



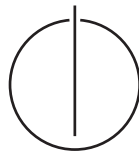
FAKULTÄT FÜR INFORMATIK

DER TECHNISCHEN UNIVERSITÄT MÜNCHEN

Bachelorarbeit in Informatik

**Myriad – a mailmerge tool for massive
parallel, yet individual email conversations**

Ludwig Schubert





FAKULTÄT FÜR INFORMATIK

DER TECHNISCHEN UNIVERSITÄT MÜNCHEN

Bachelorarbeit in Informatik

Myriad – a mailmerge tool for massive parallel, yet
individual email conversations

Myriad – ein Serienbrief Email-Tool für hochgradig
parallele, jedoch individualisierte Emailkonversationen

Author: Ludwig Schubert
Supervisor: Prof. Dr. Johann Schlichter
Advisor: Dr. Wolfgang Wörndl
Date: September 30, 2013



Ich versichere, dass ich diese Bachelorarbeit selbständig verfasst und nur die angegebenen Quellen und Hilfsmittel verwendet habe.

München, den 30. September 2013

Ludwig Schubert

Abstract

This thesis introduces the myriad system for email mass communication.

Despite it's age, Email has remained the prevalent form of electronic communication, it's usage being wildly different from how it was imagined. The tools to handle it, however, are still stuck in their original UI metaphors.

Myriad aims at producing personalized communication on a comparable level to manually composed messages, while reducing user effort. A cross-over of mailmerge and customer support/helpdesk software, it enables managing big volumes of bidirectional email-based communication. It is based on a self-developed framework for separating information extraction, decision- making, and personalization steps in communication.

The myriad system consists of a server component that handles interfacing with email servers, a core logic system and a web frontend for users.

It can be tested at <http://myriad.ludwigschubert.de>.

Keywords

Email, Workflow, Helpdesk, Mailmerge, Crowdsourcing, Personalized Communication, Assisted Templating, Generated Documents, Web-Application

Acknowledgements

This thesis is based on research conducted from October 2012 through April 2013 together with Christian Ikas, Barış Öztop and Nicolas Kokkalis under the guidance of *Prof. Michael S. Bernstein* and *Prof. Scott R. Klemmer* during a stay at Stanford University's Human Computer Interaction Department.

The research stay was partly financed by Elitenetzwerk Bayern through a grant to the study program *Technology Management* at the Center for Digital Technology and Management.



Stanford
University

Elitenetzwerk
Bayern



Contents

Disclaimer	v
Abstract	vii
Acknowledgements	ix
Table of Contents	xi
 Main Matter	 3
1. Introduction	3
1.1. Outline	3
1.2. Motivation	4
1.3. Goals and Background	4
2. Technical Backgrounds	5
2.1. Web Applications	5
2.1.1. Why build a web application instead of a native one?	5
2.1.2. Main Components of a Web Application	5
2.1.3. Rails and Ruby	5
2.2. Email Systems	5
2.2.1. Working with RFC 2822	5
2.2.2. IMAP and SMTP	5
2.3. Workflow Systems	5
2.3.1. History of Workflow Systems	5
2.3.2. Famous Examples	5
3. Comparison with similar systems	7
3.1. Mailmerge Systems	7
3.1.1. CRM Systems	7
3.1.2. Dedicated Mailmerge Systems	7

3.1.3. Backend Services	7
Amazon SES	7
SendGrid	7
3.2. Customer Support Systems	7
4. Concept	9
4.1. Functional Analysis	10
4.2. Product Functions	10
4.3. User Interface	10
4.3.1. Prototyping Approaches	10
4.4. Technical Analysis	10
4.4.1. Runtime Environment	10
4.4.2. Server Software Stack	10
4.4.3. Client Side	10
4.4.4. Backend Service Connections	10
Google Mail	10
Google Docs	10
4.5. System Design	10
4.5.1. Database Schema	10
Unusual Patterns	10
4.5.2. Distribution of System Components	10
5. Implementation	11
5.1. Preparation and Tools	12
5.1.1. Development Environment	12
5.1.2. Collaborative Development	12
git, gitflow and Github	12
5.1.3. Deployment	12
Deployment Tool Capistrano	12
5.2. Server Component	12
5.2.1. Core Classes and their Interaction	12
Contact	12
Template	12
Email	12
Campaign	12
Conversation	12
Key & Value	12
Search & KeyBinding	12
Notification	12

5.2.2.	Workers and their Jobs	12
5.2.3.	Maintenance and Rake Tasks	12
5.3.	Backend Services Connection	12
5.3.1.	Email Fetching	12
	IMAP IDLEing	12
5.3.2.	Google Docs Syncing	12
5.4.	“Best Practices”	12
5.4.1.	Core Extensions	12
5.4.2.	Lean Workers with AbstractWorker	12
5.4.3.	Monitoring Services	12
6.	Evaluation	13
6.1.	Comparison with Initial Goals	13
6.2.	Observed Use Cases	13
6.2.1.	Recruiting Exchange Students for one of the Most Desired Universi- ties of the World	13
6.2.2.	Requesting paper Reviews for a Journal	13
6.2.3.	Managing Incoming Class Administration Emails	13
7.	Conclusion	15
7.1.	Conclusion of this work	15
7.2.	Discussion of results	15
7.3.	Future Work	15
	Bibliography	17
	List of Figures	19
	Appendix	23
A.	Colophon	23

Main Matter

1. Introduction

This is the introduction.

1.1. Outline

This chapter will give an overview and arguments for the relevance of new Email tools, as well the goals pursued by this thesis. Additionally, the structure of the work is explained.

In **chapter 2, Technical Backgrounds**, relevant technical background information is provided. The decision to build a web app is motivated. Standard-compliant email systems are explained and relevant standards are introduced. Lastly, an introduction to workflow systems and historic examples is given.

In **chapter 3, Comparison with similar systems**, two major categories of software – mailmerge systems and customer relationship management systems – are introduced, which overlap in functionality with Myriad.

In **chapter 4, Concept**, the architecture of the proposed system is motivated and its development process is highlighted.

In **chapter 5, Implementation**, is concerned with technical details of how Myriad was implemented. The collaborative development process is described, as are actual system component and their functionality.

In **chapter 6, Evaluation**, Myriad's initial goals will be reiterated and contrasted with real world observed usage.

In **chapter 7, Conclusion**, the relevance of this system and the proposed framework is discussed; future work is outlined and possible directions proposed.

The conclusion is followed by a **Bibliography** of cited works and a **List of Figures**.

The **Appendix** contains selected source code, blabla, and a **Colophon**.

1.2. Motivation

1.3. Goals and Background

2. Technical Backgrounds

2.1. Web Applications

2.1.1. Why build a web application instead of a native one?

2.1.2. Main Components of a Web Application

2.1.3. Rails and Ruby

2.2. Email Systems

2.2.1. Working with RFC 2822

2.2.2. IMAP and SMTP

2.3. Workflow Systems

2.3.1. History of Workflow Systems

2.3.2. Famous Examples

3. Comparison with similar systems

3.1. Mailmerge Systems

3.1.1. CRM Systems

3.1.2. Dedicated Mailmerge Systems

3.1.3. Backend Services

Amazon SES

SendGrid

3.2. Customer Support Systems

4. Concept

4.1. Functional Analysis

4.2. Product Functions

4.3. User Interface

4.3.1. Prototyping Approaches

4.4. Technical Analysis

4.4.1. Runtime Environment

4.4.2. Server Software Stack

4.4.3. Client Side

4.4.4. Backend Service Connections

Google Mail

Google Docs

4.5. System Design

10

4.5.1. Database Schema

Unusual Patterns

5. Implementation

5.1. Preparation and Tools

5.1.1. Development Environment

5.1.2. Collaborative Development

`git`, `gitflow` and Github

5.1.3. Deployment

Deployment Tool `Capistrano`

5.2. Server Component

5.2.1. Core Classes and their Interaction

`Contact`

`Template`

`Email`

`Campaign`

`Conversation`

12

`Key & Value`

`Search & KeyBinding`

6. Evaluation

6.1. Comparison with Initial Goals

6.2. Observed Use Cases

6.2.1. Recruiting Exchange Students for one of the Most Desired Universities of the World

6.2.2. Requesting paper Reviews for a Journal

6.2.3. Managing Incoming Class Administration Emails

7. Conclusion

7.1. Conclusion of this work

7.2. Discussion of results

7.3. Future Work

Bibliography

- [1] Leslie Lamport. *LaTeX : A Documentation Preparation System User's Guide and Reference Manual*. Addison-Wesley Professional, 1994.

List of Figures

Appendix

A. Colophon

This thesis is set in L^AT_EX[1]. The template used is based on the official TUM Computer Science template. The sources are hosted publicly on GitHub, while the actual PDF file is build by the continuous integration server Travis.