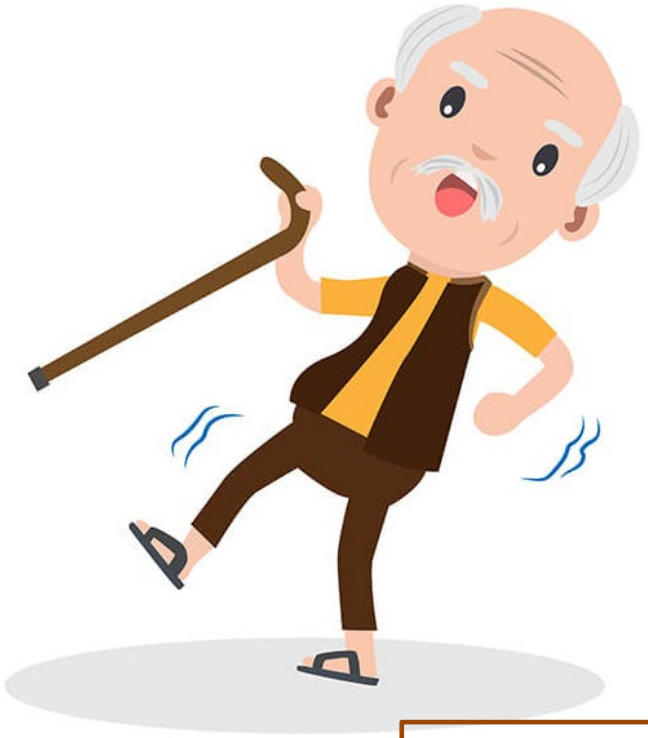
SMART on FHIR : Unleashing the Power of Health Data

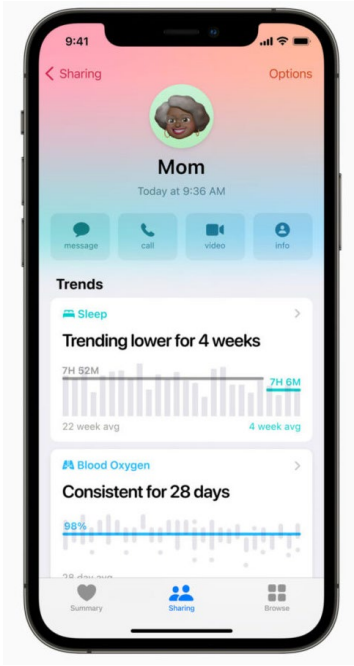
https://techvariable.com/blogs/smart-on-fhir/

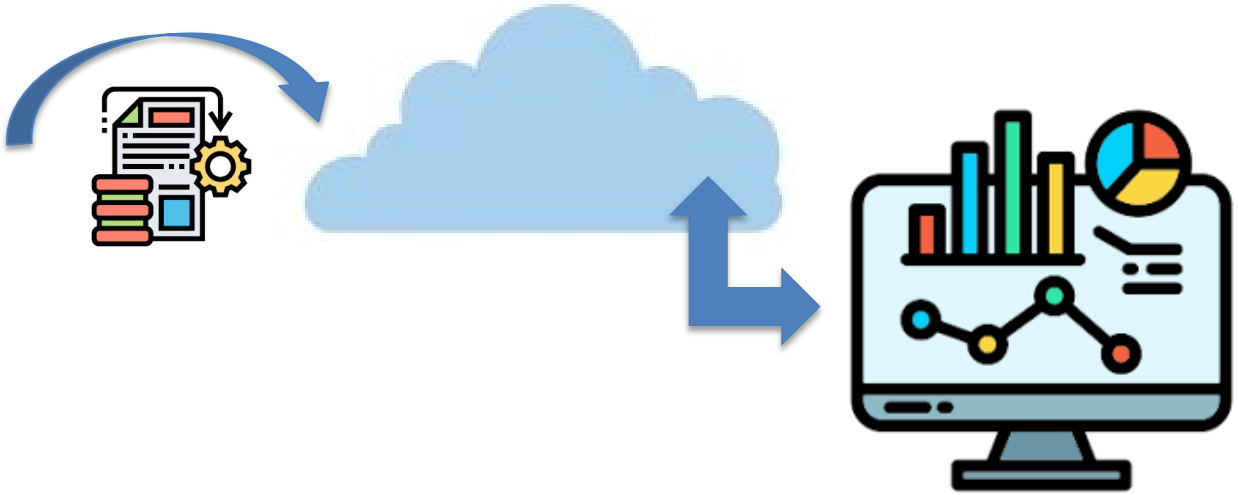
Why “SMART on FHIR “

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

SMART(Substitutable Medical Applications and Reusable Technologies)

- 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**.

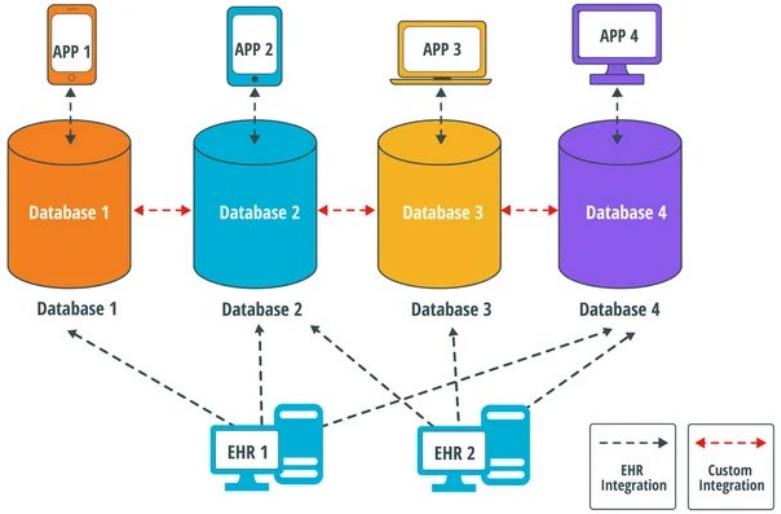
✓ Before FHIR was ignited, **SMART** launched an **interoperability application**

- ✓ 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 。

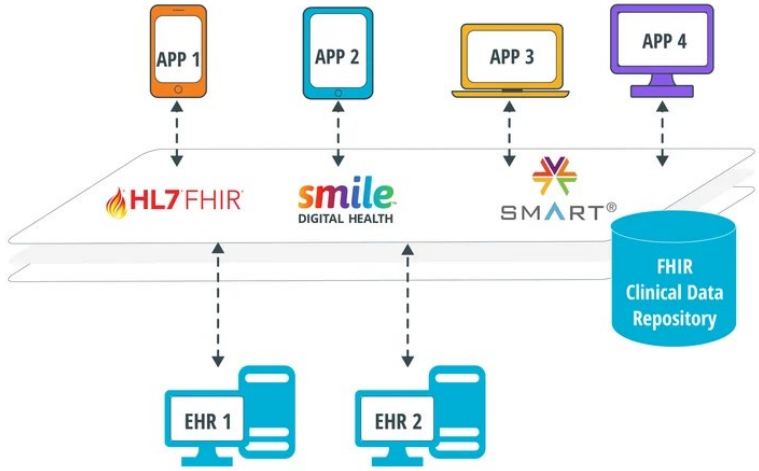


AS IS

FHIR standardized data framework

SMART on FHIR

SMART standardized data access



TO BE

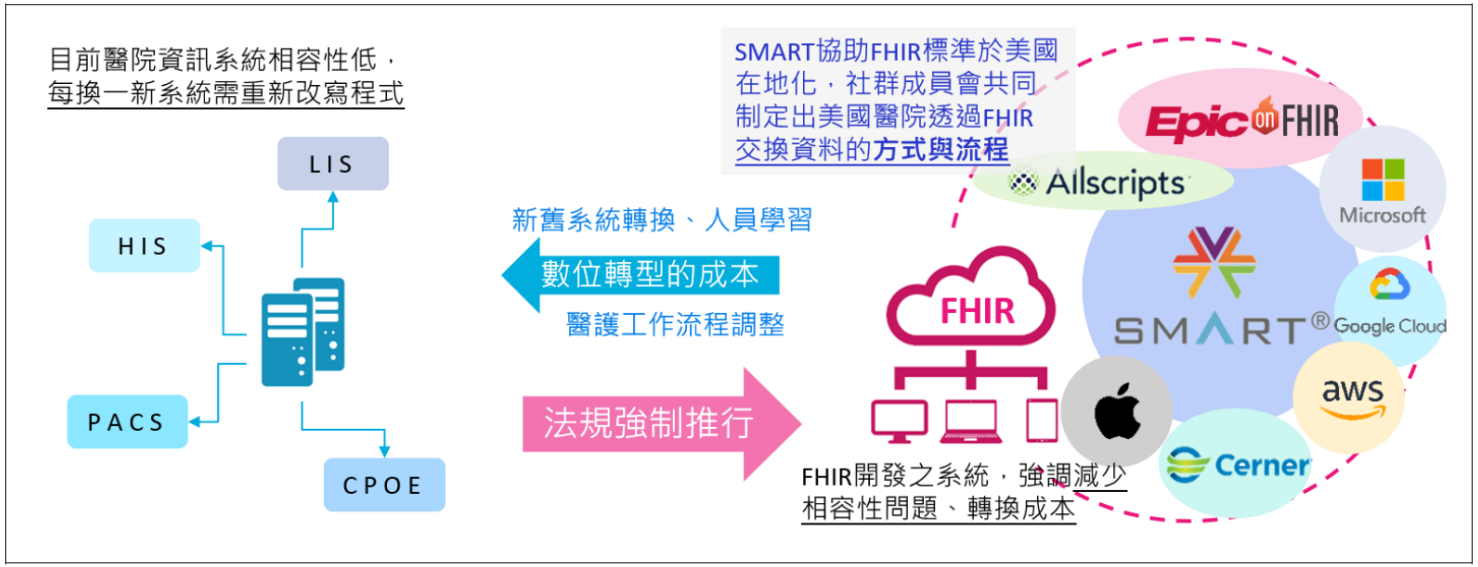
Picture Reference : smile digital health

SMART improves healthcare interoperability

- 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

SMART



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.

International Trends and Promotions

- **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.。

Steps to Build a SMART on FHIR App (I)

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

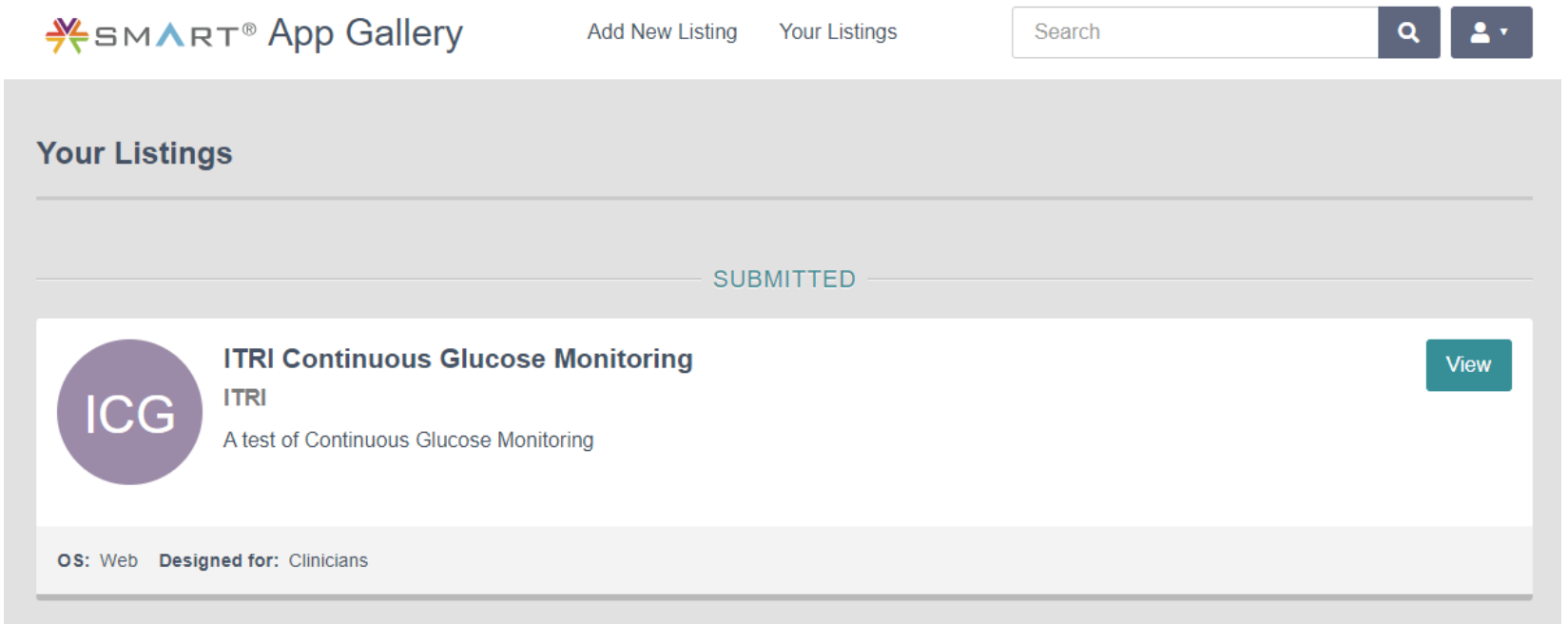
Public Sandboxes for Testing

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

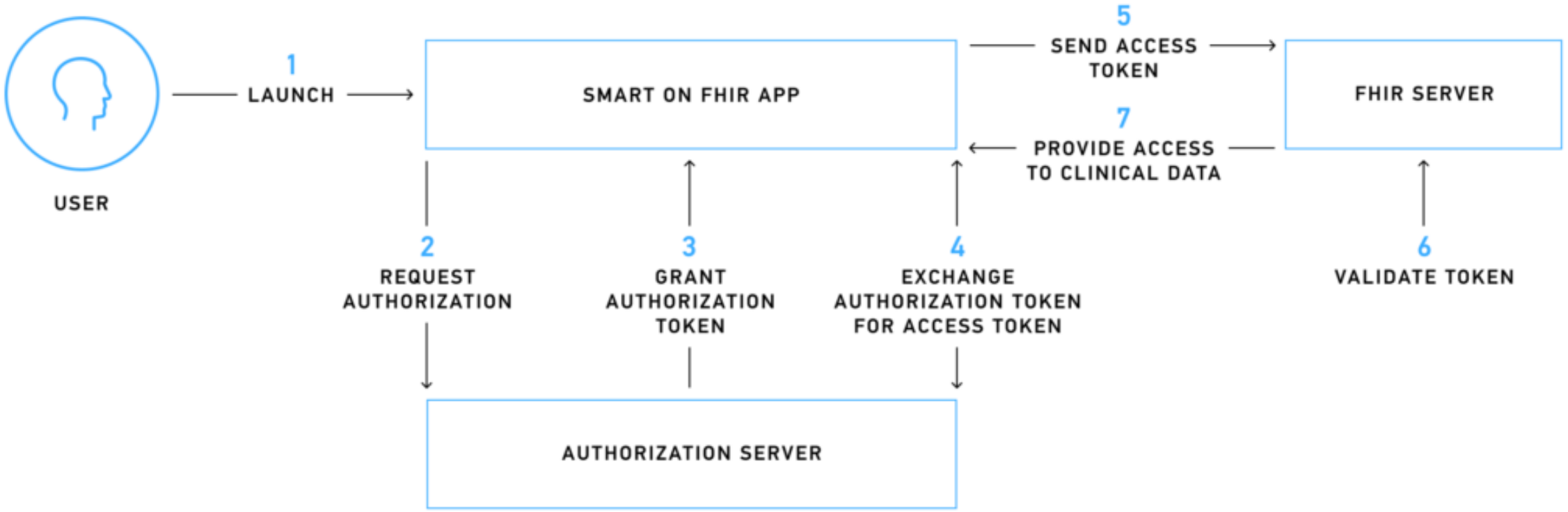
Steps to Build a SMART on FHIR App (II)

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.

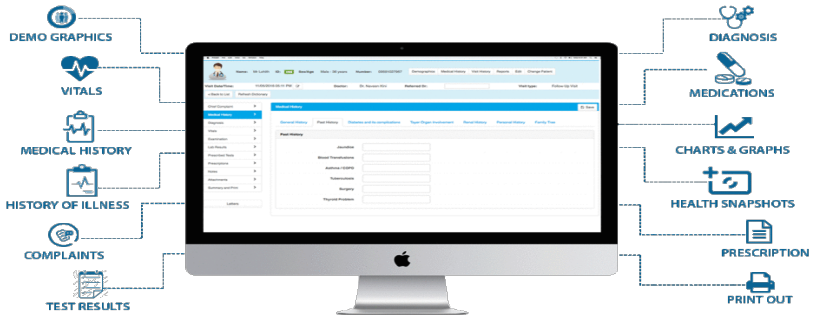


Steps to Build a SMART on FHIR App (III)



https://kodjin.com/blog/smart-on-fhir-facilitating-healthcare-interoperability/

SMART allows users to stay within the familiar EHRs environment

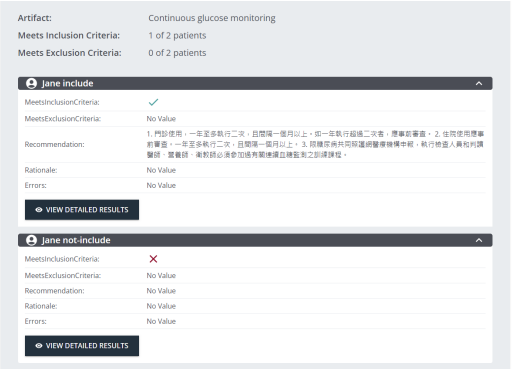


EHR

Launch

1. Identity verification
2. Access FHIR server
3. Back to the app's website
4. Result output

Output



Inclusions :

Example :
Patient is >=35 years old AND <=70 years old
AND
BMI >=25kg/m2 (MOST RECENT VALUE)

Exclusions:

Example :
Pregnancy *(active)*
OR
pregnancy observation within the past 42 weeks

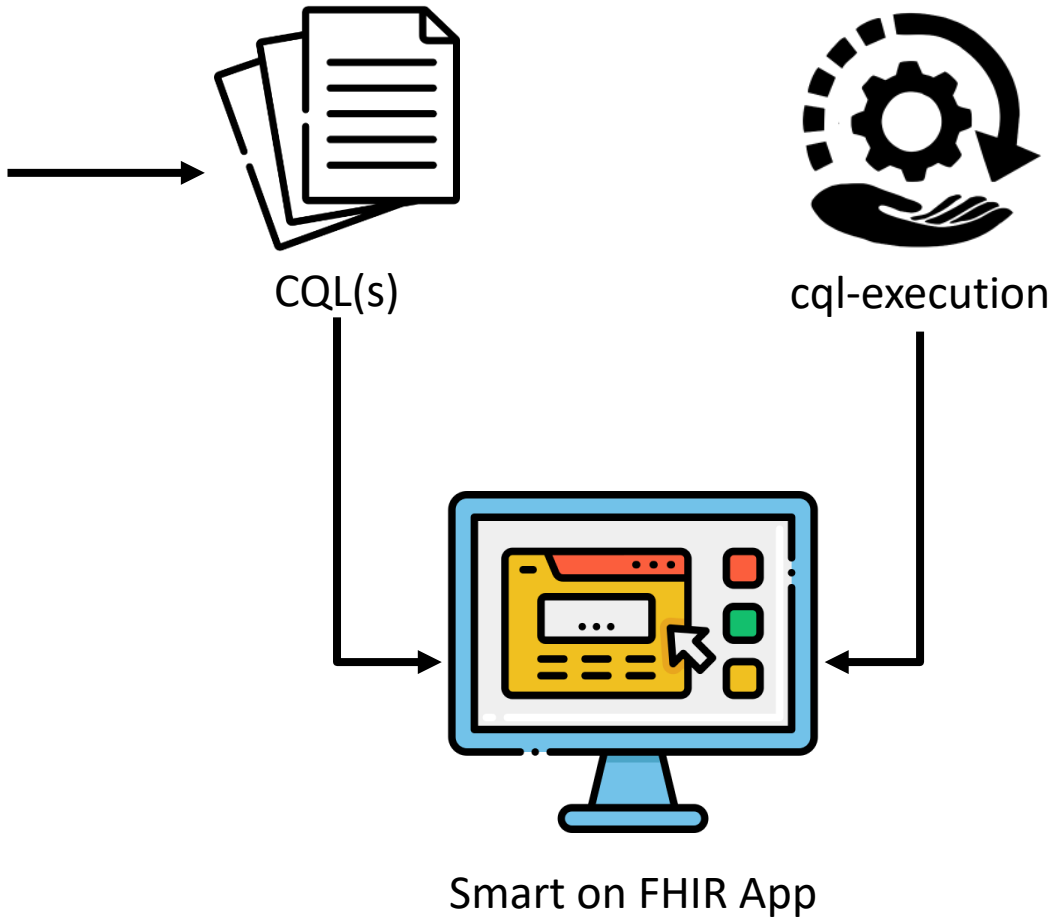
FHIR Resources

- Patient
- Observation
- Condition

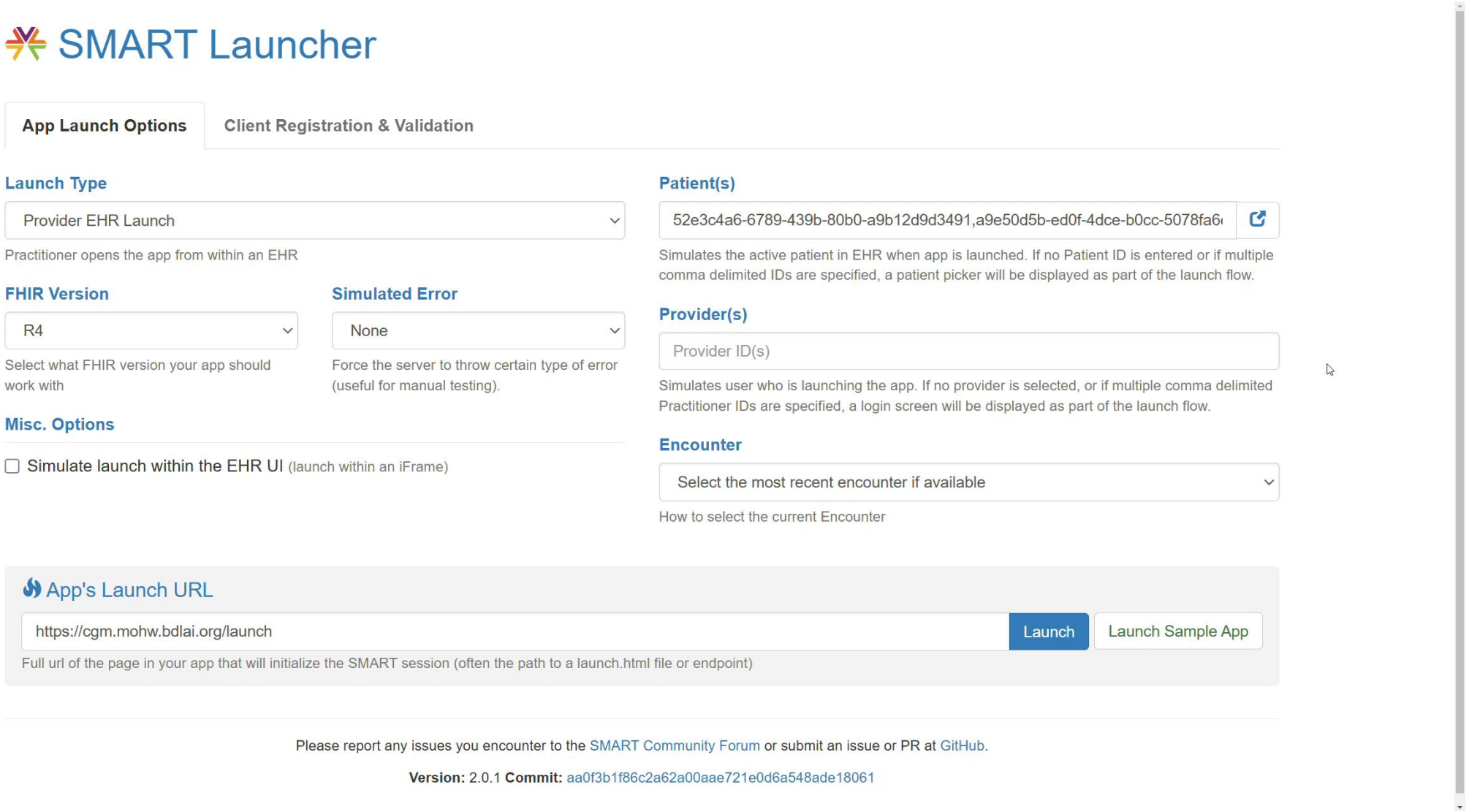
CQL ➔ SMART APP

Example： Using SMART APP to execute CQL

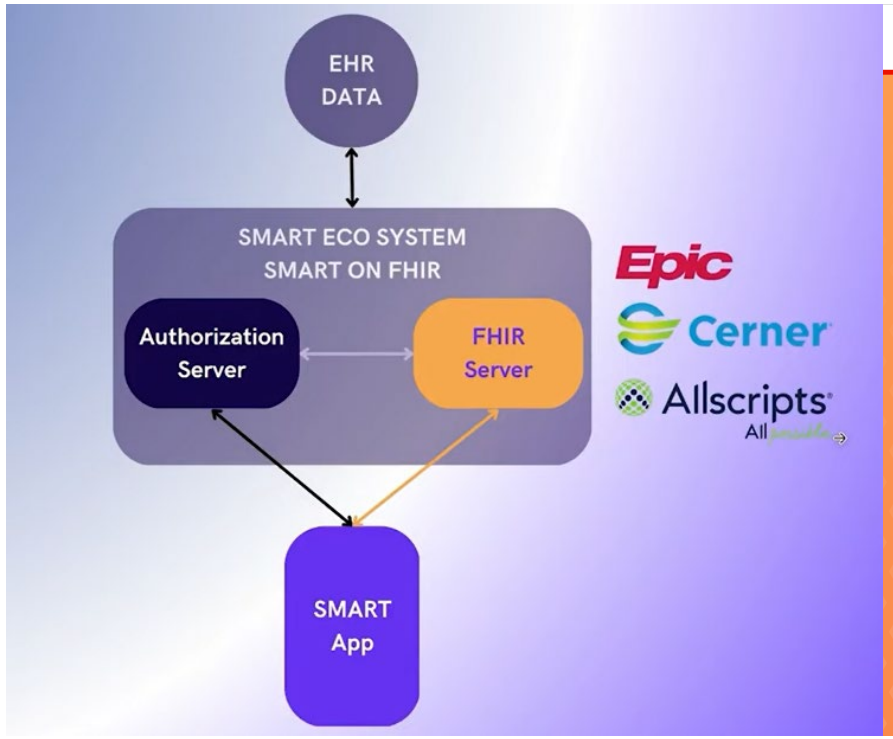
08134B	連續血糖監測 Continuous glucose monitoring 註： 1.適應症： (1)第一型糖尿病(領有重大傷病證明)、新生兒糖尿病，或因Near-total pancreatectomy所致糖尿病等個案，且須符合下列任一條件： A.血糖過度起伏且最近六個月二次醣化血紅素(HbA1c)值都大於(含)8%。 B.低血糖無感症。 C.常有嚴重低血糖，須他人協助治療，最近三個月有因低血糖曾至急診診治或住院。 D.懷孕。 (2)懷孕之第二型糖尿病或妊娠糖尿病，且接受胰島素注射者。 (3)肝醣儲積症第零型、第一型、第三型、第六型、第九型，有嚴重低血糖病史或仍持續使用玉米粉治療者。 2.支付規範： (1)門診使用，一年至多執行二次，且間隔一個月以上。如一年執行超過二次者，應事前審查。 (2)住院使用應事前審查。一年至多執行二次，且間隔一個月以上。 (3)限糖尿病共同照護網醫療機構申報，執行檢查人員和判讀醫師、營養師、衛教師必須參加過有關連續血糖監測之訓練課程。		v	v	v	4842

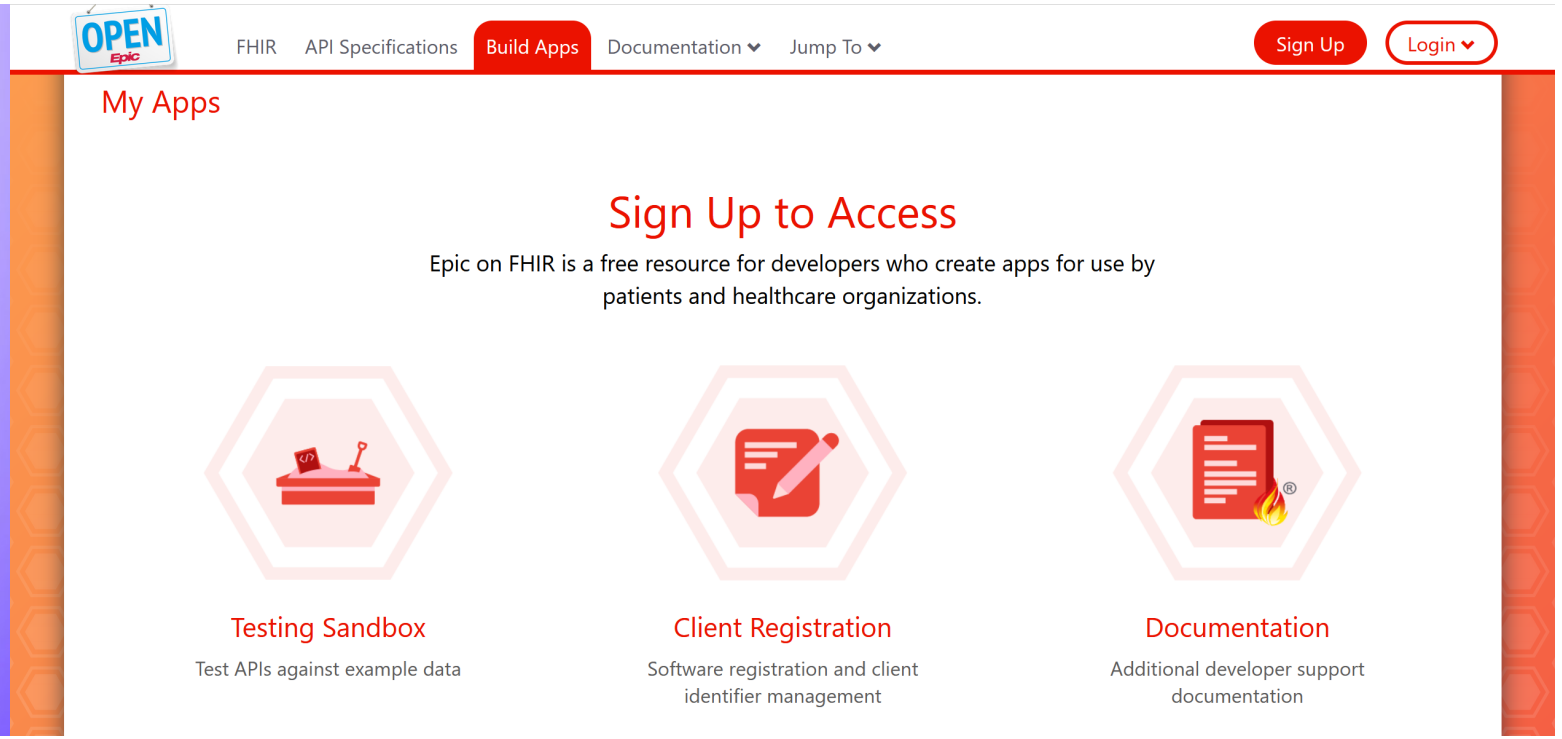


Example： Using SMART APP to execute CQL (Demo Video)



Build and launch SMART on FHIR applications in Epic





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	