Towards sustainable computing

How KDE can help to get there

Akademy 2021

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From: Anders S. G. Andrae and Tomas Edler,
On Global Electricity Usage of Communication Technology: Trends to 2030
The WEEE Man
Can we do something about this?
What's the role of software?

- Hardware and software can't be separated
- Architecture and design of software determines energy consumption
- Hardware becomes obsolete because of software
- Restrictions are implemented in software
What's the role of software?

Software matters

It matters how software is done
What can we do about this?
KDE’s vision:

"A world in which everyone has control over their digital life and enjoys freedom and privacy."

https://community.kde.org/KDE/Vision
KDE technology is efficient

Native applications

C++ is a resource efficient programming language

Linux as open and efficient platform

KDE provides leverage

Many applications
Many use cases
Many users

Even small effects accumulate and propagate
How do we do it?
Three projects

The FOSS Energy Efficiency Project (FEEP)

The Blue Angel label for resource and energy efficient software

Blue Angel for Free and Open Source Software

Measurements
Quantify energy efficiency

Certification
Demonstrate sustainability criteria

Community
Spread the word, engage others
FEEP
The FOSS Energy Efficiency Project (FEEP)

Goals:

Quantify energy efficiency
Make measurements repeatable
Make results transparent
Automate measurements
Measurement procedure

- Based on **UFOPLAN-SSD 2015 – UMWELTFORSCHUNGSPLAN: SUSTAINABLE SOFTWARE DESIGN 2015**
- Focused on desktop software
- Automated usage scenarios
  - Baseline
  - Idle
  - Standard usage
- Measurement
  - Power consumption with external meter
  - Collection of system stats
- Report generation
  - Average power and resource utilisation
Measurements – Okular

Usage scenario:
- Open file
- Presentation mode
- Change pages
- Invert view
- Zoom
- Change pages
- Invert view

Measurements done by Franziska Mai at Umwelt-Campus Birkenfeld
Measurements – KMail

Usage scenario:
- Open mail folders
- Compose and send mail
- Read mails
- Reply to 3 mails
- Organize and move mails

Measurements done by Ina Seiwert at Umwelt-Campus Birkenfeld
Measurements – Krita

Usage scenario:
- Open picture
- Move layer to group
- Move layer to other layer
- Delete group
- Create group from selected layers

Measurements done by Melissa Zaczyk at Umwelt-Campus Birkenfeld
Measurements – Operating systems

Usage scenario:
1) Install software
2) Create folder
3) Run Spotify
4) Download in browser
5) Copy from USB
6) Run VLC
7) Create test files
8) Delete folder
9) Uninstall software
10) Empty cache

Measurements done by Franziska Mai at Umwelt-Campus Birkenfeld
What if this would be part of our CI?

- We already have quality gates and metrics for releases
  - Passing tests
  - Bug count
  - Translations
  - ...
- What if we would make energy efficiency another quality gate?
  - Spot regressions
  - Motivate optimisation
  - Transparency, enabling users to choose
Blue Angel
"The Blue Angel is the ecolabel of the federal government of Germany since 1978. The Blue Angel sets high standards for environmentally friendly product design and has proven itself over the past 40 years as a reliable guide for a more sustainable consumption."

https://www.blauer-engel.de/en
Resource and energy efficient software

New category introduced in 2020

Presentation at 36C3 by Marina Köhn and Eva Kern: „Wie klimafreundlich ist Software?“ („How climate friendly is software“, English translation available)

Current focus: desktop applications Server and mobile will be added

Criteria:
- Resource and energy-efficiency
- Potential hardware operating life
- User autonomy

Criteria: Resource and energy-efficiency

- Measurements according to UFOPLAN-SSD methodology for standard usage scenarios
- Transparency of measurements (publication in standard format)

Criteria: Potential hardware operating life

- Energy consumption should not increase with new versions
- Measurements on old reference systems (spec for 2015-2019 systems)
Criteria: User autonomy

- Data formats
- Transparency of the software product
- Continuity of the software product
- Uninstallability
- Offline capability
- Modularity
- Freedom from advertising
- Documentation of the software product, licence conditions and terms of use
GREEN-IT: STADT DORTMUND BEKENNT SICH ZUM BLAUEN ENGEL FÜR RESSOURCEN- UND ENERGIEEFFIZIENTE SOFTWAREPRODUKTE

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Freie Software für Digitale Nachhaltigkeit

Application for Okular is almost ready.

KMail, Krita next. Measurements available.

Measurements to be done for more applications: KDevelop, Kate, ...

Tooling and infrastructure available to help with the measurements and applications.

KDE e.V. as official applicant
Update Okular product information

#26

3.1.3.8: Documentation of the software product, licence conditions and terms of use

Annex 1  Annex 2  Annex 3

#17

3.1.1.2: Hardware utilisation and electrical power consumption in idle mode

Annex 1  Annex 2  Annex 3

#6

Intro 3.1.1.2: Hardware utilisation and electrical power consumption in idle mode

Annex 1

#4

https://invent.kde.org/cschumac/blue-angel-application/-/boards/5189
Can we do something about this?
Yes, ...

... if we can shave off a bit of energy, multiply by our users

... if we can make this spread amongst other applications

... if we can make the idea stick
Blue Angel for FOSS
Can we do something about this?
We are not alone

Project „Support sustainable software development by promotion and application of the criteria of the Blue Angel in the Free and Open Source software community“ supported by a grant of the German Environment Agency, starting in July

Contact with other organizations: FSFE, Round Table Repair, TDF

There are many more communities which might want to join
Let's do something about this!
Towards sustainable computing
Let’s carry the flag for sustainable computing
Measure energy efficiency

Make energy efficiency a quality gate of our release process

Demonstrate how our software extends hardware life

Demonstrate how our software preserves user autonomy

Get Blue Angel for KDE applications

Spread the word, help others
Help wanted!

Definition of standard usage scenarios
Automation of usage scenarios
Tooling for measurements
Execution of measurements
Analysis and reports of measurement data
Documentation of user autonomy
...

...
Where to get together?

Mailing list:
energy-efficiency@kde.org

Repositories:
https://invent.kde.org/cschumac/feep
https://invent.kde.org/cschumac/blue-angel-application

BoF:
Tuesday, June 22nd 2021, 9:00 UTC
https://community.kde.org/Akademy/2021/Tuesday