

DTU



Kurt S. Hansen & Nikola Vasiljević, DTU Wind Energy

Rescuing legacy data from obsolescence:

The WindData.com user-case

Short CV - Kurt S. Hansen Emeritus (Senior Scientist)

- MSc. Mech Engineering (1977) DTH
- DTU Wind Energy
 - Working area: research & education
- 44 years of experience within wind energy
 - Initial projects: (large) proto wind turbines, design & testing.
 - – **Database on Wind Characteristics** & data analysis as part of research projects.
 - Flow analysis of onshore and offshore wind farms.



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Introduction

- Research groups often possess a rich heritage of data spanning periods of several decades.
- As a consequence, the legacy data are typically unreadable and inaccessible due to obsolete formats and technologies in which they are provided.
- To prevent this from happening, DTU Wind Energy executed a pilot data rescue project and FAIRified the WindData.com data collection, moving it to a new technology stack.
- In this talk, we will present **process** and the **result** of this work.

Outline

- Database on Wind Characteristics
 - Introduction to the legacy dataset;
 - Vision, technology & contents;
- Requirements for the new database
- Implementation
 - Structure & transfer process
 - Data documentation
 - Examples of access to data and documentation
- Status for the transfer
- Wrap-up

Database on Wind Characteristics [objectives]

- Vast amounts of wind data from various locations

Visions

The database should be useful as a supporting tool to identify:

- Rare meteorological events;
- Distributions of wind speed and turbulence (time & shear);
- Spatial structure of turbulence;
- **Interaction:** meteorology ↔ wind turbine
- Spacing parameters in wind farms.
-

These data was initiated in 1996.

Database on Wind Characteristics

– FAIR before FAIR acronym was defined

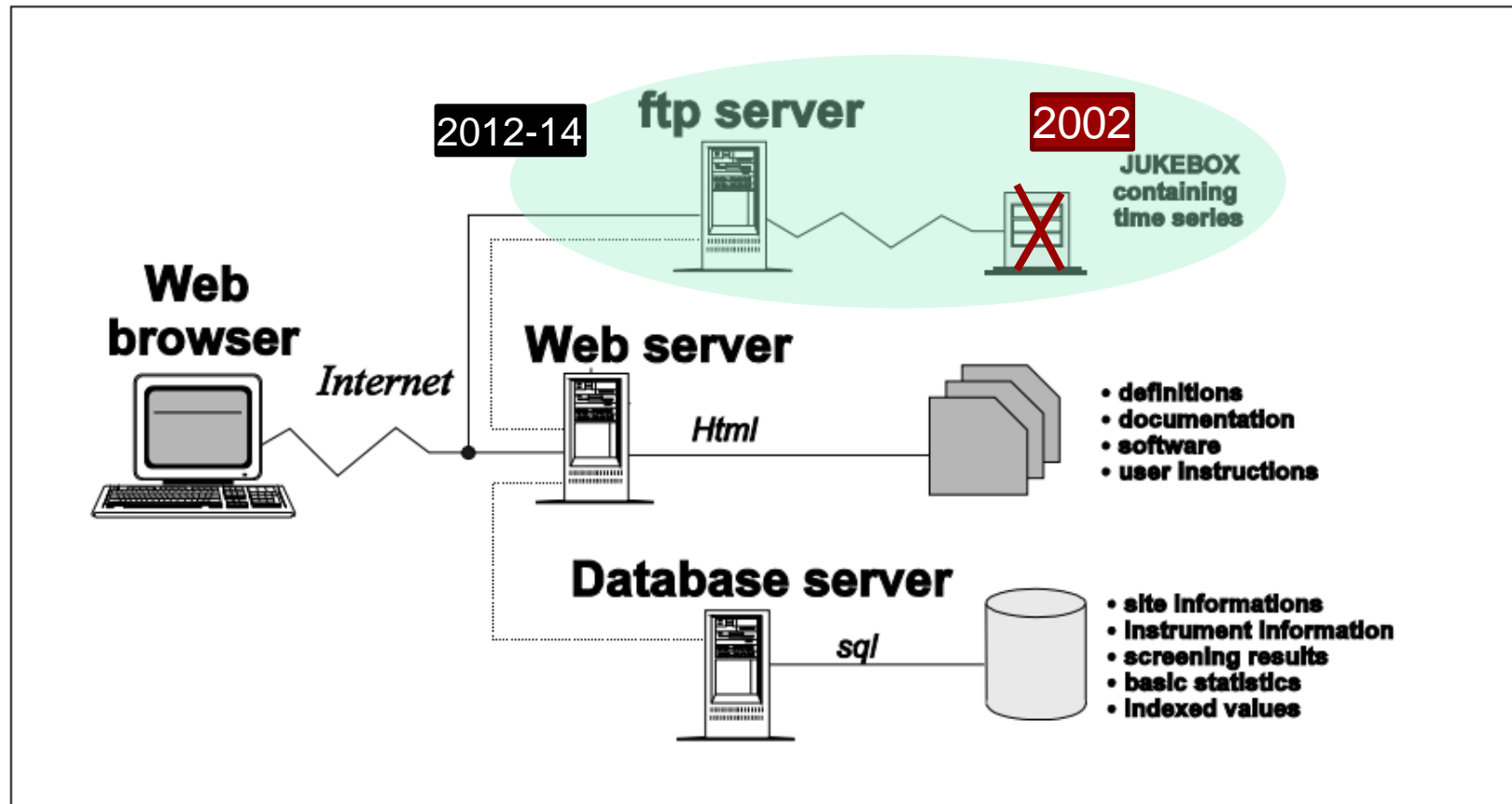
The procedure when receiving data included:

- Data conversion to a **standard format**.
- Screening for errors (=>quality index).
- Re-calculation of the statistics.
- Documentation of setup and instrumentation based on a **template**.

Technology – initial [1996]

- *Database*
 - Borland Interbase => **MySQL**
 - User accounts (guest, users & administration)
 - Simple queries & advanced queries
- *Webserver*: MS IIS => **Apache**
- *Online queries*: **PHP**
 - FTP => **sFTP**
 - Online graphic tool
- **Challenges**
 - Updates & ethical hackers

Structure of database server[s] in years 1996-2002

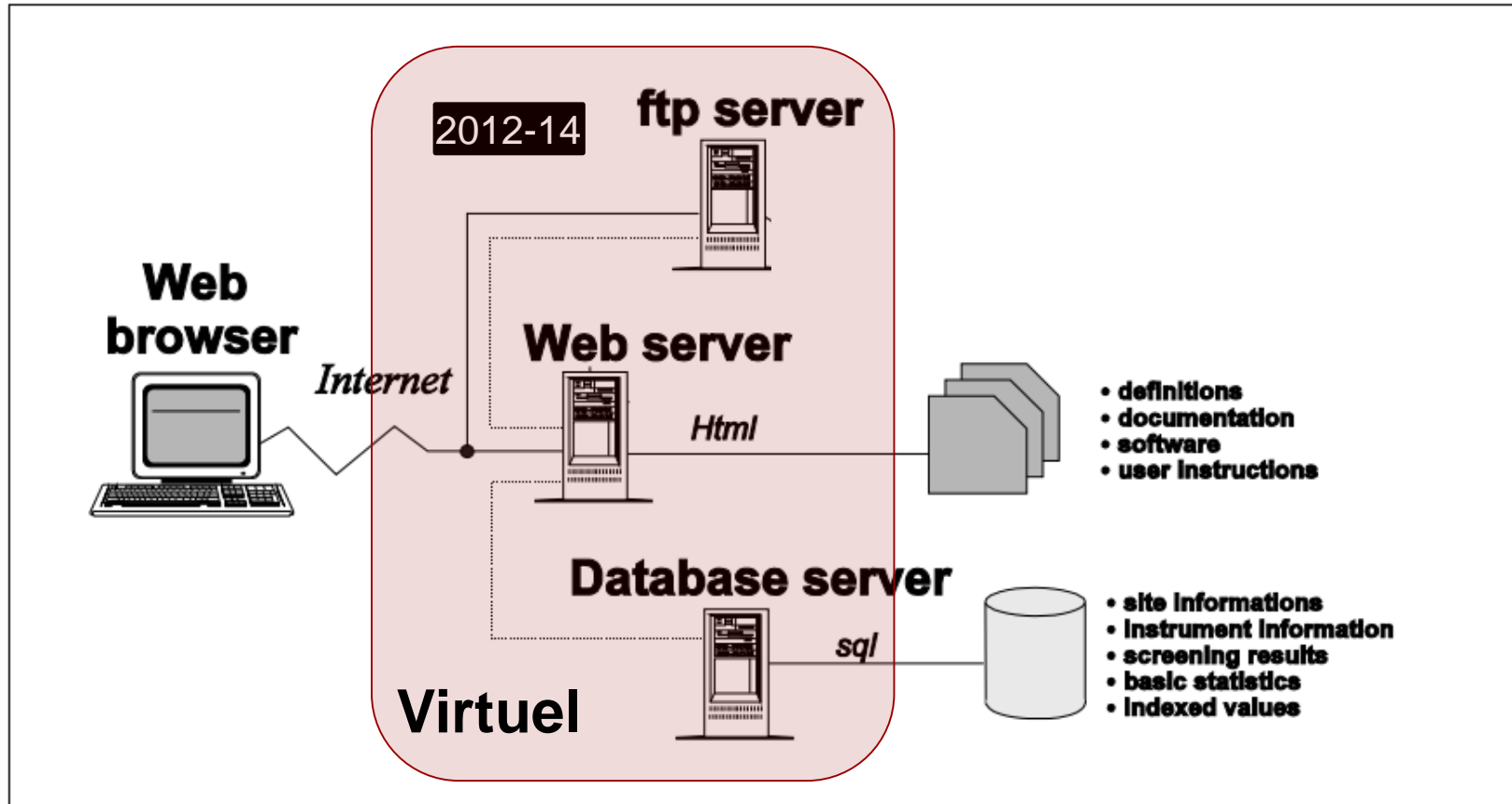


Jukebox with 150 CD's



105 GB

Structure of database server after 2014



Database on Wind Characteristics [contents]

FTP server 109GB

- ***Time series of wind measurements***
 - Documentation
 - Statistics
 - Time series (1-40 Hz)
 - *Max. 62 sites*
 - *~ 196187 hours of measurements*
- ***Time series of wind turbine loads***
 - Documentation
 - Statistics
 - Time series (1-40 Hz)
 - 7 sites
 - *~ 6533 hours of measurements*
- ***Resource data (statistics)***
 - Documentation
 - Statistics
 - *Max. 49 sites*
 - *~ 1342132 hours of statistics*
- ***Wind farm data (SCADA; statistics)***
 - Documentation
 - Statistics
 - *2(3) sites*
 - *~ 19141 hours of statistics*

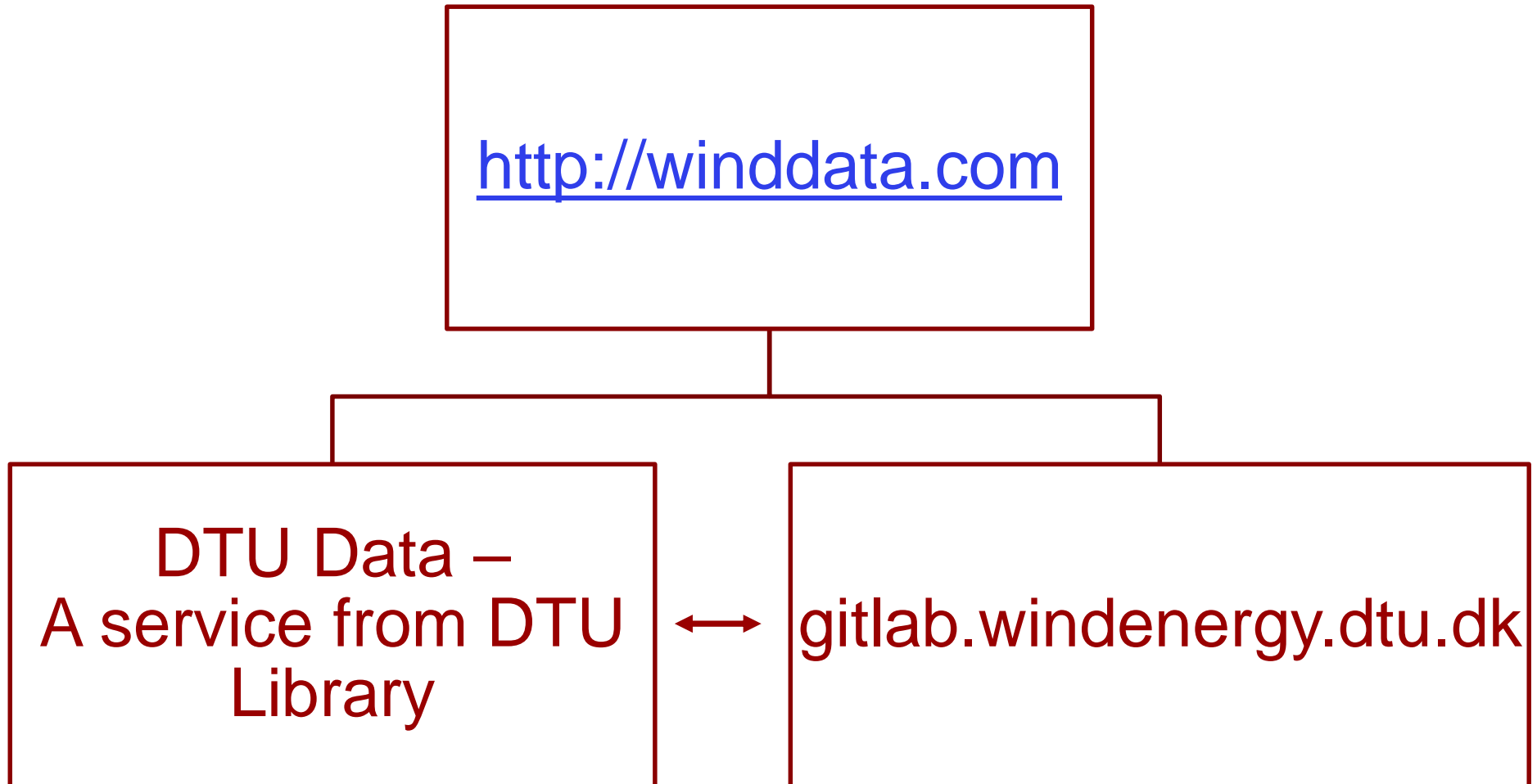
MYSQL: 16GB

> 100 sites

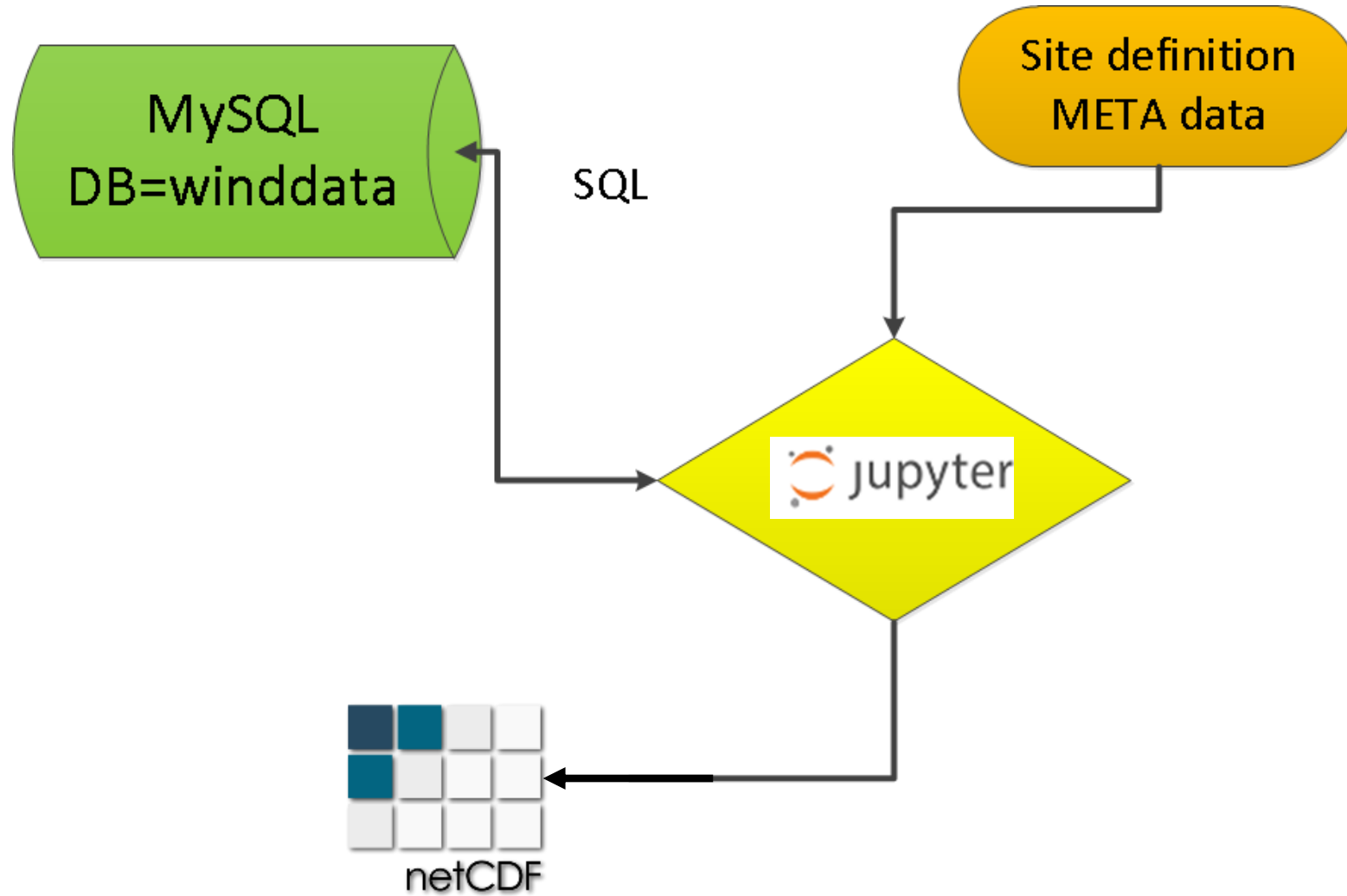
Requirements for new database

- Data should be FAIR;
- Global and persistent findability, but also discovery through **winddata.com**, a solid brand for quality wind data;
- All data should have a clear accessible criteria;
- Data should be reusable through detailed documentation and by clear copyright information;
- Interoperable file formats should be used for the data;
- Easy citation of specific dataset;
- **Low maintenance.**

New platform structure



Data transfer process





Resource data from the Godhavn met mast

[Cite](#) [Download all \(19.13 MB\)](#) [Share](#) [Embed](#) [+ Collect](#) [...](#)

Dataset posted on 15.04.2021, 10:44 by [Kurt Schaldemose Hansen](#), [Nikola Vasiljevic](#), [Steen Arne Sørensen](#)

This resource dataset consists of 10 minute wind speed and wind direction measurements from a small met mast at Qeqertarsuaq (Godhavn), Greenland. The period includes 10 years of measurements, which starts in 1991. Detailed documentation can be found [here](#).

Data files:

- 1) Godhavn_all.nc includes all periods
- 2) Godhavn_concurrent.nc only includes concurrent periods for all channels.

FUNDING

Internal

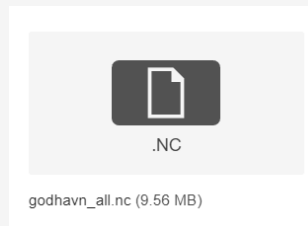
HISTORY

- 14.04.2021 - Submission date
- 15.04.2021 - First online date, Posted date

REFERENCES

- <http://doi.org/10.5281/zenodo.4580574>
- <http://doi.org/10.5281/zenodo.4580722>
- <https://gitlab.windenergy.dtu.dk/fair-data/winddata-revamp/winddata-documentation/-/blob/master/godhavn.md>

DTU Data
Ex. site=Godhavn



LOCATION

Latitude: 69.250833, Longitude: -53.513611

DATE

Start date: 1994-06-01 Stop date: 2002-07-14

TOPIC

- Siting;>Wind Mapping
- Siting;>Design conditions;>Extreme wind

MODELS

- Not applicable

ACTIVITIES

- Measurements;>Field experiment

EXTERNAL CONDITIONS

- Location;>Offshore;>Nearshore
- Terrain type;>Flat

DATA CATEGORY

- Meteorological data

Wind Energy Topics
<http://purl.org/neat>

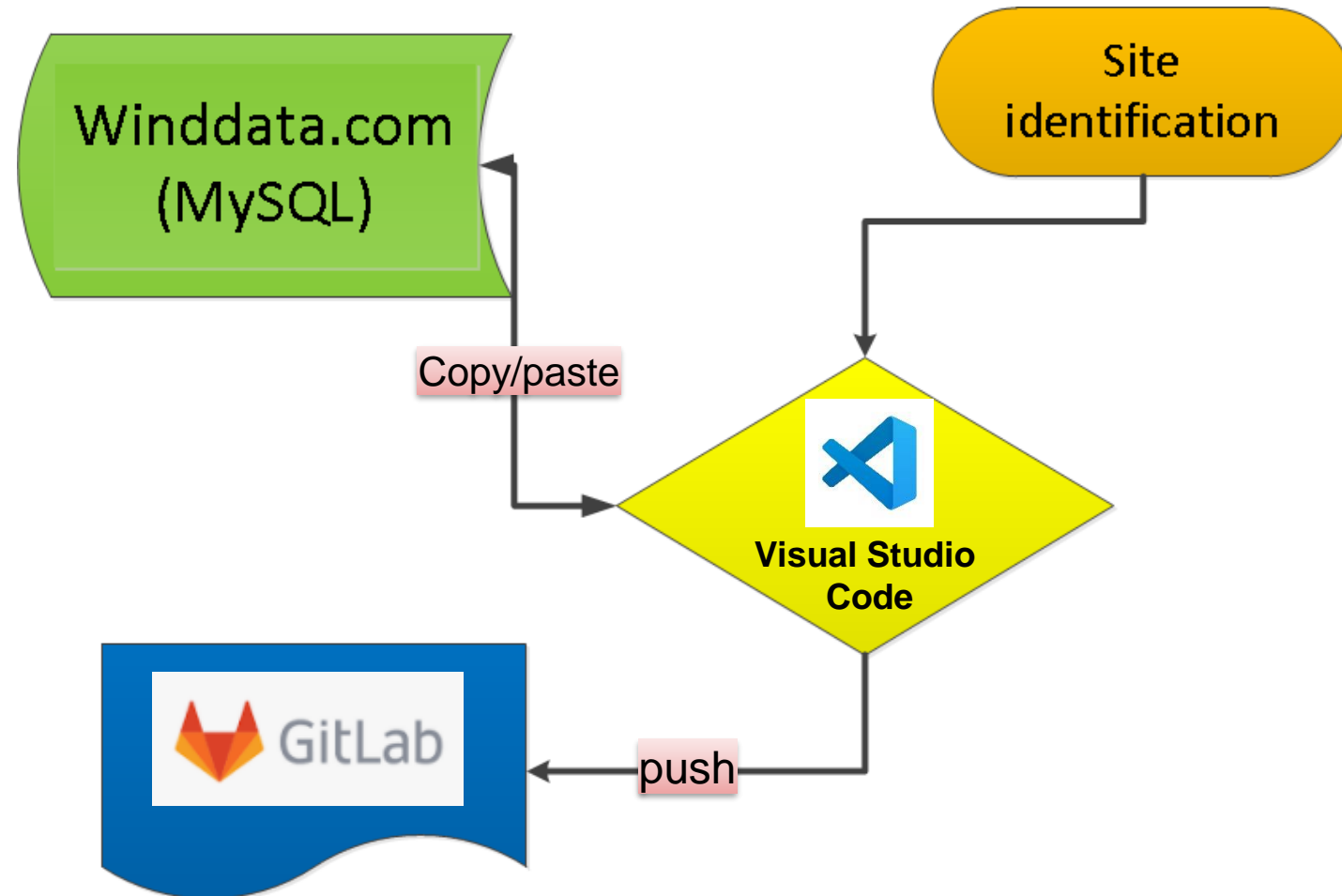
Wind Energy Activities
<http://purl.org/weave>

External Conditions Taxonomy
<http://purl.org/extract>

data.dtu.dk
[Download all](#)

gitlab.windenergy.dtu.dk
[Documentation](#)

Documentation process



https://gitlab.windenergy.dtu.dk godhavn.md

DTU Menu Search GitLab Sign in / Register

FAIR data > WindData Revamp > WindData Documentation > Repository

master winddata-documentation / **godhavn.md** Find file Blame History Permalink

Godhavn + kuhan authored 2 weeks ago bc3f5553

godhavn.md 4.39 KB **Gitlab** Ex. site=Godhavn Edit Web IDE

Background Information

- CLASSIFICATION: hill(rolling hills), coastal(water and land)
- COUNTRY : Greenland
- ALTITUDE : 0 [m]
- POSITION : 69° 15' 3" N 53° 30' 49" E (Note: Geohack often includes national high resolution maps, otherwise try Google Earth)

Short summary

This resource dataset consists of 10 minute wind speed and wind direction measurements from a small met mast at Qeqertarsuaq (Godhavn),Greenland. The period includes 10 years of measurements, which starts in 1991.

<https://gitlab.windenergy.dtu.dk/> => **godhavn.md**

1. List of mast signals

SCROLLED TO BOTTOM

ACKNOWLEDGMENTS

- Acknowledgement : Niels Nielsen, Institute of Geography, University of Copenhagen.
- E-mail: nn@geogr.ku.dk
- INSTITUTION : Institute of Geography, University of Copenhagen
- ADDRESS : Øster Voldgade 10, DK-1350 Copenhagen K
- TEL/FAX : Ole Humlum / N.Nielsen
- CONTACTS : Niels Nielsen
- LINKS : <http://www.geogr.ku.dk/>
- COLLABS : Copenhagen University
- FUND AGENTS : Internal
- PERIOD : 1991-2001
- Naming_authority : 'DTU Data'
- DOI : '<https://doi.org/10.11583/DTU.14153240>'

Gitlab
Ex. Godhavn

DOI to
DTU Data:
Godhavn

Public data

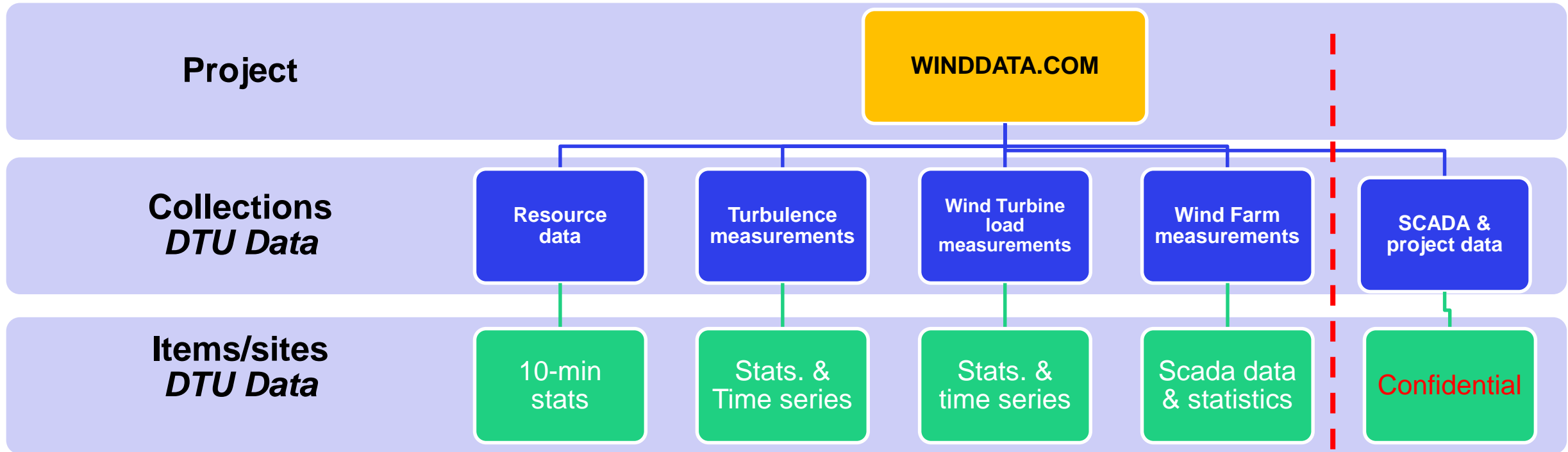
1. Resource data (NetCDF)

DTU Data structure

Terminology:
1) Item = site
2) Collection = group of items

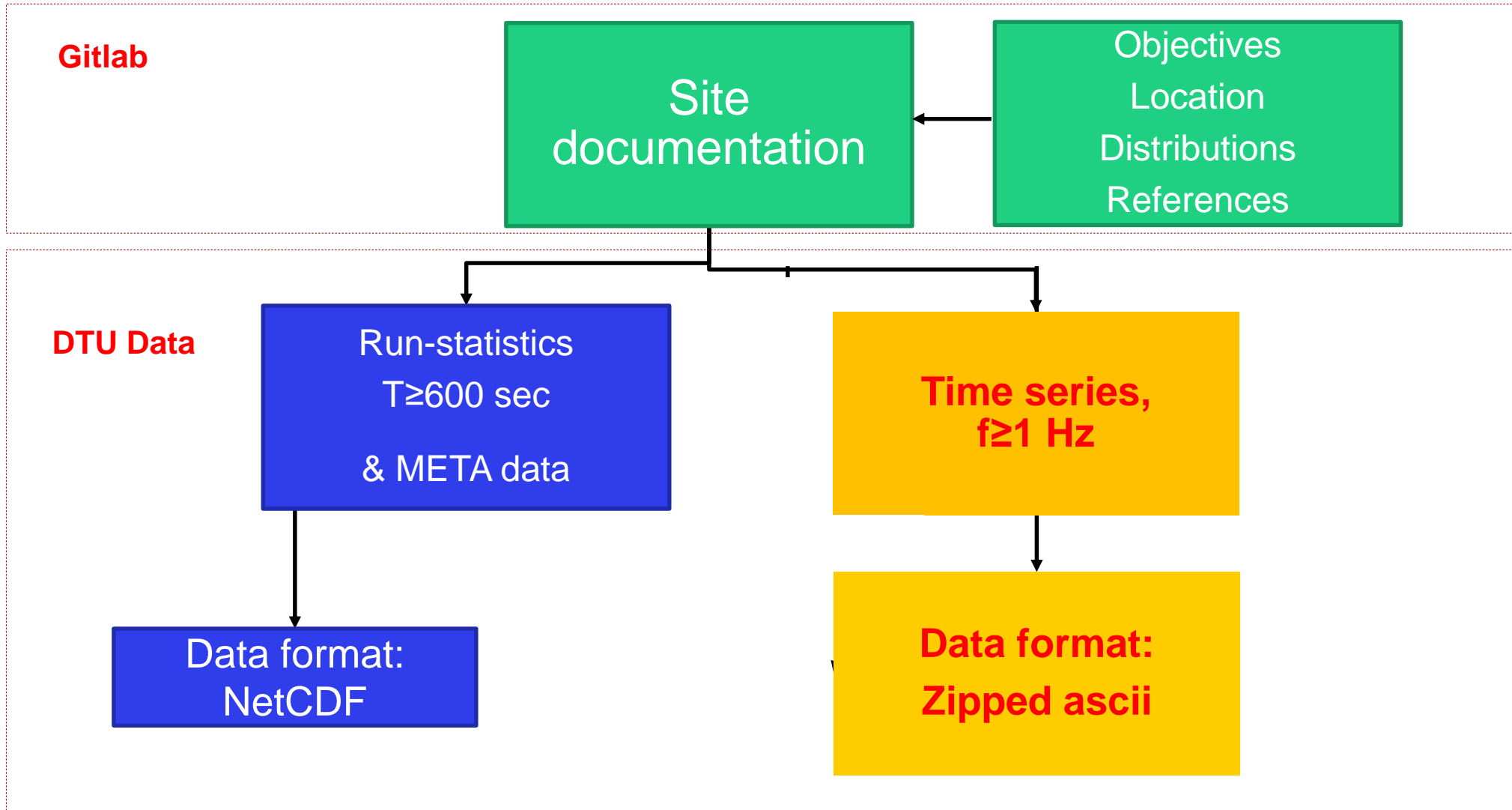


DTU Data: Database on Wind Characteristics



Documentation is located on: *Gitlab/Fair data/Winddata Rewamp/*

Documentation of *Time series of measurements*



Status for winddata.com on DTU Data

- Collection of wind resource data finalized 😊
- Collection of time series of wind measurements (>85%)
- Time series of structural loads (66%)
- Wind farm data (33%)
- Internal SCADA & Project data - overview 😊

Database on Wind Characteristics

Wrap-up

- Five data collections have been defined
 - Wind resource; time series and SCADA data.
- Major part of winddata.com including documentation has been transferred.
- Metadata of both statistical and raw time series are publicly accessible.
- A platform for future publication of wind energy related dataset has been established.

Thanks for your attention

Questions?

