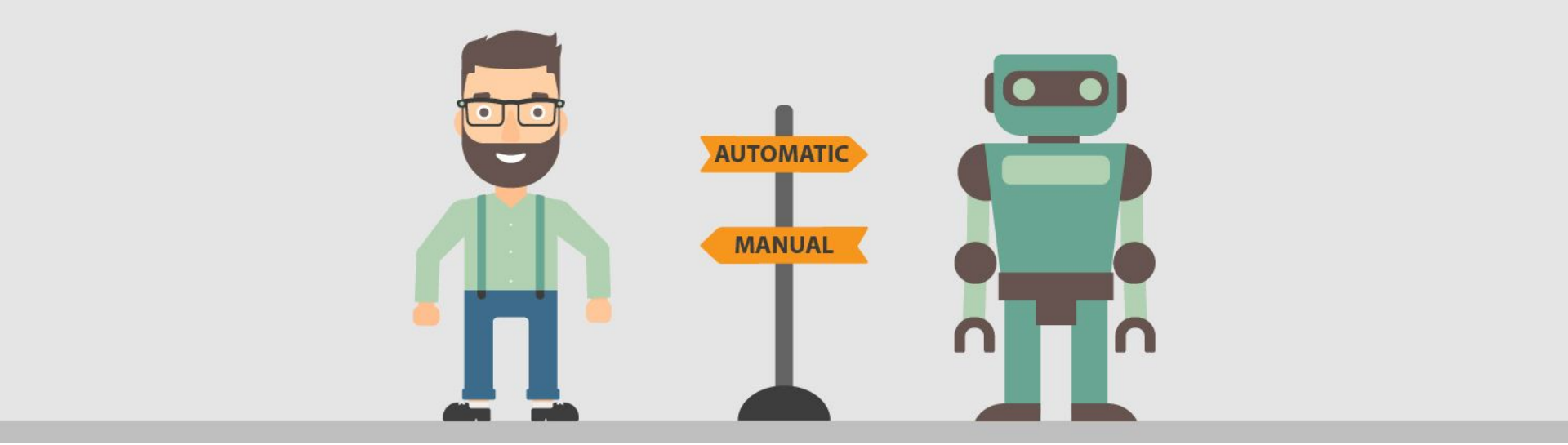


# Mikrotik Automation using Scripting, SSH, & API

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# Introduction

# About ID-Networkers


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# About SMP & SMK IDN

## SMP IT (Apps.Design.Web)

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## SMK RPL (Pemrograman)

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## SMK TKJ (Jaringan.Komputer)

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# About IDNFoundation


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# About IDNFoundation



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# About SMKN 1 Nglegok, Blitar


PERINGKAT JUARA
OLIMPIADE JARINGAN 2018

JUARA 1
SMK NEGERI 1 NGLEGOK
JAWA TIMUR

JUARA 2
SMK TELKOM MALANG
JAWA TIMUR

JUARA 3
SMK N 1 KADEMANGAN
JAWA TIMUR

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# What are we going to talk about?

- Introduction to Network Automation
- General problem
- How to solve it
- Mikrotik scripting
- Python for networking
- SSH vs API
- DEMO TIME!!!

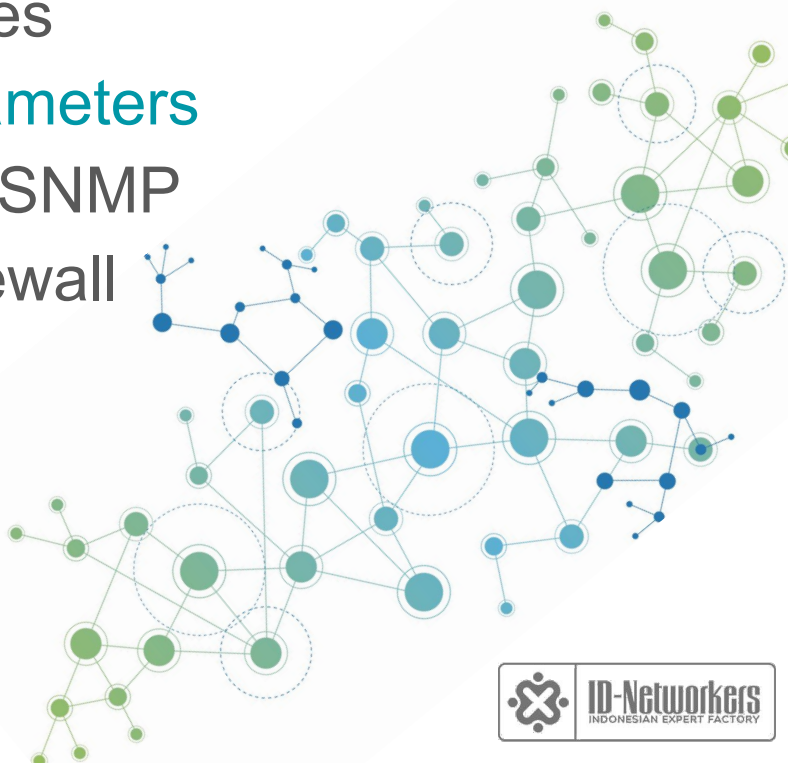
# Introduction to Network Automation

- Network Automation is a methodology in which software automatically configures, provisions, manages and tests network devices

# General Problem

# General Problem

- We have thousand mikrotik devices
- We need to configure identik parameters in all of mikrotik devices, such us SNMP community, ipsec parameters, firewall rule, basic security, etc



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# General Problem

- Need many peoples work together in a few days to configure thousand of devices.
- Need to pay extra for many peoples who doing that job

# General Problem

- **Human error** is a big enemy

*Lhoooo Kenopo iki router ku gak iso di remot???*

*Whoalahhhh… iki lho firewall mu kleru!!!*

# General Problem

- **Miscommunication** is daily habit

```
[admin@CoreIDNBaru] > user print
Flags: X - disabled
 #    NAME
 0    ;;; system default user
      admin
 1    user1
```

*Kelakuane sopo to iki nambah user sak karepe dewe?????*

*Sopo meneh lek uduk bocah kae!!!*

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# General Problem

- People will feel bored when doing repititive jobs. When People bored, the jobs will not completed perfectly

*Iki kerjoan kapan entek e!!!*

# General Problem

- Non standard configuration



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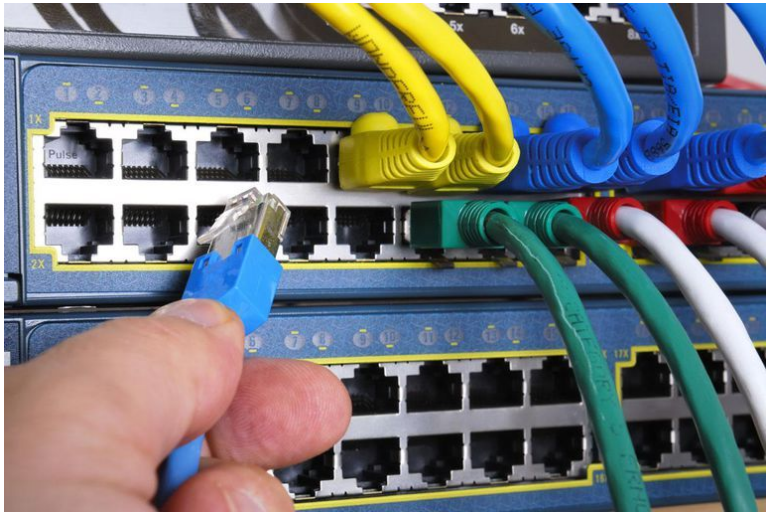
# Solution!!!

# Solution

- Computer can doing repititive jobs without feel bored, and the result will be perfect!

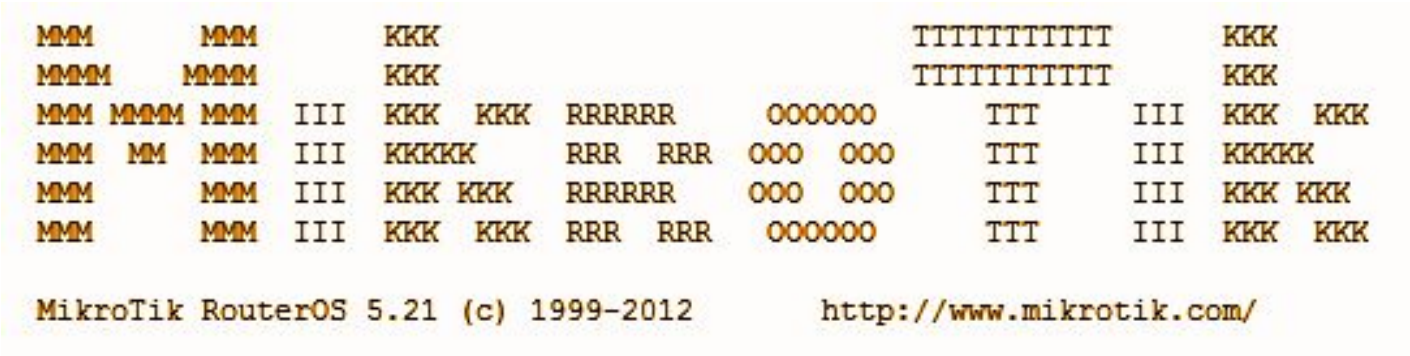
# Solution

- We don’t need configure each devices manually, computer will do that! We should focus on jobs that can’t solved by computer



# Mikrotik Scripting

- Used to auotomate simple stuff in single router



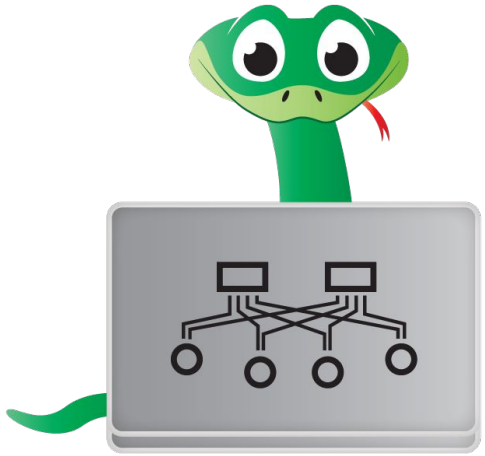
# Mikrotik Scripting (example)

- Configure simple queue for target-address 192.168.1.100-192.168.1.200

```
:local x
:for x from 100 to 200 do={/queue simple
add target-address="192.168.1.$x"}
```

# Python for Networking

- Used to auotomate advanced stuff in multiple router
- Easy to Learn



# Python for Networking (example)

- Configure multiple queue in multiple router

```
ip_address = ["192.168.99.1","192.168.99.2","192.168.99.3"]

for ip in ip_address:
    ssh.connect(hostname=ip, username=user, password=passw)
    for x in range(100,200):
        ssh.exec_command("queue simple add target="192.168.1.%s" % x)
```

# SSH vs API

# SSH vs API

```
[admin@Mikrotik] > ip firewall nat print
Flags: X - disabled, I - invalid,

 0     ;;; masquerade hotspot network
       chain=srcnat action=masquerade
        src-address=10.10.10.0/24

 1     ;;; masquerade hotspot network
       chain=srcnat action=masquerade
       src-address=10.10.10.0/24
```

SSH is a human language, we happy to look the display like that. But computer don't! Computer like display with "key" & "value" pair

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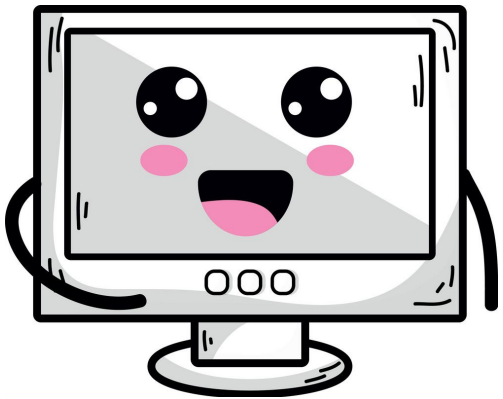
# SSH vs API



```
{
    "chain": "srcnat",
    "packets": 0,
    "bytes": 0,
    ".id": "*12",
    "invalid": false,
    "dynamic": false,
    "action": "masquerade",
    "src-address": "10.10.10.0/24"
}
```

API is a computer languange, Computer like display with “key” & “value” pair.

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# Automation using SSH

```
import paramiko
from getpass import getpass

ip_address = ["192.168.99.1","192.168.99.2","192.168.99.3"]

user = raw_input("Input username: ")
passw = getpass()
…

for ip in ip_address:
    ssh.connect(hostname=ip,username=user, password=passw)
    stdin,stdout,stderr = ssh.exec_command("ip address print")
    print stdout.read()
```

# Automation using SSH

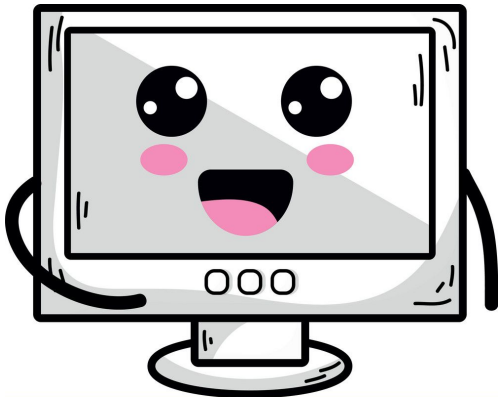
```
$ python mikrotik_ssh.py
Flags: X - disabled, I - invalid, D - dynamic
 #   ADDRESS            NETWORK         INTERFACE
 0   192.168.99.1/24    192.168.99.0    ether4

Flags: X - disabled, I - invalid, D - dynamic
 #   ADDRESS            NETWORK         INTERFACE
 0   192.168.99.2/24    192.168.99.0    ether1

Flags: X - disabled, I - invalid, D - dynamic
 #   ADDRESS            NETWORK         INTERFACE
 0   192.168.99.3/24    192.168.99.0    ether3
```

# Automation using API

```
from librouteros import connect
from getpass import getpass
import json

ip_address = ["192.168.99.1","192.168.99.2","192.168.99.3"]

user = raw_input("Input username: ")
passw = getpass()

for ip in ip_address:
    api = connect(username=user, password=passw, host=ip)
    ip_info = api(cmd="/ip/address/print")
    print json.dumps(ip_info, indent=3)
```

# Automation using API

```
$ python mikrotik_api.py
[
    {
        "network": "192.168.99.0",
        "dynamic": false,
        "invalid": false,
        "disabled": false,
        "actual-interface": "ether4",
        ".id": "*1",
        "address": "192.168.99.1/24",
        "interface": "ether4"
    }
]
```



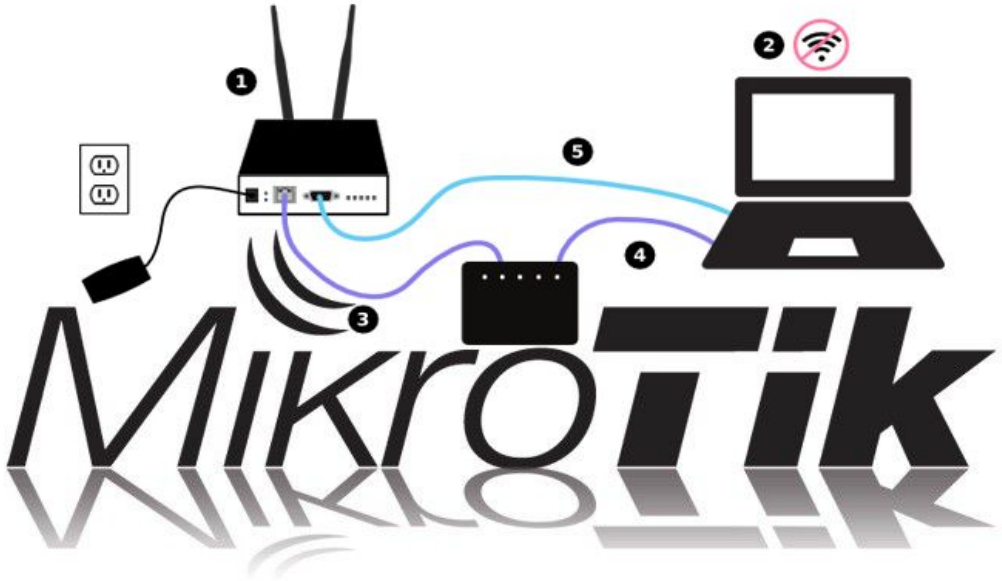
# Use Case

# Use case

- Security Vulnerability
  - Change Password
  - Change Winbox Port
  - Disable Unused Services
  - Setting Allowed from on Services

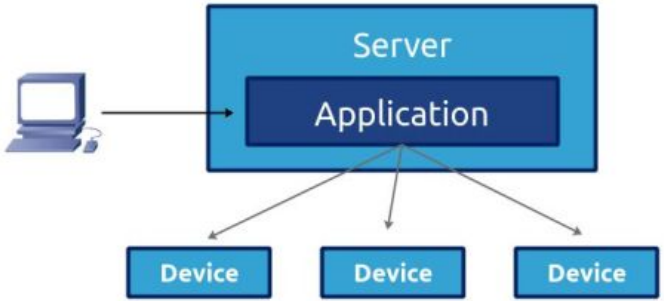
# Use case

- Setup new customer in ISP
  - Same private IP
  - Same firewall rule
  - Same NAT rule
  - Same security rule



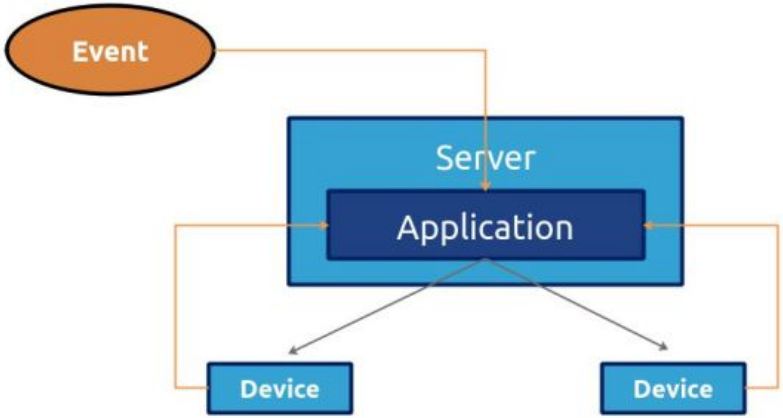
# Hard Work vs Smart Work

# Network Automation Type




**Proactive**

- Manual Change
- Change by human



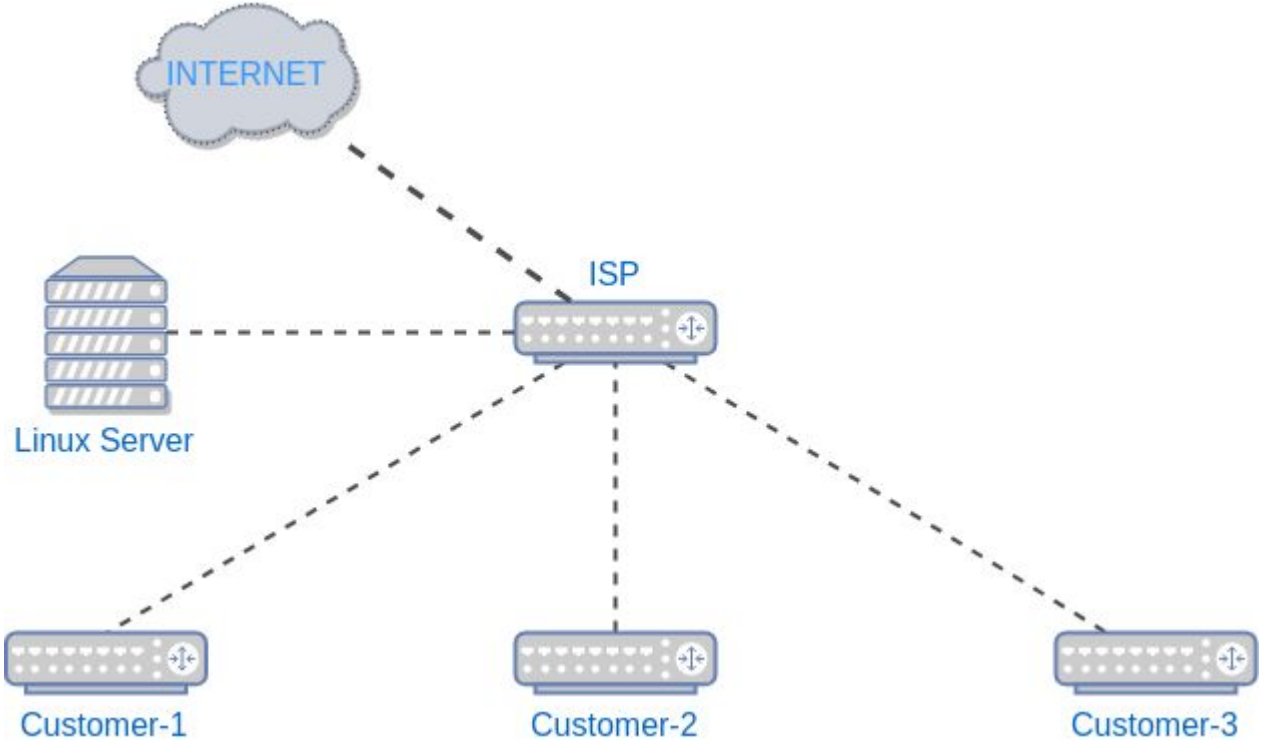

**Reactive**

- Change by event
- Device send information to server

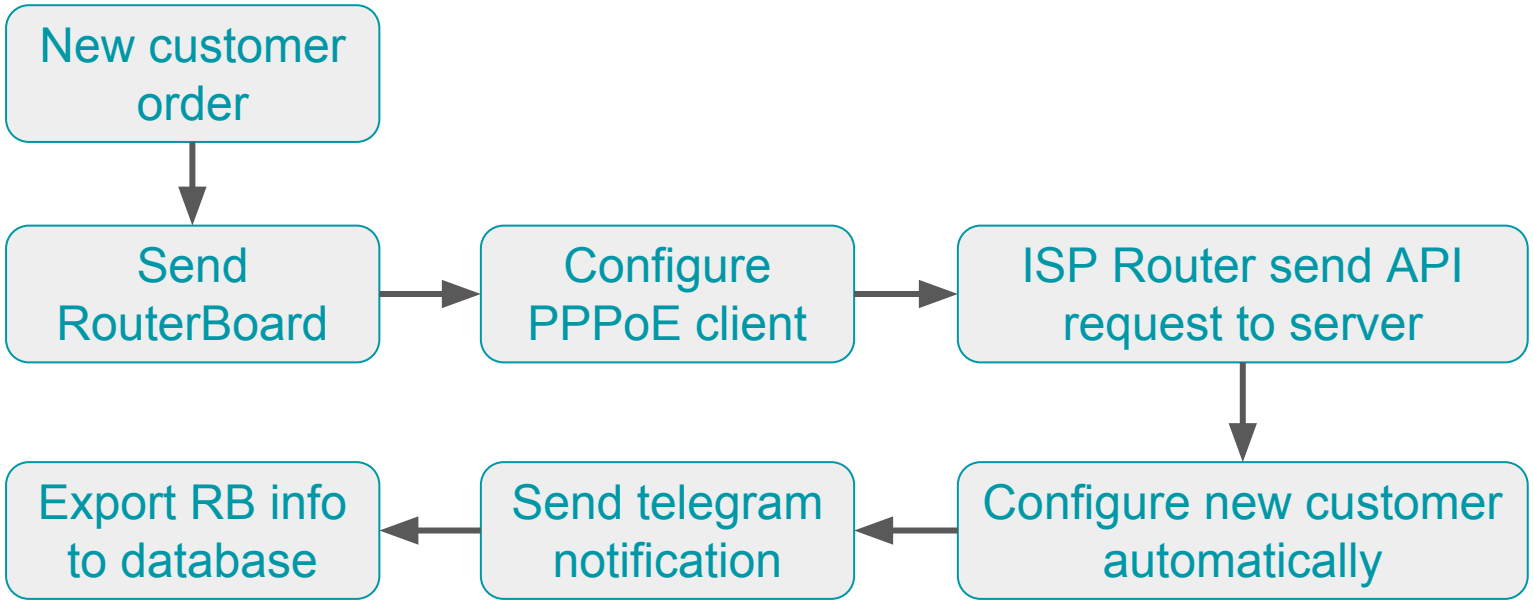
Image Source: EN-SDN Slide by Zufar Dhiyaulhaq

# Demo Time

# Topology



# Flow Chart



# Question?

# Further Reading

- Mikrotik Scripting
  https://wiki.mikrotik.com/wiki/Manual:Scripting
- Mikrotik API
  https://wiki.mikrotik.com/wiki/Manual:API
- Mikrotik Python
  https://wiki.mikrotik.com/wiki/Manual:API_Python3
- My Github
  https://github.com/arrosid

# Got more question? Stay in touch!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