Todo list

University of Heidelberg
Institute for Computer Science
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Bachelor thesis

Messaging Architecture for Integration of Customer Self-Services

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I assure that I have written this bachelor thesis on my own and only used the specified sources and resources and that I followed the principles and recommendations "Responsibility in Science" of the University of Heidelberg.

Date of Submission: October 26, 2020

Zusammenfassung

Abstract

Contents

1 Context

Expand Context Chapter: Add more content to this chapter

Many enterprises provide digital tools which improve service usability for their customers. For example: If somebody wants to watch a movie, he does not drive to the nearest store to buy a DVD but instead uses websites providing video on demand (VoD). The reason is: VoD enterprises provide tools for digital customer self-service (DCSS). A customer can easily access the video over a website on his own. DCSS becomes increasingly relevant, as the german government introduced requirements for DCSS in many recent regulations. Most prominent are "Onlinezugangsgesetz" (OZG), "Datenschutzgrundverordnung" (DSGVO) and "Digitale Versorgung Gesetz" (DVG).

DCSS is made available through DCSS providers. They can consist of websites and applications developed in self-work or be services provided by separate companies. Adding DCSS providers to a system architecture is a common task. It usually involves integration of new DCSS components into an existing system architecture. Due to the complicated nature of system architectures, integration proves to be a difficult task.

2 Objective

Expand Objectives Chapter: Add more content to this chapter

The objective of this bachelor thesis is to improve the capability of enterprises and organizations to integrate DCSS providers. The thesis explains the basis of what DCSS and its providers are, which relevant scenarios exist and how DCSS providers can help in the digital transformation.

The technological challenge of integrating DCSS providers into existing system architectures is focus of this bachelor thesis.

Based on scenarios resulting from governmental regulations (due to their current relevance), an integration architecture is presented, which describes their integration. It provides information on which type of systems and data objects an existing architecture requires. It models how CSS providers and system architectures can communicate - deliver data and instructions. And it shows how, with fast development and deployment speed, integration can be applied to heterogeneous system architectures, be non-invasive and reliable.

The integration architecture is evaluated in respect to technological feasibility and real-life applicability. The results are incorporated into an operating manual, providing guidance in developing and deploying the presented integration architecture.

3 Structure of Work

Write Structure of Work Chapter: Briefly explain each chapter and their relationships

4 Fundamentals

4.1 Digital Customer Self-Service

Expand DCSS Chapter: Add more content to this chapter

This chapter introduces the concept of digital customer self-service. It defines DCSS, describes what it is by usage of examples and mentions benefits such as challenges.

Definition: Digital self-service is the consumption of services provided by an enterprise over the internet without human to human interaction.

It is important to distinguish between "service" and "self-service". The difference is shown through two examples:

Example 1: A service is the availability to purchase items whereas digital self-service is the placement of orders over a website.

Example 2: A service is the availability of video on demand whereas digital self-service is the access of video files over a website.

Digital self-service is one of many possible ways to access a service: An order placement could also be done through email or phone call and access to videos could be granted through same-day-delivery of DVDs.

Customers are able to do self-service because companies provide them with self-service tools. Creating them is not trivial and is the main business model of many companies. Video on demand websites for example do not only flourish as a result of providing access to videos (this business model existed long before them) but as a result of the digital self-service tools they provide.

Reasons for the widespread usage of digital self-service are significant benefits in ease of service usability for customers and cost reduction for enterprises. Customers can self-service from almost every place, easily manage customer data like phone number and address, configure services like subscription plans and access lots of information on available products or trouble shooting steps in an immediate way. Digital customer self-service improves usability, saves time, increases availability, saves money and therefore increases customer experience [Dave Oliver, 2009, cf. 243]. Enterprises, especially in progressive countries, aim to keep employment at a minimum, as it is a big cost factor. Digital self-service turns customers into unpaid employees [Oliver D, 2005].

Decreasing employment cost while increasing customer experience sounds like a win-win situation. Sadly, digital self-service does have its downsides. One downside is most immediate to the elderly. In order to use DCSS, computers have to be available and one has to be experienced in their usage. Technological complexity, however, is not only a problem for customers but also for enterprises providing DCSS. Based on existing system architectures, adding DCSS functionalities can turn out to be a difficult task. Some form of integration is often necessary. With increased system complexity and business dependability come additional maintenance cost.

As tody most large enterprises provide DCSS, it can be assumed, that at a given size of an enterprise (measured in number of customers), the benefits of DCSS surpass its disadvantages.

Governments see digitalization as a chance for improvements in many important social and economical areas. The process of digitalization can in some cases be described as reinventing existing solutions for usability with computers. One of the goals is to make solutions more easily accessible for users and as a method, provide digital self-service. Governmental regulations relating to digitalization therefore often encourage or demand enterprises and organizations to provide DCSS.

references

4.2 OZG

Research Governmental Regulations Chapter: Explain the three regulations in general, what their purpose is what their challenges are

4.3 DCSS Provider

Write DCSS Providers Chapter: Explain what DCSS Providers are (what services they can provide) and how they can help creating DCSS. Also explain the concept of a business connector as technological communication point of the DCSS provider

4.3.1 Description

4.3.2 CSS Solutions

4.3.3 Business Connector

4.4 Enterprise Architecture

Write Enterprise Architectures Chapter: Introduce Enterprise Architectures and challenges such as heterogeneous systems when trying to model them

1. Heterogeneous Enterprise Architecture Systems

a) Different Applications

b) Different Application Vendors

c) Different / No Application Interfaces

d) Legacy Systems

2. Different (proprietary) data models within and between Enterprises and Organizations

a) Different (property)name for same data objects (syntactic integration)

b) Different meanings for same (property)name (semantic integration)

4.4.1 Modeling of the real world

4.4.2 Modeling Challenges

4.4.3 Enterprise Architecture Patterns (EAP)

4.5 Integration

Write Integration Chapter: Introduce the concept of integration. What are challenges in general and what would be an ideal integration. Also explain the approach towards integration used (messaging, patterns)

1. Scarce Resources

a) Integration Development Speed

i. Necessary Development <=> Reuse of existing Technology

ii. Complexity / Size of Integration

b) Maintenance of finished Integration

c) Hardware / Software Costs of Integration

i. Licenses for Software

ii. Scalability of Integration => Necessary Computing Power

d) Messaging Integration

i. Loose Coupling

A. Loose Coupling simplifies adaption to changing EA => simpler Maintenance

B. Loose Coupling simplifies integration of new EA systems => integration of heterogeneous EA

C. Loose Coupling allows Reuse of "Modules" => faster development

ii. Messaging enables communication with many systems through Adapters

iii. Stability of Integration

A. Future Changes of EA

B. Scalability

C. Failure of EA or Integration Components

iv. Messaging provides mechanisms for Stability

A. Store-and-Forward

B. Load Balancing

e) Integration Patterns

i. Patterns speed up construction of Integration Architecture

ii. Patterns are proven solutions

iii. Patterns abstract from concrete technologies

A. Simplifies understanding of integration concept

B. Allows implementation with different technologies

4.5.1 Definition

4.5.2 Requirements

Loose Coupling

Homogeneous Landscapes

5 Preparatory Work

5.1 OZG Scenarios

Research DCSS Scenarios Chapter:

1. Should governmental regulations be the focus of scenarios? => good resources for OZG

Usage of DCSS OZG scenarios (**process diagrams and data schemas available** [BMI, 2020])

The scenarios include more than just CSS and are partly non-digital. Therefore processes relevant for DCSS have to be selected and it has to be defined which processes are part of a CSS provider, the business systems or the integration architecture:

1. What part of a scenario is digital?
2. What part of a scenario can be done through a DCSS provider / is relevant for DCSS?
3. What part of a scenario is done through **existing** business systems?
   a) new necessary business logic part of (configurable) integration? => non invasive
4. What part of a scenario should be done by the integration architecture?
5. What are commonalities of scenarios?
   a) OZG scenarios often describe digital handling of applications
   b) In OZG scenarios, often multiple governmental institutions are involved. This could be modeled as one system architecture with the problem of distributed data and functionality which the integration architecture would solve.

- Unemployment Benefit (AG2)
  - Data Schema
  - Process Diagram

  - Process Diagram of Application
  - Click-Dummy
- Training Promotion (BAföG)
  - Data Schema
  - Process Diagram
  - Click-Dummy
- Drivers License
  - Data Schema
  - Process Diagram
  - Process Diagram of Application
  - Click-Dummy
- Company Registration and Approval
  - Data Schema
  - Process Diagram
  - Click-Dummy
- Visa Issuance
  - Data Schema
  - Process Diagram

5.2 Relevant Systems and Data

Research Relevant Systems and Data Chapter: Explain the approach of modeling enterprise architectures by EAPs and explain the used EAPs. Analyze which system and data bricks of the system architecture could be necessarry for DCSS

5.2.1 EAPs

5.2.2 Architecture Bricks

5.2.3 Data Bricks

5.2.4 Integration Requirements

Regarding Integration Architecture

Regarding Business Connector

5.3 Business Connector

Research Business Connector Chapter: Construct the model of the business connector

5.3.1 Functionalities and Interfaces

5.3.2 Integration Requirements

Regarding Enterprise Architecture

Regarding Integration Architecture

5.3.3 Documentation

Connector as Architecture Brick

6 Integration Architecture

Integration Architecture Chapter: Create the integration architecture

6.1 Scenario 1

6.1.1 Integration Documentation

6.1.2 Required System and Data Bricks

6.1.3 System Integration

6.1.4 Data Integration

6.2 Scenario 2

6.2.1 Integration Documentation

6.2.2 Required System and Data Bricks

6.2.3 System Integration

6.2.4 Data Integration

7 Integration Architecture Evaluation

7.1 Technology

7.2 Customer Example

7.3 Operating Manual

Bibliography

[BMI, 2020] BMI (2020). Ozg-informationsplattform.

[Dave Oliver, 2009] Dave Oliver, Celia Romm Livermore, F. S. (2009). *Self-Service in the Internet Age*. Springer.

[Oliver D, 2005] Oliver D, Romm Livermore C, F. N. (2005). Are you being served? - exploring the role of customer as employees in the digital world. *CollECT Europe*.