UiO : Department of Informatics
University of Oslo

Improving the performance of Web Services in Disconnected, Intermittent and Limited Environments

Joakim Johanson Lindquister

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Abstract

My abstract

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Introduction

Kort intro om oppgaven her.

1 Background and Motivation

1.1 Mobile tactical networks

Mobile tactical networks are characterized by that the units use tactical communication equipment which includes technologies like VHF, UHF, HF, tactical broadband and satellites. Examples of such units are mobile units like vehicles, foot soldiers and field headquarters. These types of networks have low bandwidth, possibly high delay, high error rates and frequent disconnections. They are often called disadvantaged grids or DIL. NATO studies has identified such networks to have the following characteristics:

> *Disadvantaged grids are characterized by low bandwidth, variable throughput, unreliable connectivity, and energy constraints imposed by the wireless communications grid that link the nodes*[1].

These constrains of mobile tactical networks are central in order to understand the problem at hand, and I will therefore explain the concepts here:

Bandwidth and throughput The terms bandwidth and throughput are used interchangeably in the networking community and refers to the data transfer rate; how fast data can be transported from one point to another in given time period. This is often expressed in bits per second.

Unreliable connectivity Units that are participating in a tactical network are highly mobile and may disconnect from a network either voluntarily or not. Unplanned loss of connectivity can be due to various reasons, such as loss of signal or equipment malfunction.

Energy constraints imposed by the wireless communication grid The battery capacity and the transmission range of the communication equipment for mobile units may be limited. Another issue is that in some cases military units are required to enter radio silence in order to avoid being detected by the enemy. During radio silence units may only receive data and not send any.

2 Problem Statement

Most of the Web Service solutions used today are aimed for civilian use and does not necessarily perform well in military environments. In contrast to civilian

networks where bandwidth are abundant, mobile tactical networks may suffer from high error rates and low bandwidth.

In my master thesis I will investigate different optimization techniques that can be applied to improve communication. In order for the clients and services to remain interoperable the optimization techniques will be placed in proxies.

The Web Services will communicate with his counter part over HTTP as regular, with all traffic going umerkelig through the proxy. The Web Service itself does not need to pay attention to the bad connectivity, the proxy will choose the appropriate protocol and configuration.

3 Premises

Ikke endre web-servicene.

4 Scope and Limitations

Snevre inn oppgaven

5 Research Methodology

6 Contribution

Hva er det oppgaven min bidrar med?

7 Outline

Hvordan er resten av oppgaven strukturert.

Part II
Background

In this part, I will present relevant technologies.

8 Related Work

Diskuterer eksisterende arbeid.

Requirement	Priority
Receive and forward HTTP 1.X requests	1
Allow modifications on the payload	1
Allow configuration of HTTP timeouts	1
asd	1
Support protocol X and y	2

// //

Table 1: Proxy requirements

9 DIL

Disconnected, Intermittent and Limited environments (DIL) definer hva DIL er og hvilke begrensninger det legger.

10 Requirement Analysis

Diskutere CPU-bruk vs compression.

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12 Overall Design

13 Proxy

13.1 Squid

Squid is a fully-featured HTTP/1.0 proxy.

14 Optimization techniques

By using proxies, we can freely choose the communcations protocols and configurations between the proxy pair without altering the Web Services themself. In this thesis I will investigate different techniques in order to optimize the communcation between a Web Service and a Web Service client. The first technique I will look into is compression.

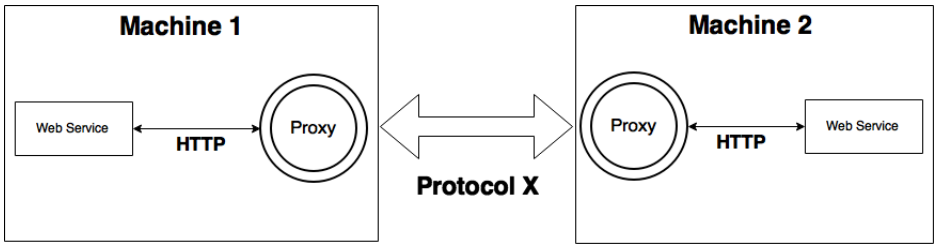

Figure 1: Architectural overview of proposed design

14.1 Compressing the payload

Compress the payload using GZIP and forward it to the other proxy. The

14.2 Tuning application server configuration

14.3 Alternative transport protocols

15 Summary

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17 Conclusion

18 Future Work

References

[1] A. Gibb et al. “Information Management over Disadvantaged Grids”. In: *Task Group IST-030/ RTG-012, RTO-TR-IST-030* (2007). Final report of the RTO Information Systems Technology Panel.