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Fun with Analytics

- Intro – About Us
- What is this “fun” all about?
- Hardware
- The Solution
- Results
Who Are We?

Marcello Lino

- Senior Security Engineer
  - 25+ years of IT experience
  - Background in database, development, *NIX
  - Using Splunk for 3 years
  - Splunk Certified Architect

- Hobbies
  - Play guitar (mostly metal \m/)

James Sullivan

- Senior Security Engineer
  - 15+ years of IT experience
  - Background in *NIX, Python, Security
  - Using Splunk for 3 years
  - Splunk Certified Architect

- Hobbies
  - Hiking
The idea came from a 6th grade science project.

- Objective was to grow plants on different soil types and analyze the results
  - Soil matter → Clay, Sand, Dirty and Silt.
  - And more and more questions started to come up ...
    - How do we measure the amount of water required?
    - Do we need a green house to ensure a constant, stable environment?
    - How do we know if the environment is healthy or not?
      - Sun light?
      - Temperature?
      - Moisture?
      - Humidity?
Let’s Make It Fun
Science Project

So we thought … Let’s collect all the required data automatically!

- Having this data collected allows near real-time analysis on:
  - Illumination (lux)
  - Soil moisture
  - Current greenhouse temperature and humidity

- Data is streamed to Splunk for:
  - Analytics
  - Visualizations
“A **Theory** Can Be Proved By **Experiment**; But No Path Leads From Experiment To The Birth Of A Theory.”

Albert Einstein
Equipment Used
Science Project

- Raspberry Pi 3
- Sensors, chips, etc:
  - Light intensity sensor BH1750
  - MCP3008 Microchip 8 Channel 10 bit
  - Breadboard MB102 & jumper cables
  - Temperature and Humidity sensor AM2302
  - Soil Moisture Sensor And Automatic Watering System (AWS was not implemented)
  - Traffic light LEDs
Software Used

Science Project

- Python scripts created for data collection and alerts
- Splunk Universal Forwarder
- Splunk Enterprise (free version!)

Process Flow

Alerts will trigger LEDs Using SDK
And When We Put Everything Together
Science Project

- First… Isabella received A+ as final grade (applause…)
- LEDs light up whether the plants are in optimal (Green) or bad conditions (Red).
  - Need water
  - Has too much water
  - Temperature
  - Too humid could indicate plants cannot breath
- Splunk visualizations allows real time analytics
The Sourcetypes
Science Project

- Greenhouse – Temperature and Humidity
  - Near real-time collection using sensors and Splunk UF

- Growth – Daily plant measurements (in inches)
  - Isabella measured daily and fed results into Splunk via dashboard form input

- Soil – Moisture for each of the soil types
  - Near real-time collection using sensors and Splunk UF

- Data (output) was written w/ normalized timestamps, line breaks and key=value (or JSON) pairs to make indexing and field extraction automatic.
A series of dashboards and reports were built based on Isabella’s requirements

- Temperature and Humidity: Show me the min, avg and max by day
- How much did the plant grow for each soil type by day
- Moisture levels by soil matter. Let’s make sure they are at the right level.
The Splunk SDK for Python was installed on the Raspberry Pi device.

Every 30 seconds, a script would:
- Search moisture levels and trigger LED lights.
  - >1000 (Red) = Too Dry!
  - Between 800 and 1000 (Yellow)
  - Between 600 and 800 (Green)
  - Between 100 and 500 (Yellow)
  - <100 (Red) = Too Wet!

The Python SDK package includes sample scripts (eg. search.py) that helped us get up and running quickly.
Use the `timechart` command to visually measure growth by day.

- **Sample search**: … | timechart max(clay) as “clay (in.)”
Use the **delta** command to compute the difference in growth by day.

- Powerful splunk command that computes the difference, **in search order**, between the field value for the event and the field value for the previous event.

- **Sample search:** … | delta sand as “sand (growth)”
Predict Future Growth by Day
Science Project

► Use the **predict** search command to predict future growth.

• **Sample search**: … | timechart max(clay) as “clay (in.)” | **predict “clay (in.)”**
Predict Using The Splunk MLT Science Project

- Use the Forecast assistant in the Splunk Machine Learning Toolkit
  - Prettier visualization!
Thank You

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