Compact Graph Drawing

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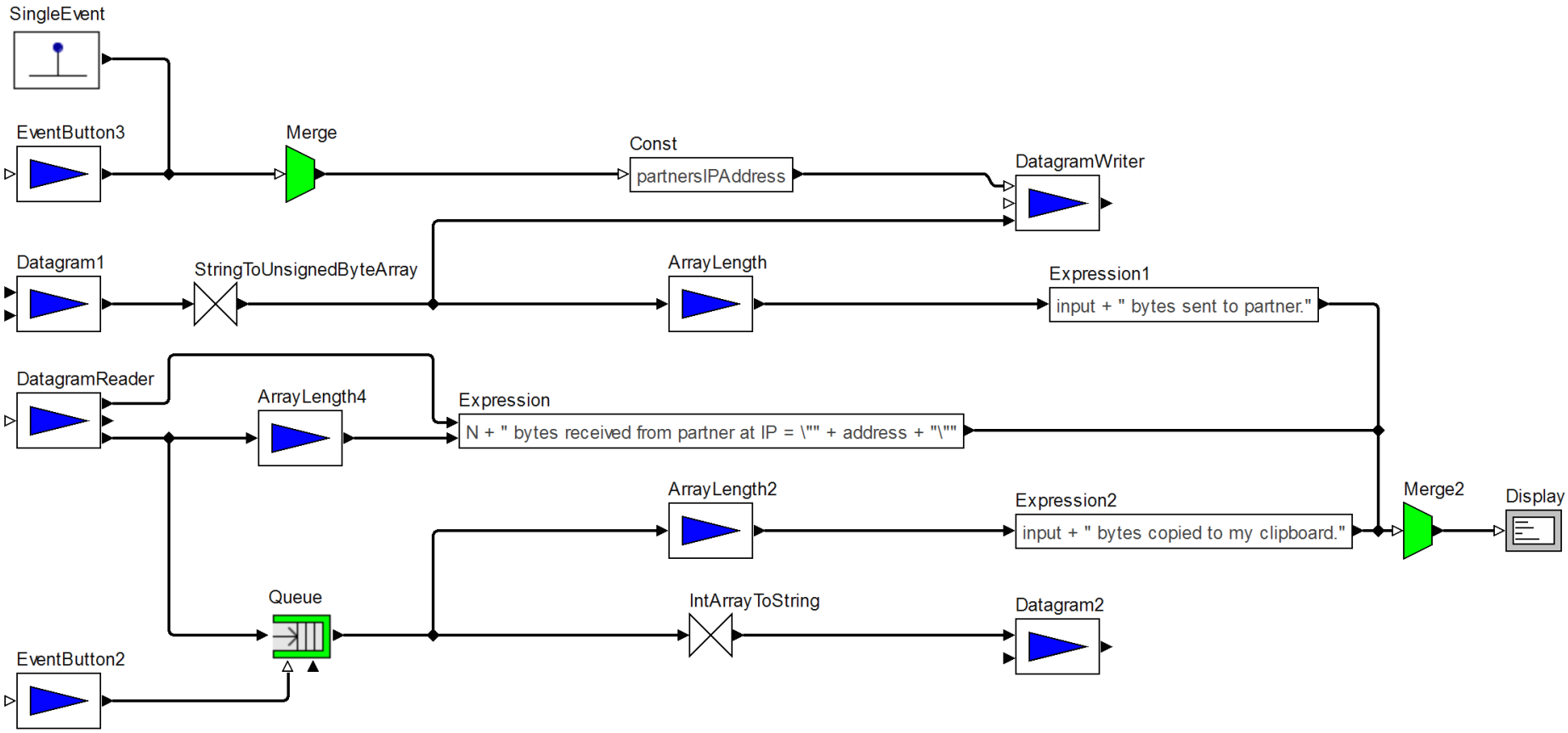
Oberseminar SS14

RTSYS KLay Layered

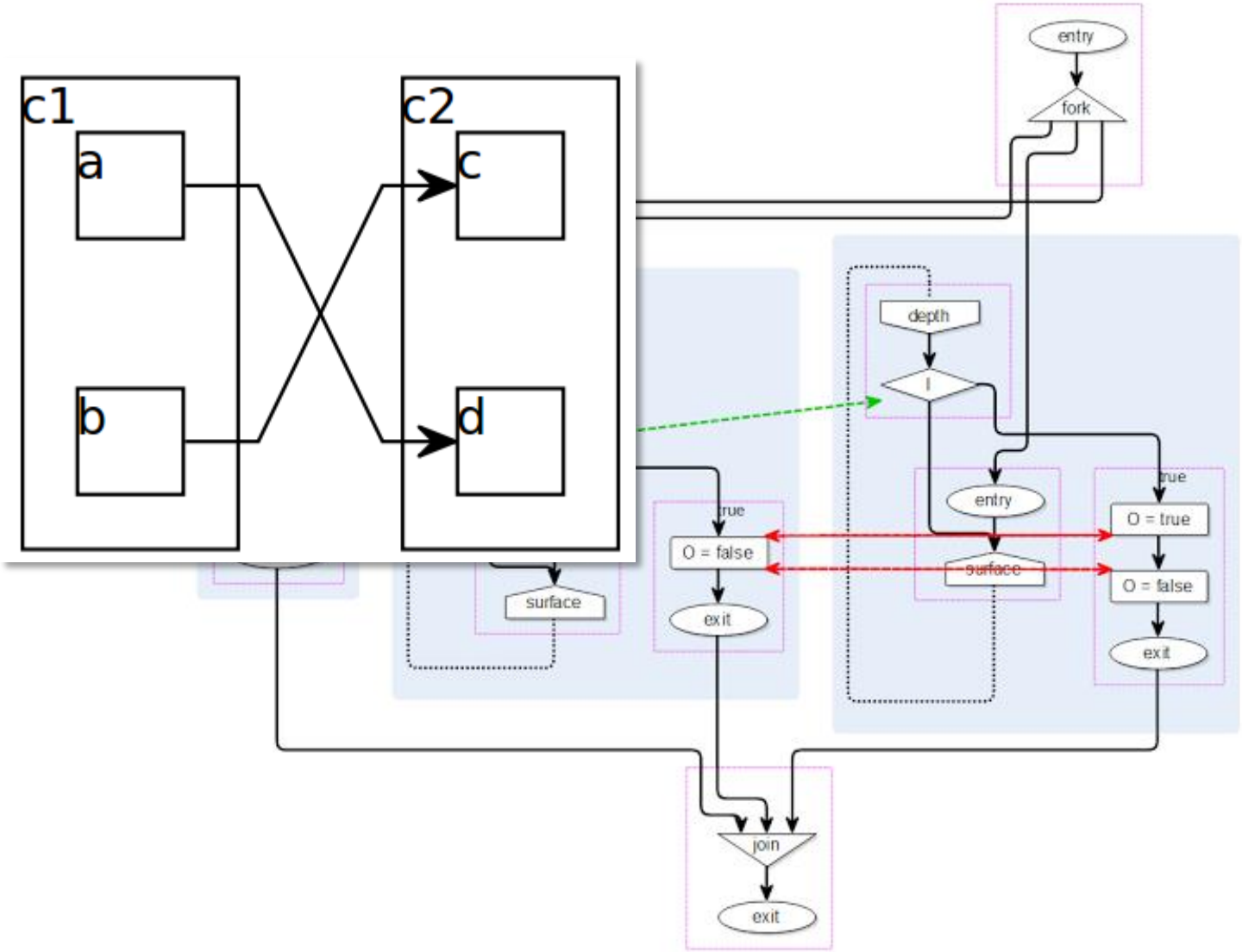
Current State

- Several years of research and hard work
- Papers, Theses, Industrial projects
- Only algorithm that properly supports ports (open-source)
- ~~No issues~~
- Ok … some ~~negligible~~

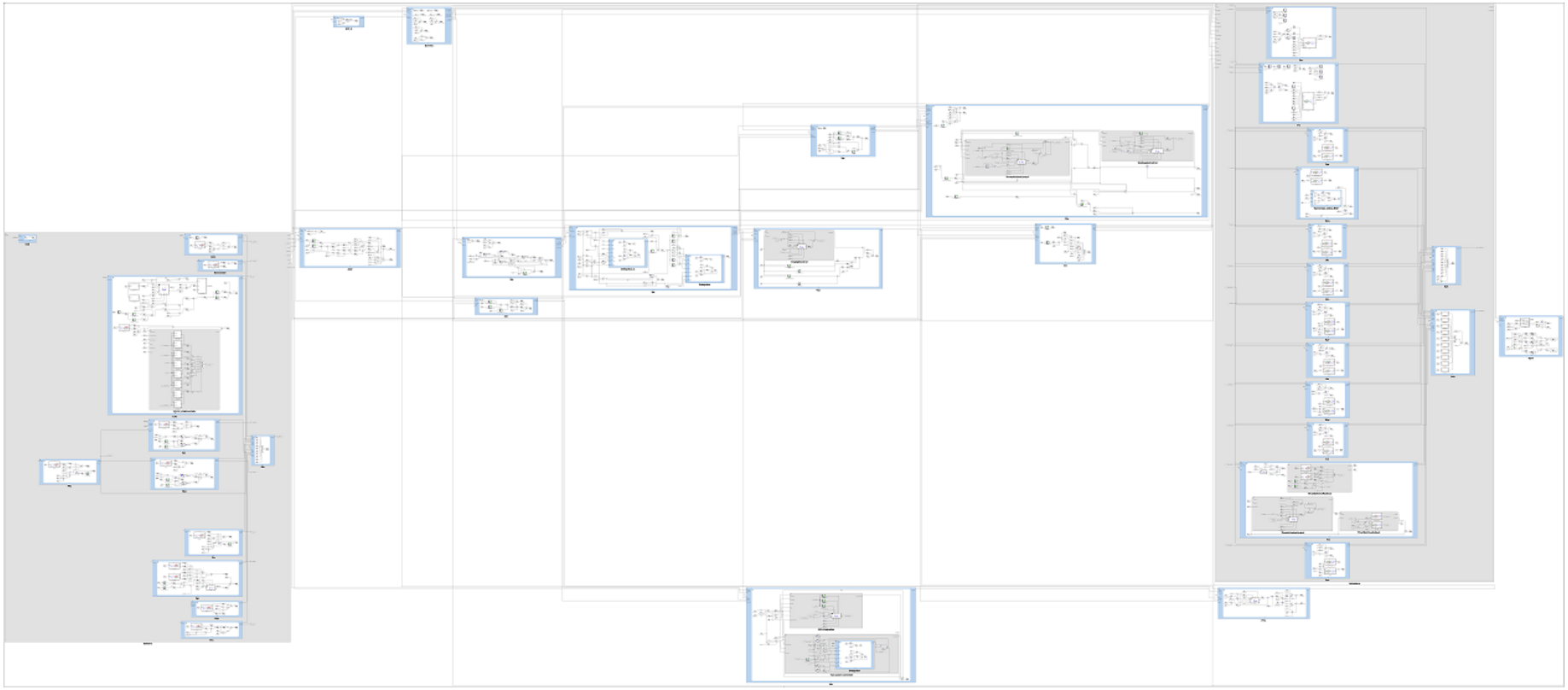
Big Nodes


SingleEvent
EventButton3
Merge
Const
partnersIPAddress
DatagramWriter
Datagram1
StringToUnsignedByteArray
ArrayLength
Expression1
input + " bytes sent to partner."
DatagramReader
ArrayLength4
Expression
N + " bytes received from partner at IP = \"" + address + "\""
ArrayLength2
Expression2
input + " bytes copied to my clipboard."
Merge2
Display
Queue
IntArrayToString
Datagram2
EventButton2

Hierarchy / Node Placement

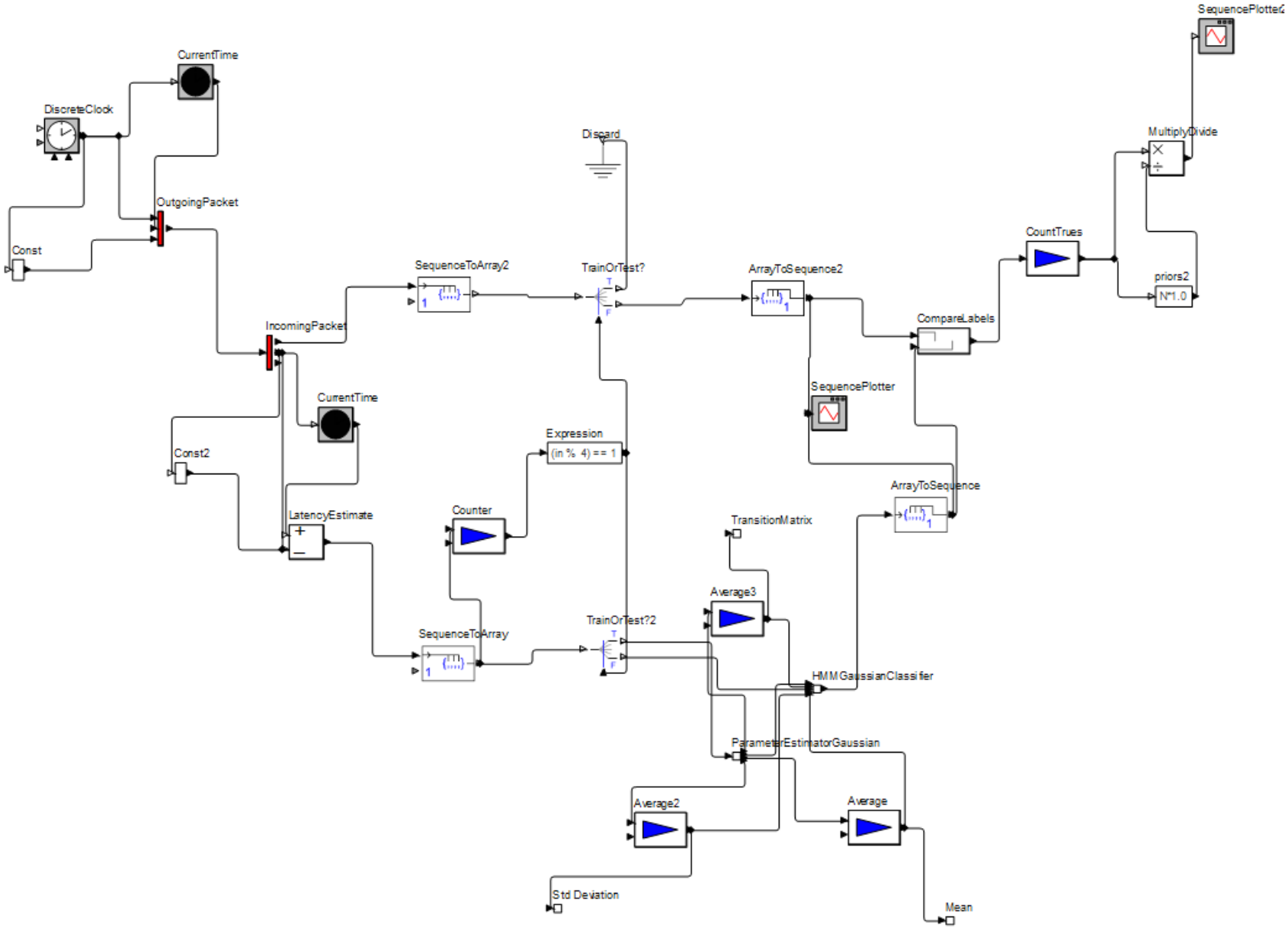


Compactness



May the Force be with you

FORCES

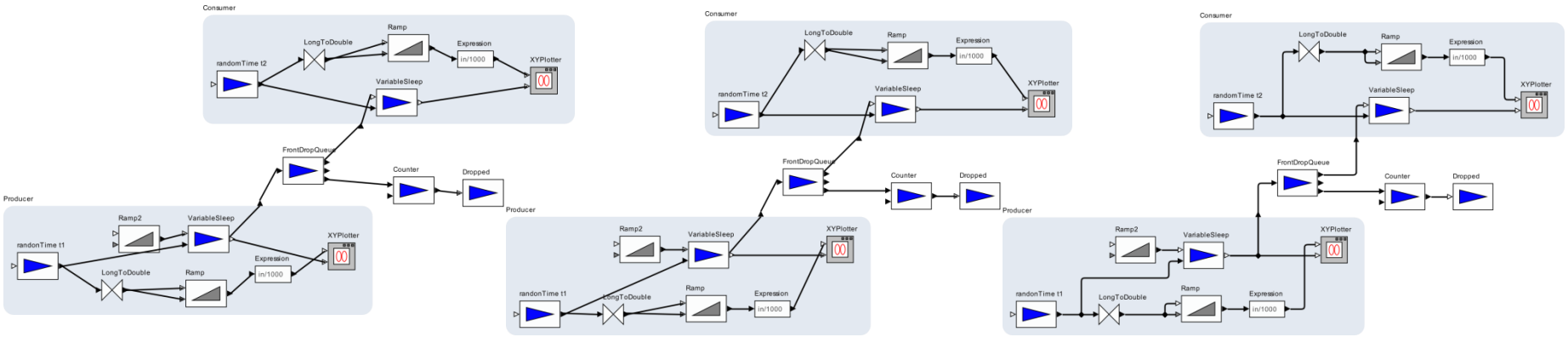

SequencePlotter2
CurrentTime
DiscreteClock
Discard
MultiplyDivide
OutgoingPacket
Const
SequenceToArray2
TrainOrTest?
ArrayToSequence2
CountTrues
priors2
N*1.0
CompareLabels
IncomingPacket
SequencePlotter
CurrentTime
Expression
(in % 4) == 1
Const2
ArrayToSequence
LatencyEstimate
Counter
TransitionMatrix
Average3
SequenceToArray
TrainOrTest?2
HMMGaussianClassifier
ParameterEstimatorGaussian
Average2
Average
Std Deviation
Mean

Stress-Minimizing Orthogonal Layout
of Data Flow Diagrams with Ports

CODAFLOW

Pipeline

1. Constrained Stress-Minimizing Node Positioning
2. Grid-like Node Alignment
3. Orthogonal Edge Routing



P-Stress

repulsive attractive

minimize $$\sum_{u<v\in V} w_{uv}\left((lp_{uv} - b(u,v))^{+}\right)^2 + \sum_{(u,v)\in E} l^{-2}\left((b(u,v) - l)^{+}\right)^2$$

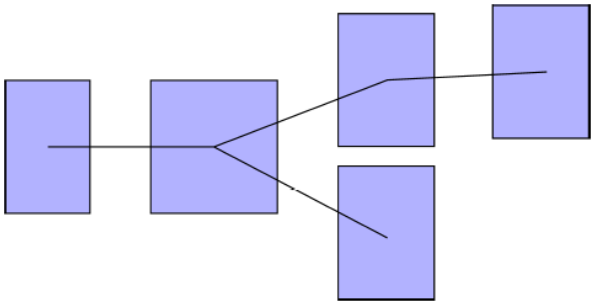
subject to certain constraints

$b(u,v)$	euclidean distance between u and v
p_{uv}	number of edges on shortest path between u and v
l	an ideal edge length
w_{uv}	normalization factor
$(z)^{+}$	$\max(0,z)$

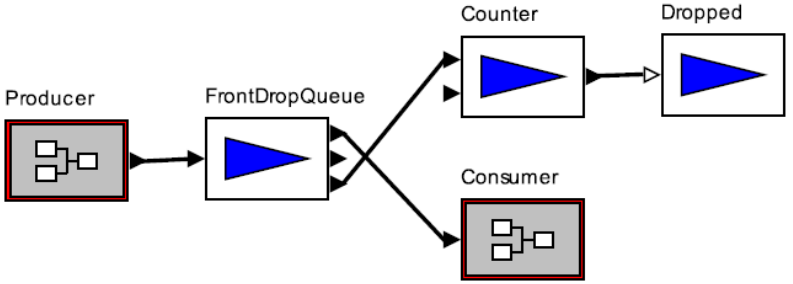
Dwyer, T., Koren, Y., & Marriott, K. (2006). IPSep-CoLa: An incremental procedure for separation constraint layout of graphs. *IEEE Transactions on Visualization and Computer Graphics*

Dwyer, T., Marriott, K., & Wybrow, M. (2009). Topology preserving constrained graph layout. *Graph Drawing 2009*.

Ports

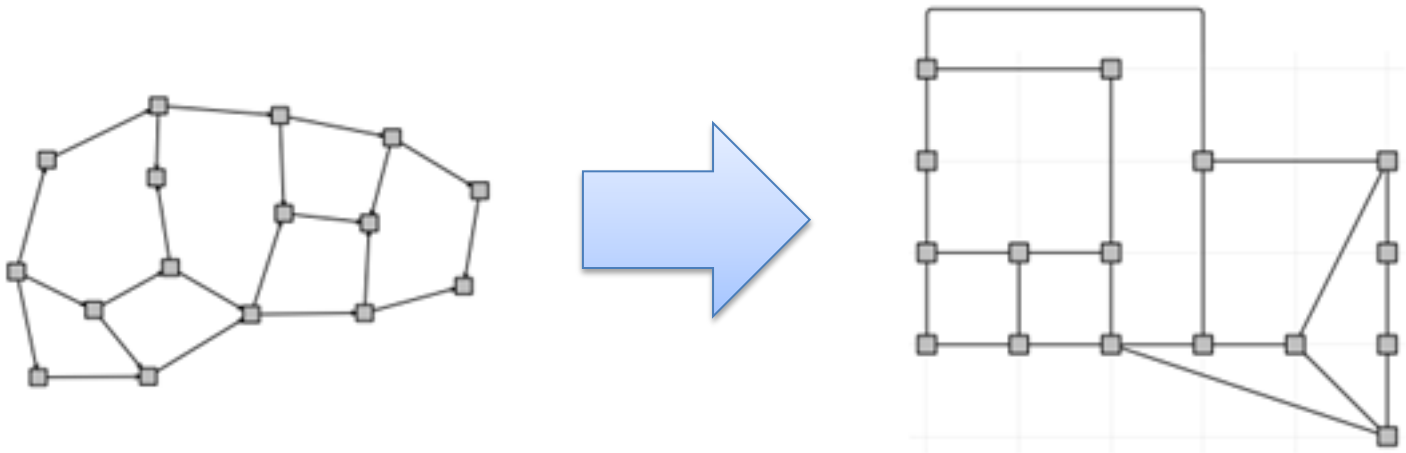


(a)



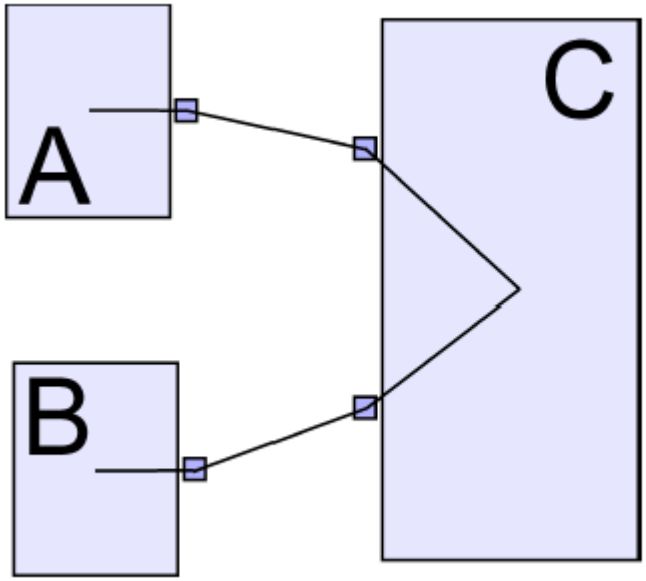
(b)

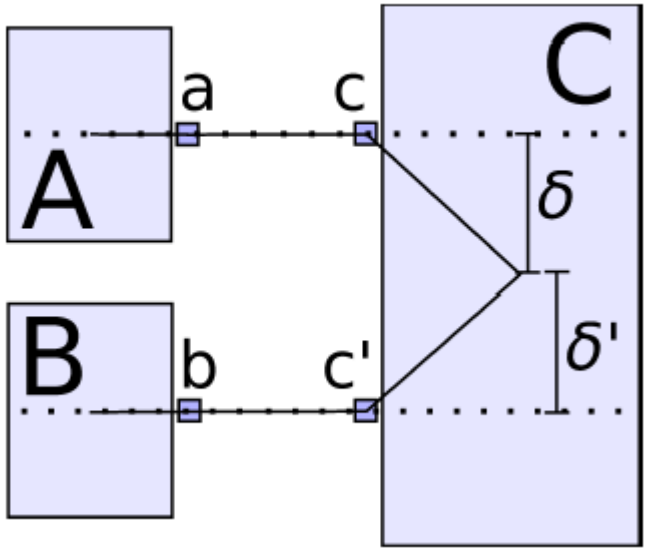
Grid-like Node Alignment



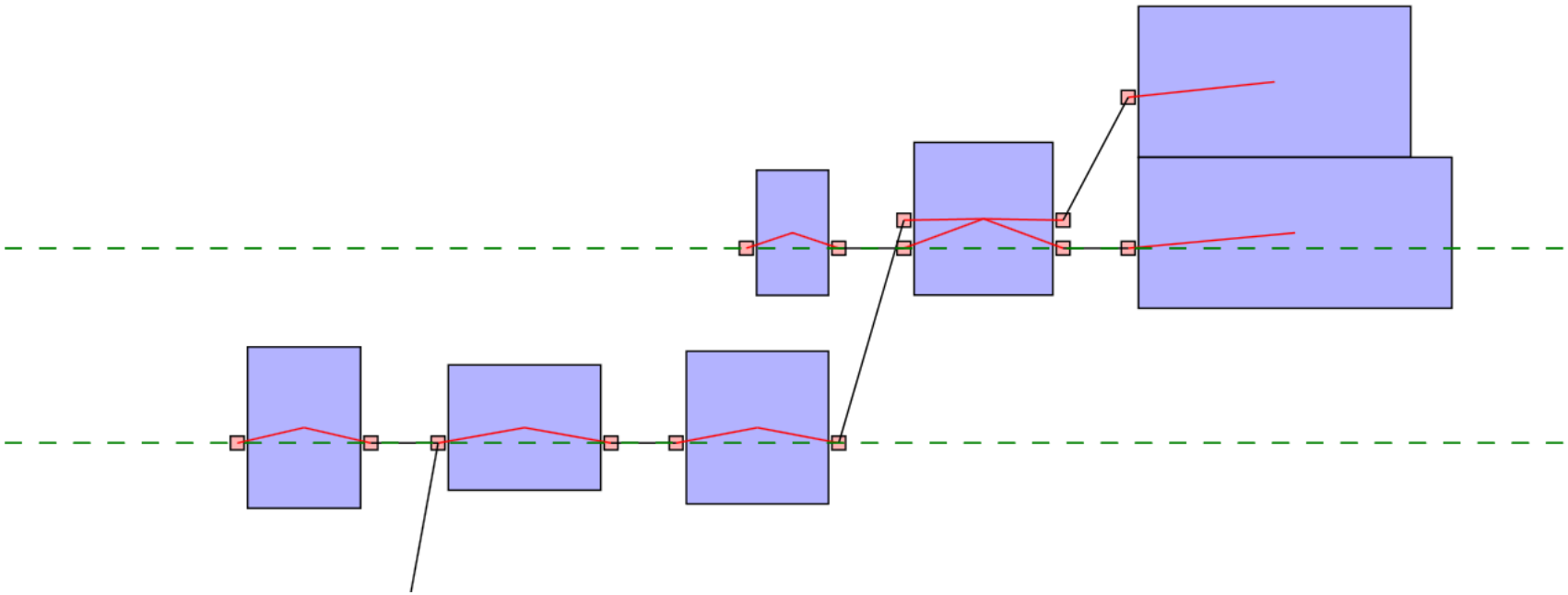
Kieffer, S., Dwyer, T., Marriott, K., & Wybrow, M. (2013). Incremental grid-like layout using soft and hard constraints. *Graph Drawing 2013*.

Grid-like Node Alignment

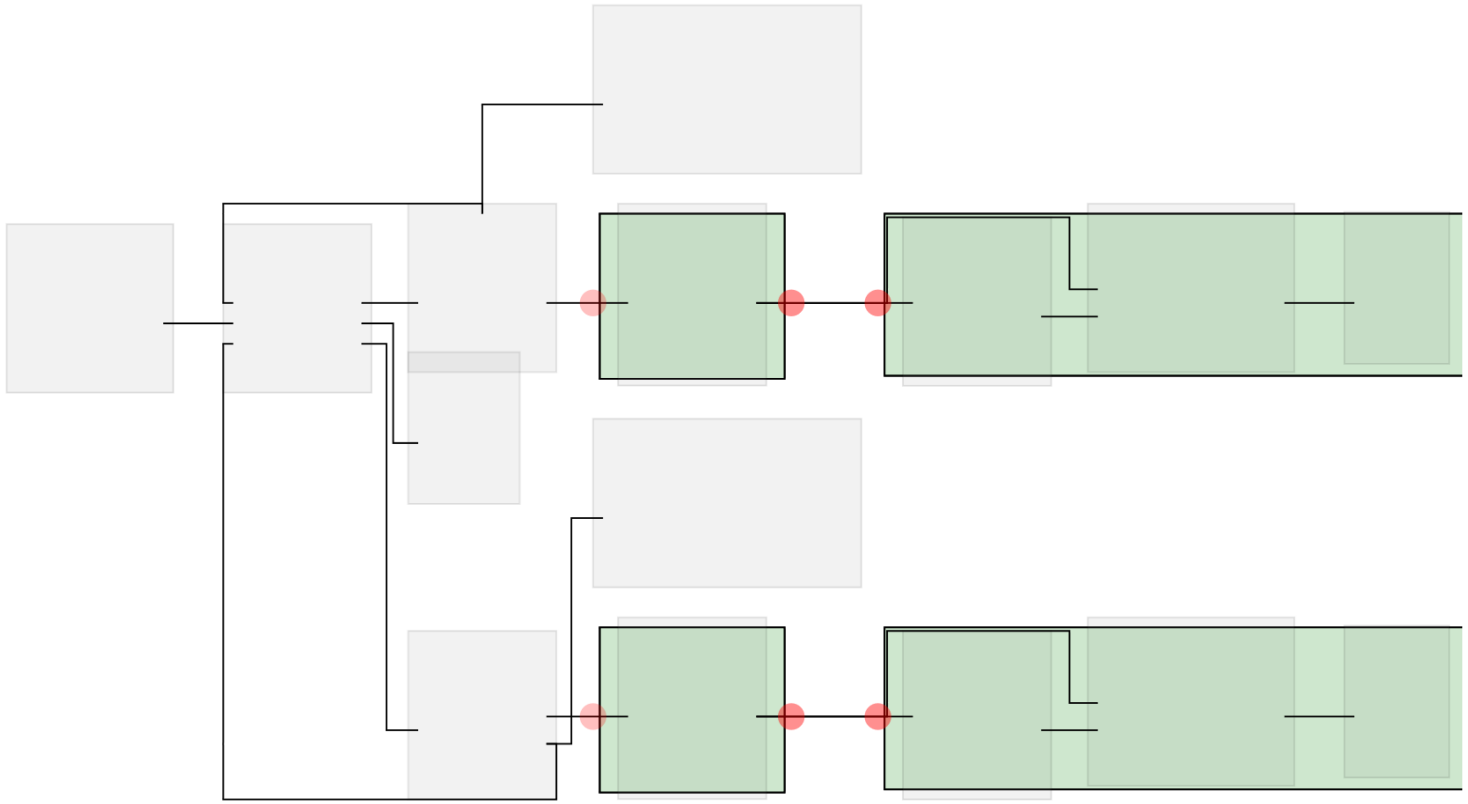




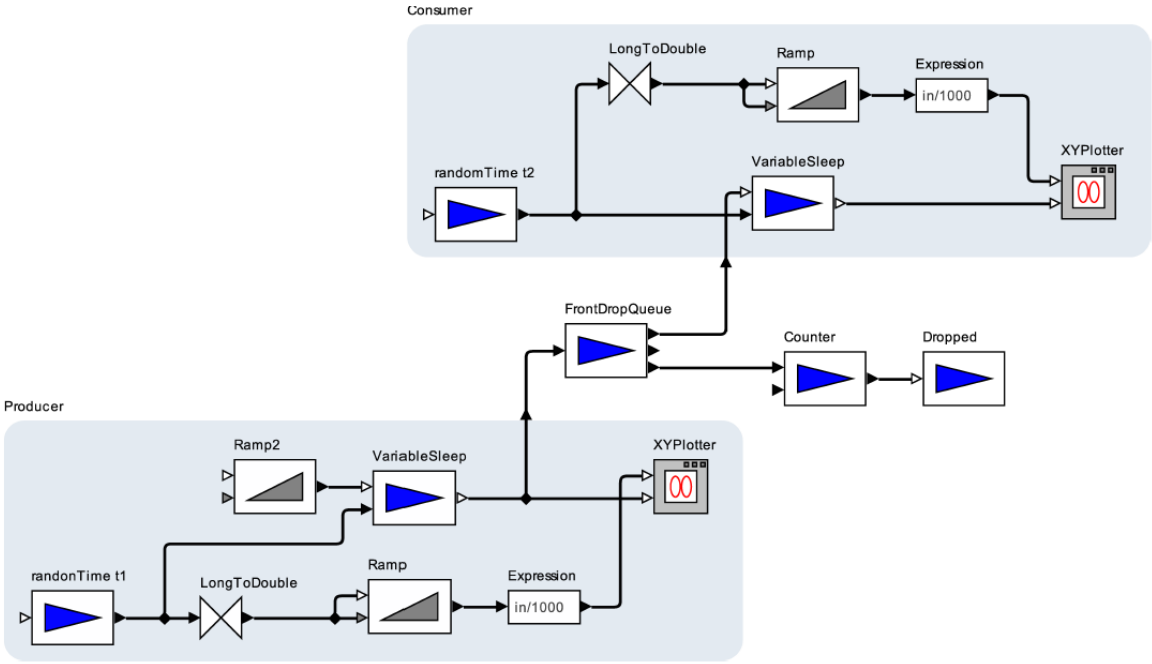
Grid-like Node Alignment



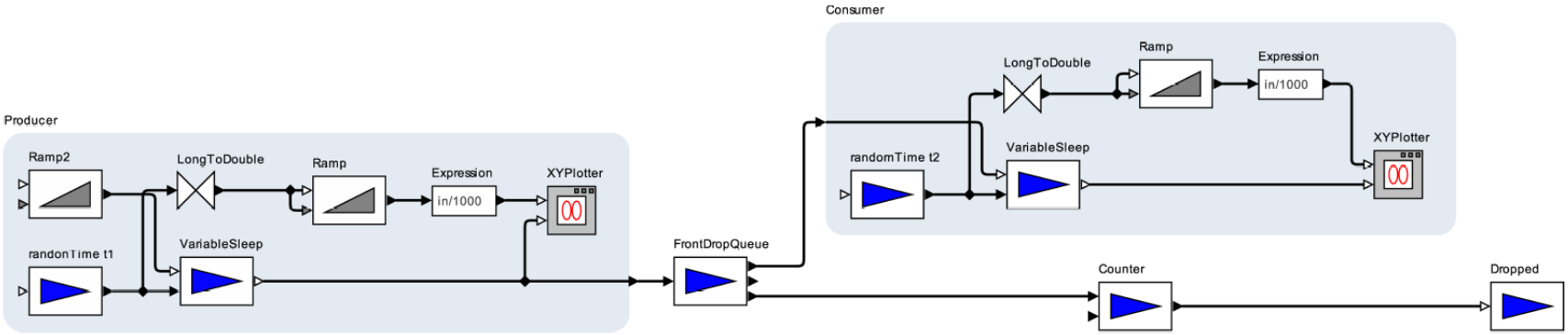
Orthogonal Edge Routing



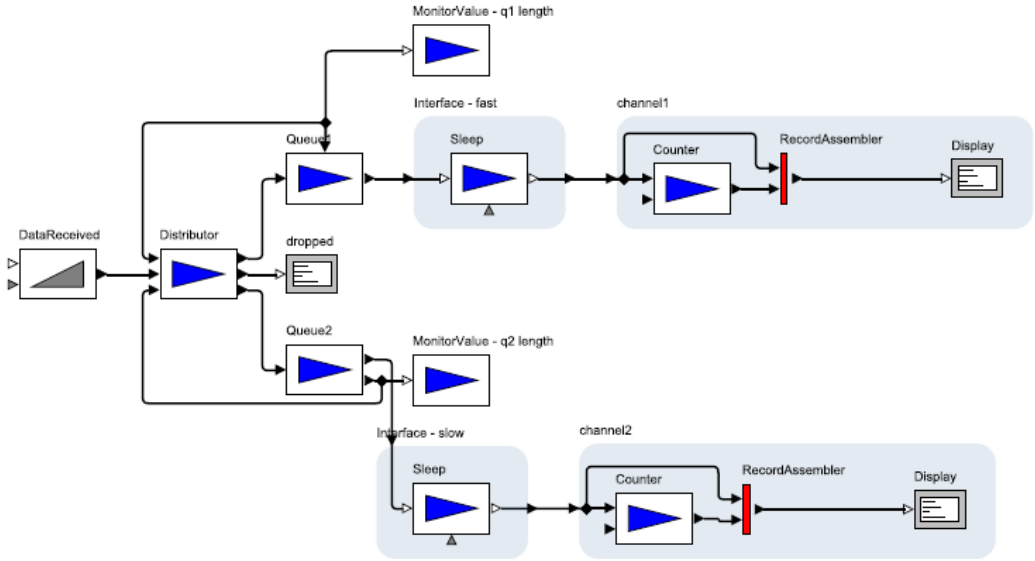
Wybrow, M., Marriott, K., & Stuckey, P. (2010). Orthogonal connector routing. *Graph Drawing 2010*.



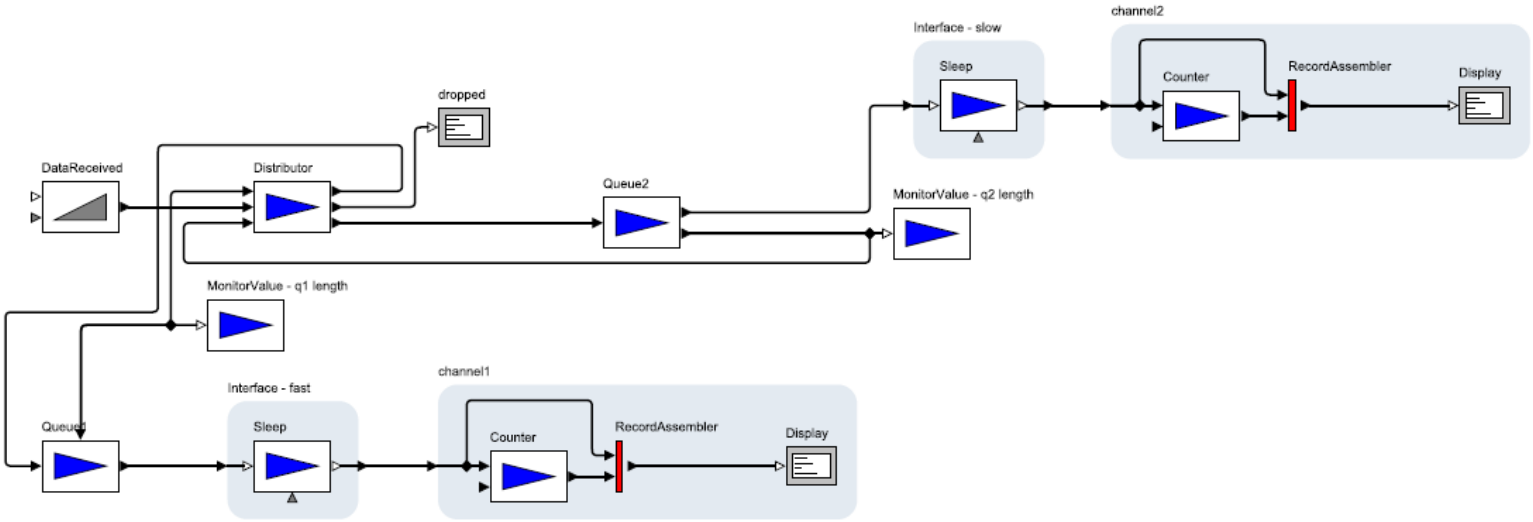
(a) CoDaFlow



(b) KLay Layered



(a) CoDaFlow



(b) KLay Layered

I'm done