Arduino and Nagios Integration for Monitoring

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Commercial Solutions

Advantages

- Highly integrated environments
- Sensors and controllers nicely packaged
- Support
- Wide range of sensors available

Disadvantages

- Expensive for small Data-Centers (≤ 10 Racks?)
  - APC: ~ 370€+ sensors (≥ 30€ each)
  - AVTech: ~ 110€+ 1 sensor (≥ 25€)
  - ServersChecks: ~ 180€+ 1 sensor (≥ 45€)
  - Domodesk: ~ 480€+ sensors
- Expanding them requires, some times, to buy from the same vendor
Open hardware/Software solutions

Pros
- They can be highly integrated environments
- Highly customizable by the user
- Affordable.
- Wide range of sensors available
- Can be bought as a full solution

Cons
- Lots of work if DIY:
  - Software: Arduino, sensors and control programs
  - Hardware: some soldering
- Lack of support if DIY
- Could be expensive if bought from a vendor
It is a well known open source monitoring solution
Nagios

- It is a well known open source monitoring solution
- High number of sensors already available

SNMP
Current Load
Current Users
Disk use
HTTP
CVMFS
Ping
SSH
etc...

Warning?
Critical?
Measurement
Critical Message
No
Warning Message
Message|perf data
No
exit(0)
exit(1)
exit(2)
Start
Yes
Yes
Nagios

- It is a well known open source monitoring solution
- High number of sensors already available
- Easy to create new sensors
Nagios

- It is a well known open source monitoring solution

- High number of sensors already available

- Easy to create new sensors

- Plenty of add-ons to extent basic functionality
It is a well known open source monitoring solution

High number of sensors already available

Easy to create new sensors

Plenty of add-ons to extent basic functionality

It is the monitoring software we have been using for \(~10\) years
It is a simple microcontroller board and a development environment.
It is a simple microcontroller board and a development environment

It was designed to be:
- Inexpensive
- Cross-platform
- To have a Simple, clear programming environment
- Open source and extensible software
- Open source and extensible hardware
It is a simple microcontroller board and a development environment

It was designed to be:
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- Cross-platform
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- Open source and extensible hardware

Its capabilities can be extended with the use of shields, that is, boards that can be plugged on top of the Arduino.
Software

Node 1
SNMP Trap Handler (perl)

Node 2
SNMP Trap Handler (perl)

Node 3
SNMP Trap Handler (perl)

Node 1
SNMP Trap Handler (perl)

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Software

Implementation

Nagios
Nagiosgraph
Nagios Server
Sensor (python)
Sensors
Information flow
Server
SNMP Relay (perl)
Query Arduino (python)
Query Sensor
Arduino+GSM shield

Node 1
SNMP Trap Handler (perl)
Node 2
SNMP Trap Handler (perl)
Node 3
SNMP Trap Handler (perl)

Response
Request

Information flow

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Software

Implementation

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Hardware

Humidity Sensor
Pressure Sensor
Temperature Sensors

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Humidity Sensor

Pressure Sensor

Temperature Sensors

Made with Fritzing.org
Implementation

Hardware

Humidity Sensor

Pressure Sensor

Temperature Sensors

- Ground
- Voltage
- Data
- CLK/SCL

Made with Fritzing.org
Project Costs

Our project:

1. Arduino Mega 2560: 46€
2. GSM Shield: 97€
3. 24 DS18B20 (Temperature): 198€
4. 1 Sensirion SHT75 (Humidity): 40€
5. 1 Bosch BMP085 (Pressure): 23€
6. 2 Prototype boards with continuous strips: 20€

Total: 424€

Other vendors (without GSM): APC ~ 1000€, AVTech ~ 1200€, ServerChecks ~ 1300€
Results
Results

**Temperature**

Day

Week

Month

Year

**Daily Pressure**

**Daily Humidity**