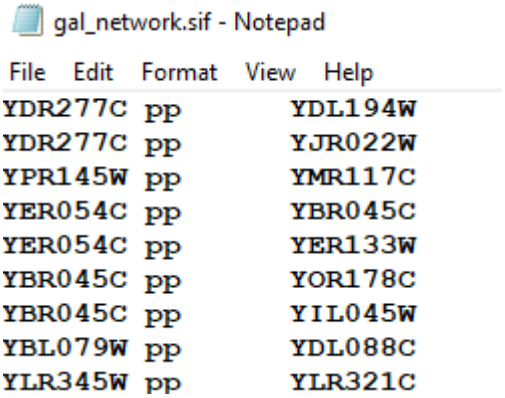
For this demo, we will use Cytoscape (a Java tool) to visualize and calculate topological properties for a yeast protein-protein interaction network

Getting the data and software

1. Cytoscape can be downloaded from https://cytoscape.org/. Java will be automatically installed if not already present on your computer.
2. Data files are provided on class website:
    a. Network (.sif) https://github.com/cmb-chula/comp-biol-3000788/blob/main/demo/gal_network.sif
    b. Node annotation (.csv) https://github.com/cmb-chula/comp-biol-3000788/blob/main/demo/gal_node.csv
    c. Edge annotation (.csv) https://github.com/cmb-chula/comp-biol-3000788/blob/main/demo/gal_edge.csv
3. More tutorials on Cytoscape: https://github.com/cytoscape/cytoscape-tutorials/wiki

Understanding Cytoscape file formats

1. The network format for Cytoscape (.sif) is just a tab-separated text file. The first and third columns contain node names and the middle column contain user-defined interaction name (e.g., pp = protein-protein interaction).



2. The node annotation file is a tabular text file. Each row corresponds to a node (gene) and each column contains information for that gene, such as gene symbol, expression level, etc.

	A	B	C	D	E	F	G	H
1	genesymbol	gal1RGexp	gal1RGsig	gal4RGexp	gal4RGsig	gal80Rexp	gal80Rsig	name
2	GCN3	-0.154	9.12E-04	-0.501	3.57E-06	0.292	0.011229	YKR026C
3	NAB2	0.174	8.73E-04	0.02	0.61707	0.187	0.0059966	YGL122C
4	CRM1	-0.018	0.61381	-0.001	0.9794	-0.018	0.80969	YGR218W
5	SRM1	0.16	0.0021913	-0.23	0.0022461	0.008	0.93826	YGL097W
6	DED1	-0.033	0.39944	-0.056	0.31268	-0.91	8.35E-16	YOR204W
7	YEF3	-0.39	2.71E-08	-0.394	0.04747	-0.769	0.035939	YLR249W
8	TEF1	-0.138	9.87E-04	0.009	0.89728	-0.278	6.78E-04	YPR080W
9	TEF2	-0.074	0.053125	-0.063	0.15497	0.044	0.54556	YBR118W

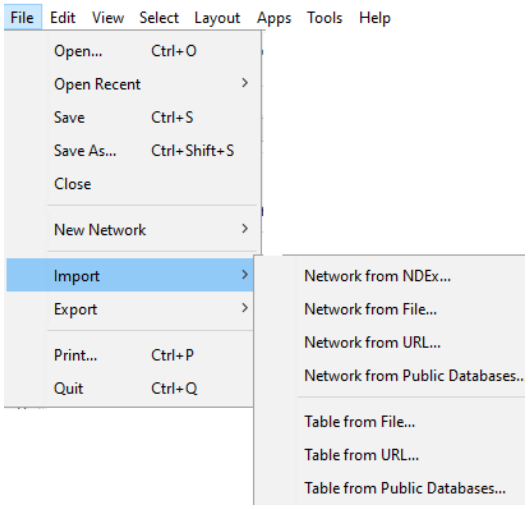
3. The edge annotation file is also similarly structured. Here, the protein-protein interaction strengths (from experiment or prediction) are provided.

	A	B	C
1	interaction strength	interaction	name
2	0.89	pp	YKR026C (pp) YGL122C
3	0.12	pp	YGL122C (pp) YOL123W
4	0.57	pp	YGR218W (pp) YGL097W
5	0.46	pp	YGL097W (pp) YOR204W
6	0.32	pp	YLR249W (pp) YPR080W
7	0.77	pp	YLR249W (pp) YBR118W

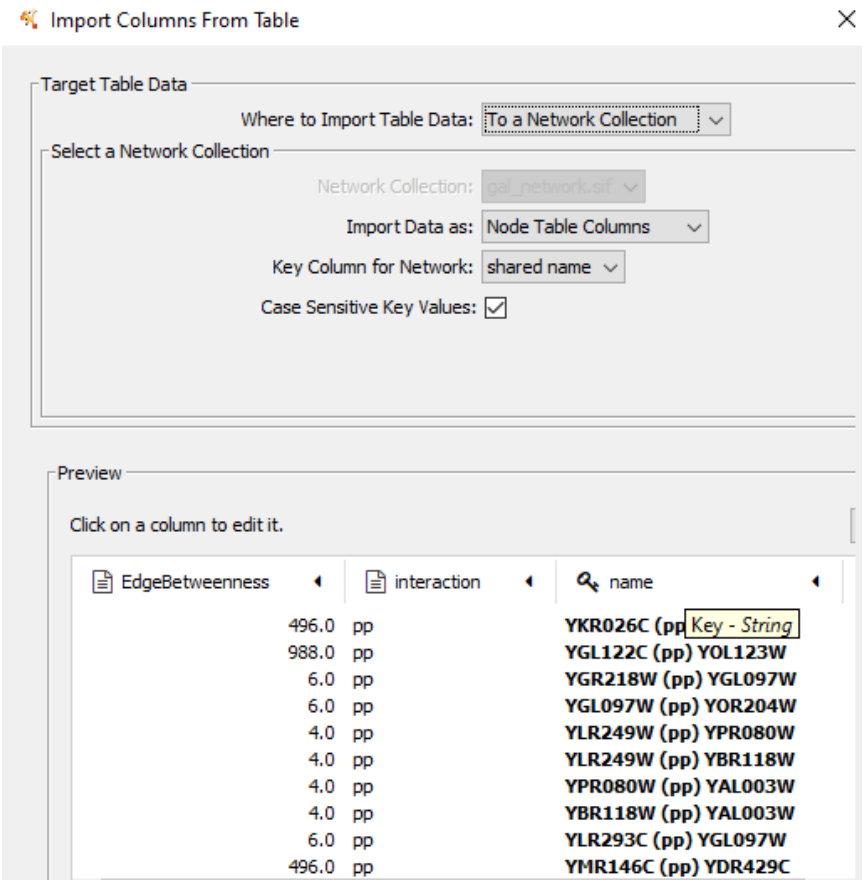
Running the demo

1. These files can be imported into Cytoscape using the **File → Import**

For network, use Network from File option. For node and edge annotations, use Table from File option.



2. You will then be asked to specify whether the data is for Node Table or Edge Table and which column should be used to map the node or edge name (Key Column for Network). This is also visualized with a key symbol in the columns below.



3. More Cytoscape features will be explored in class.