

Optimizing Cloud - Based Manufacturing: A Study on Service and Development Models

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Abstract: *This study introduces an optimized cloud - based manufacturing system for industries suffering high - cost losses due to inefficient technology acceptance. The proposed system leverages cloud migration automation and cloud computing service models to enhance data storage and management, aiming to replace manual, error - prone processes. The purpose of this research is to introduce an optimized cloud - based manufacturing system that can enhance efficiency and reduce costs in industries struggling with technology acceptance. This research is significant as it proposes a solution to the prevalent issue of inefficient technology acceptance in industries, potentially leading to cost reduction and increased efficiency. The technology is there in market but not functional use Manual migration of essential manufacturing related data wherein they identify servers manually for placement of application executable files and includes subject matter expertise to manually select the server and create, configure website and authorization and repeat migration process in other servers. This involves migration from source - server to destination - servers. The concept of cloud computing is not been introduced in both the case i.e., source server and destination server. In case of failures, they perform manual back - up and restore. This manual migration process is time consuming, error prone, repetitive operation. Proposed Automatic migration system uses cloud migration automation where in both the source server and destination servers are placed in any of the deployment model such as private cloud, community cloud or public cloud. Provide a Rules engine core for data encryption, Intuitive UI for client - side acceptance. Autonomic fig DB for daily refresh of data and migration database which execute using impersonated EPR specific user. Resource planning is also required to do random testing in case there are few requests or quality of the product is critical and this will help in identifying how much testing is done. The proposed model can be deployed in any services - based industries or manufacturing line which is using the old manual entry of data and manual deployment of application executable files onto the physical servers. The concept of cloud computing service models such as Software as a Service, Platform as a Service, and Infrastructure as a Service can be extensively used in industries which face difficulties in data storage.*

Keywords: Source - server, Destination servers, Rules engine core, Intuitive UI, Universal configuration management database solution (UCNDB), migration database, Impersonated EPR specific user. Cloud - Based Manufacturing, Service Models, Development Models, Cloud Migration Automation, Data Storage, Technology Acceptance

1. Introduction

The proposed model can be deployed in any services based industries or manufacturing line which is using the old manual entry of data and manual deployment of application executable files onto the physical servers. The concept of cloud computing service models such as Software as a Service, Platform as a Service, Infrastructure as a Service can be extensively used in industries which face difficulties in data storage.

1.1 The existing units can be classified as follows

- 1) **Level - 1 manufacturing/service units:** Which use Manual data entry and proprietary tools for daily data analysis and updates. Which is visible in most of the small scale industries. Which lack even a basic level GUI.
- 2) **Level - 2 manufacturing/service units:** Which use manual data entry and proprietary tools for daily data analysis and updates. But have a GUI/Application in physical servers built to automate the process.
- 3) **Level - 3 manufacturing/service units:** Automatically update / retrieve data from database from single physical servers and GUI placed in client server where in the data is entered directly to the database placed in servers.
- 4) **Level - 4 manufacturing/service units:** Automatically update / retrieve data from database from multiple physical servers and GUI placed in client server where in

the subject matter expertise is needed to select the server manually and place the daily data.

Existing manufacturing systems use Manual migration of essential manufacturing related data wherein they identify servers manually for placement of application executable files and includes subject matter expertise to manually select the server and create, configure website and authorization and repeat migration process in other servers. This involves migration from source - server to destination - servers. The concept of cloud computing is not been introduced in both the case i. e. source server and destination server. In case of failures they perform manual back - up and restore. This manual migration process is time consuming, error prone, repetitive operation

2. Objectives

- To strengthen global competitiveness of Indian SMEs in manufacturing by innovative high quality products and services at affordable manufacturing costs and prices through adoption of advanced cloud migration automation
- To adopt cloud infrastructures in India for simulation services in manufacturing and provide these services for SMEs in India.

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3. Scope

Many are evaluating cloud - based manufacturing applications including Enterprise Resource Planning (ERP) and several have adopted cloud - based applications across their companies.

4. Methodology

- The project will target broad uptake of cloud computing as the infrastructure to run the simulation services for SMEs in manufacturing. The project will improve the efficiency, adaptability and sustainability of SMEs in manufacturing by offering cloud - based simulation services systems to develop new products and services to be able to compete in an increasingly globalized industrial context.
- The project will create a production - level cloud - based simulation platform targeting Indian SMEs in manufacturing. The platform will present how to customise and adopt HPC cloud - powered simulation services by SMEs. It will provide "one - stop - shop" access to simulation services for SMEs based on cooperation of three key players

5. Manual Migration Process

a) Existing model difficulties

First, Trainings on Private Cloud in case of level - 4 manufacturing/service units and Applications in case of level - 1, 2, 3 manufacturing/service units; Cost is very high of training is very high and time consuming
Second, Consumes valuable SME bandwidth and impacts committed deliverables
Third, Its Manual, Time consuming and error prone.
Fourth, Repetitive operations
Fifth, No Audit history

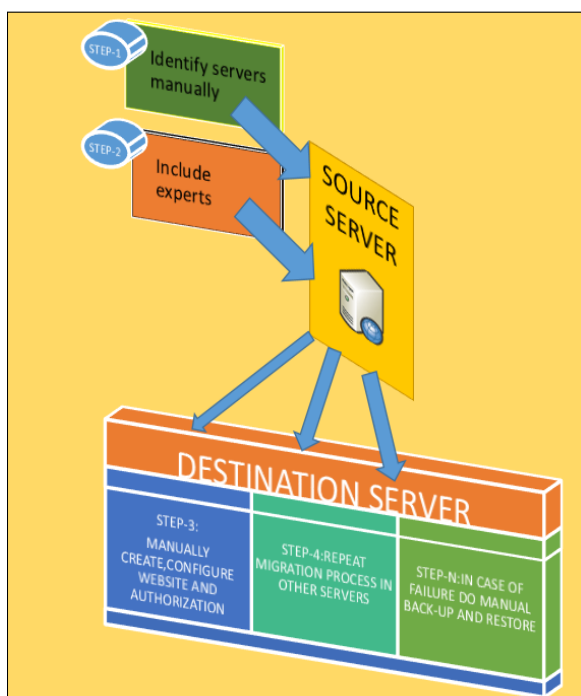


Figure 1: Manual - Migration Model

STEP 1: Identify physical servers manually for placement of application executable files and data base servers to insert/delete/update data

STEP 2: Trained Expert is required to perform such action since data is very critical and any minute error may lead to deletion of important product/services related data to source server

STEP 3: In destination server where in the files have to placed finally may be a private cloud based on deployment model as per level - 4 manufacturing/service units

STEP 4: Repeat Migration process in other servers

STEP N: In case of failure do manual back - up and restore
Let us see the manual migration process in case of specified levels of industries:

1) **Level - 1 manufacturing/service units:** Which use Manual data entry and proprietary tools for daily data analysis and updates need to train the user to use proprietary tools, more or less system is user driven, time consuming and error prone. Which is visible in most of the MSME. Which lack even a basic level GUI. Here Source and destination servers should be moved to private cloud and service models have to be used to interact with the cloud infrastructure. The users should be trained in deployment and service model of cloud computing. Later these servers are migrated automatically using cloud migration executer

2) **Level - 2 manufacturing/service units:** Which use manual data entry and proprietary tools for daily data analysis and updates. But have a GUI/Application in physical servers built to automate the process.

3) **Level - 3 manufacturing/service units:** Automatically update / retrieve data from database from single physical servers and GUI placed in client server where in the data is entered directly to the database placed in servers.

4) **Level - 4 manufacturing/service units:** Automatically update / retrieve data from database from multiple physical servers and GUI placed in client server where in the subject matter expertise is needed to select the server manually and place the daily data.

b) Benefits of cloud migration automation

- Sites created, configured and setup
- Migration done in 30 mins, 50X faster than manual
- Expert bandwidth is released and they can focus on deliverables
- Faster repeat migration and rollbacks
- Audit logs and restore points

c) Deployment

Automation migration

d) Source server to destination server



Figure 2: Manual - Migration Database

e) Manual Migration Database

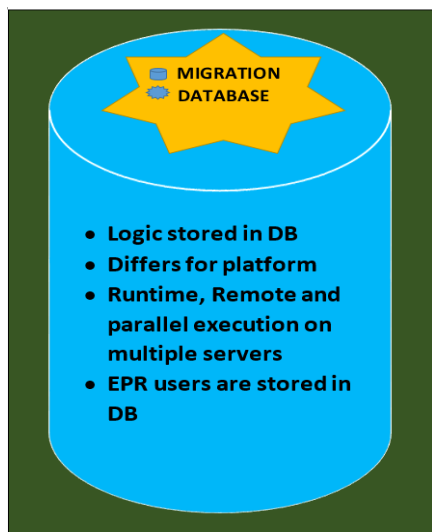


Figure 3: Manual - Migration Database

- Logic stored in DB
- Differs for platform
- Runtime, Remote and parallel execution on multiple servers
- EPR users are stored in DB

f) Identify the Headings

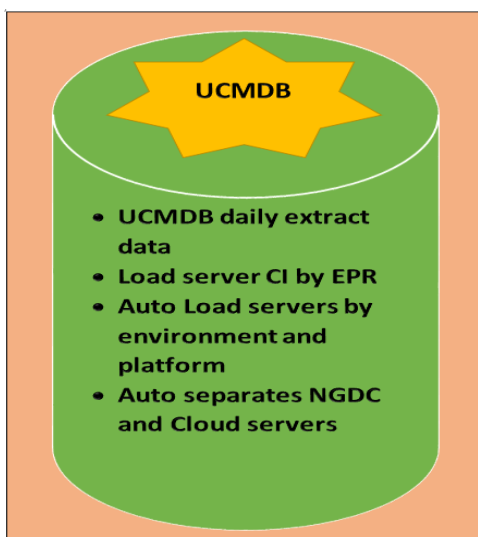


Figure 4: Universal CMDB

The Universal CMDB, a configuration management database solution, automatically collects and manages accurate and updated business service definitions, associated infrastructure relationships and detailed information on the assets, and is a central component in many of the key processes in your IT organization, such as change management, asset management, service management and business service management. The UCMDB ensures that these processes rely on comprehensive and true data for all business services. Together with UCMDB Configuration Manager (UCMDB - CM) you can standardize your IT environments, and make sure they comply with clear policies, and defined authorization process.

Many IT organizations turn to a CMDB and configuration management processes to create a shared single version of truth to support business service management, IT service management, change management, and asset management initiatives. These initiatives help align IT efforts with business requirements and run IT operations more efficiently and effectively.

The initiatives' success depends on the CMDB providing a complete view into the configuration items (CIs) and assets as well as how various IT elements relate together to deliver the business service.

g) How it works

Configuration Management System (CMS) comprises three components: UCMDB, Discovery, and Configuration Manager. The UCMDB reconciles data from multiple discovered and federated sources into one data set, model your business services, calculate the potential impact of changes within these services, track changes for any configuration item, and contains reporting capabilities to transform CMDB data into comprehensible, actionable information that helps answer critical questions and solve business problems. HPE Universal Discovery (UD) software, with rich and constantly updated content, is UCMDB's preferred method to acquire and maintain application and IT infrastructure data.

HPE UCMDB Configuration Management makes it possible to analyze IT environments in order to move toward fewer standards and improve IT management processes. This helps you improve data quality in your configuration management system (CMS), avoid single points of failure, achieve geographic redundancy of applications and drive changes based on configuration standards. The configuration management software solution also helps improve the stability of your environment, deliver standardized services and improve the resiliency of your architecture.

With its components, the HPE Universal CMDB logically stands as a central element of the HPE Configuration Management System (CMS) as defined in ITIL UCMDB provides service context and CI - level information to both HPE Software and third - party IT solutions.

h) Multi tenancy

The UCMDB can manage more than one tenant within a single UCMDB, allowing service providers, and large or

distributed organizations to manage several tenants in one UCMDB.

The multi tenancy is a flexible yet manageable way to manage the data and the security for both shared and non-shared data. This authorization module delivers management of data and provides controlled automation rules to distribute data to the right ownership.

i) User permissions

The UCMDB gives you powerful and easy to use tools to manage user permissions for different resources in the UCMDB. The concept of “Resource Groups” bundle resources such as TQLs “Topology Query Language” views, reports and correlation rules together enabling to manage permissions for them as a single group. User permissions can also be implied to folders and not just for specific resources, making it much easier to secure the UCMDB. UCMDB and Configuration Manager combine user management processes to enable you to define your users and roles one time and leverage them across the solution.

j) Key features and benefits

- Provide a single version of the truth to improve collaboration among IT and business teams.
- Proactively analyze change and service impact to reduce business risk.
- Improve business continuity and gain insight into the resiliency of clusters and enforce the similarity of groups of CIs.
- Gain greater value from the configuration management system by improving data quality, controlling changes, and ensuring architecture resiliency.

k) INTUITIVE UI



Figure 5: INTUITIVE UI

- a) EPR id driven migrations
- b) Hides Business Logic
- c) Background processing of logic In - browser search and edit files
- d) Real - time Progress logs
- e) UI driven seamless restore point based rollback
- f) Email notification

l) Rules Engine Core

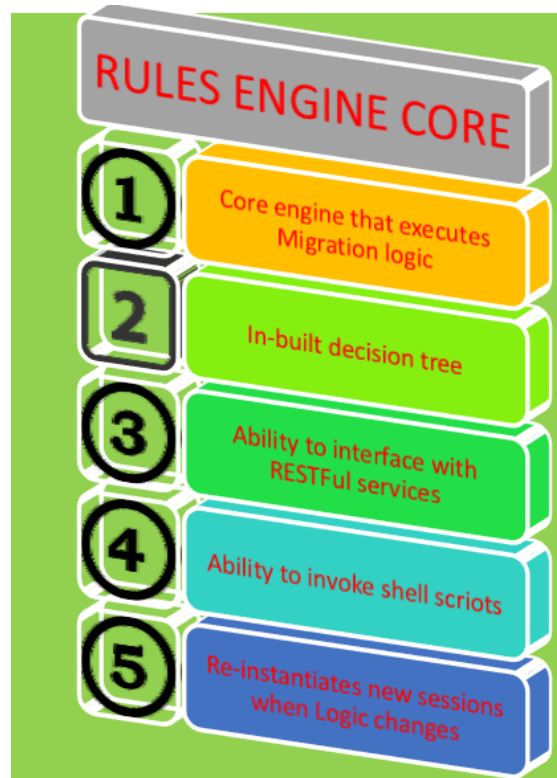


Figure 6: Rules engine Core

- Core engine that executes Migration logic:
- In - built decision tree
- Ability to interface with RESTful services
- Ability to invoke shell scripts
- Re - instantiates new sessions when Logic changes

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6. Conclusion

The proposed automation cloud migration process will have a high - level benefits like Sites created, configured and setup, Migration done in 30 mins, 50X faster than manual, Expert bandwidth is released and they can focus on deliverables, Faster repeat migration and rollbacks, Audit logs and restore points. This study introduces an optimized cloud - based manufacturing system that could significantly reduce costs and increase efficiency in industries. By leveraging cloud migration automation and cloud computing service models, the proposed system aims to replace manual, error - prone processes, paving the way for a more technologically advanced manufacturing sector.

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