

Abstract topology analysis of the join phase of the merge protocol with `astra`

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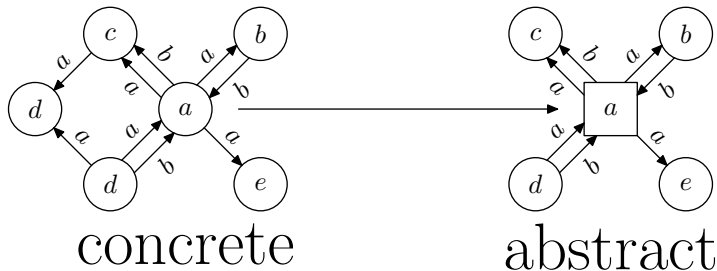
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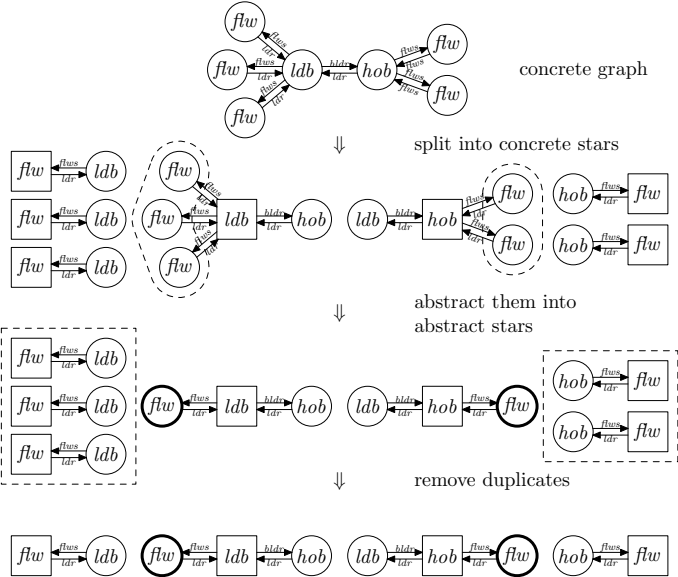
Star abstraction

- idea: consider only the “role” of a node, consisting of
 - ▶ its label (process state)
 - ▶ labels of its partner nodes
 - ▶ and the connections between the node and its partner nodes.



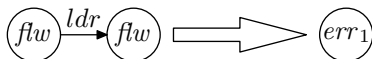
Notions: Star, core node, axis, outer nodes

Example of abstraction (α)

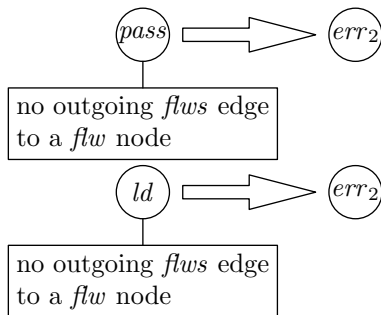


Property evaluation

- No two nodes labelled *flw* are connected to each other with an edge labelled *ldr*.



- A node labelled *pass* or *ld* always has at least one node labelled *flw* connected via some edge labelled *flws*.



Results

- tool: `astra`
- completeness of system: only “join” phase — in contrast to existing abstraction based tools (`hiranalysis`), `astra` has no problems with the arising topologies (drawbacks: fails to analyze merge phase (work in progress))
- completeness of analysis: arbitrarily many processes
- performance: < 1 MB memory, < 1 sec processor time on any reasonably modern machine.
- output flexibility: graphviz, GDL, XGDL, Tulip and METAPOST, no filtering
- power of property evaluation: subgraph matching with negative application conditions

Thanks

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