2021 ZABBIX
Financial Services Use Case

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West Highland Support Services is the leading Market Data Solutions company serving the financial services vertical.

WHSS optimize client market data ecosystems by providing cost effective and optimized operations, business management, administration and outsourced services.

Our clients are Investment Banks, Asset Managers, Hedge Funds, Brokers, Wealth Managers, Market Data vendors, PE Firms, Ratings Agencies, Commodities firms, Energy firms, and Exchanges.

We facilitate our client's ability to reduce their overall spend of market data, introduce visibility into expenditures, trends, usage, and establish key metrics to ensure that the operation of their global market data environments achieve maximum uptime at the lowest cost.

One of the tools we use to help clients achieve this, is Zabbix.
AGENDA

- History of Zabbix for West Highland
- What is Market Data
- Financial Vertical Problem
- Critical Metrics for Market Data
- Custom Network Templates / Conflating
- Custom CPU Monitoring / Power Management
- Reporting Metrics
- Resultant benefits to our clients
- Questions?
History of Zabbix for West Highland

- Started using Zabbix with 1.8 in December 2009
- Goal was to mimic the alerts available from a commercially available tool
- Fully Deployed monitoring to entire site by March 2009 roughly 20 servers
- Lots of growing pains related to the database and the amount of data we were collected.
- Out of the Box Templates don’t fit every model, especially Market Data
- We upgraded to Zabbix 2 and were running that until 2019
- Deployed Zabbix 4.0, Then Zabbix 4.2, Then Zabbix 5.0
- Currently Running Zabbix 5.0.15
- Dashboards are Key!
What is Market Data?

- Real Time
  Also known as Tick by Tick Data. What is GOOG trading right now?
- Quote Data
  What is GOOG worth right now?
- Trade Data
  What did someone else just buy GOOG for?
- Reference Data
  Who is the shareholders of GOOG?
- Historical Data
  Give me the last 30 years of GOOG closing prices?
Financial Vertical Problem?

• Latency
  If your data is slower than your competitor, you're at a competitive disadvantage. Alerting is key.

• Volume
  You always need to be ahead of the next peak

• Legacy Monitoring tools or script-based tools
  Most tools are only snapshots in time

• Lack of trending
  People forget the previous peaks and we need to see where things are trending.
  Are we moving up or down for the week, month, or year

• Lack of charting abilities
  Most of the tools had no charting other than what you watched at that moment

• Inability to integrate with other systems
  Closed systems, lack the ability to integrate with other tools

• Lack of intuitive dashboards
  Other tools would require you to look in many different tools to get your answers. New dashboards are key

• Poor Service
  Poor Response to issues equals Poor Service. If you can’t see a problem, you already missed it.
Critical Metrics for Market Data

- **Network Bandwidth**
  Typically, each host has 3 – 4 critical interfaces
  - Client Interface 1,2
  - Messaging Backbone
  - Feed Network
  All range from 1G -> 10G -> 25G

- **Per Core CPU Usage**
  Processes are bound core by core for optimal performance
  - Cores are mostly 20 cores+
  - Power Management of Core

- **Distribution Cache Usage**
  How many symbols are we distributing to users

- **Update Rates / second**
  How many times has those symbols have changed prices in a second

- **Connections**
  How many TCP sessions does all of the applications need to support the current load
Custom Templates - Network Bandwidth

Network Discovery

Traditional Monitoring Tools of Network Traffic (Sampling 30 Seconds)

Zabbix Enhanced Monitoring (10 Second Samples of 100ms peaks)

Even if we turn Zabbix down to the smallest interval we could never see the 100ms peaks. In market data we call this conflating data into the database.
Conflating - Network Bandwidth

- Here is a 10 second sample window.
- For simplicity, it shows 100 data points (10 seconds x 10 100ms samples).
- Traditional monitoring would probably grab this as a peak of 90mb/s.
- Conflating the data to get the peak of the 10 second window grabs this as 700mb/s.
- Combine this with auto discovery on critical boxes. You have great monitoring.
Conflation was key for CPU metrics. Combine mpstat with Zabbix user parameters to get down to 1-second minimums. These graphs are showing idle CPU a low dip is a problem. 30 second Zabbix samples are utilized.

Quick View of critical CPU’s is now possible thanks to dashboards. Dashboards allowed us to pick and chose which CPUs to show in a quick and easy way. Now we can see the impact to the system during the US Fed announcement.
Using tools like Turbostat we are able to see the crippling effect of power management from the Intel Skylake processors. (Simple Scraper -> zabbix_trapper)

Before: Disabling Power Management (CPU sitting at under 300mhz)

After: Disabling Power Management (CPU set to Poll)
How WHSS applied Zabbix

Zabbix is our single pane of glass to monitor all environments

- Refinitiv TREP
  **Parsing Scraper -> Zabbix_sender**

- Bloomberg BPIPE
  **Java App -> Zabbix_sender**

- Solace Messaging Router
  **SEMP Poller and Parser -> Zabbix_sender**

- A.L.I.V.E.
  Separating App recording tick by tick timestamps
  Zabbix polling averages to alert on.

- Data Notification Manager
  **Looking for up coming notifications and alerting of problems.**

- Key tool (ODBC / Zabbix trappers)

- Other metrics
  **Lots of zabbix_trappers**
How WHSS applied Zabbix
Zabbix Frontend Add-ons

- Zabbix 2.0
  - We used to add custom pages by modifying the core PHP scripts
  - 😞 This was no fun when it came to upgrades
  - Hence why we stayed on Zabbix 2.0 for so long

- Zabbix 5.0
  - All add-on pages are written in PHP using zabbix-api to pull data from zabbix.
  - Easy to point to different pages in zabbix like (latest data)
  - Pages are navigable via a top bar and we embed zabbix in it.

Upgrades are minor upgrades now when pages names change in zabbix.

Getting excited for Zabbix 6.0
All of our status reports are based on the zabbix api. Get a full snapshot of the production environment at click of a button. These reports used to be scripts and took 5-10 minutes to complete now its only 2 seconds.
West Highland performs benchmarks of the environments and displays key metrics in a Capacity Report.

This report lets our clients know how their system fared today compared to yesterday / last week / last month / last year.

All this data is based on Zabbix trends via php using mysql queries. Its not the most elegant but it works well.
Client Benefits

• Realtime Alerting
• Millisecond data
• Instant Notification as the issue occurs
• Proactive monitoring
• Capacity Planning
• Ability to analyze what happened during the last outage
• Deep level forensics
West Highland Support Services has a demonstrated history of working in the financial services industry for 23+ years. Bringing together strong technical, administration and business experience allows us to look at broader cost savings opportunities for our customers while also providing enhanced 24-hour support. With offices in New York, Connecticut and London we leverage our industry and client experience to provide a best practice approach to our engagements.