



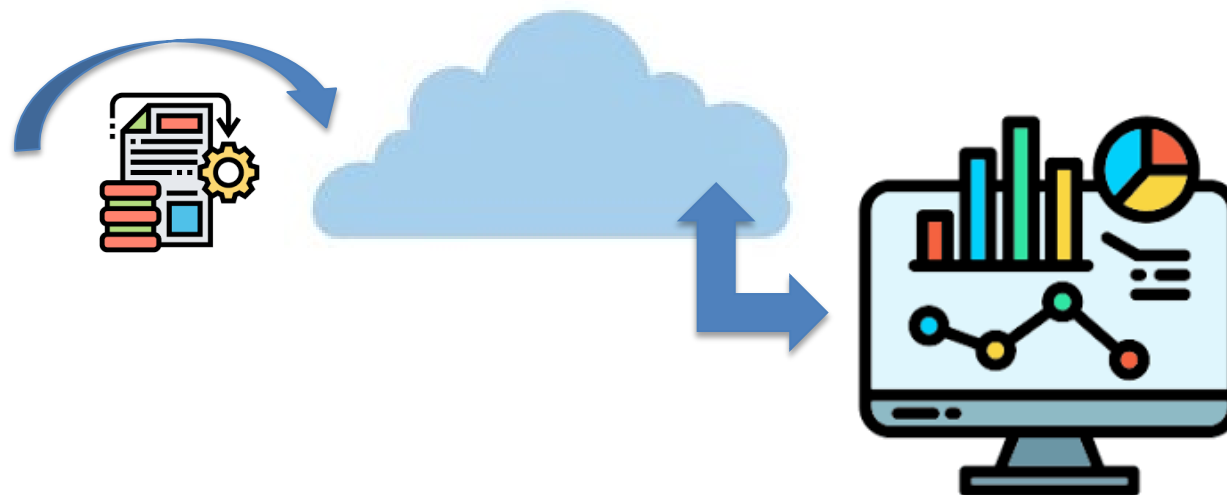
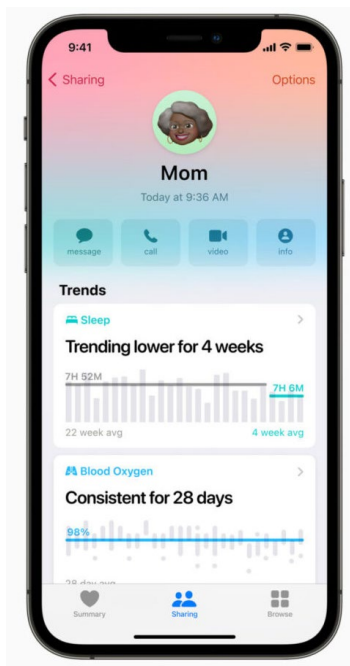
SMART on FHIR : Unleashing the Power of Health Data





Scenario : A hospital implements a remote patient management program for elderly. This hospital uses Epic's electronic medical record system.

Solution : Import patient mobile applications with edge computing AI/ML capabilities.



Providers run the cloud application through a web browser to view all patient fall risks, data trends, and more.

Problems : Healthcare providers need to switch between the Epic EHR and this standalone web-based software. Different applications require independent login permissions



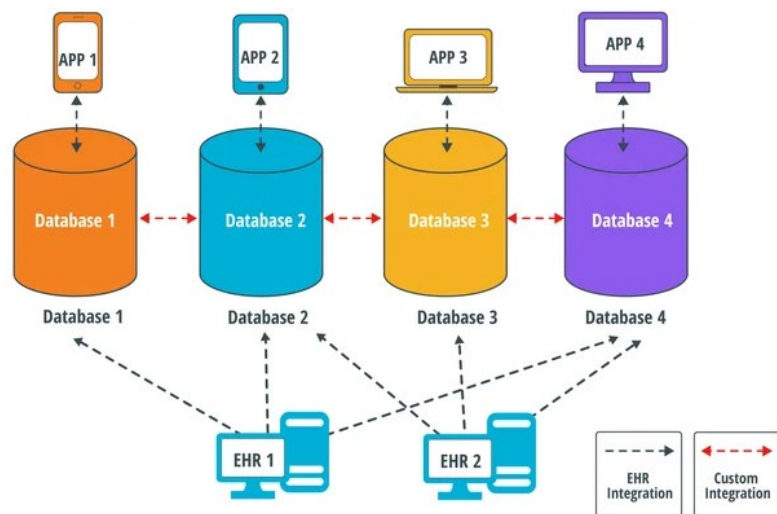
- It was originally developed in 2010 by **Harvard Medical School and Boston Children's Hospital**.
- In 2010, with the help of federal funding, SMART grew into the platform it is today, currently used by **Microsoft Azure and Apple**.

- ✓ Before FHIR was ignited, **SMART** launched an **interoperability application**
 - ✓ The goal is to build a platform that allows medical applications to be developed once and run without modification on HIS in different healthcare institutions.
 - ✓ In addition to healthcare providers, SMART is available to patients.
 - ✓ U.S. veterans can access their health records using Apple's SMART on FHIR health app.
- ✓ **SMART is an open-source, standards-based API that leverages the OAuth 2.0 standard to provide secure, universal access to EHRs**



SMART and FHIR represent an open, standardized and practical approach

- ✓ Applications have their own proprietary **databases, data models, and interfaces** .
- ✓ If applications become outdated or out of maintenance, data becomes **data silos** .
- ✓ **SMART on FHIR** allows various applications to exist on the same infrastructure and the same data model (FHIR) .
- ✓ FHIR provides a set of models to standardize EHR or other clinical data, and SMART standardizes the process for third-party applications .

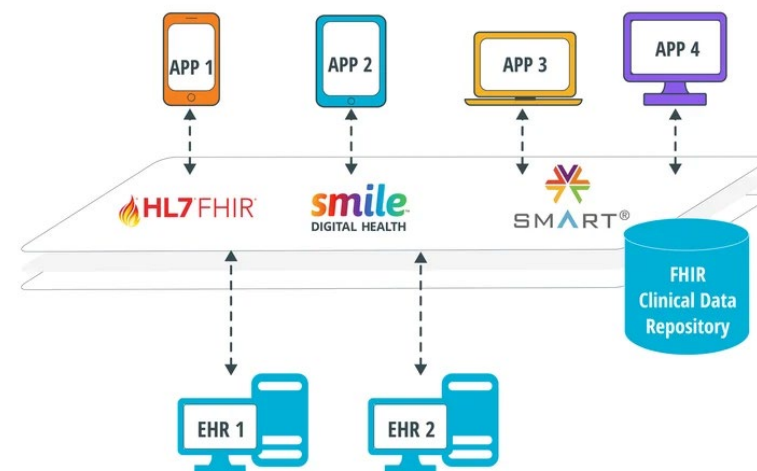


AS IS

FHIR standardized data framework

SMART on FHIR

SMART standardized data access

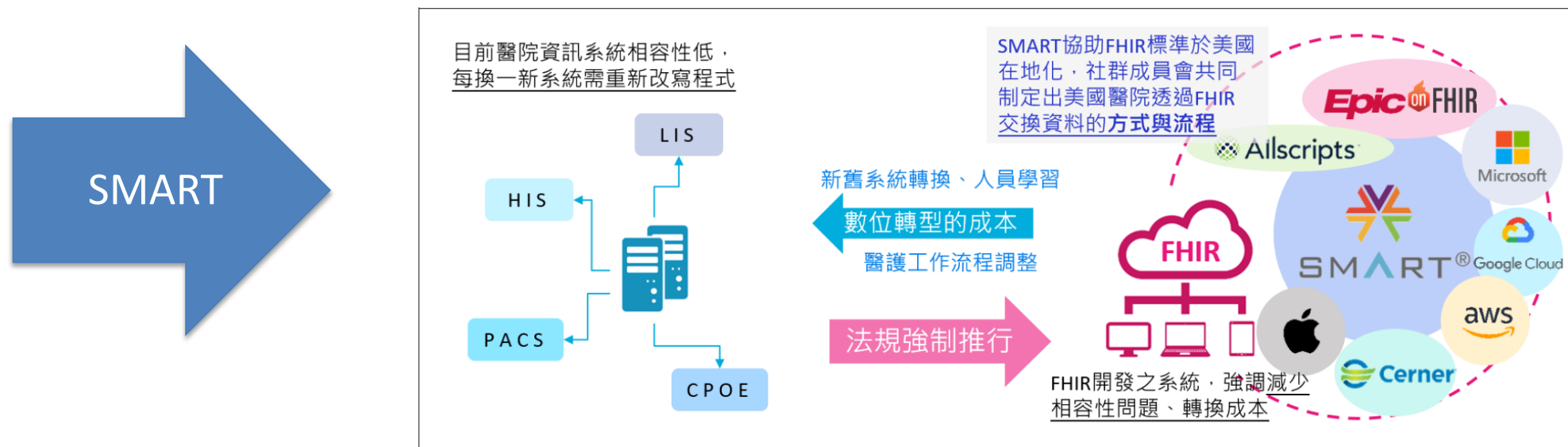


TO BE



- Most EHR databases use proprietary APIs
- Tech companies must create custom connections to each database to access medical data.

SMART provides a standard common API for accessing EHRs



資料來源：各廠商，MIC 整理，2022 年 1 月

SMART improves healthcare interoperability in the same way standard electrical sockets and plugs simplify the process of powering different devices in your home.



- **21st Century Cures Act**
 - Called for the adoption of a **universal API**
 - Securely and easily access structured electronic health information using **smartphone applications.**"
- **The Office of the National Coordinator for Health Information Technology' s (ONC' s)**
 - Final Rule on Interoperability (published in 2020) later named SMART as that **universal API** ◦
 - For **ONC-certified health IT** (primarily government applications) ◦
- **The Centers For Medicare and Medicaid Services (CMS):**
 - **SMART on FHIR** is named as the **preferred technical standard** for doing so
 - Meaning any health system that accepts Medicare or Medicaid must also adopt SMART. ◦



Select application type

- ✓ Applications for providers or patients
 - ✓ mobile application
 - ✓ web application
- ✓ Run within an existing clinical application or as a standalone application

Software Libraries for Developers



Security verification



There is also no need to enter a password in the third-party solution, since authorization is done through their EHR system.

Test with the SMART Sandbox

Public Sandboxes for Testing

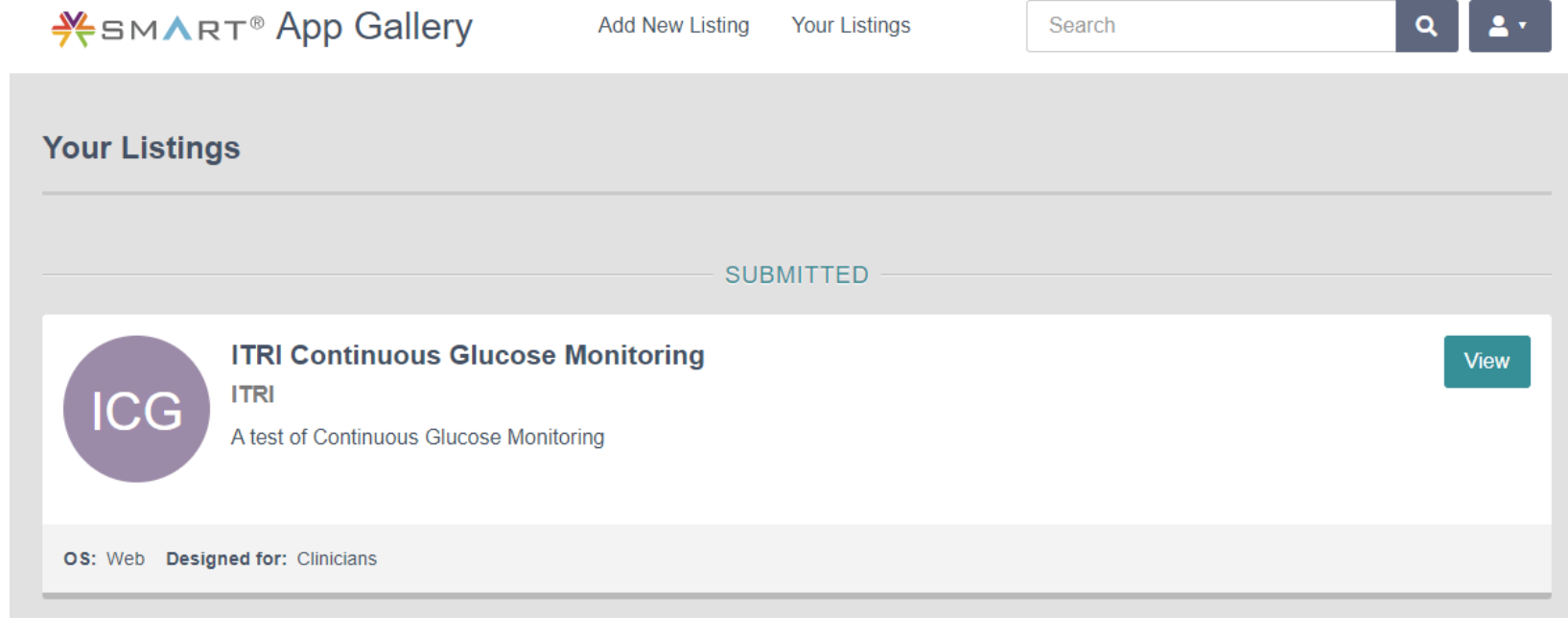


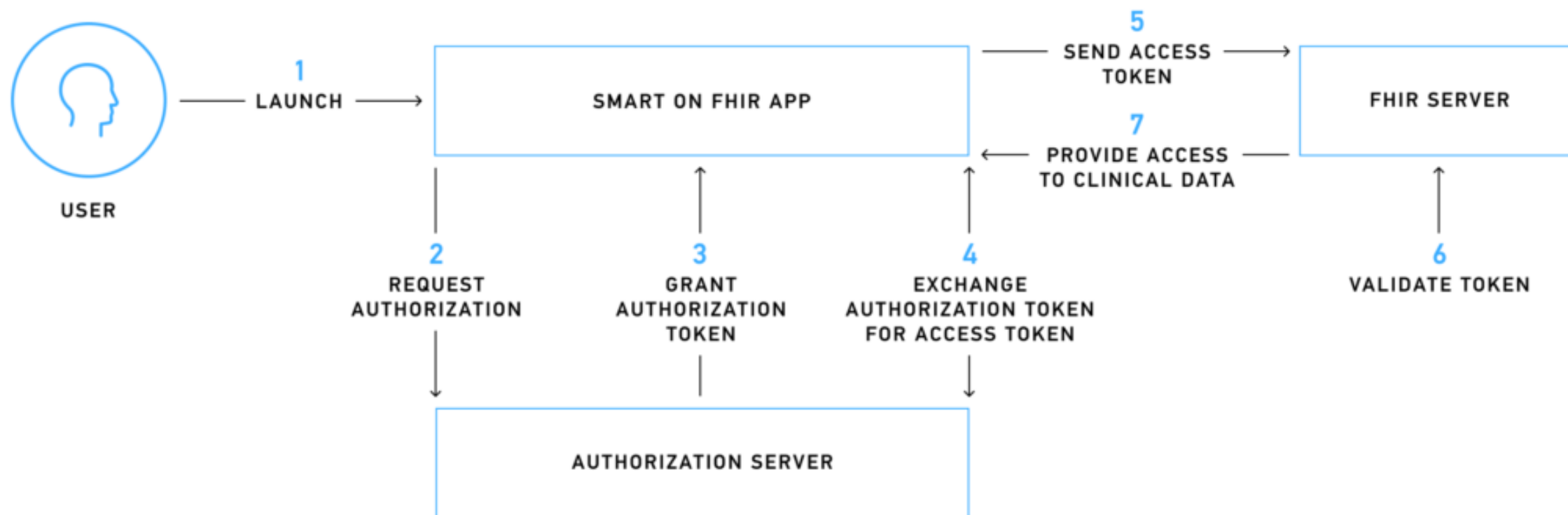
For all SMART on FHIR developers, it is recommended to use the SMART sandbox to test the functionality of the application.

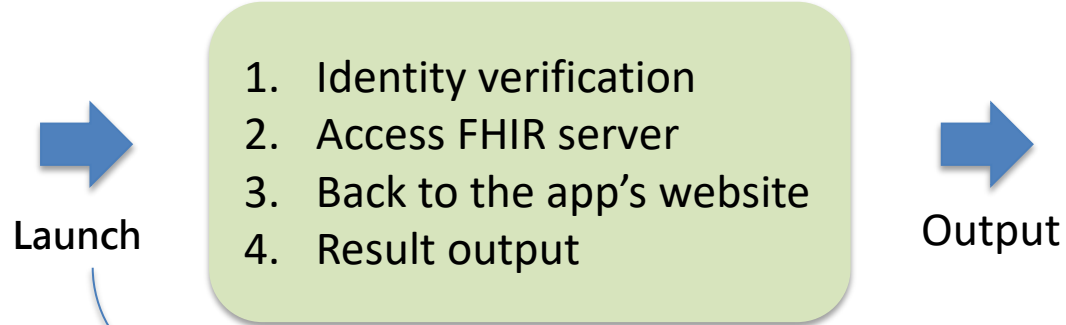
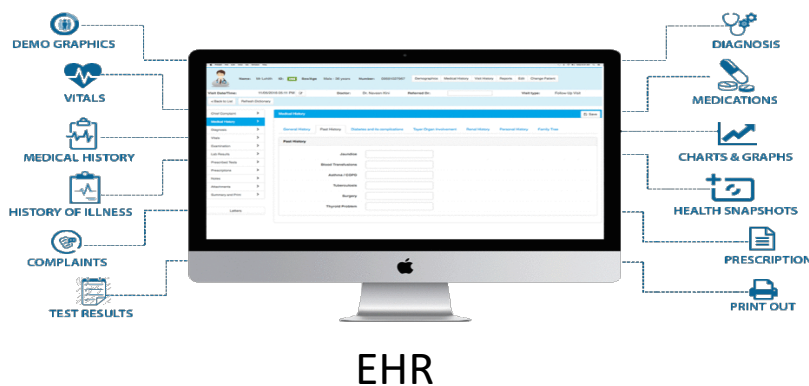


Deploy and add to App Store

- ✓ After the application is tested, it can be deployed to the server or through the app store for doctors or patients to download and use.
- ✓ The App Gallery is similar to a mobile store, providing information about app descriptions, requirements, and testing apps.







The screenshot shows the SMART app output for a patient named Jane. It displays the following information:

- Artifact: Continuous glucose monitoring
- Meets Inclusion Criteria: 1 of 2 patients
- Meets Exclusion Criteria: 0 of 2 patients

Below this, there are two sections: 'Jane include' and 'Jane not-include'. Each section shows a table with columns for 'MeetsInclusionCriteria', 'MeetsExclusionCriteria', 'Recommendation', 'Rationale', and 'Errors'. The 'Jane include' section shows a patient who meets the inclusion criteria, while the 'Jane not-include' section shows a patient who does not meet the inclusion criteria.

Inclusions :

Example :

Patient is ≥ 35 years old AND ≤ 70 years old
AND
BMI $\geq 25\text{kg/m}^2$ (MOST RECENT VALUE)

Exclusions:

Example :

Pregnancy (*active*)

OR

pregnancy observation within the past 42 weeks

FHIR Resources

Patient

Observation

Condition

CQL → SMART APP





SMART Launcher

App Launch Options

Client Registration & Validation

Launch Type

Provider EHR Launch

Practitioner opens the app from within an EHR

FHIR Version

R4

Select what FHIR version your app should work with

Simulated Error

None

Force the server to throw certain type of error (useful for manual testing).

Misc. Options

☐ Simulate launch within the EHR UI (launch within an iFrame)

Patient(s)

52e3c4a6-6789-439b-80b0-a9b12d9d3491,a9e50d5b-ed0f-4dce-b0cc-5078fa61

Simulates the active patient in EHR when app is launched. If no Patient ID is entered or if multiple comma delimited IDs are specified, a patient picker will be displayed as part of the launch flow.

Provider(s)

Provider ID(s)

Simulates user who is launching the app. If no provider is selected, or if multiple comma delimited Practitioner IDs are specified, a login screen will be displayed as part of the launch flow.

Encounter

Select the most recent encounter if available

How to select the current Encounter

App's Launch URL

https://cgm.mohw.bdlai.org/launch

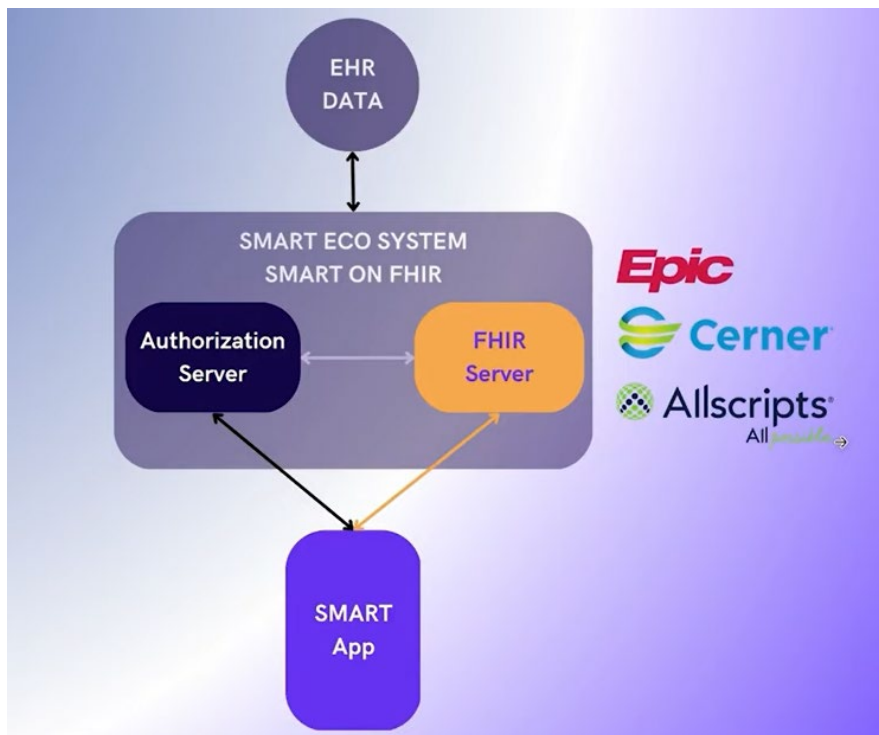
Full url of the page in your app that will initialize the SMART session (often the path to a launch.html file or endpoint)

Launch

Launch Sample App

Please report any issues you encounter to the [SMART Community Forum](#) or submit an issue or PR at [GitHub](#).

Version: 2.0.1 Commit: aa0f3b1f86c2a62a00aae721e0d6a548ade18061



The screenshot shows the 'fhir.epic.com' website. The top navigation bar includes links for 'FHIR', 'API Specifications', 'Build Apps' (highlighted in red), 'Documentation', and 'Jump To'. There are 'Sign Up' and 'Login' buttons in the top right corner. The main content area is titled 'My Apps' and features a 'Sign Up to Access' section with the text: 'Epic on FHIR is a free resource for developers who create apps for use by patients and healthcare organizations.' Below this, there are three hexagonal icons representing different resources: 'Testing Sandbox' (with a test tube icon), 'Client Registration' (with a document and pencil icon), and 'Documentation' (with a document and flame icon). Each icon has a corresponding title and description below it.

SMART on FHIR can be built through a developer account at fhir.epic.com.



2024.11.08 13:00~16:00 台北生技園區一樓大會議室

時間	主題 / 議程	主持 / 主講人
13:00-13:30	報到	
13:30-13:35	開場致歡迎詞	衛生福利部資訊處技監兼處長 李建璋
13:35-14:05	SMART on FHIR介紹	哈佛大學波士頓兒童醫院 Kenneth D. Mandl MD, MPH
14:05-14:25	SMART on FHIR關鍵議題交流	主持：衛生福利部資訊處技監兼處長 李建璋 與談：哈佛大學波士頓兒童醫院 Kenneth D. Mandl MD, MPH
14:25-14:40	中場休息	
14:40-15:10	SMART on FHIR建置作法	次世代數位醫療平臺專案辦公室 李建儒 分項計畫主持人
15:10~15:30	SMART on FHIR案例分享(一)	次世代數位醫療平臺專案辦公室 羅仕昌 工程師
15:30~15:50	SMART on FHIR案例分享(二)	宏碁智醫 楊宗翰 經理
15:45~16:00	QA交流	