Attribute-Based Access Control (ABAC)

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Access Control

Discretionary Access Control (DAC), 1970

Mandatory Access Control (MAC), 1970

Role Based Access Control (RBAC), 1995

Attribute Based Access Control (ABAC), ????
Discuss Figs 2 and 3 of NIST SP 800-162
ABAC Status

1990? 2016
ABAC still in pre/early phase

Pre-RBAC → Early RBAC → 1st expansion phase → 2nd expansion phase

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ABAC is not New

User (Identity)

Attributes

Public-keys + Secured secrets
ABAC is not New

User (Identity)

X.500 Directory

Attributes

Public-keys + Secured secrets

X.509 Identity Certificates

Pre Internet, early 1990s
ABAC is not New

Post Internet, late 1990s
ABAC is not New

User (Identity)

Attributes  SPKI Certificates  Public-keys + Secured secrets

Post Internet, late 1990s
ABAC is not New

User (Identity)

Attributes

Anonymous Credentials

Public-keys + Secured secrets

Mature Internet, 2000s
ABAC is not New

Attributes

Action
User
Subject
Object
Context
Policy

Authorization Decision

Yes/No

XACML

Mature Internet, 2000s
ABAC is not New

- unified model integrating
  - authorization
  - obligation
  - conditions
- and incorporating
  - continuity of decisions
  - mutability of attributes

Usage Control Models, early 2000s
ABAC on steroids
ABAC Status

1990? ABAC still in pre/early phase

2016

Pre-RBAC Early RBAC 1st expansion phase 2nd expansion phase

Amount of Publications

Year of Publication

Pre-RBAC Early RBAC 1st expansion phase 2nd expansion phase

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ABACα Model Structure

Policy Configuration Points

1. Constraints on subject attributes at creation and modification time.
2. Constraints on object attributes at creation and modification time.
3. Authorization policy

Can be configured to do simple forms of DAC, MAC, RBAC
Discuss highlights of Jin 2012 paper
RBAC Extensions

1. Context Attributes
2. Subject attribute constraints policy are different at creation and modification time.
3. Subject attributes constrained by attributes of subjects created by the same user.
4. Policy Language
5. Meta-Attributes

Extended Constraints on Role Activation:

Extended Concept of Role:
- Role Template-1997 [45], Parameterized RBAC-2004 [2], Parameterized RBAC-2003 [34], Parameterized Role-2004 [43], Attributed Role-2006 [99]

Changes in Role-Permission Relationship:
- Task-RBAC-2000 [77], Task-RBAC-2003 [78]

Extended Permission Structure:
- RBAC with Object class- 2007 [24], Conditional PRBAC 07 [74], PRBAC 07 [75], Purpose-aware RBAC- 2008 [67], Ubi-RBAC-2010 [76], RCPBAC-2011 [55]

Organization and Team:
ABAC\(\beta\) Model

Can be configured to do many RBAC extensions
Application Domains

- Cloud computing
- Internet of Things
- ...........
Discuss Fig 1 of Kandala 2011 paper
Discuss Fig 1 and Table 1 of Hu 2015 paper
Discuss Kuhn 2010 paper