# WordnetLoom – a Multilingual Wordnet Editing System Focused on Graph-based Presentation

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# Agenda

- Context and goal: a wordnet editor
- Basic assumptions for a wordnet editor
- Graph-based presentation
- Architecture
- Extensions and Applications
  - plWordNet development
  - Portuguese Wordnet
- Conclusions and Further Works

# Context and Goal

- Context
  - A wordnet is a complex graph of several types of nodes and edges
  - WordnetLoom 1.0: simultaneous browsing and editing wordnet graphs
  - Limitations: focus on monolingual wordnet and a quite inefficient thick client model
- Goal
  - a new re-built and expanded, version of WordnetLoom 2.0
  - based on an efficient software architecture of a thin client
  - facilitating work on a multilingual system of wordnets and more flexibility in enriching wordnet representation
  - discussion of its applications and variants, e.g. for *MultiWordnet of Portuguese*

# Basic Assumptions for a Wordnet Editor

- All editing actions should be done only via GUI
- Support for distributed group work on the central database
- Corpus-based wordnet development paradigm
  - extraction of the most frequent lemmas from a large corpus
  - corpus-based a measure of semantic similarity
  - clustering lemmas into *packages* – units of work assignments
- Substitution tests – intrinsic parts of the relation definitions to be stored and presented
- A relation graph is the basic means for both browsing and editing the wordnet structure
  - the user can freely browse the network unfolding as many levels and parts as he wants
  - *direct editing* – every link can be added or removed directly on the graph

# Basic Assumptions for a Wordnet Editor

- Construction of the mappings between wordnets should be also based on visual graph presentation
  - wordnets for different languages presented simultaneously on the screen as graphs
  - inter-lingual relations visually shown on the screen
  - *direct multilingual editing*
- Non-relational elements of descrption
  - e.g.: glosses, usage examples, and different attributes, e.g. stylistic register, sentiment polarity
  - different perspectives: not only graph-based, but also more dictionary-oriented
  - perspectives on data: *perspective of lexical units*, *visualisation* and *synsets*

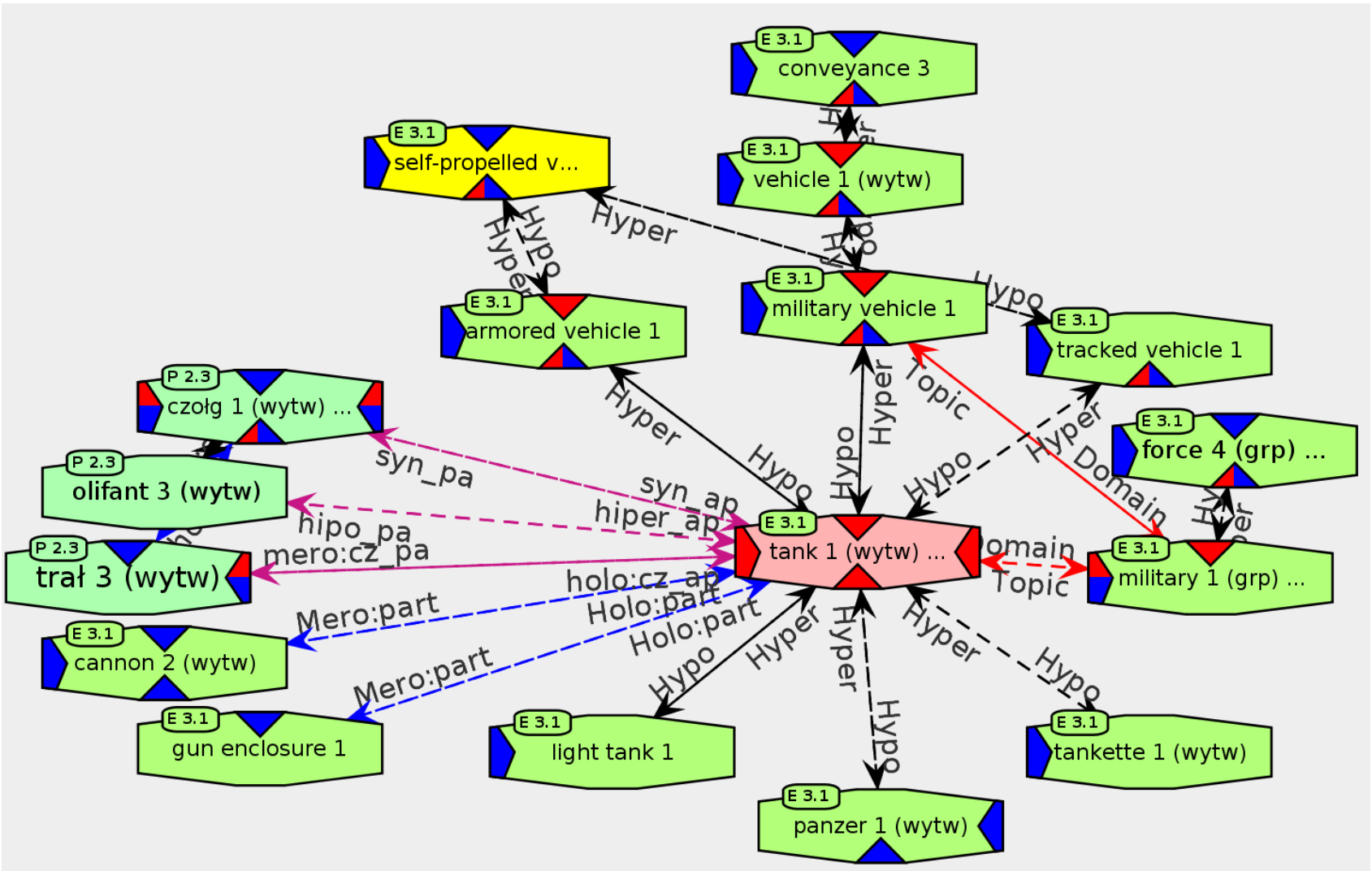
# Graph-based Presentation

## Assumptions

- Two types of wordnet relations
  - relations expressing some aspects of hierarchy (e.g. hypernymy/hyponymy, type/instance)
  - other relations (e.g. holo/meronymy)
- Inadequacy of typical presentation schemes, e.g.
  - *radial* : characteristic features of the hierarchical relations are lost
  - *tree-like*: the majority of its relations do not form a tree
- Unique combination of the radial and tree-like presentation
  - structure relations are presented along the vertical dimension
  - other relations are presented radially around synsets
- User initiated exploration: unfolding and browsing many levels, presentation of links on demand

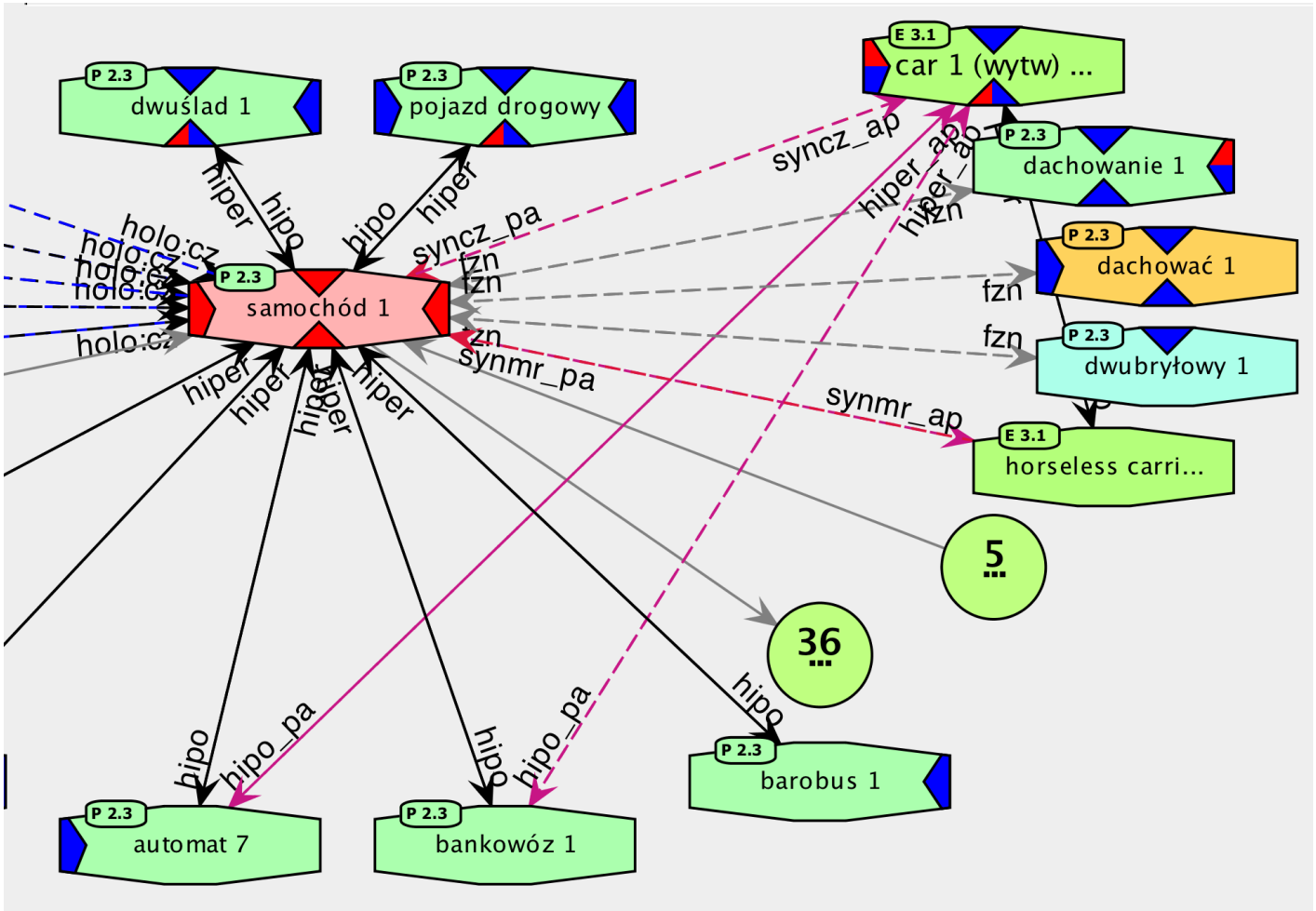
# Graph-based Presentation

## Example



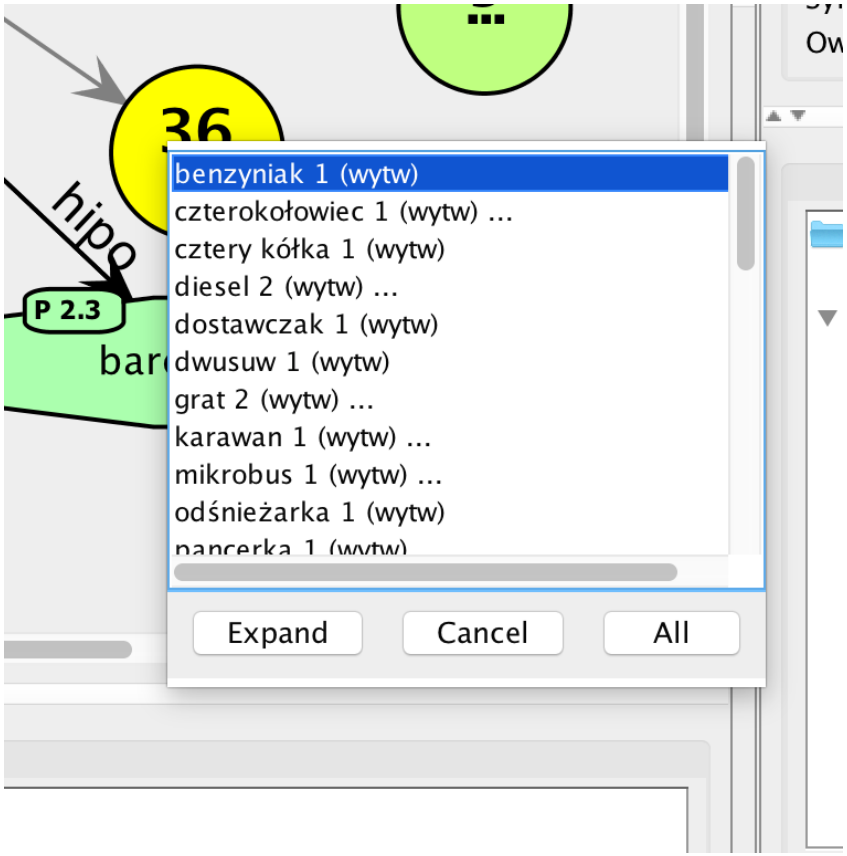
# Graph-based Presentation

## Example: hiding links



# Graph-based Presentation

## Example: expanding hidden links



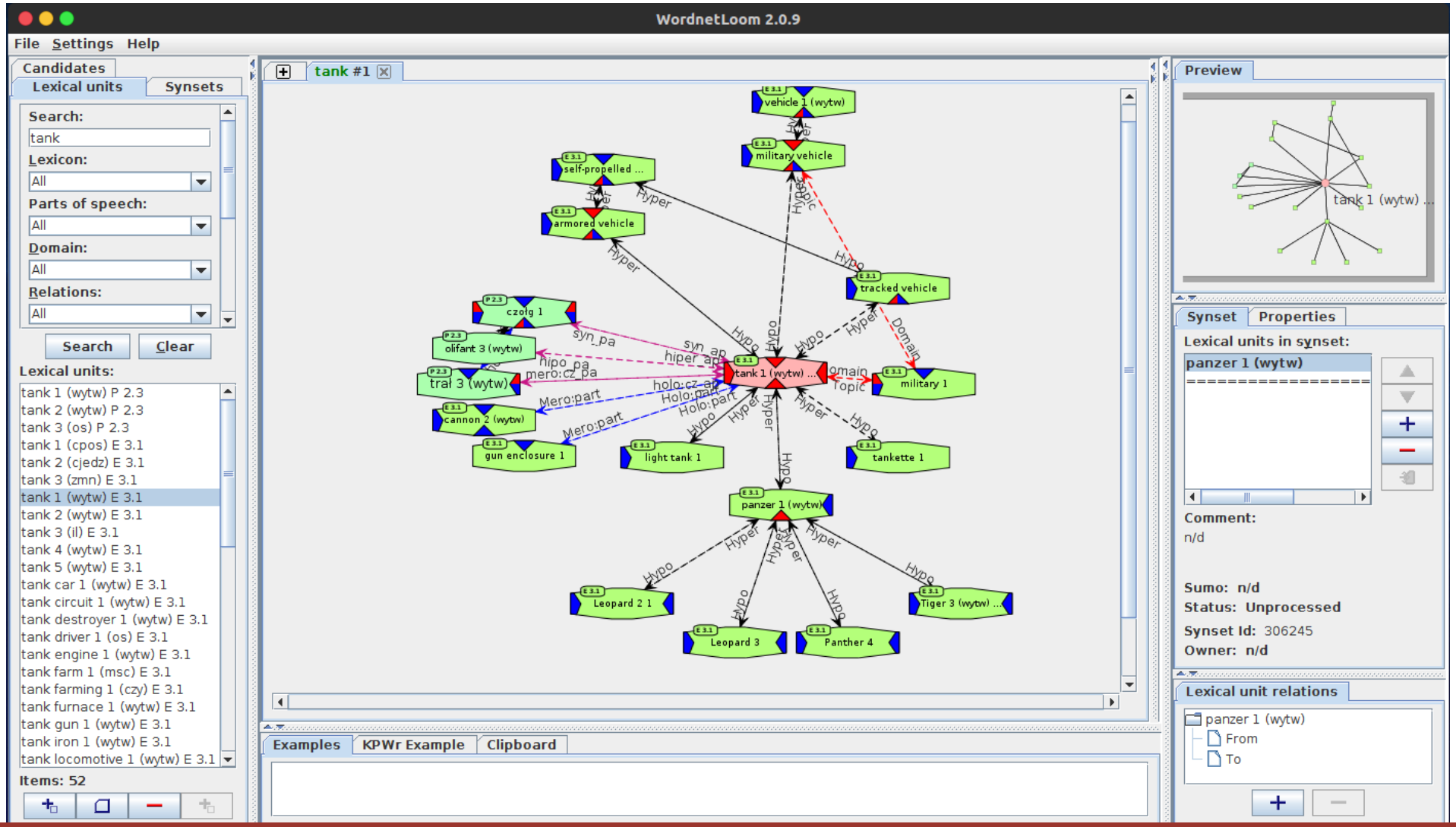
# Graph-based Presentation

## Synset vs lexical relations

- Double layer graph: synsets and lexical units as nodes
  - cross-linked: lexical units are synset members
  - two inter-connected graphs is too much for one screen
- Only the synset graph is visually presented
  - synset in focus
  - lexical units and their relations are presented in a separate side panel
- Large synsets: less than 2 on average, but up to 20
  - more important to see the structure
  - only one synset member, the first lexical unit presented in the graph
  - full list of lexical units in a side panel

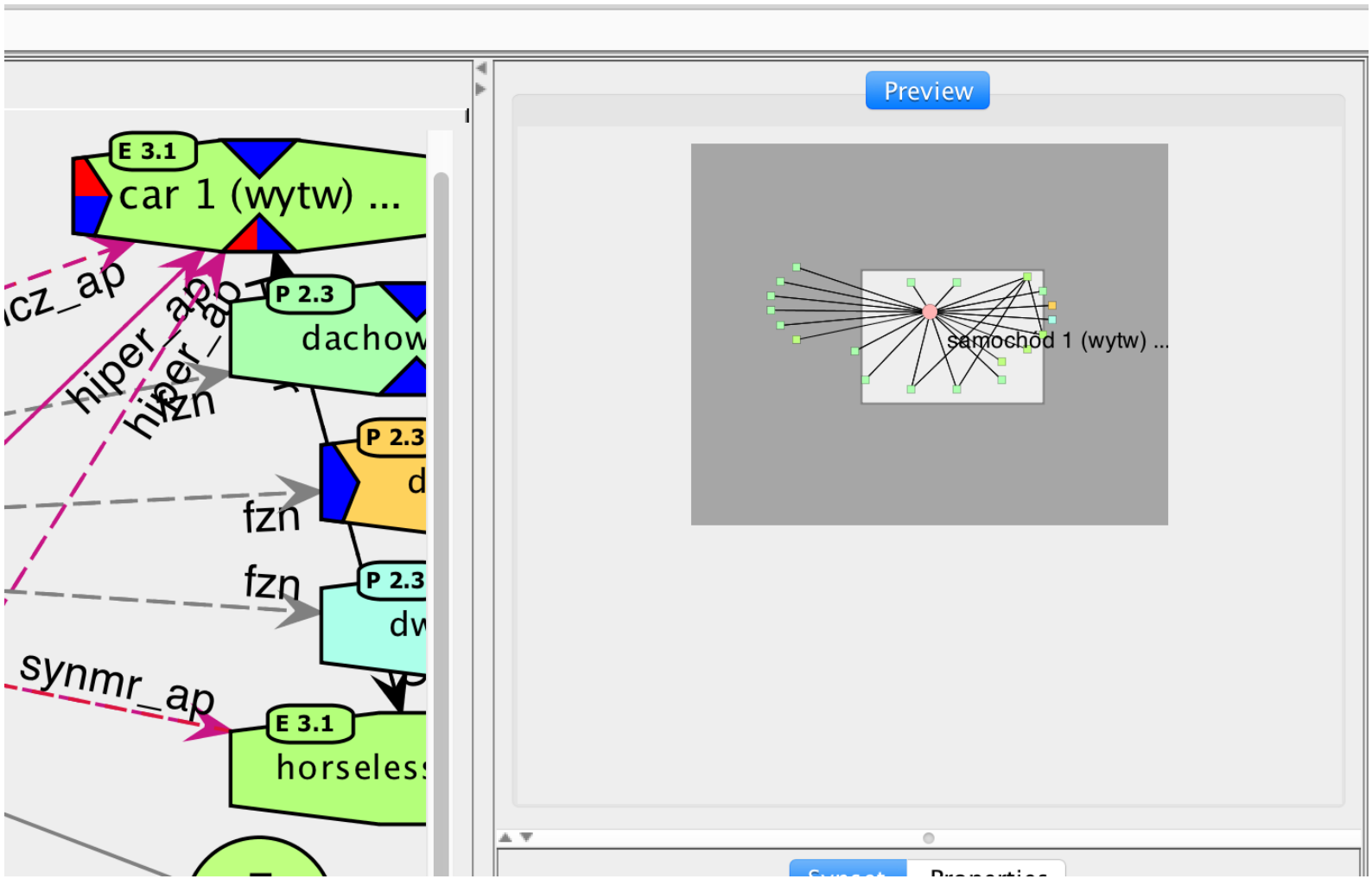
# Graph-based Presentation

## Combined graphs



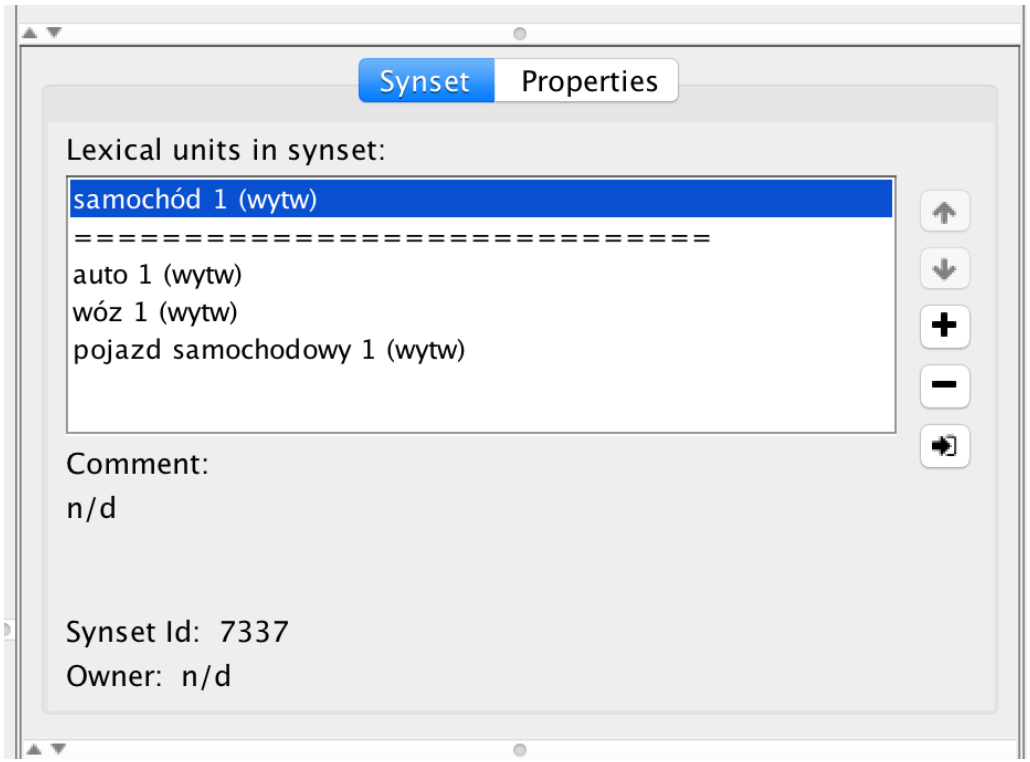
# Graph-based Presentation

## Bird eye view



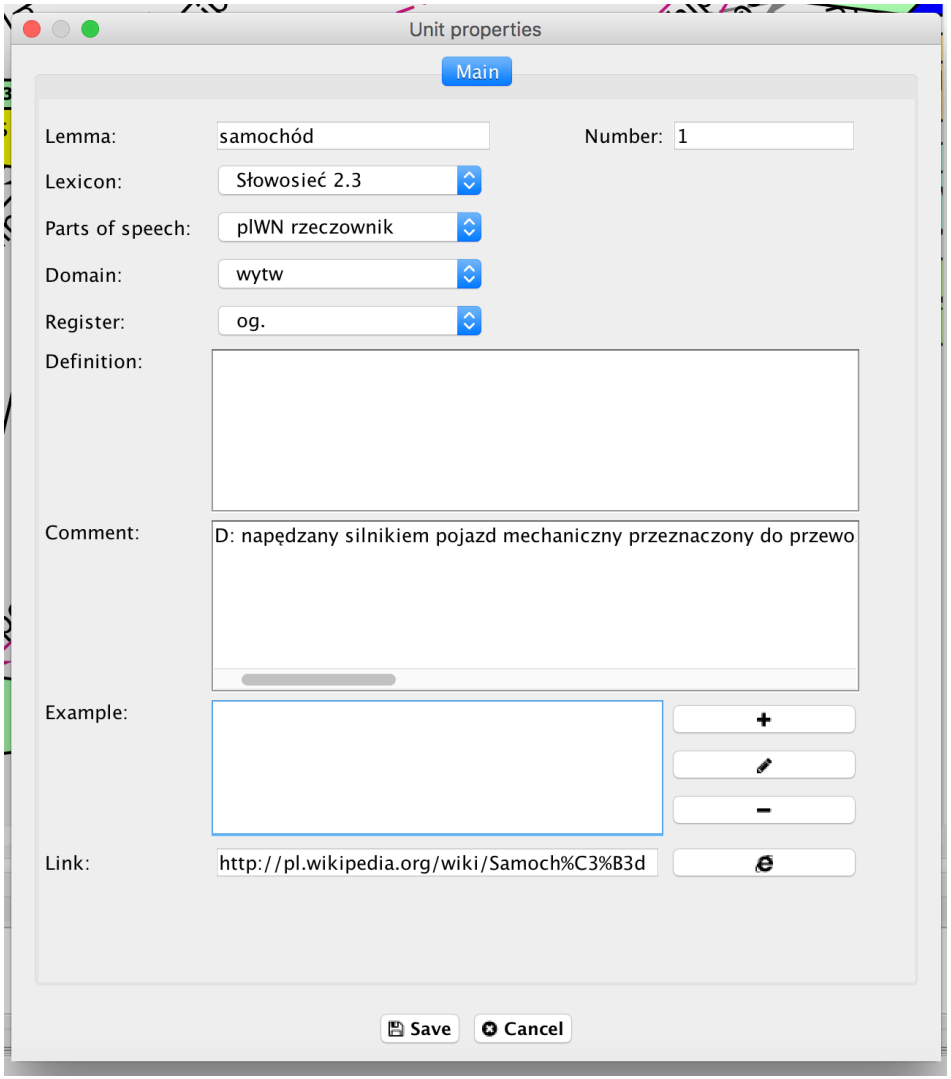
# Combined graphs

## Example: Synset presentation



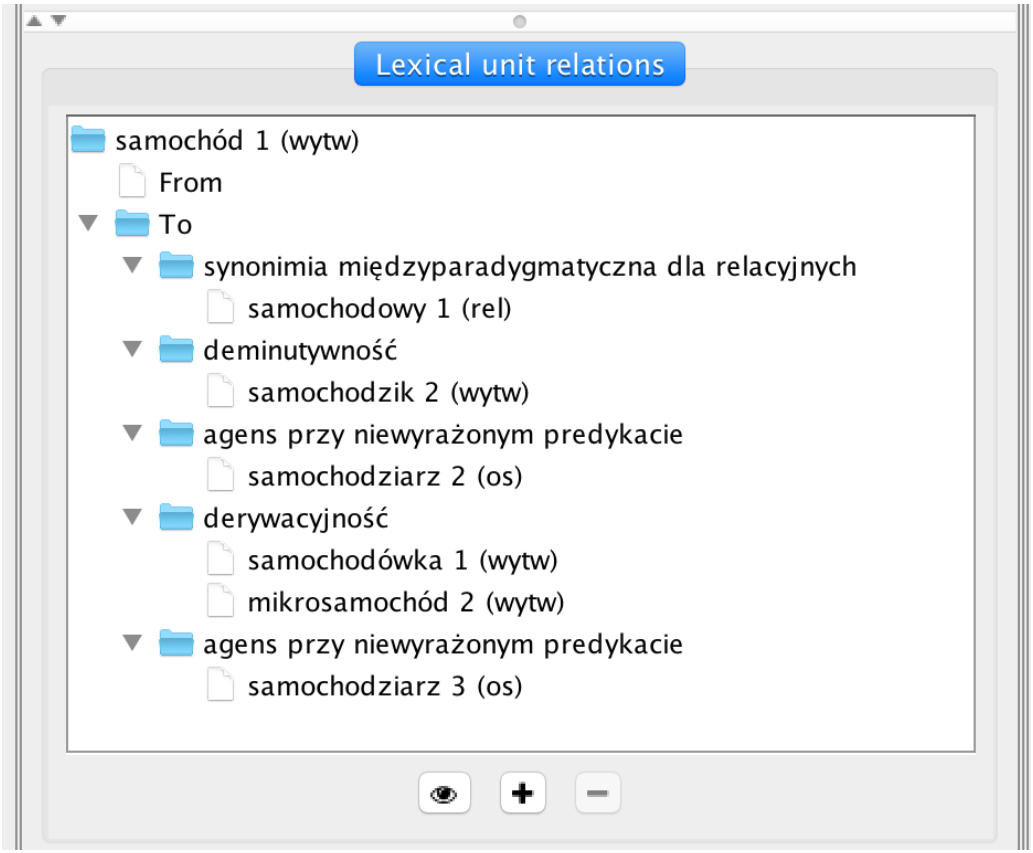
# Combined graphs

## Example: lexical unit properties

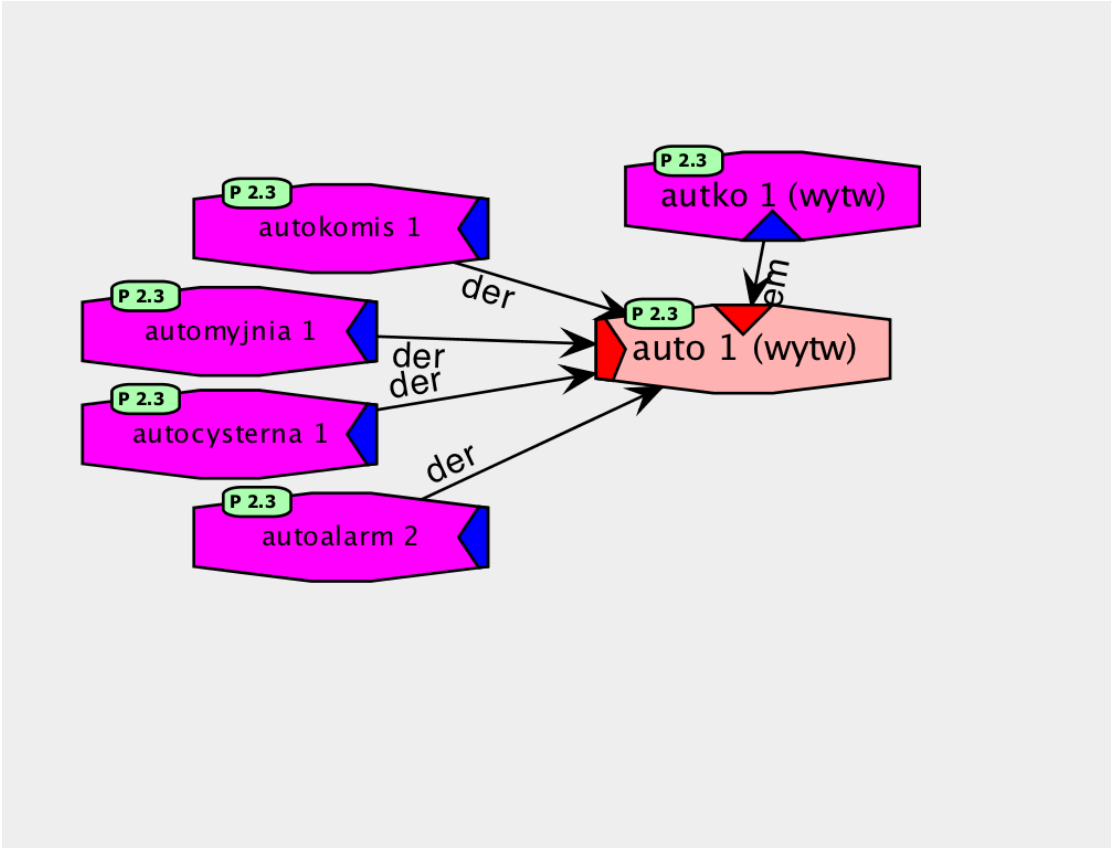


# Combined graphs

## Example: lexical relations

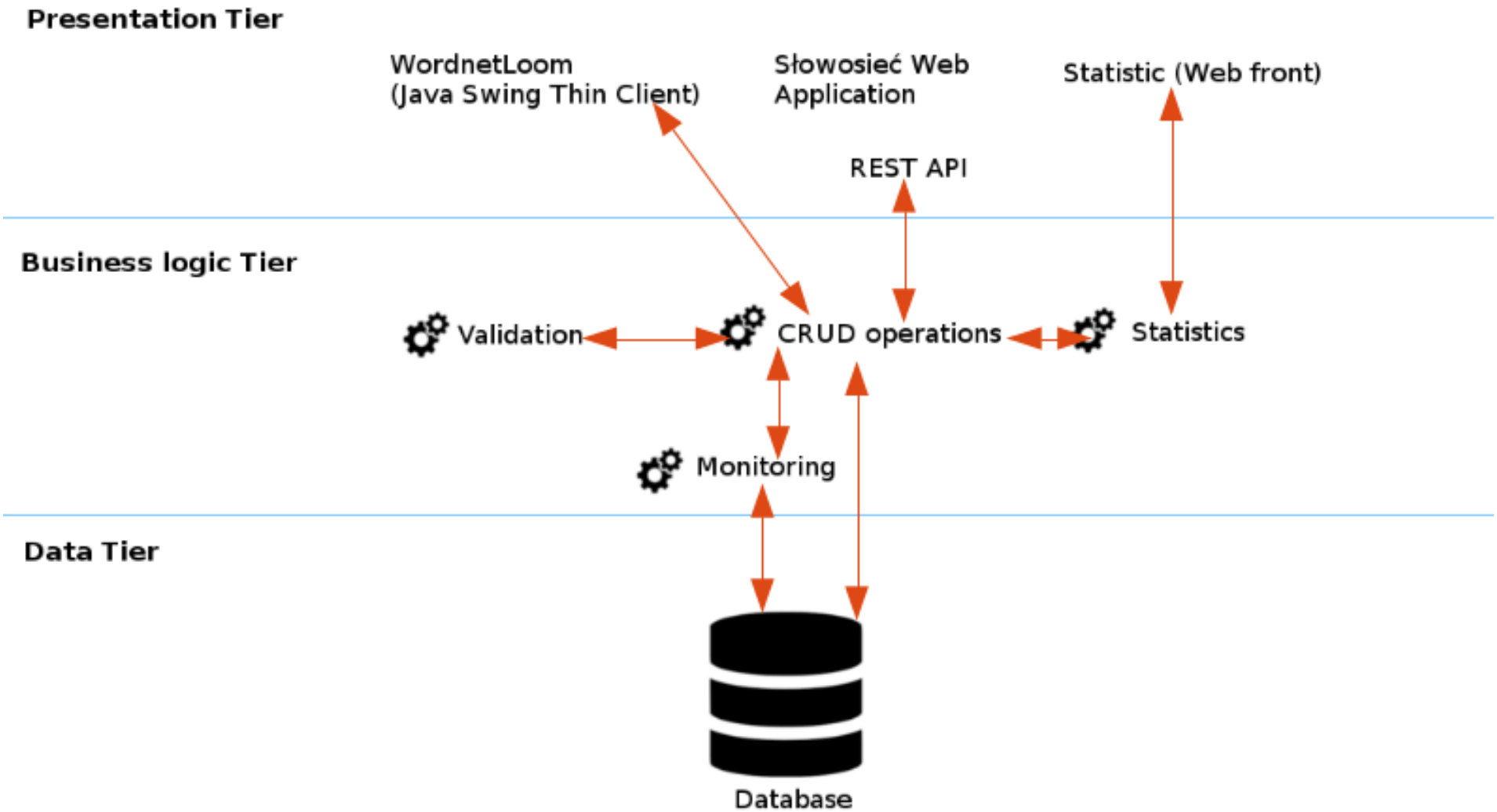


# Experimental Graph of Lexical Relations



# Architecture

## Scheme of the platform



# Architecture

## Selected features

- Java-based implementation
  - free of the problems related to the changing versions of web-browsers
  - works on every operating system
  - easy to install by non-technological users
- Based on *MySql 5.7* database management system
- *Hibernate Envars* module allows for easier undoing of changes
- Database schema has been rebuilt to be similar to the UBY-LMF structure
- All dictionaries are stored in the database; it supports localisation mechanisms
- Users can achoose which lexicons, mostly wordnets, they want to work with
- Extensible validation module to prevent errors including some semantic errors

# Extensions and Applications

## plWordNet development (1)

- Rich experience collected during more than 10 years of using WordnetLoom for plWordNet editing ($>$ 50 person-years)
- Multilinguality
  - inter-lingual relations are synset relations, but between synsets in different languages
  - any number of wordnets for any number of languages can be edited on the same screen
- Additional status meta-attribute and support for team management
  - editors are assigned packages of lemmas and are obliged to identify and add all lexical units
  - *not processed* (default value), *error*, *verified*, *new*, *partially processed*
  - *added sense* – a lexical unit added from the outside of a package

# Extensions and Applications

## plWordNet development (2)

- Improved navigation
  - search function was also expanded to cover all attributes
  - navigation: a synset $\longleftrightarrow$ a lexical unit
- Improved diagnostics
  - PoS tags to variables in substitution tests $\longrightarrow$ automated control of the link correctness
  - easier adding new types of lexicographic files and annotation with semantic domains

# Extensions and Applications

## Using WordnetLoom in Portuguese MultiWordNet (1/2)

Enhancement in

- Wordnet content
  - Language variants
    - 1- specific spellings (e.g. *receção* and *recepção*)
    - 2- specific words (e.g. *autocarro* and *ônibus*)
    - 3- specific syns (e.g. *camisola*: t-shirt or nightdress)
  - Mapping to SUMO ontology
- Lexicographer work

  1- new labels for senses/synsets (e.g. "unchecked", ćhecked")

  2- more search options, including by the new labels

# Extensions and Applications

## Using WordnetLoom in Portuguese MultiWordNet (2/2)

Enhancement in

- Format compatibility
  - converter WNPrincet (syns-based) to WNLoom (sense-based)
    any Princeton-convertible WN is now loadable into WNLoom
- Technical issues
  - bugs with words with multiple senses
  - bugs in the GUI
  - other issues

# Conclusions and Further Works

- *WordnetLoom* incorporates more than 10 years of experience in the development of a very large wordnet by many linguists on daily basis
- This rich experience has become a good basis for the development of new version improved with respect to both: technology and functionality
- *WordnetLoom* is open:
  `https://github.com/CLARIN-PL/WordnetLoom`
- Most unique features
  - direct work on the visually presented wordnet graph
  - simultaneous editing and inter-linking of many wordnets
- Adaptation for Portuguese Wordnet developed according to completely different method
- Further collaborative development of the system

# Thank you very much for your attention!



http://clarin-pl.eu

http://nlp.pwr.edu.pl

http://plwordnet.pwr.edu.pl

https://github.com/nlx-group