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# JSIM

## the Queueing Petri Nets simulator of JMT

Java Modelling Tools  
<http://jmt.sourceforge.net>

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## outline

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- JMT supported models
- Support for PN elements
- Case study: YARN capacity scheduler
- Case study: Rock falling monitoring system

# the JMT home screen

JMT - Java Modelling Tools v.1.0.4-BETA4

**JMT - Java Modelling Tools v.1.0.4-BETA4**  
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Introduction to JMT

Online Documentation

Credits

Models

Workload Analysis

Methods

Simulation

Analytical

Model Definition

Textual

Graphical

MVA exact approximate

Markov Chain

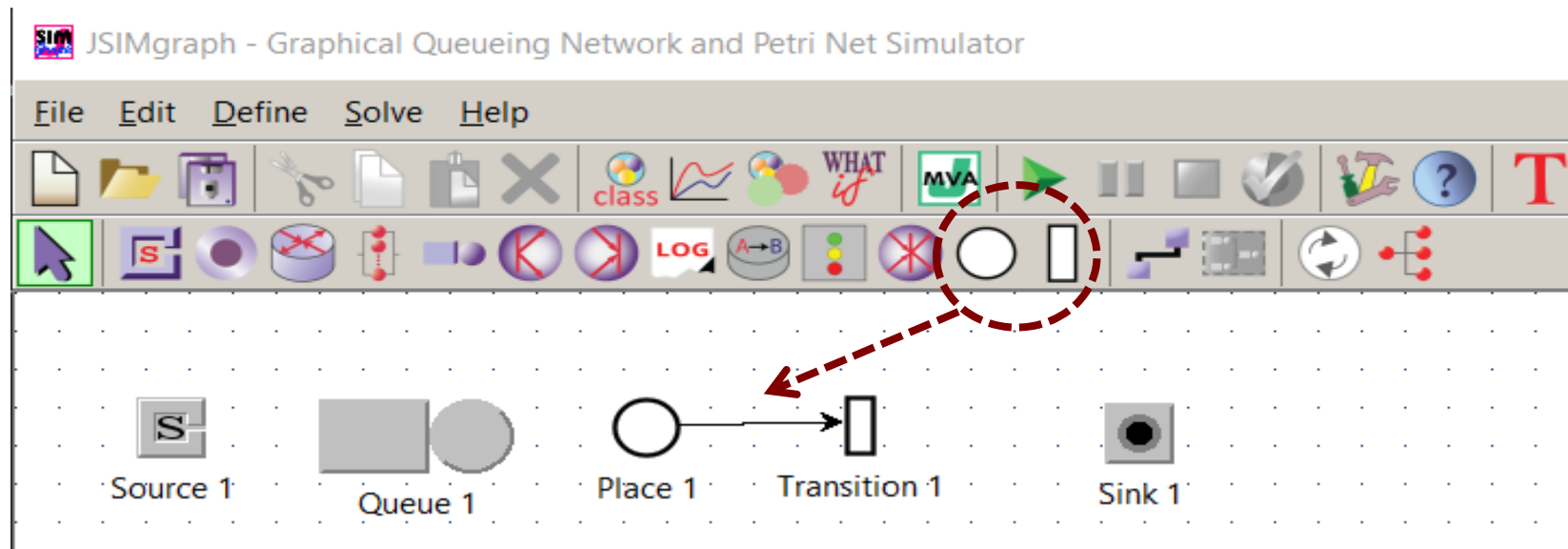
Asymptotic bounds

WAT

QPN

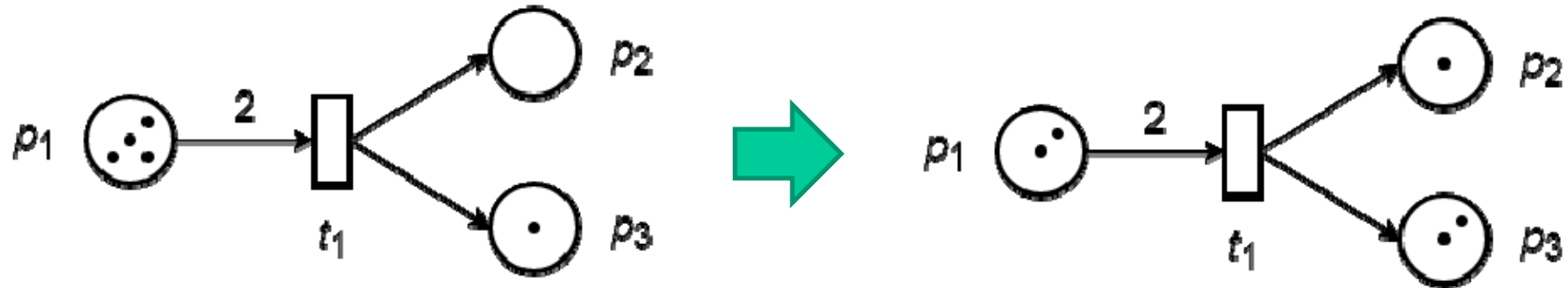
# Supported models

- Queueing Networks (QN)
  - Product-form
  - Extended (fork/join, blocking, priorities, ...)
- Petri Nets (PN)
  - Stochastic Petri Nets (SPN)
  - Generalized Stochastic Petri Nets (GSPN)
  - Coloured Petri Nets (CPN)
- Queueing Petri Nets (QPNs)

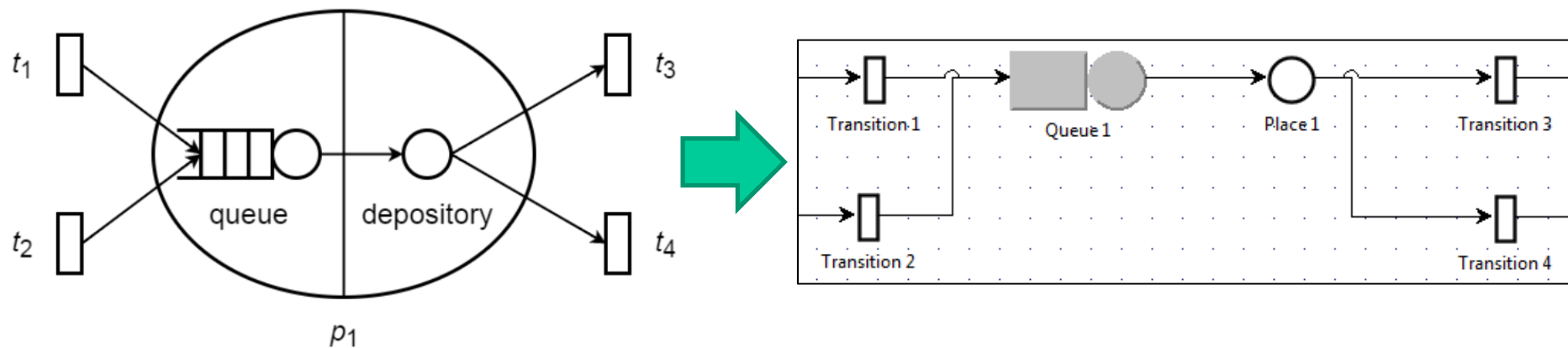


# PN elements

- Places and transitions



- Queueing Petri nets



# PN sections & modes

- JMT design paradigm extends to PN elements
- **Mode**: a rule to activate and fire a transition



Place Station



Store Section

Tunnel Section

Link Section

Transition Station



Enabling Section

Timing Section

Firing Section

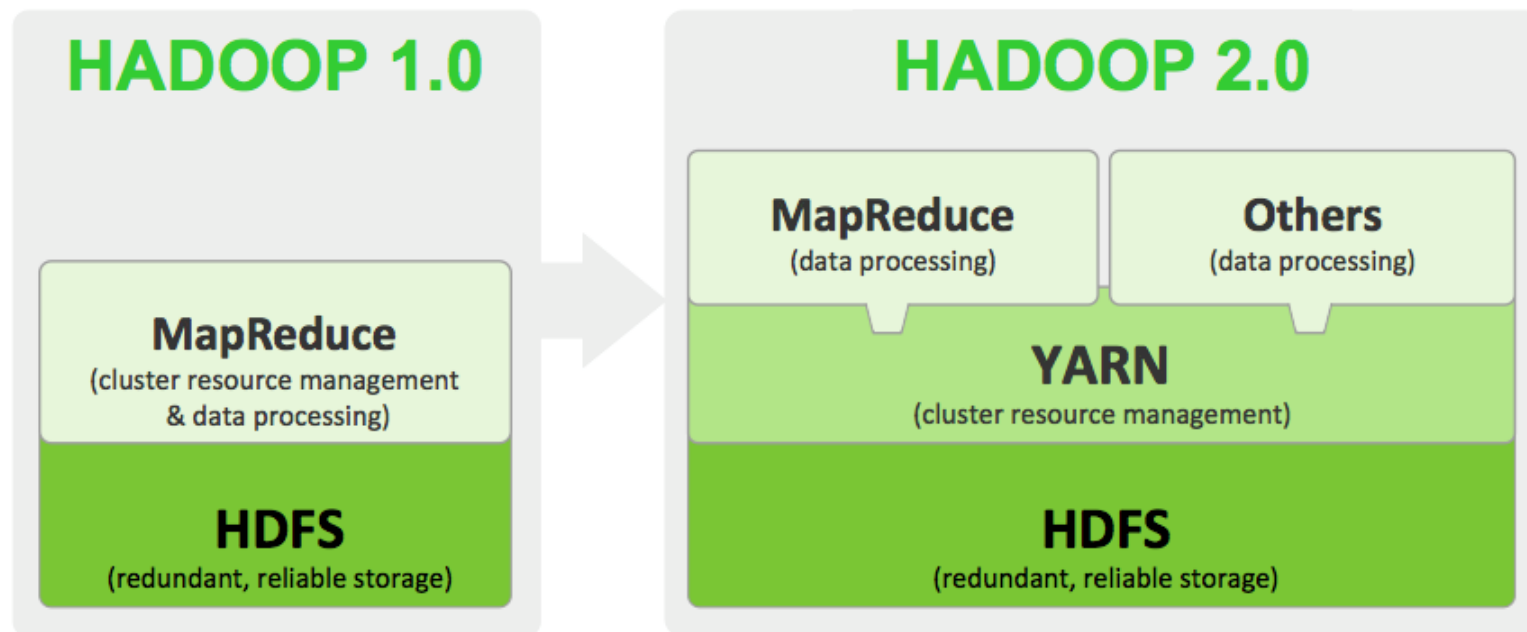
A screenshot of a software dialog box titled 'Editing Transition 1 Properties...'. The dialog has a 'Station Name' field with the value 'Transition 1'. Below this is a section titled 'Transition 1 Parameters Definition' with three tabs: 'Enabling Section', 'Timing Section', and 'Firing Section'. The 'Enabling Section' tab is active, showing an 'Enabling Condition for Mode1' table.

	Class1	Class2
Place 1	5	0

# Case Study: YARN Capacity Scheduler

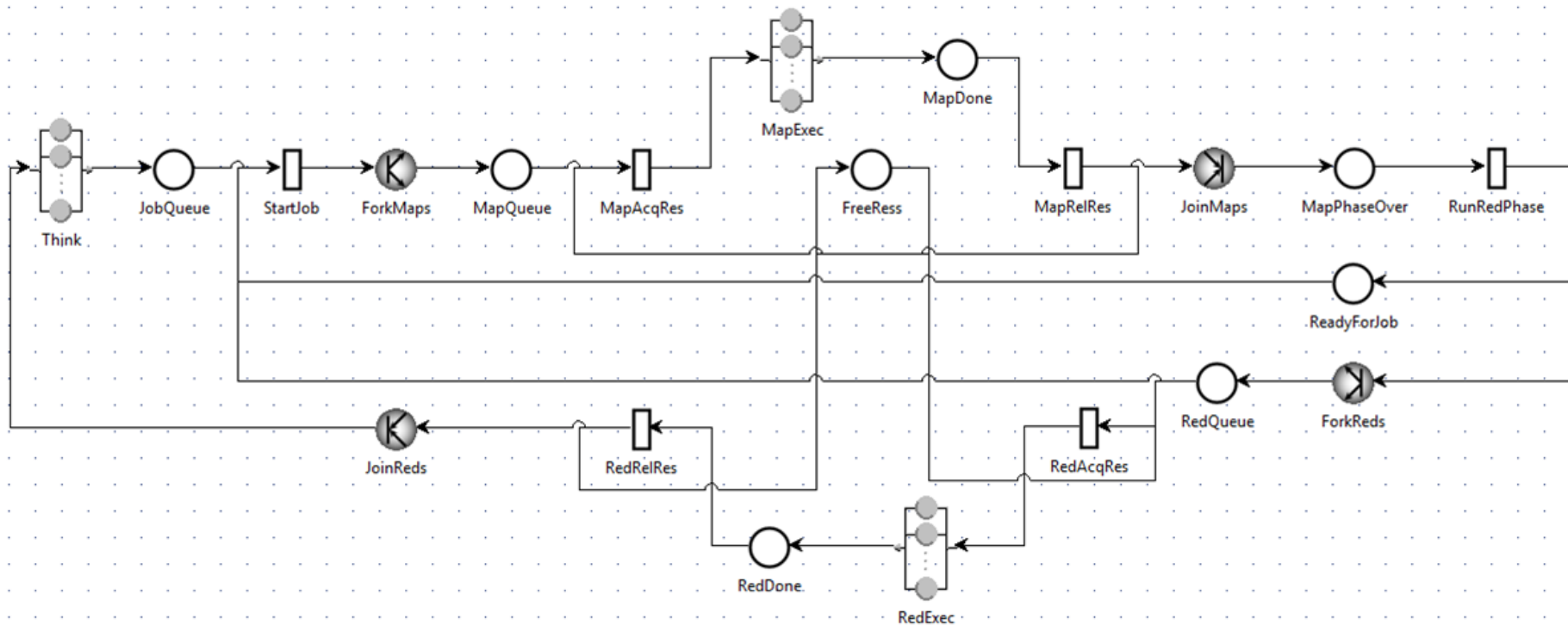
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- YARN — Yet Another Resource Negotiator



# Case Study: YARN Capacity Scheduler

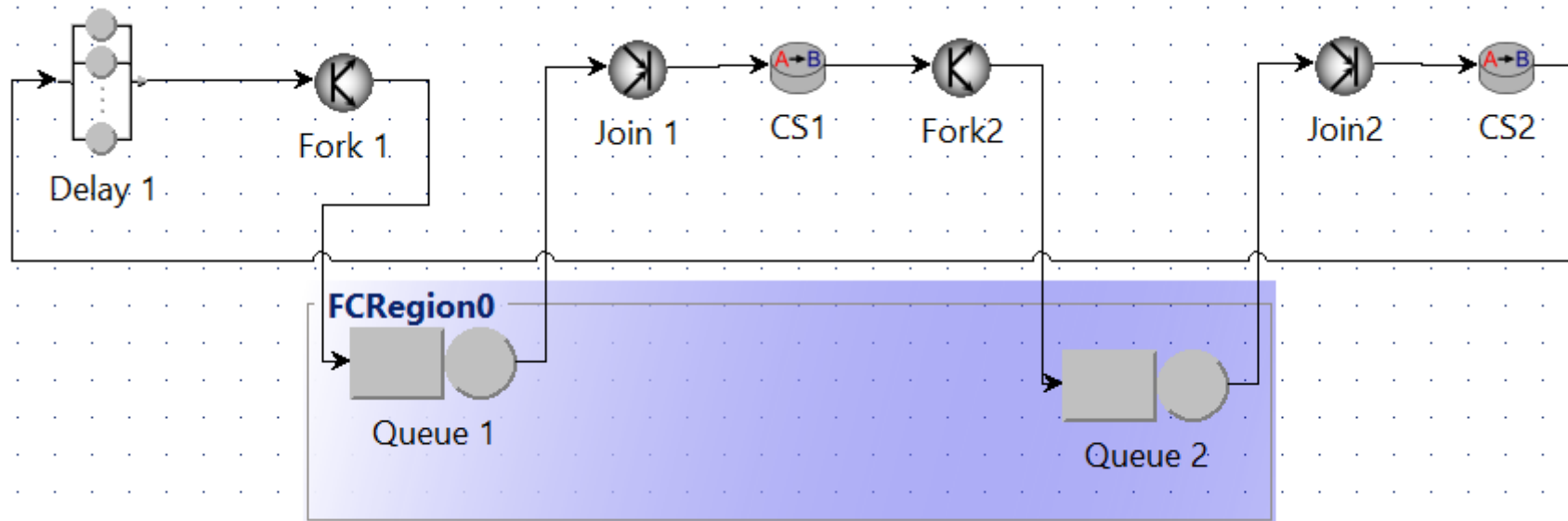
- Detailed model using QPN
  - Nested FCRs (JobQueue, MapQueue, RedQueue)
  - Single class of MapReduce jobs



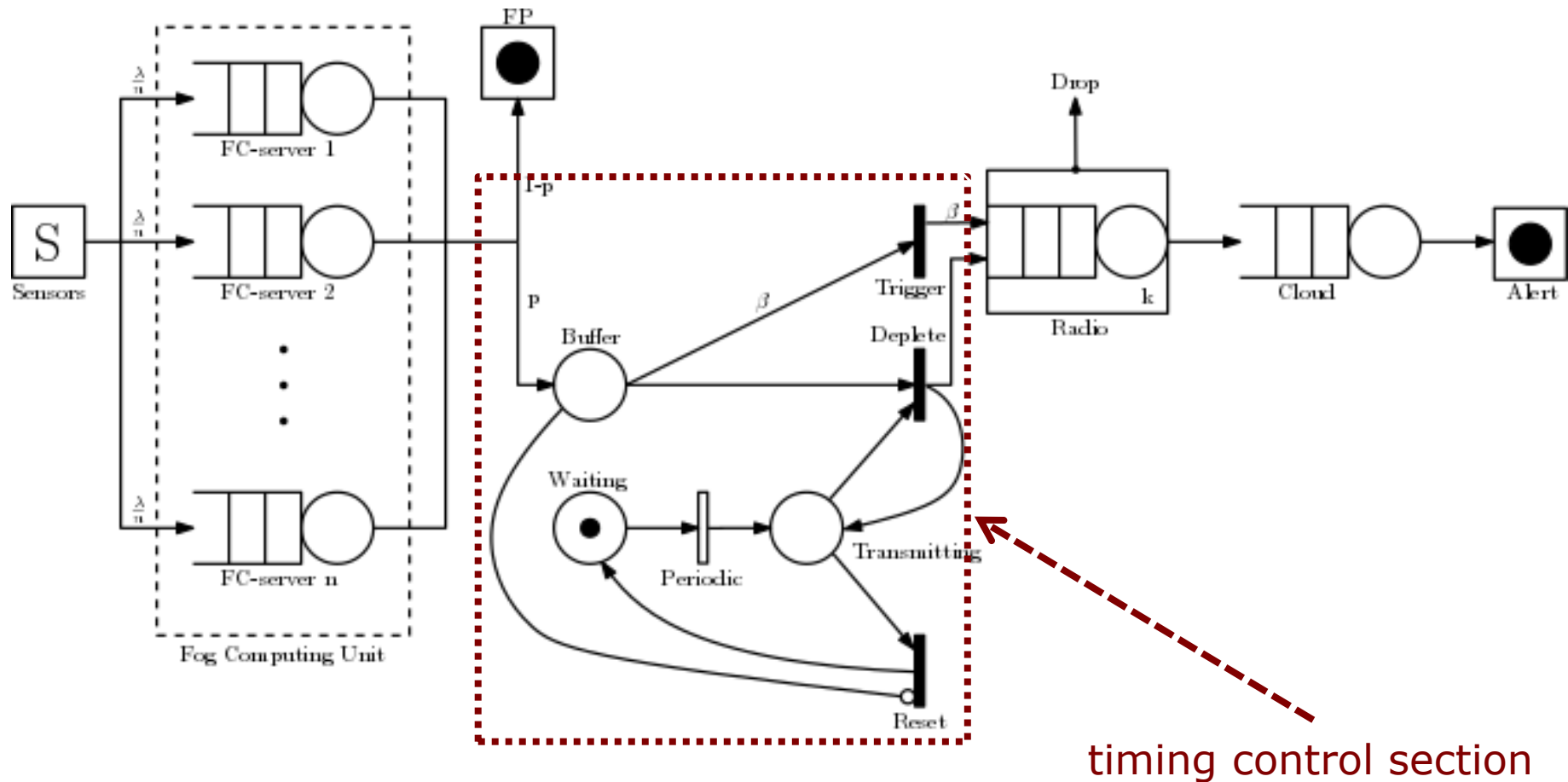


# Case Study: YARN Capacity Scheduler

- Simplified model using QN
  - Class switching between Map tasks and Reduce tasks



# Case study: Rock falling monitoring system



R. Pincioli, M. Gribaudo, M. Roveri, G. Serazzi, "Capacity Planning of Fog Computing Infrastructures for Smart Monitoring", New Frontiers in Quantitative Methods in Informatics - 7th Workshop, InfQ 2017, Venice, Italy, pp.72--81, 2017.