An Implementation of Asset Tracking System for Computer Center Using Topic Maps

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Abstract

This paper presents an implementation of asset tracking system for computer center by using Topic Maps. The system is to solve the deficiency of organizational asset management. Major concerns in computer operations are optimized, budgeting , maintenance costs, asset loses, replacement. The organizations tempt to make better use of their assets for improved capital investment. Thus the organizations need asset tracking to solve those problem. The research uses Topic Maps standard to design the asset tracking system using Protege software as a tool. To implementation a XTM Conceptual Model, we use protege design asset data is defined in 3 types: Computer, Peripheral, and Network. The model is Ontology for asset tracking, which use Asset Data as the key concept. This system has been implemented in Computer Center for Directorate of Electronics, Royal Thai Air Force.

Key Words: Asset Management, Asset Tracking, Knowledge Base, Topic Maps, Ontology.

1. Introduction

In the organization, lack of asset management introduce organizational inefficiency in operations. The asset management is the key for which need optimized capital investment organizations. An efficient asset management emphasizes, accurate operations in each step in asset management cycle (AMC).[1] The AMC defines 4 main operations: Planning, Asset Acquisition, Use-Maintenance, and Sale. If each cycle operates correctly that affect to organization operates efficiency and using assets in organization be worthwhile. Thus the Royal Thai Air Force (RTAF) creates asset management framework. That is 4 Years Operation RTAF Plan (2005-2008). One of the plan uses Information Technology (IT) for solve the problem about asset management.[2] This research design a conceptual model and develop a asset tracking system for the Computer Center according to a Plan. The design model defines the Ontology concept uses Theresa Edgington concept in system design and creation. It uses the standard of XTM Conceptual Model (XML Topic Maps Conceptual Model) [3] as design tool, and Protege Version 3.2.1 for creating data.[4]

2. Literature review

Major concerns in computer operations are optimized, budgeting, maintenance costs, asset loses, replacement. Thus the organizations need asset management in order to raise the capital value of their assets by maximize utilization and necessary replacement.

The asset management cycle are Planning , Asset acquisition, Use-Maintenance, and Sale as shown in Figure 1.

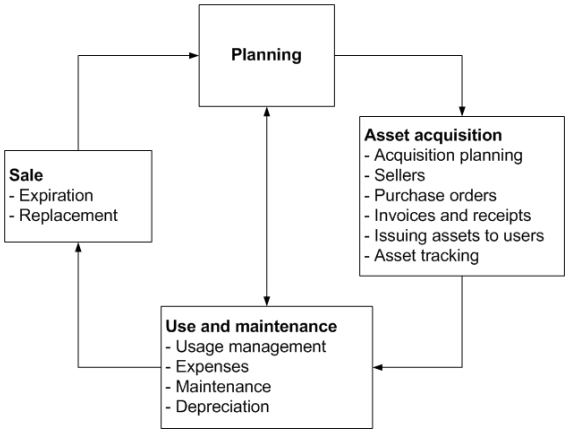

Figure 1. The asset management cycle. [1]

The asset tracking is one of the asset acquisition. The process of asset tracking and evaluation are important for executive use of data to adjust work

plan and modify policies. The information from the process is useful for computer center staff in solving the inefficiency problem in operations. That includes budget use for computer operations. The computer center management uses 4 Years Operation RTAF Plan for implementation of IT system for solving the asset related problem. Figure 2 shows the framework of 4 Years Operation RTAF Plan, which can be summarized as follows.

Figure 2. 4 Years Operation RTAF Plan. [2]

Vision : Develop IT management system and knowledged personnel of RTAF.

Challenges : Use IT for operation in RTAF nation-wide.

Goal (KPI) : Use IT for improved efficiency in operations, create IT system for control, command, tracking of operations.

Strategies : Use IT for command, control and resource management (80% target) for good governance in all levels of operation. [2]

Major policy in asset control is asset tracking. An efficiency asset tracking needs all information of assets provided by trustee. Example information includes checklist asset transfer checklist and indication whether the asset is a new asset, moving to a new location, being transferred to a new trustee, or being disposed of. The trustee who manages assets must assure periodically that assets transfer transactions must be recorded in the system.[5]

Based on Theresa Edgington concept [6,7] of the ontology process are Design, Develop, Integrate, Validate and feed back, and Interate process. The design process includes 5 steps : Framing the problem statement, Defining, The Scope, Developing success and acceptance criteria, Investigating tasks and business are goals, and Analyzing use cases. The model uses the knowledge lens concept. They are the ontology development for creating Target Information, which specifies sources and media information of the target document.

The research uses Topic Maps for system design and construction. Topic Maps are used as a specification to provide a model and grammar for representing the structure of information resources used to define topic and association between topics. Name, resources and relationships are characteristic of abstract. [3]

3. Asset tracking system design

The system is to solve the deficiency of organizational asset management, the system design 4 Years Operation RTAF Plan as model the framework. Figure 3 shows the main components: Help Desk, Implementation Planning, Asset Management and Budgeting.

- Help Desk is one of the standards of system developing IT RTAF for information and assistance resource that problem solving. (RTAF Standard for IT, Year 2001) [8]
- Implementation Planning is one of the standards of system IT RTAF for IT Project Planning. (RTAF Standard for IT, Year 2001) [8]
- Asset Management is one of the standards of finance management for asset management in organization for asset Utilization and Acquisition. [9]
- Budgeting is one of the standard of finance management for Budgeting and Financial control. [9]

In this research the framework for asset tracking system for Computer Centers defines 4 work groups in computer operation, as shown in Figure 3.

1. Help Desk
2. Implementation Planning
3. Asset Management
4. Budgeting

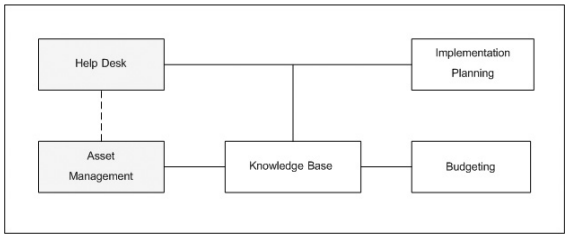

Figure 3. A asset tracking for Computer Center framework.

This research develops asset tracking system model follow the knowledge lens concept. It is composed of Work Process (W), Organization (O) and Target Information (TI) which use for check data on monitor or reports as shown in Figure 4.

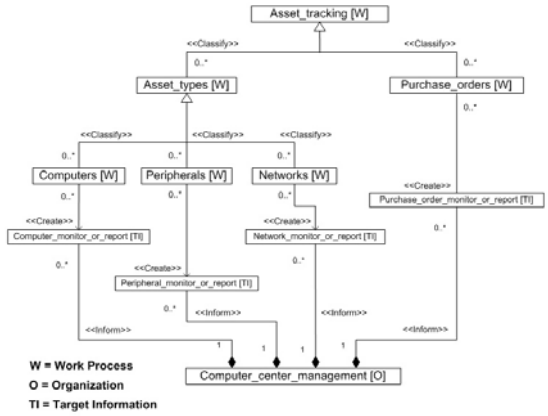

Figure 4. The asset tracking system design.

Our asset management system is designed by using XTM Conceptual Model. The design model is composed of 3 main elements:

- Asset tracking data can be classified into Asset types and Purchase orders.
- Asset types can be either Computer, Peripheral, or Network, which has different detail of information
- The output data is the summary for the purpose of Computer Center management's use.

4. Implementation

In Implementing our system model, We use Protege for constructing graph relation of data, asset data and Topic Maps XML. The details of assets are recorded by the Instance Editor of Protege tool and use the tool to generate graph relation of data, asset data and Topic Maps XML, such as Computer, Peripheral and Network.

The Computer asset tracking is composed of, for each Computer type, Asset Category, ID Number, Asset Name, Current Location, Designated Trustee, New Location, New Trustee.

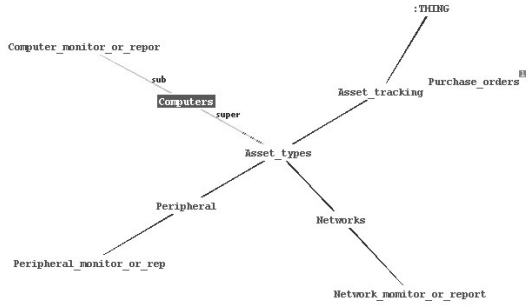

Figure 5. Graph relation of asset tracking of Computer type.

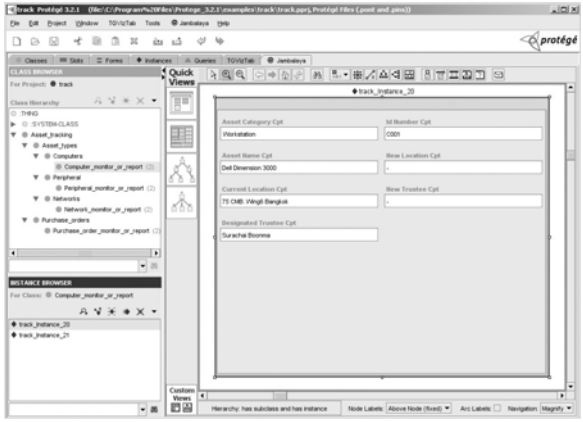

Figure 6. Asset tracking Computer data.

```
<?xml version='1.0' encoding='UTF-8'?>
<!DOCTYPE rdf:RDF [
    <!ENTITY rdf 'http://www.w3.org/1999/02/22-rdf-syntax-ns#'>
    <!ENTITY rdf_ 'http://protege.stanford.edu/rdf'>
    <!ENTITY rdfs 'http://www.w3.org/2000/01/rdf-schema#'>
]>
<rdf:RDF xmlns:rdf="&rdf;"
    xmlns:rdf_="&rdf_;"
    xmlns:rdfs="&rdfs;">
<rdf_:Computer_monitor_or_report rdf:about="&rdf_;track_Instance_20"
    rdf_:asset_category_cpt="Workstation"
    rdf_:asset_name_cpt="Dell Dimension 3000"
    rdf_:current_location_cpt="75 CMB. Wing6 Bangkok"
    rdf_:designated_trustee_cpt="Surachai Boonma"
    rdf_:id_number_cpt="C001"
    rdf_:new_location_cpt="-"
    rdf_:new_trustee_cpt="-"
    rdfs:label="track_Instance_20"/>
<rdf_:Computer_monitor_or_report rdf:about="&rdf_;track_Instance_21"
    rdf_:asset_category_cpt="Workstation"
    rdf_:asset_name_cpt="Dell Latitude C640"
    rdf_:current_location_cpt="84 LCB. Wing2 Lopburi"
    rdf_:designated_trustee_cpt="Somchai Surasee"
    rdf_:id_number_cpt="C002"
    rdf_:new_location_cpt="-"
    rdf_:new_trustee_cpt="-"
    rdfs:label="track_Instance_21"/>
</rdf:RDF>
```

Figure 7. Asset tracking Computer data Topic Maps XML Standard.

The Peripheral asset tracking is composed of, for each Peripheral type, Asset Category, ID Number, Asset Name, Current Location, Designated Trustee, New Location, New Trustee.

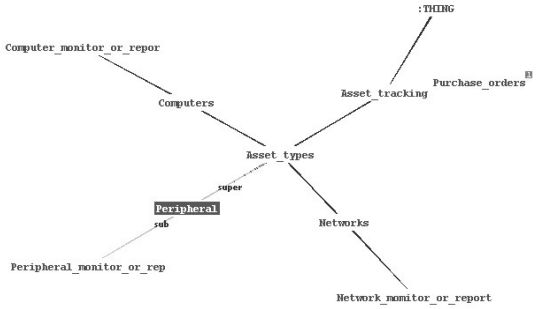

Figure 8. Graph relation of asset tracking of Peripheral type.

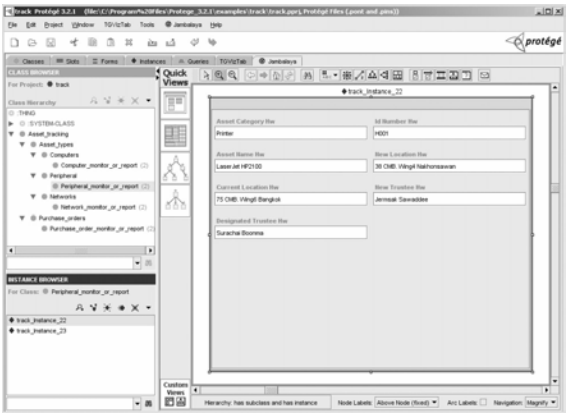

Figure 9. Asset tracking Peripheral data.

```
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    <!ENTITY rdf 'http://www.w3.org/1999/02/22-rdf-syntax-ns#'>
    <!ENTITY rdf_ 'http://protege.stanford.edu/rdf'>
    <!ENTITY rdfs 'http://www.w3.org/2000/01/rdf-schema#'>
]>
<rdf_:Peripheral_monitor_or_report rdf:about="&rdf_;track_Instance_22"
    rdf_:asset_category_hw="Printer"
    rdf_:asset_name_hw="LaserJet HP2100"
    rdf_:current_location_hw="75 CMB. Wing6 Bangkok"
    rdf_:designated_trustee_hw="Surachai Boonma"
    rdf_:id_number_hw="H001"
    rdf_:new_location_hw="38 CMB. Wing4 Nakhonsawan"
    rdf_:new_trustee_hw="Jermsak Sawaddee"
    rdfs:label="track_Instance_22"/>
<rdf_:Peripheral_monitor_or_report rdf:about="&rdf_;track_Instance_23"
    rdf_:asset_category_hw="Scanner"
    rdf_:asset_name_hw="Scanner HP ScanJet4070C"
    rdf_:current_location_hw="84 LCB. Wing2 Lopburi"
    rdf_:designated_trustee_hw="Somchai Surasee"
    rdf_:id_number_hw="H002"
    rdf_:new_location_hw="41 AMB. Wing7 Suratthani"
    rdf_:new_trustee_hw="Supan Yoddee"
    rdfs:label="track_Instance_23"/>
</rdf:RDF>
```

Figure 10. Asset tracking Peripheral data Topic Maps XML Standard.

In Figure 9 the trustee can check periodically, to see such asset changes as location move and asset owner (trustee) changes. The summary can also tracks new location and trustee information, previous information.

The Network asset tracking is composed of, for each Network type, Asset Category, ID Number, Asset Name, Current Location, Designated Trustee, New Location, New Trustee.

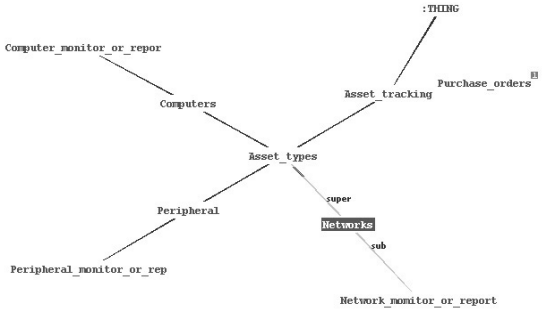

Figure 11. Graph relation of asset tracking of Network type.

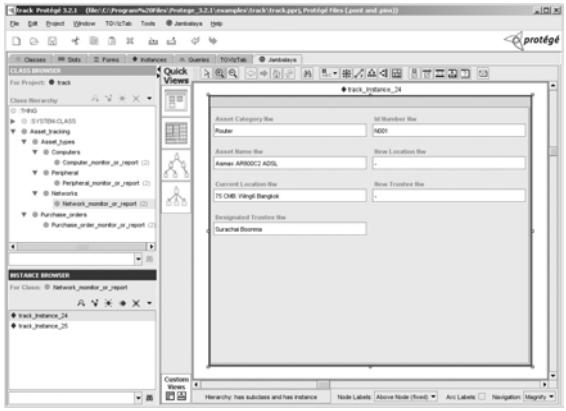

Figure 12. Asset tracking Network data.

```
<?xml version='1.0' encoding='UTF-8'?>
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    <!ENTITY rdf_ 'http://protege.stanford.edu/rdf'>
    <!ENTITY rdfs 'http://www.w3.org/2000/01/rdf-schema#'>
]>
<rdf_:Network_momitor_or_report rdf:about="&rdf_;track_Instance_24"
    rdf_:asset_category_nw="Router"
    rdf_:asset_name_nw="Asmax AR800C2 ADSL"
    rdf_:current_location_nw="75 CMB. Wing6 Bangkok"
    rdf_:designated_trustee_nw="Surachai Boonma"
    rdf_:id_number_nw="N001"
    rdf_:new_location_nw="-"
    rdf_:new_trustee_nw="-"
    rdfs:label="track_Instance_24"/>
<rdf_:Network_momitor_or_report rdf:about="&rdf_;track_Instance_25"
    rdf_:asset_category_nw="Switch"
    rdf_:asset_name_nw="D-Link DGS-3627G"
    rdf_:current_location_nw="75 CMB. Wing6 Bangkok"
    rdf_:designated_trustee_nw="Surachai Boonma"
    rdf_:id_number_nw="N002"
    rdf_:new_location_nw="-"
    rdf_:new_trustee_nw="-"
    rdfs:label="track_Instance_25"/>
</rdf:RDF>
```

Figure 13. Asset tracking Network data Topic Maps XML Standard.

5. Conclusion

The result of research presented here is a asset management with knowledge base implemented with consider which of technology combined. The asset management is significant for operation and use budget in organization. Major concerns in computer operations are optimized, budgeting, maintenance costs, asset loses, replacement. The organizations tempt to make better use of their assets for improved capital investment. Thus the organizations need asset tracking to solve those problem. The research uses Topic Maps standard to design the asset tracking system, using and create output data. Output data use Protege Version 3.2.1 as a tool for implementation. This tool is open source software and many users network. That affect will be saved the budget for purchase. The result of implementation is XTM Conceptual Model. We use protege design asset data is defined in 3 types: Computer, Peripheral, and Network. The Computer Center can use Ontology from that model for asset tracking. They use Asset Data is key concept. In order that organization can solve the problem about asset tracking in organization enhance efficiency.

6. References

[1] Chaisit Chaleummeprasert, *Finance Management Standard 7 Hurdles and New Budget System Making*, Chapter 1, Chulalongkorn University, Bangkok, 2001.

[2] Royal Thai Air Force committee, *4 Years Operation Royal Thai Air Force Plan (2005-2008)*, 2005, pp.12,37, 2005.

[3] Steve Pepper, Graham Moore, *XML Topic Maps (XTM) 1.0*, pp.1,57, 2001.

[4] Stanford Medical Informatics, *The Protege Ontology Editor and Knowledge Acquisition System*, Available: http://protege.stanford.edu, [2007, February 7].

[5] WebRing Inc., *Asset Control Policy*, Available: http://www.comptechdoc.org/independent/security/policies/asset-control-policy.html, [2007, April 19]

[6] Jirasak Gornmanee and Dr.Kittima Mekhabuncahkij, "An Implementation of Knowledge Management System for Computer Center Using Topic Maps", *JCSSE2007*, **4**, pp.202, Khonkaen, 2007.

[7] Theresa Edgington, Beomjin Choi, Katherine Henson, T.S. Raghu, and Ajay Vinze, "*A Dopting Ontology to Facilitate Knowledge Sharing*", 2004, pp.87-88.

[8] Information Technology Royal Thai Air Force committee, *Information Technology Royal Thai Air Force Standard,* 2001*,* pp.40, 63, 2001.

[9] Directorate of Finance. Royal Thai Air Force, *Performance Based Budget*, pp.2, 2002.