Customization of OpenMRS at Leishmaniasis Research and Treatment Center in Ethiopia

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Scope of the Project

- EuroLeish project was conducted by European Union Framework Programme for Research and Innovation “Horizon-2020”
- A multidisciplinary PhD training programme, aimed to develop and apply new methodologies in the control of leishmaniasis
- Involves 15 PhD students from several scientific fields (genetics, microbiology, epidemiology, informatics, and financial)
- Collaborative work with
  - Gondar University
  - Institute of Tropical Medicine
Neglected Tropical Diseases

- A group of parasitic and bacterial infectious diseases (17 diseases)
- Spread in 149 countries (mostly low-constrained regions)
- More than 1.6 billion people are affected by NTDs
- 3 billion people are at risk
Leishmaniasis

A zoonotic NTD transmitted by sandflies

20 species of Leishmania parasites that can infect humans

Spread in over 100 countries

12 million people are affected

350 million people are at risk

Two types:
- Visceral (internal organs)
- Cutaneous (skin lesions)
Leishmaniasis Research and Treatment Center (LRTC)

- Based in Gondar, Ethiopia
- A specific disease clinic
- Inpatient/Outpatient Departments
- Laboratory
- Pharmacy
LRTC needs

• Shift from paper-based to digital records

• Integration between all clinic departments

• Automation of the workflow
Specificity of low-resource settings

Barriers:

- Poor infrastructure
- Unstable power supply
- Internet connection absence
- Ill-equipped
- Remote regions
- Untrained staff
Requirements for low-resource setting

- cost effective
- offline work
- customisable
- multilingual interface
- cross-platform software
EHR System Implementation

- Gather user requirements (interview the clinical staff, observe and analyse clinic’s workflow)
- Verify infrastructure and check available equipment
- Compare and choose an open-source EHR platform
- Configure EHR solution to meet users’ needs
Gondar EHR system
Open-source EHR selection

- Patient management
  - Inpatient and Outpatient
- Laboratory management
- Pharmacy management
- Offline work
- Community
- Support international e-health standards
  - HL7, ICD-10, SNOMED-CT, LOINC,
## Comparison matrix

<table>
<thead>
<tr>
<th>Integrated applications</th>
<th>GNU Health</th>
<th>OpenEMR</th>
<th>FreeMED</th>
<th>OpenMRS</th>
<th>Bahmni</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>EHR,HIS</td>
<td>EHR,PMS,ERP</td>
<td>EHR,PMS</td>
<td>EHR</td>
<td>EHR,PMS,ERP,LIS,PACS</td>
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<tr>
<td>Configurable reports</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
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<tr>
<td>Custom reports</td>
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<td>NO</td>
<td>NO</td>
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<td>YES</td>
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<tr>
<td>Custom forms</td>
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<tr>
<td>Data exchange</td>
<td>FHIR,cust</td>
<td>HL7</td>
<td>HL7</td>
<td>HL7,FHIR</td>
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<tr>
<td>Coding systems</td>
<td>Few</td>
<td>Many</td>
<td>Few</td>
<td>Many</td>
<td>Many</td>
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<tr>
<td>External auth. methods</td>
<td>LDAP</td>
<td>LDAP,AD</td>
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<td>-</td>
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<td>Patient portal</td>
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<td>Access control model</td>
<td>RBAC</td>
<td>ACL</td>
<td>ACL</td>
<td>RBAC</td>
<td>RBAC</td>
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<td>Cryptographic features</td>
<td>Sign, encrypt</td>
<td>Encrypt</td>
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<td>-</td>
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<tr>
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<td>Modularity rank</td>
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<td>★★★★</td>
<td>★★★★★</td>
<td>★★★★</td>
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<tr>
<td>Off-line support</td>
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<td>NO</td>
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<td>Native client</td>
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<td>Web client</td>
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<tr>
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<td>PIIP</td>
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<td>Active</td>
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<td>★</td>
<td>★★★★★</td>
<td>★★★★</td>
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</table>
Selected EHR system

- Bahmni
  - Patient management
  - Laboratory management
  - Billing

- OpenMRS
- OpenELIS

Integrated | Flexible | Adaptable | User-friendly | Modular | Offline work
Bahmni architecture

All communication over http
No orchestrator

User’s Machine

Server (Linux)

Bahmni MRS Frontend
(JavaScript, HTML5, AngularJS)

Browser

Apache Web Server

OpenERP Server
(XML-WS API)

OpenMRS Server
(REST API)

OpenELIS Server
(REST API)

Python

Java

Java

OpenERP DB
(PostgreSQL)

OpenMRS DB
(MySQL)

OpenELIS DB
(PostgreSQL)

Background jobs consuming feeds
User Interface
User Interface

### User Interface Overview

#### General Information
- **Mogos Tiruneh (GLC200084)**: Male, 35 years 4 months 10 days

#### Diagnosis
- **Kalaazar**: CONFIRMED PRIMARY 24 Nov 16
- **VL**: CONFIRMED SECONDARY Inactive 24 Nov 16

#### Treatments
- **Visit On 24 Nov 16**
  - SSG: 850 mg, Once a day, Intramuscular - 30 days

#### Programs
- No active/inactive programs for this patient.

#### Radiology Orders
- No Radiology Orders for this patient.

#### Lab Orders Display Control
- **Hematology**: Ermiyas Dino 12:24 pm
- **CXR**: Ermiyas Dino 12:24 pm

#### Nutritional Values
- **Date**: 01 Feb 17 12:44 pm
  - **Weight**: 78 kg
  - **Height**: 178 cm
  - **BMI**: 24.62
  - **BMI Status**: Normal

#### Second Vitals
- No Second Vitals for this patient.

#### Gynaecology
- No Gynaecology for this patient.
Thank you for attention!