



GreenDelta

sustainability consulting + software


Collaborative Platform in data exchange – openLCA

84th LCA Discussion Forum – Sept 21, 2023

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GreenDelta GmbH

Content: Collaborative platform, the LCA collaboration server

- Motivation
- What is it, exactly?
- Discussion

The background image shows an industrial facility at dusk. On the left, a sign with the letters 'LWEC' is visible. In the center, several tall smokestacks are silhouetted against the darkening sky. To the right, a large tower crane stands prominently. The foreground is dominated by a multi-lane highway with visible lane markings, suggesting a busy industrial or urban area.

openLCA Collaborative Platform, motivation

Motivation

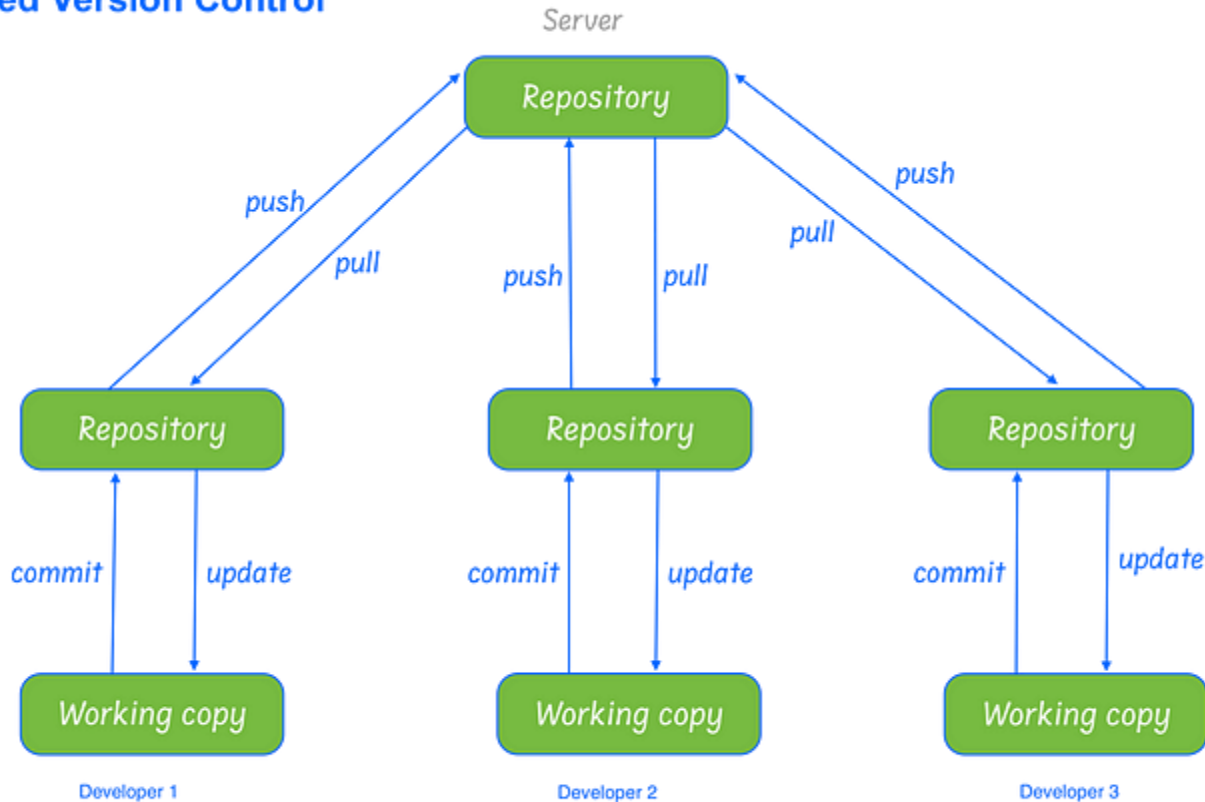
Software development: a complex system is created, by several “users”, over time; the system must be consistent and yet, additions and modifications must be possible, which for a time break the consistency.

The system shows (often) when it is not consistent.

→ Version control systems

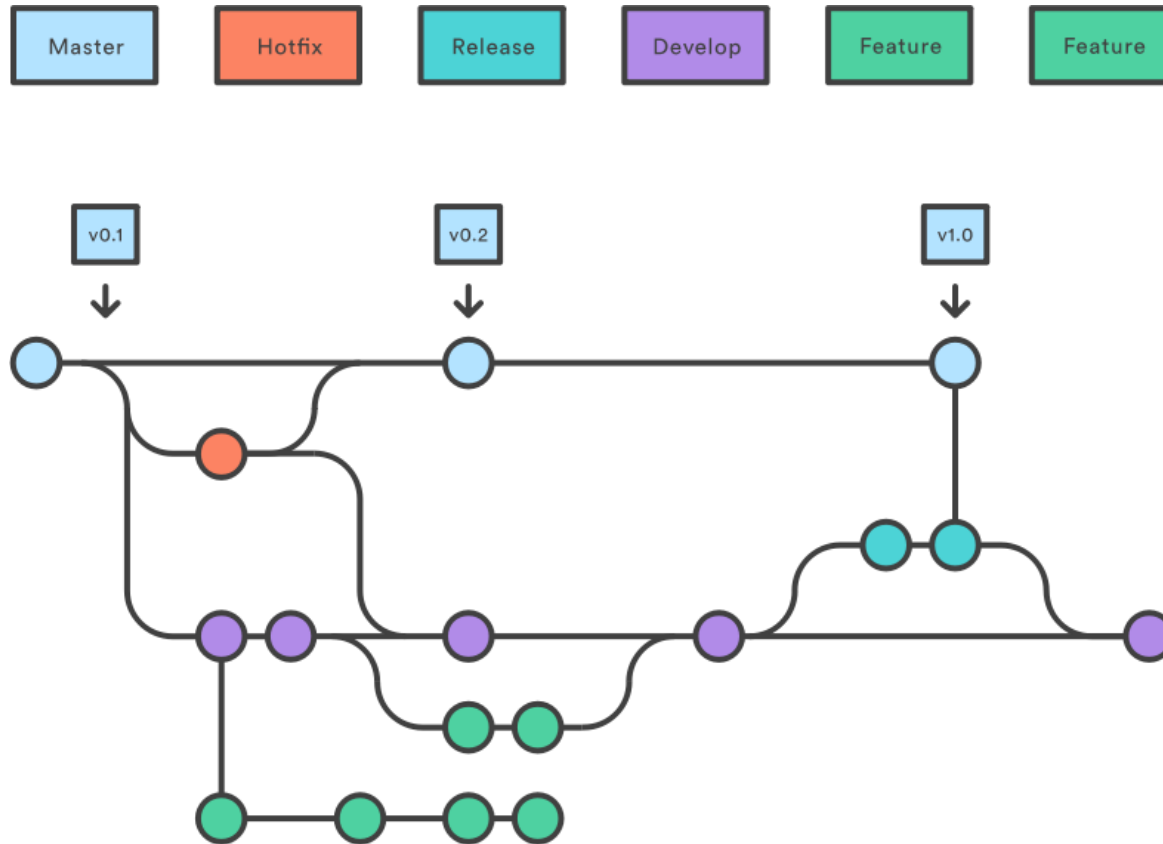
Motivation: version control systems in software development

Distributed Version Control Systems



<https://blog.stackademic.com/what-is-a-version-control-system-2f3509066b72>

Motivation: version control systems in software development



<https://www.atlassian.com/de/git/tutorials/comparing-workflows/gitflow-workflow>

Motivation

- Version control systems, in software development:
 - Different, distributed people, working together on development of a larger, complex system
 - This system must remain consistent
 - Yet everyone may work on something that is at a certain time not yet consistent
 - And everyone is basically working with text files.
- Version control systems, push and pull to and from a main system to local development systems, branches, rollbacks, traceability who submitted what, when.
- Good practice in software development since at least 20 years.

Motivation

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→ This is identical to a larger LCA project, or to the development of an LCA database.

(text files: ILCD, JSON-LD, EcoSpold)

Motivation

- Version control systems, in software development:
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→ This is identical to a larger LCA project, or to the development of an LCA database.

(text files: ILCD, JSON-LD, EcoSpold)

→ “So let’s develop a software for LCA version control and collaboration..”: The LCA Collaboration Server.

The background image shows an industrial facility at dusk or dawn. A large tower crane is prominent on the right side. In the center, several tall smokestacks are visible, some with smoke rising from them. The sky is a mix of dark blue and orange. In the foreground, there are blurred light trails from a road or highway, suggesting traffic. A semi-transparent blue banner is overlaid on the lower half of the image, containing the text.

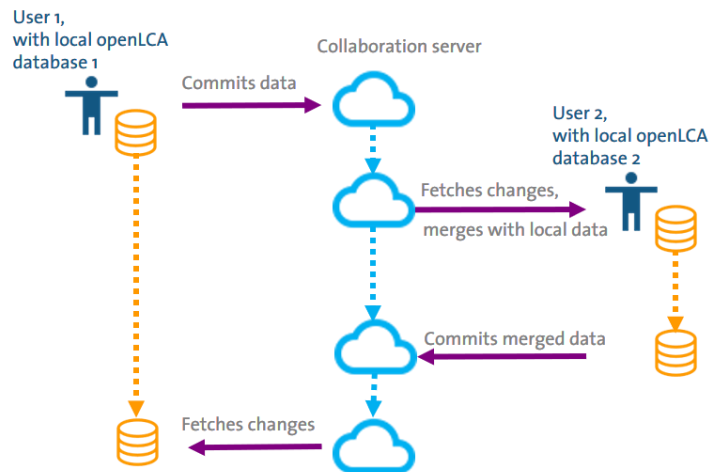
The LCA Collaboration Server, what is it?

The LCA Collaboration Server



The LCA Collaboration Server is a web application to provide version control, data review and data distribution features for LCA data.

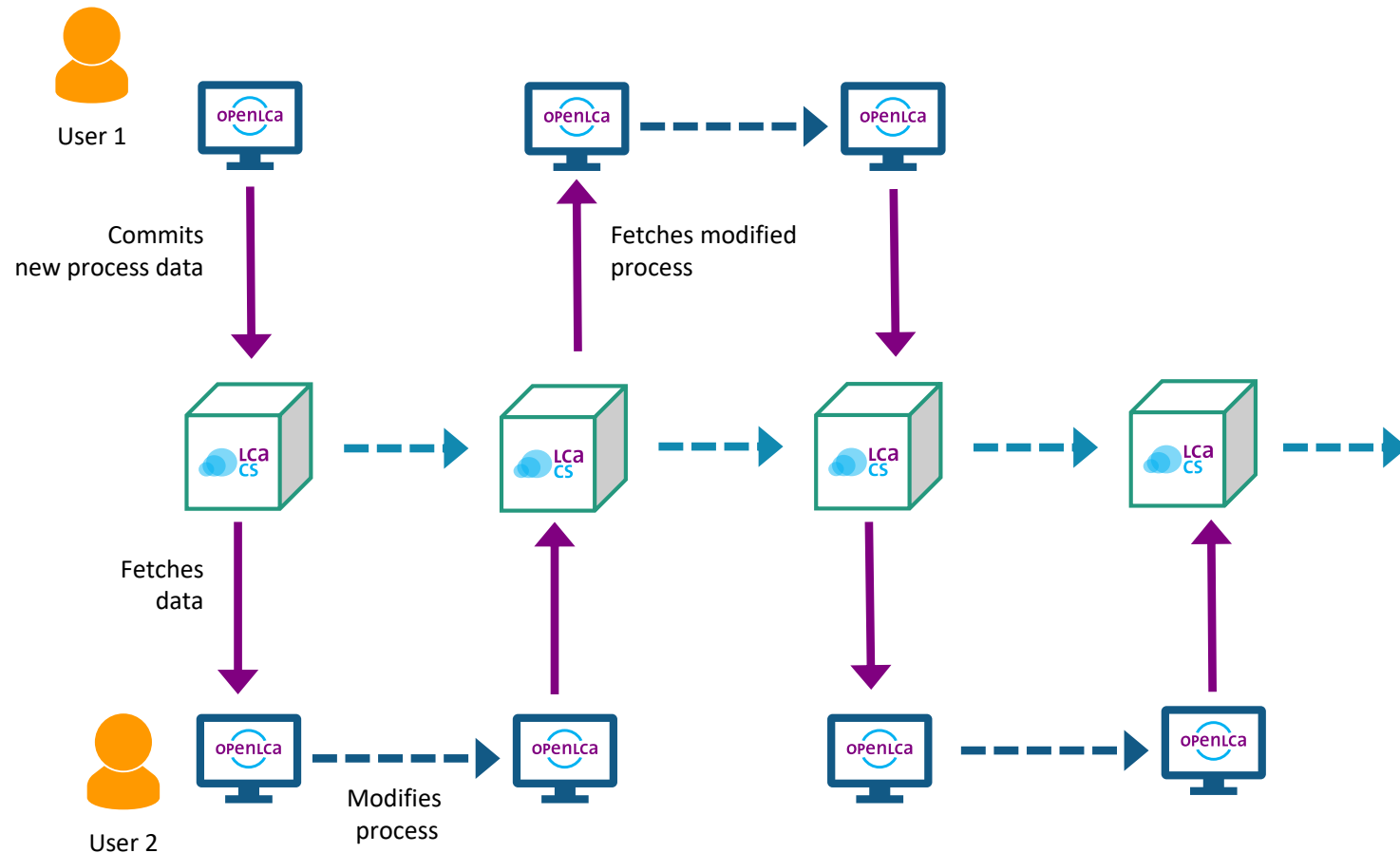
It connects with openLCA; openLCA users can directly interact with the server and push, pull merge, combine datasets.



The LCA Collaboration Server



Distributed modeling

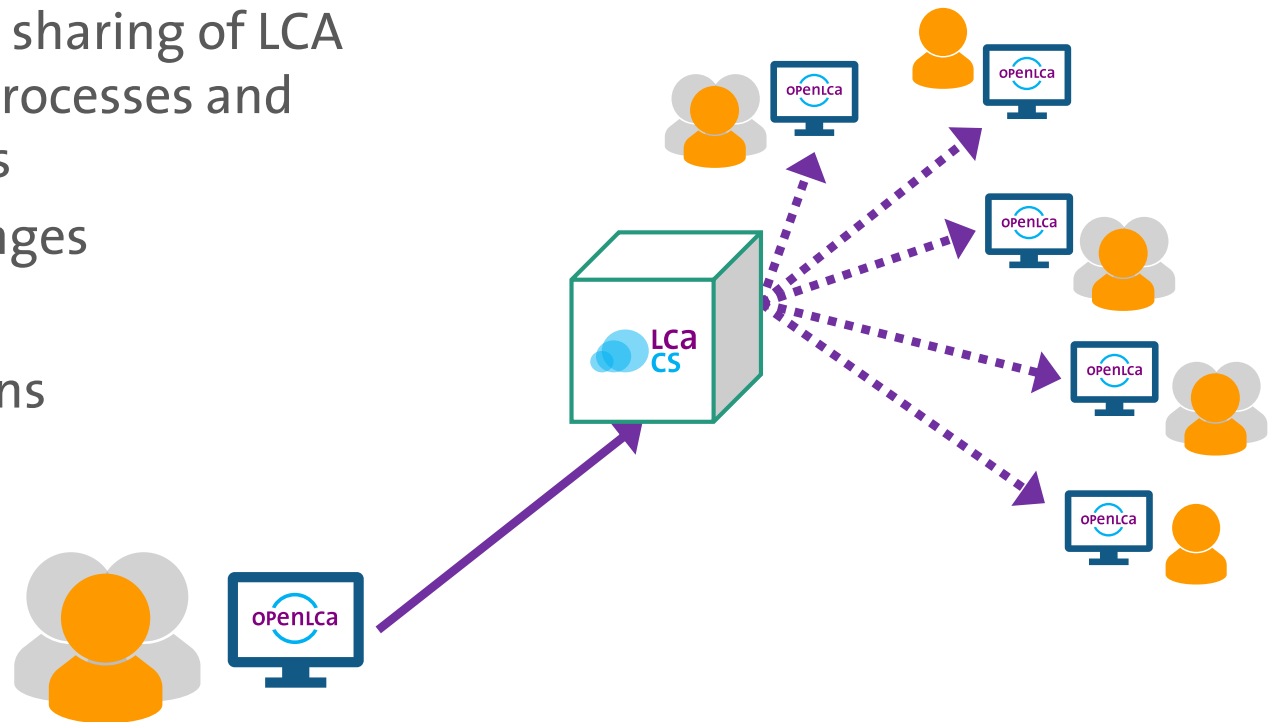


The LCA Collaboration Server



“Publication”: Sharing LCA models, flows, processes, authors, ... and entire databases

- Straightforward sharing of LCA models, flows, processes and entire databases
- Tracking of changes
- Comments
- E.g. LCA commons

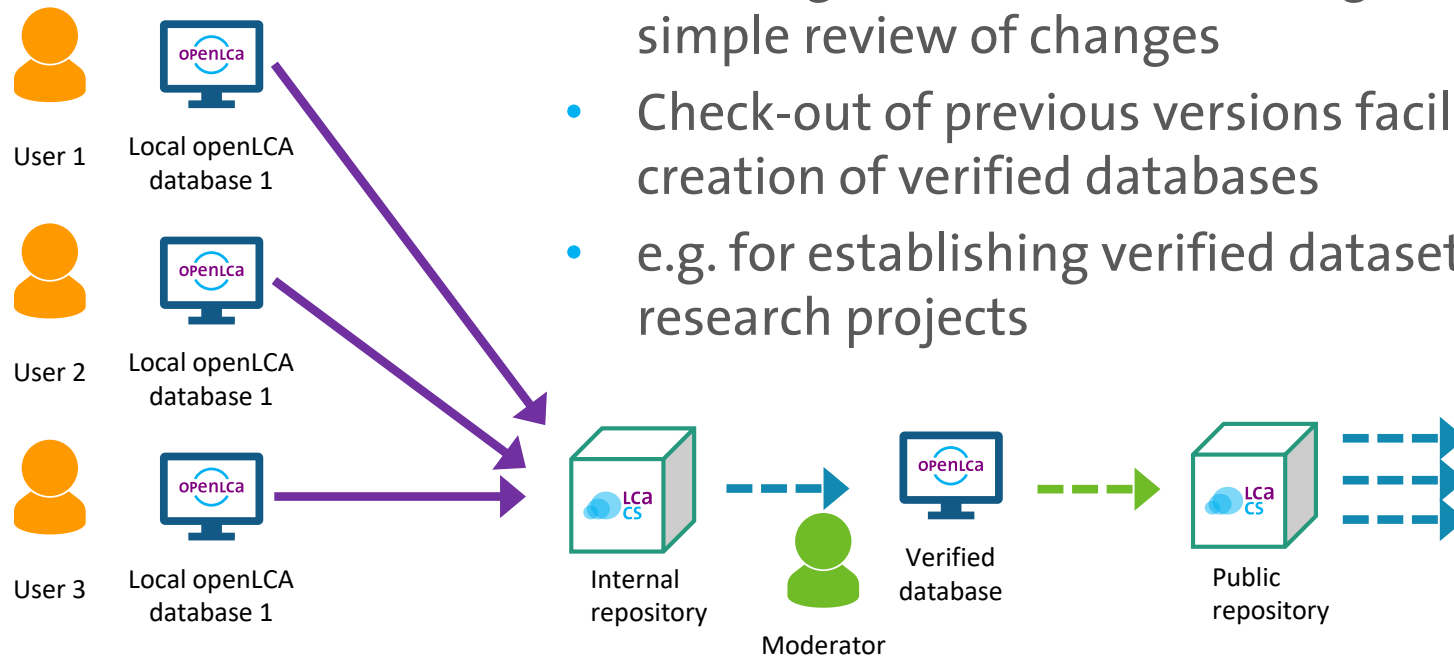


The LCA Collaboration Server



- Building and managing verified public LCA repositories

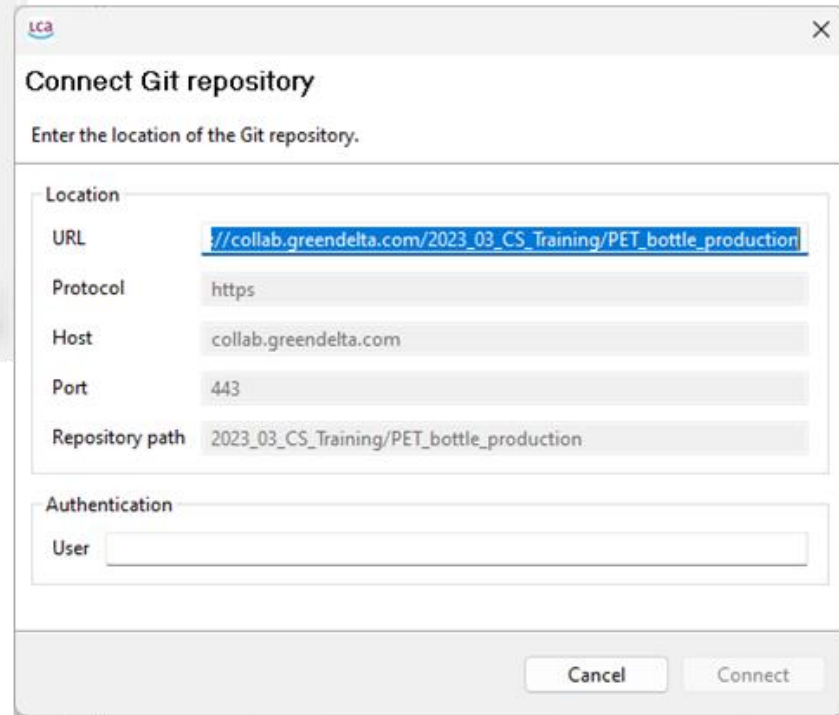
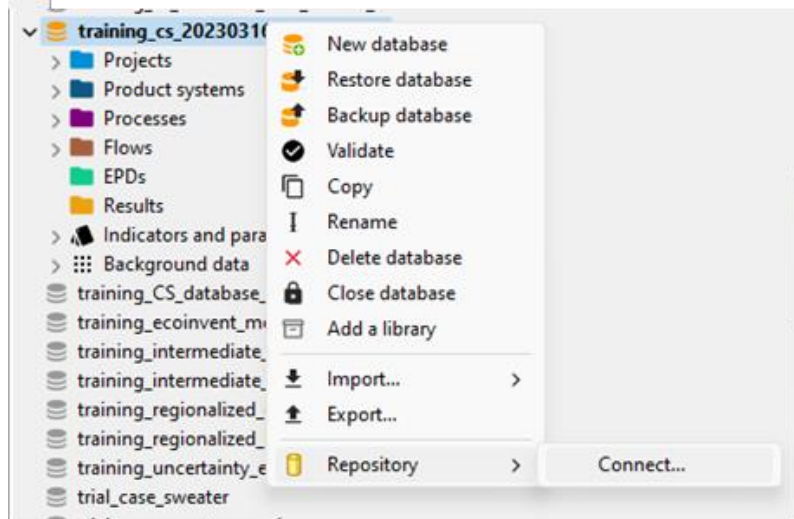
- Tracking feature and versioning allows simple review of changes
- Check-out of previous versions facilitates the creation of verified databases
- e.g. for establishing verified datasets within research projects



The LCA Collaboration Server



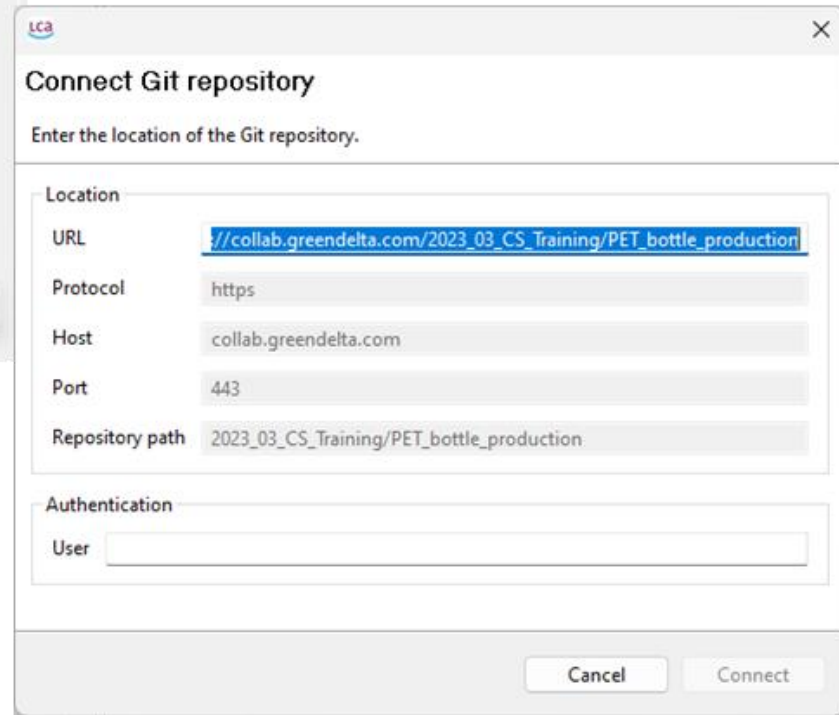
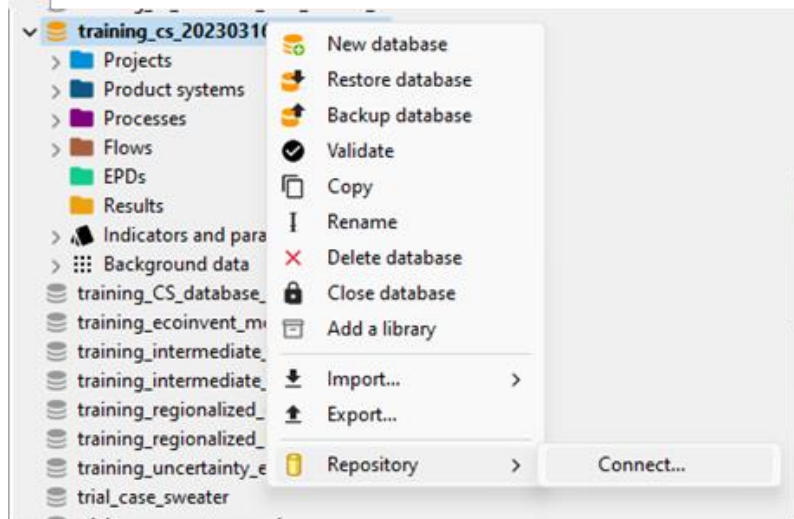
- Starting from openLCA



The LCA Collaboration Server



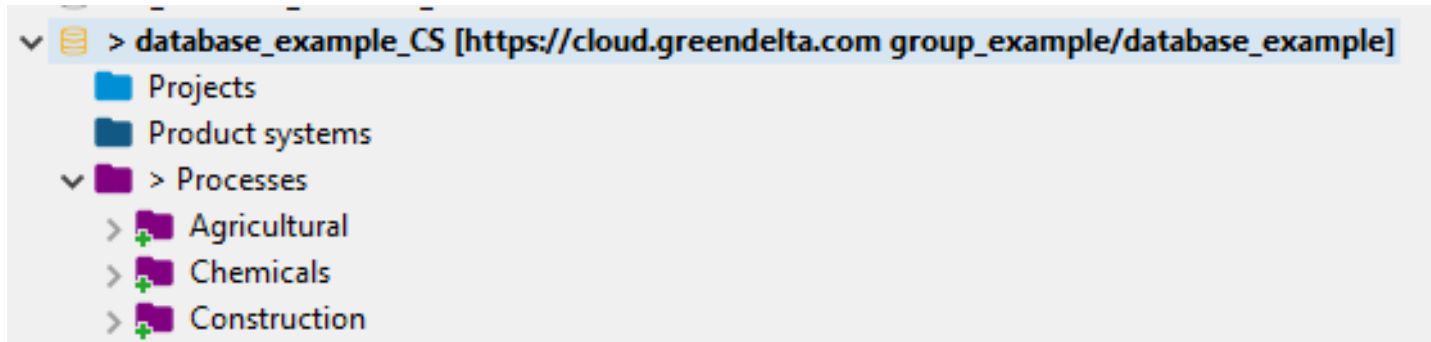
- Starting from openLCA



The LCA Collaboration Server



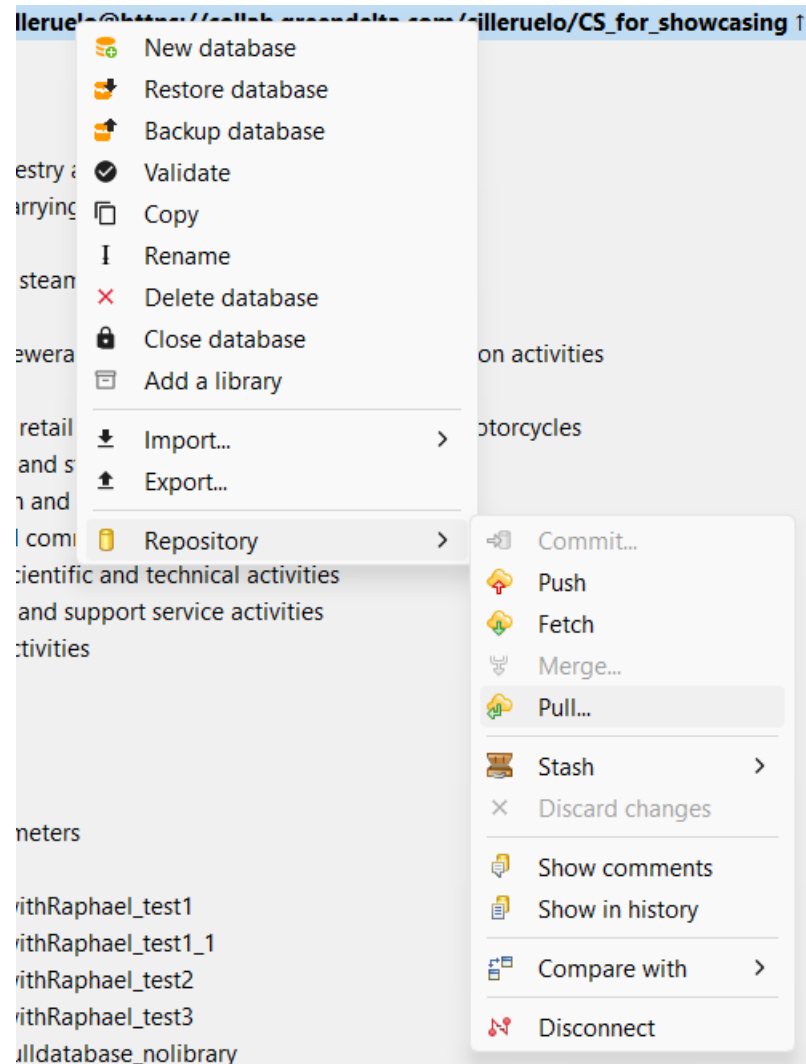
- Starting from openLCA: database with local additions (e.g.)



The LCA Collaboration Server



- Starting from openLCA:
Pulling from a remote repository



The LCA Collaboration Server



- Starting from openLCA: Managing conflicts in datasets

The screenshot shows a 'Merge' dialog box in the LCA software. The main window displays a tree view of processes under 'Background Unit Process Group'. A smaller dialog box titled 'Merge: Background Unit Process Group' is open, comparing two versions of the model. The 'Existing or previous model' and 'Updated model' columns show a list of processes. Process 82, 'Acetic acid (CH3COOH)', is highlighted in both. In the existing model, its amount is 1.1, while in the updated model, it is 9.0. The dialog also shows a 'Mark as merged' button and a footer with 'Overwrite local changes', 'Overwrite remote changes', 'OK', and 'Cancel' buttons.

Existing or previous model	Updated model
> 77: Natural gas distribution, to consumer [CA]	> 77: Natural gas distribution, to consumer [CA]
> 78: Sugar cane, at farm [BR - Maranhão]	> 78: Sugar cane, at farm [BR - Maranhão]
> 79: Sugar cane, at farm [BR - Espírito Santo]	> 79: Sugar cane, at farm [BR - Espírito Santo]
> 80: Long-distance scenario, liquid LCIF plant to delivery	> 80: Long-distance scenario, liquid LCIF plant to delivery
> 81: Electricity distribution, from wind, onshore, to consu	> 81: Electricity distribution, from wind, onshore, to consu
▼ 82: Acetic acid (CH3COOH)	▼ 82: Acetic acid (CH3COOH)
Flow property: Mass	Flow property: Mass
Unit: kg	Unit: kg
Amount: 1.1	Amount: 9.0
Avoided product: No	Avoided product: No
Provider: Acetic acid (CH3COOH)	Provider: Acetic acid (CH3COOH)
> 83: Electricity, from grid [CA-NS]	> 83: Electricity, from grid [CA-NS]

Merge

Processes

Background Unit Process Group

LCA

✕

Merge: Background Unit Process Group

⏪ ⏩ ↶ ↷ ↻ ↺

Existing or previous model	Updated model
> ⚙️ 77: Natural gas distribution, to consumer [CA]	> ⚙️ 77: Natural gas distribution, to consumer [CA]
> ⚙️ 78: Sugar cane, at farm [BR - Maranhão]	> ⚙️ 78: Sugar cane, at farm [BR - Maranhão]
> ⚙️ 79: Sugar cane, at farm [BR - Espírito Santo]	> ⚙️ 79: Sugar cane, at farm [BR - Espírito Santo]
> ⚙️ 80: Long-distance scenario, liquid LCIF plant to delivery	> ⚙️ 80: Long-distance scenario, liquid LCIF plant to delivery
> ⚙️ 81: Electricity distribution, from wind, onshore, to consu	> ⚙️ 81: Electricity distribution, from wind, onshore, to consu
▼ ⚙️ 82: Acetic acid (CH ₃ COOH)	▼ ⚙️ 82: Acetic acid (CH ₃ COOH)
⚖️ Flow property: Mass	⚖️ Flow property: Mass
Unit: kg	Unit: kg
Amount: 1.1	Amount: 9.0
Avoided product: No	Avoided product: No
🔗 Provider: Acetic acid (CH ₃ COOH)	🔗 Provider: Acetic acid (CH ₃ COOH)
> ⚙️ 83: Electricity, from grid [CA-NS]	> ⚙️ 83: Electricity, from grid [CA-NS]

Mark as merged

Overwrite local changes

Overwrite remote changes

OK

Cancel

The LCA Collaboration Server



- Starting from openLCA: Pushing to the server, commit log messages

Id	Message	Committer	Commit date
791e3cfe-b95b-4ba...	... looking good. I just added some inputs to our product system!	Sally_Housecoat	1 second ago
80b15ab7-2d53-45d...	Ohps, I forgot something. Here you go ...	Average_Joe	1 minute ago
a33643dc-1015-48cb...	There you go ... here's the dataset!	Average_Joe	2 minutes ago

The LCA Collaboration Server



- ..and on the server:
Commits

The screenshot shows a web browser window displaying the 'Commits' page for the repository 'dinoi/CS_Canadian_training'. The browser address bar shows the URL 'https://cloud.greendelta.com/dinoi/CS_Canadian_training/commits'. The page has a dark sidebar on the left with navigation options: Repository, Activities, Data sets, Commits (highlighted), Comments, Tags, and Members. The main content area shows a list of commits with a search bar and a 'Download changelog' button. The commits are grouped by date.

Date	Commit Message	Author	SHA-1	Changes
11/18/2021 2 commits	Changed kg process test	Claudia Di Noi II on 11/18/2021	b6086c82-4b53-4279-a54f-9ebce6ffa025	1 change Details »
	Created process test	DiNoi on 11/18/2021	7c4e9559-56ea-4f8e-adcb-ee8c1232dd7e	2 additions Details »
11/16/2021 5 commits	Change in process 1	DiNoi on 11/16/2021	d2ccebb9-fe64-4f90-a8b0-b24c2e7cbe30	1 change Details »
	Commit3	Claudia Di Noi II on 11/16/2021	2f3421c6-689e-42ca-96c1-7c997ac0bc39	2 additions, 2 deletions Details »
	flow	Claudia Di Noi II on 11/16/2021	370e3b03-d4fa-4283-affa-027234400ae6	1 addition Details »

The LCA Collaboration Server



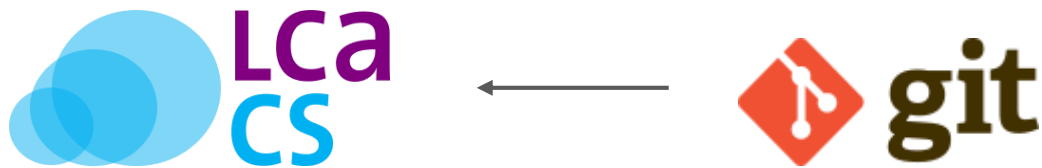
- ..and on the server: one repository

The screenshot shows a web browser window with the URL <https://cloud.greendelta.com/lca-co>. The page title is "GreenDelta/Public_Rep - Data sets". The interface includes a sidebar on the left with navigation options: "Back to group", "Repository", "Data sets", "Commits", "Comments", and "Members". The main content area shows a table of data sets with columns for "Name", "Last change", and "Commit". A "Download" button is visible, with a dropdown menu showing options: "as JSON-LD", "as ILCD", "as JSON-LD (Subselect)", and "as ILCD (Subselect)...".

Name	Last change	Commit
Product systems (1)	3 hours ago	Thanks. I revised the inputs!
Processes (19)	3 hours ago	Thanks. I revised the inputs!
Flows (145)	4 hours ago	Initial commit

The LCA Collaboration Server

- History: LCA Collaboration Server developed for US DA, LCA Commons, since ~ 5 years
- Recent development: LCA Collaboration Server 2, fit for openLCA 2, replacement of the entire merge, fetch and pull logic by git → much faster, more options.



- Free software, plus hosting option from GreenDelta.
- 100+ users, research groups, larger companies, etc.

The LCA Collaboration Server

- Version 2, at [lcacommons.gov](https://www.lcacommons.gov)

The screenshot shows a web browser window with the URL <https://www.lcacommons.gov/lca-collaboration/search/query=wood>. The page header includes the Federal Commons logo and navigation links: Home, About Us, Documentation, Contact, and a green Sign In button. A search bar at the top right contains the text 'wood'. Below the search bar, it indicates '467 results' for the query 'wood' and provides a 'clear all filters' option. The main content area displays a list of search results, each with a title, location, date, and a green 'Download' button. The results are:

- Solid strip and plank flooring, hardwood, E - United States**
 - United States
 - 2005
 - found in repository [National_Renewable_Energy_Laboratory/USLCL_Database_Public](#)
 - 1 other version found in [Federal_Highway_Administration/mtu_pavement](#)
- Lumber, softwood, borate treated, PNW - United States**
 - United States
 - 2004 - 2009
 - found in repository [National_Renewable_Energy_Laboratory/USLCL_Database_Public](#)
 - 1 other version found in [Federal_Highway_Administration/mtu_pavement](#)
- Poles, softwood, PCP treated - Northern America**
 - Northern America
 - 2004 - 2009
 - found in repository [National_Renewable_Energy_Laboratory/USLCL_Database_Public](#)
 - 1 other version found in [Federal_Highway_Administration/mtu_pavement](#)
- Veneer, hardwood, green, at veneer mill, E - United States**
 - United States
 - 2006
 - found in repository [National_Renewable_Energy_Laboratory/USLCL_Database_Public](#)
 - 1 other version found in [Federal_Highway_Administration/mtu_pavement](#)

On the right side of the page, there are two sections:

- Group/Repository** (multi-select):
 - National Renewable Energy Laboratory (201)
 - USLCL_2023_Q2_v1 (185)
 - CED Method (14)
 - Federal Highway Administration (188)
 - MTU Asphalt Pavement Framework (188)
 - US Forest Service Forest Products Laboratory (228)
 - Woody biomass (7)
 - CORRIM (221)
 - Forestry and forest products (221)
 - US Environmental Protection Agency (52)
 - Construction and Demolition Debris (CDD) Management (32)
 - USEEIO v1.1 (10)
 - USEEIO v2.0 (10)

Show 9 more
- Model type** (multi-select):
 - Flows (303)
 - Processes (163)
 - Sources (1)



Discussion

Discussion

“LCA development – Did we forget about data?”

Rather, in my view:

In Europe, especially, the Information Technology part of LCA is not really addressed.

We forgot about IT.

Often, rather dogmatic, and inflexible approaches (“ILCD format forever”, because it was good 20 years ago..).

IT and IT innovation is a chance for scaling up LCA and data development. We should embrace it.

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Thank you!

Contact

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