An Introduction to Syslog

Rainer Gerhards
Adiscon
What is Syslog?

- The “heterogeneous network logging workhorse”
- a system to emit/store/process meaningful log messages
- both a communications protocol as well as a set of actual programs and libraries
- designed for system admins to keep machines up and running
- Great way to get heterogeneous data into a single data repository
What is Syslog being used for?

- Troubleshooting Routers/Firewalls/Devices
  - during installation
  - in problem situations
- Intrusion Detection
- Operations Management
- (Long Term) Auditing
- tracking user and admin activity
Where is Syslog Available?

- Native to all flavors of UNIX and Linux
- Third parties on Windows and other OSs
- Syslog Data is sent by almost all network equipment:
  - Routers
  - Firewalls
  - Switches
  - And other “active” boxes
**Syslog Roles**

- **Device** – generates message (may be a program)
- **Collector** – receives and optionally stores messages. Commonly known as syslog daemon or server.
- **Relay** – receives and forwards message
- **Sender** – anyone who sends syslog messages (device & relay)
- **Receiver** – anyone who receives syslog messages (relay & collector)
Syslog – Protocol vs. Application

- Some confusion stems from the fact that the name “syslog” is often used both for the protocol and several “syslog applications”.
- The actual syslog applications vary greatly (performance, stability, security... - as usual)
- This presentation talks about protocol issues, which should be common across all applications.
Passive Nature of Syslogd

- “just like TV” - only records what is sent to it
- The syslog receiver is passive and waits for incoming input – it does not actively gather it (but it needs to be configured to accept network messages)
- The senders must be pointed to send data to the syslog receivers
Typical Syslog Setup - Small

- One or multiple senders send data to a single, central syslog server
- Server stores (e.g. analysis) and/or may act on received data
- Typically all on one LAN.
Typical Syslog Setup - Larger

- Senders send data to intermediary syslog servers
- Intermediary receives, may filter and forward message to final destination
- Typically found in larger enterprises.
Fields you Should Know

• Fields commonly found
  - Facility
  - Severity
  - Timestamp
  - Host
  - Tag
  - Message

• Not all of them always present – largely depending on implementation and configuration

• Fields can be used for filtering and processing
Syslog - Facility

- numerical indicator (0..23) of sender component/application that sent the message
- Each of the values is assigned a friendly name
- For example, on Unix systems, facility 0 is traditionally used for kernel messages, 2 for mail subsystem messages, and values 16-23 are reserved for local customization.
- Other implementations may use it differently.
- In general: a more-or-less user-assigned value to be used for filtering at the server side.
Syslog - Severity

- Another integer value with a range from 0 to 7
- Indicates the severity / importance of a message (thus the name ;-) - but some implementations do not properly support this
- The lower the number, the more important the message is deemed to be (e.g. 0 is “emergency” and 7 “debug”)
- This too is most often be used to filter incoming messages (e.g. Where to store, page users, ...)
Syslog - Timestamp

• If present, most often a timestamp with just the date and day of month, hour, minutes and seconds
• Most often no time zone, year or better-than-second resolution
• Often wrong! ... due to out-of-sync internal device clocks (e.g. Clock always starts at Jan, 1\textsuperscript{st} 1997 after power up)
  – If supported (by device), plan for NTP or similar mechanism to solve this.
• Improved in upcoming standards
**Syslog - Host**

- Name or IP-Address of the sender
- Sometimes missing, sometimes present, sometimes meaningless or invalid (depending on configuration)
- Often duplicate if multiple networks are being monitored (e.g. a service provider monitoring customer networks)
- Intention is to provide the name of the original sender when passing through syslog relays.
Syslog - Tag

- A short ID made up of printable characters
- Most often identifies the process/device sending the message
- Sometimes contains a static process name and a dynamic process ID (changing after each reboot)
- Actual format is very different between implementations
Syslog - Message

- Confusing – a “syslog message” contains a “message”
- The textual part after all the “header” fields (facility, severity, ..., tag)
- Often non-structured clear-text intended for human recipient
- Sometime better machine-parsable form (but then less human readable)
Syslog Limitations

- 1K message size
- Not the most secure protocol in this world...
- Reliability issues
- As the content format is not standardized, there is a large variety of message contents (but almost all are human readable).
- Side note: “human readable” does not necessarily mean that the message makes sense in all cases...
Can you Trust Syslog?

- Good enough for many cases
- BUT
  - Not 100% reliable delivery (UDP based)
  - Sender address can be easily faked
  - Open to replay attacks
  - ... and more
- If you deploy syslog, spend some time thinking on how to do it securely!
- Again, newer standards provide better protection
Syslog Reliability

• “traditional” syslog works OK over a non-congested LAN
• Expect some packet loss when the network is congested, the sender or receiver is busy, the network is slow (WAN) or there is a large burst of syslog traffic
• Plan for some minor packet loss in your analyzer
• Experience shows it is reliable enough to work
• Newer developments promise better reliability
What if I need more Reliability?

- Think about non-standard extensions, e.g. raw tcp syslog (some vendors do this)
- Try to implement the new standards (RFC3195!) as soon as possible
- Be sure to think about the “big picture” in a larger network
- Make sure the central syslog receiver is monitored and backed up! Use a redundant configuration if it is mission-critical. (reliability issue #1!)
Syslog Standardization

- Been around for long, but only recently standardized (beginning in 1999)
- To learn about standardization process, visit IETF syslog-sec WG homepage at http://www.employees.org/~lonvick/index.shtml
- NO standardization on the actual content so far.
- Still a large variety of “interpretations”
- So far, few if any implementations of the new standards. They will appear over time...
Questions?

• My page with further links and information to syslog:

http://www.monitorware.com/en/topics/syslog/

• Just mail me ;-)

rgerhards-at-adiscon.com

(I am sometimes swamped, so please bear a little with me if a reply takes time – but re-send when you do not hear back within 1 week – this is an indication your message ended up in the SPAM filter...)

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