Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Analytical Queuing Model for Telesto

Report Group 32

Dominic Langenegger

dominicl@student.ethz.ch

Advanced Systems Lab 2013
Systems Group
ETH Zürich

Supervisors:
Markus Pilman
Prof. Dr. Gustavo Alonso

December 20, 2013

Abstract

This report summarizes the work of analytically modeling and evaluating *Telesto*, the Distributed Message Passing System built by Simon Marti and Dominic Langenegger during the first milestone of the course project of the *Advanced Systems Lab* course 2013 at ETH Zurich. All relevant information about the first milestone can be found in [1].

Used concepts, mathematical formulas and theoretical aspects are heavily based on [2] and the lecture slides.

Contents

Chapter 1

Introduction

Chapter 2

Analytical Queuing Model

This chapter introduces the analytical queuing model built to model the characteristics of *Telesto*. It also includes explanations about simplifications and assumptions that were made.

We recall Table 5.3 in [1], showing in which parts of the system a request spends how much time:

Phase	Time	Relative
Waiting for client	79 µs	0.82%
Parsing request	14 µs	0.15%
Waiting for database	9.574 µs	98.80%
Responding	22 µs	0.23%

Table 2.1: Time spent on various tasks by middleware workers

Based on this data we can safely say, that the time a request is handled by the middleware is minimal in comparison to the time spent to actually handle it on the database tier. thereforee, we can simplify the queuing model for the middleware by reducing it to the database tier as seen in figure 2.1.

Notice, that this leads to a very simplified model with one queue per middleware and one service per database connection, since we can remove the service time of the middleware interaction before and after the database interaction. The database queues then become redundant and we can directly link the queues of the middleware to all database connection services.

Due to the architecture of *Telesto*, the database connection pool and the worker thread pool are two entirely separated parts and therefore each request handled by any worker thread, can be handled by any database connection out of the pool.

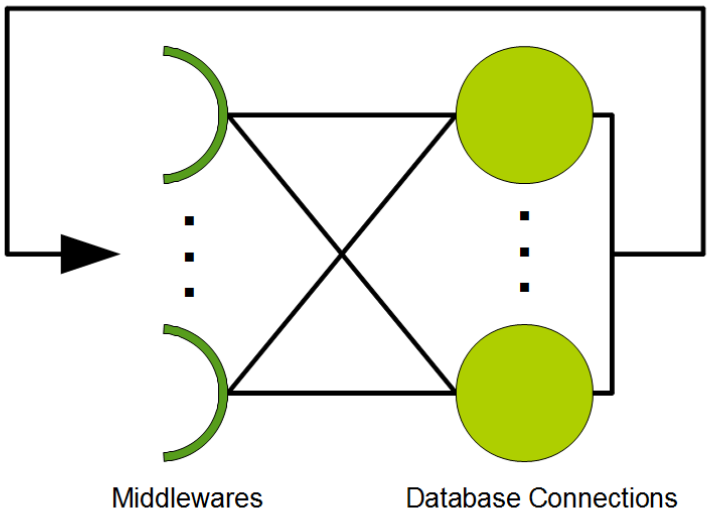

Figure 2.1: Simplified model of the closed queuing system for *Telesto*

2.1 Workload

As seen in figure 2.1, we use a closed queuing network to model *Telesto*.

2.2 Notation

Arrival Process

2.3 Load-Dependent Service Centers

Chapter 3

Performance Analysis

Chapter 4

Comparison

Chapter 5

Conclusion

Bibliography

[1] Langenegger, D., Marti, S.: Telesto - A Distributed Message Passing System. Advanced Systems Lab, ETH Zurich (November 2013)

[2] Jain, R.: The Art Of Computer Systems Performance Analysis:. Wiley India Pvt. Limited (2008)