

Towards a Stakeholder-Oriented Taxonomical Approach for Secure Cloud Computing



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Abstract

BACKGROUND:

- Lack of consensus on cloud security and privacy requirements versus responsibilities.
- The widespread deployment and service models of cloud computing (CC) in addition to the wide variety of stakeholders make it difficult to guarantee privacy and security.
- Laws and regulations diverge in some industries and different locations make it even harder to focus towards providing a unified process to secure the CC model.

PROBLEM: The emerging paradigm of CC arises security risks that adversely impact its different stakeholders. The widespread deployment and service models of CC in addition to the wide variety of stakeholders make it difficult to guarantee privacy and security.

Cloud Computing S&P Proposed Solution

Proposed Solution: This work-in-progress proposes a stakeholder-oriented taxonomical approach that determines the security and privacy issues for various CC models from a stakeholder's perspective. It recommends a comprehensive list of security and privacy attributes that are related to these issues.

FEATURES:

- **Taxonomical:** this methodological arrangement of features enforces a better understanding of the different use cases of a CC model and facilitates Future extensions and upgrades.
- **Inspired from the NIST** characteristics of CC, to conform to the standards.
- **Stakeholder-oriented:** Stakeholders are the most tangible aspect of the CC model and hence they represent a significant part of the taxonomy. Every stakeholder's interaction with the CC model will be classified in route.

Stakeholder-Oriented Cloud Computing Taxonomy

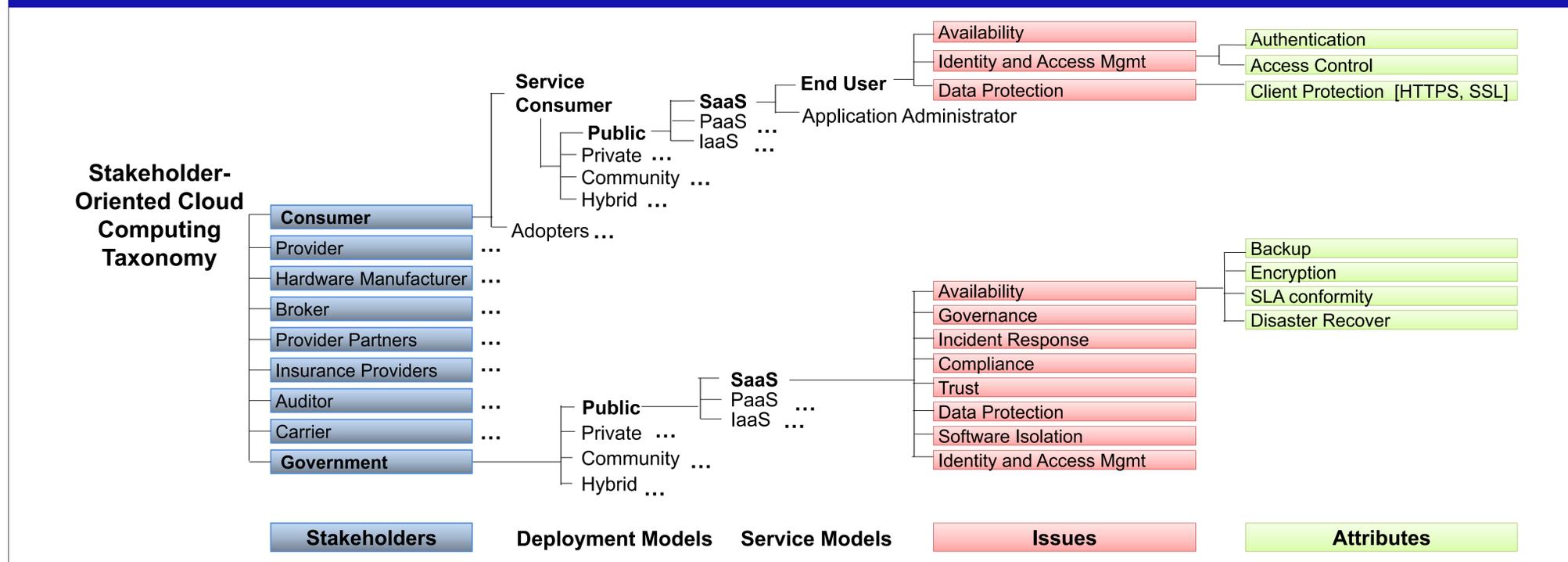


Figure 1: The proposed Taxonomy with Two expanded scenarios of "End User" and "Government" stakeholders

Example : A Taxonomy based Representation

- The taxonomy is shown in Figure 1 and is composed of five levels: (1) Stakeholders, (2) CC Deployment Models, (3) CC Service Models, (4) Security and Privacy Issues, and (5) Security and Privacy Attributes [1].
- (Scenario A) in top part of Figure 1 shows a user who interacts with Google Docs to create or edit a text document would be traversed on the taxonomy as an end user consumer on a SaaS public cloud.
- Availability, identity and access management and data protection are the possible security and privacy issues in level-3.
- Level-4 presents authentication and access control as two suggested security and privacy attributes associated to the issues the previous level. A representation of the taxonomy traversal for this scenario is shown in Table I.

Taxonomy Level	Scenario A		
Stakeholder (level0)	End User (Consumer)		
Deployment (level1)	Public		
Service (level2)	SaaS		
Security Issues (level3)	Identity and Access Mgmt	Data Protection	Availability
Sec. Attributes (level4)	- Authentication - Access Control	Client Protection	-Backup, Encryption -SLA Conformity -Disaster Recovery

Table I: A taxonomy based representation for scenario A

Conclusion and Future Work

- This work presents a unique approach to define the security scope for the different stakeholders of a cloud computing model.
- We extensively examined the various cloud stakeholders, determined their ways of interacting with the cloud and investigated the security issues that can concern them based on their nature of interaction with a CC model.
- Our proposed taxonomy provides them with a comprehensive list of security and privacy attributes that are associated with their issues.
- The strength of this approach resides in its affinity to the stakeholders and its capability to comprehend different scenarios. It reduces the stakeholders' efforts to identify the issues in the different forms of CC services they use.
- As a work-in-progress, we aim to continue to collect the S&P issues and their related attributes. Moreover, we intend to examine our approach on popular and diverse stakeholders like commercial service auditors, brokers and cloud service providers.

[1] Abuhusseini, A., Bedi, H., & Shiva, S. (2012, December). Evaluating security and privacy in cloud computing services: A Stakeholder's perspective. In *Internet Technology And Secured Transactions, 2012 International Conference For* (pp. 388-395). IEEE.

