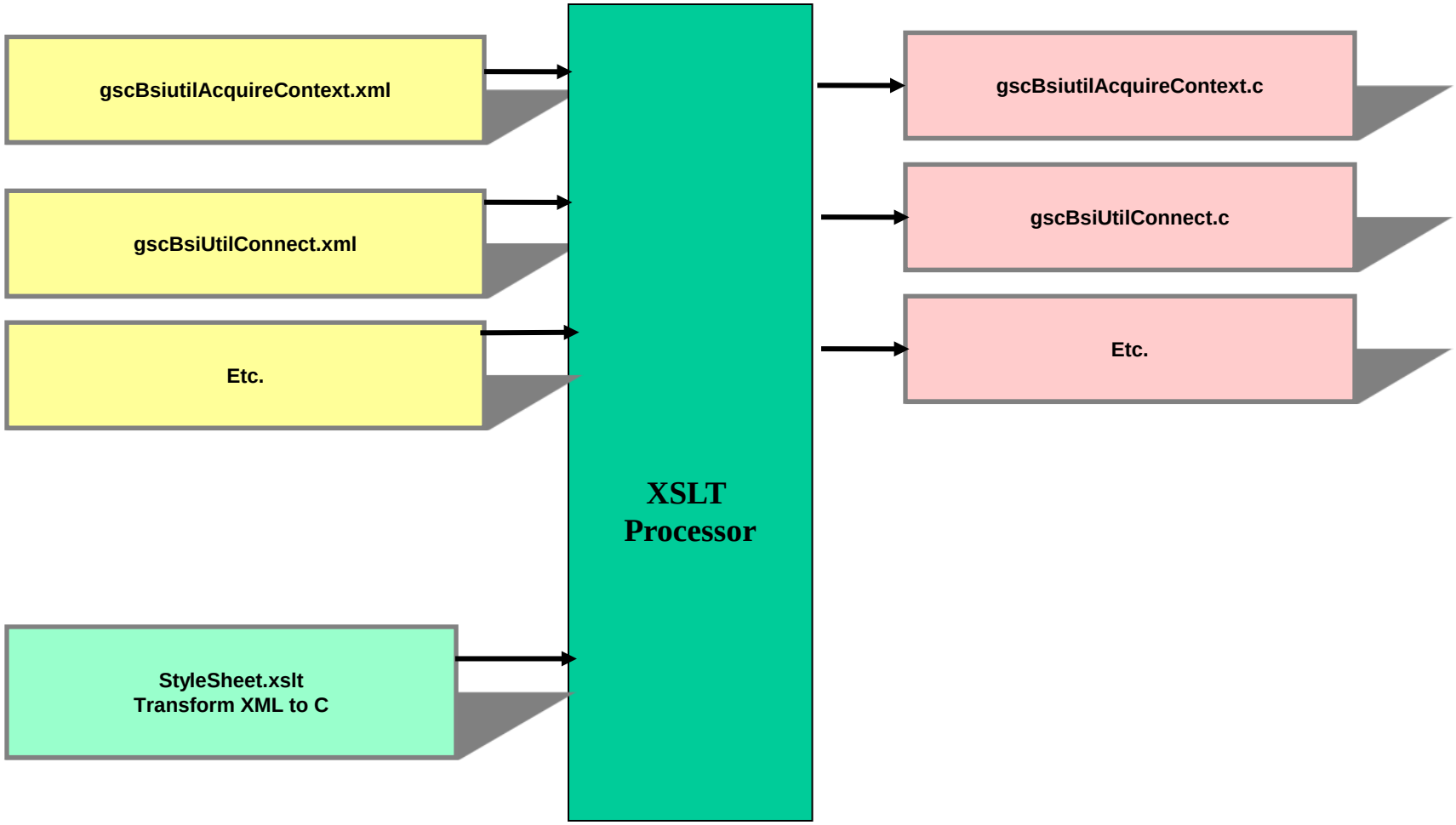
XML Document Type Definition



XML Sample of BSI Connect Function

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE test-method SYSTEM "javadtd.dtd">
<!--Connect BSI Java Binding- Dec 16, 2002 Elizabeth Fong- -->
<test-method>
  <method method-name="gscBsiUtilConnect">
    <description>This is the function to connect a card to a reader and get a card handle.</description>
    <reference>GSC-IS 4.4, F.2.2</reference>
    <parameter way="OUT" type="int" pname="hCard0200" initial-value="0"/>
    <parameter way="IN" type="String" pname="uszReaderName0200" initial-value="constants.defReaderName"/>
    <assertions id="U2.1">
      <purpose>To test gscBsiUtilConnect() using a good card inserted into a specified reader.</purpose>
      <scenario>
        <testcase-no>2.1</testcase-no>
        <called-method>mybsi.gscBsiUtilConnect(uszReaderName0200)</called-method>
        <expected-results>
          <return-value>hCard0200</return-value>
        </expected-results>
      </scenario>
```

XML to C Transformation using XSLT



Automatic Generator of Source Code

- XSLT processor, Xalan™ is used to generate C or Java code.
- Constants and parameters are defined in the data file.
- The source code is compiled and executed with a simulator. (This simulator will be replaced by the real implementation under test)
- Test results are compared with the expected output results to produce a test output report.

Output Results in HTML

NIST
National Institute of Standards and Technology

GSC IS Conformance testing suite

------ Java Binding ------

Test Environment	
Software / OS :	Windows 2000
Hardware :	Pentium III , 250 Meg RAM
Card reader :	Gemplus
Date tested :	April 1, 2003 3:03:28 PM EST en US
Test Operator Name :	Eric DALCI

Tested method	
Name :	gscBsiUtilConnect
Description :	This is the function to connect a card to a reader and get a card handle.
Parameters IN :	String uszReaderName0200
Parameters OUT	int hCard0200

Assertion : U2.1

Purpose of the assertion :	To test gscBsiUtilConnect() using a good card inserted into a specified reader

Test case no :	2.1
Called method :	gscBsiUtilConnect(uszReaderName0200)
Thrown (BSI)Exception :	
Returned value :	hCard0200 = -437445526
Test status :	passed

Test case no :	7.2.1.1
Comment :	call extended error text for return code : -
Called method :	gscBsiUtilGetExtendedErrorText (hCard0200)
Expected exception code :	BSI_NO_TEXT_AVAILABLE
Thrown (BSI)Exception :	BSI_NO_TEXT_AVAILABLE
Returned value :	uszErrorText0700 = empty
Test status :	passed

Test case no :	7.2.1.2
Comment :	call extended error text with bad handle
Called method :	gscBsiUtilGetExtendedErrorText (runs an s bad hCard)
Expected exception code :	BSI_BAD_HANDLE
Thrown (BSI)Exception :	BSI_NO_TEXT_AVAILABLE
Test status :	failed

Demonstration of BSI Conformance Testing