Advanced Searching in the Valency Lexicons Using PML-TQ Search Engine

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Outline

- Motivation
  - searching in complex lexicons
- Valency lexicons for a demonstration
- PML format
  - Viewing – TrEd
  - Searching – PML-TQ
  - Interlinking

Motivation

- Electronic lexical resource (an example):
  - Simple bilingual dictionary

- What we need to find?
  - search the lemma *look*

1. *(gaze, stare)* regarder; ***2.*** ...

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... ***c.*** she's **looking forward to** going on holiday → elle a hâte de partir en vacances ...

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- Electronic lexical resource (an example):
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- What we need to find?
  - search the lemma — *look*
  - fulltext search — *"looking forward to"*
  - regular expressions — `/look.* to/`
  - advanced search? — *"a word with more than five translations"*

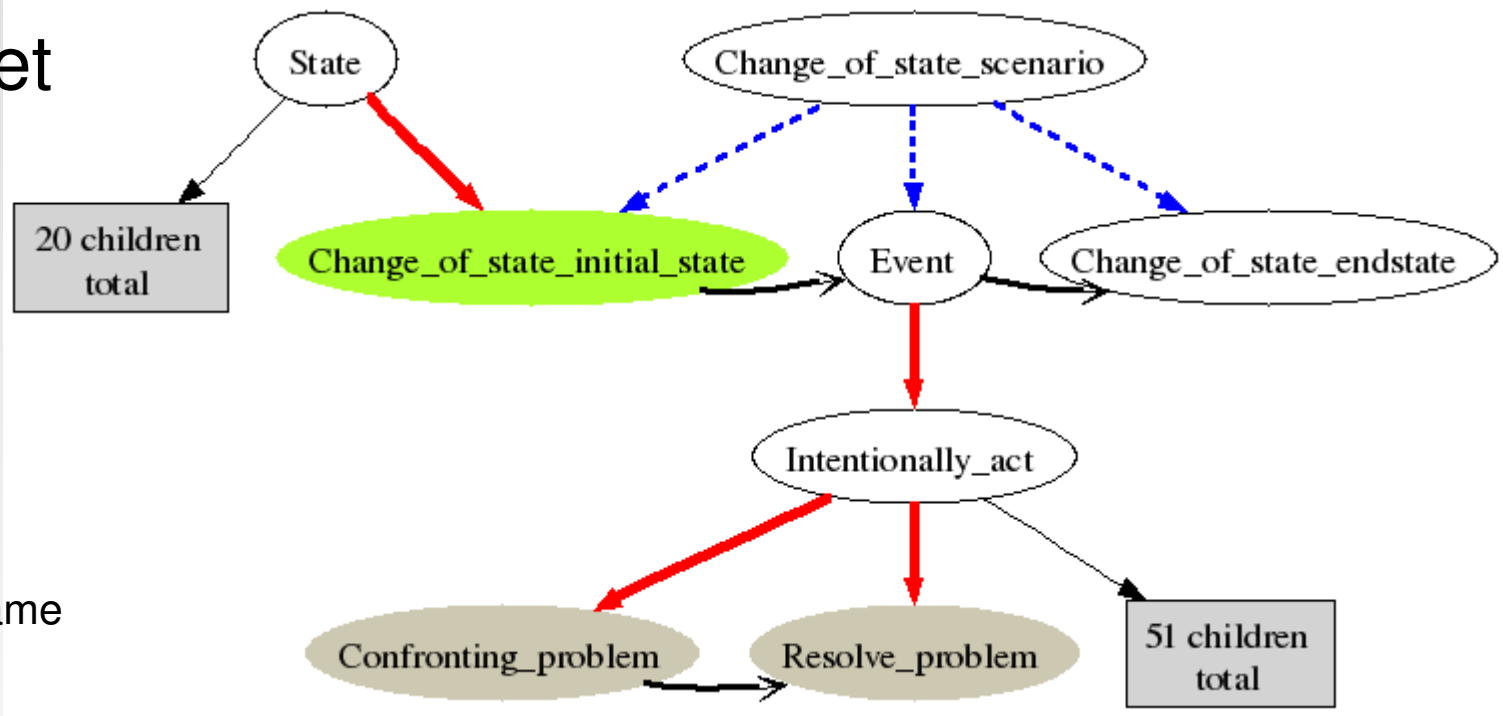
1. *(gaze, stare)* regarder; ***2.*** ...

... ***c.*** she's **looking forward to** going on holiday → elle a hâte de partir en vacances ...

stand → ***1.*** se lever; ***2.*** tenir debout; ***3.*** se trouver; ***4.*** marcher sur; ***5.*** rester valable; ***6.*** se présenter; ...

Motivation (2)

- Lexicons with complex hierarchical structure (1)
  - FrameNet



Searching for:

- lemma
- name of the frame

Motivation (3)

- Lexicons with complex hierarchical structure (2)
  - VerbNet

Searching for:

- lemma

ROLES REF

- AGENT [+ANIMATE | +ORGANIZATION]
- THEME
- SOURCE [+ANIMATE | [+LOCATION & -REGION]]
- BENEFICIARY [+ANIMATE]

FRAMES REF KEY

NP V NP

EXAMPLE	"The thief stole the paint."
SYNTAX	AGENT V THEME
SEMANTICS	MANNER(DURING(E), ILLEGAL, AGENT) HAS_POSSESSION(START(E), ?SOURCE, THEME) HAS_POSSESSION(END(E), AGENT, THEME) NOT(HAS_POSSESSION(END(E), ?SOURCE, THEME)) CAUSE(AGENT, E)

NP V NP PP.SOURCE

EXAMPLE	"The thief stole the paint from the museum."
SYNTAX	AGENT V THEME {{+SRC}} SOURCE
SEMANTICS	MANNER(DURING(E), ILLEGAL, AGENT) HAS_POSSESSION(START(E), SOURCE, THEME) HAS_POSSESSION(END(E), AGENT, THEME) NOT(HAS_POSSESSION(END(E), SOURCE, THEME)) CAUSE(AGENT, E)

NP V NP PP.BENEFICIARY

EXAMPLE	"The thief stole the paint for Mary."
SYNTAX	AGENT V THEME {FOR} BENEFICIARY
SEMANTICS	MANNER(DURING(E), ILLEGAL, AGENT) HAS_POSSESSION(START(E), ?SOURCE, THEME) HAS_POSSESSION(END(E), BENEFICIARY, THEME) NOT(HAS_POSSESSION(END(E), ?SOURCE, THEME)) CAUSE(AGENT, E)

Motivation (4)

- Lexicons with complex hierarchical structure (3)
  - Corpus Pattern Analysis

Last

No.	%	Pattern / Implicature
1	86%	**[[Eventuality | Physical Object | Psych]] last [NO OBJ] [Adv[Time]]**
		[[Eventuality | Physical Object | Psych]] continues (to exist) for a particular length of time expressed by [Adv[Time]]
2	13%	**[[Eventuality | Physical Object]] last [NO OBJ] [NO ADVL]**
		[[Eventuality | Physical Object]] continues to exist for a long time
3	2%	**[[Physical Object]] last [[Human]] [Adv[Time]]**
		[[Physical Object]] does not run out and is enough for [[Human]] for [Adv[Time]]

Searching for:

- lemma

Motivation (5)

- Lexicons with complex hierarchical structure (4)
  - VerbaLex

vyčkat$^{pf}_{1}$
vyčkávat$^{impf}_{1}$ **počkat**$^{pf}_{2}$ **čekat**$^{impf}_{5}$

definition: *odkládat něco na pozdější dobu*
class: linger-53.1
passive: no

1 čekat$_5$, vyčkat$_1$, vyčkávat$_1$, počkat$_2$ ≈
-frame: **AG**<person:1>$^{obl}_{kdo1}$ **VERB**^{obl} **ACT**<act:2>$^{obl}_{s+čím7}$
-example: *počkal s nákupy* ***(pf)***
-example: *vyčkal s odjezdem* ***(pf)***
-example: *čekal s přípitkem* ***(impf)***
-synonym:
-use: prim
-reflexivity: no

2 čekat$_5$, vyčkat$_1$, vyčkávat$_1$, počkat$_2$ ≈
-frame: **AG**<person:1>$^{obl}_{kdo1}$ **VERB**^{obl} **ACT**<act:2>$^{obl}_{s+čím7}$ **TIME**<point:6>$^{obl}_{do+čeho2}$
-example: *počkali se zahájením porady do čtyř hodin* ***(pf)***
-synonym:
-use: prim
-reflexivity: no

Searching for:

- lemma

Lists for

- verb roles
- morphemic roles
- verb classes, etc.

Motivation (6)

- Example query
  - find a reflexive verb
    with optional TIME complement
    realized in other than prepositional genitive case
    that has more than two synonyms
    - hardly by a regular expression

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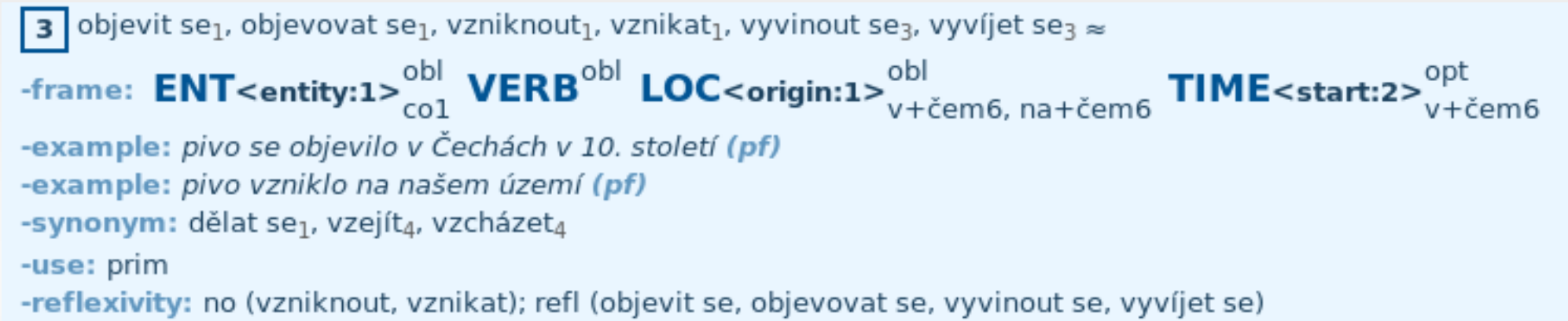

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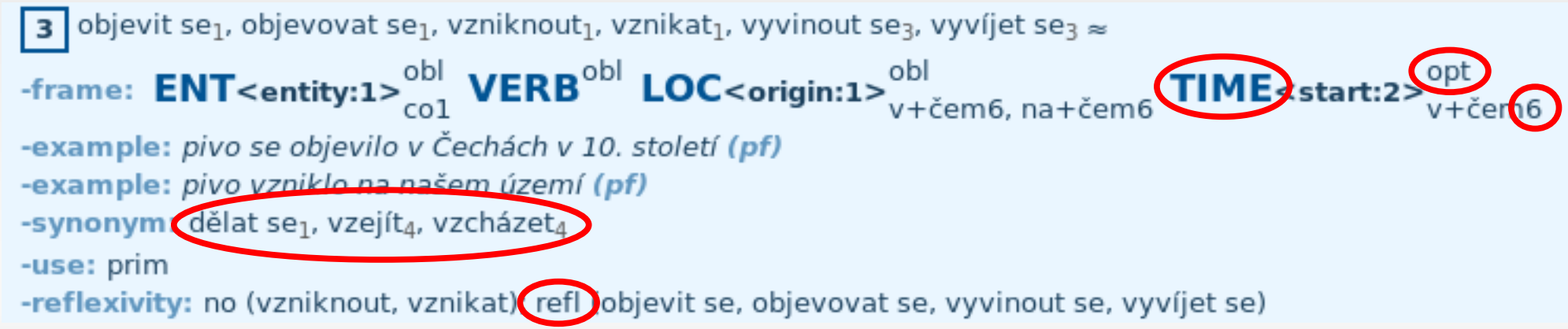

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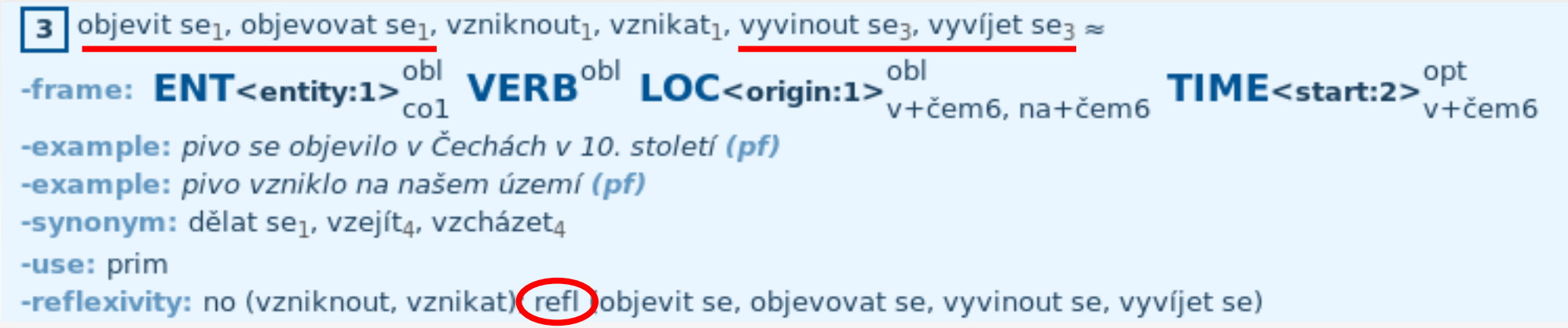


Motivation (7)

- What (and how) we want to search in lexicons?
- How we want to display it?

- a sophisticated way to search lexicons with complex structure

Goal: Universal advanced searching

- As a case study: PDT-VALLEX and VALLEX 2.5
  - similar approaches, different formats and information
- What we want to do with them?
  - interlink lemmas and their lexical units
  - facilitate searching and browsing in linked lexicons
- Tools
  - search engine and viewer
  - universal, adaptable for other lexicons

Two Czech lexicons

Lexicons	PDT-VALLEX	VALLEX 2.5
PoS	verbs, some nouns and adjectives	verbs
lemmas	at least once in PDT	most frequent ones and their aspectual counterparts
frames	at least once in PDT	~ all
frame information - core	**frame**, gloss, example	
- further	syntactic information on functors, frame frequency in data	reciprocity, reflexivity, grammatical control, syntactico-semantic class
- linking	linked with the occurences in PDT	no linking
lexicon unit	lemma	lexeme

Unit: Lemma vs. Lexeme

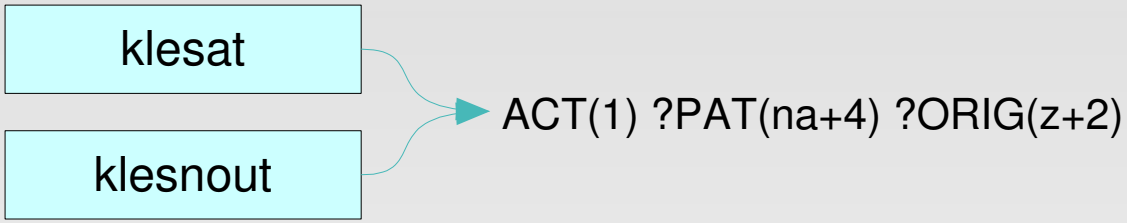
PDT-VALLEX

klesat

klesnout

Unit: Lemma vs. Lexeme

PDT-VALLEX



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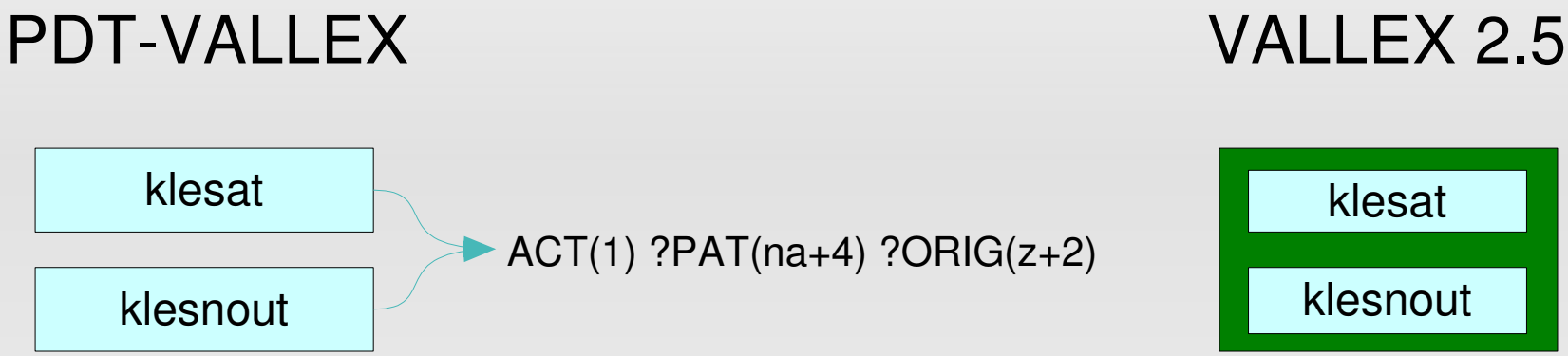

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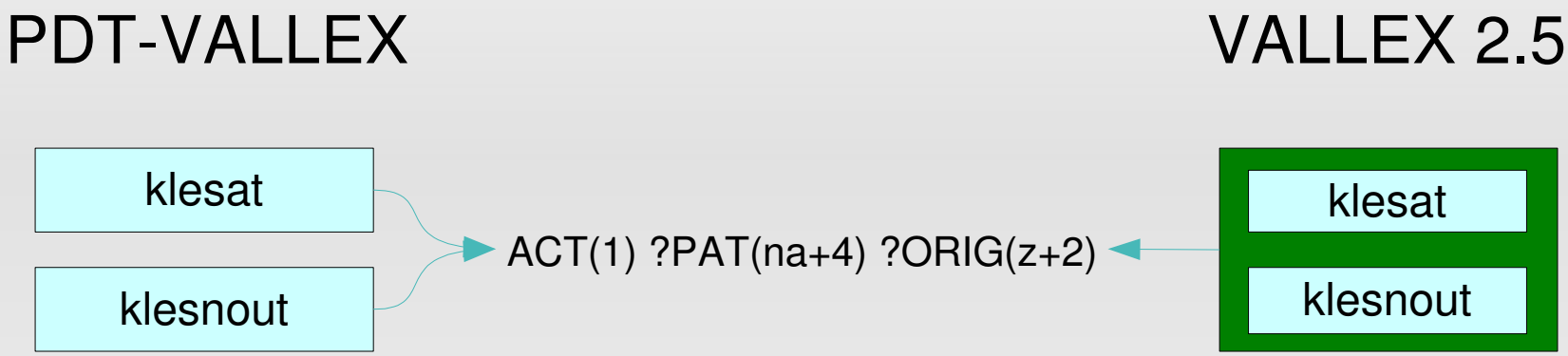

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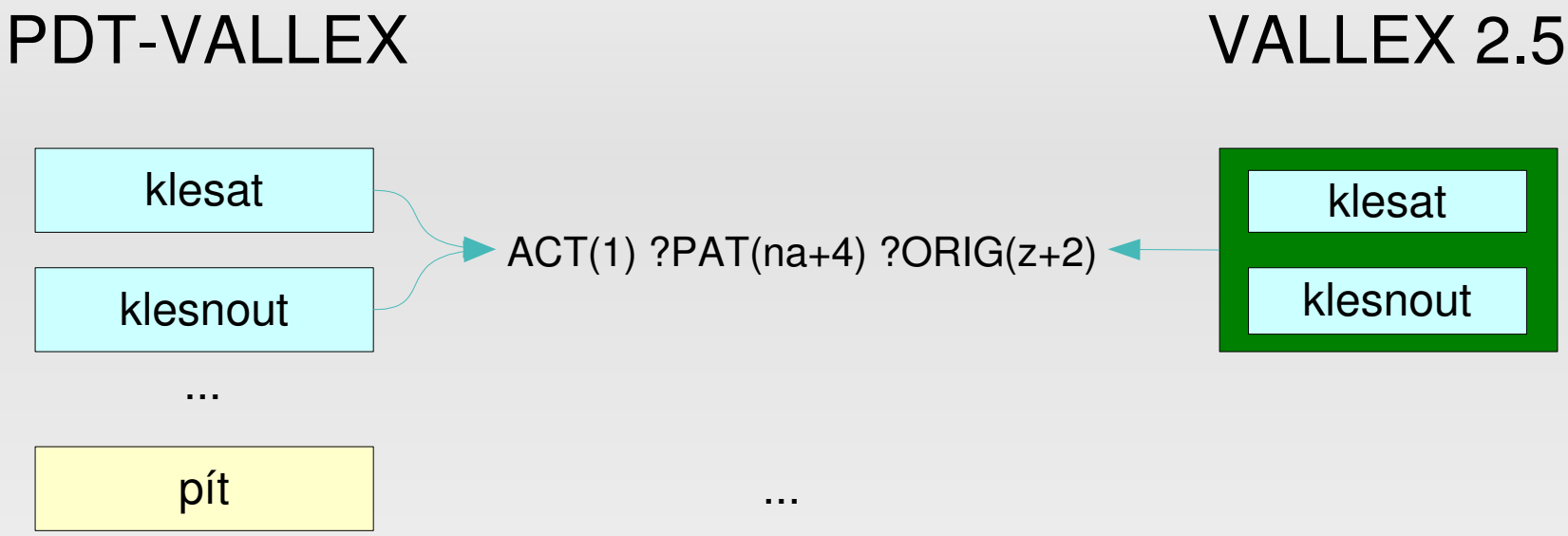

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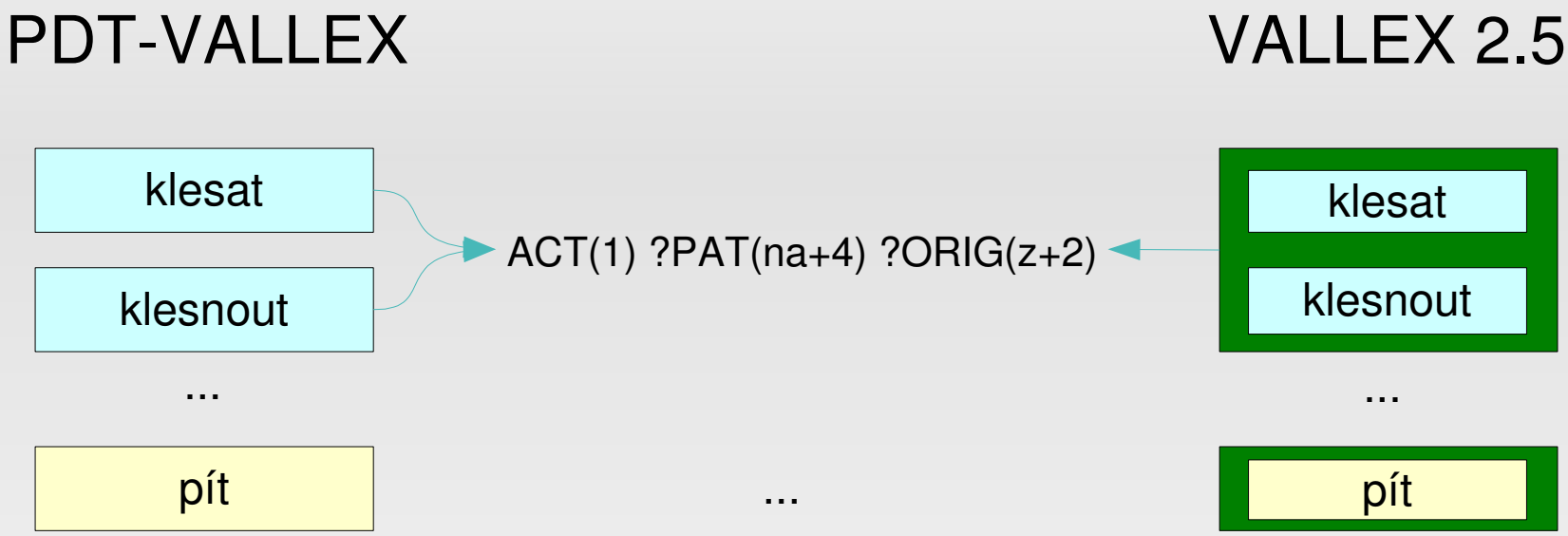

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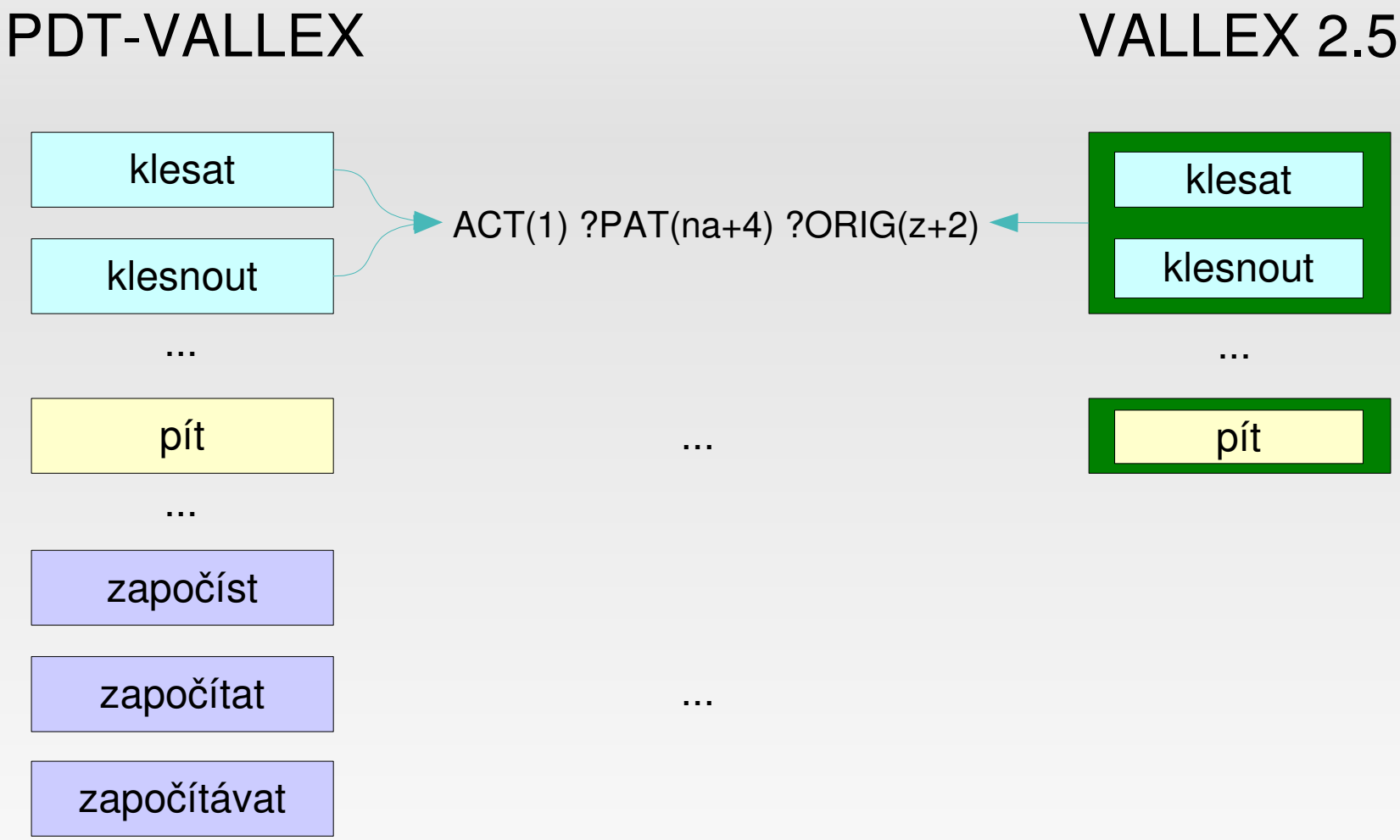

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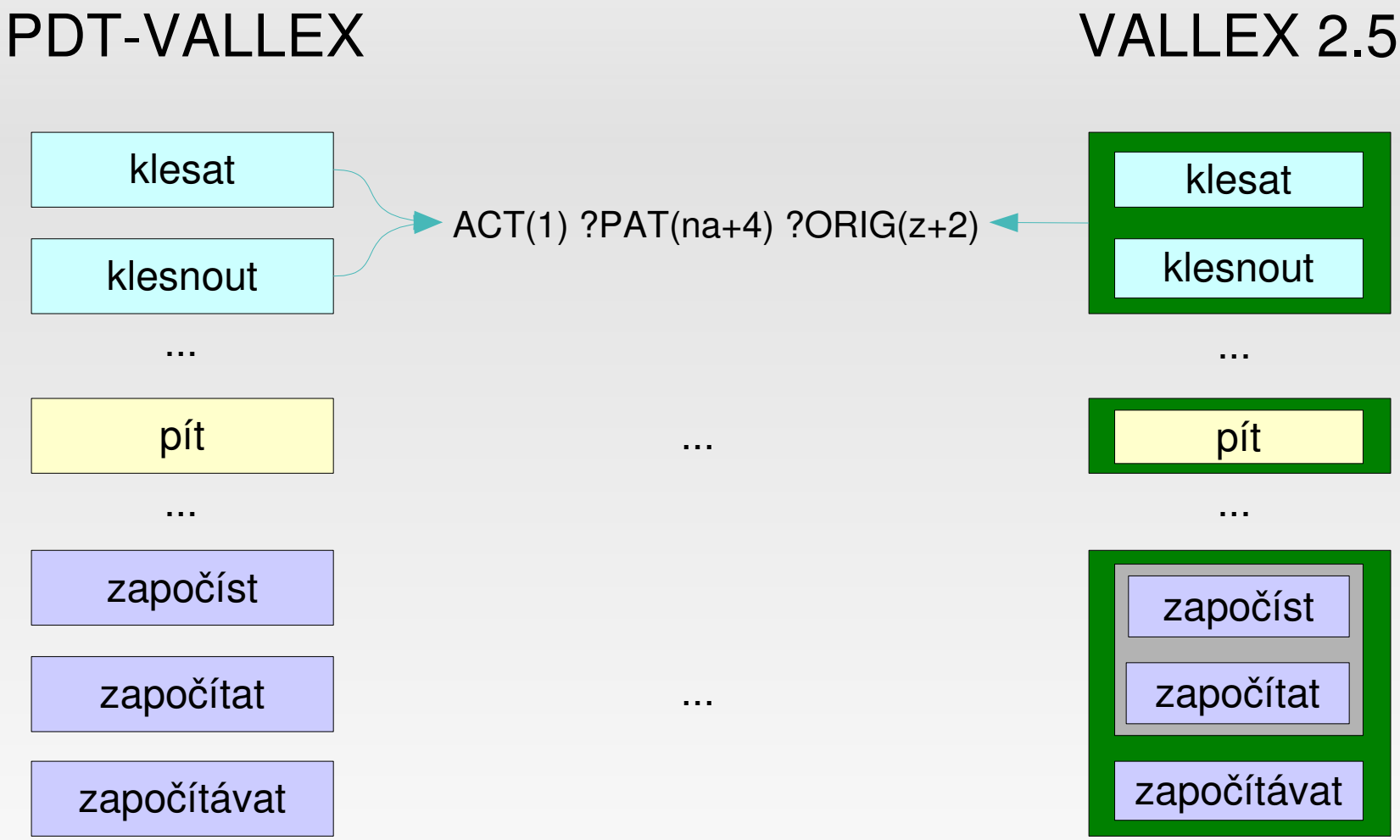
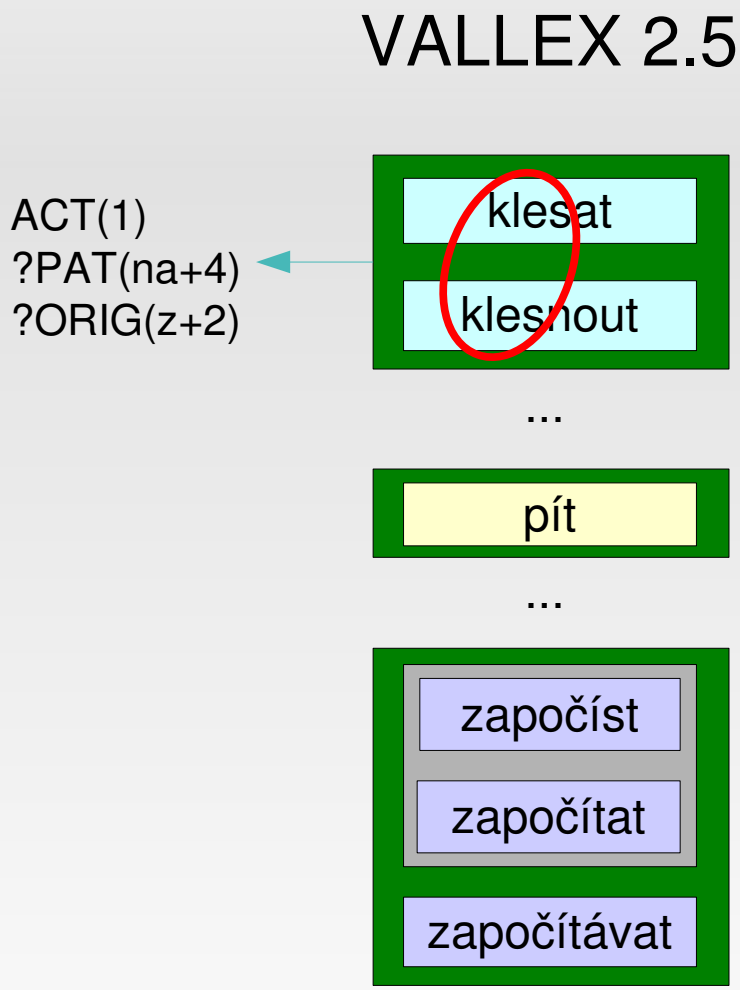


Why lexemes?

- Advantages
  - theoretical adequacy
  - compact representation
  - convenience for human users
- Disadvantages
  - complex format, hard to process



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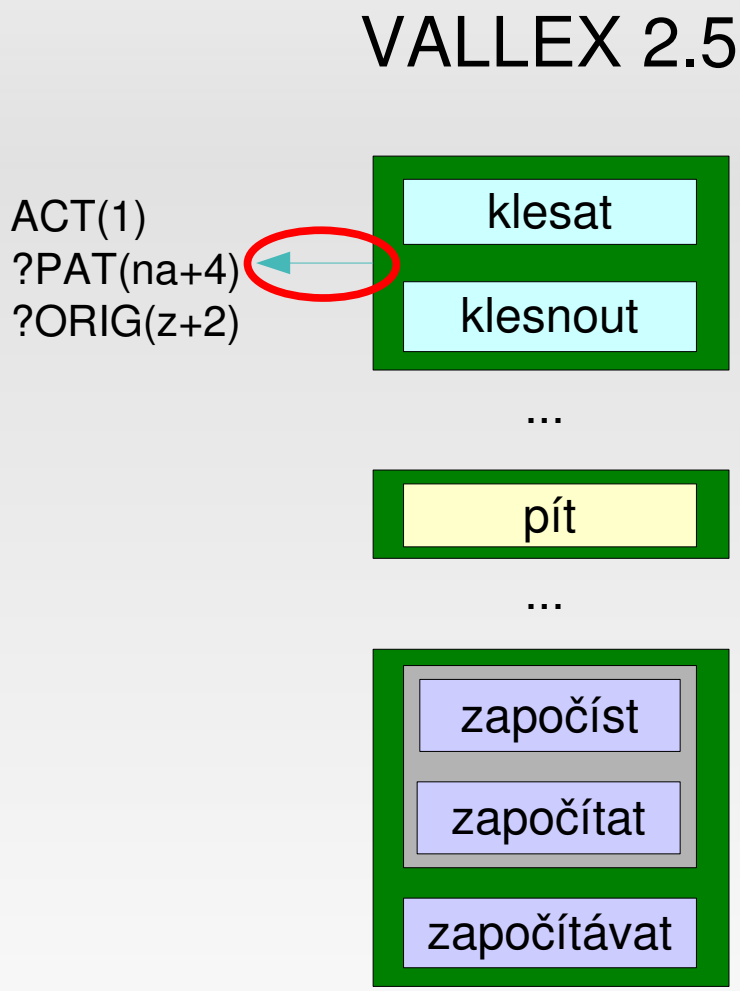

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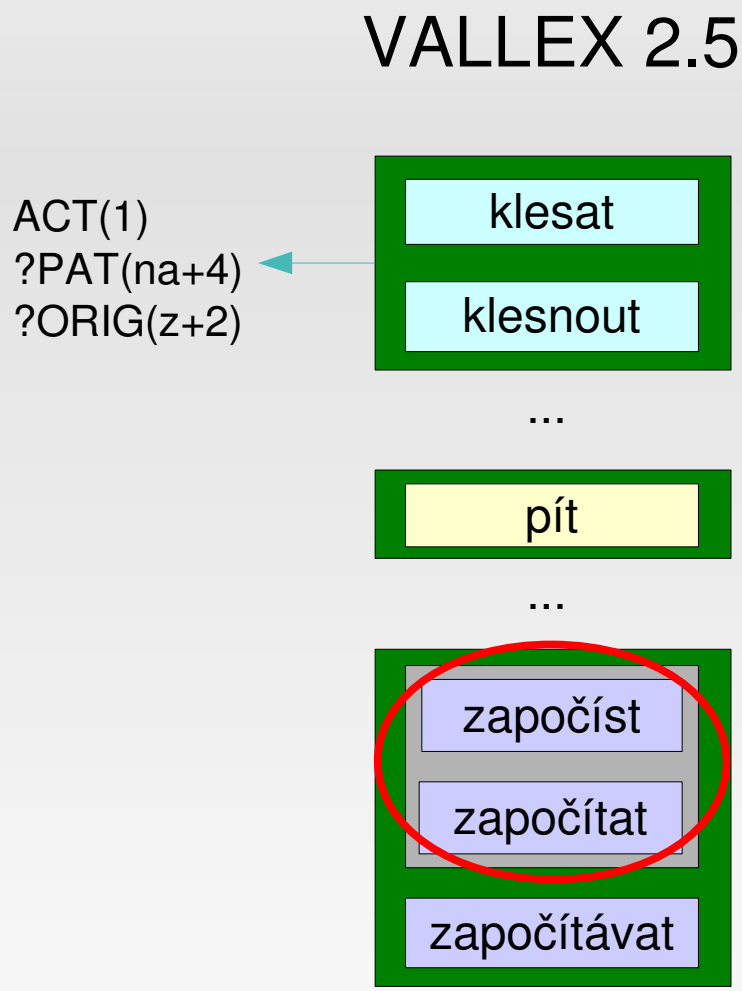

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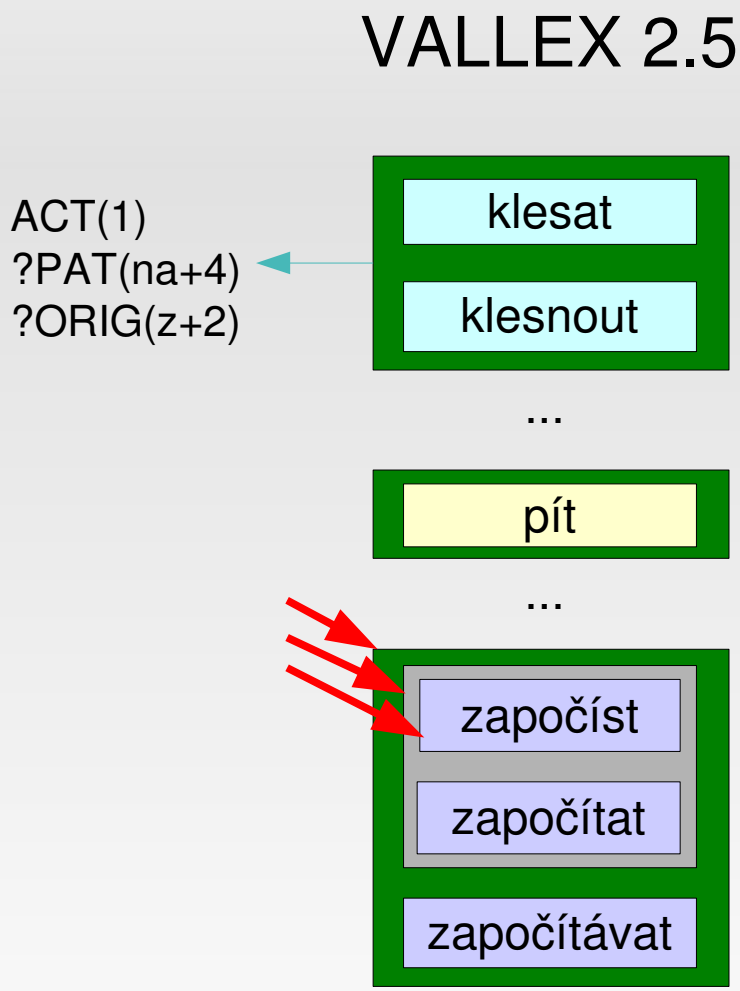
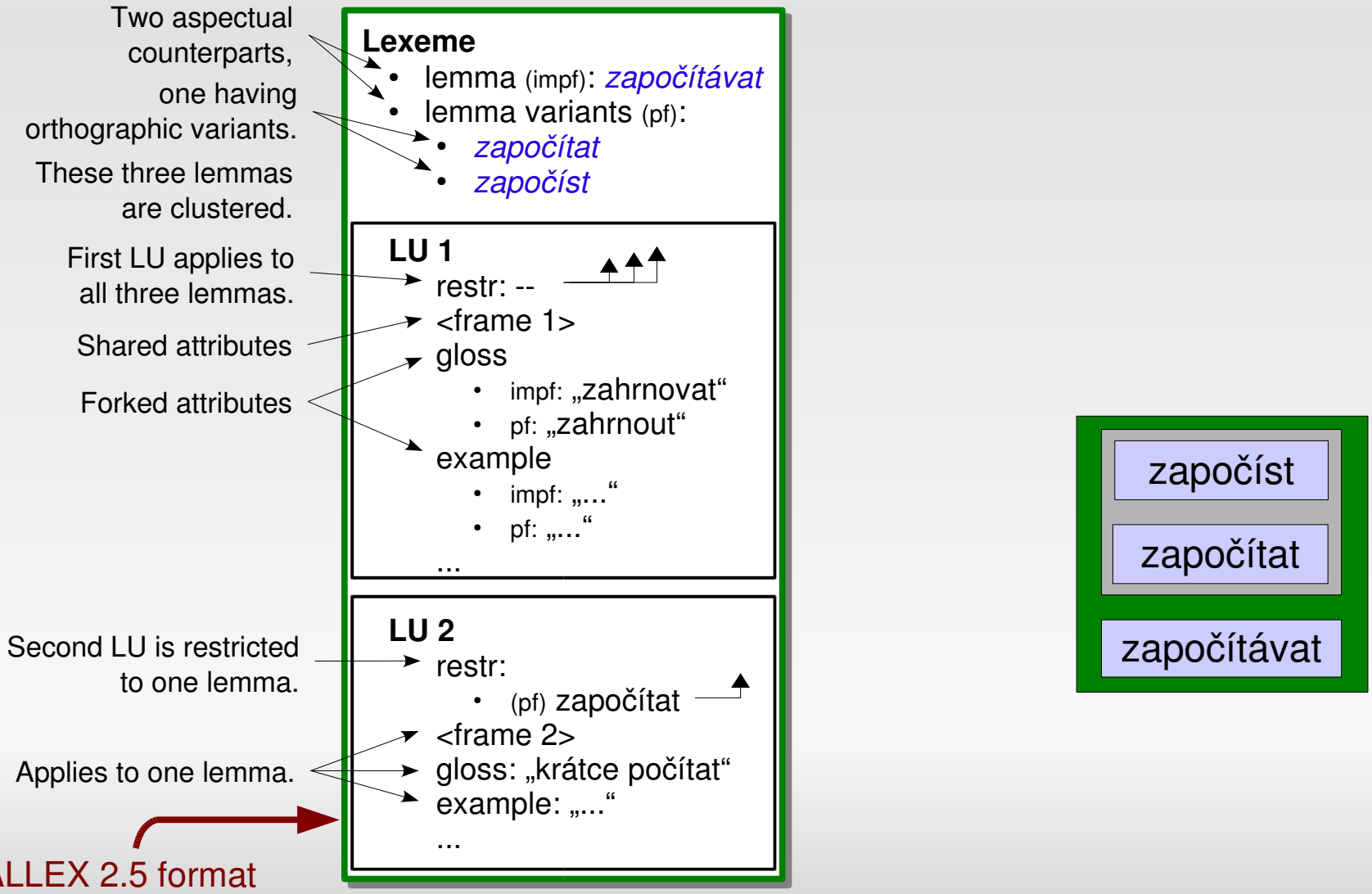


The common vallex_pml format



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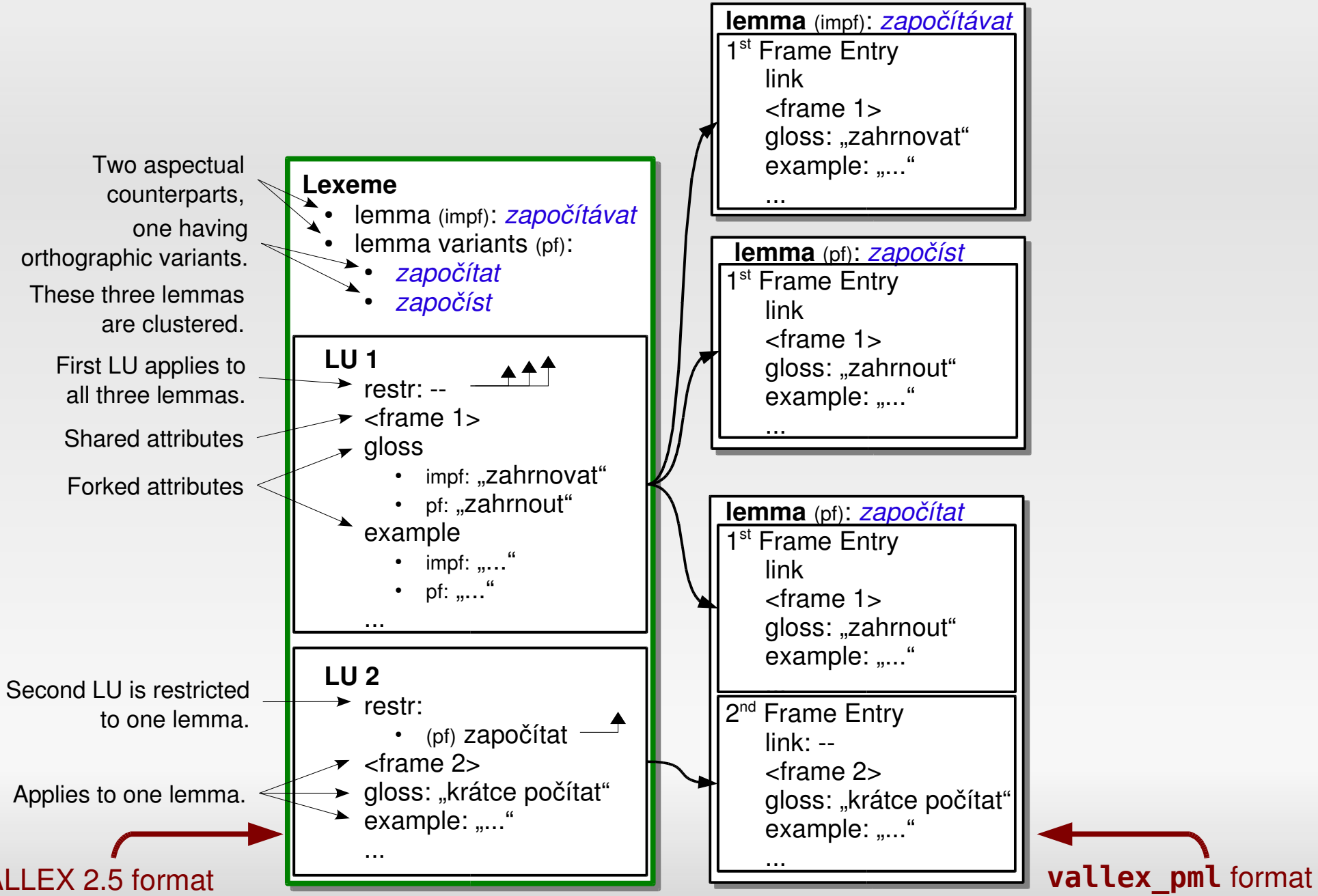

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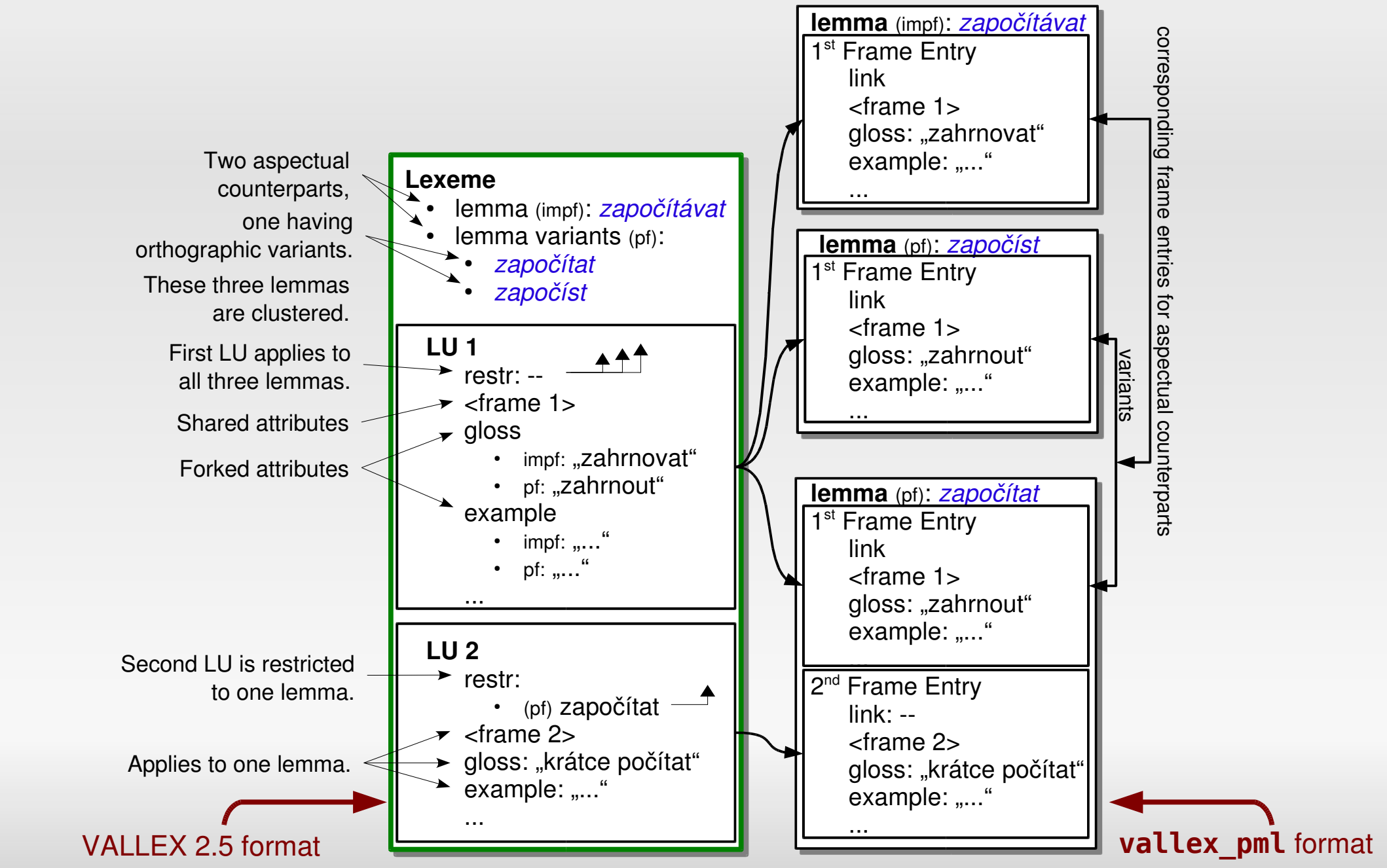

Prague Markup Language

- Lexicon transformed into PML format
  - http://ufal.mff.cuni.cz/jazz/PML
  - XML-based
  - described by a PML-schema
    - automatically from DTD
    - PML roles (next slide)

Prague Markup Language (2)

- Reasons for PML
  - suitable common representation
  - can be displayed as a tree in the tree editor TrEd
    - PML roles (define nodes etc.)
  - and searched by PML-TQ

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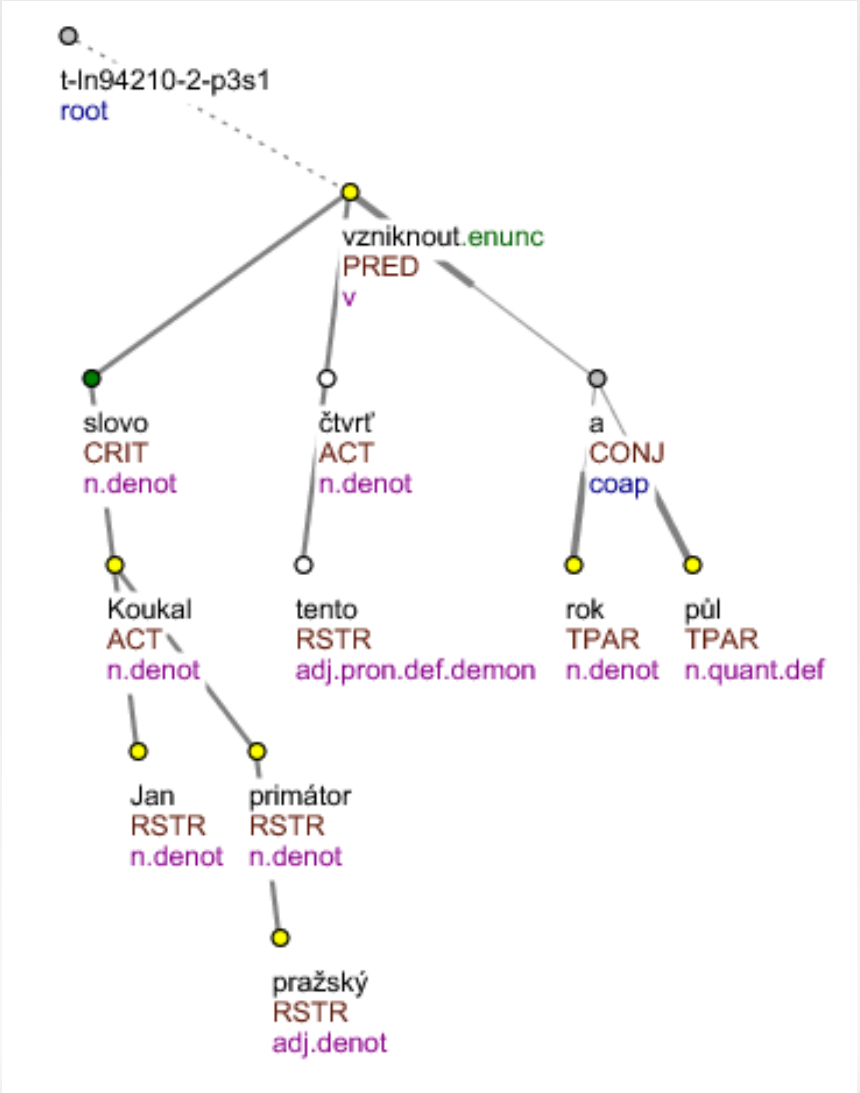
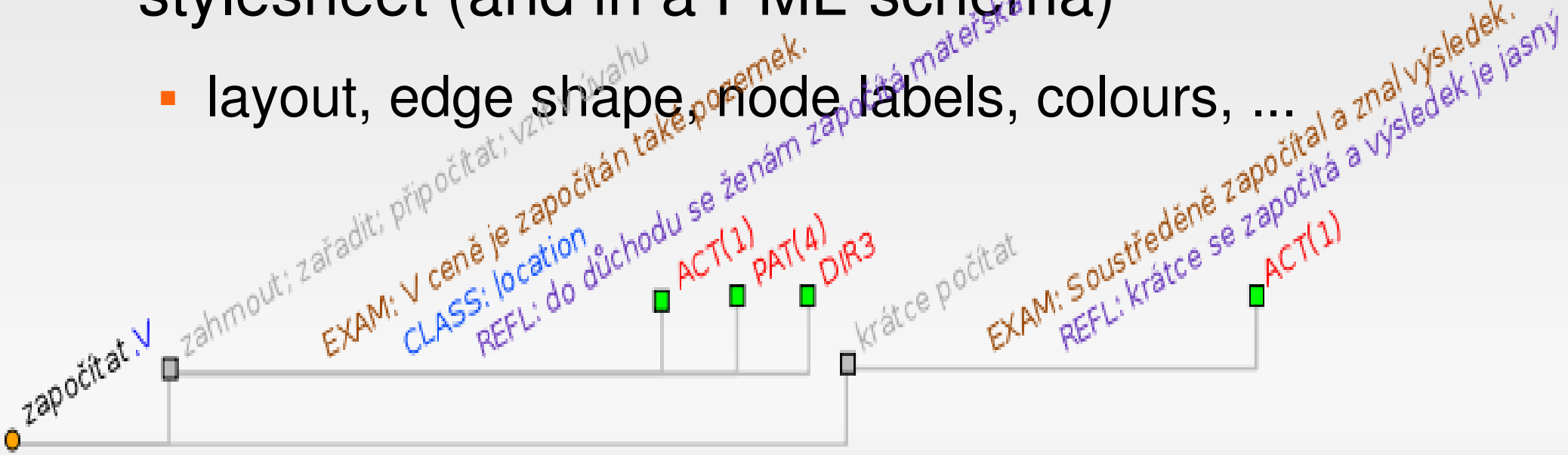


What can we do with lexicons?

- A) Display, go through
  - each lexicon entry as one "tree"
- B) Search, display the search
  - query in the form of a tree with constrains
- C) Interlink, display these links
  - links within a single lexicon
  - links to the other lexicon

A) Viewing in TrEd

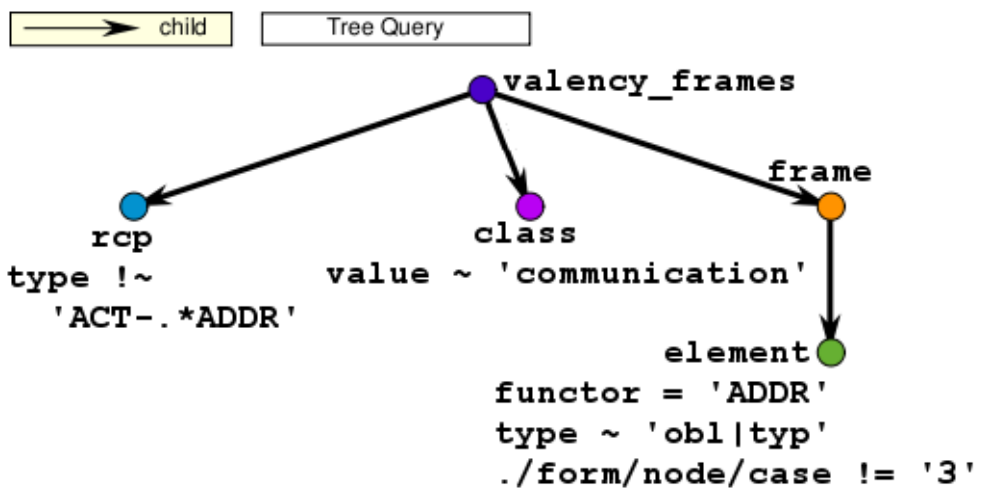
- TrEd http://ufal.mff.cuni.cz/~pajas/tred/
- lexicon entry (= a verb) as a tree
- the specific appearence is defined in a stylesheet (and in a PML-schema)
  - layout, edge shape, node labels, colours, ...



B) Searching by PML-TQ

- PML Tree Query
  http://ufal.mff.cuni.cz/~pajas/pmltq/
- a query created in a graphical mode – by drawing a subtree (with possible constraints) to search

- verbs from the class 'communication' with obligatory ADDR realized in other than dative case that cannot be in a reciprocity relation with ACT



B) Searching by PML-TQ (2)

- textual alternative to each query
- further processing ("filters")
  - frequency of found lemmas in indiviual verb classes
  - can be appended to any query
  - generate simple text table

C) Interlinking

- Three types
  - aspectual counterpart
  - lemma variant
  - same lemma/frame in the other lexicon (future work)
- view the linked lemma/frame in TrEd

Conclusion

- format for linking valency lexicons
- universal method, adaptable for other lexicons
- any tree-like structure (XML based lexicon)
- necessary modifications
  1. PML-schema from DTD
  2. assignment of PML roles
  3. stylesheet
  4. (transfer into the database)

Thank you.

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