

Global Samba 4 AD Domain Tips and Tricks

Disclaimer

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Last year's presentation

- Audio:
https://sambaxp.org/archive_data/SambaXP2017-AUDIO/Day3/Is%20Samba%204%20AD%20ready%20for%20Global%20Enterprise.mp3
- Slides:
https://sambaxp.org/archive_data/SambaXP2017-SLIDES/Day3/Is%20Samba%204%20AD%20Ready%20for%20Global%20Enterprise%20-%20Kevin%20Kunkel.pdf

Kevin Kunkel

IT Systems, Indeed Inc.

About me (Kevin Kunkel)

- Windows 95 converted me to Linux
- Software Engineering at RIT, BS CS from Mercy College
- 12 years of Systems Administration
 - Linux SysAdmin
 - Windows SysAdmin
 - B2B SMB consulting
- 4 years managing large scale Samba AD

Carlos Gonzalez

IT Systems, Indeed Inc.

About Carlos

- Use to be a Mac SysAdmin
- Joined Indeed 2 years ago
- Now manages Indeed's Samba AD Domain

But really, how about you?

This is for you.

You

- Samba Team
- Samba Developers
- Samba Users
- Enterprises/organizations/governments willing to try Samba

The past year for Samba AD

CVE-2018-1057

Password reset exploitation

- All passwords for all users had been susceptible to a bug that would allow anyone to change another user's password, since... FOREVER
 - **This is Bad**

Password reset exploitation

- All passwords for all users had been susceptible to a bug that would allow anyone to change another user's password, since... FOREVER
 - **This is Bad**
- Unless logging is set to 10 (full debug) this exploit would not generate any logs and be undetected. (possibly not even)
 - **This is Even Worse**

Actual impact?

- Truly very little. We have no evidence that this was ever exploited
- but
 - Reinforces a misperception that Samba isn't "enterprise-grade"
- **This is The Worst**

The patches

- Patches were dropped at 8am CEST
 - Great for Europe, Asia, Australia, Pacific Islands
 - Horrible time for the Americas (2am CDT for example)
- I'd like to propose a set time of day for important security updates.
- 2pm CEST - Midnight in New Zealand and 5am PDT
 - Fewest possible SysAd sleeping 1am-5am

Samba Bugs #13095 #13328 etc

Linked attribute mishandling/corruption

- Linked attributes have been the bane of Samba AD administrators
- I have too many repressed memories to elaborate on the causes



Theoretical Company

- Acme Global Corp is a large global multinational with over 10,000 employees, contractors and vendors.
- It has 10s of thousands of user objects in AD with 10s of thousands of groups objects.
- Many of these groups are used to facilitate RBAC to gate access to corporate networks and resources

Theoretical Impact

- Acme Global Corp has an “employees” group with over 7,000 members
- As a large multinational, employees come and go every day.

Before:

Alice
Bob
Charlie
...
Xavier

After:

Alice
Bob
Bob
...
Bob

Theoretical Impact (continued)

- Large swathes of users “removed” from “large” groups
- These same “large” groups are often used to gate access to standard applications and tools (think employees vs contractors vs vendors)
- Some SAML providers will sync AD membership and provision/delete application’s user accounts.
- Acme Global would have experienced widespread outages to core applications

Don't put all your eggs in one basket!



So what then?

- Can we have a single source of truth with multiple baskets?

No! Put all your eggs in one basket
AND THEN WATCH THAT BASKET!

- Andrew Carnegie

Monitoring

Nagios

- Port checks, both local and remotely
 - DNS: 53/tcp 53/udp 5353/tcp 5353/udp
 - Kerberos: 88/tcp 88/udp 464/tcp 464/udp
 - NTP 123/udp
 - SMB/CIFS: 135/tcp 135/udp 139/tcp 445/tcp
 - NETBIOS: 137/udp 138/udp
 - CIFS: 139/tcp
 - LDAP: 389/tcp 389/udp 636/tcp
 - Global Catalogue: 3268/tcp 3269/tcp
 - Dynamic RPC: 1024/tcp **OR** 49152/tcp

Nagios

- Local: **`/usr/bin/sudo fuser 1024/tcp || /usr/bin/sudo fuser 49152/tcp`**
- Remote: **`echo test > /dev/tcp/$HOST_IP/1024 || echo test > /dev/tcp/$HOST_IP/49152`**
- Samba-tool drs showrepl with some awk:

Nagios (check_drs_repl)

```
#!/bin/bash
sudo samba-tool drs showrepl -kno|awk '
BEGIN {
    FS="\t"; RS="" #Tab field separator, blankline record separator
#($1)DC=SAMDOM,DC=EXAMPLE,DC=COM
#    ($3)SITENAME\DOMAIN-CONTROLLER via RPC
#    ($6)DSA object GUID: 8974495f-a191-4d8b-84d1-25ff54f0d45a
#    ($9)Last attempt @ Mon May 30 12:14:32 2016 EDT was successful
#    ($12)0 consecutive failure(s).
#    ($15)Last success @ Mon May 30 12:14:32 2016 EDT
#
}{
    sub(/ via RPC/, "", $3);    # strip off postfix
    sub(/^\.*\V, "", $3);      # strip off site prefix
    sub(/^\./, "", $12);       # remove trailing period from failures
    if( $12 ~ /[1-9]/ ) {      # failures > 0
        sub(/^\.*@/, "", $15); # get time of success
        sub(/NTTIME.*$/, "always", $15); # remove NTTIME with always
        errs=errs"\n"$3" has "$12" syncing "$1" since "$15; #reformat
        sub(/ consecutive.*$/, "", $12); # reduce $12 to error count
        total = total + $12; # total error count
```

```
    } else if ( $9 !~ /NTTIME/ ){ # Successes (ignoring unattempted)
        sub(/^\.*@/, "", $9);    # get time of success
        sub(/was.*$/, "", $9);   # remove "was successful"
        out=out$3" - "$1" - "$9"\n"; # add to output
    }
    lines = lines + 1;           # count output lines
} END {
    if ( lines < 5 ) {
        print "CRITICAL: Samba4 not running!";
        exit 2;
    } else if ( total > 10 ) {
        print "WARNING:"errs out;
        exit 1;
    } else {
        print "OK:\n"errs out;
        exit 0;
    }
}'
```

Example Healthy check_drs_repl output

OK:

DSA object GUID: ddcda871-524e-48c2-87eb-892234f9f159 - SITE1\DOMAIN-CONTROLLER -

- ==== INBOUND NEIGHBORS ==== -

SITE2-DC2 - CN=Schema,CN=Configuration,DC=SAMDOM,DC=EXAMPLE,DC=COM - Wed Jun 6 10:41:31 2018 EDT

SITE4-DC1 - CN=Schema,CN=Configuration,DC=SAMDOM,DC=EXAMPLE,DC=COM - Wed Jun 6 10:41:31 2018 EDT

SITE3-DC1 - CN=Schema,CN=Configuration,DC=SAMDOM,DC=EXAMPLE,DC=COM - Wed Jun 6 10:41:31 2018 EDT

SITE5-DC1 - CN=Schema,CN=Configuration,DC=SAMDOM,DC=EXAMPLE,DC=COM - Wed Jun 6 10:41:31 2018 EDT

SITE6-DC1 - CN=Schema,CN=Configuration,DC=SAMDOM,DC=EXAMPLE,DC=COM - Wed Jun 6 10:41:32 2018 EDT

SITE2-DC2 - DC=ForestDnsZones,DC=SAMDOM,DC=EXAMPLE,DC=COM - Wed Jun 6 10:41:29 2018 EDT

SITE4-DC1 - DC=ForestDnsZones,DC=SAMDOM,DC=EXAMPLE,DC=COM - Wed Jun 6 10:41:29 2018 EDT

SITE3-DC1 - DC=ForestDnsZones,DC=SAMDOM,DC=EXAMPLE,DC=COM - Wed Jun 6 10:41:29 2018 EDT

SITE5-DC1 - DC=ForestDnsZones,DC=SAMDOM,DC=EXAMPLE,DC=COM - Wed Jun 6 10:41:30 2018 EDT

SITE6-DC1 - DC=ForestDnsZones,DC=SAMDOM,DC=EXAMPLE,DC=COM - Wed Jun 6 10:41:30 2018 EDT

Example Warning check_drs_repl output

WARNING:

SITE-DC3 has 13 consecutive failure(s) syncing CN=Schema,CN=Configuration,DC=SAMDOM,DC=EXAMPLE,DC=COM since Sun Jun 3 11:07:40 2018 CDT

SITE-DC3 has 13 consecutive failure(s) syncing DC=ForestDnsZones,DC=SAMDOM,DC=EXAMPLE,DC=COM since Sun Jun 3 11:07:36 2018 CDT

SITE-DC3 has 13 consecutive failure(s) syncing DC=SAMDOM,DC=EXAMPLE,DC=COM since Sun Jun 3 11:07:41 2018 CDT

SITE-DC3 has 13 consecutive failure(s) syncing DC=DomainDnsZones,DC=SAMDOM,DC=EXAMPLE,DC=COM since Sun Jun 3 11:07:38 2018 CDT

SITE-DC3 has 13 consecutive failure(s) syncing CN=Configuration,DC=SAMDOM,DC=EXAMPLE,DC=COM since Sun Jun 3 11:07:43 2018 CDT

DSA object GUID: 103d5a2d-5c53-44a8-8f72-a07ad07d9e6b - SITEORP\SITE-DC4 -

- ==== INBOUND NEIGHBORS ==== -

SITE11-DC1 - CN=Schema,CN=Configuration,DC=SAMDOM,DC=EXAMPLE,DC=COM - Sun Jun 3 12:15:09 2018 CDT

SITE-DC1 - CN=Schema,CN=Configuration,DC=SAMDOM,DC=EXAMPLE,DC=COM - Sun Jun 3 12:16:51 2018 CDT

SITE-DC2 - CN=Schema,CN=Configuration,DC=SAMDOM,DC=EXAMPLE,DC=COM - Sun Jun 3 12:15:24 2018 CDT

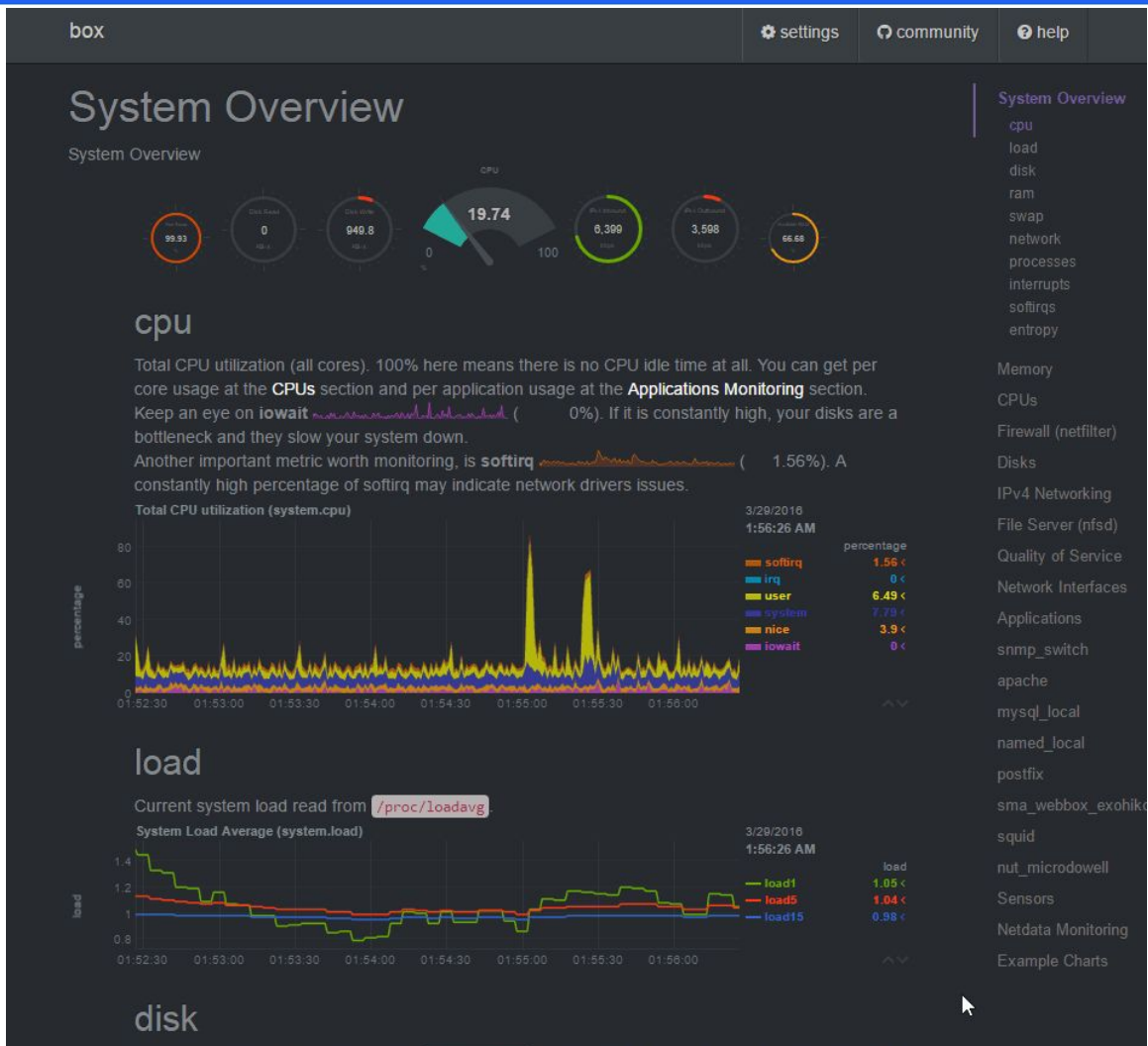
Nagios

- LDAP
 - `/usr/lib64/nagios/plugins/check_ldap -H localhost -b "dc=samdom,dc=example,dc=com" -D "dj@samdom.example.com" -P REDACTED`
- DNS
 - `/usr/lib64/nagios/plugins/check_procs -C named -c1:`
 - `/usr/lib64/nagios/plugins/check_dns -H host.example.com -w1 -c3`

Netdata

- <https://github.com/firehol/netdata>
- “netdata collects several thousands of metrics per device. All these metrics are collected and visualized in real-time.”

Netdata





netdata is a **monitoring agent**: you install it on all your systems:

- supports **auto-detection** and **zero configuration** for most applications and systems
- is **real-time**: every metric is on your dashboard in just 1-second (collection to visualization)
- is **fast**: for a few thousand metrics per second, it needs just 1% CPU of a single core
- and **efficient**: it needs a few MB of RAM and no disk I/O at all while it runs
- also, it is **embeddable**, **extensible**, and **open-source** (GPL v3+)

...and netdata runs everywhere:



netdata

simple. effective. awesome!

<https://my-netdata.io>

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Costa Tsaoasis

(costa@tsaoasis.gr)

Prometheus

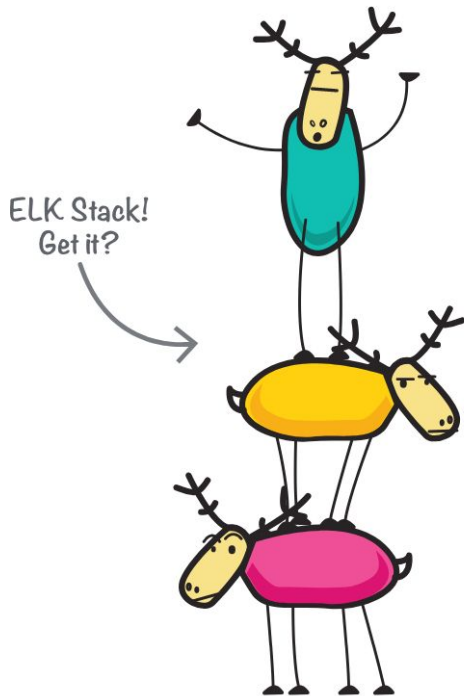
- <https://prometheus.io/>
- Time series database
- Central repository for netdata data

Grafana

- <https://grafana.com/>
- “No matter where your data is, or what kind of database it lives in, you can bring it together with Grafana. Beautifully.”
- Can pull from Zabbix, Prometheus, ElasticSearch
- Calculates Domain Jackedness Factor

Elastic.co

- <http://elastic.co>
- "ELK" stack
 - Filebeat
 - Logstash
 - Elasticsearch
 - Kibana



E Elasticsearch

L Logstash

K Kibana

Filebeat

- <https://www.elastic.co/products/beats>
- Filebeat is a lightweight log data shipper
- Prospectors monitor log files, converts to json and ships to desired output.

```
- input_type: log
  paths:
    - /var/log/log.samba.json
  fields_under_root: true
  fields:
    tags: ['json']
```

```
multiline:
  pattern: '^20'
  negate: true
  match: after
  max_lines: 4000
  tail_files: false
```

Logstash

- <https://www.elastic.co/products/logstash>
- “Logstash is an open source, server-side data processing pipeline that ingests data from a multitude of sources simultaneously, transforms it, and then sends it to your favorite “stash.” (Ours is Elasticsearch, naturally.)”
- Log transformation and data extraction

Logstash grok filters:

- Turning this:

```
[2018/03/07 11:50:07.827974, 2]
```

```
../auth/auth_log.c:760(log_authentication_event_human_readable)
```

```
Auth: [Kerberos KDC,ENC-TS Pre-authentication] user  
[(null)]\[i-109750$@SAMDOM.EXAMPLE.COM] at [Wed, 07 Mar 2018 11:50:07.827966  
IST] with [(null)] status [NT_STATUS_NO_SUCH_USER] workstation [(null)]  
remote host [ipv4:10.218.43.15:59902] mapped to [(null)]\[i-109750$@SAMDOM.EXAMPLE.COM]. local  
host [NULL]
```

Logstash

- into this:

```
{datetime: 2018/03/07 11:50:07.827974
```

```
samba_source_line: ../auth/auth_log.c:760
```

```
samba_source_function: log_authentication_event_human_readable
```

```
authentication_type: Kerberos
```

```
...
```

```
}
```

Elasticsearch

- <https://www.elastic.co/products/elasticsearch>
- “Elasticsearch is a distributed, RESTful search and analytics engine capable of solving a growing number of use cases. As the heart of the Elastic Stack, it centrally stores your data so you can discover the expected and uncover the unexpected.”
- Very simple to manage and scale

Kibana

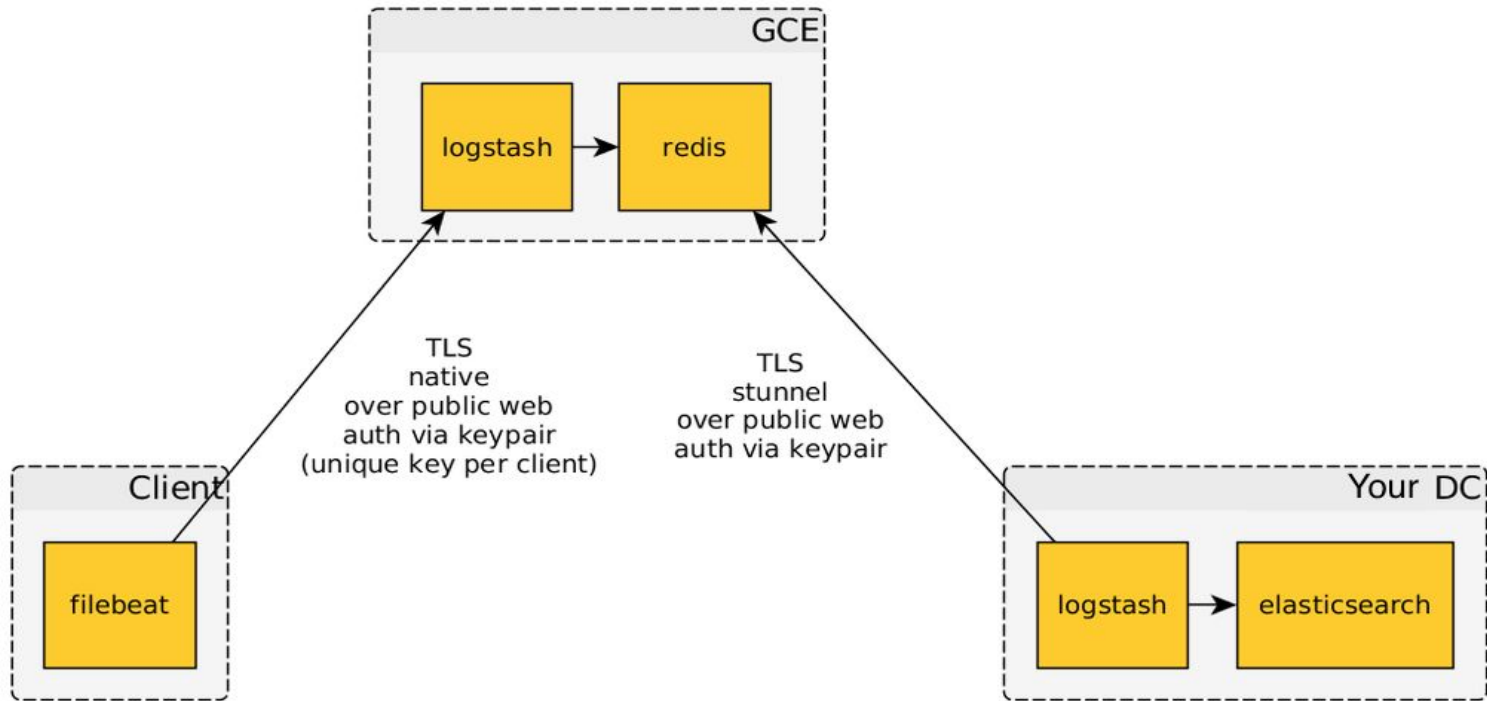
- <https://www.elastic.co/products/kibana>
- “Kibana lets you visualize your Elasticsearch data and navigate the Elastic Stack, so you can do anything from learning why you're getting paged at 2:00 a.m. to understanding the impact rain might have on your quarterly numbers.”
- Powerful, flexible visualization tool for Elasticsearch (only)

ElastAlert

- <https://elastalert.readthedocs.io/en/latest/>
- “Easy & Flexible Alerting With ElasticSearch”
 - “Match where there are X events in Y time” (`frequency` type)
 - “Match when the rate of events increases or decreases” (`spike` type)
 - “Match when there are less than X events in Y time” (`flatline` type)
 - “Match when a certain field matches a blacklist/whitelist” (`blacklist` and `whitelist` type)
 - “Match on any event matching a given filter” (`any` type)
 - “Match when a field has two different values within some time” (`change` type)

Multiple domains over multiple networks?

- Use the cloud!



Configuration Management

Puppet

- <https://puppet.com>
- Configuration management
- Includes an internal CA and basic cert handling
- Puppet Forge: <https://forge.puppet.com/kakwa/samba>

The Foreman

- <https://www.theforeman.org/>
- External node classifier
- Ability to set parameters on a variety of conditions
- GUI interface for fact collection

Managing Replication with KCC

The Power of Three (or $n+1$ where $n=2$)

- Group sites geographically into triplets
- Create intersite links to connect these small groups

The not-too-distant future of Samba

Better testing

- “Lab” Domain
 - backup/rename of existing domain to preserve scale and number of objects to better mirror our production domain

Better testing

- “Lab” Domain
 - backup/rename of existing domain to preserve scale and number of objects to better mirror our production domain
- Production workload emulation with `traffic_replay`

Better KCC

- Why can't the domain update link costs automatically based on site to site latency?

Better KCC

- Why can't the domain update link costs automatically based on site to site latency?
- Why do I need to limit the number of replication partners?
 - Can't it limit the active links to only what's needed?

Better KCC

- Why can't the domain update link costs automatically based on site to site latency?
- Why do I need to limit the number of replication partners?
 - Can't it limit the active links to only what's needed?
- If a bridgehead server isn't specified in a site, it becomes an island.

Thank you

Thank you

- Microsoft
- Catalyst
- SerNet
- Samba Team and community

Q & A

