

BAHMNI Training for Digital Healthcare

ThoughtWorks®



Bahmni™



Welcome!

- Record this meeting
- The Trainers
- The Participants
- Questions / Parking Lot
- Please be respectful of others, and time.
- Use the zoom chat to share any interesting tidbits or questions.
- Keep your zoom on silent/mute when not speaking to avoid disturbance to the group.
- Pref “raise hand” for comment/questions, or type them in zoom chat.
- Intro to overall plan for today & next 2 days.
- Feedback anytime!



Source: How JSS uses Bahmni/EMR reports for impact and decision making (Blog)

We bring the best of our distributed teams to build impactful software!

10,000+
Employees

27+
Years

48
Offices

17
Countries

Australia / Brazil / Canada / Chile
China / Ecuador / Finland / Germany
India / Italy / Netherlands / Romania
Singapore / Spain / Thailand
United States / United Kingdom



Thoughtworks' purpose

To create an extraordinary impact on the world through our culture and technology

Our core values:

Global first / Courageous / Inclusivity / Cultivation / Integrity

Curiosity / Pursuit of Excellence / Autonomous teams excellence



Be an awesome partner for clients and their ambitious missions



Revolutionize the technology industry



Amplify positive social change and advocate for an equitable tech future



Foster a vibrant community of diverse and passionate technologists



Achieve enduring commercial success and sustained growth

OUR EXPERIENCE IN PUBLIC HEALTH

We bring experience, insight and learnings that comes from working with Patients & Providers, DOHs, NGOs, Academic and Technology communities worldwide



GitHub

TOP 10 CONTRIBUTOR TO OPEN SOURCE

Our technologists bring successful, field-tested techniques and ideas from around the globe to open source solutions.



DeepLearning.scala



CSS Critic

Binding.scala



Ranking of GitHub contributors in 2017 – study by InfoWorld

RANK	COMPANY	EMPLOYEES CONTRIBUTING
1	Microsoft	4,550 / 3.3%
2	Google	2,267 / 2.2%
3	Red Hat	2,027 / 16%
4	IBM	1,813 / .05%
5	Intel	1,314 / 1.2%
6	Amazon.com	881 / 0.0%
7	SAP	747 / 0.0%
8	ThoughtWorks	739 / 15%
9	Alibaba	694 / 0.0%
10	GitHub	676 / 85%
11	Facebook	619 / 1.7%
12	Tencent	605 / 1.3%
13	Pivotal	591 / 23%
14	EPAM Systems	585 / 2.2%
15	Baidu	584 / 1.4%
16	Mozilla	469 / 47%
17	Oracle	455 / .03%



OPEN SOURCE TECHNOLOGIES IN GLOBAL HEALTH

And **Thoughtworks** has been instrumental in most of the key components listed here

HOSPITAL / CLINICAL SYSTEMS



REPORTING & ANALYTICS

The logo for dhis2, featuring the text "dhis2" in white on a dark blue rounded rectangular background.

PLATFORMS



ProjectEKA

Health
Information
Exchange

SHARED
HEALTH
RECORD

DISTRIBUTION & SUPPLY CHAIN



COMMUNITY HEALTH



EMERGENCY RESPONSE

RAPIDFTR





Bahmni™

<https://bahmni.org>

- ▶ *One of the most popular EMR/EHR/HIMS*
- ▶ *40+ countries, over 400+ implementations.
600+ downloads a month*
- ▶ *Open Source, Open System, Open Community*
- ▶ *Preferred EHR/HIMS solution in many countries in Asia and Africa*
- ▶ *Strategic asset for Large Humanitarian Organizations*

Bahmni is an easy to use EMR and hospital system. It combines and enhances existing open source products into a single solution.



*for electronic medical records
and patient management*



*for inventory, billing,
financial accounting*



*for DICOM
and PACS*



*for laboratory
management*

Improve

patient care. Access intuitive clinical summaries, charts and X-rays from anywhere.

Inform

decision-making with a comprehensive view of data. Increase efficiency.

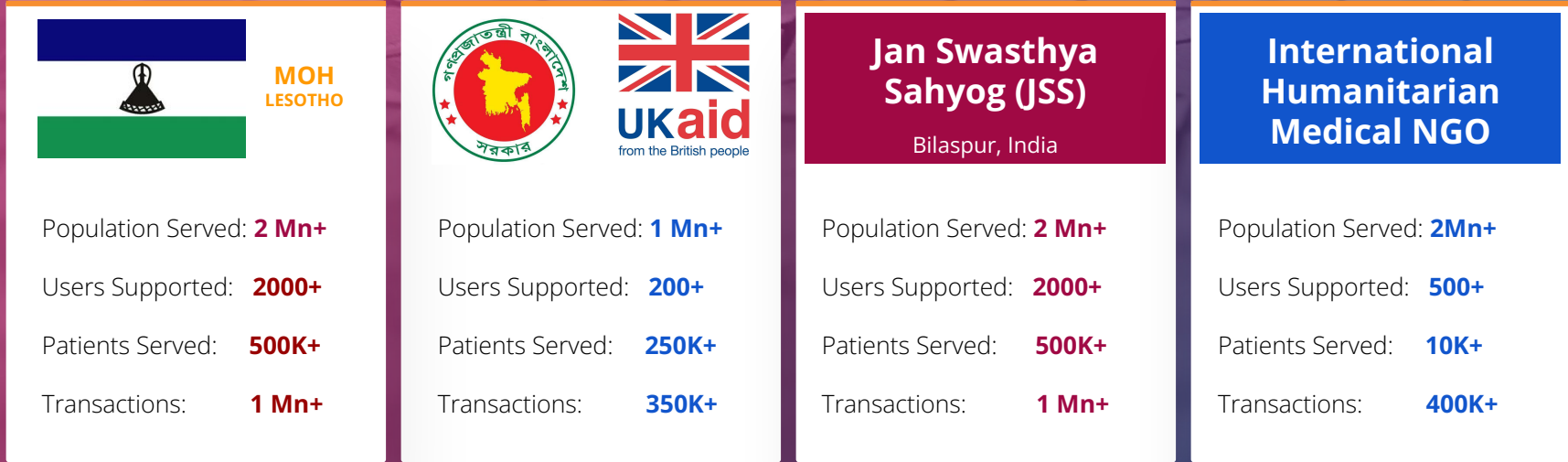
Configure

a reliable system easily to your hospital's workflow.

Engage

with a growing and responsive implementer community.

BAHMNI - THE OUTREACH AND IMPACT



BAHMNI IMPLEMENTATIONS



Bahmni Goals

Outcomes

- Improve quality of patient care
- Efficiency in hospital operations
- Improve the health of the community
- Easy to use/acquire/implement/accessibile
- Enable advocacy using data

Target Audience

- LMICs (Low-to-Middle income countries)
- NGOs, Government, non-profit organizations
- Open Source Adopters

Ecosystem Development

- Elevate public health, working through our clients and delivery partnerships
- Create a platform for best practices and possibilities
- Create a network effect through solutions leveraged
- Build a community to take Bahmni to places we can't.



BAHMNI - DESIGNED AND NURTURED BY THOUGHTWORKS

BAHMNI combines and enhances existing open source products into a single solution designed for Healthcare Practitioners and Health Service Providers in the ecosystem

- **ROBUST:** Open Source EMR and hospital system
- **SCALABLE:** Used in 50+ Countries and over 500+ hospital/units, favored choice in many African/Asian countries
- **RESILIENT:** Runs in low resource settings as well as corporate hospitals
- **ELASTIC:** Can run on the cloud as well as on premise
- **FUTURISTIC:** Integrating newer features such as teleconsult as well as data privacy support following DEPA act, NDHM integrated



Bahmni recognized as an **approved Digital Public Good (DPG)**

UNICEF along with the Governments of Norway and Sierra Leone, and the India-based think tank iSPIRT have jointly established the **Digital Public Goods Alliance**, a multi-stakeholder initiative to accelerate the attainment of the sustainable development goals in low- and middle-income countries by facilitating the discovery, development, use of, and investment in digital public goods. The DPGA is an effort to convene a network of partners from different sectors that will contribute to the identification, support, scale-up, and use of software, data, and algorithms that can advance humanity.



Norwegian Ministry
of Foreign Affairs



unicef 
for every child

<https://digitalpublicgoods.net/blog/unicefs-open-source-approach-to-innovation/>

[Registry](#)



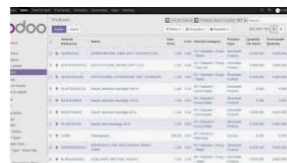
Screenshots of Bahmni – Bahmni™ bahmni.org



Screenshots of Bahmni – Bahmni™ bahmni.org



Screenshots of Bahmni – Bahmni™ bahmni.org



Screenshots of Bahmni – Bahmni™ bahmni.org



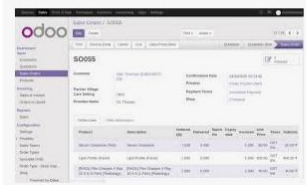
Screenshots of Bahmni – Bahmni™ bahmni.org



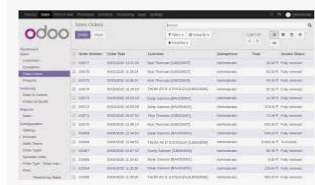
Screenshots of Bahmni – Bahmni™ bahmni.org



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Bahmni Documentation Wiki bahmni.atlassian.net



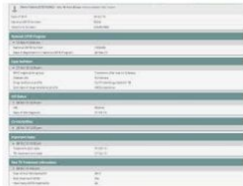
Screenshots of Bahmni – Bahmni™ bahmni.org



Screenshots of Bahmni – Bahmni™ bahmni.org



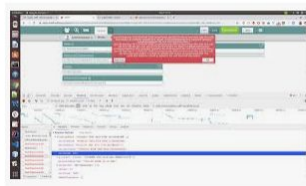
Bahmni Dhis 2 Integration Error ... talk.openmrs.org



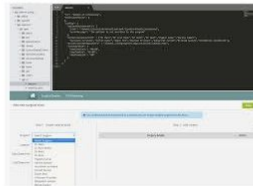
Screenshots of Bahmni – Bahmni™ bahmni.org



Bahmni Pricing, Features & Reviews 2021 ... softwaresuggest.com



Bahmni - Connect 0.92 Visit type ... talk.openmrs.org



OT surgeons list - Bahmni - OpenMRS Talk talk.openmrs.org



Screenshots of Bahmni – Bahmni™ bahmni.org

Features Available

Feature List



Patient Registration

1. Patient Demographics
2. Patient ID generation
3. Patient Search
4. Photo Capture
5. Custom Patient Card
6. Patient Relationships
7. Name in Local Language
8. Registration Fees
9. Custom Attributes
10. Secondary IDs
11. Attach custom validations/plugins to registration page.
12. Upload Patient Documents, xRay, etc.
13. Queue Management
14. Emergency Registration
15. Retro-active data entry mode
16. Appointment Module
17. Program Enrollment

<https://www.bahmni.org/feature-list>

Clinical

1. Coded Concepts & Clinical Notes
2. Clinical Forms (by speciality), with Form Designer
3. Observations/Diagnosis/Chief Complaints
4. Lab & Radiology Orders
5. Drug Orders/Order Sets/Pharmacy
6. Patient Dashboard / Widgets
7. Track visits & encounters
8. Trends/Charts/Graphs/Tables
9. Visit History
10. Teleconsultation
11. Library of Open Source forms
12. Operation Theatre Management

IPD

1. Admin, Discharge & Transfer
2. Ward Management & Bed Layout
3. In-Patient Dashboard (Custom)

LAB (OpenELIS)

1. Lab Workflow (with Approvals)
2. Samples/Accession Number Generation
3. Capture Test results
4. Flow from & into Clinical modules automatically as-and-when available.
5. Lab Test Report Printout
6. Workload Dashboard view
7. Referrals

X-RAY/DICOM Support

1. PACS Integration
2. OVIYAM2 viewer
3. Integrate xRay/DICOM Machines

Feature List

Stock Management (Odoo)

1. Hierarchical modelling of your warehouses and stocking points.
2. Management of products (medicines, other supplies) in stock.
3. Vendor/Supplier Management
4. Procurement of the products from a supplier, broken up by batches with their expiry dates
5. Stock movement between different stocking points and warehouses
6. Ability to view the current stock levels by products
7. Automatic reduction in stock of product batch quantities when patient pays for the invoice consisting of products (via the billing function).
8. Reports
 - a. Sales, Discounts, Credits
 - b. Purchases
 - c. Stock Movement
 - d. Inventory Status
 - e. Organisational Accounts

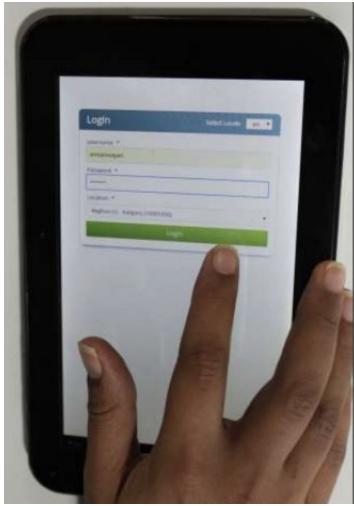
Billing / Account (Odoo)

1. Setup discount, credit and tax related accounting heads. Define financial years.
2. Auto-create draft bill (quotation) consisting products (drugs, injections, etc) for a patient, driven from Clinical order placement.
3. Automatically chooses first to expire batch for each product to dispense from.
4. Bill Payments after applying credit, discount and taxes.
5. Maintain patient's financial record.
6. Standard accounting reports.

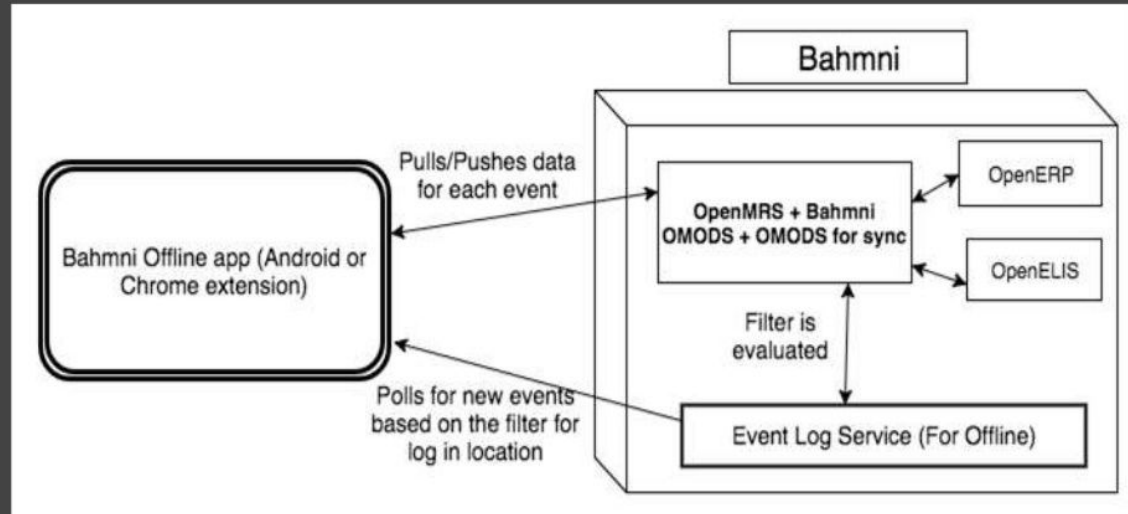


<https://www.odoo.com/>

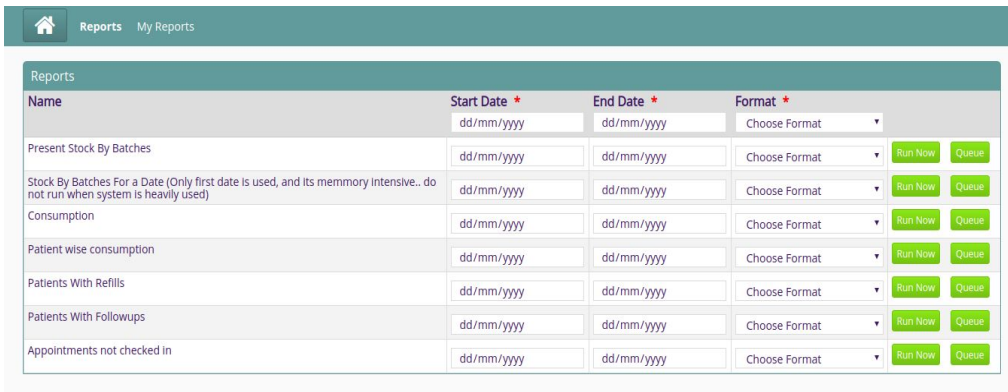
Bahmni Connect



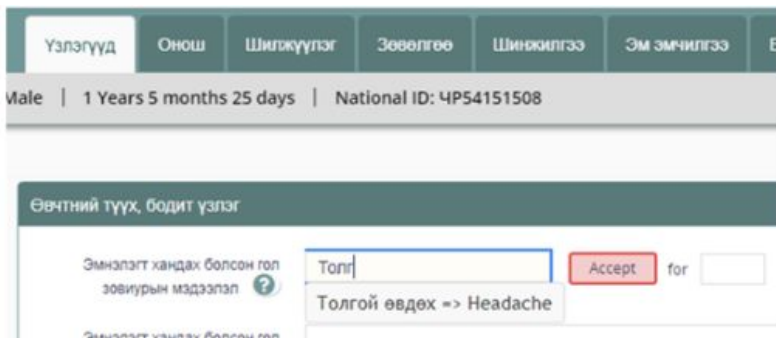
Data Flow:



Feature List



Name	Start Date *	End Date *	Format *		
Present Stock By Batches	dd/mm/yyyy	dd/mm/yyyy	Choose Format	Run Now	Queue
Stock By Batches For a Date (Only first date is used, and its memory intensive... do not run when system is heavily used)	dd/mm/yyyy	dd/mm/yyyy	Choose Format	Run Now	Queue
Consumption	dd/mm/yyyy	dd/mm/yyyy	Choose Format	Run Now	Queue
Patient wise consumption	dd/mm/yyyy	dd/mm/yyyy	Choose Format	Run Now	Queue
Patients With Refills	dd/mm/yyyy	dd/mm/yyyy	Choose Format	Run Now	Queue
Patients With Followups	dd/mm/yyyy	dd/mm/yyyy	Choose Format	Run Now	Queue
Appointments not checked in	dd/mm/yyyy	dd/mm/yyyy	Choose Format	Run Now	Queue



Узлэгүүд | Онош | Шилжүүлэг | Зөвөлгөө | Шинжилгээ | Эм эмчилгээ | Б...

Male | 1 Year 5 months 25 days | National ID: 4P54151508

Өвчний түүх, бодит үзлэг

Эмнэлэгт хандах болсон гол зовиурын мэдээлэл ?

Толгой

Толгой өвдөх => Headache

Accept for

Others

1. Reports
 - a. Out of Box
 - b. Metabase Custom Reporting
2. Authentication/Authorisation
3. Metadata Management/Concept Dictionary
4. Auto-sync across systems
5. I18n Enabled (Spanish, French, Arabic, etc).
6. Fully Open Source
7. Data Migration Import/Export
8. Audit Log
9. Linux Based (CentOS)
10. Multiple Implementers world-wide
11. LetsEncrypt SSL
12. Great wiki documentation (Creative Commons)
13. Slack based community channel



Linux



open source

Bahmni Features in 2021



1. Teleconsultation (Appointment) on Jitsi
2. NDHM - India Digital Health Infrastructure compatible
3. Bahmni with BikaLIMS (SenaitelIMS) integration over AtomFeed & HL-7
4. Covid Starter-Kit
5. Release V0.93
 - Many enhancements across Appointments, Data Import, Operation Theatre, Localisation, etc.
 - Bahmni Mart.
 - Security Assessments & fixes.
 - Many bug fixes.
6. Dockerziation (Phase1)

Priorities for 2022!



1. Bahmni @next - new frontend based on OpenMRS Micro-frontend (and move away from Angular.JS)
2. Support more use-cases for Teleconsultation.
3. Upgrade OpenMRS platform (and Java + FHIR support).
4. Security Stream
5. Dockerization and support beyond CentOS
6. Cloud Deployment (multi-instance) + centralized master-data
7. OCR for Paper to Data conversion (IIT Mumbai)

<https://bahmni.atlassian.net/wiki/spaces/BAH/pages/1645674497/Active+Bahmni+Initiatives+Projects>

Questions + History? + Demo

John Smith (GAN4000) - Male, 44 Years 6 months 7 days (Jerusalem)

Date of Birth: 29 Sep 71

Disposition: No dispositions available.

Radiology: No documents for this patient.

Navigation Links Control

- Home Dashboard
- Patient Visit Page
- Patient ADT Page
- Patient Dashboard
- Discharge Summary Page
- Program Management Page
- Consultation

Pacs: No Radiology Order for this patient.

Lab Results: No Lab Orders for this patient.

Vitals: 09 Mar 16 2:40 am

Pulse	70 /min
RR	18 /min
Temperature	98 F
Blood Pressure	
Systolic	150 mm Hg
Diastolic	90 mm Hg

Diagnosis

Diabetes II, uncomplicated	CONFIRMED PRIMARY	09 Mar 16
Meformin 1,000mg BID		Super Man 2:40 am
abc123	CONFIRMED PRIMARY	09 Mar 16
Pinworms	PRESUMED PRIMARY	09 Mar 16

Treatments

Visit On 09 Mar 16		
Sulfamethoxazole & Trimethoprim 800mg + 160mg (Tablet)	1 Tablet(s) Twice a day, Oral - 3 Days	09 Mar 16
Metformin 1000mg (Tablet)	1 Tablet(s) Twice a day, Oral - 90 Days	09 Mar 16
abc123	10 mg, Once a day - 90 Day(s)	09 Mar 16

Programs

Active Programs

- Surgery (31 Mar 16)

Radiology Orders: No Radiology Order for this patient.

Lab Orders Display Control: No Lab Order for this patient.

Nutritional Values: 09 Mar 16 1:31 am

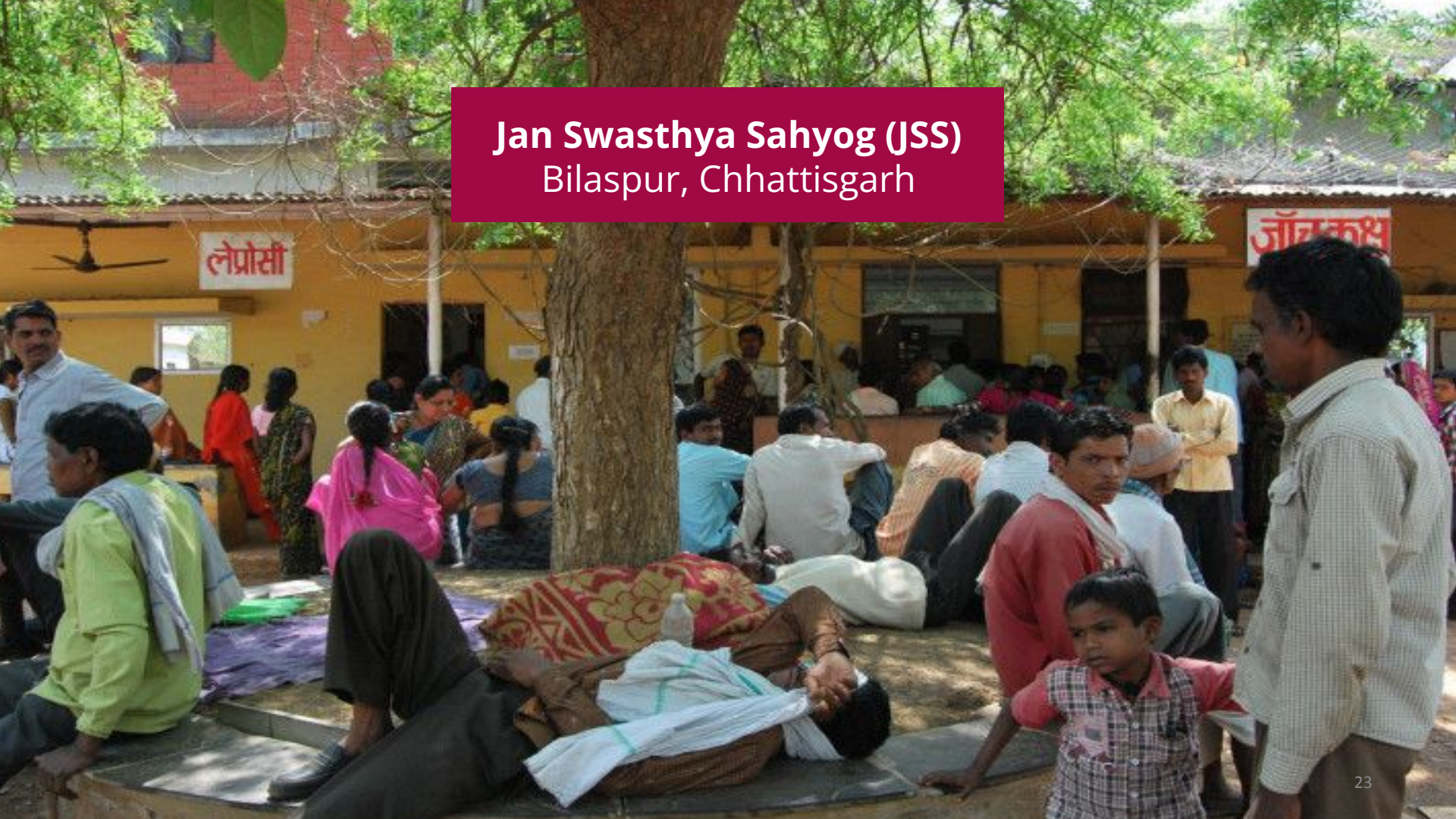
BMI	22.22
BMI STATUS	Normal



Bahmni™

EHR for low resource settings

Jan Swasthya Sahyog (JSS)
Bilaspur, Chhattisgarh





[I am a Doctor 2.5](#)
[Hope and Health for the bottom billion](#)
[Healthcare for India's underprivileged](#)

October 2012



<https://www.thoughtworks.com/de/clients/jss>

OUR INSPIRATION

- ▶ *“People in small places do not have small problems”*
- ▶ *Why is technology so expensive?*
- ▶ *“ ... physician is the natural attorney of the poor”*



[JSS - Making healthcare accessible in rural India](#)
[JSS - Visual journey of how Bahmni is used](#)

JSS

- ▶ *“Almost” digitized hospital - uses EMR, Billing, Pharmacy/Inventory, Lab, Radiology Systems*
- ▶ *Using for clinical care, operational efficiency & teaching/training*
- ▶ *Leveraging connectivity and EHR for remote consultation with specialists*
- ▶ *Data driven - for research and advocacy*
- ▶ *Self-sufficient and self-reliant with the system*
- ▶ *Aiming for integrated EHR - integrated sub-centers and CHW programs*



Gudalur Adivasi (Tribal) Hospital

“Your health is your problem and you should be able to take care of yourself” - Dr. Shyla Nandakumar

- *50 bed Hospital*
- *Infant mortality rate reduced to 20/thousand from 300/thousand*
- *Run by the tribals for the tribals*
- *Self reliant - Community collective, 75% of the tribal have dedicated to improvement of health*



Reconstructive Surgery

- *Reconstructive surgery hospital in Amman, Jordan.*
- *The hospital serves war wounded patients from across the region (Syria, Iraq, Yemen etc) who have no access to specialized surgical care in their home countries*
- *The hospital also provides physiotherapy and psychosocial support alongside specialized surgical interventions*



Vertical Programmes

endTB

- › A Partnership among 3 organisations - **MSF, Partners in Health (PIH) & Interactive Research & Development (IRD)** funded by UNITAID
- › Operational over 17+ countries
- <http://endtb.org>
- [Dr. Cathy Hewison on Design, development, and deployment of the endTB electronic medical record](#)
- [Fighting Tuberculosis with Open-Source Tech](#)

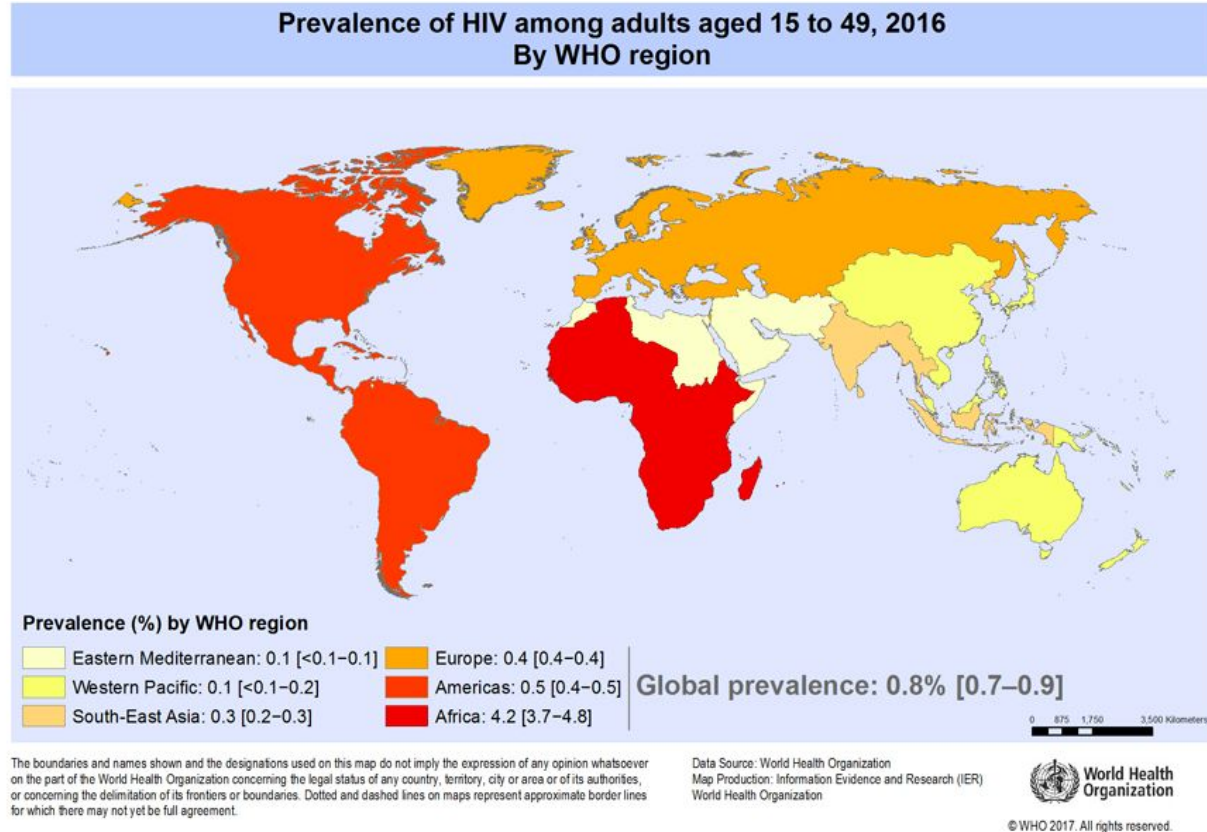
OBJECTIVE

- To find shorter, less toxic and more effective treatments for 'multidrug-resistant TB' or MDR-TB with two new drugs - **Bedaquiline** and **Delamanid**
- Aims to share findings with WHO and Governments for a much wider impact



HIV

- ▶ *Médecins Sans Frontières (MSF)/ Doctors Without Borders*
 - *Centre Hospitalier Kabinda in Kinshasa, DRC*
 - *Almost 1 million HIV positive patients in DRC*
- ▶ *University of Dar-es-salaam Computing Center (UCC), Tanzania*
 - *Pilot for a HIV center, to be followed by a nationwide rollout*



Architecture

Bahmni Architecture -> Component Architecture



Android application



Chrome App



Browser

Apache webserver

OpenMRS
(Tomcat)

OpenElis
(Tomcat)

Odoo (Python)

DCM4CHEE
(Jboss)

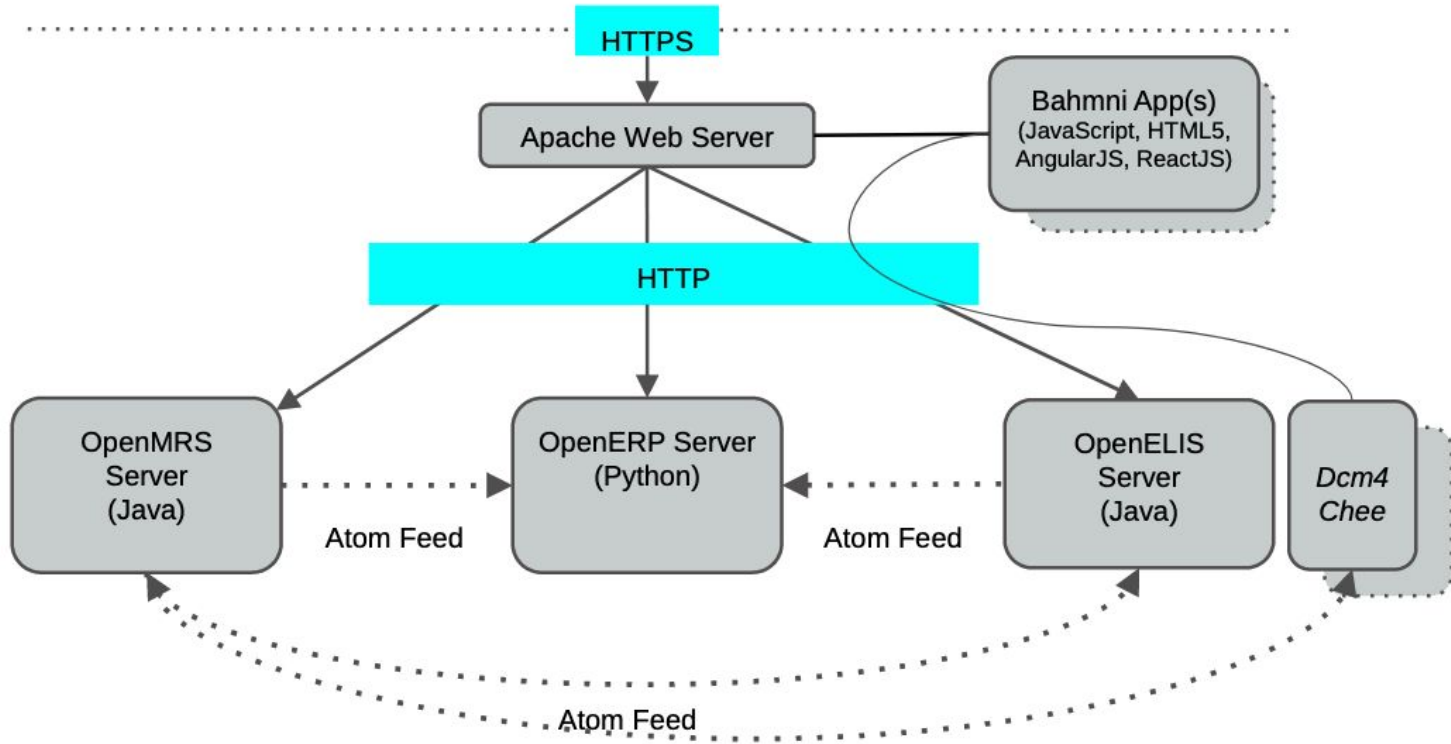
Reports
(Tomcat)

OpenMRS
(MySQL)

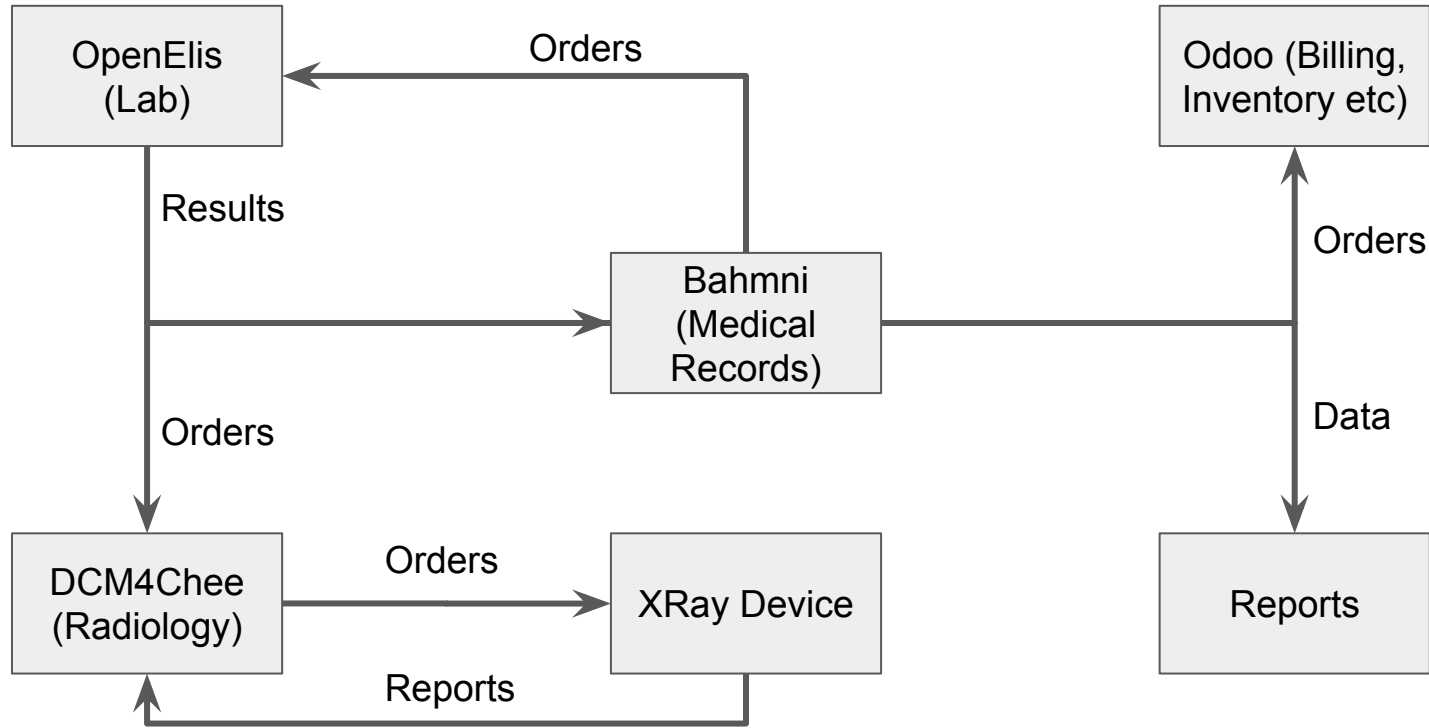
OpenElis(Post
gres)

Odoo(Postgres
)

Dcm4Chee(Po
stgres)



Bahmni Architecture -> Data Flow



Modules

OWA

HTML Form Entry

Registration

Scheduling

Registration



AngularJS



Spring



HTML5

Presentation



OpenMRS API



REST API



FHIR API

Service



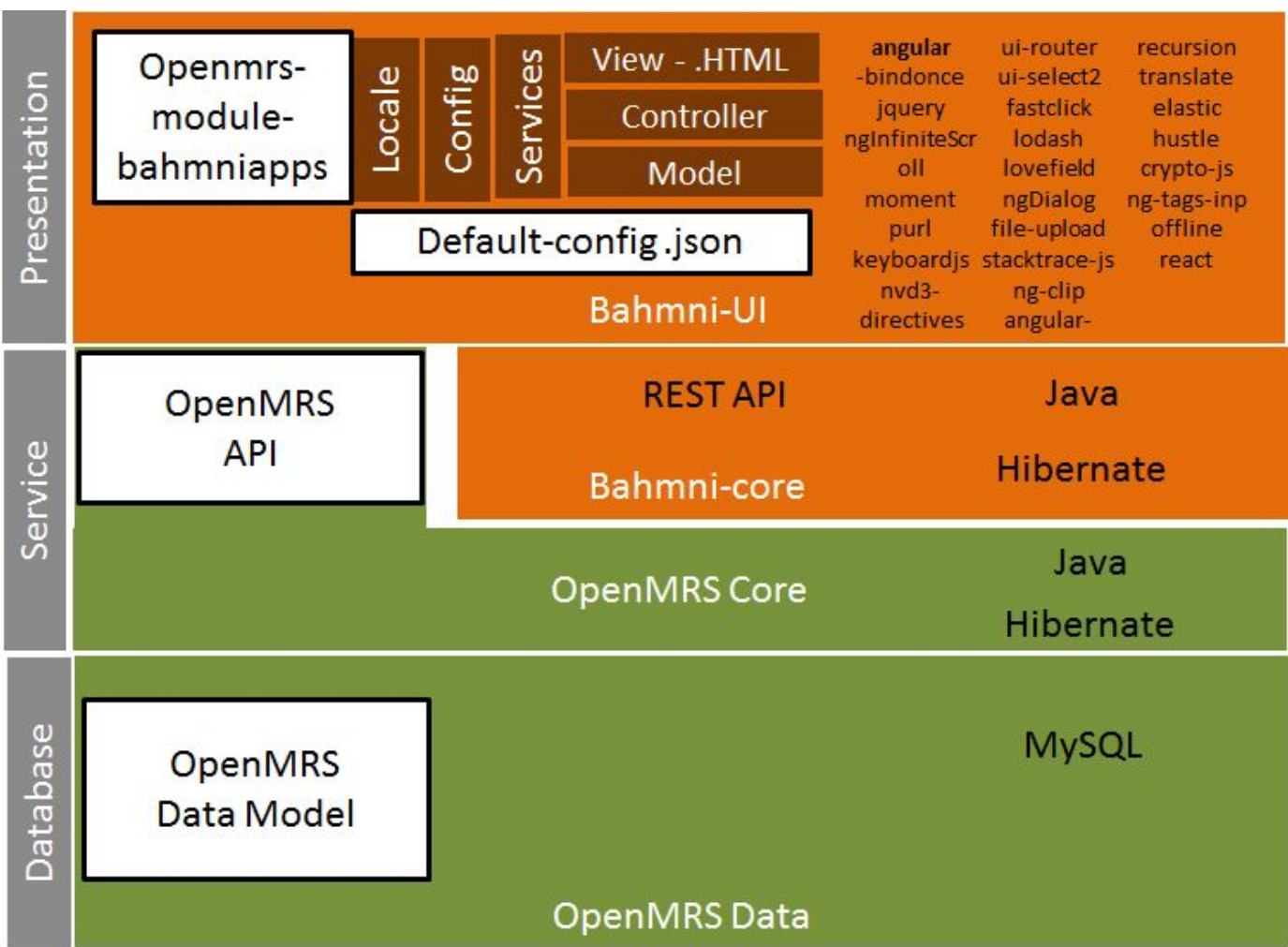
Hibernate



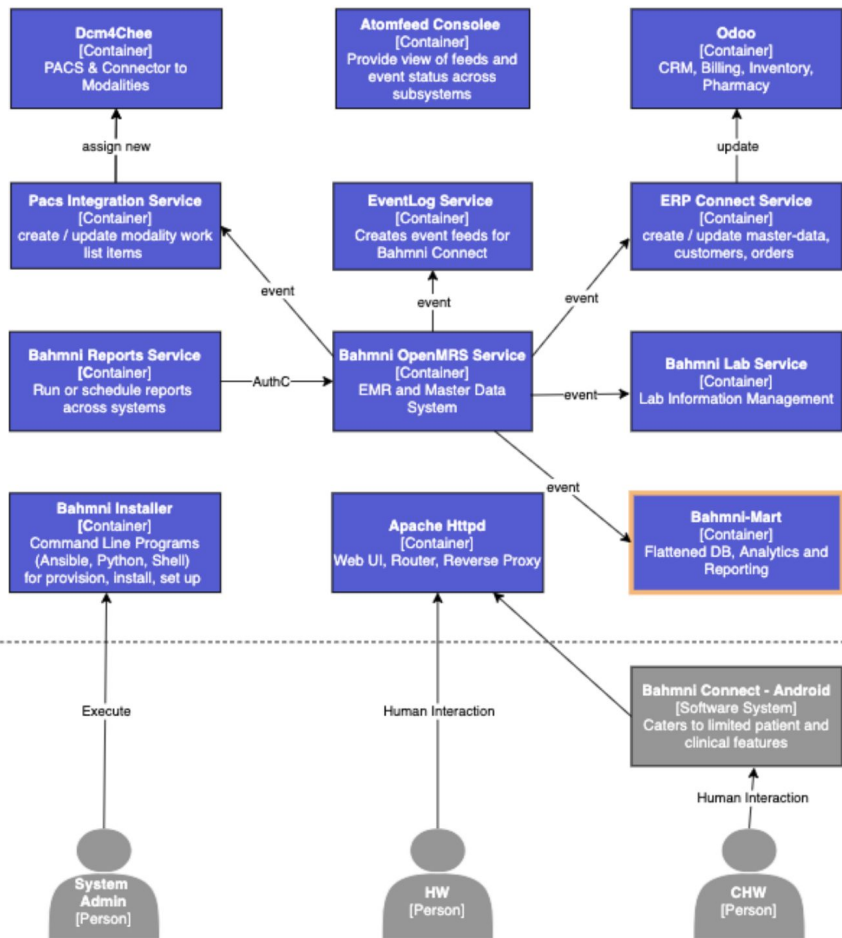
Database



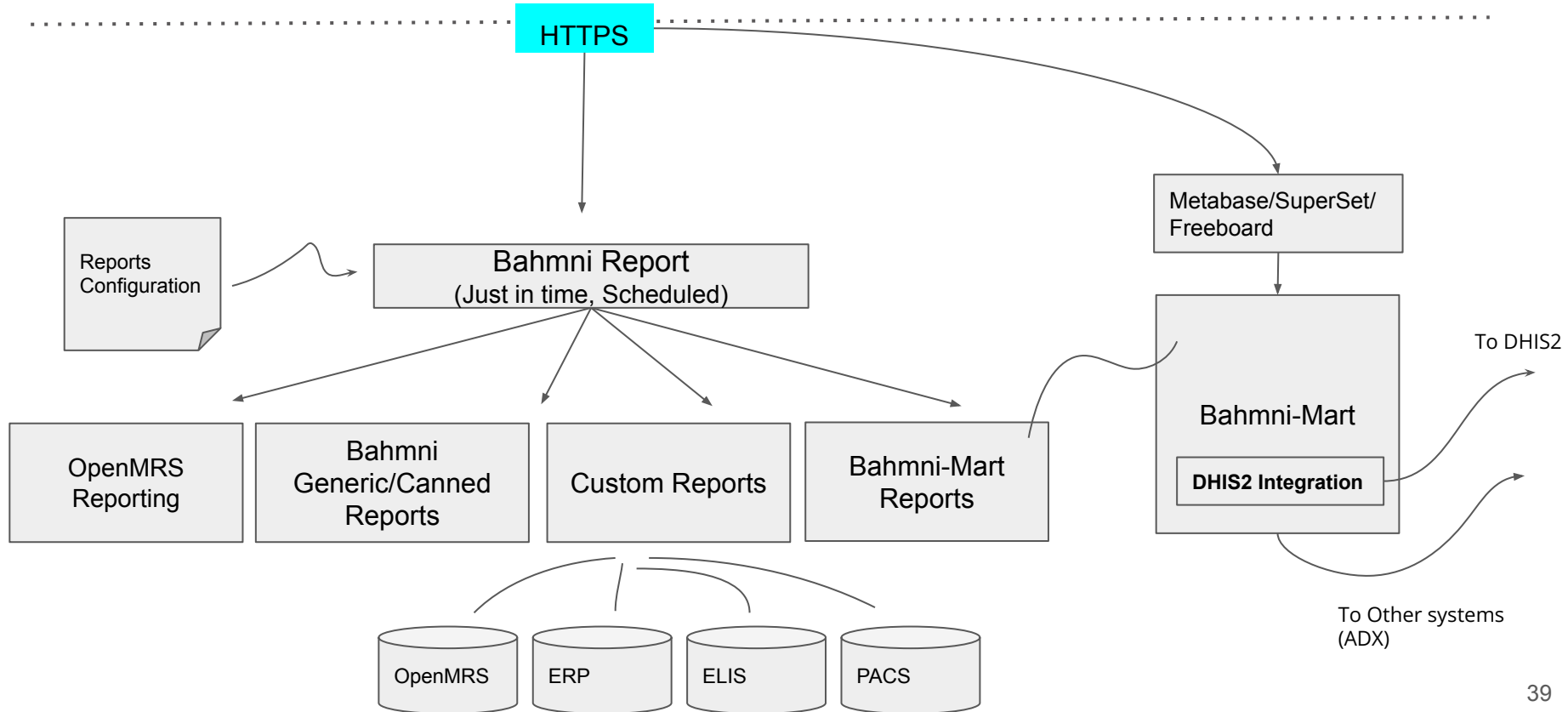
OpenMRS Data Model



[Bahmni Software, System]



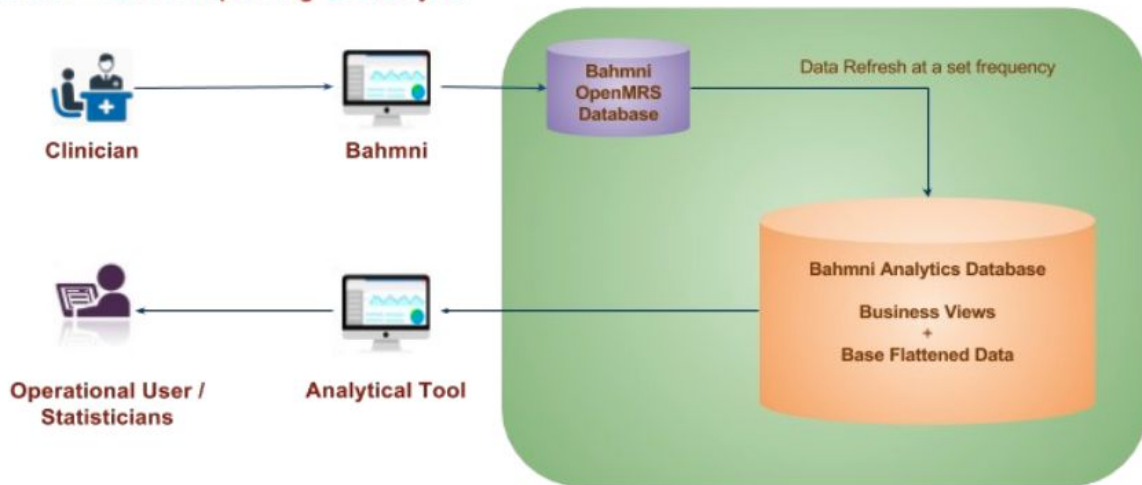
Bahmni Reporting



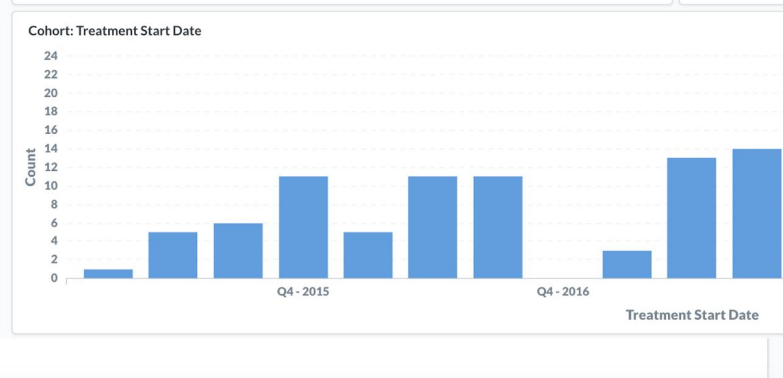
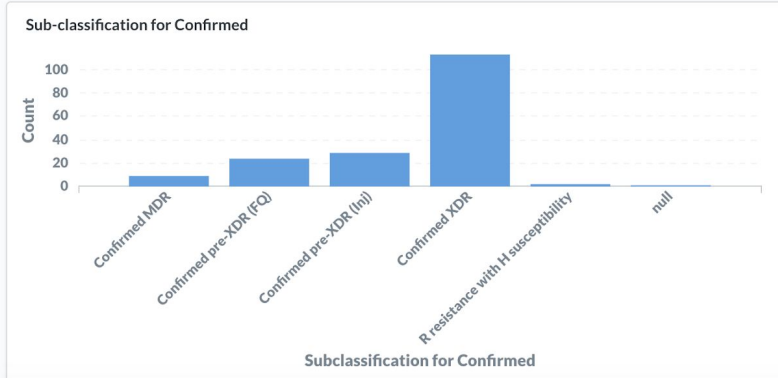
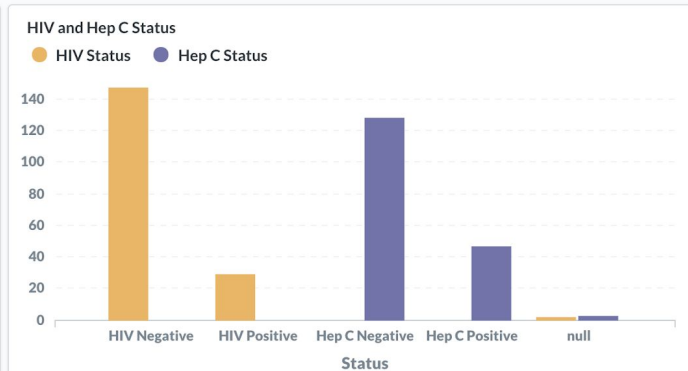
Bahmni Mart + Metabase

Reporting Platform

Bahmni - Data Reporting & Analysis



Bahmni Mart + Metabase



Details

- Home
- Grid
- Notifications
- Profile

General Details

Dictionary Name
SITE B in COUNTRY B

Short Code
SiteBCountryB

Description
This is my dictionary for our implementation in Site B in Country B.

Preferred Source
MSFOCP

Owner
admin(You)

Visibility
Public

Concepts(HEAD Version)

Total Concepts: 53

From MSFOCP: **53**

Custom Concepts: **0**

[VIEW CONCEPTS](#)

Versions

No versions created

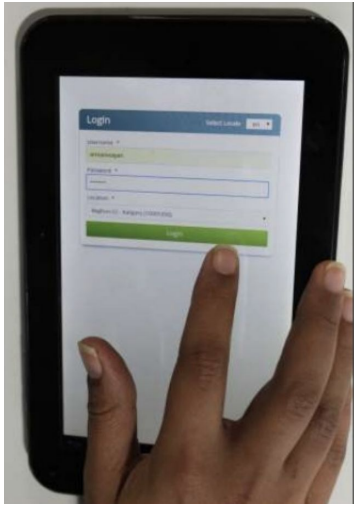
[CREATE NEW VERSION](#)

1:32 / 3:28

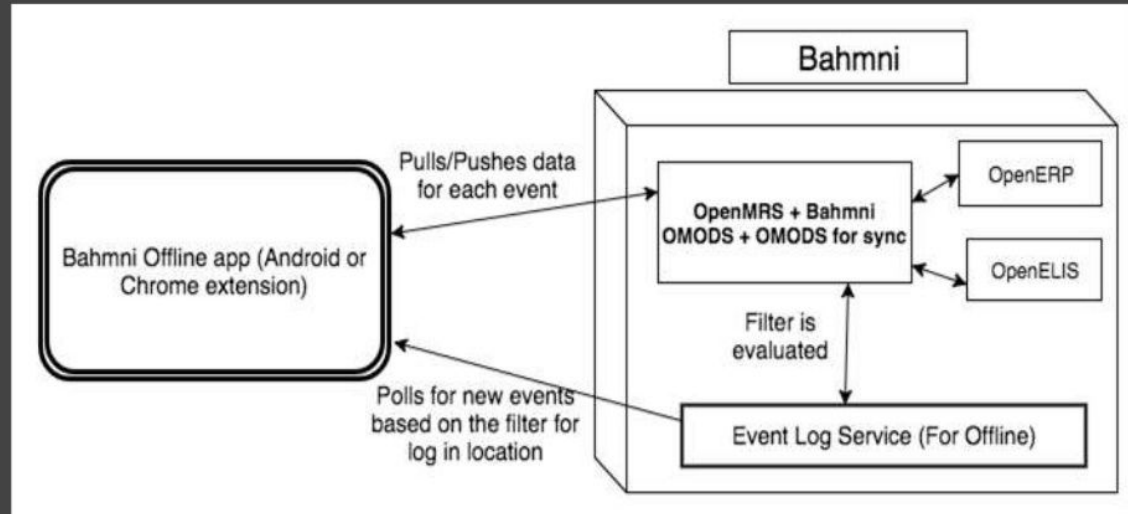
Loom for Chrome is sharing your screen. [Stop sharing](#) [Hide](#)



Bahmni Connect



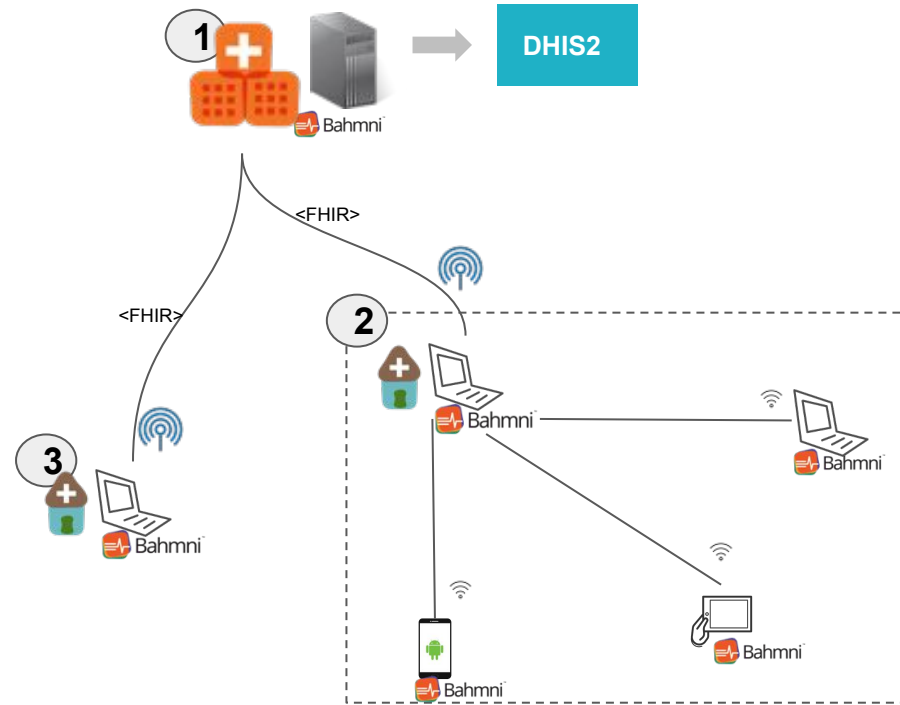
Data Flow:



Bahmni for Mobile Medical Units, Outreach programs, Health Centers

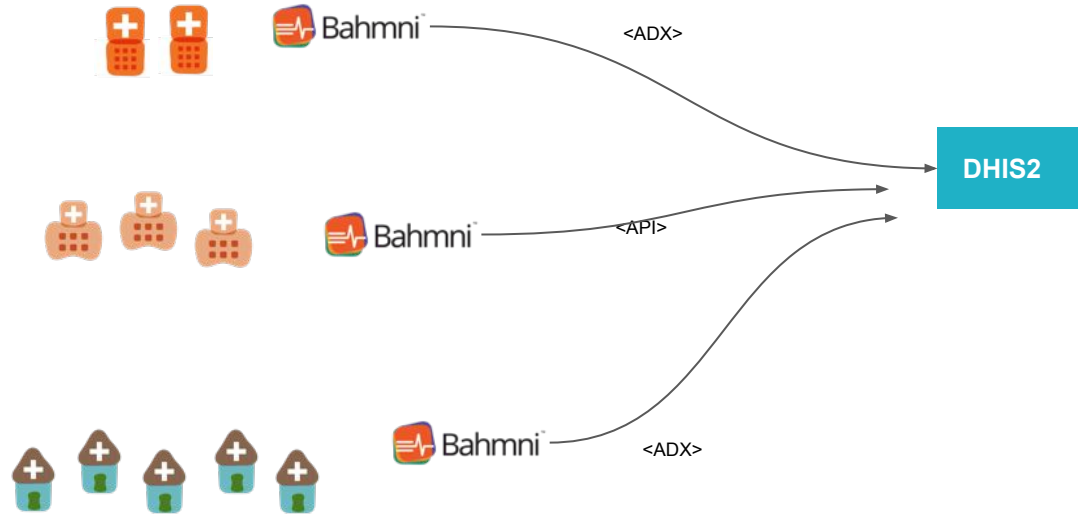
Hub & Spoke

- ▶ *Central Bahmni instance (1) acts as master, and central data repository. It also serves to define meta-data, master-data etc. Bahmni 1, acts as a central hub.*
- ▶ *Bahmni (2) works as a spoke to the hub (1) and is a fully functional system for the defined “catchment”. It can be installed either on premise in a low-grade server or laptop. It syncs data over internet with the hub (1).*
- ▶ *Bahmni (2) can work as a hub for the downstream systems in the health centers. Bahmni Connect, from other laptops, tablets, smartphones work as spoke systems connecting to the local Bahmni hub (2).*
Bahmni Connect syncs data to the local hub typically using Wi-Fi.
- ▶ *Use HL7 FHIR resources to communicate with servers for patient information*



Bahmni at Points of Care, integrated to a centralized Data Warehousing System for reporting and analytics

- Bahmni at Hospitals/Clinics sync via ADX to DHIS2
- Aggregate or Individual routine data



Data Model & Concepts

Visits, Encounters, and Observations

Visit:
(1 day)

Encounter:
Registration

Encounter:
Vitals

Encounter:
Clinical Exam

Encounter:
Pharmacy

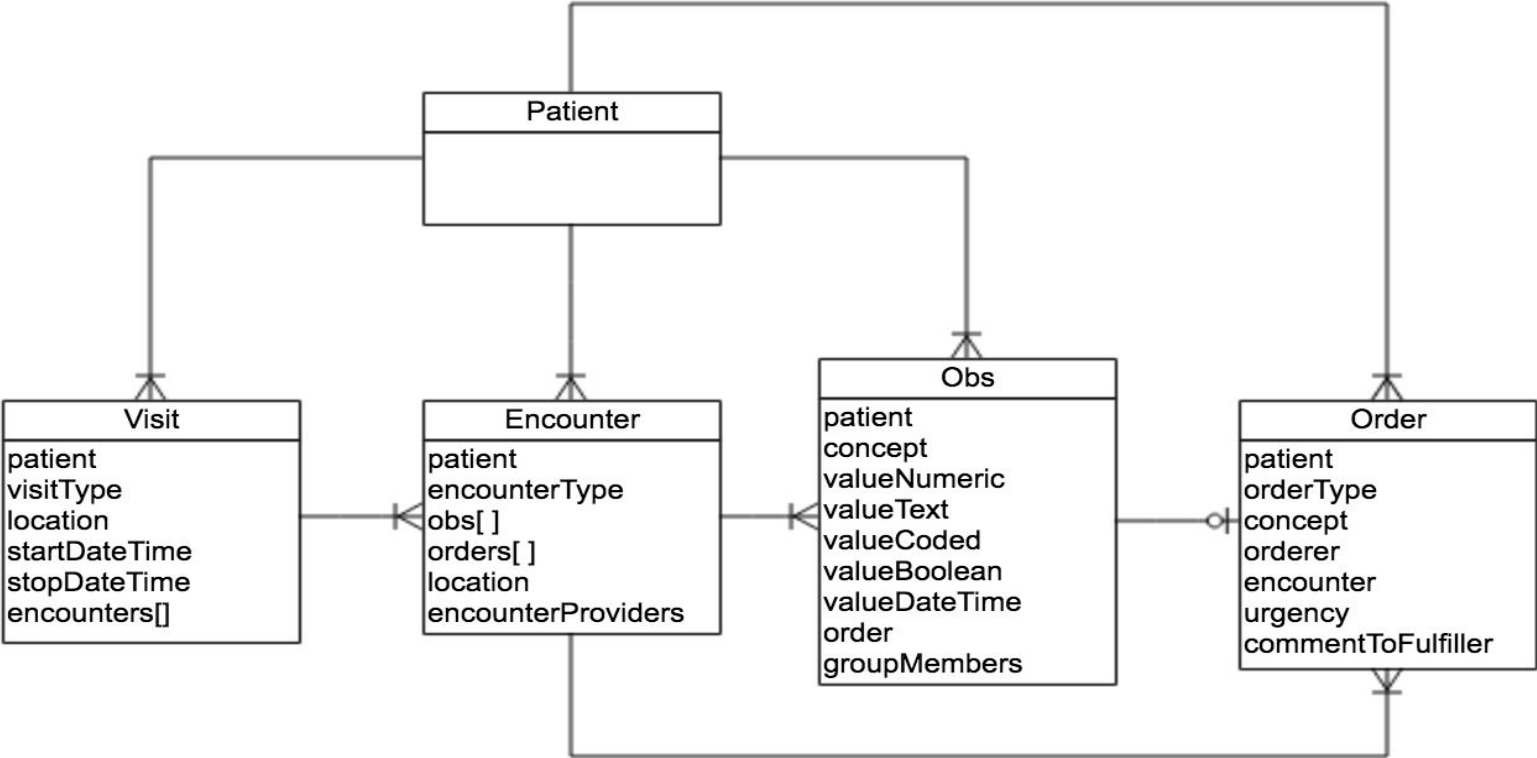
obs:
occupation,
marital status

obs: weight,
height,
temperature

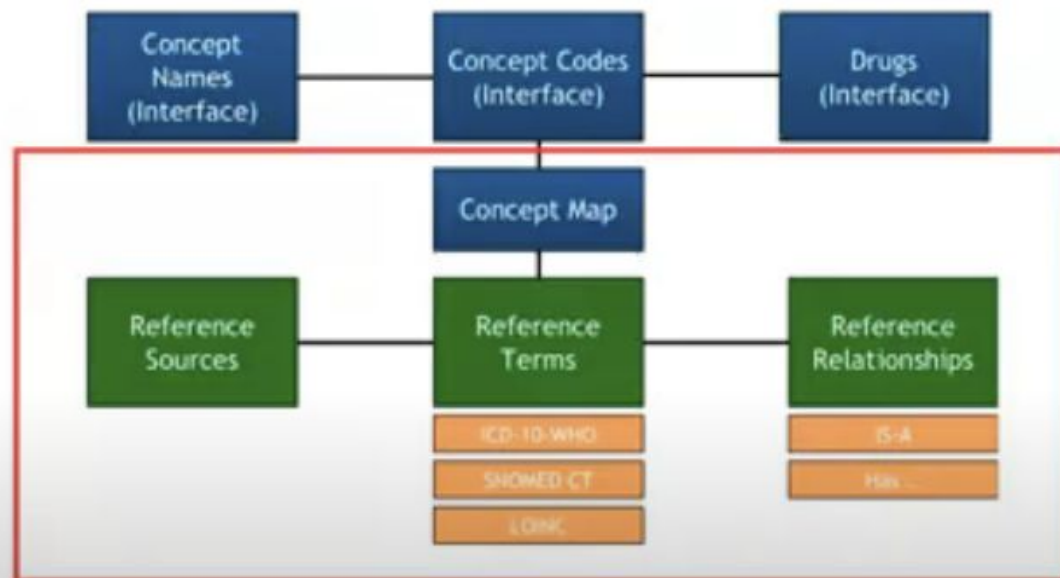
obs:symptoms,
labs, diagnosis,
prescriptions

obs: dispensed
drugs with
dosage

Clinical Data Model (high level view)



OpenMRS Concept Dictionary (3) - Mappings



Practical Exercise: Match data

Exercise: Match the OpenMRS data model (table and field) with the highlighted data on the paper form.

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Daily Progress Note

Date: _____ **Time:** _____

Current Condition State: Mild Moderate Severe Critical

Transfer from: COVID-19 Isolation Hospital Other

Signs and Symptoms

Symptom	<input type="checkbox"/> new	<input type="checkbox"/> improved	<input type="checkbox"/> unchanged	<input type="checkbox"/> worsened
Fever	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cough	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
With sputum production	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shortness of breath (Dyspnea)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sore throat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Vitals

Temp	°C	°F	Cap refill time	<input type="checkbox"/> < 3 sec
Pulse		bpm		<input type="checkbox"/> sec
RR		bpm	Pain:	<input type="checkbox"/> None <input type="checkbox"/> Mild
BP	/	mmHg		<input type="checkbox"/> Moderate <input type="checkbox"/> Intense
SpO2	%	on _____ L/min		<input type="checkbox"/> room air

table.field

encounter. **encounter_datetime**
 encounter. **encounter_type**
 form. **name**
 obs. **concept_id**
 obs. **value_numeric**
 obs. **value_coded**
 patient_identifier. **identifier**
 person. **gender**
 person. **birthdate**
 person_name. **given_name**
 person_name. **family_name**

OpenMRS Admin

OpenMRS
Currently logged in as Super User | [Log out](#) | [My Profile](#) | [Help](#)

[Home](#) | [Find/Create Patient](#) | [Dictionary](#) | [Cohort Builder](#) | [Reporting](#) | [Appointments](#) | [Administration](#)

Administration

- Users**
 - [Manage Users](#)
 - [Manage Roles](#)
 - [Manage Privileges](#)
 - [Manage Alerts](#)
- Patients**
 - [Manage Patients](#)
 - [Find Patients to Merge](#)
 - [Manage Identifier Types](#)
 - [Manage Patient Identifier Sources](#)
 - [Auto-Generation Options](#)
 - [View Log Entries](#)
- Person**
 - [Manage Persons](#)
 - [Manage Relationship Types](#)
 - [Manage Person Attribute Types](#)
- Visits**
 - [Manage Visit Types](#)
 - [Manage Visit Attribute Types](#)
 - [Configure Visits](#)
- Encounters**
 - [Manage Encounters](#)
 - [Manage Encounter Types](#)
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- Providers**
 - [Manage Providers](#)
 - [Manage Provider Attribute Types](#)
- Locations**
 - [Manage Locations](#)
 - [Manage Location Tags](#)
 - [View Location Hierarchy](#)
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 - [Manage Address Template](#)
- Observations**
 - [Manage Observations](#)
- Scheduler**
 - [Manage Scheduler](#)
- Programs**
 - [Manage Programs](#)
 - [Manage Triggered State Conversions](#)
- Concepts**
 - [View Concept Dictionary](#)
 - [Manage Concept Drugs](#)
 - [Manage Proposed Concepts](#)
 - [Manage Concept Classes](#)
 - [Manage Concept Datatypes](#)
 - [Manage Concept Sources](#)
 - [Manage Concept Stop Word](#)
 - [Manage Reference Terms](#)
 - [Manage Concept Attribute Types](#)
- Forms**
 - [Manage Forms](#)
 - [Manage Fields](#)
 - [Manage Field Types](#)
 - [Merge Duplicate Fields](#)
- HL7 Messages**
 - [Manage HL7 Sources](#)
 - [Manage Queued Messages](#)
 - [Manage Held Messages](#)
 - [Manage HL7 Errors](#)
 - [Manage HL7 Archives](#)
 - [Migrate HL7 Archives](#)
- Maintenance**
 - [Set Implementation Id](#)
 - [System Information](#)
 - [View Quick Reports](#)
 - [Settings](#)
 - [Advanced Settings](#)
 - [View Server Log](#)
 - [View Database Changes](#)
 - [Manage Locales And Themes](#)
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- Modules**
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 - [Module Properties](#)
- Data Exchange Module**
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 - [Manage Report Macros](#)
 - [Manage Data Exports](#)
 - [Manage Row Per Obs Data Exports](#)
 - [Manage Cohorts](#)
 - [Manage Patient Searches](#)
 - [Manage Report Elements](#)
- REST Web Services**
 - [Settings](#)
 - [Test](#)
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- OpenMRS Atlas**
 - [Manage Atlas Marker](#)
- Provider Management Module**
 - [Manage Provider Roles](#)
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- Metadata Mapping**
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 - [Export Metadata](#)
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<https://github.com/Bhamni/bahmni-java-utils/blob/master/font-transformer/src/test/java/org/bahmni/fonttransform/KrishnaFontTransformerTest.java>

```
@Test
public void shouldPlaceUpRTwoBackIfPrecededByAey() {
    assertEquals("दुर्गा", transformer.krishnaToUnicode("nqxkZ"));
    assertEquals("वर्षा", transformer.krishnaToUnicode("o\\kkZ"));
}

@Test
public void shouldReplaceHalfConsonantsFollowedByKWithFullConsonants() {
    assertEquals("मंडल", transformer.krishnaToUnicode("eaMYk"));
    assertEquals("निवृत्ता", transformer.krishnaToUnicode("fuo`Rkk"));
    assertEquals("नन्नावारे", transformer.krishnaToUnicode("uUUkkokjs"));

    assertEquals("बुधरी", transformer.krishnaToUnicode("pq/kjh"));
    assertEquals("माधुरी", transformer.krishnaToUnicode("ek/kqjh"));
    assertEquals("प्रभाकर", transformer.krishnaToUnicode("izHkkdj"));
    assertEquals("प्रतिक्षा", transformer.krishnaToUnicode("izfr{kk"));
    assertEquals("भेदुजी", transformer.krishnaToUnicode("Hksnzqth"));
    assertEquals("शंकरजी", transformer.krishnaToUnicode("kadjth"));
    assertEquals("प्रीती", transformer.krishnaToUnicode("izhrh"));
}

@Test
public void shouldReplaceSmallMatraEFollowedByHalfConsonants() {
    assertEquals("भिवाजी", transformer.krishnaToUnicode("fHkkokth"));
}
```