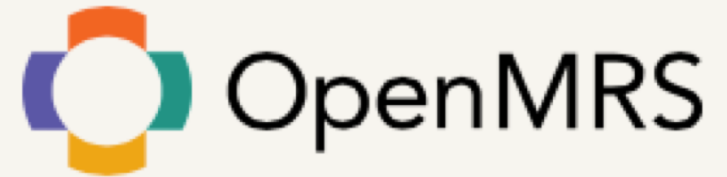


Università degli Studi di Trieste

Corso di Laurea Magistrale in  
INGEGNERIA CLINICA



## OpenMRS: OVERVIEW

Corso di Informatica Medica

Docente Sara Renata Francesca MARCEGLIA

Dipartimento di Ingegneria e Architettura



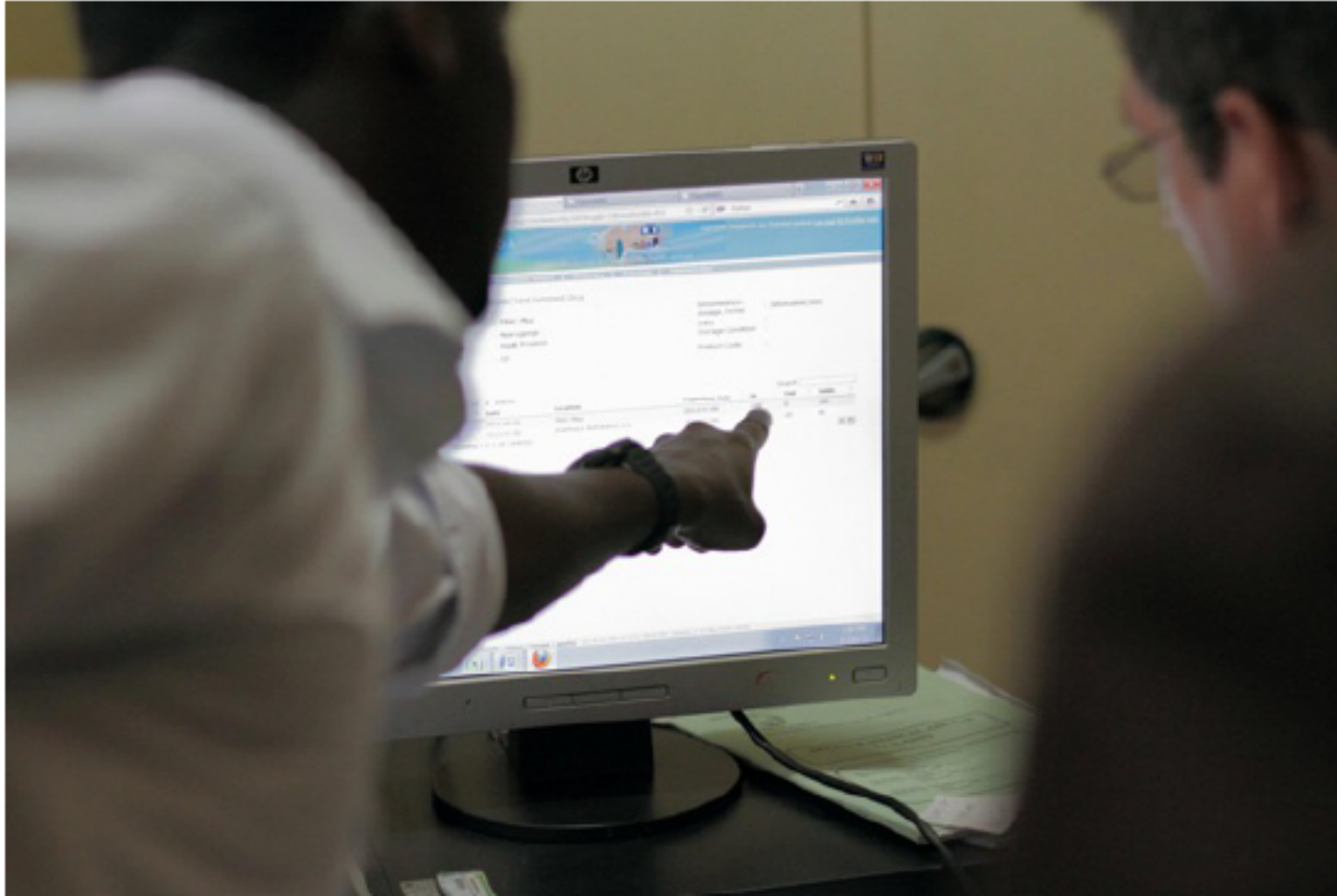
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# OPENMRS: LOCATIONS AROUND THE WORLD



*OpenMRS clinical and research locations as of 2011.*

# OPENMRS WAS CREATED FOR THE DEVELOPING COUNTRIES



*OpenMRS in use at TRAC Plus Clinic in Kigali, Rwanda.*

# OPEN SOURCE: IMPLEMENTATION VS DEVELOPMENT



## IMPLEMENTERS

- Clinics/Hospitals in need of the EHR system
- Install OpenMRS and Use it
- Create the dictionary and the forms useful for their implementation
- Rely on the development community for new features → use modules

## DEVELOPERS

- Information scientists who develop the source code
- Work independently or after being committed to a project
- The source code is available
- There is a large developer community around the world
- Develop modules

# FROM PAPER-BASED RECORDS... TO THE EHR



*A paper-based patient register book at an African OpenMRS clinic.*

# THE DEVELOPMENT PROCESS: IDENTIFYING YOUR NEEDS



## YOUR ORGANIZATIONAL GOALS AND PRACTICES

For now, forget about technology and instead think about your organizational goals and processes. Here's a list of questions to start:

- What are the high level goals of your organization?
- What are the teams and staff in the clinic? What roles exist? What functions does each role perform?
- What tasks are staff involved with on a day to day basis?
- What services does the clinic provide to your patients? What activities are involved?
- What other 3rd-party or government organizations do you report to? What information is included in each of these reports?

## TAKE ADVANTAGE OF INSTITUTIONAL KNOWLEDGE

As you think about your patients and how they interact with your organization, talk to your clinical and administrative staff -- both those who have been around a long time, and those who have just joined. Talk to as many people as you possibly can to get a complete picture of every service provided to patients.



**MAP YOUR NEEDS TO OPENMRS**



# THE OPEN SOURCE COMMUNITY

## DO NOT "REINVENT THE WHEEL"

The open source ethos of OpenMRS extends beyond just the application, to a much larger open community where ideas and experiences are shared. There are many existing resources available in the form of pre-built OpenMRS features (modules) and content that a new implementer should take advantage of. You should explore the following resources before building anything new.

### Reuse an existing concept dictionary

### Adapt existing forms

Implementers should evaluate data collection forms built by other OpenMRS users before creating new custom forms for their specific needs.

### Explore the module repository

Implementers should consult the OpenMRS Module Repository at <http://modules.openmrs.org/> before considering customization through software development.

...AND THEN IMPLEMENT...



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*An OpenMRS server in Uganda.*

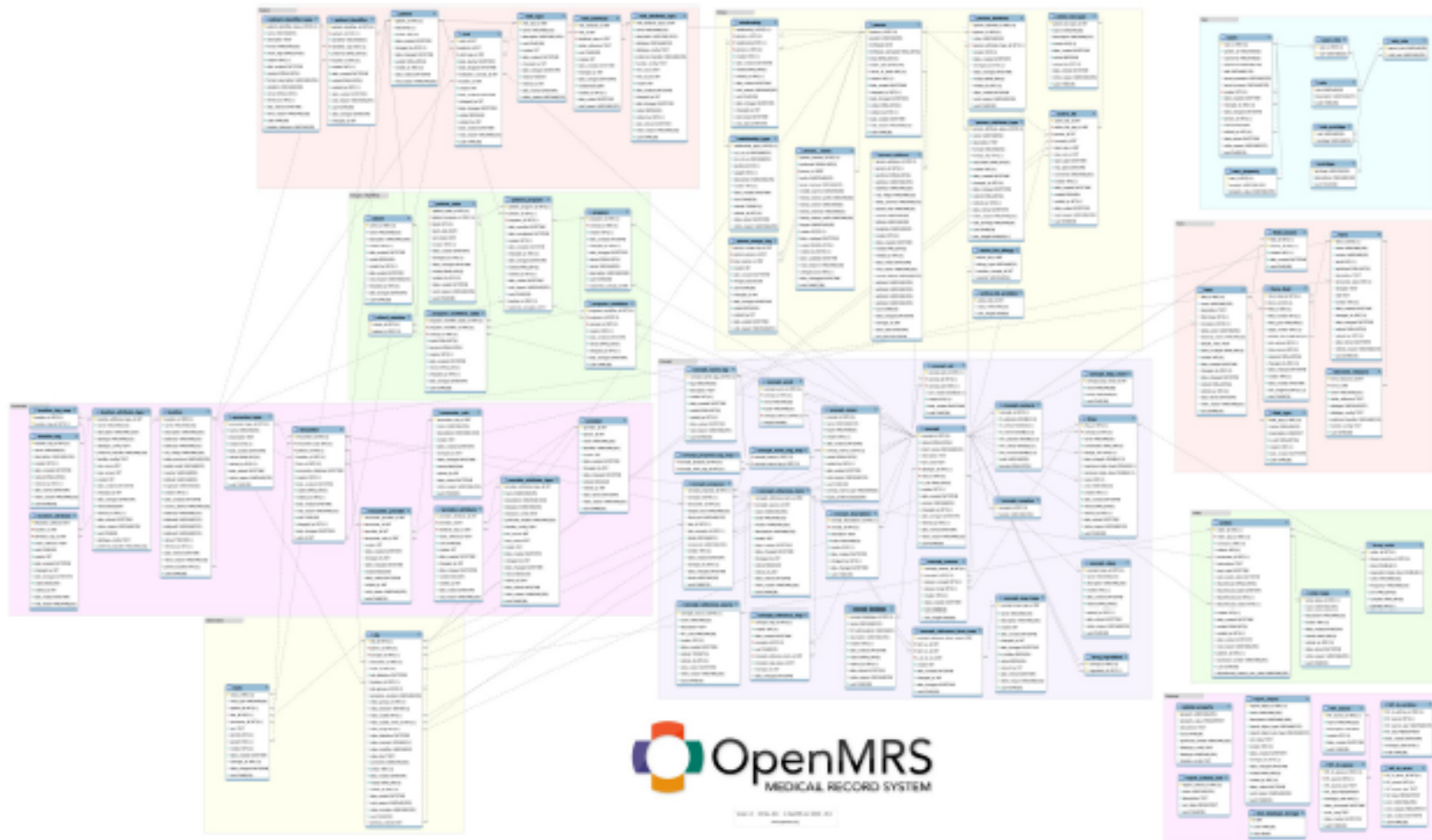




# THE INFORMATION MODEL

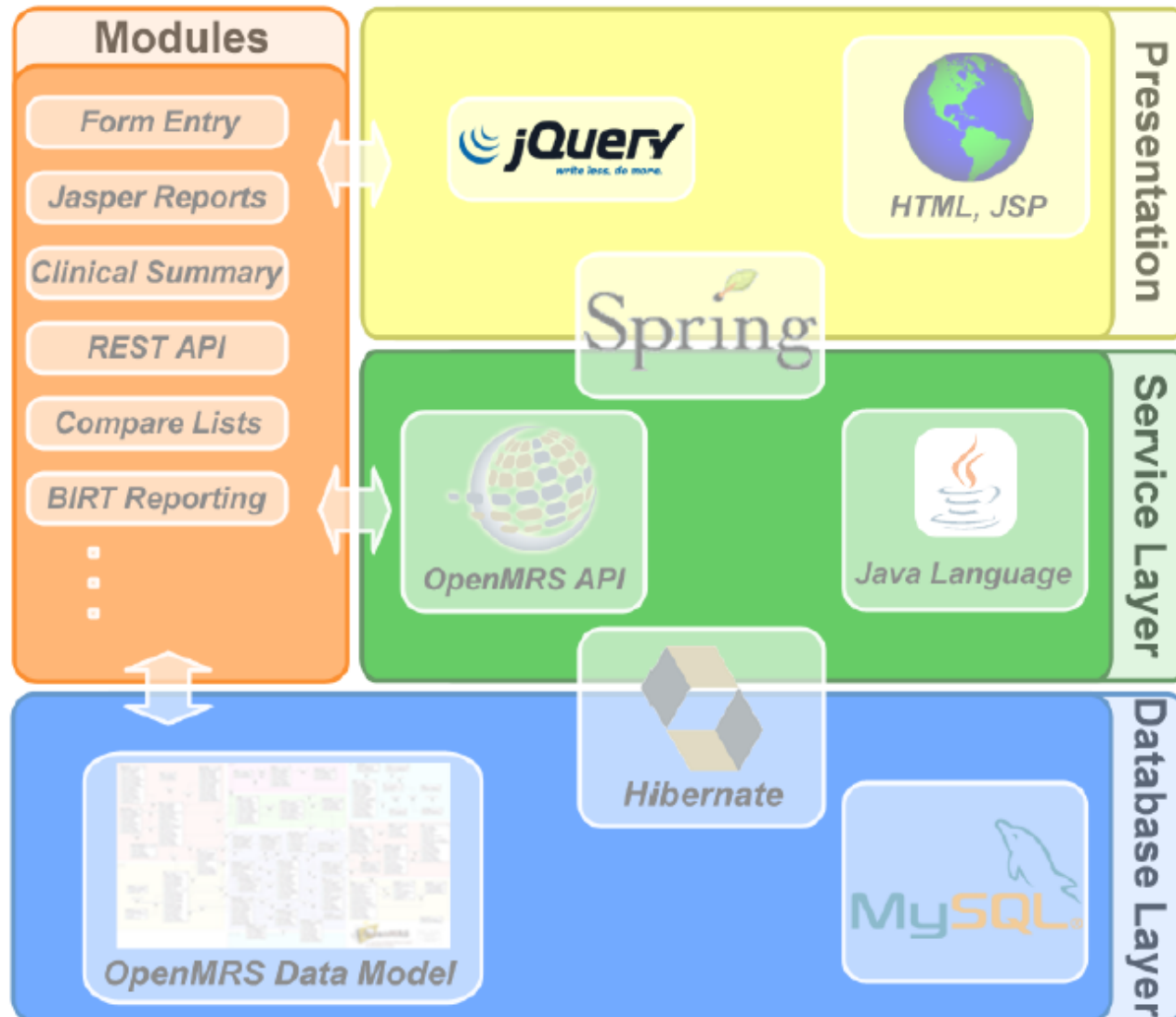
- DATA
  - Person
  - Encounter
  - Visit
  - Observation
  - Order
  - Workflow
- METADATA
  - Locations
  - Concept Dictionary
- FORMS

# THE DATA MODEL



OpenMRS data model version 1.9. Details at <http://go.openmrs.org/newdev-data>

# ARCHITECTURE



An overview of OpenMRS

# GET INVOLVED



*The OpenMRS Community, circa 2013*

# DOWNLOAD OpenMRS



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<http://openmrs.org/download/>

## Reference Application 2.5

### Standalone Edition

412.1 MB at sourceforge.net · Released 10-November-2016  
Linux, Mac OS X, Windows · [Release Notes](#)

**Recommended for new people exploring OpenMRS.** A self-contained ZIP archive that includes an embedded database and application server, as well the option to install demo data for sample patients. Expand the ZIP archive and run the .jar file to start the Reference Application. Log in with username: **admin**, password: **Admin123**.

This is not intended for production use.

[Download Standalone](#)

## Reference Application 2.5

### Individual Components for Advanced Installation

Released 10-November-2016  
Linux, Mac OS X, Windows · [Release Notes](#)

For production use of the Reference Application, you must install an OpenMRS Platform WAR, which requires an existing Java servlet container such as Apache Tomcat, and an existing database such as MySQL. Download these individual components here:

[Download Platform 2.0.1 WAR](#)

[Download Reference Application 2.5 Modules & Data](#)

## Platform 2.0.4.1

### WAR (for Enterprise)

71.2 MB at sourceforge.net · Released 7th February 2017  
Multi-platform Java webapp · [Release Notes](#)

**Recommended for advanced users using Reference Application 2.x or Platform in production.** Requires an existing Java servlet container such as Apache Tomcat, and an existing database such as MySQL. Separate demo data is available for download below.

[Download](#)

# THE DEMO ENVIRONMENT



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The screenshot shows a web browser window displaying the OpenMRS website. The browser's address bar shows 'openmrs.org'. The page features a navigation menu with links for Home, About Us, Get Involved, Tools, Demo, Download, Contact Us, and Donate. The 'Demo' link is highlighted. Below the navigation, the page title is 'OpenMRS Demo'. The main content area includes a paragraph explaining that OpenMRS demos are designed to give users a taste of the system from an implementer's perspective, using anonymized patient data. It also mentions two different demonstration systems available. To the right, there is a search bar and a list of recent news items, including 'OpenMRS Releases 2016 Annual Report' and 'OpenMRS Google Code-In student Mira Yang Wins Grand Prize'.

OpenMRS.org ID Modules Wiki Atlas Ask OpenMRS Talk Chat Issues Code CI OpenMRS Update GSoC Search OpenMRS Sites

## OpenMRS

Home About Us Get Involved Tools **Demo** Download Contact Us Donate

### OpenMRS Demo

OpenMRS demos are designed to give you a taste of OpenMRS from an implementer's point of view. It is a fully working copy of OpenMRS with observations on large numbers of anonymized patients. **These are not real patients.** Log in to examine all of OpenMRS's features.

We currently have two different demonstration systems available. The first is a standard OpenMRS installation – what you would find if you download OpenMRS yourself from our download page. The other system has been customized and used in the “real world” for management of drug-resistant tuberculosis (MDR-TB).

[Explore the standard OpenMRS installation](#)

[Explore OpenMRS customized for tuberculosis](#)

Search...

Latest Popular Comments

**OpenMRS Releases 2016 Annual Report Following Inaugural Report**  
March 23, 2017

**OpenMRS Google Code-In student Mira Yang Wins Grand Prize**  
March 23, 2017

**OpenMRS Google Code-In student Nji Collins Wins Grand Prize**  
March 21, 2017

# THE STANDALONE EDITION



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OpenMRS  
MEDICAL RECORD SYSTEM

LOGIN

Username:  Password:

Location for this session:

<a href="#">Inpatient Ward</a>	<a href="#">Isolation Ward</a>	<a href="#">Laboratory</a>
<a href="#">Outpatient Clinic</a>	<a href="#">Pharmacy</a>	<a href="#">Registration Desk</a>

[Log In](#) [? Can't log in?](#)

Choose the location for the session

Username: admin  
Password: Admin123



Logged in as Super User () at Inpatient Ward.



Find Patient Record



Active Visits



Register a patient



Capture Vitals



Appointment  
Scheduling



Data Management



Configure Metadata



System  
Administration





## Find Patient Record



Identifier	Name	Gender	Age	Birthdate
100397	Brian Smith	M	58	17 Jun 1958
100199	Jessica Smith	F	40	02 Jan 1977
1001MH	John Smith	M	47	19 Jun 1969
100694	Joseph Smith	M	42	09 Jan 1975
1001LK	Lisa Smith	F	76	04 May 1940
100GHA	Mary Smith	F	61	18 Jun 1955
1005HM	Michelle Smith	F	30	14 Apr 1986
10064F	Paul Smith	M	51	04 Jul 1965
10080M	Paul Smith	M	39	12 May 1977
100DEM	Robert Smith	M	77	13 Apr 1939
10017E	Thomas Smith	M	18	25 Mar 1999

Showing 1 to 11 of 11 entries

[First](#) [Previous](#) [1](#) [Next](#) [Last](#)



> Jessica Smith

Jessica Smith

Female 40 year(s) (02.Jan.1977) [Edit](#) [Show Contact Info](#)

Patient ID 100199

Given Family Name

### DIAGNOSES

- GI upset
- Seizure
- Rheumatic fever without heart involvement
- Sexually transmitted disease
- Musculoskeletal pain
- Genitourinary tract infection in pregnancy
- Diarrhea
- Dysphagia
- Labor and delivery complicated by intrapartum hemorrhage
- Peptic ulcer

### RECENT VISITS

<a href="#">25.Dec.2016</a>	Outpatient
<a href="#">30.Nov.2016 - 02.Dec.2016</a>	Inpatient
<a href="#">29.Sep.2016</a>	Outpatient
<a href="#">27.Oct.2015</a>	Outpatient
<a href="#">08.Sep.2015</a>	Outpatient

### ALLERGIES

Unknown

### General Actions

- Start Visit
- + Add Past Visit
- Merge Visits
- Q Chart Search
- Schedule Appointment
- Request Appointment
- x Delete Patient

# START VISIT



demo.openmrs.org

Digital, Social...obile in 2015 Health for All - Italia-ISTAT Apple Disney Sky Yahoo! Wikipedia Google Maps YouTube Notizie I più conosciuti iOS Applicat... Background

Posta in arrivo (185) - sara.marceglia@gmail.com - Gmail OpenMRS Demo | OpenMRS OpenMRS Electronic Medical Record

OpenMRS admin Inpatient Ward Logout

Home > Jessica Smith > Visits

**Jessica Smith** Female 40 year(s) (02.Jan.1977) Edit Show Contact Info Patient ID 100199

Given Family Name

Active Visit - 28.Mar.2017, 15:13:37 Outpatient

Visits Appointments Actions

28.Mar.2017 (active since 03:13 PM)

No diagnosis yet.

25.Dec.2016 - 25.Dec.2016

GI upset

30.Nov.2016 - 02.Dec.2016

Rheumatic fever without heart involvement

29.Sep.2016 - 29.Sep.2016

Sexually transmitted disease

27.Oct.2015 - 27.Oct.2015

Musculoskeletal pain

Active Visit Started at 28.Mar.2017, 15:13:37 Edit date | Delete visit

End Visit Visit Note Admit to Inpatient

Capture Vitals

# CAPTURE VITALS



OpenMRS admin Inpatient Ward Logout

[Home](#) > [Jessica Smith](#) > **Vitals**

**Jessica Smith** Female 40 year(s) (02.Jan.1977) [Edit](#) [Show Contact Info](#) Patient ID 100199

Given Family Name

Active Visit - 28.Mar.2017, 15:13:37 Outpatient

[Exit Form](#)

Vitals	
Height (cm)	Height (cm) <input type="text"/> cm
Weight (kg)	
(Calculated) BMI	
Temperature (C)	
Pulse	
Respiratory rate	
Blood Pressure	
Blood oxygen saturation	
<b>Confirm</b>	

# VISIT REPORT



OpenMRS admin Inpatient Ward Logout

Home > [Jessica Smith](#) > **Edit: Visit Note**

**Jessica Smith** Female 40 year(s) (02.Jan.1977) [Edit](#) [Show Contact Info](#) Patient ID 100199

Given Family Name

Active Visit - 28.Mar.2017, 15:13:37 Outpatient

### Visit Note

Provider	Location	Date	The diagnosis is chosen from the dictionary
Jane Smith	Inpatient Ward	28/03/2017 (dd/mm/yyyy)	

Add presumed or confirmed diagnosis (required):  
Choose primary diagnosis first, then secondary diagnoses

Clinical Note

Primary Diagnosis:  
**Tuberculosis, Tuberculosis BK+** A15.0 ✕  
 Primary  Confirmed

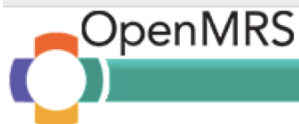
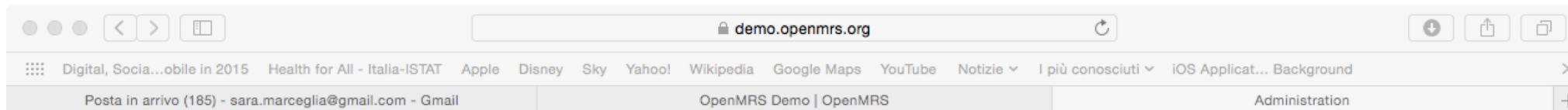
Secondary Diagnoses:  
None

Cancel Save

# ADMINISTRATION SECTION



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## Administration

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- [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](#)
- [Manage Encounter Roles](#)

### Providers

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- [Manage Provider Attribute Types](#)

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- [Manage Concept Drugs](#)
- [Manage Proposed Concepts](#)
- [Manage Concept Classes](#)
- [Manage Concept Datatypes](#)
- [Manage Concept Sources](#)
- [Manage Concept Stop Word](#)
- [Manage Reference Terms](#)
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- [Manage Field Types](#)
- [Merge Duplicate Fields](#)

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- [Manage Queued Messages](#)
- [Manage Held Messages](#)
- [Manage HL7 Errors](#)
- [Manage HL7 Archives](#)
- [Migrate HL7 Archives](#)

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### Data Exchange Module

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- [Manage Row Per Obs Data Exports](#)
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- [Manage Patient Searches](#)
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### REST Web Services

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- [API Documentation](#)

### OpenMRS Atlas

- [Manage Atlas Marker](#)

### Provider Management Module

- [Manage Provider Roles](#)

# CONCEPT DICTIONARY



## Concept Dictionary Maintenance

[Download the concept dictionary](#) in CSV format -- (dynamically creates a CSV file containing current dictionary terms/concepts)

[Add new Concept](#)

### Find Concept(s)

Find a concept by typing in its name or Id:    Include Retired  Show Details

Viewing results for **'tuber'** - 1 page

Tuberculosis, Tuberculosis BK+

Primary Respiratory Tuberculosis, Confirmed Bacteriologically and Histologically

**Showing 1 to 2 of 2 entries**

Show  entries

# CREATE NEW CONCEPT



## Creating New Concept

| [New](#)

**Id**

**Locale** [English](#) | [English \(United Kingdom\)](#) | [Spanish](#) | [French](#) | [Italian](#) | [Portuguese](#)

**Fully Specified Name\***

**Synonyms**

**Search Terms**

**Short Name**

**Description**

**Class**

**Is Set**

**Datatype**

**Numeric**

<b>Absolute High</b>	<input type="text"/>
<b>Critical High</b>	<input type="text"/>
<b>Normal High</b>	<input type="text"/>
<b>Normal Low</b>	<input type="text"/>
<b>Critical Low</b>	<input type="text"/>
<b>Absolute Low</b>	<input type="text"/>



# QUESTION&ANSWER CONCEPTS



Concept saved successfully

## Viewing Concept Diagnosis

[Previous](#) | [Edit](#) | [Stats](#) | [Next](#) | [New](#)

<b>Id</b>	163140
<b>UUID</b>	063290b6-fe5f-460e-83a8-3d3cacc99d2b
<b>Locale</b>	<a href="#">English</a>   <a href="#">English (United Kingdom)</a>   <a href="#">Spanish</a>   <a href="#">French</a>   <a href="#">Italian</a>   <a href="#">Portuguese</a>
<b>Fully Specified Name</b>	Diagnosis
<b>Synonyms</b>	
<b>Search Terms</b>	
<b>Short Name</b>	
<b>Description</b>	
<b>Class</b>	Question
<b>Datatype</b>	Coded
<b>Answers</b>	<a href="#">Epilepsy (155)</a> <a href="#">Tetanus (124957)</a> <a href="#">Poliomyelitis (5258)</a>
<b>Mappings</b>	□
<b>Version</b>	
<b>Created By</b>	Super User - 28 March 2017 16:09:02 UTC
<b>Changed By</b>	Super User - 28 March 2017 16:15:47 UTC

### Resources

[Similar Concepts](#)  
[Merriam Webster®](#)  
[Google™](#)  
[UpToDate®](#)  
[Dictionary.com®](#)  
[Lab Tests Online](#)  
[Wikipedia](#)

### Concept Usage

**Obs for this concept: 0**

# CREATE A NEW FORM



- We want to create a form that contains:

## CASE DETAILS

**Age:** \_\_\_\_\_

**Gender:**

Male

Female

**Diagnosis:** \_\_\_\_\_

**Years of disease history:** \_\_\_\_\_

**Predominant side:**

Left

Right

**Date of implant:** \_\_\_\_\_

**Target structure:** \_\_\_\_\_



## CREATE THE CONCEPTS

- Age →
  - question with numeric answer
  - Equivalent to SNOMED CT “current chronological age “ code: 424144002
- Gender →
  - Question with answers “male” and “female”
  - First you have to create the concepts for the answers
- Diagnosis →
  - Question with either open answer or coded answer (set of diagnoses)
- Years of disease history →
  - question with numeric answer

# CREATE THE NEW FORM



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[Admin](#) | [Manage HTML Forms](#) | [Preview HTML Form from File](#)

## Create HTML Form

Name	<input type="text"/>
Description	<input type="text"/>
Version	<input type="text"/>
Encounter Type	<input type="text"/>
	<input type="button" value="Save"/>

# EDIT THE NEW FORM



## Edit HTML Form

[Show/Hide extra fields](#)

Id 6

Name

Published

Retired

Form Schema: [View](#)

HTML:

```
<htmlform>
  <!-- Autogenerated example form (template from 01-Nov-2010 -->
  <macros>
    paperFormId = (Fill this in)
    headerColor = #009d8e
    fontOnHeaderColor = white
  </macros>

  <style>
    .section {
      border: 1px solid $headerColor;
      padding: 2px;
      text-align: left;
      margin-bottom: 1em;
    }
    .sectionHeader {
      background-color: $headerColor;
      color: $fontOnHeaderColor;
      display: block;
      padding: 2px;
    }
  </style>
  </htmlform>
```

# CREATE THE CODE



```
<tr>
  <td>Diagnosi neurologica:</td>
  <td>
    <obs conceptId="163140" labelText="" style="radio"/>
  </td>
</tr>
<tr>
  <td>Genere:</td>
  <td>
    <obs conceptId="163143" labelText="" answerConceptIds="163141,163142"
      answerLabels="Maschio, Femmina" /></td>
</tr>
```

# PREVIEW THE NEW FORM



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## Preview

### Parkinson (v0.0)

Paper Form ID: (Fill this in)

#### 1. Encounter Details

Date:  (dd/mm/yyyy)

Location:

Provider:

#### 2. Demographic Information

Name: [Demo The Person](#)

OpenMRS ID:

OpenMRS Identification Number:

Gender: **F**

Birthdate: **29/Mar/1986** (Age: **31**)

Diagnosi neurologica:  Epilepsy  Poliomyelitis  Tetanus

Genere: