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<?xml version="1.0" encoding="utf-8"?>
<!DOCTYPE rdf:RDF [
  <!ENTITY okar      "http://www.labs.fujitsu.com/jp/techinfo/okar/0.9#" >
  <!ENTITY okarURI   "http://www.labs.fujitsu.com/jp/techinfo/okar/0.9" >
  <!ENTITY dc        "http://purl.org/dc/elements/1.1/" >
  <!ENTITY dcterms   "http://purl.org/dc/terms/" >
  <!ENTITY ical      "http://www.w3.org/2002/12/cal/ical#" >
  <!ENTITY icalURI   "http://www.w3.org/2002/12/cal/ical" >
  <!ENTITY vcard     "http://www.w3.org/2001/vcard-rdf/3.0#" >
  <!ENTITY vcardURI  "http://www.w3.org/2001/vcard-rdf/3.0" >
  <!ENTITY owl     "http://www.w3.org/2002/07/owl#" >
  <!ENTITY xsd       "http://www.w3.org/2001/XMLSchema#" >
]>

<rdf:RDF
  xmlns:okar      = "&okar;"
  xmlns:dc        = "&dc;"
  xmlns:dcterms  = "&dcterms;"
  xmlns:ical      = "&ical;"
  xmlns:vcard     = "&vcard;"
  xmlns:owl       = "&owl;"
  xmlns:rdf       = "http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:rdfs      = "http://www.w3.org/2000/01/rdf-schema#"
  xmlns:xsd       = "&xsd;"
  xml:base        = "&okarURI;"
>

<owl:Ontology rdf:about="&okarURI;"
  <rdfs:label>Ontology for Knowledge Activity Resources (OKAR) vocabulary</rdfs:label>
  <rdfs:comment>
    Ontology for Knowledge Activity Resources (OKAR) RDF vocabulary,
    described using W3C RDF Schema and Web Ontology Language (OWL)
  </rdfs:comment>

  <!-- import for other vocabularies -->
  <owl:imports>
    <owl:Ontology rdf:about="&icalURI;" />
  </owl:imports>
  <!-- <owl:imports>
    <owl:Ontology rdf:about="&vcardURI;" />
  </owl:imports> -->
  <!-- <owl:imports>
    <owl:Ontology rdf:about="&dc;" />
  </owl:imports> -->

  <owl:versionInfo>$Id: OKAR0.9.owl,v 1.2 2005/02/01 00:33:39 igata Exp $</owl:versionInfo>
</owl:Ontology>

<!-- *** OKAR Basic Class Definitions *** -->

<!-- Agent -->
<owl:Class rdf:ID="Agent">
  <rdfs:label xml:lang="en">Agent</rdfs:label>
  <rdfs:comment xml:lang="en">
    The Agent class describes the subject of an event or a thing that
    has an identity. This includes not only Persons, but also
    Organizations, Equipments(physical things), Software.
  </rdfs:comment>
  <rdfs:subClassOf>
    <owl:Restriction>
      <owl:onProperty rdf:resource="&vcard:FN" />
      <owl:minCardinality rdf:datatype="&xsd:nonNegativeInteger">1</owl:minCardinality>
    </owl:Restriction>
  </rdfs:subClassOf>
  <owl:disjointWith rdf:resource="#Role" />
  <owl:disjointWith rdf:resource="#Event" />
  <owl:disjointWith rdf:resource="#Artifact" />
  <owl:disjointWith rdf:resource="#Location" />
  <owl:disjointWith rdf:resource="#PersonName" />
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:Class>

<!-- Person -->
<owl:Class rdf:ID="Person">
  <rdfs:label xml:lang="en">Person</rdfs:label>
  <rdfs:subClassOf rdf:resource="#Agent" />
  <owl:disjointWith rdf:resource="#Organization" />
  <owl:disjointWith rdf:resource="#Equipment" />
  <owl:disjointWith rdf:resource="#Software" />
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:Class>

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<!-- Organization -->
<owl:Class rdf:ID="Organization">
  <rdfs:label xml:lang="en">Organization</rdfs:label>
  <rdfs:subClassOf rdf:resource="#Agent" />
  <owl:disjointWith rdf:resource="#Person" />
  <owl:disjointWith rdf:resource="#Equipment" />
  <owl:disjointWith rdf:resource="#Software" />
  <rdfs:isDefinedBy rdf:resource="#okarURI;" />
</owl:Class>

<!-- Equipment -->
<owl:Class rdf:ID="Equipment">
  <rdfs:label xml:lang="en">Equipment</rdfs:label>
  <rdfs:subClassOf rdf:resource="#Agent" />
  <owl:disjointWith rdf:resource="#Person" />
  <owl:disjointWith rdf:resource="#Organization" />
  <owl:disjointWith rdf:resource="#Software" />
  <rdfs:isDefinedBy rdf:resource="#okarURI;" />
</owl:Class>

<!-- Software -->
<owl:Class rdf:ID="Software">
  <rdfs:label xml:lang="en">Software</rdfs:label>
  <rdfs:subClassOf rdf:resource="#Agent" />
  <owl:disjointWith rdf:resource="#Person" />
  <owl:disjointWith rdf:resource="#Organization" />
  <owl:disjointWith rdf:resource="#Equipment" />
  <rdfs:isDefinedBy rdf:resource="#okarURI;" />
</owl:Class>

<!-- Role -->
<owl:Class rdf:ID="Role">
  <rdfs:label xml:lang="en">Role</rdfs:label>
  <rdfs:comment xml:lang="en">
    The Role class is used to describe an Agent who has multiple roles
    that vary depending on the relationship with a resource.
  </rdfs:comment>
  <rdfs:subClassOf>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#owner" />
      <owl:cardinality rdf:datatype="xsd:nonNegativeInteger">1</owl:cardinality>
    </owl:Restriction>
  </rdfs:subClassOf>
  <owl:disjointWith rdf:resource="#Agent" />
  <owl:disjointWith rdf:resource="#Event" />
  <owl:disjointWith rdf:resource="#Artifact" />
  <owl:disjointWith rdf:resource="#Location" />
  <owl:disjointWith rdf:resource="#PersonName" />
  <rdfs:isDefinedBy rdf:resource="#okarURI;" />
</owl:Class>

<!-- Event -->
<owl:Class rdf:ID="Event">
  <rdfs:label xml:lang="en">Event</rdfs:label>
  <rdfs:comment xml:lang="en">
    The Event class describes who is doing what at a certain time in a
    certain place. The two subclasses include Action, which describes
    an action of an Agent, and GroupEvent, which describes cooperation
    among multiple Agents.
  </rdfs:comment>
  <rdfs:subClassOf rdf:resource="#ical:Vevent" />
  <owl:disjointWith rdf:resource="#Agent" />
  <owl:disjointWith rdf:resource="#Role" />
  <owl:disjointWith rdf:resource="#Artifact" />
  <owl:disjointWith rdf:resource="#Location" />
  <owl:disjointWith rdf:resource="#PersonName" />
  <rdfs:isDefinedBy rdf:resource="#okarURI;" />
</owl:Class>

<!-- Action -->
<owl:Class rdf:ID="Action">
  <rdfs:label xml:lang="en">Action</rdfs:label>
  <rdfs:subClassOf>
    <owl:Restriction>
      <owl:onProperty rdf:resource="#okar:actor" />
      <owl:maxCardinality rdf:datatype="xsd:nonNegativeInteger">1</owl:maxCardinality>
    </owl:Restriction>
  </rdfs:subClassOf>
  <rdfs:subClassOf rdf:resource="#Event" />
  <owl:disjointWith rdf:resource="#GroupEvent" />

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    <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:Class>

<!-- GroupEvent -->
<owl:Class rdf:ID="GroupEvent">
  <rdfs:label xml:lang="en">Group Event</rdfs:label>
  <rdfs:subClassOf rdf:resource="#Event" />
  <owl:disjointWith rdf:resource="#Action" />
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:Class>

<!-- Artifact -->
<owl:Class rdf:ID="Artifact">
  <rdfs:label xml:lang="en">Artifact</rdfs:label>
  <rdfs:comment xml:lang="en">
    The Artifact class describes a result produced by an Agent that is
    the subject of some action. The subclass is Document, which uses
    symbols (text or other format) to describe the thoughts and orders
    of an Agent.
  </rdfs:comment>
  <owl:disjointWith rdf:resource="#Agent" />
  <owl:disjointWith rdf:resource="#Role" />
  <owl:disjointWith rdf:resource="#Event" />
  <owl:disjointWith rdf:resource="#Location" />
  <owl:disjointWith rdf:resource="#PersonName" />
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:Class>

<!-- Document -->
<owl:Class rdf:ID="Document">
  <rdfs:label xml:lang="en">Document</rdfs:label>
  <rdfs:subClassOf rdf:resource="#Artifact" />
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:Class>

<!-- *** Auxiliary Class Definitions *** -->

<!-- Location -->
<owl:Class rdf:ID="Location">
  <rdfs:label xml:lang="en">Location</rdfs:label>
  <owl:disjointWith rdf:resource="#Agent" />
  <owl:disjointWith rdf:resource="#Role" />
  <owl:disjointWith rdf:resource="#Event" />
  <owl:disjointWith rdf:resource="#Artifact" />
  <owl:disjointWith rdf:resource="#PersonName" />
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:Class>

<!-- PersonName -->
<owl:Class rdf:ID="PersonName">
  <rdfs:label xml:lang="en">Person Name</rdfs:label>
  <owl:disjointWith rdf:resource="#Agent" />
  <owl:disjointWith rdf:resource="#Role" />
  <owl:disjointWith rdf:resource="#Event" />
  <owl:disjointWith rdf:resource="#Artifact" />
  <owl:disjointWith rdf:resource="#Location" />
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:Class>

<!-- *** OKAR Basic Property Definitions *** -->

<!-- Death day (OKAR) -->
<owl:DatatypeProperty rdf:ID="DDAY">
  <rdfs:label xml:lang="en">Death Day</rdfs:label>
  <rdf:type rdf:resource="&owl:FunctionalProperty" />
  <rdfs:domain>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Agent" />
        <owl:Class rdf:about="#Role" />
      </owl:unionOf>
    </owl:Class>
  </rdfs:domain>
  <rdfs:range rdf:resource="&xsd:dateTime" />
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:DatatypeProperty>

<!-- Role Weight (OKAR) -->
<owl:DatatypeProperty rdf:ID="roleWeight">
  <rdfs:label xml:lang="en">Role Weight</rdfs:label>

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<rdfs:comment xml:lang="en">
This property is used to express the weight that an #Agent spends
on each #Role. This range is defined as float value, the semantics
of value depend on applications.
</rdfs:comment>
<rdf:type rdf:resource="&owl:FunctionalProperty"/>
<rdfs:domain rdf:resource="#Role" />
<rdfs:range rdf:resource="&xsd:float" />
<rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:DatatypeProperty>

<!-- Role Rank: Position in Organization(OKAR) -->
<owl:DatatypeProperty rdf:ID="roleRank">
<rdfs:label xml:lang="en">Role Rank</rdfs:label>
<rdfs:comment xml:lang="en">
This property is used to express a person's position (rank) in
the organization. This range is defined as float value, the
semantics of value depend on applications.
</rdfs:comment>
<rdf:type rdf:resource="&owl:FunctionalProperty"/>
<rdfs:domain>
<owl:Class>
<owl:intersectionOf rdf:parseType="Collection">
<owl:Class rdf:about="#Role" />
<owl:Restriction>
<owl:onProperty rdf:resource="#owner" />
<owl:allValuesFrom rdf:resource="#Person" />
</owl:Restriction>
</owl:intersectionOf>
</owl:Class>
</rdfs:domain>
<rdfs:range rdf:resource="&xsd:float" />
<rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:DatatypeProperty>

<!-- Knows(OKAR) -->
<owl:ObjectProperty rdf:ID="knows">
<rdfs:label xml:lang="en">knows</rdfs:label>
<rdfs:comment xml:lang="en">
This property is used to express special field or business field
of an #Agent. That means an #Agent has knowledge about those fields.
</rdfs:comment>
<rdfs:domain rdf:resource="#Agent"/>
<rdfs:comment xml:lang="en">
NOTE: We don't define the range of #knows. That means it is
available to use all resources. However, please note this
property is defined as owl:ObjectProperty.
</rdfs:comment>
<rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:ObjectProperty>

<!-- Personal Network: Social Network(OKAR) -->
<owl:ObjectProperty rdf:ID="mate">
<rdfs:label xml:lang="en">mate</rdfs:label>
<rdfs:comment xml:lang="en">
This property is used to express known people of an #Agent.
For example friends, mates, colleagues, etc.
This is like foaf:knows.
</rdfs:comment>
<rdfs:subPropertyOf rdf:resource="#knows"/>
<rdfs:domain rdf:resource="#Person" />
<rdfs:range>
<owl:Class>
<owl:intersectionOf rdf:parseType="Collection">
<owl:Class rdf:about="#Role" />
<owl:Restriction>
<owl:onProperty rdf:resource="#owner" />
<owl:allValuesFrom rdf:resource="#Person" />
</owl:Restriction>
</owl:intersectionOf>
</owl:Class>
</rdfs:range>
<rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:ObjectProperty>

<!-- From Agent to Role(OKAR) -->
<owl:ObjectProperty rdf:ID="hasRole">
<rdfs:label xml:lang="en">has Role</rdfs:label>
<owl:inverseOf rdf:resource="#owner"/>
<rdfs:domain rdf:resource="#Agent"/>
<rdfs:range rdf:resource="#Role" />

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    <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:ObjectProperty>

<!-- From Role to Agent (OKAR) -->
<owl:ObjectProperty rdf:ID="owner">
  <rdfs:label xml:lang="en">Role Owner</rdfs:label>
  <owl:inverseOf rdf:resource="#hasRole"/>
  <rdfs:domain rdf:resource="#Role"/>
  <rdfs:range rdf:resource="#Agent" />
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:ObjectProperty>

<!-- Member (OKAR) -->
<owl:ObjectProperty rdf:ID="member">
  <rdfs:label xml:lang="en">Member (Person)</rdfs:label>
  <rdfs:comment xml:lang="en">
    This property is used to express a constituent (member) in an
    organization. If you discribe organization units, please use
    #groupMember property.
  </rdfs:comment>
  <rdfs:domain rdf:resource="#Organization" />
  <rdfs:range>
    <owl:Class>
      <owl:intersectionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Role" />
        <owl:Restriction>
          <owl:onProperty rdf:resource="#owner" />
          <owl:allValuesFrom rdf:resource="#Person" />
        </owl:Restriction>
      </owl:intersectionOf>
    </owl:Class>
  </rdfs:range>
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:ObjectProperty>

<!-- Leader (OKAR) -->
<owl:ObjectProperty rdf:ID="leader">
  <rdfs:label xml:lang="en">Leader</rdfs:label>
  <rdfs:subPropertyOf rdf:resource="#member"/>
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:ObjectProperty>

<!-- Subleader (OKAR) -->
<owl:ObjectProperty rdf:ID="subLeader">
  <rdfs:label xml:lang="en">Sub Leader</rdfs:label>
  <rdfs:subPropertyOf rdf:resource="#member"/>
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:ObjectProperty>

<!-- Regular Member (OKAR) -->
<owl:ObjectProperty rdf:ID="regularMember">
  <rdfs:label xml:lang="en">Regular Member</rdfs:label>
  <rdfs:subPropertyOf rdf:resource="#member"/>
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:ObjectProperty>

<!-- Temporary Member (OKAR) -->
<owl:ObjectProperty rdf:ID="temporaryMember">
  <rdfs:label xml:lang="en">Temporary Member</rdfs:label>
  <rdfs:subPropertyOf rdf:resource="#member"/>
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:ObjectProperty>

<!-- Organization Unit (OKAR) -->
<owl:ObjectProperty rdf:ID="groupMember">
  <rdfs:label xml:lang="en">Organization Unit</rdfs:label>
  <rdfs:comment xml:lang="en">
    This property is used to express an organization unit in an
    organization. If you discribe a member, please use #member
    property.
  </rdfs:comment>
  <rdfs:domain rdf:resource="#Organization" />
  <rdfs:range>
    <owl:Class>
      <owl:intersectionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Role" />
        <owl:Restriction>
          <owl:onProperty rdf:resource="#owner" />
          <owl:allValuesFrom rdf:resource="#Organization" />
        </owl:Restriction>
      </owl:intersectionOf>
    </owl:Class>
  </rdfs:range>
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:ObjectProperty>

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    </owl:Class>
  </rdfs:range>
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:ObjectProperty>

<!-- Regular Organization Unit (OKAR) -->
<owl:ObjectProperty rdf:ID="regularGroupMember">
  <rdfs:label xml:lang="en">Regular Organization Unit</rdfs:label>
  <rdf:type rdf:resource="&owl:TransitiveProperty"/>
  <rdfs:subPropertyOf rdf:resource="#groupMember"/>
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:ObjectProperty>

<!-- Temporary Organization Unit (OKAR) -->
<owl:ObjectProperty rdf:ID="temporaryGroupMember">
  <rdfs:label xml:lang="en">Temporary Organization Unit</rdfs:label>
  <rdfs:subPropertyOf rdf:resource="#groupMember"/>
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:ObjectProperty>

<!-- Related Role (OKAR) -->
<owl:ObjectProperty rdf:ID="relatedRole">
  <rdfs:label xml:lang="en">Related Role</rdfs:label>
  <rdfs:comment xml:lang="en">
    This property is used to express a relationship between some
    #Role. If you describe a secondary role derived from another
    role, you can use this property.
  </rdfs:comment>
  <rdf:type rdf:resource="&owl:TransitiveProperty"/>
  <rdfs:domain rdf:resource="#Role" />
  <rdfs:range rdf:resource="#Role" />
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:ObjectProperty>

<!-- Purpose (OKAR) -->
<owl:DatatypeProperty rdf:ID="purpose">
  <rdfs:label xml:lang="en">Purpose of Role</rdfs:label>
  <rdfs:domain rdf:resource="#Role"/>
  <rdfs:range rdf:resource="&xsd:string" />
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:DatatypeProperty>

<!-- Event Location (OKAR) -->
<owl:ObjectProperty rdf:ID="hasLocation">
  <rdfs:label xml:lang="en">Event Location</rdfs:label>
  <rdfs:domain rdf:resource="#Event" />
  <rdfs:range rdf:resource="#Location" />
  <rdfs:comment xml:lang="en">
    NOTE: &icalURI; defines the range of &ical:location as xsd:string
    (owl:DatatypeProperty). Then we define this property for
    describing an event location.
  </rdfs:comment>
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:ObjectProperty>

<!-- Event Actor (OKAR) -->
<owl:ObjectProperty rdf:ID="actor">
  <rdfs:label xml:lang="en">Event Actor</rdfs:label>
  <rdfs:comment xml:lang="en">
    This property is used to express an actor/a subject of the event.
  </rdfs:comment>
  <rdfs:domain rdf:resource="#Event" />
  <rdfs:range rdf:resource="#Role" />
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:ObjectProperty>

<!-- Event Target (OKAR) -->
<owl:ObjectProperty rdf:ID="target">
  <rdfs:label xml:lang="en">Event Target</rdfs:label>
  <rdfs:comment xml:lang="en">
    This property is used to express a target/an object/a result of
    the event.
  </rdfs:comment>
  <rdfs:domain rdf:resource="#Event" />
  <rdfs:comment xml:lang="en">
    NOTE: We don't define the range of #target. That means it is
    available to use all resources. However, please note this
    property is defined as owl:ObjectProperty.
  </rdfs:comment>
  <rdfs:isDefinedBy rdf:resource="&okarURI;" />
</owl:ObjectProperty>

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<!-- *** Extention Definitions for Other Vocabularies *** -->
<!-- *** VCARD Vocabularies *** -->
<!-- VCARD vocabraries are used for properties of #Agent and #Role. -->

<!-- Formatted Name(vcard) -->
<owl:DatatypeProperty rdf:about="&vcard:FN">
  <rdfs:domain>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Agent" />
        <owl:Class rdf:about="#Role" />
      </owl:unionOf>
    </owl:Class>
  </rdfs:domain>
  <rdfs:range rdf:resource="&xsd:string" />
  <rdfs:isDefinedBy rdf:resource="&vcardURL;" />
</owl:DatatypeProperty>

<!-- Structured Name(vcard) -->
<owl:ObjectProperty rdf:about="&vcard:N">
  <rdfs:domain rdf:resource="#Person" />
  <rdfs:range rdf:resource="#PersonName" />
  <rdfs:isDefinedBy rdf:resource="&vcardURL;" />
</owl:ObjectProperty>

<!-- Family Name(vcard) -->
<owl:DatatypeProperty rdf:about="&vcard:Family">
  <rdfs:domain rdf:resource="#PersonName" />
  <rdfs:range rdf:resource="&xsd:string" />
  <rdfs:isDefinedBy rdf:resource="&vcardURL;" />
</owl:DatatypeProperty>

<!-- Given Name(vcard) -->
<owl:DatatypeProperty rdf:about="&vcard:Given">
  <rdfs:domain rdf:resource="#PersonName" />
  <rdfs:range rdf:resource="&xsd:string" />
  <rdfs:isDefinedBy rdf:resource="&vcardURL;" />
</owl:DatatypeProperty>

<!-- Additional Name(vcard) -->
<owl:DatatypeProperty rdf:about="&vcard:Other">
  <rdfs:domain rdf:resource="#PersonName" />
  <rdfs:range rdf:resource="&xsd:string" />
  <rdfs:isDefinedBy rdf:resource="&vcardURL;" />
</owl:DatatypeProperty>

<!-- Honorific Prefix(vcard) -->
<owl:DatatypeProperty rdf:about="&vcard:Prefix">
  <rdfs:domain rdf:resource="#PersonName" />
  <rdfs:range rdf:resource="&xsd:string" />
  <rdfs:isDefinedBy rdf:resource="&vcardURL;" />
</owl:DatatypeProperty>

<!-- Honorific Suffix(vcard) -->
<owl:DatatypeProperty rdf:about="&vcard:Suffix">
  <rdfs:domain rdf:resource="#PersonName" />
  <rdfs:range rdf:resource="&xsd:string" />
  <rdfs:isDefinedBy rdf:resource="&vcardURL;" />
</owl:DatatypeProperty>

<!-- Nickname(vcard) -->
<owl:DatatypeProperty rdf:about="&vcard:NICKNAME">
  <rdfs:domain>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Agent" />
        <owl:Class rdf:about="#Role" />
      </owl:unionOf>
    </owl:Class>
  </rdfs:domain>
  <rdfs:range rdf:resource="&xsd:string" />
  <rdfs:isDefinedBy rdf:resource="&vcardURL;" />
</owl:DatatypeProperty>

<!-- Photograph(vcard) -->
<owl:ObjectProperty rdf:about="&vcard:PHOTO">
  <rdfs:domain>
    <owl:Class>

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    <owl:unionOf rdf:parseType="Collection">
      <owl:Class rdf:about="#Agent" />
      <owl:Class rdf:about="#Role" />
    </owl:unionOf>
  </owl:Class>
</rdfs:domain>
<rdfs:range rdf:resource="#Document"/>
<rdfs:isDefinedBy rdf:resource="&vcardURI;" />
</owl:ObjectProperty>

<!-- Logo (vcard) -->
<owl:ObjectProperty rdf:about="&vcard:LOGO">
  <rdfs:domain>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Agent" />
        <owl:Class rdf:about="#Role" />
      </owl:unionOf>
    </owl:Class>
  </rdfs:domain>
  <rdfs:range rdf:resource="#Document"/>
  <rdfs:isDefinedBy rdf:resource="&vcardURI;" />
</owl:ObjectProperty>

<!-- Address (vcard) -->
<owl:ObjectProperty rdf:about="&vcard:ADR">
  <rdfs:domain>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Agent" />
        <owl:Class rdf:about="#Role" />
      </owl:unionOf>
    </owl:Class>
  </rdfs:domain>
  <rdfs:range rdf:resource="#Location" />
  <rdfs:comment xml:lang="en">
    NOTE: &vcardURI; defines the range of &vcard:ADR as vcard:ADRTYPES.
    Neither vcard:ADRTYPES nor #Location are in the relation of
    owl:disjointWith, so any conflicts don't arise.
    But some specific processing would be required.
  </rdfs:comment>
  <rdfs:isDefinedBy rdf:resource="&vcardURI;" />
</owl:ObjectProperty>

<!-- Telephone Number (vcard) -->
<owl:ObjectProperty rdf:about="&vcard:TEL">
  <rdfs:domain>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Agent" />
        <owl:Class rdf:about="#Role" />
      </owl:unionOf>
    </owl:Class>
  </rdfs:domain>
  <rdfs:comment xml:lang="en">
    NOTE: &vcardURI; defines the range of &vcard:TEL as vcard:TELTYPES.
  </rdfs:comment>
  <rdfs:isDefinedBy rdf:resource="&vcardURI;" />
</owl:ObjectProperty>

<!-- E-mail (vcard) -->
<owl:ObjectProperty rdf:about="&vcard:EMAIL">
  <rdfs:domain>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Agent" />
        <owl:Class rdf:about="#Role" />
      </owl:unionOf>
    </owl:Class>
  </rdfs:domain>
  <rdfs:comment xml:lang="en">
    NOTE: &vcardURI; defines the range of &vcard:EMAIL as vcard:EMAILTYPES.
  </rdfs:comment>
  <rdfs:isDefinedBy rdf:resource="&vcardURI;" />
</owl:ObjectProperty>

<!-- Birthday (vcard) -->
<owl:DatatypeProperty rdf:about="&vcard:BDAY">
  <rdf:type rdf:resource="&owl:FunctionalProperty"/>
  <rdfs:domain>
    <owl:Class>

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    <owl:unionOf rdf:parseType="Collection">
      <owl:Class rdf:about="#Agent" />
      <owl:Class rdf:about="#Role" />
    </owl:unionOf>
  </owl:Class>
</rdfs:domain>
<rdfs:range rdf:resource="&xsd:dateTime" />
<rdfs:isDefinedBy rdf:resource="&vcardURL;" />
</owl:DatatypeProperty>

<!-- Organization(vcard) -->
<owl:ObjectProperty rdf:about="&vcard:ORG">
  <owl:inverseOf rdf:resource="#owner" />
  <rdf:type rdf:resource="&owl:FunctionalProperty" />
  <rdfs:domain>
    <owl:Class>
      <owl:intersectionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Role" />
        <owl:Restriction>
          <owl:onProperty rdf:resource="#owner" />
          <owl:allValuesFrom rdf:resource="#Person" />
        </owl:Restriction>
      </owl:intersectionOf>
    </owl:Class>
  </rdfs:domain>
  <rdfs:range rdf:resource="#Organization" />
  <rdfs:comment xml:lang="en">
    NOTE: One Role has one/no &vcard:ORG property.
  </rdfs:comment>
  <rdfs:isDefinedBy rdf:resource="&vcardURL;" />
</owl:ObjectProperty>

<!-- Title(vcard) -->
<owl:DatatypeProperty rdf:about="&vcard:TITLE">
  <rdf:type rdf:resource="&owl:FunctionalProperty" />
  <rdfs:domain rdf:resource="#Role" />
  <rdfs:range rdf:resource="&xsd:string" />
  <rdfs:isDefinedBy rdf:resource="&vcardURL;" />
</owl:DatatypeProperty>

<!-- Occupation(vcard) -->
<owl:DatatypeProperty rdf:about="&vcard:ROLE">
  <rdf:type rdf:resource="&owl:FunctionalProperty" />
  <rdfs:domain rdf:resource="#Role" />
  <rdfs:range rdf:resource="&xsd:string" />
  <rdfs:isDefinedBy rdf:resource="&vcardURL;" />
</owl:DatatypeProperty>

<!-- Note(vcard) -->
<owl:DatatypeProperty rdf:about="&vcard:NOTE">
  <rdfs:domain>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Agent" />
        <owl:Class rdf:about="#Role" />
      </owl:unionOf>
    </owl:Class>
  </rdfs:domain>
  <rdfs:range rdf:resource="&xsd:string" />
  <rdfs:isDefinedBy rdf:resource="&vcardURL;" />
</owl:DatatypeProperty>

<!-- Access Class(vcard) -->
<owl:DatatypeProperty rdf:about="&vcard:CLASS">
  <rdf:type rdf:resource="&owl:FunctionalProperty" />
  <rdfs:domain>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Agent" />
        <owl:Class rdf:about="#Role" />
      </owl:unionOf>
    </owl:Class>
  </rdfs:domain>
  <rdfs:range rdf:resource="&xsd:string" />
  <rdfs:isDefinedBy rdf:resource="&vcardURL;" />
</owl:DatatypeProperty>

<!-- Key(vcard) -->
<owl:DatatypeProperty rdf:about="&vcard:KEY">
  <rdfs:domain>
    <owl:Class>

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    <owl:unionOf rdf:parseType="Collection">
      <owl:Class rdf:about="#Agent" />
      <owl:Class rdf:about="#Role" />
    </owl:unionOf>
  </owl:Class>
</rdfs:domain>
<rdfs:range rdf:resource="&xsd:string" />
<rdfs:isDefinedBy rdf:resource="&vcardURI;" />
</owl:DatatypeProperty>

<!-- *** iCalendar Vocabularies *** -->
<!-- iCalendar vocabrararies are used for properties of #Event. -->

<!-- Related Event(iCal) -->
<owl:DatatypeProperty rdf:about="&ical:relatedTo">
  <rdfs:domain rdf:resource="#Event" />
  <rdfs:range rdf:resource="&xsd:anyURI" />
  <rdfs:comment xml:lang="en">
    NOTE: &icalURI; defines the range of &ical:relatedTo as xsd:string.
          We want to define the range as #Event,
          however it defines &ical:relatedTo as owl:DatatypeProperty.
          Therefore we restrict the range to &xsd:anyURI.
  </rdfs:comment>
  <rdfs:isDefinedBy rdf:resource="&icalURI;" />
</owl:DatatypeProperty>

<!-- Attendee(iCal) -->
<owl:ObjectProperty rdf:about="&ical:attendee">
  <rdfs:domain rdf:resource="#GroupEvent" />
  <rdfs:range rdf:resource="#Role" />
  <rdfs:comment xml:lang="en">
    NOTE: &icalURI; defines the range of &ical:attendee as ical:CAL-ADDRESS.
          Neither ical:CAL-ADDRESS nor #Role are in the relation of
          owl:disjointWith, so any conflicts don't arise.
          But some specific processing would be required.
  </rdfs:comment>
  <rdfs:isDefinedBy rdf:resource="&icalURI;" />
</owl:ObjectProperty>

<!-- Organizer(iCal) -->
<owl:ObjectProperty rdf:about="&ical:organizer">
  <rdfs:domain rdf:resource="#GroupEvent" />
  <rdfs:range rdf:resource="#Role" />
  <rdfs:comment xml:lang="en">
    NOTE: It has same problem of &ical:attendee.
  </rdfs:comment>
  <rdfs:isDefinedBy rdf:resource="&icalURI;" />
</owl:ObjectProperty>

<!-- Attached Artifact(iCal) -->
<owl:ObjectProperty rdf:about="&ical:attach">
  <rdfs:domain rdf:resource="#GroupEvent" />
  <rdfs:range rdf:resource="#Artifact" />
  <rdfs:comment xml:lang="en">
    NOTE: &icalURI; doesn't define the range of &ical:attach.
  </rdfs:comment>
  <rdfs:isDefinedBy rdf:resource="&icalURI;" />
</owl:ObjectProperty>

<!-- *** Dublin Core Vocabrararies *** -->
<!-- Dublin Core vocabrararies are used for properties of #Artifact. -->

<!-- Artifact Title(DC) -->
<owl:DatatypeProperty rdf:about="&dc:title">
  <rdfs:domain rdf:resource="#Artifact" />
  <rdfs:range rdf:resource="&xsd:string" />
  <rdfs:isDefinedBy rdf:resource="&dc;" />
</owl:DatatypeProperty>

<!-- Creator (DC) -->
<owl:ObjectProperty rdf:about="&dc:creator">
  <rdfs:domain rdf:resource="#Artifact" />
  <rdfs:range rdf:resource="#Role" />
  <rdfs:isDefinedBy rdf:resource="&dc;" />
</owl:ObjectProperty>

<!-- Subject (DC) -->
<owl:ObjectProperty rdf:about="&dc:subject">
  <rdfs:domain rdf:resource="#Artifact" />

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<rdfs:comment xml:lang="en">
NOTE: We don't define the range of &dc:subject. That means it is
available to use all resources. However, please note this
property is defined as owl:ObjectProperty.
</rdfs:comment>
<rdfs:isDefinedBy rdf:resource="&dc;" />
</owl:ObjectProperty>

<!-- Description (DC) -->
<owl:DatatypeProperty rdf:about="&dc:description">
<rdfs:domain rdf:resource="#Artifact" />
<rdfs:range rdf:resource="&xsd:string" />
<rdfs:isDefinedBy rdf:resource="&dc;" />
</owl:DatatypeProperty>

<!-- Publisher (DC) -->
<owl:ObjectProperty rdf:about="&dc:publisher">
<rdfs:domain rdf:resource="#Artifact" />
<rdfs:range rdf:resource="#Role" />
<rdfs:isDefinedBy rdf:resource="&dc;" />
</owl:ObjectProperty>

<!-- Contributor (DC) -->
<owl:ObjectProperty rdf:about="&dc:contributor">
<rdfs:domain rdf:resource="#Artifact" />
<rdfs:range rdf:resource="#Role" />
<rdfs:isDefinedBy rdf:resource="&dc;" />
</owl:ObjectProperty>

<!-- Date (DC) -->
<owl:DatatypeProperty rdf:about="&dc:date">
<rdfs:domain rdf:resource="#Artifact" />
<rdfs:range rdf:resource="&xsd:dateTime" />
<rdfs:isDefinedBy rdf:resource="&dc;" />
</owl:DatatypeProperty>

<!-- Artifact Format (DC) -->
<owl:DatatypeProperty rdf:about="&dc:format">
<rdfs:domain rdf:resource="#Artifact" />
<rdfs:range rdf:resource="&xsd:string" />
<rdfs:isDefinedBy rdf:resource="&dc;" />
</owl:DatatypeProperty>

<!-- Source (DC) -->
<owl:ObjectProperty rdf:about="&dc:source">
<rdfs:domain rdf:resource="#Artifact" />
<rdfs:range rdf:resource="#Artifact" />
<rdfs:isDefinedBy rdf:resource="&dc;" />
</owl:ObjectProperty>

<!-- Related Artifact (DC) -->
<owl:ObjectProperty rdf:about="&dc:relation">
<rdfs:domain rdf:resource="#Artifact" />
<rdfs:range rdf:resource="#Artifact" />
<rdfs:isDefinedBy rdf:resource="&dc;" />
</owl:ObjectProperty>

<!-- Artifact identifier (DC) -->
<owl:DatatypeProperty rdf:about="&dc:identifier">
<rdfs:domain rdf:resource="#Artifact" />
<rdfs:range rdf:resource="&xsd:anyURI" />
<rdfs:isDefinedBy rdf:resource="&dc;" />
</owl:DatatypeProperty>

<!-- Artifact Type: Genre (DC) -->
<owl:ObjectProperty rdf:about="&dc:type">
<rdfs:domain rdf:resource="#Artifact" />
<!-- <rdfs:range rdf:resource="&dcterms:DCMIType" /> -->
<rdfs:comment xml:lang="en">
NOTE: DCMI recommended best practice is to select a value from a
controlled vocabulary (for example, the DCMI Type Vocabulary).
</rdfs:comment>
<rdfs:isDefinedBy rdf:resource="&dc;" />
</owl:ObjectProperty>

<!-- Language (DC) -->
<owl:DatatypeProperty rdf:about="&dc:language">
<rdfs:domain rdf:resource="#Artifact" />
<rdfs:range rdf:resource="&xsd:string" />
<rdfs:comment xml:lang="en">
NOTE: DCMI recommended best practice is to use RFC 3066.

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</rdfs:comment>
<rdfs:isDefinedBy rdf:resource="&dc;" />
</owl:DatatypeProperty>

<!-- Coverage (DC) -->
<owl:DatatypeProperty rdf:about="&dc:coverage">
  <rdfs:domain rdf:resource="#Artifact" />
  <rdfs:range rdf:resource="&xsd:string" />
  <rdfs:isDefinedBy rdf:resource="&dc;" />
</owl:DatatypeProperty>

<!-- Copy Rights (DC) -->
<owl:DatatypeProperty rdf:about="&dc:rights">
  <rdfs:domain rdf:resource="#Artifact" />
  <rdfs:range rdf:resource="&xsd:string" />
  <rdfs:isDefinedBy rdf:resource="&dc;" />
</owl:DatatypeProperty>

</rdf:RDF>
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