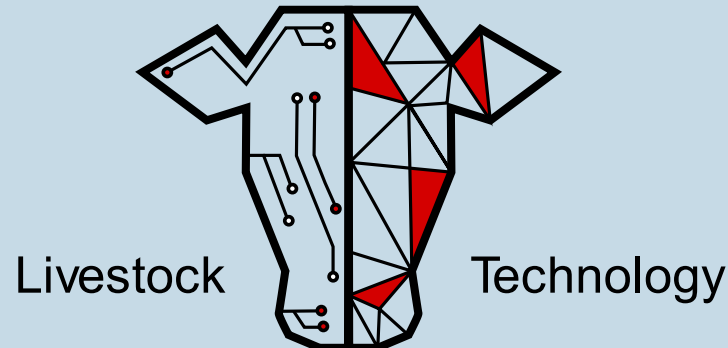


CowConnect: A semi-real-time data acquisition from dairy farms using Globus

ManGO User Day 2024 – Martin Gote

Animal and Human Health Engineering (A2H), Geel Campus



Who are we?



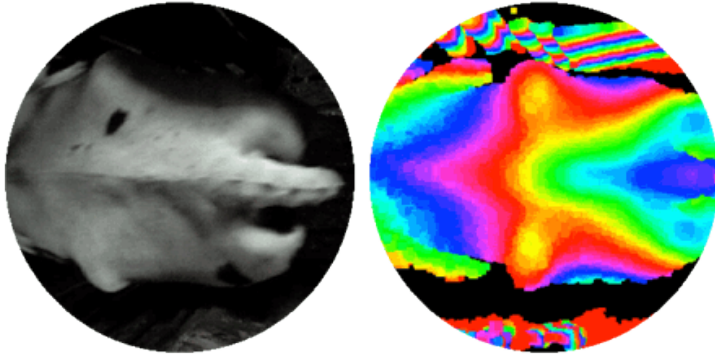
Livestock Technology team – A2H Campus Geel

Data on modern dairy farms



Activity
e.g., pedometers / accelerometers

Body condition score
e.g., BCS 3D cameras

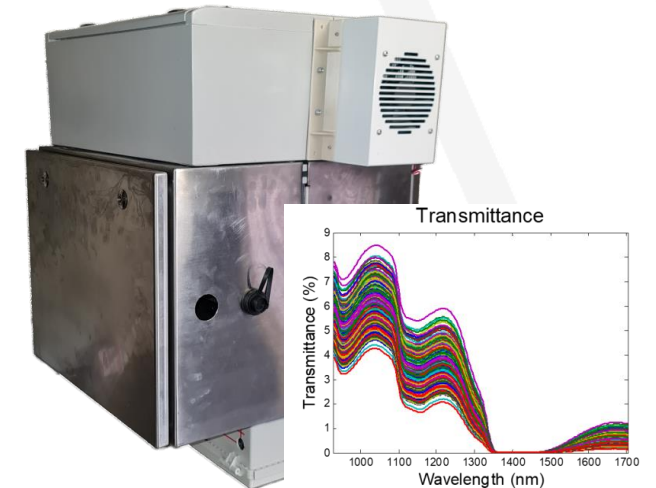


Milking system (robot)



Hormones & enzymes
e.g., lateral flow immuno-assays

Livestock Technology sensor
NIR spectroscopy – Arnout van Nuenen



How is the data available?

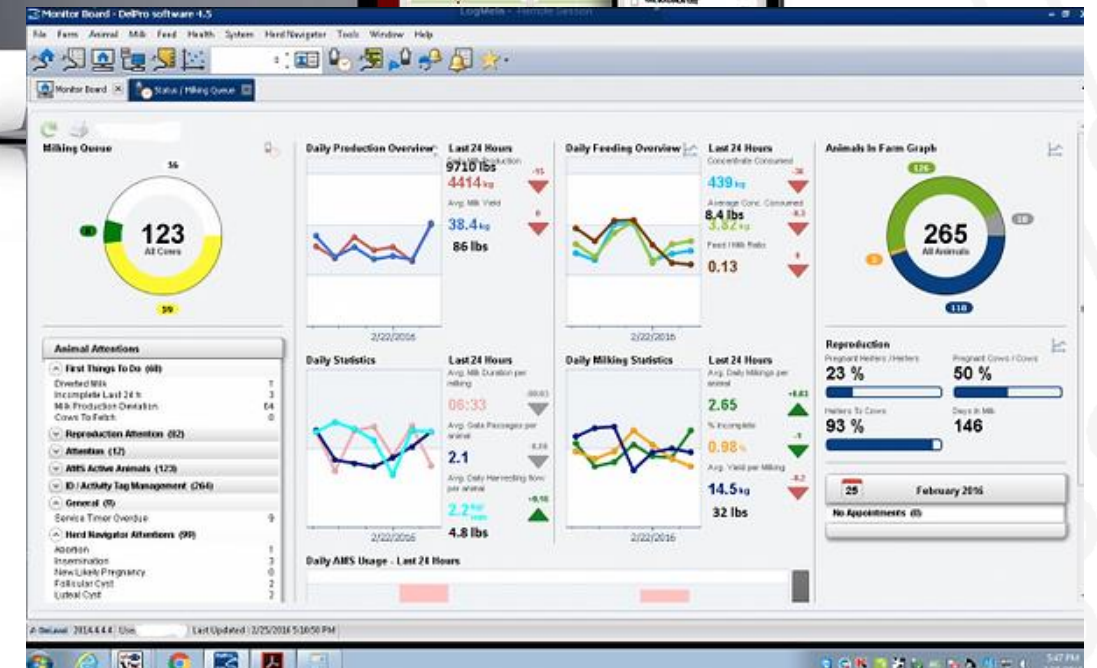
For farmers

Lely: T4C/ Lely horizon

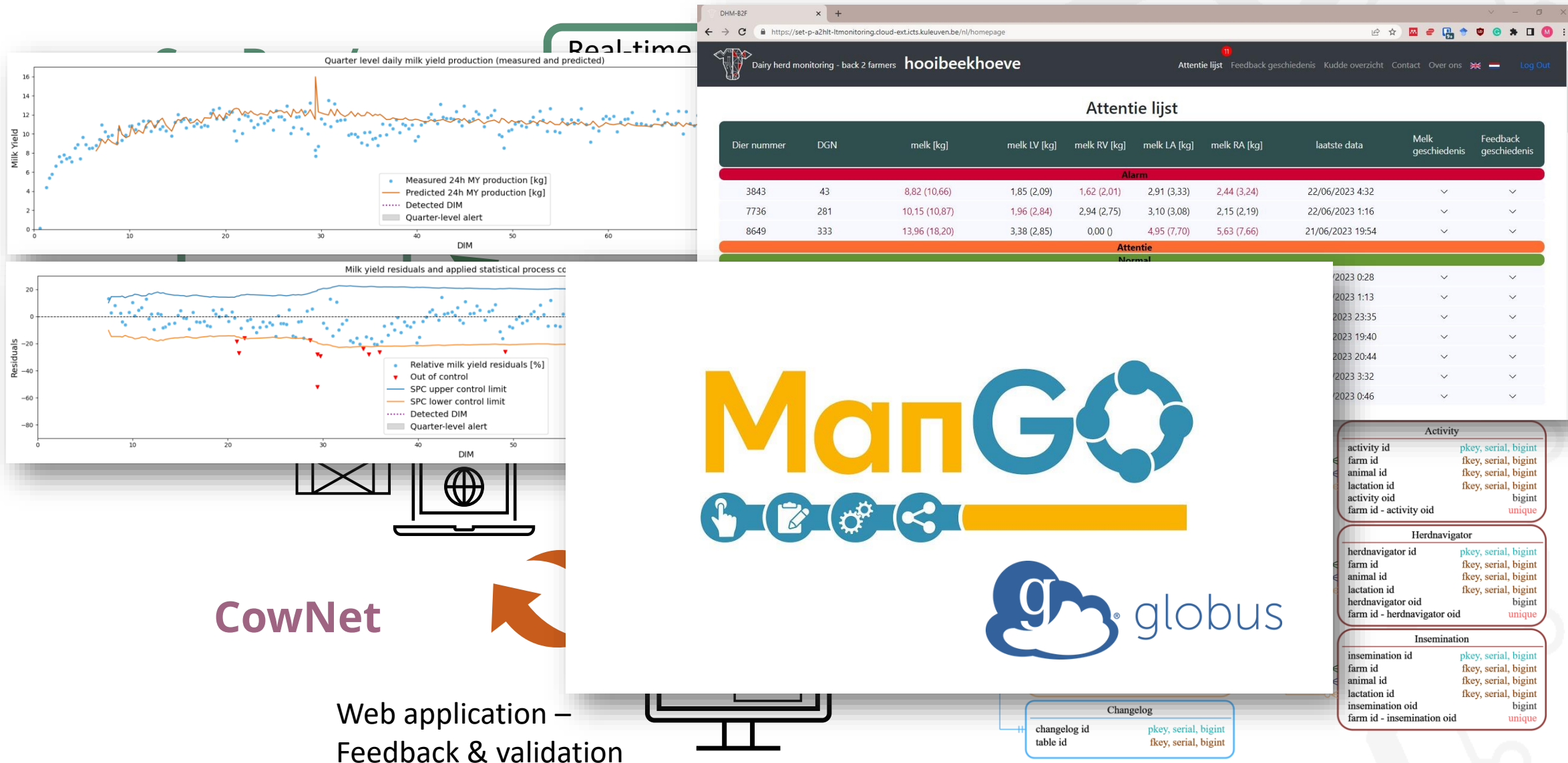
DeLaval: DelPro

For researchers

Access to the database or backups



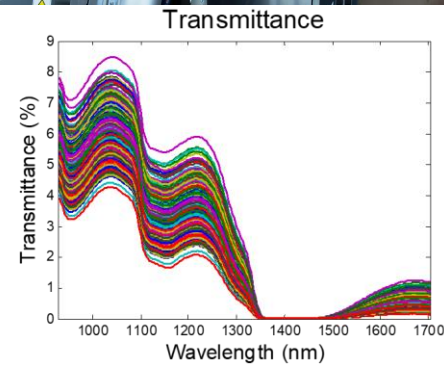
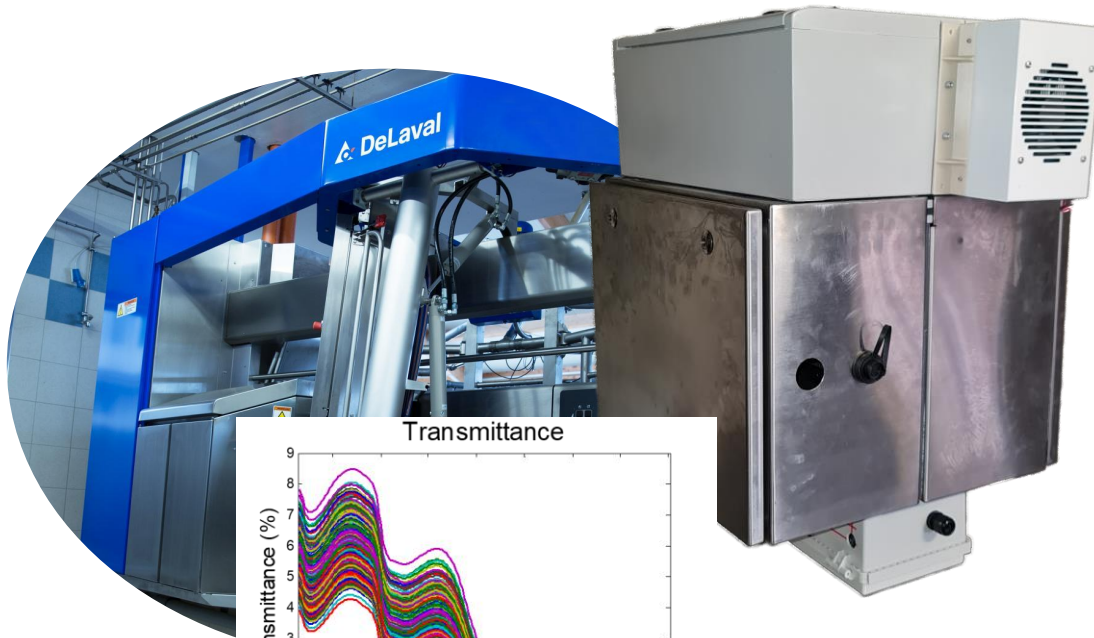
Use Case 1: A feedback system for farmers



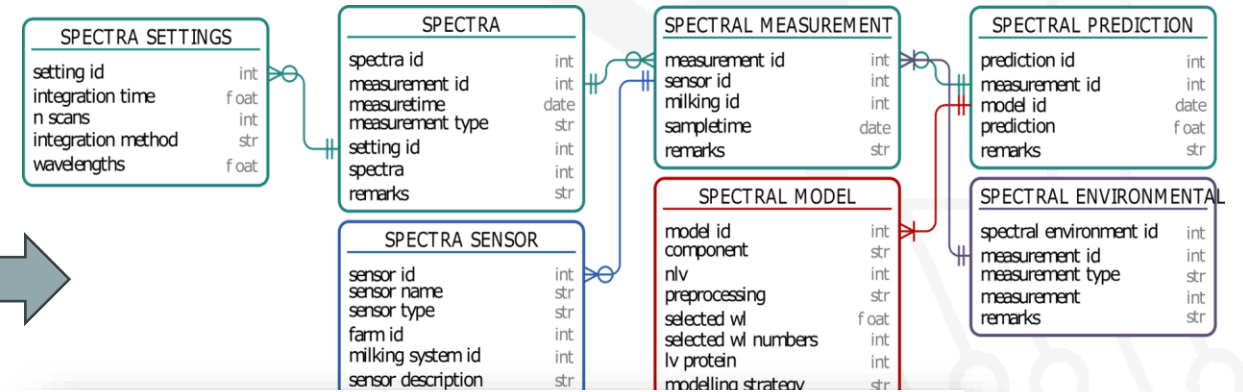
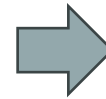
CowNet

Web application –
Feedback & validation

Use Case 2: Acquisition of additional sensor data



Sensor build by Arnout van Nuenen



ManGO

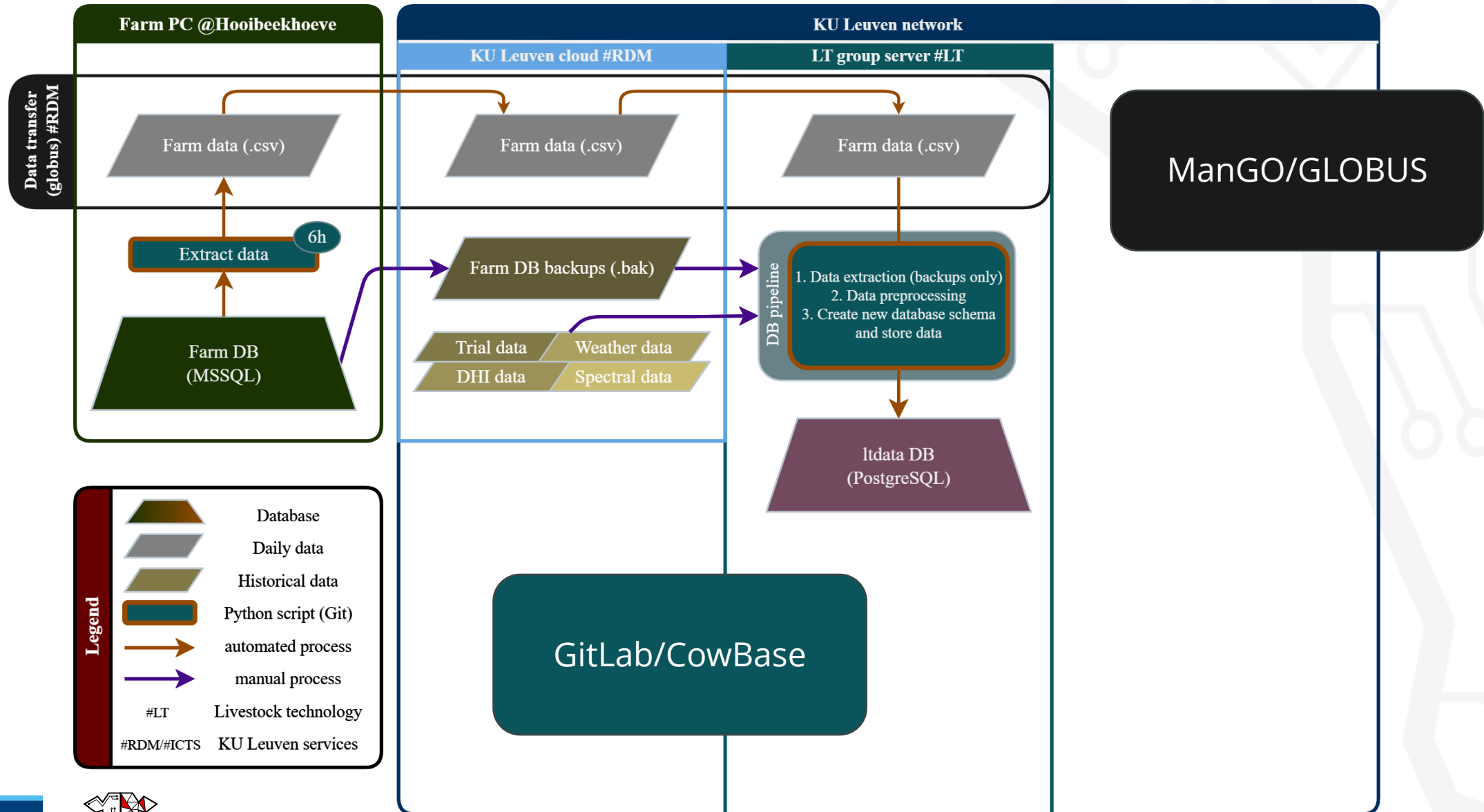


globus


Why ManGO/Globus? – bringing together data from all over Belgium





Use Case 1: A feedback system for farmers – technical setup





ManGO – Storing data


 Livestock_Technology

 Collections

 Search

 Metadata schemas

 Group administration

 Trash

set » home

Livestock_Technology

Add collection

Upload files ...

Content




Metadata

Permissions

Copy

Download

⚠ Copying/Download is only available for data objects.

<input type="checkbox"/>	Name	Owner	Created	Modified	Size
<input type="checkbox"/>	 00_ByPass_Sensor_v2.0	x0116999	2023-04-12 14:52:03	2024-07-26 14:11:39	
<input type="checkbox"/>	 01_	x0116999	2023-04-12 13:31:52	2024-09-19 10:21:37	
<input type="checkbox"/>	 02_	u0141520	2023-07-14 09:59:22	2023-07-14 11:59:26	

Globus – Transferring data

Transfer: Farm management system



ManGO

The screenshot displays the Globus Connect Manager interface for a data transfer. The top section shows the source and destination paths. The source path is `/C/KULeuven/data/CowBase/OUTPUT/01_full_table/` and the destination path is `/set/home/Livestock_Technology/02_01_full_table/`. The interface includes a 'Start' button and a 'Transfer & Timer Options' dropdown. Below the paths, there are two panels showing file lists. The left panel shows a list of folders with names like '202410010500' and '202410011100'. The right panel shows a list of folders with names like '202309121100' and '202309121700'. A central sidebar contains various actions such as 'Share', 'Transfer or Sync to...', 'New Folder', 'Rename', 'Delete Selected', 'Download', 'Open', 'Upload', 'Get Link', 'Show Hidden Items', and 'Manage Consent'.

NAME	LAST MODIFIED
202410010500	10/1/2024, 05:00 AM
202410011100	10/1/2024, 11:00 AM
202410011700	10/1/2024, 05:00 PM
202410012300	10/1/2024, 11:00 PM
202410020500	10/2/2024, 05:00 AM
202410021100	10/2/2024, 11:00 AM
202410021700	10/2/2024, 05:00 PM
202410022300	10/2/2024, 11:00 PM

NAME	LAST MODIFIED	SIZE
202309121100	9/12/2023, 11:07 AM	—
202309121700	9/12/2023, 11:07 PM	—
202309122300	9/12/2023, 11:07 PM	—
202309130500	9/13/2023, 05:07 AM	—
202309131100	9/13/2023, 11:07 AM	—
202309131700	9/13/2023, 05:07 PM	—
202309132300	9/13/2023, 11:07 PM	—
202309140500	9/14/2023, 05:07 AM	—

Globus – Transferring data

Transfer:

Research server



ManGO

Collection: a2h-ltserver

Path: /var/lib/globus/data/CowBase/OUTPUT/d_.../01_full_table/01_full_table/

Start

Transfer & Timer Options

Globus timers

Start

select all up one folder refresh list filter view

NAME	LAST MODIFIED
202404270500	9/19/2024, 03:25 PM
202404271100	9/19/2024, 03:25 PM
202404271700	9/19/2024, 03:25 PM
202404272300	9/19/2024, 03:25 PM
202404280500	9/19/2024, 03:25 PM
202404281100	9/19/2024, 03:25 PM
202404281700	9/19/2024, 03:25 PM
202404282300	9/19/2024, 03:25 PM

Share

Transfer or Sync to...

New Folder

Rename

Delete Selected

Download

Open

Upload

Get Link

Show Hidden Items

Manage Content

NAME

LAST MODIFIED

SIZE

202307302300	7/30/2023, 11:06 PM	—
202307310500	7/31/2023, 05:06 AM	—
202307311100	8/2/2023, 02:04 PM	—
202307311700	8/2/2023, 02:04 PM	—
202307312300	8/2/2023, 02:04 PM	—
202308010500	8/2/2023, 02:04 PM	—
202308011100	8/2/2023, 02:04 PM	—
202308011700	8/2/2023, 02:04 PM	—

Globus Timers – Automating data transfer

Label This Transfer

Transfer Settings

NOTE: These settings will persist during this session unless changed.

☒ sync - only transfer new or changed files ⓘ

where the ⓘ

Files which were part of an incomplete transfer will not be overwritten by this option.

☐ delete files on destination that do not exist on source ⓘ

☐ preserve source file modification times ⓘ

☐ do NOT verify file integrity after transfer ⓘ

☒ encrypt transfer ⓘ

☐ Skip files on source with errors ⓘ

☐ Fail on quota errors ⓘ

☐ Apply filter rules to the transfer ⓘ

Notification Settings

☒ Disable success notification ⓘ

☐ Disable failure notification ⓘ

☐ Disable inactive notification ⓘ

Schedule Start ⓘ

Repeat ⓘ

every hours

end ⓘ



Avoids errors for locked files due to incomplete transfers (none as of lately)


Encrypt data when handling sensitive data


Notifications are only received in case of failure or stopped timer


Regular transfer to facilitate semi-real-time data analysis

Globus Timers – Automating data transfer

 Activity


 FILE MANAGER


 Tasks













 Timers

Timers are scheduled and repeating transfer tasks. They can be created while setting up a transfer in [File Manager](#) using settings under the [Transfer & Timer Options](#) tab

☐ ACTIVE ☐ COMPLETED

filter by timer name 

Sort 

 F02 FMS-ManGO /C/KULeuven/data/CowBase/OUTPUT/ to /set/home/Livestock_Technology/02_Maes/01_full_table/	  			
LATEST REQUEST 10/3/2024, 04:31 PM	NEXT REQUEST 10/3/2024, 06:05 PM	EXECUTIONS 415 - no limit set	FREQUENCY every 6 hours	ENDS ON n/a
 Timer F01 CowBase ManGO-A2H /set/home/Livestock_Technology/01_Hooibeekhoeve/ to /var/lib/globus/data/CowBase/OUTPUT/d_hooibeekhoeve/	  			
LATEST REQUEST 10/3/2024, 04:31 PM	NEXT REQUEST 10/3/2024, 05:20 PM	EXECUTIONS 45 - no limit set	FREQUENCY every 6 hours	ENDS ON n/a
 Timer F02 CowBase ManGO-A2H /set/home/Livestock_Technology/02_Maes/ to /var/lib/globus/data/CowBase/OUTPUT/d_maes/	  			
LATEST REQUEST 10/3/2024, 04:31 PM	NEXT REQUEST 10/3/2024, 05:20 PM	EXECUTIONS 45 - no limit set	FREQUENCY every 6 hours	ENDS ON n/a

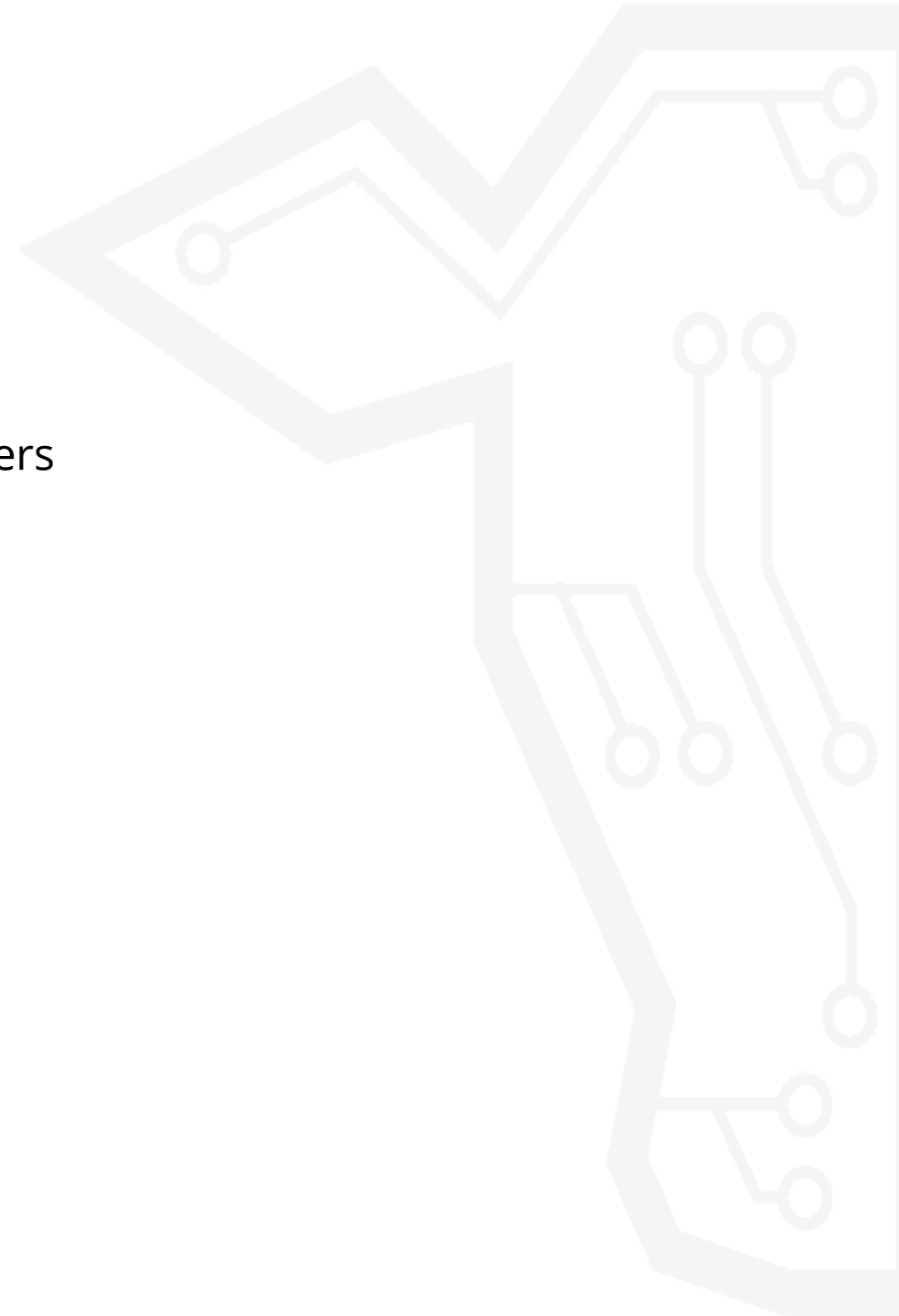
Globus/ManGO – current & future

Current setup

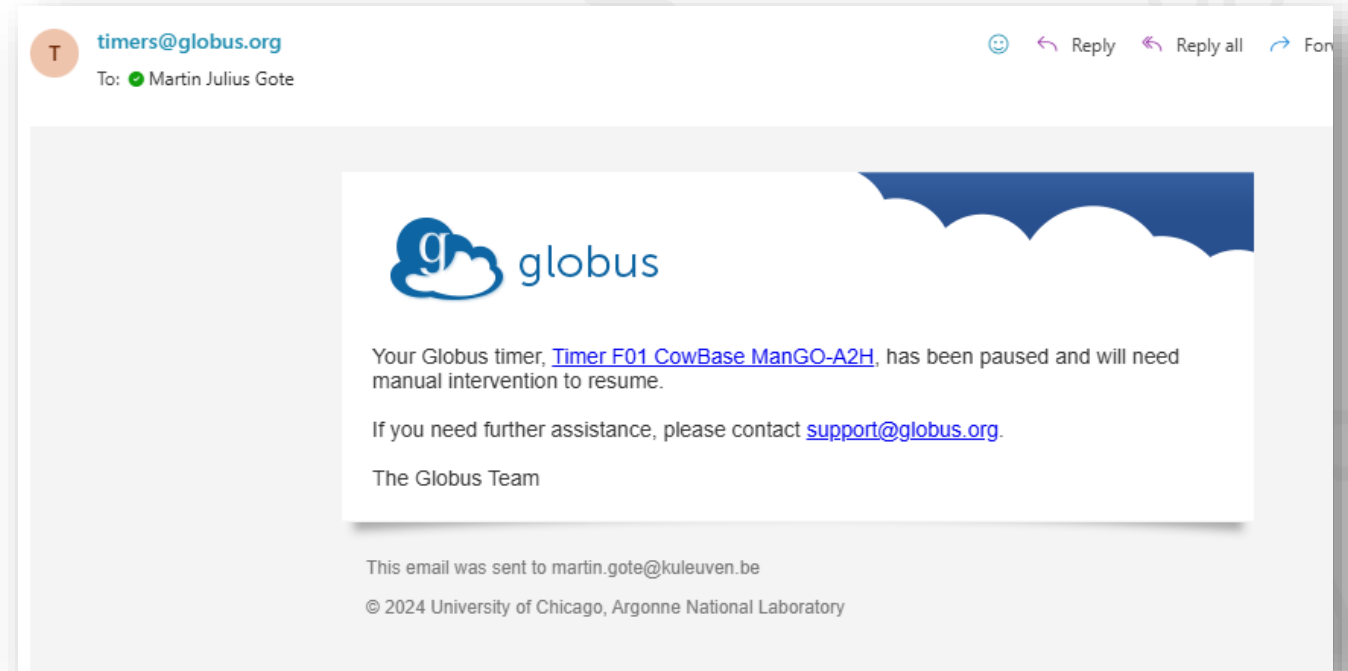
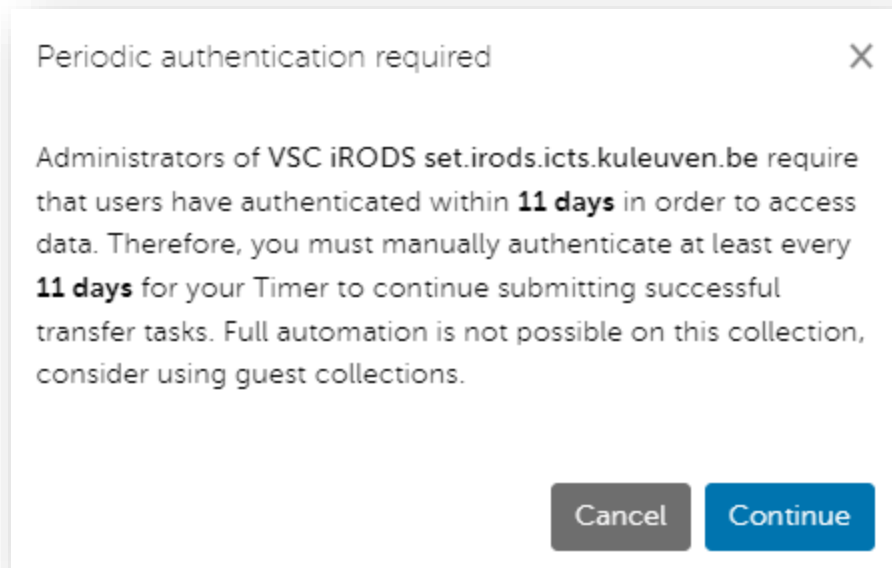
- Use case 1: Currently running with two farms since 07/2022
 - 4 transfers/day & 2 transfers & 2 farms → ~13000 transfers
- Use case 2: Running for one farm since 08/2023
 - 1 transfer/day & 2 transfers & 1farm → ~840 transfers

Future setup

- Use case 1: Run for 10-15 farms in second trial

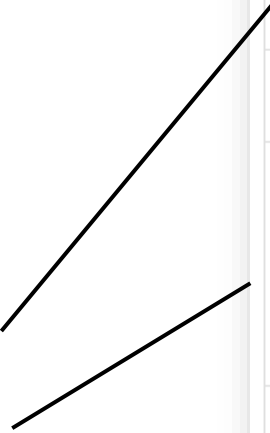


Globus – Timers – insights



Globus – Timers – insights

Reducing the number of files that need to be scanned reduces the total transfer time



9/28/2024, 12:07 AM	succeeded
Scanned 374 file(s)	
9/28/2024, 12:07 AM	succeeded
9/28/2024, 12:06 AM	succeeded
Scanned 5000 file(s)	
9/28/2024, 12:05 AM	started
Starting sync scan	
9/28/2024, 12:05 AM	started
<pre>{ "type": "GridFTP Transfer", "concurrency": 4, "parallelism": 4, "pipelining": 20 }</pre>	

Globus – Timers – insights

9/28/2024, 12:08 AM	succeeded
<pre>{ "files_succeeded": 12 }</pre>	
9/28/2024, 12:08 AM	progress
<pre>{ "bytes_transferred": 42064341, "mbps": 5.26, "duration": 64.0 }</pre>	
9/28/2024, 12:07 AM	started
<pre>{ "type": "GridFTP Transfer", "concurrency": 4, "parallelism": 4, "pipelining": 20 }</pre>	

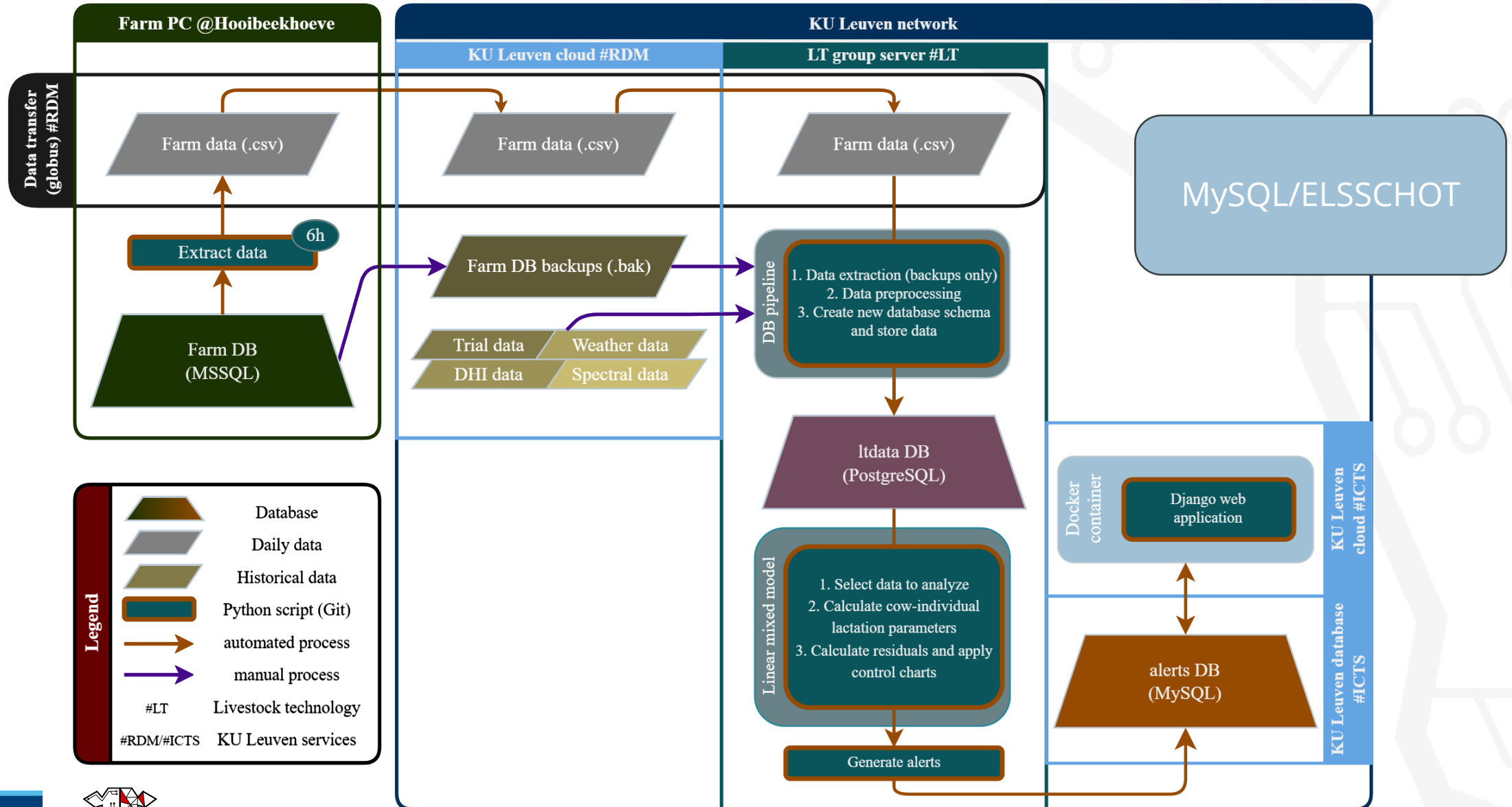
Farm-ManGO

10/3/2024, 11:23 PM	succeeded
<pre>{ "files_succeeded": 13 }</pre>	
10/3/2024, 11:23 PM	progress
<pre>{ "bytes_transferred": 42078130, "mbps": 64.49, "duration": 5.22 }</pre>	
10/3/2024, 11:23 PM	started
<pre>{ "type": "GridFTP Transfer", "concurrency": 4, "protocol": "Mode S" }</pre>	

ManGO-server

Speed of transfer
mainly limited due
to farm internet

Use Case 1: A feedback system for farmers

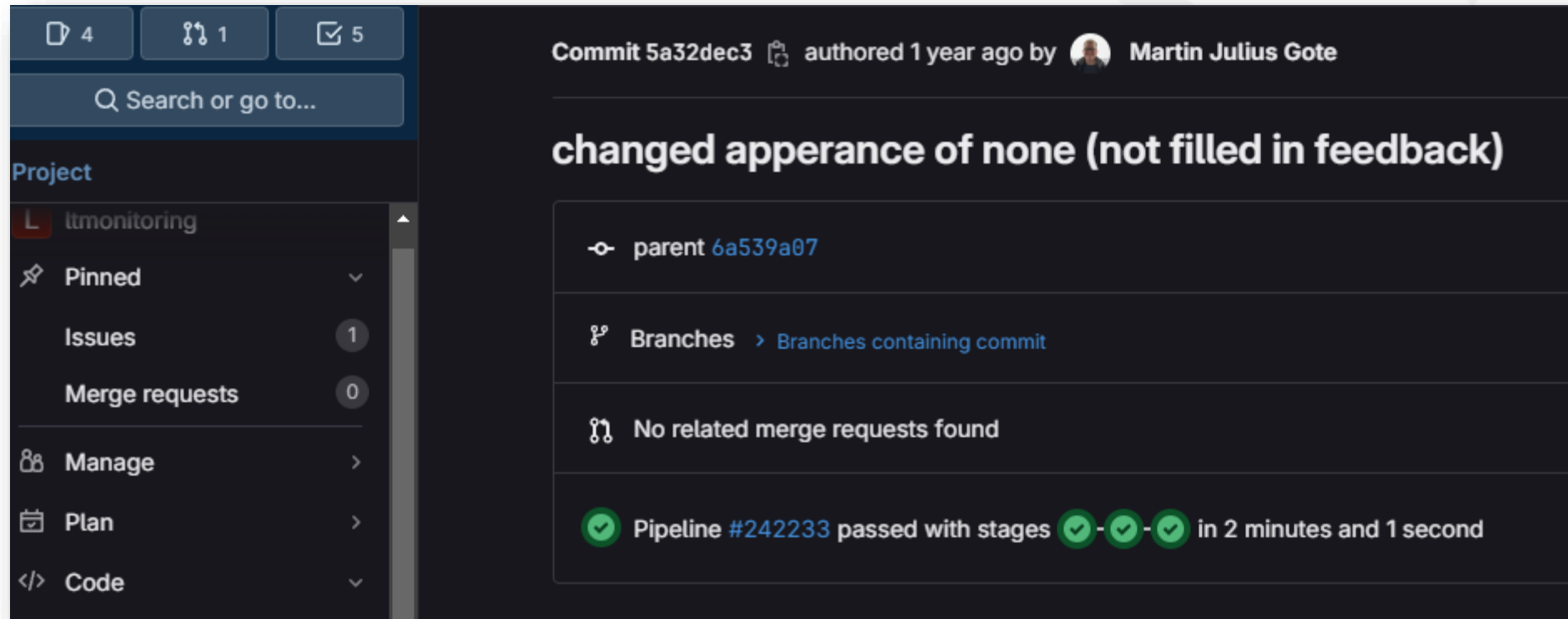


Use Case 1: Alert database – KU Leuven MySQL

The screenshot displays the phpMyAdmin web interface. On the left, a tree view shows the database 'a2hlt' expanded, listing various tables. On the right, the 'Structure' tab is active, showing a table list with columns 'Table' and 'Action'. The list includes 16 tables, each with a star icon and a 'Browse' link. At the bottom of the table list, it says '16 tables' and 'Sum'.

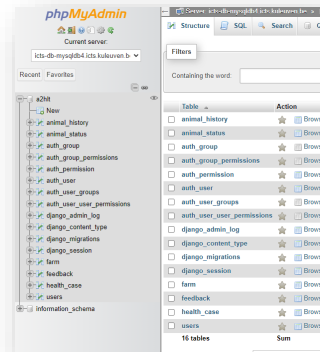
Table	Action
<input type="checkbox"/> animal_history	★ Browse
<input type="checkbox"/> animal_status	★ Browse
<input type="checkbox"/> auth_group	★ Browse
<input type="checkbox"/> auth_group_permissions	★ Browse
<input type="checkbox"/> auth_permission	★ Browse
<input type="checkbox"/> auth_user	★ Browse
<input type="checkbox"/> auth_user_groups	★ Browse
<input type="checkbox"/> auth_user_user_permissions	★ Browse
<input type="checkbox"/> django_admin_log	★ Browse
<input type="checkbox"/> django_content_type	★ Browse
<input type="checkbox"/> django_migrations	★ Browse
<input type="checkbox"/> django_session	★ Browse
<input type="checkbox"/> farm	★ Browse
<input type="checkbox"/> feedback	★ Browse
<input type="checkbox"/> health_case	★ Browse
<input type="checkbox"/> users	★ Browse
16 tables	
Sum	

Use Case 1: Web application – GitLab KU Leuven (docker)

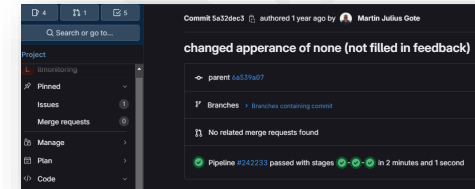


Use Case 1: ELSSCHOT Container as a service

MySQL database



Django webapp
(docker)



HOSTED BY

ASSOCIATIE
KU LEUVEN

ELSSCHOT: CONTAINERS AS A SERVICE

MARTIN JULIUS GOTE

CONTAINERS

Search by container name

LAUNCH NEW CONTAINER

	Name	Team	Organization	Status	Last Updated	Actions
+	Itmonitoring	a2hlt	set	● running	344 days ago	<div></div> <div></div>

Use Case 1: CowNet – A dynamic monitoring and feedback web application

The screenshot displays the CowNet web application interface. The top navigation bar includes the logo, the text "Dairy herd monitoring - back 2 farmers hooibeekhoeve", and links for "Attentie lijst", "Feedback geschiedenis", "Kudde overzicht", "Contact", "Over ons", and "Log Out".

The main section is titled "Attentie lijst" and contains a table with the following columns: Dier nummer, DGN, melk [kg], melk LV [kg], melk RV [kg], melk LA [kg], melk RA [kg], laatste data, Melk geschiedenis, and Feedback geschiedenis. The table is divided into two sections: "Alarm" (red header) and "Attentie Normal" (green header).

Dier nummer	DGN	melk [kg]	melk LV [kg]	melk RV [kg]	melk LA [kg]	melk RA [kg]	laatste data	Melk geschiedenis	Feedback geschiedenis
Alarm									
3843	43	8,82 (10,66)	1,85 (2,09)	1,62 (2,01)	2,91 (3,33)	2,4			
7736	281	10,15 (10,87)	1,96 (2,84)	2,94 (2,75)	3,10 (3,08)	2,1			
8649	333	13,96 (18,20)	3,38 (2,85)	0,00 ()	4,95 (7,70)	5,6			
Attentie Normal									
2222	11	13,72 (15,11)	3,35 (3,85)	0,00 ()	4,95 (5,49)	5,4			
7711	40	10,90 (10,29)	2,19 (2,17)	2,65 (2,23)	3,07 (2,97)	2,9			
7714	91	9,97 (11,19)	2,39 (2,66)	2,41 (2,71)	2,75 (3,03)	2,4			
7727	278	15,81 (15,80)	3,31 (3,46)	1,90 (1,81)	6,05 (5,74)	4,5			
7735	151	11,10 (11,32)	0,00 ()	3,42 (3,52)	3,76 (4,04)	3,9			
8860	204	9,83 (9,17)	2,33 (2,24)	2,28 (2,12)	2,71 (2,46)	2,5			
8874	38	8,58 (8,45)	1,99 (2,11)	2,17 (2,08)	1,95 (1,93)	2,4			

Two detailed feedback forms are shown below the table:

Form 1 (Dier nummer = 8874, Datum detectie = 19/06/2023 18:57):

- Zijn er symptomen?
- Vermoedelijke oorzaak?
- Opmerkingen:
-

Form 2 (Dier nummer = 7711, Diagnose = None, Datum detectie = 17/06/2023 12:45):

- Zijn er symptomen?
- Vermoedelijke oorzaak?
- Behandeld?
- Behandeld door wie?
- Opmerkingen:
-

Big thanks to Ingrid, Jef, and Ronny for helping to set this all up!!! – Questions?

