



MikroTik Hotspot Implementation in a Campus Environment

PRESENTED BY THUMMAWIT CHAIRINYA

MUM THAILAND 2018

ABOUT THUMMAWIT CHAIRINYA

- Software Engineer at jetradius
- Based in Thailand
- implement MikroTik in campus network since 2015
- Certified MTCNA , MTCUME , MTCIPv6E , MTCWE
- PHP Developer , Node.js Developer
- Github : <https://github.com/xeleniumz>
- Website : <https://jetradius.com>
- Email : thummawit@hotmail.com





Agenda

- Success Case
- Problem Encounter
- How to resolve
- Infrastructure design
- Question

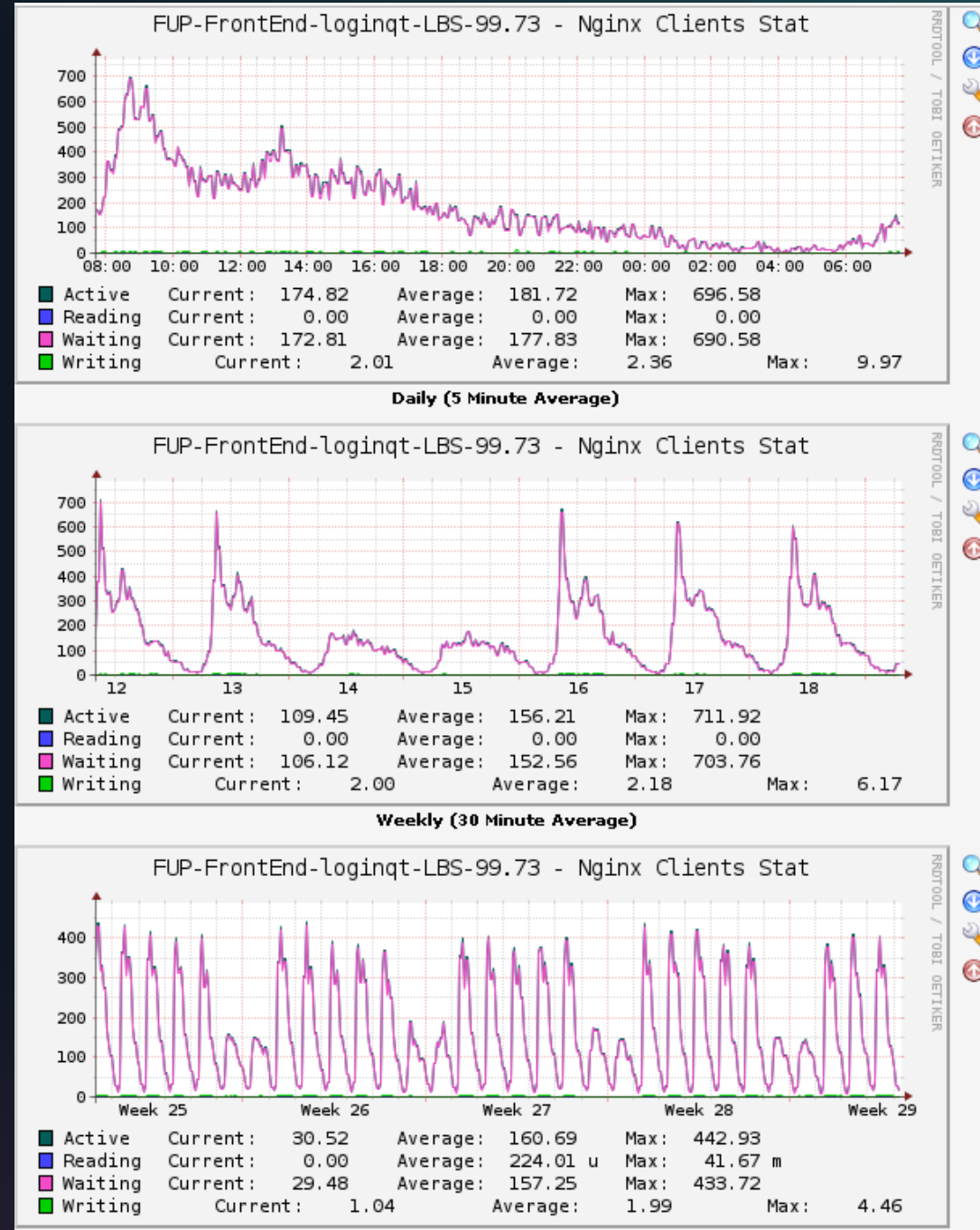
Success Case

- Khon kaen University (KKU)
- 27,000 – 30,000 concurrent users active per day
- Hotspot service implement with MikroTik
- Authorization user with external platform
- We 're using CCR1036 , CCR1072 to handle load
- Stateless system infrastructure design

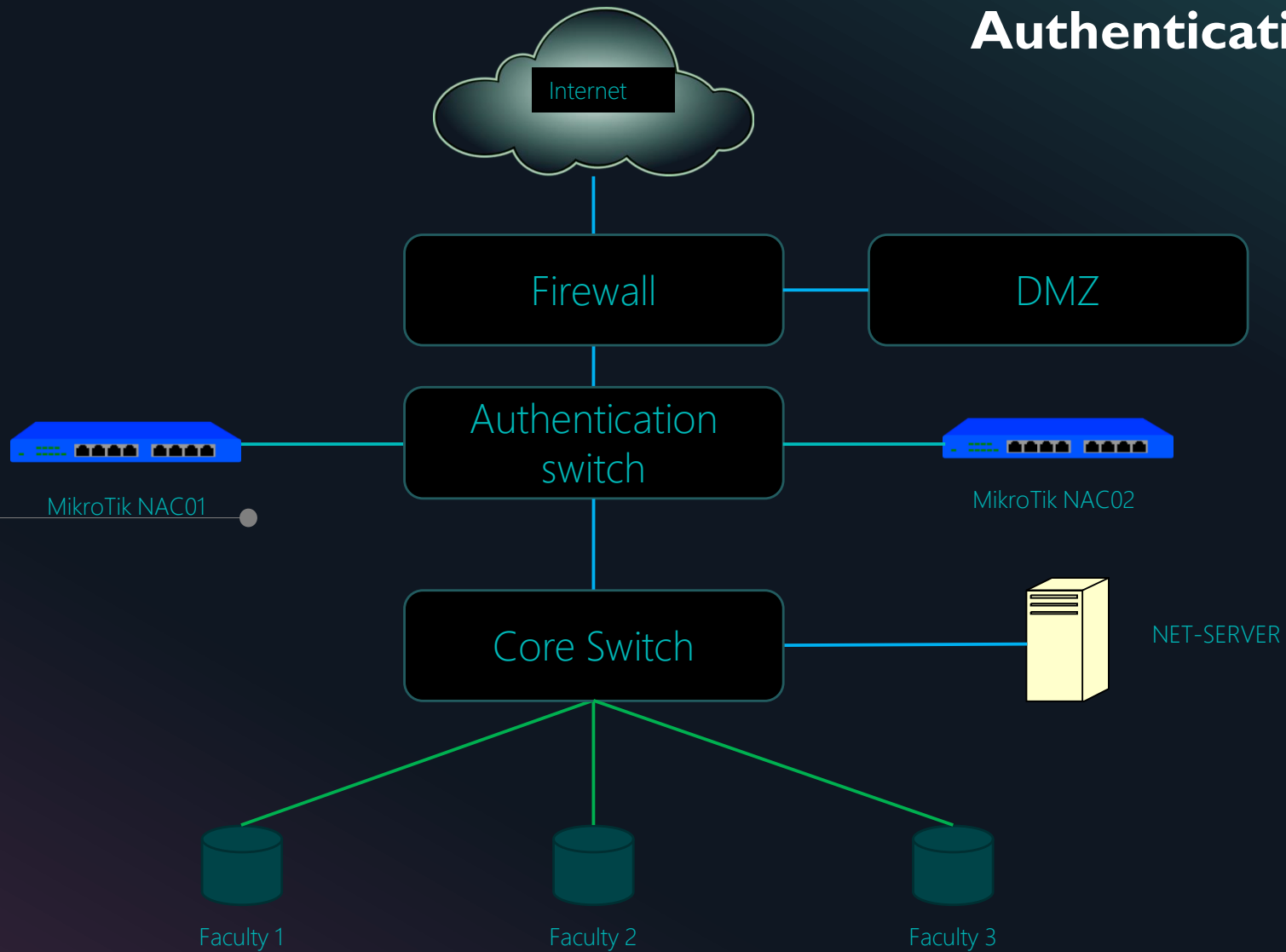


Success Case

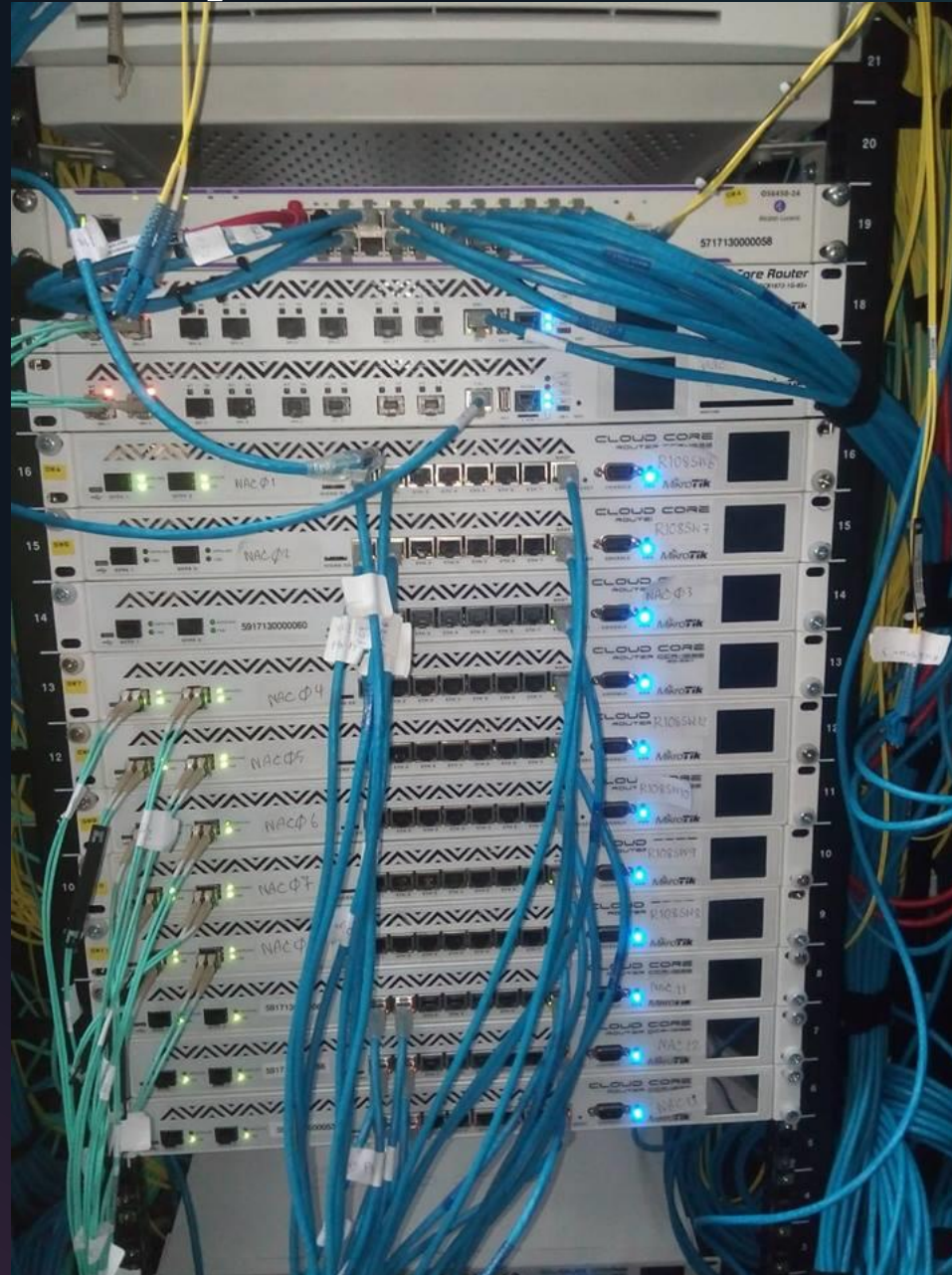
- Cacti graph clients stat
- We used external login service for best performance
- From this graph we will see in every morning we have to handle about 700-800 requests from clients
- Almost devices are mobile and notebook



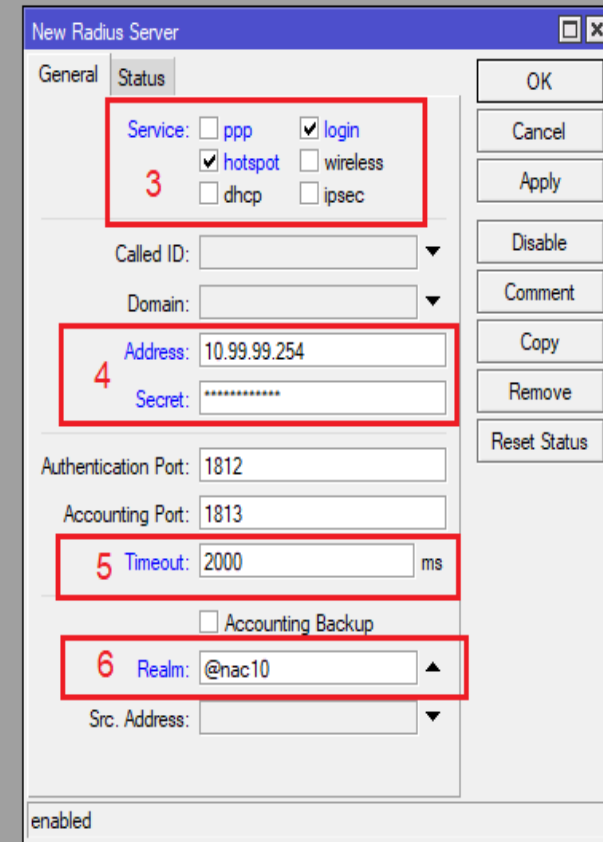
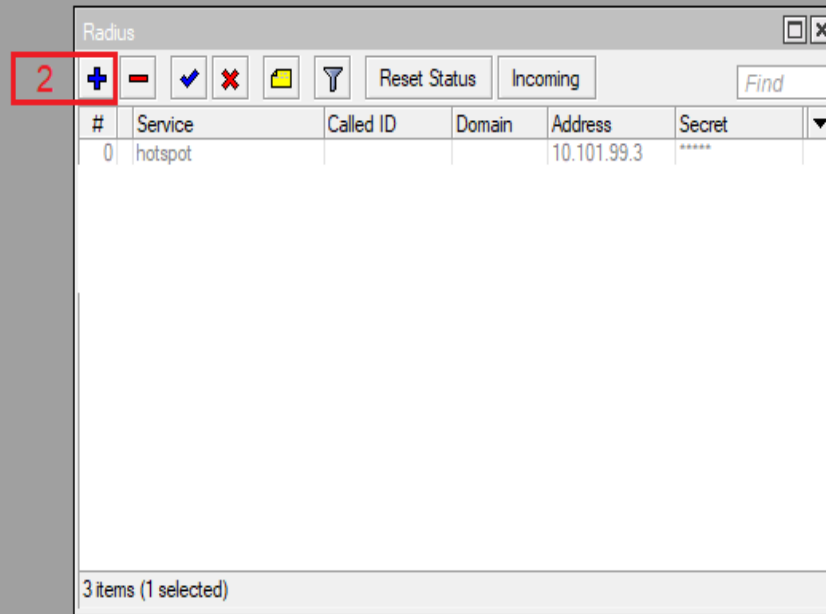
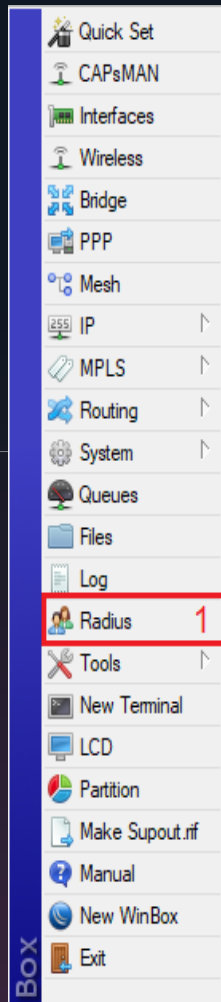
Authentication Internet Layer



Physical Network



Hotspot Configuration & Trick



Hotspot Configuration & Trick

RouterOS WinBox

9

Hotspot Configuration & Trick

Hotspot

Servers Server Profiles Users **User Profiles** 3 Active Hosts IP Bindings Service Ports Walled Garden Walled Garden IP List Cookies

Quick Set CAPsMAN Interfaces Wireless Bridge PPP Mesh **IP** 1 MPLS Routing System Queues Files Log Radius Tools New Terminal LCD Partition Make Supout.nif Manual New WinBox Exit

ARP Accounting Addresses Cloud DHCP Client DHCP Relay DHCP Server DNS Firewall **Hotspot** 2 IPsec Neighbors Packing Pool Routes SMB SNMP Services Settings Socks TFTP Traffic Flow UPnP Web Proxy

Hotspot User Profile <default>

General Queue Scripts

Name: default

Address Pool: none

Session Timeout: 1d 00:00:00

4 Idle Timeout: 00:30:00

Keepalive Timeout: 00:30:00

Status Autorefresh: 00:05:00

Shared Users:

Rate Limit (rx/tx):

☐ Add MAC Cookie

MAC Cookie Timeout: 3d 00:00:00

Address List:

Incoming Filter:

Outgoing Filter:

Incoming Packet Mark:

Outgoing Packet Mark:

Open Status Page: always

☐ Transparent Proxy

OK Cancel Apply Copy Remove

Name	Session Time	Idle Timeout	Shared U...
* default	1d 00:00:00	00:30:00	

default

Hotspot

Servers **Server Profiles** Users User Profiles Active Hosts IP Bindings Service P

+ - 1

Name	DNS Name	HTML Directory	Rate Limit (rx/tx)
* default		hotspot	

Hotspot Server Profile <hsprof2>

General Login RADIUS

2

Name: hsprof2

Hotspot Address: 10.8.51.2

DNS Name: nac05.kku.ac.th

HTML Directory: login

HTML Directory Override:

Rate Limit (rx/tx):

HTTP Proxy:

HTTP Proxy Port: 0

SMTP Server:

OK

Cancel

Apply

Copy

Remove

Hotspot Server Profile <hsprof2>

General **Login** RADIUS

3

Login By: ☐ MAC ☐ Cookie ☐ HTTP CHAP ☒ HTTPS ☐ Trial

4

☐ MAC Cookie

MAC Auth. Mode: MAC as username

MAC Auth. Password:

HTTP Cookie Lifetime: 3d 00:00:00

5

SSL Certificate: star.kku.ac.th.crt_0

☐ Split User Domain

Trial Uptime Limit: 00:30:00

Trial Uptime Reset: 1d 00:00:00

Trial User Profile: default

OK

Cancel

Apply

Copy

Remove

Hotspot Configuration & Trick

Hotspot Server Profile <hsprof2>

General Login **RADIUS**

☒ Use RADIUS

Default Domain: []

Location ID: []

Location Name: []

MAC Format: XX:XX:XX:XX:XX:XX

☒ Accounting

Interim Update: 00:10:00

NAS Port Type: 19 (wireless-802.11)

OK Cancel Apply Copy Remove

default

Hotspot Configuration & Trick

Hotspot

1 Servers Server Profiles Users User Profiles Active Hosts IP Binding

+ - ✓ ✗ Filter Reset HTML Hotspot Setup

Name	Interface	Address Pool	Profile
Hotspot Server <NAC05>			
Name: NAC05	Interface: sfp-sfpplus2	Address Pool: none	Profile: hsprof2
Idle Timeout: 00:30:00	Keepalive Timeout: 00:30:00	Login Timeout:	Addresses Per MAC:
IP of DNS Name: 10.8.51.2		Proxy Status: running	
enabled		HTTPS	

2

OK Cancel Apply Disable Copy Remove Reset HTML

CCR1072 users active

(NAC10) - WinBox v6.40.4 on CCR1072-1G-8S+ (tile)

Session Settings Dashboard

Safe Mode Session: Date: Aug/08/2018 CPU: 10%

Hotspot

Servers Server Profiles Users User Profiles Active Hosts IP Bindings Service Ports Walled Garden Walled Garden IP List Cookies

Server	U	Domain	Address	Uptime	Idle Time	Session Time	Rx Rate	Tx Rate
R nac10	61...		10.51.5.0	00:58:22	00:20:54	23:01:38	0 bps	0 bps
R nac10	59...		10.51.9.0	01:53:35	00:23:37	22:06:25	0 bps	0 bps
R nac10	59...		10.51.17.0	01:46:23	00:00:48	22:13:37	0 bps	0 bps
R nac10	58...		10.51.45.0	00:00:34	00:00:03	23:59:26	66.4 kb	1723.5 ...
R nac10	59...		10.51.73.0	01:44:19	00:00:03	22:15:41	80.9 kb	137.7 k
R nac10	60...		10.51.87.0	00:35:40	00:14:47	23:24:20	0 bps	0 bps
R nac10	61...		10.51.109.0	00:18:03	00:07:51	23:41:57	0 bps	0 bps
R nac10	59...		10.51.122.0	00:36:10	00:04:49	23:23:50	0 bps	0 bps
R nac10	59...		10.51.4.1	00:57:40	00:21:02	23:02:20	0 bps	0 bps
R nac10	59...		10.51.5.1	02:12:11	00:00:03	21:47:49	436 bps	849 bps
R nac10	61...		10.51.7.1	00:10:58	00:08:04	23:49:02	0 bps	0 bps
R nac10	58...		10.51.8.1	00:15:11	00:00:04	23:44:49	1804 bps	1770 bps
R nac10	60...		10.51.9.1	00:23:49	00:00:12	23:36:11	0 bps	0 bps
R nac10	59...		10.51.36.1	00:33:21	00:03:35	23:26:39	0 bps	0 bps
R nac10	58...		10.51.44.1	01:31:51	00:00:04	22:28:09	134 bps	266 bps
R nac10	59...		10.51.85.1	02:16:27	00:00:08	21:43:33	0 bps	0 bps
R nac10	61...		10.51.104.1	02:17:56	00:00:11	21:42:04	0 bps	0 bps
R nac10	60...		10.51.109.1	01:55:53	00:00:29	22:04:07	0 bps	0 bps
R nac10	58...		10.51.110.1	00:56:06	00:00:05	23:03:54	19.8 kb	39.5 kb
R nac10	56...		10.51.117.1	02:51:22	00:00:05	21:08:38	100 bps	0 bps
R nac10	61...		10.51.120.1	01:33:37	00:27:28	22:26:23	0 bps	0 bps
R nac10	61...		10.51.121.1	01:54:42	00:00:03	22:05:18	866 bps	312 bps
R nac10	59...		10.51.122.1	00:33:17	00:00:53	23:26:43	0 bps	6.5 kbps
R nac10	58...		10.51.4.2	03:04:30	00:00:03	20:55:30	257.9 k	9.2 Mbps
R nac10	60...		10.51.5.2	02:10:51	00:24:53	21:49:09	0 bps	0 bps
R nac10	61...		10.51.6.2	00:40:21	00:21:09	23:19:39	0 bps	0 bps
R nac10	60...		10.51.10.2	00:43:21	00:00:05	23:16:39	86 bps	639 bps
R nac10	59...		10.51.17.2	01:09:33	00:00:03	22:50:27	2.4 kbps	8.2 kbps
R nac10	58...		10.51.28.2	01:04:06	00:07:31	22:55:54	0 bps	0 bps
R nac10	58...		10.51.45.2	01:49:39	00:00:14	22:10:21	0 bps	0 bps
R nac10	59...		10.51.61.2	00:26:13	00:00:03	23:33:47	18.7 kb	39.5 kb
R nac10	60...		10.51.62.2	00:14:51	00:00:22	23:45:09	0 bps	0 bps
R nac10	59...		10.51.64.2	06:13:43	00:00:56	17:46:17	0 bps	0 bps
R nac10	59...		10.51.68.2	00:34:00	00:00:03	23:26:00	510 bps	3.9 kbps
R nac10	56...		10.51.73.2	01:53:03	00:00:38	22:06:57	0 bps	0 bps
R nac10	59...		10.51.84.2	02:32:54	00:00:03	21:27:06	18.9 kb	43.6 kb
R nac10	59...		10.51.85.2	02:17:45	00:01:35	21:42:15	0 bps	0 bps
R nac10	57...		10.51.86.2	01:50:33	00:00:23	22:09:27	0 bps	0 bps
R nac10	60...		10.51.87.2	00:27:03	00:00:27	23:32:57	0 bps	0 bps
R nac10	61...		10.51.96.2	01:04:49	00:00:03	22:55:11	5.1 kbps	39.4 kb
R nac10	60...		10.51.109.2	00:13:17	00:02:23	23:46:43	0 bps	0 bps
R nac10	58...		10.51.110.2	00:44:26	00:00:03	23:15:34	9.6 kbps	9.3 kbps
R nac10	61...		10.51.121.2	01:55:00	00:01:51	22:05:00	0 bps	0 bps
R nac10	59...		10.51.122.2	00:35:44	00:00:24	23:24:16	0 bps	0 bps
R nac10	58...		10.51.6.3	00:40:14	00:00:44	23:19:46	0 bps	0 bps
R nac10	61...		10.51.7.3	01:45:01	00:01:06	22:14:59	0 bps	0 bps
R nac10	59...		10.51.8.3	03:25:57	00:00:04	20:34:03	107 bps	451 bps
R nac10	60...		10.51.9.3	00:18:59	00:14:59	23:41:01	0 bps	0 bps
R nac10	59...		10.51.17.3	01:51:08	00:00:05	22:08:52	289 bps	262 bps
R nac10	60...		10.51.44.3	02:09:22	00:01:17	21:50:38	0 bps	0 bps
R nac10	58...		10.51.45.3	01:49:38	00:00:09	22:10:22	0 bps	0 bps
R nac10	56...		10.51.62.3	01:58:06	00:00:06	22:01:54	1723 bps	2.0 kbps
R nac10	59...		10.51.63.3	00:39:58	00:22:39	23:20:02	0 bps	0 bps
R nac10	59...		10.51.72.3	00:30:15	00:16:37	23:29:45	0 bps	0 bps
R nac10	59...		10.51.84.3	02:33:01	00:00:06	21:26:59	25.5 kb	693.2 k
R nac10	58...		10.51.104.3	00:28:28	00:19:17	23:31:32	0 bps	0 bps

4760 items

Hotspot Server Profile <default>

General Login RADIUS

Login By: ☐ MAC ☐ Cookie

☐ HTTP CHAP ☒ HTTPS

☒ HTTP PAP ☐ Trial

☐ MAC Cookie

MAC Auth. Mode: MAC as username

MAC Auth. Password:

HTTP Cookie Lifetime: 3d 00:00:00

SSL Certificate: star.kku.ac.th.crt_0

☐ Split User Domain

Trial Uptime Limit: 00:30:00

Trial Uptime Reset: 1d 00:00:00

Trial User Profile: default

default

CCR1036 users active

(NAC05) - WinBox v6.40.4 on CCR1036-8G-2S+ (tile)

Session Settings Dashboard

Safe Mode Session: Date: Aug/08/2018 CPU: 7%

Hotspot

Servers Server Profiles Users User Profiles Active Hosts IP Bindings Service Ports Walled Garden Walled Garden IP List Cookies

Server	U	Domain	Address	Uptime	Idle Time	Session Time	Rx Rate	Tx Rate
R NAC05	lc...		10.177.33.0	02:52:56	00:00:02	21:07:04	15.6 kb	24.0 kb
R NAC05	vi...		10.210.5.1	00:50:18	00:00:06	23:09:42	0 bps	0 bps
R NAC05	rk...		10.212.56.1	03:14:39	00:00:02	05:30:42	345 bps	115 bps
R NAC05	pi...		10.177.202.1	00:25:03	00:00:02	23:34:57	1104 bps	44.4 kb
R NAC05	5...		10.66.237.1	04:29:13	00:03:16	19:30:47	0 bps	0 bps
R NAC05	b...		10.180.1.2	02:59:19	00:00:02	21:00:41	1524 bps	233 bps
R NAC05	tri...		10.212.56.2	03:13:56	00:00:02	05:30:42	1081 bps	115 bps
R NAC05	5...		10.66.233.2	13:20:36	00:00:12	10:39:24	0 bps	0 bps
R NAC05	5...		10.66.237.2	02:01:10	00:15:30	21:58:50	0 bps	1682 bps
R NAC05	b...		10.180.1.3	02:36:00	00:00:02	21:24:00	149 bps	0 bps
R NAC05	6...		10.212.8.3	00:11:37	00:00:02	23:48:23	233.5 k	3.8 Mbps
R NAC05	6...		10.212.55.3	01:14:00	00:08:09	22:46:00	0 bps	0 bps
R NAC05	rk...		10.212.56.3	03:13:13	00:00:03	05:30:42	1656 bps	1711 bps
R NAC05	5...		10.177.202.3	00:19:13	00:00:05	23:40:47	3.4 kbps	1049 bps
R NAC05	5...		10.66.235.3	01:05:17	00:00:02	22:54:43	16.3 kb	232.1 k
R NAC05	5...		10.66.236.3	00:52:13	00:00:02	23:07:47	20.9 kb	2.6 Mbps
R NAC05	5...		10.66.237.3	01:29:34	00:00:29	22:30:26	0 bps	0 bps
R NAC05	p...		10.177.33.4	00:46:26	00:00:04	23:13:34	13.0 kb	1465.7 ...
R NAC05	6...		10.212.55.4	02:21:57	00:02:39	21:38:03	0 bps	0 bps
R NAC05	tri...		10.212.56.4	03:11:59	00:00:02	05:30:42	2.4 kbps	920 bps
R NAC05	n...		10.177.76.4	03:18:56	00:00:14	20:41:04	0 bps	0 bps
R NAC05	b...		10.136.101.4	01:04:38	00:00:02	22:55:22	212.1 k	6.9 Mbps
R NAC05	5...		10.66.233.4	01:01:09	00:00:05	22:58:51	0 bps	0 bps
R NAC05	5...		10.66.234.4	01:46:54	00:06:01	22:13:06	0 bps	0 bps
R NAC05	5...		10.66.237.4	12:02:31	00:00:02	11:57:29	12.0 kb	17.0 kb
R NAC05	5...		10.66.238.4	00:22:06	00:06:53	23:37:54	0 bps	0 bps
R NAC05	5...		10.210.2.5	00:25:40	00:00:02	23:34:20	1280 bps	865 bps
R NAC05	6...		10.212.55.5	02:21:41	00:00:03	21:38:19	256 bps	394 bps
R NAC05	s...		10.212.56.5	03:11:16	00:00:05	05:30:42	0 bps	0 bps
R NAC05	5...		10.66.233.5	15:08:55	00:15:28	08:51:05	0 bps	0 bps
R NAC05	5...		10.66.235.5	13:07:14	00:03:46	10:52:46	0 bps	0 bps
R NAC05	p...		10.210.5.6	02:30:36	00:00:02	21:29:24	12.7 kb	182.8 k
R NAC05	jio		10.210.9.6	02:10:05	00:00:03	21:49:55	353 bps	563 bps
R NAC05	5...		10.199.12.6	02:36:30	00:00:04	21:23:30	356 bps	506 bps
R NAC05	so...		10.177.33.6	02:00:37	00:00:03	21:59:23	117 bps	149 bps
R NAC05	ut...		10.212.56.6	03:10:13	00:00:02	05:30:42	788 bps	0 bps
R NAC05	5...		10.210.86.6	02:03:03	00:00:04	21:56:57	146 bps	140 bps
R NAC05	6...		10.66.233.6	10:03:44	00:00:03	13:56:16	10.5 kb	2.4 kbps
R NAC05	5...		10.66.237.6	00:00:44	00:00:02	23:59:16	22.5 kb	13.0 kb
R NAC05	ss...		10.131.1.7	20:15:48	00:00:47	03:44:12	0 bps	0 bps
R NAC05	5...		10.199.12.7	01:27:21	00:00:02	22:32:39	460 bps	523 bps
R NAC05	n...		10.212.56.7	03:09:24	00:00:02	05:30:43	926 bps	138 bps
R NAC05	5...		10.66.238.7	04:30:06	00:00:02	19:29:54	12.4 kb	442.5 k
R NAC05	a...		10.210.5.8	00:52:16	00:05:33	23:07:44	0 bps	0 bps
R NAC05	6...		10.212.8.8	00:11:41	00:00:02	23:48:19	136.4 k	6.8 Mbps
R NAC05	jul		10.210.9.8	02:26:58	00:00:09	21:33:02	0 bps	0 bps
R NAC05	5...		10.199.10.8	14:50:50	00:00:18	09:09:10	0 bps	0 bps
R NAC05	5...		10.199.12.8	02:38:09	00:00:02	21:21:51	44.5 kb	55.8 kb
R NAC05	g...		10.212.56.8	03:14:25	00:00:02	05:30:42	5.8 kbps	5.4 kbps
R NAC05	6...		10.66.235.8	02:00:15	00:08:23	21:59:45	0 bps	0 bps
R NAC05	ro...		10.210.5.9	00:46:27	00:06:43	23:13:33	0 bps	0 bps
R NAC05	kit...		10.131.7.9	02:50:31	00:00:03	21:09:29	862 bps	273 bps
R NAC05	g...		10.212.56.9	03:13:31	00:00:02	05:30:42	135.8 k	221.8 k

1613 items

Hotspot Server Profile <hsprof2>

General Login RADIUS

Login By: ☒ MAC ☐ Cookie

☐ HTTP CHAP ☒ HTTPS

☒ HTTP PAP ☐ Trial

☐ MAC Cookie

MAC Auth. Mode: MAC as username

MAC Auth. Password:

HTTP Cookie Lifetime: 3d 00:00:00

SSL Certificate: star.kku.ac.th.crt_0

☐ Split User Domain

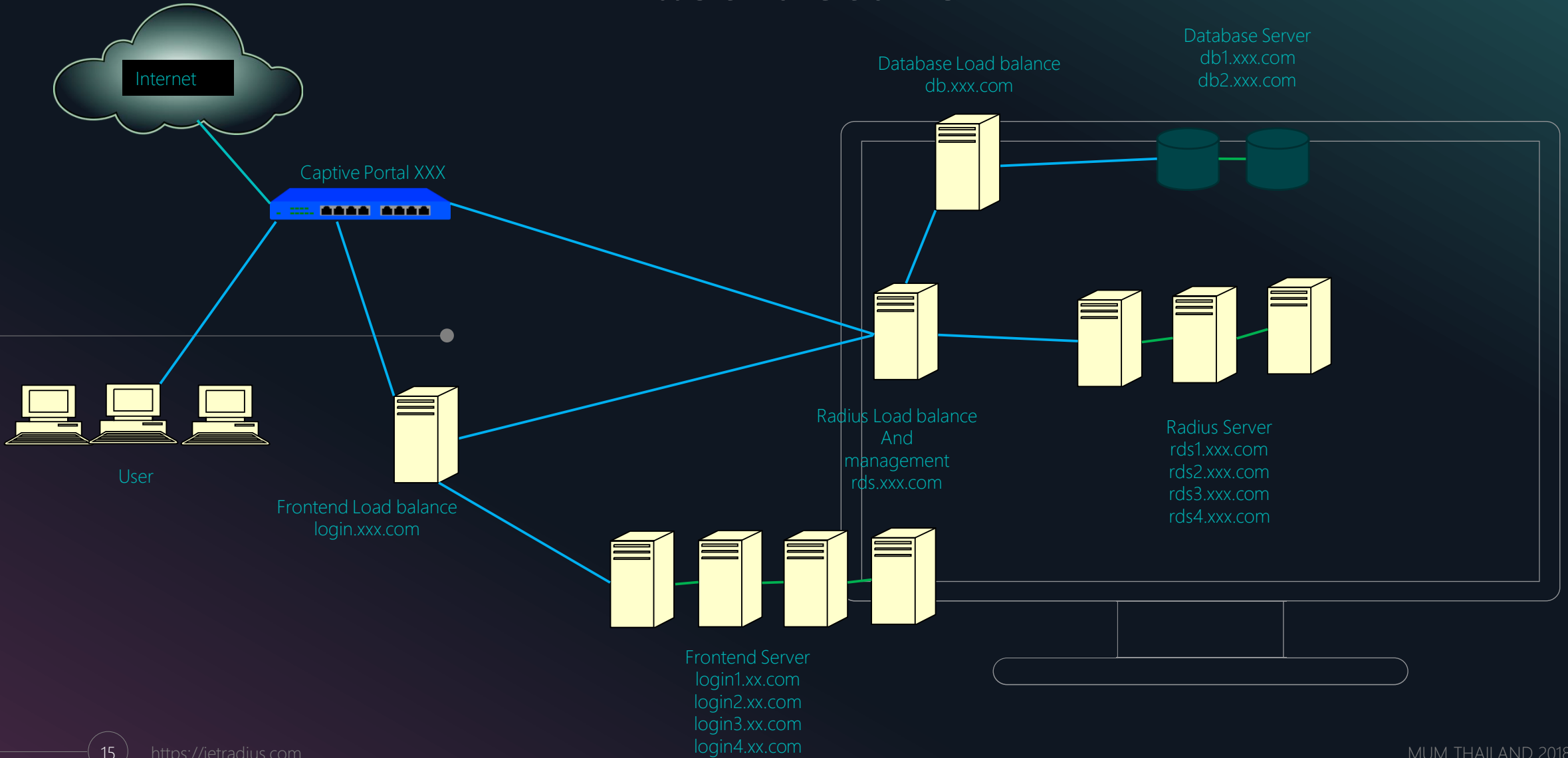
Trial Uptime Limit: 00:30:00

Trial Uptime Reset: 1d 00:00:00

Trial User Profile: default

OK Cancel Apply Copy Remove

Infrastructure



Problem Encounter



- Database
- RouterOS version
- MikroTik web server
- MikroTik API service
- Other Platform we're use have problem
- Network problem
- Scaling system infrastructure and feature.
- Login problem

How to solve

From problem that we face
we have plan to solve the problem with 3 step



Research



Build test case



Migrate infrastructure

How to solve

In this case we decide to split our system
to 4 sections each section will work only their own job



Network Section



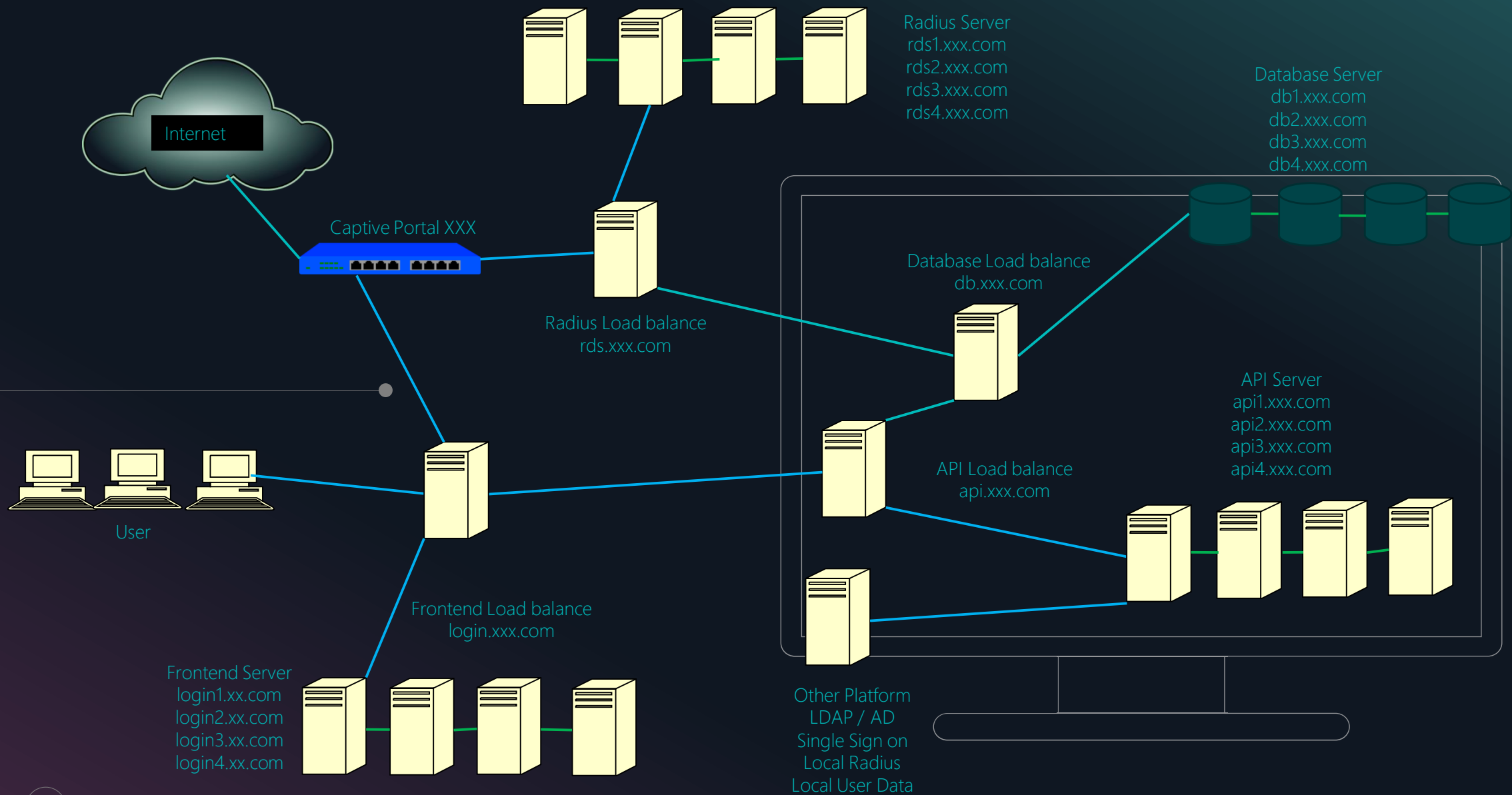
Authentication Section







Api Section




Other Platform Section



Result


    Secure https://jetradius.com/		
Database 10.10	Status [CONNECTED]	Response Time : 0.01
Database 10.10	Status [CONNECTED]	Response Time : 0.008
Database 10.10	Status [CONNECTED]	Response Time : 0.012
Database 10.10	Status [CONNECTED]	Response Time : 0.013
<hr/>		
Ldap 202.	Status [CONNECTED]	Response Time : 0.005
Ldap 202.	Status [LDAP Service DISCONNECT]	Response Time : 0.004
Ldap 202.	Status [LDAP Service DISCONNECT]	Response Time : 0.004

 LINE Notify


KKU Monitor: nac03 error can't log in
nac04 error can't log in
nac05 error can't log in

KKU Monitor: Database : Status [OFFLINE] SequelizeConnectionError: Connection lost: The server closed the connection.


9 มิ.ย.(ส.)

 LINE Notify


KKU Monitor: Api Server : Status [OFFLINE] 11.00 น.

 LINE Notify


KKU Monitor: Frontend Server : Status [OFFLINE] 15.20 น.

 LINE Notify


KKU Monitor: Frontend Server : Status [OFFLINE] 15.25 น.

 LINE Notify


KKU Monitor: Api Server : Status [OFFLINE] 15.40 น.

 LINE Notify


KKU Monitor: Frontend Server : Status [OFFLINE] 18.00 น.

 LINE Notify


KKU Monitor: Frontend Server : Status [OFFLINE] 18.05 น.

 LINE Notify

KKU Monitor: Frontend Server : Status [OFFLINE] 18.10 น.

 LINE Notify

KKU Monitor: nac12 error can't log in 12.35 น.

 LINE Notify

KKU Monitor: Api Server : Status [OFFLINE] 22.55 น.

Question ?



THANK YOU!

Credit

- Bureau of Information Technology
Khon kaen University (KKU)
- MikroTik I08 Team