Multiple Class G-Networks with Restart

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The restart method

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- Insight useful for:
  - Optimising software performance
  - Development of benchmarks
Evaluation Approaches

- Experimentation on test-beds – low abstraction level
  - Set up the system in the lab
  - Cost and time constraints
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  - Build a simulation (e.g. NS-2, OMNeT++, Möbius)
  - Give slightly more general results than measurement studies
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\[ F(x) = \int_0^x f(u) du \]

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- **Analytical Approaches – high abstraction level**
  - Formalise problem
  - Give general insights
  - Results might be far from reality
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A G-network is an open queueing network with several types of customers
- regular jobs
- negative customers, signals
- (signals between queues)
Jobs arrive into one of $K$ classes
G-networks

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- Derivation of standard queueing metrics straightforward
First example: iid services

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- Determine utilisation, expected queue length and expected waiting time
Second example: 5 classes

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- Compare results with simulation using SFERA
Expected queue length and expected waiting time for different values of the restart rate

Average queue length and average response time for the simulation
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Average queue length and average response time for the simulation

Both have minimum for similar restart rate

Why are simulation and G-network not exactly the same?
What is the difference between SFERA and G-network

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- G-network restarts random job
- Jobs have no 'age'
Third example: more complex service times

- Job arrivals to class 1 ($\lambda_1 = 0.004$) and class 2 ($\lambda_2 = 0.01$)
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- Class 3, 4, 5 have Erlang(3) service time with $\lambda = 0.5$ and different restart success probs
- Restart has strong positive effect
Conclusions

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- Need better tool support.
Thank you.