What Makes a Successful Open-Source Project in Medical Imaging?



OrthancCon I, 2019

Andrew Crabb

The Johns Hopkins University

I Do Imaging





I Do Imaging

The searchable database of free and open-source medical imaging software

In operation 20 years

330 active medical imaging projects12,000 monthly visitors30,000 subscribers

	DEMO DATA WIKI BLOG ABOUT	Search	REGISTER LOG IN
Orthanc			
ightweight cros	s-platform DICOM server with REST API		
Orthanc is a lightweigh external database. It pr extensive configuration Orthanc provides a RE! This provides a languag standard Web technolo PNG images. A web-bas	t self-contained DICOM store, requiring no dependencies or rowides the basic features of a PACS system without h. In addition to standard DICOM network functionality, ST API to its store, find and move SCP and SCU operations, ge-independent means of scripting operations and employs ogles such as HTTP transport, JSDN format data files and sed GUI interface is also provided for most functions.	Platforms Function Interfaces Read Format	Technical Details Linux, Mac, Windows Networking GUI, Command Line, API DiCOM
Program home	*	Write Format	BEST API PACS server WADO C.
Latest version	1.5.7 (June 2019) ¥	100,00183	MOVE, C-STORE, QIDO
Authors	jodogne, Sebastien # (6 other programs)	Programmings	APVLibrary, Scripting
Get Source	🖃 (C++, Lua)	Languages	C++, Lua
Resources	W/W/Wild	Audience	Advanced user
Your Rating	Sign in to rate this program	Built upon	DCMTK
		Built into	Stone of Orthanc
		Required by	Orthanc Web Viewer, Osimis Web Viewer, DWV Orthanc Plugin, Orthan DICOMweb plugin, orthanc-s3-stora
		Related to	OHE Viewers, Orthanc-Imagel, DWA DICOM Web Viewer
		Distributions	Ready to run, Docker

Successful Open-Source Medical Imaging Project

Successful

Open Source

Medical Imaging

Project

Successful? You decide – it's your project

What is your goal? Solve a problem, new skills/field, recognition, entrepleneurship, share knowledge
What is it? Software, service, website, blog, channel
What dosself domemaged isplay analysis, information, utility, library
Some good profile of the provide set of the provi

Swifes fould jwst bette, big, figation of your own ideas, to be implemented in your next project

Five Successful Projects



Problem Size

XMedCon (Erik Nolf)



Medical image conversion, emphasis on nuclear medicine file formats 18+ years of updates Oriented to research and command line Includes other code (NIfTI, DICOM, GIF) Open source and binary distributions Available for many platforms



XMedCon

Main / Download

	distribution	type	files	readme
source				
	any	bz2	xmedcon-0.16.2.tar.bz2	README
	any	tgz	xmedcon-0.16.2.tar.gz	
	any	zip	xmedcon-0.16.2.zip	
	any	rpm-src	xmedcon-0.16.2-1.src.rpm	
package				
	centos/fedora	rpm- bin	xmedcon-0.16.2- 1.x86 64.rpm	
	centos/fedora	rpm- devel	xmedcon-devel-0.16.2- 1.x86 64.rpm	
	gentoo/sabayon	ebuild	xmedcon-0.16.2.ebuild	README.EBUILD
	windows	zip	xmedcon-0.16.2-mswin.zip	README.MSWIN
	macOS	brew	xmedcon-0.16.2.rb	README.BREW
	debian	deb	stable or testing	README.DEB
	freebsd	tgz	listing	README.BSD

Search Index Home Intro New Download Notes Faq Documentation Upcoming Contributed Links	Main / Faq * Where to get? * What do we need? * How to install? * What to do with problems? * Why (X)MedCon? * Can (X)MedCon convert my vendor 's format? * Can (X)MedCon do backwards conversion? * How come (X)MedCon's GUI is based on Gtk+? * How to stack DICOM series into one volume? * How to build (X)MedCon/DLL on MS Windows? * How to build (X)MedCon on macOS? * How to burn CD's with viewer included?
Project Overview Admin Source	* Where to get? The latest distribution is <u>here</u> available.

in release 0.16.2 @ 05-Aug-2019

must fflush(stdout) within MSYS2: no output on console when waiting for user input (-e, -i, -p, -r ...)

increased hardcoded number of loadable LUTs (= 999) because more LUTs are added in (X)MedCon-Extra.

- BUGFIX: ECAT7 proper handling of patient_birth_date & scan_start_time (1)
- removed broken #if(n)def HAVE_8BYTE_INT directives, allowing for int64_t and uint64_t pixel values.
- 1. patch kindly offered by Jonathan Traum

in release 0.9.9.6 @ 9-Jul-2007

- ECAT6+7: our old "-db" option now prints main header entirely (1)
- ECAT7: writing using <u>Turku PET Centre</u> libraries (2)
- two FILEINFO parameters added: patient_height and operator_name (2)
- fix for broken xmedcon.m4 autotools version check (with more than three numbers) (3)
- 1. request by Andrew "idoimaging.com" Crabb
- 2. contribution by Harri Merisaari
- 3. fixed by Hannes Hofmann

Mango/Papaya (Univ of Texas)



Product of one neuro imaging lab Funded project (US NIH)

Mango: Java neuroimaging app Research image viewing and analysis Wide range of file formats Command line integration and scripting Plugin architecture with extensions from the neuroimaging community





Papaya

View on GitHub

tar.gz

A pure JavaScript medical research image viewer.

Papaya

Papaya is a pure JavaScript medical research image viewer, supporting DICOM and NIFTI formats, compatible across a range of web browsers. This orthogonal viewer supports overlays, atlases, GIFTI & VTK surface data and DTI data. The Papaya UI is configurable with many display, menu and control options and can be run on a web server or as a local, shareable file.





Documentation & Demo

Related Projects

- · Daikon for DICOM support
- NIFTI-Reader-JS for NIFTI support
- GIFTI-Reader-JS for GIFTI support
- · Papaya Builder for customizing Papaya build
- Papaya Builder for customizing Papaya build

Image J (US NIH) Image Processing and Analysis in Java

Long-lasting Java image analysis app Targeted audience (image processing, optical imaging) 500 plugins available Automate with 300 available macros Loyal, active user base

🛓 ImageJ	
File Edit Image Process Analyze Plugins Window	Help
Dev Stk LUT & #	👌 🖊 💦 😕
ImageJ 1.38e / Java 1.5.0_09	



XNAT (Washington University St Louis)



Research/clinical neuroimaging informatics platform since 2004. REST interface

Many related tools for uploading and editing DICOM files

De-identification language

Extensible, with plugin marketplace



Kitware

Commercial company Started with one product (VTK) Influential publisher Basis of many projects











Attributes of Successful Projects

Passion for the topic

• Most projects stop through lack of interest or time

Identifying a market

- Address an underserved need
- Niche/smaller use cases
- New technologies

A quality product

- Competing for time and attention
- Even free software must be good

Use existing resources

- Software libraries
- Frameworks (web apps and text)

Reward helps

- Funding for public benefit
- Reputation and recognition

Continual progress

 Abandoned projects will be ignored or supplanted

Community contact

- Publications, social media, workshops, conferences
- Release notes, issue tracker

A good user experience

- Memorable name
- Attractive and responsive website
- Low barrier to adoption

Starting Your Own Project

You have something to contribute Identify your product Think of a name Build your brand – domain name, social media



Free Resources



Free

\$0

Per month The basics of GitHub for every developer

- 🚥 Unlimited public repositories
- oo Unlimited private repositories
- 3 collaborators for private repositories
- 2,000 total Action minutes/month See pricing details
- 500MB of GitHub Packages storage See pricing details
- Advanced vulnerability scanning for public repositories
- Automated security updates
- GitHub Security Advisories
- Issues and bug tracking
- Project management



GitLab.com SaaS offering hosted by GitLab

Free

Helping developers build, deploy, and run their applications.





2,000 CI pipeline minutes per group per month on our shared runners

Unlimited private and public projects and unlimited collaborators

→ Community Support

 \rightarrow Built-in CI/CD

→ Project Issue Board

→ ChatOps

→ Code intelligence by Sourcegraph



Use any static website generator: Jekyll, Middleman, Hexo, Hugo, Pelican, and more.

Connect your custom domain(s) and TLS certificates.

Host your static websites on Gill division for free, or on your own Gill all instances.

Free Resources – Amazon Web Services

AWS Free Tier

COMPUTE	STORAGE
Free Tier 32 MONTHE PREE Amazon EC2 750 Hours per month Resizable compute capacity in the Cloud.	Free Tier 12 Amazon S3 5 GB of standard storage Secure, durable, and scalab storage infrastructure.
The bases are constituted from Birth, or \$123.	5.08 of Stanlard Strenge
DATABASE	MACHINE LEARNING
Free Tier ALWAYS FREE	Free Tier.
Amazon DynamoDB	Amazon SageMake
25 GB of storage Fast and flexible NoSQL database with seamless scalability.	250 Hour per month of 12 medium notation the first two months Fully managed platform to and deploy machine learning
COMPUTE	STORAGE
Free Tier FREE TRIAL	Free Tier
Amazon Lightsail	Amazon Glacier
750 Hours	10 GB

1 Marth Free Trial

and networking

Virtual Private Servers made easy!

Everything you need to jumpstart your

project on AWS with compute, storage,

MONTHS FREE le object FREE TRIAL

S

ook utage for

build, train, ng models.

ALWAYS FILE

of storage retrievals Long-term, secure, durable object storage.

10 dill of American Glacker Hata retrievals.per

Free Tier 12 MONTHS FREE Amazon RDS **750** Hours per month of db.t2 micro database usage tapplicable DB engined Managed Relational Database Service for MySQL, PostgreSQL, MariaDB, Oracle BYOL, or SOL Server.

COMPUTE

DATABASE

Free Tier ALWAYS FREE

AWS Lambda Million

free requests per month

Compute service that runs your code in response to events and automatically manages the compute resources.

MACHINE LEARNING

Free Tier

Truth

Amazon SageMaker Ground

FREE THIAL

2 Months Feee Tria

Build highly-accurate training datasets quickly, while reducing data labeling



AWS Open Source Blog

AWS promotional credits for open source projects

by Arun Gupta and Vicente | on 14 OCT 2019 | in Open Source | Permalink | 🗩

Today, we are excited to further extend our support by offering AWS promotional credits to open source projects. Typically, these credits are used to perform upstream and performance testing, CI/CD, or storage of artifacts on AWS. We hope this program will free up resources for open source projects to further expand and innovate in their communities, as several projects are already doing.

Free Resources – Microsoft Azure



Which products are free for 12 months?

These popular products are free each month for 12 months

COMPUTE	Windows Virtual Machines COMPUTE	Managed Disks STORAGE
'50 hours 15 VM reate Linux virtual machines with on-demand apacity in seconds.	750 hours B15 VM Create Windows virtual machines with on- demand capacity in seconds.	64 GB x 2 2 P6 SDDs Get premium, secured disk storage for Azure Virtual Machines with simplified management.
Biob Storage STORAGE	File Storage STORAGE	SQL Database DATABASES
GB RS hot block	5 GB LRS File Storage	250 GB
se massively scalable object storage for any ype of unstructured data.	Migrate to simple, distributed, cross-platform file storage without changing code.	Create a SQL Database that delivers intelligence built-in.

Which products are always free?

These products-including serverless, containers, and AI-are always free



Orthanc

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