Multiple Class G-Networks with Restart

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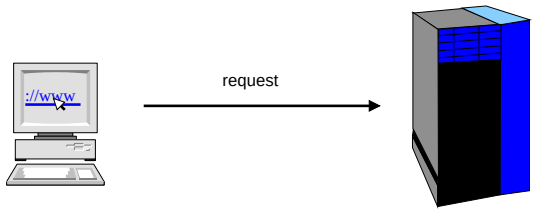
The restart method



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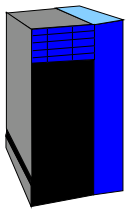

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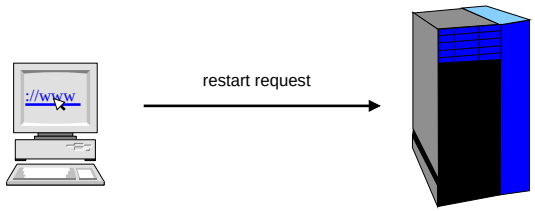

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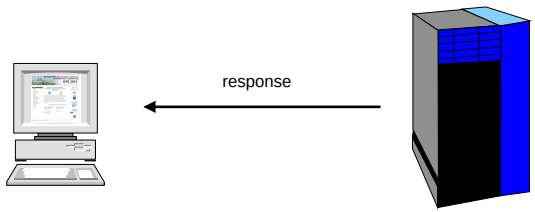

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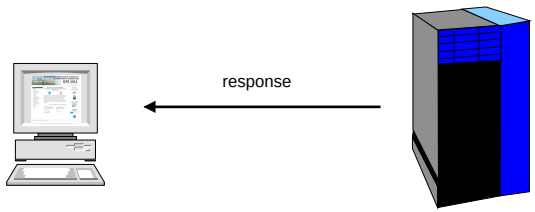

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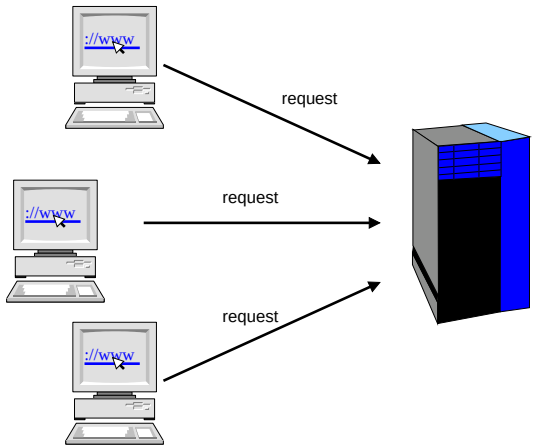

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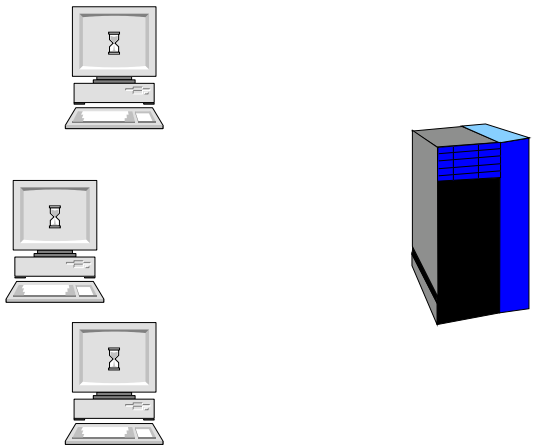

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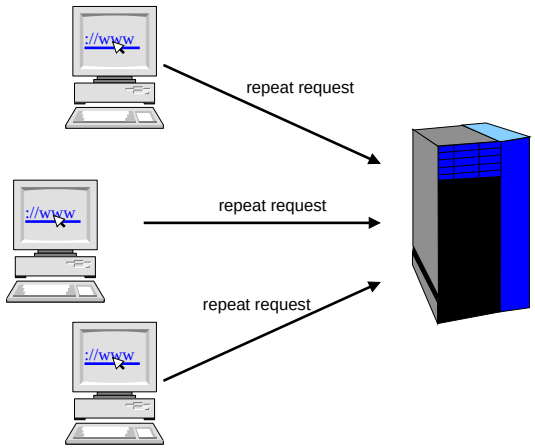

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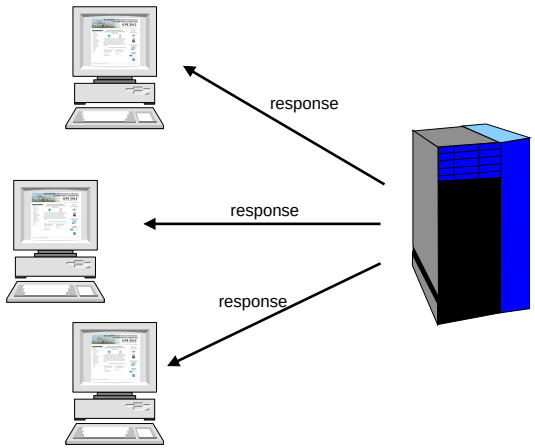

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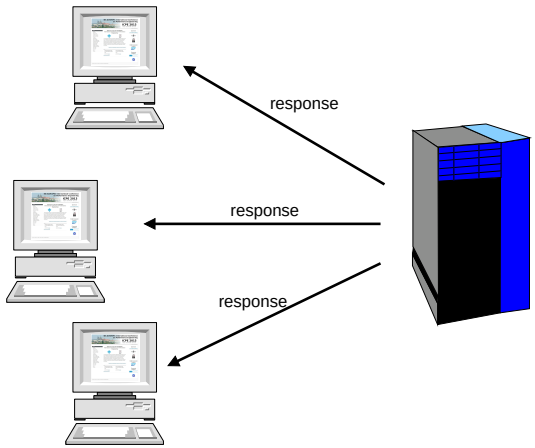

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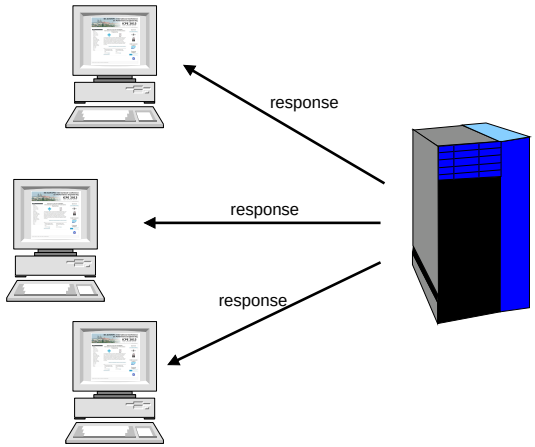

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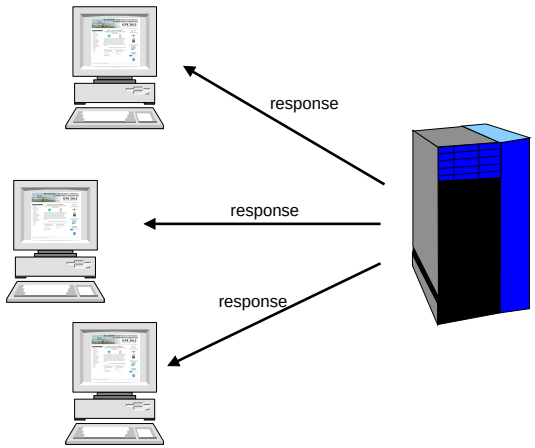

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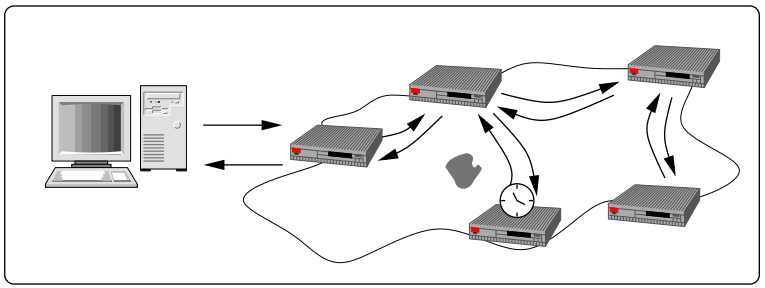
  - Development of benchmarks

Evaluation Approaches



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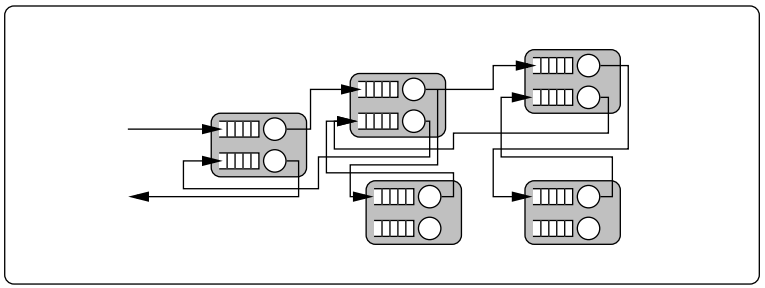

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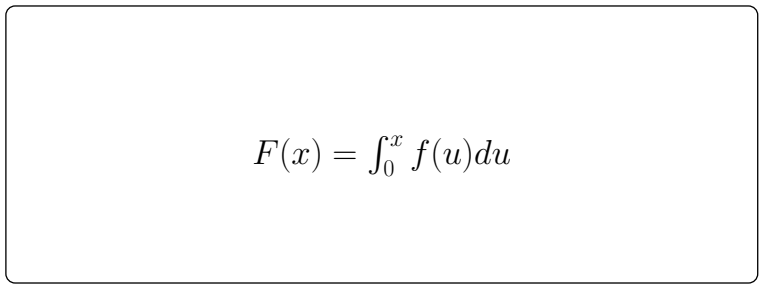

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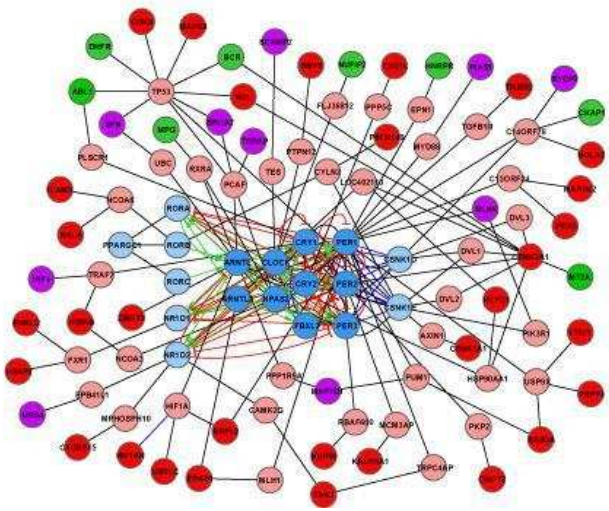
  - Results are less realistic
- Analytical Approaches – high abstraction level
  - Formalise problem
  - Give general insights
  - Results might be far from reality

G-networks



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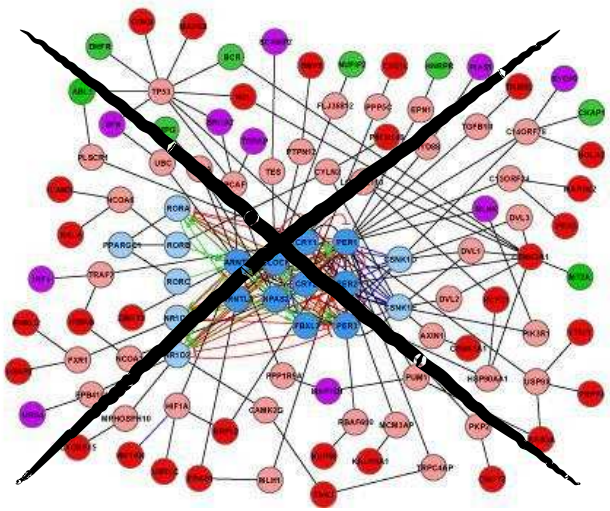

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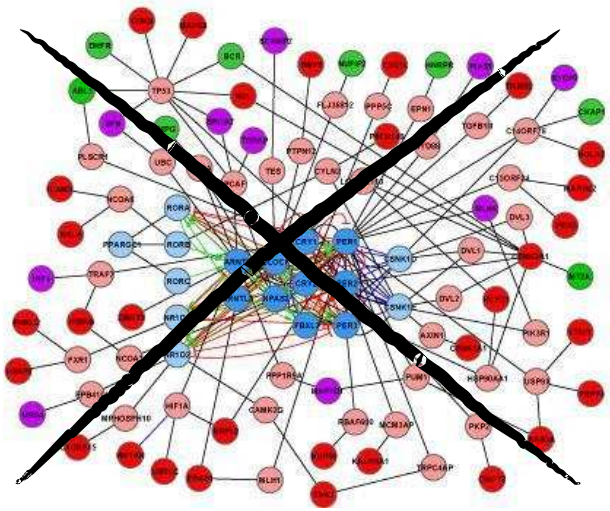

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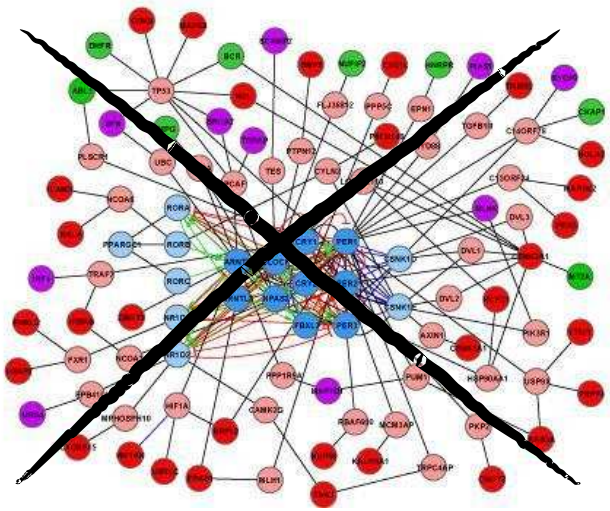

- one could guess, a G-network is a genetic network
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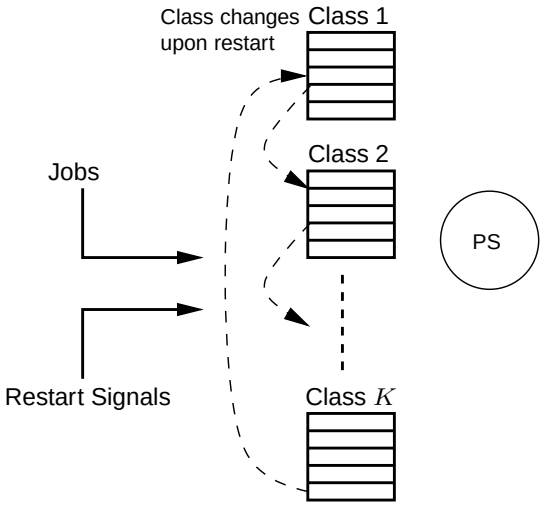
- G as generalized queueing network or Gelenbe network
- A G-network is an open queueing network with several types of customers
  - regular jobs
  - negative customers, signals
  - (signals between queues)

G-networks



- Jobs arrive into one of K classes

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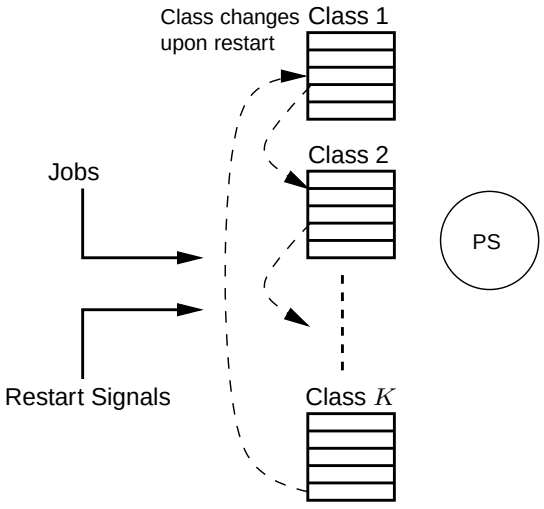

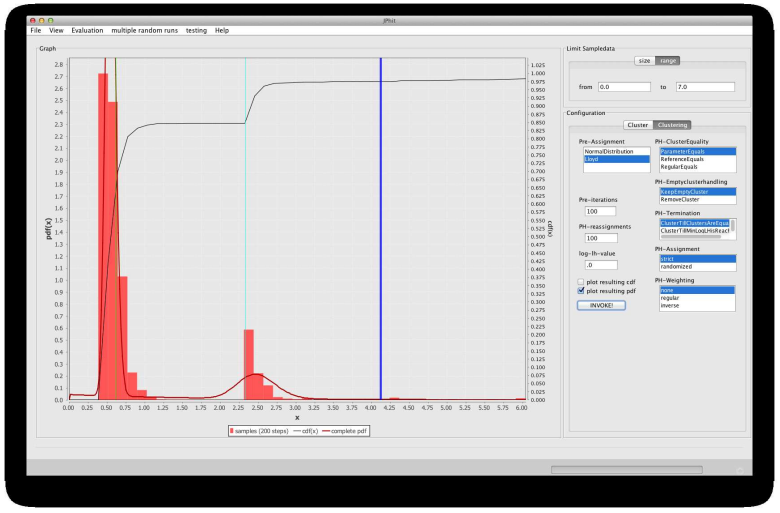

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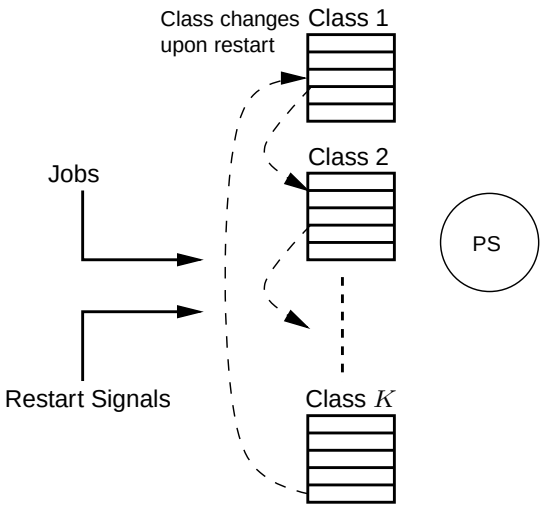

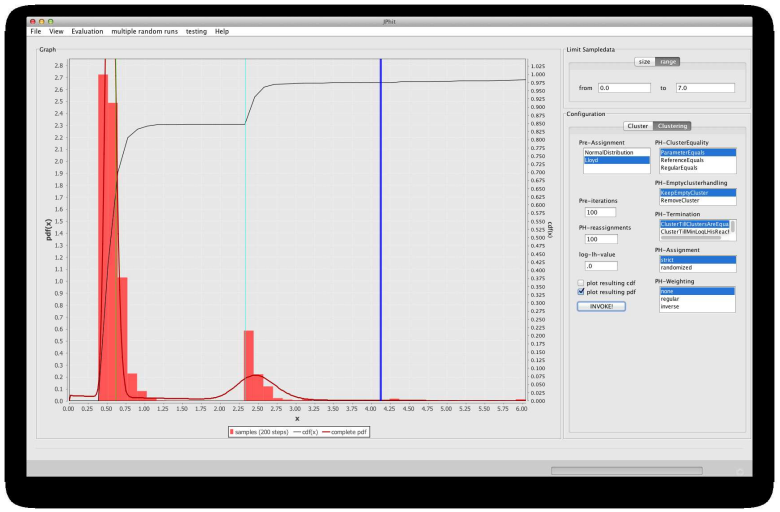

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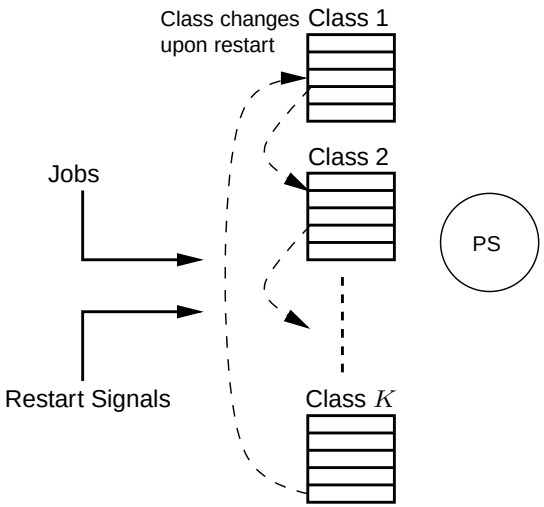

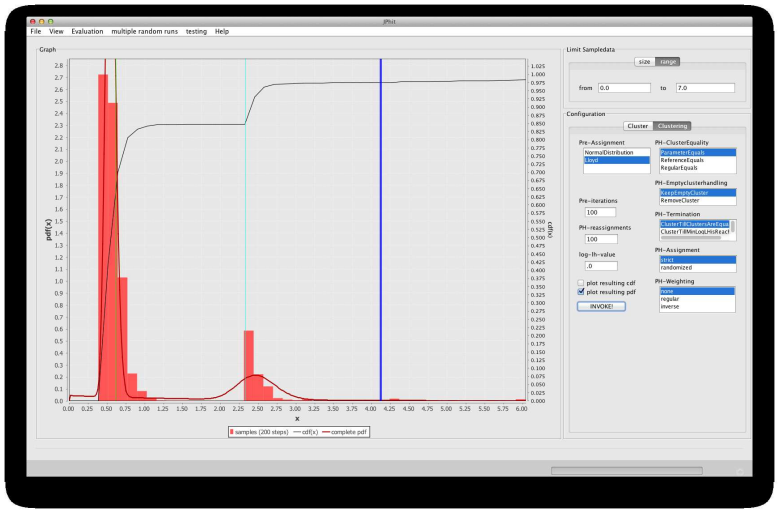

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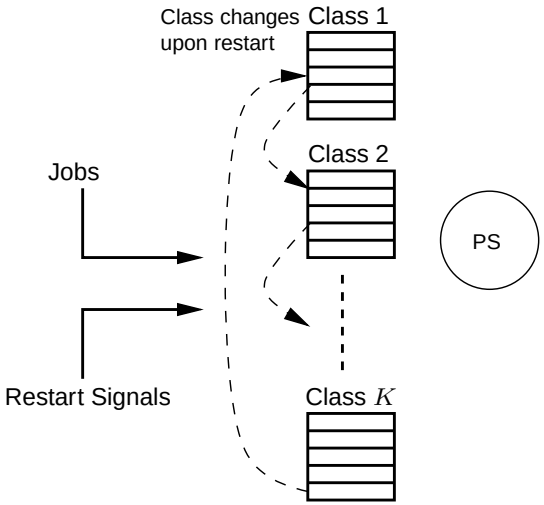

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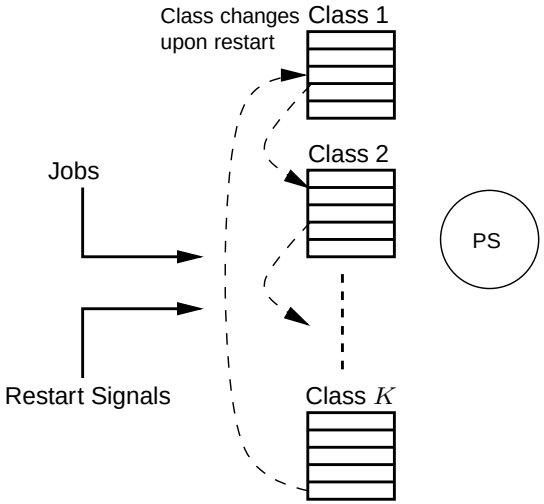

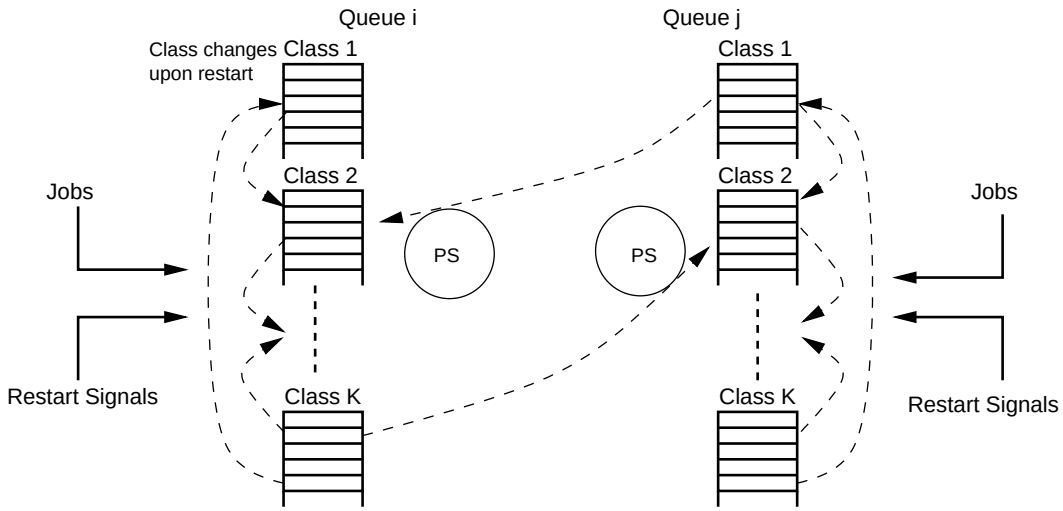

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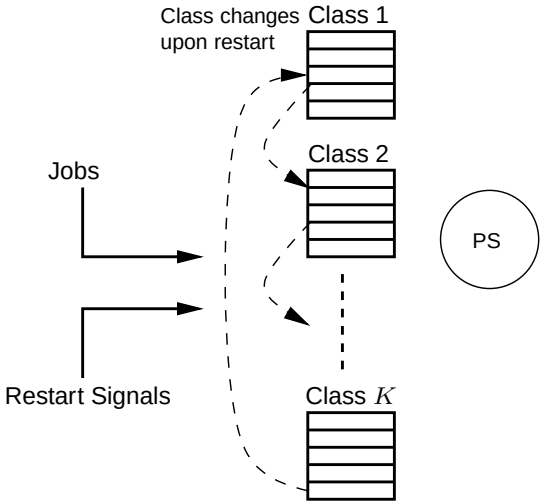

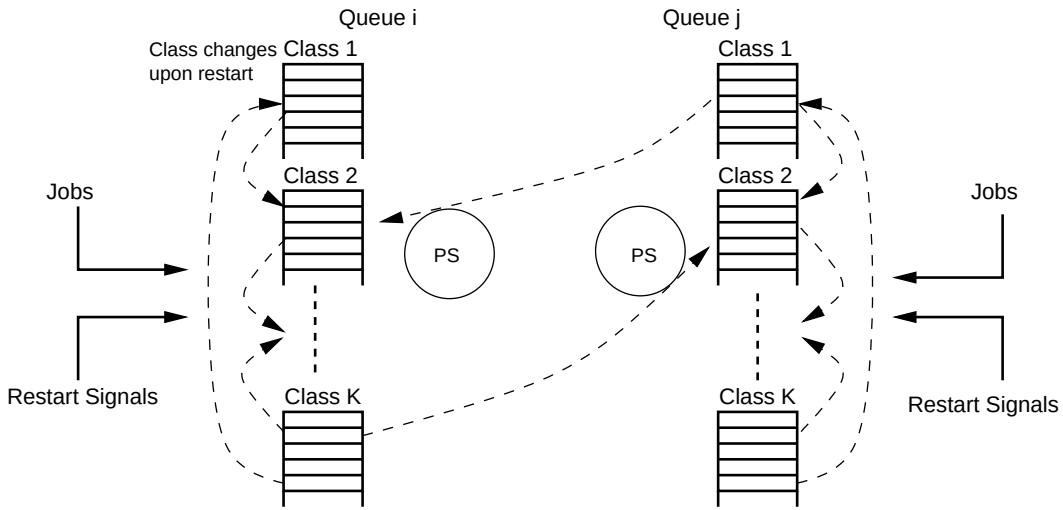

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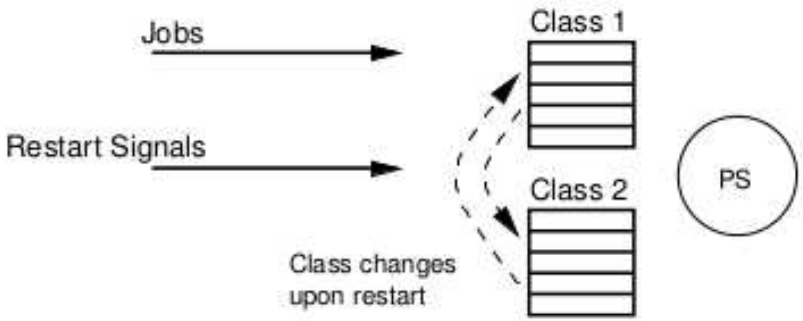
- Product-form solution
- Derivation of standard queueing metrics straight forward

First example: iid services



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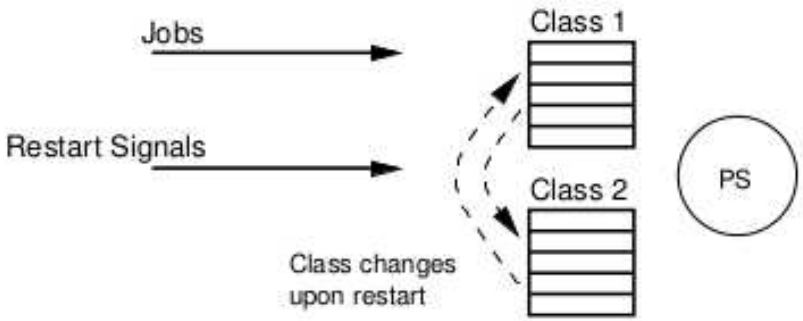

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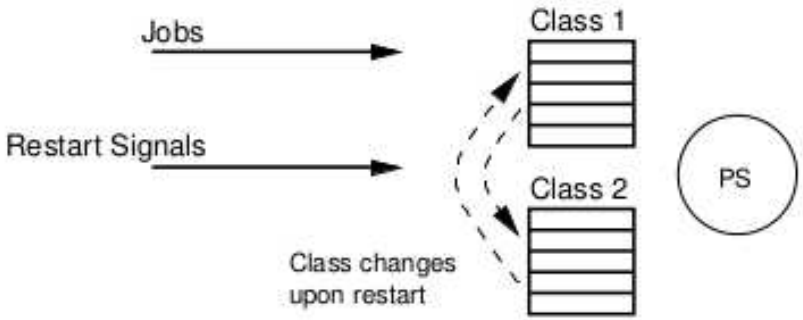

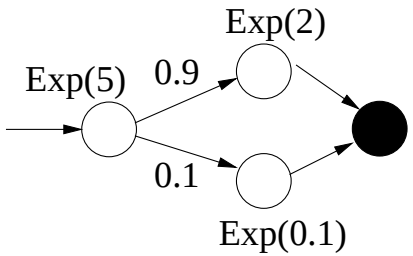

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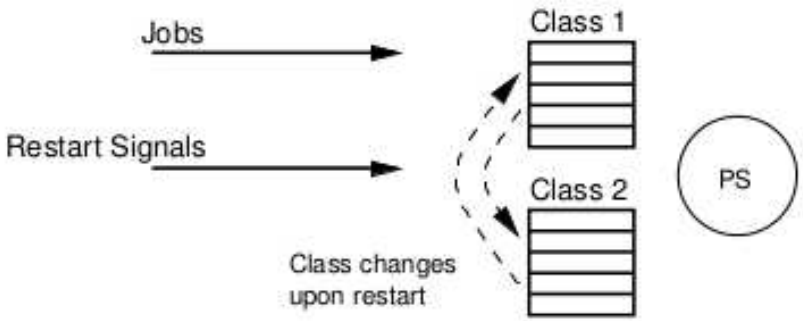

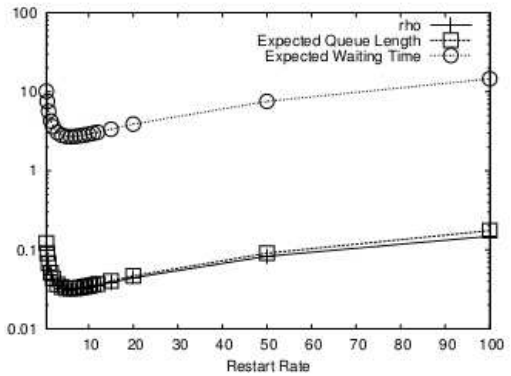

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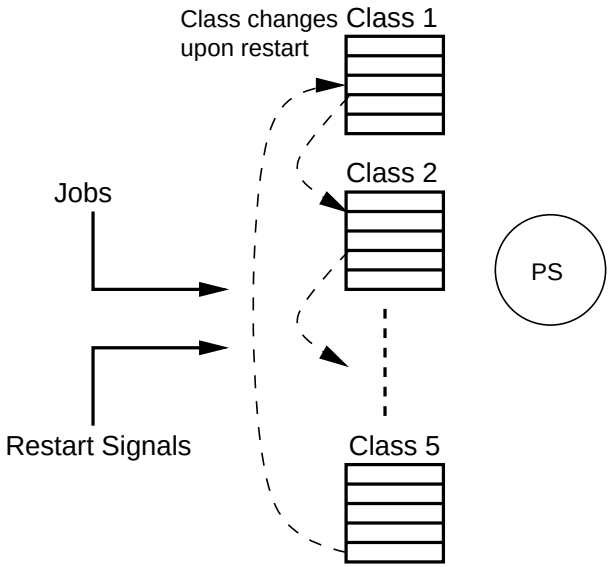
- Determine utilisation, expected queue length and expected waiting time

Second example: 5 classes



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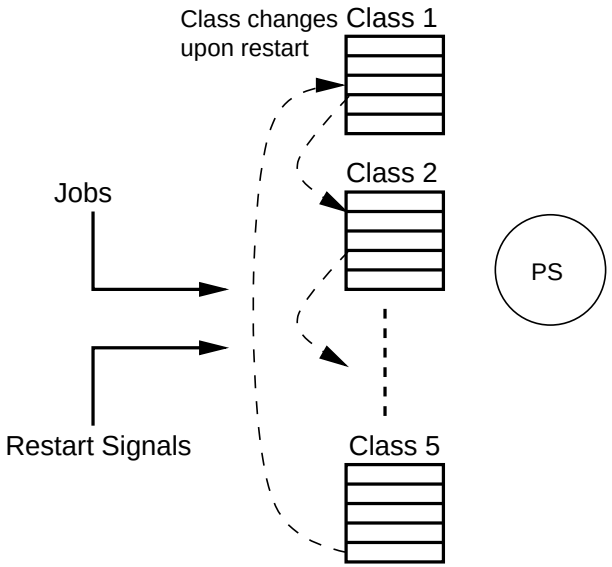

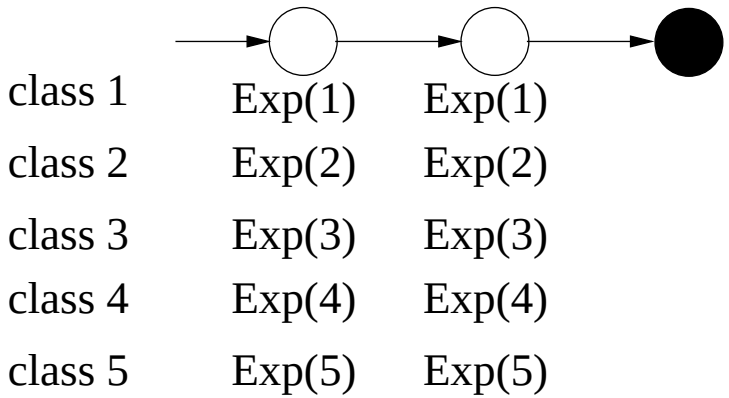

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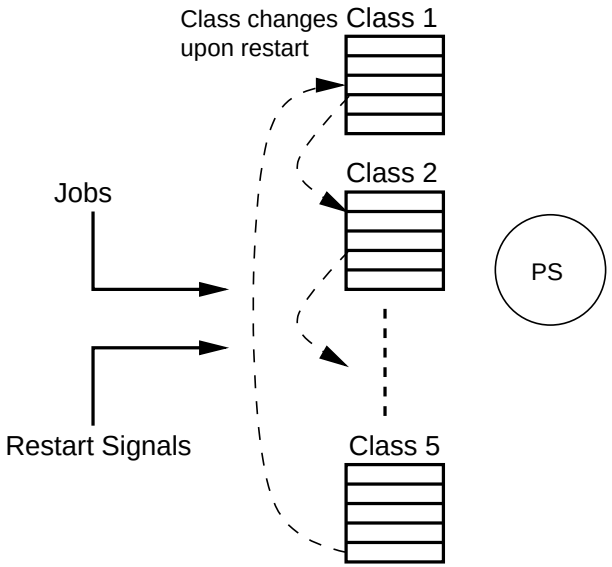

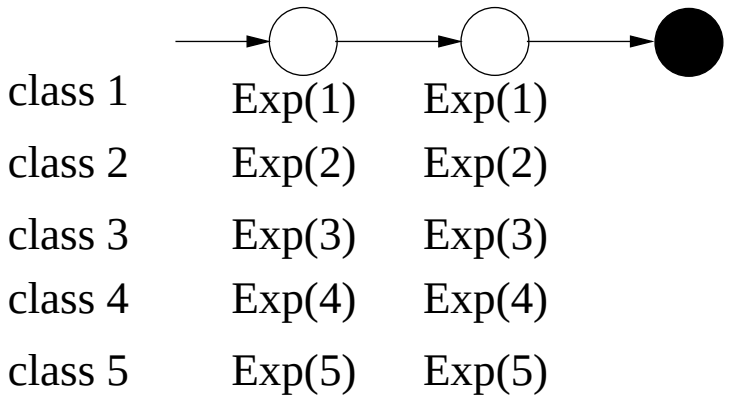

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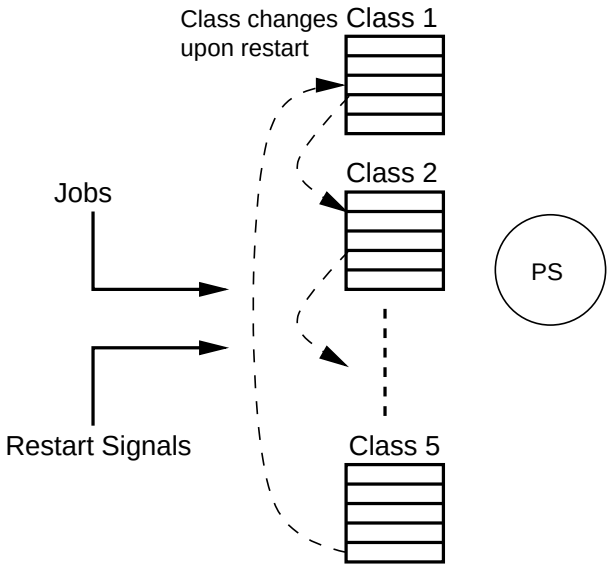

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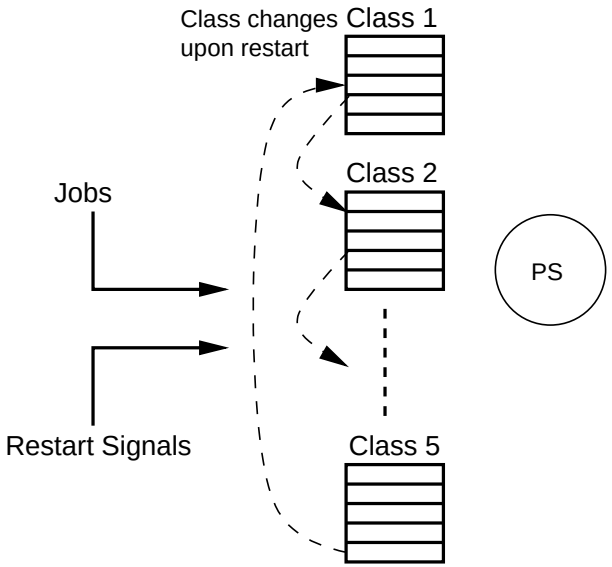

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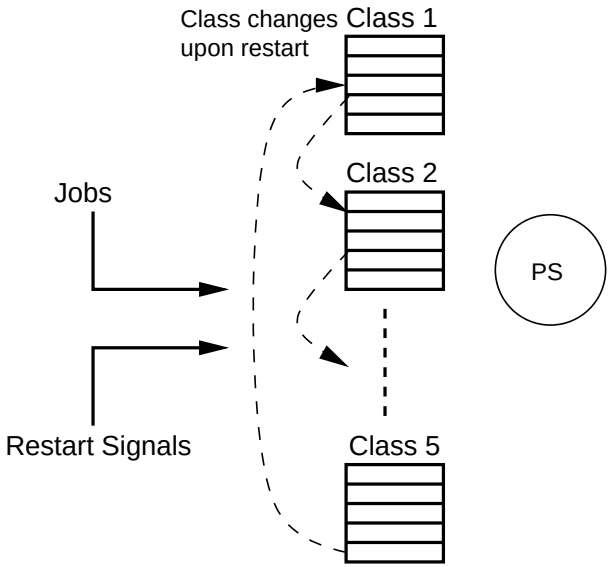

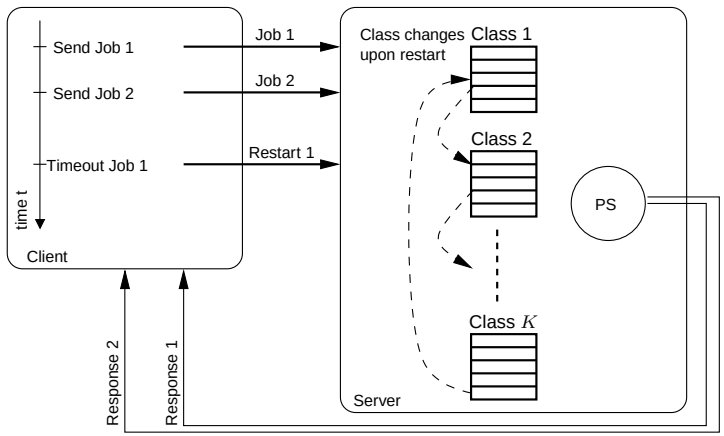

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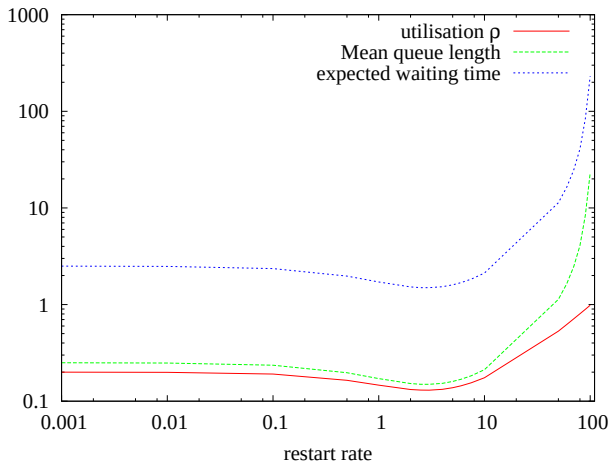
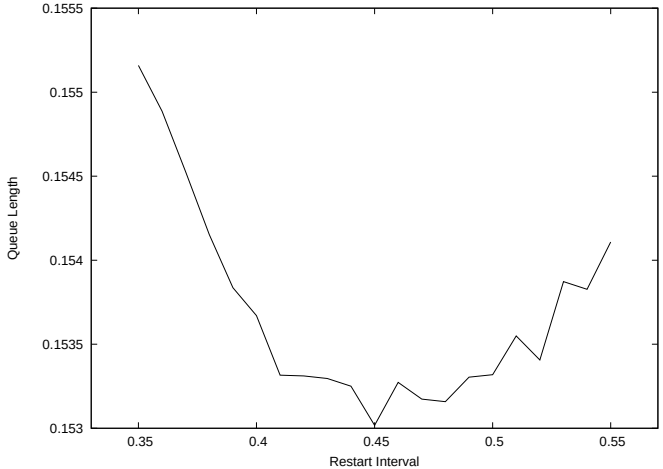
- Compare results with simulation using SFERA

Results





- 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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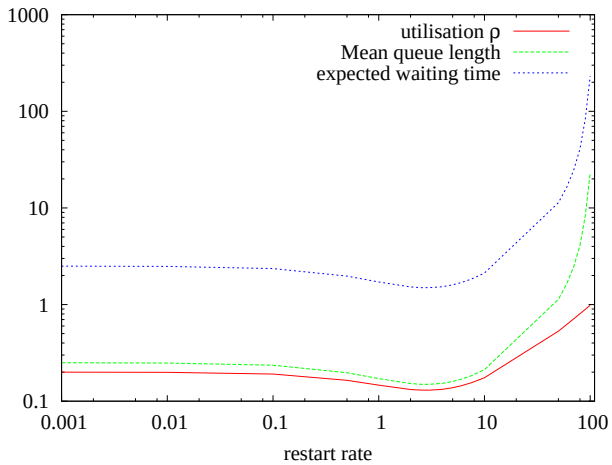
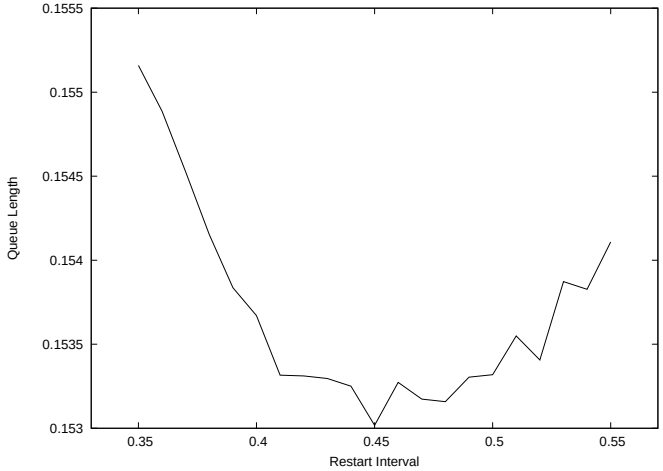
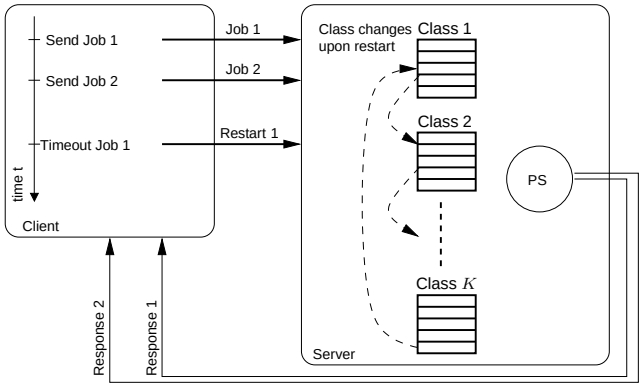




- Expected queue length and expected waiting time for different values of the restart rate
- Average queue length and average response time for the simulation
- Both have minimum for similar restart rate
- Why are simulation and G-network not exactly the same?

What is the difference between SFERA and G-network



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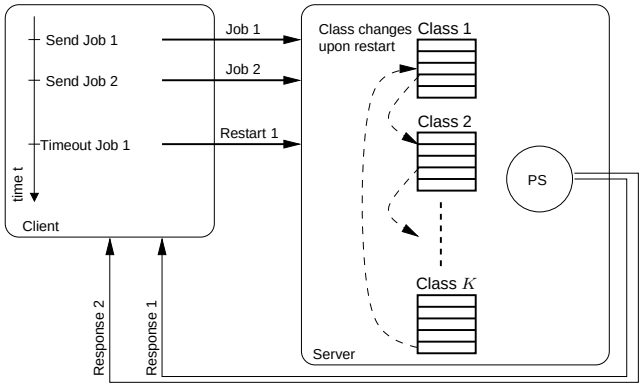

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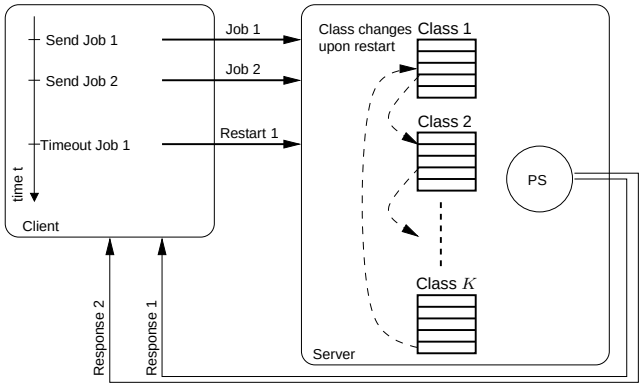

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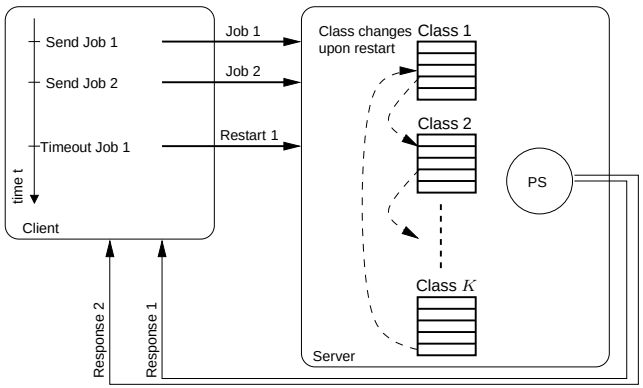

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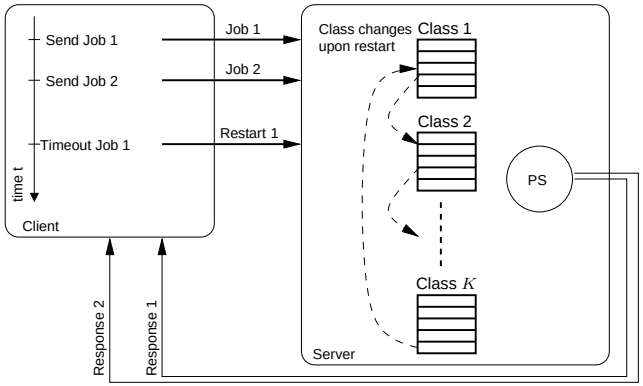

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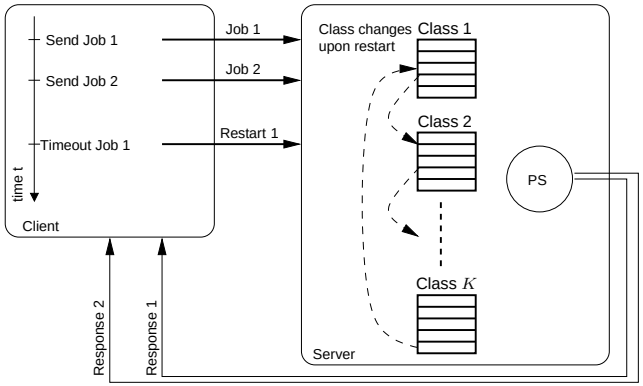

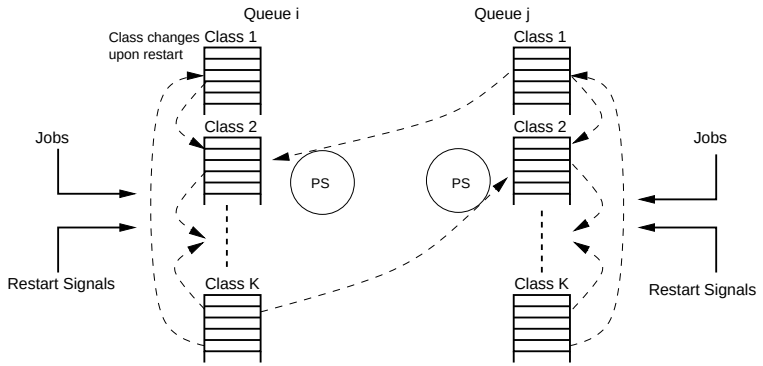

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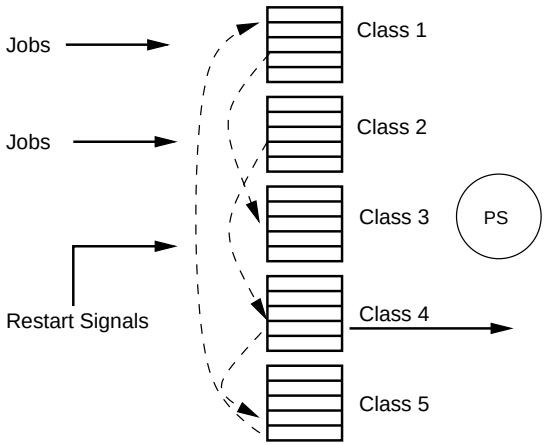
- G-network restarts random job
- Jobs have no 'age'

Third example: more complex service times



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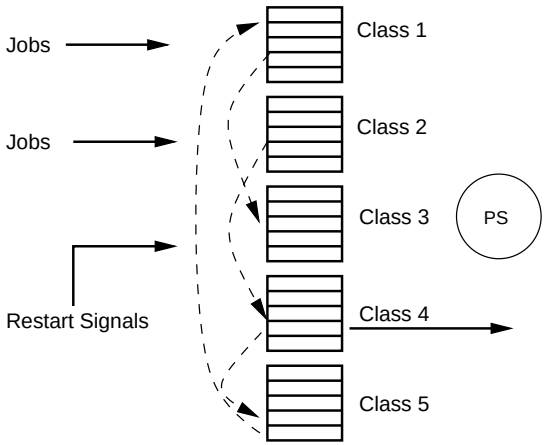

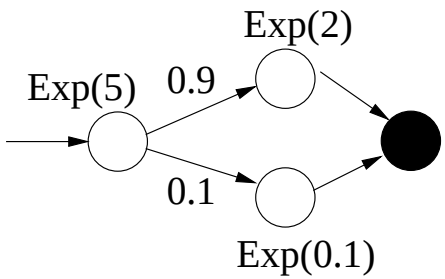

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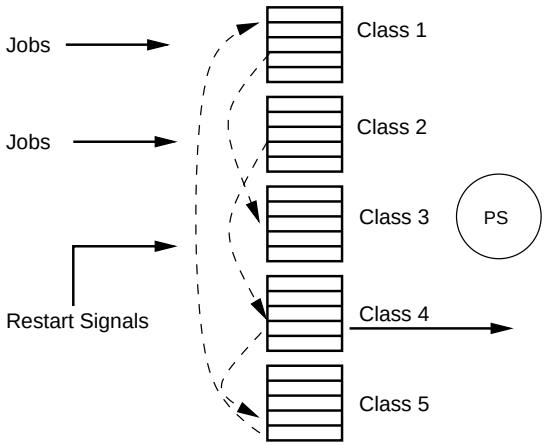

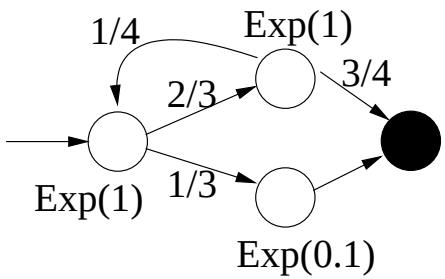

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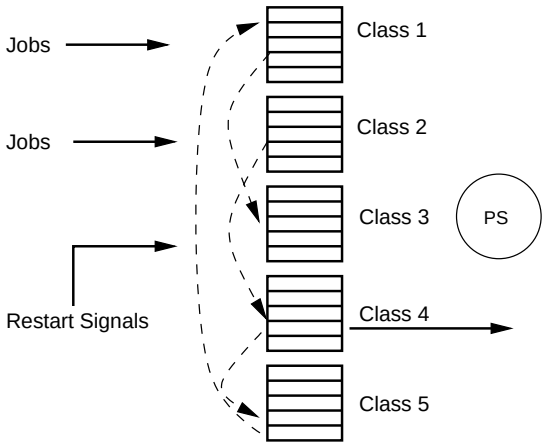

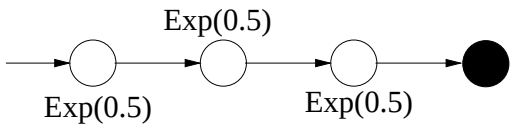

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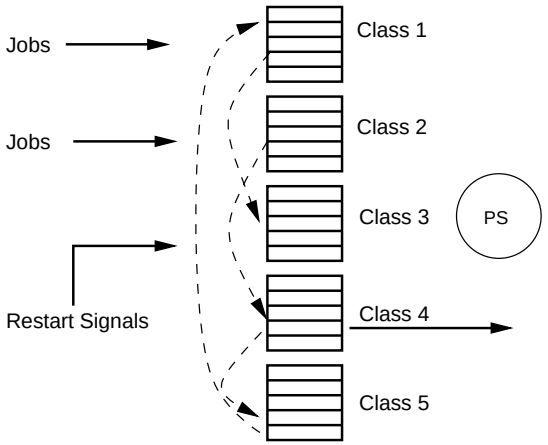

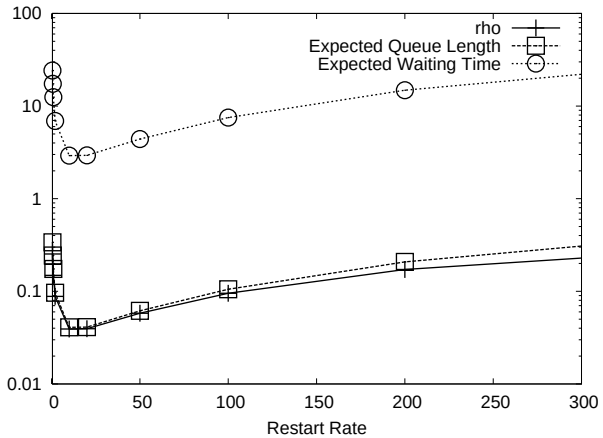

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- Need better tool support.

Thank you.