Service Level Monitoring with Nagios

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Outline

- Introduction
- Design & Architecture
- Implementation
- Conclusions

SLA metrics

- Dependence of modern applications (e.g. VoIP)on characteristics such as
  - Packet Round Trip Time.
  - Jitter.
  - Packet Loss.
  - One way delay.
- Definition of Service Availability and SLA's based on these qualities.

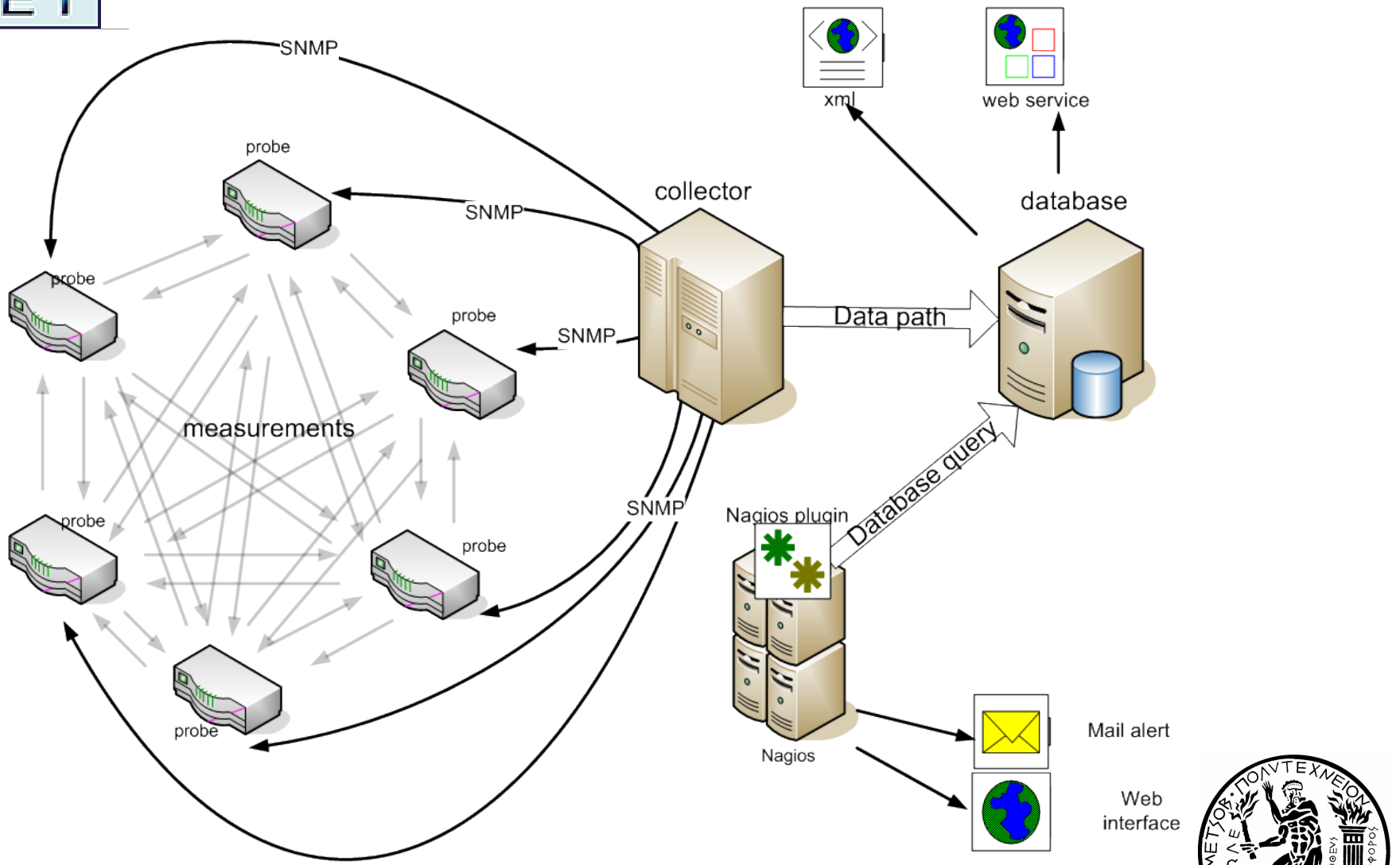
Aspects of SLA monitoring

- Execution of measurements using Network Probes.
- Collection of data.
- Processing.
- Presentation of information.
- Integration with Network Management Systems.

Goals

- Accuracy of measurements.
- Easy deployment of probes.
- Low installation cost.
- Simplified operation.
- Efficient communication.
- Resiliency of data path to outages.
- Standards compliance.
- Modularity and reusability.

Architecture Overview



Probe Implementation

Cisco Service Assurance Agent (IOS feature).

- Definition of functional units (*Probes).*
- Scheduling of probes.
- Measurement of Round Trip Time, RTT variance (jitter), one way delay, packet loss.
- Aggregation of measurements and inclusion of statistical properties.
- Data available though the SAA-MIB for up to 24 hours back.

Data Collector

- Gathering of measurement data from SAA capable devices.
- Storing of data in a database.
- Usage of SNMP for gathering phase.
- Designed to run unattended
  - Ability to detect reloads and outages.
  - Ability to detect new probes as they appear.
- Many instances can work together.

Database Schema

- Tag registry.
  - Probe ID (router, probe tag).
  - Probe characteristics.
- Echo probes table.
- Jitter probes table.
- Indexed by probe ID and time to optimise large queries.

Nagios

- Network and Service monitoring tool.
- Concept of hosts and services.
- Web interface, mail alerts, paging.
- Extensible architecture through service checkers (Nagios *Plugins).*
- *Plugins* == external commands.
- Well known plugin interface.

Integration with Nagios

- Nagios plugin capable of reading from the measurement database.
- Comparison against predefined metrics such as
  - Downtime calculation.
  - Jitter thresholds tolerable for VoIP operation.
- Monitoring of SLA's on hourly, daily, weekly, monthly and yearly basis.
- Fine grained monitoring for work hours, work days and calendar periods.

SAA probe details

- Usage of ICMP echo and Jitter probes on routers.
- Requirement for the SAA responder feature in order for the Jitter probes to function.
- Probe configuration: 10 • 1000bit packets every minute for each probe.
- Hourly aggregation of measurements.
- Back store tuned to 3 hours to minimise memory usage.

Probe deployment strategy

- Standard SAA configuration same for all selected devices to homogenise deployment.
- Echo every router in the network (All pairs).
- Jitter every router in the network (All pairs).
- Probe configuration installed on all routers capable of accurate measurements.
- Responder installed everywhere.
- Configuring and starting of probes using TFTP

Collector internals

1. Establishment of SNMP session to the target device.
2. Discovery of available probes (by their tag) and updating of Tag registry accordingly.
3. For each individual probe:
    1. Gathering of available hour sets.
    2. Insertion of sets that have not been inserted yet based on their creation time.
    3. Updating of the timestamps in the tag registry.

Nagios plugin usage

- Reading from database.
- Calculation of metric.
- Comparison with threshold.
- Same plugin for both echo and jitter probes.
- Pluggable time queries.
- Pluggable metric queries (downtime, jitter etc)

Experience

- Deployment extremely easy, low administration overhead.
- Integration with existing Nagios installation beneficial.
- Combined collector, database and plugin activity light in terms of processing load.

But:

- Various SAA bugs.

Future ideas

- Ditch SAA, use various MIB's from DISMAN working group.
- Measurements available through web service.
- Usage of NMWG XML schema.

Thank you very much!

Any Question???

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