LowTech GMmBH Techincal Transformation Milestone 1

Wladymir Alexander Brborich Herrera
wladymir.brborich-herrera@stud.fra-uas.de,
Vishwaben Pareshbhai Kakadiya
vishwaben.kakadiya@stud.fra-uas.de,
Hellyben Bhaveshkumar Shah (1476905)
hellyben.shah@stud.fra-uas.de,
Priyanka Dilipbhai Vadiwala
priyanka.vadiwala@stud.fra-uas.de, and
Heer Rakeshkumar Vankawala
heer.vankawala@stud.fra-uas.de

Frankfurt University of Applied Sciences
(1971-2014: Fachhochschule Frankfurt am Main)
Nibelungenplatz 1
D-60318 Frankfurt am Main

Abstract In this report, we as consultants from *Awesome Cloud AG* present a technical transformation analysis aimed at modernizing the infrastructure of *LowTech GmbH*, a small to medium-sized enterprise specializing in wooden furniture production. The analysis includes a critical assessment of the current infrastructure, energy consumption calculation for the existing setup followed by a detailed transformation roadmap of future-ready modern infrastructure and explanations of enhancements in scalability, availability, and security compared to current infrastructure. This analysis will serve as a foundational step for subsequent project phases, ensuring that *LowTech GmbH* is well-equipped to meet future requirements and challenges.

1 Overview of the problem

2 Objectives of the technological transformation

3 Assessment of the current (as-is) infrastructure

3.1 Current traffic and usage

3.2 Scalability, Availability and Security Analysis

According to NIST definition of cloud computing is given as "Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction." [2]

As *LowTech GmbH* is based on Legacy IT infrastructure and currently lacking *NIST five essential characteristics* such as On-demand self-service, Broad network access,Resource pooling,Rapid elasticity and Measured service.

Elasticity / Scalability

- **Fixed Hardware & Inflexible Infrastructure**:
  Current infrastructure consists of 7 on-premises servers housed in a single 19-inch rack, along with

17 clients and 19 laptops all with predetermined, static configurations. Moreover, the physical constraints of the on-premises setup, with no additional space for expansion, severely limit scaling options. This inflexibility makes it challenging to accommodate growth or adapt to changing business needs.

- **Absence of Resource Utilization/pooling**:
  There's no apparent way to quickly scale resources up or down based on demand or user traffic fluctuation in the current infrastructure. Each application typically runs on a dedicated server with fixed resources. This approach leads to inefficient resource utilization, as some servers may be underutilized while others are overloaded which may lead to performance issues during peak times or resource waste during low-demand periods due to no dynamic resource allocation.

- **Manual Processes & High Cost**:
  Any changes in capacity would likely require manual hardware upgrades or replacements including hardware installation, and configuration, making the process time-consuming and potentially leading to downtime. Replacement of hardware is not only tedious but also financially burdensome due to high costs of new hardware.

Availability

- **Obsolate Hardware/OS & Runtime Environments**:
  Many components of the current infrastructure is based on very old hardware and outdated operating systems such as Windows XP SP3 (Finance clients), Windows 7 SP3 (HR clients and Customer Service laptops), Debian 5.0 Lenny (Warehouse clients and server), Ubuntu 16.04 LTS (Sales CRM Storage server) etc. Several applications are running on outdated software versions such as Java 1.7/1.8, MySQL 5.5/5.7, PHP 5.3 and Firefox 3.6 etc. which makes this whole infrastructure more susceptible to failure.

- **Lack of Redundancy and Backup Mechanism**:
  There's no mention of redundant systems or data backup solutions which might lead to significant service disruptions as well as data loss in case of any system failure.

- **Manual Maintainance**:
  It is impossible to meet high availability requirements without a robust failover mechanism due to manual maintenance operations. This increases the possiblity of human errors, leads to longer downtime and reduces overall reliability.

Security

- **Basic Windows Firewall and pSense**:
  Many components of the current infrastructure is based on very old hardware and outdated operating systems such as Windows XP SP3 (Finance clients), Windows 7 SP3 (HR clients and Customer Service laptops), Debian 5.0 Lenny (Warehouse clients and server), Ubuntu 16.04 LTS (Sales CRM Storage server) etc. Several applications are running on outdated software versions such as Java 1.7/1.8, MySQL 5.5/5.7, PHP 5.3 and Firefox 3.6 etc. which makes this whole infrastructure more susceptible to failure.

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3.3 Energy consumption and approximate cost

Energy consumption calculation for the as-in infrastructure of Low Tech GmbH is as follows :

Departments	Server (Qty x Power)	Client (Qty x Power)	Laptop (Qty x Power)	Total Power Consumption	Annual Energy Consumption(KWh)
Finance	1 x 1000W	4 x 500W	-	3000W	26,280
HR	1 x 1000W	3 x 500W	-	2500W	21,900
Warehouse	1 x 1000W	10 x 500W	-	6000W	52,560
Sales	1 x 1000W 1 x 1200W	-	10 x 50W	2700W	23,652
Operations	1 x 1200W	-	4 x 50W	1400W	12,264
Customer Service	-	-	5 x 100W	500W	4,380
Webshop	1 x 1200W	-	-	1200W	10,512

Table 1. Power Consumption by Department and Device Type

Total Energy Consumption (Annual) : 151,548 KWh (151.548 MWh)

According to Eurostat published data of electricity prices for non-household consumers [1], Low Tech GmbH falls under the annual energy consumption band 'IB (20 MWh to 499 MWh)' with energy price 0.3244 € per KWh.

Total Cost for Energy Consumption (Annual) : 151,548 KWh x 0.3244 € = 49,162.17 €

4 Client Requirements

5 Assessment of potential technological components

5.1 Hardware

5.2 Virtualization technologies

5.3 Application components

5.4 Platforms

5.5 Security components

6 Migration to a private-cloud context

6.1 Selected technologies

6.2 Architecture

6.3 Roadmap

6.4 Operation considerations

References

1. Eurostat. (2023). *Electricity prices for non-household consumers - bi-annual data (from 2007 onwards).* Retrieved November 16, 2023, from `https://ec.europa.eu/eurostat/databrowser/view/nrg_pc_205_custom_13581723/default/table?lang=en`

2. Mell, P. and Grance, T. (2011). *The NIST definition of cloud computing*. National Institute of Standards and Technology, Special Publication 800-145, Gaithersburg, MD. `https://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf`