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European Topic Centre
Land Use and Spatial Information

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BeETLe project:

ETL geo-spatial tool

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ETC-LUSI

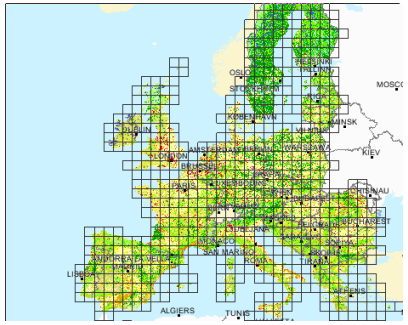
- European Topic Centre on Land Use and Spatial Information (Universidad Autónoma de Barcelona):

http://etc-lusi.eionet.europa.eu/

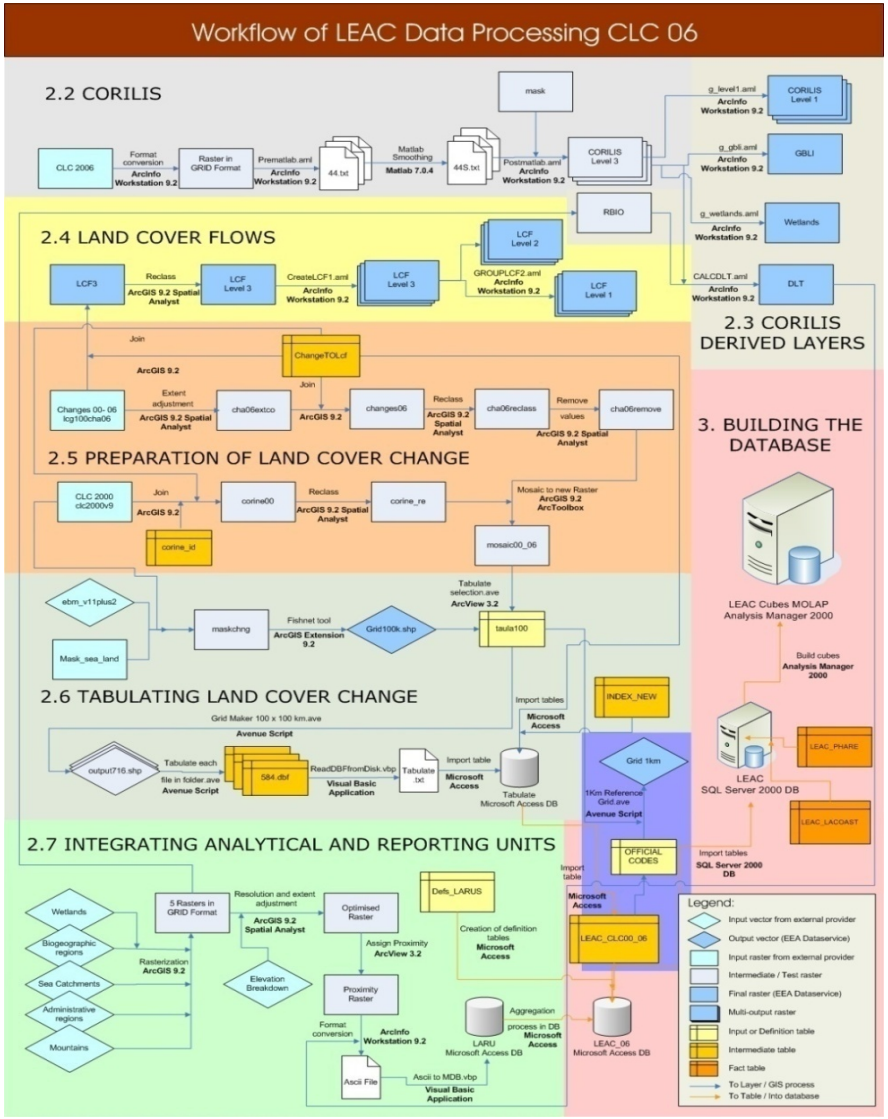
- European Consortium to support the European Environmental Agency (EEA)
- Main work field: Monitoring of land use and land use changes, and their environmental consequences
- Other thematics related with spatial information: coasts, ecosystem accounting...

ETC-LUSI

- Manages a lot of information at European scale
  → Data has big size
  → Data Types: vector, raster and non-geo
- Data is updated periodically
  → Repetitive work-flows
- Several projects at European scale: FP-7, Espon,
- Other projects at national and regional scale



Use case: LEAC project
Current methodology



- Several tools and programming languages
- Mainly interactive processes

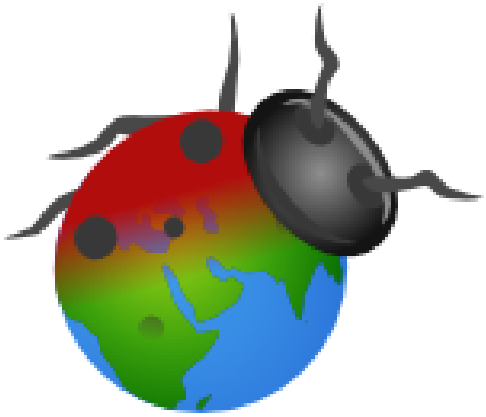
Use case: LEAC project
Current methodology problems

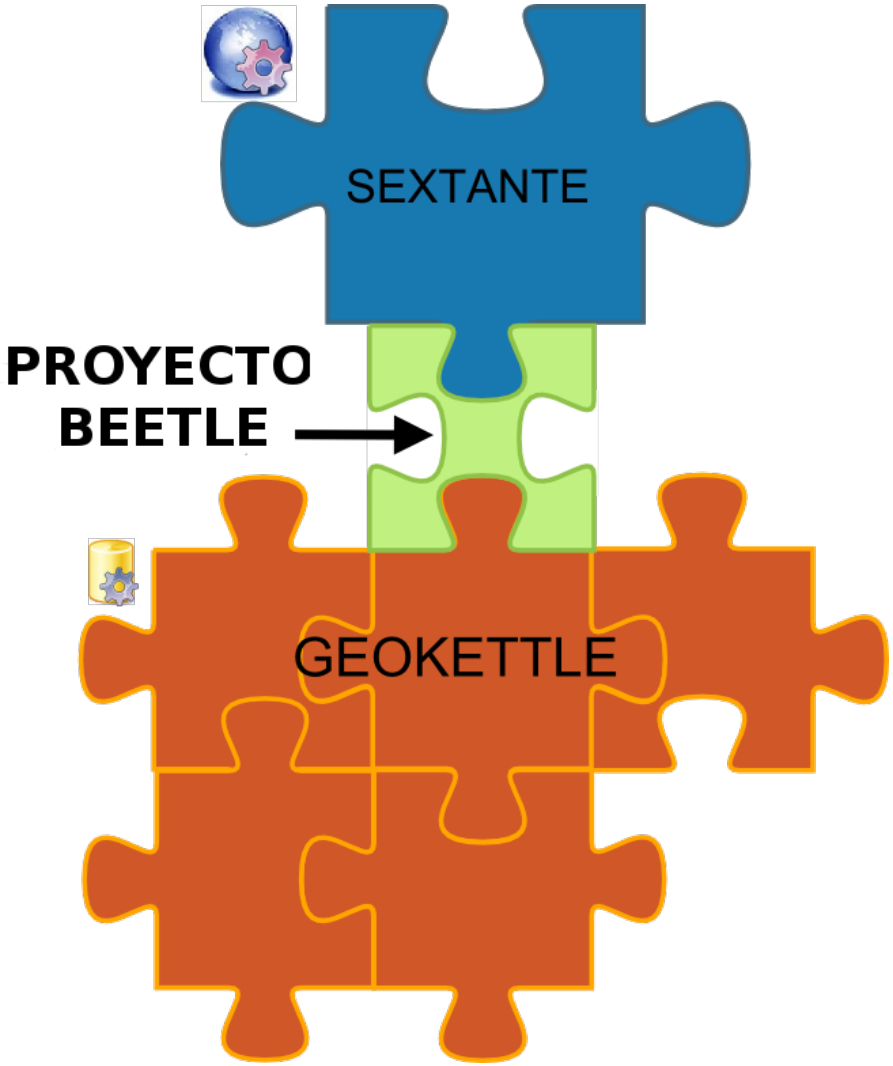
- Several tools:
  → Experienced users
  → License costs
- Format conversions → Processing time
- Interactive processes → User time
- Work-flows hard to to standardise
  → human error
- Work-flows hard to document

Limitations or errors in software: “in the next version or next service pack”

Solution: BeETLe project

- ETL geo-espatial tool
- Based on (Geo-)Kettle and Sextante (+Grass?)



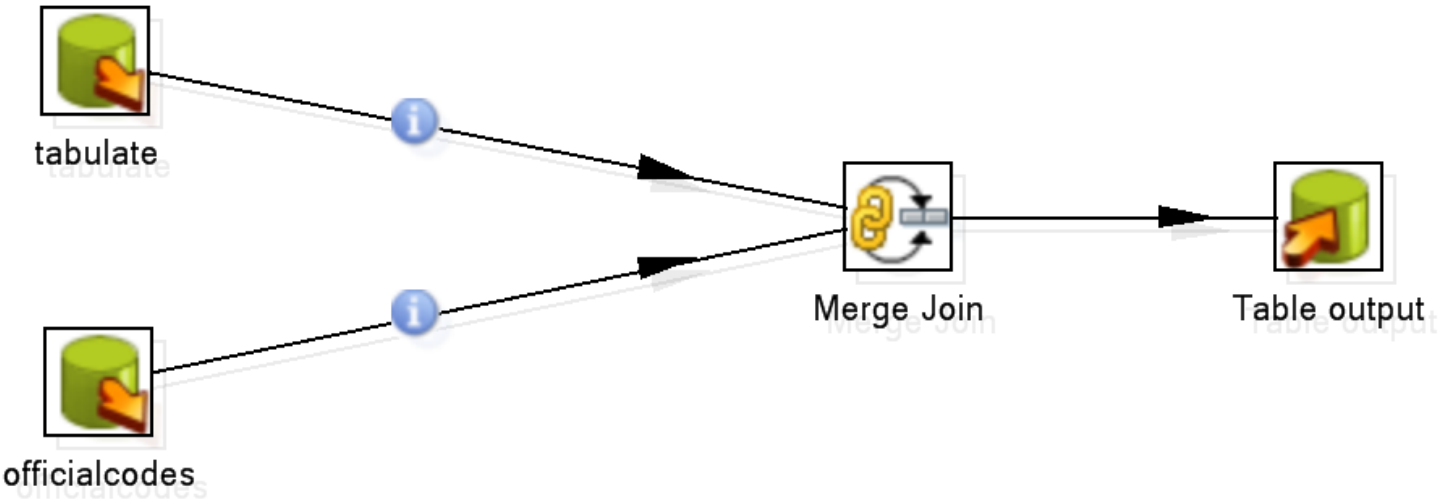


Solution: BeETLe project

- Other solutions were analysed: Talend
- Decision was taken based on:
  - Maturity of the project
  - Community
  - Leader organization supporting the project (Pentaho, Spatialytics, University of Laval).
  - Future plans

ETL (Extract, Transform, Load)

- Tools to define work-flows to automate tasks:



- The model documents the work-flow in a formal way
- Parallel process execution

Geokettle - ETL for Geospatial Data

Kettle (Pentaho Data Integration):

- **ETL open source tool (LGPL)**
- Part of the BI suite designed by Pentaho

GeoKettle

ETL for Geospatial Data:

- Kettle extension with spatial support
- Limited support to vector operations (there is no raster support)
- Developed by the **GeoSOA research group at University of Laval, Canada.**

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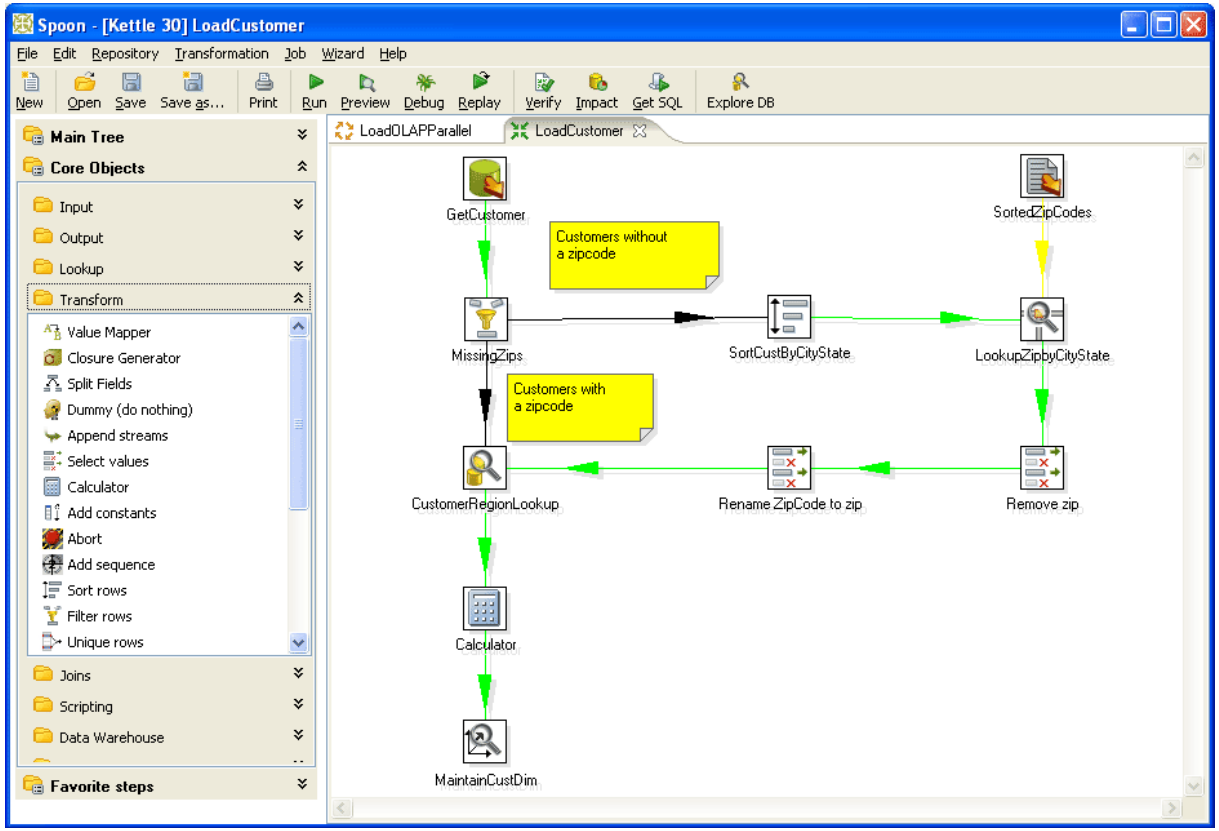
Kettle

- Easy and intuitive interface
- Parallel and distributed execution
- High number of data sources and transformations available

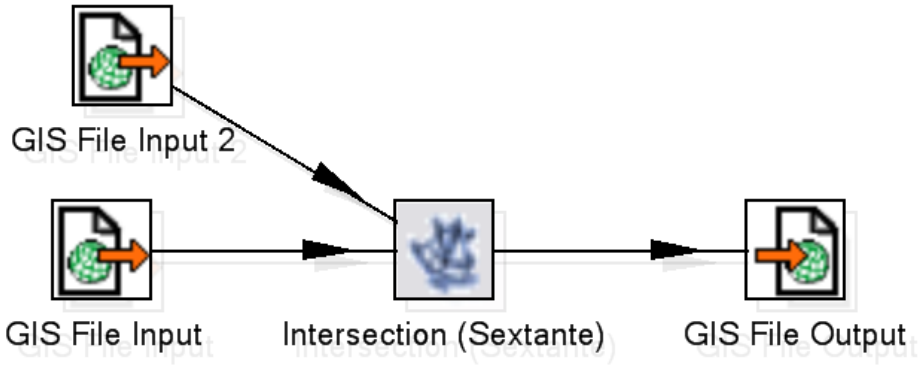


What does BeETLe bring to GeoKettle?

	Geokettle	BeETLe
License Type	LGPL	LGPL
Number of GIS formats supported	4	6
Programming Language and libraries	Java JTS GeoTools	Java JTS GeoTools, Sextante
Raster Support	NO	SI
Support vector	SI	SI
Vector Analysis Operations	> 25	> 100
Raster analysis operations	No	> 100
Parallel and distributed processing	Yes	Yes
Visor Cartográfico integrado Integrated Mapping Viewer	No	No

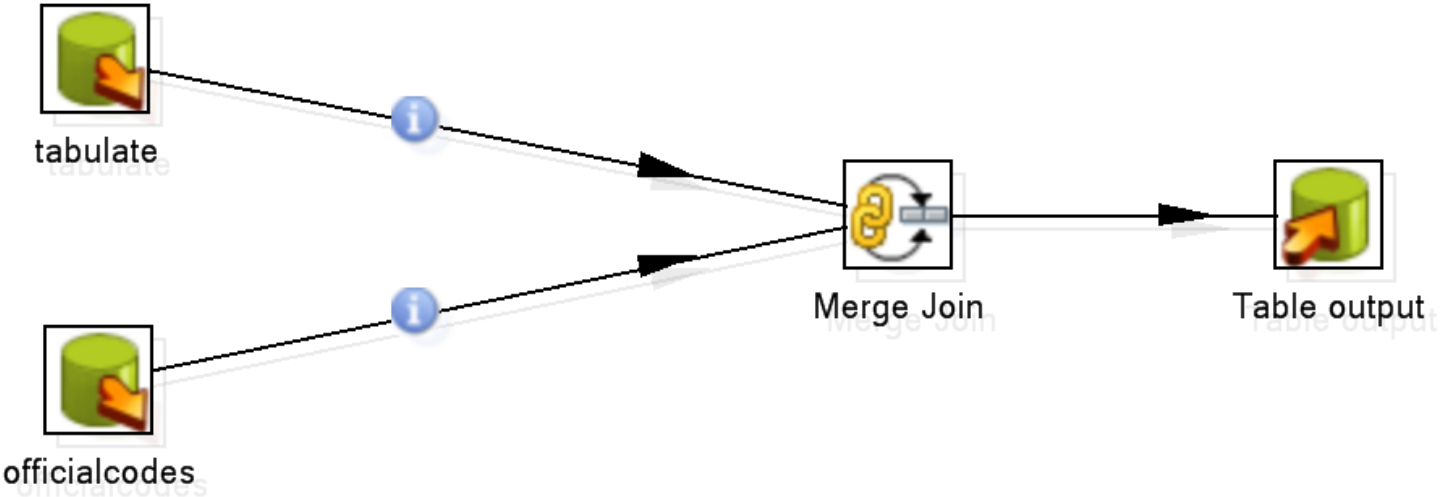
BeETLe: goals

- Unified technology:
  - Easy to use
  - Software licenses
  - Less format conversions – higher throughput



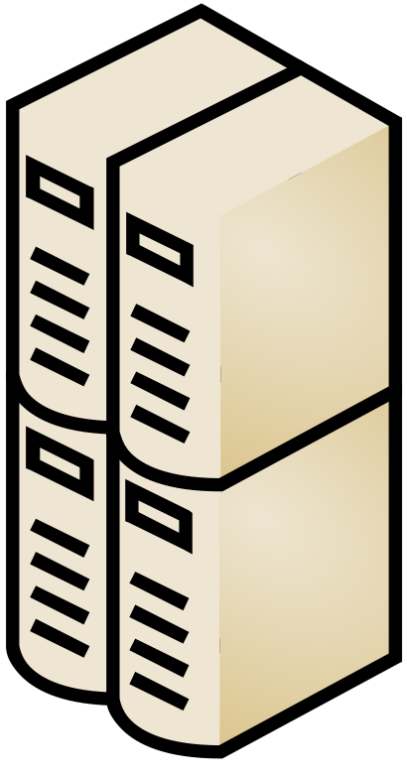
BeETLe: goals

- Standardization and documentation of work-flows:
  - Reduce human error
  - Processes can be reproduced and audited
  - Non-interactive processes: processing and user time



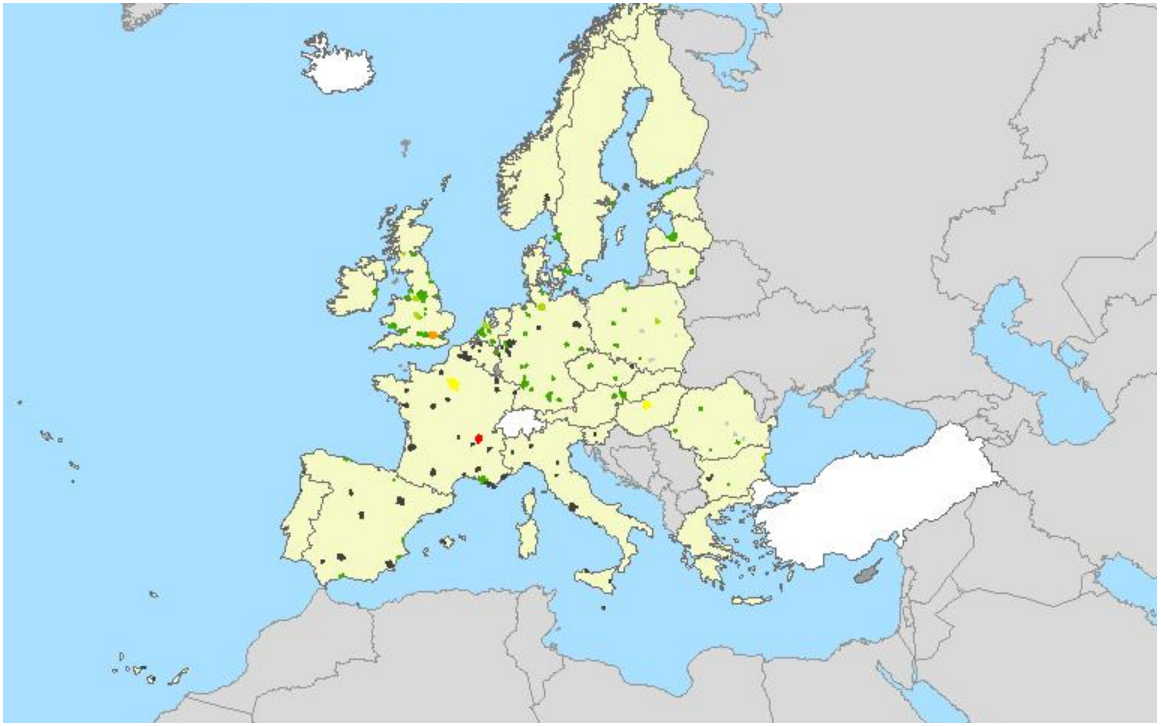
BeETLe: goals

- Parallel execution
  - Using the ETL technology
  - GIS specific issues



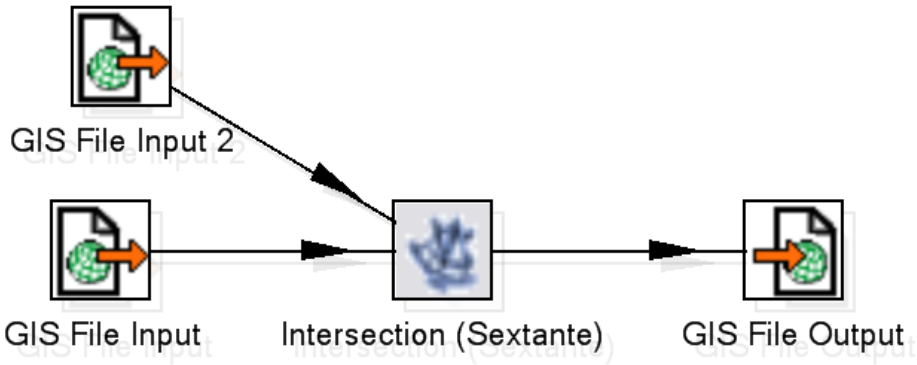
BeETLe: goals

- Ability to process big data
  - Free software: can be improved and adapted
  - Benefits from parallel processing (ETL tools)



BeETLe: features

- Supports raster, vector and table data
- All the Sextante algorithms available in a single ETL tool
- Plus all the features provided by Kettle



Kettle Transformations and Jobs

- Jobs:
  - Sequential execution
  - Component-level parallelism
- Transformations:
  - Concurrent execution
  - Data parallelism and parallel segmentation

Technical challenges

- Sextante vs Kettle architectures: Data pull vs Data push
- Sextante is not designed for parallel computing: API and implementation must be adapted

Technical challenges (II)

- Big data processing: limitations on base libraries (GeoTools, Sextante)
- Data and task distribution; result consolidation

Project Roadmap

- 1st milestone: Sextante as Kettle Jobs
  - no changes are required in Sextante
  - limited parallel execution
  - full range of Sextante algorithms available in Kettle
  - vector and raster support

Project Roadmap (II)

- 2nd milestone: Sextante as Kettle Transformations
  - bigger effort (requires changes in Sextante)
  - more powerful parallel execution
  - a sub-set of algorithms available as Transformations

Algorithm categories

- If the algorithm can be applied independently to different subsets of the data to get a valid result: Directly parallelizable algorithms. Examples:
  - raster sum, product, division, etc: can be calculated on overlapping tiles
  - vectorial buffer: can be calculated on each geometry

Algorithm categories (II)

- The algorithm can be applied to different subsets of the data, but a global post-process (and/or pre-process) is necessary to get a valid result: Indirectly parallelizable algorithms. Examples:
  - Tabulate area algorithm: the result of tabulating tiles does not match the global result, but these partial result can be easily merged
- Sequential algorithms: when no parallelism is possible

Thinking out loud: OGC Services

- Remote services (WMS, WFS, etc) as data sources
  - Use WFS as vector data input
  - Use WMS or WCS as raster data input
- WPS services as BeETLe transformations
  - Similar to Sextante algorithms, but remotely processed using 3rd party resources

Thinking out loud: WPS designer

- BeETLe as WPS flow modeller:
  - Design a complex data-flow in BeETLe
  - Be able to publish this data-flow as WPS service

Thinking out loud: Grass

- Sextante is developing a Grass module that allows to execute Grass algorithms from Sextante
- So we could use the Sextante connector to make Grass algorithms available in BeETLe

Links

- Official blog: http://beetle-project.blogspot.com/
- OSOR Project (SVN, tickets, development docuementation):
  http://forge.osor.eu/projects/etclusi/
- ETC-LUSI: http://etc-lusi.eionet.europa.eu/

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Muchas gracias Moltes gràcies Eskerrik Asko Muitas gracias

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Dziekuje Merci beaucoup Много Благодаря Obrigado

Paldies Ευχαριστώ Tack Thank you very much Dank u

Hvala Köszönöm Dekuj Multumesc Dakujem Danke Takk

Aitäh Grazzi Kiitos Grazie Dêkuji Спаси́бо شُكْرًا

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