#### FOSSCOMM 2021



# MyGNUHealth and the GNU Health Ecosystem. The Importance of Free/Libre Software in the Public Health sector

Luis Falcon, MD











# Agenda

- About GNU Health
  - History of the project & community
- The GH ecosystem components
  - The GNU Health Federation and its components
- MyGNUHealth
  - The GH Personal Health Record
- MyGNUHealth technical infrastructure
  - Framework and integration w/ GH Federation
- Q&A
  - Questions and answers



## About me

Luis Falcón President, GNU Solidario Author of GNU Health falcon@gnuhealth.org

#### **Education**

- Computer Scientist
- Physician
- Genomics & Medical Genetics

#### **Activism**

- Social Medicine
- Animal Rights





#### **History of GNUHealth and Community**



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#### GNU Solidario

- Is the NGO behind GNUHealth
- Non-for-profit organization
- Works globally
- Focused on Social Medicine

#### Official GNU Project

- GNUHealth is an official GNU project
- Hosted at GNU Savannah
- Many mirrors around the World
- International community

### **From GNU Solidario**





Group pic from GNUHealthCon 2018 in Canary Islands





## **Official GNU Package**

Official GNU Package, from the Free Software Foundation Open Documentation Relies on free technology Friendly community







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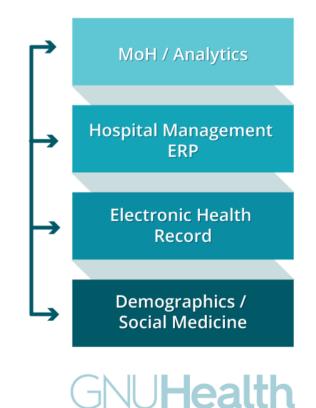


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### **GNU Health ecosystem**











#### **GNU Health Hospital Management snapshots**

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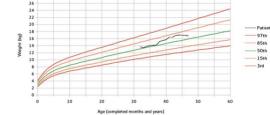
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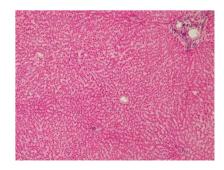




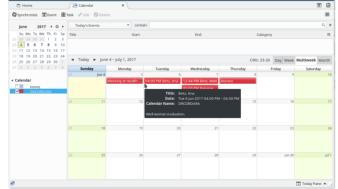
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#### **GNU Health + Orthanc PACS Server**

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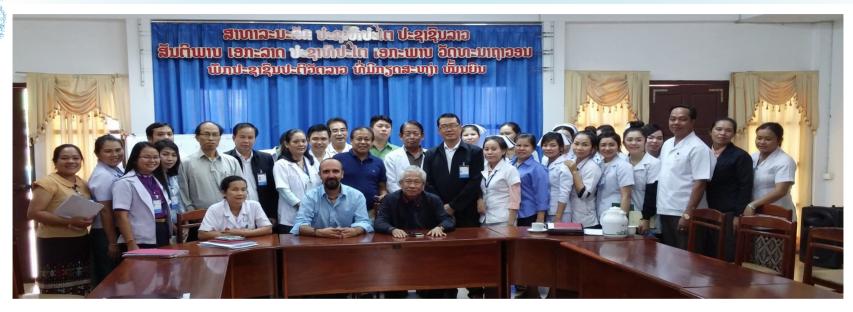
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#### Social Medicine & Health Informatics



## **GNU Health in Laos**









**GNUHealth** 

## Jamaica Govt. Adopts GNU Health

#### GNU Health Goes to Jamaica !

**GNUHealth** 



Started as a joint project between Government of Jamaica Ministry of Health and GNU Solidario

Local team

Sustainability and independence

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## **GNU Health in the heart of Africa**























http://health.gnu.org



## **Clinics and Laboratories in Africa**

GNU Health Implementation in Africa

• Ghana, Gambia, Cameroon, Gabon, Congo, Tanzania, Kenia, etc.



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**GNUHealth** 





### AIIMS, largest hospital in Asia



#### **Red Cross Mexico**





**GNUHealth** 



## **United Nations University**









## **World Health Organization - WHO**



#### ICT for Improving Information and Accountability for Women's and Children's Heal

#### Immunization schedules

Malaria, TB and HIV modules List of Essential Medicines Tropical diseases ICD-10 ICPM Pediatric growth charts



Training session to WHO officials from western Africa



GNU Health implementation with WHO at Bafia general hospital

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## **Argentina: COVID-19 Observatory**









IP COVID 19 -791 Dr Sassetti, Fernando

Universidad Nacional de Entre Rios

Implementación de un sistema de información sanitario basado en software libre (GNU Health) para la gestión de epidemias en municipios





## **Official GNU Package**

Official GNU project Open Documentation Relies on free technology Friendly community







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#### **GNUHealth ecosystem components**



LABORATORY / LIMS



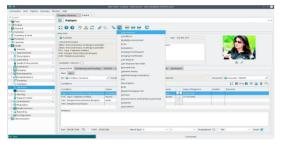


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## **GNUHealth HMIS component**





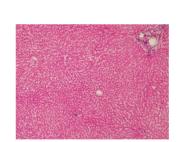


**MoH / Analytics Hospital Management** ERP **Electronic Health** Record Demographics / Social Medicine

### **GNUHealth**



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#### **MyGNUHealth: The Libre Personal Health Record**



Empowering the person to be an active member in the System of Health

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# K+R+G+P++

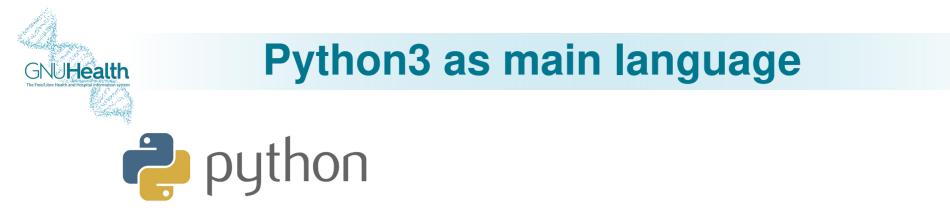






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**Health** 



Python 3 is the main language used in most of GNU Health ecosystem components Most packages can be found at the **Python Package Index (PyPi)** 



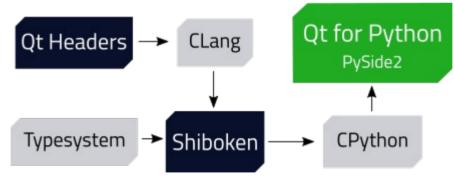








MyGNU Health is a Python3 application that uses the Qt framework



Source: https://doc.qt.io/qtforpython/shiboken2/shibokengenerator.html





#### **MyGNUHealth is a convergent application**



Set of QtQuick components to create convergent applications

Built on top of the QML language

MyGNUHealth is convergent. It adapts very well to desktops and mobile devices.

## **Qt for Python (PySide2)**

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**GNUHealth** 

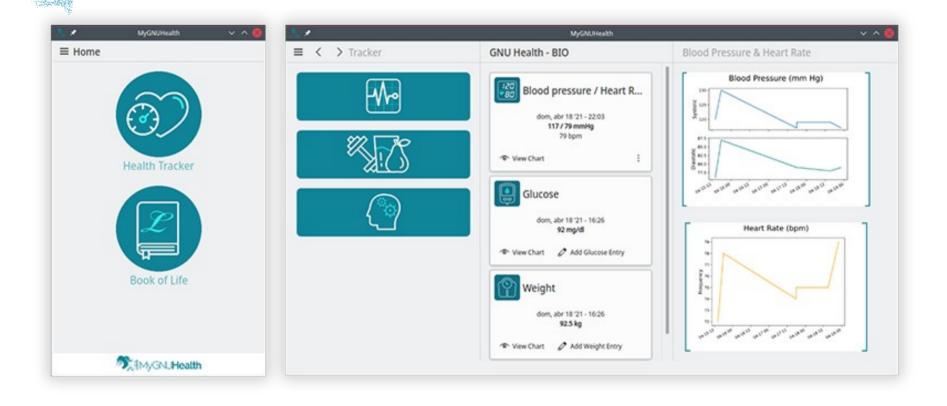


#### **MyGNUHealth running on Desktop**





## **MyGNUHealth on Desktop**



**GNUHealth** 



## **MyGNUHealth on the PinePhone**

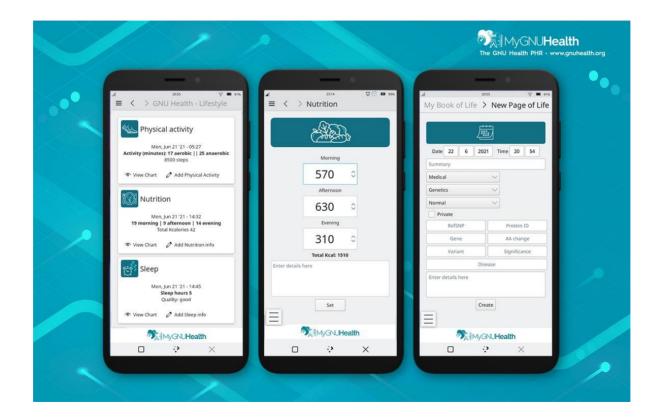


Hardware: PinePhone ("Braveheart") Qt5 Kirigami (set of QtQuick components)





#### **MyGNUHealth on the PinePhone**







#### **MyGNUHealth running on the PinePhone**



#### Current development environment:

Hardware: PinePhone ("Braveheart")

Qt5

Kirigami (set of QtQuick components)





## **Local Storage**



#### MyGNU Health uses TinyDB for storage

Document oriented Database

JSON encoded

Python3 compatible

Platform independent

Easy to port from one device to another





# **GH Federation and MyGNUHealth**



### Nodes



### Information System





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	Profile	
	Network Settings	

< > Netwo	ork Settings	
Protocol	https	
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Port	8443	
Fed. Acct	Federation ID	
Password	Password	
Sync		
	Test Connection	
	Done	

**GNUHealth** 





# **MyGNUHealth nodes in the GH Federation**



### Highlights

Every person is a node

Realtime update with her health professional

Person is in control of what to share

Decrease the burden in the public health system

The person is now an active member in the public health system





### **GNUHealth in Medical Genetics and Cancer Research**

GNU Health - admin@localhost/genetics - Administrator - GNU SOLIDARIO HTAL [Euro]  $\sim \sim \infty$ s Window Help Variant Phenotypes 💈 🔢 Variant Phenotypes 17/40 Q BRCA1 × 🗉 O O Gene & Protein Phenotype Variant BRCA1 (P38398) (breast cancer 1, early onset VAR 007778 ; p.Thr1025Ile DI-02602:Breast cancer BRCA1 (P38398) :breast cancer 1, early onset VAR 007781 : p.Val1047Ala DI-02602:Breast cancer BRCA1 (P38398) :breast cancer 1, early onset VAR 007782 : p.Pro1150Ser DI-02602:Breast cancer BRCA1 (P38398) :breast cancer 1, early onset VAR\_007796 : p.Ala1708Glu DI-02602:Breast cancer BRCA1 (P38398) :breast cancer 1, early onset VAR\_007799 : p.Met1775Arg DI-02602:Breast cancer BRCA1 (P38398) :breast cancer 1, early onset VAR\_020679 : p.Glu10Lys DI-02602:Breast cancer BRCA1 (P38398) (breast cancer 1, early onset VAR 020680 ; p.Glu23Lvs DI-02602:Breast cancer BRCA1 (P38398) :breast cancer 1, early onset VAR 020683 : p.Asp749Tv BRCA1 (P38398) :breast cancer 1, early onset VAR\_020690 : p.Ser1187Ile DI-02602:Breast cancer BRCA1 (P38398) (breast cancer 1, early onset VAR 020691 (p.Gln1200His DI-02602:Breast cancer BRCA1 (P38398) :breast cancer 1, early onset VAR\_020692 : p.Arg1204Ile DI-02602:Breast cancer BRCA1 (P38398) :breast cancer 1, early onset VAR\_020693 : p.Lys1207Asn DI-02602 Breast cancer BRCA1 (P38398) :breast cancer 1, early onset VAR\_020695 : p.Ser1217Tyr DI-02602:Breast cancer BRCA1 (P38398) :breast cancer 1, early onset VAR\_063212 : p.Met1775Lys DI-02602:Breast cancer BRCA1 (P38398) :breast cancer 1, early onset VAR\_075666 : p.Arg1699Trp DI-02602:Breast cancer BRIP1 (O9BX63) (BRCA1 interacting protein C-t) VAR 020896 (p.Pro47Ala DI-02602:Breast cancer BRIP1 (O9BX63) (BRCA1 interacting protein C-ti VAR 020900 ; p.Met299Ile DI-02602:Breast cancer BRCA1 (P38398) :breast cancer 1, early onset VAR 007757 ; p.Cvs61Glv DI-01655:Ovarian cancer BRCA1 (P38398) :breast cancer 1, early onset VAR\_020702 : p.Cys1697Arg DI-01655:Ovarian cancer BRCA1 (P38398) ;breast cancer 1, early onset VAR 075666 ; p.Arg1699Trp DI-01655:Ovarian cancer BRCA1 (P38398) :breast cancer 1, early onset VAR\_020679 : p.Glu10Lys DI-01559:Breast-ovarian cancer. familial. 1 BRCA1 (P38398) :breast cancer 1, early onset VAR\_020680 : p.Glu23Lys DI-01559:Breast-ovarian cancer. familial. 1 BRCA1 (P38398) ;breast cancer 1, early onset VAR 020690 ; p.Ser1187Ile DI-01559:Breast-ovarian cancer. familial. 1 BRCA1 (P38398) :breast cancer 1, early onset VAR 020691 : p.Gln1200His DI-01559:Breast-ovarian cancer. familial. 1 BRCA1 (P38398) :breast cancer 1, early onset VAR 020695 : p.Ser1217Tvr DI-01559:Breast-ovarian cancer, familial, 1 File Edit View Bookmarks Settings Help BRCA1 (P38398) :breast cancer 1, early onset VAR 020696 ; p.Phe1226Leu DI-01559:Breast-ovarian cancer. familial. 1 Angles: 0 Dihedrals: 0 Impropers: 0 Cross-terms: 0 Info) BRCA1 (P38398) (breast cancer 1, early onset VAR 020697 (p.Arg1243Gly DI-01559:Breast-ovarian cancer, familial, 1 Bondtypes: 0 Angletypes: 0 Dihedraltypes: 0 Impropertyp Info) BRIP1 (O9BX63) BRCA1 interacting protein C-te VAR 023700 ; p.Gln255His DI-01603:Fanconi anemia complementation gr info) Residues: 224 BRIP1 (Q9BX63) :BRCA1 interacting protein C-ti VAR\_023702 : p.Ala349Pro DI-01603:Fanconi anemia complementation gr Info) Waters: 3 BRIP1 (Q9BX63) BRCA1 interacting protein C-te VAR\_023703 : p.Trp647Cys DI-01603:Fanconi anemia complementation gr Info) Segments: 1 BRIP1 (O9BX63) (BRCA1 interacting protein C-t) VAR 023704 (p.Arg707Cvs DI-01603:Fanconi anemia complementation gr nfo) Fragments: 5 Protein: 2 Nucleic: 0

Connected

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# **Real-time observatory and reporting**



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## **GNU Health Federation Community Hub**



Community public server in Munich Demo and test environment Main Federation components:

- \* HMIS node and PgSQL
- \* Thalamus message server
- \* Person / Patient Master Index HIS
- \* openSUSE Leap OS

The GNU Health Federation Community Hub allows developers, health practioners and research institutions from all over the world to learn, test and develop their nodes & integrate them in the Federated network.



United Nations University, Kuala Lumpur, Malasia

# Academia



Univ. Palermo, Italia



Universidad de Entre Rios, Argentina

### HST.936: Global Health Informatics to Improve Quality of Care

The 2015 iteration of our course will focus on **Public Health** Emergencies and Humanitarian Crises.

Classes begin: February 6, 2015 Fridays 9am – 11am ET (GMT -5) Room: 09-057



Harvard / MIT, Boston, United States



### UNIVERSIDAD DE CIENCIAS MÉDICAS Matanzas

Univ. Matanzas, Cuba







## **Entre Ríos National University - UNER**





GHCon2020



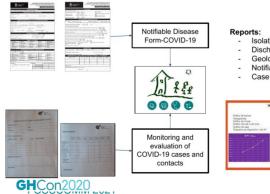






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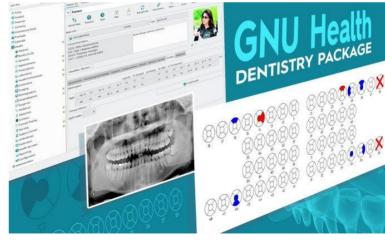
### **GNU Health COVID-19 Module**



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- Isolation Certification. Discharge Certification.
- Geolocalization Maps
- Notifiable Disease Form
- Case and Contact Statistics









# **IFMSA Bangladesh**



"Welcome IFMSA Bangladesh to the GNU Health Alliance of Academic and Research Institutions!"



3500+ Bangladesh medical students

65 universities

Focused on Primary Care

Exclusive use of Free/Libre Software





The GNU Health Alliance of Academic and Research Institutions



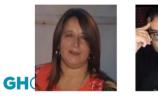


# **Alianza UNER**

### 1- Operative Team



2- Municipalities Team









4 - Researchers

3- Support staff











# **Cancer as result of social injustice**



### **IN SITU** FL CÁNCER COMO INIUSTICIA SOCIAL

NATALIA LUXARDO · FERNANDO SASSETTI editores

LEANDRO ALVA JAVIER BILLORO U CILLA PASSERINO TERESITA CALZIA INGRID SPESSOTTI CARLOS SCOTTA JULIO CÉSAR BELLO MARCEL KOLVENBACH GIULIANA SANABRIA NÉLIDA ARNALDI DAIANA RETAMAR MARCELA BELARDO MARIANA BORDES NICOLÁS RODRÍGUEZ EUGENIA WRIGHT MARIANO TREACY

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PREFACIO: JAIME BREILH PRÓLOGO: CLAUDIO MARTYNIUK

**Editorial Biblos** 

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FIBSM094355TII es bioingeniero (Universidad nacional de Entre Rios). Magister en Gestión de Sistemas y Servicios de Salud (Universidad Nacional de Kosario) y doctor en Ingeniería (Universidad Nacional de Litora). Es docente adjunto de Organización de los Sistemas de Salud de la carrera de Bioingenieria en la Facultad de Ingeniería (UNER). Participa como investigador en diversos proyectos liderados por Natalia Luxardo vinculados con el abordaje del cáncer en Argentina.



Dra. Natalia Luxardo Univ Buenos Aires CONICET



Dr. Fernando Sassetti Univ Entre Ríos Cátedra Salud Pública





Trailer documentary : https://vimeo.com/524433855

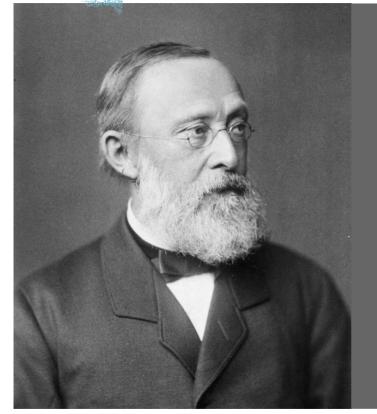
GNU Health was used to collect and process the demographic, clinical, epidemiological and socio-sanitary information from the participating centers

FOSSCOMM 2021 November 13, Greece





# **Social Medicine**



*"Medicine is a Social Science, and politics nothing but medicine at a larger scale"* 

Rudolf Virchow







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