Zero-effort Monitoring Support

University of Amsterdam
Network and System Engineering

Julien Nyczak

Supervisor: Rick van Rein, ARPA2.net

Introduction

- Linux shipped with large amount of packages
- systemd, the new init system
- Process information available through systemd
- SNMP, standardized monitoring protocol

Related Work

- Existing process monitoring solutions:
  - Linux Process Monitoring with Nagios:
    - Not using SNMP
    - Plugin required on the host side
  - SNMP plugin for Nagios *check_snmp_process.pl*
    - Uses Host Resources MIB (RFC2790)
    - MIB covers only running processes
    - MIB not aware of invalid process state
    - No need of subagent

Related Work (2)

- Existing process monitoring solutions:
  - UCD-SNMP-MIB
    - Covers running processes and their state (running or not)
    - Specific snmpd.conf configuration on monitored host
    - No need of subagent

Research Questions

- How feasible it is to integrate service monitoring in a generic manner for different systems (e.g. Red Hat and Debian)?

- How can SNMP be used to relay service status to a monitoring station and be aware of changes to adapt to them in an automated way?

Background - systemd

- Developed in 2010 by Lennart Poettering
- New init system
- Uses unit files instead of old init shell scripts
- Unit status can be queried with *systemctl* command

Background – The AgentX Protocol

- Standard for master and subagent communication
- Subagent not aware of SNMP traffic
- Has access to management information
- Registers OIDs with the master agent
- Binds OIDs with variables

Requirements for Automatic Service Monitoring

- Linux packages with a unit file
- Subagent built upon NET-SNMP -> tool packaged in rpm, with NET-SNMP as a dependency
- Started by default by systemd at boot time

Proof of Concept - Subagent

- Written using the python-netsnmpagent Python module developed by Pieter Hollants licensed under GPL v3
- Written for the Network Service Monitoring MIB (RFC2788)
- 3 OIDs used under the applTable:
  - applIndex
  - applName
  - applOperStatus

Proof of Concept – Subagent (2)

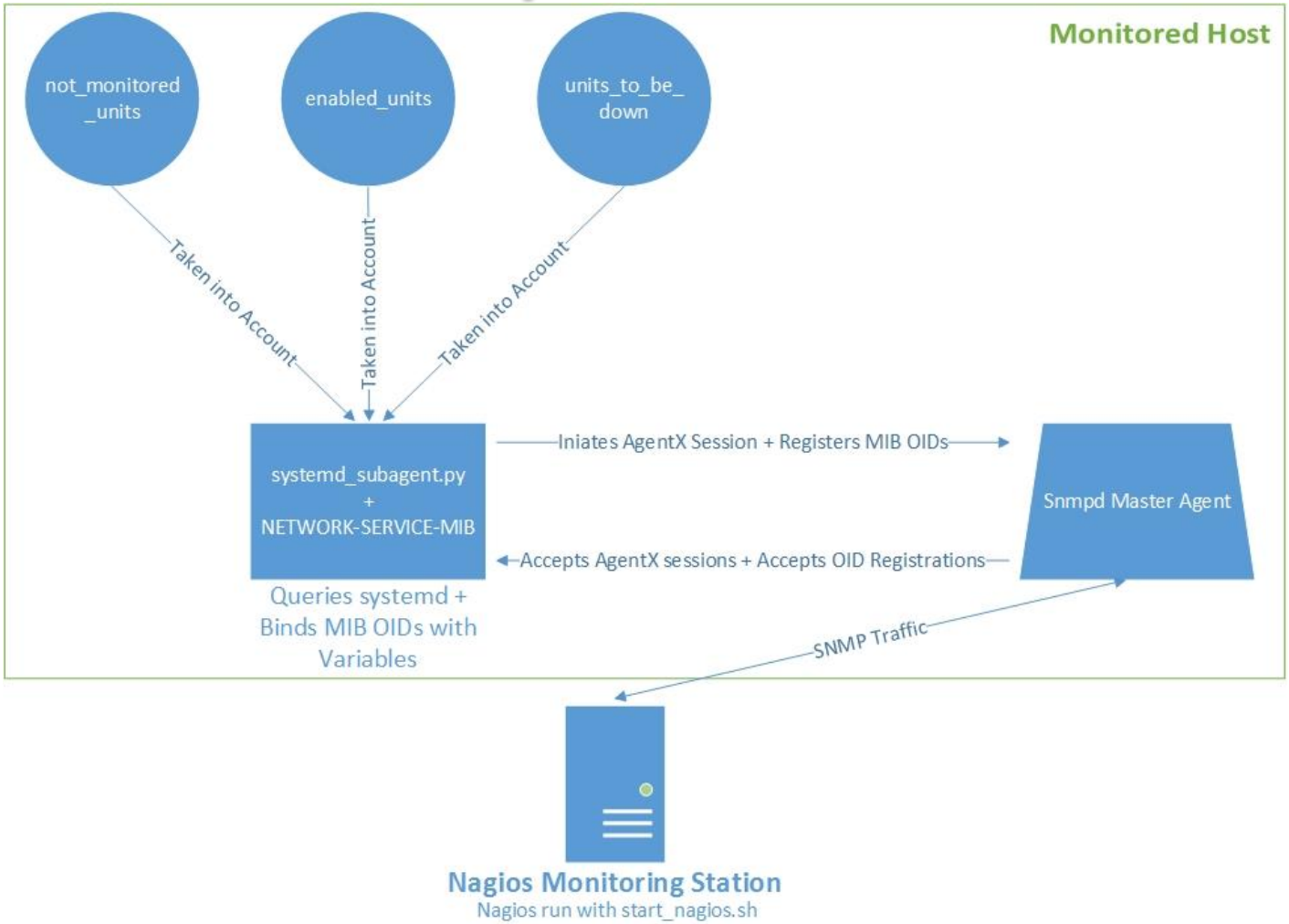
- Queries ALL service units with systemctl commands
  - unit is **active**, **active and enabled** or **inactive and should be**: applOperStatus = **1**
  - unit is **active but not enabled but should be**: applOperStatus = **3**
  - unit in **unknown** status: applOperStatus = **3**
  - if other state (**inactive, failed**): applOperStatus = **2**

- Can be configured with files to fine-tune monitoring:
  - units NOT to be monitored
  - units to be started at boot time
  - units that must be down

Proof of Concept – Monitoring

- Nagios
- No existing perfect SNMP plugin
  - Modified version of *check_snmp_table.pl* by William Leibzon licensed under GPL v2
  - Called in a home-made shell script
- But “proper” plugin needed

Proof of Concept - Workflow



Demo

Conclusion

- Zero-effort monitoring support idea possible
- systemd is generic enough
- All packages should have a unit file
- Tool could be packaged and started by systemd at boot time
- Network Service Monitoring MIB lacks status specific to systemd

Future Work

- Develop the subagent in C
- Create a MIB meant for systemd unit monitoring (status specific to systemd)

Thank you for your attention!

Questions?

Julien.Nyczak@os3.nl