Framework Design for Decommissioning Information System on Nuclear Facilities

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1. Introduction

KAERI is the only one expert group which has decommissioning experiences and KAERI is trying to develop computer code to converge all the data which has been accumulated during KRR-1 & 2 and Uranium Conversion Plant decommissioning. To date, many applications related to decommissioning of nuclear facilities have been developed, but cannot provide integrated decommissioning information management as those were developed in the form of independent databases and applications. In addition, various development languages and databases are used, there are problems with system improvement and maintenance[1].

In order to solve these problems, various information required to decommissioning for nuclear facilities should be managed and it is linked with information needed to decommissioning engineering. After that it will improve system efficiency and, its exact and quick information should be provided.

Framework design and set-up for decommissioning information system on nuclear facilities is written on based on conception design in this paper.

2. Design of Framework

Framework is developed by Window Presentation Foundation (WPF), which is effective to make the Graphical User Interface (GUI). And its application designed with Model-View-View-Model (MVVM) pattern so that the package makes improvement in upgrade and maintenance feature. In order to increase usage speed and get direct insight for user, the GUI was designed with compact layout except for excessive visual elements. It consists of an intuitive structure so that users can easily access it. Framework is constructed a Client/Server environment based on integrated database. All information data can be integrated using common data model. Decommissioning information system framework is classified three categorizations as bellows.

- Decommissioning Project Information Management for Nuclear Facilities
- Module Type Decommissioning Engineering Solution
- Decommissioning Engineering Database

2.1. The Decommissioning Project Information Management

It manages information required to decommissioning project and provide system management function.

Table 1. The list of decommissioning project information management

Menu list	
· Decommissioning project management · Decommissioning requirement management · Decommissioning plans management · Decommissioning facilities characterization · Decommissioning work management	· Radioactive Waste management · Site restoration information · Radiation/active information · Configuration management · Contents management

2.2. The Module Type Decommissioning Engineering Solution

The module type decommissioning engineering solution program can perform the tasks related to decommissioning engineering such as Comprehensive Analysis and Assessment, Decommissioning Processing modeling, and Decommissioning Work Simulation, and it is designed as a plug-in type.

Table 2. The menu& list of module type decommissioning engineering solution

Comprehensive Analysis and Assessment	Decommissioning Processing Modeling	Decommissioning Work Simulation
· Decommissioning plan assessment · Decommissioning cost estimation · Exposure dose assessment · Decommissioning Radioactive waste volume estimation · Decommissioning safety assessment · Data production	· Decommissioning processing modeling · Work modeling · Comprehensive search	· Decommissioning work simulation · Decommissioning work cost estimation · Decommissioning labor dose rate estimation · Decommissioning work schedule assessment · Simulation results report

2.3. The Decommissioning Engineering Database

The decommissioning engineering database store and manage information required to decommissioning, and

provide database considering expansion. The database used in this system has the following features. It is possible to objectify data so that can be classified. And the database can link objects each other and it can systematically arrange and present the complexed data. Based on acceptable management design for data with various attributes and version, the system can be manage various real plant data without any schema changes. In This study, we composed engineering data based on following tools.

Facilities data of decommissioning information system compose and manage roughly with three categorizations as below.

1) CORE: manages links, properties as master's information and copies only connected links, properties information without definition and change of special schema when add a new CORE.

2) LINK: is information defined relation of between CORE information.

3) PROPERTY: manages properties information related to each CORE type.

3. Results

Followings are the demonstration results of the framework.

The Decommissioning Project Information Management

The project information management is composed Ribbon menu as shown in Fig 1. Each top menu is composed of function as sub-menu except of manager and engineering solution of function item.

In the design of frame work for decommissioning information system is set of detailed function to sample case for decommissioning work management & costing and key of many sub-menu. For other menu, only architecture is designed but it can be developed easily to next step.
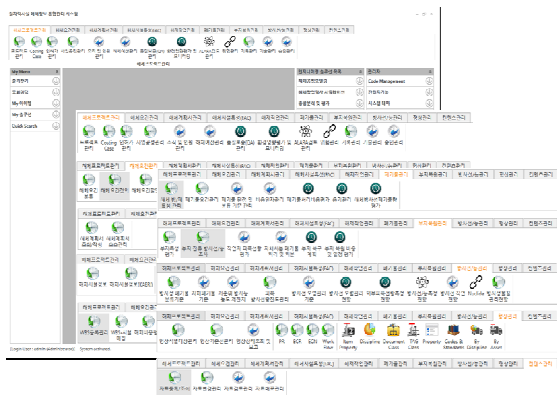

Fig. 1. Decommissioning information system screen

The Decommissioning Engineering Solution

The list of engineering solution is composed the type of Accordion menu and three categorizations.

- Decommissioning processing modeling
- Decommissioning work simulation
- Overall analysis and assessment

Also it is provided every function for decommissioning design, decision making, report and assessment for pre-decommissioning step.

The Decommissioning Engineering Database

Database for decommissioning engineering system is set-up in accordance with schema defined in above section 2.2 and in Window Server 2012 R2 environment. Various types of data would be managed in decommissioning information system was separated as three standard database tables and was managed.

4. Conclusion

Many application programs related to decommissioning for nuclear facilities are developed so far but, it is difficult to offer integrated decommissioning information management and inquiry environment as current programs have independent database and is form of application program system. In this study, framework design and set-up for decommissioning information system on nuclear facilities is written on based on conception design. Decommissioning information system provides a standardized information management environment and engineering software to support the decommissioning engineering work.

In the future, decommissioning information system would be developed based on the results of this study and it will provide the foundation for standard database management, decommissioning information management environment, and construct continuously expandable decommissioning engineering solution.

REFERENCES

[1] Y.J. Hong. Daejeon, S.K. Park. Daejeon, and H.S. Park. Daejeon, Requirement of Conceptual Design for Decommissioning Information Integration Management System, Korea Radioactive Waste Society, Spring, 2017.