Automatic Assessment of Tasks in the Course Programming Network Applications 🔀

Author: Ing. Martin Krčma, Supervisor: Ing. Tomáš Dulík, Ph.D.

Tomas Bata University in Zlin - Faculty of Applied Informatics



1. Motivation

The primary motivation for this thesis was to solve the problem associated with the increasing number of students at the faculty and to ease the workload of teachers in evaluating assignments. This work specifically focuses on the programming network applications course, where verifying the functionality of students' solutions often requires additional network resources (servers, clients, ...), making the assessment process time-consuming. Network applications often have varied behaviors and communicate in different ways, which poses a significant challenge in creating a universal solution that can accommodate all these testing needs.

Therefore, the goal was to develop a comprehensive and universal solution that would allow the testing of software assignments both locally and within GitLab repositories, without relying on external network resources. This will help students and, more importantly, teachers, as this solution will save them a significant amount of time, allowing them to focus on more important matters at the faculty. This solution is not limited to educational institutions, it can also be used in a wide range of software projects.

2. Conclusion

The result of this thesis is a universal black-box testing tool that effectively enables the testing of network applications. This tool, developed in Java and designed to be cross-platform, supports testing across a wide range of network applications using commonly employed communication protocols. It is easily configurable via YAML, and a straightforward configuration language has been created to define test scenarios using a basic set of keywords. Additionally, a simple IDE was developed to facilitate the creation and runtime testing of these test scenario configurations.

This thesis includes not only the development of the testing tool (NATT) but also the IDE, comprehensive documentation, example projects and configurations, a new set of assignments for the network programming course, and GitLab repositories for each assignment.

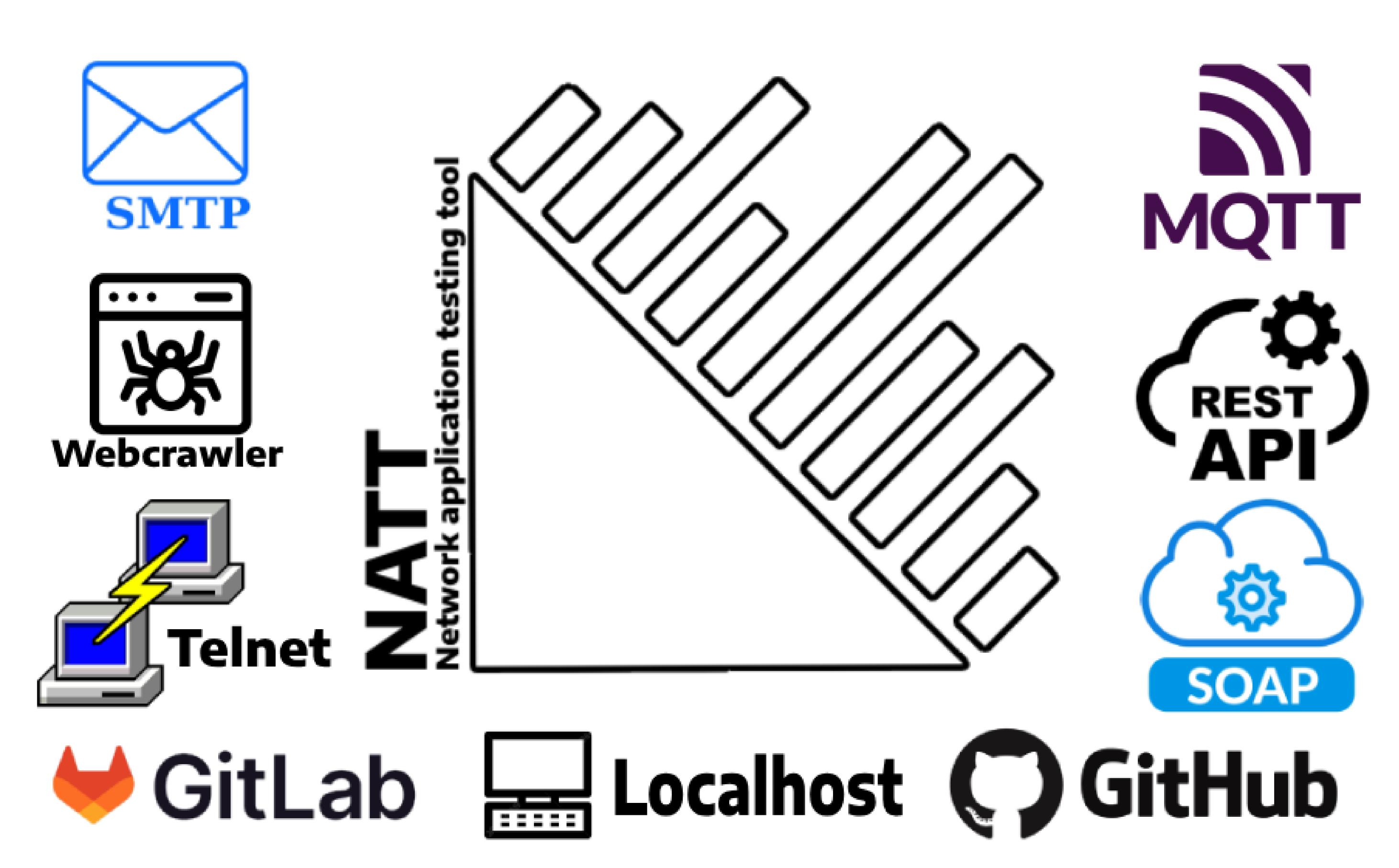


Figure 1. Network Application Testing Tool - supported technologies

3. Main features of testing tool

This Black Box Testing Tool automates the testing and evaluation of software applications without needing internal implementation details. It supports a wide range of applications, operates independently of external network resources by creating virtual servers and clients, and offers flexible configuration for defining new test scenarios.

What does the tool allow you to test?

- 1. Testing simple email sending applications
- 2. Testing clients that use the telnet protocol
- 3. Testing **servers** that use the telnet protocol
- 4. Testing applications that use REST API
- 5. Testing SOAP web services
- 6. Testing MQTT clients
- 7. Testing Web crawlers
- 8. Testing the application through the standard stream

4. Principle of the testing tool

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figures/dag.png

Figure 2. Another figure caption.

5. Test scenarios and configuration

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7. Usage of testing tool

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References

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