

# GNU Health and Orthanc - The perfect companions

Integrating two great solutions

**Dr. Axel Braun**

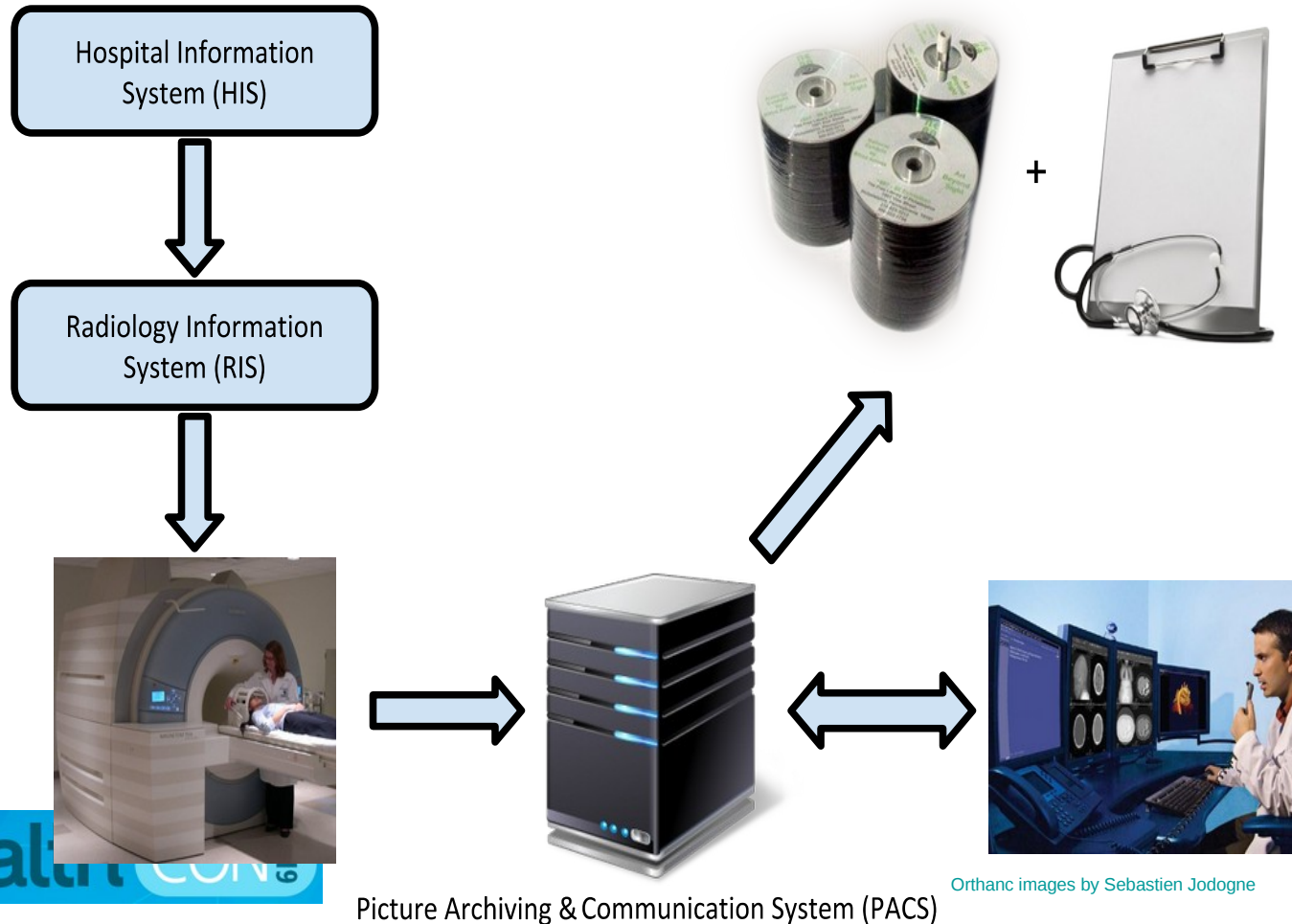
✉ [axel.braun@gnuhealth.org](mailto:axel.braun@gnuhealth.org)

# DocB on Freenode.net

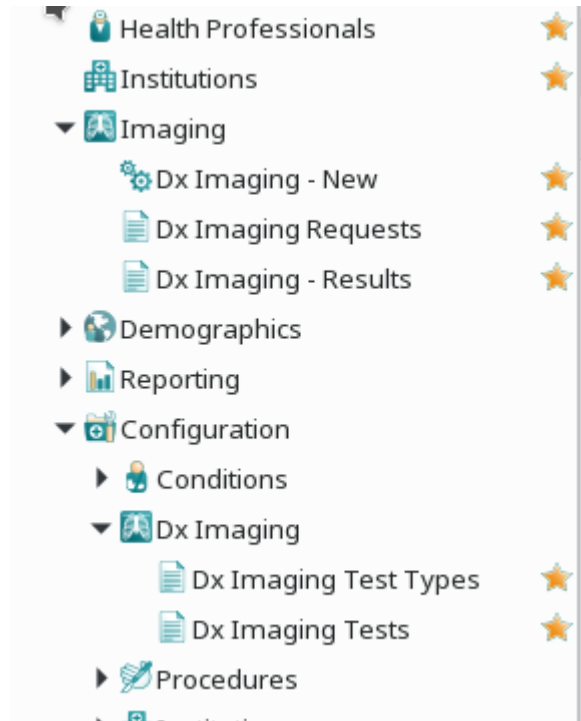
🐦 @coogor

[m] @docb:matrix.org

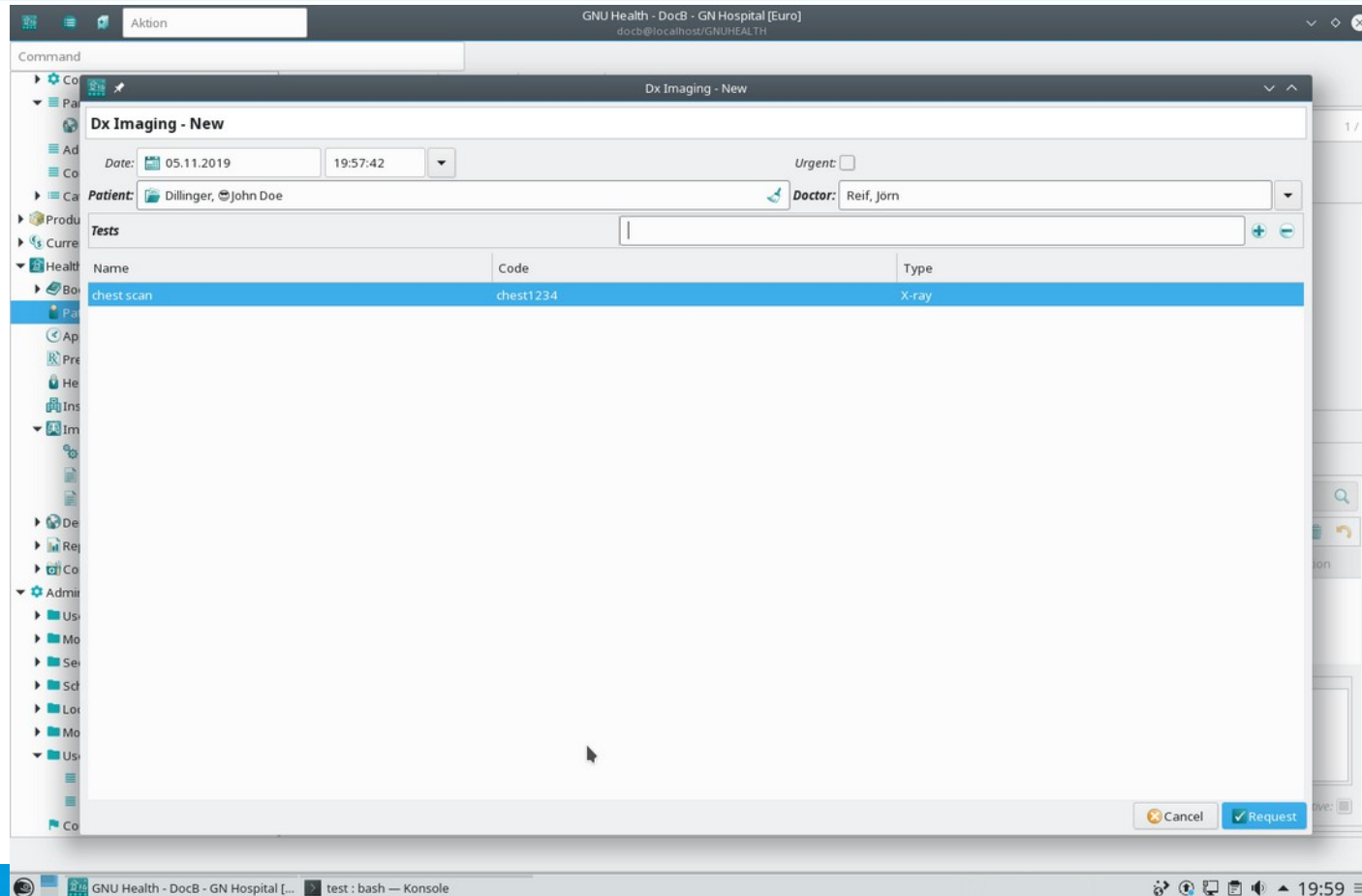
# 'Standard' imaging workflow using DICOM



# Image workflow in GNU Health



# Requesting a new Image



# Draft Image Request completed

Health Professionals People Patients **Dx Imaging Requests**

▼ **Dx Imaging Requests** 1 / 1


Suchen

Draft Requested Done All

Request	Patient	Date	Test	Doctor	U
001	Dillinger, John Doe	05.11.2019	chest scan	Reif, Jörn	<input type="checkbox"/>

# Entering the Test Result manually

**Dx Imaging - Results** 1 / 1





Patient:  Number:

Date:


Requested Date:

Request:

Test:  

Doctor:  

Images **Comment**

*Images* 

Name	Summary	Last User	Last Modificatio	Last Modificatio	Type	Data	Link
Screenshot_20	this is a x-ray				Data	34.3KB	

# Integrating GNU Health with Orthanc



# The Challenge: worldwide explosion of med. images

CT



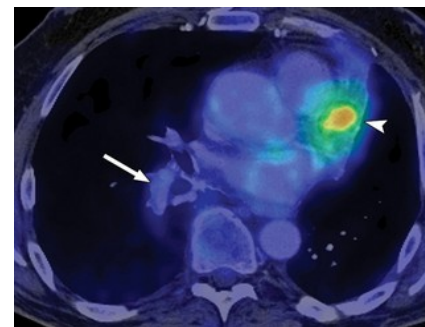
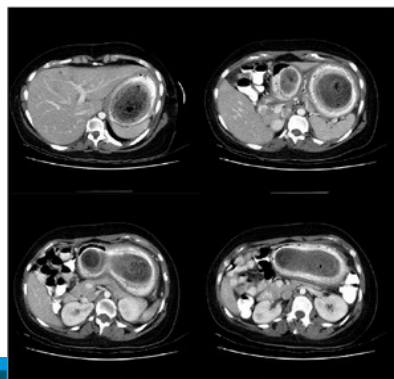
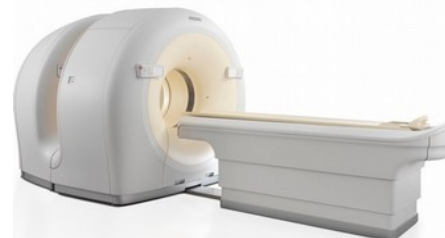
+

MRI



+

PET-CT



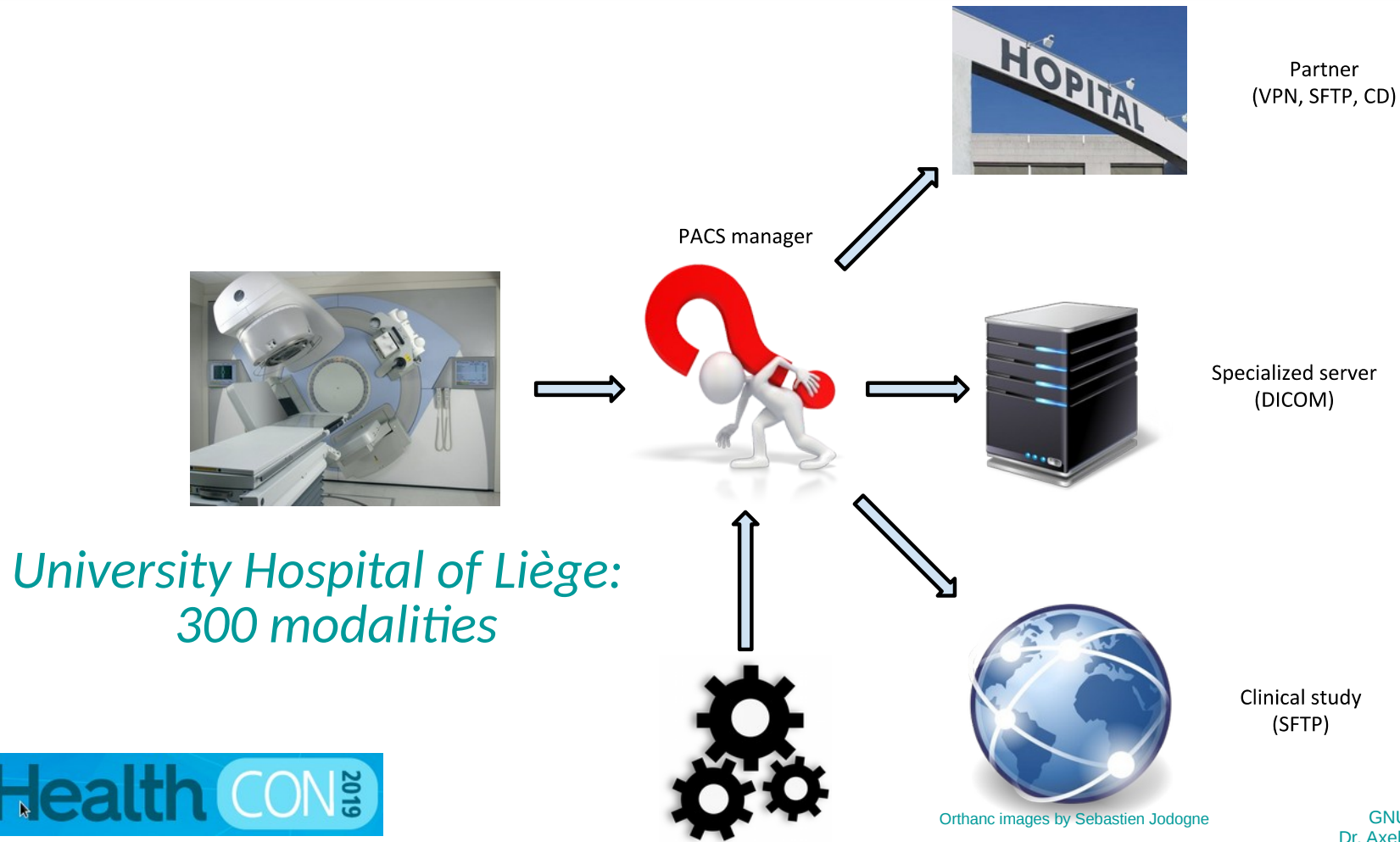


# DICOM is a standard, but....

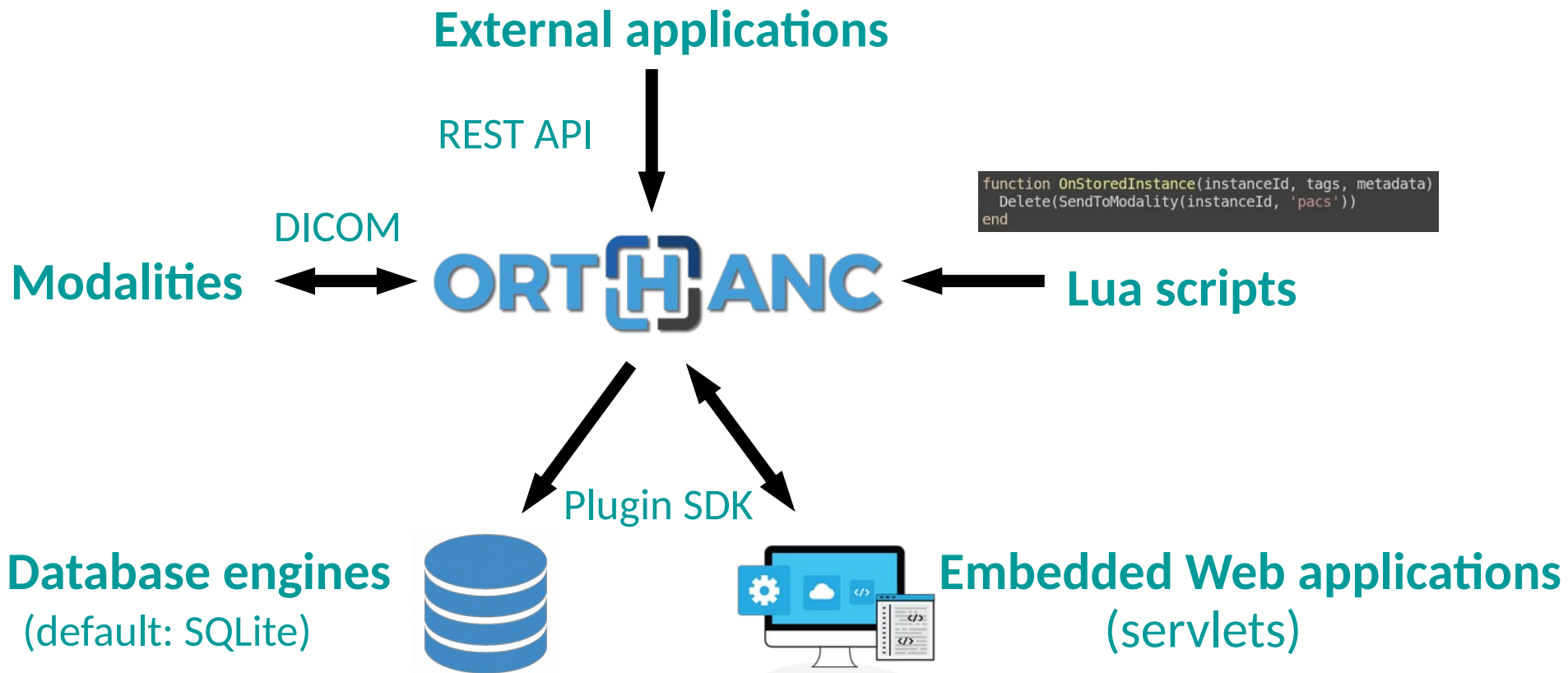
- \* The DICOM standard is very complex, both for users and developers
- \* Not every PACS comes with teleradiology (remote expertise)  
⇒ need to combine vendors
- \* Many specialized vendors, with costly, proprietary and monolithic ecosystem  
⇒ high risk of lock-in, few agility
- \* Interoperability is checked in “Connectathons” where vendors meet  
( $N^2$  complexity) ⇒ no reference implementation
- \* Few IT expertise in hospitals about imaging  
⇒ need to share knowledge

Heterogeneous modalities ⇒ very problematic in emerging economies!

# Automation of Imaging Workflow



# Orthanc is a microservice for medical imaging



# New module: health\_orthanc



Kudos to Chris Zimmerman!

Our specialist for interfaces

- HL7/FHIR
- Orthanc

# How to use health\_orthanc?

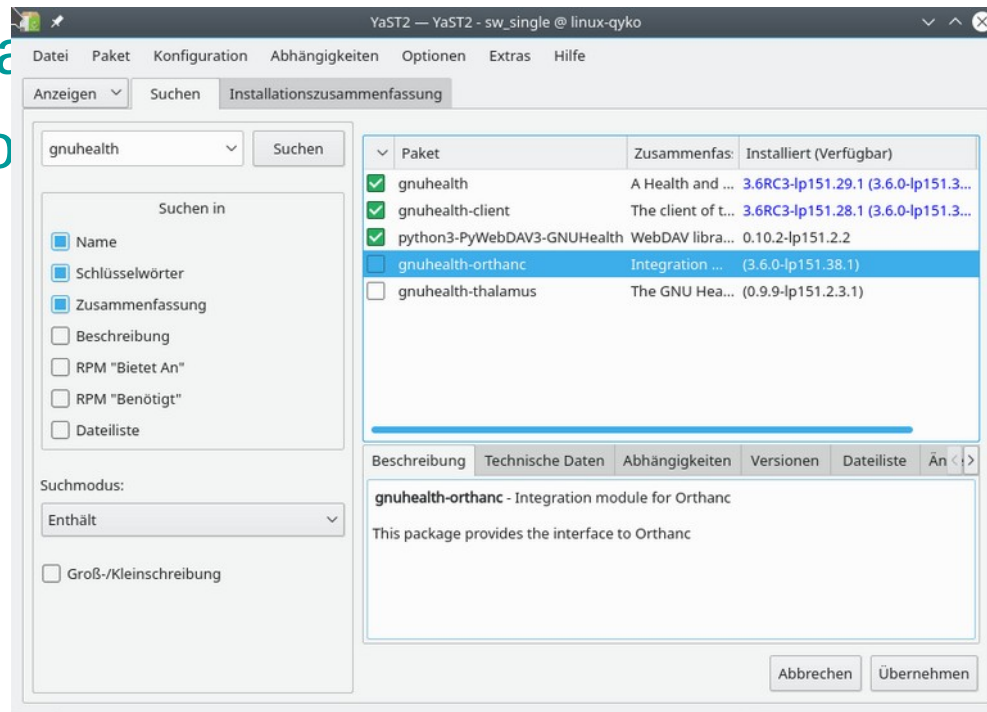
health\_orthanc comes with GNU Health-Sources

On openSUSE, it is a separate package

\* as this is probably not needed on

How to install?

zypper install gnuhealth-orthanc



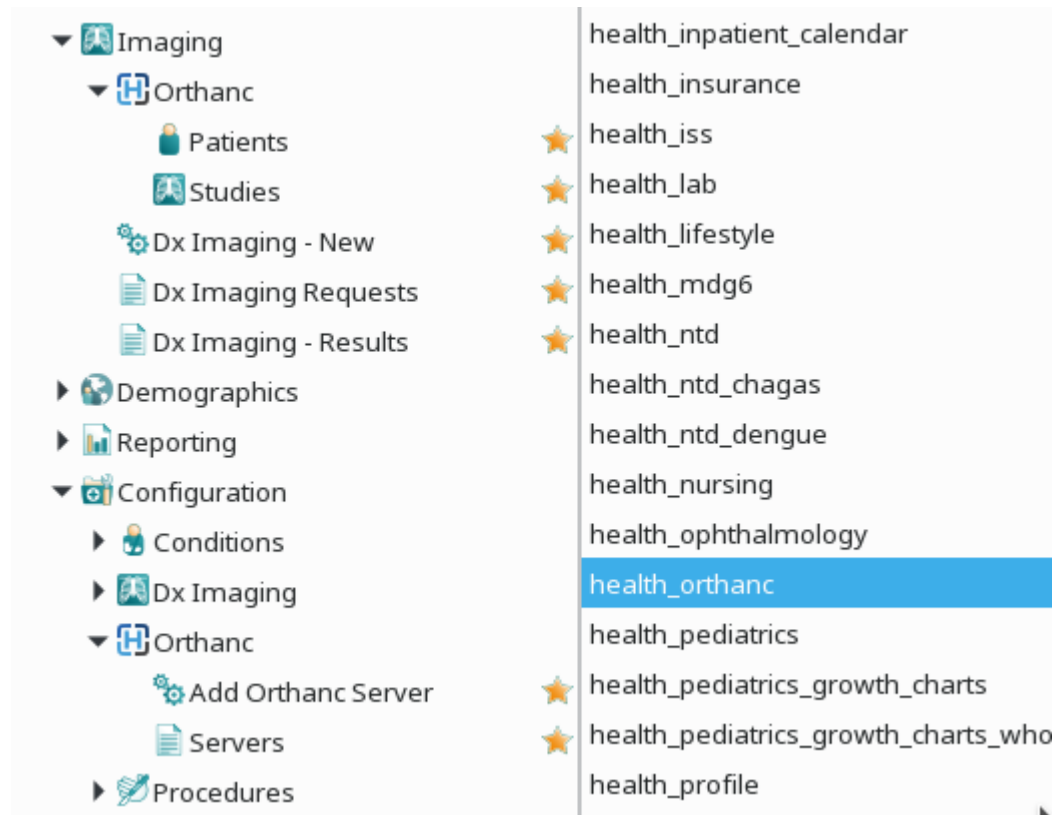
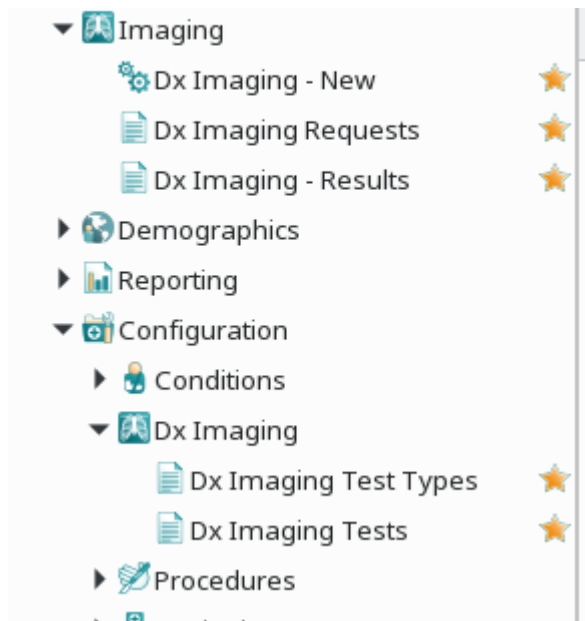
# Activate the module

Modules 39 /

Suchen


Name	Version	State	Mark for Up...	Mark for Act...	Cancel Act...	Cancel U...
health_icu	3.6RC2	Not Activated		Mark for A...		
health_imaging	3.6RC2	Activated	Mark for U...			
health_inpatient	3.6RC2	Not Activated		Mark for A...		
health_inpatient_calendar	3.6RC2	Not Activated		Mark for A...		
health_insurance	3.6RC2	Not Activated		Mark for A...		
health_iss	3.6RC2	Not Activated		Mark for A...		
health_lab	3.6RC2	Not Activated		Mark for A...		
health_lifestyle	3.6RC2	Not Activated		Mark for A...		
health_mdg6	3.6RC2	Not Activated		Mark for A...		
health_ntd	3.6RC2	Not Activated		Mark for A...		
health_ntd_chagas	3.6RC2	Not Activated		Mark for A...		
health_ntd_dengue	3.6RC2	Not Activated		Mark for A...		
health_nursing	3.6RC2	Not Activated		Mark for A...		
health_ophthalmology	3.6RC2	Not Activated		Mark for A...		
health_orthanc	3.6RC2	To be activate			Cancel Act...	
health_pediatrics	3.6RC2	Not Activated		Mark for A...		
health_pediatrics_growth_charts	3.6RC2	Not Activated		Mark for A...		
health_pediatrics_growth_charts_who	3.6RC2	Not Activated		Mark for A...		
health_profile	3.6RC2	Not Activated		Mark for A...		
health_qrcodes	3.6RC2	Not Activated		Mark for A...		
health_reporting	3.6RC2	Not Activated		Mark for A...		
health_services	3.6RC2	Not Activated		Mark for A...		
health_services_lab	3.6RC2	Not Activated		Mark for A...		
health_socioeconomics	3.6RC2	Activated	Mark for U...			
health_stock	3.6RC2	Not Activated		Mark for A...		

# A new entry in the menu appears



# Adding an Orthanc-Server

▼ Servers 1 / 1




Server information

General

**Label:**  **URL:**


Sync Time:  Since last sync:

Last Index:  **Validated:**

URL: 

User

**Username:**  **Password:**

 Sync



# Synchronization

The screenshot shows the GNU Health interface with the 'Patients' section selected in the left sidebar. The main window displays a table of patient synchronization data. The table has four columns: 'Local patient', 'Orthanc patient', 'Orthanc PatientID', and 'URL'. The patient 'Dillinger, John Doe' is highlighted in blue, indicating they are selected. The table shows that this patient is linked to the Orthanc patient 'BRAINIX' with the PatientID '5Yp0E'. Other patients listed include 'KNIX', 'COMUNIX', 'PHENIX', 'INCISIX', 'ASSURANCETOURIX', and 'VIX'.

Local patient	Orthanc patient	Orthanc PatientID	URL
	KNIX	ozp005jY2xG	
	COMUNIX	fYET5.0	
	PHENIX	Vafk,T,6	
	INCISIX	S0tNwu	
Dillinger, John Doe	BRAINIX	5Yp0E	
	ASSURANCETOURIX		
	VIX	vAD7q3	






Assign GNU Health Patient to Orthanc Patient (if not requested with PUID)

# Patient View

Patients 5 / 7

↔ ⏪ ⏩ ✎ ⬇️ ↻ 📎 💬 ⚙️ 🔗 📁 ✉️ 🖨️ 🌐

General **Studies**

Patient:	 Dillinger, 🗿 John Doe	 PatientName:	BRAINIX
Birthdate:	 01.03.1949	PatientID:	5Yp0E
PatientUUID:	16738bc3-e47ed42a-43ce044c-a3414a45-cb069bd0	URL:	
Server:	 Orthanc_Demo		

Click URL Icon to view result

# Images are held on Orthanc-Server

The screenshot shows the Orthanc Explorer web interface in a Mozilla Firefox browser. The browser address bar displays the URL: `https://demo.orthanc-server.com/app/explorer.html#patient?uuid=16738bc3-e47ed42a-43ce044c-a3414a45-cb069bd0`. The interface has a dark navigation bar with 'LookUp', 'Plugins', 'Orthanc Demo » Patient', 'Upload', 'Query/Retrieve', and 'Jobs' buttons. The main content area is divided into two panels. The left panel, titled 'Patient', shows details for 'BRAINIX' (PatientBirthDate: Tuesday, March 1, 1949; PatientID: 5Yp0E; PatientSex: 0000) and includes buttons for 'Send to DICOMweb server', 'Unprotected', and 'Transfers accelerator'. Below these are sections for 'Interact' (Delete this patient, Send to remote modality, Anonymize) and 'Access' (Download ZIP, Download DICOMDIR). The right panel, titled 'Friday, December 1, 2006', shows details for 'IRM cérébrale, neuro-crâne' (AccessionNumber: 0; InstitutionName: 7GEFF0GbzqCNo43Yd0,ibu,zQSSX; ReferringPhysicianName: dAEvNTxZJO0E; RequestedProcedureDescription: IRM cérébrale, neuro-crâne; StudyDate: Friday, December 1, 2006; StudyID: 218211405; StudyInstanceUID: 2.16.840.1.113669.632.20.1211.10000357775). A search bar at the top of the right panel contains the text 'Filter items...'. A list of actions is overlaid on the bottom right of the interface.

- \* Transparent indexing: Patient → Study → Series → Instance
- \* Preview 2D Images
- \* Send to other modalities in 1 click
- \* Inspect medical data, ZIP, anonymize,...


# Studies to a patient

The screenshot displays the Orthanc web interface. On the left is a navigation sidebar with categories: Artikel, Währungen, Health (Books of Life, Patients, Appointments, Prescriptions, Health Professionals, Institutions), and Imaging (Orthanc, Patients, Studies, Dx Imaging - New, Dx Imaging Requests, Dx Imaging - Results). The 'Studies' menu item is highlighted. The main content area is titled 'Studies' and shows details for a specific study. A toolbar with various icons (undo, redo, edit, download, refresh, link, unlink, folder, mail, print, globe) is located above the form. The form contains the following fields:

Patient:	PHENIX	Description:	CT2 TÊTE, FACE, SINUS
Date:	27.09.2005	Institution:	HUG
Referring Physician:	CHIR-PED^CHIR-PE	ID:	1361
UUID:	49974143-ec23cb52-6b2a1c46-14d5daa0-0822ce1a	URL:	
Server:	Orthanc_Demo	Test:	<input type="text"/>

# Studies to a patient - details

**Dx Imaging - Results** 1 / 1




Patient: Dillinger, John Doe Number: TEST001

**Date:** 05.11.2019 20:00:24 ▼ **Test:** chest scan

Requested Date: 05.11.2019 19:57:42 ▼ **Doctor:** Reif, Jörn

Request: 1

Studies **Images** Comment

Studies  (1/1)

Patient	Description	Date	Institution	Referring Physician	Requesting Physician	URL
PHENIX	CT2 TÊTE, FACE, SINUS	27.09.2005	HUG	CHIR-PED^CHIR-PE	KOHLER^Romain	

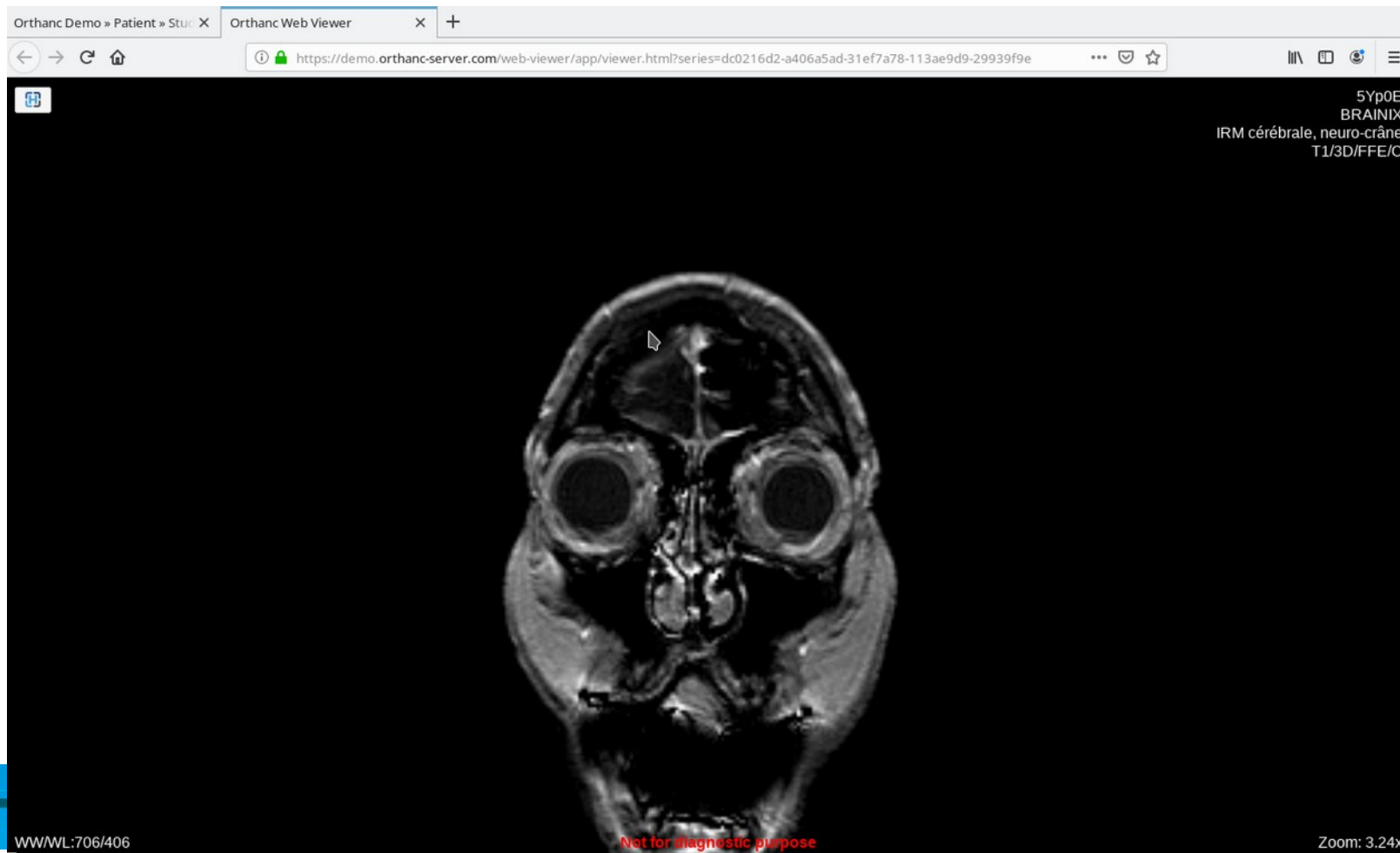
# View all images to a patient

The screenshot displays the Orthanc Demo web interface in a Mozilla Firefox browser. The address bar shows the URL: `https://demo.orthanc-server.com/app/explorer.html#series?uuid=dc0216d2-a406a5ad-31ef7a78-113ae9d9-29939f9e`. The interface is divided into several sections:

- Header:** "Orthanc Demo » Patient » Study » Series" with navigation icons for "Look up", "Plugins", "Upload", "Query/Retrieve", and "Jobs".
- Left Sidebar:**
  - Patient:** BRAINIX, PatientBirthDate: Tuesday, March 1, 1949, PatientID: 5Yp0E, PatientSex: 0000.
  - Study:** IRM cérébrale, neuro-crâne, AccessionNumber: 0, InstitutionName: 7GEFF0GbzqCNo43Yd0.Jbu.zQSSX, ReferringPhysicianName: dAEvNTxZJO0E, RequestedProcedureDescription: IRM cérébrale, neuro-..., StudyDate: Friday, December 1, 2006, StudyID: 218211405, StudyInstanceUID: 2.16.840.1.113669.632.20.1211.1000...
  - Series:** T1/3D/FFE/C, Status: Unknown, Modality: MR, NumberOfTemporalPositions: 1, PerformedProcedureStepDescription: IRM cérébrale, neuro-c..., ProtocolName: T1/3D/FFE/C CLEAR, SeriesInstanceUID: 1.3.46.670589.11.0.0.11.4.2.0.8743.5.539..., SeriesNumber: 801, StationName: intera.
- Right Panel:** A list of 8 image instances, each with a "Filter items..." search box and a right-pointing arrow icon.
  - Instance: 1** SOPInstanceUID: 1.3.46.670589.11.0.0.11.4.2.0.8743.5.5396.2006120114483570701 TemporalPositionIdentifier: 1
  - Instance: 2** SOPInstanceUID: 1.3.46.670589.11.0.0.11.4.2.0.8743.5.5396.2006120114483564700 TemporalPositionIdentifier: 1
  - Instance: 3** SOPInstanceUID: 1.3.46.670589.11.0.0.11.4.2.0.8743.5.5396.2006120114483557699 TemporalPositionIdentifier: 1
  - Instance: 4** SOPInstanceUID: 1.3.46.670589.11.0.0.11.4.2.0.8743.5.5396.2006120114483550698 TemporalPositionIdentifier: 1
  - Instance: 5** SOPInstanceUID: 1.3.46.670589.11.0.0.11.4.2.0.8743.5.5396.2006120114483543697 TemporalPositionIdentifier: 1
  - Instance: 6** SOPInstanceUID: 1.3.46.670589.11.0.0.11.4.2.0.8743.5.5396.2006120114483535696 TemporalPositionIdentifier: 1
  - Instance: 7** SOPInstanceUID: 1.3.46.670589.11.0.0.11.4.2.0.8743.5.5396.2006120114483529695 TemporalPositionIdentifier: 1
  - Instance: 8** SOPInstanceUID: 1.3.46.670589.11.0.0.11.4.2.0.8743.5.5396.2006120114483521694 TemporalPositionIdentifier: 1
- Bottom Buttons:** "Send to DICOMweb server", "Transfers accelerator", and "Orthanc Web Viewer".
- Interact:** A section at the bottom for further actions.



# View all images to a patient



# Conclusion

- \* Othanc is a perfect complement to GNU Health
- \* Image workflow improves use in GNU Health
- \* All build on open technologies / free software



**Thank you!**

**Questions?**