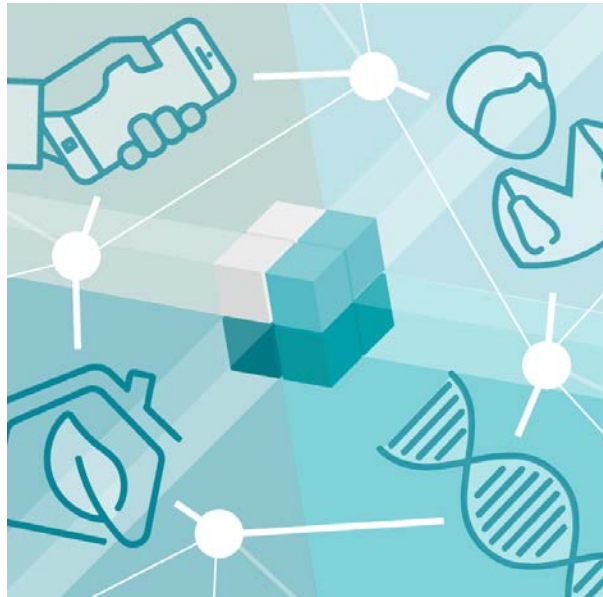


GNU Health in Integrative and Precision Medicine



The Free, Community-based, Hospital and Health Information System

Luis Falcón Martín, M.D., B.Sc

falcon@gnu.org

GNUHealth CON 2017



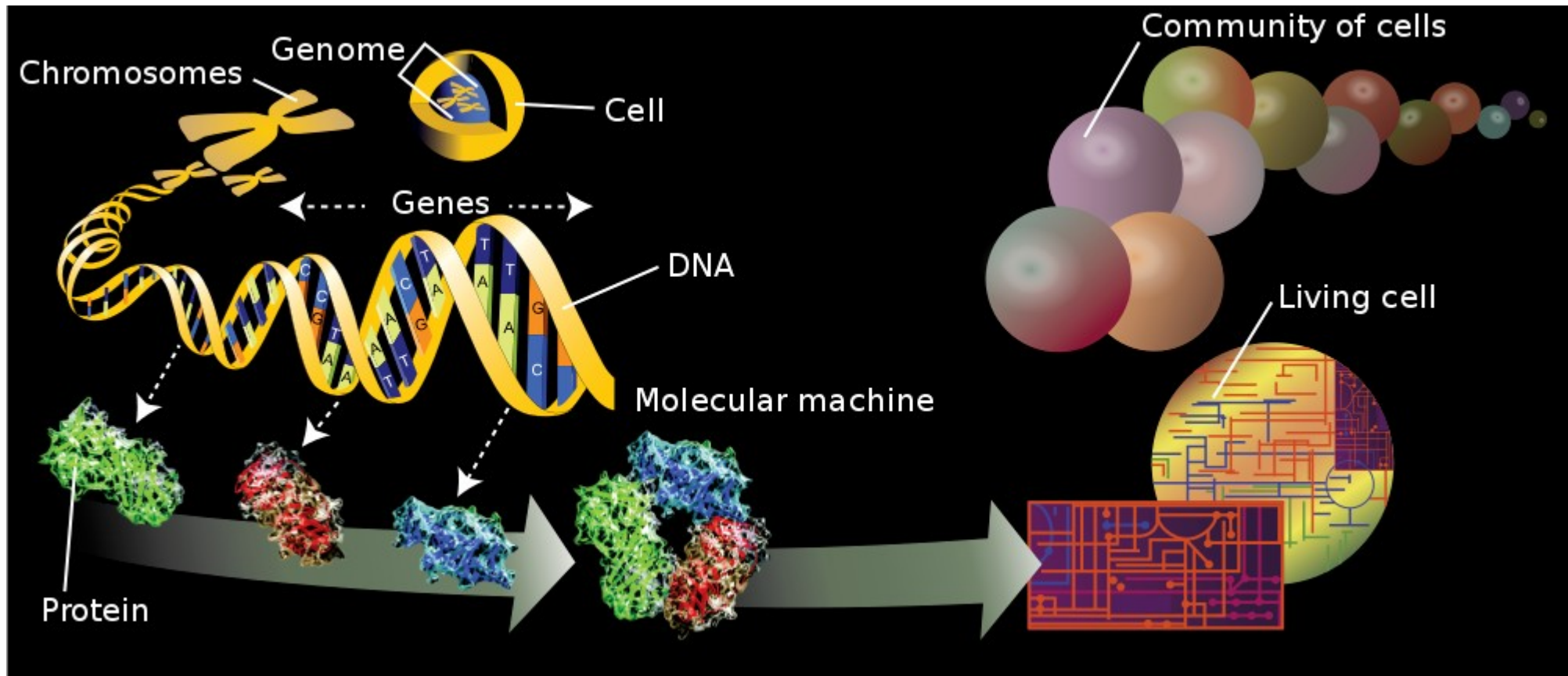
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November 25th, 2017

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Nature [vs,and] Nurture



Formidable achievements in biology & biomedicine



Source: "From DNA to Life" US dept. of energy



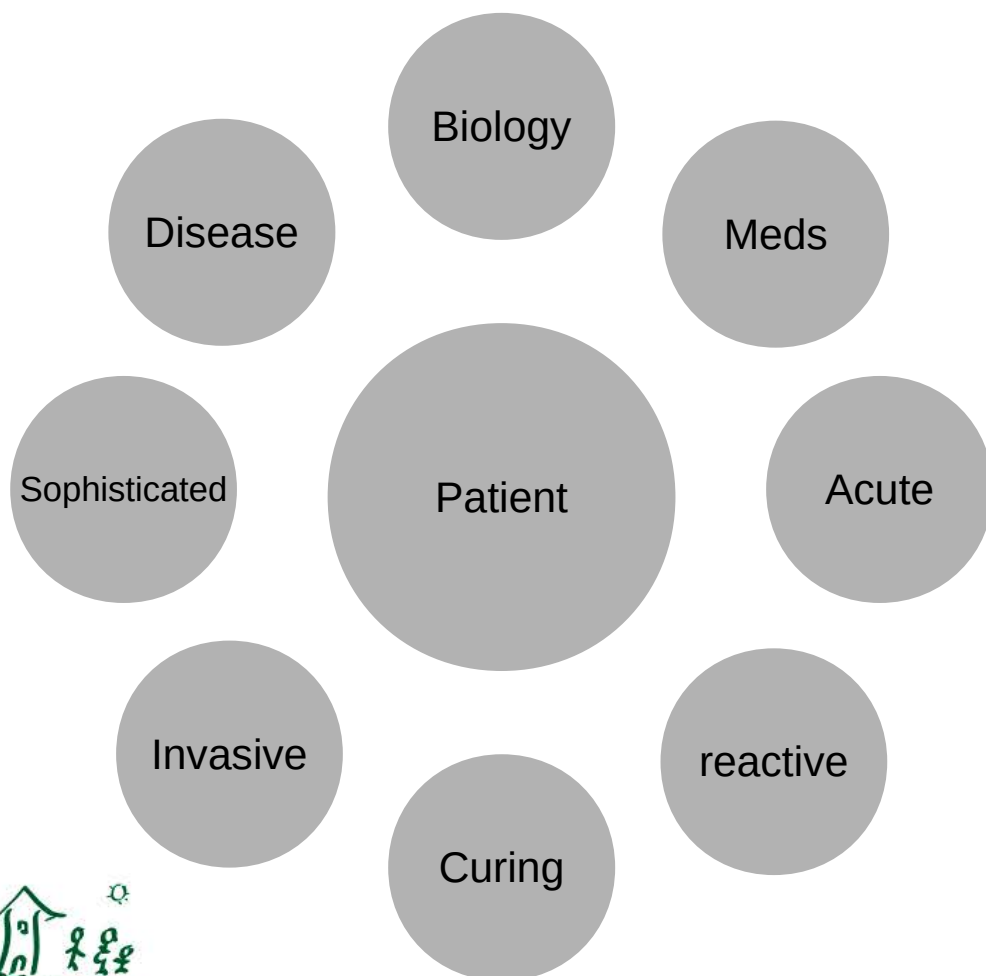
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Nature: Biology “rules”

Western medicine
(reductionist & reactive)



Deterministic

Based on Central Dogma & Germ theories

Reductionist

More focused on disease

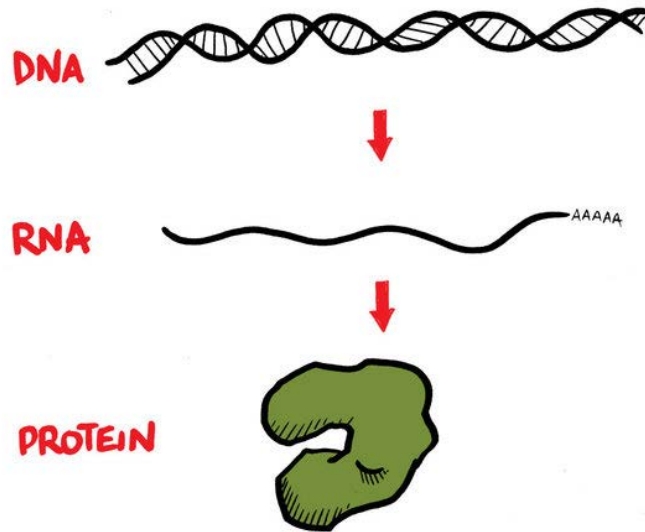
Specific (medical specialties)

Generally more expensive



Molecular Biology Central Dogma

THE CENTRAL DOGMA OF BIOLOGY



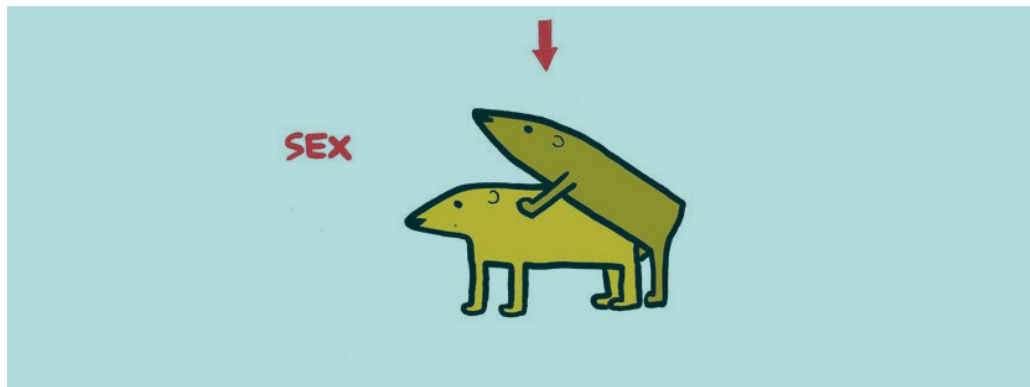
Deterministic : Our fate is “hardcoded” by our genes.

Environment is not taken into account

Unidirectional
DNA → RNA → Protein

Only 2% codes for protein

What about “dark matter” ?



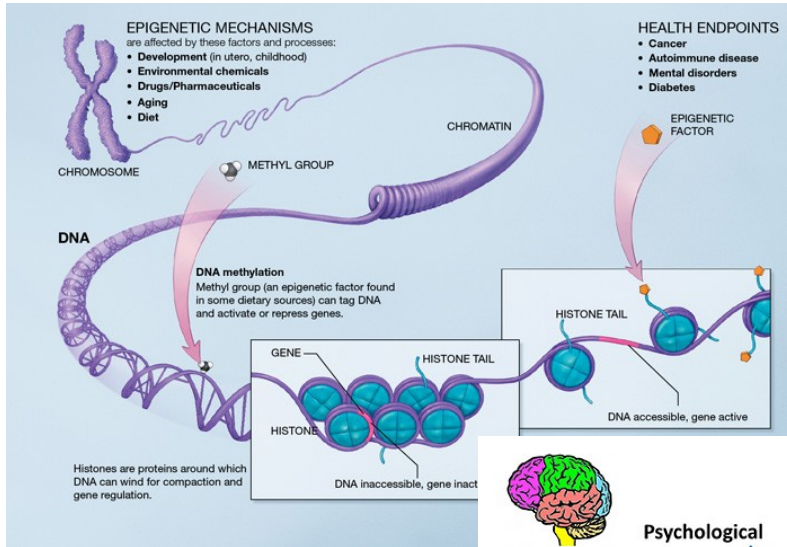
Extra bonus :)



Nurture : Environment makes the difference



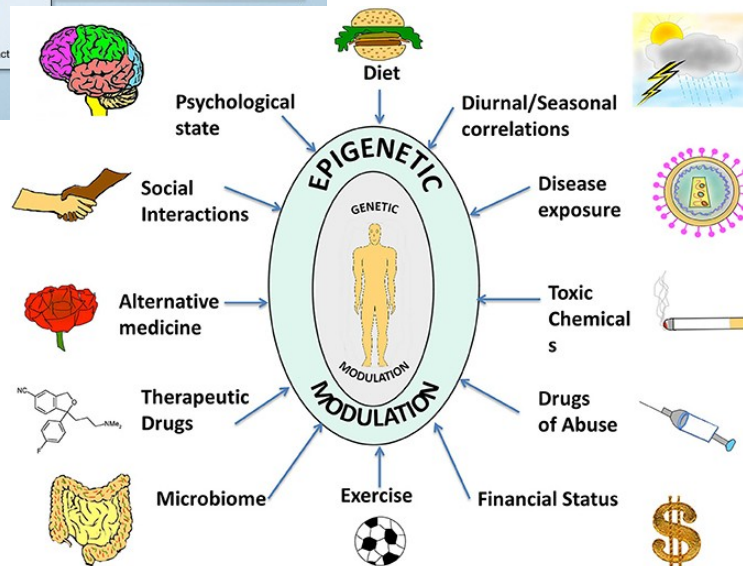
Epigenetics : Environment regulates our genes



“Nutrition, stress and emotions can modify those genes without changing their basic blueprint”

Bruce Lipton, PhD

Our lifestyle and environment impacts the gene expression and health



“Before, genes predetermined outcomes. Now everything we do—*everything we eat or smoke*—can affect our gene expression and that of future generations.

Dr Randy Jirtle
 (“agouti sisters”)

<http://journal.frontiersin.org/article/10.3389/fcell.2014.00049/full>

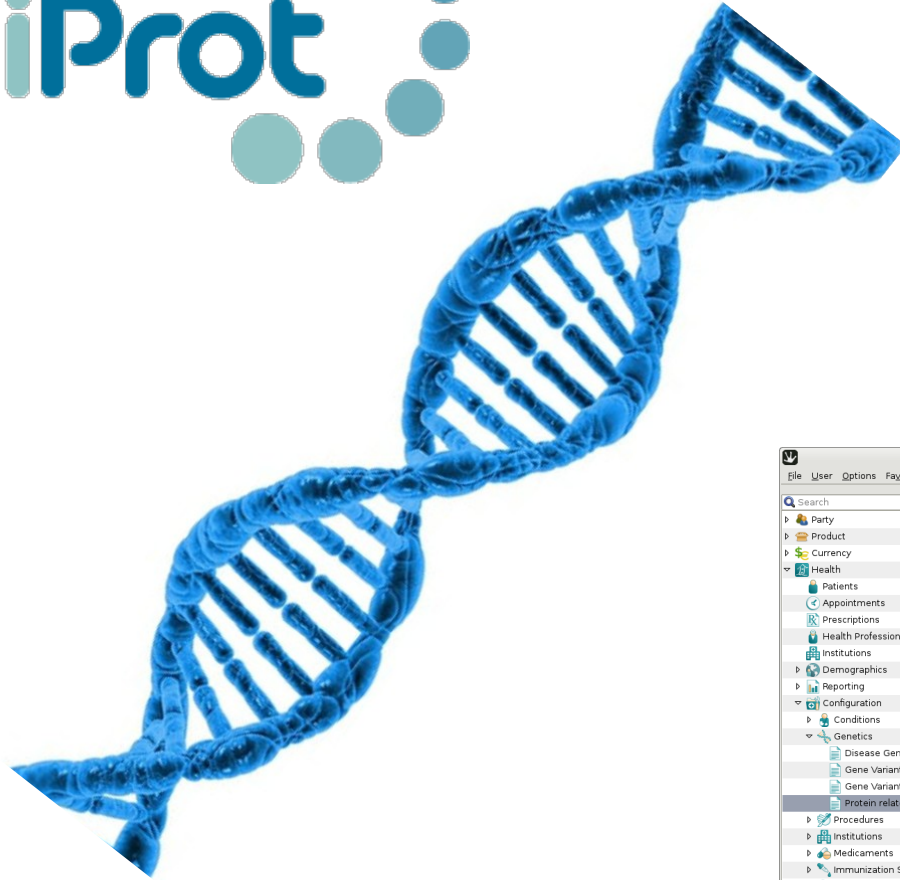


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GNU Health :Genetics & Research Institutions



Linking clinicians with research

Personal genetic information & family history

Work with Uniprot

Protein related diseases

Gene Natural Variants & phenotypes

GNU Health Federation to interact with scientific community

The screenshot shows the GNU Health software interface. The main window is titled "Protein related diseases" and displays information for a specific disease: "Amyloidosis B" (Disease name) with the acronym "AMYL8". Below this, there is a table of gene variants involved in this condition. The table has two columns: "Gene" and "Variant".

Gene	Variant
APOA1:apolipoprotein A-I	APOA1:apolipoprotein A-I : VAR_000609 : p.Gly50Arg
APOA1:apolipoprotein A-I	APOA1:apolipoprotein A-I : VAR_000610 : p.Leu84Arg
FGA:fibrinogen alpha chain	FGA:fibrinogen alpha chain : VAR_010731 : p.Glu545Val
FGA:fibrinogen alpha chain	FGA:fibrinogen alpha chain : VAR_010732 : p.Arg573Leu
LZ2:lysozyme (renal amyloidosis)	LZ2:lysozyme (renal amyloidosis) : VAR_004280 : p.Ile74Thr
LZ2:lysozyme (renal amyloidosis)	LZ2:lysozyme (renal amyloidosis) : VAR_004281 : p.Asp85His



Natural Variants involved in Health Conditions

Tryton - Administrator - GNU SOLIDARIO HTAL [Euro]

File User Options Favorites Help

Search

- Party
- Product
- Currency
- Health
 - Patients
 - Appointments
 - Prescriptions
 - Health Professionals
 - Institutions
 - Demographics
 - Reporting
 - Configuration
 - Conditions
 - Genetics
 - Disease Genes
 - Gene Variants
 - Gene Variant Phenotypes
 - Protein related diseases**
 - Procedures
 - Institutions
 - Medicaments
 - Immunization Schedule
 - Misc
 - Administration

Protein related diseases 99 / 1000 of 4429

Disease Genes Gene Variant Protein relate

Disease

Disease: DI-00104 **Disease name:** Amyloidosis 8 **Acronym:** AMYL8

Protein and Gene

Disease URI: **Dominance:** **MIM:** 105200

A hereditary generalized amyloidosis due to deposition of apolipoprotein A1, fibrinogen and lysozyme amyloids. Viscera are particularly affected. There is no involvement of the nervous system. Clinical features include renal amyloidosis resulting in nephrotic syndrome, arterial hypertension, hepatosplenomegaly, cholestasis, petechial skin rash.

Gene Variants (6/6)

Gene	Variant
APOA1:apolipoprotein A-I	APOA1:apolipoprotein A-I : VAR_000609 : p.Gly50Arg
APOA1:apolipoprotein A-I	APOA1:apolipoprotein A-I : VAR_000610 : p.Leu84Arg
FGA:fibrinogen alpha chain	FGA:fibrinogen alpha chain : VAR_010731 : p.Glu545Val
FGA:fibrinogen alpha chain	FGA:fibrinogen alpha chain : VAR_010732 : p.Arg573Leu
LYZ:lysozyme (renal amyloidosis)	LYZ:lysozyme (renal amyloidosis) : VAR_004280 : p.Ile74Thr
LYZ:lysozyme (renal amyloidosis)	LYZ:lysozyme (renal amyloidosis) : VAR_004281 : p.Asp85His

Gene variants involved in this condition

tryton://localhost:8000/genetics/model/gnuhealth.protein.disease/99/context=%7B%22date_format%22%3A+%22%25m%2F%25d%2F%25Y%22%7D&views=%5B270%2C+271%5D



GNU Health : Freedom and Equity in Health



Social Medicine

- "La medicina sin humanismo médico no merece ser ejercida."
Professor Dr. Rene Favaloro -



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Les Misérables

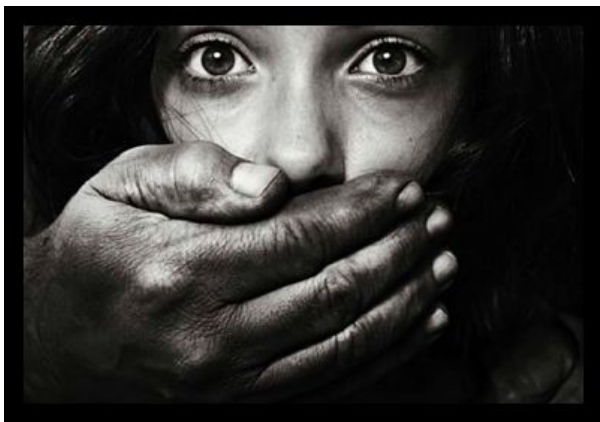


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Over 20000 Children die every day from Social Diseases – in misery



Human Trafficking
Contaminated Water
Malnutrition
Cholera
Drug abuse
Prostitution
Chagas
Tuberculosis
Child Labour
War
Family Violence
Malaria
HIV /AIDS



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The other Miserables: Those who cause misery



The macabre business of war



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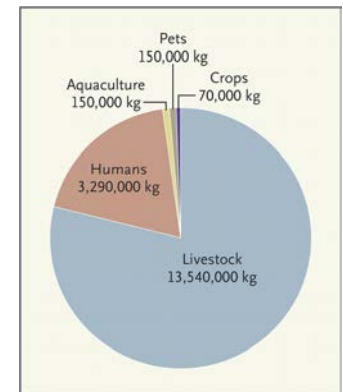
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Dairy and Meat : Inhumane, Cruel and Unhealthy



- * Extremely cruel
- * Stress → immunocompromise → ATB → Resistance
- * Bacteria contamination
- * Milk / meat full with ATB, Hormones, ...
- * Linked to cancer, cardiovascular disease in humans
- * Global warming



New England Journal of Medicine
Dec 26, 2013

Factory farming accounts for 37% of methane (CH₄) emissions, 20 times the global warming potential of CO₂.



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Nature vs Nurture

Tuberculosis : $\frac{1}{3}$ of the world infected . Who gets sick ?



"Bernard avait raison. Le germe n'est rien, c'est le terrain qui est tout."

Louis Pasteur

"Epidemia de Injusticia" Dr. José Caminero



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GNU Health : Functionality Areas



Person and Community

Person, family, Socioeconomics, lifestyle ...

Domiciliary Units, Operational Areas, Institutions,

Patient

Evaluations, Genetics, prescriptions, History, surgeries...

Health Institution Management

Hospitalizations, Finances, Laboratory, stock, HR, ..

Health Authorities / MoH

Health campaigns, epidemiology, ...

LIMS

Laboratory Information System (GNU LIMS - Occhiolino)



GNU Health is Free/Libre Software

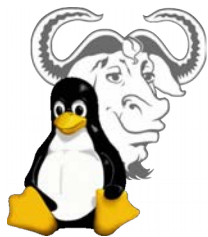
Freedom to run , adapt, improve and redistribute

Official GNU Package, from the Free Software Foundation

Open Documentation

Relies on free technology

International community (100+ language teams)



PostgreSQL



WIKIBOOKS

Open books for an open world



mongoDB®

The Domiciliary Units (DUs)

Address / Location
Construction material
Number of rooms

Sanitary conditions

Bathrooms
Sewers
Electricity

...

The screenshot shows a web application interface for Domiciliary Units (DUs). The interface is divided into several sections:

- Form Fields:** Includes fields for Code (Valse-LeonyCastillo), Desc (House by the city town hall), Street (Leon y Castillo), Number (1), Apartment, District, Municipality (Valsequillo), City, Zip Code (35217), Country (Spain), and Province (Las Palmas).
- Geolocation:** Latitude (27.99189100000000) and Longitude (-15.49462800000000) are displayed, along with an OSM Map link.
- Infrastructure:** Includes fields for Material (Concrete), Roof (Concrete), Bathrooms (2), Running Water (checked), Gas supply (unchecked), and Telephone (checked).
- Members Table:** A table listing members with columns for Code, Name, Last Name, and SSN.

Code	Name	Last Name	SSN
2	Ana	Betz	55567890
5	John	Zenán	40556644
4	Matt	Zenon Betz	97234436

At the bottom of the interface, it shows "Administrator - GNU SOLIDARIO HOSPITAL [Euro]" and "Waiting requests: 0 received - 0 sent".

The DU shows the people currently living in it at any given moment
The DU can be geolocated / linked to OpenStreetMap



Health Institutions and Operational Sectors

The screenshot displays the GNU Health Administrator interface for the GNU Solidario Hospital. The main window is titled "Institutions" and shows the configuration for the "GNU SOLIDARIO HOSPITAL". A context menu is open over the "Beds" field, listing options: Beds, Buildings, Operating Rooms, Units, and Wards. The "Beds" option is selected. The configuration fields include:

- Institution: GNU SOLIDARIO HOSPITAL
- Type: General Hospital
- Public Level: Public
- Heliport:
- Trauma Center:
- Trauma Level: Level I
- Beds: 750
- ORs: 15
- Code: SPAIN-LASPALMAS-GNUSOLIDARIO-GRAL_H
- Specialty: (empty)
- Teaching:
- Operating Room:

The "Operational Sector" section shows "Las Palmas de Gran Canaria". Below this, there is a text description of the hospital:

The GNU Solidario General Hospital (GSGH), is a major fictional teaching hospital in Las Palmas, and core of the automomic region health network. GNU Solidario General Hospital has research units covering nearly all major specialties of medicine and is the primary teaching hospital in the island. The hospital's emergency department is certified as a level I trauma center for adults and pediatrics. It is the sample health center used in the demo system.

The URL at the bottom of the browser window is: `tryton://localhost:8000/health26/model/gnuhealth.institution/1;views=%5B603%2C+604%5D`



People Before Patients : Demographics

Name: Last Name: PUID:

Active:

HHealth General Accounting Stock

Person: Patient: Health Prof: Institution: Insurance Company: Pharmacy:

Demographics

DoB: Sex:


Occupation: Education Level:

Mother: Father:

Marital Status: Citizenship:

Country of Residence: Domiciliary Unit:

Ethnic group: Alternative IDs:

Picture 

Alternative IDs

Code	ID type	Comments
93674665J	Passport	Spanish Passport
PAC001	Medical Record	



Families

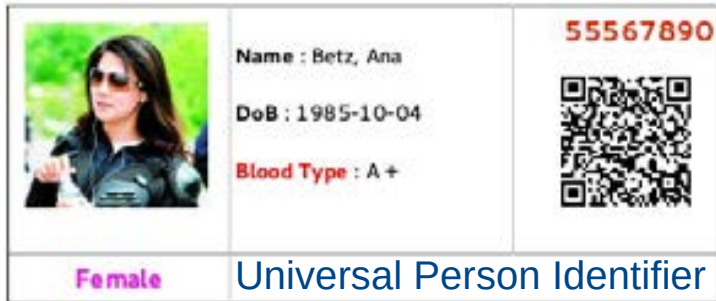
The screenshot shows the 'Families' module in the GNU Solidario Hospital software. The interface includes a menu bar (File, User, Options, Favorites, Help), a search bar, and a sidebar with a tree view of categories like Health, Demographics, and Operational Area. The main content area displays the 'Families' view for a specific family named 'Zenon-Betz'. Below the family name, there is a 'Members' section with a table listing family members and their roles. The table has two columns: 'Party' and 'Role'. The members listed are Betz, Ana (Mother), Zenon, John (Father), and Zenon Betz, Matt (Son). Below the table is an 'Extra Info' section. At the bottom of the window, the URL is visible: `tryton://health.gnusoalidario.org:8000/health28/model/gnuhealth.family/1;views=%5B167%2C+168%5D`.

Party	Role
Betz, Ana	Mother
Zenon, John	Father
Zenon Betz, Matt	Son

Example of a “nuclear family” . They may or may not share the same Domiciliary Unit



Empowering the person, family and community



Socioeconomics
Education
Lifestyle
Physical exercise
Nutrition
Working conditions

...



Family Members and their roles
Family Affection / Functionality Level
Domiciliary Units conformants
Contacts info : **Key for quickly locating them in outbreaks**

...

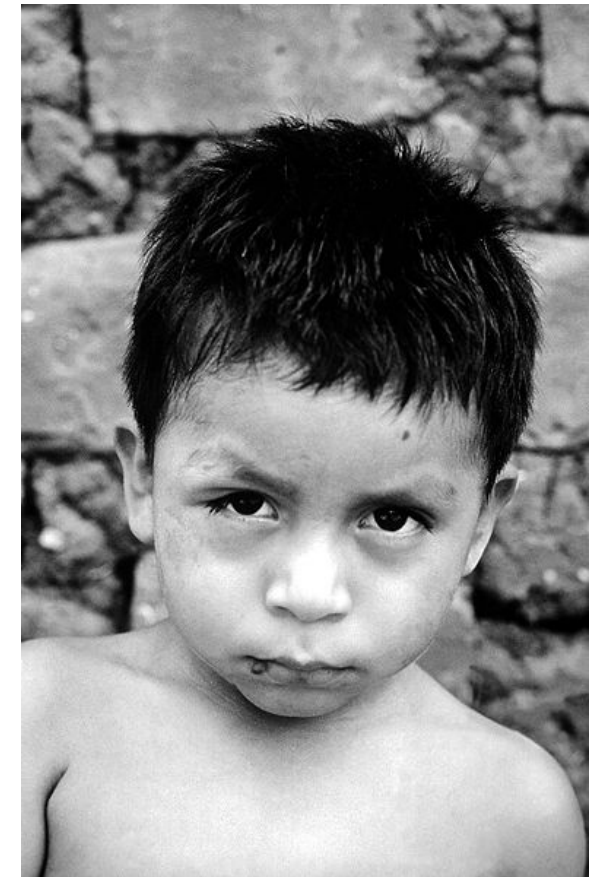


GNU Health promotes transdisciplinary work, and makes the person an active member of the system of health

GNU Health WHO modules to fight against social diseases



MDG 6 : Fight HIV, Malaria & Tuberculosis



NTD: Fight Neglected Tropical Diseases(Chagas, Dengue...)



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Domiciliary Units Survey / Vector Control

Tryton

File User Options Favorites Help

Search

- Party
- Product
- Financial
- Currency
- Inventory & Stock
- Purchase
- Sales
- Calendar
- Health
 - Patients
 - Appointments
 - Prescriptions
 - Demographics
 - Domiciliary Units**
 - Families
 - Family Members
 - Operational Areas
 - Laboratory

Domiciliary U ... Chagas DU S ...

Chagas DU Survey 1 / 1

Survey Code: CHAGAS-DU-2013/001 DU: DUsample-X1230 Date: 07/28/2013 Status: Initial

Presence of triatomines—
Triatomines: Nymphs: Domiciliary: Peri-Domiciliary: Vector: T. infestans

Areas to Improve—
Roof: Walls: Floor:

Preventive Measures—
Bug traps:
Fumigation: Fumigation Date: 07/27/2013

Notes

Triatomines found in the roof section of the bedroom.

Action : House has been sprayed and the social worker notified the family to place bug traps for further evaluation.

Next survey: 08/03/2013

Administrator - GNU SOLIDARIO HOSPITAL [EGP] Waiting requests: 0 received - 0 sent admin@health.gnusolidario.org:8000/health20

vinchucachaco.jpg

Image Edit View Go Help



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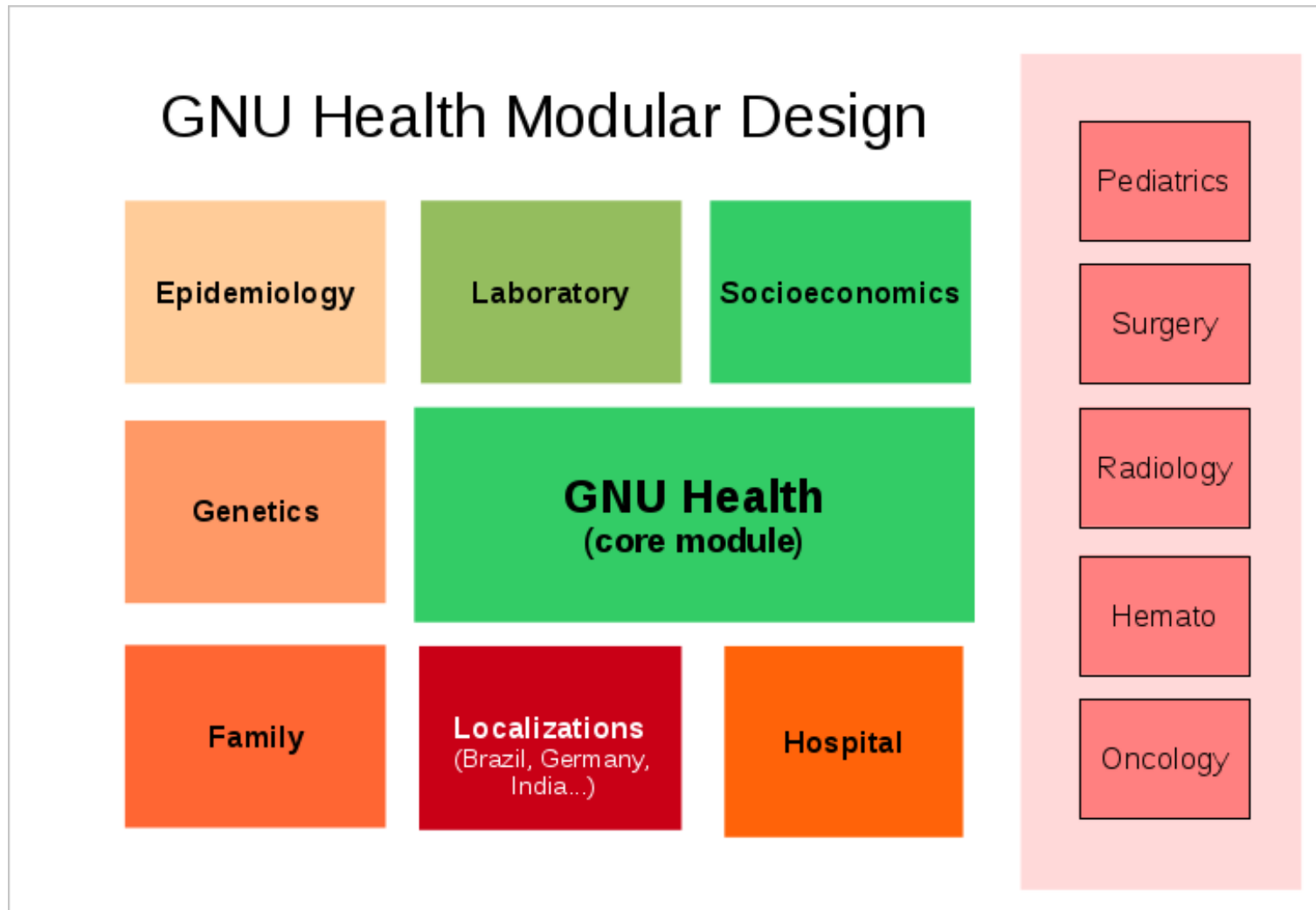
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Medical Practice and Health Center Management



Modularity

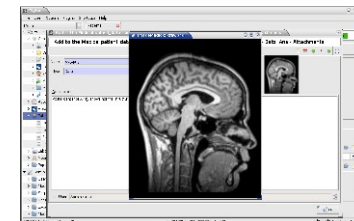


Centralized Patient Information

The screenshot shows the GNU Health interface for a patient named Ana Betz. The main window displays the patient's name, age (29y 4m 8d), and a photo. A dropdown menu is open, listing various medical actions such as Appointments, Evaluations, Imaging Test Request, and Lab Reports. The interface includes a sidebar with navigation options like Party, Product, Financial, and Health. The patient's general information is visible, including GP (Cordara, Cameron), Family (Zenon-Betz), and Insurance (Universal Health). The URL at the bottom is: `tryton://health.gnusoalidario.org:8000/health28/model/gnuhealth.patient/1;views=%5B223%2C+224%5D`

A patient information card for Ana Betz. It includes a photo, name, date of birth (1985-10-04), blood type (A+), and a QR code with the ID 55567890. The card also indicates the patient is female and has a critical information note: T1D.

A screenshot of a data table in the GNU Health interface, showing a list of patient records with columns for various attributes.



GNU LIMS



Laboratory Information System for HealthCare and Biomedicine



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GNU LIMS : Interoperability and Interfaces

The screenshot displays the GNU LIMS interface for a Complete Blood Count (CBC) test. The main window shows the following details:

- Lab Tests Results** (5/5)
- Main Info**
 - ID: TEST006
 - Test type: COMPLETE BLOOD COUNT
 - Date of the Analysis: 10/23/2016
 - Patient: Betz, Ana
 - Date requested: 10/23/2016
 - Request: 5
- Lab Test Criticisms** table:

Warn	Exclude	Analyte	Value	Result - Test	Lower Limit	Upper Limit	Units	Remarks
<input type="checkbox"/>	<input type="checkbox"/>	Hemoglobin	14.0		11.0	15.0	g/dL	
<input type="checkbox"/>	<input type="checkbox"/>	RBC	4.5		3.5	5.5	10 ⁶ /µL	
<input type="checkbox"/>	<input type="checkbox"/>	HCT	42.0		37.0	50.0	%	
<input type="checkbox"/>	<input type="checkbox"/>	MCV	85.0		82.0	95.0	fL	
<input type="checkbox"/>	<input type="checkbox"/>	MCH	28.0		27.0	31.0	pg	
<input type="checkbox"/>	<input type="checkbox"/>	MCHC	35.0		32.0	35.0	g/dL	
<input type="checkbox"/>	<input type="checkbox"/>	RDW - CV	12.0		11.5	14.5	%	
<input type="checkbox"/>	<input type="checkbox"/>	RDW - SD	41.0		35.0	55.0	fL	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	WBC	12.0		4.5	11.0	10 ³ /µL	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	NEUT%	72.0		40.0	70.0	%	
<input type="checkbox"/>	<input type="checkbox"/>	LYM%	22.0		20.0	45.0	%	
<input type="checkbox"/>	<input type="checkbox"/>	MON%	2.0		2.0	10.0	%	
<input type="checkbox"/>	<input type="checkbox"/>	EO%	1.0		1.0	5.0	%	
<input type="checkbox"/>	<input type="checkbox"/>	BA%	1.0		0.0	2.0	%	
<input type="checkbox"/>	<input type="checkbox"/>	LYM#	3.0		1.5	4.0	10 ³ /µL	
<input type="checkbox"/>	<input type="checkbox"/>	GRA#	5.0		2.0	7.5	10 ³ /µL	
<input type="checkbox"/>	<input type="checkbox"/>	PLT	285.0		150.0	450.0	10 ³ /µL	
<input type="checkbox"/>	<input type="checkbox"/>	ESR	12.0		0.0	15.0	mm/hr	

Terminal output on the left side of the screenshot:

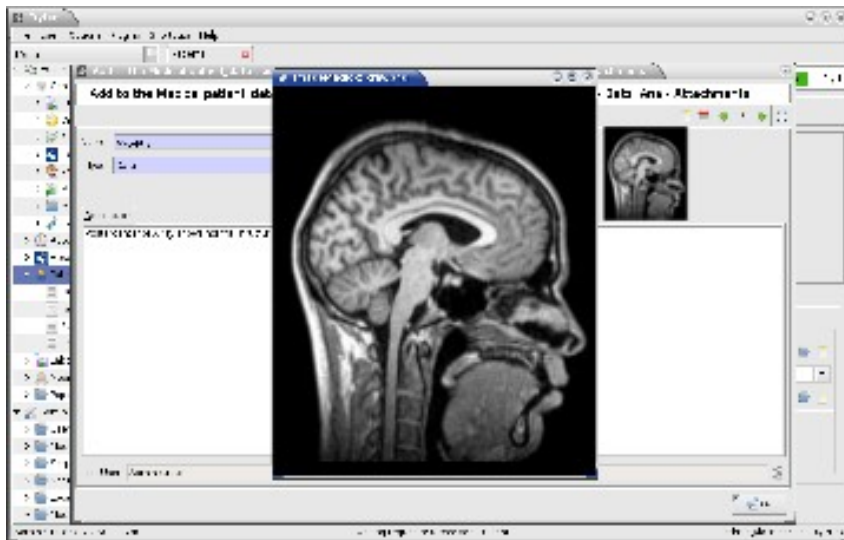
```

lfm@beastie:~/health/tryton/doc/
Connecting to GNU Health Server
Connected !
Checking integrity of the batch
Basic check on test ID and analy
Updating lab results from batch
Done !
    
```



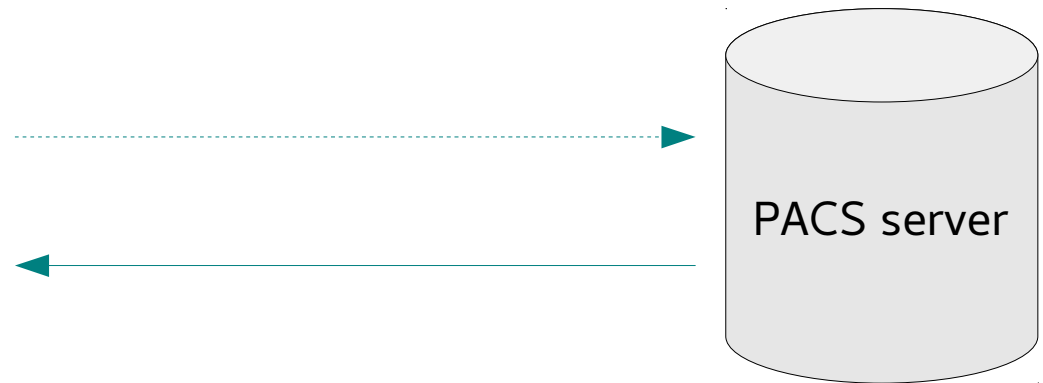
Dx Imaging

GNU Health



Can store the image, metadata
or DICOMDIR location

ORTHANC



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Obstetrics & Pediatrics

Tryton - Administrator - GNU SOLIDARIO HOSPITAL [Euro]

File User Options Favorites Help


Patte Neonatal Inf...

Neonatal Info 1/1

Main Endings and Tests

Baby: Zenon Betz, Matt | DoB: 03/15/2010 12:18:09 | Sex: Male

Mother: Betz, Ana | Length: 52 | Weight: 3.600 | CP: 36



APGAR scores

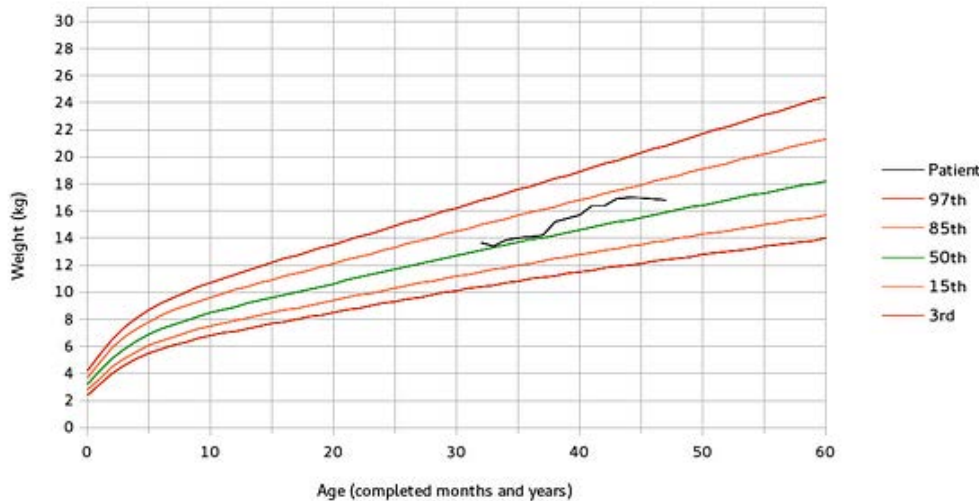
Minute	APGAR	Appearance	Pulse	Grimace	Activity	Respiration
1	9	acrocyanosis > 100	cry or pull away when stimulated	flexed arms and legs	strong	
5	10	no cyanosis > 100	cry or pull away when stimulated	flexed arms and legs	strong	

Stimulation: Aspiration: Intubation: Mask: Oxygen:



Notes

Name at Birth: Matt | Newborn ID: 9876894 | Discharged: 03/17/2010 12:22:39 | Doctor in charge: Idara, Cameron

tryton:/health.gnusolidario.org:8000/health2B/model/gnuhealth.newborn?1.domain=%5B%5B%22patient%22%2C+%22%3D%22%2C+%2%5D%5D&views=%5B%49%2C+%45%5D



- Preconception and Prenatal Care
- Genetic Risks and counseling
- Obstetric evaluations / imaging
- Nutrition and growth charts
- Socioeconomics
- Neonatology
- Immunizations
- Family Functionality and Affection level
- Psychosocial Risk (Mass General Hospital PSC)

	Name : Matt Mother : Betz, Ana Mother's PUID : 55567890 DoB : 2010-03-15 16:18:09	9876894 
	Male	3600 gr and 52 cm



Health Services, Billing / Invoicing

Tryton - Administrator - GNU SOLIDARIO HOSPITAL [Euro]

Health services ... Invoices

Health services 1 / 5

New Save Switch Reload Previous Next Attachment(0) Action Relate Report E-Mail Print

Patient: Date: ID:

Description: Invoice to:

Service Line

Invoice	Product	Description	Qty	From	To
<input checked="" type="checkbox"/>	[BED 310] 310	Hospitalization	1	09/30/2013	10/02/2013
<input checked="" type="checkbox"/>	Medical evaluation	Initial assesment	1	09/30/2013	09/30/2013
<input checked="" type="checkbox"/>	Ultrasound charges	Abdominal Ultrasound - Req	1	09/30/2013	09/30/2013
<input checked="" type="checkbox"/>	[CBC] Blood count test charg	Complete Blood Count	1	09/30/2013	09/30/2013

State:

tryton://health.gnusoaldario.org:8000/health28rc1/model/gnuhealth.health_service/1;views=%5B517%2C+518%5D



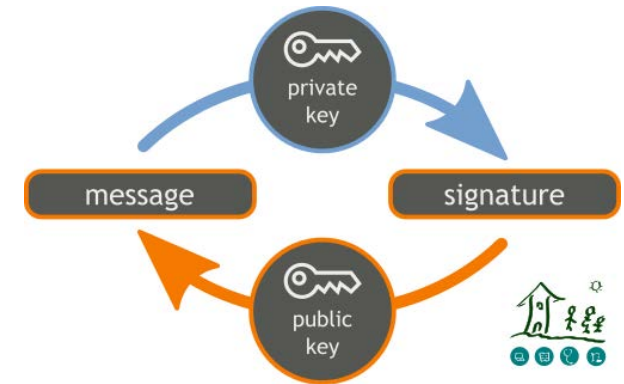
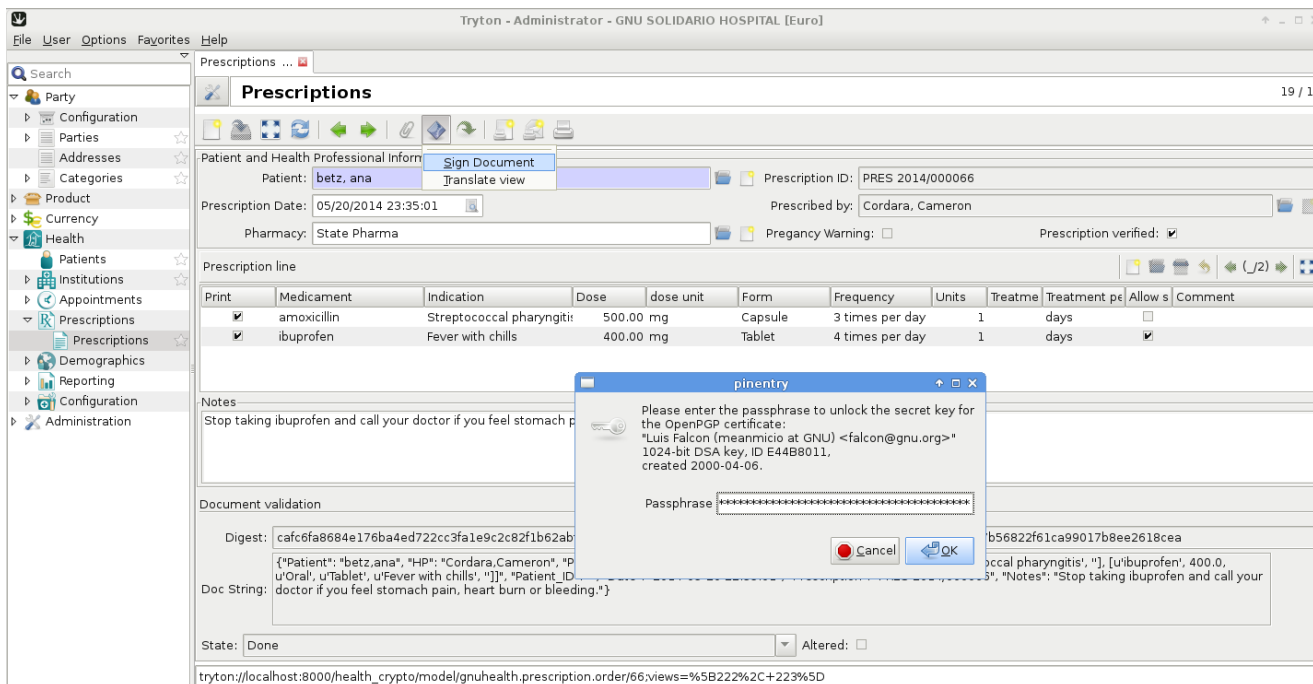
Digital Signatures & ePrescriptions

Digitally sign documents and medical acts

GNU Privacy Guard (GNUPG) Integration

Authenticity, accountability & non-repudiation

Document validation



ePrescriptions

Evaluations / Encounters

Birth and death certificates

Lab Tests, ...

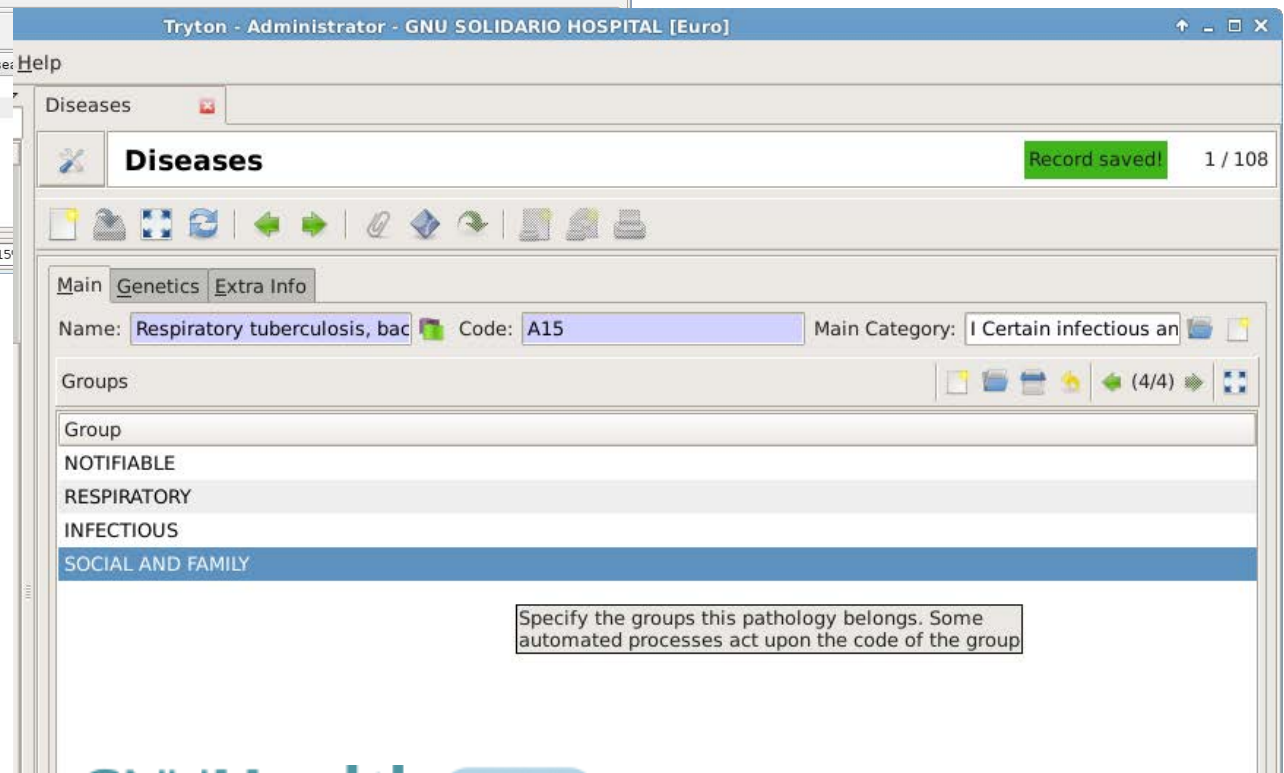
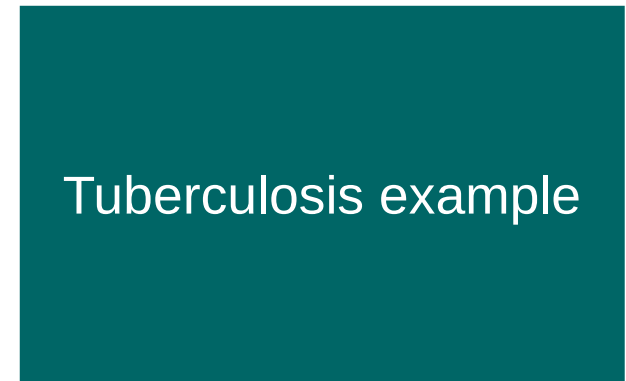
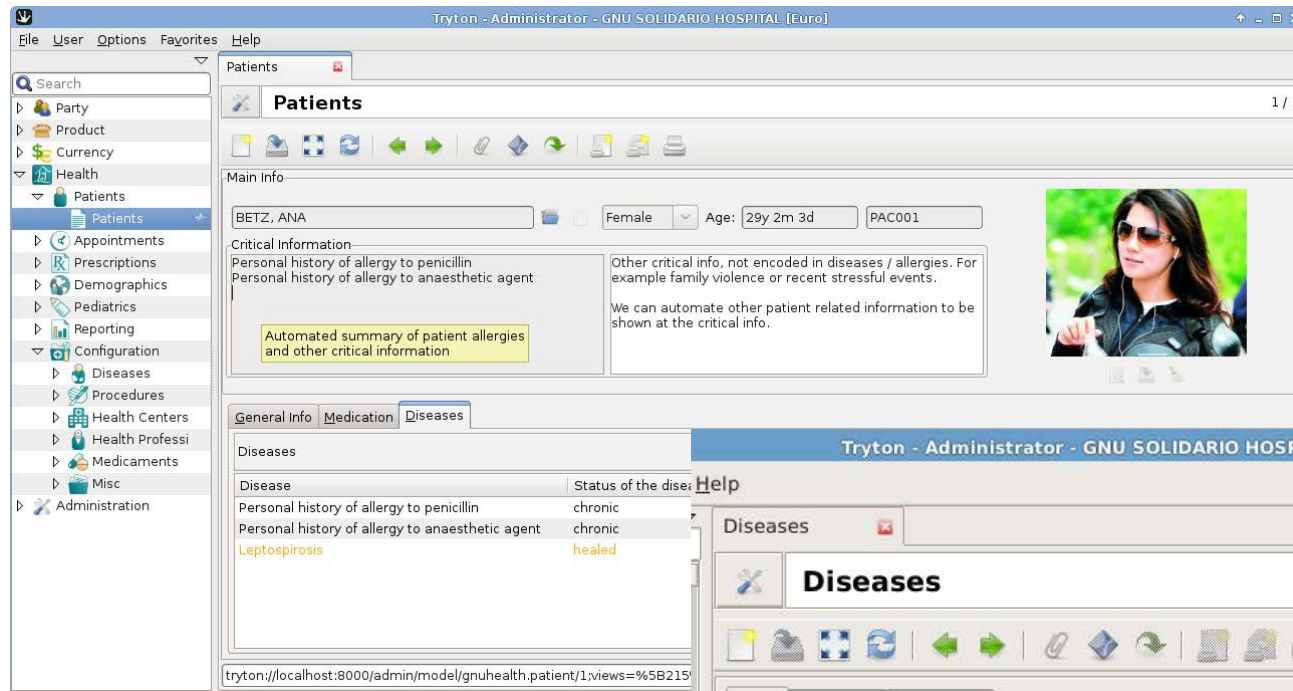


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November 25th, 2017

GNUHealth CON 2017

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Disease Groups



Automatic triggers

Patient Critical Info

Reporting



Some Social and Lifestyle screening tools

CAGE Alcoholism screening

Smilkstein Family functionality test

Henningfield recreational drug classification

Pediatric Psychosocial risk (PSC from MGH)

NIDA recreational drugs Database

Pediatric Symptom Checklist 1/1

Patient: **Velasco, Sarah** Date: **08/09/2011 10:30:00** Appointment: PSC Total: **49**

Complains of aches and pains: Sometimes	Spends more time alone: Sometimes
Tires easily, has little energy: Often	Fidgety, unable to sit still: Sometimes
Has trouble with teacher: Often	Less interested in school: Often
Acts as if driven by a motor: Often	Daydreams too much: Sometimes
Distracted easily: Often	Is afraid of new situations: Sometimes
Feels sad, unhappy: Often	Is irritable, angry: Often
Feels hopeless: Often	Has trouble concentrating: Sometimes
Less interested in friends: Sometimes	Fights with other children: Sometimes
Absent from school: Often	School grades dropping: Often
Is down on him or herself: Sometimes	Visits the doctor with doctor finding nothing wrong: Sometimes
Has trouble sleeping: Often	Worries a lot: Often
Wants to be with you more than before: Often	Feels he or she is bad: Sometimes
Takes unnecessary risks: Often	Gets hurt frequently: Sometimes
Seems to be having less fun: Sometimes	Acts younger than children his or her age: Sometimes
Does not listen to rules: Sometimes	Does not show feelings: Often
Does not get people feelings: Sometimes	Teases others: Sometimes
Takes things that do not belong to him or her: Sometimes	Refuses to share: Sometimes

Family APGAR

Help from family: Problems discussion: Decision making:

Time sharing: Family affection: Score:

Name	Code	Category	Toxicity	Dependence	Street names
Heroin	HEROIN	Opioids	Extreme	Extreme	diacetyl-morphine:
Hydrocodone bitartrate	HYDROCODONEBIT	Opioids	High	High	Vicodin: vike, Wats
Inhalants	INHALANTS	Others	Extreme	High	Solvents (paint thin
Ketamine	KETAMINE	Dissociative Anesthetics	Extreme	Low	Ketalar SV: cat Vali
LSD	LSD	Hallucinogens	Low	Low	Lysergic acid dieth
MDMA methylenedioxy-methamphetamine	MDMA	Stimulants	High	Low	Adam, clarity, ecst
Marijuana	MARIJUANA	Cannabinoids	Low	Low	blunt, dope, ganja,

CAGE (1/4)

Date	Hard to Cut	Angry	Guilt	Eye-opene	CAGE Score
02/18/2015	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
01/13/2015	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1
03/13/2014	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2
01/08/2014	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4



Tools for the Health Authorities



One person, one history : PUID

The screenshot shows the 'People' management interface in GNU Solidario Hospital. The patient record for Ana Betz is displayed, with the PUID field highlighted in orange. The Code field is highlighted in red. The interface includes a sidebar with navigation options, a main form for patient details, and a table for alternative IDs and insurances.

Person Information:

- Name: Ana, Last Name: Betz, PUID: 55567890
- Active:

Demographics:

- DoB: 10/04/1985, Sex: Female
- Occupation: Teacher, Education Level: University
- Mother: Luna, Father: Caput, Bonifacio
- Marital Status: Married, Citizenship: Spain
- Country of Residence: Spain, Domiciliary Unit: Valse-LeonyCastillo1
- Ethnic group: Hispanic, Alternative IDs:

Alternative IDs Table:

Code	ID type	Comments
93674665J	Passport	Spanish Passport
PAC001	Medical Record	

Insurances Table:

Number	Plan	Insurance Ty	Insurance Comp	Category	Member since	Expiration date
1257457	Family Plan	State	Universal Health		05/12/2012	05/12/2015

Code and Activation:

- Code: 63dd59be-141c-4ff9-a0a9-e43a6f
- Activation date: 01/17/2008

63dd59be-141c-4ff9-a0a9-e43a6f754b39-GNU SOLIDARIO HOSPITAL



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Demographics, Epidemiology, Early Warning

Data aggregation

Demographics

People without health coverage

Vital Records Sytem

Outbrake early warning

Geolocalization (OSM)

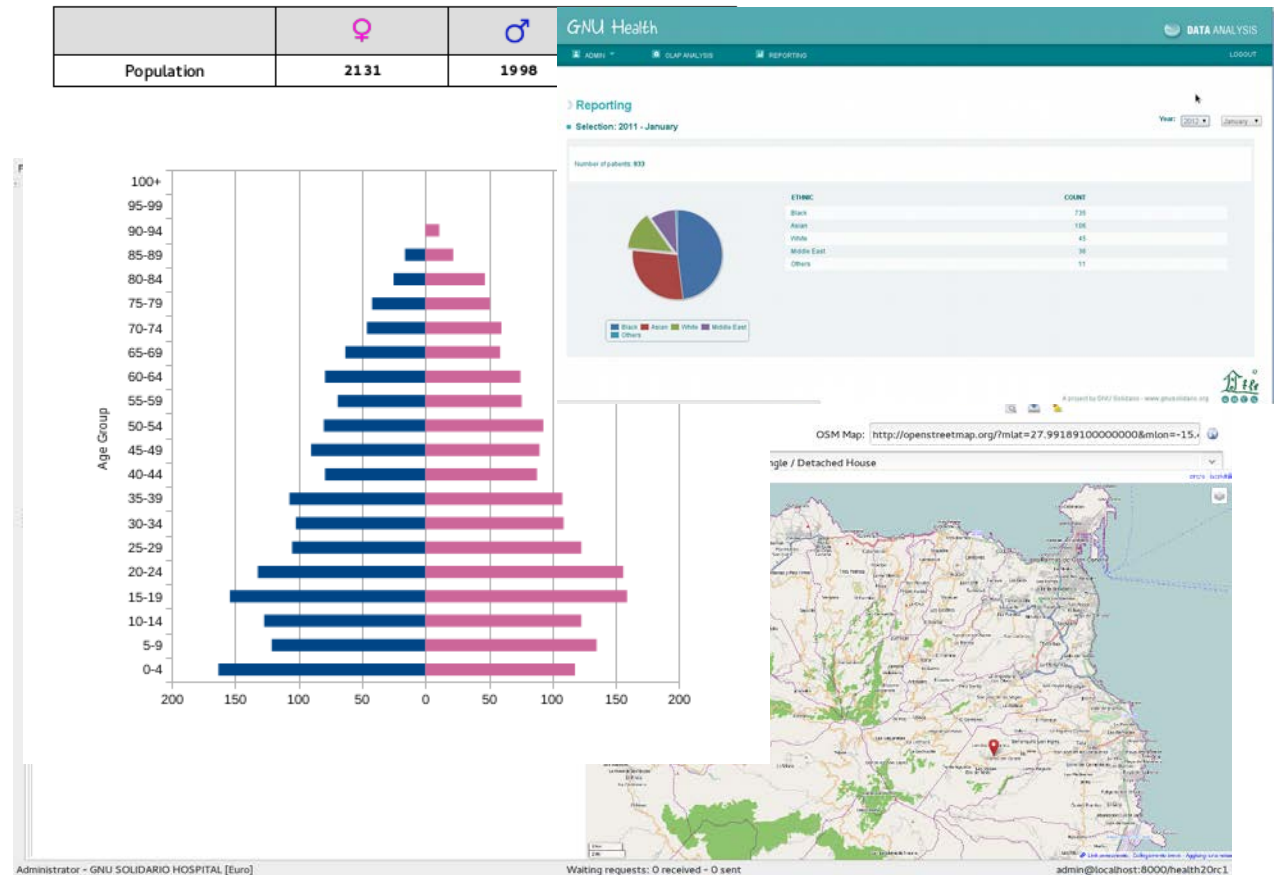
Notifiable diseases

Print Date: 10/11/2014 at 18:57:01

GNU Health Summary Report

Population Pyramid

	♀	♂
Population	2131	1998

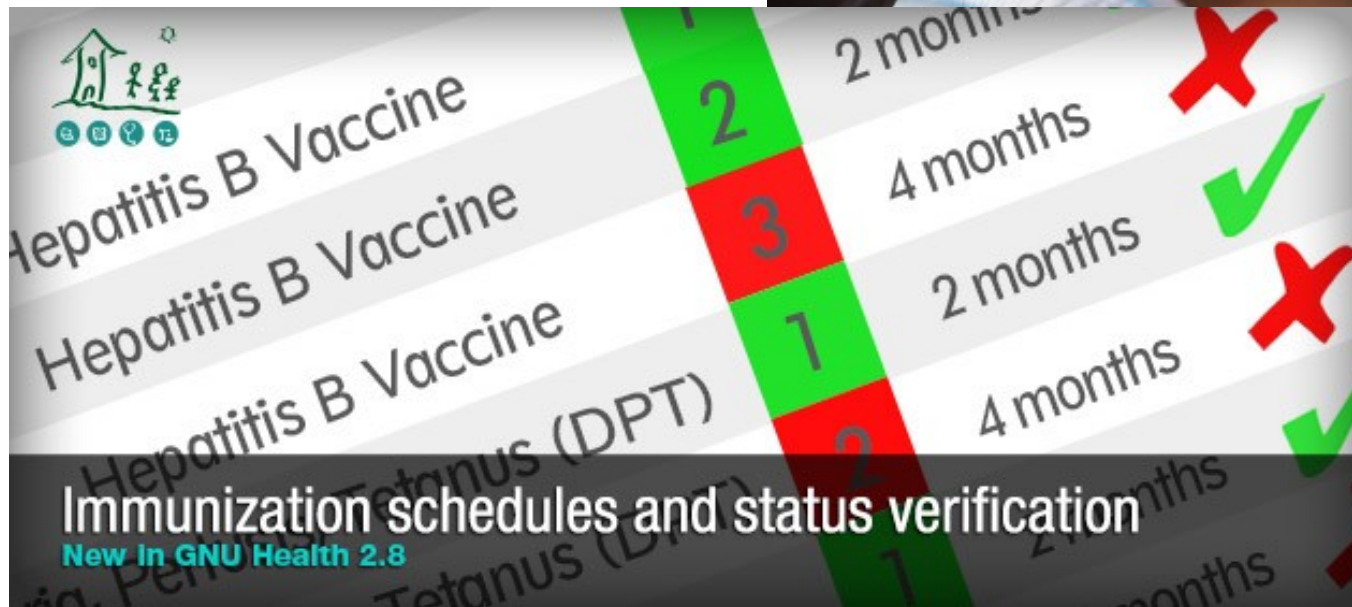


Health Campaigns

Personalized campaigns (age, sex, social conditions, ...)

Immunization status of the population

Risk groups (obesity, diabetes, ...)



VRS : Birth and Death Certificates

Death certificates Record saved! 1 / 1

Main
 Person: Caput, Bonifacio Date: 01/17/2015 15:00:00 Age: 97y 11m 29d

Place
 Place: Health Center Details:
 DU: Op. Sector: Las Palmas de Gran Canaria
 Institution: GNU SOLIDARIO HOSPITAL
 Country: Spain Subdivision: Las Palmas

Cause
 Rupture of cardiac wall without haemopericardium as current complication following acute myocardial infarction

Underlying Conditions (1/3)

Condition	Interval	Unit
Acute myocardial infarction		4 days
Intracardiac thrombosis, not elsewhere classified		5 months
Atherosclerotic heart disease		7 years

Other
 Type of death: Natural Autopsy: Code: 9472635

Observations

State: Done Signed by: Cordara, Cameron Certified on: 01/18/2015 19:43:39

Document validation
 Digital Signature
 -----BEGIN PGP SIGNED MESSAGE-----
 Hash: SHA1
 648966aaaf2c660089d5ca4c132eaded84cb9a230cc0c53dc00070528cee4c01cd69df2b3c5a57f815cbe0cf1b2fd7b30836aefb9da22c4e81eae20e03e7427
 -----BEGIN PGP SIGNATURE-----

Original String
 {"Country": "Spain", "HP": "Cordara, Cameron", "Person": "Caput, Bonifacio", "Cod": "Rupture of cardiac wall without haemopericardium as current complication following acute myocardial infarction", "Person_ID": "GHE620VFX", "Place_of_death": "health_center", "Person_dob": "1917-01-19", "Underlying_conditions": "[[u'Acute myocardial infarction', 4, u'days'], [u'Intracardiac thrombosis, not elsewhere classified', 5, u'months'], [u'Atherosclerotic heart disease', 7, u'years']]", "Type_of_death": "natural", "certificate": "9472635", "Country_subdivision": "Las Palmas", "Date": "2015-01-17 15:00:00", "Autopsy": false, "Observations": ""}

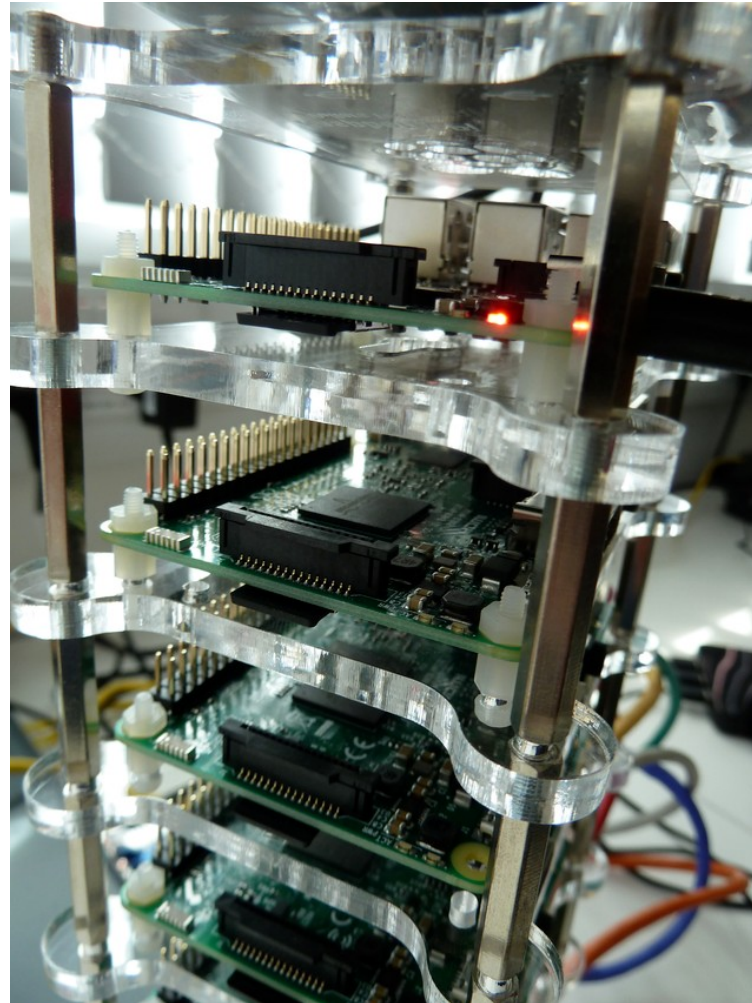
Hashes
 Digest: 648966aaaf2c660089d5ca4c132eaded84cb9a230cc0c53dc00070528cee4c0 Altered:

tryton://localhost:8000/health28rc1/model/gnuhealth.death_certificate/1?views=%5B644%2C+645%5D

Death certificate document as a legal, administrative, epidemiological document



Free Hardware



The tower of ten Raspberry Pi 3 systems with the 10-port hub

Euan Livingstone / Dr. Tom Kane, Napier University, Scotland

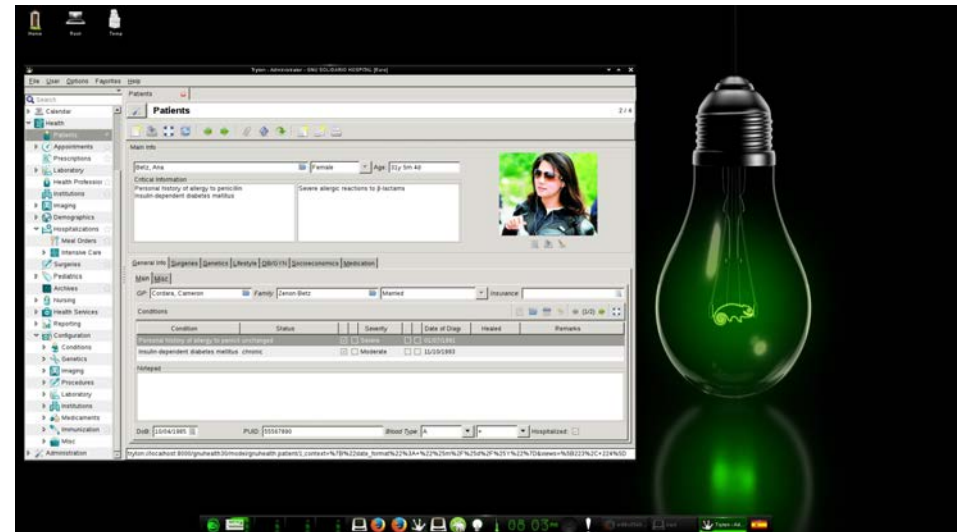
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GNU Health & Raspberry Pi



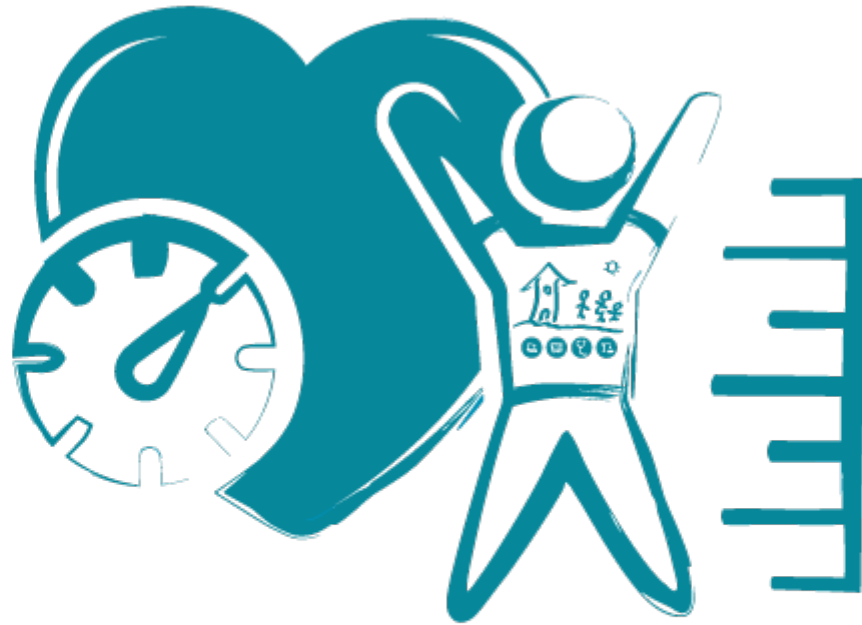
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Thanks OpenSUSE !

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My GNU Health (3.2)



MyGNUHealth



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MyGNUHealth : PHR



Personal Health Record Application

Demographics
Appointments
Telemedicine

BMI
Excercise
Vitals
Blood Glucose levels
Nutrition
Socioeconomics

Health History

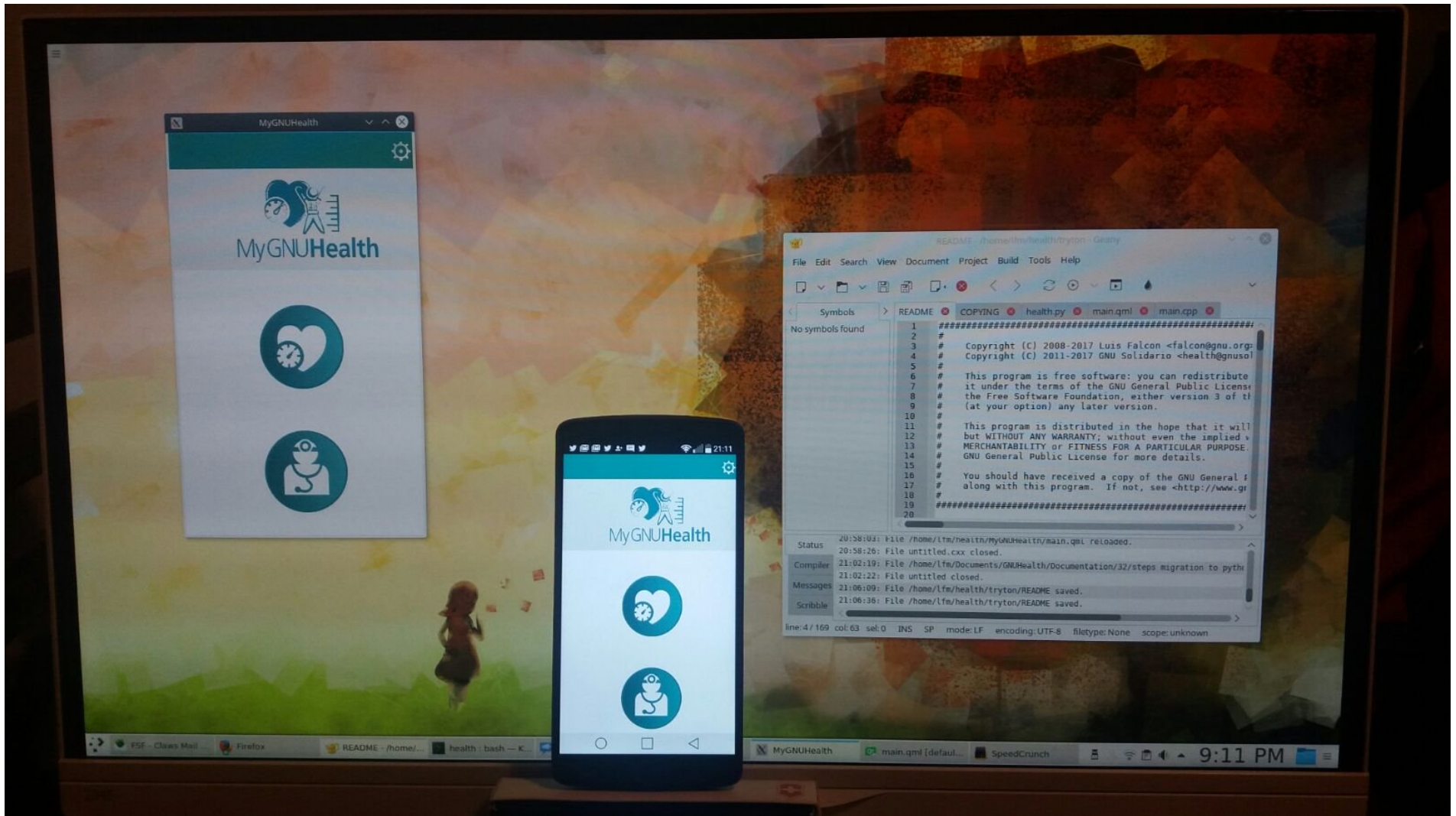


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Mobile and Desktop application



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GNU Health Camera

The screenshot shows the GNU Health software interface. On the left is a navigation tree with categories like Configuration, Parties, People, Addresses, etc. The main window displays a 'People' table with columns for ID, Name, Family names, Patient, Health Prof, and Deceased. A video window titled 'GNU Health Camera' is overlaid on the table, showing a man with a beard and a necklace.

ID	Name	Family names	Patient	Health Prof	Deceased
FOY575UJVV	Juana		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PVJ324FPW	Luna		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RR0748BULG	Rainone		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
NNXBUB97CKI	unidentified patient		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55567890	Ana Isabel	Betz	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GH6620VFX	Bonifacio	Caput	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
CKW38800K	Roberto	Carles	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
94023208	Cameron	Cordara	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
NAXS07GOW	Wilson	Greg	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
QNJU737JIT	Carla	Lee	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
COB603VAX	Ignacio Alberto	Pérez Trujillo	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40556644	John	Zenon	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
97234436	Matt	Zenon Betz	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Person / Patient Registration

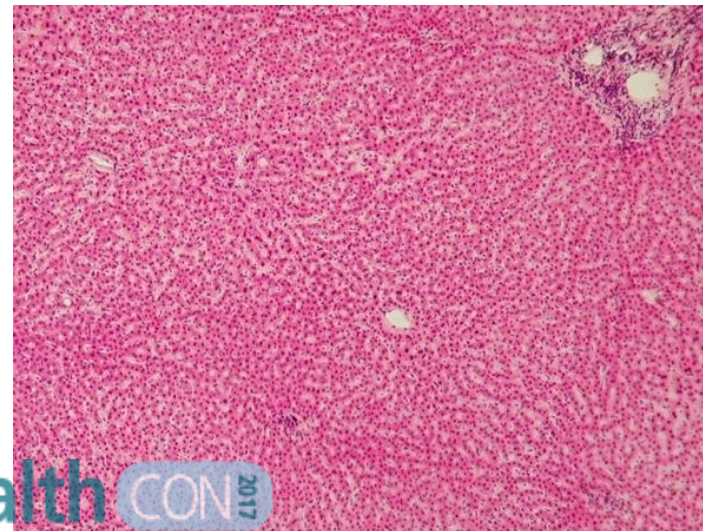
DUs Surveys

Dx Imaging

Histology / Pathology

...

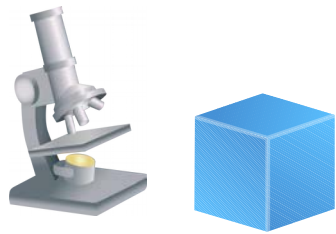
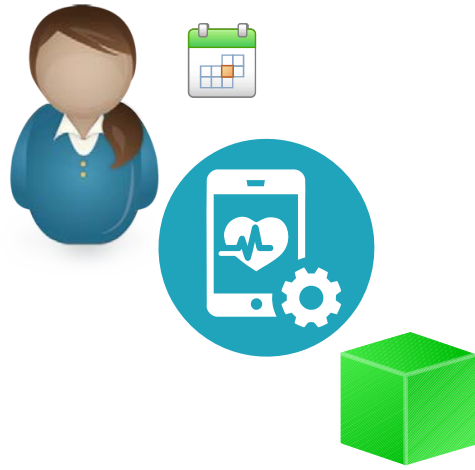
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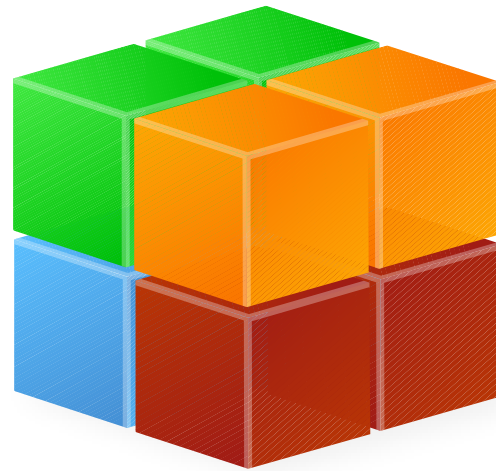
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GNU Health Federation



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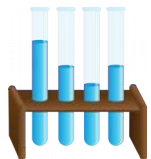
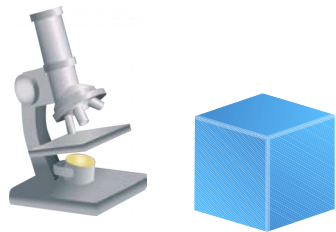


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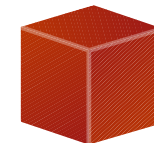
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Autonomous
Distributed
Heterogeneous
Scalable
High availability
Secure

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Community



About GNU Solidario

“Delivering Health and Education with Free Software”



GNU Solidario first project :Santiago del Estero, Argentina, 2006

GNU Health

The Free Health and Hospital Information System.
(health.gnu.org)

GNUHealthCon - IWEEE

International Workshop on E-Health in Emerging Economies.



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Thalamus – GNU Health Federation Message Server



Role of the Academia



United Nations University, Kuala Lumpur, Malasia

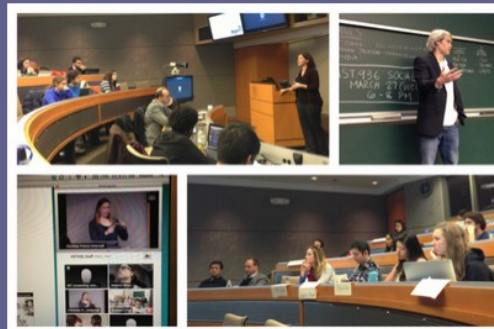


University of Entre Rios, Argentina

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

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Univ. Palermo, Italy

UNIVERSIDAD DE CIENCIAS MÉDICAS
Matanzas

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GNU Health & WHO



MDG6 : Malaria, TB, HIV

Essential list of medicines

Neglected Tropical Diseases

ICD-10

ICPM

MDG4 : Reduce Child mortality

Immunization schedules

Pediatric growth charts



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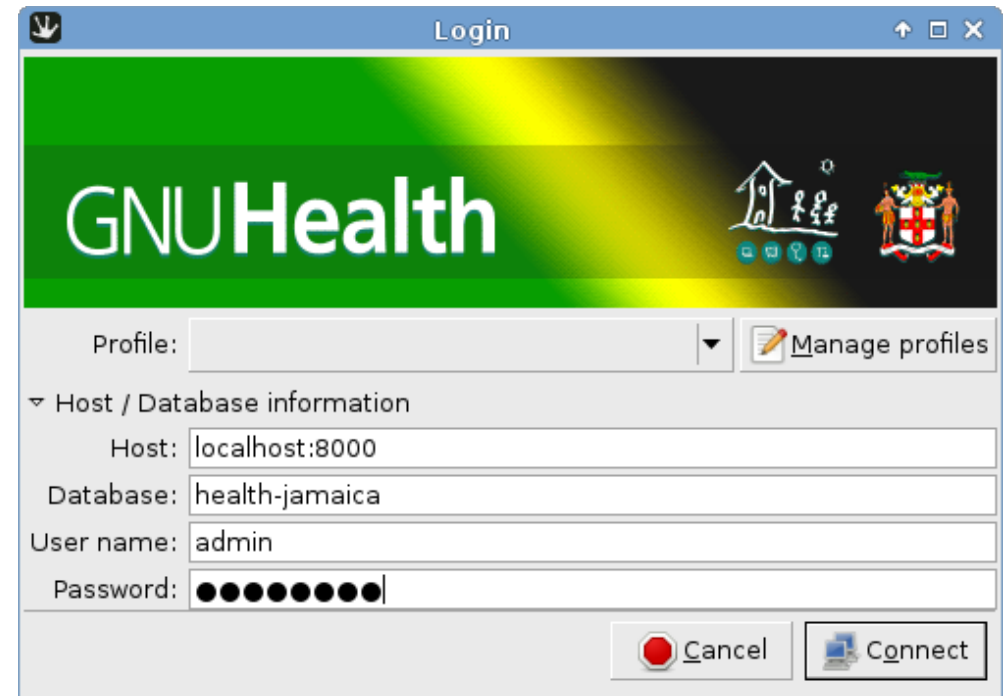
GNU Health at the Government of Jamaica



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

Local team

Sustainability and independence



Unique ID for each individual across the country

GNU/Linux on both workstations and servers

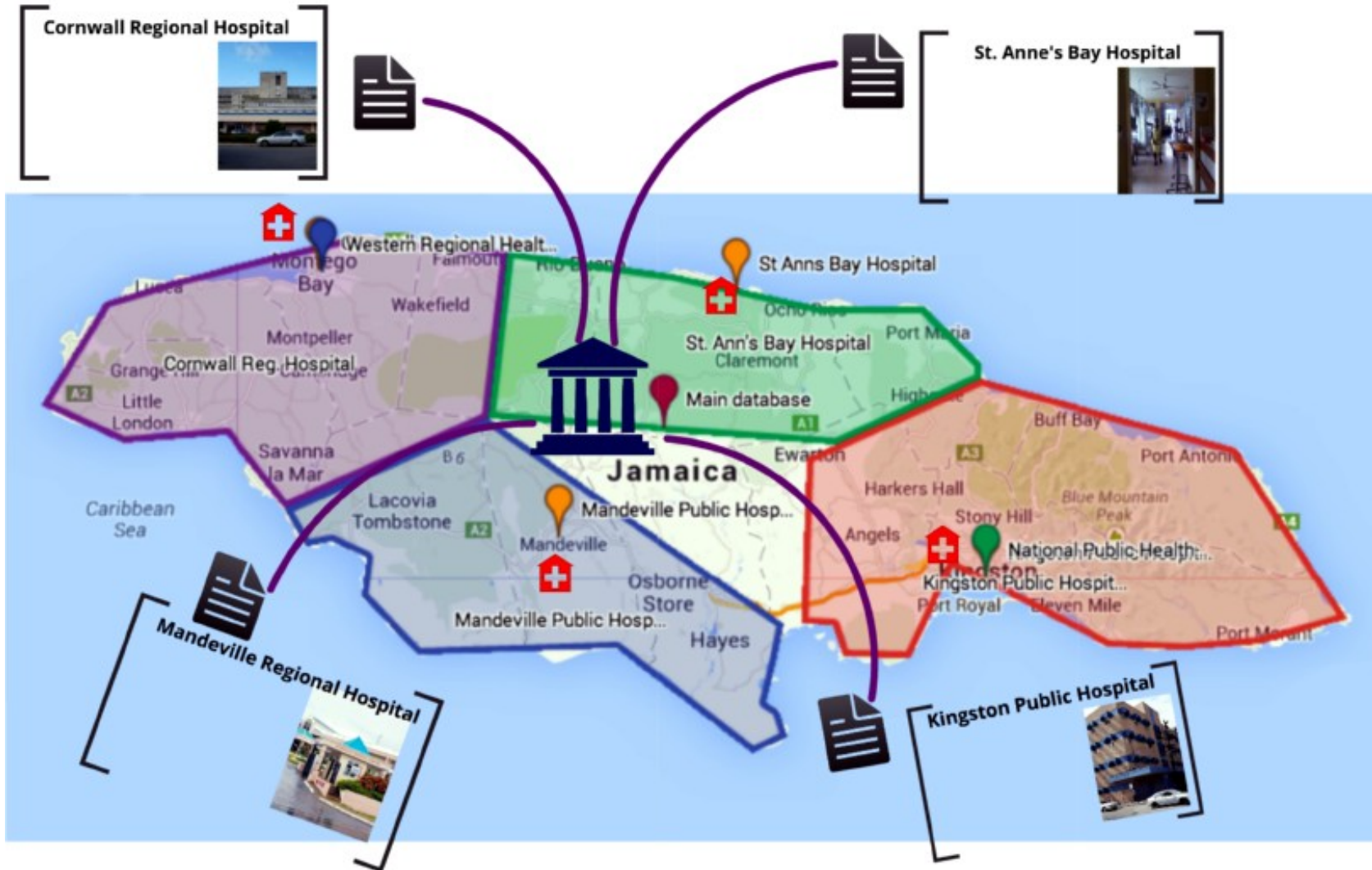


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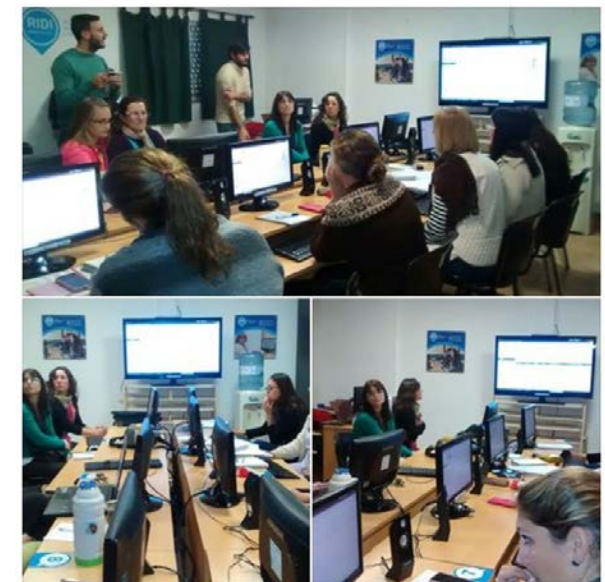
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350+ “GNU” Health facilities nation-wide



GNU Health in Argentina



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GNU Health at Laos Public Health System



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South Africa : Visit to Nelson Mandela Children Hospital



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GNU Health and Insolafrica



Insolàfrica



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GNU Health in Mexico Public Health



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Bikop - Cameroon



<http://health.gnu.org>



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People before Profit

From the GNU Health Code of Conduct ...

“GNU Health is, first and foremost, a social project to bring freedom and equity in health care around the World. GNU Health involves much more than just technology. We strive to generate a friendly, welcoming and positive environment around the GNU Health community”.

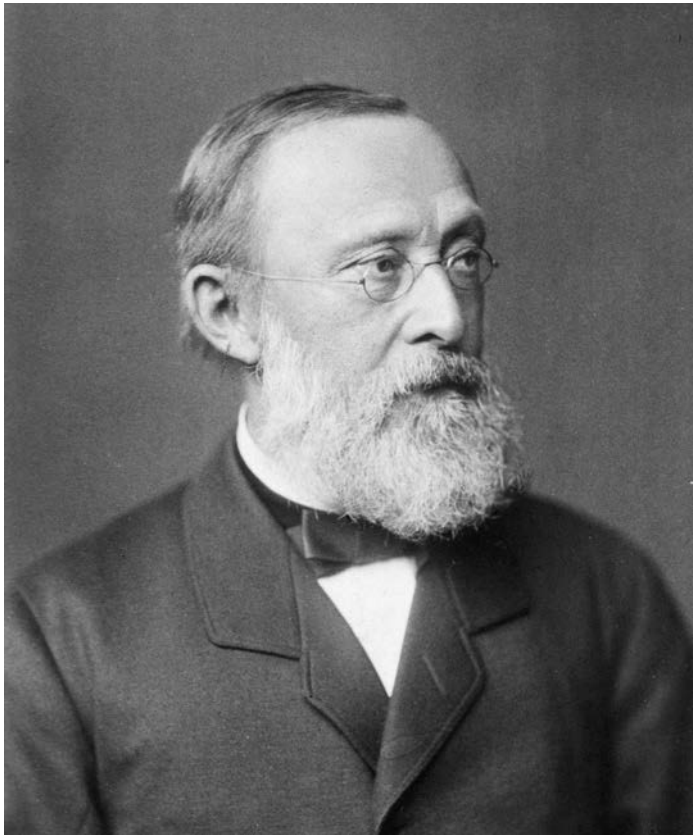
From the GNU Health Social Contract ...

“Ethical Software Agreement : For GNU Solidario, Ethical Software is a philosophy, that places people before profit, and which main goal is to respect the non-negotiable human right to health care.

This agreement provides an extra level of protection to the Health Center, Health Professional and the population around them. Your organization will never use lock-in policies, such as not releasing part of the code; not providing the upgrade scripts; hiding documentation or any other malicious, ill-intentioned action.”



Rudolf Virchow on Medicine and Politics



Medicine is a social science, and politics is nothing else but medicine on a large scale



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See you at GNUHealthCon 2017



II International GNU Health Conference - Nov 24-26, Las Palmas, Spain #GNUHealthCon2017

GNUHealthCon 2017 – November 24-26th

Las Palmas de Gran Canaria, Spain

www.gnuhealthcon.org

Twitter : @gnuhealth

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