



# XACML 3.0 Additional Combining Algorithms Profile Version 1.0

## Committee Specification Draft 01 / Public Review Draft 01

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### Specification URIs

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#### Technical Committee:

OASIS eXtensible Access Control Markup Language (XACML) TC

#### Chairs:

Hal Lockhart ([hal.lockhart@oracle.com](mailto:hal.lockhart@oracle.com)), Oracle  
Bill Parducci ([bill@parducci.net](mailto:bill@parducci.net)), Individual

#### Editor:

Erik Rissanen ([erik@axiomatics.com](mailto:erik@axiomatics.com)), Axiomatics

#### Related work:

This specification is related to:

- *eXtensible Access Control Markup Language (XACML) Version 3.0*. Latest version.  
<http://docs.oasis-open.org/xacml/3.0/xacml-3.0-core-spec-en.html>

#### Abstract:

This profile defines new useful but optional combining algorithms for XACML 3.0.

#### Status:

This document was last revised or approved by the OASIS eXtensible Access Control Markup Language (XACML) TC on the above date. The level of approval is also listed above. Check the "Latest version" location noted above for possible later revisions of this document.

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# 1 Introduction

This profile defines additional combining algorithms for XACML 3.0, **[XACML3]**. These algorithms may be useful in certain contexts, but have not been considered important enough to include as mandatory items in the core XACML specification.

## 1.1 Terminology

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in **[RFC2119]**.

## 1.2 Normative References

- [RFC2119]** S. Bradner, *Key words for use in RFCs to Indicate Requirement Levels*, <http://www.ietf.org/rfc/rfc2119.txt>, IETF RFC 2119, March 1997.
- [XACML3]** *eXtensible Access Control Markup Language (XACML) Version 3.0*, 10 August 2010. OASIS Committee Specification Draft 01. <http://docs.oasis-open.org/xacml/3.0/xacml-3.0-core-spec-cs-01-en.doc>

## 1.3 Non-Normative References

None

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## 2 on-permit-apply-second policy combining algorithm

### 2.1 Algorithm definition

This section defines the “on-permit-apply-second” policy combining algorithm of a policy set.

The policy combining algorithm defined here has the following identifier:

urn:oasis:names:tc:xacml:3.0:policy-combining-algorithm:on-permit-apply-second

The following is a non-normative informative description of this combining algorithm:

The on permit deny second combining algorithm is primarily intended for those cases where it would be desirable to attach a condition to a policy or policy set. This algorithm has the following behavior.

The input contains an array of children (policies and/or policy sets).

1. If there are not exactly two children, then the result is "Indeterminate{DP}".
2. Otherwise, if the decision from the first child is "NotApplicable", "Deny", or "Indeterminate{D}", then the result is "NotApplicable".
3. Otherwise, if the decision from the first child is "Permit", then the result is the decision from the second child.
4. Otherwise, if the decision from the second child is "Permit", then the result is "Indeterminate{P}".
5. Otherwise, if the decision from the second child is "Deny", then the result is "Indeterminate{D}".
6. Otherwise, the result is the decision from the second child.

The following pseudo-code represents the normative specification of this policy combining algorithm. The algorithm is presented here in a form where the input to it is an array with children (the policies or policy sets) of the policy set.

```
Decision onPermitApplySecondCombiningAlgorithm(Node[] children)
{
    if (lengthOf(children) != 2) {
        // Use status code
        // urn:oasis:names:tc:xacml:1.0:status:processing-error
        return Indeterminate{DP}
    }
    Decision decision0 = children[0].evaluate();
    if (decision0 == NotApplicable ||
        decision0 == Deny ||
        decision0 == Indeterminate{D}) {
        return NotApplicable;
    }
    Decision decision1 = children[1].evaluate();
    if (decision0 == Permit) {
        return decision1;
    }
    // decision0 is Indeterminate{P} or Indeterminate{DP}
    if (decision1 == Permit) {
        // Use the status code from decision0
        return Indeterminate{P};
    }
}
```

```

if (decision1 == Deny) {
    // Use the status code from decision0
    return Indeterminate{D};
}
if (decision1 == NotApplicable) {
    return NotApplicable;
}
return decision1;
}

```

Obligations and advice **MUST** be combined as described in **[XACML3]**.

## 2.2 Discussion (non-normative)

XACML 3.0, **[XACML3]**, does not allow `<Condition>` elements at the policy or policy set levels. In some cases it may be useful to have a `<Condition>` at the policy or policy set level since a `<Condition>` allows for more expressive matching than a `<Target>`, which can only match against constant values.

For instance, someone may want to write a policy which applies to the cases where the subject is the owner of the resource. In this case the policy should apply if the subject-id of the request equals the owner attribute of the resource in the request. This matching cannot be done with a `<Target>` since it is not a match expression against a constant value. Such a policy would require a `<Condition>` at the Policy level.

The on-permit-apply-second combining algorithm makes it possible to define a policy structure which behaves as if there was a `<Condition>` at the policy or policy set level, without changes to the XACML 3.0 schema.

For instance, assume that someone wants to define policy A, which should contain condition A. Ideally the user would like to define this policy:

```

Policy A:
  Target A
  Condition A
  Rules of A...

```

This is not possible in XACML 3.0, but with the help of the on-permit-apply-second combining algorithm, the above policy structure can be refactored into the following structure, which has the desired effect:

```

PolicySet X [on-permit-apply-second]
  Target A
  Policy Y
    Rule Z [Permit]
      Condition A
  Policy A:
    Rules of A...

```

If Target A matches, then the on-permit-apply-second combining algorithm will evaluate policy Y. If Condition A applies, policy Y will say Permit and policy A is evaluated and the result of policy A is used as the result of policy set X. If Condition A does not apply, then policy set X returns NotApplicable.

A similar structure can be used to get the effect of a `<Condition>` in a `<PolicySet>`.

---

## 3 Conformance

The following table lists the defined algorithms in this profile. Each of them is optional to implement so an implementation may choose to implement and conform to one or more of the described combining algorithms depending on the usefulness of the algorithm in the implementation context.

urn:oasis:names:tc:xacml:3.0:policy-combining-algorithm:on-permit-apply-second
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## Appendix A. Acknowledgments

The following individuals have participated in the creation of this specification and are gratefully acknowledged:

**Participants:**

- David Brossard, Axiomatics
- Erik Rissanen, Axiomatics
- Remon Sinnema, EMC
- David Staggs, Jericho Systems
- Danny Thorpe, Quest Software
- Crystal Hayes, The Boeing Company
- Richard Hill, The Boeing Company
- John Tolbert, The Boeing Company
- Jean-Paul Buu-Sao, Transglobal Secure Collaboration Participation, Inc. (TSCP)
- Bill Parducci, Individual Member
- Hal Lockhart, Oracle
- Rich Levinson, Oracle

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## Appendix B. Revision History

Revision	Date	Editor	Changes Made
WD 01	17 Feb 2012	Erik Rissanen	Initial version with the on-permit-apply-second algorithm.
WD 02	22 Aug 2012	Erik Rissanen	Added acknowledgements
WD 03	31 Oct 2012	Erik Rissanen	Changed the example for refactoring conditions into a slightly different form. Generalized the definition of the on-permit-apply-second algorithm based on discussion on the XACML TC list.