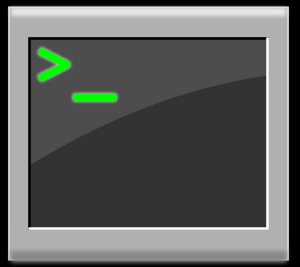
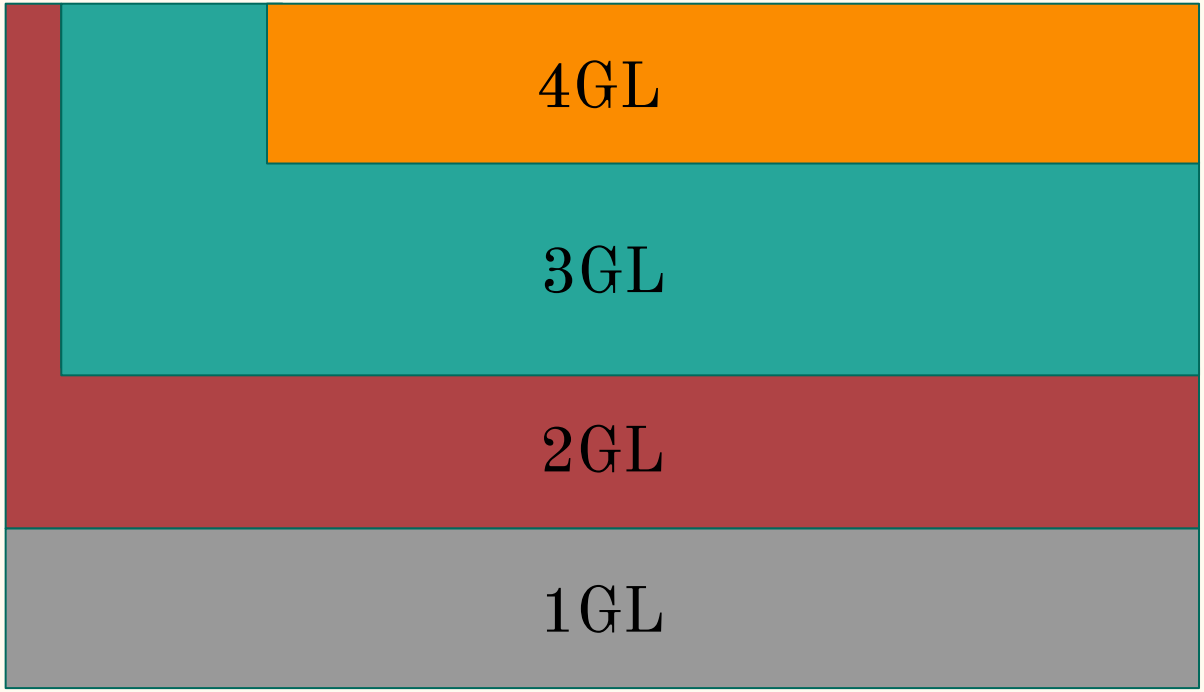
Incremental Coverage of Legacy Software Languages

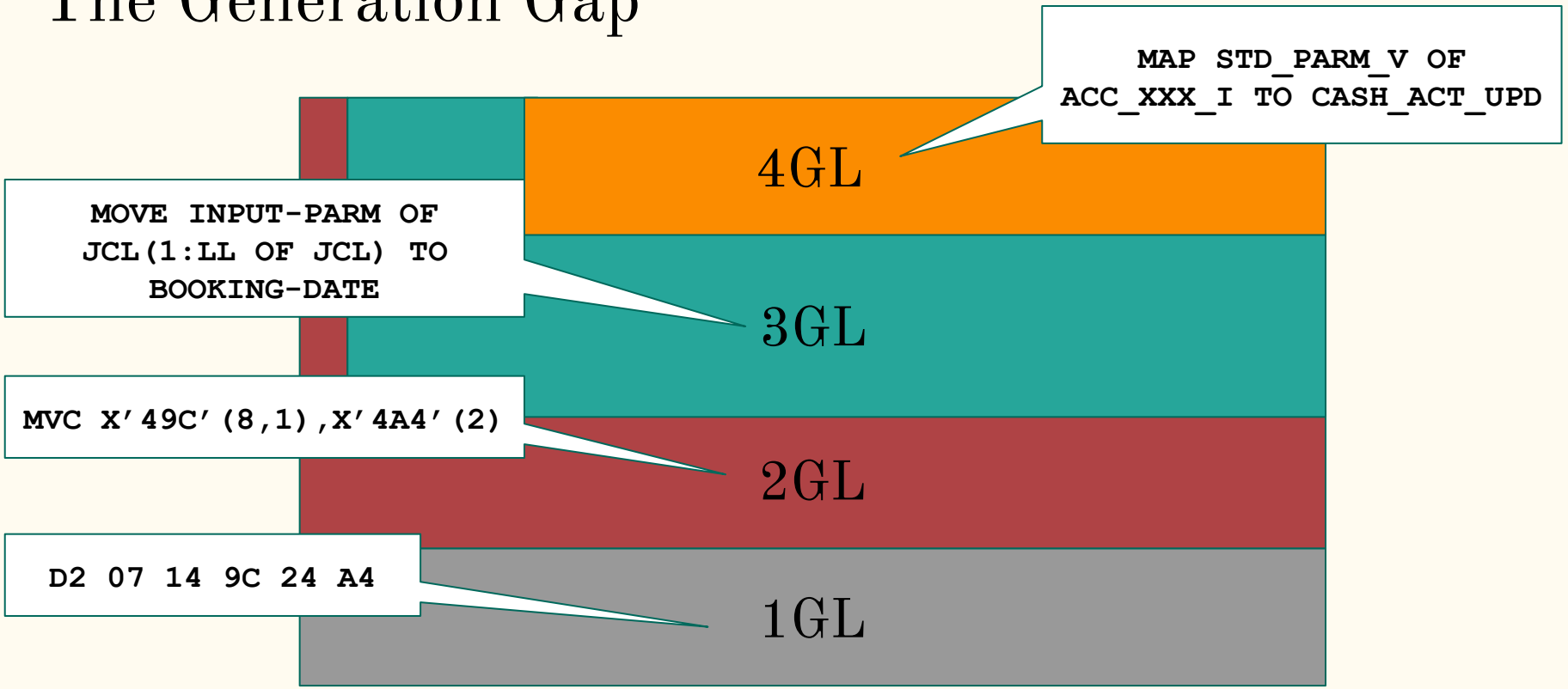
V. Zaytsev @ PX/17.2 @ SPLASH 2017



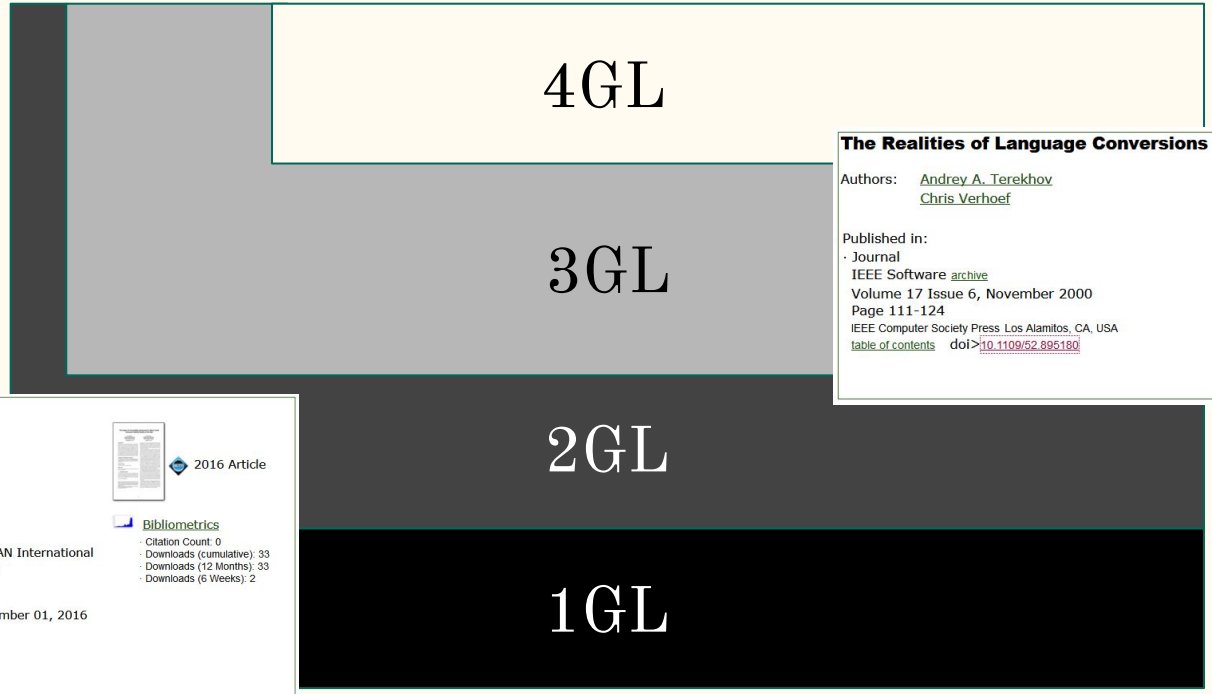
The Generation Gap



The Generation Gap



Language Migration



The Realities of Language Conversions

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Raincode assembler compiler

Full Text: PDF

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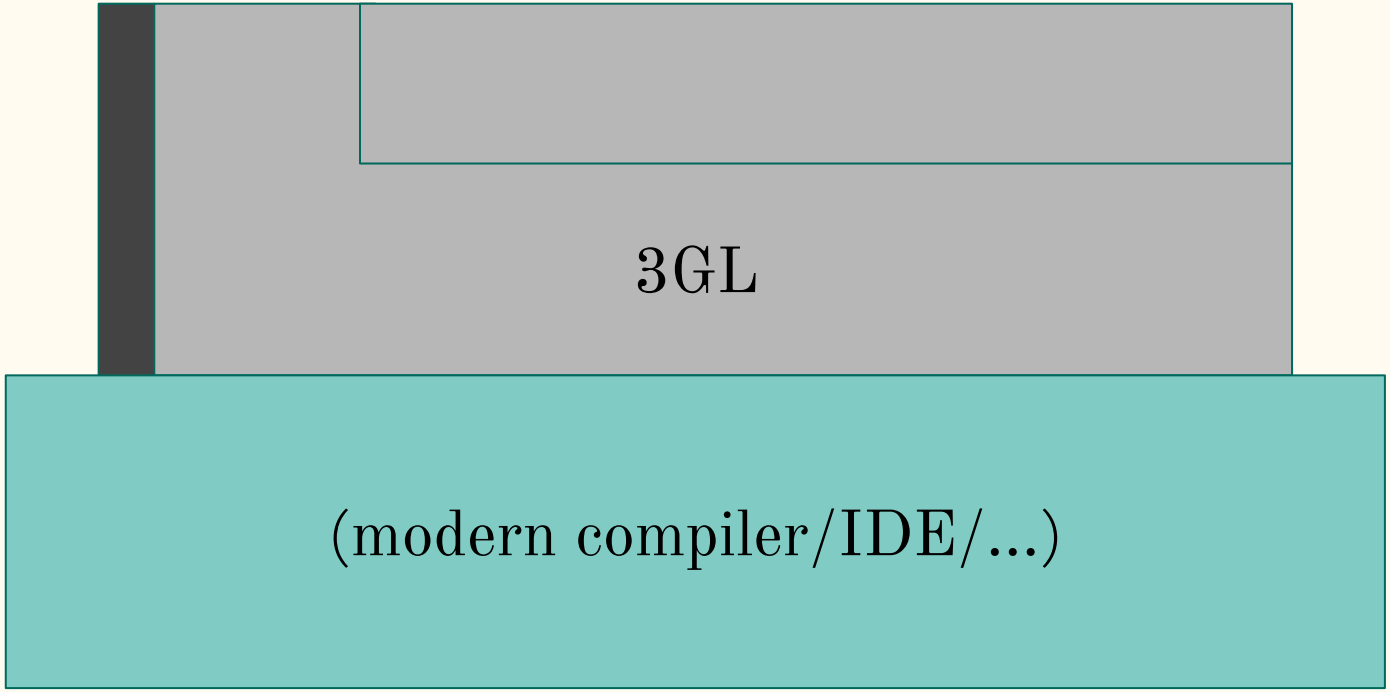
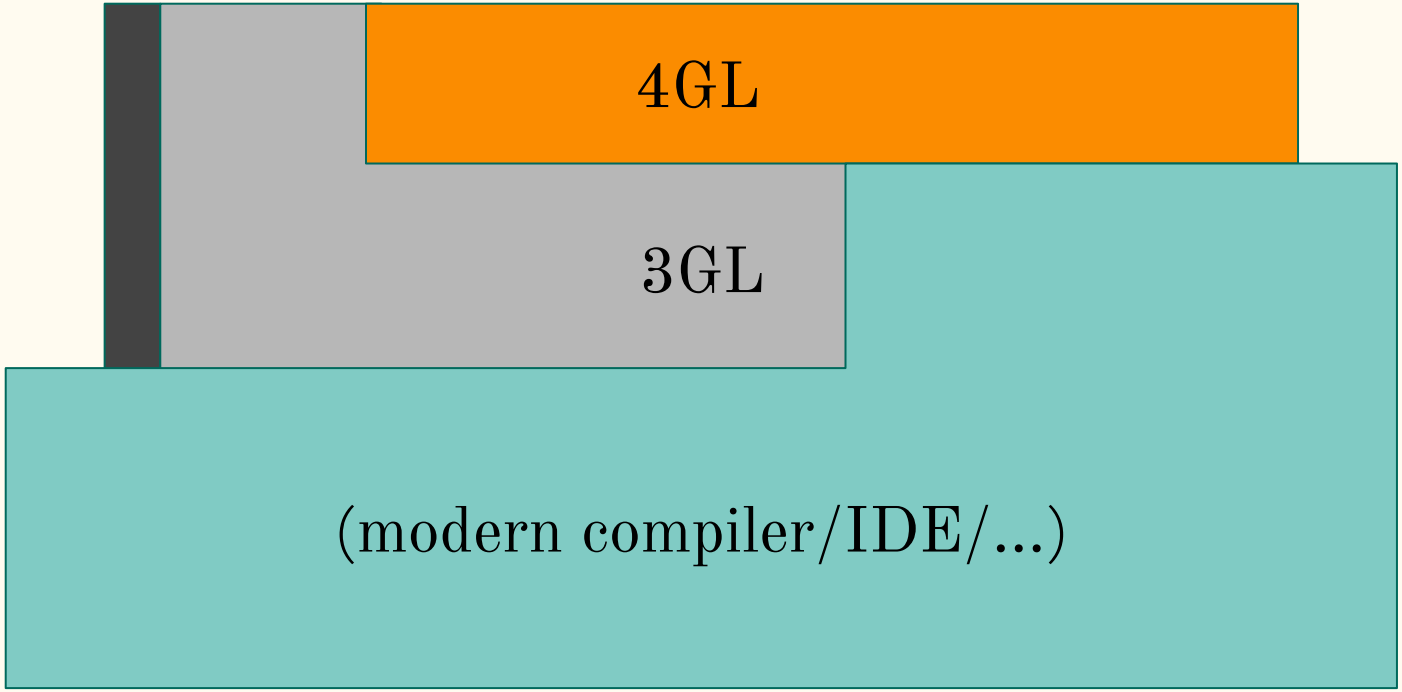
Language Migration with Generated Code



Language Migration with 4GL Code



Keep in Mind

- No language design, 100% implementation
- Documentation is not (a) given
- Domain experts = language experts/devs
- Many iterations with domain experts
- Months and years of effort, even with advanced tech
- Don’t try this at home!

Challenge: Regression Parsing

- regression parsing in general works well
- also in industrial settings
- great for the nightly build
- sometimes suitable only for weekly builds
- takes too long for continuous processes
- incrementality is ad hoc and limited

Challenge: Test Suite Inference

- first days of the compiler: nothing parses
- first months of the compiler: nothing runs
- customers grow impatient
- need to measure progress
- extensive test suites take tremendous time to create
- need coverage analysis, iterative refinement, etc

Challenge: Grammar Impact Analysis

- grammars are great
- finite specs of complex infinite artefacts
- if one nonterminal changes, what is the impact?
- no readily useful techniques, but no foreseeable showstoppers
- knowing the change impact enables many incremental techniques

Challenge: Grammar/Samples Dependencies

- for some languages, grammar inference is feasible and useful
- cf. "*Parser Generation by Example for Legacy Pattern Languages*" @ GPCE
- very few studies on incremental grammar inference
- needed both ways: codebase are updated, grammars too
- many opportunities to research and make great tools

Challenge: Neighbour Analysis

- the dark data of compiler construction: near misses
- cannot parse: “totally against expectations” vs “missing comma”
- useful for error tolerance and recovery
- done manually when exploring a new 4GL
- practical parsers often distinguish between success and commit
- differential testing + fuzzing?