COMP522 - Project Presentation
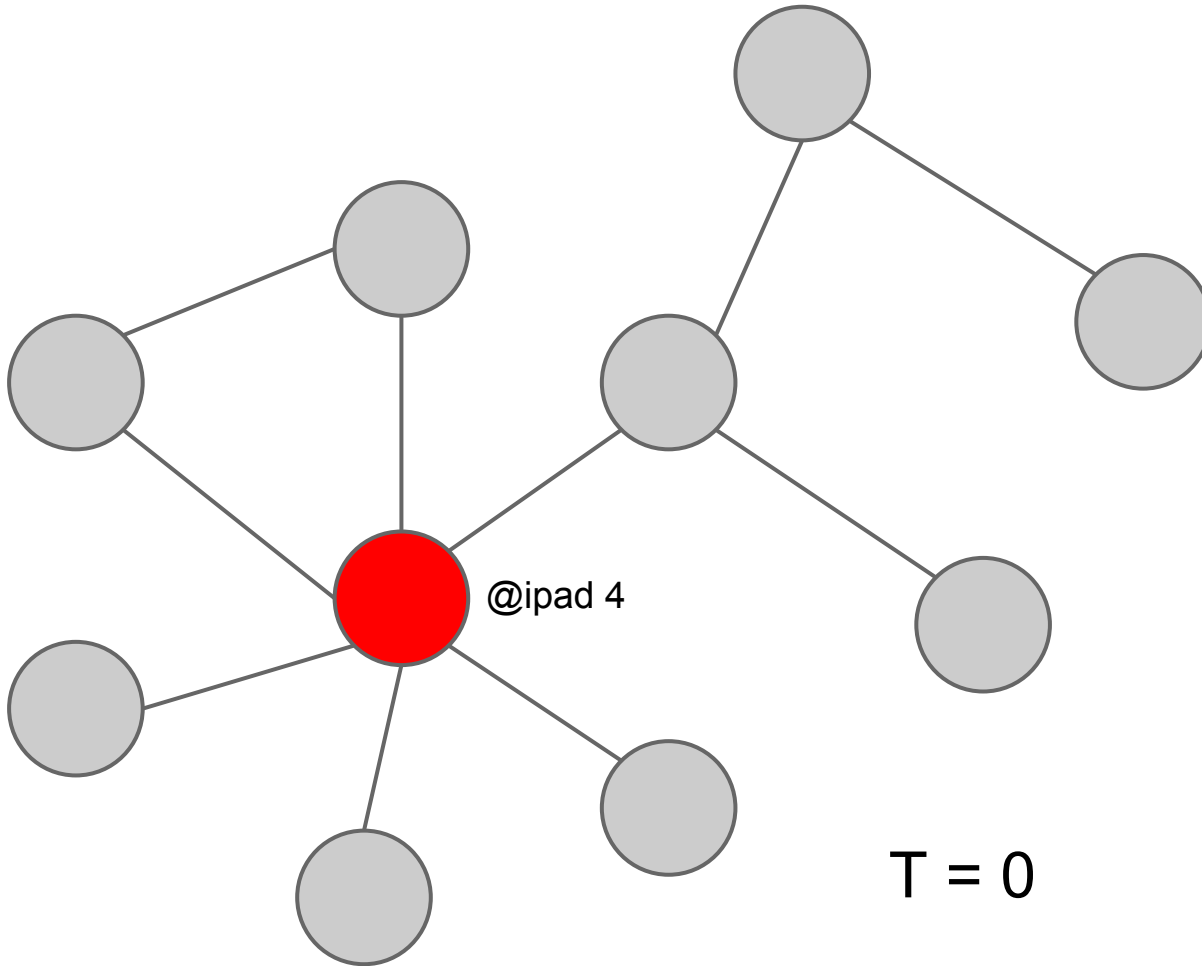
Modelling Information Diffusion over Networks using DEVS
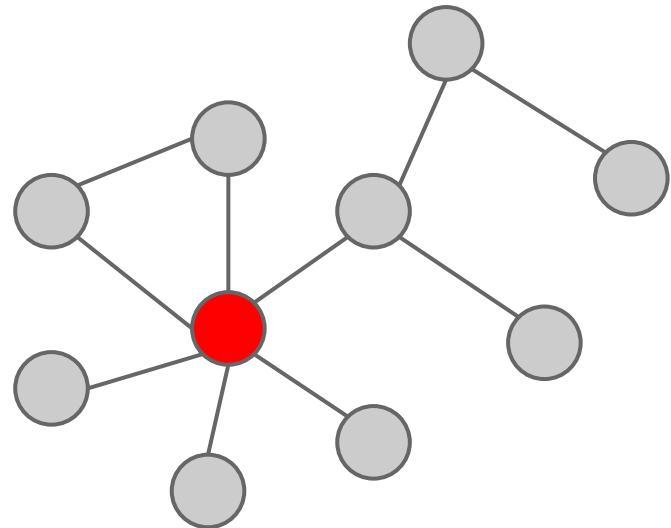
By: Hiu Kim, Yuen

Information Diffusion over network

@ipad 4

T = 0

Information Diffusion over network

T = t

What are we interested in?

- Speed of the spread
- # of diffused nodes at the end
- Any difference if we:
  - start at different node?
  - with other network topology?

Previous Work

Differences in the Mechanics of Information Diffusion Across Topics: Idioms, Political Hashtags, and Complex Contagion on Twitter

by: Daniel. M. Romero, Brandan Meeder and Jon Kleinberg from cornell university

What is this project?

Model

Work from Daniel. M. Romero, Brandan Meeder and Jon Kleinberg
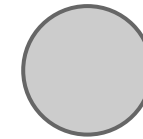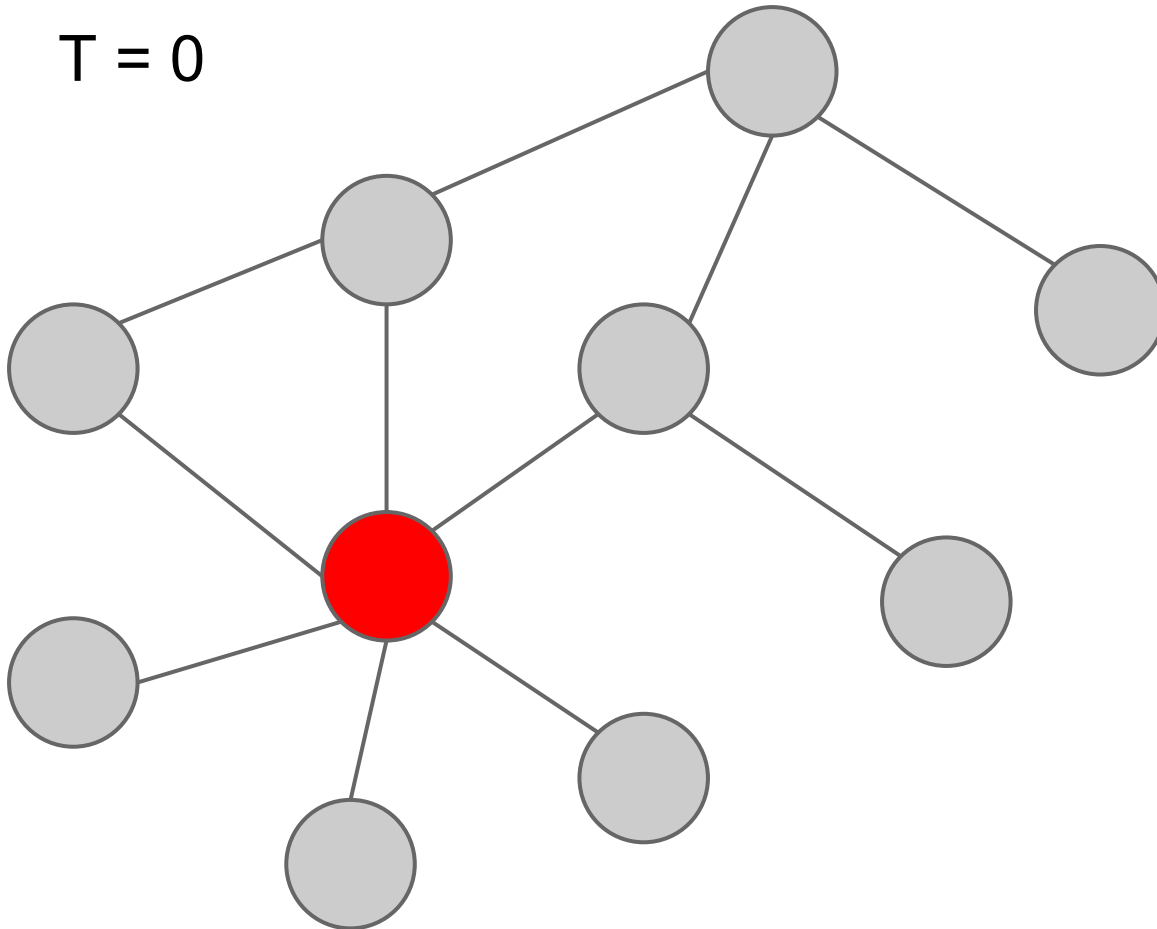
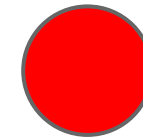Simplified Model

Work from me

DEVS Model (PythonDEVS)

Simulation/ Experiments

Network Diffusion Model Simulation Process

Network Diffusion Model Simulation Process
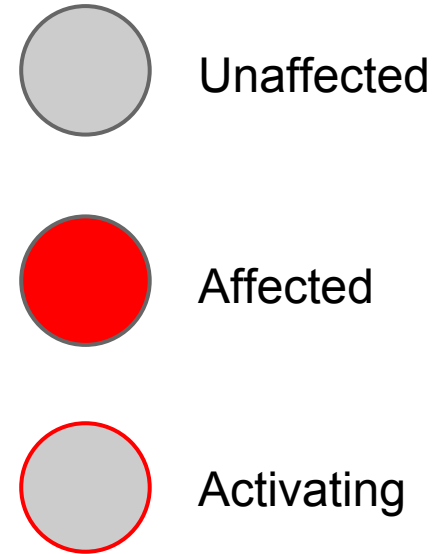
Network Diffusion Model Simulation Process
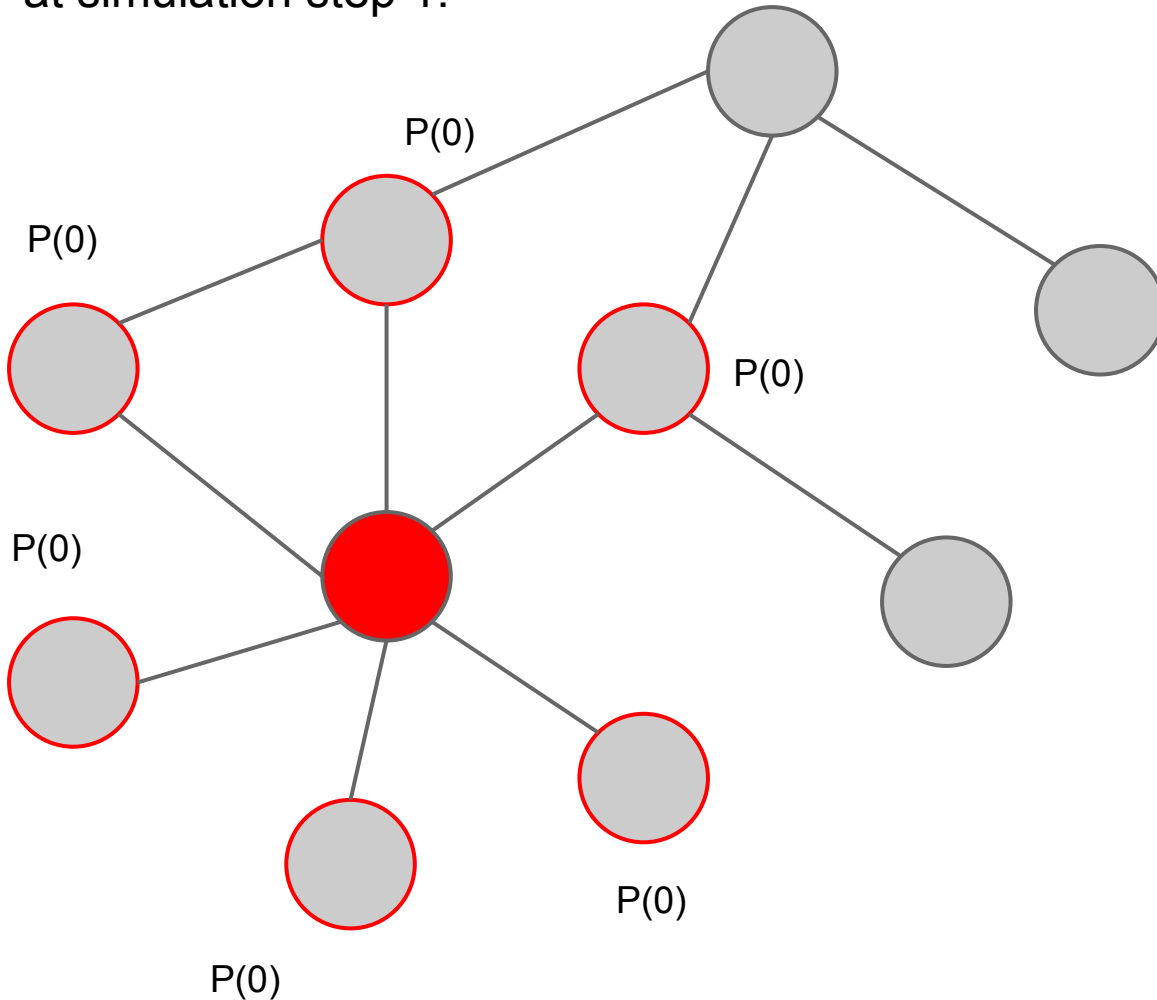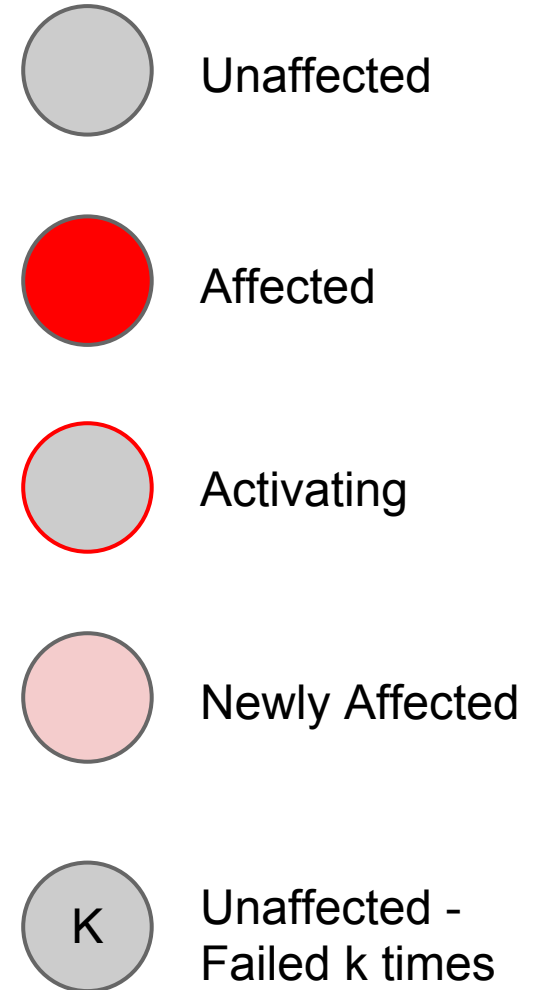
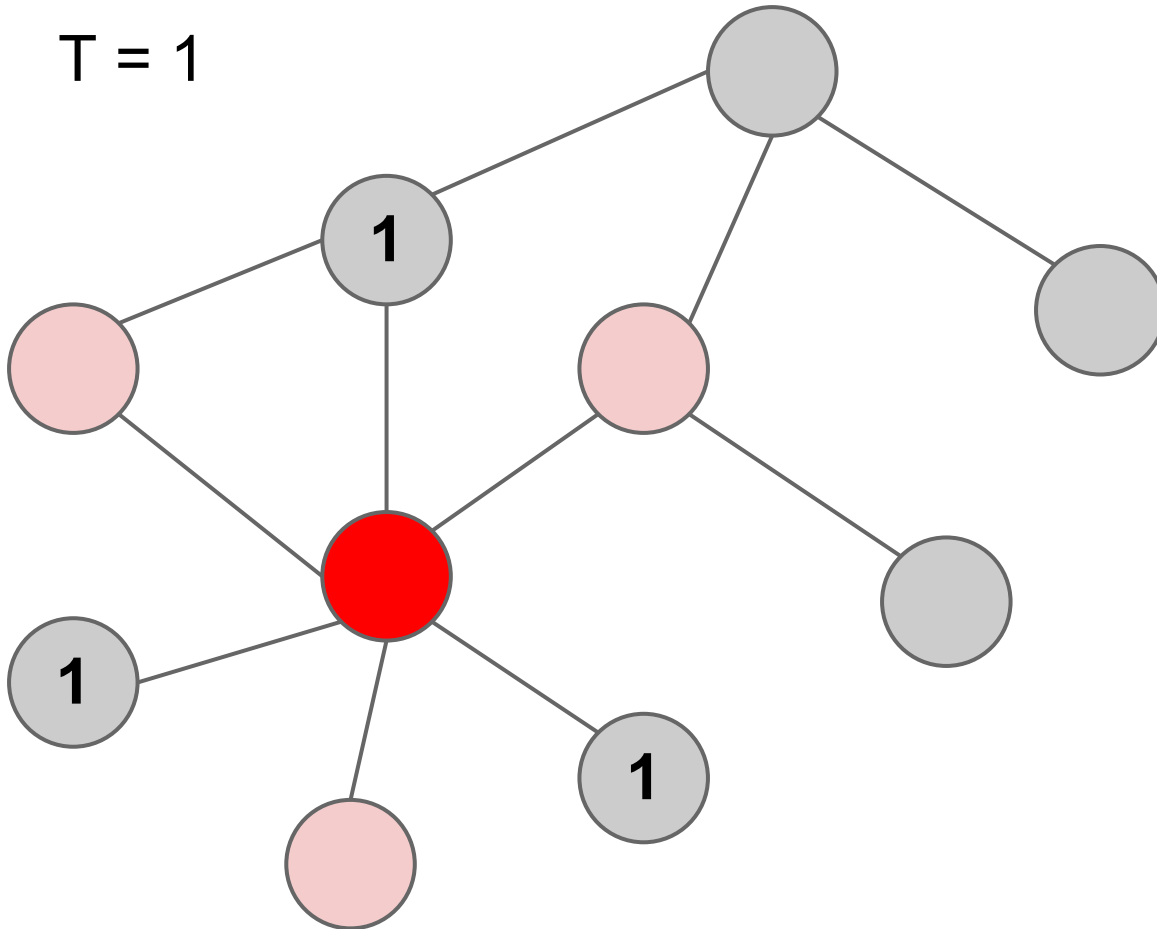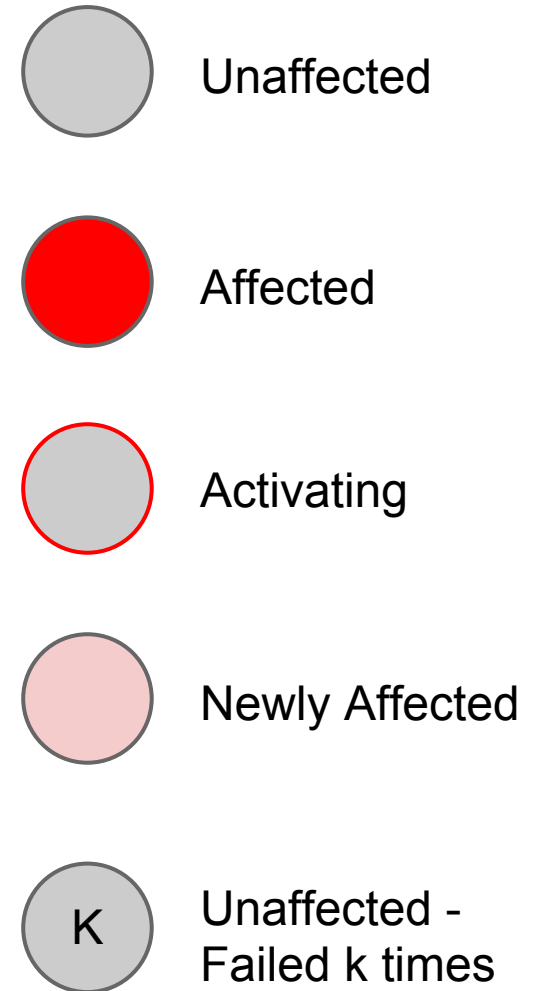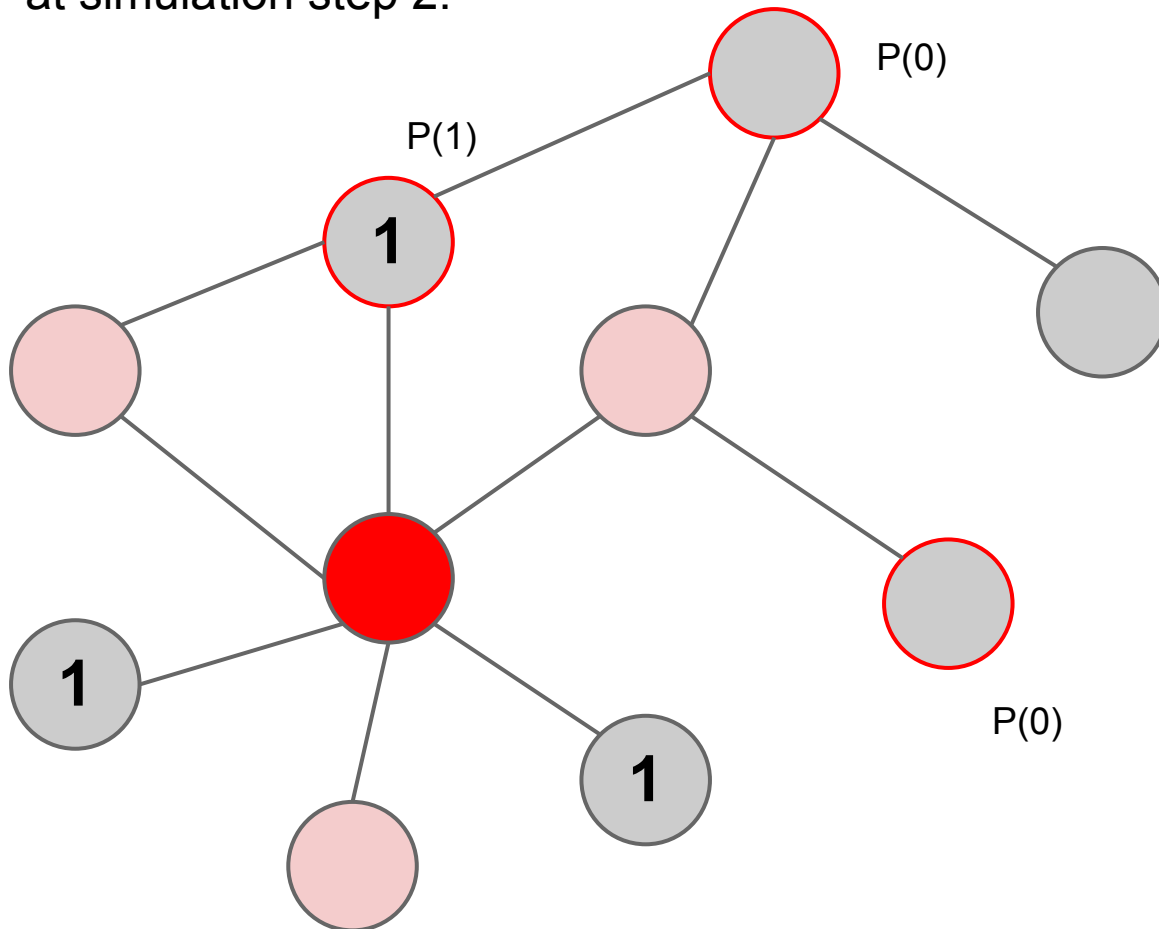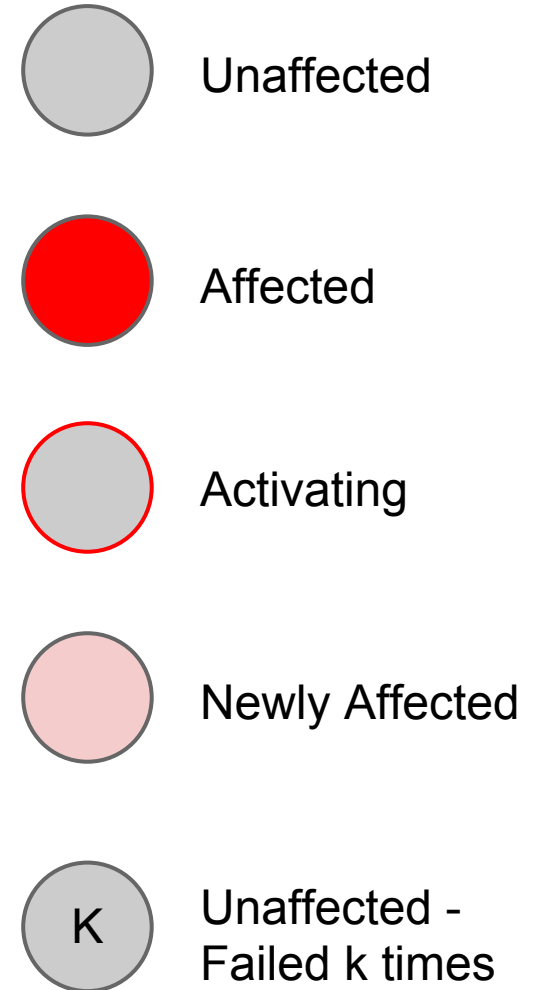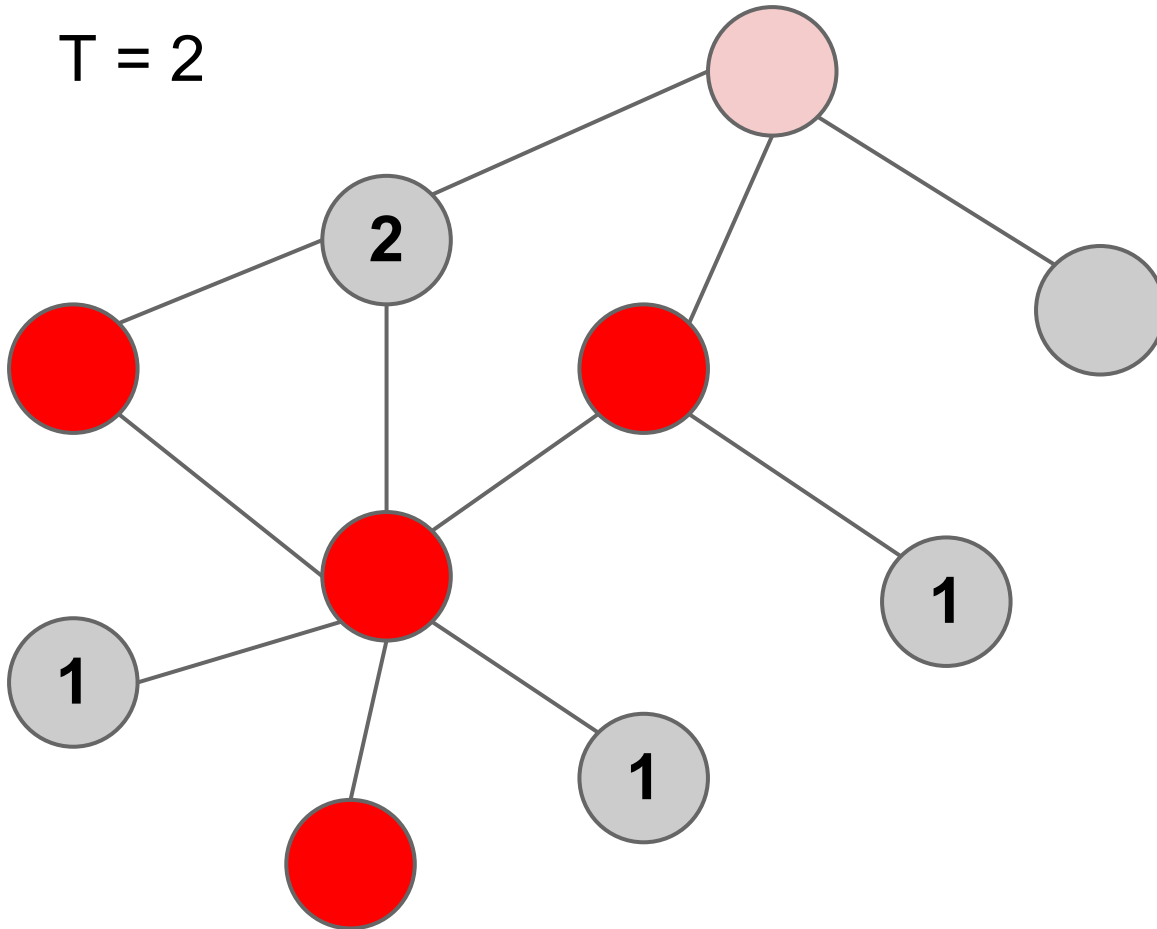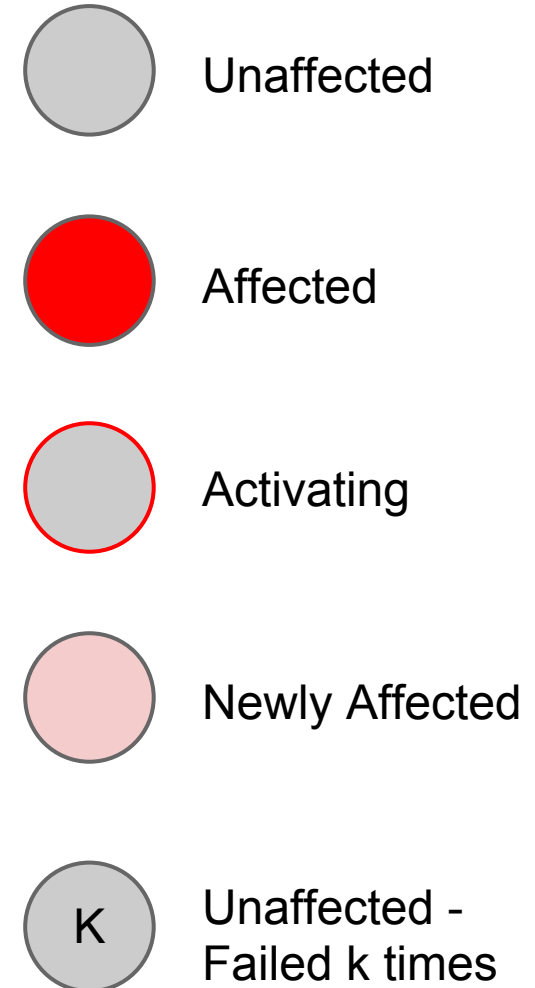# Network Diffusion Model Simulation Process

at simulation step 2:

Network Diffusion Model Simulation Process

T = 2

Unaffected

Affected

Activating

Newly Affected

Unaffected -
Failed k times

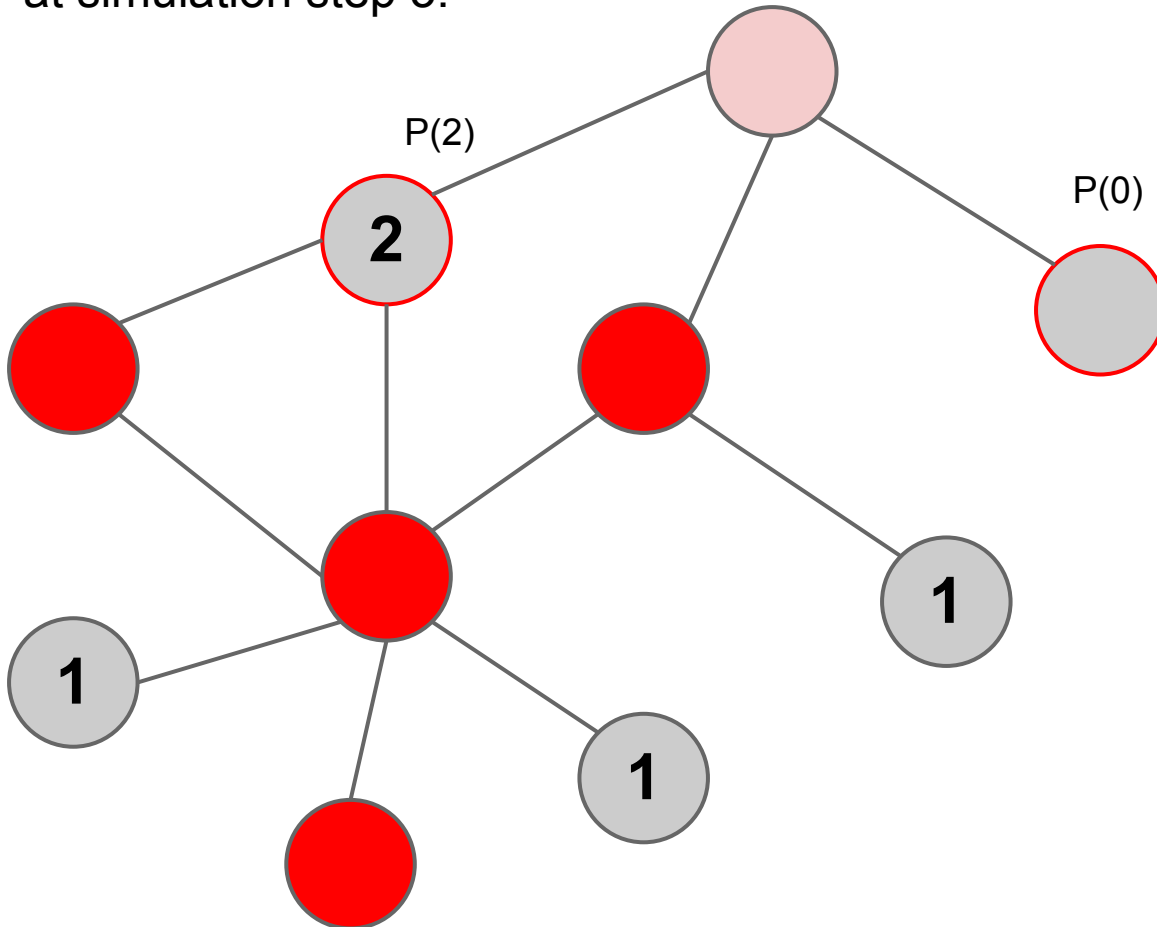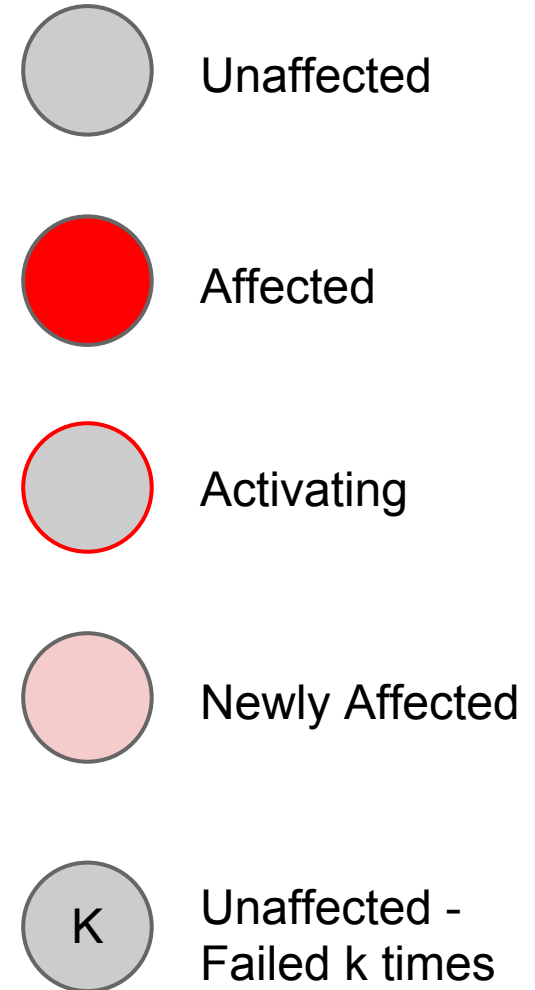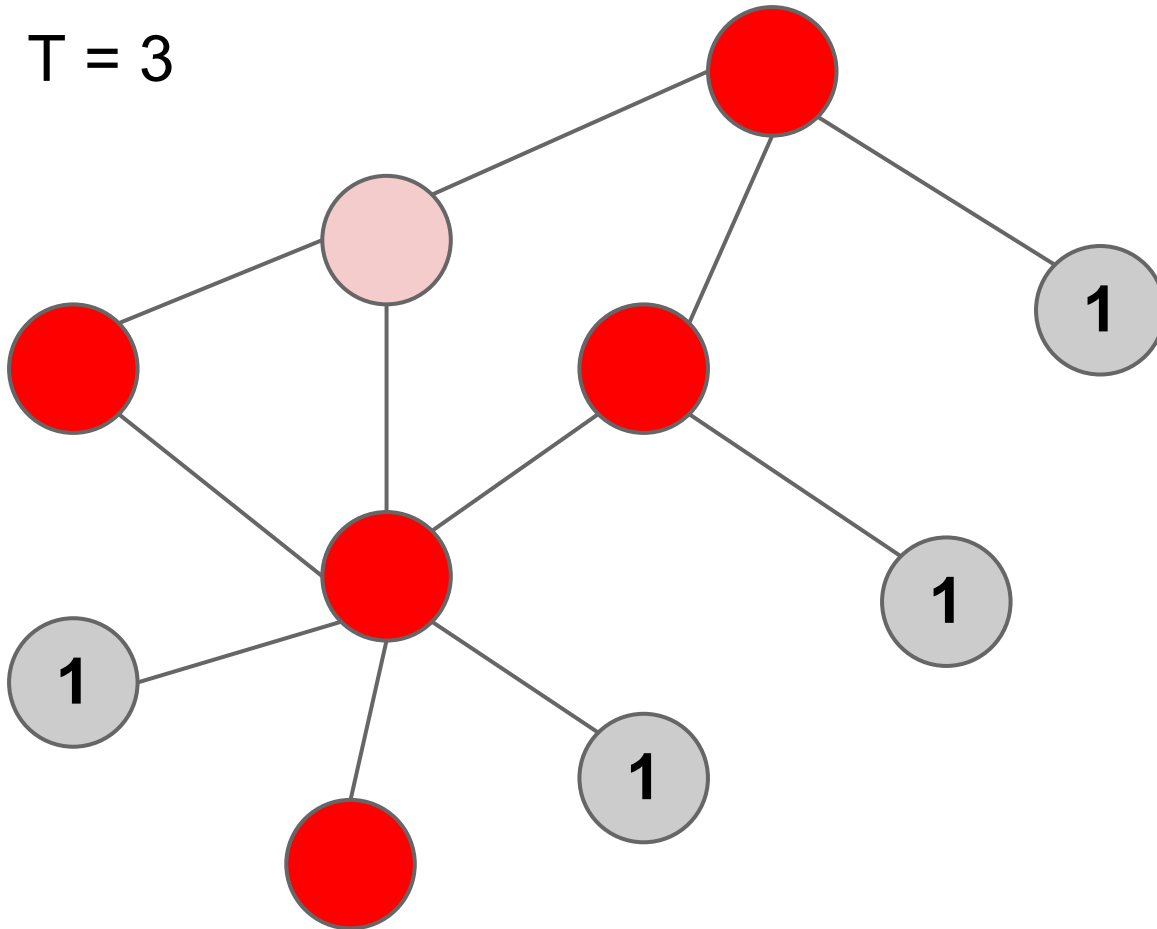# Network Diffusion Model Simulation Process

at simulation step 3:

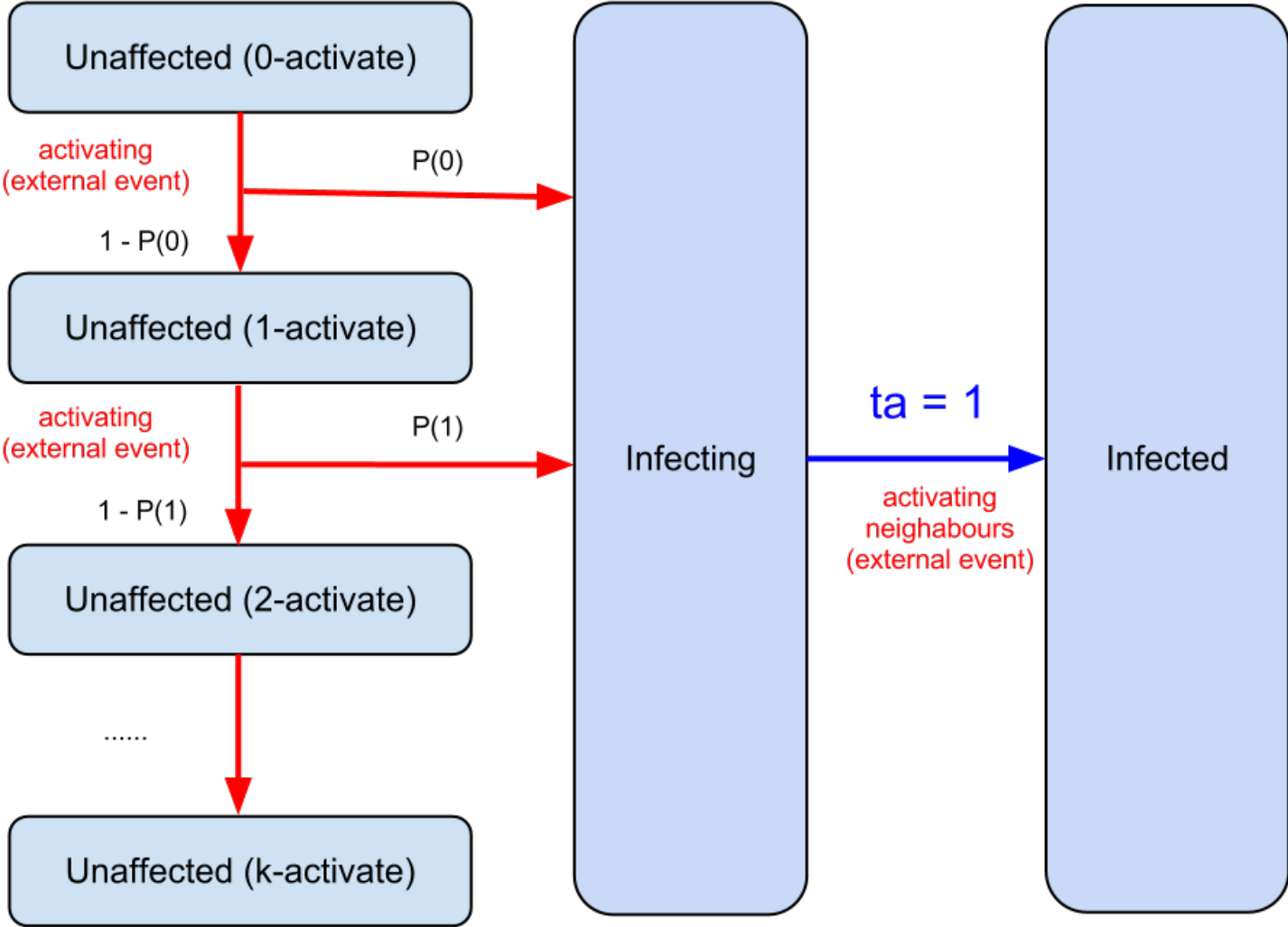Unaffected

Affected

Activating

Newly Affected

Unaffected -
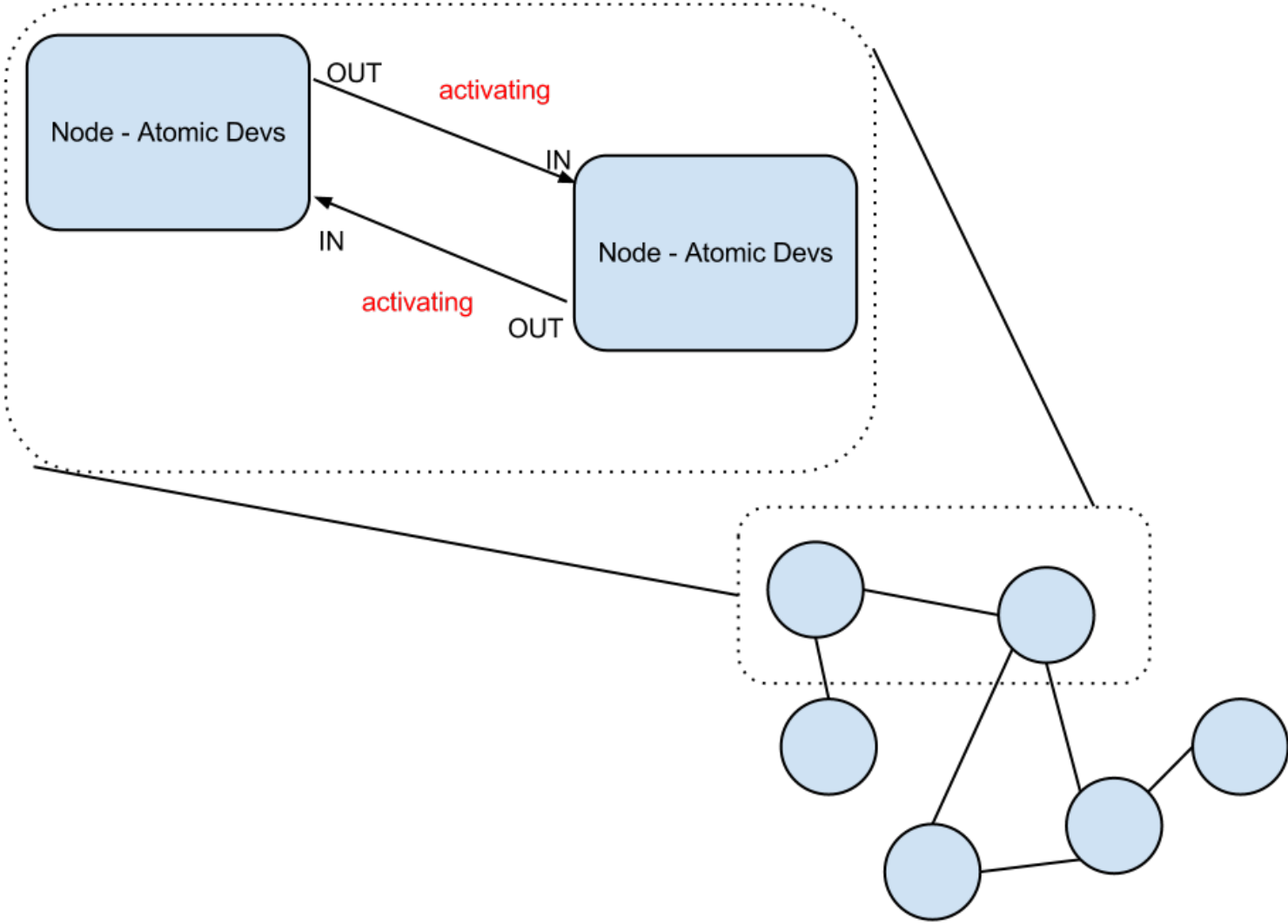Failed k times

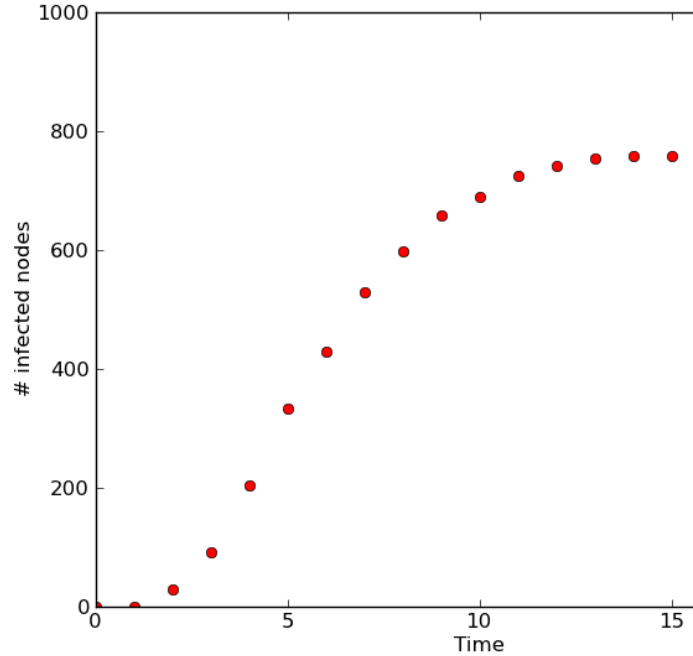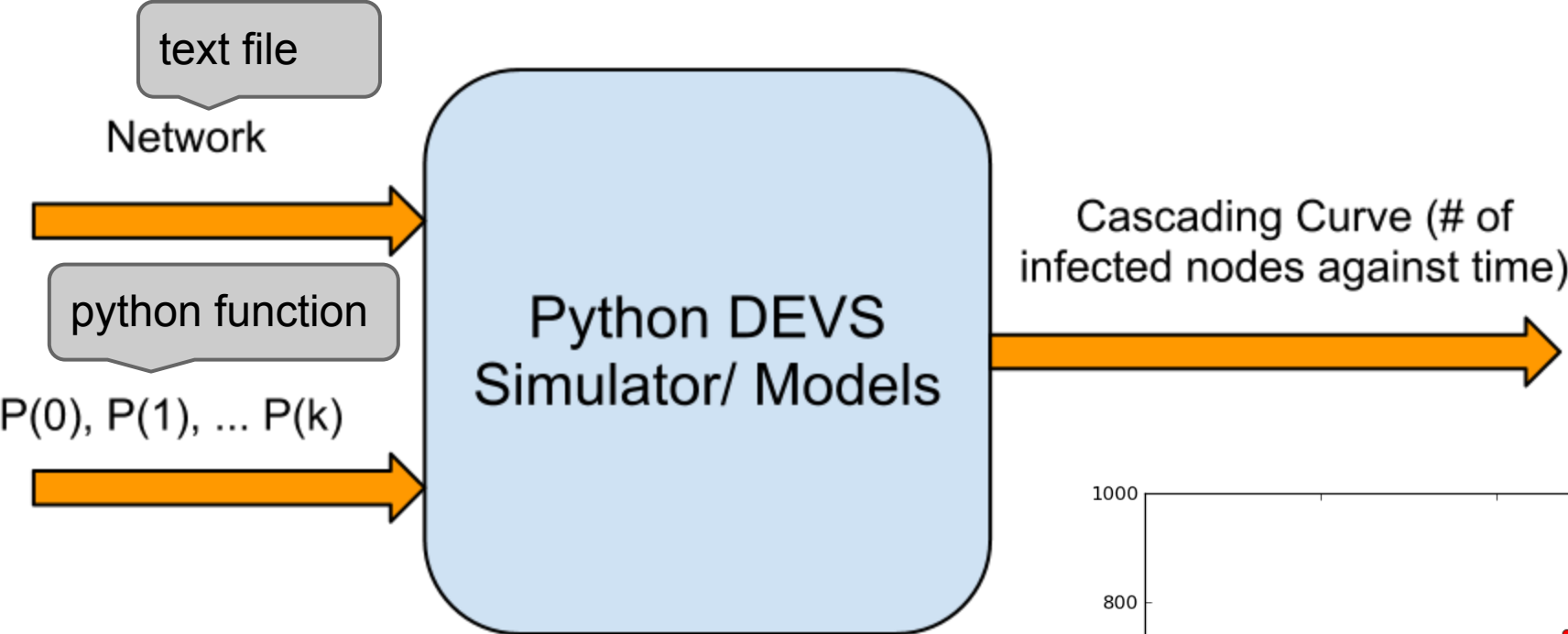# Network Diffusion Model Simulation Process

DEVS Model - Node as an AtomicDEVS

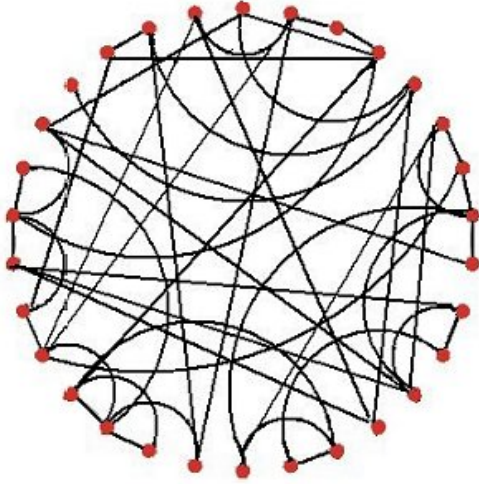# DEVS Model - Interaction between Nodes
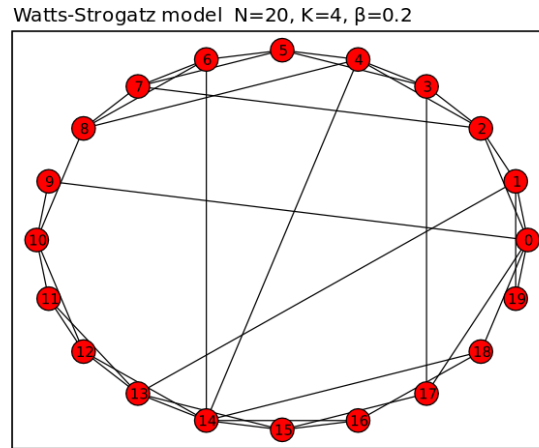
DEVS Model - PythonDEVS Implementation

What are we interested in?

- Speed of the spread
- # of diffused nodes at the end
- Any difference if we:
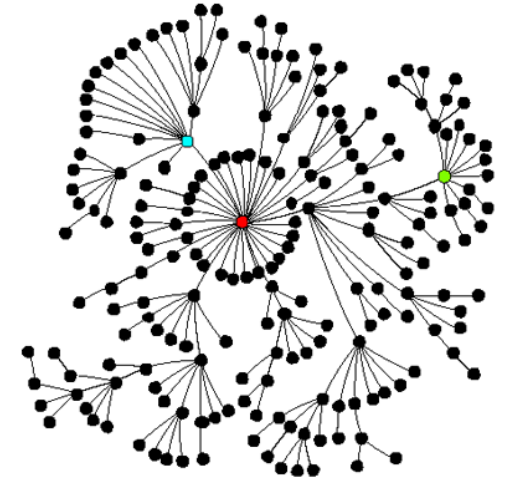 - start at different node?
  - with other network topology?

Different Network Topology

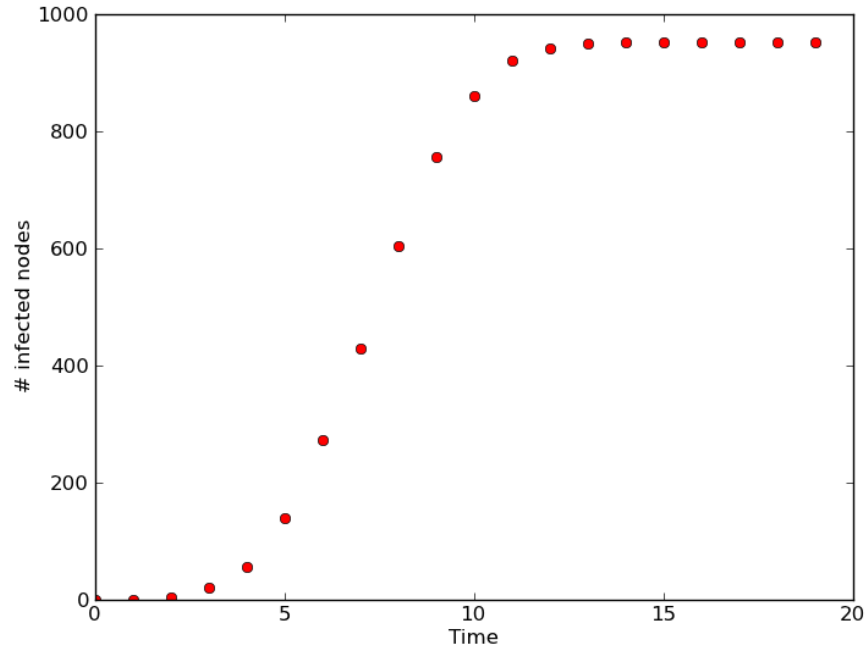Watts-Strogatz model N=20, K=4, β=0.2

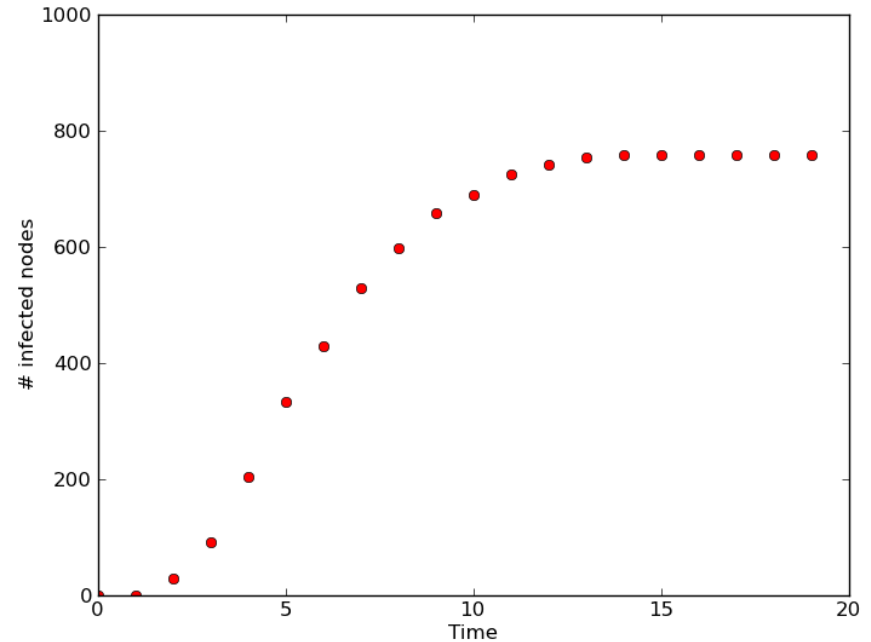Flat Random   Small World property   Scale-Free

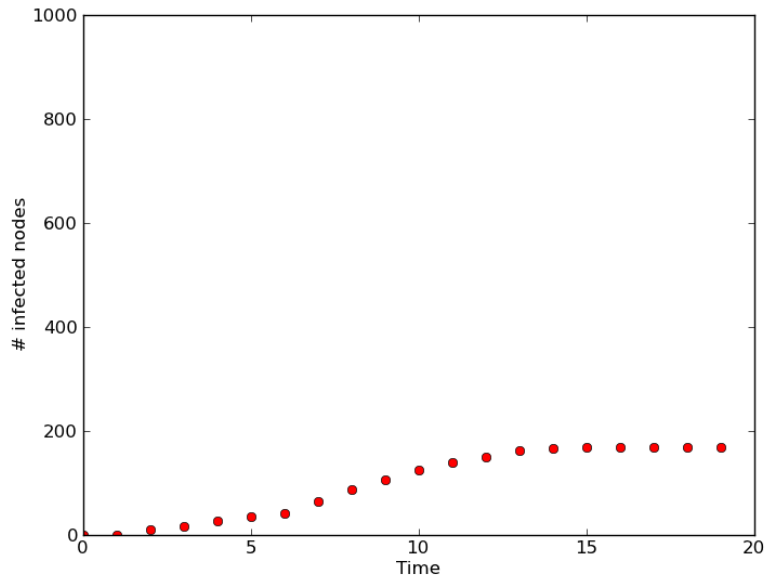# Experiments and Results (1) - network topology
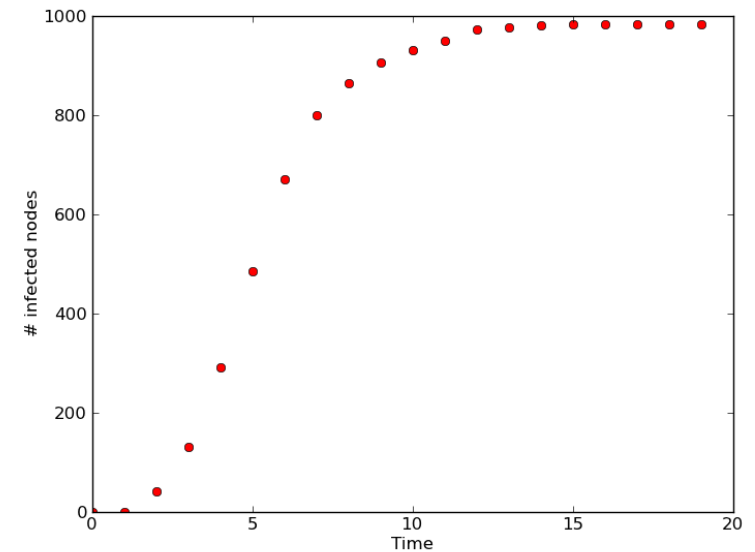
Flat Random - P(K) = 0.5

Scale Free - P(K) = 0.5

Experiments and Results (2) - activation probability
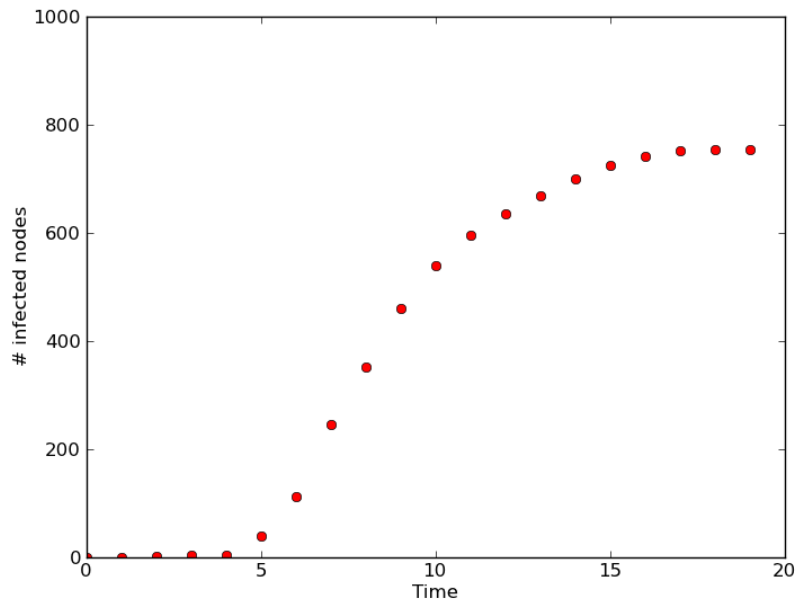
Scale Free - P(K) = 0.2
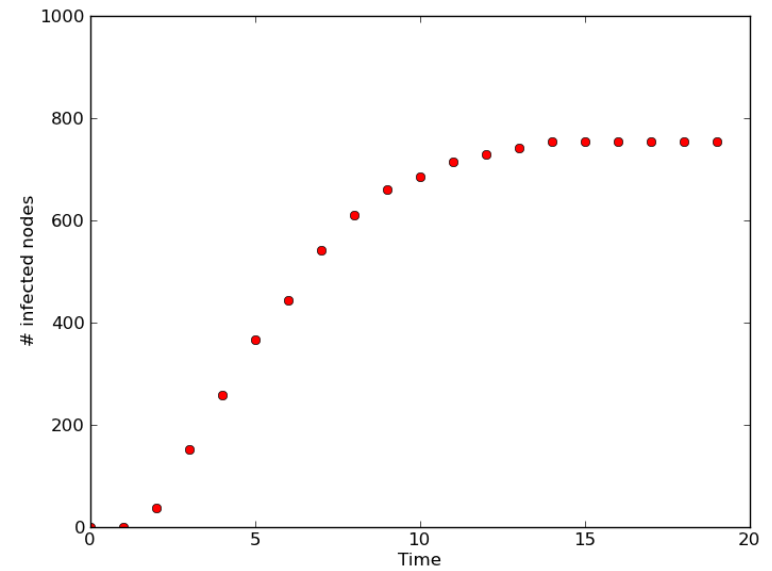
Scale Free - P(K) = 0.8

Experiments and Results (3) - information origin

originated at
lowest degree node

originated at
highest degree node

Conclusions

- "Network Science" Model -> DEVS Model
- An simulation environment with PythonDEVS
  - Take parameters and produce (useful?) output

Future Work

- Use realistic inputs
  - real network topology - e.g. social network?
  - estimate parameters - e.g. P(0), P(1)
- Build a comprehensive tool for real use

Thanks!