



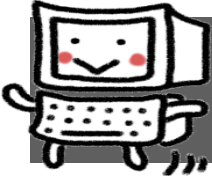
「維基夥伴獎學金」專題研究成果報告

Design and Implementation of Generic Northbound Interface and Topology Discovery for Ryu Controller

設計與實作Ryu控制器之北向通用介面與拓樸探知機制

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OpenADM

● OpenADM: 軟體定義網路的管理框架

■ 提供上層 App 一個統一的介面

- 兼容各種 Controller

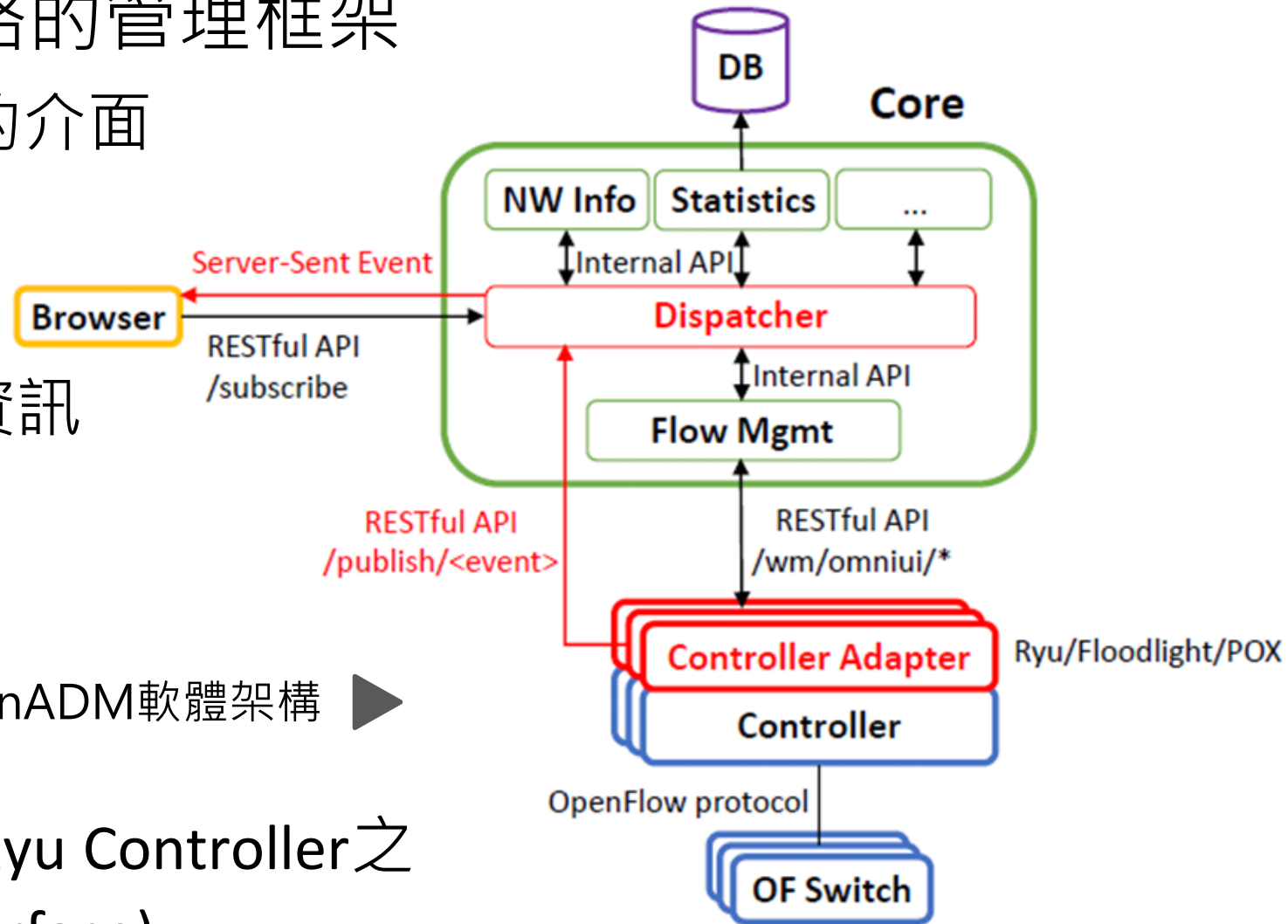
■ 提供圖形化使用者介面

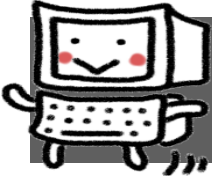
■ 動態且即時地呈現網路資訊

- Topology
- Flow Table
- Port Statistic

OpenADM軟體架構 ►

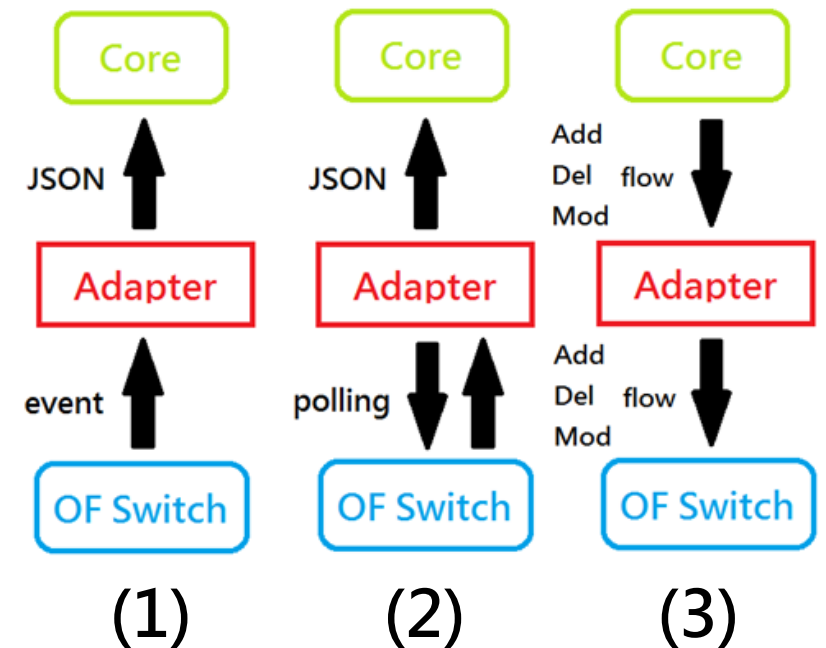
➤ 本專題實作OpenADM的Ryu Controller之Adapter (Northbound Interface)

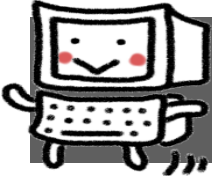




Ryu Controller Adapter

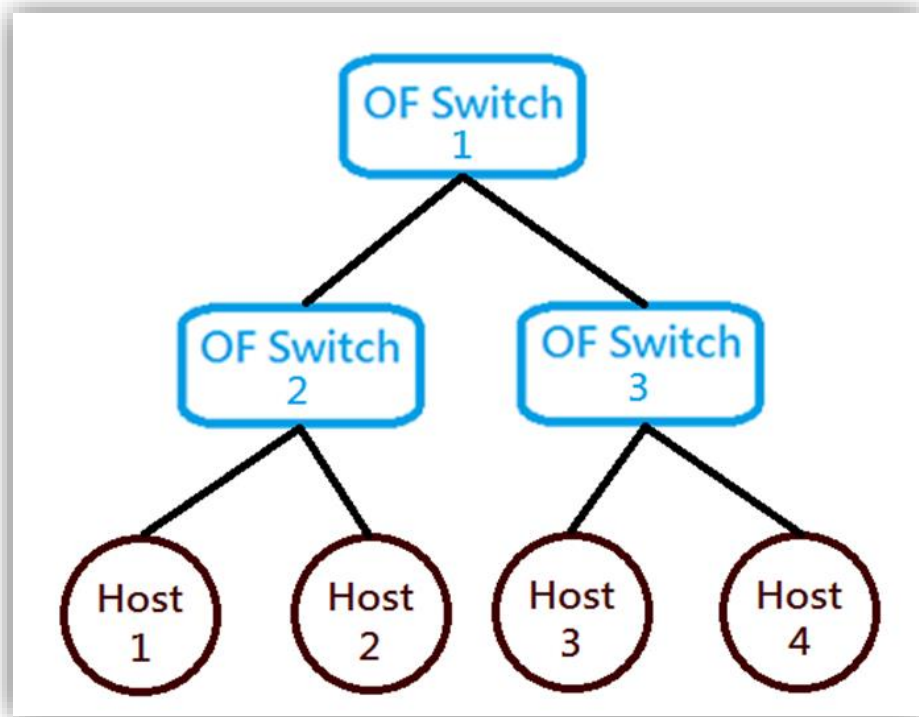
- 將收集的網路資料傳給 Core
 - 網路資料: 拓樸, Host, Link, Port
 - 利用 Controller 的 Event Handler 取得資訊 (1)
 - 如 Add_Switch, Del_Switch, Add_Link 和 Del_Link
 - 將無法用 Event Handler 取得的資訊 Poll 上來 (2)
 - 如 Flow Table 和流量統計資料
- 處理 Core 下的指令 (3)
 - 封包如何導向的 Routing 指令
 - 提供 RESTful API 讓 Core 使用
 - 處理 Flow Table 更動的要求



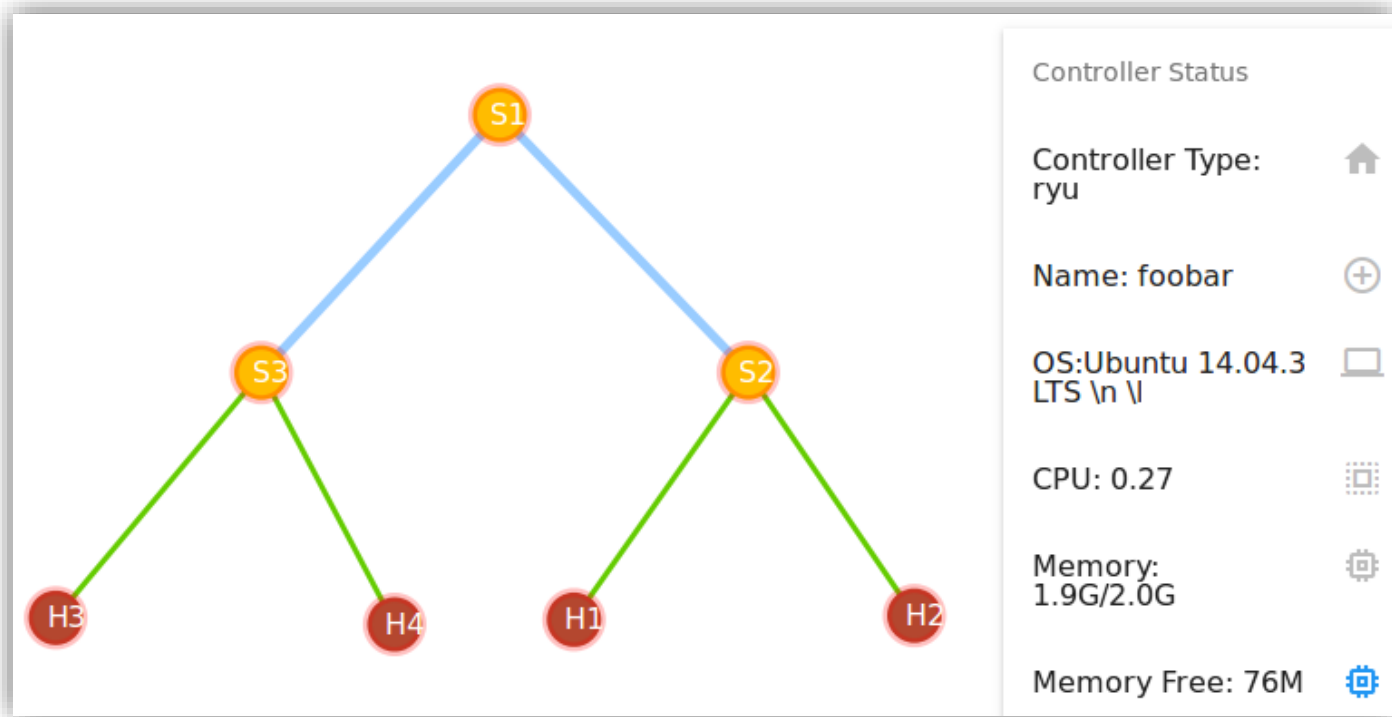


研究結果 (1/3)

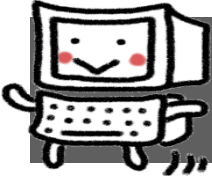
- 環境: 用 Mininet 模擬網路拓樸



▲ 示意圖



▲ UI拓樸呈現



研究結果 (2/3)

● Core 收集到的拓樸資訊

```
{"controller": "test1", "dpid": "00:00:00:00:00:00:00:01"}  
127.0.0.1 - - [2016-01-24 03:30:52] "POST /publish/adddevice HTTP/1.1" 200 117 0  
.004557
```

◀ Switch 的資訊

```
{"ip": "0.0.0.0", "vlan": "0", "mac": "00:00:00:00:00:02", "controller": "test1",  
"location": {"port": "2", "dpid": "00:00:00:00:00:00:00:02"}, "type": "wired"}  
127.0.0.1 - - [2016-01-24 03:30:52] "POST /publish/addhost HTTP/1.1" 200 117 0.0  
00625
```

◀ Host 的資訊

● Core 收集到的統計資料

```
{"txbyte": "1600", "rxbyte": "976", "rxpacket": "12", "controller": "test1", "txpa  
cket": "25", "dpid": "00:00:00:00:00:00:00:02", "port": "1"}  
127.0.0.1 - - [2016-01-24 03:44:41] "POST /publish/port HTTP/1.1" 200 117 0.001519
```

◀ Port 流量資料

● Core 核心函式做BusyLink Detection

```
****Busy Link ID****  
{"controller": "foobar", "link": [{"port": 1, "dpid": "00:00:00:00:00:00:00:01"}, {"port": 3, "dpid": "00:  
00:00:00:00:00:00:00:02"}]}  
{"controller": "foobar", "link": [{"port": 3, "dpid": "00:00:00:00:00:00:00:03"}, {"port": 2, "dpid": "00:  
00:00:00:00:00:00:00:01"}]}
```

◀ h1 ping h3



研究結果 (3/3)

- 運用RESTful API修改Flow Table

UI操作介面 ▶

Flow Mod

Filter Results ADD

type	field	input
misc	switch	<input type="text" value="00:00:00:00:00:00:03"/>
misc	priority	<input type="text" value="9"/>
misc	idleTimeout	<input type="text"/>
misc	hardTimeout	<input type="text"/>

CANCEL SUBMIT

▼ UI Flow Table呈現

Flow Table

Filter Results

flowMod	switch	ingressPort	srcMac	dstMac	dlType	netProtocol	actions	priority	hardTimeout	idleTimeout
MOD_ST	00:00:00:00:00:00:03	0	00:00:00:00:00:00	01:80:c2:00:00:0e	0x88cc	0x00	OUTPUT=CONTROLLER	65535	0	0
DEL_ST										
MOD_ST	00:00:00:00:00:00:03	3	00:00:00:00:00:00	00:00:00:00:00:00	0x0000	0x00	OUTPUT=3	9	0	0
DEL_ST										

00:00:00:00:00:00:03

FLOW MOD **SETTINGS**