On the fragmentation in the open-source world and on the challenges to create a healthy and sustainable project maintenance

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Challenges

- Open source movement - millions of volunteers/contributors
- Not true for every single open-source project

- Human factor is more critical for small projects
  - Maintainers and core developers are humans, too
  - Limited amount of time
  - Maintaining such a project becomes “work”, the amount of stress increases
  - Personal interests and motivations change over time
  - Very hard to safe-guard the reliability (maintenance, etc.) of the project in the long run
- People tend to underestimate the importance of the invest in the long-term maintenance

Fragmentation of resources, or lack of collaboration, is an issue!
LabPlot – KDE application for interactive graphing and analysis of scientific data

• GUI based approach
• Import of data in different formats (ASCII, binary, HDF5, FITS, JSON, etc.)
• Support for live-data (reading from local and network sockets, MQTT, serial port)
• 2D visualization
• Analysis functions (fitting, smoothing, FFT, interpolation, etc.)
• Basic statistical capabilities
• Support for different open-source computer algebra systems like Maxima, Octave, etc.
• Export of the results to different formats (SVG, PNG, etc.)
```maxima
iter:500$
%tau:float(%pi)$

/* first example with the driving force \( \sin(t) \) */
solve the differential equation with the Runge-Kutta method */
duffling:[x,-v/10+x^3/4+sin(t)]$
solution:rk(duffling,[x,v],[0,0],[t,0,iter/5,5,0,1])$

/* extract data */
t_data:map(lambda([x],x[1]),solution)$
x_data:map(lambda([x],x[2]),solution)$
v_data:map(lambda([x],x[3]),solution)$

/* calculate poincare map */
solution2:rk(duffling,[x,v],[0,0],[t,0,iter*2*%tau,%tau/30])$
poincare_list:create_list(solution2[1],1, makelist(i*60,1,1,iter))$
poincare_data:maplist(poincare_list[1],1,1,iter)$

/* extract data */
poincare_v_data:map(lambda([x],x[2]),poincare_data)$
poincare_x_data:map(lambda([x],x[1]),poincare_v_data)$

/* second example with the driving force 2.5*\( \sin(2t) \) */
duffling2:[v,-v/10+x^3/4+2.5*sin(2*t)]$
solution3:rk(duffling2,[x,v],[0,0],[t,0,iter/10,0,1])$

/* extract data */
t_data_2:map(lambda([x],x[1]),solution3)$
x_data_2:map(lambda([x],x[2]),solution3)$
v_data_2:map(lambda([x],x[3]),solution3)$

/* calculate the Poincare map */
solution4:rk(duffling2,[x,v],[0,0],[t,0,iter*4*%tau,%tau/30])$
poincare_list_2:create_list(solution4[1],1, makelist(i*30,1,1,iter))$
poincare_data_2:maplist(poincare_list_2[1],1,1,iter)$

/* extract data */
poincare_x_data_2:map(lambda([x],x[2]),poincare_data_2)$
```
Similar Projects
SciDAVis is a free application for Scientific Data Analysis and Visualization.

http://scidavis.sourceforge.net/
**AlphaPlot** is an open-source computer program for interactive scientific graphing and data analysis. It can generate different types of 2D and 3D plots (such as line, scatter, bar, pie, and surface plots) from data that is either imported from ASCII files, entered by hand, or using formulas.
**Veusz** is a scientific plotting and graphing program with a graphical user interface, designed to produce publication-ready 2D and 3D plots. In addition it can be used as a module in Python for plotting.

https://veusz.github.io/
**Kst** is the fastest real-time large-dataset viewing and plotting tool available and has built-in data analysis functionality. Kst contains many powerful built-in features and is expandable with plugins and extensions.

https://kst-plot.kde.org/
Summary:

• Development resources strongly fragmented, mostly one- to two-men projects
• Different development paces for different projects
• Active and healthy development right now for LabPlot, won’t go on “forever”
• Still, the resources are limited which is blocking a bigger and faster development

How to change the current situation?

• Look for synergies and collaborations with other projects
• Intensify activities within the organization (packaging, stores, infrastructure for CI, documentation, etc.)
• Increase the frequency of releases
• Invest more into the promotional work to attract new contributors
Cantor - KDE Frontend to mathematical applications

Basic properties of signals

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A signal is a set of data that conveys information about some phenomenon (Bendat, Piersol 2010; Lathi 2008; Lyons 2010). A signal can be represented mathematically by a function of one or more independent variables, we also refer to signals as simply data. The time-dependent voltage of an electric circuit and the acceleration of a

Let’s see now a brief description about the basic properties of signals (for a more detailed description, see Bendat, Piersol 2010; Lathi 2008; Lyons 2010; Smith 1997).

Amplitude, frequency, period, and phase

A periodic function can be characterized by the properties: amplitude, frequency, period, and phase. Let’s exemplify these properties for a periodic function composed by a single frequency, the sine wave or sinusoidal: 

$$y(t) = A \sin(2\pi ft + \phi)$$

where $A$ is the amplitude, $f$ the frequency, $\phi$ the phase, and $T = 1/f$ the period of the function $y(t)$.

We can define $\omega = 2\pi f = 2\pi / T$ as the angular frequency, then:

$$y(t) = A \sin(\omega t + \phi)$$

Let’s visualize this function:

```python
import numpy as np
import matplotlib.pyplot as plt
import scipy.io as sio

# t = np.linspace(-2, 2, 1011) # time vector
f = 2 # frequency
A = 2 # amplitude
phi = np.pi/4 # phase

x1 = A * np.sin(2 * np.pi * f * t + phi)
x2 = A * np.cos(2 * np.pi * f * t + phi)

fig, ax = plt.subplots()
ax.plot(t, x1, label='signal 1')
ax.plot(t, x2, label='signal 2')
ax.legend()
plt.show()
```

https://cantor.kde.org/
Change in the mindset
-> invest more into promotion

• Invest more into documentation, tutorials, example projects
• Make the usage of the application and the contribution to it easier
• Attract new contributors
• Convert users into contributors
• Make yourself redundant

All this requires even more work and effort for maintainers, at the least at the beginning
Do the promotion properly!

The cat brought 4 time more attention on Twitter than the distribution of hydrogen in our galaxy.
Thank You!

(https://labplot.kde.org/support/)