VizPub: Visualizing the Performance of Overlay-Based Pub/Sub Systems

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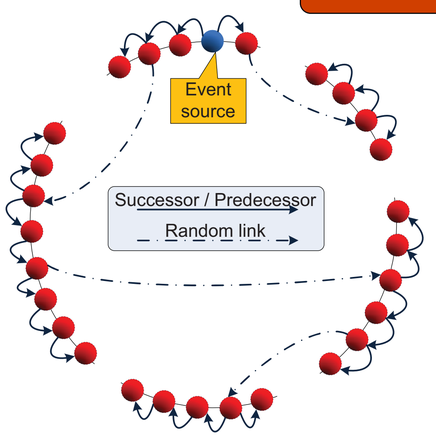
Overview

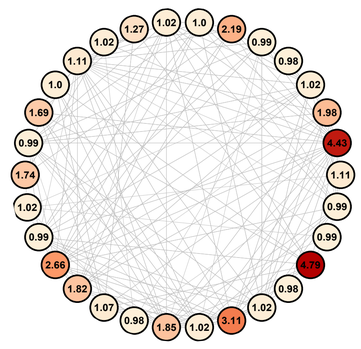
- Tool for visualizing overlay-based pub/sub systems
- Gain insight into system performance
- Compare different pub/sub systems visually
- Visualize metrics such as node degree and hit-ratio

Background for the visualized system (PolderCast)

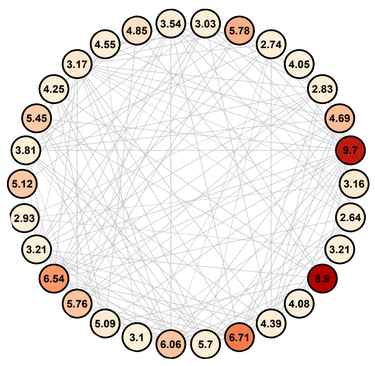


- Topic-based P2P pub/sub system
- Organizes nodes in a ring structure
- Gossip-based overlay maintenance under churn
- Hybrid dissemination using ring and random links

Visualizing structural properties



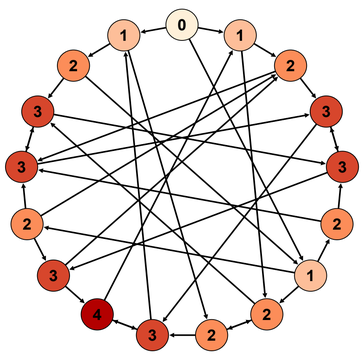
*Average number of gossip messages **sent** per node in PolderCast*



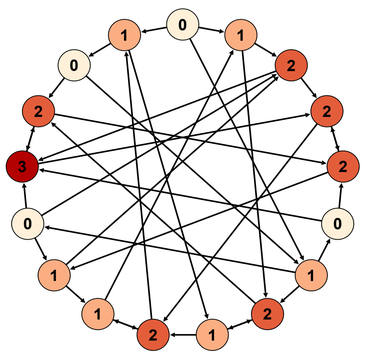
*Average Number of gossip messages **received** per node in PolderCast*

- Visualize structural properties of the overlay
- More
- And more..

Visualizing Event dissemination

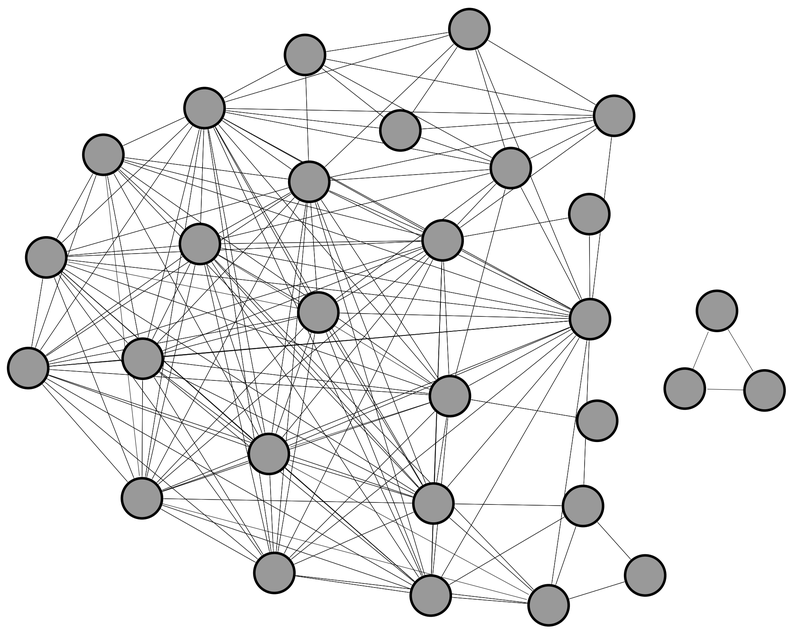


*Visualization of **path lengths** in PolderCast, each node label represents the hop count of the publication message*



*Visualization of **duplicate message count** for PolderCast, as edges are directed the values derived based on the in-degree of each node*

- Visualize publication message dissemination step-by-step
-
- And more..



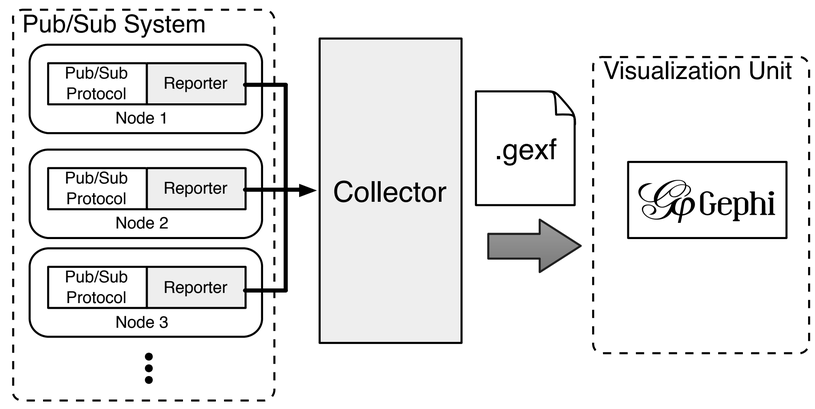
Disconnected component in PolderCast

Implementation code can be found at:

github.com/vizpub/vizpub

Architecture

- The *Reporter* implements the *Reporter Interface*
- The *Collector* pulls information from the *Reporter*
- Metrics are derived and calculated based on the reported information
- The Collector stores the final report in a .GEXF file
- The *Visualization Unit* reads the .GEXF file using the ***Gephi** framework*.

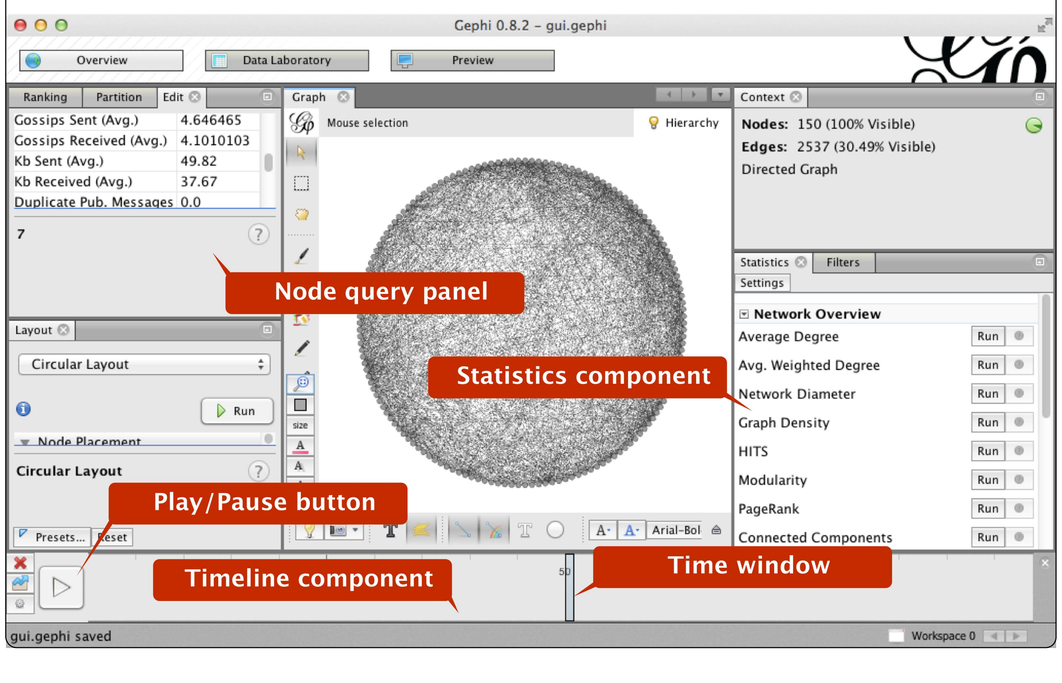


Reporter Interface

Method Name	Description
long reportId()	The Unique Id of this node
long[ ] reportNeighborIds()	The unique ids of this node's neigbors
long[ ] reportTopics()	List of topic ids this node subscribes to
long reportControlMsgsSent()	Number of overlay control messages sent
long reportControlMsgsReceived()	Number of overlay control messages received
long reportControlBytesSent()	Number of overlay control bytes sent
long reportControlBytesReceived()	Number of overlay control bytes received
PubMessage[] reportPubMsgsSent	List of publication messages sent
PubMessage[] reportPubMsgsReceived	List of publication messages received

Gephi

- Play back system execution
- Calculate topology metrics such as degree
- Export data to .csv using the *Data Laboratory*



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