Tim Betzer, Christian Dietze, Georg Carle
Chair of Network Architectures and Services
Technical University of Munich

slices DE

Technical University of Munich

Scalability and Maintainability

## Internet Measurements in a Testbed

Global INternet Observatory

- ► **Overview [1]**
  - – Founded in 2016
  - – Long running Measurements
  - – Large Scale Data Collection Efforts
  - – Downloads
  - – Large Scale Internet Measurements
- ► **Internet Wide Scans**
  - – DNS
  - – TLS
  - – IPv6 Hitlist
  - – QUIC
- ► **Setup**
  - – Manually configured Servers
  - – Code in Repositories
  - – Responsible Disclosure
  - – Monitoring

Infrastructure Expansion

Current Infrastructure
- ► 11 Scan Server
- ► 3 Analysis Server
- ► 2 Storage Server

$\longrightarrow$
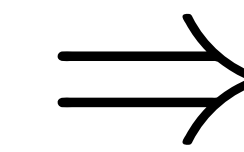
Current Expansion
- ► 20 Scan Server
- ► 11 Analysis Server
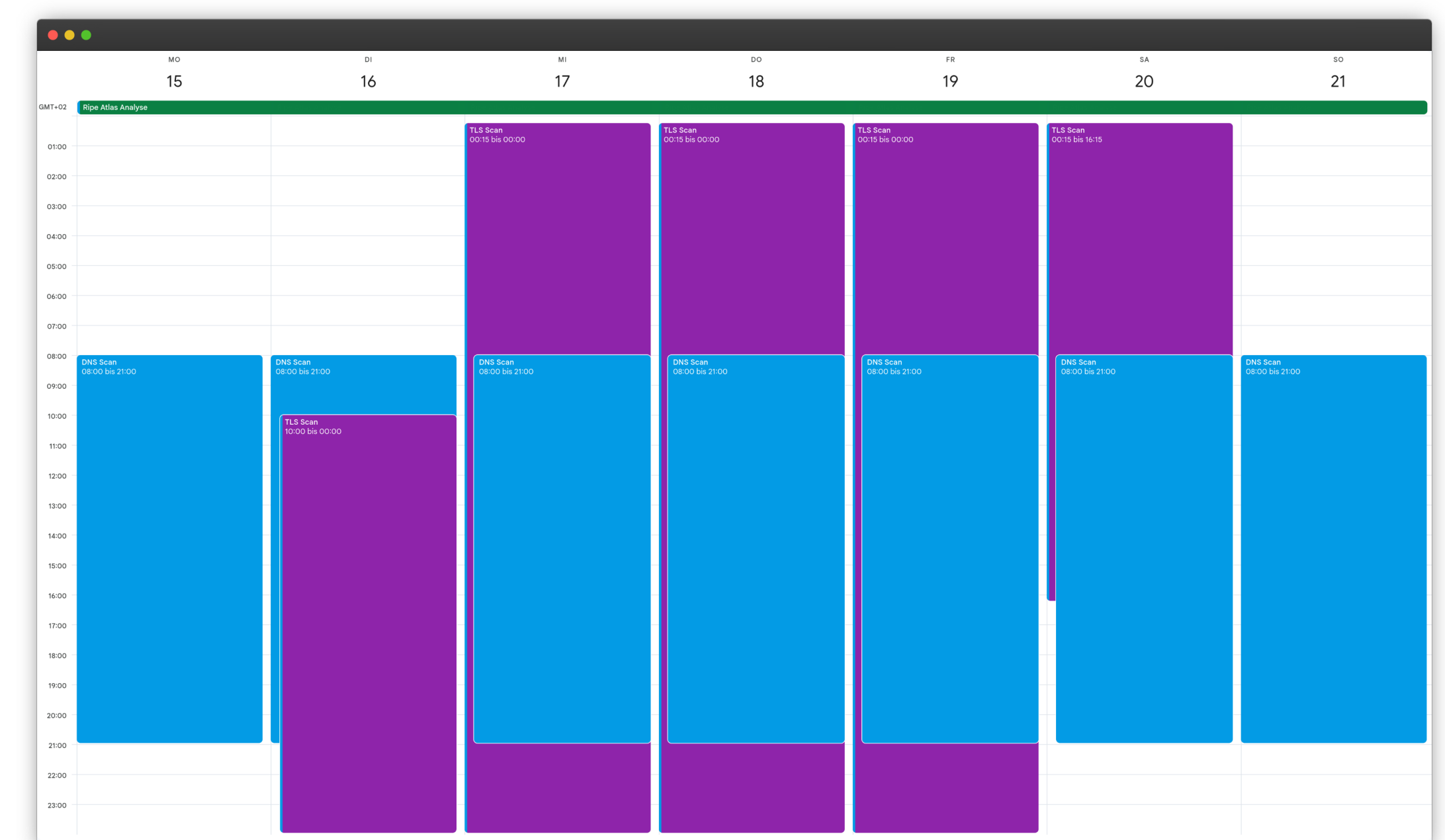- ► 3+ Storage Server
- ► Development System

How do we want to handle our ecosystem?
- ► Better Hardware Utilization
- ► Better Fault Detection
- ► Better Fault Handling

Testbed

Plain Orchestrating System [2]

- ► **Testbed Functionality**
  - – Reproducibility
  - – User Management
  - – Modularity
- ► **Calendar Functionality**
  - – Scheduling
  - – Overview
  - – Experiment Automation

- ► **Hardware Independent**
  - – Existing Hardware can be integrated
  - – Multiple management protocols
  - – Fits well to the existing workflow
- ► **Scan $\neq$ Server $\neq$ IP**
  - – Dependencies resolved
  - – Higher Uptime
  - – Greater Flexibility

Additional Aspects

Infrastructure as Code
- ► Ansible
- ► Every Configuration is documented
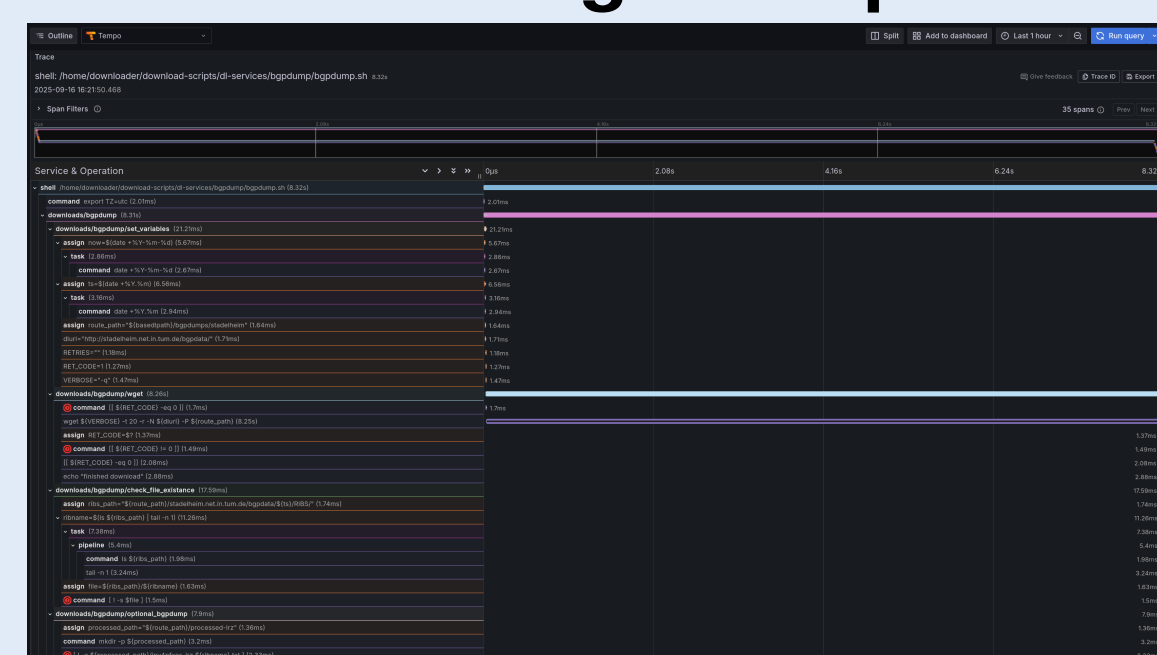- ► Server Change produces same results

Storage Solution
- ► Currently network share
- ► Does not scale and is unflexible
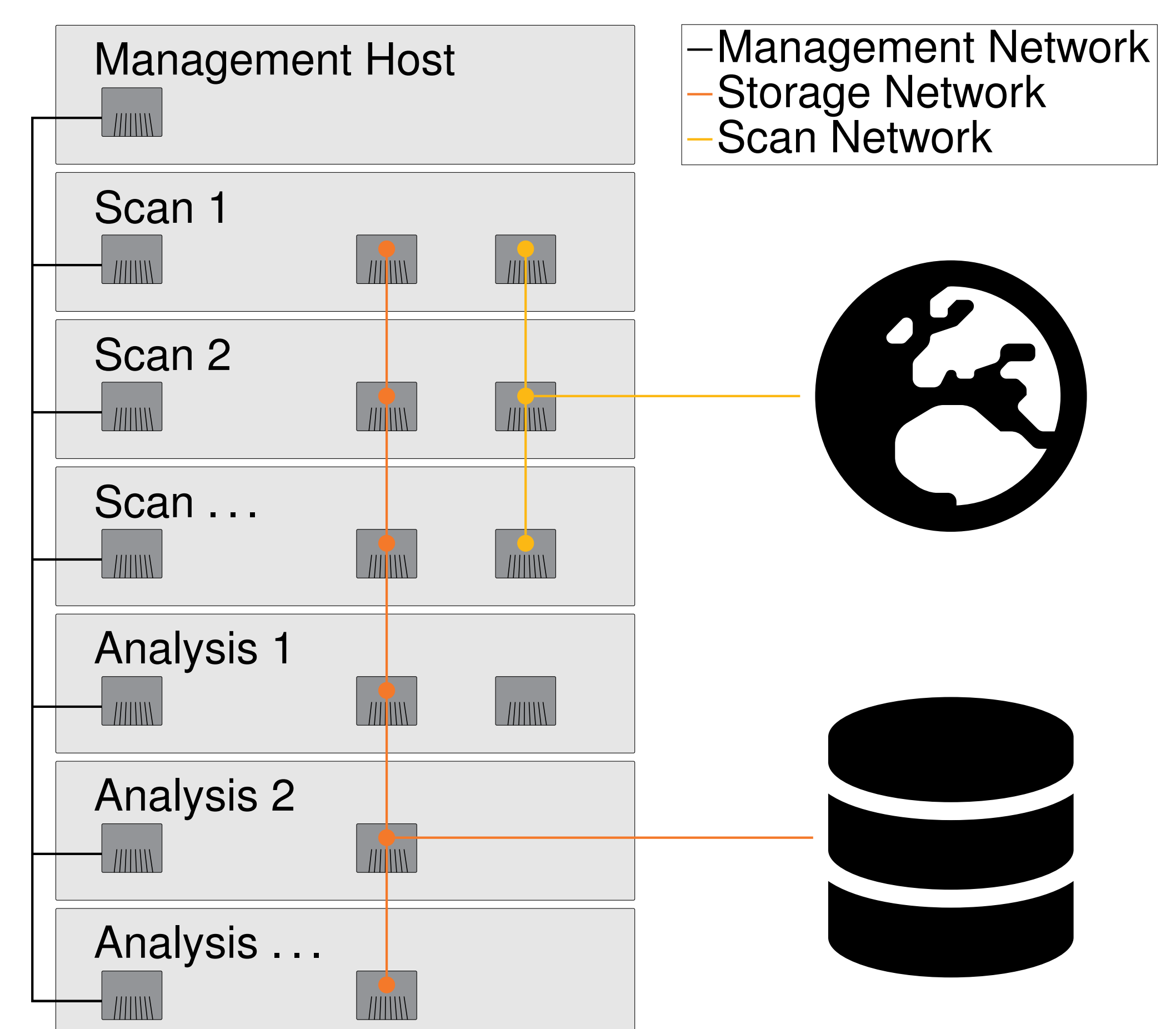- ► S3 Compatible Storage
- ► Each Dataset gets its own bucket

Monitoring
- ► Fine grained overview needed
- ► Alerting for errors
- ► Faults can propagate
- ► Grafana + Prometheus

Monitoring Example

Internet Measurement Testbed

Management Host

Scan 1

Scan 2

Scan …

Analysis 1

Analysis 2

Analysis …

- Management Network
- Storage Network
- Scan Network

[1] GINO homepage. https://net.in.tum.de/projects/gino/.
[2] S. Gallenmüller*, D. Scholz*, H. Stubbe, and G. Carle. The pos Framework: A Methodology and Toolchain for Reproducible Network Experiments. In *The 17th International Conference on emerging Networking EXperiments and Technologies (CoNEXT '21)*, Munich, Germany (Virtual Event), Dec. 2021.