

Inferno Tech Talk – Jan 2024

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Inferno Tech Talk Introduction

- Purpose: to provide regularly scheduled updates on the Inferno tool and its implementation of the (g)(10) test procedure
- Typical agenda to include:
 - Announcements about upcoming releases
 - Training on new features
 - Highlight outstanding issues or known problems
 - Open discussion
- Monthly recurrence: 2nd Wednesday at 1PM ET

Content reflects Inferno's implementation of applicable Test Procedure
and does not necessarily reflect ONC policy.

Today's Agenda

- (g)(10) Standardized API Test Kit v5.0.0
- Preview of Site Redesigns:
 - Inferno on HealthIT.gov
 - Inferno Framework Home

ONC (g)(10) Standardized API Test Kit v5.0.0

- Approved Standard Update:
 - Removal of **US Core v5 / USCDI v2**
- Test Update:
 - Changes that may result in new failure: **1**

Approved Standards Update

- Removes US Core v5 / USCDI v2
- ONC requirement to remove this option for new certifications starting this month



Options

US Core Version

US Core 3.1.1 / USCDI v1

US Core 4.0.0 / USCDI v1

US Core 6.1.0 / USCDI v3

SMART App Launch Version

SMART App Launch 1.0.0

SMART App Launch 2.0.0

Bulk Data Version

Bulk Data 1.0.1

Bulk Data 2.0.0

START TESTING

Changes that may result in new failures

- Previous version incorrectly omitted a required check for SMART App EHR Launch Encounter context when using US Core v6.1.0
- Added this check: it is the same as when users selected US Core 5

The screenshot shows the ONC Certification (g)(10) Standardized API interface. On the left, there is a sidebar with a dropdown menu labeled "Preset" set to "None". Below it is a list of categories: "(g)(10) Standardized API", "1 Standalone Patient App", "2 Limited Access App", "3 EHR Practitioner App" (which is highlighted with a blue arrow pointing from the left), "10 Single Patient API", "7 Multi-Patient API", "9 Additional Tests", "9.1 SMART Public Client Launch", and "9.2 Token Revocation". To the right of the sidebar is a list of test cases, each preceded by a radio button:

- 3.3.10 User-level access with OpenID Connect and Refresh Token scopes used.
- 3.3.11 Server rejects unauthorized access
- 3.3.12 OAuth token exchange response body contains patient context and patient resource can be retrieved
- 3.3.16 OAuth token exchange response body contains encounter context and encounter resource can be retrieved
- 3.3.14 Launch context contains smart_style_url which links to valid JSON
- 3.3.15 Launch context contains need_patient_banner
- 3.5 OpenID Connect

At the bottom of the interface, there is a footer with the INFERNO logo, the text "BUILT WITH V.0.4.26 API", and links to "Report Issue", "Open Source", and "Download".

Inferno Redesign Preview

inference.healthit.gov

The screenshot shows the main page of the inference.healthit.gov website. At the top, there's a banner for the ONC Health IT Certification Program. Below it, there's a section for "ONC HOSTED TESTS AND UTILITIES" which includes a link to the "(g)(10) Standardized API Test Kit". To the right, there's a section for "INFERNO DEVELOPMENT FRAMEWORK" which includes a link to "Inferno Framework". There's also an "ANNOUNCEMENTS" box with a message about a tech talk.

ONC-hosted testing for select
Inferno tests

(e.g. (g)(10) Standardized API)

inference-framework.github.io

The screenshot shows the main page of the inference-framework.github.io documentation. It features a sidebar with navigation links like Home, Overview, Concepts, Getting Started, Writing Tests, Advanced Features, Available Test Kits, Test Kit Repository Layout and Organization, Distributing Tests, and Deployment. The main content area has a heading for "Inferno Framework" and a sub-section titled "Simple to Read, Simple to Write" with a code snippet in Ruby DSL.

Inferno Documentation, including
how to create your own tests

Redesign Goals

- Improve design & visually refresh both sites
- Better differentiate sites and their purposes
- Expand content and consolidate information across multiple channels
- Lay foundation for future content and improvements
- Minimally disrupt existing workflows and users

Preview available today – Release Planned for February 13

Preview at <https://inferno-qa.healthit.gov>

Inferno on HealthIT.gov

ONC-Hosted Inferno Test Site

inferno.healthit.gov Redesign

Landing Page

1. Distinct branding for **Inferno on HealthIT.gov**
2. Important links to get started do not require scrolling
3. Explanatory “What is Inferno?” and News/Events below the fold

Preview at <https://inferno-qa.healthit.gov>

The screenshot shows the redesigned landing page for Inferno on HealthIT.gov. At the top, there's a navigation bar with links for Test Kits, News & Updates, Events, and About. Below the navigation is a banner stating "Inferno on HealthIT.gov is for demonstration only. Not for use with sensitive data or Protected Health Information (PHI). Data periodically removed. ⓘ". The main title "Inferno on HealthIT.gov" is prominently displayed, followed by a subtitle "HL7® FHIR® Testing by The Office of the National Coordinator for Health IT". A paragraph explains that Inferno on HealthIT.gov is a public service for running select FHIR conformance tests built with Inferno, including tests relevant to the ONC Health IT Certification Program and other popular FHIR Implementation Guides. Two buttons are visible: "Learn More" and "Start Testing Now". To the right, there are two sections: "ONC Health Certification Program" (with a "ONC (g)(10) Standardized Test Kit" button) and "FHIR Resource Validator" (with an "Open Validator" button). Below these are three columns: "What is Inferno?", "Open Source FHIR Testing" (describing Inferno as a tool for creating, executing, and sharing automated conformance tests), "Start Testing Today" (describing Inferno as a public host for the (g)(10) Standardized API Test Kit), and "Create your own tests" (describing Inferno's flexibility and the ability to create custom tests). At the bottom, there are links for "Run your own Inferno Instance", "Integrate with Inferno", and "Additional Tools".

inferno.healthit.gov Redesign

Test Kit Listing Page

1. Tests are organized by Test Kits, which aligns with fundamental Inferno packaging strategy
2. Description, Last Updated and other metadata provided
3. Search/Filter added to accommodate growing list of test kits available on this host
4. "Your Recent Sessions"

Preview at <https://inferno-qa.healthit.gov>

The screenshot displays the Inferno on HealthIT.gov Test Kit Listing Page. At the top, there's a navigation bar with links for Test Kits, News & Updates, Events, and About. A yellow arrow points downwards from the top right towards the main content area. The main content area has a header "HOME / TEST KITS". It includes a search bar labeled "Search Hosted Test Kits", a "Standard All Standards" dropdown, and a "Test Kit Maturity All Levels" dropdown. Below this, there are four test kit cards:

- ONC Certification (g)(10) Standardized API Test Kit**: Described as a testing tool for Health IT systems seeking to meet the requirements of the Standardized API for Patient and Population Services criterion § 170.315(g)(10) in the 2015 Edition Cures Update rule. It is an approved test method for the § 170.315(g)(10) test procedure. It was last updated on 01/09/2024, version 5.0.0, with a maturity level of High.
- UDS+ Test Kit**: Validates the conformance of a server to the UDS+ IG v1.0.1. It includes tests function as a rudimentary data receiver. It was last updated on 01/09/2024, version 1.0.7, with a maturity level of Moderate.
- US Core Test Kit**: Validates the conformance of a server implementation to a specific version of the US Core IG. It can test against implementations of versions v3.1.1, v4.0.0, v5.0.1, and v6.1.0. It was last updated on 12/11/2023, version 0.6.2, with a maturity level of High.
- International Patient Access Test Kit**: Provides an executable set of tests for the International Patient Access (IPA) Implementation Guide v1.0.0. It evaluates a system's ability to support applications acting on behalf of patients to access clinical records using an HL7® FHIR® R4 API. It was last updated on 12/11/2023, version 0.6.2, with a maturity level of High.

A sidebar on the right is titled "Select a Test Kit to Start Testing" and contains a descriptive paragraph about how Inferno tests are grouped into Test Kits. It also includes a "More information" link and a "Your Recent Sessions" section which states there are no recent sessions. There's also a small trash icon in the sidebar.

inferno.healthit.gov Redesign

Test Kit Page

1. New view with overview of the Test Kit and provides a permanent URL
2. Provides metadata such as version, maturity, last updated
3. Flexibility to provide extended content and links

Preview at <https://inferno-qa.healthit.gov>

The screenshot displays the 'ONC Certification (g)(10) Standardized API Test Kit' page. At the top right, there is a yellow arrow pointing downwards towards the page content. The page features a logo for 'INFERNO on HealthIT.gov'. Below the logo, a banner states: 'Inferno on HealthIT.gov is for demonstration only. Not for use with sensitive data or Protected Health Information (PHI). Data periodically removed.' The main content area has a blue header bar with the text 'HOME / TEST KITS / ONC CERTIFICATION (G)(10) STANDARDIZED API TEST KIT'. The main title is 'ONC Certification (g)(10) Standardized API Test Kit'. Below the title, it says 'Last Updated: January 9, 2024', 'Test Kit Version: 5.0.0', and 'Maturity: High'. There are three tabs: 'SMART App Launch' (selected), 'US Core', and 'Bulk Data'. The 'Status' section contains text about the test kit being a testing tool for Health IT systems seeking to meet the requirements of the Standardized API for Patient and Population Services criterion § 170.315(g)(10) in the 2015 Edition Cures Update rule. It is an approved test method for the § 170.315(g)(10) test procedure. It includes a simulated conformant FHIR API link, information about GitHub, and a walkthrough for demonstration. The 'Start Testing' sidebar on the right lists 'US Core Version' with 'US Core 3.1.1 / USCDI v1' selected, 'SMART App Launch Version' with 'SMART App Launch 1.0.0' selected, and 'Bulk Data Version' with 'Bulk Data 1.0.1' selected. A 'Create Test Session' button is available. The 'Your Recent Sessions' sidebar is empty.

inferno.healthit.gov Redesign

Test Session Interface

1. No changes except for banner on top
2. URLs from previous release are unchanged and should still function

Preview at <https://inferno-qa.healthit.gov>

The screenshot shows the HealthIT.gov Test Session Interface. At the top, there's a blue header bar with the HealthIT.gov logo, a "NEW SESSION" button, and links for "HHS Privacy Policy" and "HHS Vulnerability Disclosure Policy". Below the header, a banner states: "Inferno on HealthIT.gov is for demonstration only. Not for use with sensitive data or Protected Health Information (PHI). Data periodically removed." The main content area is titled "ONC Certification (g)(10) Standardized API v.5.0.0" and specifies "US Core 3.1.1 / USCDI v1, SMART App Launch 1.0.0, Bulk Data 1.0.1". On the left, a sidebar has a "Preset" dropdown set to "None" and a list of test categories: "(g)(10) Standardized API" (radio buttons for 1. Standalone Patient App, 2. Limited Access App, 3. EHR Practitioner App, 4. Single Patient API, 7. Multi-Patient API), "9 Additional Tests" (radio buttons for 9.1 SMART Public Client Launch, 9.3 Token Revocation, 9.4 SMART Invalid AUD Launch, 9.5 SMART Invalid Token Request, 9.8 EHR Launch with Patient Scopes, 9.10 Visual Inspection), and a "Report" section. The main panel displays the "ONC Certification (g)(10) Standardized API" page, which includes instructions for getting started, a list of test types (1. Standalone Patient App - Full Access, 2. Standalone Patient App - Limited Access, 3. EHR Practitioner App, 4. Single Patient API (US Core 3.1.1), 7. Multi-Patient Authorization and API), and a "9 Additional Tests" section. A "RUN ALL TESTS" button is located in the top right of this panel. At the bottom, there's a "Configuration Messages" section, the INFERNO logo with "BUILT WITH V.0.4.26 API", and links for "Report Issue", "Open Source", and "Download".

inferno.healthit.gov Redesign

News & Updates

1. Each deployment will have a news entry providing an overview of what has changed
2. Additional news will be provided as relevant

Preview at <https://inferno-qa.healthit.gov>

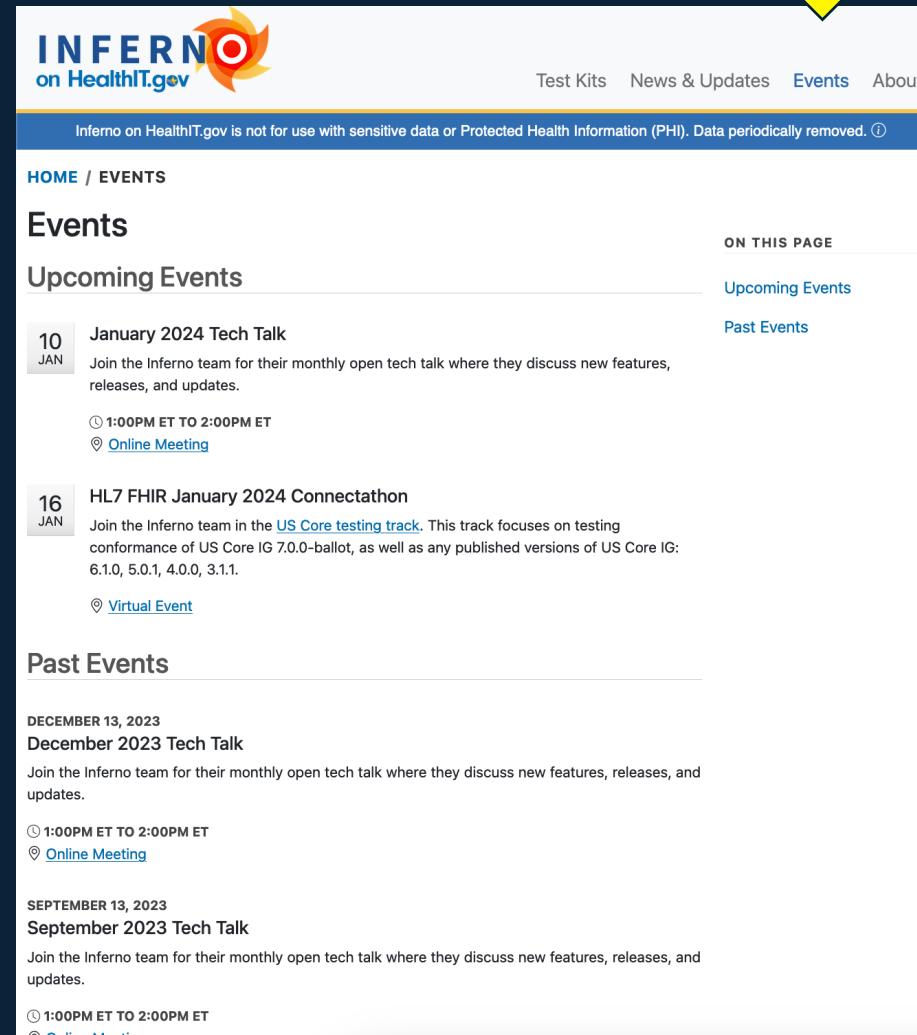


The screenshot shows the 'News & Updates' section of the Inferno on HealthIT.gov website. The top navigation bar includes links for Test Kits, News & Updates (which is highlighted by a yellow arrow), Events, and About. A banner at the top states: 'INFERNO on HealthIT.gov is not for use with sensitive data or Protected Health Information (PHI). Data periodically removed.' Below the banner, the 'HOME / NEWS & UPDATES' link is followed by the 'News & Updates' heading. The page is divided into sections for '2024' and '2023'. Under the 2024 section, there is a link to 'Welcome to the new Inferno on HealthIT.gov' dated 'JANUARY 9, 2024', which describes the redesign goal. Under the 2023 section, there are links to 'January 2024 Monthly Update' (dated 'JANUARY 8, 2024') and 'December 2023 Monthly Update' (dated 'DECEMBER 12, 2023'), both detailing monthly releases and updates to test kits.

inferno.healthit.gov Redesign

Events

1. Provides information about upcoming events; such as Tech Talks & Test Event participation
2. Provides a history of events and relevant content



The screenshot shows the 'Events' section of the Inferno website. At the top, there's a navigation bar with links for 'Test Kits', 'News & Updates', 'Events' (which is highlighted in blue), and 'About'. Below the navigation, a banner states: 'Inferno on HealthIT.gov is not for use with sensitive data or Protected Health Information (PHI). Data periodically removed.' A small orange arrow icon is part of the 'Inferno' logo.

HOME / EVENTS

Events

Upcoming Events

10 JAN January 2024 Tech Talk
Join the Inferno team for their monthly open tech talk where they discuss new features, releases, and updates.
⌚ 1:00PM ET TO 2:00PM ET
📍 [Online Meeting](#)

16 JAN HL7 FHIR January 2024 Connectathon
Join the Inferno team in the [US Core testing track](#). This track focuses on testing conformance of US Core IG 7.0.0-ballot, as well as any published versions of US Core IG: 6.1.0, 5.0.1, 4.0.0, 3.1.1.
⌚ [Virtual Event](#)

Past Events

DECEMBER 13, 2023
December 2023 Tech Talk
Join the Inferno team for their monthly open tech talk where they discuss new features, releases, and updates.
⌚ 1:00PM ET TO 2:00PM ET
📍 [Online Meeting](#)

SEPTEMBER 13, 2023
September 2023 Tech Talk
Join the Inferno team for their monthly open tech talk where they discuss new features, releases, and updates.
⌚ 1:00PM ET TO 2:00PM ET
📍 [Online Meeting](#)

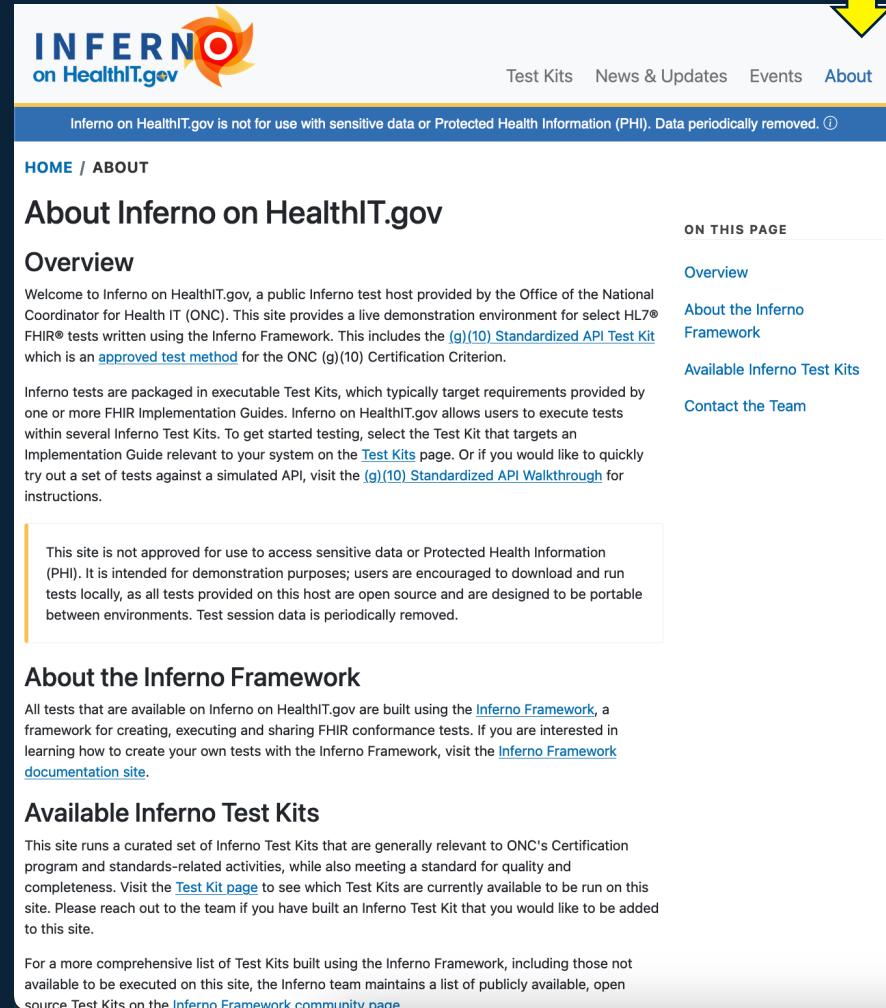
Preview at <https://inferno-qa.healthit.gov>

inferno.healthit.gov Redesign

About

1. Provides overview of Inferno on HealthIT.gov and the Inferno Framework

Preview at <https://inferno-qa.healthit.gov>



The screenshot shows the homepage of the Inferno on HealthIT.gov website. At the top, there is a logo for "INFERNO on HealthIT.gov" with a stylized orange and yellow sun-like icon. The top navigation bar includes links for "Test Kits", "News & Updates", "Events", and "About". A yellow arrow points from the top right towards the "About" link. Below the navigation, a blue banner states: "Inferno on HealthIT.gov is not for use with sensitive data or Protected Health Information (PHI). Data periodically removed. ⓘ". The main content area has a breadcrumb trail "HOME / ABOUT" and a section titled "About Inferno on HealthIT.gov". This section contains an "Overview" paragraph, a "Test Kits" section, and a note about the site's purpose. To the right of the main content, there is a sidebar titled "ON THIS PAGE" with links to "Overview", "About the Inferno Framework", "Available Inferno Test Kits", and "Contact the Team".

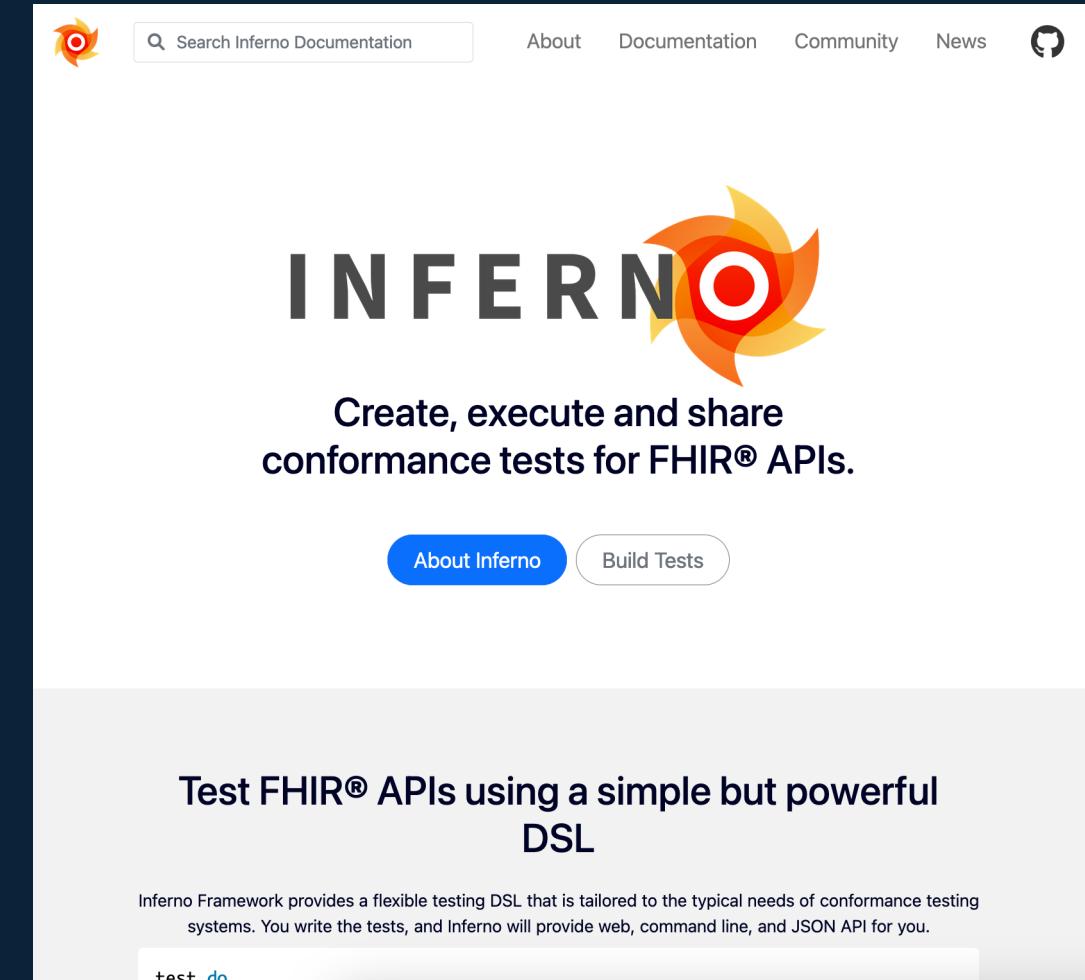
Preview at https://inferno-framework.github.io/index_new.html

Inferno Framework Home

Inferno Documentation and Community Hub

Overview

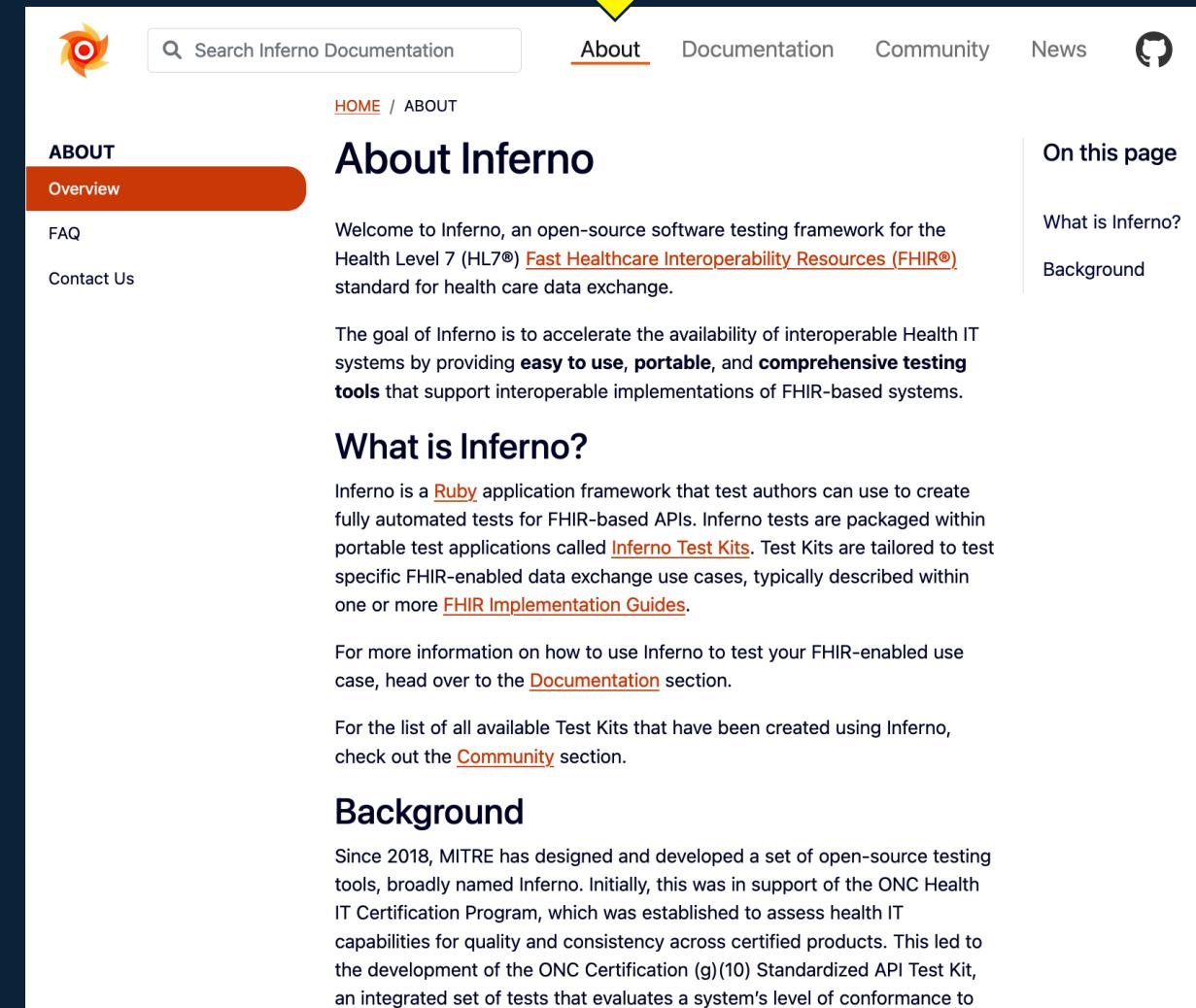
1. Provides documentation on how to use Inferno to create and run tests; and how to participate in development
2. Not a host for executing tests



Preview at https://inferno-framework.github.io/index_new.html

About

1. Explanatory content for Inferno
2. Provides FAQ
3. Contact Information



The screenshot shows the 'About' page of the Inferno documentation. The top navigation bar includes links for 'About', 'Documentation', 'Community', 'News', and a GitHub icon. The 'About' link is underlined, indicating it is the current page. The left sidebar has a 'ABOUT' section with 'Overview' (which is highlighted with a red background), 'FAQ', and 'Contact Us'. The main content area features a heading 'About Inferno' with a brief welcome message about the FHIR standard. Below it is a section titled 'What is Inferno?' with text about the Ruby application framework and its purpose. Another section, 'Background', discusses the history of Inferno starting in 2018.

Search Inferno Documentation

About Documentation Community News

 HOME / ABOUT

ABOUT

Overview

FAQ

Contact Us

About Inferno

Welcome to Inferno, an open-source software testing framework for the Health Level 7 (HL7®) [Fast Healthcare Interoperability Resources \(FHIR®\)](#) standard for health care data exchange.

The goal of Inferno is to accelerate the availability of interoperable Health IT systems by providing **easy to use, portable, and comprehensive testing tools** that support interoperable implementations of FHIR-based systems.

What is Inferno?

Inferno is a [Ruby](#) application framework that test authors can use to create fully automated tests for FHIR-based APIs. Inferno tests are packaged within portable test applications called [Inferno Test Kits](#). Test Kits are tailored to test specific FHIR-enabled data exchange use cases, typically described within one or more [FHIR Implementation Guides](#).

For more information on how to use Inferno to test your FHIR-enabled use case, head over to the [Documentation](#) section.

For the list of all available Test Kits that have been created using Inferno, check out the [Community](#) section.

Background

Since 2018, MITRE has designed and developed a set of open-source testing tools, broadly named Inferno. Initially, this was in support of the ONC Health IT Certification Program, which was established to assess health IT capabilities for quality and consistency across certified products. This led to the development of the ONC Certification (g)(10) Standardized API Test Kit, an integrated set of tests that evaluates a system's level of conformance to

Preview at https://inferno-framework.github.io/index_new.html

Documentation

1. Approximately equivalent to what is currently on inferno-framework.github.io
2. Reorganized for clarity and some content added

The screenshot shows the Inferno Documentation website. At the top, there is a navigation bar with links for About, Documentation (which is underlined in red), Community, News, and a GitHub icon. A yellow arrow points down from the "Documentation" link in the navigation bar to the "Introduction" section in the sidebar. The sidebar on the left contains a "DOCUMENTATION" section with a sub-section for "Introduction". Below this are sections for "Key Concepts", "CREATING TEST KITS" (with sub-links for "Getting Started", "Writing Tests", "Advanced Features", and "Distributing Tests"), "Inferno Core Docs" (with a link to "JSON API"), and "USING TEST KITS" (with sub-links for "Getting Started" and "Deploying to Shared Hosts"). The main content area on the right features a large heading "Inferno Documentation" and a sub-section "Introduction to Inferno". It describes Inferno as an application framework for creating, executing, and sharing conformance test for FHIR APIs. It mentions "Inferno Test Kits" and "FHIR Implementation Guides" (IGs). It includes examples of test kits like the ONC Certification (g)(10) Standardized API Test Kit, US Core Test Kit, and SMART App Launch Test Kit. It also explains what a Test Kit is and provides a link to the "Using Test Kits" documentation. A sidebar titled "On this page" on the right lists links to "Introduction to Inferno", "Main Inferno Repositories", "Documentation Resources", and "Inferno Test Kits".

Search Inferno Documentation

HOME / DOCUMENTATION

DOCUMENTATION

Introduction

Key Concepts

CREATING TEST KITS

Getting Started >

Writing Tests >

Advanced Features >

Distributing Tests

Inferno Core Docs ⓘ

USING TEST KITS

Getting Started

Deploying to Shared Hosts >

JSON API ⓘ

Inferno Documentation

Introduction to Inferno

Inferno is an application framework for creating, executing, and sharing conformance test for FHIR APIs. Inferno tests are packaged within portable test applications called [Inferno Test Kits](#). Test Kits are tailored to test specific FHIR-enabled data exchange use cases, typically described within one or more [FHIR Implementation Guides](#) (IGs).

For example:

- The [ONC Certification \(g\)\(10\) Standardized API Test Kit](#) provides tests for systems that seek conformance to [ONC's Standardized API certification criterion](#).
- The [US Core Test Kit](#) provides tests for servers implementing [US Core Implementation Guide](#).
- The [SMART App Launch Test Kit](#) provides tests for systems that support the [SMART App Launch Framework](#).

If you would like to learn how to run or deploy an existing Inferno Test Kit, please visit the [Using Test Kits](#) documentation.

A Test Kit is a standalone Ruby application that can be run on an end user's machine, on a shared private host behind a firewall, or on a shared public host such as [inferno.healthit.gov](#). It is built with the [Inferno Core](#) gem, which provides several useful features for a FHIR testing application, including:

- **The Inferno DSL** - A domain specific language (DSL) for authoring FHIR API tests that includes a FHIR client, native Ruby classes for FHIR, and FHIR instance validators

Preview at https://inferno-framework.github.io/index_new.html



Community

1. Describes how to contribute and participate in development of Inferno
2. Provides discoverability for Test Kits built with Inferno

The screenshot shows the 'Community' section of the website. On the left, there's a sidebar with links like 'Welcome', 'Resources', 'Code of Conduct', 'COMMUNITY REGISTRY' (which is expanded), and 'LINKS'. Under 'COMMUNITY REGISTRY', the 'Inferno Test Kits' link is highlighted with a red background. The main content area is titled 'Test Kit Registry' and contains a table of test kits. The table has columns for 'Test Kit', 'Source Code', and 'Public Host'. Most entries have 'GitHub Repository' under 'Source Code' and 'Hosted by ONC' under 'Public Host'. Some entries like 'TLS Test Kit' and 'UDS+ Test Kit' have 'N/A' under 'Public Host'. A yellow arrow points down from the top of the screenshot towards the table.

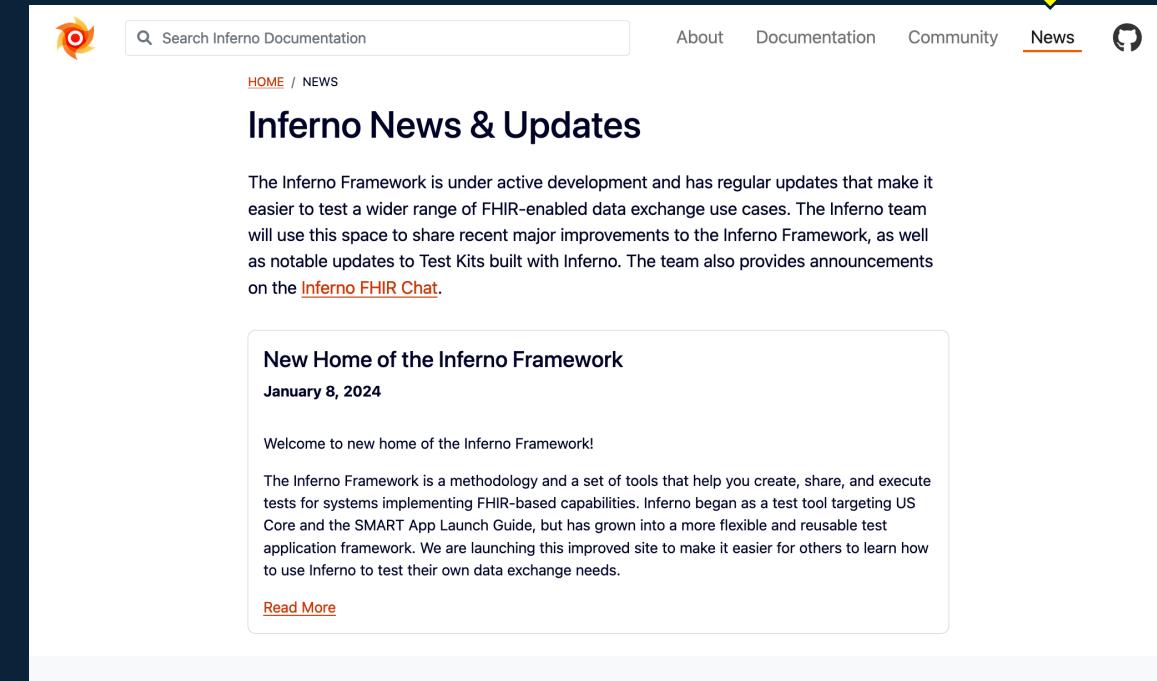
Test Kit	Source Code	Public Host
ONC Certification (g)(10) Standardized API Test Kit	GitHub Repository	Hosted by ONC
At-Home In-Vitro Test Kit	GitHub Repository	Hosted by ONC
CARIN IG for Blue Button® Test Kit	GitHub Repository	Hosted by ONC
FAST Security Test Kit	GitHub Repository	Hosted by ONC
International Patient Access Test Kit	GitHub Repository	Hosted by ONC
International Patient Summary Test Kit	GitHub Repository	Hosted by ONC
SMART App Launch Test Kit	GitHub Repository	Hosted by ONC
SMART Health Cards: Vaccination & Testing Test Kit	GitHub Repository	Hosted by ONC
SMART Scheduling Links Test Kit	GitHub Repository	Hosted by ONC
TLS Test Kit	GitHub Repository	N/A
UDS+ Test Kit	GitHub Repository	Hosted by ONC
US Core Test Kit	GitHub Repository	Hosted by ONC

Preview at https://inferno-framework.github.io/index_new.html

inferno-framework.github.io

News

1. Provides updates made to components of Inferno and foundational test kits



The screenshot shows the Inferno News & Updates page. At the top, there is a navigation bar with links for About, Documentation, Community, and News (which is underlined). Below the navigation bar is a search bar and a logo. The main content area has a heading "Inferno News & Updates". Below the heading is a paragraph of text about the Inferno Framework's development and updates. Underneath this is a news card with the title "New Home of the Inferno Framework" and the date "January 8, 2024". The news card contains a brief welcome message and a paragraph about the Inferno Framework's purpose and evolution. A "Read More" button is at the bottom of the news card.

Preview at https://inferno-framework.github.io/index_new.html

Redesign: Feedback welcome!

- <https://inferno-qa.healthit.gov>
- https://inferno-framework.github.io/index_new.html
- Expected to be deployed February 13
- Redesign intended to be unintrusive
- Please let us know if you have concerns

Open Discussion / Feedback

Resources and Contact Information

- <https://inferno.healthit.gov/>
 - General materials & live demonstration server
- <https://github.com/onc-healthit/onc-certification-g10-test-kit/>
 - ONC Certification tests repository, downloads, issues
 - “Watch” repository to receive alerts (new releases, etc)
 - Note: this repository is specific to ONC Certification testing
- <https://groups.google.com/forum/#!forum/inferno-testing>
 - Announcements & community discussion
- inferno@groups.mitre.org (or rscanlon@mitre.org)
- Also, FHIR Zulip Chat: <https://chat.fhir.org/#narrow/stream/179309-inferno>

Upcoming Meetings

- Next Inferno Tech Talk: **Wednesday February 14** at 1 PM ET
- Please reach out with questions & issues