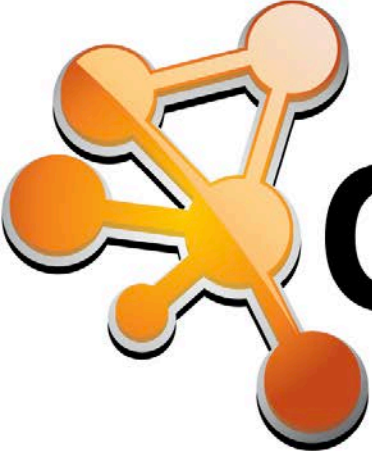


GENEMANIA & Cytoscape



Jason Montojo
University of Toronto

JSMF Workshop on Plug-and-Play Microscopes
November 16-17 2012, Indiana University

GeneMANIA: Introduction

- Real-time gene function prediction tool
- Available as:
 - Interactive web site (<http://genemania.org>)
 - Command line tool
 - Plugin for Cytoscape 2
 - App for Cytoscape 3
- Java
- LGPL licensed
- Code available upon request

GeneMANIA: Introduction

- Current:

- Gary Bader (co-PI)
- Quaid Morris (co-PI)
- Max Franz
- Christian Lopes
- Jason Montojo
- Harold Rodriguez
- Khalid Zuberi

- Alumni:

- Pauline Chao
- Ovi Comes
- Sylva Donaldson
- Farzana Kazi
- Chris Grouios
- Anson Maitland
- Sara Mostafavi
- Deb Ray
- Quentin Shao
- Michael Tsui
- David Warde-Farley
- George Wright



GenomeCanada



OntarioGenomicsInstitute



Ontario



Donnelly Centre
for Cellular + Biomolecular Research
UNIVERSITY OF TORONTO



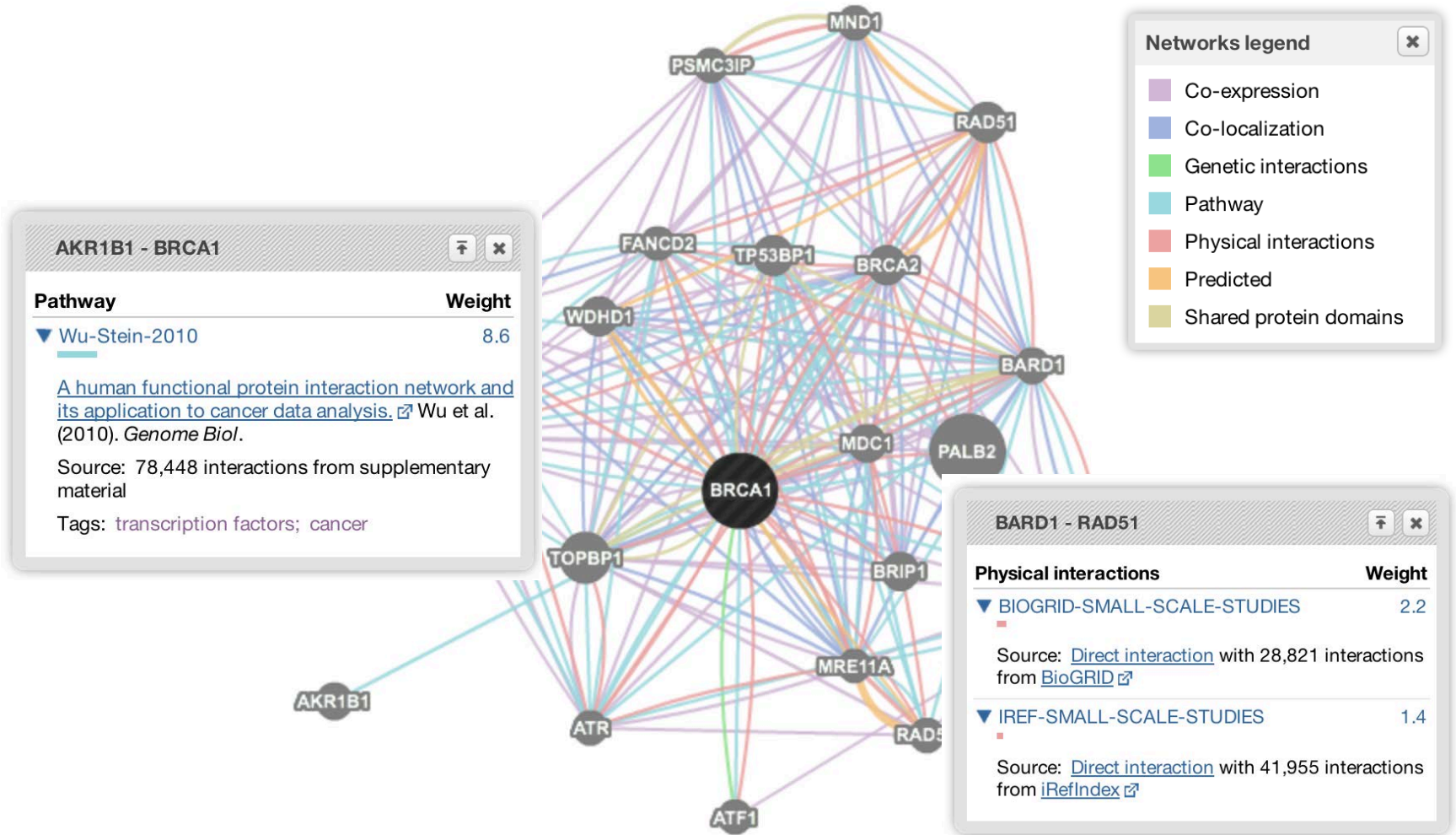
UNIVERSITY OF
TORONTO

GeneMANIA: Overview

Guilt by association

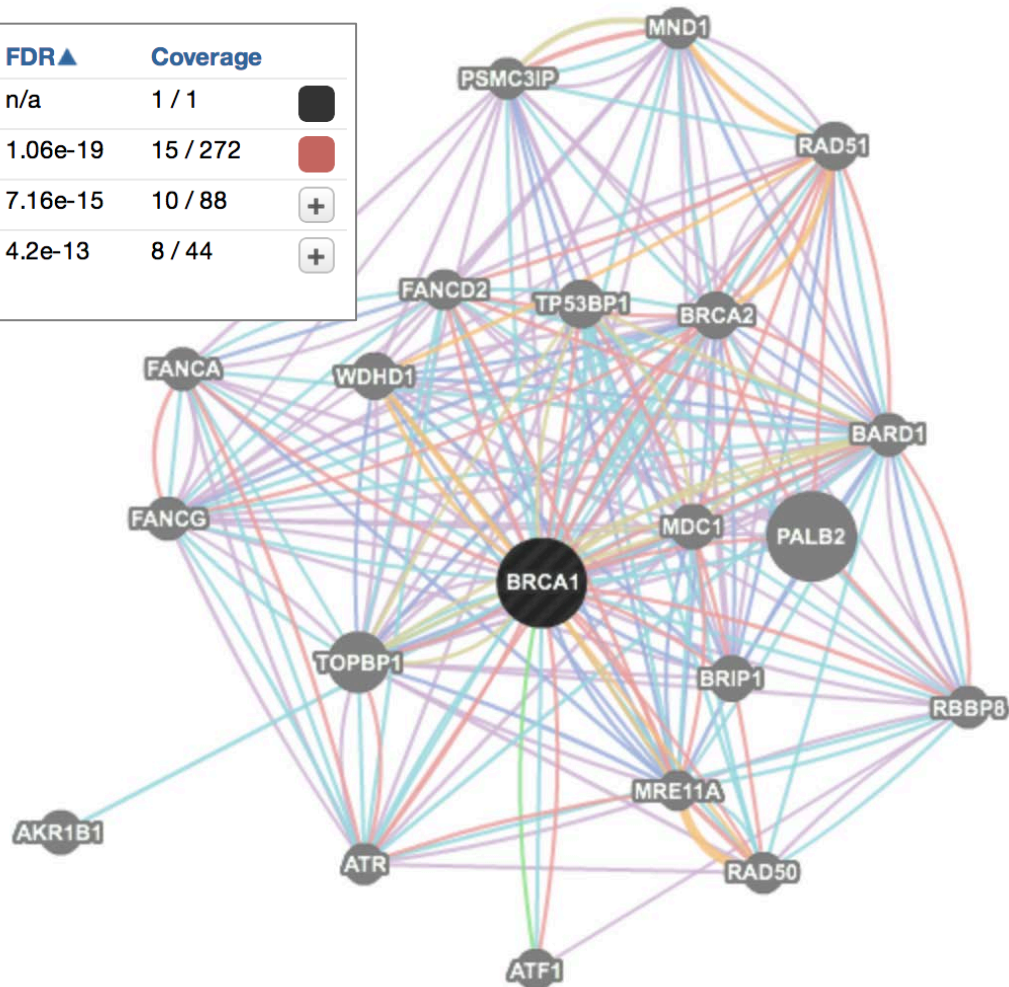


GeneMANIA: Overview



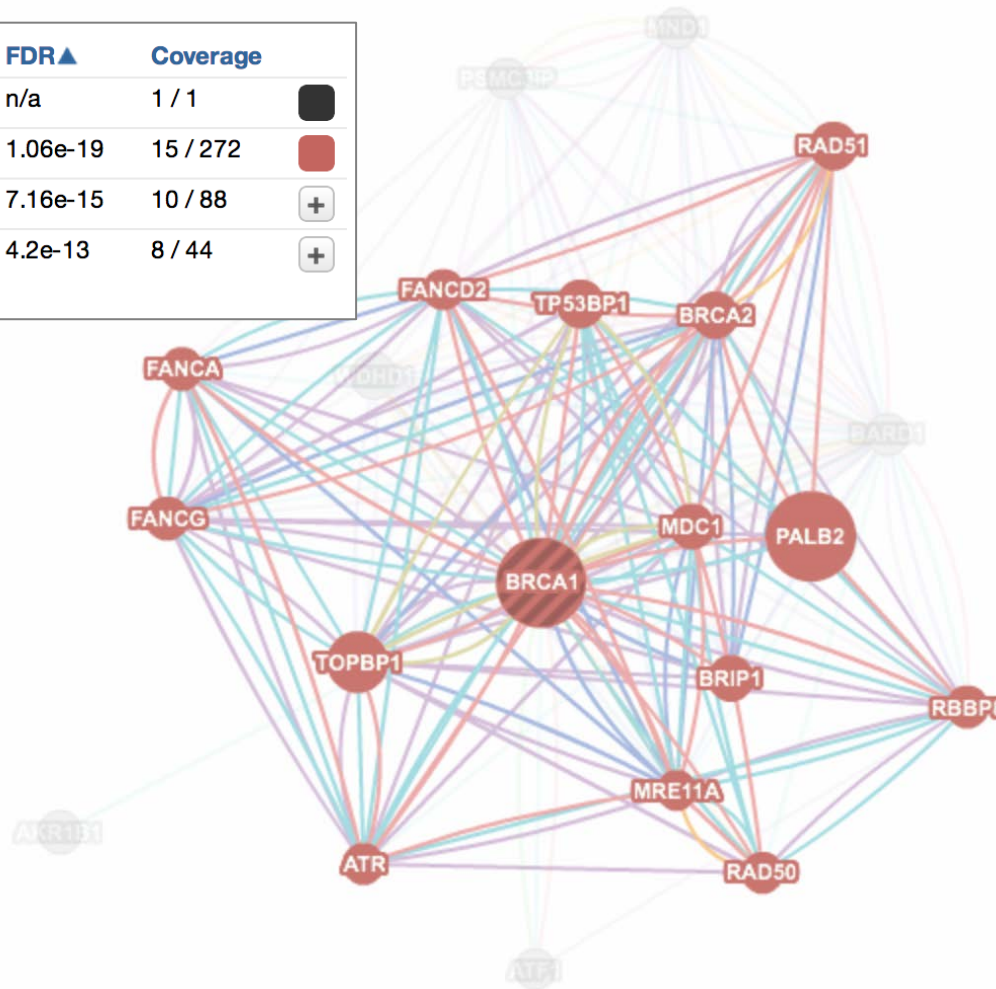
GeneMANIA: Overview

Function	FDR▲	Coverage	
query genes	n/a	1 / 1	■
DNA repair	1.06e-19	15 / 272	■
double-strand break repair	7.16e-15	+	
double-strand break repair via homologous recombination	4.2e-13	8 / 44	+



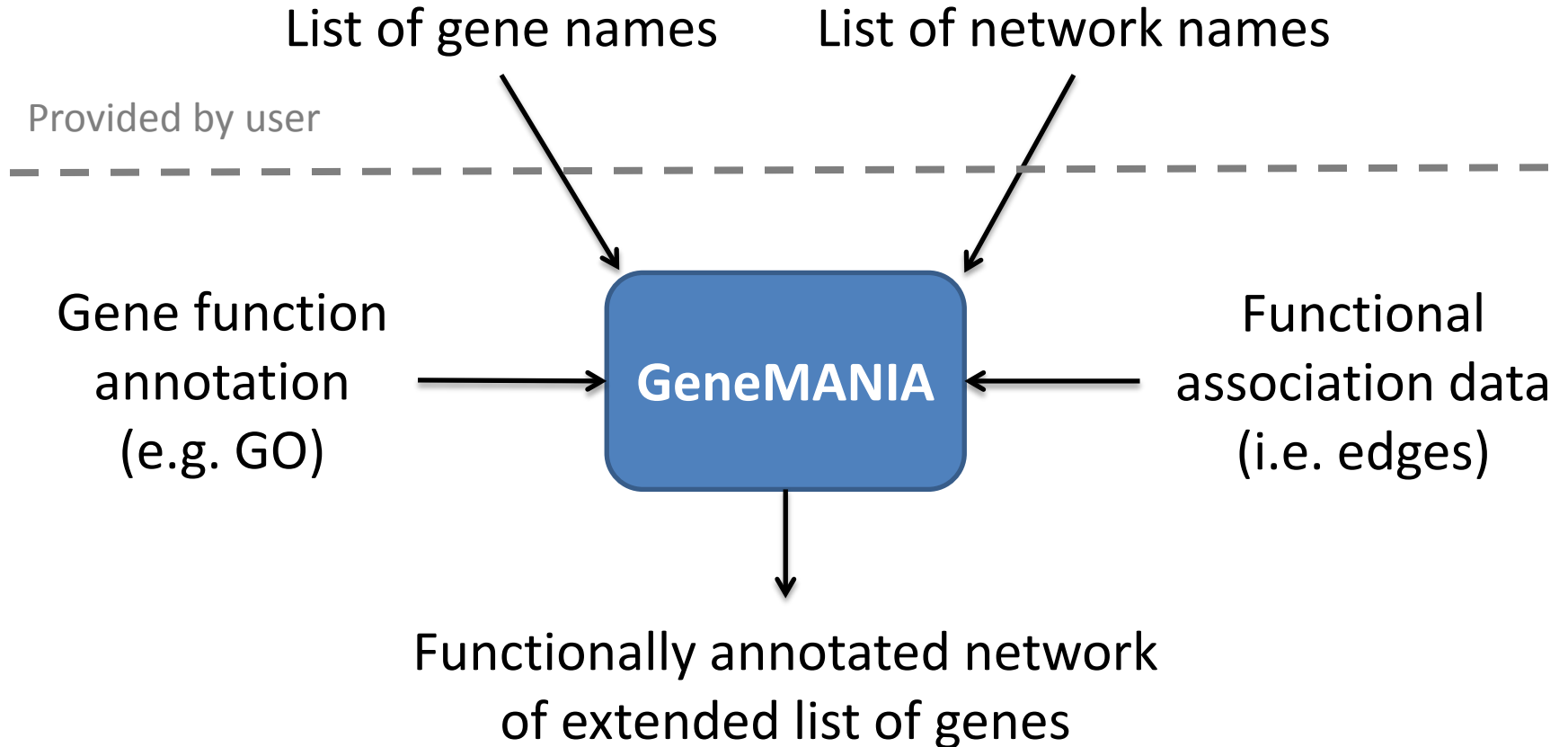
GeneMANIA: Overview

Function	FDR▲	Coverage	
query genes	n/a	1 / 1	■
DNA repair	1.06e-19	15 / 272	■
double-strand break repair	7.16e-15	10 / 88	+
double-strand break repair via homologous recombination	4.2e-13	8 / 44	+

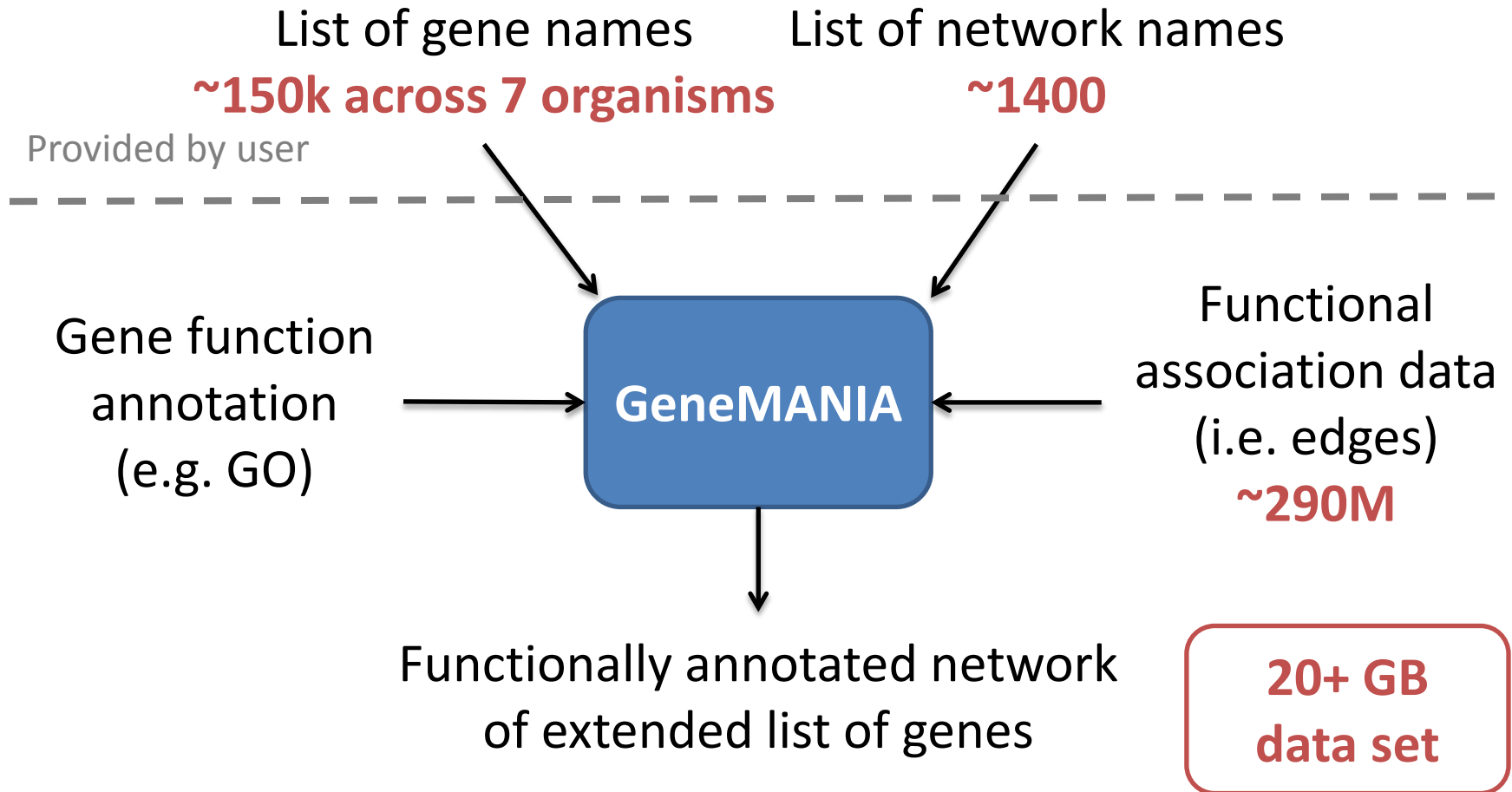


GeneMANIA: Overview

“How are these genes related in the context of these networks?”



GeneMANIA: Overview

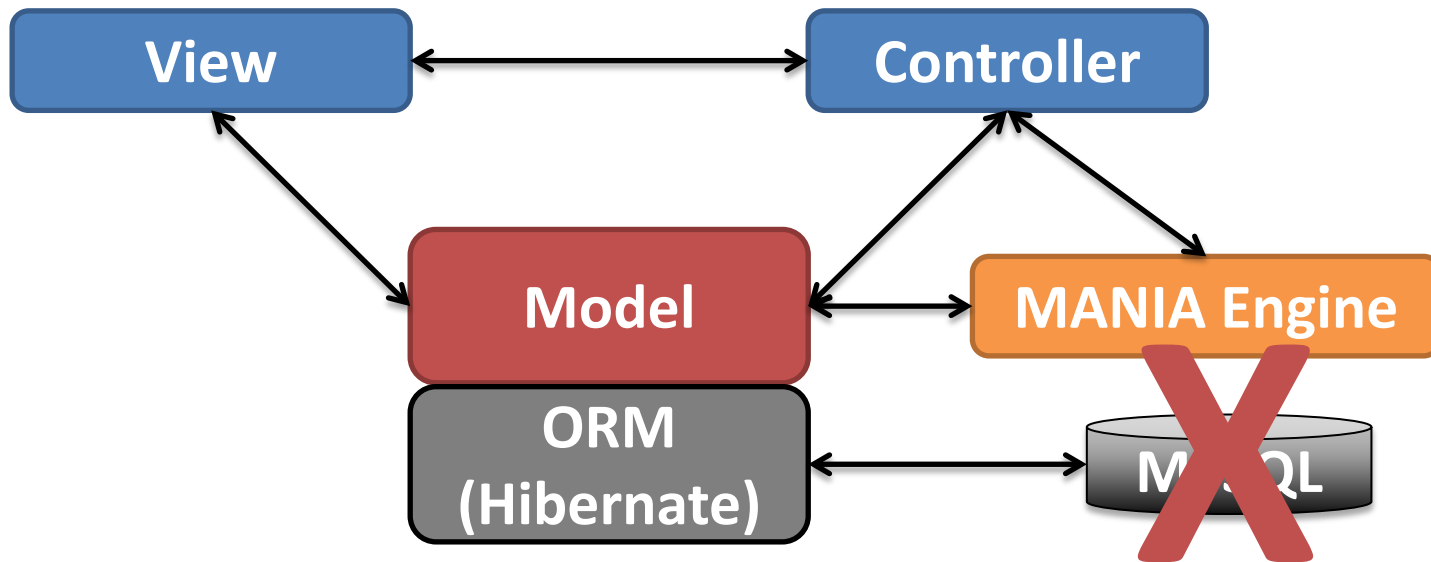


GeneMANIA: Challenges

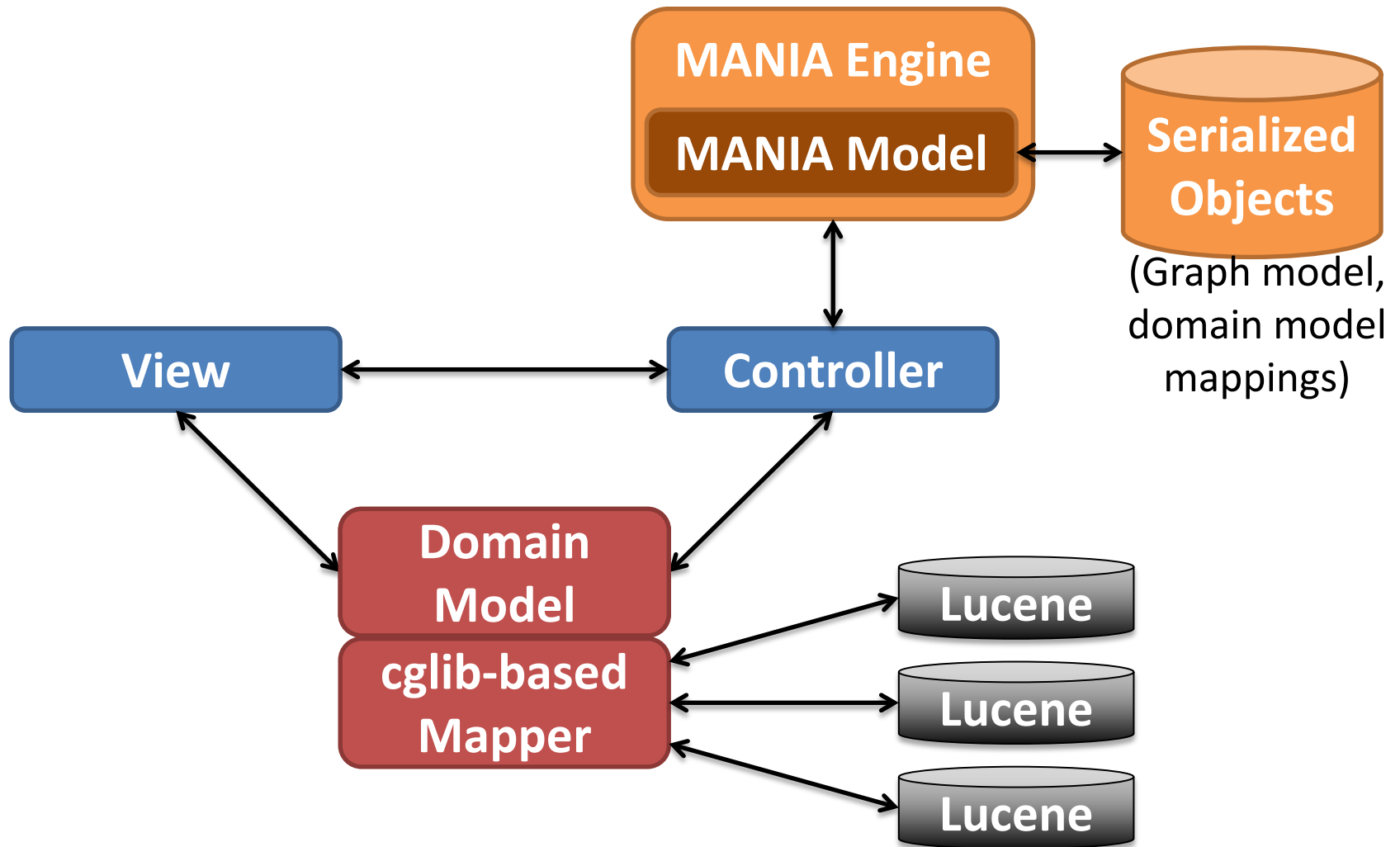
- Accuracy
- Speed
 - Real-time predictions
- Scalability
 - We add new data regularly
- Portability
 - We support multiple environments with very different user interaction models

GeneMANIA: 1st Attempt

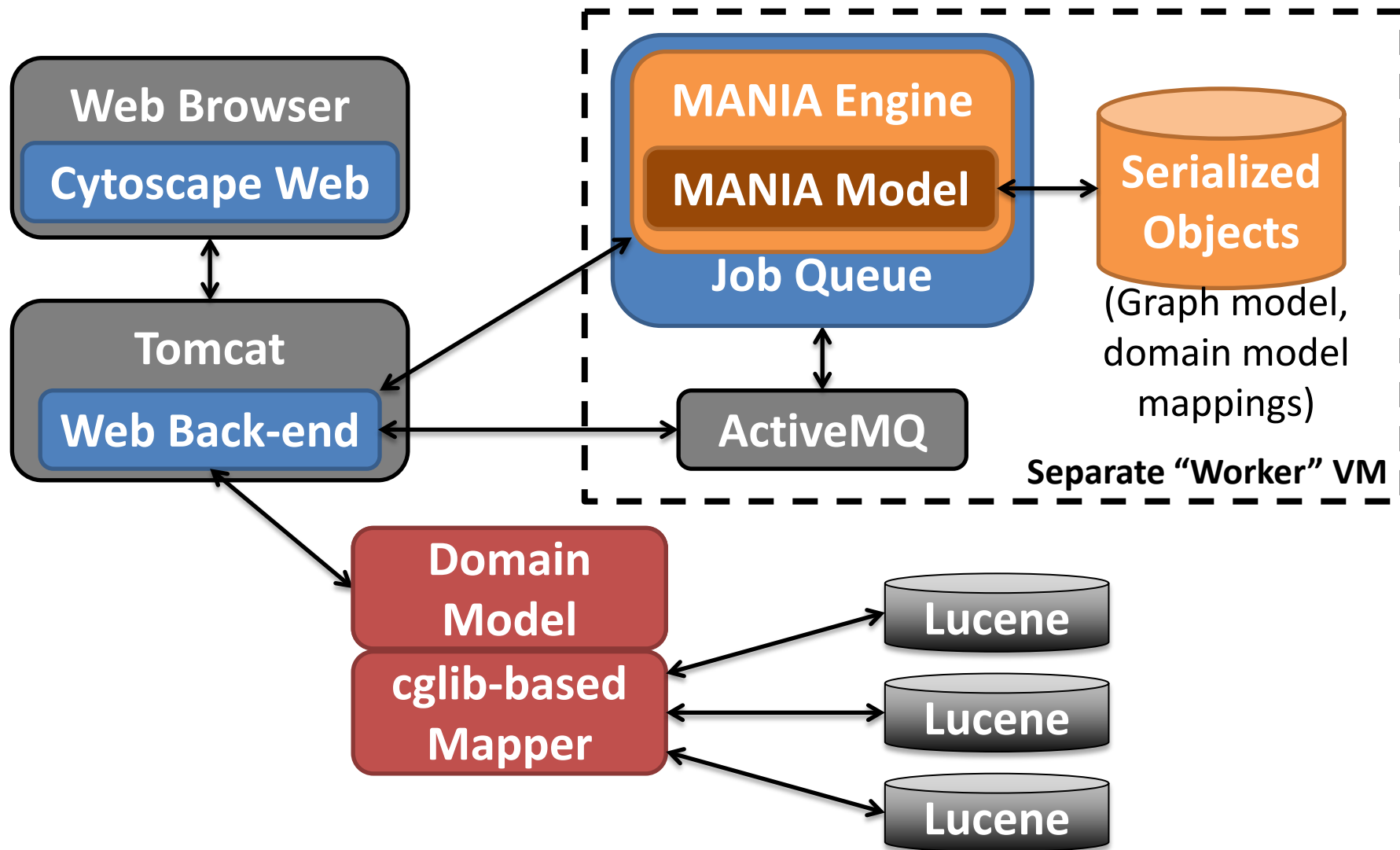
Does not scale!



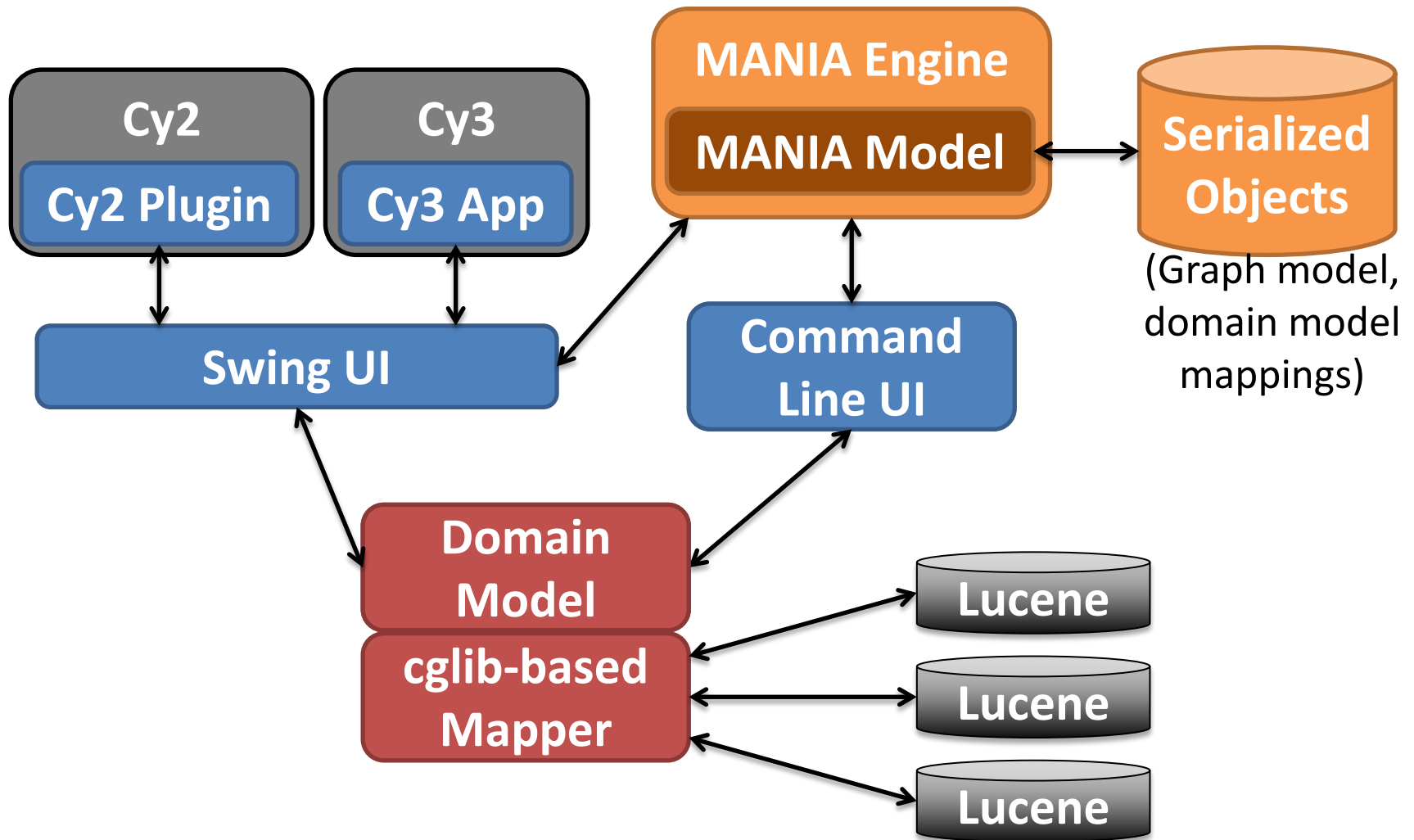
GeneMANIA: 2nd Attempt



GeneMANIA: Web Site

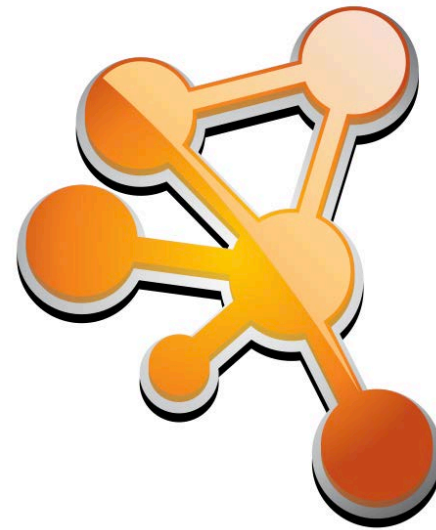


GeneMANIA: Cytoscape



Cytoscape: Introduction

- Extensible network analysis and visualization platform
- Desktop application
- Java
- Open source
 - LGPL
 - <http://cytoscape.org>



Session: /Users/jay/galFiltered.cys

Control Panel

Network VizMapper Filters

Current Visual Style: galFiltered Style

Defaults (Click to edit)

Visual Mapping Browser

- Edge Visual Prop...
- Edge Line Type: interaction
- Edge Stroke Color: interaction
- Node Visual Prop...
- Node Border Paint: Family Description
- Node Fill Color: gal4RGexp
- Mapping Type: Continuous Mapping
- Current Mapping:
- Node Label: SGD symbol
- Unused Properties
- Edge Label: Double-Click to creat...

galFiltered.sif

Table Panel

galFiltered.sif

Source...	annota...	GeneR...	annota...	Family...	PDB ID	PubMe...	GeneRIF	gal80R...	gal1R...	Unified...	annota...	a
[S00000...	[actin ca...		Protein o...	[UNKNO...				-0.798	-0.427	[GIC2_YE...	20020906	SGE
[S00000...	[commit...	[168612...	Compon...	[AMBIGU...			[a conse...	0.101	0.015	[BBP_YE...	20080214	SGE
[S00000...	[cellular_...		ATP-NA...	[AMBIGU...				-0.265	0.211	[YEF1_YE...	20060215	SGE
[S00000...	[chromo...	[160966...	DNA-bin...	[AMBIGU...	[1IGN]	[154550...	[Rap1 is...	0.234	0.205	[RAP1_Y...	20080213	SGE
[S00000...	[U4/U6...	[150753...	Lsm (Lik...	[UNKNO...			[an Lsm...	-0.064	-0.032	[LSM2_Y...	20050926	SGE
[S00000...	[cytoplas...		Protein c...	[NEURO...				-0.17	-0.259	[RS28B...	20080214	SGE

Node Table Edge Table Network Table

Memory: OK

Cytoscape: Introduction

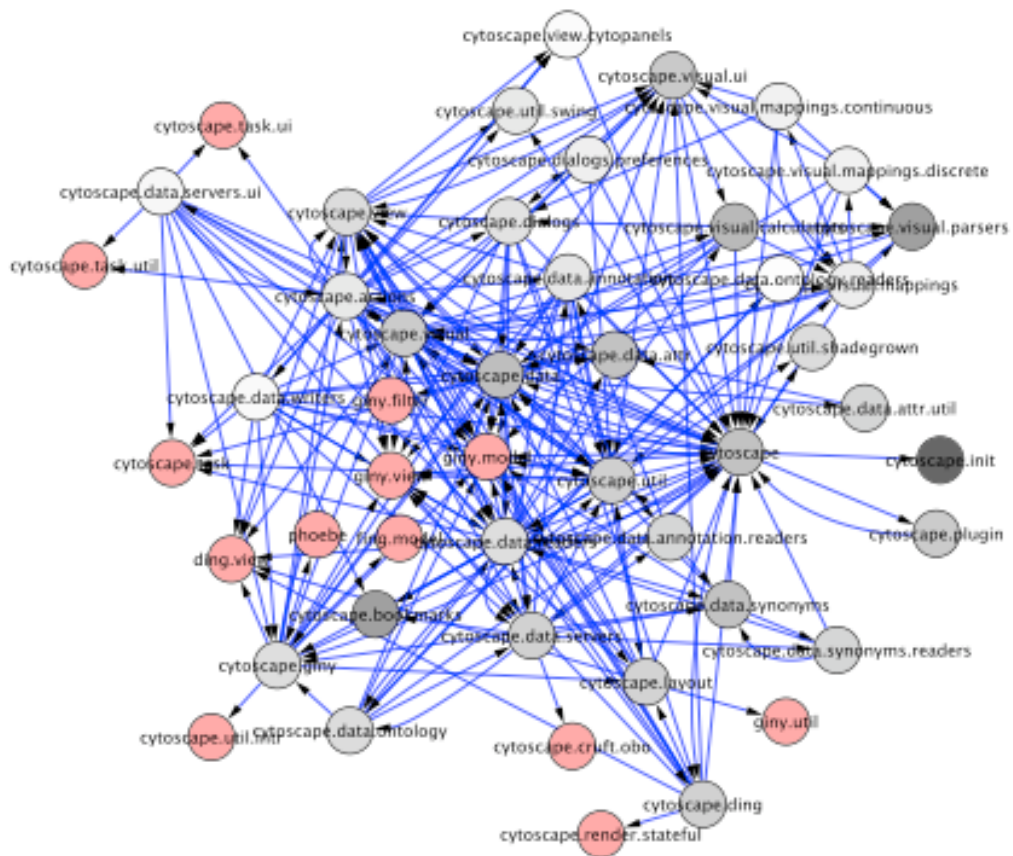


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 - U.S. National Institute of General Medical Sciences (NIGMS) of the National Institutes of Health (NIH) under award number GM070743

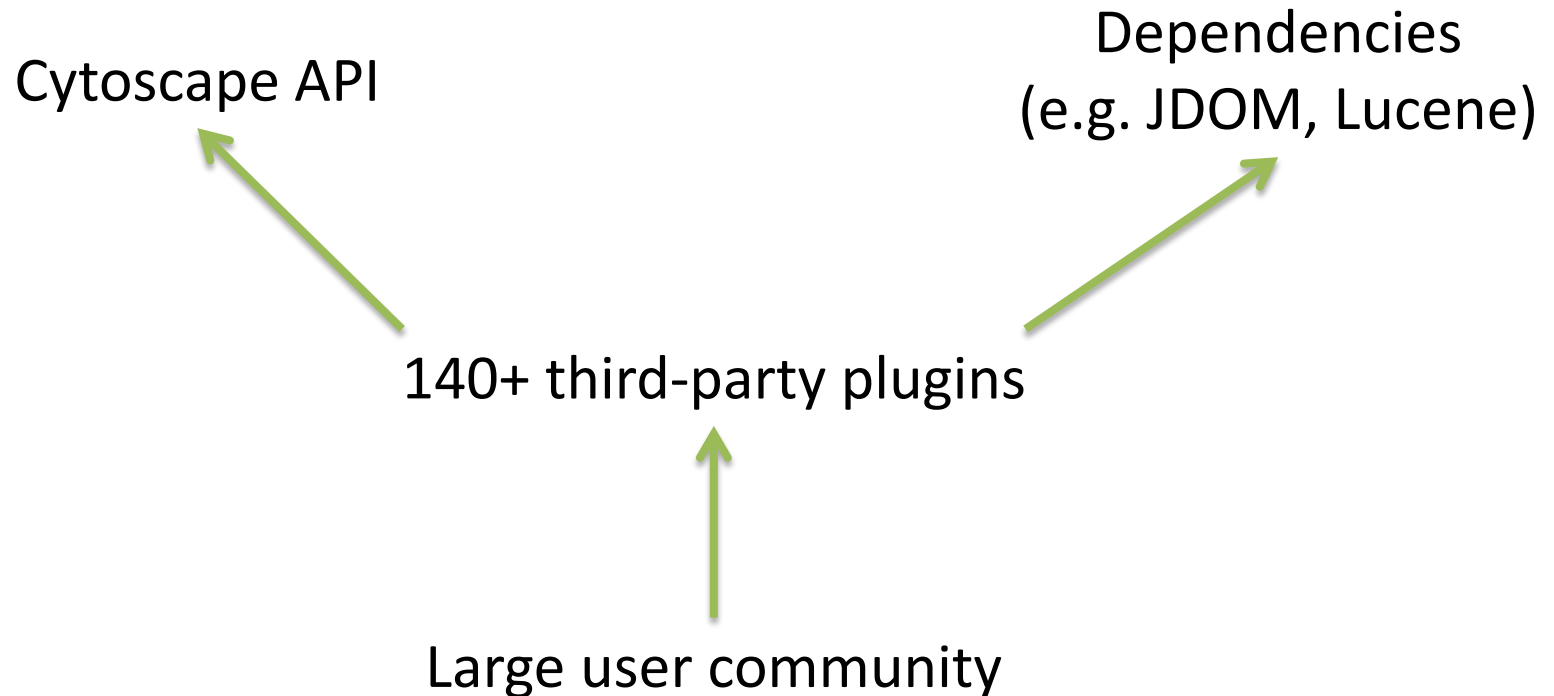
Cytoscape: Introduction

- Annette Adler
- Nada Amin
- Mark Anderson
- Iliana Avila-Campillo
- Gary Bader
- Hamid Bolouri
- Ethan Cerami
- Rowan Christmas
- Melissa Cline
- Mike Creech
- Yue Dong
- Paul Edlefsen
- Stephanie Fan
- Roza Ghamari
- Oriol Guitart
- Tim Hull
- Trey Ideker
- Liz Kain
- Larissa Kamenkovich
- Ryan Kelley
- Sarah Killcoyne
- Michael Kirby
- Brad Kohlenberg
- Allan Kuchinsky
- Nerius Landys
- Willem Ligtenberg
- Christian Lopes
- Samad Lotia
- Andrew Markiel
- James McIninch
- Jason Montojo
- Scooter Morris
- Keiichiro Ono
- Owen Ozier
- Alexander Pico
- David Reiss
- Chris Sander
- Paul Shannon
- Robert Sheridan
- Benno Shwikowski
- Mike Smoot
- James Taylor
- Aditya Vailaya
- Jonathan Wang
- Peng-Liang Wang
- Chris Workman

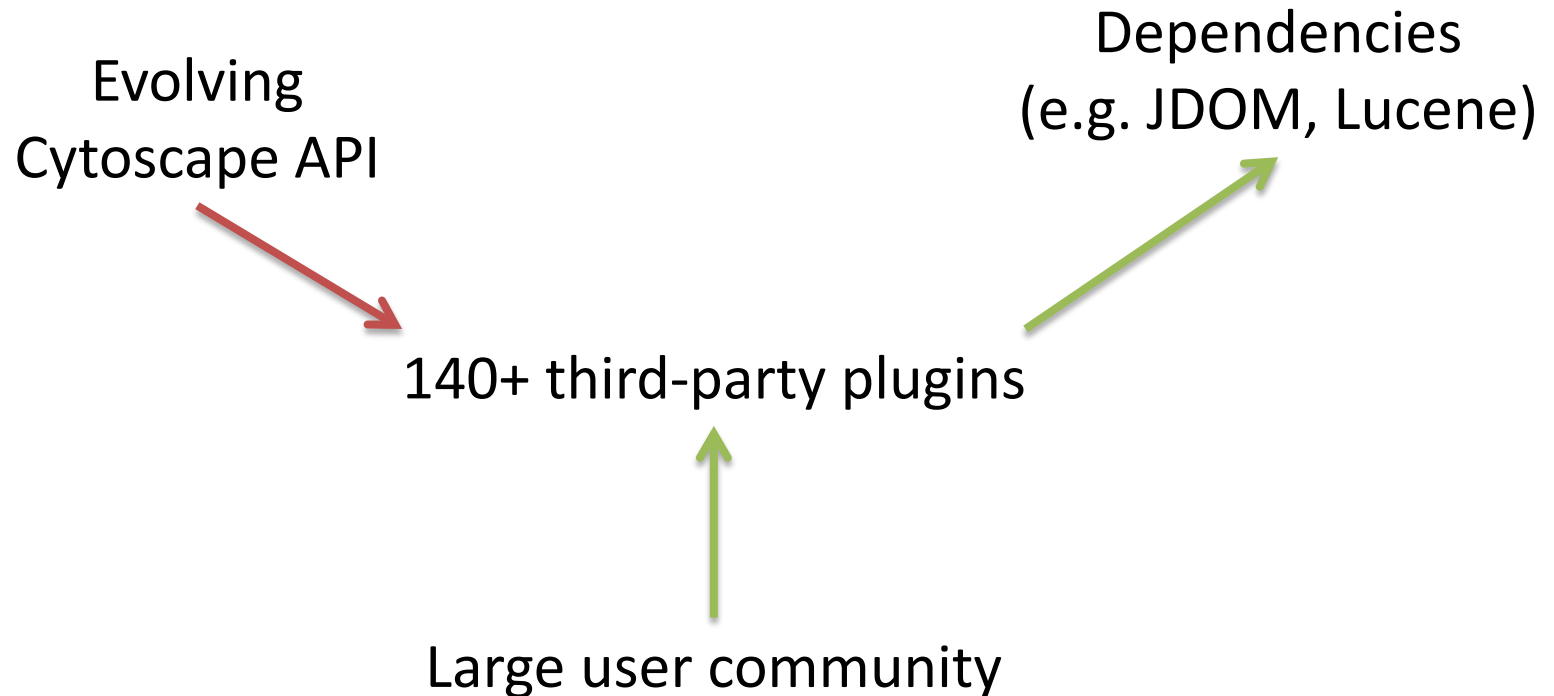
Cytoscape: 2.X “Architecture”



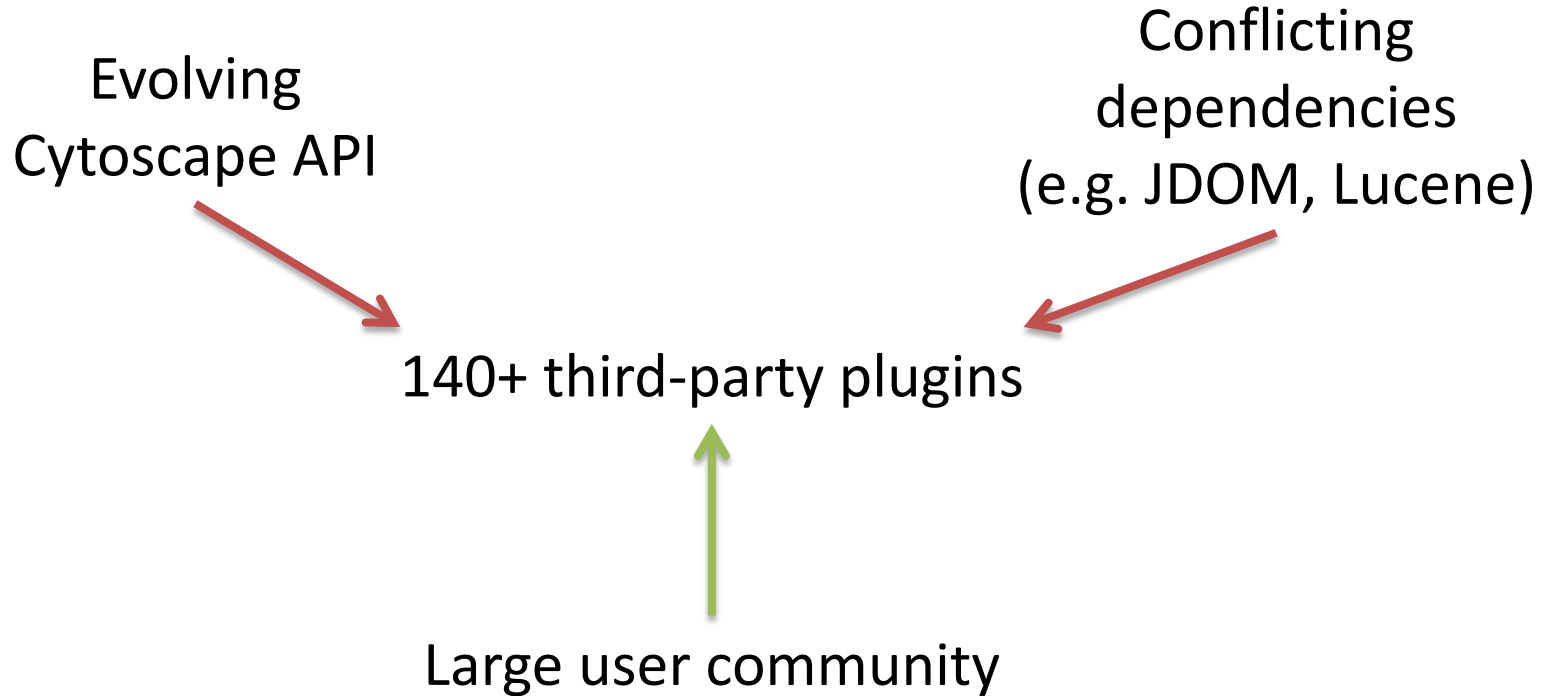
Cytoscape: Challenges



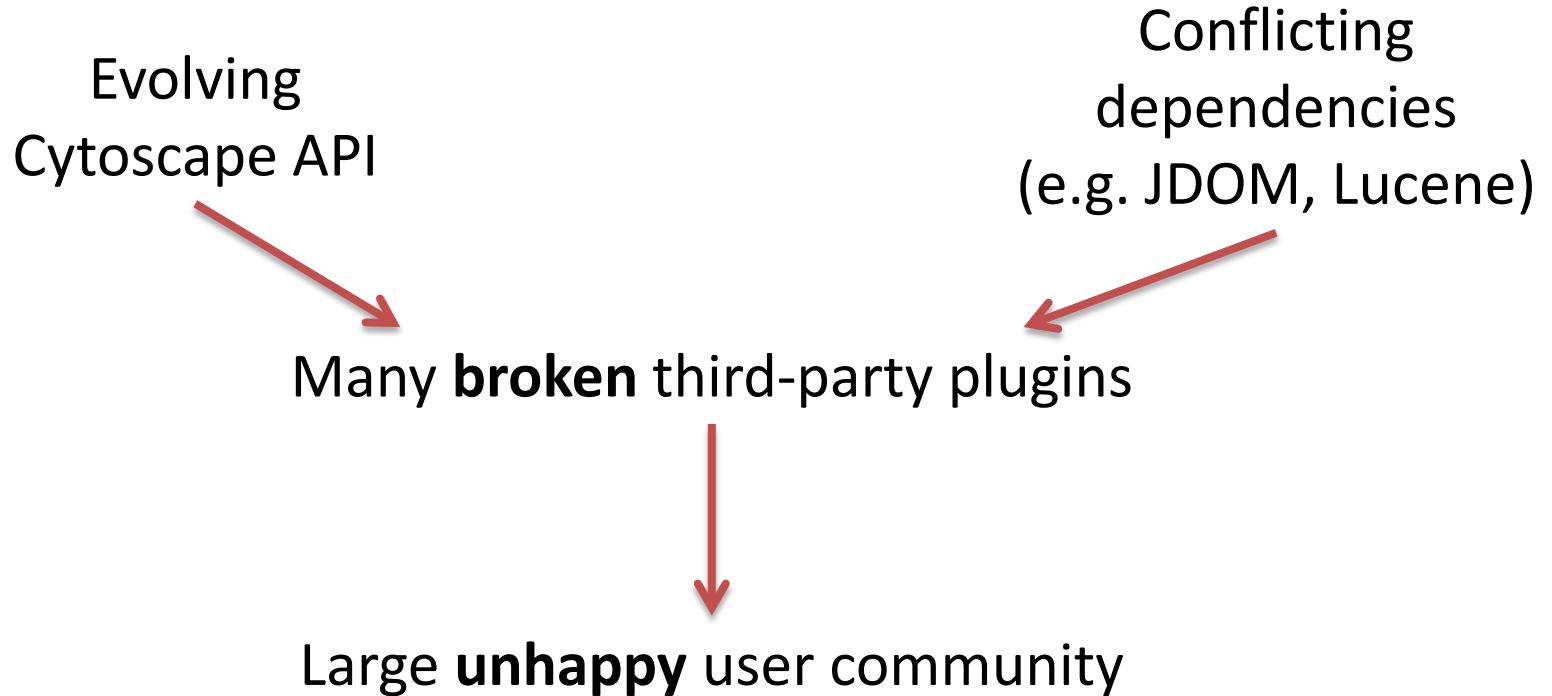
Cytoscape: Challenges



Cytoscape: Challenges

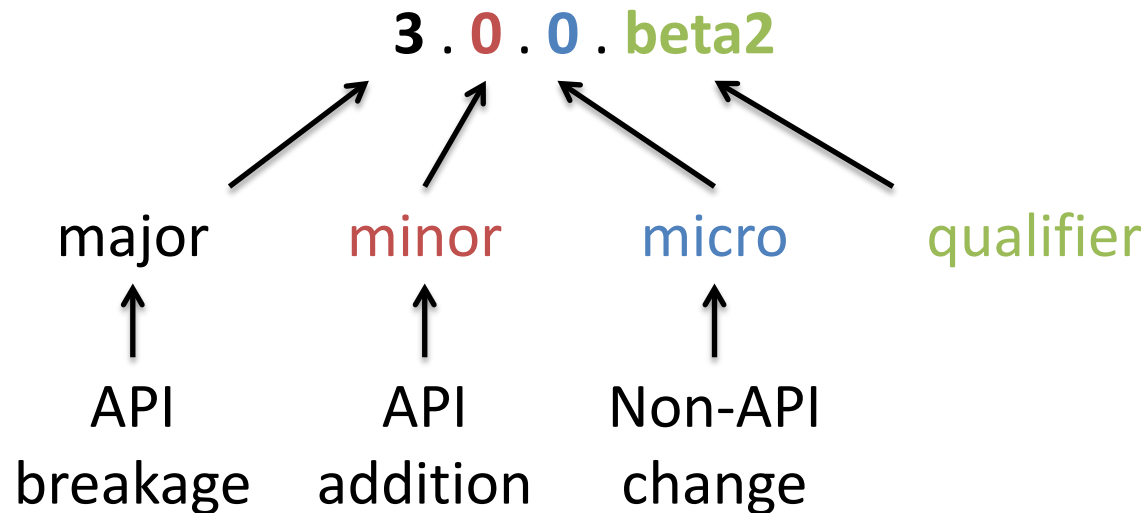


Cytoscape: Challenges



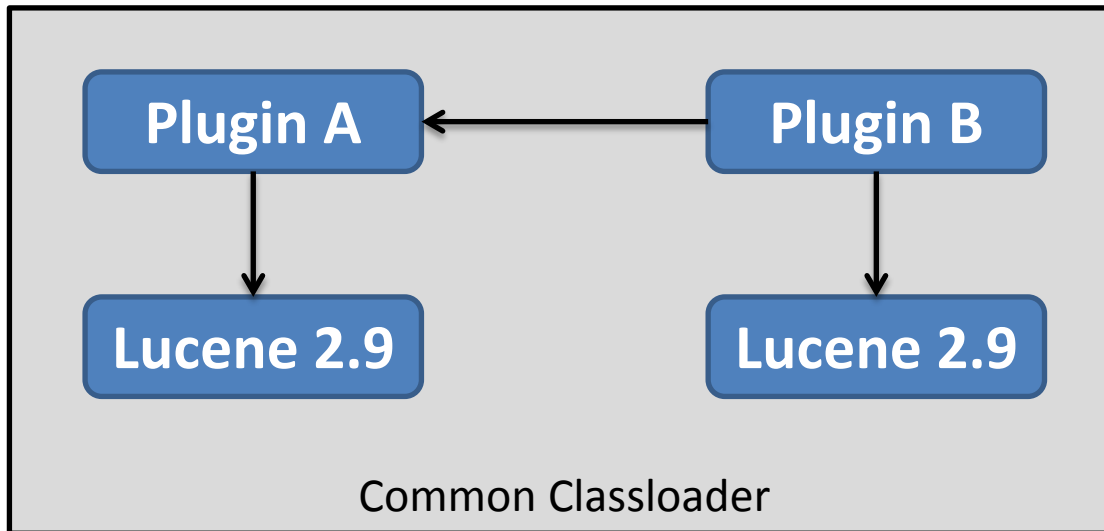
Cytoscape: Solutions

- Evolving API
 - Semantic versioning



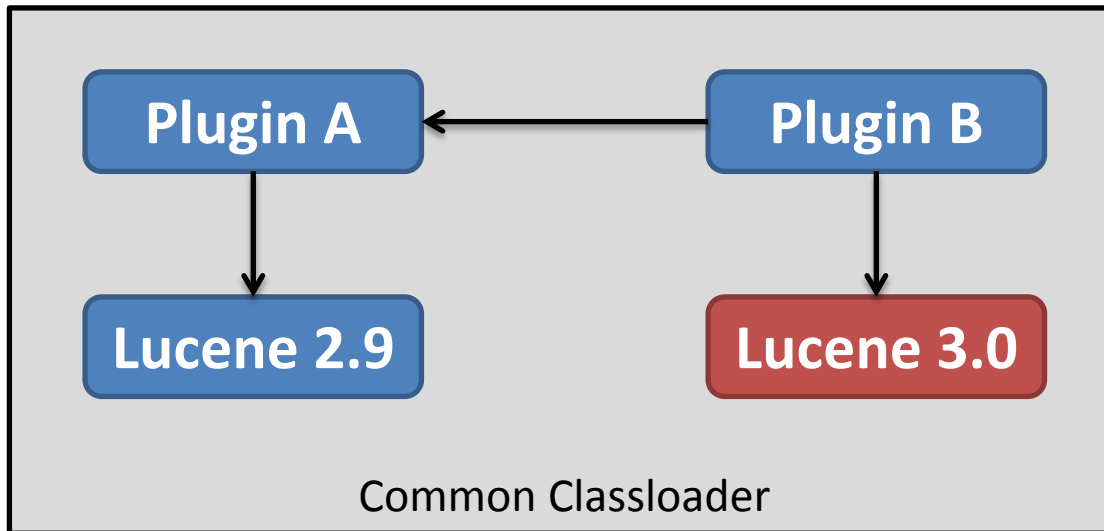
Cytoscape: Solutions

- Conflicting dependencies



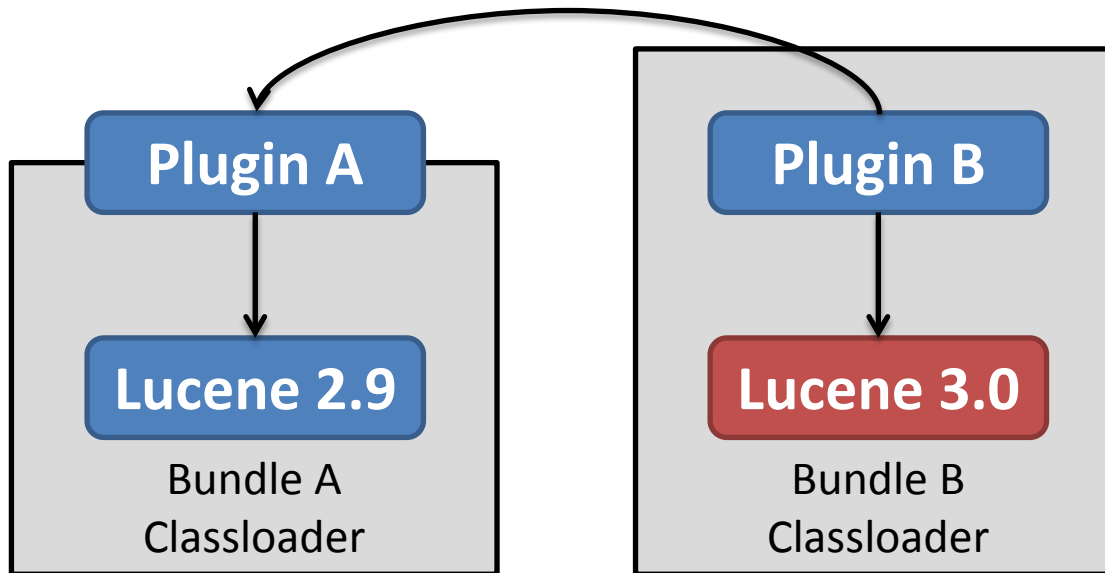
Cytoscape: Solutions

- Conflicting dependencies



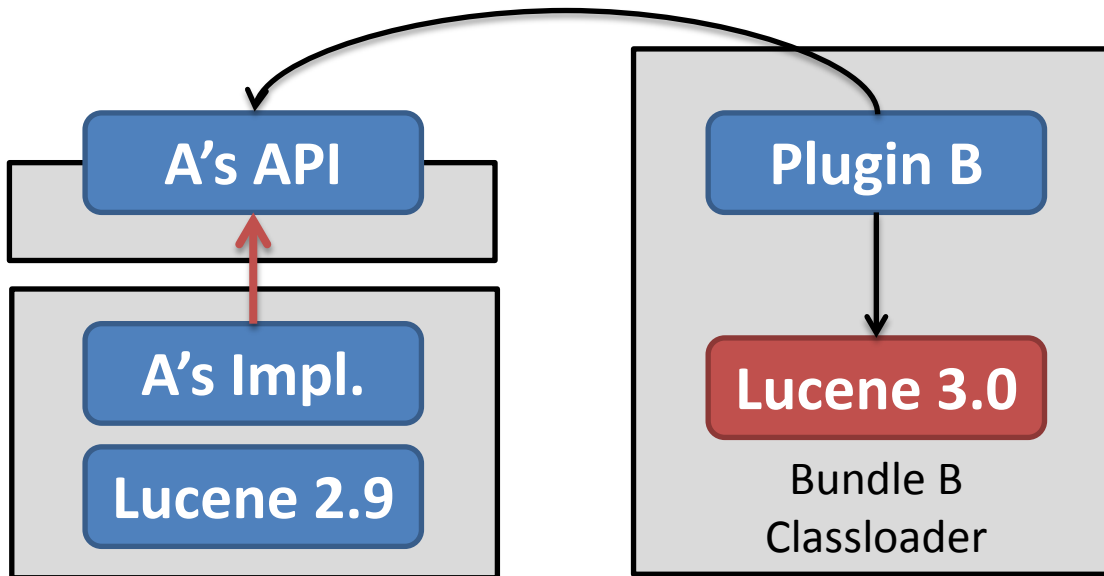
Cytoscape: Solutions

- Conflicting dependencies
 - OSGi: dynamic module framework



Cytoscape: Solutions

- Conflicting dependencies
 - OSGi: dynamic module framework



Cytoscape: 3.0 Architecture

