WiGis Introduction

Why Visualize?

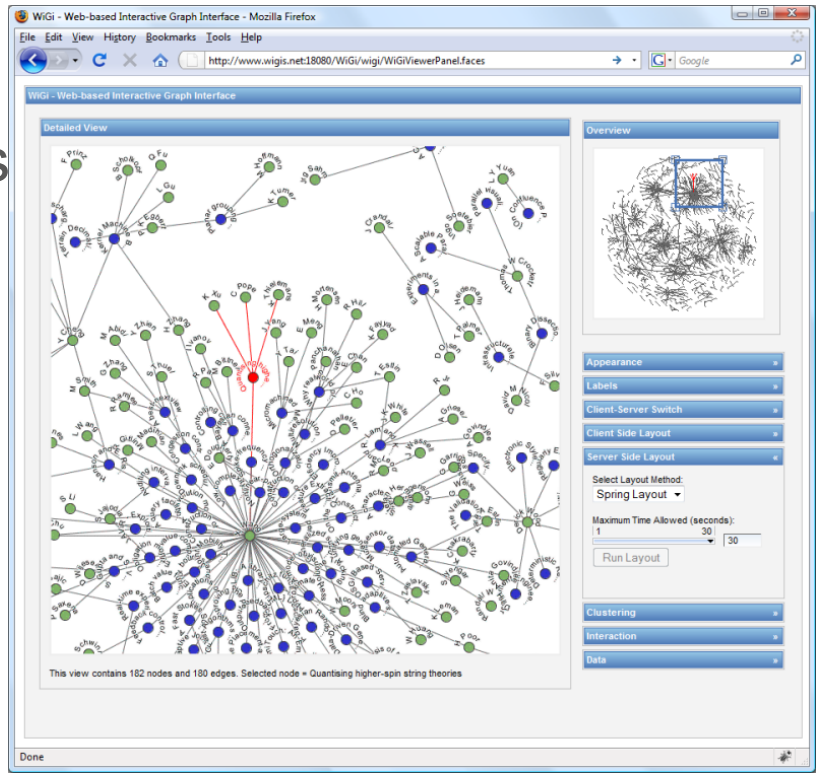
Real-time visual interaction and dynamic probing are powerful tools for data analysis

Our approach:

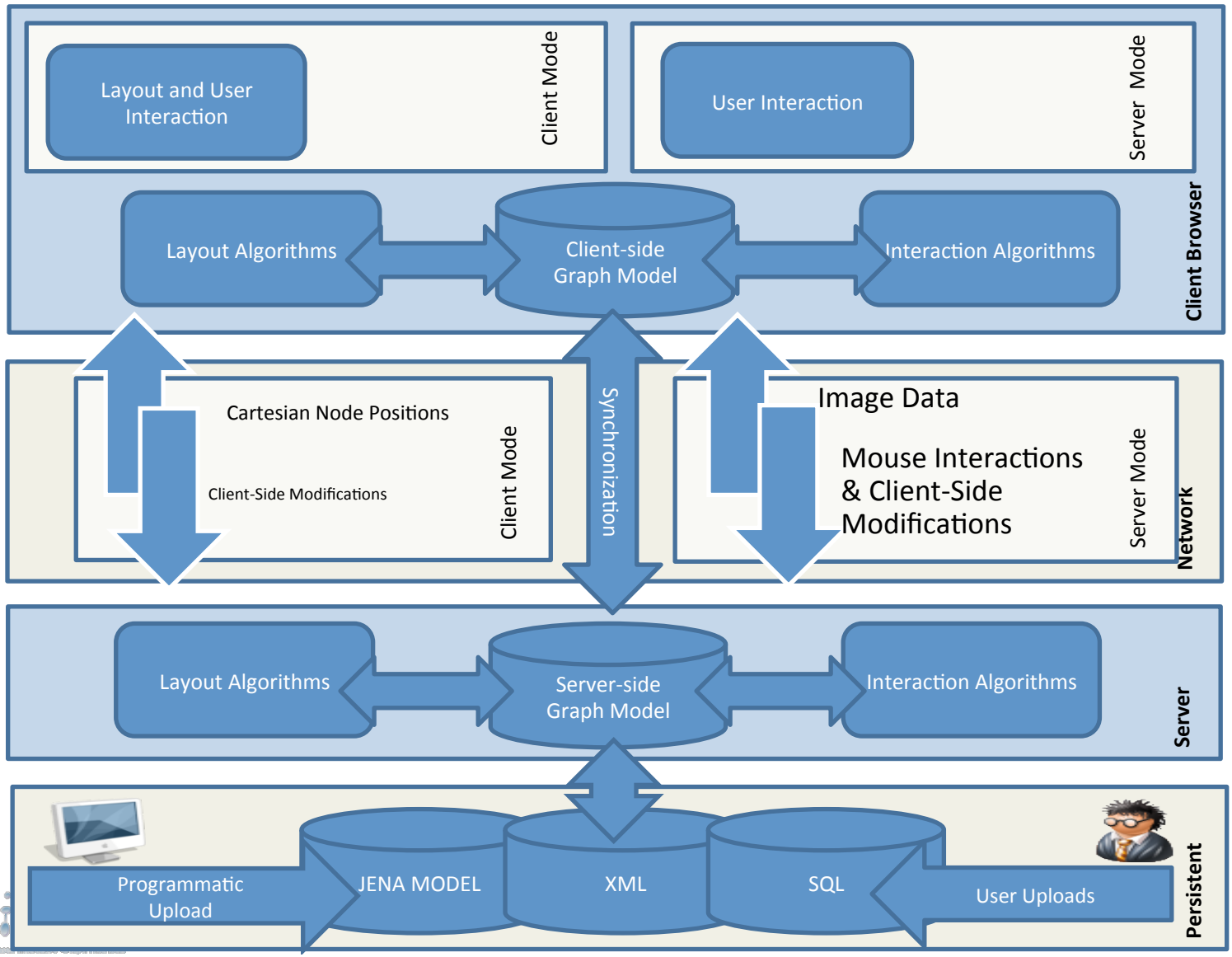
Make interaction feasible for large-scale data.

Use interaction to predictably explore the data

Make the tool easily accessible & embeddable



How it's done…


Layout and User Interaction
Client Mode
User Interaction
Server Mode
Client Browser
Layout Algorithms
Client-side Graph Model
Interaction Algorithms
Cartesian Node Positions
Client-Side Modifications
Client Mode
Synchronization
Image Data
Mouse Interactions & Client-Side Modifications
Server Mode
Network
Layout Algorithms
Server-side Graph Model
Interaction Algorithms
Server
Programmatic Upload
JENA MODEL
XML
SQL
User Uploads
Persistent

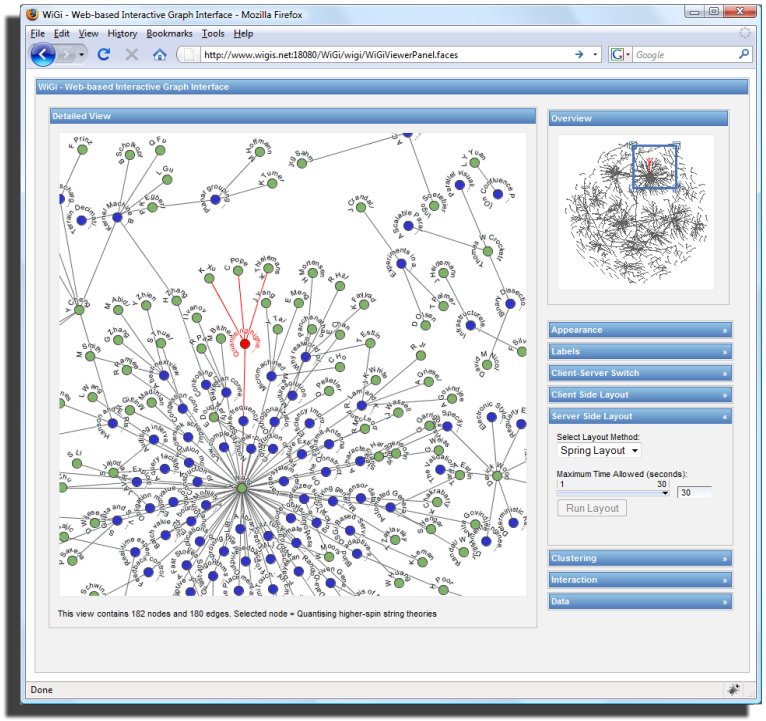
So what does it do?

Scalable Interactive Visualization of >1M networked entities
An order of magnitude more scalable than the next best web based graph tool

Customizable Semantic Framework. Map any data field to a Graph Dimension

Rich search functionalities, Node, Edge, Group and Shortest Path Highlighting

Native in all major browsers, with no plugins (flash, java etc)



Overview and Zoom Navigation

Visualize Remote algorithms running on local data in real time

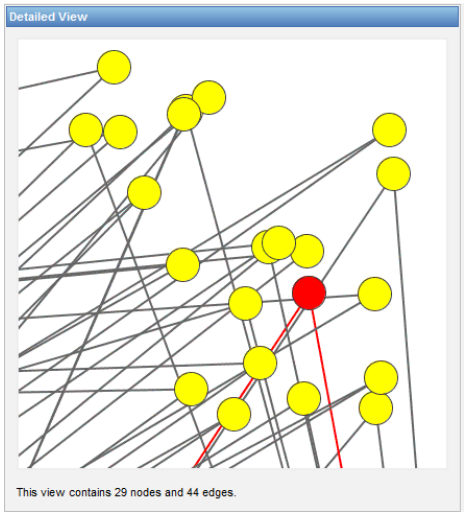
Feature Rich:
Layout, Clustering and Interaction algorithms

Seamless Transition between client (local) and server based (remote) data models. Graph representations synchronized through AJAX.

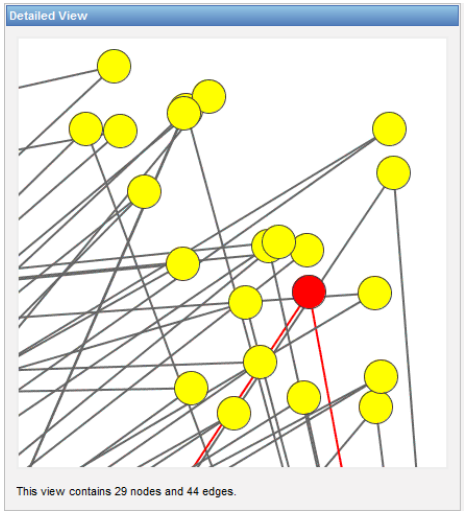
How it's done…

- Bi-Modal Web-based Architecture
- Synchronous graph models on client and server.
- Remote processing enables scalability
- Scalability achieved through asynchronous data communication

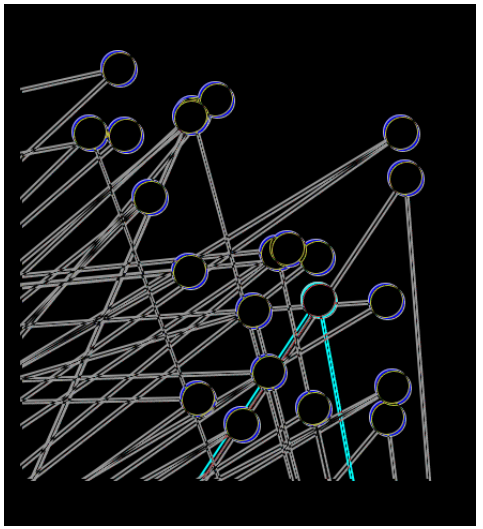
Seamless Transitioning



(a.) Client-Side Rendering (JavaScript)

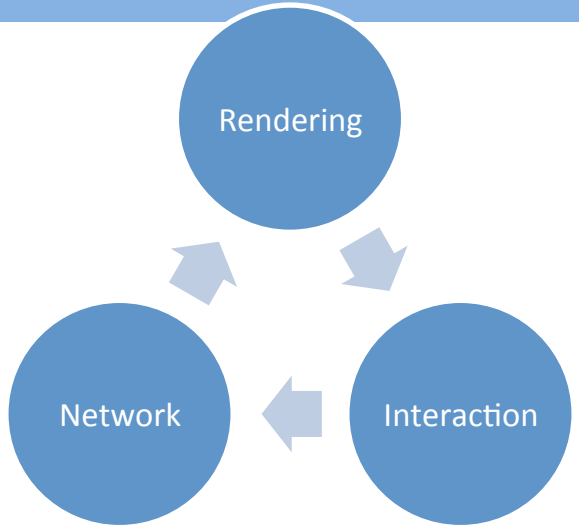


(a.) Server-Side Rendering (Java2D)



(a.) Difference Image

Bottlenecks / Phases of Interactive Vis



G1. 10 nodes. Scale Free

G6. 1 Million Nodes, Scale Free

Interaction algorithm is very efficient (~linear)

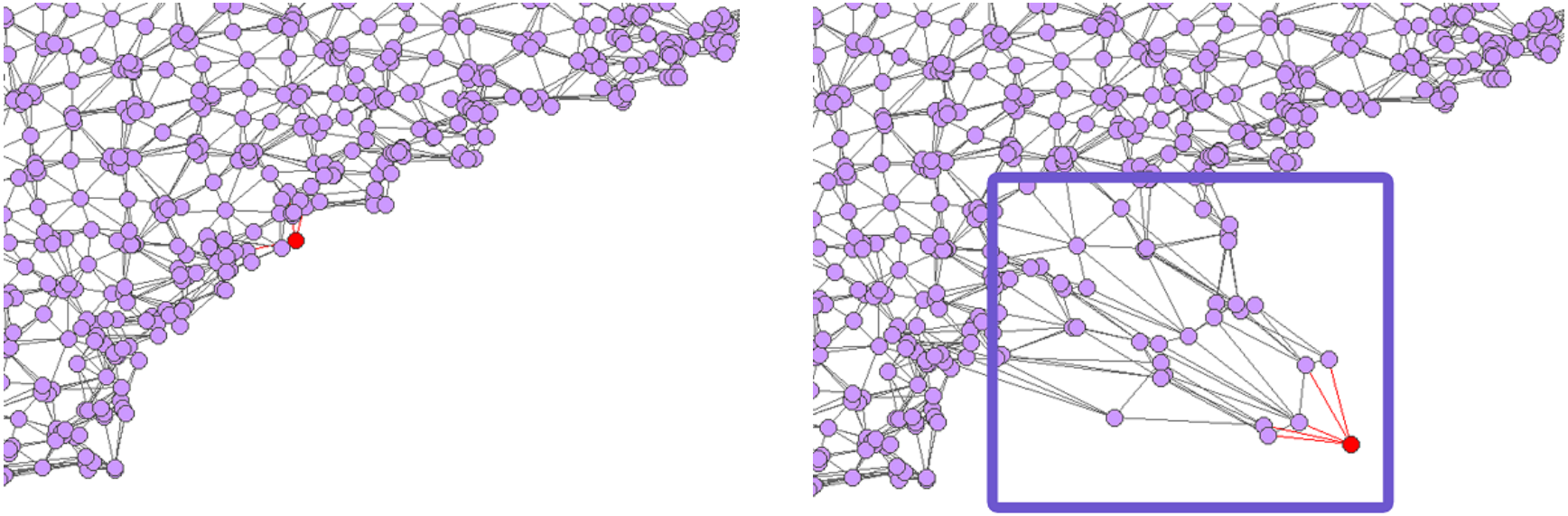
Influence of network delay drops with increasing graph size

Rendering takes the bulk of processing time

Graph	*G1*	*G2*	*G3*	*G4*	*G5*	*G6*
Mode	Client	Client	Server	Server	Server	Server
Rendering	89%	83%	39%	57%	71%	77%
Interaction	0.04%	0.04%	0.4%	3.9%	6.5%	7.1%
Network	0%	0%	59%	30%	5%	0.5%
Other	11%	17%	2%	9%	18%	16%
Total *ms*	13.2	40.9	57.9	108.6	705.6	6299.5

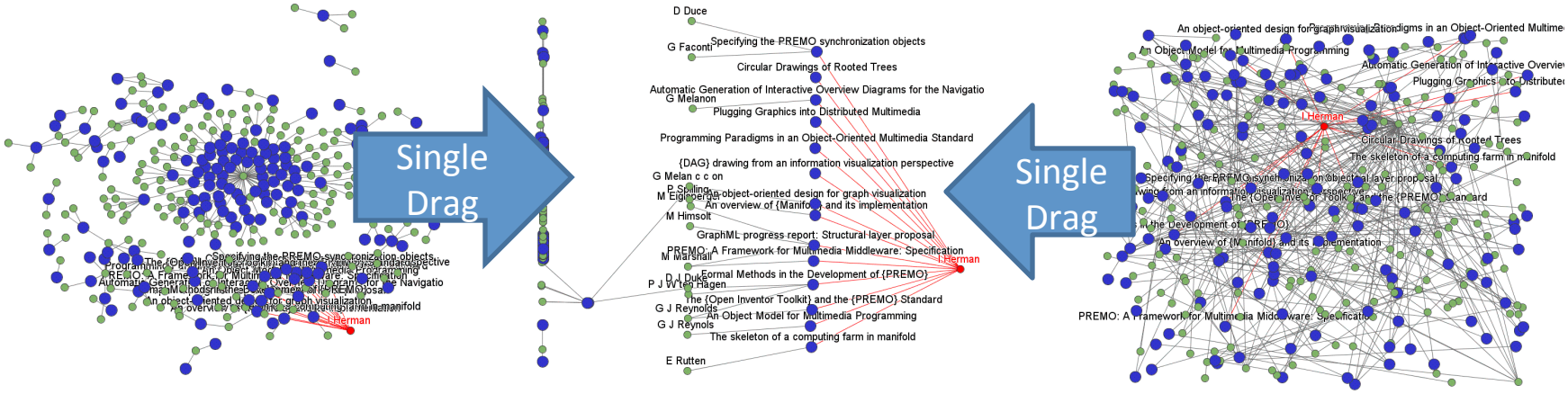
Table 3: Percentage breakdown of the online interactive visualization process in Google Chrome for our test graphs.

Interaction Algorithm

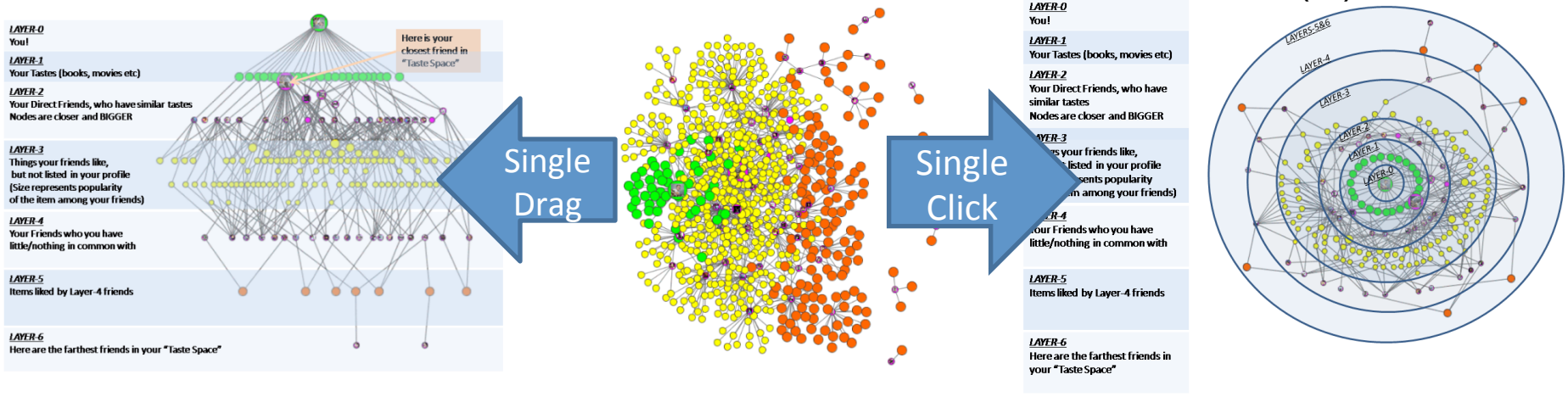


Interpolation method with effect parameter set to 3

Exploring Data through Interaction



(a.) (b.) (c.)



(a.) (b.) (c.)

Web-based Interactive Graph Interface

Why is WiGis Better?

1: Comparison test for interaction speeds against popular graph vis tools.

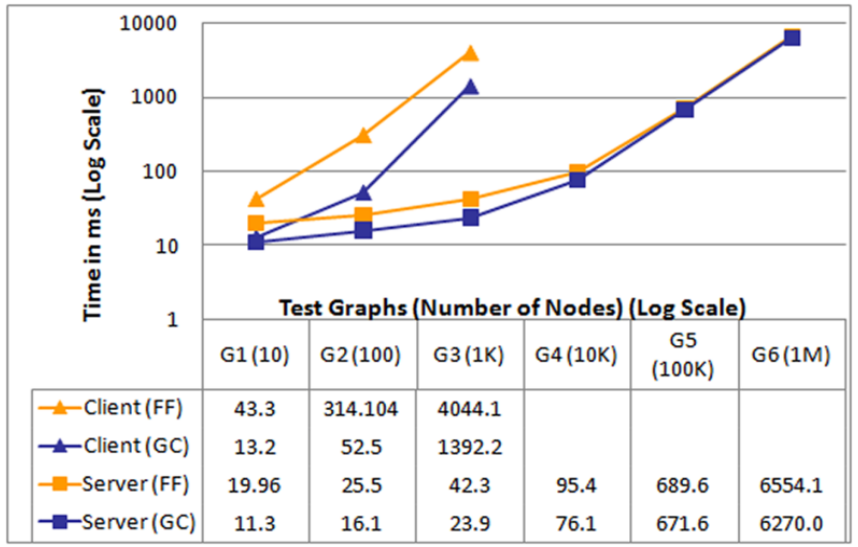
2: Comparison test against other systems for the overall interactive process.

Results:

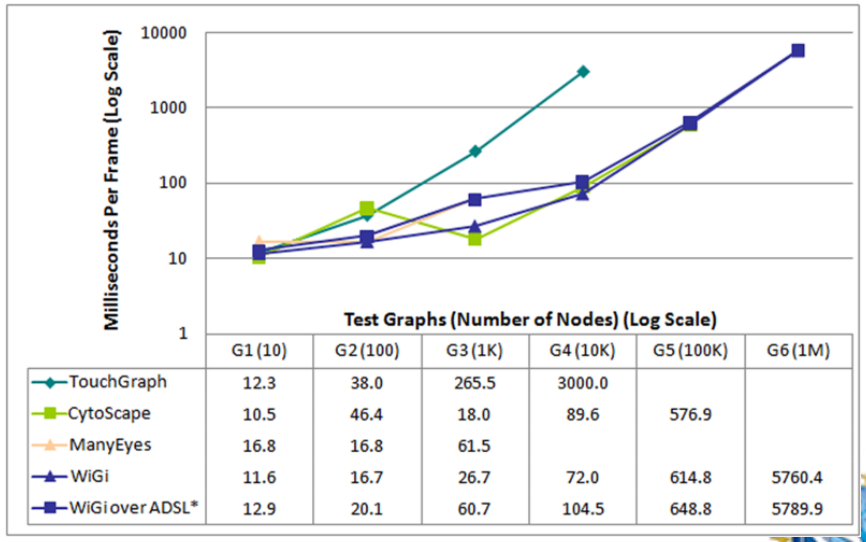
Interactive visualization of 1M+ nodes.

Scalable by an order of magnitude more than standard web-based graph visualization tools.

Fully Integrated with KDD-Blackbook 3.0

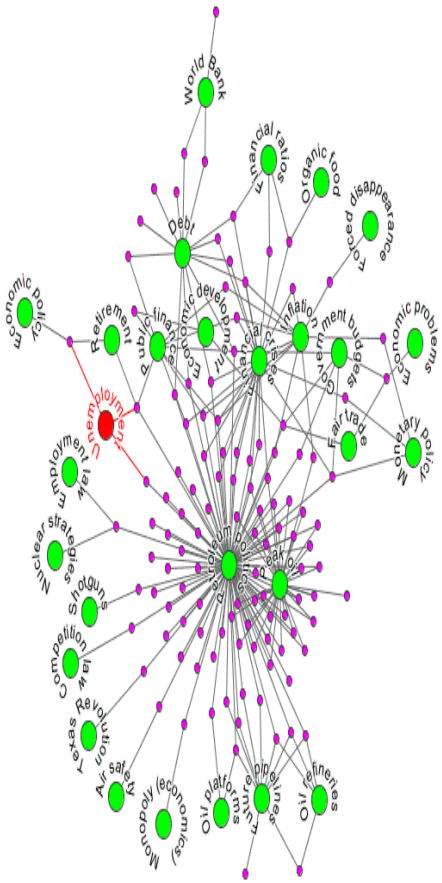


	G1 (10)	G2 (100)	G3 (1K)	G4 (10K)	G5 (100K)	G6 (1M)
Client (FF)	43.3	314.104	4044.1			
Client (GC)	13.2	52.5	1392.2			
Server (FF)	19.96	25.5	42.3	95.4	689.6	6554.1
Server (GC)	11.3	16.1	23.9	76.1	671.6	6270.0



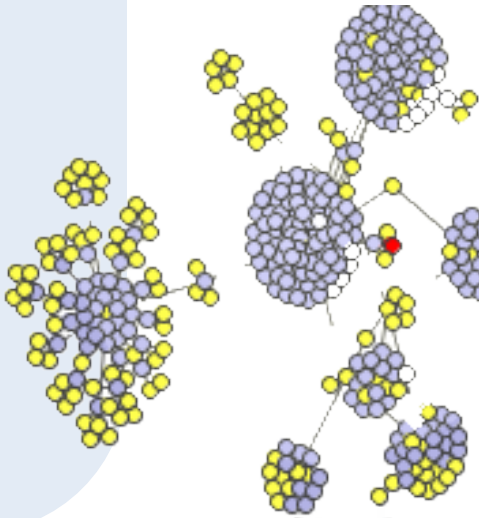
	G1 (10)	G2 (100)	G3 (1K)	G4 (10K)	G5 (100K)	G6 (1M)
TouchGraph	12.3	38.0	265.5	3000.0		
CytoScape	10.5	46.4	18.0	89.6	576.9	
ManyEyes	16.8	16.8	61.5			
WiGi	11.6	16.7	26.7	72.0	614.8	5760.4
WiGi over ADSL*	12.9	20.1	60.7	104.5	648.8	5789.9

Possible Commercial Applications



Applications & Collaborations

- Item Recommendation on Facebook
- Long Text Visualization
- Data Analysis for Intelligence Community
- Visualizations for data provenance- earth and life sciences.
- Citeseer Integration



WIGIS
Web-based Interactive Graph Interface

NSF