ITSM Assignment 2: Implementation and Demonstration of Configuration Management Database

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**Word Count:** 1176

# Introduction

The Configuration Management Database (CMDB) designed in Assignment 1 has been implemented using a local installation of iTop (*Combodo/iTop*, 2018/2024). The database schematics designed in Assignment 1 is shown in Appendix 1 for reference.

Due to the simplicity of the design from Assignment 1, and the complexity of iTop as a commercial solution, there are several differences, however iTop has been configured to match the requirements as closely as possible.

# Implementation

## Installation

iTop has been installed on Ubuntu 24.04LTS. The SQL user *iTop* was created to run the database installation (Appendix 2). Initial Configuration settings used for iTop are shown in Appendix 3.

Additional items were configured in iTop, which are outside the scope of implementing the design from Assignment 1, however are required to enable iTop Ticketing System (Services, Sub-Services, Organisation Delivery Models, SLA’s, SLT’s).

## Adding Configuration Items

The configuration Items (CI’s) chosen to enter are representative of the CI’s used within the Radiotherapy Department at Portsmouth Hospitals University NHS Trust. It is hoped that this installation can be used to resolve a real-life gap in configuration management, where Medical Devices fall outside the scope of corporate IT Service Management, but a formal ITSM process does not exist. The resultant configuration network, as it stands is shown in Figure 1. There are items not fully configured, and these gaps are to be completed as information becomes available. The preference is to configure with true data.

A diagram of a network

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Figure : Network configured in iTop

# Usage

### Adding CI’s

There are two main ways to create a CI. The first, and most simple method is from the “Configuration Management” overview dashboard. For the CI type, the “Create” button can be selected, which will provide the appropriate fields to enter. Alternatively, a “New CI” can be selected from the Configuration Management menu, where the type of CI is selected from an additional menu.

A screenshot of a computer

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Figure : Configuration Management Menu and dashboard showing how to create new CI

## Problem and Change Management

To manage a problem, such as a security vulnerability, a *Problem* is raised in iTop, where all relevant information is entered in the *Properties* tab.

A screenshot of a computer

Description automatically generated

Figure : Properties page of Problem

The relevant CI’s can be added in the relevant tab. iTop will use the relations already defined in the configuration data to assign additional CI’s based on these relationships.

A screenshot of a computer

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Figure : CI's added to problem management

Work performed to investigate the problem can be recorded under *Work Orders* tab. This allows a clear audit trail of who has done what to investigate and resolve the problem.

A screenshot of a computer

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Figure : Work Order

Should the outcome of the investigation show that a change is required, then a change can be raised *Properties* tab when the problem is put into edit state. This Change can then be assigned to an agent and managed correctly.

The Assignment of a Change Request requires agents to be identified for implementation, supervisor, and manager.

When progressing the change to the next stage, the plan for the change must be documented, and include a fallback plan.

A screenshot of a computer

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Figure : Planning for a Change

After the plan, the change can be approved, and then implemented. The changes made can be documented against the relevant CI’s before the Change has been marked as fully implemented. There is then the option to monitor or finish the change. The problem can then be returned to, and then resolved if needed.

## Reporting Compliance

iTop is based on MySQL, and therefore with enough SQL knowledge, and report required could be produced. iTop has the ability to modify dashboards to show problems and changes, filtered by status, and grouped by severity, and the ability to chart these. The required table to report from can be selected with simple SQL commands.

A screenshot of a computer

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Figure : example of modifying dashboard with simple SQL

# Discussion

## Challenges Implementing CMDB

Implementing a CMDB is not a simple task. There are many cases where organisations have failed to fully implement their CMDB (Dande & Li, 2023; Schorr et al., 2020). There were two main challenges when implementing the current solution – Knowledge and Data Collection.

There was a lack of knowledge and experience in using Apache Web Services, PHP, and MySQL. This assignment has resulted in a very steep learning curve. This highlights the need for an organisation to ensure they have adequately trained staff to implement and maintain not only the organisations IT, but their own IT requirements.

A considerable amount of time has been spent looking for the configuration data required to add the CI’s and their relationships. At the time of submission not all required information has been obtained. (Schorr et al., 2020) describe a Configuration Service (CS), that can *“automatically import IT asset data from the many sources that monitor IT assets”*. Such a service would be extremely useful when setting up a CMDB, particularly for an already existing IT infrastructure.

Strict maintenance of a CMDB would also be required without a Configuration Service. New CI’s added to an organisation could be manually added to the CMDB as part of the commissioning process, however manual entry can always be prone to error (Kukielka, 2021). Additionally, the hierarchy of controls shows that an automated “Engineering” control is more effective than a manual “Procedural” control (Spigarelli, 2020).

## Benefits of a CMDB and Potential Improvements

There are a number of benefits of maintaining a CMDB. Acting as a “Single Source of Truth” for an organisations Configuration Items (Dande & Li, 2023; Farayola et al., 2023) can help considerably when monitoring from a Security perspective.

When combined with a Configuration Service, additional services can be implemented combining a continuous monitoring of assets and comparing to the CMDB record. Any discrepancies indicate a potential security vulnerability within the organisation (Farayola et al., 2023).

For heavily regulated industries, a well-managed CMDB provides assurance to regulators that procedures are correctly followed and provides an “Engineering” level of assurance for “Procedural” controls from the Hierarchy of controls.

By accurately recording relationships between CI’s an organisation can easily and effectively identify the impact of any vulnerability on other CI’s and the organisation.

# Conclusion

A Configuration Management Database is a critical tool for effective IT Service Management. It can provide an organisation with a single source of truth for the configuration of all assets and their relationships, allowing for effective impact analysis.

This single source of truth acts as assurance in the case an unauthorised change is made. The correct configuration of an asset can be reverted using the configuration data within the CMDB, and also Configuration Services can be used to monitor Assets and compare the asset configuration against the CMDB in order to alert Security Teams of unauthorised changes.

Finally, the implementation of a CMDB should not be taken lightly. There are many challenges to successful implementation. Challenges include technical knowledge and ability to obtain accurate CI data, both experienced here, but also the selection of the correct tool (Dande & Li, 2023). There were many features of iTop that were not identified as requirements in Assignment 1, which needed to be correctly configured to allow required iTop functionality.

# References

*Combodo/iTop*. (2024) [PHP]. Combodo. https://github.com/Combodo/iTop (Original work published 2018)

Dande, F., & Li, X. (2023, June 15) 'Enterprise Service Management Cybersecurity Threats: Exploring Cloud Configuration Management Database (CMDB) Implementation Within Community Colleges', *8th North American Conference on Industrial Engineering and Operations Management.* Houston, USA. 13-16 June. IEOM Society International. DOI: https://doi.org/10.46254/NA8.20230157

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Kukielka, E. (2021) Challenges with Measurement and Transcription of Patient Height: An Analysis of Patient Safety Events in Pennsylvania Related to Inaccurate Patient Height. *Patient Safety*, 48–57. DOI: https://doi.org/10.33940/data/2021.3.5

Schorr, F., Ghosh, A., & Hvam, L. (2020) 'Managerial Challenges in Designing an IT Service Configuration System', *Proceedings of the 22nd International Configuration Workshop*. Vicenza, Italy. 81-88

Spigarelli, C. (2020) Understanding the Hierarchy of Controls Through a Pandemic. *Professional Safety*, 65(5): 20–21. Available from: https://www.proquest.com/docview/2400562308/abstract/93E6FEE135A744E1PQ/1 [Accessed 30 November 2024]

# Appendix 1

A chart with colorful text

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# Appendix 2

mark@Ubuntu:~$ sudo mysql

Welcome to the MySQL monitor. Commands end with ; or \g.

Your MySQL connection id is 8

Server version: 8.0.40-0ubuntu0.24.04.1 (Ubuntu)

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owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> CREATE USER 'itop'@localhost IDENTIFIED BY 'Password1';

Query OK, 0 rows affected (0.01 sec)

mysql> GRANT ALL PRIVILEGES ON \*.\* TO itop@localhost;

Query OK, 0 rows affected (0.05 sec)

mysql> SELECT User FROM mysql.user;

+------------------+

| User |

+------------------+

| debian-sys-maint |

| itop |

| mysql.infoschema |

| mysql.session |

| mysql.sys |

| root |

+------------------+

6 rows in set (0.00 sec)

mysql> exit

# Appendix 3

iTop version 3.2.0-2 is about to be installed into the new database cmdb on the server localhost.

Installation Parameters

Database Parameters

Server Name: localhost

DB User Name: itop

DB user password: \*\*\*

Database Name: cmdb (will be created)

Prefix for the iTop tables: none

Data Model Configuration

CAS SSO (hidden)

External user authentication (hidden)

User authentication based on LDAP (hidden)

User authentication based on the local DB (hidden)

Backoffice: Darkmoon theme (hidden)

Backoffice: Fullmoon with high contrast accessibility theme (hidden)

Backoffice: Fullmoon with protonopia & deuteranopia accessibility theme (hidden)

Backoffice: Fullmoon with tritanopia accessibility theme (hidden)

Backup utilities (hidden)

Configuration editor (hidden)

iTop files information (hidden)

Portal Development Library (hidden)

Create standard ITIL profiles (hidden)

SLA Computation (hidden)

Core iTop Structure (hidden)

ITIL skin (hidden)

User authentication by token (hidden)

Configuration Management Core

Data Center Devices

End-User Devices

Storage Devices

Virtualization

Bridge for CMDB and Ticket (auto\_select)

Links between virtualization and storage (auto\_select)

Service Management for Enterprises

Bridge for CMDB and Services (auto\_select)

Bridge for CMDB Virtualization objects and Services (auto\_select)

Bridge for CMDB endusers objects and Services (auto\_select)

Bridge for CMDB Virtualization objects and Services (auto\_select)

Bridge for CMDB Virtualization objects and Services (auto\_select)

ITIL Compliant Tickets Management

User Request Management

Incident Management

Customer Portal

Bridge - Request management ITIL + Incident management ITIL (auto\_select)

ITIL Change Management

Known Errors Management and FAQ

Problem Management

Other Parameters

Default language: EN US

URL to access the application: http://localhost/itop/

Graphviz' dot path: /usr/bin/dot

Admininistrator Account

Login: admin

Password: iTopAdmin

Language: EN US

# Appendix 4