Queueing & Python

`pip install ciw`

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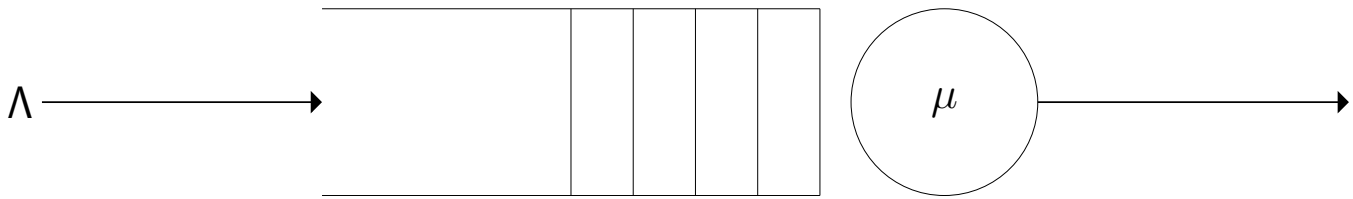
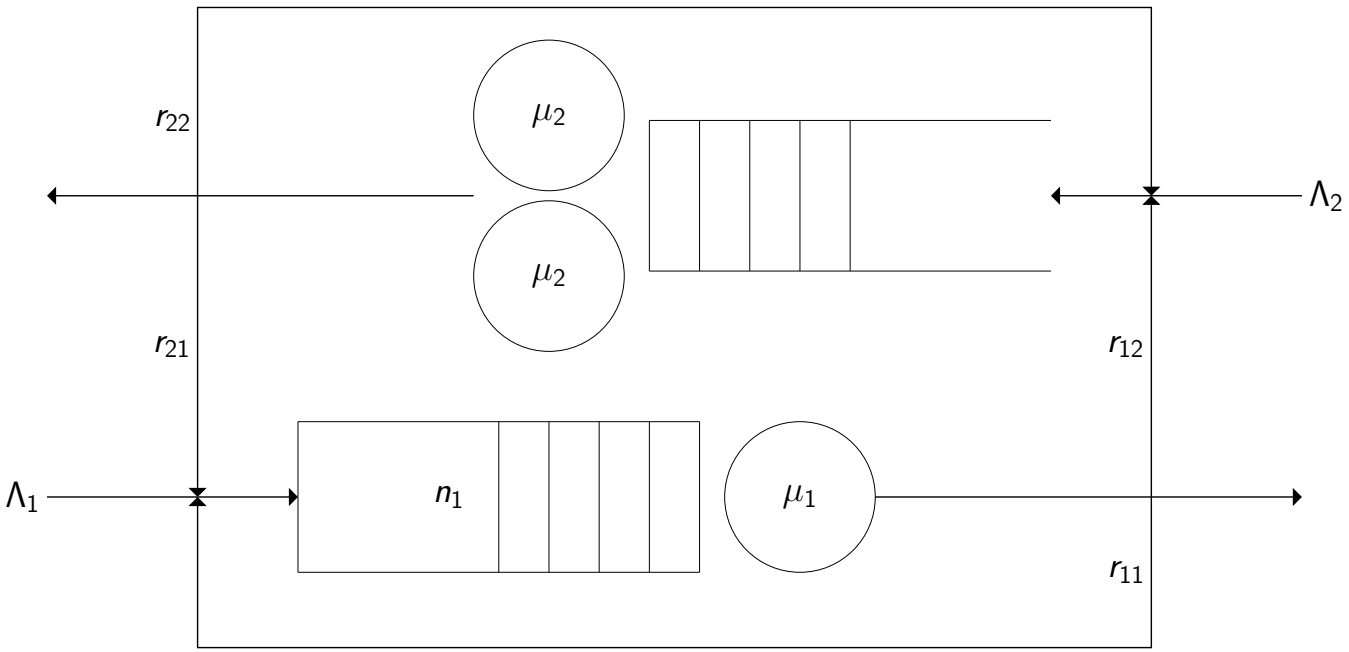
PyCon UK 2016


GAME

What is a Queue?



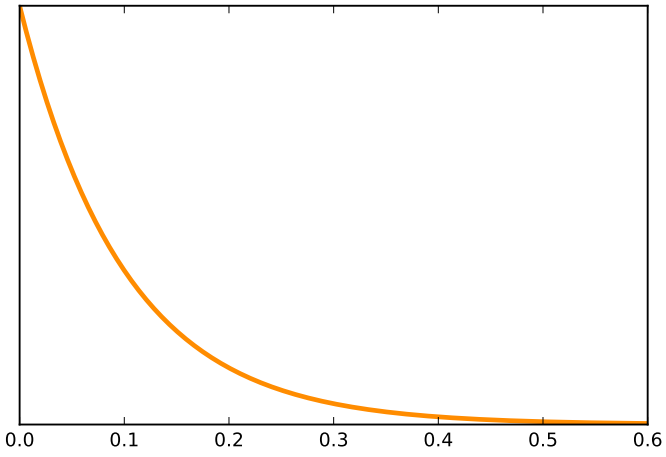
What is a Queue?

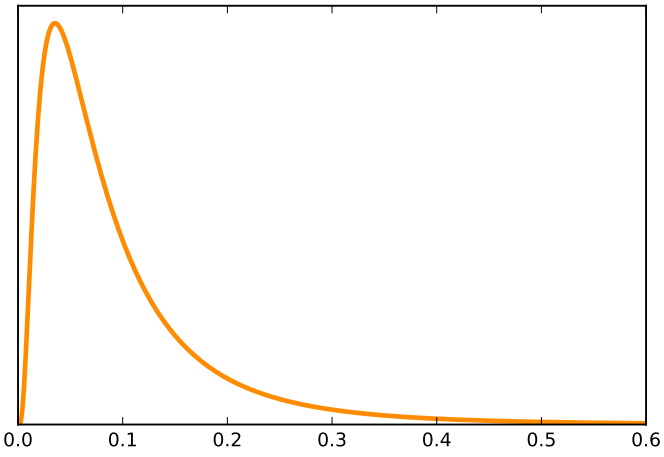


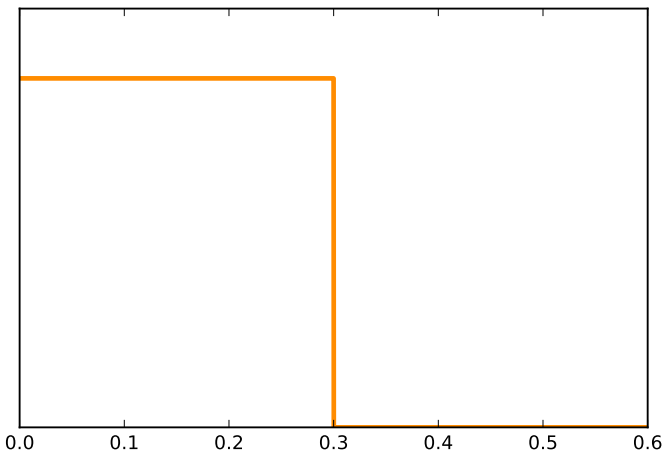
Features

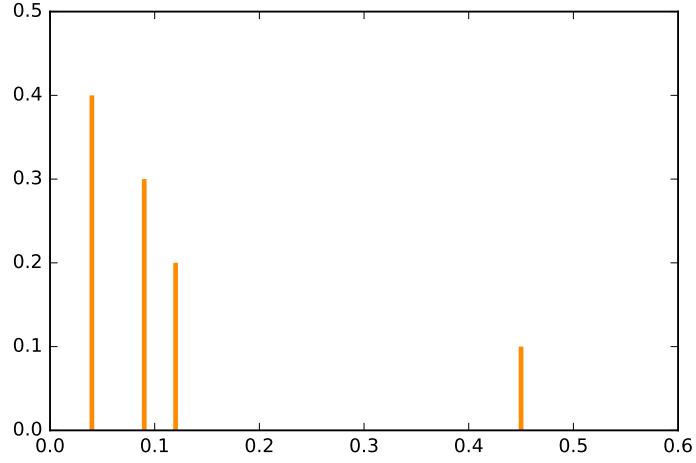
http://ciw.readthedocs.io

Distributions

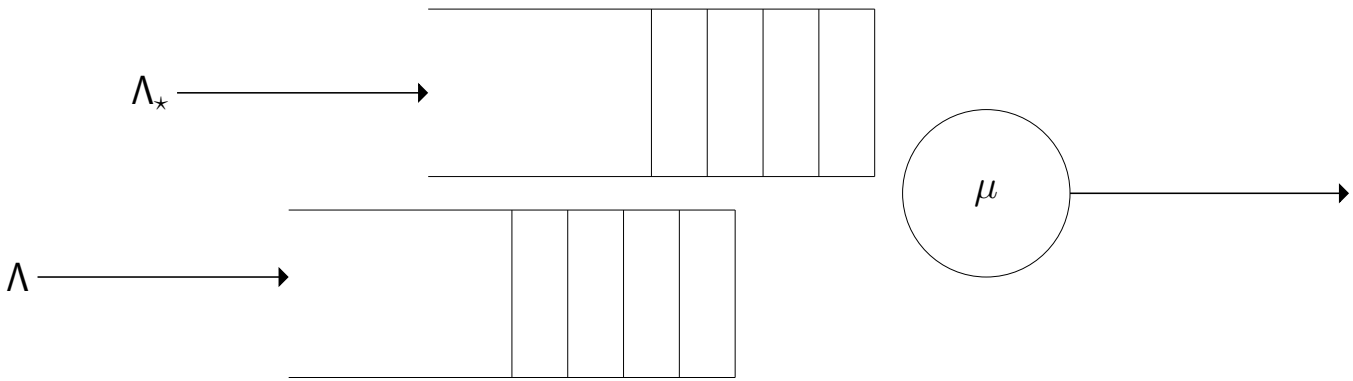




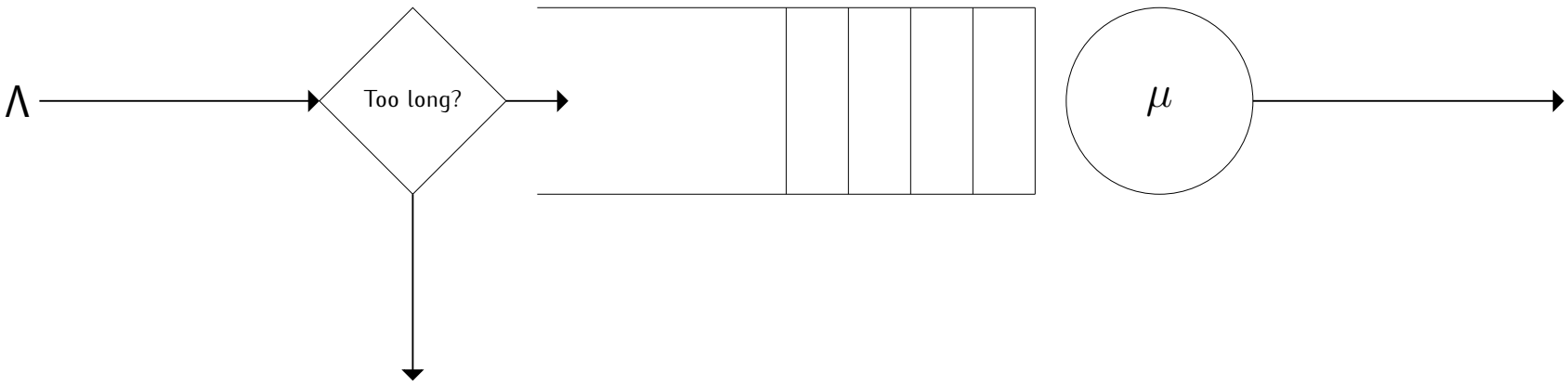




Priority Queues

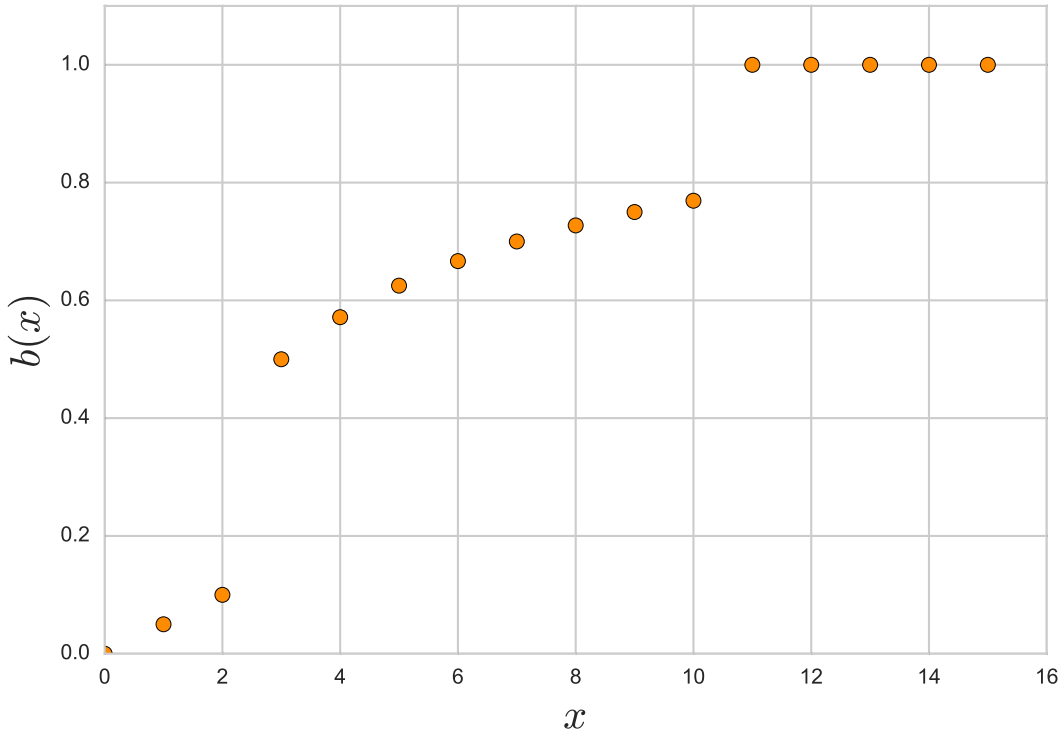


Baulking

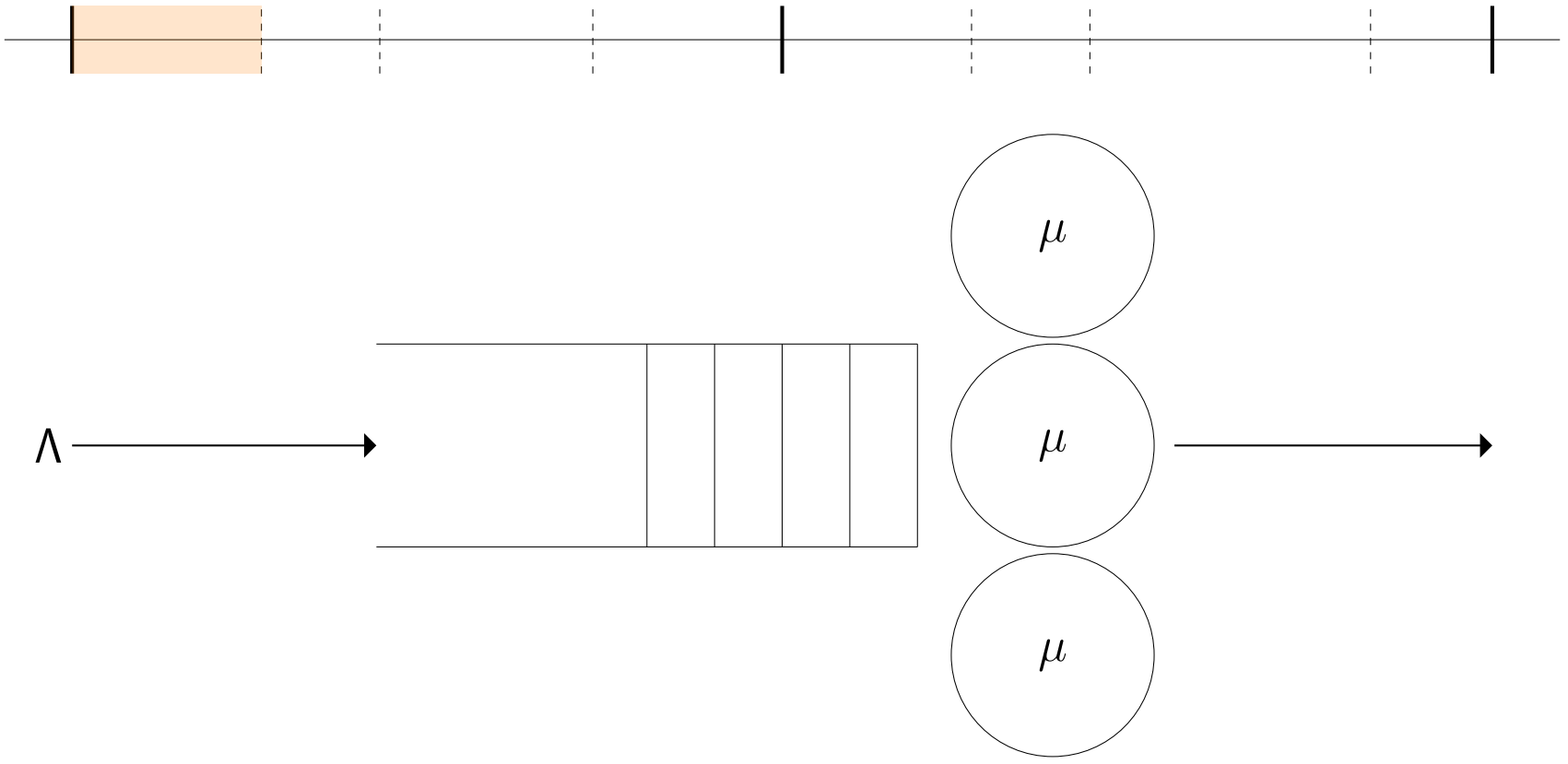


$$P(\text{baulk} \mid x \text{ in queue}) = b(x)$$

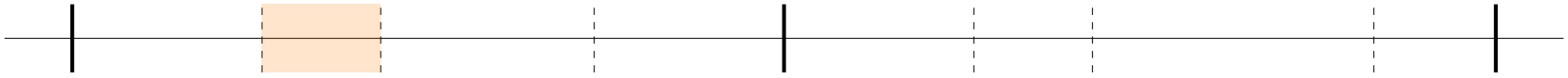
$$b(x) = \begin{cases} \frac{x}{20} & \text{if } x \leq 2 \\ \frac{x}{x+3} & \text{if } 2 < x \leq 10 \\ 1 & \text{otherwise} \end{cases}$$

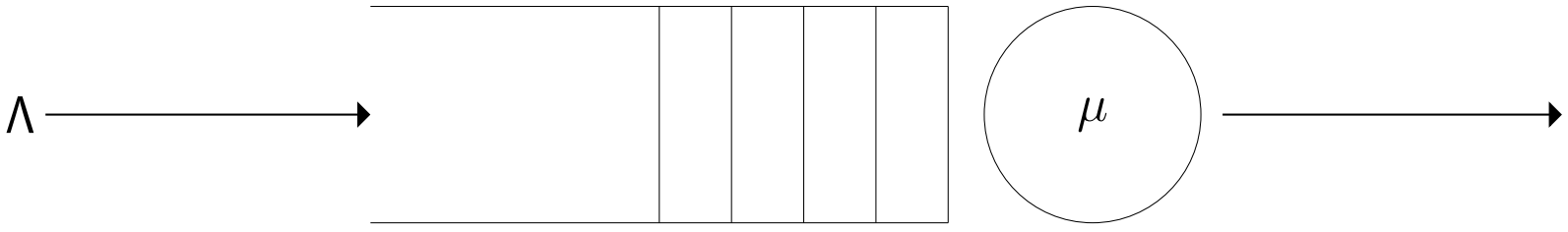


Server Schedules



Server Schedules





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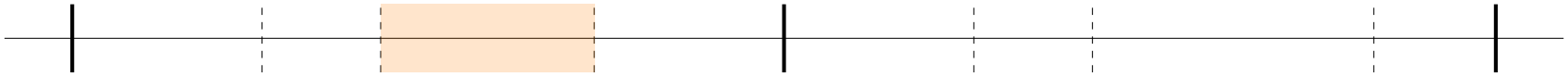
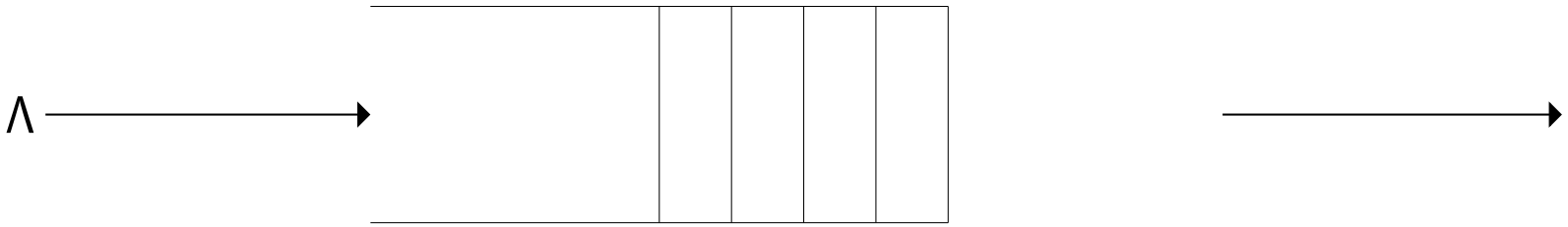
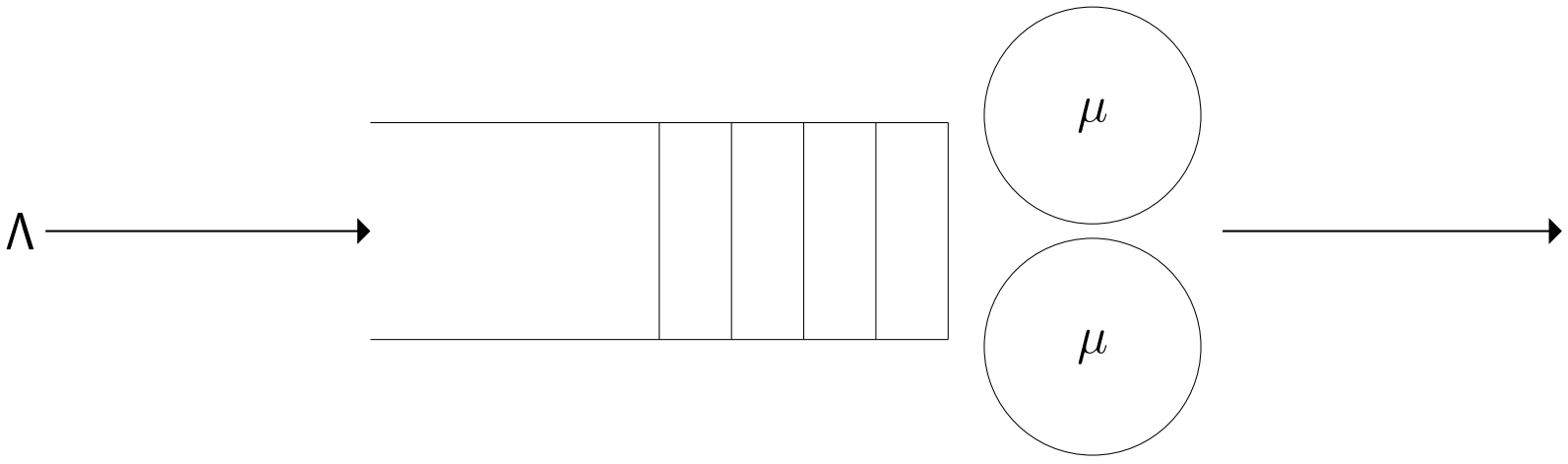
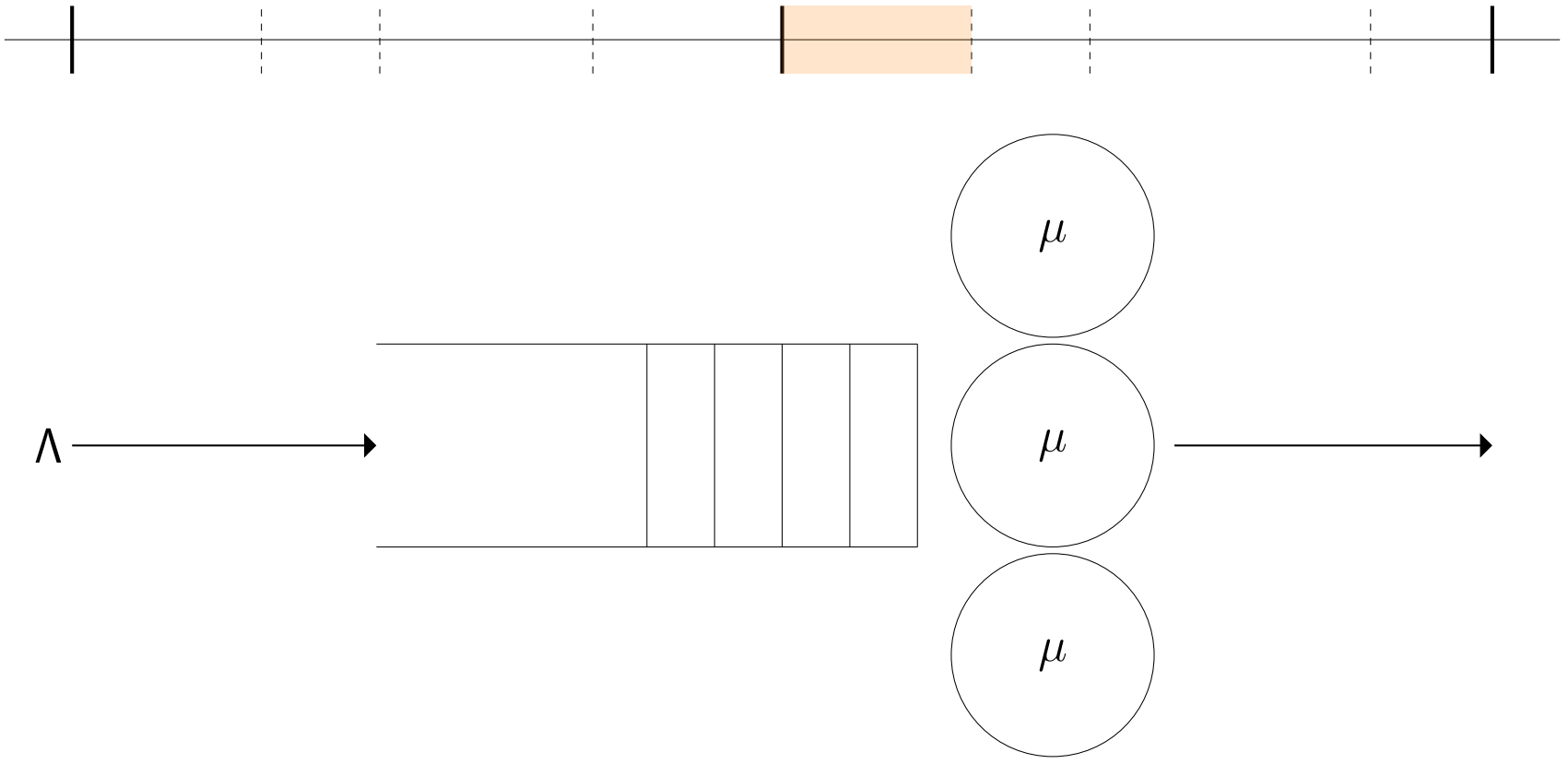




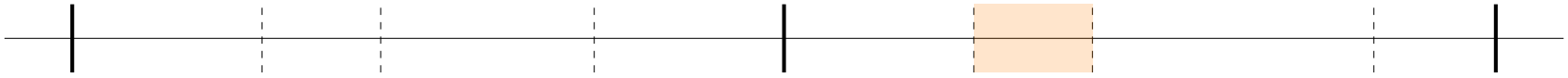
Server Schedules

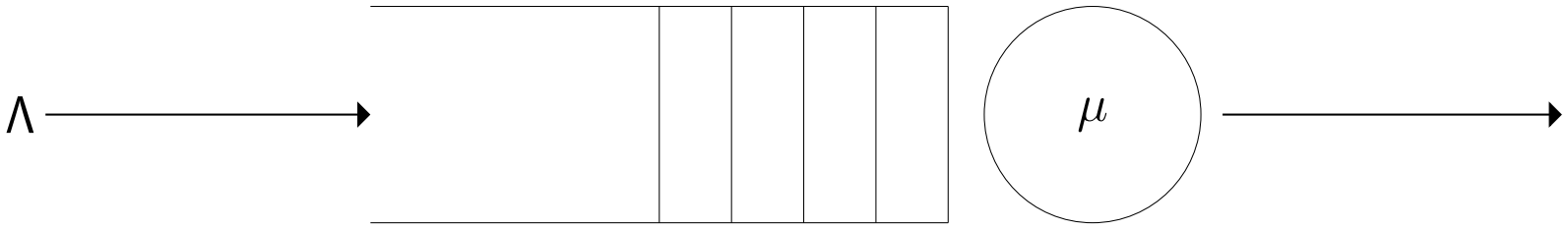


Server Schedules

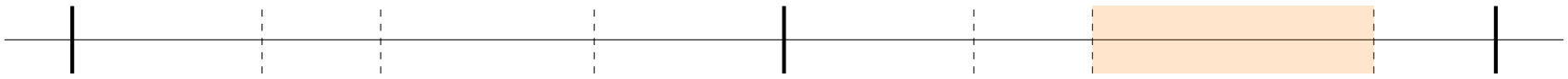


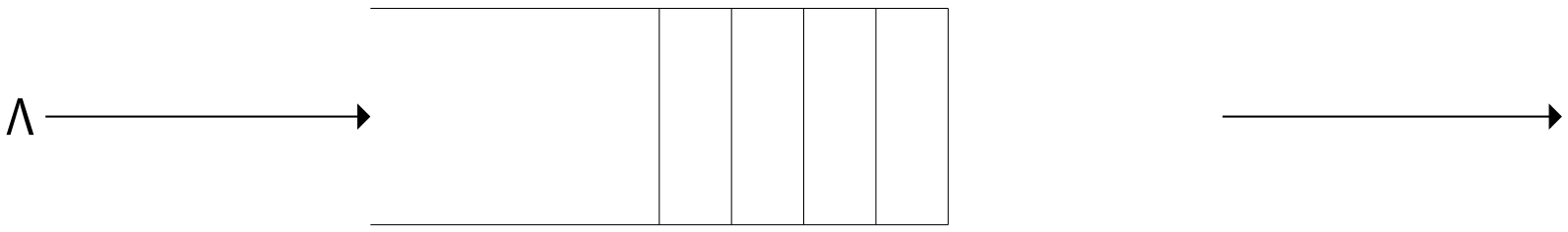
Server Schedules



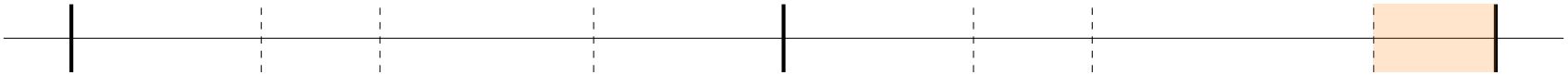


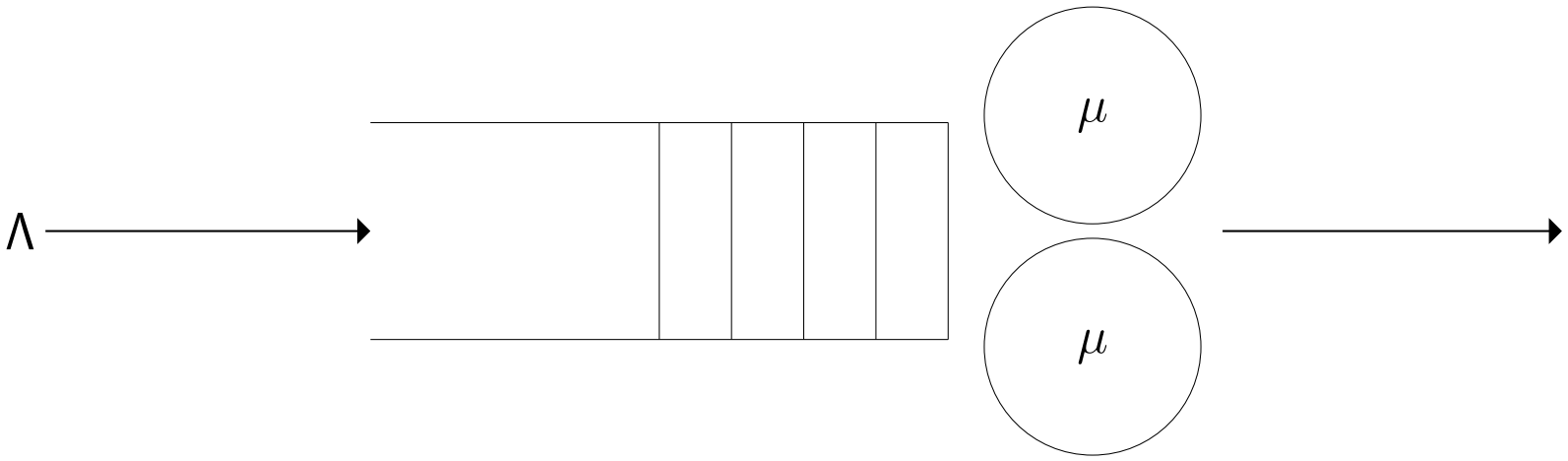
Server Schedules

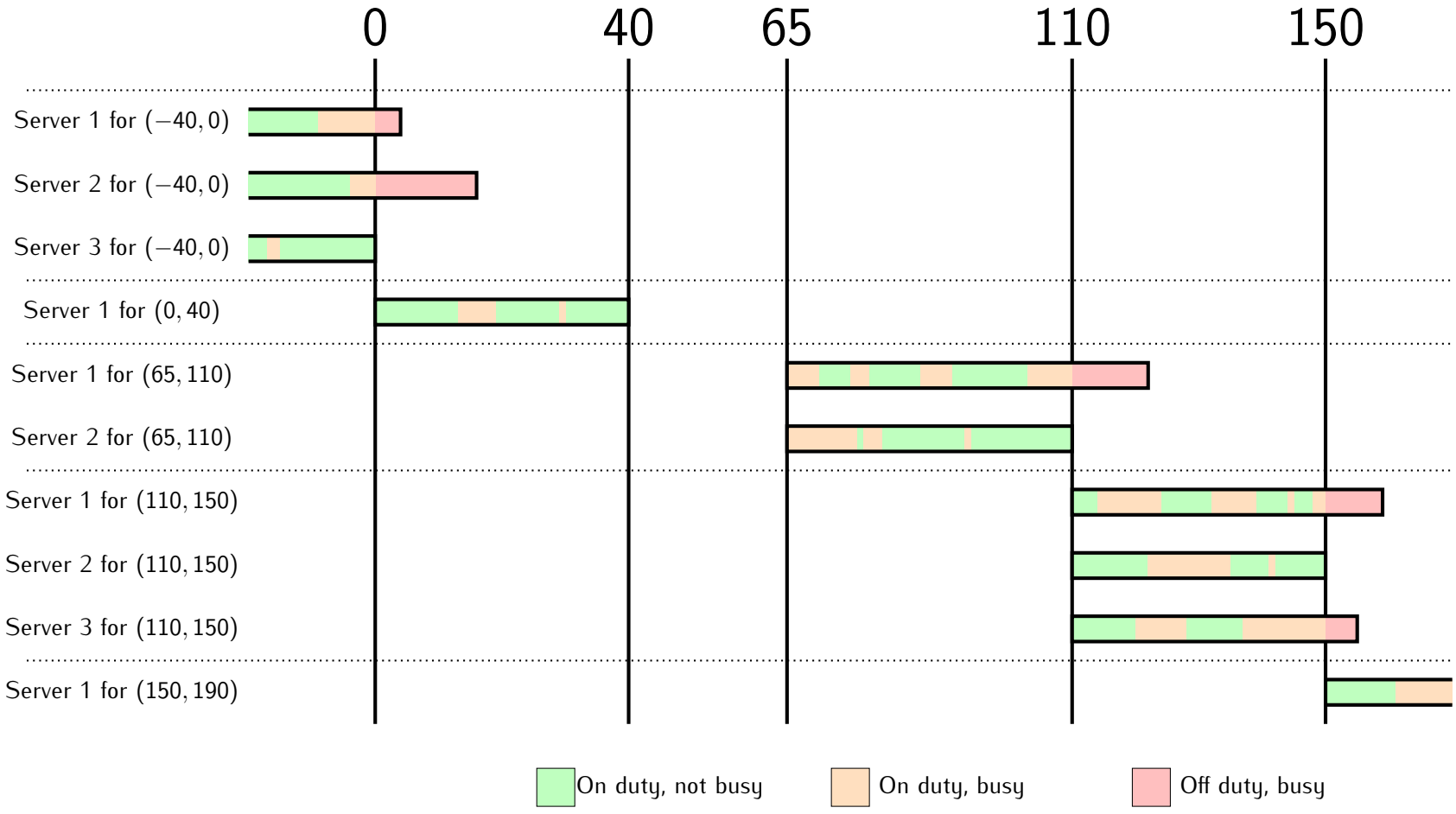




Server Schedules






0
40
65
110
150
Server 1 for $(-40, 0)$
Server 2 for $(-40, 0)$
Server 3 for $(-40, 0)$
Server 1 for $(0, 40)$
Server 1 for $(65, 110)$
Server 2 for $(65, 110)$
Server 1 for $(110, 150)$
Server 2 for $(110, 150)$
Server 3 for $(110, 150)$
Server 1 for $(150, 190)$
On duty, not busy
On duty, busy
Off duty, busy

CiwVis

https://ciwpython.github.io/CiwVis/

Academic Uses

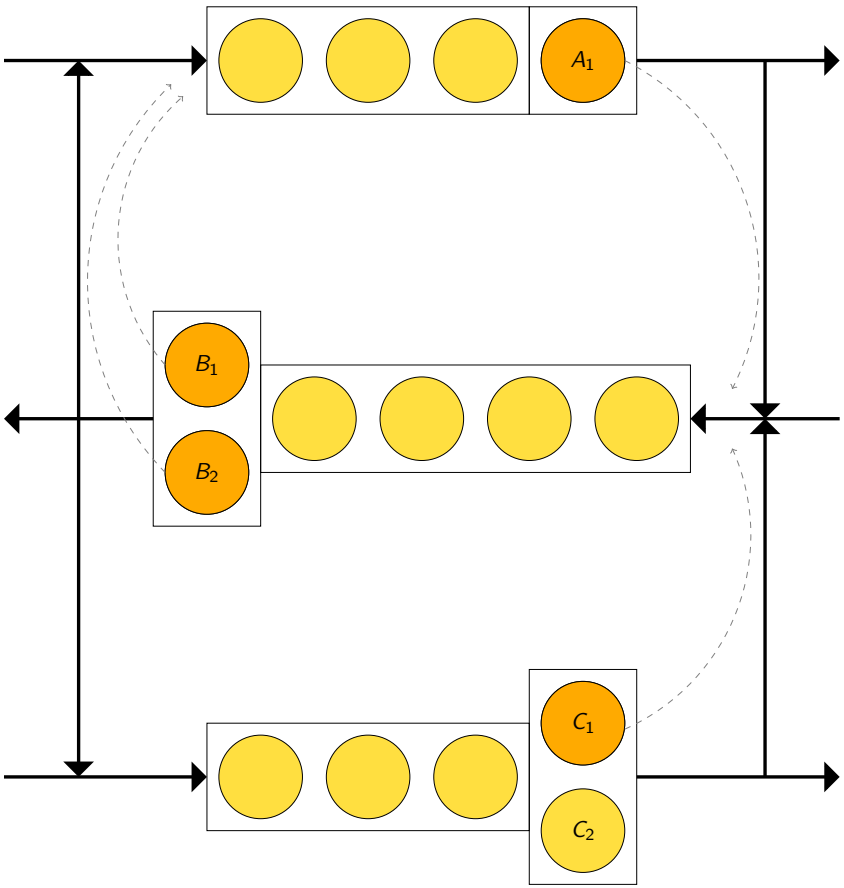
Theoretical Work

Investigating deadlock in queueing networks.
(Geraint Palmer, Prof. Paul Harper, Dr. Vincent Knight)

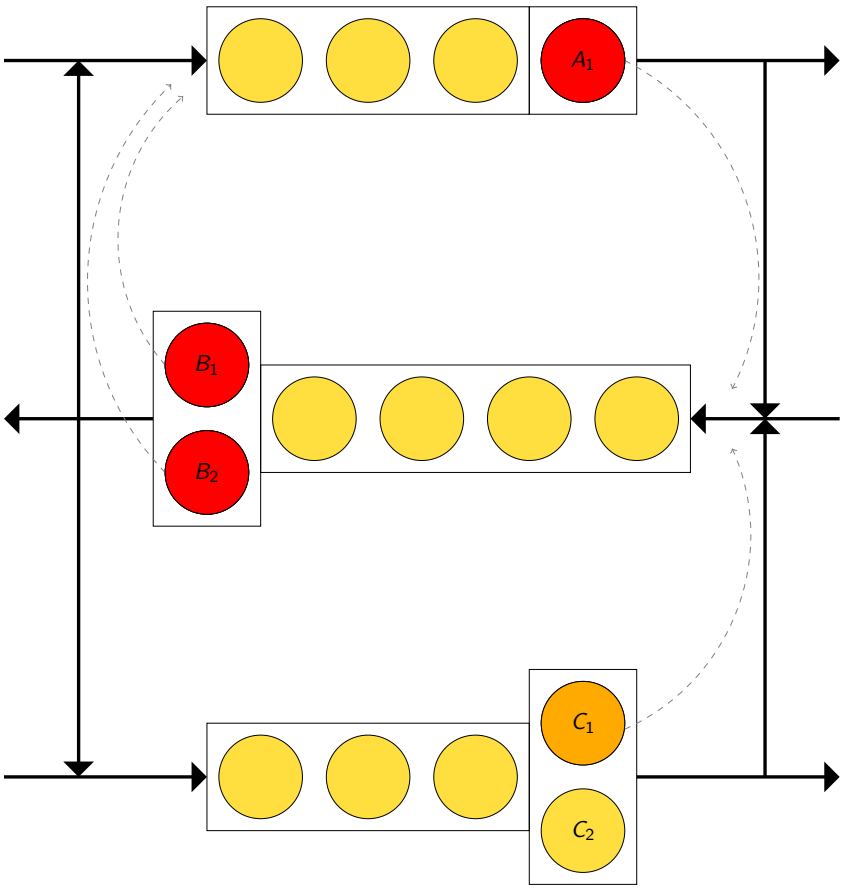
Practical Work

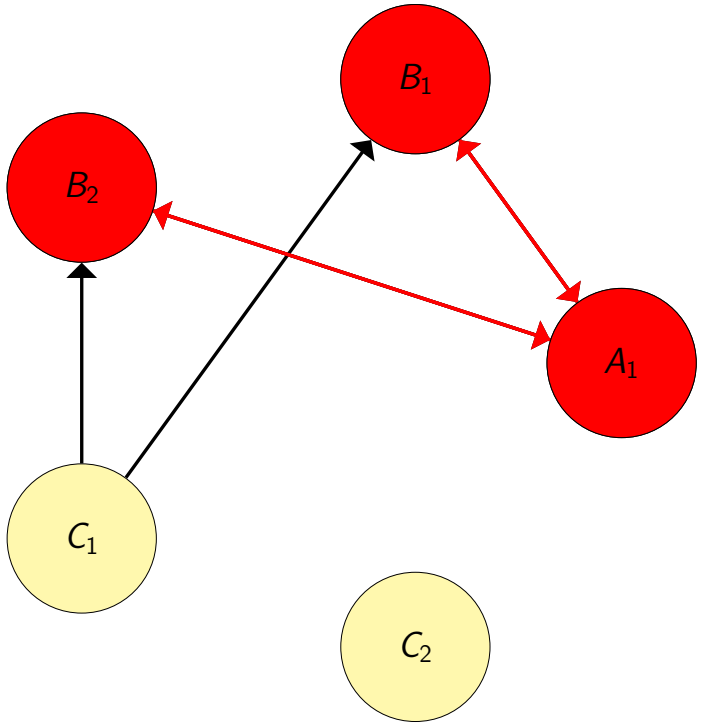
Modelling an ophthalmology clinic to strategise scheduling.
(Lieke Hölscher, Dr. Jennifer Morgan)

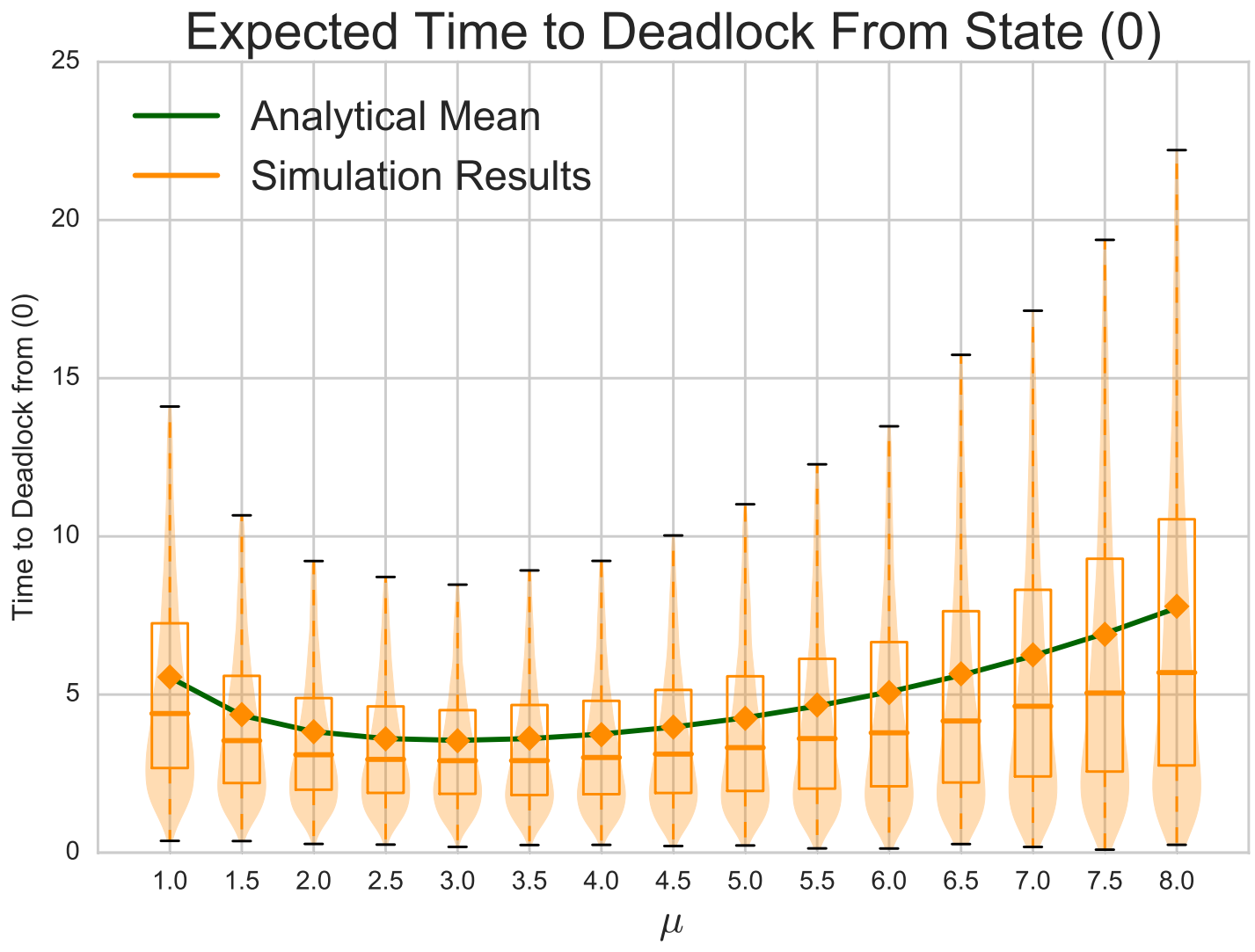
Investigating Deadlock



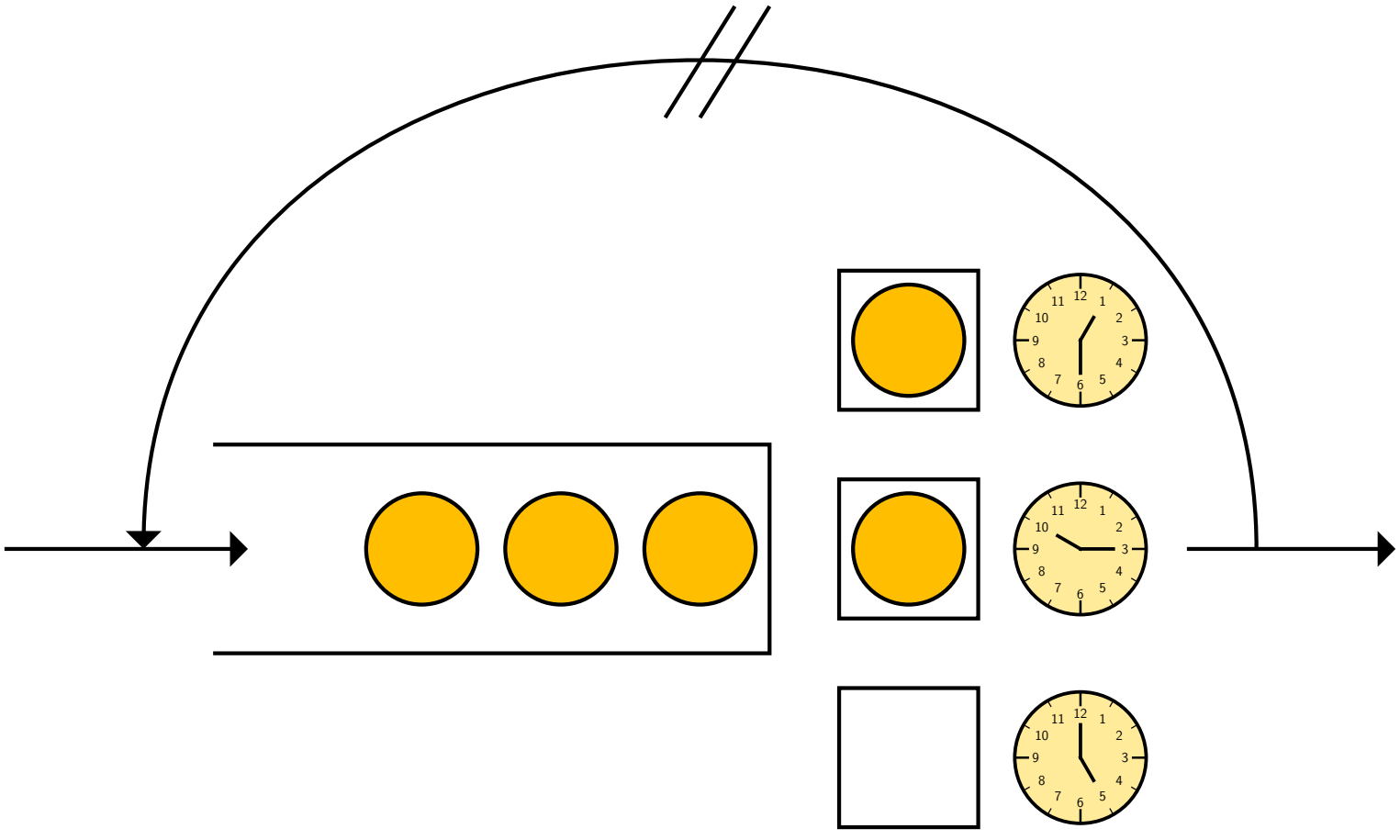
Investigating Deadlock






Expected Time to Deadlock From State (0)
Analytical Mean
Simulation Results
Time to Deadlock from (0)
0
5
10
15
20
25
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
μ

Modelling Ophthalmology Clinic




python
jupyter
GIG CYMRU NHS WALES
Bwrdd Iechyd Prifysgol
Aneurin Bevan
University Health Board
CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD
Hypothesis
Test faster, fix more
PyYAML
NATCOR
A National Taught Course Centre in Operational Research
Coverage.py
jQuery
write less, do more.
Coleg Cymraeg Cenedlaethol
matplotlib
NumPy
NetworkX
THE OR SOCIETY
PyDiff
Read the Docs
SPHINX
Python Documentation Generator
Software Sustainability Institute
jStat
Bootstrap

Thank you!

@GeraintPalmer

@CiwPython

http://ciw.readthedocs.io

https://github.com/geraintpalmer/Ciw

https://ciwpython.github.io/CiwVis/