

# A rule based file management tool for facility log files integration in disaster environments<sup>☆</sup>

Young-Geol Lee<sup>1</sup>, Younlae Lee<sup>2</sup>, Hyunah Kim<sup>3</sup>, Yeonyi Jang<sup>4</sup>, Minjae Park<sup>1\*</sup>

## ABSTRACT

We often experience complex presence of files within the compute environment. It could be an end-user's desktop environment or a professional part of file management. We would like to suggest one way to manage these different cases of duplicate files. It is a rule-based file management tool, and we want to use it as a tool to consolidate facility management log files. In this paper, we will describe the rule-based file management tools and show examples of how files are managed using them. We are interested in the management of the disaster environment and would like to apply this method to the management of log data related to facilities to be considered in the event of a disaster.

✉ keyword : rule based file management tool, facility management in disaster environments

## 1. Introduction

In recent years, large-scale earthquakes have been increasing in South Korea, and they can cause huge loss of life and economic loss in a wide area when an earthquake occurs, and can cause national disaster such as paralysis of the national neural network. Due to the large scale of disasters, new and complex disasters, the overall disaster risk of society has increased, and the scale of damage has also become larger, and the public's interest in disaster and safety has become very high. The Republic of Korea has established and implemented a 'Comprehensive Plan for Disaster and Safety Technology Development' in order to promptly respond to and recover from disasters and other

accidents such as national protection, disaster, accident prevention, and damage, data, etc., there is not enough integrated management system for systematic management and utilization. The first step in this management is to manage the files from the facility.

In fact, the idea started with managing files in a complex desktop environment. It was to manage the files, using a method of organizing the complicated desktop environment, as shown in Figure 2.



(Figure 1) Various Types of Disaster Situations

As we would organize files in these complex desktop environments, we wanted to develop and apply file management tools in order to properly organize the files that

1 Dept. of Computer Software, Daelim University, Anyang, 13916, South Korea

2 R&D Center, KGI, LTD., Incheon, 21999, South Korea

3 Division of General Studies, Kyonggi University, Suwon, 16727, South Korea

4 Dept. of Applied Information Technology and Security, Ansan University, Ansan, 15328, South Korea

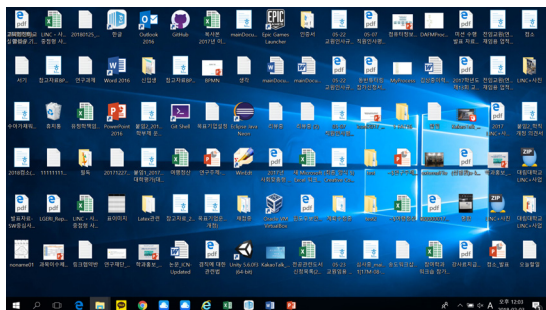
\* Corresponding author (mjpark@daelim.ac.kr)

[Received 5 September 2018, Reviewed 19 September 2018, Accepted 17 October 2018]

☆ This research was supported by a grant(code17CTAP- C129818-01) from Technology Advancement Research Program (TARP) funded by Ministry of Land, Infrastructure and Transport of Korean government.

☆ A preliminary version of this paper was presented at ICONI 2017 and was selected as an outstanding paper.

could be generated in the various facilities in the disaster environment.



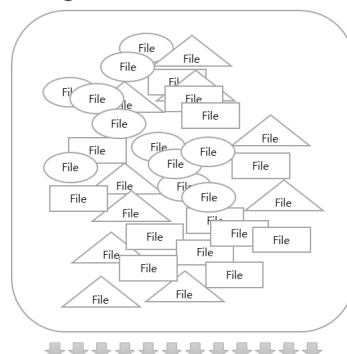
(Figure 2) Complex Desktop Files

## 2. Design of rule based file management tool

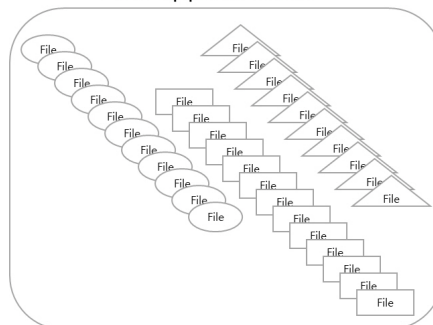
### 2.1 Basic Concept

The basic concepts for managing files are complicated and various types of files, which have a name according to administered rules, is to organize according to the rules that we want. If logs from SOC's facilities are organized according to the appropriate rules, the integrated management of the data will make it very easy and useful to use the data about the facilities.

### Unmanaged Files of Various Facilities

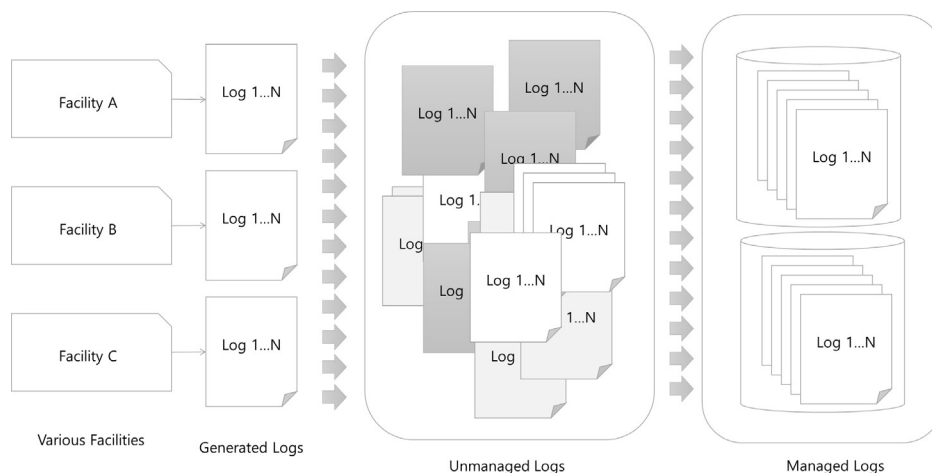


### Files applied Rules



(Figure 3) Basic Concept for File Management

Appropriate data is extracted from log data to perform a proper analysis, and alarms etc. are implemented for facility



(Figure 4) Various Facilities Log Files Management

management in a disaster environment. As a result, analytical - based data such as spreads or charts will be extracted.

The scope of this study is not the part of the file that analyzes and manages its contents, but the part that groups and manages the file itself. Therefore, to design these functions, we design features to define and manage several rules

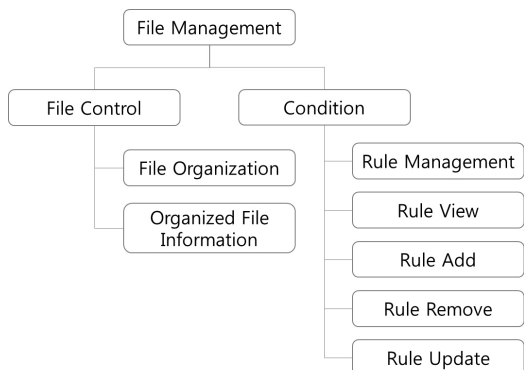
## 2.2 Rules Design

Various types of log files, including log files for a facility, usually have names that reflect the characteristics of the facility or equipment from which they are generated. Of course, files may have different characteristics, but the basic part is considered the name of the file. Thus, the file management tool uses the name to define the conditions for the rule.

The criteria for file management are to generalize the data retrieval conditions to determine 'include', 'exclude(do not include)', 'equal', 'do not equal' and 'do not end with '.

(Table 1) Condition of a Rules

Conditions	Rules
Condition 1	Include
Condition 2	Do not include
Condition 3	Equal
Condition 4	Do not equal
Condition 5	Start together
Condition 6	Do not end with '



(Figure 5) File Management Functions

In addition to the conditions for these rules, the functions that must be defined are primarily the control of the file and control over the condition rules.

## 3. Implementation of rule based file management tool

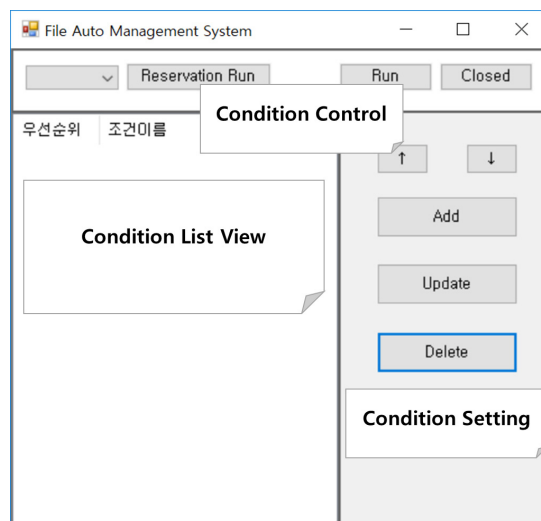
### 3.1 Basic UIs and functions

The basic UI consists of functions 'condition list view', 'condition setting', and 'condition control'.

'condition list view' shows a list of set conditions and one or more conditions to be set. That is, it shows a list of management of facility data with one or more rules applied.

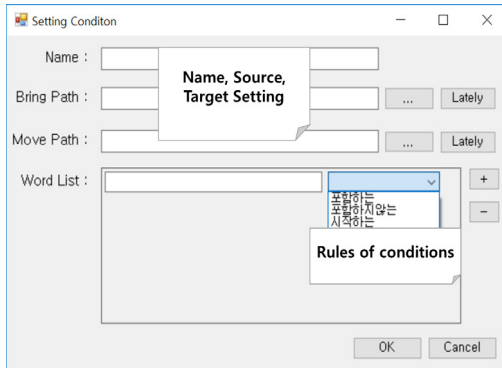
'condition setting' is the control list for setting each condition with add, update and delete. And it is implemented to manage, using pop-up windows. In case of overlapping conditions, parts of the priority are also considered.

'condition control' controls the execution of conditions. Execution of a condition can be done manually after it is set up, and similarly, it can be done periodically.



(Figure 6) Main UI of File Management Tool

The UI for setting the condition enables you to set the source repository and target repository of the file. It is also intended to describe the detailed condition list for word.



(Figure 7) Rules Setting UI

In addition, there is an UI that shows execution results. After the condition has been performed, information about the results from which it was performed is available.

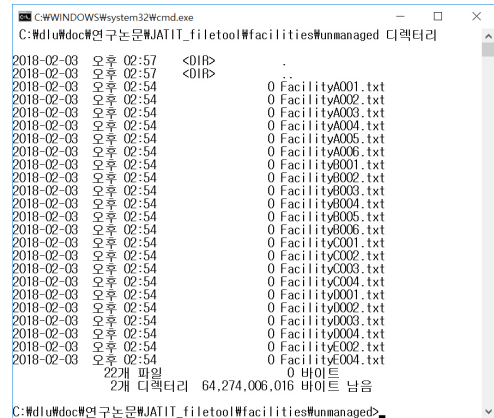


(Figure 8) Result Information View UI

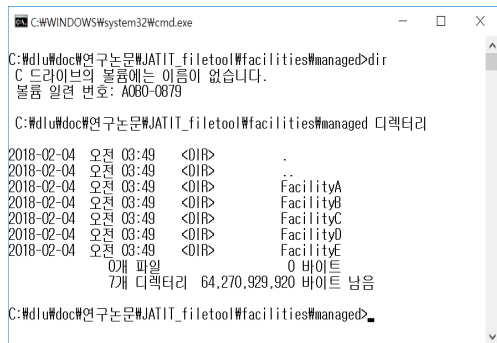
### 3.1 An example of running the file management tool

File management, for example, is explained. We assume that there are 22 unmanaged files, log files, in the 'unmanaged' directory, as shown in Figure 9 below. The 22 files consist of log files generated from facility A, facility B, facility C, facility D, and facility E. And it consists of the equipment name and serial number, such as FacilityA001.

As per the log of the facility, move these files to each facility directory, that is 'FacilityA', 'FacilityB', 'FacilityC', 'FacilityD', and 'FacilityE' directory, in the managed directory as follows to manage them.



(Figure 9) Unmanaged Directory



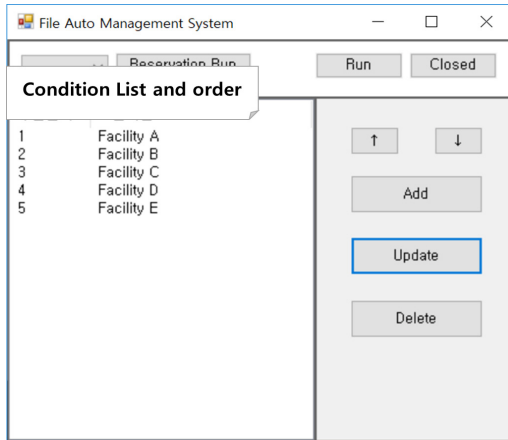
(Figure 10) Managed Directory

Therefore, to define each, we generate five conditions. We use the Condition Setting button of the 'Main UI' described above to create and manage the condition, and set each condition through the 'Condition Setting' pop-up window.

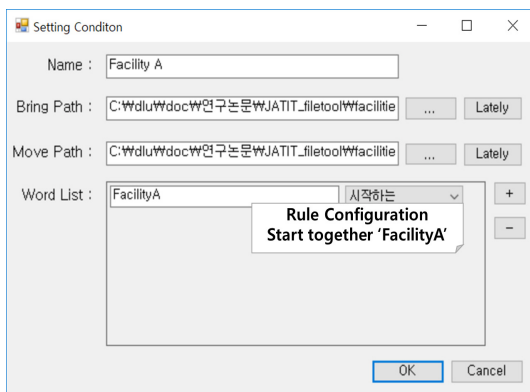
In this case, all the log files start with the facility name, and the changed part is the serial number, so the condition can be set as follows.

(Table 2) Rule Configurations with an Example

Conditions	Rule Configuration	
Facility A	Include or Start together	FacilityA
Facility B	Include or Start together	FacilityB
Facility C	Include or Start together	FacilityC
Facility D	Include or Start together	FacilityD
Facility E	Include or Start together	FacilityE



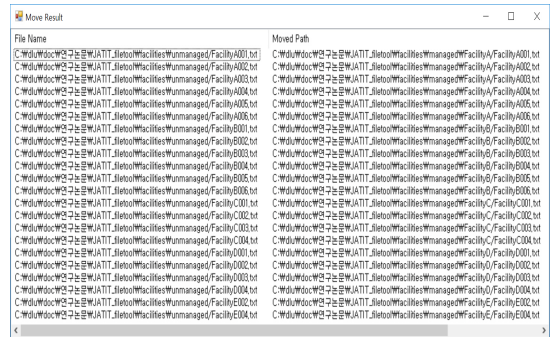
(Figure 11) Main UI with an Example: 5 conditions setting



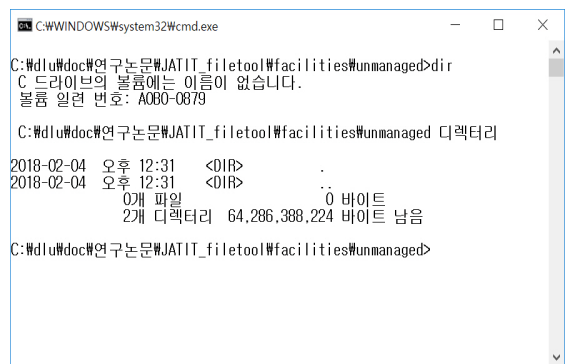
(Figure 12) Condition Setting Popup Window UI

We use the main UI in Figure 11 and the control setting popup window UI in Figure 12 to set up the information organized in table 2. Of course, the control popup setting UI is set up through five different pop-ups, depending on the rules.

And we can do manual or periodic execution using the condition control in the main UI. Information on the results of the run is shown in a new pop-up windows as shown in Figure 13. We can see in Figure 13 that 22 files in the unmanaged directory were moved to the directory for each facility based on the rule information set. As a result, we can see that the files in the unmanaged directory do not exist and were moved to the directory for each facility as shown in Figure 15.



(Figure 13) Result Information with an Example



(Figure 14) Result of Unmanaged Directory with an Example

## 4. Related works

There are already many studies and tools available to manage the files. We explain several file management tools, including what is introduced in the article[23].

TeraCopy[1] acts as an alternative to the built-in copy and move process in Windows. It is designed to copy and move files either locally or over the network at a faster rate. It allows to pause and resume file transfer activities, it integrates into the Windows shell and has an automatic error recovery mechanism in case something goes wrong during the transfer process. Steganos LockNote[2] allows to securely store confidential notes such as license keys, passwords, phone numbers, etc. It uses AES-256 encryption to store your text in a self-executable container that requires a password to open it. Duplicate Cleaner[3] is a file de-duplication tool that removes redundant copies of files



```

C:\WINDOWS\system32\cmd.exe
C:\Wdlu\doc\연구논문\JATIT_filetool\facilities\managed>cd
C 드라이브의 볼륨에는 이름이 없습니다.
볼륨 일련 번호: A0B0-0879

C:\Wdlu\doc\연구논문\JATIT_filetool\facilities\managed 디렉터리
2018-02-04 오전 03:49 <DIR> .
2018-02-04 오전 03:49 <DIR> ..
2018-02-04 오후 12:31 <DIR> FacilityA
2018-02-04 오후 12:31 <DIR> FacilityB
2018-02-04 오후 12:31 <DIR> FacilityC
2018-02-04 오후 12:31 <DIR> FacilityD
2018-02-04 오후 12:31 <DIR> FacilityE
0개 파일 0 바이트
7개 디렉터리 64,286,085,120 바이트 남음

C:\Wdlu\doc\연구논문\JATIT_filetool\facilities\managed>

C:\Wdlu\doc\연구논문\JATIT_filetool\facilities\managed\FacilityA 디렉터리
2018-02-04 오후 12:31 <DIR> .
2018-02-04 오후 12:31 <DIR> ..
2018-02-03 오후 02:54 0 FacilityA001.txt
2018-02-03 오후 02:54 0 FacilityA002.txt
2018-02-03 오후 02:54 0 FacilityA003.txt
2018-02-03 오후 02:54 0 FacilityA004.txt
2018-02-03 오후 02:54 0 FacilityA005.txt
2018-02-03 오후 02:54 0 FacilityA006.txt
4개 파일 0 바이트
2개 디렉터리 64,286,085,120 바이트 남음

C:\Wdlu\doc\연구논문\JATIT_filetool\facilities\managed\FacilityA>

C:\Wdlu\doc\연구논문\JATIT_filetool\facilities\managed\FacilityD 디렉터리
2018-02-04 오후 12:31 <DIR> .
2018-02-04 오후 12:31 <DIR> ..
2018-02-03 오후 02:54 0 FacilityD001.txt
2018-02-03 오후 02:54 0 FacilityD002.txt
2018-02-03 오후 02:54 0 FacilityD003.txt
2018-02-03 오후 02:54 0 FacilityD004.txt
4개 파일 0 바이트
2개 디렉터리 64,286,089,216 바이트 남음

C:\Wdlu\doc\연구논문\JATIT_filetool\facilities\managed\FacilityD>

C:\Wdlu\doc\연구논문\JATIT_filetool\facilities\managed\FacilityE 디렉터리
2018-02-04 오후 12:31 <DIR> .
2018-02-04 오후 12:31 <DIR> ..
2018-02-03 오후 02:54 0 FacilityE002.txt
2018-02-03 오후 02:54 0 FacilityE004.txt
2개 파일 0 바이트
2개 디렉터리 64,286,089,216 바이트 남음

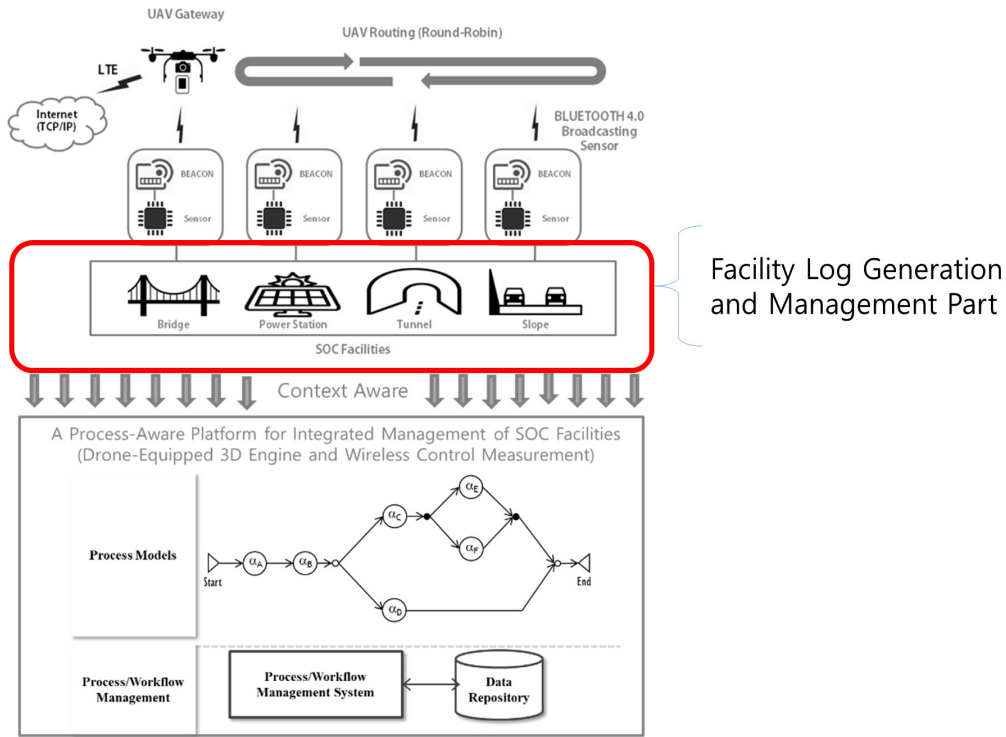
C:\Wdlu\doc\연구논문\JATIT_filetool\facilities\managed\FacilityE>

```

(Figure 15) Result of Managed Directories with an Example

from a specified hard drive or network location. It works by generating an MD5 hash of each file and then comparing hashes for duplicates. It also gives the option to search for files using a byte-to-byte comparison. Once the duplicate files have been found, we can choose to delete them or move them to an archive location. Bulk Rename Utility[4], [5], [6] is a lightweight yet powerful application for renaming files and folders using an extensive array of criteria. Using this tool you can remove, add or change text and numbers within the file name, add date/time stamps, change case, modify file and folder attributes and preview what the changes will look like before you go ahead with them. The Bulk Rename Utility also supports regular expressions for additional flexibility. FreeFileSync[7], [8] is a folder comparison and synchronization tool designed with usability and performance in mind. FreeFileSync allows you to save the configuration as a ".batch" file which you can then use to schedule a task

for automatic folder synchronization. PeaZip[9], [10] is a cross-platform file and archive manager that supports volume spanning, high levels of compression and encryption, and support for a wide range of archiving formats. Using PeaZip you can create archive formats such as 7Z, ARC, BZ2, GZ, PAQ, PEA, QUAD/BALZ, TAR, UPX, WIM, XZ, and ZIP, and extract over 150 archive formats, including ACE, CAB, ISO, RAR, UDF, ZIPX and many more. WinMerge[11], [12], [13] is a file comparison and merging tool that visually displays the differences side-by-side. This tool is useful for helping to determine what has changed between two files versions and then merging those changes. WinMerge supports Unicode and regular expressions and includes Visual SourceSafe and Windows Shell integration. SearchMyFiles[14], [15] aims to be an alternative to the Windows "Search For Files And Folders" process, allowing more flexible and accurate searches to be performed. You



(Figure 16) A Platform and Its Facility Log Management Part (Process-Aware Drone-Equipped 3D Engine and Wireless Control Measurement Platform for Integrated Management of SOC Facilities)

can search using wildcards, last modified/created/accessed time, file attributes, file content (text or binary search) and by file size. Search results can be saved as a text, html, csv or xml file. AxCrypt[16], [17], [18] is a file-level encryption tool that integrates with the Windows shell and allows you to right-click on a file to encrypt or decrypt it using AES-256 encryption. AxCrypt also offers the ability to create a self-extracting archive to securely transfer files to another location. Similar to the functionality offered in WinMerge, ExamDiff[19] offers a visual side-by-side comparison of two files, highlighting the differences in different colours and giving you the option to navigate through the changes in a number of ways. SyncToy[20] is an application that can be used as a mini backup utility to synchronize files and folders between two locations. SyncToy allows to ‘Synchronize’ FolderA with FolderB where the changes are replicated on both ends, ‘Echo’ FolderA to FolderB where the changes in

FolderA are replicated to FolderB, and ‘Contribute’ FolderA to FolderB where the changes in FolderA (except deletions) are replicated to FolderB. Locate32[21], [22] is a search utility that finds files or folders based on their names. Locate32 works by indexing file and folder names in a database and then using the database to quickly return results. Locate32 comes packaged with a command line version that can be used to update and access the databases without any user interaction. Tools that focus on their functions for file management shown above can be seen as general and usable on various aspects. Of course, some tools may be available now in terms of what we would like to use, but as a tool aimed at managing the facility, we are not focused on tools for disaster environment.

And, we will include the file management tools developed from this study in our proposed disaster environment platform[24], that a process-aware drone-equipped 3D engine

and wireless control measurement platform, research. Research into disaster environment platforms is being introduced as a combination of process management technologies, 3D data processing technologies, drone technologies, file analysis and processing technologies.

## 5. Conclusions and future works

The part about the disaster has become very controversial lately. Therefore, the management of the associated facilities is also very important. As part of the management of the facilities for such a disaster environment, we conducted research and developed one tool.

We have described the file management tools to facilitate the management of log files in facilities for disaster environment management. Although the basic contents of file management may not necessarily be related to disaster related facility management, the basic scope is designated as the log file for facility management, citing the description.

Future research will lead to the development of the platform for the disaster environment and for each function within the platform. The platform's ultimate purpose is to manage the facility against the disaster environment and includes data collection, preprocessing, and business logic processing.

## Acknowledgement

This research was supported by a grant(code17CTAP-C129818-01) from Technology Advancement Research Program (TARP) funded by Ministry of Land, Infrastructure and Transport of Korean government.

## Reference

- [1] Pung, William, and Andrew Woodward, "Does the use of MIMO Technology used by 802.11 n Reduce or Increase the Impact of Denial of Service Attacks?" 2010. <https://doi.org/10.4225/75/57b2b2fb40ce1>
- [2] Beckman, David, and David Hirsch, "Hard Drive Homicide," ABA JOURNAL, 92, 62-62, 2006. [www.abajournal.com/magazine/archives/2006](http://www.abajournal.com/magazine/archives/2006)
- [3] James, Delores C., et al., "Participation of African Americans in e-Health and m-Health studies: A systematic review," *Telemedicine and e-Health*, 23.5, 351-364, 2017. <https://doi.org/10.1089/tmj.2016.0067>
- [4] Shavers, Brett. *Cybercrime Investigative Case Management: An Excerpt from Placing the Suspect Behind the Keyboard*. Newnes, 2013.
- [5] Wickramasinghe, Samantha, and Sunesh Hettiarachchi, "Use of Computer Forensics and Its Implications," 2016.
- [6] Collie, Aaron, Lucas Mak, and Shawn Nicholson, "One Stone, Two Birds: Data Assessment Framework for Digital Collection Audit and Preservation," *Archiving Conference*, Vol. 2011, No. 1, Society for Imaging Science and Technology, 2011. <https://www.ingentaconnect.com/content/ist/ac/2011/00002011/00000001;jsessionid=767hh1go7hvl.x-ic-live-02>
- [7] Workbench, Compuware. "William McKnight's Information Management (Elsevier/Morgan Kaufmann)." 2013.
- [8] Anderson, Wells H. "New backup options to protect your work," *GPSolo*, 30, 53, 2013. <https://heinonline.org/HOL/LandingPage?handle=hein.journals/gpsolo30&div=96&id=&page=>
- [9] Whitt, Phillip, "Additional Software Products," *Pro Freeware and Open Source Solutions for Business*. Apress, Berkeley, CA, 235-241, 2015. [https://doi.org/10.1007/978-1-4842-1130-4\\_12](https://doi.org/10.1007/978-1-4842-1130-4_12)
- [10] Choi, JongCheon, et al. "A static birthmark for MS windows applications using import address table," *Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS)*, 2013 Seventh International Conference on. IEEE, 2013. <https://doi.org/10.1109/IMIS.2013.159>
- [11] Grimm, Dean. "WinMerge," 2010. <http://winmerge.org/?lang=en>
- [12] Winn, Khine Zar Ne, "Quantifying and Validation of Changeability and Extensibility for Aspect-Oriented Software," *International Conference on Advances in Engineering and Technology (ICAET'2014)*. Singapore. 2014.
- [13] Abebe, Surafel Lemma, et al., "Analyzing the evolution of the source code vocabulary," *Software Maintenance and Reengineering*, 2009. CSMR'09. 13th European



- Conference on. IEEE, 2009.  
<https://doi.org/10.1109/CSMR.2009.61>
- [14] Wickramasinghe, Samanthi, and Sunesh Hettiarachchi, "Use of Computer Forensics and Its Implications," 2016.
- [15] bt Yusof, Nadiah, Amirah Ismail, and Nazatul Aini Abd Majid. "Deduplication image middleware detection comparison in standalone cloud database," 2016. <http://warse.org/IJACST/static/pdf/Issue/icdcb2016sp03.pdf>
- [16] Seleborg, Svante, "Axantum Strong Software Licensing," Retrieved at<>, Version 0.3, 6, 2004. <http://www.axantum.com/AxCrypt/etc/Axantum-Strong-Licensing.pdf>
- [17] Perkins, Jethro. "Information Management and Technology," 2014. <https://info.lse.ac.uk/staff/Services/Policies-and-procedures/Assets/Documents/infSecPol.pdf>
- [18] Tatli, Emin Islam. "Google reveals cryptographic secrets." Kryptowochenende 2006—Workshop über Kryptographie Universität Mannheim. 2006. <http://th.informatik.uni-mannheim.de/people/tatli.shtml>
- [19] Ruengtam, Pornpip, "Learning Efficiency in Theoretical Subjects of Interior Architecture by Cooperative/ Collaborative Learning Technique," Procedia-Social and Behavioral Sciences, 68, 281-294, 2012. <https://doi.org/10.1016/j.sbspro.2012.12.227>
- [20] Hargreaves, Christopher, and Howard Chivers, "A Virtualisation Based Forensic Computing Research Tool," [https://www.researchgate.net/profile/Christopher\\_Hargreaves/publication/264543639\\_A\\_Virtualisation\\_Based\\_Forensic\\_Computing\\_Research\\_Tool/links/53e3b5230cf2fb74870db859/A-Virtualisation-Based-Forensic-Computing-Research-Tool.pdf](https://www.researchgate.net/profile/Christopher_Hargreaves/publication/264543639_A_Virtualisation_Based_Forensic_Computing_Research_Tool/links/53e3b5230cf2fb74870db859/A-Virtualisation-Based-Forensic-Computing-Research-Tool.pdf)
- [21] Agarkhed, Jayashree, and Sumaiyya Joochi, "Smart work for college-be digital." Inventive Computation Technologies (ICICT), International Conference on., Vol. 2. IEEE, 2016. <https://doi.org/10.1109/INVENTIVE.2016.7824908>
- [22] Andrew Tabona, "The Top 20 Free File Management Tools for Sys Admins", TechTalk, July 24, 2013
- [23] Minjae Park, et al., "A Process-Aware Drone-Equipped 3D Engine and Wireless Control Measurement Platform for Integrated Management of SOC Facilities," ICACT Transactions on Advanced Communications Technology (ICACTION-TACT), November 30, 2017. [http://icact.org/upload/2018/0684/20180684\\_finalpaper.pdf](http://icact.org/upload/2018/0684/20180684_finalpaper.pdf)

## ● 저 자 소 개 ●



### Young-Geol Lee

Young-Geol Lee is a full professor of computer software at Daelim University, South Korea. He received B.S., M.S., and Ph.D. degrees in computer science from Inha University in 1993, 1995, and 1999, respectively. His research interests include Database, Spatial Database, Geographic Information System, Spatial Warehousing, Data-centric Constraint Language and Process-aware facility management systems.



### Younlae Lee

Younlae Lee is the director of KGI Corp., the South Korea Software Development Co. He received B.S. degrees in physics from Inha University and M.S. degrees in civil engineering from Kangwon University. He developed BlastAZ, the blasting simulation program. And his Research interests include 3D modeling and Imaging processing, Simulation systems, IoT(Internet of Things) and location-based infrastructure maintenance systems.

## ● 저 자 소 개 ●



### Hyunah Kim

Hyunah Kim is an adjunctive professor and a faculty member of the collaboration technology research laboratory in the department of computer science at Kyonggi University, South Korea. She received her B.S. degree in computer science from Korea Nazarene University in 2001. Also, she received her M.S. and Ph.D. degrees in computer science from Kyonggi University in 2003 and 2009, respectively. Her research interests include workflow systems, SCORM-based e-Learning process models, BPM, BPI, ACM, workflow-supported social networks discovery and analysis, and process-aware Internet of Things.



### Yeonyi Jang

Yeonyi Jang is an assistant professor of Applied Information Technology and Security at Ansan University, South Korea. She received Ph.D. degrees in Advanced Imaging Science Multimedia, and Film from Chung-ang University in 2011. Her research interests digital image processing, 3D-Modeling and Information Security.



### Minjae Park

Minjae Park is an assistant professor of computer software at Daelim University, South Korea. He received B.S., M.S., and Ph.D. degrees in computer science from Kyonggi University in 2004, 2006, and 2009, respectively. His research interests include groupware, workflow systems, BPM, CSCW, collaboration theory, process warehousing and mining, workflow-supported social networks discovery and analysis, process-aware information systems, data intensive workflows, and process-driven Internet of Things and process-aware factory automation systems.