

SCCharts

Sequentially Constructive Charts

Sequentially Constructive Model of Computation

Synchrony Hypothesis

- Time divided into discrete ticks
- Computations take no time
- Holds for most synchronous languages, e.g., Lustre, Esterel, SCADE, SyncCharts, SCCharts

SC MoC in a Nutshell

- Natural sequencing prescribes deterministic scheduling
 - "stmt1; stmt2", "trigger/effect"
 - Prescriptive, not descriptive like Esterel/SyncCharts
- Only concurrent data dependencies matter
 - Sequential data dependencies do not lead to rejection
- Concurrent initialize/update/read scheduling:
 - Absolute writes ("x = false")
 - Relative writes ("x = x | true")
 - Reads ("y = x")
- Distinguish between relative and absolute writes

Dependency Types

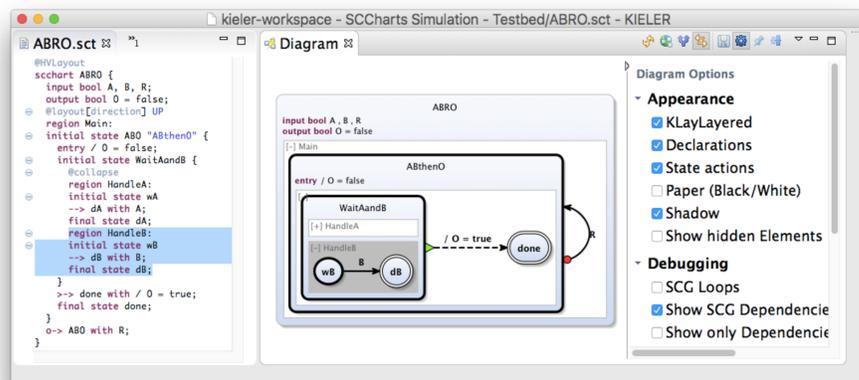
HW + SW Compiler Stack



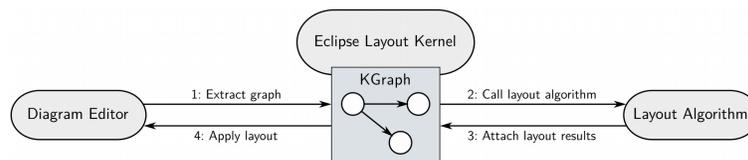
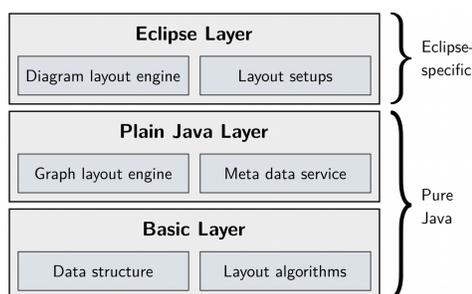
KIELER – Kiel Integrated Environment for Layout Eclipse Rich Client

SCChart Modeling with KIELER

- Modeler edits textual description
- Graphical SCChart synthesized automatically
- View filtering
- Textual/graphical back-and-forth navigation
- Numerous diagramming options
- Layout provided by ELK



ELK – Eclipse Layout Kernel



ELK Features

- Provides layout algorithms for state diagrams, data-flow diagrams, class diagrams, sequence diagrams, ...
- Usable with or without Eclipse
- Currently in Incubation Phase as official Eclipse Project
- Eclipse Public License encourages academic and commercial use
- Used in Ptolemy, ETAS EHANDBOOK, Sigasi Studio, ...

Contact:
 Prof. Dr. Reinhard von Hanxleden,
 Christian Motika, Steven Smyth
 Department of Computer Science
 Christian-Albrechts-Universität zu Kiel
 Olshausenstr. 40
 24098 Kiel, Germany
 Phone: +49 (0) 431 880-7282 /-7526
 Fax: +49 (0) 431 880-7615
 rvh@cmot@smm@informatik.uni-kiel.de
 www.rt.informatik.uni-kiel.de

Prof. Dr. Michael Mendler
 Department of Computer Science
 Universität Bamberg
 An der Weberei 5
 96047 Bamberg, Germany
 Phone: +49 (0) 951 863-2828
 Fax: +49 (0) 951 863-1200
 michael.mendler@uni-bamberg.de
 www.gdi.uni-bamberg.de/
 personnel/mendler

External Funding:



German Research Foundation,
 PRETSY Project
 dfg.de
 pretsy.org



National Instruments
 ni.com

Further Information:

<http://www.rtsys.informatik.uni-kiel.de/en/research/kieler>

- H. Fuhrmann, R. von Hanxleden, Taming Graphical Modeling, In Proc. ACM/IEEE 13th International Conference on Model Driven Engineering Languages and Systems (MoDELS'10), vol. 6394 LNCS, p. 196-210, Oct.2010, Springer.
- R. von Hanxleden, B. Duderstadt, C. Motika, S. Smyth, M. Mendler, J. Aguado, S. Mercer, and O. O'Brien, SCCharts: Sequentially Constructive Statecharts for Safety-Critical Applications, In Proc. ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI'14), Edinburgh, UK, June 2014.
- R. von Hanxleden, M. Mendler, J. Aguado, B. Duderstadt, I. Fuhrmann, C. Motika, S. Mercer, O. O'Brien, P. Rood, Sequentially Constructive Concurrency—A Conservative Extension of the Synchronous Model of Computation, ACM Transactions on Embedded Computing Systems, Special Issue on Applications of Concurrency to System Design, 13(4):144:1–144:26, July 2014.
- F. Rybook, S. Smyth, C. Motika, A. Schulz-Rosengarten, R. von Hanxleden, Interactive Model Based Compilation Continued – Interactive Incremental Hardware Synthesis for SCCharts, In Proc. 7th International Symposium on Leveraging Applications of Formal Methods, Verification and Validation (ISoLA 2016), volume 8802 of LNCS, page 443–462, Corfu, Greece, Oct. 2016.
- C. D. Schulze, M. Spönemann, R. von Hanxleden, Drawing Layered Graphs with Port Constraints, Journal of Visual Languages and Computing, Special Issue on Diagram Aesthetics and Layout, 25(2):89–106, 2014.