Information and Knowledge; Communication

Trust Hierarchy Trees Applied in Team Management and Data Access

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Abstract: Controlling access to data and information within organizations is an important concern today and also our aim. This paper is based on the concept of trust, which allows access control and control of actions that can be applied to data and information in documents held in computer systems. Methods we have used are: defining trust hierarchies applied to team members, data and actions. Results we have obtained are trust policies based on trust hierarchies.

Keywords: trust; document; trust hierarchy; hierarchy tree; actions hierarchy; trusting authorization policy

JEL Classification: M13; L86; L96

1. Trust Hierarchies

An organization consists of a number of members involved in achieving a particular purpose. In general, any organizational structure is a hierarchical type structure, which is a leader and members to execute various activities under his directions.

Organization does or does not trust the people involved in information-decision process within it. Information-decision process is manifested by the creation of documents containing data and information that are processed by individual (called subjects) belonging to the organization as result of different kind activities.

Trust is manifested by allowing access to various data and information, according to the position *subject* in a team. *Subjects* have many tasks to do according to the position in the team, and the team in the enterprise.

Teams are various working groups, formal and informal. Formal groups are those that form the organization (departments, services, offices, workshops, etc.) and informal groups or instant groups are created for a certain project and outgoing

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from achieving the goal. During the activity of these groups (formal and informal), the importance of every person, is based on trust given by the organization to each topic that is part of a group. Trust is differentiated, depending on the *subject's* position, activity and importance within the group (formal/informal) and the organization.

There may be a simplistic approach to these levels of trust like allow/deny (trust / distrust). Specialists in the field of sociology have established that the trust level adopted fuzzy values, i.e. values between 0.00 and 1.00, values which assigned roughly corresponding levels of confidence.

Approaching this kind of classification, based on labeling trust, not entirely correspond to reality, enables a faster classification of privacy levels by granting a trust level for the group which includes a *subject* and its heritage by all the subjects pertaining to that group.

To refine the trust level of staff, it can be assigned a correction factor that allows higher levels of trust to the maximum level, but this factor does not apply to all group members, but on individual cases.

2. Relation Between Personal Attributes and the Position in a Hierarchy

Every organization has personal expectations from employees. Meeting these expectations determine the hierarchical position in a team.

Generally, these expectations relate to personal attributes that make differentiation between team members. Further mention a few:

- communication skills;
- team-working skills;
- problem-solving skills;
- literacy skills;
- numeracy skills;
- general IT skills;
- timekeeping;
- business awareness;
- customer care skills;
- personal presentation;
- enthusiasm/commitment;
- enterprising;
- vocational job-specific skills;

- advanced vocational job-specific skills. (Martin, Villeneuve-Smith, Marshall, & McKenzie, 2008)

Not only the attributes presented are the most important, but these are generally accepted.

General trust is a sum of personal attributes. Every attribute has his importance in personnel evaluation. In a trust applied policy, the values of appreciation generated for every attribute is between 0.00 and 1.00. These attributes generates for every employee a general trust attribute, noted T_g. Also, every attribute has his distinguished importance in general trust attribute, importance which can be increased or decreased by a value noted I_v. Every position in the team has distinguished values for I_v. The general trust values are a media from all attribute's trust values. The difference between 1 and T_g represents the risk attributed to employee noted R_g.

$$T_{gi} = \frac{\sum_{x=1}^{m} Txi}{x} \quad \text{and} \quad R_g = \frac{\sum_{x=1}^{m} Rx}{x}$$

where x represent an attribute evaluated of an employee i

$T_x + R_x = 1$

Generally, within a team, hierarchical structure is not a simple one in which each team member has a predecessor and a successor. The structure is arborescent. Thus, in this structure there may be people who have the same level of trust but different competence, and which require different activities. In fact, the team has assigned many tasks to perform. The team leader meets their execution. It makes task delegation to team members, considering their skills. Although the team works as a whole, some activities are performed by members with a lower level of trust and other activities are performed by members with increased competence and a higher level of trust.

In the context of information processing, in the work team, the team members that process this information manipulate data that requires a properly level of trust and appropriate actions to be applied on them. Therefore, it is obtained a **data tree** and a **tree of actions** to be performed.

We note with:

A_m = team members tree, based on trust hierarchies;
a_m = team members trust hierarchy;
A_d = tree of data to be processed;
a_d = data hierarchy;
A_c = tree of necessary actions for data processing;
a_c = actions hierarchy.

We find that for any members hierarchy a_m belonged to A_m there is a documents hierarchy a_d and a hierarchy of actions a_p.

To a hierarchy tree of a team (A_m) corresponds a data hierarchy tree (A_d) and an actions hierarchy tree (A_c). From this correspondence results a hierarchy of tuples of the form (a_m, a_d, a_c) representing actions performed by a team member on data. This hierarchy of tuples can be associated with an index action "i" and thus are obtained: (a_{mi}, a_{di}, a_{ci}, i) which represents the state of activities performed by a team member on data, at a time "i". This tuple can be called **state vector of a document**.

3. Conclusions and Future Research

As shown in previous articles mentioned in the references, reliable values assigned to team members, documents and actions, are centralized by Trusting Authorization Policy (TAP). Trust authorization is a research field towards which we have identified many challenges and many are turning to future research.

4. References

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