
> Open-Source Actuarial Science with Examples_



CAS Annual Meeting in Minneapolis
November 2022

Your Speakers



John Bogaardt

Chief Actuary
WCF Insurance



Kenneth Hsu

Lead Actuary
Breach Insurance



Agenda

- What is Open-Source
- Chainladder-Python
- Joining the Community
- Discussion



> What is Open-Source_

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**How many open-source
tools do you use?**

① Start presenting to display the poll results on this slide.

Examples of Open Source Tools

Operating Systems



Software



Languages



Databases



Open-Source

adjective \ 'ō-pən-'sɔrs \

*of software: Open source software is a tool that is designed to be publicly accessible - anyone can **see**, **modify**, and **distribute** the code as they see fit.*



Extracted from
opensource.org

The Good

- Cost
- Permissive
- Transparent
- Flexible
- Direct access to developers
- Democratic
- Source of ideas & talent
- Pull requests
- Fork

The Bad

- Skills
- Steeper learning curve
- Usability
- Company restrictions
- Human resources
- Lack of usage
- Deprecation cycles

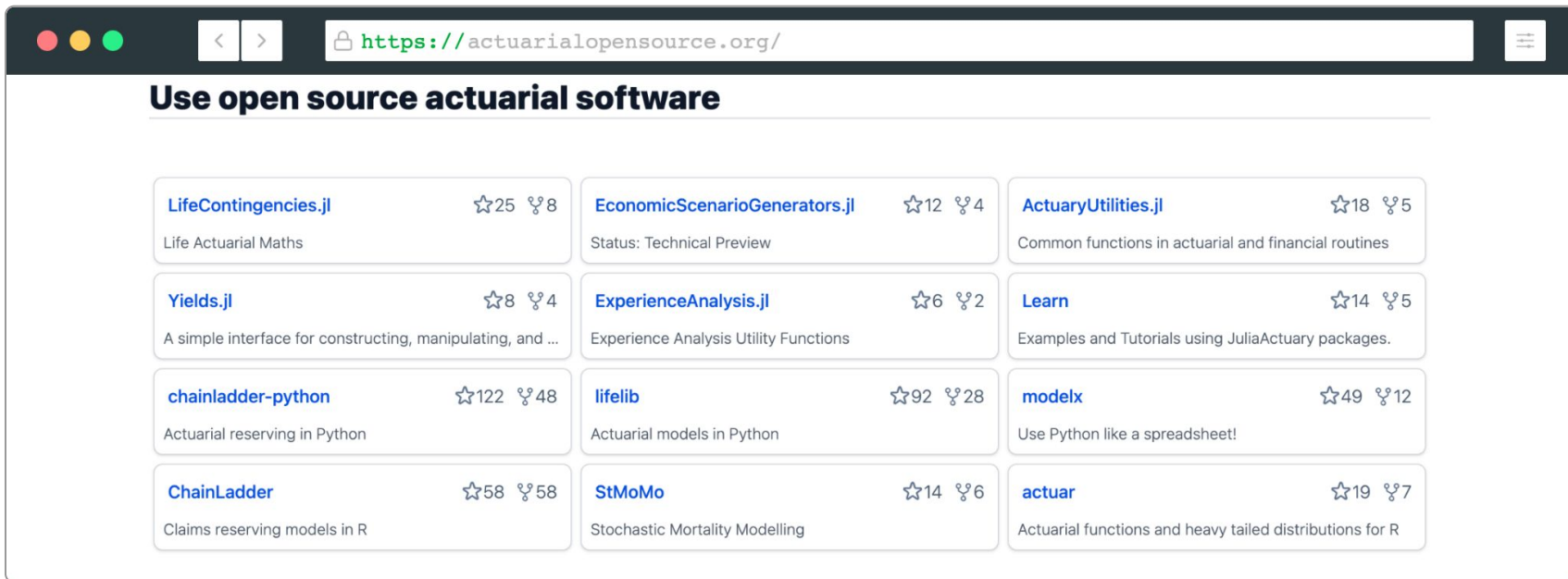
slido



**How much have you
interacted on GitHub?**

① Start presenting to display the poll results on this slide.

Actuarial Open-Source is Young



The screenshot shows the homepage of <https://actuarialopensource.org/>. The page is titled "Use open source actuarial software" and displays a grid of 12 project cards. Each card includes the project name, a description, and star/fork counts.

Project Name	Description	Stars	Forks
LifeContingencies.jl	Life Actuarial Maths	25	8
EconomicScenarioGenerators.jl	Status: Technical Preview	12	4
ActuaryUtilities.jl	Common functions in actuarial and financial routines	18	5
Yields.jl	A simple interface for constructing, manipulating, and ...	8	4
ExperienceAnalysis.jl	Experience Analysis Utility Functions	6	2
Learn	Examples and Tutorials using JuliaActuary packages.	14	5
chainladder-python	Actuarial reserving in Python	122	48
lifelib	Actuarial models in Python	92	28
modelx	Use Python like a spreadsheet!	49	12
ChainLadder	Claims reserving models in R	58	58
StMoMo	Stochastic Mortality Modelling	14	6
actuar	Actuarial functions and heavy tailed distributions for R	19	7



Extracted from
actuarialopensource.org

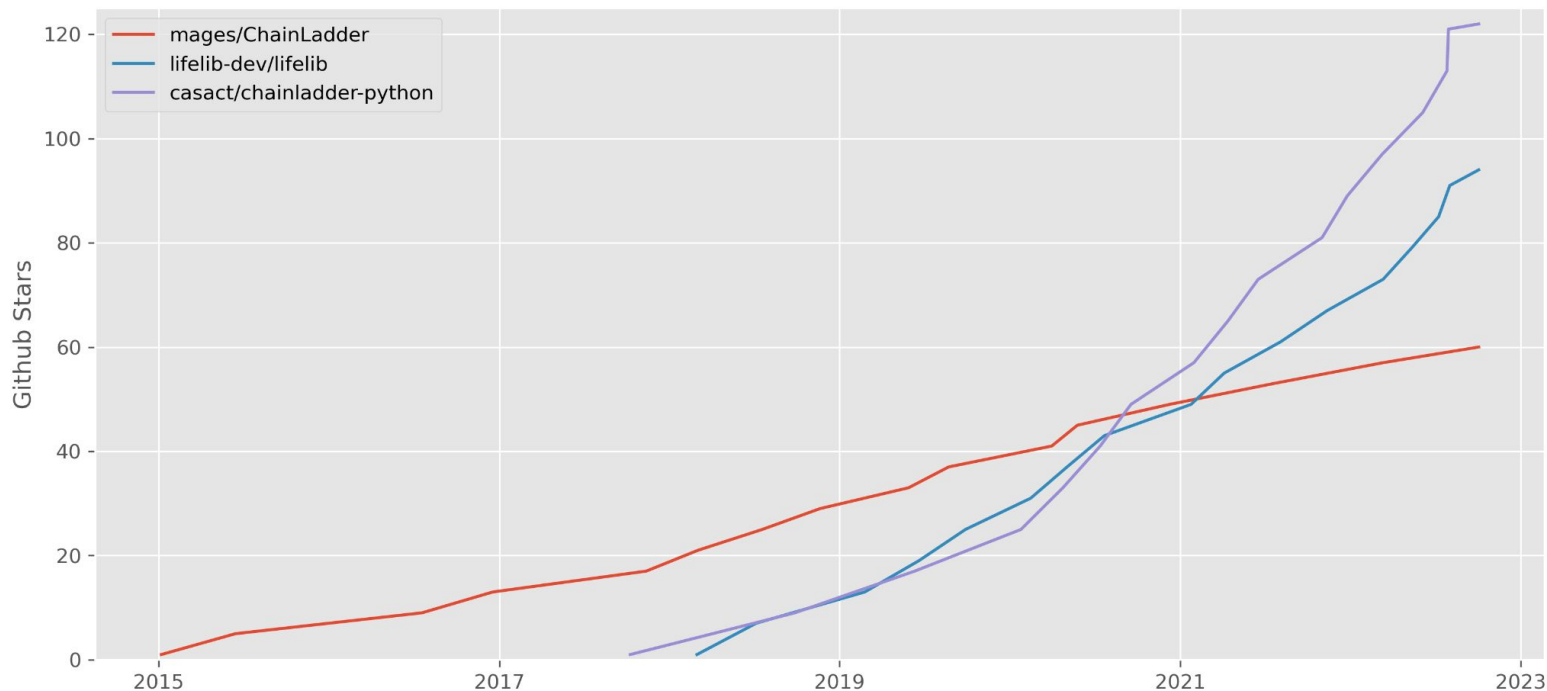
What is Open-Source

Chainladder-Python

Joining the Community

Discussion

Actuarial Open-Source is Growing



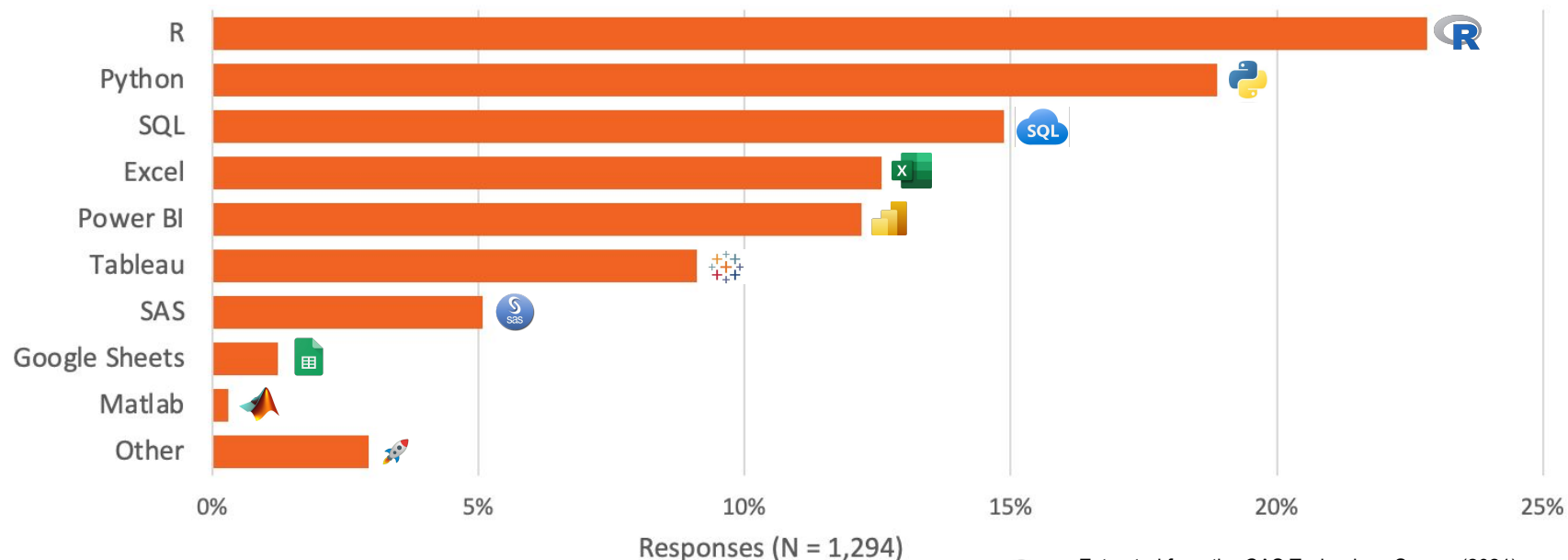
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Which of the following tools do you plan to increase your proficiency in the next 12 months?



Extracted from the CAS Technology Survey (2021)
Raw data and analysis can be found on
github.com/casact/technology_survey



> Chainladder-Python_

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**How much do you know
about Chainladder-Python?**

① Start presenting to display the poll results on this slide.

Founding Vision

```
import chainladder as cl

clrd = cl.load_sample("clrd")
comauto = clrd.groupby("LOB").sum().loc["comauto"]

bf_model = cl.BornhuetterFerguson(apriori=0.75)
bf_model.fit(
    comauto["CumPaidLoss"],
    sample_weight=comauto["EarnedPremNet"].latest_diagonal
)

bf_model.ultimate_
```



Practitioner Focused



Reinforce Python Data
Science Stack



Bridge Modern
Techniques

What is Open-Source

Chainladder-Python

Joining the Community

Discussion

Journey Began

Jun 2017



Initial Commit

What is Open-Source

Chainladder-Python

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Discussion

Building Up

Early 2020



- Triangle framework
- Link ratios
- Tail factors
- Deterministic models
- Refactoring

Structural Improvements

Feb 2020



GPU
Support

Aug 2020



Sparse
Support

Oct 2020



4-D triangle
Support

Downstream Dependencies

Nov 2020



First Research
Paper Cited

*The Actuary and IBNR Techniques: A
Machine Learning Approach*

By Caesar Balona and Ronald Richman

Jun 2021



GUI Software

*FASLR
(Free Actuarial System for Loss Reserving)*

By Gene Dan

Increased Popularity

Sep 2021



First CAS Technical
Course

CAS Virtual Python Workshop

Oct 2021



Documentation Site
(Re)launch

chainladder-python.readthedocs.io

Today

Nov 2022



68
releases



195,000
downloads



15
contributors



40
countries



123
stars



800
visitors/mo



48
forks



?
companies

What is Open-Source

Chainladder-Python

Joining the Community

Discussion



> Live Demo_



chainladder-python.readthedocs.io
(or bit.ly/clpdocs)



> Joining the Community_

10 Ways to Engage



Try the
Package



Ask
Questions



Answer
Questions



Test
Codes



Report
Bugs



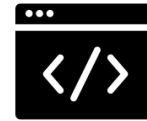
Develop
Examples



Improve
Documentation



Generate New
Ideas



Implement
Code



Spread the Word



Information sharing is power. If you don't share your ideas, smart people can't do anything about them, and you'll remain anonymous and powerless.

- Dr. Vint Cerf
"Father of the Internet"





> Discussion_

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Audience Q&A Session

① Start presenting to display the audience questions on this slide.



Thank You!

John Bogaardt

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Kenneth Hsu

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Attending the Roundtable?

See you later today at **2:30 p.m.**

in **Orchestra Ballroom D**



Please bring your laptop!

To learn more...

Chainladder-Python:

- chainladder-python.readthedocs.io
- github.com/casact/chainladder-python

CAS's GitHub:

- github.com/casact

Other Resources:

- actuarialopensource.org
- *The Actuary and IBNR Techniques: A Machine Learning Approach*
- github.com/casact/FASLR