

Network Working Group
Internet-Draft
Intended status: Standards Track
Expires: April 29, 2012

C. Joy
Oracle
C. Daboo
Apple Inc.
M. Douglass
RPI
October 27, 2011

**Schema for representing resources for calendaring and scheduling
services
draft-cal-resource-schema-06**

Abstract

This specification describes a schema for representing resources for calendaring and scheduling. A resource in the scheduling context is any shared entity that can be scheduled by a calendar user, but does not control its own attendance status.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <http://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on April 29, 2012.

Copyright Notice

Copyright (c) 2011 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<http://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must

include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

Table of Contents

- [1. Introduction](#) [5](#)
- [2. Conventions Used in This Document](#) [5](#)
- [3. General Considerations](#) [5](#)
- [4. Resource Object](#) [5](#)
 - [4.1. LDAP Resource ObjectClass Definition](#) [5](#)
- [5. Resource Attributes](#) [6](#)
 - [5.1. Common Name](#) [6](#)
 - [5.1.1. LDAP Attribute Definition](#) [6](#)
 - [5.1.2. VCard Property Definition](#) [6](#)
 - [5.2. Kind](#) [6](#)
 - [5.2.1. LDAP Definition](#) [7](#)
 - [5.2.1.1. LDAP Attribute Definition](#) [7](#)
 - [5.2.2. VCard Property Definition](#) [7](#)
 - [5.2.3. Mapping of KIND value between LDAP and VCard representations](#) [8](#)
 - [5.3. Unique ID](#) [8](#)
 - [5.3.1. LDAP Attribute Definition](#) [8](#)
 - [5.3.2. VCard Property Definition](#) [8](#)
 - [5.4. Nick Name](#) [8](#)
 - [5.4.1. LDAP Attribute Definition](#) [9](#)
 - [5.4.2. VCard Property Definition](#) [9](#)
 - [5.5. Description](#) [9](#)
 - [5.5.1. LDAP Attribute Definition](#) [9](#)
 - [5.5.2. VCard Property Definition](#) [9](#)
 - [5.6. Organizational Unit](#) [9](#)
 - [5.6.1. LDAP Attribute Definition](#) [10](#)
 - [5.6.2. VCard Property Definition](#) [10](#)
 - [5.7. Categories](#) [10](#)
 - [5.7.1. LDAP Attribute Definition](#) [10](#)
 - [5.7.2. VCard Property Definition](#) [10](#)
 - [5.8. Group Member](#) [10](#)
 - [5.8.1. LDAP Attribute Definition](#) [11](#)
 - [5.8.2. VCard Property Definition](#) [11](#)
 - [5.9. Admittance Info](#) [11](#)
 - [5.9.1. LDAP ObjectClass Definition](#) [11](#)
 - [5.9.2. Restricted Access](#) [11](#)
 - [5.9.2.1. LDAP Attribute Definition](#) [11](#)
 - [5.9.2.2. VCard Property Definition](#) [12](#)
 - [5.9.3. Admittance Info URL](#) [12](#)
 - [5.9.3.1. LDAP Attribute Definition](#) [12](#)
 - [5.9.3.2. VCard Property Definition](#) [12](#)
 - [5.10. Accessibility](#) [13](#)

- [5.10.1. LDAP Attribute Definition](#) [13](#)
- [5.10.2. VCard Property Definition](#) [13](#)
- [5.11. Capacity](#) [14](#)
 - [5.11.1. LDAP Attribute Definition](#) [14](#)
 - [5.11.2. VCard Property Definition](#) [14](#)
- [5.12. Inventory Info](#) [14](#)
 - [5.12.1. LDAP ObjectClass Definition](#) [15](#)
 - [5.12.2. Inventory List](#) [15](#)
 - [5.12.2.1. LDAP Attribute Definition](#) [15](#)
 - [5.12.2.2. VCard Property Definition](#) [15](#)
 - [5.12.3. Inventory URL](#) [16](#)
 - [5.12.3.1. LDAP Attribute Definition](#) [16](#)
 - [5.12.3.2. VCard Property Definition](#) [16](#)
- [5.13. Owner](#) [16](#)
 - [5.13.1. LDAP Attribute Definition](#) [17](#)
 - [5.13.2. VCard Property Definition](#) [17](#)
- [5.14. Resource Manager](#) [17](#)
 - [5.14.1. LDAP Attribute Definition](#) [17](#)
 - [5.14.2. VCard Property Definition](#) [18](#)
- [5.15. Calendar URL](#) [18](#)
 - [5.15.1. LDAP Attribute Definition](#) [18](#)
 - [5.15.2. VCard Property Definition](#) [18](#)
- [5.16. FreeBusy URL](#) [18](#)
 - [5.16.1. LDAP Attribute Definition](#) [19](#)
 - [5.16.2. VCard Property Definition](#) [19](#)
- [5.17. Scheduling Address](#) [19](#)
 - [5.17.1. LDAP Attribute Definition](#) [19](#)
 - [5.17.2. VCard Property Definition](#) [19](#)
- [5.18. Time Zone](#) [20](#)
 - [5.18.1. LDAP Attribute Definition](#) [20](#)
 - [5.18.2. VCard Property Definition](#) [20](#)
- [5.19. Multiple Bookings](#) [20](#)
 - [5.19.1. LDAP Attribute Definition](#) [20](#)
 - [5.19.2. VCard Property Definition](#) [21](#)
- [5.20. Maximum Instances](#) [21](#)
 - [5.20.1. LDAP Attribute Definition](#) [21](#)
 - [5.20.2. VCard Property Definition](#) [21](#)
- [5.21. BookingWindow Start](#) [22](#)
 - [5.21.1. LDAP Attribute Definition](#) [22](#)
 - [5.21.2. VCard Property Definition](#) [23](#)
- [5.22. BookingWindow End](#) [23](#)
 - [5.22.1. LDAP Attribute Definition](#) [24](#)
 - [5.22.2. VCard Property Definition](#) [24](#)
- [5.23. Scheduling Approval Info](#) [24](#)
 - [5.23.1. LDAP ObjectClass Definition](#) [25](#)
 - [5.23.2. Auto schedule](#) [25](#)
 - [5.23.2.1. LDAP Attribute Definition](#) [25](#)
 - [5.23.2.2. VCard Property Definition](#) [25](#)

- [5.23.3. Approval Info URL](#) [26](#)
- [5.23.3.1. LDAP Attribute Definition](#) [26](#)
 - [5.23.3.2. VCard Property Definition](#) [26](#)
- [5.23.4. Scheduling Admin Contact](#) [27](#)
- [5.23.4.1. LDAP Attribute Definition](#) [27](#)
 - [5.23.4.2. VCard Property Definition](#) [27](#)
- [5.24. Cost](#) [27](#)
- [5.24.1. LDAP ObjectClass Definition](#) [28](#)
 - [5.24.2. Nocost](#) [28](#)
 - [5.24.2.1. LDAP Attribute Definition](#) [28](#)
 - [5.24.2.2. VCard Property Definition](#) [28](#)
 - [5.24.3. Cost URL](#) [29](#)
 - [5.24.3.1. LDAP Attribute Definition](#) [29](#)
 - [5.24.3.2. VCard Property Definition](#) [29](#)
- [5.25. Related](#) [29](#)
- [5.25.1. LDAP Attribute Definition](#) [30](#)
 - [5.25.2. VCard Property Definition](#) [30](#)
- [6. Examples](#) [30](#)
- [6.1. LDAP Examples](#) [30](#)
 - [6.1.1. Location Resource](#) [30](#)
 - [6.1.2. Role Resources Group](#) [31](#)
 - [6.2. VCard Examples](#) [32](#)
 - [6.2.1. Location Resource](#) [32](#)
 - [6.2.2. Role Resources Group](#) [33](#)
- [7. Security Considerations](#) [34](#)
- [8. IANA Considerations](#) [34](#)
- [8.1. LDAP Objectclass and Attribute Registration](#) [34](#)
 - [8.2. VCard Property and Value Registration](#) [36](#)
- [9. Recommendations for Calendaring Systems](#) [37](#)
- [10. Acknowledgments](#) [37](#)
- [11. Normative References](#) [38](#)

1. Introduction

This specification defines a schema for representing resources to ease the discovery and scheduling of resources between any calendar client and server.

LDAP and vCard mappings of the schema are described in this document. The Object model chosen is the lowest common denominator to adapt for LDAP.

2. Conventions Used in This Document

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](#)].

3. General Considerations

Data values must have valid representation for the chosen format with respect to escape characters, line folding, and so on.

4. Resource Object

A resource object definition should contain all information required to find and schedule the right resource. For this, it should contain all, or a set of the attributes described in [Section 5](#). The cn attribute, described in [Section 5.1](#) MUST be present in any resource object. Additional proprietary attributes may be defined as well, but must begin with "X-". Clients encountering attributes they don't know about must ignore them.

Attributes or Properties required to contact the resource are not included in this specification. LDAP attributes defined in [[RFC4519](#)] and VCARD properties defined in vCard Format Specification [[RFC6350](#)] can be used to include contact information for the resource.

4.1. LDAP Resource ObjectClass Definition

In LDAP, a resource object SHOULD be defined as an objectClass with attributes as defined in [Section 5](#). This objectClass MUST be an auxiliary class. Its Superior class is the calEntry objectClass as defined in [Section 2.4.3.1 of \[RFC2739\]](#).

Definition of the CalendarResource ObjectClass:


```
( 1.3.6.1.1.x.1.1
  NAME 'CalendarResource'
  DESC 'Calendar Resource Object Class'
  SUP calEntry
  AUXILIARY
  MUST (cn)
  MAY (kind $ nickname $ description $ ou $ categories $
      member $ uniquemember $ accessibilityurl $ capacity $
      owner $ resourcemanager $ timezoneid $
      multiplebookings $ maxinstances $
      bookingwindowstart $ bookingwindowend $
      vcarduid $ related) )
```

5. Resource Attributes

5.1. Common Name

Description:

Full name of the resource. This attribute MUST be defined for a resource object.

ValueType:

String value.

Example value:

Room One

5.1.1. LDAP Attribute Definition

cn attribute as defined in [Section 2.3 of \[RFC4519\]](#). This attribute MUST be present in a CalendarResource object.

5.1.2. VCard Property Definition

FN property as defined in [Section 6.2.1 of \[RFC6350\]](#).

5.2. Kind

Description:

The kind of object represented.

ValueType:

Some of the possible values are "Location", "Individual", "CalendarResource", or "Group".

Location is used for any physical location resource such as room, building, etc.

Individual is used for for a human resource such as driver, technician, etc.

CalendarResource is used for any physical object that can scheduled like projector, printer, etc.
Group is used to specify a group of resources with a specific skill set. For example: drivers, electricians, etc.

Example value:
Location

5.2.1. LDAP Definition

In LDAP, this information can be represented by including the right category objectclass.

Possible objectclasses are:

Person objectclass as defined in [Section 3.12 of \[RFC4519\]](#).

groupOfNames objectclass as defined in [Section 3.5 of \[RFC4519\]](#).

groupOfUniqueNames objectclass as defined in [Section 3.6 of \[RFC4519\]](#).

device objectclass as defined in [Section 3.4 of \[RFC4519\]](#).

room objectclass as defined in [Section 3.8 of \[RFC4524\]](#).

In the absence of an objectclass that accurately describes the type of the object, the KIND attribute defined below MUST be used.

5.2.1.1. LDAP Attribute Definition

Definition of the kind LDAP attribute:

```
( 1.3.6.1.1.x.0.1
  NAME 'Kind'
  DESC 'Kind of Object'
  EQUALITY caseIgnoreMatch
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.15
  SINGLE-VALUE )
```

5.2.2. VCard Property Definition

Property KIND that specifies the kind of object represented, as defined in [Section 6.1.4 of \[RFC6350\]](#). A new value of "calendarresource" will be used to represent any physical object or device.

5.2.3. Mapping of KIND value between LDAP and VCard representations

KIND Value Mapping Table:

LDAP Objectclass	VCard Value
person	individual
groupOfNames or groupOfUniqueNames	group
device	calendarresource
room	location

5.3. Unique ID

Description:

A Unique Identifier.

ValueType:

Single string value.

Example value:

room1-id1

5.3.1. LDAP Attribute Definition

Definition of the vcarduid LDAP attribute:

```
( 1.3.6.1.1.x.0.1
  NAME 'vcardUid'
  DESC 'VCard UniqueID'
  EQUALITY caseExactMatch
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.15
  SINGLE-VALUE )
```

5.3.2. VCard Property Definition

UID property as defined in [Section 6.7.6 of \[RFC6350\]](#).

5.4. Nick Name

Description:

A short or popular name for the resource.

ValueType:

String value.

Example value:
TheOne

[5.4.1.](#) LDAP Attribute Definition

Definition of the nickname LDAP attribute:

```
( 1.3.6.1.1.x.0.2
  NAME 'NickName'
  DESC 'Nick Name'
  EQUALITY caseIgnoreIA5Match
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.26 )
```

[5.4.2.](#) VCard Property Definition

NICKNAME property as defined in [Section 6.2.3 of \[RFC6350\]](#).

[5.5.](#) Description

Description:
Description of the resource.

ValueType:
String value.

Example value:
Room 1 in Building X

[5.5.1.](#) LDAP Attribute Definition

description attribute as defined in [Section 2.5 of \[RFC4519\]](#).

[5.5.2.](#) VCard Property Definition

NOTE property as defined in [Section 6.7.2 of \[RFC6350\]](#).

[5.6.](#) Organizational Unit

Description:
Organizations the resource belongs to.

ValueType:
String value.

Example value:
EngineeringDepartment

[5.6.1.](#) LDAP Attribute Definition

ou attribute as defined in [Section 2.20 of \[RFC4519\]](#).

[5.6.2.](#) VCard Property Definition

ORG property as defined in [Section 6.6.4 of \[RFC6350\]](#).

[5.7.](#) Categories

Description:

Categories the resource falls under or tags for easy discovery of the resource.

ValueType:

String value. Multi-valued attribute with one attribute per text value in LDAP. One or more text values separated by a COMMA character in VCard property value.

Example value:

Rooms

[5.7.1.](#) LDAP Attribute Definition

Definition of the categories LDAP attribute:

```
( 1.3.6.1.1.x.0.3
  NAME 'Categories'
  DESC 'Categories'
  EQUALITY caseIgnoreIA5Match
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.26 )
```

[5.7.2.](#) VCard Property Definition

CATEGORIES property as defined in [Section 6.7.1 of \[RFC6350\]](#).

[5.8.](#) Group Member

Description:

List of unique resources in a group of resources object.

ValueType:

URL value.

Example value:

```
http://www.example.com/printer1.html
http://www.example.com/printer2.html
```


5.8.1. LDAP Attribute Definition

member attribute as defined in [Section 2.17](#) or uniquemember attribute as defined in [Section 2.40 of \[RFC4519\]](#).

5.8.2. VCard Property Definition

MEMBER property as defined in [Section 6.6.5 of \[RFC6350\]](#).

5.9. Admittance Info

Description:

Information required to gain access to the resource.

ValueType:

Object value.

5.9.1. LDAP ObjectClass Definition

Definition of the admittanceinfo LDAP objectclass:

```
( 1.3.6.1.1.x.1.2
  NAME 'AdmittanceInfo'
  DESC 'Calendar Resource Admittance Info Class'
  SUP CalendarResource
  AUXILIARY
  MAY (admittanceurl $ restricted) )
```

5.9.2. Restricted Access

Description:

Is access to the resource restricted?

ValueType:

Boolean value.

Example value:

TRUE

5.9.2.1. LDAP Attribute Definition

Definition of the restricted LDAP attribute:

```
( 1.3.6.1.1.x.0.4
  NAME 'Restricted'
  DESC 'Access Restricted'
  EQUALITY booleanMatch
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.7
```


SINGLE-VALUE)

5.9.2.2. VCard Property Definition

Purpose: To specify if access is restricted or not.

Type value: A single boolean value.

Cardinality: (0,1)

ABNF:

```
RESTRICTEDACCESS-param = ; no parameter allowed
RESTRICTEDACCESS-value = boolean
```

Example:

```
RESTRICTEDACCESS:TRUE
```

5.9.3. Admittance Info URL

Description:

URL pointing to complete information for accessing the resource including getting accessibility rights, special entrances, and so on.

ValueType:

URL value.

Example value:

```
http://www.example.com/room1_admittance.html
```

5.9.3.1. LDAP Attribute Definition

Definition of the admittanceurl LDAP attribute:

```
( 1.3.6.1.1.x.0.5
  NAME 'AdmittanceURL'
  DESC 'Cal Resource Admittance Info URL'
  EQUALITY caseIgnoreIA5Match
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.26 )
```

5.9.3.2. VCard Property Definition

Purpose: To specify URL pointing to Admission Information.

Type value: URI.

Cardinality: (0,n)

ABNF:

```
ADMISSIONINFO-param = "VALUE=uri" / any-param
ADMISSIONINFO-value = uri
```

Example:

```
ADMISSIONINFO:http://www.example.com/room1_admittance.html
```

5.10. Accessibility

Description:

Special resource accessibility info for the physically disabled.

ValueType:

URL value.

Example value:

```
http://www.example.com/room1_specialaccess.html
```

5.10.1. LDAP Attribute Definition

Definition of the accessibilityurl LDAP attribute:

```
( 1.3.6.1.1.x.0.6
  NAME 'accessibilityURL'
  DESC 'Cal Resource accessibility Info URL'
  EQUALITY caseIgnoreIA5Match
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.26 )
```

5.10.2. VCard Property Definition

Purpose: To specify URL pointing to Disabled Access Information.

Type value: URI.

Cardinality: (0,n)

ABNF:

```
ACCESSIBILITYINFO-param = "VALUE=uri" / any-param
ACCESSIBILITYINFO-value = uri
```

Example:

```
ACCESSIBILITYINFO:http://www.example.com/room1_specialaccess.html
```


5.11. Capacity

Description:

Capacity of the resource.

ValueType:

Integer.

Example value:

10

5.11.1. LDAP Attribute Definition

Definition of the capacity LDAP attribute:

```
( 1.3.6.1.1.x.0.7
  NAME 'Capacity'
  DESC 'Cal Resource Capacity'
  EQUALITY caseIgnoreIA5Match
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.27 )
```

5.11.2. VCard Property Definition

Purpose: To specify Capacity Information.

Type value: integer.

Cardinality: (0,n)

ABNF:

```
CAPACITY-param = "VALUE=integer" / any-param
CAPACITY-value = integer
```

Example:

CAPACITY:10

5.12. Inventory Info

Description:

Information on resources available as part of this resource.

ValueType:

Object value.

[5.12.1.](#) LDAP ObjectClass Definition

Definition of the inventoryinfo LDAP attribute:

```
( 1.3.6.1.1.x.1.3
  NAME 'InventoryInfo'
  DESC 'Calendar Resource Inventory Info Class'
  SUP CalendarResource
  AUXILIARY
  MAY (inventorylist $ inventoryurl) )
```

[5.12.2.](#) Inventory List

Description:

List of resources available as part of this resource.

ValueType:

String value. Multi-valued attribute with one attribute per text value in LDAP. One or more text values separated by a COMMA character in VCard property value.

Example value:

Printer

[5.12.2.1.](#) LDAP Attribute Definition

Definition of the inventorylist LDAP attribute:

```
( 1.3.6.1.1.x.0.8
  NAME 'InventoryList'
  DESC 'Inventory List'
  EQUALITY caseIgnoreIA5Match
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.26 )
```

[5.12.2.2.](#) VCard Property Definition

Purpose: List the resources available as part of this resource.

Type value: One or more text values separated by a COMMA character (ASCII decimal 44).

Cardinality: (0,n)

ABNF:

```
INVENTORYLIST-param = "VALUE=text" / any-param
INVENTORYLIST-value = text
```


Example:

INVENTORYLIST:projector, phone

5.12.3. Inventory URL

Description:

A URL pointing to other resource URLs part of this resource.

ValueType:

URL value.

Example value:

http://www.example.com/room1_inventory.html

5.12.3.1. LDAP Attribute Definition

Definition of the inventoryurl LDAP attribute:

```
( 1.3.6.1.1.x.0.9
  NAME 'InventoryURL'
  DESC 'Cal Resource Inventory Info URL'
  EQUALITY caseIgnoreIA5Match
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.26 )
```

5.12.3.2. VCard Property Definition

Purpose: To specify URL pointing to Inventory Information.

Type value: URI.

Cardinality: (0,n)

ABNF:

```
INVENTORYURL-param = "VALUE=uri" / any-param
INVENTORYURL-value = uri
```

Example:

INVENTORYURL:http://www.example.com/room1_inventory.html

5.13. Owner

Description:

Pointer to the owners of the resource. An owner is anyone who has complete authority over the resource, from naming to overall availability.

ValueType:
URL value.

Example value:
`http://www.example.com/room1_ownerinfo.html`

5.13.1. LDAP Attribute Definition

owner attribute as defined in [Section 2.21 of \[RFC4519\]](#).

5.13.2. VCard Property Definition

Purpose: To specify URL pointing to Resource Owner. It MAY refer to something other than a vCard object.

Type value: URI.

Cardinality: (0,n)

ABNF:
RESOURCEOWNER-param = "VALUE=uri" / any-param
RESOURCEOWNER-value = uri

Example:
RESOURCEOWNER:`http://www.example.com/room1_owner.vcf`

5.14. Resource Manager

Description:
Pointer to the managers of the resource. A manager is someone responsible for the day-to-day up keep of the resource.

ValueType:
URL value.

Example value:
`http://www.example.com/room1_managerinfo.html`

5.14.1. LDAP Attribute Definition

Definition of the resourcemanager LDAP attribute:

```
( 1.3.6.1.1.x.0.10  
  NAME 'ResourceManager'  
  DESC 'Cal Resource Manager Info'  
  EQUALITY distinguishedNameMatch  
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.12 )
```


[5.14.2.](#) **VCard Property Definition**

Purpose: To specify URL pointing to Resource Manager.

Type value: URI.

Cardinality: (0,n)

ABNF:

```
RESOURCEMANAGER-param = "VALUE=uri" / any-param  
RESOURCEMANAGER-value = uri
```

Example:

```
RESOURCEMANAGER:http://www.example.com/room1_manager.vcf
```

[5.15.](#) **Calendar URL**

Description:

URL to access calendar data of the resource.

ValueType:

URL value.

Example value:

```
http://www.example.com/calendar/home/Room1/calendar/
```

[5.15.1.](#) **LDAP Attribute Definition**

Calendar access attribute calCAPURI as defined in [Section 2.4.4.3](#) and calOtherCAPURIs as defined in [Section 2.4.4.7 of \[RFC2739\]](#) respectively.

[5.15.2.](#) **VCard Property Definition**

Calendar access property CAPURI as defined in [Section 2.3.3 of \[RFC2739\]](#).

[5.16.](#) **FreeBusy URL**

Description:

URL to read freebusy information of the resource's calendar.

ValueType:

URL value.

Example value:

<http://www.example.com/freebusy/home/Room1/>

5.16.1. LDAP Attribute Definition

Calendar access attribute calFBURL as defined in [Section 2.4.4.2](#) and calOtherFBURLs as defined in [Section 2.4.4.6 of \[RFC2739\]](#) respectively.

5.16.2. VCard Property Definition

FBURL attribute as defined in [Section 2.3.1 of \[RFC2739\]](#) and further explained in [Section 6.9.1 of \[RFC6350\]](#).

5.17. Scheduling Address

Description:

Address used for scheduling the resource by a Calendaring and Scheduling service.

ValueType:

String value.

Example value:

<mailto:room1@example.com>

5.17.1. LDAP Attribute Definition

Scheduling Address attribute calCalAdrURI as defined in [Section 2.4.4.4](#) and calOtherCalAdrURIs as defined in [Section 2.4.4.8 of \[RFC2739\]](#) respectively. This is the address that would be used by a Scheduling and Calendaring application to schedule the resource. Its value must be a uri string, in most cases a mailto: uri. The mail attribute value of the resource should be used for scheduling, in the absence of this attribute.

5.17.2. VCard Property Definition

Scheduling Address property CALADRURI as defined in [Section 2.3.2 \[RFC2739\]](#) and further explained in [Section 6.9.2 of \[RFC6350\]](#). This is the address that would be used by a Scheduling and Calendaring application to schedule the resource. Its value must be a uri string, in most cases a mailto: uri. The EMAIL property value of the resource should be used for scheduling, in the absence of this attribute.

[5.18.](#) Time Zone

Description:

TimeZone Identifier for the timezone the resource is in.

ValueType:

String value.

Example value:

America/New_York

[5.18.1.](#) LDAP Attribute Definition

Definition of the timezoneid LDAP attribute:

```
( 1.3.6.1.1.x.0.11
  NAME 'TimeZoneID'
  DESC 'Cal Time Zone ID'
  EQUALITY caseIgnoreIA5Match
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.26 )
```

[5.18.2.](#) VCard Property Definition

TimeZone property TZ as defined in [Section 6.5.1 of \[RFC6350\]](#).

[5.19.](#) Multiple Bookings

Description:

Number of simultaneous bookings allowed.

ValueType:

Integer value.

Value of 0 indicates no limits.

Example value:

1

[5.19.1.](#) LDAP Attribute Definition

Definition of the multiplebookings LDAP attribute:

```
( 1.3.6.1.1.x.0.12
  NAME 'Multiplebookings'
  DESC 'Cal Num Bookings Allowed'
  EQUALITY integerMatch
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.27
  SINGLE-VALUE )
```


5.19.2. VCard Property Definition

Purpose: To specify number of simultaneous bookings allowed.

Type value: integer.

Cardinality: (0,1)

ABNF:

```
MULTIBOOK-param = "VALUE=integer" / any-param  
MULTIBOOK-value = integer
```

Example:

```
MULTIBOOK:10
```

5.20. Maximum Instances

Description:

Maximum number of instances of an event, the resource can be scheduled for from NOW.

ValueType:

Integer value.

Value of 0 indicates no limits.

Example value:

```
60
```

5.20.1. LDAP Attribute Definition

Definition of the maxinstances LDAP attribute:

```
( 1.3.6.1.1.x.0.13  
  NAME 'MaxInstances'  
  DESC 'Cal Maximum Instances allowed'  
  EQUALITY integerMatch  
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.27  
  SINGLE-VALUE )
```

5.20.2. VCard Property Definition

Purpose: To specify maximum number of instances of an event, the resource can be scheduled for from NOW.

Type value: integer.

Cardinality: (0,1)

ABNF:

MAXINSTANCES-param = "VALUE=integer" / any-param

MAXINSTANCES-value = integer

Example:

MAXINSTANCES:10

5.21. BookingWindow Start

Description:

Defines how much time in advance the resource can be booked. The value of this property is used to calculate the earliest date and time when a resource can be reserved for an event starting on a specific date and time.

If this property value is defined, the resource may be booked for an event at a certain time, only if the current time is equal to or after the date and time calculated by subtracting this value from the event's proposed start time. If this property is absent, then the resource may be booked at any time before the end of the booking window.

ValueType: Duration value.

The format is based on the [[ISO.8601.2004](#)] duration representation basic format with designators for the duration of time. The format can represent nominal durations (weeks and days) and accurate durations (hours, minutes, and seconds). The syntax is further defined in [Appendix A](#), "Duration" section of [[RFC3339](#)].

Example value:

P3M

5.21.1. LDAP Attribute Definition

Definition of the bookingwindowstart LDAP attribute:

```
( 1.3.6.1.1.x.0.14
  NAME 'BookingWindowStart'
  DESC 'Cal Booking Window Start'
  EQUALITY caseIgnoreIA5Match
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.26
  SINGLE-VALUE )
```


[5.21.2.](#) VCard Property Definition

Purpose: To specify how much time in advance the resource can be booked.

Type value: duration.

The format is based on the [[ISO.8601.2004](#)] duration representation basic format with designators for the duration of time. The format can represent nominal durations (weeks and days) and accurate durations (hours, minutes, and seconds). The syntax is further defined in [Appendix A](#), "Duration" section of [[RFC3339](#)].

Cardinality: (0,1)

ABNF:

```
BOOKINGWINDOWSTART-param = "VALUE=text" / any-param
BOOKINGWINDOWSTART-value = text
```

Example:

```
BOOKINGWINDOWSTART:P3M
```

[5.22.](#) BookingWindow End

Description:

Defines how much time in advance the resource booking is closed. The value of this property is used to calculate the latest date and time when a resource can be reserved for an event starting on a specific date and time.

If the current time is equal to or before the value obtained by subtracting BookingWindowEnd from the start date and time of the event, then the resource may be booked. If this property is absent, then the resource may be booked anytime from booking window start to the start of the event.

BookingWindow Start and End together provide the window of time a resource can be booked, relative to the start time of the event.

```
If BookingWindowStart = BwS,
BookingWindowEnd = BwE,
Current Time = CT and
Event Start Time = ST,
a resource can be booked at a certain time only if
CT is equal to or after (ST - BwS)
and CT is equal to or before (ST - BwE)
```


ValueType: Duration value.

The format is based on the [[ISO.8601.2004](#)] duration representation basic format with designators for the duration of time. The format can represent nominal durations (weeks and days) and accurate durations (hours, minutes, and seconds). The syntax is further defined in [Appendix A](#), "Duration" section of [[RFC3339](#)].

Example value:

P5D

[5.22.1](#). LDAP Attribute Definition

Definition of the bookingwindowend LDAP attribute:

```
( 1.3.6.1.1.x.0.15
  NAME 'BookingWindowEnd'
  DESC 'Cal Booking Window End'
  EQUALITY caseIgnoreIA5Match
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.26
  SINGLE-VALUE )
```

[5.22.2](#). VCard Property Definition

Purpose: To specify how much time in advance the resource booking is closed.

Type value: duration.

The format is based on the [[ISO.8601.2004](#)] duration representation basic format with designators for the duration of time. The format can represent nominal durations (weeks and days) and accurate durations (hours, minutes, and seconds). The syntax is further defined in [Appendix A](#), "Duration" section of [[RFC3339](#)].

Cardinality: (0,1)

ABNF:

```
BOOKINGWINDOWEND-param = "VALUE=text" / any-param
BOOKINGWINDOWEND-value = text
```

Example:

BOOKINGWINDOWEND:P5D

[5.23](#). Scheduling Approval Info

Description:

Information regarding approval of a scheduling request to the resource.

ValueType:
Object value.

5.23.1. LDAP ObjectClass Definition

Definition of the schedapprovalinfo LDAP objectclass:

```
( 1.3.6.1.1.x.1.4
  NAME 'SchedApprovalInfo'
  DESC 'Calendar Sched Approval Class'
  SUP CalendarResource
  AUXILIARY
  MAY (autoschedule $ approvalinfo $ schedadmin) )
```

5.23.2. Auto schedule

Description:
No approval required. Automatically scheduled.

ValueType:
Boolean value.

Example value:
TRUE

5.23.2.1. LDAP Attribute Definition

Definition of the autoschedule LDAP attribute:

```
( 1.3.6.1.1.x.0.16
  NAME 'Autoschedule'
  DESC 'Cal Scheduling no approval required'
  EQUALITY booleanMatch
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.7
  SINGLE-VALUE )
```

5.23.2.2. VCard Property Definition

Purpose: To specify if invitations should be automatically scheduled.

Type value: Boolean.

Cardinality: (0,1)

ABNF:

```
AUTOSCHEDULE-param = "VALUE=boolean" / any-param
AUTOSCHEDULE-value = "TRUE" / "FALSE"
```

Example:

```
AUTOSCHEDULE:TRUE
```

5.23.3. Approval Info URL

Description:

URL pointing to complete information on scheduling request approval process for the resource.

ValueType:

URL value.

Example value:

```
http://www.example.com/room1_approval.html
```

5.23.3.1. LDAP Attribute Definition

Definition of the approvalinfourl LDAP attribute:

```
( 1.3.6.1.1.x.0.17
  NAME 'ApprovalInfoURL'
  DESC 'Cal Sched Approval Info'
  EQUALITY caseIgnoreIA5Match
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.26 )
```

5.23.3.2. VCard Property Definition

Purpose: To specify URL pointing to Scheduling Approval Information.

Type value: URI.

Cardinality: (0,n)

ABNF:

```
APPROVALINFO-param = "VALUE=uri" / any-param
APPROVALINFO-value = uri
```

Example:

```
APPROVALINFO:http://www.example.com/room1_approval.html
```


5.23.4. Scheduling Admin Contact

Description:

Contact information for the scheduling approvers, if approval required.

ValueType:

URL value.

Example value:

<http://www.example.com/SchedAdmin1.vcf>

5.23.4.1. LDAP Attribute Definition

Definition of the schedadmin LDAP attribute:

```
( 1.3.6.1.1.x.0.18
  NAME 'SchedAdmin'
  DESC 'Cal Sched Admin Info'
  EQUALITY distinguishedNameMatch
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.12 )
```

5.23.4.2. VCard Property Definition

Purpose: To specify URL pointing to Scheduling Manager.

Type value: URI.

Cardinality: (0,n)

ABNF:

```
SCHEDADMIN-param = "VALUE=uri" / any-param
SCHEDADMIN-value = uri
```

Example:

SCHEDADMIN:<http://www.example.com/SchedAdmin1.vcf>

5.24. Cost

Description:

Scheduling costs for this resource.

ValueType:

Object value.

[5.24.1.](#) LDAP ObjectClass Definition

Definition of the cost LDAP objectclass:

```
( 1.3.6.1.1.x.1.5
  NAME 'CalendarResourceCost'
  DESC 'Calendar Resource Cost Object Class'
  SUP CalendarResource
  AUXILIARY
  MAY (nocost $ costurl)
```

[5.24.2.](#) Nocost

Description:

No cost for using the resource. Can be used for a resource scheduling query.

ValueType:

Boolean value.

Example value:

TRUE

[5.24.2.1.](#) LDAP Attribute Definition

Definition of the nocost LDAP attribute:

```
( 1.3.6.1.1.x.0.19
  NAME 'Nocost'
  DESC 'Free or Priced resource'
  EQUALITY booleanMatch
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.7
  SINGLE-VALUE )
```

[5.24.2.2.](#) VCard Property Definition

Purpose: To specify if resource usage is free.

Type value: A single boolean value.

Cardinality: (0,1)

ABNF:

```
NOCOST-param = ; no parameter allowed
NOCOST-value = boolean
```


Example:

NOCOST:TRUE

5.24.3. Cost URL

Description:

URL pointing to complete pricing information for usage of the resource.

ValueType:

URL value.

Example value:

<http://www.example.com/cost.html>

5.24.3.1. LDAP Attribute Definition

Definition of the costurl LDAP attribute:

```
( 1.3.6.1.1.x.0.20
  NAME 'CostURL'
  DESC 'Cal Resource Cost Info'
  EQUALITY caseIgnoreIA5Match
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.26 )
```

5.24.3.2. VCard Property Definition

Purpose: To specify URL pointing Resource Scheduling Cost Information.

Type value: URI.

Cardinality: (0,n)

ABNF:

```
COSTINFO-param = "VALUE=uri" / any-param
COSTINFO-value = uri
```

Example:

COSTINFO:<http://www.example.com/cost.html>

5.25. Related

Description:

Specify a relationship with another resource.

ValueType:
URL value.

Example value:
<http://www.example.com/printer1.html>

5.25.1. LDAP Attribute Definition

Definition of the related LDAP attribute:

```
( 1.3.6.1.1.x.0.21
  NAME 'Related'
  DESC 'Related URL'
  EQUALITY uniqueMemberMatch
  SYNTAX 1.3.6.1.4.1.1466.115.121.1.34 )
```

5.25.2. VCard Property Definition

The property RELATED as defined in [Section 6.6.6 of \[RFC6350\]](#).

6. Examples

6.1. LDAP Examples

6.1.1. Location Resource


```
dn: cn=Room One,ou=Engineering,dc=example,dc=com
objectclass: top
objectclass: calendarresource
objectclass: admittanceinfo
objectclass: inventoryinfo
objectclass: schedapprovalinfo
objectclass: calendarresourcecost
objectclass: room
vcarduid: room1-id
cn: Room One
ou: Engineering
nickname: The One
description: Room 1 in Engineering Building X
categories: rooms
categories: engineering_resources
restricted: TRUE
admittanceurl: http://www.example.com/room1_admittance.html
accessibilityurl: http://www.example.com/room1_specialaccess.html
capacity: 100
inventorylist: phone
inventorylist: projector
inventoryurl: http://www.example.com/room1_inventory.html
owner: cn=RoomOwner,ou=Engineering,dc=example,dc=com
resourcemanager: cn=RoomOwner,ou=Engineering,dc=example,dc=com
calcapuri: http://www.example.com/calendar/home/Room1/calendar/
calfburl: http://www.example.com/freebusy/home/Room1/
calcaladruri: mailto:room1@example.com
timezoneid: America/Los_Angeles
multiplebookings: 1
maxinstances: 10
bookingwindowstart:P3M
bookingwindowend: P3D
autoschedule: FALSE
approvalinfourl: http://www.example.com/room1_approval.html
schedadmin: cn=RoomOwner,ou=Engineering,dc=example,dc=com
nocost: FALSE
costurl: http://www.example.com/cost.html
```

6.1.2. Role Resources Group


```
dn: cn=Drivers X,ou=Transportation,dc=example,dc=com
objectclass: top
objectclass: groupOfuniqueNames
objectclass: calendarresource
objectclass: schedapprovalinfo
objectclass: calendarresourcecost
vcarduid: driversX-id
cn: Driver One
ou: Transportation
nickname: The X
description: Drivers in the Transportation department driver pool X
categories: drivers
uniquemember: cn=Driver1,ou=Transportation,dc=example,dc=com
uniquemember: cn=Driver2,ou=Transportation,dc=example,dc=com
uniquemember: cn=Driver3,ou=Transportation,dc=example,dc=com
owner: cn=Transportation_Manager,ou=Transportation,dc=example,dc=com
calfburl: http://www.example.com/freebusy/home/DriversX/
calcaladruri: mailto:driversX@example.com
timezoneid: America/Los_Angeles
multiplebookings: 3
maxinstances: 10
bookingwindowstart:P3M
bookingwindowend: P3D
autoschedule: FALSE
approvalinfourl: http://www.example.com/driversX_approval.html
schedadmin: cn=TransportationManager,ou=Transportation,dc=example,dc=com
nocost: FALSE
costurl: http://www.example.com/driversXcost.html
```

[6.2.](#) VCard Examples

[6.2.1.](#) Location Resource


```
BEGIN:VCARD
VERSION:4.0
UID:urn:uuid:room1-id
KIND: location
FN: Room One
ORG: Engineering
NICKNAME: The One
NOTE: Room 1 in Engineering Building X
CATEGORIES: rooms, engineering_resources
RESTRICTEDACCESS: TRUE
ADMISSIONINFO: http://www.example.com/room1_admittance.html
ACCESSIBILITYINFO: http://www.example.com/room1_specialaccess.html
CAPACITY: 100
INVENTORYLIST: phone, projector
INVENTORYURL: http://www.example.com/room1_inventory.html
RESOURCEOWNER: http://www.example.com/ResOwner1.vcf
RESOURCEMANAGER: http://www.example.com/ResManager1.vcf
CAPURI: http://www.example.com/calendar/home/Room1/calendar/
FBURL: http://www.example.com/freebusy/home/Room1/
CALADRURI: mailto:room1@example.com
TZ: America/Los_Angeles
MULTIBOOK: 1
MAXINSTANCES: 10
BOOKINGWINDOWSTART:P3M
BOOKINGWINDOWEND: P3D
AUTOSCHEDULE: FALSE
APPROVALINFO: http://www.example.com/room1_approval.html
SCHEDADMIN: http://www.example.com/SchedAdmin1.vcf
NOCOST: FALSE
COSTINFO: http://www.example.com/cost.html
END:VCARD
```

[6.2.2.](#) Role Resources Group


```
BEGIN:VCARD
VERSION:4.0
UID:urn:uuid:driverXPool-id
KIND: group
FN: Driver X Pool
ORG: Transportation
NICKNAME: The X Group
NOTE: Drivers in the Transportation department driver pool X
CATEGORIES: drivers
MEMBER:urn:uuid:driver1-id
MEMBER:urn:uuid:driver2-id
MEMBER:urn:uuid:driver3-id
RESOURCEOWNER: http://www.example.com/DriversManager.vcf
FBURL: http://www.example.com/freebusy/home/DriversX/
CALADRURI: mailto:driversX@example.com
TZ: America/Los_Angeles
MULTIBOOK: 3
MAXINSTANCES: 10
BOOKINGWINDOWSTART:P3M
BOOKINGWINDOWEND: P3D
AUTOSCHEDULE: FALSE
APPROVALINFO: http://www.example.com/driversX_approval.html
SCHEDADMIN: http://www.example.com/DriversX_SchedAdmin.vcf
NOCOST: FALSE
COSTINFO: http://www.example.com/driversXcost.html
END:VCARD
```

7. Security Considerations

As this document only defines schema for representing resource information for calendaring and scheduling and does not refer to the actual storage mechanism itself, or the calendaring and scheduling protocol, no special security considerations are required as part of this document.

8. IANA Considerations

8.1. LDAP Objectclass and Attribute Registration

New LDAP objectclasses and attributes defined in this document need to be registered by the Internet Assigned Numbers Authority (IANA) as requested in the following template. Once the assignment is done, this document needs to be updated with the right OID numbers for all the newly defined objectclasses and attributes.

Subject: Request for LDAP Descriptor Registration

Descriptor (short name): See table below

Object Identifier: See table below

Person & email address to contact for further information:

Ciny Joy <ciny.joy@oracle.com>

Usage: See table below

Specification: [draft-cal-resource-schema](#)

Author/Change Controller: IESG

New LDAP ObjectClass and Attributes Table:

Name	Type	Definition	OID
CalendarResource	ObjectClasses	Section 4.1	IANA-ASSIGNED-0 ID
Kind	Attribute	Section 5.2.1 .1	IANA-ASSIGNED-0 ID
VcardUid	Attribute	Section 5.3.1	IANA-ASSIGNED-0 ID
NickName	Attribute	Section 5.4.1	IANA-ASSIGNED-0 ID
Categories	Attribute	Section 5.7.1	IANA-ASSIGNED-0 ID
AdmittanceInfo	ObjectClasses	Section 5.9.1	IANA-ASSIGNED-0 ID
Restricted	Attribute	Section 5.9.2 .1	IANA-ASSIGNED-0 ID
AdmittanceURL	Attribute	Section 5.9.3 .1	IANA-ASSIGNED-0 ID
AccessibilityURL	Attribute	Section 5.10.1	IANA-ASSIGNED-0 ID
Capacity	Attribute	Section 5.11.1	IANA-ASSIGNED-0 ID
InventoryInfo	ObjectClasses	Section 5.12.1	IANA-ASSIGNED-0 ID
InventoryList	Attribute	Section 5.12.2 .1	IANA-ASSIGNED-0 ID
InventoryURL	Attribute	Section 5.12.3 .1	IANA-ASSIGNED-0 ID
ResourceManager	Attribute	Section 5.14.1	IANA-ASSIGNED-0 ID
TimeZoneID	Attribute	Section 5.18.1	IANA-ASSIGNED-0 ID
MultipleBookings	Attribute	Section 5.19.1	IANA-ASSIGNED-0 ID
MaxInstances	Attribute	Section 5.20.1	IANA-ASSIGNED-0 ID

BookingWindowStart	Attribute	Section 5.21.1	IANA-ASSIGNED-0 ID
BookingWindowEnd	Attribute	Section 5.22.1	IANA-ASSIGNED-0 ID
SchedApprovalInfo	ObjectClasses	Section 5.23.1	IANA-ASSIGNED-0 ID
Autoschedule	Attribute	Section 5.23.2 .1	IANA-ASSIGNED-0 ID
ApprovalInfoURL	Attribute	Section 5.23.3 .1	IANA-ASSIGNED-0 ID
SchedAdmin	Attribute	Section 5.23.4 .1	IANA-ASSIGNED-0 ID
CalendarResourceCost	ObjectClasses	Section 5.24.1	IANA-ASSIGNED-0 ID
Nocost	Attribute	Section 5.24.2 .1	IANA-ASSIGNED-0 ID
CostURL	Attribute	Section 5.24.3 .1	IANA-ASSIGNED-0 ID
Related	Attribute	Section 5.25.1	IANA-ASSIGNED-0 ID

8.2. VCard Property and Value Registration

The following new VCard Properties need to be registered by IANA.

New VCard Properties Table:

VCard Property Name	VCard Property Definition
RESTRICTEDACCESS	Section 5.9.2.2
ADMISSIONINFO	Section 5.9.3.2
ACCESSIBILITYINFO	Section 5.10.2
CAPACITY	Section 5.11.2
INVENTORYLIST	Section 5.12.2.2
INVENTORYURL	Section 5.12.3.2
RESOURCEOWNER	Section 5.13.2
RESOURCEMANAGER	Section 5.14.2
MAXINSTANCE	Section 5.20.2
BOOKINGWINDOWSTART	Section 5.21.2
BOOKINGWINDOWEND	Section 5.22.2
AUTOSCHEDULE	Section 5.23.2.2
APPROVALINFO	Section 5.23.3.2
SCHEDADMIN	Section 5.23.4.2
NOCOST	Section 5.24.2.2
COSTINFO	Section 5.24.3.2

The following new VCard Property Values need to be registered by IANA.

New VCard Property Values Table:

VCARD Property Name	Additional VCard Property Value	Value Definition
KIND	calendarresource	Section 5.2.2

9. Recommendations for Calendaring Systems

While this document does not mandate how each of the defined attribute values must be used by calendaring systems, here are some recommendations:

1. BookingWindow Start ([Section 5.21](#)), Booking Window End ([Section 5.22](#)), and Multiple Bookings ([Section 5.19](#)) information should be used in freebusy calculations. A query for a time slot that falls outside the booking window or one that already has the maximum allowed number of simultaneous bookings, must be returned as BUSY_UNAVAILABLE.
2. Calendaring systems that support the auto schedule ([Section 5.23.2](#)) attribute, should automatically mark the attendee PARTSTAT for a resource as ACCEPTED, if its auto schedule value is TRUE and the scheduling is successful. If owner approval is required, the PARTSTAT could be automatically marked as TENTATIVE.
3. Information like Capacity ([Section 5.11](#)) can be used by calendaring systems to warn end users if the number of attendees exceed the capacity value.

10. Acknowledgments

This specification is a result of discussions that took place within the Calendaring and Scheduling Consortium's Resource Technical Committee. The authors thank the participants of that group, and specifically the following individuals for contributing their ideas and support: Arnaud Quillaud, Adam Lewenberg, Andrew Laurence, Guy Stalnaker, Mimi Mugler, Dave Thewlis, Bernard Desruisseaux, Alain Petit, Andrew Sciberras, and Jason Miller.

11. Normative References

- [ISO.8601.2004] International Organization for Standardization, "Data elements and interchange formats -- Information interchange -- Representation of dates and times", 2004.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC2739] Small, T., Hennessy, D., and F. Dawson, "Calendar Attributes for vCard and LDAP", [RFC 2739](#), January 2000.
- [RFC3339] Klyne, G., Ed. and C. Newman, "Date and Time on the Internet: Timestamps", [RFC 3339](#), July 2002.
- [RFC4519] Sciberras, A., "Lightweight Directory Access Protocol (LDAP): Schema for User Applications", [RFC 4519](#), June 2006.
- [RFC4524] Zeilenga, K., "COSINE LDAP/X.500 Schema", [RFC 4524](#), June 2006.
- [RFC6350] Perreault, S., "vCard Format Specification", [RFC 6350](#), August 2011.

Authors' Addresses

Ciny Joy
Oracle Corporation
4210 Network Circle
Santa Clara, CA 95054
USA

EMail: ciny.joy@oracle.com
URI: <http://www.oracle.com/>

Cyrus Daboo
Apple Inc.
1 Infinite Loop
Cupertino, CA 95014
USA

EMail: cyrus@daboo.name
URI: <http://www.apple.com/>

Michael Douglass
Rensselaer Polytechnic Institute
110 8th Street
Troy, NY 12180
USA

EMail: douglm@rpi.edu

URI: <http://www.rpi.edu/>