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A Systematic Literature Review on Role-Based Access Control

Abstract

Role-based access control (RBAC) has become an increasingly popular access control for various applications such as web applications and database applications. RBAC restricts access to resources based on identity of subjects and/or groups called roles. Since RBAC is introduced in 1998, researchers have proposed various extended models of RBAC. For example, they define additional constraints among roles (e.g., temporal constraints or location constraints) or hierarchy relationship of roles. Our goal of this work is to study extended models of RBAC and analyze their extended features and claimed research contributions to find limitations of current RBAC models and what extent of extended features that can be used for future RBAC. We conduct a systematic literature review by collecting and synthesizing relevant research papers. We initially collect XXXX papers from various sources such as IEEE and ACM websites and selected 26 papers systemically. We perform a comparative analysis to find relationships among extended models and RBAC.

TBD: Result

TBD: Conclusion

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Keywords:

1. Introduction

Role-based access control (RBAC) models [1] become popularly used to govern access to critical resources. In an RBAC model, roles represent a group of users who are involved in a specific job function in an organization. RBAC assigns permissions of specific actions on resources to roles instead of individual users. Therefore, in order to gain roles' permission on specific resources, users acquire appropriate roles first.

RBAC is a generalized access control approach used for various applications including web services, database applications, and healthcare applications. RBAC has advantages in maintaining and managing organization's security policies. For example, if a user is to access manager role's resources within a given organization, security policy administrators simply add the user to be associated with the manager role.

RBAC is first introduced in 1990s, NIST proposed standard RBAC model [1]. Standard RBAC model considers only role-user association and role hierarchy. Since standard RBAC model has limitations such as specifying environmental constraints or context information Researchers developed extended models of RBAC to overcome the limitations. However, as researchers often develop their own specialized extended models of RBAC, their research cannot be generalized or compared with other research work appropriately. As a result, researchers could take time on reinventing the wheel.

The goal of this work is to synthesize available research results on extended models of RBAC. We analyze their extended features and claimed research contributions to find limitations of current RBAC models and what extent of

extended features by comparing with similar research work. We conducted a systematic literature review (SLR) to evaluate and interpret all available research relevant to a particular research question or topic area of interest.

Our research give benefits to a community as follows:

- Our work summarizes current extended RBAC research work and its contributions. By synthesizing the current results, our work shows a roadmap of current extended RBAC research.
- Our work guides a direction for a standard of extended RBAC. Understanding the categorization and the motivation of the existing research results helps decide a standard of extended RBAC.
- Our work shows a criteria in comparison among research results.
- Our work helps identify the research challenges in the ares of security policies and suggest a future extension of RBAC.

2. Methodology and Process

We collect papers on extended role-based access control [1]. We select 27 papers out of XXX papers.

2.1. Research Questions

We have following research questions.

- RQ1. What are problems in current RBAC model to propose extended RBAC models?
- RQ2. What are reasons to propose RBAC extensions?
- RQ3. Which extended features of RBAC model are proposed?
- RQ4. How they provide evidence to show that their model work in practice? For example, they provide a prototype to run a real example.
- RQ5. What is criteria for evaluation? We investigate how they evaluate their research work.

For RQ1-RQ3, we compare of proposed extended models. For RQ4, we compare quality of completeness of the proposed models. Beyond modeling of extended RBAC models, an prototype shows that their models work in practice and improves the quality of the completeness of research papers. For RQ5, we compare criteria for evaluation of extended RBAC models.

2.2. Categorization

This section describes categorization of papers based on specific extended features as follows.

- Temporal-related-constraints [2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12]
- Inheritance [13]
- Location [7]
- Delegation [14]
- General constraints [15, 16]
- Context [17, 18, 19, 20, 21, 22]
- General extension [23, 24]
- Combination with other access control models such as Task-based access control [16, 25, 26, 27] and Agent-based access control [28]

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