FHIR Testing and Touchstone

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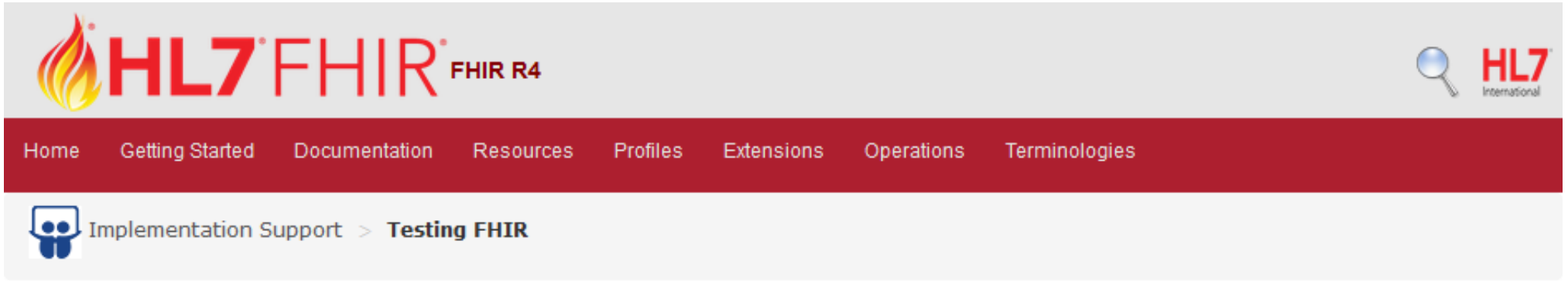
Goal of Session Two

- Present the FHIR Testing framework
- Introduce Touchstone:
  - User registration
  - Account setup
  - Test system setup
  - Test execution (demo)

FHIR Testing Framework

- To ensure interoperability between applications claiming conformance to the specification, a testing framework has been established within the FHIR specification.
- This framework defines the TestScript resource as a natural language, computable format of a test case.
- It provides a defined test methodology for the FHIR specification which can be used to validate interoperability across FHIR server and client implementations.

FHIR Testing Framework

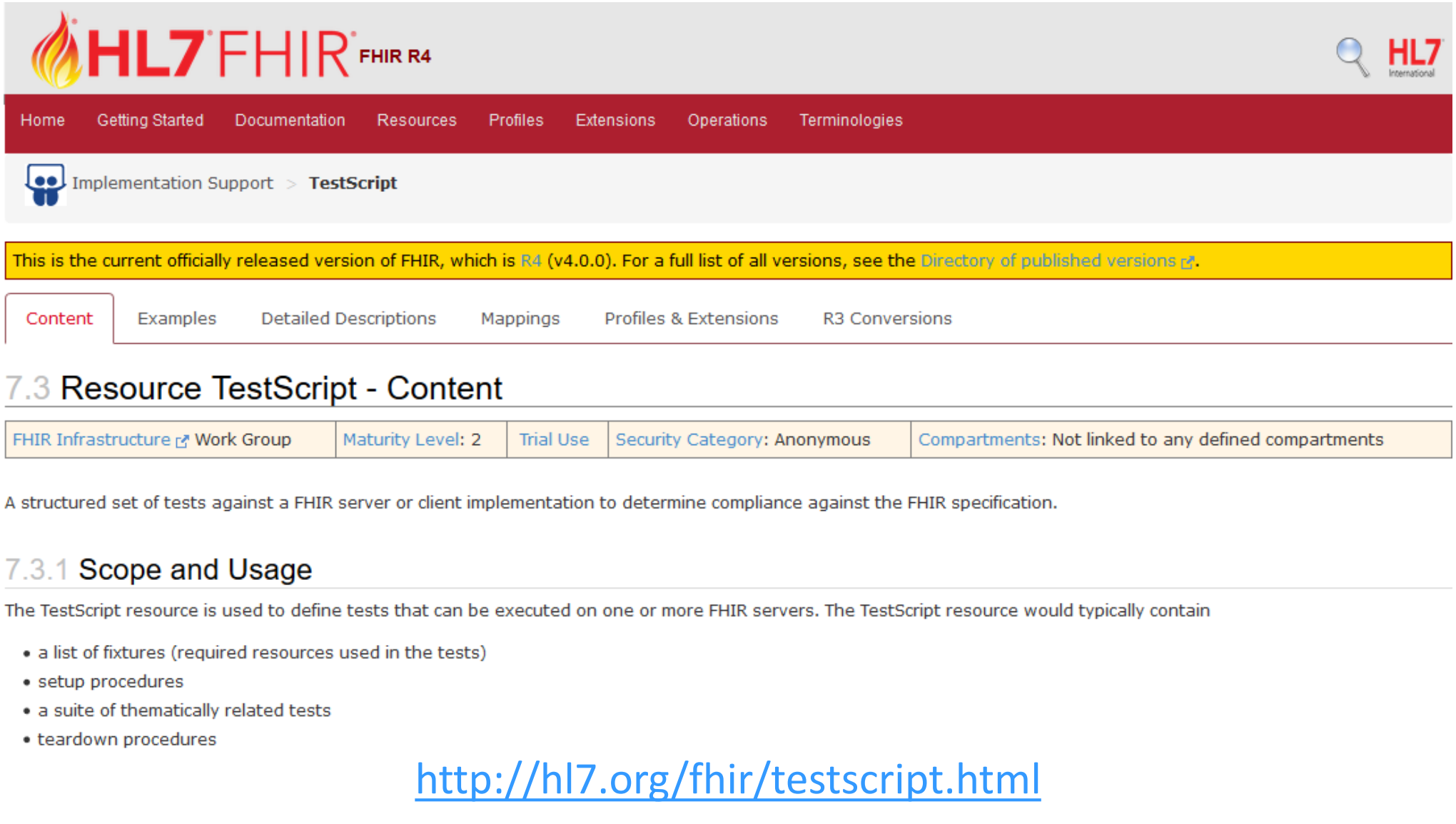


http://hl7.org/fhir/testing.html

FHIR TestScript Resource

- The TestScript resource represents an executable test definition for examining the results of FHIR RESTful API interactions.
- A TestScript example would be a set of tests that exercise a certain function, such as Patient Search, and validating the responses. For this example we require:
  - Patient resource(s) required to complete this test
  - A setup procedure to create those Patient resource(s)
  - The tests which execute the functions being exercised & evaluate the results
  - A setup or tear-down procedure to initialize or clean up the test data

TestScript Resource



http://hl7.org/fhir/testscript.html

Test Engine Workflow

- Pre-Processing
  - Determine whether or not the TestScript interactions match the capabilities of the system under test.
- Setup Execution
  - Optional operations that prepare the system under test for subsequent test execution.
- Test Execution
  - Execute and record each test's operations and assertions.
- Teardown Execution
  - Optional operations that revert the system under test to its pre-test state.
- Post-Processing
  - Cleanup of test execution data and collection of test results.

http://hl7.org/fhir/testing.html#execution

Pre-Processing

Capability Based Testing

- The test engine will use the CapabilityStatement of the system under test to determine how to process a TestScript.
- If the TestScript defines the testing of capabilities that the system under test does support, the test engine will continue the workflow process.
- If the TestScript defines the testing of capabilities that the system under test does not support, the test engine should allow the TestScript to be skipped.

Test Execution

Executing Operations

- Test execution consists of two action types:
  - operation: The FHIR RESTful API interaction to be executed.
  - assert: The rule that is evaluated against the results of the operation. If true, the assert passes.

Key concept: The operation is always executed regardless of whether or not an assert follows.

TestScript Operations

FHIR Interactions

Instance Level Interactions

- Read (GET)
- Vread (GET)
- Update (PUT)
- Patch (PATCH)
- Delete (DELETE)
- History (GET)

Type Level Interactions

- Create (POST)
- Create via Update (PUT)
- Search (GET)
- History (GET)

Whole System Interactions

- Capabilities (GET/OPTIONS)
- Batch/Transaction (POST)
- History (GET)
- Search (GET)

Extended Operations

http://hl7.org/fhir/operationslist.html

- Base Operations (All Resources)
- Operations Defined by Resource Type

Asserts

Conditions, Rules or Expressions

- An assert acts on the immediately preceding operation.
- It states a condition, rule or expression that will be evaluated against the executed operation context.

Asserts provide support for:

- Evaluation of both the inbound request or outbound response
- Complex and simple evaluation of HTTP headers and response codes
- Operators for equality, relational comparison, containment, etc.
- Expression language support for XPath, JSONPath and FHIRPath
- Payload comparison to defined fixtures (static or dynamic)
- Payload validation against defined FHIR profile(s)
- *Plus a whole lot more…*

Recap: FHIR Testing and TestScripts

- FHIR defines a Testing Framework as part of the specification
- Test Engines should follow a prescribed Workflow
- TestScript Resource Type provides a complete, executable test definition
- Support for the entire FHIR RESTful API (Operations)
- Support for Evaluation of Extensive Conditions, Rules and Expressions (Asserts)

Discussion (Q & A)

Introducing Touchstone

Touchstone is an easy-to-use testing platform for health information exchange that implements the FHIR Testing Framework architecture.

Touchstone

- Is available as a publicly accessible cloud-based testing platform
- Provides automated, internet-based interoperability testing of the HL7® FHIR® specification
- Tests the capabilities of and interoperability between both FHIR Server and Client implementations
- Is a blend between Test-Driven-Development (TDD) methodologies and Natural Language Processing (NLP) TestScripts

Touchstone Landing Page

TOUCHSTONE

Docs | Sign In | Register

- Analytics
  - Published
- Test Definitions

Touchstone - *an AEGIS Developers Integration Lab (DIL) Initiative*

Subscription

Touchstone is an Infrastructure as a Service (IaaS) and Testing as a Service (TaaS) Open Access Solution for health information exchange. Touchstone strives to live up to its dictionary definition - *a criterion for determining the quality or genuineness of a thing* - by offering thousands of tests in an easy-to-use system for determining a test system's conformance and interoperability against published specifications, standards, and profiles, including templates and implementation guides.

Touchstone ...

- allows for automated, internet-based interoperability testing against the HL7 FHIR specifications and standards.
- tests interoperability with other FHIR Server and FHIR Client implementations.
- has been engineered from the ground up to leverage the new FHIR TestScript resource.
- is a blend between Test-Driven-Development (TDD) methodologies and Natural Language Processing (NLP) test scripts.
- has been featured at HL7 FHIR Connectathons and is being leveraged in a continuous testing environment by numerous leading HL7 FHIR implementers.
- plays an active role in the HL7 Conformance Testing community, the HL7 Argonaut Project, and the HSPC Implementation community.

AEGIS

Features include...

- self-registration of user accounts and organizations.
- ability for users to execute FHIR test scripts against test systems with Touchstone serving as the initiator of message exchanges.
- ability for users to initiate message exchanges from their test systems against other peer test systems with Touchstone serving as the intermediary.
- ability to drill down to individual operations and assertions in test execution results.
- ability to save configured sets of test scripts as named "test setups" for re-execution.
- controlled access to test scripts, test systems, and test results at the user, organization, and organization group levels.

Help and Documentation

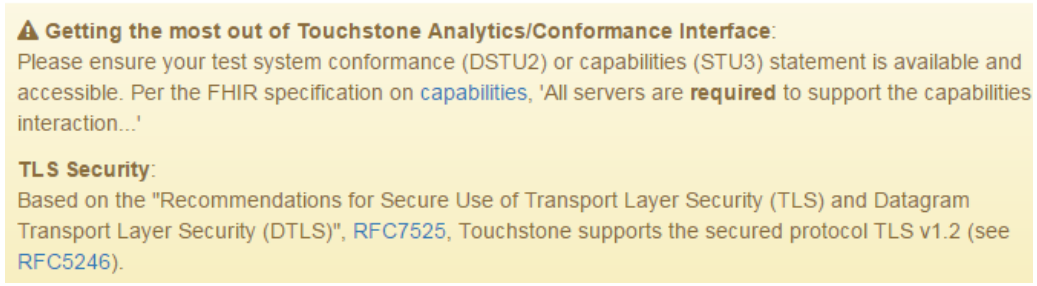
- How to register in Touchstone
- How to become a member of or create an organization
- How to approve an organization membership request
- How to create a test system
- How to execute test scripts
- How to execute client-side (peer-to-peer) tests
- How to perform Conformance-based testing
- How to integrate Touchstone with CI including Jenkins
- How to reset my password

Feeds

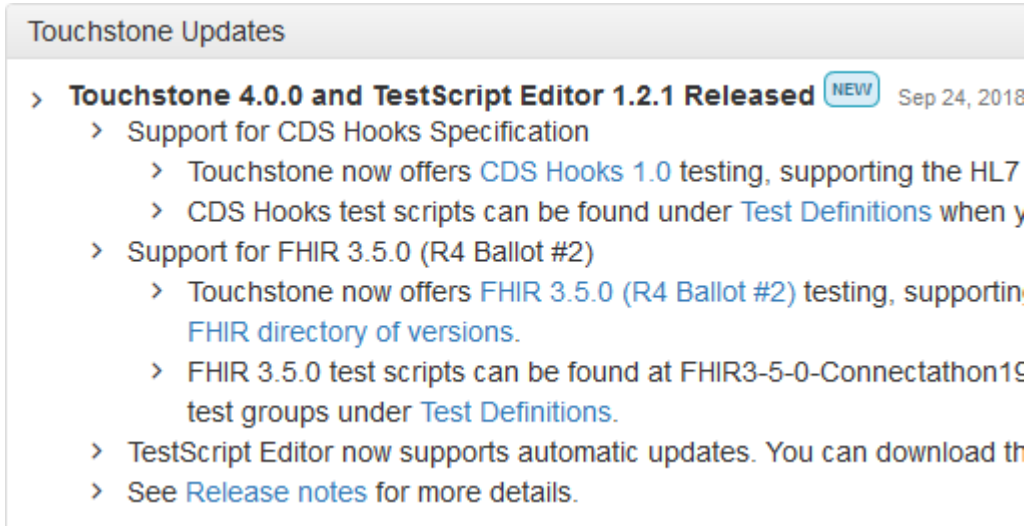
- Healthcare Interoperability Testing with FHIR Just Got Easier! NEW Jun 18, 2018
- FHIR Connectathon Links Health Technology Efforts From 17 Countries NEW May 29, 2018
- Dammit, Jim, I'm a Doctor Not an EHR Software Tester! May 25, 2018
- DevDays June 2018 Boston & Touchstone and FHIR Testing, Take 2… Apr 9, 2018
- Ready, FHIR, Test! Set your sights on testing Feb 26, 2018
- HL7 FHIR Connectathon #17 - Sat Morning Breakouts Jan 24, 2018
- Touchstone and FHIR Testing at DevDays 2017 Nov 9,

www.touchstone.com

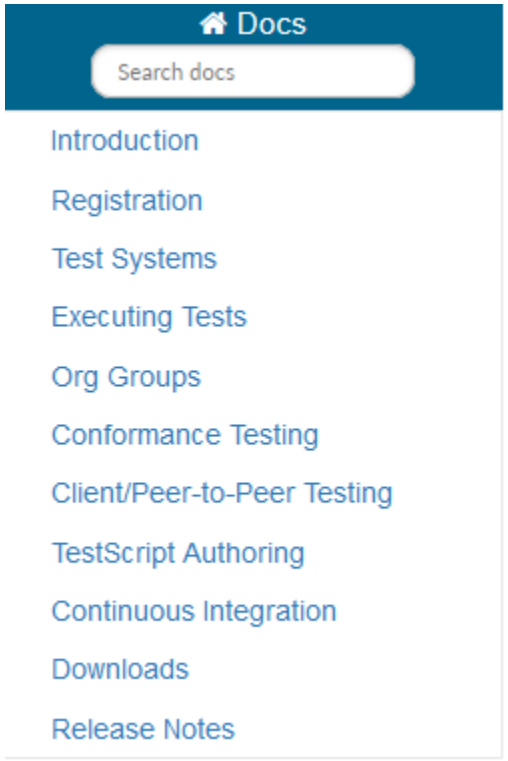
Touchstone Landing Page

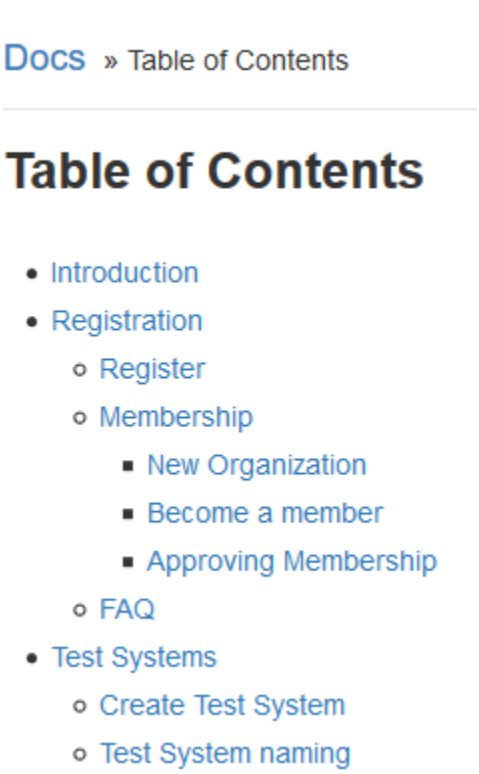


Alerts: Important usage information



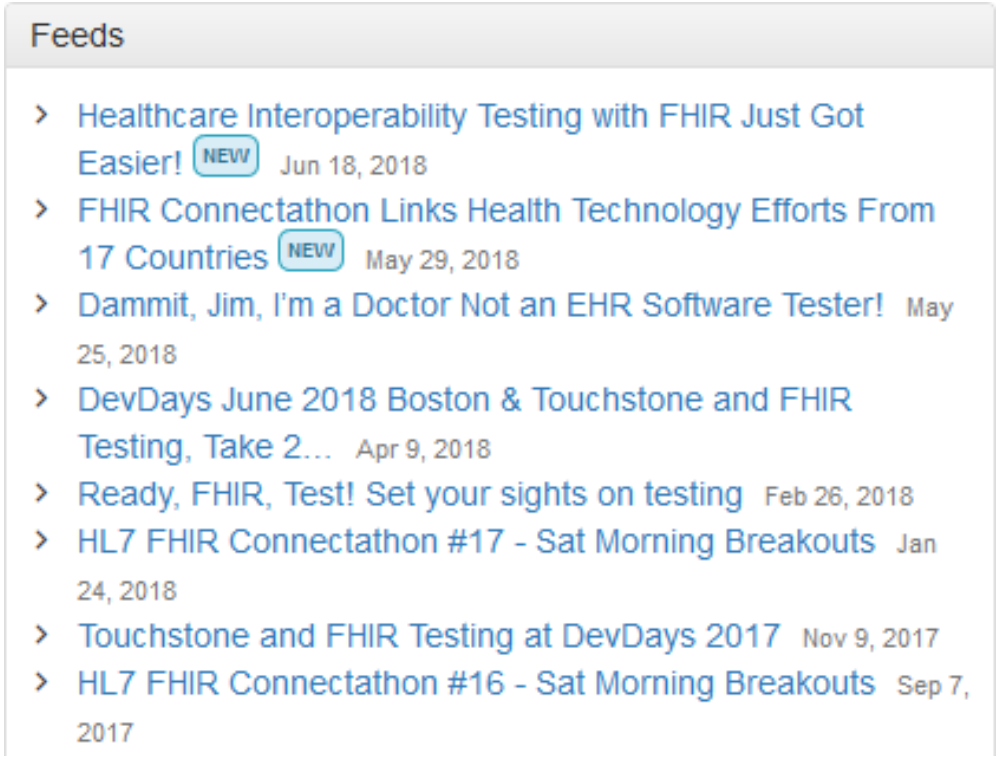
Touchstone Updates: Describes significant released version updates



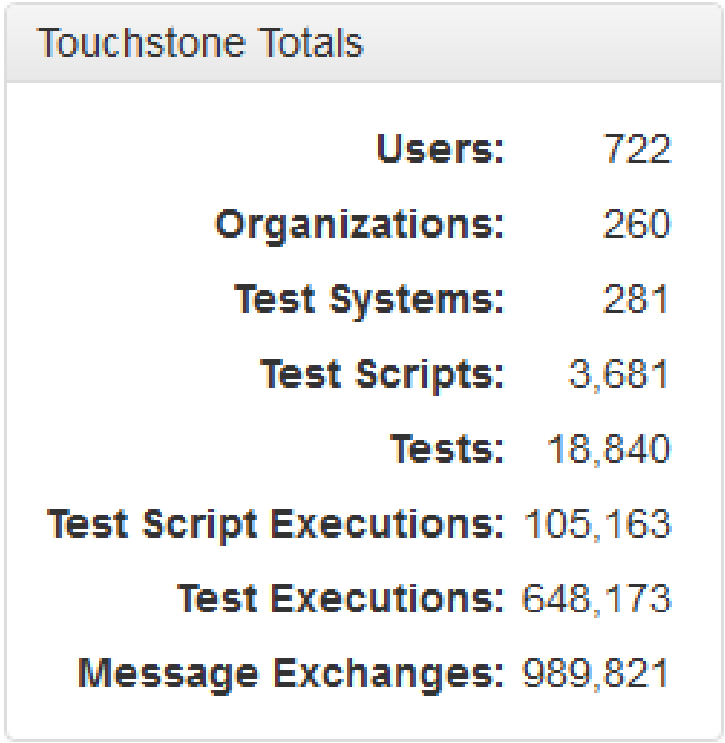


Online Documentation:
User Guide and How-Tos

Touchstone Landing Page



Feeds: News links related to FHIR, Testing and Touchstone



Touchstone Totals: Tracks participation since Touchstone v1.0 release

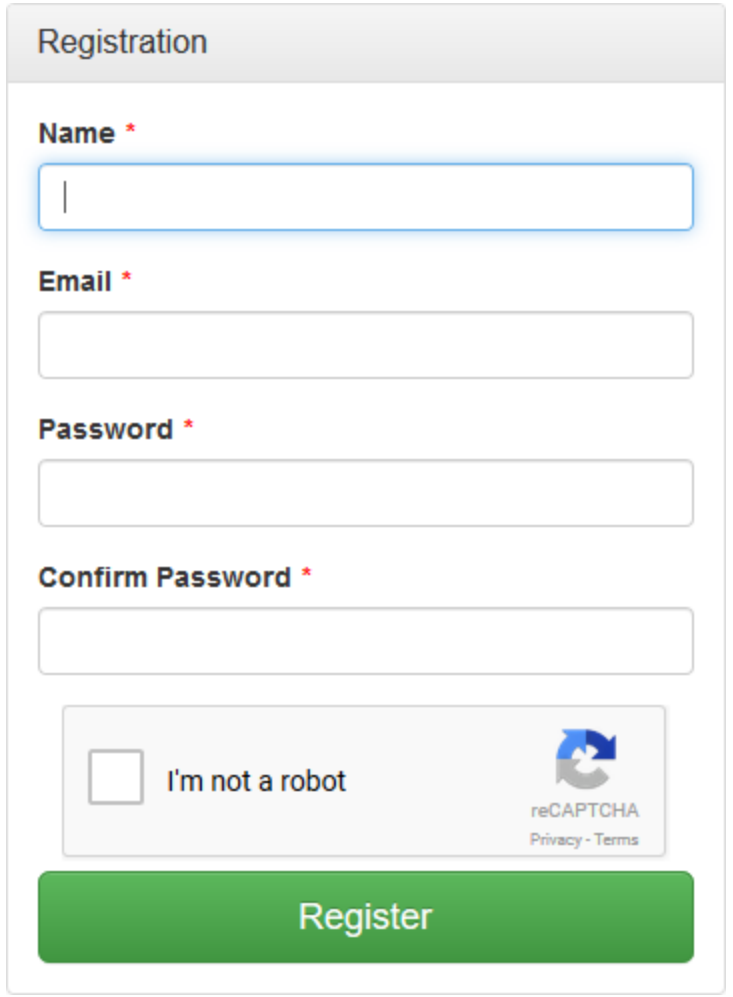
Discussion (Q & A)

Getting Started with Touchstone

- All testing participants need to first Register with Touchstone
- Organizations may have 1 or more registered users on Touchstone (based on the organization's subscription level)
- Registration and acceptance of registration must be completed before any testing can begin
- An organization will typically have at least 1 test system and may choose to run tests against other publicly available test systems

Register an Account in Touchstone

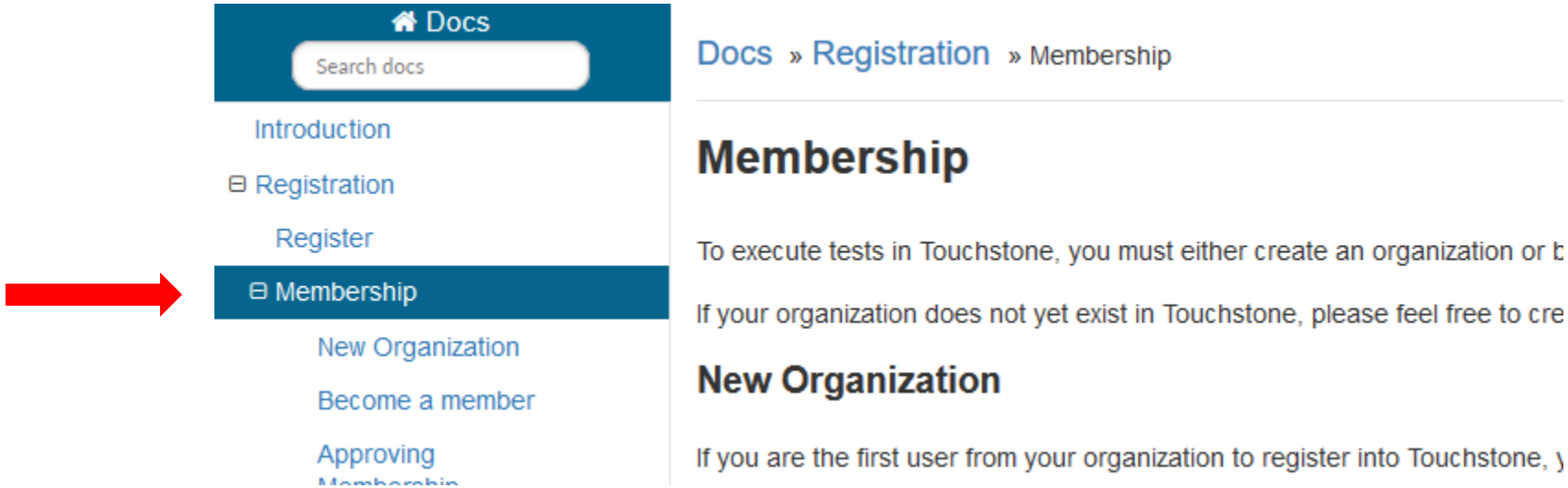
- Click Register
  - Enter your user name, email, password twice, and select “I’m not a robot”
  - Click the Register button



Create or Join an Organization

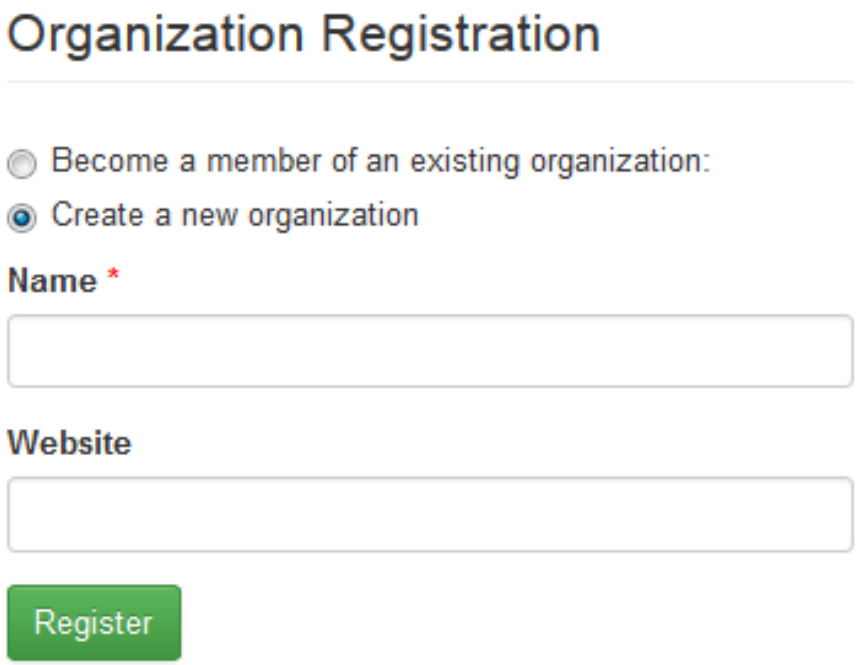
Your user account must belong to an organization. You can:

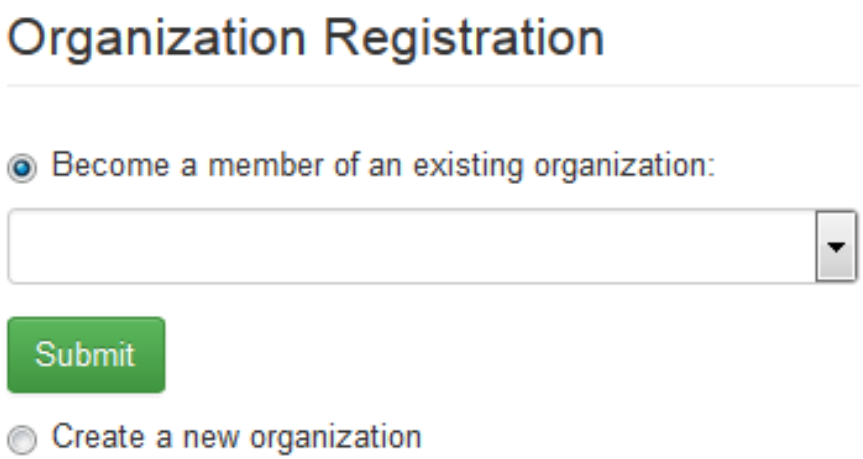
a. Create an organization with your team
b. Join an existing organization
c. Use the Online Documentation if guidance is needed



Create or Join an Organization

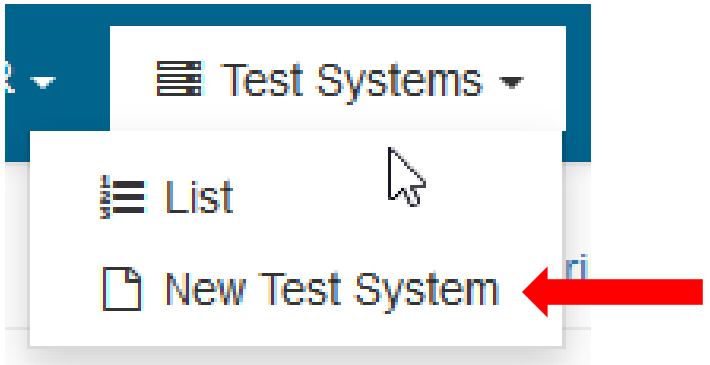
- If you are the first person from your organization to register, select Create a new organization
- If your organization is already registered, select Become a member of an existing organization. Then select your organization from the dropdown list.





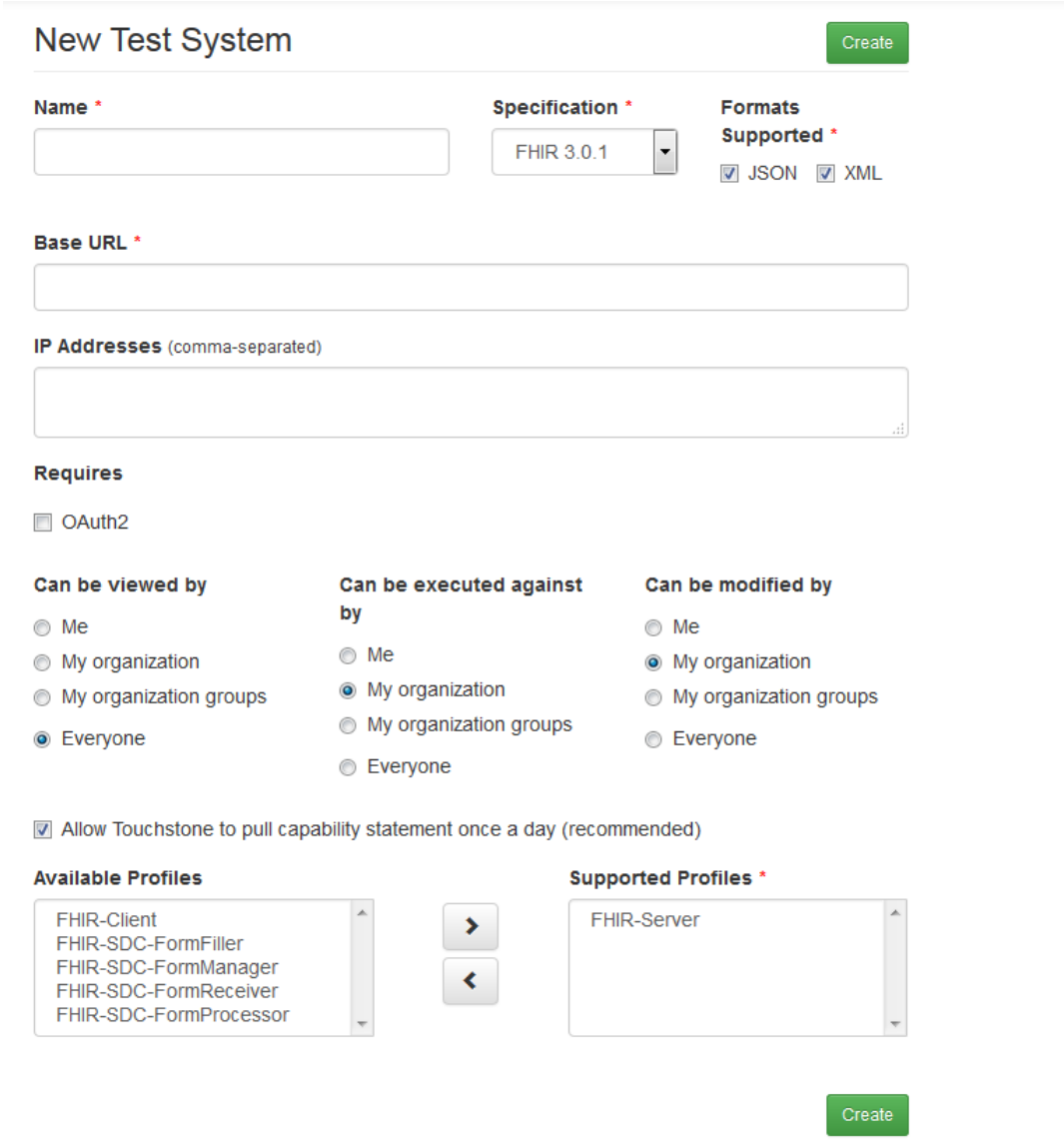
Create a New Test System Definition

- To run tests, a Test System must be defined
- From the top menu
  - Go to Test Systems
  - Select New Test System
- Once selected, a new entry for Test System will display



Create a New Test System Definition

- Enter the test system name
- Select the specification version and supported formats
- Enter the base URL
- The IP addresses are optional
  (Touchstone will determine this if left blank)
- Select OAuth2 if required
- Select privacy settings:
  - who the Test System can be viewed by
  - who can execute against the Test System
  - who can modify the Test System
- Assign the supported actor profiles



Touchstone Demo – Test Execution

Discussion (Q & A)