

Recommendation Strategy for Cloud Computing Environments

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Agenda

- Introduction
- Main Aims
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- Conclusions

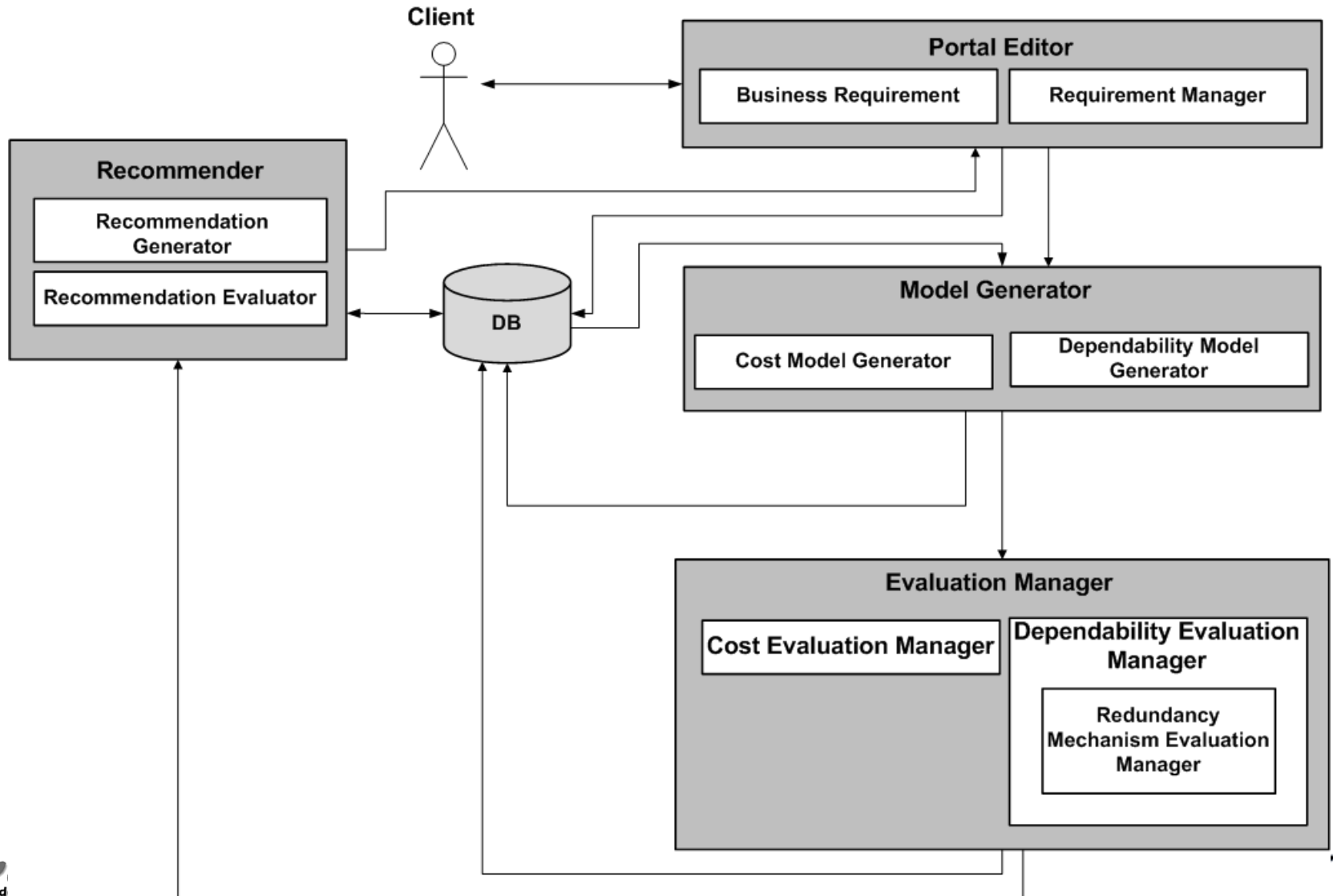
Introduction

- The dependability of the cloud computing is **very critical** but **hard to analyze** due to its characteristics [3]:
 - massive-scale service sharing
 - wide-area network
 - heterogeneous software/hardware components.
- The threat to the dependability infrastructure **may seriously affect the QoS** for the business in Cloud computing [1].
- Achieving required level of dependability is one of the most **challenging issues** in implementing the cloud environments [1].

Main Aims

- This work proposes a recommendation strategy for cloud computing environments.
- Recommendation strategy adopts a hybrid recommendation technique for suggesting cloud infrastructures.
- Recommendation strategy adopts stochastic models, such as stochastic Petri nets (SPN) and Reliability Block Diagrams (RBD).

System Architecture



System Architecture - Portal Editor



My Architectures

My Account

Logoff

Hello, Steve!
Your last login was on October 17th, 2012.

My Architectures

New Architecture

Virtual Store



Business

Performance

Dependability

Cost

Recommendation

Business details

Modify

Business Type

E-commerce

Business Description

An online store that provides a list of merchandise and an order form.

Business Editor

System Architecture - Portal Editor



My Architectures

My Account

Logoff

Hello, Steve!
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My Architectures

New Architecture

Virtual Store



Business

Performance

Dependability

Cost

Recommendation

Dependability details

Modify

Availability - Downtime

99.99% - 52 minutes/year

Reliability

99%

Dependability Editor











System Architecture - Portal Editor

Business Performance Dependability Cost Recommendation

Recommendation New Recommendation

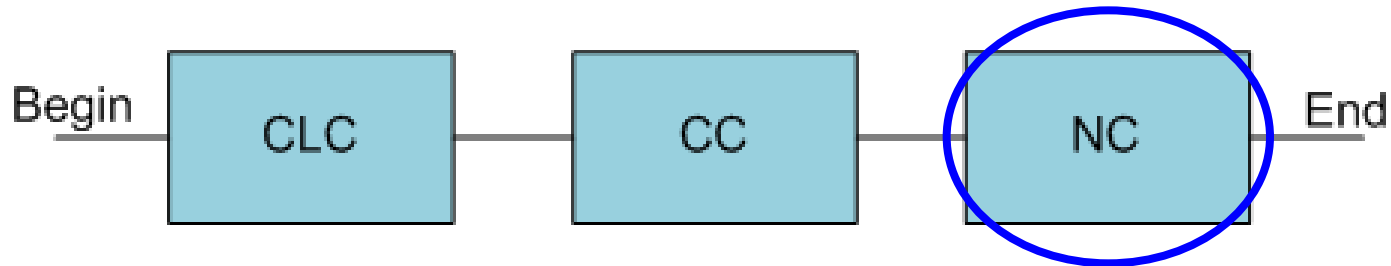
Degree of Similarity: **Order by:**

Unlikely Similar Little Similar Similar Very Similar Extremely Similar Availability

 Solution 1 Availability: 0,999528% More informations...	Cost/month US\$ 94,654.57	Evaluation 
 Solution 2 Availability: 0,999477% More informations...	Cost/month US\$ 91,822.88	Evaluation 
 Solution 3 Availability: 0,999435% More informations...	Cost/month US\$ 94,034.21	Evaluation 
 Solution 4 Availability: 0,999075% More informations...	Cost/month US\$ 92,410.82	Evaluation 
 Solution 5 Availability: 0,999017% More informations...	Cost/month US\$ 91,496.45	Evaluation 

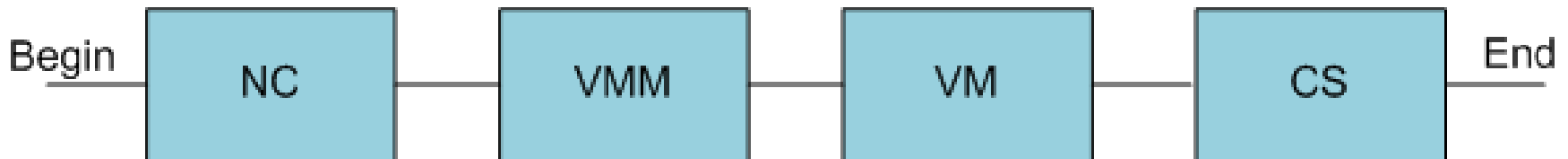
System Architecture - Model Generator

- Dependability Model



Eucalyptus model

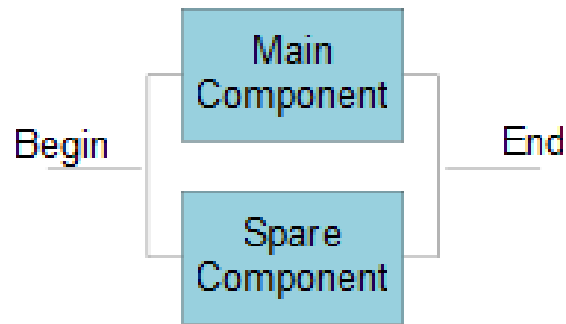
High-Level Model



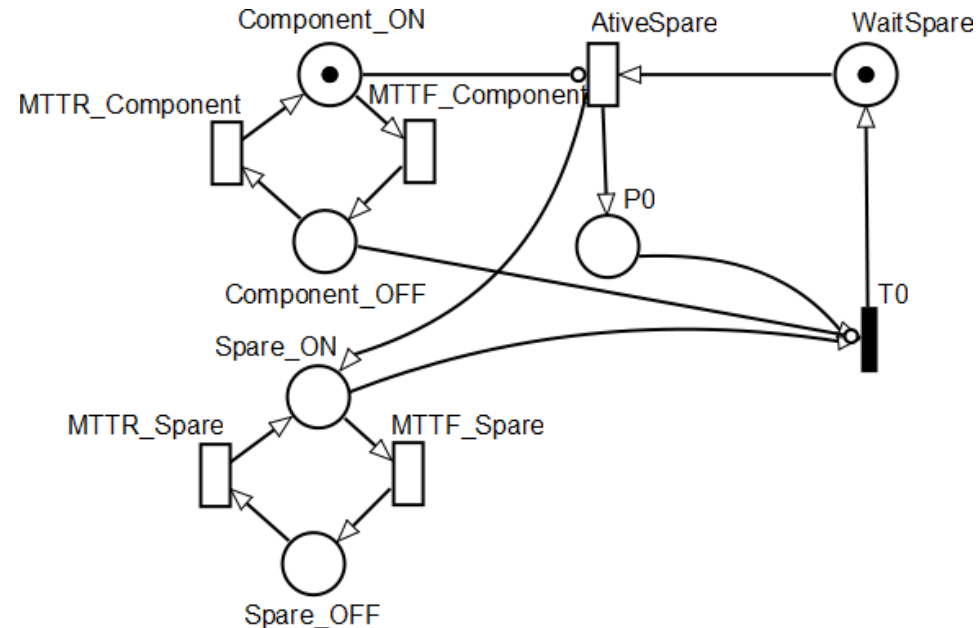
Low-Level Model

System Architecture - Model Generator

- Dependability Model



Hot Standby Model



Cold Standby Model

System Architecture - Model Generator

- Redundant Cost Model

$$\sum_{i=1}^{RCN} RCN_i \times RC_i$$

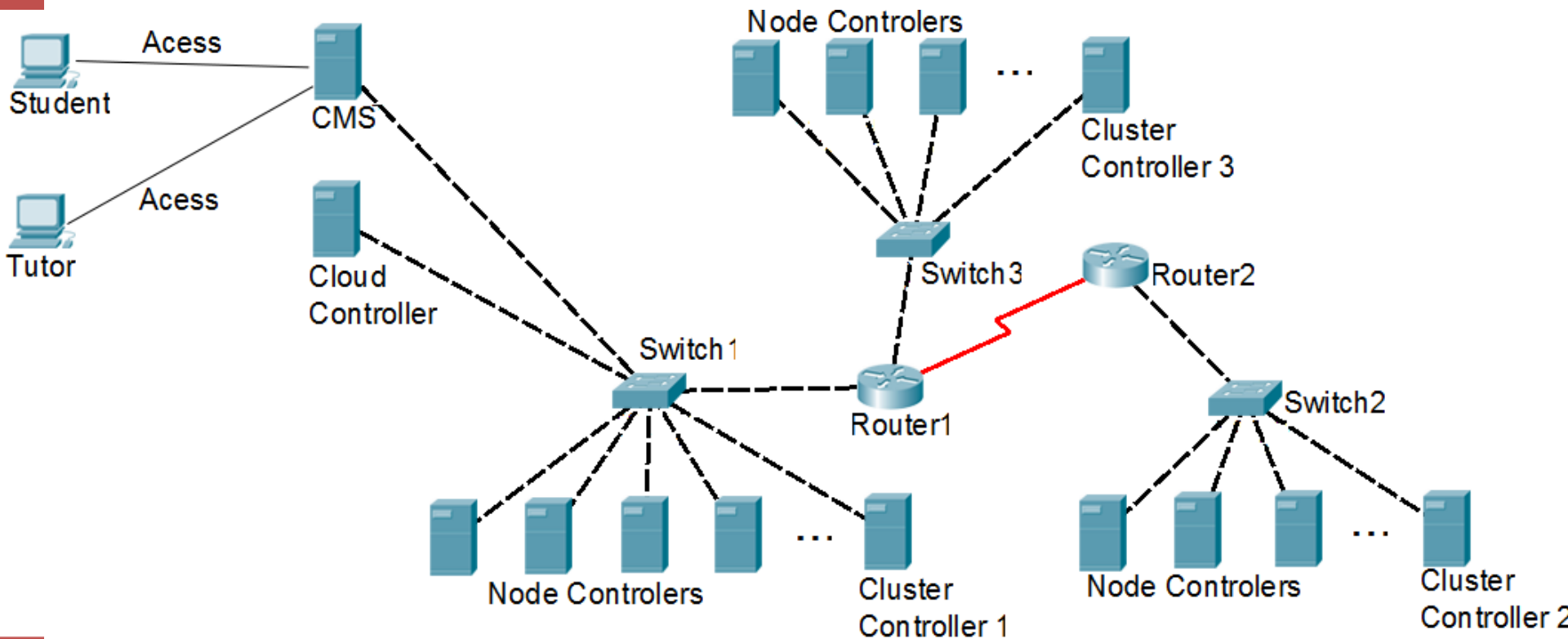
- RCN: number of distinct component types
- RCN_i : amount of a specific item (e.g.: hot and cold standby module)
- RC_i : unit cost.

Scenario

- Private cloud for e-Learning services [2]
 - This private cloud consists of **three computer pools**, that are located at different locations.
 - The pools are used by **students and staff** for **teaching, research and development** purposes during the day.
 - The pools are managed by a **Cloud Management System (CMS)**.
 - The pools have 30 computers with Ubuntu OS and KVM, Debian OS and Xen.
 - A web front-end was developed, where students can login and **create, suspend, or delete VMs** using a wizard, according to their project demands.

Scenario

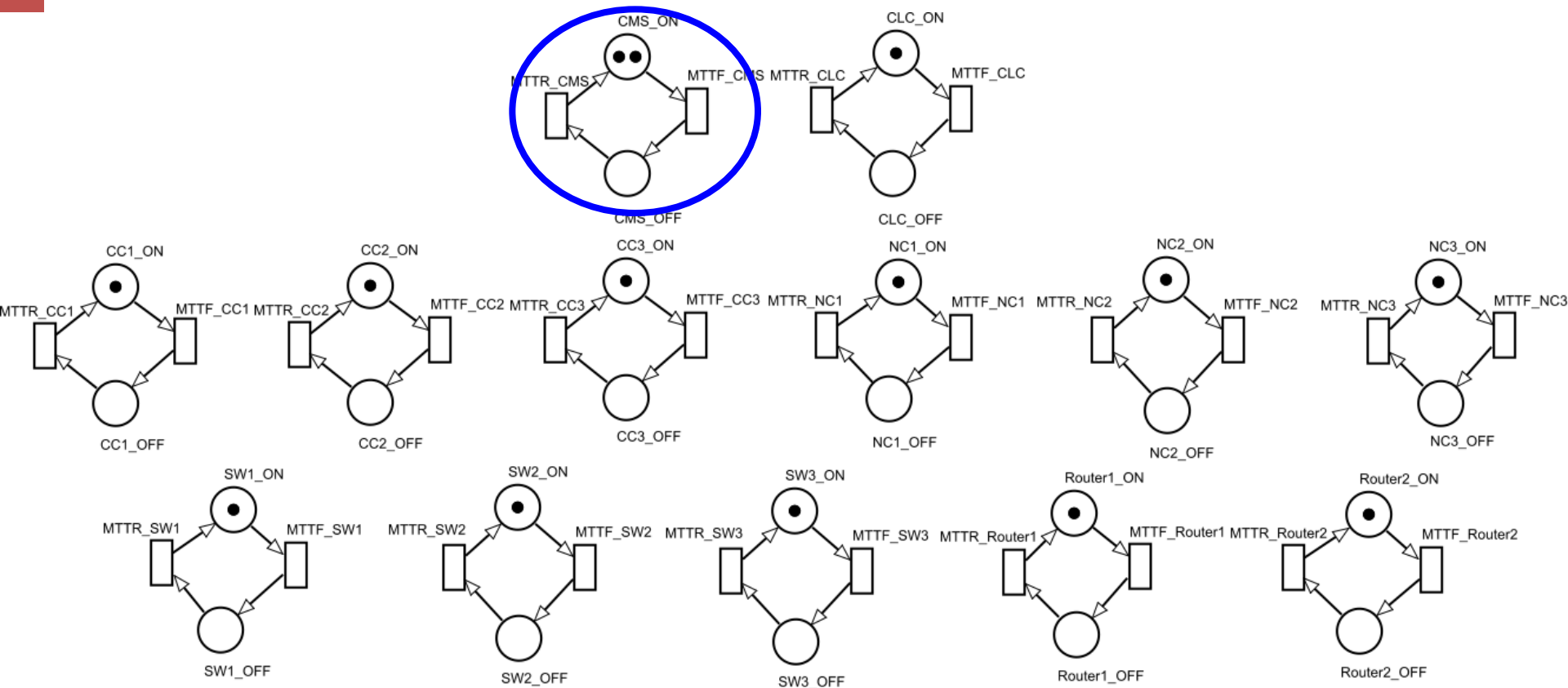
- Private cloud for e-Learning services



Private Cloud Architecture (inspired on [2])

Scenario

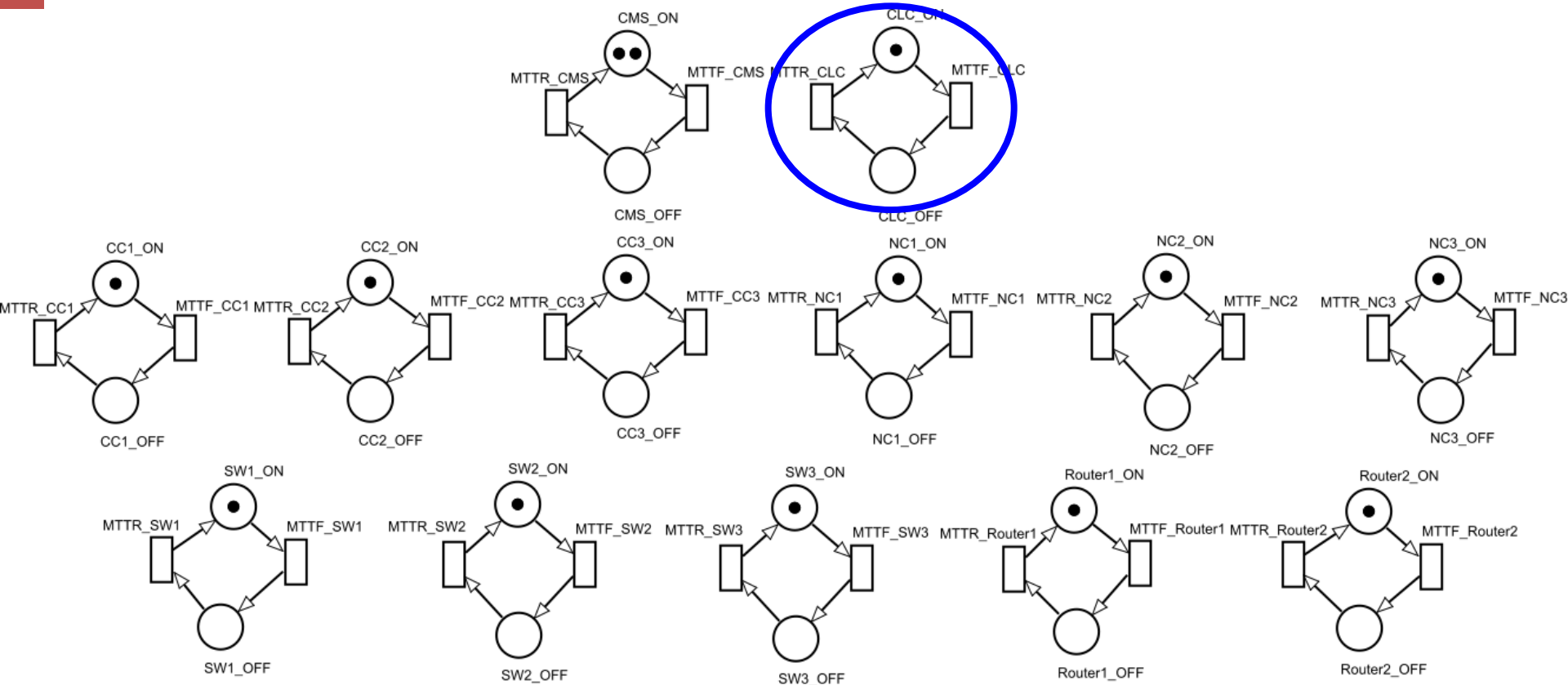
CMS



Eucalyptus Model

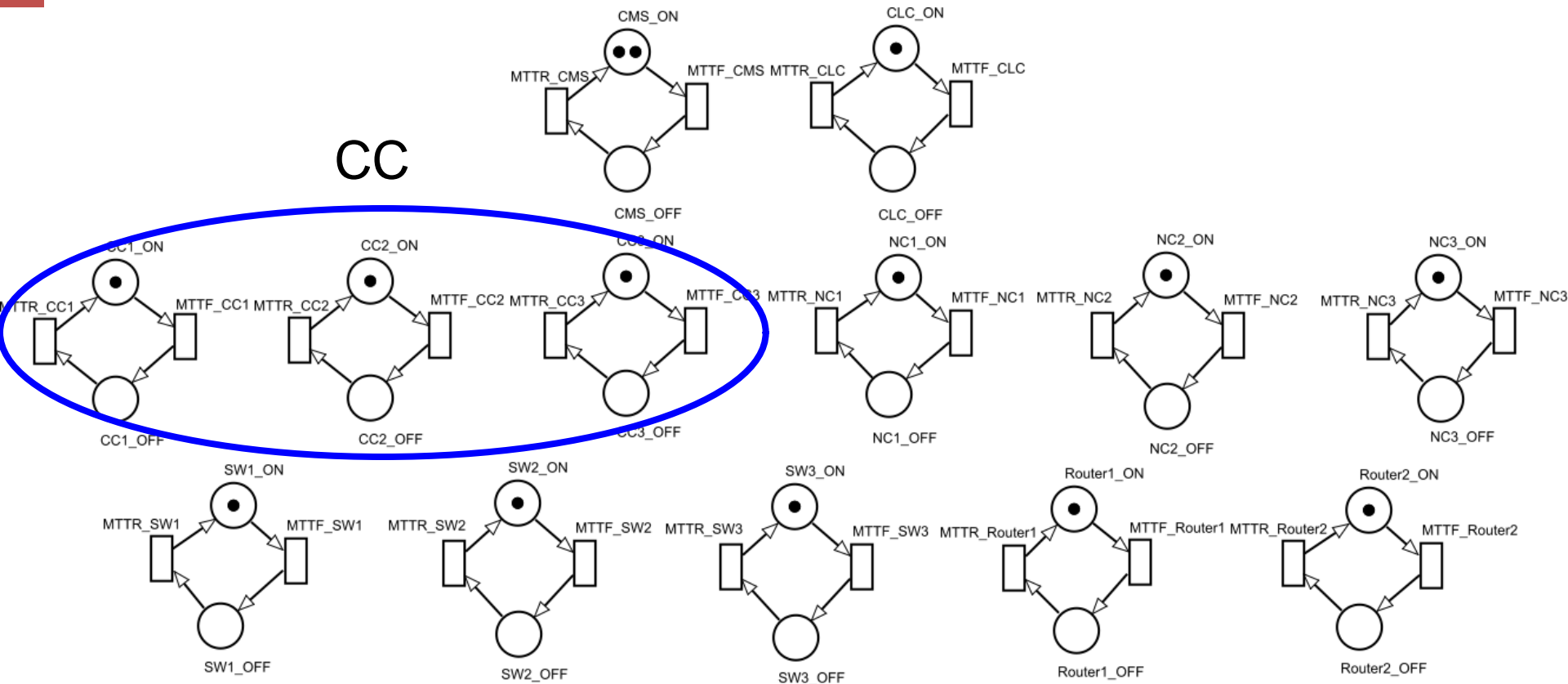
Scenario

CLC



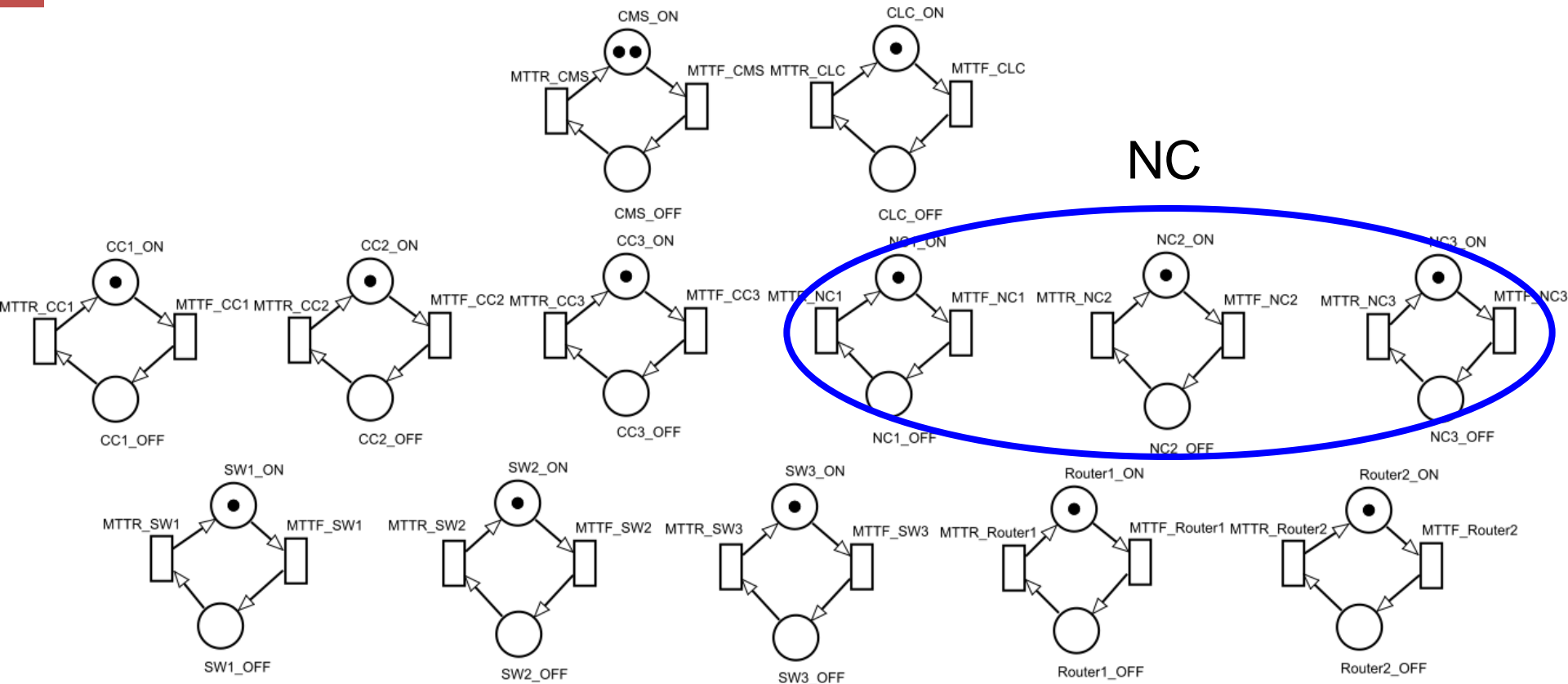
Eucalyptus Model

Scenario



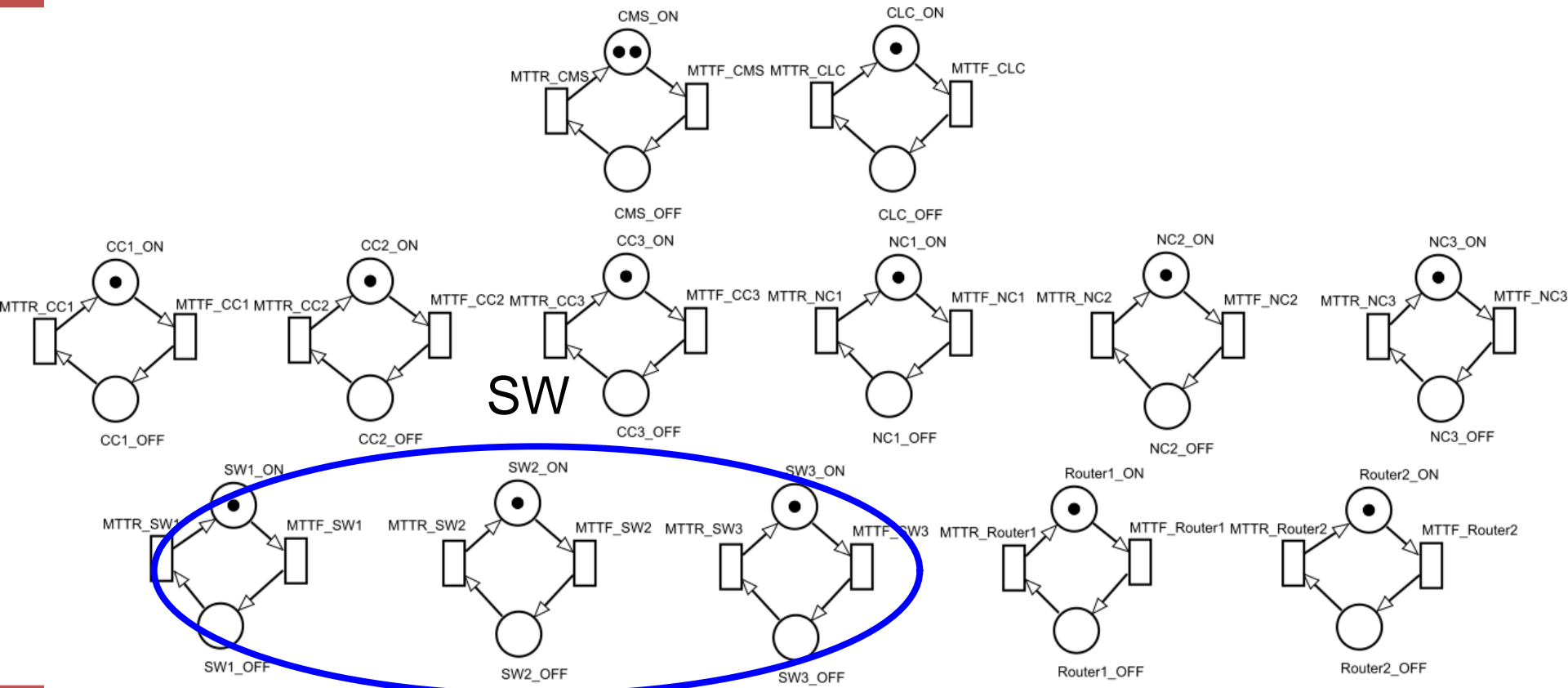
Eucalyptus Model

Scenario



Eucalyptus Model

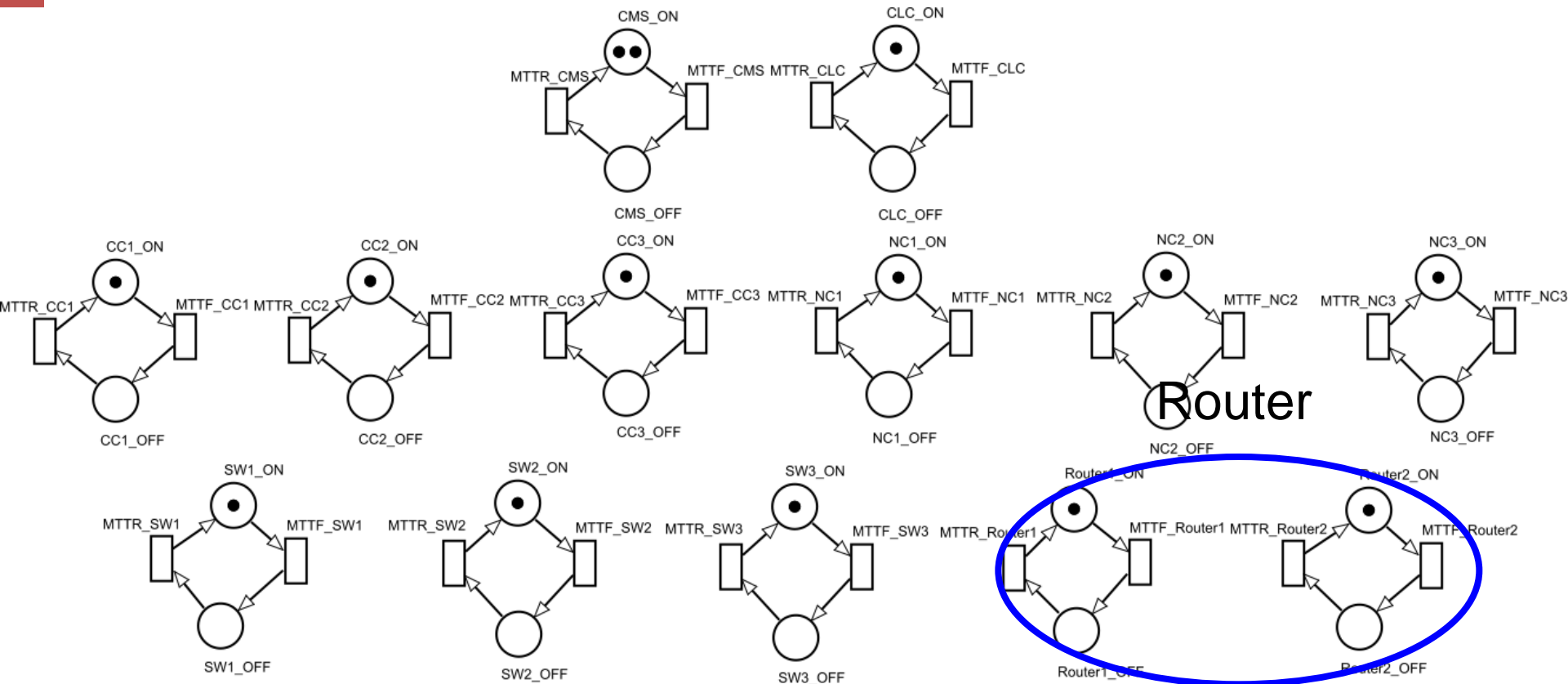
Scenario



SW

Eucalyptus Model

Scenario



Eucalyptus Model

Scenario

- Parameters

Component	MTTF (hour)	MTTR (hour)
CC	17,520.00	8
CLC	17,520.00	8
CMS	17,520.00	8
CS	26,280.00	8
NC	4,320.00	8
VM	2,880.00	8
VMM	2,880.00	8
Switch	30,660.00	8
Router	26,280.00	8

(inspired on [1])

Scenario

- Private cloud for e-Learning services [2]
 - E-learning system must be robust enough to serve the diverse needs of thousands of learners, administrators, content builders and instructors simultaneously.
 - One of major concerns in e-learning is to have the working system, and prevent outages or slowdowns since it has a great impact on learners.

Scenario

- Results

Scenario	Component Redundant	Redundancy Mechanism	Availability	Cost (U\$)
1	-	-	0.9063	0.00
2	CC1,CC2,CC3	Cold Standby	0.9970	3,200.00
3	CLC	Cold Standby	0.9960	3,200.00
4	CMS	Cold Standby	0.9960	9,600.00
5	CC1,CC2,CC3	Hot Standby	0.9987	12,000.00
6	CLC	Hot Standby	0.9968	4,000.00
7	CMS	Hot Standby	0.9968	4,000.00

Conclusions

- This work presented recommendation strategy for cloud infrastructures, which provides higher availability and reliability at lower cost.
- This work focused on the presentation of a recommendation strategy architecture as well as the conceived models for estimating dependability and costs metrics.