

ignite change.





ITEM  
MAGIC  
WEAPON  
ARMOR  
STATUS

# KEVIN SHEKLETON

## DISTINGUISHED ENGINEER

HP  
13 / 37



14 YEARS



@kpshek

# SMART on FHIR

*a primer*

SMART

Substitutable Medical Applications &  
Reusable Technology

# SMART Platform



Provides a platform to build [healthcare applications](#)



Applications can [run against any vendor](#) implementing SMART



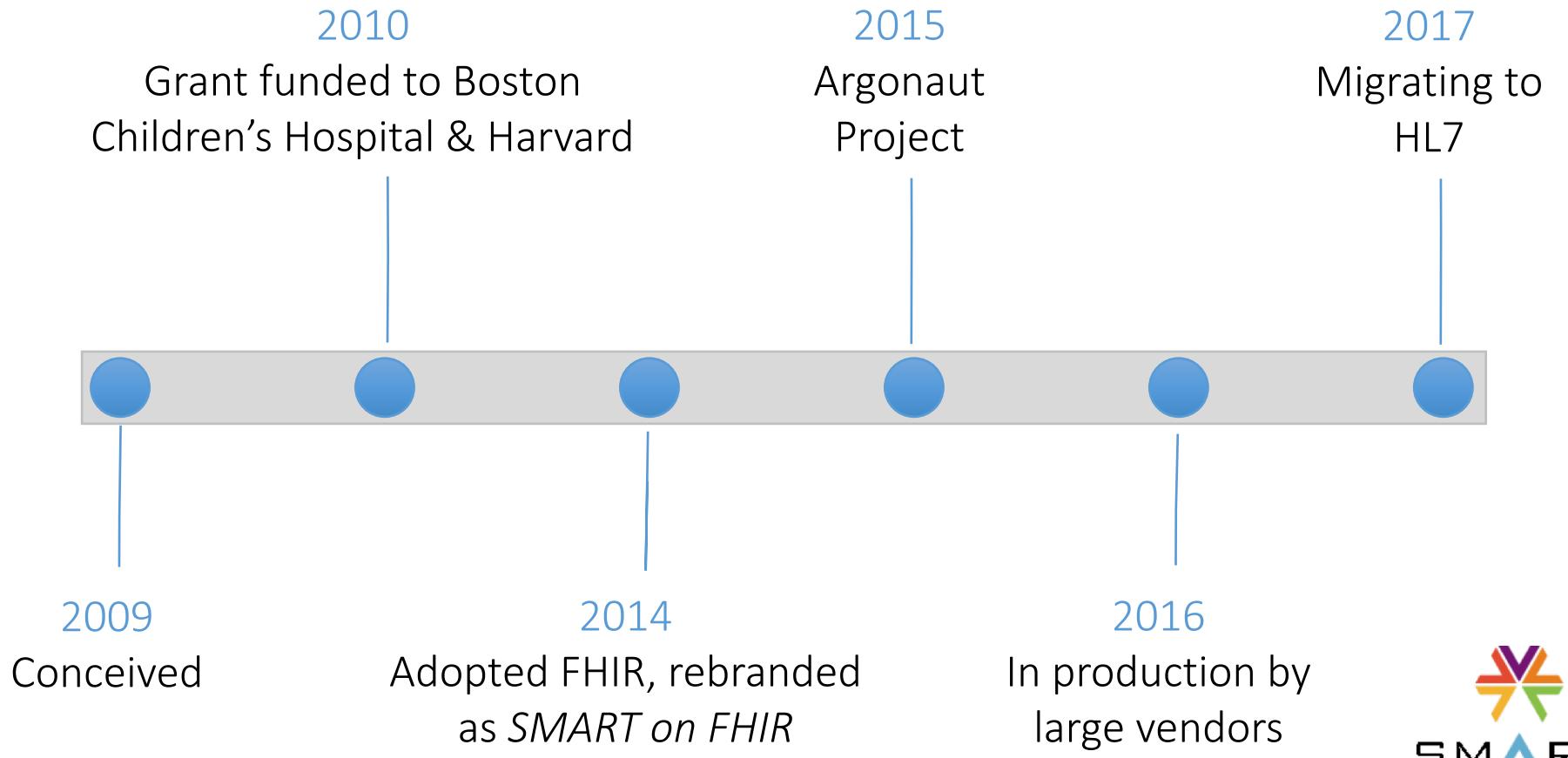
[Open source](#) (licensed under Apache License 2)



Generally [web apps](#)  
(though [native apps](#) are supported too)



# SMART > Trajectory



# SMART > Platform Benefits



Defines how apps are launched



Authorization (OAuth 2)



Authentication (OpenID Connect)



Context sharing between container and app



Discover FHIR service endpoint

# SMART > Platform Benefits



Defines how apps are launched



Authorization (OAuth 2)



Authentication (OpenID Connect)

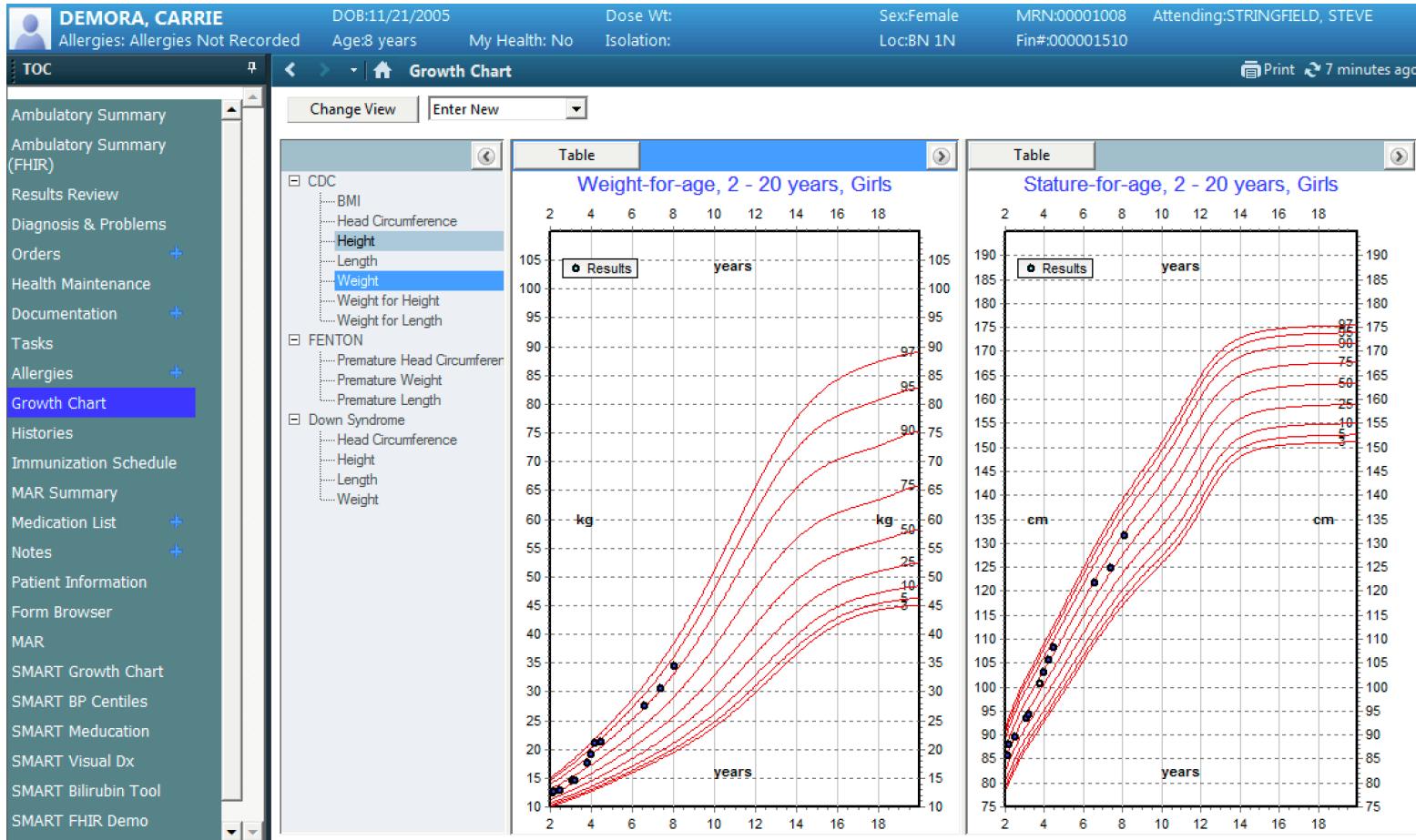


Context sharing between container and app

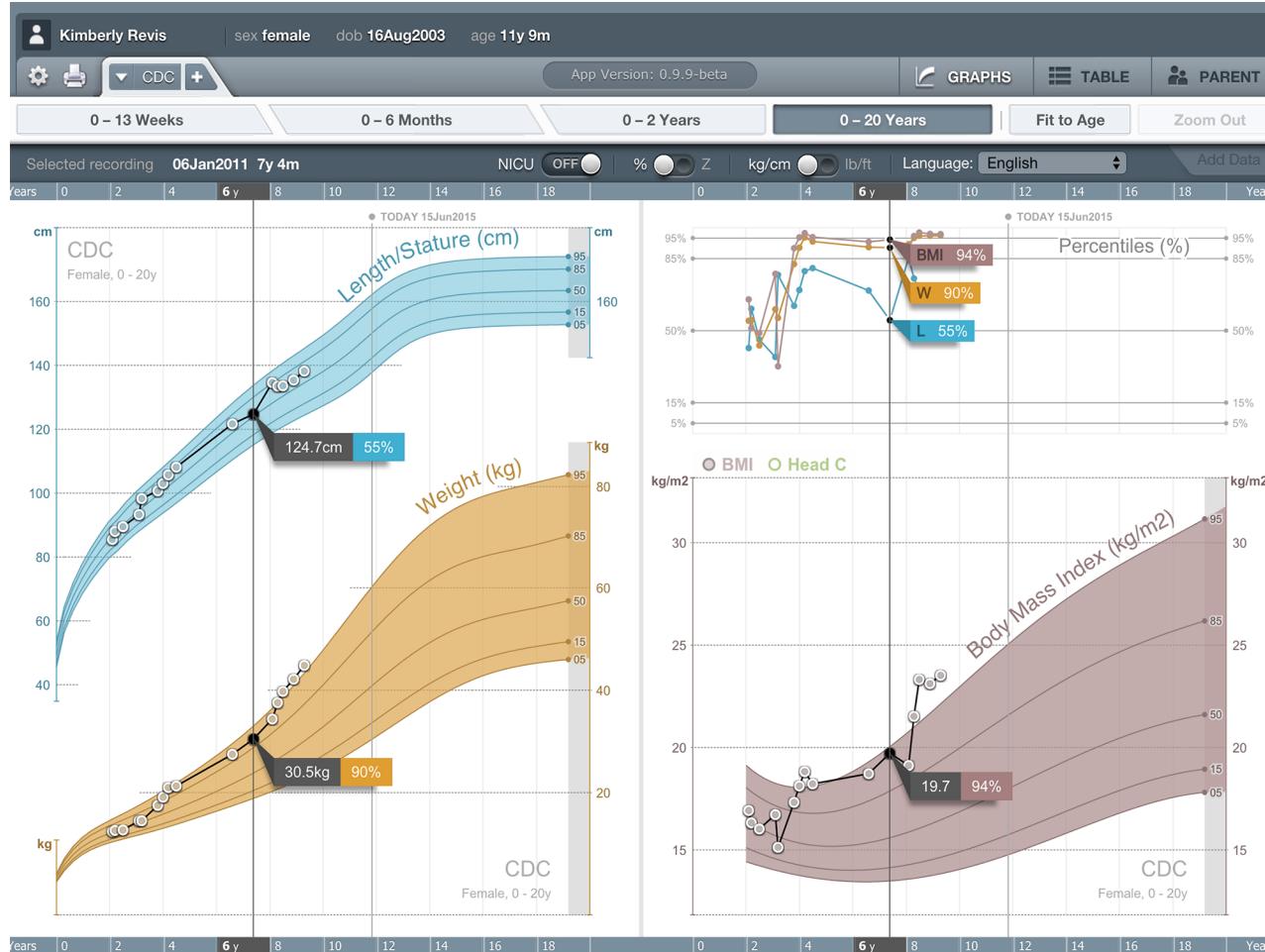


Discover FHIR service endpoint

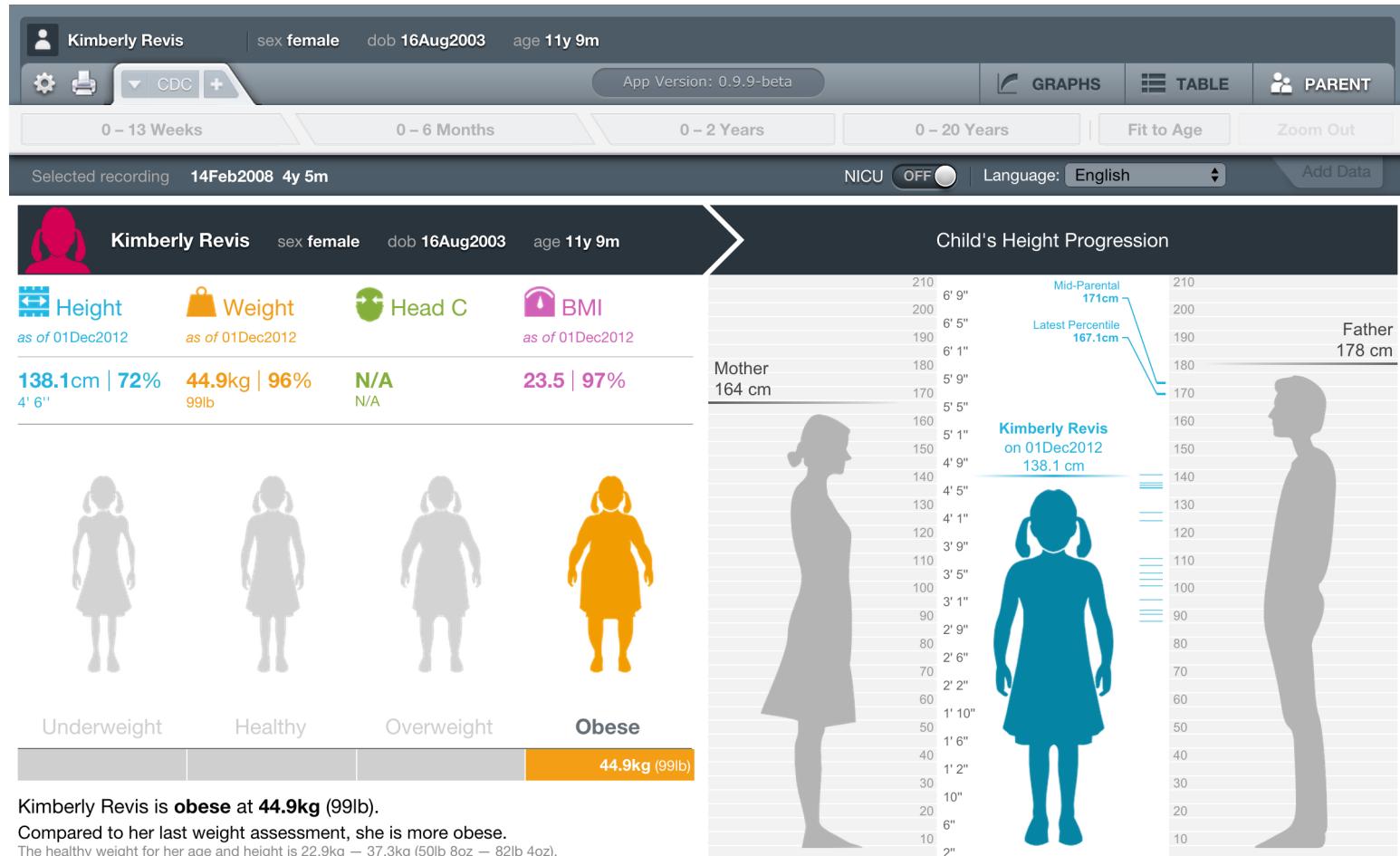
# Growth Chart by Cerner



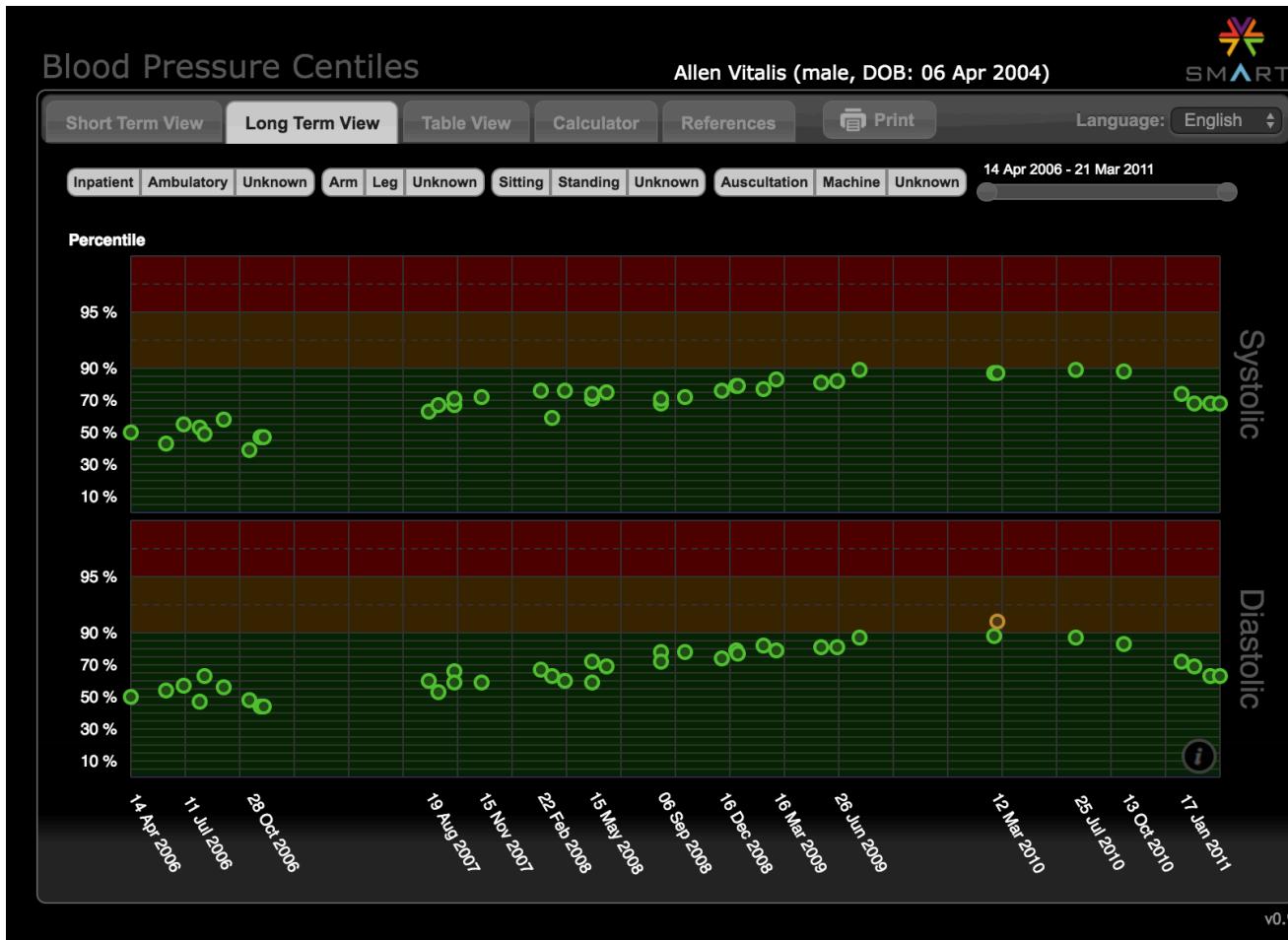
# SMART Growth Chart by Boston Children's Hospital



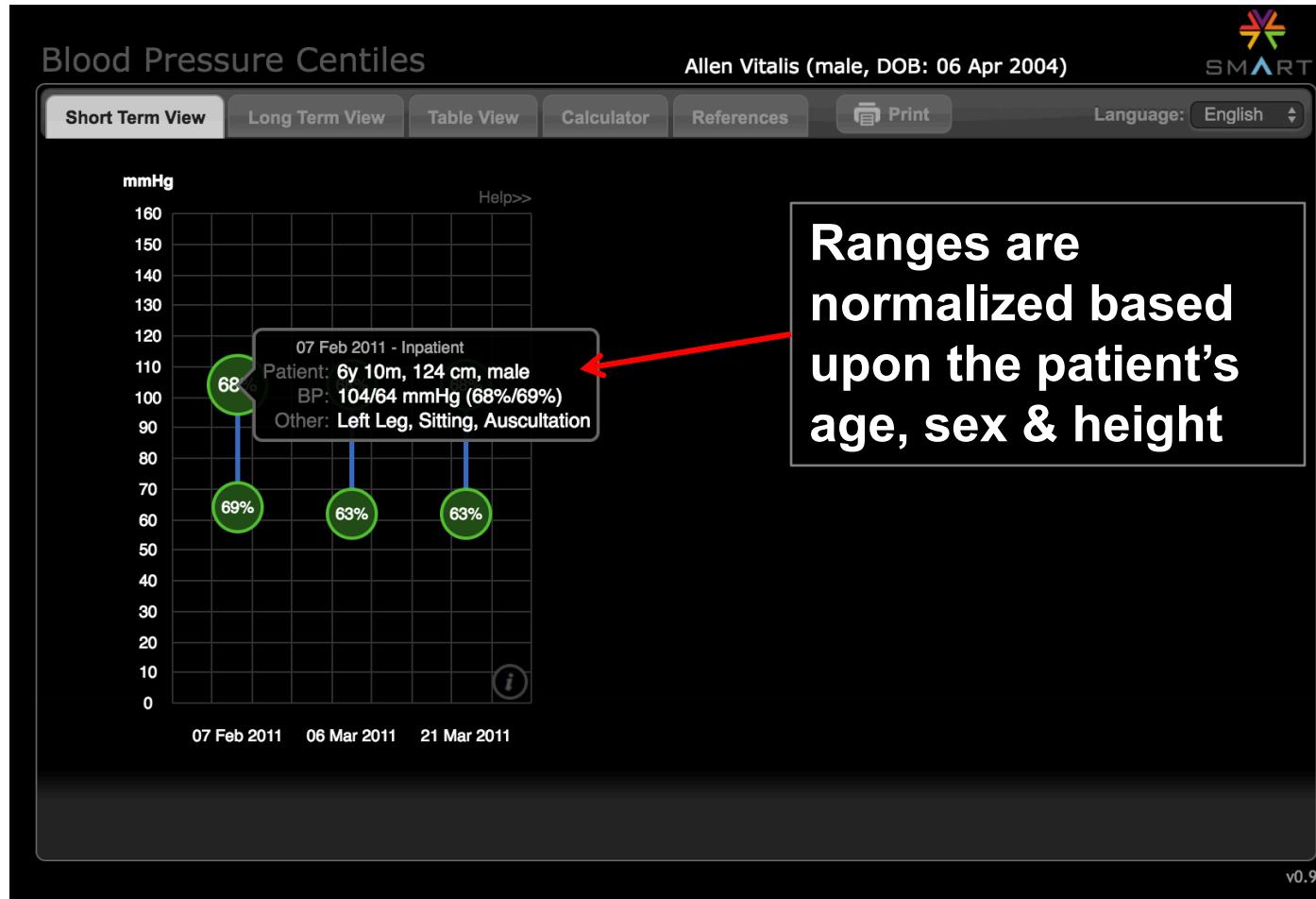
# SMART Growth Chart by Boston Children's Hospital



# SMART BP Centiles by Boston Children's Hospital



# SMART BP Centiles by Boston Children's Hospital



# SMART Neonatal Bilirubin Alerts by Intermountain

Baby Bili

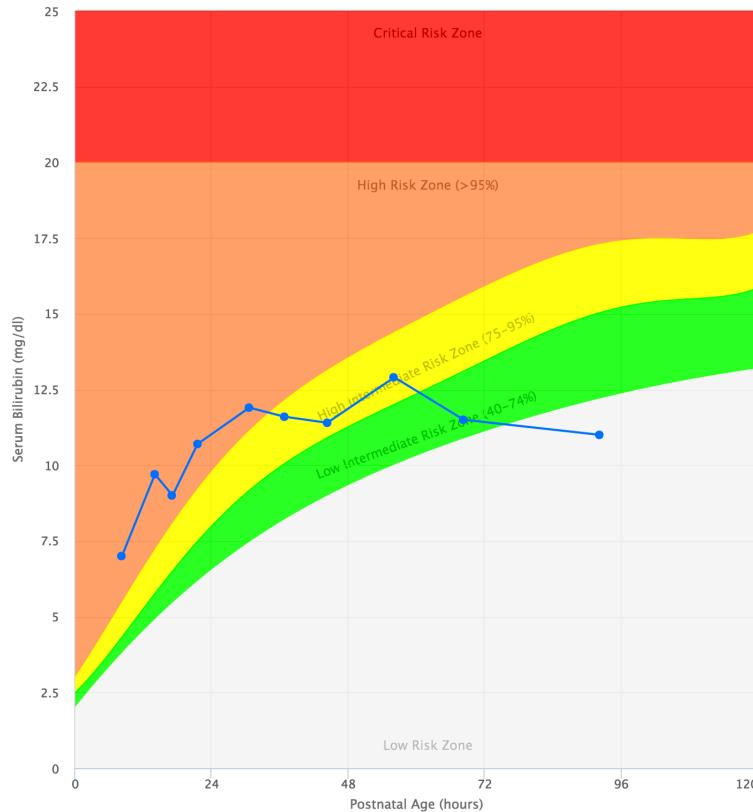
sex male

dob 03 Jan 2016 18:00

age 10m 13d



Hour Specific Bilirubin Risk Chart for Term & Near-Term Infants with NO Additional Risk Factors



Date/Time	Result (mg/dL)	Age (Hrs)	Value:Test	Risk Zone
01/04/2016 02:12	7	8.20	Transcutaneous Bilirubin	High Risk Zone (>95%)
01/04/2016 08:00	9.7	14.00	Transcutaneous Bilirubin	High Risk Zone (>95%)
01/04/2016 11:06	9	17.10	Transcutaneous Bilirubin	High Risk Zone (>95%)
01/04/2016 15:30	10.7	21.50	Transcutaneous Bilirubin	High Risk Zone (>95%)
01/05/2016 00:36	11.9	30.60	Transcutaneous Bilirubin	High Risk Zone (>95%)
01/05/2016 06:48	11.6	36.80	Transcutaneous Bilirubin	High Intermediate Risk Zone (75-95%)
01/05/2016 14:18	11.4	44.30	Transcutaneous Bilirubin	High Intermediate Risk Zone (75-95%)
01/06/2016 02:06	12.9	56.10	Transcutaneous Bilirubin	High Intermediate Risk Zone (75-95%)
01/06/2016 14:18	11.5	68.30	Transcutaneous Bilirubin	Low Intermediate Risk Zone (40-74%)
01/07/2016 14:18	11	92.30	Transcutaneous Bilirubin	Low Risk Zone (<40%)



# Medication by Polyglot

Med List

Calendar

Add Med

Print PMI

English

Regular

Options

Drug Name	SIG Instructions	Links	Med Type	Category	Cal	PMI
Aspirin Tablet 81mg	1 once daily		Oral Pill	Daily	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Carvedilol Tablet 25mg	1 twice daily		Oral Pill	Daily	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Fish Oil Capsule 1000mg	2 once daily		Oral Pill	Daily	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Flovent 100mcg/inh	1 puff every 12 hours		Inhalant	Daily	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Irbesartan Tablet 300mg	1 once daily		Oral Pill	Daily	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Metamucil Sugar-Free	1 teaspoon three times daily		Oral Liquid	Daily	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Omeprazole Delayed Release Tablet 20mg	1 once daily		Oral Pill	Daily	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
ProAir HFA	2 puffs every 4 hours for asthma		Inhalant	Daily	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Synthroid Tablet 50mcg	1 once daily		Oral Pill	Daily	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Systane ophthalmic solution	1 drop each eye twice daily		Ophthalmic	Daily	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Vitamin D3 Capsule 5000 iu	1 once daily		Oral Pill	Daily	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Zetia Tablet 10mg	1 once daily		Oral Pill	Daily	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Blue SIG: SIG not recognized

Edit unrecognized data

View PMI (Personal Med Instructions)

View demonstration

Blue Drug: Medicine not recognized

Modify SIG instructions

Med detail unavailable

View FDA Med Guide

# Meducation by Polyglot

Print header

Print

Mandarin (Simplified)

Regular

## Carvedilol Tablet 25mg

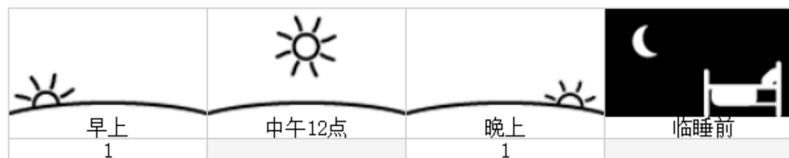
### 用法用量（服药说明）

口服，每天两次。

Take the medicine by mouth twice a day.

每次服一粒/片。

Take one (1) pill each time.



重要：以下是给您的具体说明。若该说明与您收到的其他信息不同，包括以下说明，请洽询您的处方医生或药师。

### 服用说明

吞服，请勿压碎或嚼碎药片/丸以后吞服。

此药须跟食物同服。

很重要的是要请您在每天的同一时间服药，这样药效最佳。

请在室温下储存此药，避热及避免阳光直射。

按时服用此药的每次剂量极其重要，就算感觉很好，也请准时服药。

如果您忘记了而错过（漏服）了一次剂量，请在想起来以后马上补服。如果想起来的时间已经差不多到了下一剂量的服药时间，请跳过（忽略）漏服的剂量。请继续按正常的服药时间安排服药。此药不可两剂（两次剂量）同时服用。

请告知您的医生、护士或药剂师您服用的所有药物。包括处方药和非处方药。同样告知他们您服用的任何维生素、中草药或其他保健食品。

如果您患有糖尿病，此药可能会隐藏某些低血糖的症状，比如心跳过速。请定期检测您的血糖水平并留意其它低血糖的症状。

低血糖的症状可能包括恶心、颤动、出汗、皮肤冰冷、心率过快、饥饿或易怒。

请勿突然停止服用此药。停止之前，请咨询您的医生。

### 注意事项

如果您曾对该药物过敏，请告知您的医生和药剂师。症状可能包括呼吸困难、皮疹、瘙痒、肿胀或者严重头晕。

请遵医嘱用药，不要过量用药。

SMART embedded  
launch workflow



## SMART App One-Time Setup

- SMART Apps must be published at TLS-protected URL (<https://>)
- Register a launch URL with the EHR
- Register an authorization redirect URL with EHR



Launch SMART app  
with FHIR endpoint +  
launch context

EHR

Launches SMART app via the  
app's launch URL

The FHIR endpoint URL and an  
opaque context identifier are  
given as parameters



Launch SMART app  
with FHIR endpoint +  
launch context

Calls FHIR /metadata service

SMART App

Calls FHIR conformance  
resource (GET /metadata) to  
obtain the OAuth endpoint



Launch SMART app  
with FHIR endpoint +  
launch context

Calls FHIR /metadata service

Returns Conformance with OAuth endpoint

FHIR Service

Returns the Conformance  
document containing the  
OAuth endpoint



Launch SMART app  
with FHIR endpoint +  
launch context

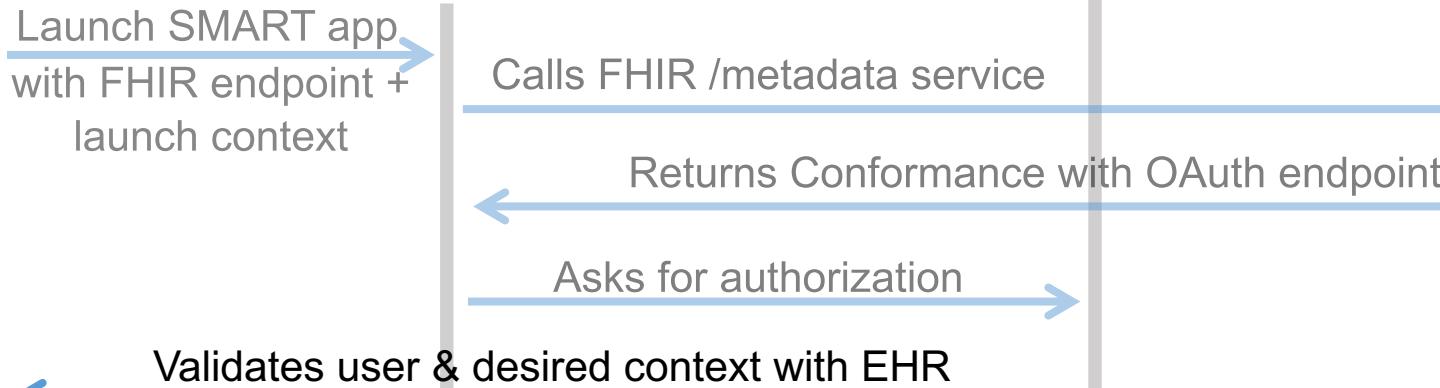
Calls FHIR /metadata service

Returns Conformance with OAuth endpoint

Asks for authorization

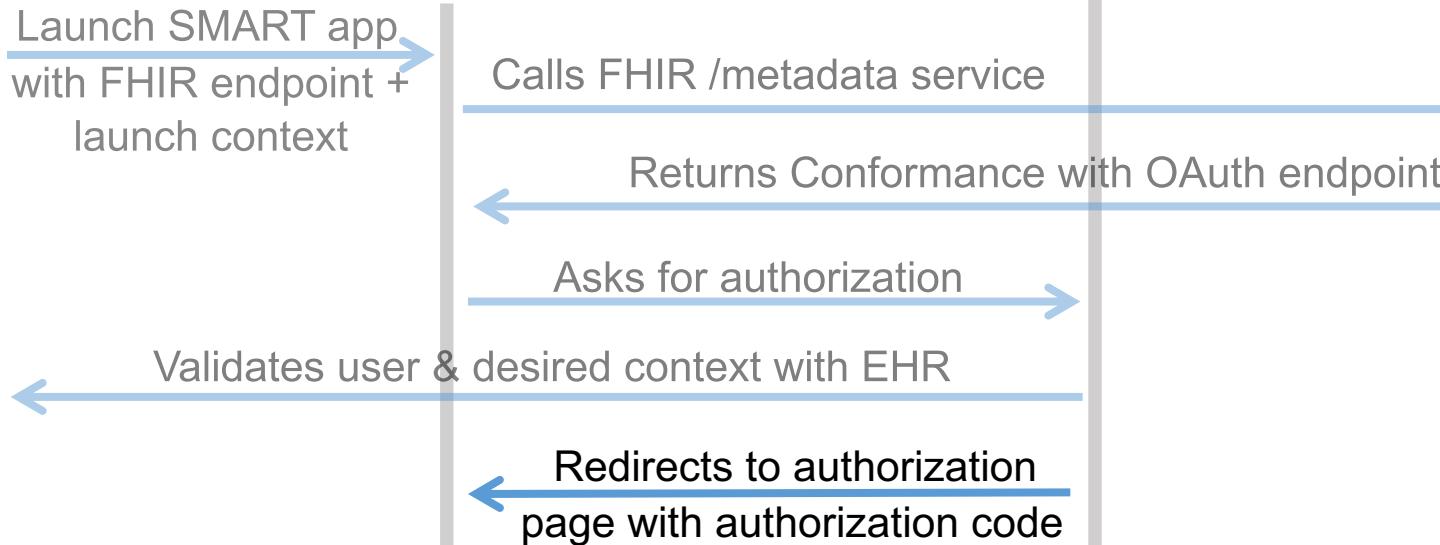
#### SMART App

Asks the OAuth provider for  
authorization to run as well as  
the desired scopes (eg, patient,  
encounter)



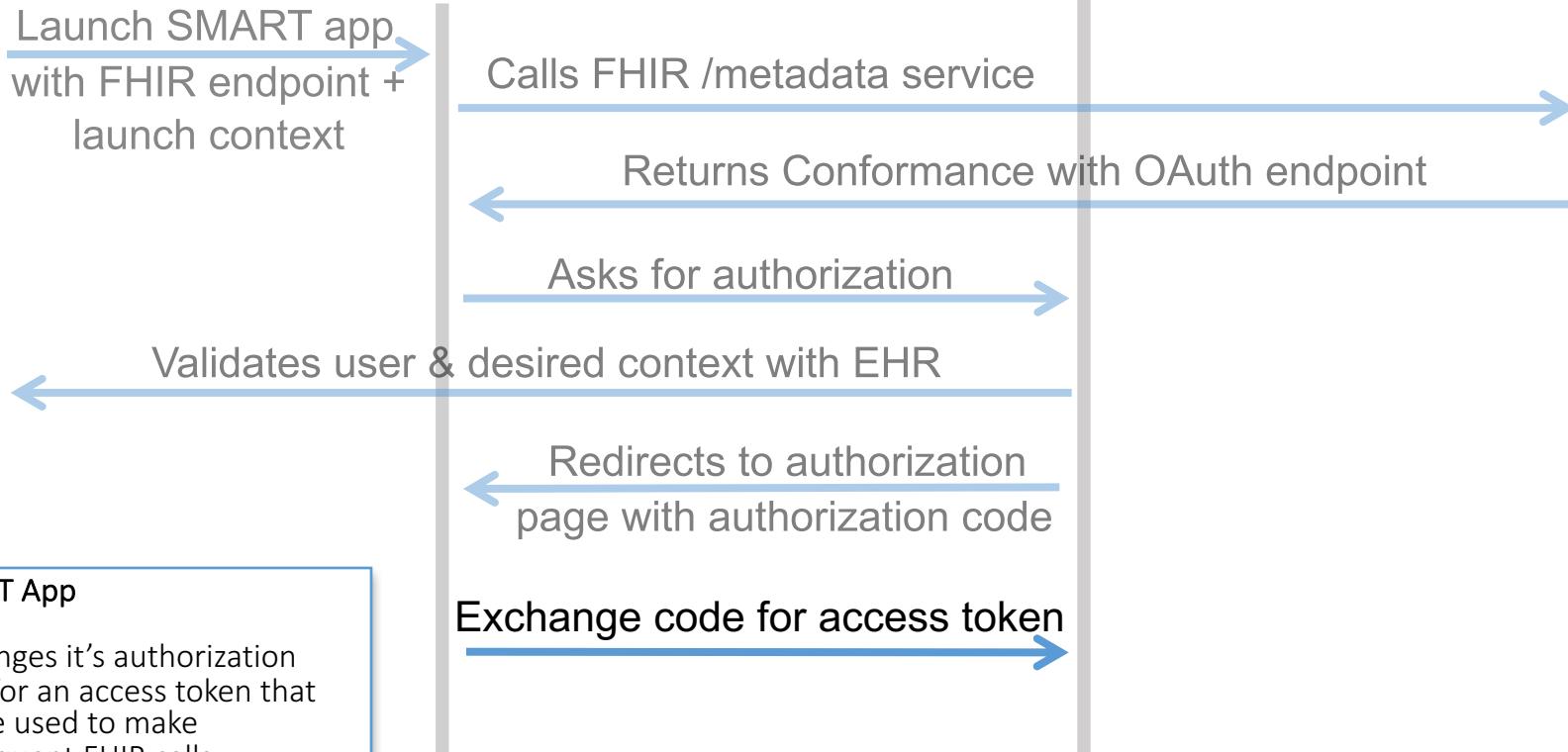
OAuth Provider

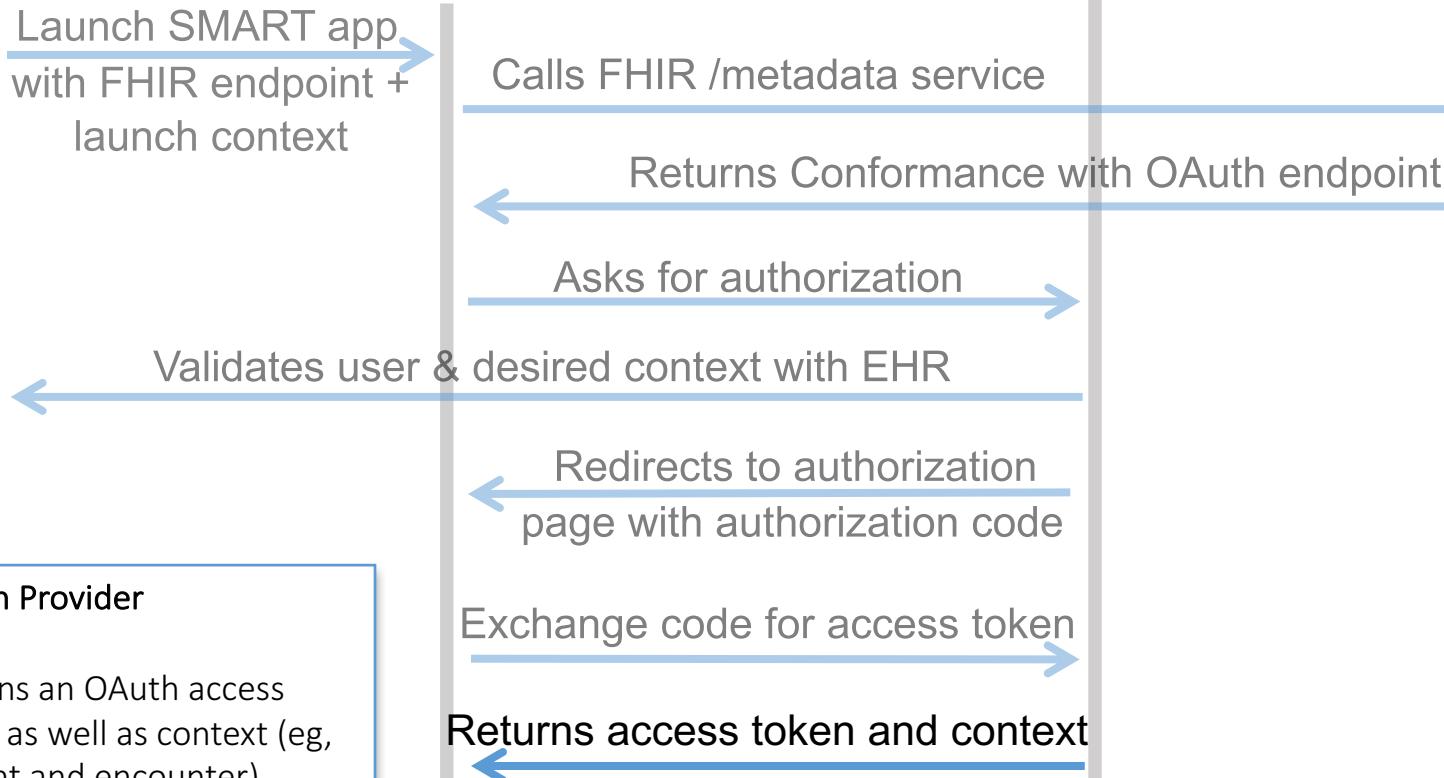
Contacts the underlying EHR to validate the authorization request from the SMART app



OAuth Provider

Redirects back to the SMART app with an authorization code







Launch SMART app  
with FHIR endpoint +  
launch context

Calls FHIR /metadata service

Returns Conformance with OAuth endpoint

Asks for authorization

Validates user & desired context with EHR

Redirects to authorization  
page with authorization code

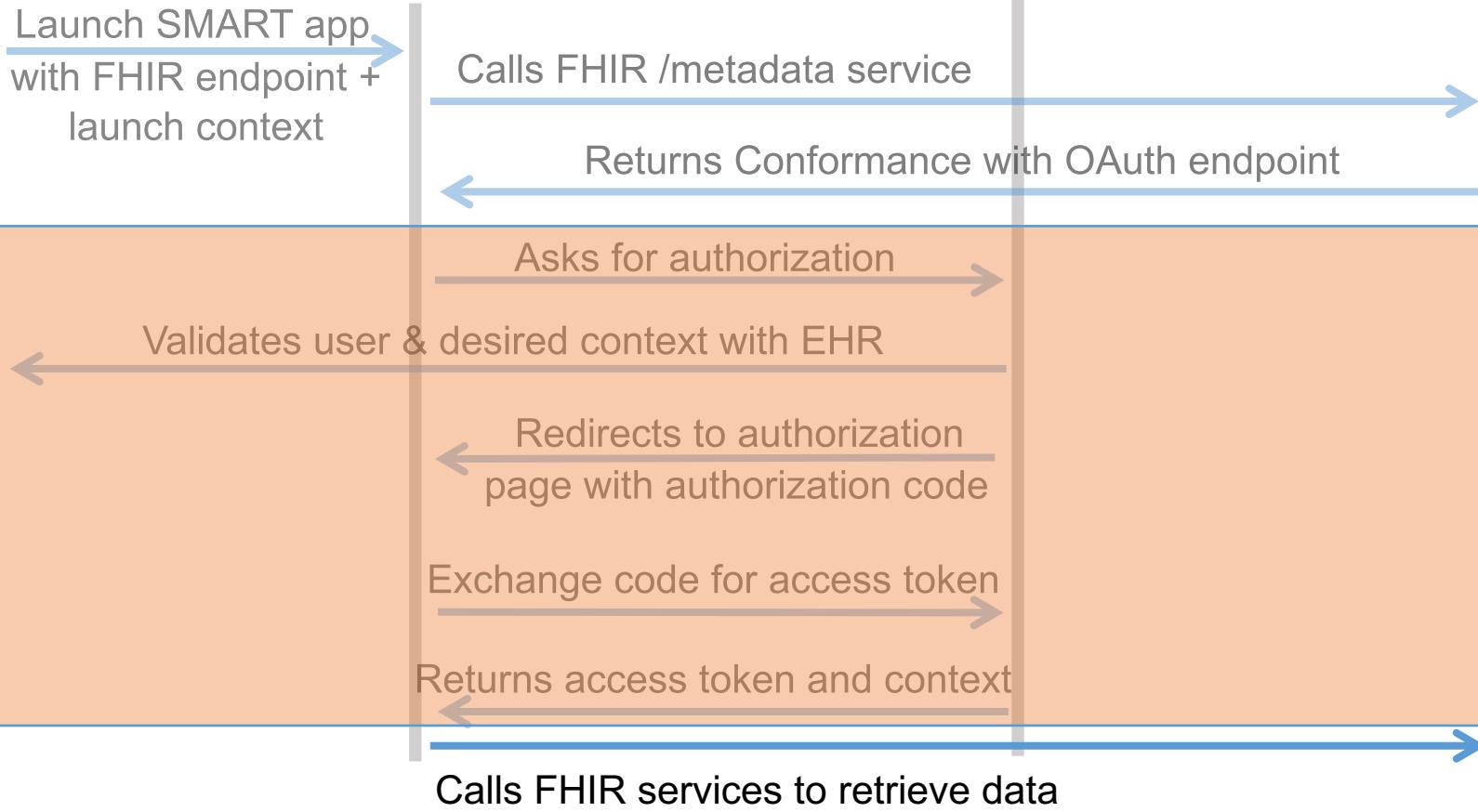
Exchange code for access token

Returns access token and context

Calls FHIR services to retrieve data

SMART App

Calls FHIR services as needed  
using the given context



# SMART > Community



[smarthealthit.org](http://smarthealthit.org)



[docs.smarthealthit.org](http://docs.smarthealthit.org)



[gallery.smarthealthit.org](http://gallery.smarthealthit.org)



[chat.fhir.org](http://chat.fhir.org) | [bit.ly/smart-google-group](https://bit.ly/smart-google-group)



[github.com/smart-on-fhir](https://github.com/smart-on-fhir)

Thanks!

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